Final Programmatic Environmental Impact Statement

Fish Culture in Floating Net-Pens

Washington Department of Fisheries

Response to Comments

January 1990

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U.S. GOVERNMENT
INFORMATION
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SCHOLZ

FINAL PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT
FISH CULTURE IN FLOATING NET PENS

RESPONSE TO COMMENTS

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INTRODUCTION

This section includes the responses to comments received on the Draft Programmatic EIS on Fish Culture in Floating Net Pens. The response is organized as follows:

General responses to frequently asked questions.

Numerous letters in response to the Draft Programmatic EIS had similar comments or questions. In order to reduce repetition, these questions are answered once at the beginning of this volume and cross-referenced when appropriate. These questions are numbered individually. When they are referred to as a response to a comment, they will be called a Question (i.e. See the response to Question 5).

Comment letter.

Each letter submitted on the Draft EIS has a unique letter number in the upper right corner of the first page. Comments made within each letter are sequentially numbered in the left margin. A list of reviewers with their respective letter numbers is included at the beginning of this volume.

Response to comment letter.

The responses to comment letters follow the text of each letter. Each comment identified in a letter has a corresponding response. As noted above, some responses will direct the reader to the categorical responses at the beginning of this volume. To further reduce repetition, some responses will direct the reader to a response already made in a previous letter, such as "See the response to Letter 4, Comment 6."

The complete text of a letter is followed by the complete set of responses to that letter. Then, the text of the next letter is followed by the responses to that letter. To aid in locating the responses to letters, vertical lines are placed in the right margin of the pages with responses.

LIST OF REVIEWERS

1. Skagit and Island Counties
2. Jamestown Klallam Tribe
3. Jefferson County Planning and Building Department
4. Richard E. Warren
5. Kitsap County Department of Community Development
6. William G. Langdon
7. Save Our Shores
8. The Mountaineers
9. Washington Department of Natural Resources
10. Nooksack Indian Tribe
11. Northwest Indian Fisheries Commission
12. Northwest Towboat Association
13. Washington State Parks & Recreation Commission
14. Point No Point Treaty Council
15. Port Gamble Klallam Tribe
16. T. Carl Pickel, Jr.
17. Puget Sound Water Quality Authority, Katherine Fletcher
18. Puget Sound Water Quality Authority, Kirvil Skinnarland
19. Deanne Roth
20. Thomas C. Santos
21. Saratoga Cove Foundation
22. Marie J. Pickett
23. Seahorse Siesta Club
24. Clark G. Sherwood
25. Sierra Club - Cascade Center
26. Department of Social and Health Services
27. Squaxin Island Tribe
28. James Stapleton
29. Rodney H. Stebbins
30. Maynard A. Steinberg
31. Solveig H. Thompson
32. The Tulalip Tribes
33. U.S. Fish and Wildlife Service
34. Puget Sound Alliance
35. Washington Aquaculture Council
36. Washington Environmental Council
37. Washington Fish Growers Association
38. Arthur H. Whiteley
39. Washington Department of Wildlife - Fred Maybee
40. Washington Department of Wildlife - Jim Watson
41. Lowell & Beverly Wohlhueter
42. Margaret Yeoman
43. E. Zahn
44. Fred C. Zwickel
45. Jeff Bakeman
46. Camano Cove Community Club

47. Zella M. Lutterloh
48. Terry Maxwell
49. Pacific Troller Association
50. Marie J. Pickett
51. Robert H. and Gladys Shipek
52. South Point Coalition
53. Barbara Stenson
54. Jacqueline Maner
55. University of Washington Friday Harbor Laboratories
56. Rodney L. Brown, Jr.
57. Annamarie K. Johnstone
58. Hattie L. Berglund
59. Doris R. Betzold
60. Alexander H. Bill
61. Charles D. Broders
62. Donald R. Cady
63. Benella Caminiti
64. Board of Clallam County Commissioners
65. Clallam County Economic Development Council
66. Larry Collinge
67. United States Army Corps of Engineers
68. Thomas Croley
69. Jim Sanford
70. Washington Department of Ecology
71. Peter J. Eglick
72. Carol Ehlers
73. Marvin E. Eisenbach
74. Fred Felleman
75. Dale E. Fisher
76. United States Food and Drug Administration
77. James Fox
78. Friends of the Earth
79. Barry L. Graham
80. Greenpeace
81. Lorna Parent Haycox
82. Robert F. Hull

ABBREVIATIONS AND ACRONYMS

ACOE	Army Corps of Engineers
AHD	Acoustic Harassment Devices
BOD	Biochemical Oxygen Demand
BMP	Best Management Practice
dBA	Decibel (A-weighted)
DEIS	Draft Environmental Impact Statement
DNR	Department of Natural Resources
Ecology	Department of Ecology
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FCR	Food Conversion Ratio
FDA	Food and Drug Administration
FEIS	Final Environmental Impact Statement
FICUN	Federal Interagency Committee on Urban Noise
HPA	Hydraulic Project Approval
L_{eq}	Equivalent Constant Sound Level
MHHW	Mean Higher High Water
MLLW	Mean Lower Low Water
MMPA	Marine Mammal Protection Act
MT	Metric tons
mV	Millivolt
NMFS	National Marine Fisheries Service
NPDES	National Pollution Discharge Elimination System
NTU	Nephelometric Turbidity Units
OTC	Oxytetracycline
PEIS	Programmatic Environmental Impact Statement
PSP	Paralytic Shellfish Poisoning
PSWQA	Puget Sound Water Quality Authority
RCW	Revised Code of Washington
RPD	Redox Potential Discontinuity
SCUBA	Self-Contained Underwater Breathing Apparatus
SEPA	State Environmental Policy Act
SMA	Shoreline Management Act
TOC	Total Organic Carbon
VHS	Viral Hemorrhagic Septicemia
WAC	Washington Administrative Code
WDF	Washington Department of Fisheries
WDOH	Washington Department of Health
WDW	Washington Department of Wildlife
WPRC	Washington Parks and Recreation Commission
WSDA	Washington State Department of Agriculture
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service

GENERAL QUESTIONS

Question 1 What is the purpose of a programmatic EIS?

A programmatic, or non-project, environmental impact statement is appropriate at the level of planning when broad decisions, such as policy formulation, are being made. It is part of the phased review process allowed under SEPA (WAC 197-11-060(5)). Phased review allows reviewers the opportunity to focus on issues that are ready for decision and exclude from consideration issues that are not ready. Phased review starts with broad policy documents and then moves to documents of a narrower scope. For instance, while this document addresses issues related to floating fish farms such as water quality, it does not list all the places in Puget Sound where water quality would prohibit the placement of farms. An advantage to phased review is that it allows agencies and the public an opportunity to be involved with the planning process at an early stage.

Question 2 Why were consultants chosen to work on this project when they have done previous work for the aquaculture industry? Isn't there a conflict of interest?

The basic process used for selecting consultants for this project is the same process used by all agencies in selecting outside contractors for technical assistance in a variety of environmental areas. When choosing a consulting team, agencies look for a demonstrated ability to perform the work through previous experience and an understanding of the project. This project requires previous experience in assessing the environmental impacts of aquaculture projects. Such experience is not a conflict of interest.

The consultants used on this project have been in the business of providing objective environmental information to decisionmakers in the Northwest for many years. Their continuing business success depends upon their ability to provide objective and impartial products for their clients. The information developed by any consulting firm for a project must be defensible through existing appeal processes and the courts. Therefore, biased reports are not in the best interest of either the consultants or the agencies.

Question 3 Is it the intent of the state to site 100 farms in Puget Sound? How was the number 100 chosen?

It is not the intent of the State to site 100 farms in Puget Sound. As stated in the first sentence of the Description of Alternatives section in the DEIS, "The objective of this programmatic EIS is to assess the environmental impacts of fish culture in floating net pens in Puget Sound." The State Environmental Policy Act (SEPA) requires EISs to include a discussion of reasonable alternatives that could feasibly attain or approximate a proposal's objectives. The 25 farm alternative was chosen by roughly doubling the existing 13 farm alternative. The 50 farm alternative was chosen by doubling the 25 farm alternative, and the 100 farm alternative was chosen by doubling the 50 farm alternative. As stated in the third sentence of the Description of Alternatives section od the DEIS, "The range of development assessed is intended to bracket the range which

is likely to occur within the next few years, depending upon the decisions made by state and local agencies."

Question 4 Why aren't all possible sites for fish farms in Puget Sound identified?

To determine the availability of all sites in Puget Sound would require analysis of site specific information which is outside the scope of this EIS.

Question 5 Why can't the deadline for comments be extended?

SEPA requires a thirty day review period for commenting on a DEIS (WAC 197-11-455(6). The DEIS was issued February 6 with a comment deadline of March 23 representing an initial 45 day review period. WDF extended the deadline for comments to April 7 because of the large, complex scope of the document.

Question 6 What is the LENKA project in Norway?

The LENKA project is a coastal zone management program started in Norway in 1987 to assess the suitability of the Norwegian coast for aquaculture. See Appendix H for further information.

Question 7 Will you issue the EIS again as a Draft and accept public comments?

No, this is a Final EIS. However, the State will continue developing plans and policies for managing the fish farming industry. The public is welcome to submit their comments on this document to appropriate agencies to aid them in subsequent planning efforts.

Question 8 What is the role of the tribes in the environmental review process for fish farms?

While Tribes do not have direct management authority over the fish farming industry, they should be consulted early in the SEPA process. Siting a fish farm in a location that affects the Tribes' ability to catch fish in their usual and accustomed fishing areas could create a significant impact on the Tribes.

Question 9 Who will enforce compliance with permit conditions derived from the information suggested in the EIS?

The enforcement of permit conditions required of the fish farming industry will be done in the same manner as with any other development. Agencies with authority such as WDF (Hydraulic Project Approval and Disease Control), DNR (Aquatic lands lease), and Ecology (Shoreline permits and NPDES in 1990) will continue their present level of random checks of permit holders. If a problem is brought to the permitting agency's attention by another agency or citizen, then special efforts are made to assure that conditions of the permit or lease are being complied with.

Local government would continue to handle permit compliance in the same manner as they do now. If a citizen brings a potential shoreline permit problem to their attention,

local government will enlist the support of the appropriate state agencies to bring the permit holder into compliance with their permit requirements.

Question 10 There are conflicts between some of the mitigation measures such as between aesthetics and navigation. Why doesn't the EIS resolve these conflicts?

The role of the EIS is to evaluate the environmental effects of a range of alternatives. The EIS suggests mitigation measures that could be implemented to eliminate or reduce impacts. Resolution of conflicting mitigation measures suggested in this EIS will have to be determined on a case-by-case basis using site specific conditions.

Question 11 What is the Public Trust Doctrine and how does it relate to the fish farming industry?

The public trust doctrine is a common law principle which recognizes the right and responsibility of each state to protect certain inalienable public rights in coastal resources. The State has a responsibility to manage its aquatic lands for the benefit of all citizens and to make resource allocations in a conservative and responsible manner. The State's public trust responsibilities are carried out through both the State's aquatic land proprietary management and shoreline management programs.

The public trust doctrine is not automatically violated by fish farms locating in navigable waters, because the State retains ownership of the bedlands and leases the land for relatively short terms. Each site is evaluated on a case-by-case basis through both the shoreline and aquatic land management programs.

For a further discussion of the public trust doctrine, see Section 8.3 of the FEIS.

Question 12 Why wasn't a thorough economic analysis of the fish farming industry included in the EIS?

SEPA does not require an economic analysis to be included in an EIS. WDF included two economic discussions in the FEIS Technical Appendices to provide additional information on the fish farming industry.

Question 13 What programs and efforts are underway that address water quality issues?

See Section 5.2 of the FEIS for a discussion of the NPDES permit system related to fish farms. In addition, the Puget Sound Water Quality Authority is instigating a number of programs related to general water quality concerns. Contact PSWQA for further information on those programs.

Question 14 What chemical and physical factors related to water quality may be affected by fish farms and how might they be affected?

Chemical factors affected by fish farms include: dissolved oxygen, nutrients, dissolved organics, suspended organics (BOD), and turbidity. Generally, dissolved oxygen will

decrease while nutrients, dissolved and suspended organics and turbidity will increase. The decrease in dissolved oxygen is related to the respiration of fish as well as the decay of organic matter. Much of the increase in turbidity is related to the increase in suspended organic matter. The increase in nutrients can contribute to other water quality changes, in particular, increases in the phytoplankton population. Large increases in the phytoplankton population can cause supersaturated dissolved oxygen concentrations near the surface from photosynthesis and a decrease in the dissolved oxygen concentration from decay of phytoplankton detritus near the bottom.

Physical changes due to fish farming are largely limited to aesthetics such as changes in turbidity, phytoplankton blooms, and sedimentation. The accumulation of organic matter under farms can lead to changes in biological diversity in benthic communities.

Question 15 What are the "models" used to simulate "real life" and why are these particular models used?

Models are used to simulate the interrelationship among the physical, biological, and chemical environment. In modelling, mathematical relationships are developed to express how a process is related to individual parts of the environment. For example, a model would describe how photosynthesis is related to phytoplankton concentration and nutrient concentrations. The model is then the collection of all the processes considered important to the problem. Properly developed and applied, a model provides information on how changes in one part of the environment affect other areas of the environment. Models of this type are usually developed for specific projects since few generalized models exist.

Question 16 How are fish farms affected by other water and upland uses?

Fish farms can be affected by pollution from point or non-point sources. Point sources of pollution include wastewater treatment plant outfalls, storm drains, and industrial discharges. Non-point sources include overland runoff from farms, feed lots, yards and streets that do not flow into storm drains or sewer systems. The primary concerns would be low dissolved oxygen in effluent waters, high BOD concentrations that could cause low dissolved oxygen concentrations in the pens, contaminants that are toxic to fish or may bioaccumulate in the fish, and pathogens. Proper siting of farms would ensure that other sources of pollution are sufficiently well removed from the farm site to minimize the impact.

Question 17 Why wasn't a discussion of the NPDES requirement for fish farms included in the EIS?

The DEIS was issued in January 1989, and EPA did not decide to require NPDES permits of floating fish farms until May 1989. Ecology is administering the NPDES program and has not finalized the specific requirements necessary for fish farms. However, a discussion of the NPDES program related to fish farms has been included in Section 5.2 of the FEIS.

Question 18 Why weren't specific siting guidelines and regulations given in the EIS to protect water quality?

As a programmatic EIS, this EIS does not analyze specific situations. The document is not intended to determine how many sites are available and where they are located. The siting conditions at specific sites for hypothetical or existing farms is done for the purpose of example, and not for the purpose of endorsing fish farms or sites for future development.

The FEIS includes an evaluation of the environmental impacts of the fish farming industry under two regulatory alternatives: (1) existing regulations and guidelines (No-Action Alternative), and (2) recommendations for WAC adoptions, additional guidelines, and further research (Preferred Alternative). Section 5.2 of the FEIS discusses the regulations and guidelines related to protecting water quality, and the Preferred Alternative includes recommendations for actions to ensure that water quality standards are not exceeded.

Question 19 Was the Kiefer Atkinson phytoplankton model verified by field studies?

The Kiefer Atkinson phytoplankton model has been verified in the field from prior studies by Dr. Kiefer in California and Hawaii, where there was a measurable "signal to noise" ratio that had an effect on phytoplankton. See Kiefer and Atkinson (1988 and 1989) for more details and references. The model run used in the DEIS is based on a typical, but theoretical embayment, so of course it could not be field verified. In fact, it would not be possible to field verify the model in Puget Sound unless a fish farm with much larger production was located in a nutrient sensitive embayment, an unlikely scenario.

Question 20 What is the relationship of the Squaxin site to other sites and what is its worst-case identification based upon?

The Squaxin Island site is one of only 2 farm sites of any significant size located in semi-restricted waters of Puget Sound that have extended periods of surface water nutrient depletion. The other site is at Fox Island, operated by WDF. The Squaxin site's production is greater than the Fox Island site, thus the description "worst-available-case" that was used in the text. This rationale has been included in the text of the EIS and in the abstract of Appendix C.

Question 21 What effect will delayed-release fish have on wild and hatchery stocks and fisheries based on these stocks?

The delayed-release program is conducted by WDF and some tribes. This EIS is limited to an evaluation of commercial fish farms whose fish are not intentionally released. A discussion of the impacts associated with delayed-release facilities is beyond the scope of this EIS.

Question 22 **What is the likelihood of Atlantic salmon escapees establishing themselves in the wild and competing with native stocks of salmon and trout?**

The likelihood of Atlantic salmon escapees establishing themselves in the wild is very small. All attempts to intentionally establish runs of Atlantic salmon outside of their natural range where there are indigenous salmonid populations have failed.

Question 23 **What do Atlantic salmon escapees prey upon and what impact will they have upon prey populations?**

Atlantic salmon basically feed on the same organisms that Pacific salmon do. Therefore, the impact on the prey population would be the same as the impact from additional Pacific salmon.

Question 24 **Why does WDF feel that the genetic issue is not a significant issue?**

WDF agrees that protection of the genetic resources for Pacific salmon is of vital importance to the citizens of Washington. The DEIS does not conclude that there are "no problems" associated with the culture of Atlantic and Pacific salmon in fish farms. WDF recognizes that there could be significant genetic problems in uncontrolled situations. However, WDF does conclude that given the current culture techniques for Atlantic and Pacific salmon in Washington and the existing regulatory review mechanisms such as the HPA permitting program, there appears to be little potential to significantly affect the genetic viability of native stocks. In addition, there appear to be little potential to successfully compete with native stocks.

However, future introductions of new species may pose potential threats. WDF lists some ways to minimize or prevent such threats (listed on page 75 of the DEIS). It is impossible to predict what might be proposed for future culture. Decisions about these proposals must be made on a case-by-case basis at that time with the best available information.

The genetic discussion in the DEIS provides an adequate description of current potential genetic impact from fish farm observations and provides useful information to assist state decisionmakers to evaluate requests for farm sites. The WDF will be involved in the review of every proposed fish farm project through the SEPA review process and the HPA permitting program to ensure that genetic concerns are evaluated.

Question 25 **What are the disease problems found elsewhere and how are they managed?**

VIRAL

Infectious hematopoietic necrosis (caused by IHN virus [IHNV]) is known to occur in North America, Asia, and continental Europe. Primary management is by avoidance; i.e. not moving infected fish into non-infected areas. Once disease is enzootic (regularly affecting animals in a particular district or at a particular season), it is managed by health inspections and fish culture practices. Vaccines are currently being developed.

Infectious pancreatic necrosis (caused by IPN virus) is known to occur in North America, Asia, and throughout Europe. Management is similar to IHNV.

Viral hemorrhagic septicemia (caused by VHS virus) is known to occur in continental Europe and has been isolated at three sites in Washington: Makah National Fish Hatchery (USFWS), Glenwood Springs (WDF), and Lummi Island Sea Ponds (Lummi Tribe). All isolations were made from adult broodstock returning to hatcheries in Washington in 1988 and 1989.

In Europe, VHS is managed in the same manner as IHNV. Current practice in North America is the eradication of infected fish (see Appendix G).

BACTERIAL

The following bacterial diseases occur worldwide as well as in Washington State. Avoidance is often difficult or impossible because these pathogens occur in all anadromous stocks and are often present in a clinical "carrier" fish. These diseases are managed by avoidance, sanitation, and good fish culture practices. Their impact is reduced by preventive vaccines and antibiotics.

Vibriosis is the most common saltwater bacterial infection. There are many species and varieties. Vaccines have proven quite effective for disease prevention.

Furunculosis (caused by Aeromonas salmonicida) is a common freshwater disease but also causes loss in sea pens. Vaccines are available, though not as effective as the vaccines for vibriosis.

Bacterial Kidney Disease - BKD (caused by Renibacterium salmoninarum) is a common disease that causes loss throughout the life of salmon in both fresh and salt water. Vaccines are in development. The disease is effectively managed by avoidance and by fish culture practices which includes antibiotic therapy (by injection) in adult broodstocks.

Other common diseases are "redmouth" (caused by Yersinia ruckeri) and "coldwater" disease (caused by Flexibacter psychrophila).

PARASITIC

There are hundreds of types of parasites of fish to include mycotic diseases, protozoan, metazoan, etc. These diseases generally have worldwide distribution and occur more frequently in wild fishes than in cultured fishes. They are managed by fish culture practices which reduce exposure of the cultured fish to the natural reservoir. Some ectoparasites are controlled by the bathing of infected fish in therapeutic baths of approved chemicals.

Question 26 What are the disease differences, if any, between hatchery and commercially farmed fish?

The pathogens which are found in freshwater culture activities may also be found in saltwater fish farm culture. The occurrence of disease is usually more of a function of the life stage of the fish. For example, the viruses discussed in Question 25 typically do not affect larger fish such as those in pens; however, they often cause a loss of fry in freshwater facilities. The bacterial diseases cause a loss in both hatcheries and farms, with BKD and vibrio being the most significant in farms.

Question 27 What potential exists for fish in farms to develop more virulent forms of disease?

There is no greater potential for a pathogen to mutate and become more virulent in a fish farm environment than in a freshwater environment.

Question 28 What is the disease risk from fish feed and what handling techniques will minimize the risk?

Fish food ingredients are pasteurized and the presence of human bacterial pathogens would be due to casual contamination during manufacture or storage. These bacteria can and should be reduced by proper manufacturer and storage procedures. The only human health risk would involve fish culturists who feed the food to the fish. Naturally, they should wash their hands before handling food for their own consumption.

Question 29 What are the implications and risks of the VHS disease recently discovered in Puget Sound?

Viral hemorrhagic septicemia virus (VHS) was identified for the first time in North America in returning adult broodstock at the tip of the Olympic Peninsula and on Orcas Island. Our information suggests that these fish became infected during residence in the ocean. We have not observed disease or mortality caused by this virus.

In Europe, VHS causes loss in rainbow trout in freshwater hatcheries. VHS has not been known to cause loss in Pacific or Atlantic salmon. Though research is being conducted in Europe on the Washington state isolate, no in vivo research has been conducted on Washington fish stocks. Therefore, it is premature to speculate on the disease risk to our stocks, let alone the implication and risks of VHS. Refer to Appendix G for further information.

Question 30 What are the impacts to bald eagles and peregrine falcons and what are the current and proposed protection measures?

Resident and migratory populations of bald eagles and peregrine falcons occur along coastal and inland waterways of western Washington. They use a variety of habitats and specific areas for nesting, perching, roosting, and foraging. If birds are present, fish farm construction and operation could affect any of these activities by altering the behavior of the birds (e.g. changing nest, perch, roost, foraging areas), or affecting their food resources (e.g. altering the distribution of waterbirds in an area).

The type and degree of potential impacts will be site-specific, depending entirely on the location of a particular proposed farm. As mentioned in the text, federal and state

protection for bald eagles and peregrine falcons ensures that a proposed operation will not adversely affect these species. The SEPA and Section 10 permitting programs will provide the site specific review of individual farm proposals to ensure that the potential effects of fish farms on these birds are evaluated.

Question 31 What are the potential impacts to bird populations due to lethal removal and habitat and food alteration?

As discussed in the text, the potential impacts to bird populations of lethal removal will depend on the degree and extent of its use and on the population size of the affected species. Lethal removal used on an occasional basis likely will have no impact on bird populations. If used continually at a fish farm, lethal removal could eliminate local populations of specific birds (e.g. herons, grebes); if used continually over a widespread area which included many farms, it could substantially reduce populations of a given species. Presently, the U.S. Fish and Wildlife Service does not issue permits to commercial fish farms in public waters that would allow birds to be killed.

Question 32 Why was the section on Land-Based Tank Farms included in the EIS?

The section on Land-Based Tank Farms was provided for additional information on other technologies being used to commercially raise salmon. This section has been moved to Appendix I in the FEIS Technical Appendices.

Question 33 What is the risk to human health from the consumption of fish and shellfish taken near fish farms due to antibiotic residuals and/or human pathogens associated with the farms?

As a rule, aquacultural use of antibiotics is far less than that of the livestock and poultry industries. Use of antibiotics in all of these industries is regulated by the FDA to protect both human and animal health. Regulations controlling the use of antibiotics are developed only after extensive scientific studies are conducted which document their efficiency and safety. Use of antibiotics in accordance with regulations, therefore, is recognized as safe and effective.

Antibiotic residuals would be expected to be low to non-existent in fish or shellfish taken near fish farms for reasons outlined in Section 5.4 of the FEIS; therefore, risk to human health would be negligible to none. Consumption of these fish or shellfish would not likely result in concentrations of antibiotics sufficient to affect bacterial flora of humans. Even in salmonids receiving a complete oxytetracycline medicated feed treatment, the drug is metabolized quickly following cessation of treatment. The FDA requires only a 21-day period from date of last treatment until treated fish can be consumed. Fish or shellfish near fish farms would, at most, digest much lower concentrations of antibiotic than would farm fish and would be expected to metabolize the lower levels of drug more quickly. Successful vaccination programs would reduce the need for antibiotic treatments of captive fish, which would reduce the risk to human health.

As outlined in this EIS, few fish or shellfish bacterial pathogens are human pathogens. Human bacterial pathogens that are associated with fish or shellfish generally become a problem due to improper food preparation techniques. Given that published reports

cited in the EIS do not indicate increased isolation of human pathogens from fish or shellfish near fish farms, there is no reason to believe that consumption of these is a risk to human health.

Question 34 How does the use of antibiotics lead to the development of resistance, and what are some case studies?

Resistance of bacteria to antibiotics may occur in several ways. Spontaneous mutations in bacterial populations may produce organisms that are resistent to certain antibiotics. If these relatively resistant mutants are present in populations of bacteria exposed to antibiotics, they may be selected for and become more numerous since susceptible organisms will be killed or controlled by the antibiotic, leaving only resistent organisms. These remaining bacteria may or may not be susceptible to other antibiotics and might be controlled using alternative treatments. Bacterial populations usually contain organisms that vary somewhat in the degree of susceptibility to antibiotics.

Selection for the more resistent organisms can occur through the improper use of antibiotics. If incomplete or reduced antibiotic treatments are administered to infected animals or humans, only the most susceptible bacteria will likely be eliminated. The remaining bacteria will require higher doses of the same antibiotic to be controlled. Repeated misuse of antibiotics in this way can eventually result in the selection for and establishment of bacteria that, if not totally resistent to that antibiotic, will require very high doses to be controlled. Again, treatment with alternative antibiotics might be effective.

An additional mechanism for development of antibiotic resistance involves the transfer of small portions of genetic material, called plasmids, from one bacteria to another. Plasmids contain genes responsible for a variety of bacterial characteristics including antibiotic resistance. However, not all plasmids are responsible for the ability to resist antibiotics. Antibiotic resistance in a previously susceptible bacterial population can develop by the transfer of a resistance plasmid from a resistent bacterium to a susceptible bacterium, followed by the reproduction of the new plasmid-containing bacterium. The two bacteria involved in this process may be from the same or unrelated species. The transfer of resistance plasmids does not necessarily guarantee the survival and reproduction of resistent bacteria, since other selection pressures might favor other forms. Elimination of other competing bacteria with antibiotics might favor the establishment of a population containing resistance plasmids, however.

The EIS cited several references regarding the development of antibiotic resistance in aquaculture. Human and veterinary medical literature also contains numerous papers addressing the topic. Natural resistance can occur in bacterial populations without the presence of antibiotics or other intervention by man.

Question 35 What are the potential dangers of antibiotic accumulation in the sediments under the pens?

The potential dangers of antibiotic accumulation in sediments under pens would vary depending on such factors as the diversity and the biotic community in and near these

sediments, the rate and frequency of medicated feed used, and the type of antibiotic used.

In fish farms and freshwater aquaculture, antibiotics are not used on a continual, long-term basis as they often are in other types of animal husbandry. Rather, they are used over short periods (5-14 days) to control outbreaks of disease.

Antibiotic accumulation in sediments would be expected to alter the microfauna in these sediments. Susceptible bacteria would likely be eliminated, provided the level of antibiotic in the sediments was high enough to inhabit them. Whether the remaining bacteria could transfer their resistance to human pathogenic bacteria is unknown, but is probably unlikely since few human pathogens have been seen to be associated with fish farm aquaculture.

LETTER NO. 1

COMMENTS OF SKAGIT AND ISLAND COUNTIES CONCERNING DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT ON FISH CULTURE AND FLOATING NET PENS

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COMMENTS OF SKAGIT AND ISLAND COUNTIES CONCERNING
DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT
ON FISH CULTURE AND FLOATING NET PENS

Skagit and Island Counties respectfully submit these comments on the Draft Programmatic Environment Impact Statement (PEIS) on Fish Culture and Floating Net Pens prepared for the Washington Department of Fisheries and issued February 6, 1989.

1. CONFLICT OF INTEREST

1 The principal consultants who prepared the Environmental Impact Statement for the Washington State Department of Fisheries were Parametrix, Inc., Batelle Pacific Northwest Labs and Rensel Associates. These organizations or their employees have been retained under contract by applicants for fish farm permits. In fact, at the time the PEIS was being prepared, each of these organizations or their employees had contracted to provide expert consulting assistance to at least four different industry applications.

Although there may be no legal requirement that experts hired on a contractual basis refrain from participating in state contracts such as the draft PEIS,[1] the Counties believe

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1 The Executive Conflict of Interest Act, RCW 42.18 and 42.22, precludes state employees from participating in transactions involving the State where the employee "has a substantial economic interest of which he may reasonably be expected to know." RCW 42.18.160. Why it would be a good idea for independent contractors to be involved in such transactions is

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that this practice represents a clear conflict of interest. Consultants should not be allowed to draft important state policy documents that are in any way related to the subjects on which they are working on behalf of industry applicants. Given the nature of contested cases today, it is unlikely that the experts did not acquire some flavor of partisanship during the contested cases. Hiring such "experts" to draft the PEIS is highly questionable under any analysis.

2. **BUDGET**

(2) The Environmental Impact Statement lists 19 areas of inquiry that it is intended to address. These include sedimentation, net-pen modeling, water quality, introduction of Atlantic Salmon, genetic impact, marine mammals and birds, odors, noise, upland and shoreline use, aesthetics, navigation, commercial fishing, recreation, local services, disease, human health, chemical and phytoplankton. It appears from a review of the Draft PEIS and Technical Appendices that independent research was only performed on three subjects: (1) the sedimentary effects of net pens on the benthic community;

(Continued)

unclear. The participation of the consultants in partisan proceedings must be considered when determining the overall balance of the Draft PEIS.

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(2) phytoplankton; and (3) economics. The rest of the report apparently is based on a review of existing literature. Most of this literature does not bear on local applications of net pen farming or the specific conditions existing in Puget Sound.

No independent research was commissioned, by the State on perhaps the two most important issues in the report, disease transmission and genetic impacts. Without independent research into these and other areas, it is difficult to envision how local governments can evaluate the potential effects of any particular net pen site on wild populations of fish. Skagit and Island Counties believe that a proper PEIS should include a budget for independent study on these areas of concern.

3. THE DRAFT PEIS DOES NOT MAKE PROVISION FOR AREAS OF PARTICULAR CONCERN PREVIOUSLY IDENTIFIED BY STATUTE, REGULATION AND MANAGEMENT PLAN, NOR DOES IT MAKE ANY SPECIFIC RECOMMENDATIONS CONCERNING THE SEPARATION OF WILD POPULATIONS AND FARMED FISH.

a. Washington's Conceptual Plan for Shoreline Regulation.

The principal regulations governing the shorelines of the State of Washington are the following:

1. The Shoreline Management Act (SMA), RCW 90.58, et. seq.

2. WAC Regulations implementing the Shoreline Management Act found at WAC 173-14 et. seq.

3. The various county Shoreline Management Master Programs.

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4. The Washington Coastal Zone Management Program (WCZMP).

The basic premise behind the SMA is that no activity is allowed on the state shorelines that is inconsistent with the Act or local implementing master programs. RCW 90.58.140. The master program classifies each stretch of shoreline under a shoreline designation area, natural, conservancy, aquatic, rural and urban areas. These designations, which are similar to zoning map classifications, specify the uses permitted in each area. Certain of the shorelines in the State of Washington are "shorelines of statewide significance." RCW 90.58.030(2)(e)(ii). Such shorelines are

> important to the state. Because these shorelines are major resources from which all people in the state derive benefit, the guidelines and master programs must give preferences to uses which favor public and long range goals.

WAC 173-16-040(5). All waters in Puget Sound and the Strait of Juan de Fuca lying seaward from the line of extreme low tide, as well as Skagit Bay and the adjacent area, and Padilla Bay, are shorelines of statewide significance. See RCW 90.58.030(e). In order to protect this statewide interest, local government, the Department of Ecology, the Department of Fisheries, and others, must comply with the use preferences set forth in the act which are to:

(1) recognize and protect the statewide interest over local interest;

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(2) preserve the natural character of the shoreline;

(3) result in long-term over short-term benefit;

(4) protect the resources and ecology of the shoreline;

(5) increase public access to publicly owned areas of the shoreline;

(6) increase recreational opportunities for the public in the shoreline RCW 90.58.020.

The WCZMP, which was promulgated by the Department of Ecology has specifically recognized certain areas of this State as being areas of "particular concern." For instance, Skagit and Padilla Bays are identified as the "most diverse, least disturbed, most biologically productive of all the major estuaries on Puget Sound." (WCZMP p. 16). It is noteworthy 3 that the WCZMP is not even mentioned in the Draft PEIS.

In addition, estuaries are also specifically designated in the WAC regulations implementing the act as areas deserving of special protection. WAC 173-16-050(5) states:

> Estuaries are zones of ecological transition between fresh and salt water. The coastal brackish water areas are rich in aquatic life, some species of which are important food organisms for anadromous fish species which use these areas for feeding, rearing and migration . . . because of their importance in the food production chain and their natural beauty, the limited estuarial areas require careful attention in the planning function.

A further protective classification is found at WAC 173-16-040, which requires counties to categorize shorelines in their master programs as either aquatic, natural,

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conservancy or other designation. It is clearly the policy of the SMA and the implementing WAC regulations to protect those areas designated natural or conservancy with substantially greater restrictions than other environments. For instance, as to the natural environments,

> The main emphasis on regulation in these areas is on the natural systems and resources which require severe restrictions of intensities and types of uses to maintain them in a natural state. Therefore, activities which may degrade the actual or potential value of this environment are to be restricted.

WCZMP p. 32.

Although aquaculture is allowed under the Shoreline Management Act, it is allowed if, and only if, the proper environmental safeguards and procedures are followed:

> Properly managed, aquaculture can result in long-term or short-term benefit and can protect the resources and ecology of the shoreline. Aquaculture is dependent on the use of the water area and, when consistent with control of pollution and prevention of damage to the environment, is a preferred use to the water area. WAC 173-16-060(2) (emphasis added).

Given the paramount goal of protecting the natural systems that exist in the State of Washington, it is curious that the (4) Draft PEIS proposes no specific reservations of waters or types of waters to be removed from salmon net pen culture nor does it discuss in any detail the philosophy behind the existing regulations that govern separation of uses. This shortcoming is particularly important in view of the fact that most net pens are proposed in areas that are either estuaries,

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shorelines of statewide significance, areas designated for special protection under the WCZMP, or some combination of the above. In other countries, such as Norway, where salmon farming has reached a more advanced state, regulations of this type are being proposed, as is described in the next section.

b. Norway Has Developed a Coastal Zone Management Program which Proposes to Separate Net Pens from Wild Salmon Rivers.

In Norway, the LENKA Project proposes a restriction of disallowing salmon farms from locating within 20 kilometers of salmon producing rivers. In addition, many fjords, including the Trondheim Fjord (which is 120 kilometers long) are proposed to be completely closed to new salmon farms. The reason for this is the Norway's extensive experience with aquaculture, which has resulted in grave concern over the effects of farm salmon on the wild stocks both as to disease and genetic pollution. One obvious solution to these concerns is to locate the fish farms as far away from salmon producing rivers as possible. Especially where salmon farms are located in estuaries, on shorelines of statewide significance, and near migratory routes or feeding grounds for important wild species, (5) it would seem that the unknowns of salmon farming impose a significant conflict with the existing regulations that cannot be resolved by the optimistic tone of the draft PEIS that "proper siting," even in sensitive areas, can avoid adverse impacts.

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c. Recommendations for Drafters Concerning Compatibility (or Lack Thereof) between Salmon Farms and existing Regulations.

The three page discussion of the relationship between proposed salmon net pens and existing land use regulations (see pp. 141-143) glosses over the inherent conflicts between salmon farms and the legal requirements of the SMA. For instance, it does not appear that salmon net pens can do anything affirmative to:

(a) preserve the natural character of the shoreline;

(b) protect the resources and ecology of the shoreline;

(c) increase public access to public areas of the shoreline; or

(d) increase recreational opportunities for the public in the shoreline. As stated in the SMA,

> In the implementation of this policy, the public's opportunity to enjoy the physical and aesthetic qualities of the natural shorelines of the state shall be preserved to the greatest extent feasible consistent with the overall best interest of the state and the people generally. To this end uses shall be preferred which are consistent with control of pollution and prevention of damage to the natural environment . . .

RCW 90.58.020. The very nature of salmon farming requires a lease of public waters to one individual or organization. It is completely unclear whether such a lease comports with either the spirit or the letter of Washington law.

The Counties believe the drafters must address salmon net
6 pens in the context of the SMA to a greater extent than has

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been done in the current PEIS. Failure to clarify the relationship between the net pen operations and the existing regulatory framework will leave local government with the difficult proposition of attempting to rationalize mutually conflicting criteria for the evaluation of net pen projects. Currently the Draft PEIS fails to reference the WCZMP, fails to comment on the protection of unique and fragile environments, fails to comment on the concept of implementation of farm free zones (except to say that this might be a mitigation measure to mitigate a problem the drafters do not recognize to exist), fails to address possible need for protection of estuaries, fails to address possible needs for protection of nursery areas for young fish, and fails to incorporate these areas of concern into the overall statutory and regulatory framework currently existing for the protection of the shorelines of the State of Washington.

d. The Public Trust Doctrine.

The public trust doctrine, as recently set out in the case of Caminiti v. Boyle, 107 Wn.2d 662, 668-69, 732 P.2d 989 (1987), cert. den. 56 U.S.L.W. 3460 (1988), is based on the principle that the public has an overriding interest in navigable waterways and lands. The doctrine resembles "a covenant running with the land (or lake or marsh or shore) for the benefit of the public and the land's wildlife department." Reed, "*The Public Trust Doctrine: Is It Amphibious?*, 1 J.

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Envtl. L. & Litigation 107, 118 (1986); see also Orion Corporation v. State, 109 Wn.2d 621, 747 P.2d 1062 (1987), cert. den. 56 U.S.L.W. 3805 (1988).

Historically, the public trust doctrine developed out of the public's need for access to navigable waters and shorelands, and, as a result, it encompasses the right to navigation and fishery. Caminiti, 107 Wn.2d at 669. However, recognizing science's ability to further expand the concept of public need, the courts have extended the doctrine beyond its navigational aspects. Thus, the Washington Supreme Court has had occasion to extend the doctrine to include:

> incidental rights of fishing, boating, swimming, water skiing, and other related recreational purposes generally regarded as corollary to the right of navigation and the use of public waters.

Wilbour v. Gallagher, 77 Wn.2d 306, 315-16, 462 P.2d 232, 40 A.L.R.3d 760 (1969), cert. den. 400 U.S. 878, 27 L.Ed.2d 115, 91 S.Ct. 119 (1970).

The public trust doctrine has particular relevance in this area, since the waters impacted by proposed project generally are protected areas which are to be preserved by the State under its public trust. The drafters of the PEIS need to (7) demonstrate how the public rights to recreation, boating and fishing will not be restricted by net pens and therefore how local decision makers can avoid conflicts with the public trust.

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4. **GENETIC CONCERNS**

(8) a. The evidence at this stage does not warrant the drafter's conclusion that no genetic effects are likely to result from interbreeding between escaped and wild fish.

The conclusions of the Draft PEIS with regard to genetic concerns start with the following proposition.

> While the current culture of Atlantic and Pacific salmon appears to have little potential to significantly effect the genetic viability of native stocks, or to successfully compete with these stocks, future introductions of new species may pose potential threats. (Draft PEIS, p. 75.)

It is difficult to determine what information has been used in arriving at the conclusion that the culture of indigenous Oncorhynchus species will have no effect on the genetic makeup of the wild stocks. The Draft PEIS is replete with apparently conflicting statements.

For instance, the draft PEIS recognizes the following facts:

(1) Different river systems have genetically different stocks of wild salmon (Draft PEIS at p. 69). The genetically different stocks have been naturally selected for specific characteristics that give rise to the ability of those fish to survive in and return to particular river systems.

(2) The Washington Department of Fisheries considers it undesirable to interbreed different stocks of wild salmon because such interbreeding decreases the genetic variability in

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those fish (Draft PEIS at p. 70). The reason that a decrease in genetic variability is undesirable is that any loss of genetic traits that are specifically related to a fish's ability to return to and survive in a particular river system is likely to decrease the viability of the population as a whole.

(3) Currently there are no regulations that require farmed or hatchery populations of indigenous species to be of the same genetic make-up as those in the natural rivers near the site of the pen-raised population. There are similarly no regulations or guidelines that prohibit genetic manipulation of wild stock.

(4) In fact, the PEIS admits that genetic manipulation of coho salmon has and does occur by fish farmers (Draft PEIS at p. 71).

In addition to the evidence outlined in the Draft PEIS that <u>supports</u> the existence of a potential problem, there is a great deal of information not cited by the drafters that further leads to the conclusion that net pen fish may significantly harm important genetic characteristics of wild population of salmon.

With Atlantic salmon, extensive genetic manipulation has been carried out by fish farmers. The goal of this manipulation is to develop a fish that can survive better in a net pen environment. Essentially, what the fish growers look for are

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traits of "docility" that allow fish to grow large in the shortest possible time frame and with the greatest degree of ability to survive stress in close quarters. These traits of docility are unlikely to aid the salmon to survive in the wild. In his work The Environmental Effects of Floating Mariculture in Puget Sound (1986), Dr. Weston outlined the theoretical dangers of interbreeding cultured and wild salmon populations. These include:

> (a) Salmon tend to evolve genetically discreet and ecologically specialized subpopulations. Natural selection can therefore lead to development of characteristics optimally adapted for a particular habitat. Cultured fish, however, are not preadapted to the habitat in which they are placed.
>
> (b) net pen fish may have been bred for characteristics that are undesirable under cultured conditions but are maladapted in the wild.
>
> (c) Cultured fish may have reduced genetic variability, limiting their abilities to cope with environmental change.

Id. at pp. 92-95.

The theoretical dangers outlined by Weston have actually occurred with respect to Atlantic salmon in Norway. Svein Mehli[2] testified in a recent net-pen case in Washington that interbreeding may lead to changes in migration patterns of

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2 Svein Mehli is the section head of the Directorate For Nature Management in Norway with responsibility for wild runs of anadromous fish. He testified in Lacey, Washington in November, 1988. Despite the relevance of his testimony, no one from either the Department of Ecology, the Department of Fisheries or Department of Wildlife came to listen to him.

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formerly wild fish or to decreases in productivity, especially in successive generations. It was estimated by Mehli that escaped salmon constitute approximately 40 percent of the fish entering Norway's natural salmon producing rivers. These fish are mature and ready to spawn. Some Norwegian scientists have predicted startling sequelae to the interbreeding between farmed and wild fish:

> The most alarming and pessimistic prognosis by one the leading experts in Norway on genetics, professor Harald Skjævold at the Norwegian Agriculture University, anticipates that we may have 50% reduction of the natural genetic variety in the course of a period of 7 to 10 years.

Lundgren. "Protective Zones for Salmon - A Concept for the Preservation of Genetic Diversity of Wild Salmons and Reduction of the Spreading Diseases Between Domestic and Wild Salmons." Ministry of Environment, Norway, p.3.

Dagfinn Gausen, a fisheries biologist in Norway, states flatly that:

> Escapes by salmon from fish farming pens to the seas represent a new and potentially greater threat to natural genetic resource than gyrodactylus or acid rain.

Gausen, The Establishment of a Salmon Sperm Bank in Norway (1988), p.1.

As a result of the concern over genetic pollution, Norway has had to establish, at great expense, a sperm bank to preserve the identity of the wild stocks of fish. Id. Gausen says that a failure to act would mean:

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> destruction of the natural genetic resources which have the greatest value, even for the fish farmers themselves. If you destroy the original resource, what can you do if you have problems with the strains you are working with? You cannot back up.

G. Meggs, "Journey to the Future" (1988) at p.7.

b. The Department of Fisheries has performed no studies.

9 There are no studies cited by the drafters of the PEIS on the effect of reduced genetic variability in Northwest stocks of coho, chinook, or other wild salmon. The Department of Fisheries apparently has not done this work nor have the drafters of the PEIS. There are, however, significant works that show that genetic variability is decreased in local populations of fish. For instance, Campton and Johnston performed a study in 1984 showing that non-native genetic material was introduced into the gene pool of rainbow trout in the Yakima River. (See Campton and Johnston, "*Electrophoretic Evidence for a Genetic Admixture of Native and Non-Native Trout in the Yakima River, Washington*", Transaction of American Fisheries Society, 114:782, (1985). Similarly, researchers have found genetic differences in growth and survival of juvenile hatchery and wild Steelhead trout (see Reisenbichler and McIntyre "*Genetic Differences in Growth and Survival of Juvenile Hatchery and Wild Steelhead Trout*", J. Fish. Res. Board Can. 34:123-128 (1977), and Brown trout (see Ryman and Stahl, "*Genetic Changes in Hatchery Stocks of Brown Trout*", Can. J. Fish. Aquat. Sy. Vol. 37, 1980.) There is extensive

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evidence that salmon farming and salmon hatcheries have altered the genetic variation between natural population and hatchery stocks of Atlantic salmon. See, e.g., Stahl *"Differences in the Amount and Distribution of Genetic Variation between Natural Populations and Hatchery Stocks of Atlantic Salmon"*, Aquaculture Vol. 33, p. 23 (1983); G. Naevdal, *"Fish Rearing in Norway with Special Reference to Genetic Problems"* Ecological Bulletin (Stockholm) 34:85 (1981); Ryman and Utter (EDS) Population Genetics and Fisheries Management (1987).

(10) c. Conclusions of Draft PEIS are not based on the literature or independent research.

Despite the fact that reduced genetic variability has been found in numerous hatchery and farm population of fish where it has been studied, the conclusion of the Draft PEIS is that "local experts agree that widespread net-pen culture of Pacific salmon in Puget Sound poses a minimal threat to wild salmon populations in terms of genetic degradation." (Draft PEIS p. 69.) It is interesting to note that this conclusion was not made on the basis of any published literature but rather on "personal communications."

The drafters of the PEIS premise their conclusion on the unfounded assumption that breeding between hatchery or farmed fish and wild fish does not occur with frequency in nature.

> This discussion considers potential impacts of escaped fish interbreeding with wild stocks on purely theoretical grounds. Impacts associated with interbreeding between wild stock and net-pen fish is

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> undocumented. Since potential impacts can only occur with returning, mature, escaped fish (and major escapements are rare), the numbers of fish involved are expected to be small.

(Draft PEIS, p. 72) This statement is false or misleading in several respects. Although it is true that no research has been done on the frequency of interbreeding of Washington farmed fish, there does exist information with regard to interbreeding in Norway. Mehli testified that in 1988 40% of the fish found in Norwegian salmon rivers were farm fish, and that the serious reduction in genetic variation caused by interbreeding had led directly to Norway's decision to establish a sperm bank to protect genetically distinct native stocks of fish. Testimony of Svein Mehli, Skagit System Cooperative v. Skagit County, SHB No. 88-14 (November 14, 1988), pp. 54-55 (hereinafter "Transcript").

One of the most significant and disturbing aspects of the reduction of genetic variability is Mehli's observation that succeeding generations of salmon are apparently less fertile. (Transcript, p. 56). In other words, when less competitive characteristics are injected into a gene pool, even though some salmon may return to the river, they may produce fewer fertile offspring, and those salmon may produce fewer yet in succeeding years. On page 70 of the Draft PEIS, the drafters seem to conclude (on no authority) that because some hatchery-raised salmon returned to the rivers, they have retained sufficient

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genetic characteristics to indicate a lack of a problem in reduced genetic variability. This seems to be result-oriented science at its best. There has been no quantitative analysis regarding the number of returning salmon, no studies with regard to the reduction in genetic variation, and no studies with regard to the effect of reduced genetic variation on fertility of succeeding generations.

Given the evidence that reduced genetic variability results in less fertile fish in rivers and that wild fish interbreed with hatchery fish, we believe that the Department's conclusion that "current culture of Atlantic and Pacific salmon appears to have little potential to significantly affect native stocks," is not only unsupportable, but flies in the face of the literature. Since the drafters have done no independent research in this regard and since the effects of genetic variability reduction may be irreversible, we consider it exceedingly unwise to adopt a "no problem" attitude as appears to have been done in the Draft PEIS.

The PEIS concludes that because hatchery releases by the State are large, the effect of net pens cannot be significant. This presumes that the hatchery releases have not had a negative effect. Since no studies were performed, there is no basis to conclude that the hatcheries have not had a negative effect on the breeding of wild fish. We do know, however, that

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wild breeding populations of fish continue to decline.[3] In fact, the populations of coho stemming from the Skagit River (for instance) are so low that no commercial season for coho is currently allowed by the Department of Fisheries.

If the hatchery program were working as suggested by the drafters, one would expect to have increasing numbers of returning breeding fish. Since we do not, it would appear that there is at least circumstantial evidence supporting the proposition that wild stocks are losing their ability to reproduce naturally. We do not know whether this effect stems from reduced genetic variability of the wild stocks because of the hatchery program or because of salmon escaping from fish farms. Given our knowledge of similar problems in Atlantic salmon, however, it would be exceedingly unwise to allow wholesale licensing of Pacific salmon farms in areas where salmon would likely enter streams with wild spawning populations.

d. The mitigation measures proposed are contradictory or ineffective.

It is also interesting to note that the Draft PEIS provides for mitigation measures that attempt to preclude the

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3 To take just one example, on the upper Baker River, which is a tributary of the Skagit River, the average annual run of sockeye salmon from 1925 to 1953 was 3,000. The average annual run of coho was 10,000 (Washington Department of Fisheries statistics). During the period from 1954 to 1978, the average annual sockeye run declined to 2,547, and the average coho run declined to 6,003 (Puget Power and Light statistics). Since 1978, there has been an alarming decrease in the number of returning adult sockeye and coho. In 1985, only 76 sockeye and 463 coho returned to spawn. Concrete-Rockport Environmental Assessment (Western

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mixing of escaped farm populations with wild stocks entering the river. On page 75, the Draft PEIS states:

> Where necessary, established minimum distances net-pens should be sited away from streams with wild populations vulnerable to genetic degradation.

The rest of the report, however, acknowledges no circumstances under which this would be necessary and cites none of the data or literature that currently exists on the potential for (11) genetic pollution. The Draft PEIS leaves local governments no criteria upon which to make a decision concerning which streams, which populations, and what deleterious effects are thought to be avoided by the mitigation measures, and how far away the pens should be located. Indeed, the PEIS identifies no adverse effects.

On page 75 of the Draft PEIS, a proposed mitigation measure suggests:

> Where significant risk of interbreeding or establishment of deleterious self-sustaining populations exist, only permit the culture of sterile or monosexual individuals.

(12) As above, the Draft PEIS identifies no situations where significant risk of interbreeding or establishment of deletorious self-sustaining populations exist. The Counties are therefore left with no scientific evidence or guidelines

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(Continued)

Washington University 1986).

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concerning the risks sought to be avoided and the method for avoiding them.

Other mitigation measures with regard to genetic pollution seem ineffective or unwise. On page 75 of the Draft PEIS the authors propose to:

> Encourage commercial, sport, and tribal fisheries to harvest escaped fish, and/or permit farm operators to conduct a targeted fishery for escaped fish in the immediate vicinity of his pens.

(13) If escapees are a native species, how will the fisherman know if it is a pen fish or a wild fish? Will not such a fishery cause an incidental catch of wild fish, especially where net pens attract wild fish? What data suggest escapees stay in the vicinity of the net-pen so that the harm from incidental catch of wild fish will not outweigh the benefit of the increased fishery for the escapees? If this fishery is allowed, what effect will it have on the rights of traditional tribal and non-tribal fisherman to catch their allocated share of returning runs? If pen fish do not harm the gene pool, why do we need this measure in the first place?

(14) e. <u>The drafters do not mention Norway's LENKA Project</u>.

One of the most significant aspects of the LENKA Project is its recommendations to move the sites for new location of salmon farms out of the fjords and toward the coast of the open ocean. The reason for this proposal is the fear that escaping net-pen fish will breed with wild fish in the salmon rivers.

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Minimum distances for location of salmon farms from the mouths of rivers have been proposed for Norway. Under the proposal, no salmon farm will be located closer than 20 kilometers from the mouth of a salmon producing river (Transcript, pp. 30-35). We have been informed by Mehli that the LENKA recommendations will be implemented by this Spring or Summer. No similar proposal, study, or concern is expressed by the draft PEIS.

In summary, no data exist regarding the escapes of farmed Pacific species because no studies have been done. Data from Norway and elsewhere indicate possible permanent, irreversible damage may be done to the fertility and survivability of distinct populations of wild fish. The mitigation measures proposed are either insufficient, contradictory, or not likely to have any effect. For the Department of Fisheries to say that no threat is posed to wild stocks is without basis given the available evidence and the potential damage that could occur (and may now be occurring) to our wild runs. We recommend detailed studies of the effects that current hatchery programs have had on wild fish runs, a careful evaluation of those data, separation of any pen fish from all wild stocks, and a monitoring program, the cost of which is borne by the industry, to make sure that the deleterious genetic effects found elsewhere do not happen in Washington.

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5. **DISEASE**

a. Nature of the disease problem.

There are two methods of disease transference among salmon, generally known as horizontal and vertical disease transmission. Horizontal transmission occurs when a virus or bacterium is spread through the water or through bodily contact from fish to fish. Vertical transmission occurs when the bacterium or virus is transferred through the egg to the newly hatching fish. It is known that some varieties of bacteria and viruses can survive intra ovum and be transmitted vertically.

There are a variety of diseases which affect net-pen fish, many if not all of which are highly communicable. Dr. Elston, who is an employee of Batelle, one of the drafters of the PEIS, has identified the three most important diseases as vibriosis, furunculosis and bacterial kidney disease (BKD). In addition to these three indigenous diseases, a number of other diseases can affect farmed salmon. In fact, Elston has stated that the number of fish diseases recorded in the literature can be directly correlated with the number of people performing research on such diseases. Recent articles co-authored by Dr. Elston describe two new such diseases. See L.W. Harrell, R.A. Elston, et al., "A Significant New Systemic Disease of Net-Pen Reared Chinook Salmon Brood Stock, Aquaculture 55:249 (1986); see also, M.L. Kent, R.A. Elston, et al., "Cranial Nodules

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Associated with Cranial Fenestrae in Juvenile Atlantic Salmon," Journal of Fish Diseases Vol. 10, p. 419 (1987).

There is documentation in the literature of examples of transmission of disease from net pen to wild fish. Moring states that after a very serious outbreak of furunculosis in National Marine Fisheries net pens, "The disease spread to wild fishes in Clam Bay". Moring, Aspects of Growth, and the Effects of Some Environmental Factors on Pen-Reared Chinook Salmon, pp. 148-49. A recent study by Malcolm C.M. Beveridge, performed under the auspices of the Food and Agriculture Organization of the United Nations, noted several instances of apparent transmission of disease from cage to wild fish. M.C.M. Beveridge, "Cage and Pen Fish Farming" (1984), pp. 13-14. Even one of the recent articles co-authored by Dr. Elston warns of the danger of transmitting a newly discovered pen fish disease to wild fish. Harrell, Elston et al., "*A Significant New Systemic Disease of Net-Pen Reared Chinook Salmon Brood Stock,*" Aquaculture 55: 249-262 (1986) at p. 261.

Svein Mehli's testimony regarding the experience of Norway is also highly instructive. Since the advent of net-pens in cultured fish, Norway has experienced the introduction of a number of new diseases that had not been found in Norway before, including BKD and redmouth disease, as well as the parasite *gyrodactylus salaris* (Transcript, pp. 43-46).

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Mehli states that net-pens are viewed in Norway as multiplying stations for disease, which thereby put pressure on the natural stocks which did not exist before the pens were installed (Transcript, p. 101). One example of this effect occurred when there was an outbreak of furunculosis in a net-pen. Five thousand diseased salmon escaped into the wild. Subsequently, wild fish were found infected with furunculosis (Transcript, pp. 95-96). Similarly, BKD did not exist in Norway before 1980. After first infecting net pen and hatchery fish, BKD is now present in the rivers in wild stocks, including rivers into which farmed fish have escaped (Transcript, pp. 98-99).

Perhaps the most spectacular example of an environmental impact was that caused by the parasite *gyrodactylus* which has multiplied and spread to 30 rivers in Norway. The only way to stop the spread of this parasite has been to poison the rivers with Rotenone thereby destroying all fish life within the rivers. The rivers were then restocked. Mehli also stated that he had witnessed the transport of *gyrodactylus* by pen-reared Rainbow trout (Steelhead) (Transcript, p. 41-43. 50, 94). *Gyrodactylus* may survive in brackish waters of up to 18 per cent salinity. One obvious measure to prevent introduction or spread of *gyrodactylus* is to preclude net pens in waters of (15) low or fluctuating salinity. No such measure has been recommended or discussed in the Draft PEIS.

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b. Mechanisms for Transmission of Disease

There are a number of ways in which disease can be transmitted from net pen to wild fish. First of all, it is well documented that net pens attract wild fish. Weston (1986) acknowledges that, "Wild fish are frequently observed in high densities around cages containing cultured fish." Id. at p. 76. Mr. Mehli also testified to his familiarity with this phenomenon (Transcript, p.67). Since many areas of Skagit and Island County shorelines are migratory routes for all five species of wild salmon, as well as for three species of wild trout, and given the highly communicable nature of diseases such as vibriosis, furunculosis and BKD, the potential for contamination is highly significant. It would therefore seem especially important not to locate net-pens in migratory routes for wild salmon. (16)

Second, there is the potential for transmission of disease through escaped pen salmon, as discussed by Mehli in the case of furunculosis. Mehli stated that escaped Atlantic salmon from net pens constituted in 18% of the fish found in Norway's rivers in 1987, and that preliminary estimates for 1988 indicated a use in this figure to 40%. Beveridge described escapement of pen fish as a common occurrence:

> Cage and penned fish frequently escape through netting or mesh damaged by predators, floating objects, or rough weather and in this way foreign or exotic species can be introduced to an environment. In any commercial cage or pen operation it is

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> inevitable that some fish escape. In one lake in Poland, Penczak estimated that 4 tonnes of trout escaped in one year. There are many records of escaped or deliberately transplanted fishes on indigenous fish stocks, and these include the extermination of local fishes through predation or competition, interbreeding with native fishes and adulteration of the genetic pool, habitat destruction and the outbreak of disease epidemics.

(Exhibit R-23, p. 305). Most recently, in February, 350,000 chinook and coho salmon escaped from net pens during a storm in British Columbia.

There is also evidence of Atlantics escaping from net pens in Washington. Mature Atlantic salmon have now been found in the Nisqually and Nooksack Rivers. These fish are sexually mature and ready to spawn. The Washington Department of Fisheries, has documented the catch of over 200 escaped fish. Moreover, as Eric Hurlburt, the Department's Aquaculture Coordinator stated, "these numbers surely underestimate the number of Atlantic salmon which are in the wild." Letter from Eric Hurlbert to Len Barson, p. 1. Greg Peterson, the Executive Director of Puget Sound Gillnetters, has stated that a number of Atlantics were caught early in the fishing season and counted as coho. He estimated that approximately 1,000 Atlantics had been caught this year. At the hearing in Mt. Vernon on the Draft PEIS, two commercial fishermen stated that just between the two of them, they had caught 83 Atlantic salmon the past year. Because of the growing number of escapes in

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(17) Washington, the Counties recommend that fish farmers be required to report all escapes of farm fish to the State.

It is often stated that transmission of disease from pen fish to wild fish will not occur because pen fish are stressed, while wild fish are not. However, juvenile fish which have just come into salt water from fresh water, such as the salmon fry that migrate in Skagit Bay, are indeed stressed. Stober and Salo discuss the increased susceptibility of salmon fry to environmental hazards, and note particular concern for pink and chum fry because of their small size and limited opportunity to adjust to salt water. Stober and Salo, Juvenile Salmonid Migration Through North Skagit Bay, p. 35.

Moreover, Moring actually documented the presence of juvenile pink salmon inside net pens at Kiket Island, in Skagit Bay, and Manchester. Moring (1975), p. 147. This is clearly a dangerous situation, since the juvenile pinks would be exposed to diseases in the pen at precisely the time they are most stressed.

c. VHS

The Draft PEIS states:

(18) The current system of certifying salmon eggs has been effective in preventing the introduction of exotic diseases such as viral hemorrhagic septicemia.

This statement has been thrown into substantial doubt recently by the appearance of the VHS virus in two hatcheries in Washington. At least one official from the U.S. Fish and Wild-

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life Service (Jerry Grover) stated that there is a strong possibility that the disease was introduced to the United States through fish farming operations for Atlantic salmon.

Dr. Ken Wolf, perhaps the foremost expert on the disease, has theorized that VHS was probably first found in one or more of Europe's salmonids, such as Atlantic salmon. The virus has proved highly virulent among Rainbow trout; however, a 1982 study by de Kinkelin confirmed that the disease can also affect Atlantics as well. The de Kinkelin study concluded,

> In conclusion, taking into account the availability of viruses to produce variance and the fact that VHS viruses are able to grow in Atlantic salmon. VHS is obviously a potential threat to intensive salmon culture. Any project to rear Atlantic salmon should apply strict sanitation rules towards VHS.

de Kinkelin and J. Castric, "*An Experimental Study of the Susceptibility of Atlantic Salmon Fry,* Salmo salar, *to Viral Hemorrhagic Septicemia,*" Journal of Fish Diseases, 5:57-65 (1982) at 65.

(19) Neither the Department nor the drafters of the Environmental Impact Statement has done any independent research on VHS. Contrary to the position taken by the Department of Fisheries, Dr. Wolf states that:

> Egtved Virus (VHS) was probably first found in one or more of Europe's salmonids - Atlantic salmon, Danube salmon, or Brown trout. Among these, the Brown trout is usually considered to be the prime or initial source species, because of its widespread original habitat, abundance, and comparatively high resistance to VHS. Although less common, the Atlantic salmon,

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Danube salmon, Greylings, and Whitefishes must remain suspect as the possible original source or sources. (Emphasis added.)

The Washington Department of Fisheries performs a variety of hatchery programs using Brown trout, as well as Atlantic salmon. No mention is made in the Draft PEIS of the potential (20) for salmon farms (which are not limited to raising any particular species) to pick up exotic diseases through species other than Atlantic salmon.

Whether the virus came from Brown trout, Atlantic salmon, or some other source, it is now in Washington, and is probably here to stay. It is a significant example of the potential impact that culture of exotic species can have on the environment.

d. The current Washington regulations are inadequate to assure protection of wild or hatchery fish.

(21) The existing regulations regarding Aquaculture Disease Control are found at WAC 220-77 et. seq. They are completely inadequate to accomplish any of the mitigation measures set forth on pages 80 and 81 in the draft PEIS.

First, WAC 220-77-030 relates only to diseases that result from the importation of eggs or fish into Washington and thus does not apply to diseases such as vibriosis, BKD, or furunculosis. Only four diseases are directly mentioned by the regulations. Significantly absent are redmouth disease, or

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other diseases that have been a problem elsewhere, as well as *gyrodactylus*, which is a parasite.

The regulations are only as good as the inspection for disease that is performed. Mehli testified that gyrodactylus was introduced into Norway because the inspectors did not know where to look or what to look for (Transcript, p. 113). In Kent and Elston's article concerning cranial nodules in Atlantic salmon a recent disease imported to Washington was traced back to eggs imported from Finland. Again, the inspectors presumably did not know what to look for or where to look. They certainly received no instruction from the regulations themselves concerning investigatory techniques or methods that should be employed in order to determine the existence of these exotic diseases.

Second, although WAC 220-77-070 provides for measures such as quarantine, the safeguards envisioned by the regulations are entirely dependent on notification by the operator that a disease is occurring at the net-pen sites. Amazingly, such notification is <u>not required</u> by the regulations unless there has been a <u>confirmed</u> diagnosis of one of the four diseases. Therefore, as to any disease not mentioned in the regulation, there is no requirement of reporting. As to any disease which is suspected, but not confirmed, there is no requirement of reporting.

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Obvious economic reasons exist why an operator would not provide notice voluntarily, since that could result in elimination of a pen stock by order of the Department. Moreover, even assuming good faith efforts by an operator, many diseases are not visible until long after they become communicated to other fish. For example, the effects of BKD are generally noticed only after a year or two of rearing. Fish also may begin to die from vibriosis before any external signs are apparent. See Margolis and Evelyn, "Aspects of Disease and Parasite Problems in Cultured Salmonids in Canada, with Emphasis on the Pacific Region and Regulatory Measures for their Control," pp. 5-6; Moring, "Aspects of Growth and the Effects of Some Environment Factors on Pen-Reared Chinook Salmon," p. 149.

By the time of detection, a great deal of damage can already have been done. Detection of disease in wild fry is also extremely difficult. The Norwegian experience amply demonstrates the potential for the spread of disease despite the fact that regulations in Norway are much more stringent than those in Washington and the United States.

The third problem involves the current methods of handling egg importation. Horizontal transmission of bacteria, viral disease and parasites can be controlled through treating the eggs with an iodine bath. In order to be effective, all eggs must be treated in the bath for at least six minutes. No

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information is presented by the Draft PEIS to establish the (22) frequency of extra-legal importation of eggs, the existence of any black market, or other factors that might lead to the importation of eggs that are not properly treated. We know of no mechanism employed by the Department of Fisheries or the State of Washington to investigate and stamp out extralegal importation (and none is discussed by the drafters). Regulators, therefore, must rely principally on voluntary compliance with the regulations. Of course, voluntary compliance is not necessarily the rule in every for profit business.

Vertical transmission of disease provides a further level of complication to the already existing difficulties in controlling disease from imported sexual products. Iodine baths do not kill viruses or bacteria inside the ovum. In order to determine whether any batch of imported eggs carries a virus or bacterium that is potentially harmful, the eggs must be quarantined.

According to Kevin Amos, a Department of Fisheries pathologist, there is no centrally located or state supervised quarantine facility. Rather, quarantine operations are carried out by unlicensed, untrained individuals at the fish growers' places of business and under conditions that are only sporadically inspected. Therefore, the very people who are the subject of the regulatory process are the ones carrying out the

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quarantine procedures. Such a mechanism for enforcement of regulations is unlikely to result in a foolproof method of disease control.

In Norway, a state run veterinarian service is charged with the detection and prevention of disease. There is no vehicle proposed by the draft PEIS to promote any preemptive steps to combat disease until after a problem develops. Under current conditions, therefore, there is no state or county agency that provides a comprehensive method of enforcement against disease. Similarly, there is no money to pay for such enforcement measures even if a county were to adopt, on its own, a regulatory mechanism that provided for better control over diseases.

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Despite the veterinarian service, comprehensive regulations, and greater experience, diseases have entered along with fish farms in Norway. Washington State is in a far worse position than Norway to detect or prevent the introduction of exotic diseases.

e. Conclusion of PEIS

The drafters of the programmatic PEIS cite some of the literature which indicates that transfer has and does occur whenever exotic species are introduced in new areas. The drafters conclude however, that the risk of transmission to wild stocks is "minimal" (PEIS p.80) and that adverse impacts can be mitigated through the measures of:

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(1) Development of legal measures;

(2) Development of regional brood stocks;

(3) The regulatory frame-work now in place;

(4) Education of regulatory agencies and fish farming industry;

(5) Technical certification procedures; and

(6) A requirement for the recording of fish disease outbreaks.

Mitigation measures 1, 2, 4, 5 and 6 are not currently (24) found anywhere in the existing Washington regulations. No specific proposal to implement the general concerns have been made in the draft PEIS.

Given the extremely damaging results that might occur from the introduction of exotic diseases, the Counties believe that (25) absent specific implementation of new regulatory and enforcement procedures, pen raised salmon pose a unique threat to our wild and hatchery fish.[4] Given the economic and social interest relating to healthy wild stocks of salmon, the risks to these stocks do not justify the introduction of exotic species where it is known that such introductions have histori-

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4 It should be remembered that hatchery fish are grown with public money for public benefit under conditions similar to farming operations. To subject our investment to a risk that only benefits private growers raises substantial questions concerning the economic costs of salmon net pens that have not been addressed in the Draft PEIS.

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cally carried with them parasites, bacteria, and viruses that have infected the native populations.

6. WATER QUALITY STANDARDS

a. Dissolved Oxygen

The Draft PEIS concludes that "net-pens would have an impact on dissolved oxygen and turbidity in Puget Sound. However, the impact would not be significant enough to violate state water quality standards." (Draft PEIS, p. 43.) On the same page, the Draft PEIS suggests that the most effective mitigation measure for dissolved oxygen impact would be to locate the net pens in areas that have historically had oxygen levels above six milligrams per liter.

It is known that dissolved oxygen is traditionally low in some places in Puget Sound, especially during the fall months. See, e.g., Colias, Atlas of Physical and Chemical Properties of Puget Sound and its Approaches (1974). Water low in dissolved oxygen enters the Puget Sound from the ocean. There is generally an upwelling of this ocean water in the late summer or the fall. Some of the water can have oxygen levels as low as 2.0 milligrams per liter at the time of upwelling. These periods of low oxygen, even in waters that are substantially oxygenated for the rest of the year, may occur for extended periods of up to a week or two. There is no discussion in the Draft PEIS as to what effect the biological oxygen demand from

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a net-pen will have on benthic or other species living near the net-pens when they have to suffer through the combined effects of seasonal low oxygen and high BOD from the net-pens.

The Counties believe that the drafters of the PEIS should (27) investigate and discuss the effects of locating net-pens in areas where seasonal reductions in dissolved oxygen are known to occur. Moreover, as indicated in the draft PEIS, actual field studies have shown a decrease in dissolved oxygen as much as 1.5 milligrams per liter in the area of net-pens (Draft PEIS, p. 42). There is no discussion in the Draft PEIS of the (28) cumulative impact of the natural decrease in dissolved oxygen combined with this additional effect from net pens. The Counties believe that this too should be remedied in the Final PEIS.

b. Phytoplankton

The draft PEIS states, "Worldwide, there has never been any evidence that net-pens caused or increased a bloom of noxious phytoplankton." (Draft PEIS, p. 48.) This statement does not seem to be supported by the literature. For instance, Dr. Weston in his August 1986 study, "The Environmental Effects of Floating Mariculture in the Puget Sound" states:

> Although not conclusively demonstrated, mariculture may be responsible, in part, for phytoplankton blooms observed in other countries, with Japan being the most notable example. Arakawa (1973) corrolated phytoplankton blooms with the culture of oysters in Hiroshima Bay. The frequency of the blooms closely paralleled historical trends in oyster production

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> within the Bay, however, it should be noted that the correlations in time are often spurious. . . . Laboratory studies have also implicated yellow tail feces as a potential contributing factor in phytoplankton blooms (Nishimura, 1982), and yellow tail culture operations have been adversely affected by blooms, with consequent production losses. Although the causative factors have not been clearly demonstrated, the Japanese have found phytoplankton blooms appearing with greater frequency than in the past. . . .
>
> Outside of Japan there are few reports of mariculture potentially contributing to phytoplankton blooms. At one site in Ireland (Doyle, et al. 1984) a bloom occurred that was localized around a culture operation, and the fish culture operation was believed to be a contributing factor . . . The potential for changes in phytoplankton community composition as a result of mariculture activities has not been addressed.

Weston, "The Environmental Effect of Floating Mariculture in Puget Sound" (1986) at pp. 41-45.

The 1988 ICES report similarly identifies the potential for algal blooms and concludes that there has not been enough work performed yet to determine what the precise effects of salmon culture are on this aspect of water quality.

> The study group recognizes that mariculture activity could bring about changes in the natural population in marine algae (phytoplankton and macroalgae) in the vicinity of the farm or at a distance where flushing action is vigorous. These effects include stimulation of primary production, changes in the species composition of the phytoplankton, reduction of phytoplankton's standing crop, senescence of phytoplankton blooms with subsequent localized areas of low dissolved oxygen, and enhancement of macrophyte growth. These effects have implications for public health, natural populations of marine organisms, and the viability of mariculture industries. . . . Byproducts of fish metabolism and

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> feed leachates represent a source of nutrients for phytoplankton growth and could, given suitable hydrographic conditions, stimulate primary production of phytoplankton if nutrients are controlling growth at the time. . . . Organic waste from fish farms might also play a role in stimulating the growth of specific algal species. For example, Nishimura (1982) has shown that fish farm by-products (fish carcasses and feces) enhance the growth of at least one red tide forming dinoflagellate. Biotin has been implicated in the effects of gyrodinium aureloum (Turner et al., in press) and Vitamin B-12 is a growth requirement for the toxic microphlagelate prymnesium parvum. Biotin and Vitamin B-12 are constituents of fish feed but their fate in the marine environment is poorly understood. . . . Toxic algal blooms are known to have killed wild fish (A. White unpublished data) and have been implicated in mass mortalities in farm fish in European waters (Doyle, et al., in press; Jones, et al. 1983) and shellfish (Buestel, et al. 1986). These problems are the subject of an ICES working group on exceptional algal blooms and are not discussed in this report.

Rosenthal, et al. "Environmental Impact of Mariculture (1988), at p.7. Finally, NASCO, the North Atlantic Salmon Conservation Organization, also recognizes that there have been examples of localized phytoplankton blooms occurring in enclosed sea lochs causing mortality of farm stock. "Potential Impacts of Salmon Farming on Wild Stocks," NASCO Council paper CNL (88) 21.)

Since 1978, the consequences of phytoplankton blooms, especially those causing PSP, have plagued the counties in Puget Sound. PSP was largely unknown in the Sound before 1978. It is unknown why these episodes began in 1978, but they are generally regarded as being influenced by additional nutrients. Net-pens introduce disproportionate amounts of nutrients into

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Net-pens introduce disproportionate amounts of nutrients into the water.

Because of the association of nutrient loading and algal blooms, and because of the low level of understanding that scientists have regarding the relationship between the nutrient loading, other promoting growth factors, and fish farms, it appears that the drafters have arrived at their opinions prematurely and without sufficient study. (29)

c. Fecal Coliform

Virtually no space is given in the draft PEIS to the problem of fecal coliform. No impact is identified and no mitigation measures are proposed to avoid fecal coliform problems. (30)

The sum total of the Draft PEIS comments on fecal coliform are as follows:

> Fecal Coliforms. Fecal coliform bacteria are produced in the intestines of warm-blooded animals and are a relative measure of sanitary quality (APHA 1985). Net-pens do not directly affect ambient (existing) fecal coliform concentrations in Puget Sound because fecal coliforms are not produced in fish. However, fecal coliform levels could indirectly increase near net-pens from increased marine bird and mammal activity. Or fecal coliform levels could possibly increase from the failure of a facility's septic system.

A great many of Puget Sound's waters surrounding areas where net-pens might be proposed are contaminated by fecal coliforms that come from failed or malfunctioning sewer systems. Recorded fecal coliform rates as high as 32 million

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per hundred milliliters of water have been measured within several miles of proposed net-pen sites. Beaches in these areas have been closed to shellfish as a result of the high pollution load.

The question then becomes whether the existence of net-pens can exacerbate already existing problems. In this regard, scholars seem to agree that insufficient work has been done to evaluate the interrelationship between coliform rates and net-pens:

> The effect of culture activities on coliform, and specifically, faecal coliform bacteria is of particular interest because of the importance of this group in water quality monitoring. Finnish authorities have found elevated concentrations of coliform and fecal streptococci bacteria in effluents from freshwater trout ponds (Haavisto, 1974). . . . Increased total coliform concentrations have also been reported in receiving waters near several freshwater hatcheries in the Western United States (Hinshaw 1973), although a large freshwater trout farm in Norway caused no change in fecal coliform numbers in receiving waters (Bergheim and Selmer-Olson, 1978). Near surface waters near marine salmon net cages in Seshelt Inlet, British Columbia were seen to have a higher total coliform concentration than comparable reference areas. The increase, however, was not statistically significant (E. Black and B.L. Carswell, unpublished data). We are in need of a clear differentiation between fecal and total coliform, because the counts obtained with methods usually employed to evaluate sewage effluents in waste waters originating from human activities, may not adequately reflect the species and type composition encountered in fish farm effluence. The development of sound hygienic criteria, specifically adapted to the marine environment is urgently needed (emphasis added).

Rosenthal et al., "Environmental Impact of Mariculture," p.5.

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Prior to arriving at a conclusion that fish farms do not have an exacerbating effect on areas already contaminated by fecal coliform (a position not shared by the world's foremost scholars), we believe that the department should either perform independent research on the subject or fairly identify the current unknowns in the literature. A description of the potential impacts on human health as a result of exacerbation of existing fecal coliform conditions should also be included in the PEIS.

A further dimension to the problem is added when considering what organisms should be considered to make up "total coliform." The assumption by the drafters of the PEIS is that fish do not produce bacteria that pose dangers of infection to humans. That assumption is not entirely well grounded. In recent years, important work has been done on the classification of pathogenic bacteria that may provide human health problems through poor water quality. Some of this work has called into question the previous classification of bacteria as "coliform." The committee in charge of revising the Publication of Standard Methods (a treatise jointly produced under the auspices of the American Public Health Association, The American Water Worker Association, and the EPA) is considering a reclassification of coliform bacteria to include species in the aeromonas genus. It has been found that

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certain aeromona species, which are known to be produced by aquaculture activities, can cause infection in humans. For instance, operators of shrimp culture pens in Hawaii have been found to be infected by the aeromas bacteria carried by the shrimp. Dr. Ted Wetzler (Personal Communication). Salmon also are known to carry and distribute aeromonas. If the concept of total coliform is re-classified to include aeromonas bacteria, net pens will necessarily be seen as having a substantial impact on total coliform concentrations. Such a result would more accurately reflect the pens' potential as a source for health problems.

7. **EFFECT ON THE BENTHOS**

(31) a. Feed Wastage Rates.

Feed wastage rates were reported at levels between 1 and 30 percent. The drafters stated that "feed wastage has proven difficult to ascertain in field conditions." It is unclear from the draft PEIS whether investigation was made into actual wastage rates; the only information used appeared to come from growers' reports. Independent work should also be undertaken in order to properly calculate FCRs (food conversion ratios). The assumption of a 1 to 1 or less than 1.5 to 1 FCR should require some substantial investigation. None seems to have been done, and even in Norway, such low FCRs are not claimed to occur in the industry.

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> Conversion efficiency obtained with the same food can vary enormously according to the method of feeding and the general skill of the fish farmer. For wet foods, containing about 12-1300 kcal of available energy/kg, conversions as low as 4 and as high as 16 to one have been reported, but the average is around 6 or 8:1. For dry foods, better (lower) conversions can be obtained with small fish up to about 50 g, and for these figures as low as 1:1 have been claimed with high energy foods (about 3670 kcal available energy/kg). For larger fish, conversions from 1½ to 3:1 have been reported, but around 2:1 is normal both for salmon and rainbow trout.

D. Edwards, Salmon and Trout Farming in Norway (1978).

The reason these two issues are important is that modeling of sedimentary deposits is now performed on a regular basis in net-pen application materials. The result of any sedimentation model will depend in large part on the assumption for feed wastage and FCR that goes into the model. It does not appear that much credence can be given to the assumptions set out in the Draft PEIS since they are not the result of independent work or study.

b. Diver Study and Baseline Benthic Survey.

The interim guidelines do not require that a diver study be performed on areas deeper than 75 feet. A baseline benthic survey is required, but only after deployment of the net pens. (32) The Draft PEIS should remedy these defects and require both a diver study and benthic analysis prior to application for any salmon net-pen. If this is not done, local governments will not have sufficient information on what species exist in the

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area of the net-pens so as to be able to fully evaluate the potential impact of the pens.

c. Eel Grass.

Some of the richest eel grass meadows in the world are located in Island and Skagit Counties. Eel grass forms the (33) basis of the food chain for many if not most of the important recreational and commercial fish species. A number of proposed sites for salmon net-pens occur in "holes" that are surrounded by shallows containing vast eel grass beds. There is, however, no discussion in the Draft PEIS of the effect of nutrient loading, dispersed fish waste, BOD, or the like on eel grass populations.

Since the principal recommended mitigation measure is dispersal of the waste, (see mitigation measures found on pages 26 - 27), it is undoubted that eel grass and dispersed waste will come into contact even in areas where the pens are located in water deep enough so that no eel grass grows directly beneath the pens. It is important from the Counties' standpoint for the PEIS to make a biological assessment of the impact these wastes will have on the eel grass. Nutrient loading of the water may promote the growth of epiphytic algae which in turn could have the effect of choking off eel grass. Given the extreme importance of eel grass in maintaining healthy populations of all naturally occurring marine organisms in our estuaries, this is an extremely important issue that

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bears inquiry by the drafters.

8. **EFFECTS ON MARINE MAMMALS AND BIRDS**

(34) a. Mammals.

Sea lions, harbor seals and otters, the three marine mammals most likely to be found in net-pen sites are protected by the Marine Mammal Protection Act, 16 USC 1361, et seq. Siting of net-pens almost anywhere in Puget Sound will generate a conflict with these marine mammals. Mitigation measures such as those described on p. 88 of the draft PEIS, including siting net-pens more than 1500 feet away from known haul-out areas, would seem to be ineffective in stopping marine mammals from visiting net-pen sites. Recently, at least six sea lions which were trapped by the Department of Fisheries at the Ballard Locks and released more than 200 miles away on the coast of Washington returned to the Ballard Locks to continue their feeding on migrating steelhead. It therefore does not appear that a 1500 foot distance presents much of a protective measure. Perhaps of even more concern to the counties, who must consider the protection of marine mammals (as must other agencies), is the fact that the conflicts between net-pen operators and marine mammals may result in increased death rates of the marine mammals.

Finally, the proximity of marine mammals to salmon net-pens also substantially increases the risk of escapes. Not

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long ago, a sea lion tore a large hole in a pen in West Seattle, allowing thousands of salmon to escape. Such incidents are only likely to increase if net-pens become more prevalent.

b. Birds.

Skagit and Island Counties are located directly in the migration routes of an extremely large number of aquatic birds and birds who feed in aquatic areas. These range all the way from ducks to peregrine falcons and bald eagles. In fact, more peregrine falcons feed in or near Skagit and Padilla Bays than anywhere else in the state.

Peregrine falcons and bald eagles are threatened species (35) and therefore protected by federal statute. There is no specific discussion of particular recommendations with regard to either of these two birds. Rather, the drafters simply mention some newly adopted "bald eagle protection rules," and say nothing with regard to peregrine falcons. (See p. 87.) Because these birds are both found in substantial quantities in Puget Sound, a better treatment of the subject is necessary.

Skagit and Padilla Bays are also extremely important migratory areas for non-endangered species. Only a general conclusion that "net-pens should not be located near wildlife habitats of special significance" is stated in the draft PEIS. In fact, however, neither the Department of Fisheries nor the Department of Ecology has opposed net-pen proposals in Skagit

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Bay despite the fact that Skagit Bay is identified as an area of "particular concern" (in part because it is such an important bird habitat) in the WCZMP. We believe that the Draft PEIS should further define the habitats of special (36) significance with respect to aquatic birds, and should conform to the protective guidelines of the WCZMP with respect to any recommendations.

c. Predators

There is ample documentation that net pens attract wild fish. As Weston explains,

> Wild fish... are attracted to the culture operations for several reasons. In part, there is a behavioral tendency for fish to congregate around floating objects. A floating mariculture facility also increases the availability of food in the area.

Weston, "Environmental Effects of Floating Mariculture in Puget Sound," pp. 76-77. It has also been theorized that the curious nature of wild fish attracts them to the pens.

In addition, it is beyond debate that net-pens attract predators. Moring documented the attraction of spiny dogfish, otters, grebes and other diving birds, gulls, and blue herons, to net pen sites to feed on salmon. Moring, "Aspects of Growth and the Effects of Some Environmental Factors on Pen-Reared Chinook Salmon," p. 153-4. Marine mammals such as seals are also predators of salmon.

Beveridge has noted the attractiveness of net-pens to predators of salmon. He states,

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> Cages and pens of fish seem to act as a magnet to a wide range of both obligate and facultative fish-eating vertebrates. The range of species reported to cause problems at cage and pen farms . . . includes fish, reptiles, birds and mammals. Many of these species move into an area where a fish farm has been established, attracted by the large number of readily detected fish and also by the bags of commercial feed occasionally left unprotected on the cage walkways. Even comparatively rare species, such as the osprey (*Pandion haliatus*) in Scotland will travel considerable distances in order to visit a fish farm.

Beveridge, "Cage and Pen Fish Farming" (1984) p. 14. Osprey are also present in Skagit and Island Counties. The draft PEIS in fact acknowledges this attraction and states that the net-pens may operate as a beneficial source of food for bird and other predator populations (Draft PEIS at p. 84).

The penned fish, of course, are generally protected from predators by the nets. The wild stocks, who are also attracted to the net-pens, are a different story. Beveridge acknowledges that, "Predation of wild fish may increase through the attraction of predators to the enclosure site." Beveridge at p. 14. Especially where net-pens are sought to be located in migratory routes, nursery grounds, or other places where wild fish congregate, it appears that the net-pens will act as an "attractive nuisance" which will result in a substantially increased predation on the wild fish.

No studies or estimates are cited by the drafters of the (37) PEIS to determine whether this potential increased predation will be significant in terms of reducing wild fish. Moreover,

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no mitigation measures are proposed that would alleviate the damage to wild populations by this increased predation. This tendency for increased predation to occur is an additional reason suggesting that net-pens should not be placed in or near the mouths of salmon-producing rivers. At least until research is done to disprove the theory, congregations of predators near net-pens should be viewed as a potential threat to wild fish.

(d) PEIS Conclusion.

The conclusion of the Draft PEIS is:

> Properly sited and operated net-pens will not have significant adverse impacts on marine mammals or birds. Some habitat loss may occur for some species, while other species may benefit. Specific impacts will depend on the pen site and the associated wildlife.

This conclusion may or may not be true. The discussion in the Draft PEIS does not consider much of the important litera-
38 ture in the area. No independent research was performed, and no discussion of certain complicating factors, such as the Marine Mammal Protection Act, is presented. It is therefore the position of the Counties that a good deal of additional work is needed on this section before it can be incorporated into the Final PEIS.

9. CHEMICALS

The section in the draft PEIS on Chemicals deals primarily with the issue of antibiotic usage in fish farms. No inde-

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(39) pendent research was performed by the authors of the draft in this area. Nonetheless, the authors, contrary to the general trend of the literature, conclude there are no substantial environmental impacts that might result from the use of antibiotics in fish farms in Puget Sound. To reach this conclusion, the authors selectively cite from the literature, and ignore strong cautionary warnings that there is much more that needs to be known before there can be a definitive answer in this area.

It is well known that drug resistant plasmids appear in bacteria at fish firm sites. See, e.g., T. Aoki, *Drug Resistant Plasmids from fish pathogens*, Microbiological Sciences 5(7) 219-223 (1988). Resistance occurs because non-resistant bacteria are killed by the antibiotic, leaving only the resistant strains remaining. Many bacterial fish diseases, including furunculosis and vibriosis, have developed resistance to antibiotics. In addition, plasmids have appeared which are resistant to as many as 2 to 8 antibiotics, including resistance to antibiotics with which the organism was not treated. Id.

The presence of resistant strains of pathogenic bacteria in a net pen makes it more difficult to control disease in the pen. This may increase the danger that disease will be transmitted from pen stocks to wild stocks. Should disease transfer occur, the effect on the wild stocks could be severe, given the

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fact that unlike the net pen fish, the wild fish are not caged in a small area where treatment can quickly be provided.

The transference of resistant plasmids also creates poten (40) tial dangers to human health. One study by Hayashi et al. cited in the Draft PEIS shows that in a laboratory experiment resistant plasmids transferred from *V. anguillarum*, a fish pathogen, to *V. parahaemolyticus*, a human pathogen. The danger, of course, is that it becomes more difficult to treat humans when antibiotic resistant plasmids are transmitted together with the disease. The draft PEIS discounts this danger, stating that transference is solely a laboratory phenomenon. This conclusion appears hasty in light of the literature documenting transfer of resistant plasmids under natural conditions. Colwell, R. R. and Grimes, D.J., *Evidence for Genetic Modification of Microorganisms Occurring in Natural Aquatic Environments*, Aquatic Toxicology and Environmental Fate: Ninth Volume, ASTM STp 921. T.M. Poston and R. Purdy, Eds., American Society for Testing and Materials, pp. 222-230 (1986). A more recent article, O'morchoe et al., *Conjugal Transfer of R68.45 and FP5 between* Pseudomanas aeruginosa *Strains in a Freshwater Environment*, Applied Environmental Microbiology, 54: 1923-29 (1988) contains an actual demonstration of the conjugal transfer of plasmids in a natural environment, and concludes, "The studies reported here demonstrate that conjugal transfer of plasmids such as R68.45 and FP5 can

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and does occur under conditions found in nature." Id. at 1929. Testimony provided in recent Shoreline Hearings Board proceedings is to the effect that it is a question of when, not if, such transfers will take place.

It is not the Counties' purpose in these comments to document on a point-by-point basis the dangers of antibiotic usage in net pens. It is disturbing, however, that the authors of the Draft PEIS have seen fit to selectively quote from the publications they cite in order to reach the conclusion they apparently wished to reach from the outset: that is, that the use of antibiotics in Puget Sound poses no environmental risks. In doing so, they ignore a host of cautionary warnings that far more study is needed before any conclusions can be drawn in this area.

For example, the Draft PEIS cites the work of Austin and Al-Zahrani, *The Effect of Antimicrobial Compounds on the Gastrointestinal Microflora of Rainbow Trout, Salmo Gairdneri Richardson*, Journal of Fish Biology 33: 1-14 (1988). This is an important work, because it is one of the few studies that actually attempts to document the effect of chemotherapeutic regimes on the microflora of fish. Nonetheless, nowhere in the Draft PEIS is the conclusion of this report:

> It may be perceived that there could be a problem associated with the release of antibiotic-resistant organisms into the aquatic environment. If the resistance mechanism is plasmid-mediated, as has been found commonly in fish pathogens and native aquatic

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> bacteria, then there could be a problem associated with the transfer of resistance to other organisms of human and/or veterinary significance. This could be of prime concern in the use of antimicrobial compounds in aquaculture.

Id. at 13 (citations omitted).

The authors of the Draft PEIS also cite a 1983 FDA (41) Environmental Assessment of oxytetracyline (OTC) for the proposition that the use of OTC does not pose adverse environmental effects. OTC is currently the most commonly used antibiotic at U.S. fish pens. There is no mention of this passage written by Dr. Weston in 1986 on the need for more research regarding OTC:

> Assessment of the environmental consequences of OTC usage in net-pens is severely hindered by a lack of available information on fate and effects of the antibiotic in the marine environment. In addition to the literature reviewed for this study, a computerized literature search on the drug has been reviewed, the Washington Department of Agriculture has attempted to obtain information from the Food and Drug Administration and I have made inquiries with the manufacturer. All efforts have met with little or no success to date. Thus, all conclusions must be regarded as tentative, having been based on limited and in some cases conflicting data.

Weston, D.P. The Environmental Effects of Floating Mariculture in Puget Sound at 97 (1986).

(42) The Draft PEIS also attempts to allay concern about the use of antibiotics by citing studies indicating that the increased level of resistance associated with antibiotic use around fish farms is soon reduced after the use has stopped. One study cited (Austin 1985) may be of limited utility since

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the samples were obtained from effluent from a flow-through system, and it is possible that there was a dilution effect rather than loss of resistance in the same bacterial population over time. See Rosenthal, H., Weston D. et al., *Report of the* ad hoc *Study Group on "Environmental Impact of Mariculture"*. ICES, Cooperative Research Report No. 154 at 12 (1988). Indeed, another work by Austin suggest a less optimistic conclusion:

> On a note of caution, however, it has been established by microbiological assay that some compounds linger in fish tissue for much longer than may have been previously realized. McCracken et al. (1976) established that trimethoprim remained in rainbow trout muscle for 77 days after administration... Similar results were reported by Salta and Liestøl (1983)... We do not dispute the results published by these two groups, but it is worthwhile to emphasize that microbiological assays are not nearly as sensitive as the more modern physico-chemical methods, such as high-pressure liquid chromatography. Conceivably, use of such ultra-sensitive methods may have revealed that the drugs were retained in fish tissues for much longer periods.

B. Austin and D.A. Austin, Bacterial Fish Pathogens: Disease in Farmed and Wild Fish (1987) at 344.

43 The Draft PEIS also contends that fewer problems are likely to arise in the United States because federal regulations are so stringent. That statement is correct in one sense, but deceptive in another. It is true that the United States prohibits the use of certain antibiotics that can be used in other countries. On the other hand, countries such as Japan and Norway regulate the application of antibiotics to a

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much greater degree than the United States, requiring that antibiotics be obtained from a state veterinarian, and that all usage be strictly monitored. These latter requirements are not currently in place in Washington State.

In fact, both of these strictures are suggested as (44) possible mitigation measures in the Draft PEIS. Adoption of both proposals would be an important first step toward the proper regulation of antibiotics in Washington. The suggestion that further research be done regarding the effect on shellfish of antibiotics, and that additional research be done on the accumulation of antibiotics in sediments near fish farms in Puget Sound, is also clearly a good one.[5]

In the end, however, the Draft PEIS, after raising issues of potential concern about antibiotics, dismisses those issues with too little thought or consideration. This is clearly a subject where further study is urgently needed. As the Rosenthal and Weston (1988) report states,

> Antibiotic resistance has been shown to be stimulated by antibiotic use in fish culture but more work on the subject is urgently needed. The development of antibiotic resistance is obviously of significance to the culturist, but it is only one of the environmental issues for which there are at best limited data. Other issues of equal concern include persistence of antibiotics and other mariculture chemicals,

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5 This is particularly true given that the study by Tibbs et al. (1988) is flawed, since the shellfish were suspended below the pens, rather than on the bottom where sediments could accumulate, as would be the case under natural conditions.

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bioaccumulation potential, and toxic effects on indigenous biota.

Rosenthal and Weston (1988) at 12. This is a topic on which no ultimate conclusion can be reached based on the present literature, and for the Draft PEIS to attempt to do so is unwarranted.

10. **ECONOMICS**

45 The report entitled "The Economics of Salmon Farming," by Robert Stokes is not included in the text of the draft PEIS, but rather is set out separately in the Technical Appendices. Neither the methodology nor the numerical results of this study appear sound, and they certainly do not justify the sweeping conclusions, uniformly favorable to aquaculture, that are drawn from the analysis. Because this report is fundamentally flawed, it should be dropped in its entirety from any final PEIS that is issued.

Dr. Stokes' report is based on a form of economic analysis 46 in which key variables are selected at the "high end" of probability ranges to give an overly optimistic estimate of economic benefits that can be derived from net pens. Several examples serve to illustrate this point. The typical fish farm is assumed to employ 20 persons at an average wage of $25,000 per year, or about $12/hour. Fish farms do not employ that many people. A recent proposal near Gig Harbor, which would be

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as large as permitted under current DNR guidelines, has stated it would only employ 5-10 workers, and gave 8 workers as the most likely number of workers to be employed. A smaller farm proposed in Skagit County south of Hope Island was estimated to create at most five new jobs. Norwegian fish farms employ on the average 6 to 8 persons. For similar reasons, the estimate of 40-51 additional jobs per farm within counties is equally unrealistic. Dr. Stokes' salary figures are similarly unrealistic, since most of the work only requires unskilled or semi-skilled personnel. Rates of $5-$7/hr. are far more likely for all but one or two supervisory personnel.

Stokes also assumes that the entire product of the fish
47 farm will be sold out-of-state for $5.00 per pound. First, this assumption, which was made to result in the most favorable economic contribution of aquaculture, appears to conflict with the assumption that development of a local net pen industry will displace the need in Washington for imports of farmed salmon from other countries. Second, $5.00/pound is not the average current price of farmed Atlantic salmon. Four dollars per pound is much closer to current market price, and James Anderson of the Department of Resource Economics at the University of Rhode Island (among others who have done work in this area) predicts that as supplies of farmed salmon increase, there will actually be a drop in real prices over the next few

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years. In fact, it is currently possible to buy farmed coho salmon in the Seattle area for $2.99/pound.

Dr. Stokes' discussion of the effect of net pens on prop-
(48) erty values is also lacking in merit. The purported measure of loss in economic value resulting from adverse environmental effects is the product of a series of unsupported assumptions: that deviations from mean real estate value contain a measurable component reflecting aesthetic characteristics; that these effects are equally distributed within an arbitrarily selected distance from pen sites; and that the equally arbitrary selection of a proportion of deviations from mean values is a meaningful estimate of losses in aesthetic values.

Finally, the Benefit-Cost Analysis is also without merit.
(49) Even if all of Dr. Stokes' faulty assumptions are accepted, it is not possible to compare the benefits lost from aquaculture with the benefits gained, since this is a classic case of comparing apples and oranges. It is also highly significant to note that nowhere does the report discuss the economic implications or potential costs of aquaculture due to fish disease, pollution, or displacement of existing industries such as commercial or recreational fishing. Nor is any attention paid to the increased costs to government of aquaculture, in the form of regulatory outlays, research and promotion that are currently borne by the State and local governments.

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In sum, both Dr. Stokes' methodology and his numerical results appear invalid, and certainly cannot be used to justify the sweeping conclusions (which are uniformly favorable to aquaculture) that are drawn from the analysis. Statistical jargon and computer graphs cannot gloss over the dubious validity of Dr. Stokes' procedures. The report should therefore be removed from any final PEIS that is issued.

11. **NEED TO MAINTAIN COUNTY AUTONOMY**

The current Recommended Interim Guidelines for the Management of Salmon Net-Pen Culture in Puget Sound state that they (50) were developed entirely with the goal of environmental protection, and "do not address social, economic, aesthetic or water/land use conflicts which must be given consideration on a case-by-case basis." It is unclear from the Draft PEIS whether this policy will be continued. It is the strong belief of the Counties that it should.

Several provisions in the Draft PEIS lead to this concern. For example, on page 2, the Draft PEIS states that it will be used by decision makers at the local level to make permitting decisions. The aesthetic analyses proposed on page 102 of the report raise at least the possibility that they could be used to usurp or limit the authority of local governmental agencies to make siting determinations.

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The guidelines established in the PEIS may be appropriate in the case of some environmental decisions regarding the project, although even in those situations many factors (such as flushing and impact on the site's existing biology) require a site-by-site analysis. It may also be appropriate for the State to establish some minimum threshold which must be met in the case of aesthetic and site conflict issues. The ultimate determination on these issues, though, must be left to the local governments through implementation of SEPA and their Shoreline Master Programs, after a site-specific review of the testimony regarding the individual characteristics of the site. (51)

At the public hearing on the Draft PEIS, Mr. Westley, the project manager for the PEIS for the Department of Fisheries, stated that it was not the intention of the authors of the report to alter the need for a site-by-site analysis of each proposed site. Mr. Westley also indicated his belief that most projects that are proposed will require a separate Environmental Impact Statement. The Counties are encouraged by these remarks, and strongly encourage their incorporation in the final PEIS, particularly with regard to aesthetics and use conflict issues. (52)

12. **THE NEED FOR ENFORCEMENT**

(53) A number of the mitigation measures proposed in the Draft PEIS involve the imposition of conditions on the manner in

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which aquaculture projects will be run. For example, with regard to the control of odor, net pen operators are directed to follow "best management practices" and maintain "the general cleanliness of the facility." In addition, nets are to be cleaned regularly, feed stored in closed containers, and/or only dry feed used. Limitations on the manner in which pens are to be run are also included in the sections on aesthetics and noise.[6] The ultimate premise in many sections of the Draft PEIS that there will be no significant environmental impacts is based at least in part on fulfillment of these mitigation measures.

The problem, however, is that there is no system in place (54) to ensure that the conditions set out in these measures are in fact met. Counties generally do not have the resources to provide detailed enforcement of site conditions, and there is no mechanism currently for the Counties to pass these costs on directly to the net pen operators. Moreover, to date the State has apparently not been willing to come forward and fill this gap in enforcement. The bottom line is that it is unrealistic to premise a finding of no significant impact on the fulfill-

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6 Other conditions on the manner in which the pen should be run are set out in Section II.A.1, Impacts of projects to Bottom Sediments and Benthos (e.g. use slow-settling, highly digestible feed, use feeding methods that maximize ingestion and food conversion); Section II.A.2.(a), Water Quality Standards (monitoring during net cleaning); Section II.A.2(b), Phytoplankton (reduce feed wastage through careful fish cultural practices); and Section II.A.4, Marine Mammals and Birds (follow established procedures for controlling predators).

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ment of conditions which most likely will not be effectively monitored.

13. **CONTRADICTORY MITIGATION MEASURES**

55 A number of mitigation measures that are recommended are internally inconsistent. Although the Draft PEIS occasionally notes the inconsistency, it does nothing to ultimately resolve these conflicts and determine whether there in fact might be an impact on the environment resulting from the siting of a net pen.

Several examples jump out of the report. Net pens should be non-reflective and somber-hued for aesthetic purposes; for navigation, they should be highly visible. For commercial fishing and navigation purposes, pens should be sited close to shore; in areas of low level shorelines, pens should be sited away from the shore. If pens are cited close to shore in an attempt to mitigate impacts on fisheries and residents on high shorelines bluffs, there is still the problem of mitigating odor impacts that may emanate from the project.

The question raised but never addressed in the Draft PEIS is whether these conflicting requirements can be resolved so that a pen can ultimately be sited without causing problems in one area or the other. Resolution of this problem in the final PEIS is a necessity.

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14. **AESTHETICS**

Perhaps the first problem of the Draft PEIS in this area is that it attempts to divide three components of aesthetic impact--visual impact, noise and odor--into different sections (56) without any discussion of their connection. A discussion of one of these factors without the others is generally meaningless, since it is most often their combination which causes the intense opposition of residents living near proposed net pen sites. Instead of being broken up into separate sections, these issues should all be addressed under one section so that the full aesthetic impact of a project can be considered as whole.

There is no question, as the Draft PEIS states, that visual impacts are "subjective and difficult to quantify." Having said that, the Draft PEIS then attempts to quantify such impacts using computer modeling studies by EDAW and CH2M Hill which do not accurately reflect real-life conditions. These studies are premised on the assumption that the viewer is located in a fixed spot and has a 60° cone of vision. A real (57) person does not spend his life fixed to the same spot without turning or moving his head. In addition, the studies do not consider the existence of structures or people at the site. There is ample testimony in prior Shoreline Hearings Board proceedings that even though a project may be 2,000 feet away

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from a residence it does not appear as a "thin line on the horizon."

At other times, the Draft PEIS falls into the trap of meaningless doublespeak, as in the case of the following paragraph:

> The overall cumulative impact resulting from five net-pen farms in an embayment, for example, would vary considerably depending on whether there were other man-made structures in the area and on observer attitudes. Placement of several net pens in an embayment that had few other man-made structures might be perceived by some as altering a natural environment to an urbanized environment. Other observers may not perceive any significant aesthetic change due to an increase in the number of net pens either because they do not perceive net pens as a visual intrusion. Or they may perceive any net pen to be a visual intrusion.

(Draft PEIS, p. 95). If the authors of the Draft PEIS have ever attended any public hearing on a proposed net pen, they would know that the attitude of nearby residents on the siting of even one pen is almost universally hostile and antagonistic. (58) To say that the above paragraph does not adequately reflect the likely reaction of nearby residents if five such projects were proposed is a major understatement.

The Counties do agree with the ultimate conclusion that there generally will be adverse visual impacts resulting from siting net pens in Puget Sound. Although aesthetic analyses, design and location guidelines may partially assist planners in evaluating the impact of a project, the ultimate determination in this area must be made by the local governmental authority

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taking into account its Shoreline Master Program and the testimony of its constituents at public forums.

15. **NOISE**

The issue of noise is a significant one because residents in areas where net pens are proposed often live there because of the quiet and pristine nature of the environment. New sources of noise (as well as of visual impacts and odor) are thus far more significant than in more urbanized areas.

The Draft EIS discussion of noise impacts does touch on a number of the objections commonly raised by nearby residents at public hearings, although perhaps not in sufficient detail. (59) Because of the fact that the pens are sited over water, noise tends to carry much farther, and to be far more noticeable, than over land. The impact of increased truck and vehicle traffic receives only one sentence in the report, but is a very real issue to residents of areas where there generally is little traffic.[7] Noise may be increased in situations where there is a steep entrance or egress from projects, or where road quality is poor, as is often the case in rural

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7 Increased traffic resulting from net pens can also present safety problems for residents of rural communities where there is currently little or no traffic. This is particularly the case in areas where children will be present. There is also the question of revenues for improved streets and traffic control, all of which are "costs" borne by the counties and their residents.

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communities. Any program of the operator for visitors to the pens may result in additional impacts. There is no mention of radios or other artificial sources of noise resulting from workers at the project, but both testimony at public hearings and common sense indicates that this too is a potential source of problems.

The suggestion that net pens should not be sited in small, populated, sheltered bays where low background back noise levels would increase the impact of noise is a good one, and might serve as a minimum threshold under which projects can be evaluated. However, because many of the other mitigation measures proposed depend on monitoring of activities at the project which may not in fact take place (see discussion above on Enforcement), the impacts of the project may be greater than the drafters of the report realize.

The Counties disagree with the report's conclusion that any increase in local noise levels "is not expected to have significant impact on shoreline residents or other users of the adjacent water and shoreline," since this conclusion does not follow from the discussion of potential impacts from projects. Rather, a number of potential net pen sites pose the spectre of unacceptable increases in noise. Each site must be considered
60 on its own merits, and approved only after careful consideration by the local government of the noise impacts the project realistically will create.

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16. **ODOR**

Testimony at public hearings confirms that net pens do emit bad odors. For example, at a recent Shorelines Hearings Board case on the Skagit System Cooperative Project, a number of nearby residents testified about the unpleasant smell emanating from the American Aqua Foods project. There was also a good deal of testimony about odors coming both from the American Aqua Foods and Cypress Island projects at the Mt. Vernon hearing on the Draft PEIS. This issue is thus a very important one, and is one of the primary reasons that nearby residents tend to generally oppose net pens.

The mitigation measures proposed in the report may in fact
61 reduce impacts in this area, although there are no studies that confirm whether or not this will be the case. Moreover, as previously noted, many of the measures proposed depend on
62 adequate enforcement, and there is no guarantee that project operators will in fact meet these standards. The siting suggestions are even more problematic. Increasing the distance of pens from the shore may increase visual impacts, or conflict
63 with navigation or fisheries activities. Siting the project downwind from one residence may simply transfer the impact to another residence. Finally, locating the pens in areas where there are already odors hardly appears to be a workable solu-
64 tion, since the appropriate government response in that case is

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to reduce the source of the existing odor rather than add an additional source.

Odor is a problem that must be dealt with on a case-by-case basis. It may be, as in the case of noise and visual impacts, that otherwise adequate sites for net pens will be (65) disqualified by local governments because of the overall aesthetic effects of the project. This point should be directly acknowledged in the Draft PEIS so it is understood that in the end the ultimate decision-maker in this area is the local government entity.

17. **COMMERCIAL FISHING**

This issue is an extremely important one, since a significant portion of the economy in both Skagit and Island Counties is dependent on the commercial fishing industry. It should be noted that many of the issues previously discussed, such as disease and the effect of projects on the surrounding biology, have a direct impact on commercial fishermen. It is the position of the Counties that foremost consideration must (66) be given to preservation of wild and hatchery runs of salmon, and that if there is any question these might be jeopardized in any way by the siting of a net pen, the site should not be permitted.

Although the discussion on potential impacts on commercial fishing is good in some respects, there is no discussion of the

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effect that the anchors of a project will have in deterring
67 fishing in a particular area. In the case of the recent Skagit System Cooperative application to site a pen just south of Hope Island in Skagit County, testimony was provided that the net pens would close the entire area between Hope Island and Seal Rock to gillnetters. This is because gillnetters would have to start pulling their nets out of the water about two miles away from the site in order to avoid the risk of snagging their nets on the project's anchors. In a similar vein, the total impact of 100 net pens on commercial fisheries appears to be understated, since the anchoring system of some pens (such as the site now proposed in Colvos Pass north of Gig Harbor) can extend over 30 acres, and because the need for fishermen to pull out their gear well before reaching these sites has not been factored in.

Another problem is that pens are often sited in areas
68 where fishing is most productive. As Greg Peterson, the Executive Director of the Puget Sound Gillnetters recently noted, the pens are usually in tidal activity areas which are good gill-netting areas. The report also does not specifically
69 acknowledge the fact that opportunities to harvest fish are often extremely limited in time. If net pens are sited so as to preclude fishing in areas where it is most efficient to harvest fish, fishermen will fail to catch the share allotted to them by the State. Table 5, which was supposed to show the

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number of salmon caught in 1986 by various gear types for the various management areas, is missing from the report.

Locating pens near shore, as suggested in the mitigation measures, may not necessarily reduce the impact of a project, (70) and in many cases may make it worse. Near shore siting may interfere with favored gillnet fishing areas, as it does in the case of the proposed Colvos Pass project. It may also interfere with the route of migratory adult and fry salmon, and with the habitat of other sensitive species such as herring or eel grass. In addition, it may affect recreational fishing for cutthroat trout, and, as noted previously in the report, can create visual impact, noise and odor problems for nearby residents.

The Counties do agree that pens should not be sited in (71) areas of "intensive" fishing. If the State wishes to designate certain areas where net pens would not be acceptable because of their impact on commercial fishing, that would be appropriate. Any such designation, however, should not preclude the Counties from considering this issue independently and determining that a proposed project should not be approved because of its impact on commercial fishermen.

18. RECREATION

Although short, the discussion of potential impacts on this subject is a reasonably good one. There is, however, no

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(72) specific mention of kayaking, wind surfing and canoeing, all of which are popular recreational activities. Recreational crabbing is not discussed. The report seems to assume that mooching can be substituted for trolling without any effect on the sportsman. This overlooks the fact that some sites are (73) simply traditionally fished by trolling, and that mooching is not an acceptable substitute. It should also be noted that on page 119, it is stated that net-pen anchors are placed at a (74) distance away from the pens equal to about three times the water depth at the pen's perimeter, while on page 7 it is stated that the correct figure is four times the water depth.

There is no discussion in the report of the mandate in the (75) Shorelines Management Act that for Shorelines of Statewide Significance, proposed projects should "<u>increase</u> recreational opportunities for the public in the shoreline." RCW 90.58.020(6) (emphasis supplied). Shorelines of statewide significance include all waters in Puget Sound and the Strait of Juan de Fuca, as well as Skagit and Padilla Bays. The Act provides that the "natural character of the shoreline [of statewide significance] should be preserved," and implementing regulations provide that "areas which contain a unique or fragile natural resource" should be left undeveloped. WAC 173-16-040(5)(d)(i). It is well established that developments proposed on shorelines of statewide significance must be reviewed for consistency not only with the local Master Program

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but also with the policy of the Shoreline Management Act. Washington Environmental Council v. Dept. of Transportation, SHB No. 86-34.

The mitigation measures appear to suggest the use of (76) "delayed release" programs to offset any negative impacts of a proposed project on recreational interests. It should first be noted that this would only mitigate the impact on one category of recreational users, fishermen, and would do nothing for the others. More importantly, there are a number of significant questions about delayed release programs. First, they may not fit in with existing programs of the Department of Fisheries or Wildlife. Second, there are concerns about the possible transmission of disease from net pen fish to the fish that will be released. This could in turn provide a means for transmission of disease to wild fish. Genetic pollution is an another serious problem. There are currently no regulations that require genetic matching of released fish with those of the nearest river system.

The report concludes, "With proper net-pen site selection, there will be no significant adverse impacts to recreational activities." This statement in and of itself is meaningless, for the task of local government is to figure out which sites are "proper". As in the case of the discussion on commercial fishing, the Counties have no objection to the designation of (77) certain areas by the State as per se inappropriate for net pens

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because of their impact on recreational uses. This may be particularly appropriate in the case of areas near Washington State Park beaches. As in the case of commercial fishing, however, any such designation should not limit the ability of Counties to determine that a particular site is inappropriate for net pens because of its impact on recreational users.

19. **NAVIGATION**

78 For shorelines of statewide significance, it is required that proposed projects "increase public access to publicly owned areas of the shoreline." Although net pens decrease, rather than increase, public access, there is no discussion of this directive in the report's section on navigation.

As noted above, many of the specific mitigation measures 79 proposed for navigation conflict with mitigation measures in other sections. Navigation lights and bright colors will cause visual impacts to nearby residents. Siting pens close to shore may cause visual, noise and odor impacts to residents, and may interfere with commercial and cutthroat trout fishing, as well as with the migratory routes of salmon and other sensitive species. Consolidating farms into areas of limited navigational use may also unduly increase impacts on nearby residents or fishermen.

80 As the draft report concludes, there undoubtedly will be adverse impacts on navigation caused by net pens. As in the

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case of other use conflicts, it may be appropriate for the State to determine that certain areas are not suitable for net pens; in all other cases, the final decision should rest with local government.

20. **HUMAN HEALTH**

The issue of whether there are potential human health impacts resulting from the siting of salmon net pens is obviously a question that is of great importance to the Counties. From the discussion in the Draft PEIS, it appears that a great deal more needs to be done before a final answer can be provided. As the report acknowledges, the typical levels of significance of bacteria in fish feed is not known. What is known is that *Salmonella cubana*, as well as other bacteria that are unidentified, have been isolated in one sample of moist fish feed. The Counties believe that further research to determine bacteriological characteristics of fish (81) feed is not only "desirable", but mandatory. In addition, the transferability of resistant plasmids also presents dangers to human health that have not been resolved to date (see discussion in Chemicals section).

Given the present state of knowledge, to conclude that "No significant impacts were identified", is presumptuous. This is (82) an issue where further work is urgently needed, and until it is performed, no final conclusions should be drawn at this time.

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21. UPLAND AND SHORELINE USE

The initial sentence of this section states that, "The issue in this section involves the displacement of existing and potential uses of shoreline and upland uses near an aquaculture facility." In spite of this statement, the bulk of the section on impacts is devoted to the unlikely assertion that net pens will be beneficial because they will highlight water quality concerns in areas where they are sited. It is hard to understand how a facility which itself contributes between 1600 and 1800 pounds of sediment consisting of fish feces and uneaten food for every metric ton of fish grown is supposed to bring about an improvement in water quality. It is far more likely that net pens will increase public understanding of water
(83) quality needs due to opposition to their siting than through their presence and operation.

Perhaps more importantly, this section correctly identifies that growth in the region will create need for additional recreational opportunities, as well as increase pressures on commercial users such as fishing and towboat industries. The
(84) section also might have noted that growth will increase the number of nearby residents who will be affected by proposed net pen projects.[8] After raising this point, however, the section

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8 For example, from 1980-87, Island County was the fastest growing county in the State on a percentage basis, and its population is projected to increase by 35% in the next ten

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does not discuss it any further, and, contrary to the report's assertion, there is no discussion of the effect of growth in the individual use conflicts sections (let alone the visual impact, noise and odor sections).

Finally, Figure 25 in this section is totally out of date (85) and therefore meaningless, since it is based on 1971 data. For example, the land use in Island County is listed as primarily forest, when in fact most of the county is zoned residential or rural residential.

This section really serves no point. Although the identification of the effect of growth on existing issues is an (86) extremely important issue, it should be addressed in the individual sections relating to aesthetics and use conflicts. The contention that net pens will somehow serve to highlight water quality concerns is of extremely dubious validity, and should be dropped from the report.

22. LOCAL SERVICES

This section is flawed because, in reaching the conclusion that there will be no significant impacts on the provision of (87) local services, it fails to consider the variety of increased

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(Continued)

years.

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responsibilities imposed by net pens on local governments. Local government will be required to provide fire, rescue, medical aid, garbage disposal, police protection and emergency services to net pen structures and to the persons working at the facilities. They will be asked to provide landfill space for both unsalvageable pens and floats and for incidental fish kills. Finally, as discussed above, many of the mitigation measures that have been proposed require monitoring of the conditions, or manner of operation, at the net pen site.

To take just one of these examples, the report neglects to (88) discuss the possible need for increased landfill space due to burial of net pen fish that have died. In British Columbia, this has been a very significant problem. Geoff Powers, the planning manager for the Sunshine Coast Regional District (where a number of aquaculture projects are located) has expressed concern that dead fish will eventually fill up the dump, and stated that currently a third of the district's landfill space is now going to dead farm salmon. Also in that location, local government is burdened with the disposal of approximately one million empty plastic feed racks annually. More generally, the potential impacts on human health, wildlife and water quality realting to the disposal of diseased fish should be discussed in the report.

This section should completely be re-done to include a more complete discussion of the actual impact of net pens on

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local governments.

23. **CUMULATIVE IMPACTS**

The cumulative impact analysis performed in the Draft PEIS (89) is extremely weak. Cumulative impacts are in fact considered for only two issue areas: BOD loading and nitrogen loading. With regard to BOD loading, the report actually concludes that 25 and 50 net-pen capacities are similar to a large wastewater treatment plant (as if this presents no additional problems) while 100 net pens are "considerably larger" than any single such plant. Nonetheless, the report concludes that any impacts would be "very weak" and "largely negligible", apparently because of the statement that, "The net pens represent a more diffuse source of BOD loading than a treatment plant." This does not constitute a reasoned or thorough consideration of the problems that are raised by this issue, and more analysis needs to be done before any conclusions can be drawn.

Other than these two issues, the section is silent with regard to the multitude of other cumulative impact problems (90) that 25, 50 or 100 net pens would create. Attempts to deal with this subject in other sections of the Draft PEIS are either inadequate or non-existent. For example, with regard to commercial fishing, the report states that the area occupied by 100 pens would only take up a small portion of Puget Sound Basin. As discussed above, however, there are a number of problems with the figures used by the report. In addition, it

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is apparent in the case of commercial fishing (or of recreation and navigation) that the location of one project will shift the use to another area. If this is repeated several times, it is easy to see that the pens may totally preclude a particular use in a given area. Nonetheless, there appears to be no recognition of the danger that this might occur in the Draft PEIS. Multiple projects also present obvious problems in the areas of aesthetics and visual impacts. Moreover, because there is not an adequate discussion of the effects of growth in Puget Sound, potential impacts are further understated.

The cumulative impact analysis is not satisfactory. It only considers in any detail at all two of the many issues relating to net pen siting. Even as to one of those issues, the discussion is inadequate. In other areas, there is limited or no recognition of the effects that multiple projects would have on alternative uses of Puget Sound, or on nearby residents. The cumulative impact analysis should be re-worked entirely to consider all of these issues.

24. LAND-BASED TANK FARMS

Because no application for land-based tank farms have been made in either Skagit or Island County, the Counties are less familiar with the potential impacts that such projects might entail. Although they may include some features that are preferable to net pens (particularly with regard to disease and

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prevention of escapement), it appears that many of the concerns expressed above apply equally to land-based tanks. Several other areas appear to present problems that are unique.

Obviously there is a significant concern about the concentrated discharge from tank farms. Extreme care must be (91) taken to ensure that the discharge will be into areas of rapid dispersion, or the result will be either the creation of new pollution problems or the exacerbation of old ones.

The report does not appear to adequately consider what might be envisioned as one of the principal objections to tank (92) farms, the impact on nearby residents. There is no question that the tanks, and the increased noise, traffic, odor and visual impact they entail will result in a substantial impact on nearby residents.

The Counties commend the authors for inclusion of this subject in the Draft PEIS, and recognize the potential benefits of the technology. It appears however, that more information will be required before the feasibility of these projects can be adequately assessed.

25. **THE NEED FOR ANOTHER DRAFT**

(93) Because of the number of comments that will be received by the Department of Fisheries, and the need for extensive revisions to the original draft, the Counties respectfully suggest that a supplemental draft be released before any final PEIS is

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adopted. This is particularly appropriate given the current need for additional information about the source of VHS in Washington State, and the research that is currently being performed by the State on the issue.

Skagit and Island Counties appreciate the opportunity provided by the Department to comment on the Draft PEIS. If there is any additional information we can provide, please do not hesitate to contact us.

DATED this 6 day of April, 1989.

William C. Smart / Leonard Barson

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RESPONSE TO LETTER NO. 1: SKAGIT AND ISLAND COUNTIES

1. See the response to Question 2.

2. One of the roles of the EIS is to present available data and point out where the data are sufficient and where they are insufficient. Independent research is not necessary for every issue involving the fish farming industry. The Preferred Alternative in the FEIS recommends additional research in Sections 5.4 and 6.4.

3. The individual local shoreline programs in conjunction with State policies and regulations constitute the *Washington Coastal Zone Management Program* (WCZMP). The WCZMP states that "Aquaculture is a preferred use in suitable water areas but should be conducted with due consideration for navigation rights and visual quality."

4. The DEIS discusses the possible use of locational controls to mitigate potential impacts of fish farms in several places in the text. However, the specific nature of those controls is a management issue and should be part of a management plan on the fish farming industry.

5. General conclusions about the suitability of locating fish farms in specific types of areas of the Sound are not warranted. Locational decisions should be made based on more detailed analysis than is possible in a programmatic EIS. "Proper siting" procedures include the development of broad management guidelines for fish farms, together with detailed environmental analysis of specific fish farm proposals. These local legislative and environmental procedures will assure that fish farms are properly sited.

6. Comments noted. The EIS has been revised to evaluate the fish farming industry under existing regulations and guidelines.

7. The *Public Trust Doctrine* does not preclude multiple uses of the waters of Puget Sound. Fish farms are not a permanent dedication of the resource, and siting decisions are based on a full consideration of all competing demands on the resource. See the response to Question 11 and Section 8.3 of the FEIS for a further discussion of the *Public Trust Doctrine*.

8. As the following lists demonstrate, the differences between the situation in Norway and Washington are substantial:

   Norway

   - 786 farms
   - Very small wild populations
   - Farms in fjords (river mouths)
   - Production (1989): 125,000 metric tons
   - Production: 100% Atlantic salmon
   - Wild population: 100% Atlantic salmon

Response to Letter No. 1: Skagit and Island Counties (continued)

- Fish farm stock: genetically altered.

Washington

- 30-50 farms
- ½ of all product in Puget Sound is from wild fish
- Farms generally placed away from river mouths
- Production potential: 10,000 to 17,000 metric tons
- Production: 11% native species
- Wild population: 100% native species
- Fish farm stock: not highly altered genetically

It is apparent that the potential for environmental impact to wild stocks due to genetic disturbance is much lower in Washington than it is in Norway by virtue of scale. In addition, Svein Mehli's testimony did not demonstrate a cause-and-effect relationship between the Norwegian salmon farming industry and any genetic changes to their wild salmon populations.

The low genetic variability in some river systems in Norway is better explained by genetic drift due to very small population numbers. Genetic drift causes inbreeding effects even in natural populations. The low numbers of wild fish in Norwegian rivers is a result of overfishing, acid rain, and hydroelectric development.

9. The reviewer implies that the loss of genetic variability is the same as the injection of maladaptive genes. However, they are not the same. Of the seven articles cited, only one supports the comment. That article, Reisenbickler and McIntyre (1977), uses wild and hatchery steelhead trout stocks to show that hatchery fish performed worse in the wild than wild fish in two out of four cases. In the other two cases, they performed similarly.

   In the one case where a large difference in performance was seen between wild and hatchery stocks, the cross between the two had twice the performance of that of pure wild stock. Scientific documentation of the genetic mixing of wild and hatchery stocks does not demonstrate a significant impact. The potential for genetic impacts is very low. See the response to Question 24.

10. Skagit and Island Counties suggest that because 40% of the Atlantic salmon found in Norwegian rivers were farmed fish, we can expect the same percentage of farmed Pacific salmon in Washington. New text added to Section 5.7 of the FEIS estimates that the maximum expected ratio of wild fish to farm fish in Washington rivers to be between 0.1 and 0.5%. According to Dr. Robin Waples (a geneticist with the National Marine Fisheries Service), a 2% interbreeding rate would not be expected to cause a perceptible impact on a wild population. However, he noted that a 10 or 20% rate might be significant.

Response to Letter No. 1: Skagit and Island Counties (continued)

Regarding the establishment of the Atlantic salmon sperm bank, that concept was developed in response to wild stock extinctions caused by acid rain not by the presence of salmon farms (see Gjedrem 1981).

The reviewer states that hatchery fish are lowering the reproductive ability of wild populations. Actually, salmon numbers are increasing in Puget Sound. In addition, there are several factors which affect wild salmon production such as urban development, pollution, forest practices, overfishing, and hydroelectric development. The example of the upper Baker River, does not support the argument made by the reviewer. WDF does not have a sockeye hatchery in western Washington. Therefore, hatchery fish could not be affecting the sockeye run in the upper Baker River.

11. WDF has the responsibility and the expertise to make the decisions necessary to protect salmon resources of Washington. WDF uses the SEPA review process to provide the necessary technical assistance to local governments during the siting of fish farms. In addition, WDF uses the HPA permit to ensure that existing salmon populations and habitats are not adversely affected by any proposed development.

12. See the response to Comment 11.

13. There is no evidence anywhere to suggest that wild salmon are attracted to farms. However, there is plentiful evidence that new escaped juveniles and previously escaped returning spawners are attracted to farms. Studies were conducted to look at this phenomenon by WDF at the Squaxin Island site and by NMFS at their Manchester facility.

14. The LENKA project in Norway is a coastal zone management program. Different countries with fish farming industries have different programs for managing the industry. A discussion of management programs is outside the scope of the EIS and would be more appropriate in a management plan document. However, a description of the LENKA project has been included in Appendix H to provide additional information.

15. Because a species of *Gyrodactylus* caused fish loss in Norwegian rivers and was likely introduced from another country and spread by the Ministry of Nature Management in Norway with their hatchery release program has no bearing on the siting of farms in brackish water. There are native monogenetic trematodes (including *Gyrodactylus* species) in Washington State that occur naturally on hatchery and feral anadromous stocks in freshwater. The State does not allow the importation of live fish from Europe. These parasites are not transmitted by eggs.

16. See the response to Questions 25 and 26. Diseases are not transmitted; pathogens are. The pathogens found in fish in farms are also in feral and hatchery stocks. The phenomenon of disease is a result of the number of pathogens, host susceptibility, and environmental conditions or stress. It is highly unlikely that

migrating fish would be exposed to pathogens to which they had not previously been exposed to. It is even more unlikely that diseases would result if an infection occurred.

17. Comment noted.

18. There is no evidence that VHS was introduced by eggs from Europe. Additionally, there is no documentation of VHS being found in the geographic areas where Washington State imports eggs. Mr. Jerry Grover (USFWS) is not a Fish Health Specialist and has publicly acknowledged that his statement was in error. Dr. Ken Wolf, while being a recognized fish virologist, is not the foremost expert in VHS. His remarks about VHS occurring in Atlantic salmon is conjecture since VHS has never been found in hatchery or feral stocks of Atlantics. For further information, see Appendix G on VHS.

19. VHS has, in fact, been found in brown trout, not Atlantics. Furthermore, the WDW, not WDF, has a hatchery program with brown trout. Brown trout, though cultured for over a century in the U.S. and widespread throughout North America, were introduced from Europe. VHS was not found in Washington State in Atlantics or brown trout, but in chinook and coho.

20. See the response to Comment 19.

21. The opinion by Skagit and Island Counties is not substantiated by available technical knowledge. Many of the mitigative measures noted in pp 10-11 of the DEIS are addressed in WAC 220-77 and supporting policies.

22. Extra-legal importation of fish eggs or any fish product is outside the scope of this EIS. WDF employees consult on a regular basis with USFWS inspectors at ports of entry and verify imports with federal monitoring.

23. Regulatory authority and the disease control program exists and is administered by the State (RCW 75.58, WAC 220-77 and supporting policies).

24. Item 6 is required by statute. Items 2, 4, and 5 are ongoing activities, though not required by law.

25. Comment noted.

26. The effect of fish farms on biochemical oxygen demand is discussed in Section 5.2 of the FEIS. Field studies by various researchers have found that decreases in dissolved oxygen near farms ranged from 0 to 1.5 mg/L. State water quality standards for dissolved oxygen are based in large part on the oxygen requirements of salmon. The effect on the benthic community is discussed in Section 5.1 of the FEIS and in Appendix A.

Response to Letter No. 1: Skagit and Island Counties (continued)

27. Areas known to have low seasonal dissolved oxygen are unsuitable for fish farm development and therefore were not discussed.

28. The additional effect of fish farms on dissolved oxygen is the same regardless of the ambient dissolved oxygen concentration. The effect of the decrease may be more severe at low ambient dissolved oxygen concentrations, but typically the salmon in the farm would be affected before other organisms.

29. There have been numerous studies concerning the relationship of nutrients and other growth-limiting factors. These studies are applicable to fish farms because inorganic ammonia from fish farms is chemically and biologically indistinguishable from other sources. The same applies to other waste products such as nitrate and trace minerals. Numerous studies have repeatedly demonstrated that inorganic nitrogen is the factor most likely to be limiting to phytoplankton growth in certain marine waters, at certain times, second only to sunlight.

    There is no evidence that the occurrence of paralytic shellfish poisoning in Puget Sound is related to nutrient concentrations or trends. In fact, EPA sponsored a recent study of recent and long-term trends in water quality (Tetra Tech 1988) that found little long-term increase in nutrients concentrations in both the main body and restricted portions of Puget Sound that were examined. Only in Carr Inlet was a slight decline in nutrient concentration thought to be related to increased phytoplankton production.

30. Comment noted.

31. Fish food conversion ratios (FCR) have improved significantly in the last decade. A 2 to 1 ratio is no longer considered the standard. A ratio of 1.5 to 1 is a more typical goal for a fish farmer to set. Considering the improvements made recently in diets, and the achievement of FCRs as low as 0.8 to 1 in experimental settings at the Norwegian Institute of Aquaculture Research (Åsgård et al. 1988), it is not unreasonable to use a working figure of 1.5 to 1 and speculate the usage of a 1 to 1 ratio in the future.

32. The *Interim Guidelines* specifically state that the baseline survey be done after the pens are in the water, but before the farm is stocked with fish. The baseline benthic survey is recommended after deployment of the pens to ensure that the specific area beneath the farm is identified. This recommendation is reasonable and not a defect in the *Interim Guidelines*.

    Diver surveys are used to rapidly, and relatively easily, assess the presence of large, or mobile organisms, primarily geoduck clams (*Panope abrupta*) or Dungeness crabs (*Cancer magister*). Diver surveys in depths greater than 75 ft would likely involve decompression diving. Decompression diving is hazardous, and the information gained from such a survey must be balanced against the risks to the personnel involved.

Response to Letter No. 1: Skagit and Island Counties (continued)

33. Eelgrass provides a substrate for some of the prey of most of our recreational or commercial fish species. It can provide a habitat refuge for various life stages of some of these species.

    An increase of the nutrient loading of the water in the areas near eelgrass beds might promote the increase in epiphytic algae, which would shade the eelgrass blades (Sand-Jensen 1977) and restrict the lower depth to which the eelgrass could grow. However, the eelgrass-epiphyte system is not simple. It involves a number of small herbivores specialized to eat the epiphytic material, chief among them, the caprellid amphipod, *Caprella laeviuscula*.

    The presence or absence of these amphipods, not ambient water nutrient loading, largely determines the extent of epiphytic algae (Caine 1980). The amphipods, in turn, are prey for nudibranchs (*Melibe leonina*) and some fishes, including some of the recreational and commercially important species.

    If the increased nutrient load resulted in an increase in the epiphytes, it is likely that the populations of their herbivores would show a corresponding increase. That increase would result in a general epifaunal population increase in the eelgrass communities, and an enrichment up the food chain. The enrichment up the food chain would include an increase in the prey for commercially or recreationally important fish species.

34. Comment noted. The 1,500 ft distance is a guideline. With site specific information, WDW, USFWS, or NMFS can recommend different distances if necessary.

35. See response to Question 30.

36. Habitats of special significance are defined by WDW using an evolving information system based on continually updated information. More specific discussion of these habitats is appropriate during SEPA reviews for each proposed farm, when the most current data are available.

37. Weston (1986) cites four papers claiming that fish farms attract wild fish species. Three of those papers deal with cage culture of catfish in lakes, which is not applicable farming in the marine waters of Puget Sound. A review of the fourth (Beaveridge 1984) did not find the referenced statement on page 14.

38. When fish farms undergo SEPA review at the local level, the lead agency under SEPA sends a copy of the proposal to all agencies with jurisdiction. In the case of birds and marine mammals, this state agency is WDW. WDW has the expertise and responsibility to ensure that wildlife populations are not adversely affected by any type of development proposal.

    Fish farms are also required to obtain an ACOE Section 10 permit. During this federal permit process, the proposal is reviewed by USFWS and NMFS. These

agencies also have the expertise and responsibility of protecting bird and marine mammal species. A discussion of the MMPA has been added to Section 5.9 of the FEIS.

39. Bacteria, in some situations, will have resistance to certain antibiotics. Resistance may be induced, as well as occur naturally. In freshwater environs as well as seawater, in cultured and feral fish, drug resistance may be observed. Once again, this would not pose a new risk to "wild" fish, and as previously stated, pathogens not diseases, are transmitted.

40. This issue is addressed in Section 5.4 of the FEIS and has never been demonstrated to occur in nature.

41. Failure by Weston to retrieve information does not mean that FDA's evaluation in 1983 is invalid. As a side note, use of OTC at fish farms has been substantially reduced because of the use of vaccines.

42. Persistence of an antibiotic in fish tissue for lengthy periods only increases the likelihood that the bacteria will be eliminated, and not develop a resistant strain.

43. Use of antibiotics in fish and other food products are tightly controlled by the FDA. Fish food manufacturers are closely monitored when adding antibiotics to fish food. Fish farmers have no more opportunity to add medications to the fish than do other livestock farmers. Very few antibiotics are approved by the FDA for use in food.

44. Comment noted.

45. Comment noted.

46. See Section 2 of the response to comments after the text in Appendix E.

47. See Section 2 of the response to comments after the text in Appendix E.

48. See Section 4 of the response to comments after the text in Appendix E.

49. See Sections 1, 3, and 5 of the response to comments after the text in Appendix E.

50. Addressing aesthetic and use conflict issues is a matter for local government and should be done on a case-by-case basis. The aesthetic analysis you refer to on page 102 of the DEIS is a tool for local government that provides an analytical structure to the discussion of aesthetics rather than relying on a simple poll of opinions.

51. Comments noted.

Response to Letter No. 1: Skagit and Island Counties (continued)

52. Comments noted. Each future fish farm proposal will be reviewed under SEPA. This will allow all agencies with expertise to review the proposals in relation to their specific sites with the best information available at the time.

53. See the response to Question 9.

54. See the response to Question 9.

55. See the response to Question 10.

56. The aesthetics section has been retitled "Visual Quality." As with many broad subjects in an EIS, the discussion has been divided into different topics for convenience and clarity.

57. The discussion on visual impacts was "quantitative" in some respects to give the reader perspective on the magnitude of visual impacts. While it is true that observers do not remain fixed in one location looking in one direction, many observers view fish farm facilities from a restricted location range (for example, their house and yard). Further, while observers constantly change their direction of view, if they stay in a relatively restricted range of locations, the facility will occupy the same portion of their angle of view as long as the facility is entirely within their view even if they move their head. Some observers, such as boaters, may view a fish farm from a wide range of locations. Nonetheless, the attempt to "quantify" aspects of visual impact by discussing angle of view provides an indication of the magnitude of impacts. It is true that where fish farms include overwater buildings and extensive human activity, the farms would be more visually evident.

58. More observers would be visually affected by five fish farms than one farm. However, if the five fish farms are adequately spaced, an individual observer may not experience any greater impact from five facilities than from one facility because the four additional facilities are too distant to be seen. The nature and magnitude of these impacts will depend on their numbers, locations, and the attitudes of observers. Figure 18 is included in the EIS to illustrate the basis for these conclusions.

59. The comment regarding the increase in noise attenuation over land relative to water was noted on page 122 of the DEIS. The other comments on potential sources of noise are noted.

60. The discussion of unavoidable adverse impacts does acknowledge that noise levels from fish farm facilities could unacceptably affect nearby residential uses. However, these unacceptable impacts could be adequately mitigated through proper siting of facilities and minimization of unnecessary noise. An example of the latter mitigation involves enclosing machinery. The statement that each site must be considered on its own merits and that the potential environmental impacts of each proposal be carefully considered is correct.

Response to Letter No. 1: Skagit and Island Counties (continued)

61. While studies that substantiate the actual effect of measures to mitigate potential odors may not exist, common sense would support the conclusion that containing or removing odor-producing material would reduce the dispersal or generation of odoriferous compounds.

62. The comment that mitigation measures are only effective if they are implemented and that the implementation of mitigation measures may require adequate enforcement is acknowledged. See the response to Question 9.

63. The comment that the effect of a mitigation measure on all elements of the environment should be considered before the measure is required in a specific case is acknowledged. In addition, decisions on location or mitigation should be made only after all potential impacts are considered. See the response to Question 10.

64. Locating fish farms in areas already experiencing odors may be appropriate where the surrounding land uses are compatible, for example non-residential industrial and commercial areas. Local jurisdictions have traditionally allowed a higher level of odor in certain areas rather than apply the same standard everywhere.

65. The comment that individual proposals for fish farms may be denied if the decisionmaking body finds that unacceptable unavoidable significant adverse impacts will occur is acknowledged.

66. Comments noted.

67. Anchor lines were mentioned in the first sentence of the discussion of impacts in the DEIS. Additional wording has been added to Section 6.3 of the FEIS to clarify that the potential impacts of fish farms on commercial fishing includes the area used by the anchor lines.

68. This issue was addressed in the discussion of impacts in the Commercial Fishing section of the DEIS.

69. Additional wording has been added to Section 6.3 of the FEIS to clarify the time element. The table showing catch statistics has been added to the FEIS (Table 8).

70. The first mitigation measure in the Commercial Fishing section of the DEIS recommends siting farms away from areas of intensive fishing. This includes areas near the shore as well as those further offshore.

71. Comments noted. Identifying special areas of concern would be part of an overall management program for the fish farming industry and is outside the scope of this EIS.

Response to Letter No. 1: Skagit and Island Counties (continued)

72. Kayaking and windsurfing were mentioned on page 119 of the DEIS as examples of other recreational activities. The list provides examples of recreational activities and is not meant to include all possible recreational pursuits.

73. This section of the DEIS describes the types of potential impacts fish farms can have on different groups of anglers using different techniques. Fish farms have a different potential impact on trollers than they do on people who fish by mooching. The point is that fish farms should not be sited in areas that are intensively used for recreation.

74. This discrepancy has been corrected in the FEIS.

75. The referenced section of the *Shoreline Management Act* states that counties, in developing their local shoreline master programs for shorelines of state-wide significance, should "give preference" to uses that satisfy criteria related to state-wide significance; of which increasing recreational opportunities is sixth in a descending list of priorities. RCW 90.58.020 does not say that all proposed projects in shorelines of state-wide significance should increase recreational opportunities.

    The discussion of shorelines of state-wide significance and the list of prioritized preferences was included in the DEIS under the Relationship To Land Use Plans and Regulations section.

76. The use of any delayed-release program as mitigation for a fish farm would have to be coordinated with the appropriate state agencies. See the response to Question 21.

77. It is outside the scope of this EIS to determine which areas of Puget Sound are inappropriate for fish farms due to significant recreational use conflicts. However, it may be appropriate for local government, in cooperation with appropriate state agencies and in accordance with the *Shoreline Management Act*, to determine which areas within their jurisdiction have significant aquatic recreational use and revise their local shoreline regulations accordingly.

78. See the response to Comment 75. Proposed projects in shorelines of statewide significance are not required to increase public access to publicly owned areas of the shoreline.

79. See the response to Question 10.

80. It is outside the scope of this EIS to determine which areas of Puget Sound are inappropriate for fish farms because of significant navigation conflicts. Local governments have established policies and regulations in their shoreline master programs that address navigation. These policies have been, and will continue to be, used to evaluate proposals on a case-by-case basis for potential impact to navigation.

Response to Letter No. 1: Skagit and Island Counties (continued)

81. Comment noted. See the response to Questions 28 and 33. Recommendations for further research to determine the bacteriological characteristics of fish feed is included in the Preferred Alternative of the FEIS. There is no evidence of resistant plasmids being transmitted from fish pathogens to human pathogens.

82. A request for further work is premature at this time because a problem has not been identified.

83. Comments noted.

84. Comment noted.

85. Land-use and zoning classifications are not the same. This figure shows broad land-use categories such as forest, rural non-farm, and urban/suburban development. It is not intended to show zoning classifications such as residential, urban, commercial, or industrial. Though Island County may be zoned residential or rural residential, the island is still covered with many forests.

86. Comment noted.

87. The increase in demand for local services as a result of new fish farm facilities is similar to the increase in demand for local services as a result of other new developments. With normal rates of fish mortality, the landfill capacity in Puget Sound jurisdictions should be sufficient to accommodate any waste from fish farms.

88. The Preferred Alternative in Section 6.9 of the FEIS includes a recommendation that local governments require information about disposal of farm waste as part of their shoreline permit application.

89. The primary effect of fish farms on the environment is the addition of nutrients and organic material (BOD). Since the Sound is nitrogen limited, nitrogen is the critical nutrient for analysis. BOD is related to decreased oxygen concentrations and therefore is also important. Other factors, such as turbidity, are more localized and are not considered in a cumulative, Puget-Sound-wide impact analysis. Comparison of farms to a treatment plant is done only for order of magnitude purposes and should not be misconstrued to mean that 50 farms at one site has the same impact as 50 farms distributed over the length of Puget Sound from the Straits of Juan de Fuca to Dana Passage. The wide distribution of fish farms in this analysis would have an effect more similar to many small treatment plants spaced throughout Puget Sound. As a widely distributed source of BOD and nitrogen, the analysis is sufficient to indicate that Puget Sound as a whole will not be adversely affected by fish farm development.

90. Comments noted.

Response to Letter No. 1: Skagit and Island Counties (continued)

91. Comment noted. All proposed tank farms will be subject to SEPA review. A thorough discussion of the potential impacts of land-based tank farms is outside the scope of this EIS.

92. Comments noted. See the response to Question 32.

93. See the response to Question 7.

LETTER NO. 2

Jamestown Klallam Tribe

305 Old Blyn Highway • Sequim, WA 98382
Phone: (206) 683-1109 – (Fisheries) (206) 683-1001

April 6, 1989

Joseph R. Blum, Director
Washington Department of Fisheries
115 General Administration Building
Olympia, WA. 98504

Dear Mr. Blum:

We have had the opportunity to review in detail the Draft Programmatic EIS on Fish Culture in Floating Net Pens. As a Tribal governmental entity concerned with management and protection of fishery resources, and as an applicant for a commercial floating fish farm, the Jamestown Klallam Tribe has a unique perspective on fish farming and its potential impacts. We are very familiar with the issues involved. We are confident that our own proposed site will result in no adverse impacts, and we believe that properly sited fish farms pose no threat to the State of Washington. However we strongly support the need for appropriate state regulation of the fish farming industry and for careful examination of each project for site-specific considerations.

The EIS contains good technical information. We are pleased to see that some of the extensive work we have done on our proposed site in Discovery Bay has provided data for the technical studies. These studies should aid in eliminating fears by the general public of some of the generic impacts of fish farms, and help policy makers to focus on site-specific considerations in the permitting process. However we find in many sections that the editing of the document is poor or even erroneous. We urge that every section be carefully reviewed for accuracy, since public interest in, and misinformation concerning, fish farming is considerable.

1 The EIS focuses on potential negative impacts of net pens, and does not give attention to the positive benefits of fish farming. These are the economic benefits in terms of employment and income generation, as well as contribution to the world's food resources and, for the Jamestown Klallam Tribe, a means to increase our economic self-sufficiency while retaining our traditional reliance on marine resources.

2 A major question arising from the PEIS is how its findings will now be used to improve the permitting process for fish farms, and how current regulations found to be conservative by the PEIS will be adjusted. Our Tribe has suffered as much as any other entity from the process as it now exists.

Attached is a more detailed review of the PEIS prepared by my staff, Lou and Lyn Muench, Aquaculture Planners.

Jamestown Klallam Tribe Joseph R. Blum

Thank you for giving us the opportunity to review the PEIS. It is a welcome addition to the body of information the State has been providing on the potential for fish farming in our area. With suitable revision the Final EIS should be a useful document for decision makers in reviewing net pen permits.

Sincerely,

Wm. R. Allen

Wm R. Allen, Chairman/Executive Director

MEMO TO: Ron Allen, Executive Director

FROM: Lyn and Lou Muench, Aquaculture Planners

SUBJECT: Draft Programmatic Environmental Impact Statement: Fish Culture in Floating Net Pens: Review by Jamestown Klallam Tribe

DATE: April 1, 1989

We have reviewed the PEIS, in consultation with the Fisheries Manager and the Timber/Fish/Wildlife Biologist. The sections where we find need for revision are itemized below.

SUMMARY:

The summary as written does not accurately reflect the technical elements of the study and omits entirely the positive findings of the PEIS. In particular, Major Conclusions should include the fact that no unavoidable adverse impacts were found.

Positive impacts of fish farming identified in the PEIS which should be included in the Summary are to be found on pages 81, 89, 104, 114, 118, 120 (two), and 129. Other positive impacts which should be discussed in the text and summarized here include the role of fish farms in monitoring water quality, the economic benefits to the State in terms of employment, income, tax revenue, and import substitution, and finally, the contribution to world food resources. At the very least these benefits should be identified in the Summary as not covered by the PEIS. 3

The Summary also does not identify or discuss the regulations currently in force which would prevent many of the potential negative impacts identified. Since the PEIS includes mitigation measures, and other actions intended to minimize potential impacts, existing regulations need to be described. In several instances current regulations are more restrictive than would be necessary under the findings of the PEIS : what actions have been proposed to relax these regulations? 4

B. BACKGROUND OF THE NETPEN INDUSTRY (page 4)

The purpose of delayed release pens is to increase the size and survival rate of salmon, and consequently increase the commercial and sport salmon harvest. The technique inhibits their inclination to migrate but does not eliminate it. This section should be rewritten to reflect these facts.

It is unfortunate that the environmental impacts of delayed release facilities were not given greater attention, since local governments have conditioned or refused permits for these facilities on environmental grounds in the past. Furthermore the fact that the fish are released into the public water makes the impacts on aquatic organisms substantially different than from commercial fish farms. Obviously delayed release net pens have a significant beneficial impact on commercial and recreational fishing. 5

I. **ALTERNATIVES: PERMITS AND APPROVALS:** (page 8)

We urge that the Tribes be included among the state, federal and local agencies involved with management and review of the net-pen industry beginning on page 10. As co-managers of fisheries resources with the State, the Tribes have a review role over net pen projects as they impact treaty fishing and wild fish/shellfish habitat. A separate but important route by which Tribes comment on net-pen projects is through the Army Corps of Engineers Section 10 permit process, where interference with treaty fishing rights is a specific consideration. Tribes regularly review net pen proposals at local and state permitting levels, and where a project poses a threat to treaty fishing rights, have recourse to the Federal courts if such a conflict is not resolved. The earlier in the process potential conflicts are identified and dealt with, the better for all parties concerned. We therefore suggest that the Tribes be listed in this section. (6)

The Tribes should also be identified along with WDF and commercial fishing organizations as those groups to be contacted to identify areas of intensive fishing, under the first Mitigating Measure at the end of the Commercial Fishing section, page 114. (7)

II. **AFFECTED ENVIRONMENT:**

NOTE: Throughout the PEIS, mitigation measures are suggested which are already in force. These should be so designated, to prevent regulations from being duplicated. For example, conditions were recommended for our county permit for the Discovery Bay project already enforced by DNR.

A. **NATURAL**

1. **SEDIMENTS:** (page 13)

It would be extremely useful to include a chart showing all existing net pen sites and their hydrographic characteristics. This information is important since many of the impacts discussed in this section are the result of sites developed before the Interim Guidelines, and would not apply to sites in deeper water with stronger currents. (8)
It would be preferable to identify the location and site characteristics of net pens studied when authors are quoted (page 23) because as written it gives the impression that all existing net pens pre-dating the Interim Guidelines have azoic areas beneath them, which is not the case.

2. **WATER QUALITY:** (page 27)

This section is particularly useful in containing new information on phytoplankton. It also recognizes that the Interim Guidelines limitation of fish farm production to one percent of nitrogen flux in 19 embayments is based on "a very conservative estimate of nitrogen flux" (because it considers only average surface levels of inorganic nitrogen but ignores organic nitrogen and dissolved nitrogen at depth). An additional factor to consider is actual tidal nitrogen flux, which can be substantially greater (about four times) than average surface levels within the bay. If the one percent limitation is to continue to be used, the PEIS analysis should be the basis of a new system for calculating nitrogen flux. (9)

Just how conservative the Interim Guidelines can be is shown by the studies conducted for our proposed fish farm site in Discovery Bay. The Interim Guidelines assume that 100% of the dissolved nitrogen emitted from a fish farm initially stays within an embayment. Our proposed site, however, lies near the mouth of the bay and the emissions would be transmitted northward toward the Strait of Juan de Fuca during ebb tide. In addition, the site lies within the area of a variably sized and located eddy which appears during flood tide. During some flood tides the flow from the site is also northward towards the Strait. This eddy also ensures that substances which do not get all of the way out of the Bay during ebb tide would continue on through the mouth to the Strait during the subsequent flood and ebb tides. Less than 50% (the best statistical estimate is 8%) of the dissolved nitrogen emissions would flow deeper into the Bay and thereby conform with the Interim Guidelines assumptions.

Taking these findings, Kiefer and Atkinson (1988) estimated that during a summertime period of very substantial nitrogen depletion (0.2 mg-at/m^3), our proposed fish farm would increase phytoplankton concentrations by two-thirds of one percent, from 3.00 to 3.02 mg-at/m^3. In contrast, phytoplankton in Discovery Bay have been found to naturally occur, during the summer months, in concentrations ranging up to 15 mg-at/m^3. In other words, the increase attributable to the fish farm would be 1/600th of the natural flux.

The point to be made here is not only that the Interim Guidelines can be extremely conservative in certain situations, but that there is no mechanism for formally relaxing them in such situations. In contrast, there are several stages in the permitting process where they can be reinforced or augmented by stricter control. Their flexibility is one-way.

The positive role of fish farms in monitoring water quality, alluded to in a later section, should also be addressed in the Water Quality section. Fish farmers, monitoring water quality on a daily basis, can provide a significant resource for water quality monitoring for the benefit of the public. As fish farmers are economically dependent on maintaining clean water, they are uniquely placed to act on any threats to water quality identified through their monitoring.

3.b. **IMPORTATION OF EXOTIC FISH SPECIES:** (page 68)

This section is confusing, as it mixes up true exotics (Atlantics) with intra-regional natives (Pacifics). Pacifics are routinely introduced into State waters as part of Washington's enhancement program, but are not the preferred species for fish farmers in Washington. Yet the discussion is (10) devoted to interbreeding, possible with Pacifics but not Atlantics. Negative impacts if any from accidental escape of farmed Pacifics would be insignificant compared to the large release program by the Tribal, State and Federal governments. This is referred to on page 72 and 73, but should be highlighted at the beginning of the section. Since "genetic impacts" is a commonly expressed fear of the general public, and poorly understood, it is extremely important to write this section clearly. The long list of mitigation measures given, in spite of the little potential for adverse

impacts, gives credence to this fear. These should be replaced with a caution that future introduction of exotic species should be carefully
(11) reviewed for potential negative impacts. One important safeguard against successful colonization of an exotic species not included in the list of mitigations is the maintenance of healthy natural production of native stocks, and protection of habitat.

3.c. **DISEASE** (page 76)

(12) The discussion of VHSD, p77, needs to be revised, to include recent experience with this disease.

4.a. **MARINE MAMMALS** (page 83) Figure 12: Seal and Sea Lion Haulouts in Puget Sound. This figure includes haulouts in both Sequim and Discovery Bays, locations with which we are familiar. We have not observed haulouts at either place. The Sequim Bay spot is at the site of the John Wayne Marina of the Port of Port Angeles. Marina staff reported verbally that in the past four years only a single seal has been seen up on the
(13) breakwater. The source of Figure 12 is given as the Puget Sound Water Quality Authority, updated by Jeffries, WDW. Mr. Jeffries, Marine Mammal Specialist for WDW, has verbally informed us that he updated the PSWQA figure by adding haulouts known to him, but that he did not delete any haulouts they had identified from other sources. WDW records do not show haulouts at either location. Both locations are sites proposed for net pens. Could you please verify whether the two sites were included on the PSWQA map by mistake, and if so, delete them.

B. BUILT ENVIRONMENT

1. **AESTHETICS**: (page 89)

(14) The information contained in this section was not reflected in The Economics of Salmon Farming,Technical Appendix E. As a consequence the analysis of impacts of net pens on real estate values is seriously flawed.

While it is true that some people may perceive any structure placed in open water as having a negative aesthetic impact, others would not. The statement in the introduction to this section in paragraph two that "many
(15) people" perceive any structure as negative is vague and not substantiated in the PEIS findings. (See for example page 91, paragraphs 4 and 5.) The many examples of high value residential development overlooking harbors, marinas, log boom operations and net pen complexes is evidence that structures in the open water are not aesthetically offensive to "many people."

(16) Figure 14 misrepresents the structure viewed from House 2 as wider than it should be. Figures 14 through 21 use different dimensions and sizes, and cannot be used for comparative purposes. They should all be redrawn using the same dimensions. Figures 19, 20 and 21 as labelled are open to
(17) misinterpretation, as they appear to suggest possible densities for net pen development, rather than a theoretical aid to regulating the distance
(18) between net pens.

3. **COMMERCIAL FISHING:** (page 105)

References in this section to the impact of net-pens on the allocation of fish between treaty and non-treaty fisheries are confusing, and present a highly unlikely scenario. There is no evidence cited to show how net pens might affect fish migration. If there was an impact on migration, it would (19) more likely adversely affect tribal fisheries than non-tribal, since tribal fisheries are limited to specific places and stocks. The management plans to attain treaty/non-treaty allocation are flexible and can usually adjust fishing opportunity to account for localized displacement in fishing activity.

Under Mitigation measures, page 114, reference is made to the potential for use of available pen space for raising of Pacifics for release and commercial harvest. This does not adequately explain the potential benefit of commercial net pens to provide staff and facilities to operate enhancement programs for Pacific salmon which would otherwise not be (20) affordable by public or tribal fisheries entities. Thus net pens can mitigate for displacing fishing activities and beyond that, may increase enhancement efforts. There are already examples, such as at Squaxin Island, where enhancement and commercial net pens are jointly operated. The Jamestown Klallam Tribe also plans to include an enhancement element in its commercial fish farm operations when appropriate under the Management Plan.

Technical Appendices: E. Economics report

This highly academic approach to an economic analysis of the fish farm (21) industry needs a common sense summary. Unfortunately this will be difficult since one of the three factors analyzed, real estate values, is predicated on the erroneous assumption that net pens can have an impact on a five to ten mile radius. As established in the EDAW study and others, fish farms are virtually invisible at distances greater than one half mile, and could therefore have no impact on real property values further away. The Technical Appendix also makes an assumption that an aesthetic loss due to net pens that is not justified within the report or by external sources. In the absence of hard information on this subject, the Jamestown Klallam Tribe commissioned a study of net pen impacts on real property values in 1988. The Skagit System Cooperative and Swecker Seafarms Limited also participated. The economics report references and quotes that study, "Influence of Floating Net Pens on Residential Property Values". We suggest that this study, which is based on actual property transactions in the vicinity of existing net-pens, be incorporated into the PEIS as a (22) technical appendix. Since Alpine Appraisal Service has updated that study as of 3/89, the most current version should be used.

Overall, the PEIS contains much useful technical information, some of it new. If the Summary is rewritten to more accurately reflect the findings, and it is carefully edited, the Final EIS will serve well as a guide to policy makers in dealing with generic issues relating to net pens. It should be especially useful for local officials, to separate out the generic issues from the site specific characteristics that need local review.

RESPONSE TO LETTER NO. 2: JAMESTOWN KLALLAM TRIBE

1. See the response to Question 12.

2 The text has been revised to evaluate existing regulations and guidelines in the FEIS.

3. See the response to Question 12. The Summary has been rewritten to discuss each issue individually.

4. See the response to Comment 2.

5. The scope of this EIS does not include evaluating the impacts from fisheries enhancement programs. However, there are significant commercial and recreational benefits from the delayed-release program.

6. See the response to Question 8. The list of agencies in Section 4 of the FEIS includes agencies with management authority over the fish farm industry. The text in Section 6.3 of the FEIS includes tribes as an entity to notify during the SEPA and shoreline permitting processes.

7. The text in Section 6.3 of the FEIS has been written to clarify that commercial fishing organizations includes tribes.

8. Including information from specific farm sites is beyond the scope of this EIS. However, the information you request can be obtained from DNR or local planning departments.

   Comment acknowledged. Not all farms sited before the *Interim Guidelines* have azoic conditions beneath them.

9. Section 5.2 of the FEIS indicates that farms monitor water quality parameters daily.

10. This section has been reorganized in the FEIS. While it is true that Atlantic salmon are currently the species of choice, the EIS must consider Pacific salmon genetic issues as well.

11. The DEIS concludes that significant genetic-related impacts are unlikely. However, anything that can be done to minimize the small level of impacts is beneficial and should be pursued where practical. If genetic impacts are a problem in the future, there are measures which may be taken to eliminate or lessen the problem.

12. See the response to Question 29.

Response to Letter No. 2: Jamestown Klallam Tribe (continued)

13. Haulout sites identified in Figure 12 are based on information provided in Angel and Balcomb 1982. This document was based on the following study:

    Everitt, R.D., C.H. Fiscus, and R.L. Delong. 1980. Northern Puget Sound Marine Mammals. DOC/EPA Interagency Energy/Environment R & D Program Report. EPA #600/7-80-139. Environmental Protection Agency. Washington, D.C.

    Figure 12 indicates haulouts that have been used at some point in the past. Site specific review of fish farm proposals will identify which haulout areas are important.

14. The analysis of impacts of fish farms on real estate values used an empirical approach. This approach involved determining whether the proximity of fish farms to properties was associated with any detectable change in property values. Thus, while this approach did not explicitly include the various factors that could affect property values, these factors, which include aesthetics, were implicitly included.

15. The statement that "many people" perceive any structure as negative is a reflection of the numbers of people expressing opposition to fish farms at public hearings on individual projects. It is not meant to indicate the relative proportion of those who do not favor fish farms versus those who do.

16. Figure 14 has been modified to show structures with the appropriate widths.

17. Figures 14 through 21 illustrate the affect of different locational parameters on visual impact and cannot be directly compared. However, the sizes of the facilities in the various figures have been revised to 100 by 1,000 ft.

18. The titles of these figures have been changed to indicate the hypothetical nature of the examples illustrated.

19. The Commercial Fishing section of the DEIS has been revised to clarify the potential impact of fish farms on the allocation of salmon between treaty and non-treaty fisheries. There is no evidence that farms affect the migration of fish. However, fish farms may affect the ability to catch salmon as they migrate past a farm.

20. Comment noted.

21. See Section 4 of the response to comments after the text in Appendix E.

22. See Section 4 of the response to comments after the text in Appendix E. The real estate report to which you refer has been added to the Technical Appendices as Appendix K.

LETTER NO. 3

JEFFERSON COUNTY COURTHOUSE

JEFFERSON COUNTY
PLANNING AND BUILDING DEPARTMENT

P.O. Box 1220
Port Townsend, Washington 98368

Planning (206) 385-9140
Building (206) 385-9141

David Goldsmith, Director

April 7, 1989

Mr. Ron Westley, Project Manager
Washington State Department of Fisheries
115 General Administration Building
Olympia WA 98504

Re: Draft Programmatic Environmental Impact Statement on Fish Culture in Floating Net Pens

Dear Mr. Westley:

I have reviewed the draft EIS and have the following comments:

1. The issues of introduction of exotic pathogens into the waters of Puget Sound and the transfer of diseases from cultured fish to wild stocks are not adequately discussed. These are technical issues which have also generated great concern and controversy among local governmental agencies and interested citizens. The draft EIS presents an ideal forum for the Department of Fisheries and its consultants to provide a detailed, thoughtful discussion of these issues, potential impacts, possible means of preventing their occurrence and mitigating their impacts. The draft EIS fails to accomplish this. (1)
2. The discussion of the direct and indirect impacts of net pen culture on Puget Sound Water Quality was thorough and well done. However, in order for this material to be of use to local governments and planning agencies in their environmental review of net pen proposals, this discussion should be supplemented by the following:

   a. Detailed studies of those areas of Puget Sound where net pen facilities should not be sited due to lack of adequate flushing, the potential for plankton blooms, etc. (2)

3 b. Detailed studies of those areas in Puget Sound where net pen facilities might cause water quality standards to be lowered (for instance from Class AA to Class A).

4 c. A discussion presenting detailed and specific suggestions to local planners and permitting agencies for baseline and ongoing water quality studies to require during the environmental review of net pen proposals.

Inclusion of this material will go a long way in making the EIS a valuable tool for local governments to use in reviewing net pen proposals.

Sincerely,

Jim Pearson
Associate Planner

JP:mkg

RESPONSE TO LETTER NO. 3: JEFFERSON COUNTY PLANNING AND BUILDING DEPARTMENT

1. The DEIS did discuss potential impacts and mitigation measures to reduce potential disease impacts. See Section 5.8 of the FEIS.

2. See the response to Question 1.

3. See the response to Question 1.

4. Specific water quality studies that should be required of permit applicants is outside the scope of this EIS. NPDES permits are now required of fish farms and permit conditions will require specific water quality monitoring.

LETTER NO. 4

KATO & WARREN, INC.
2001 WESTERN AVENUE • SUITE 555 • MARKET PLACE ONE • SEATTLE, WASHINGTON 98121 • (206) 448-4200

March 14, 1989

Ron Westly, Project Manager
Washington Department of Fisheries
115 General Administration Building
Olympia, Washington 98504

Re: Fish Culture EIS
Comments on Draft EIS

Dear Mr. Westly:

I am writing to comment on the draft EIS prepared by the Department to justify approval of more fish farming permits in Puget Sound.

1 This document is totally self-serving. If it had been written by the industry itself, it could not have been worded better to support their position.

The document totally ignores the very large pollution load even a modest fish pen operation places on the receiving waters. The draft EIS and the Weston guidelines deal only with issues to prevent the self destruction of the fish farming operation from its own waste. The so-called assimilation capacity of the Sound totally ignores the ongoing long term concern for Puget Sound water quality expressed by the public, the legislature, DOE, and the PSWQA. This is nothing more than the old "dilution is the answer to pollution" approach that was abandoned by the State and responsible industry decades ago.

At a time when Puget Sound residents are spending several billion dollars to provide improved waste treatment to remove nutrient loads, it is inconceivable that a State agency, and perhaps even the governor, are promoting an industry that will create a massive nutrient loading with no treatment.

The draft EIS is flawed by its failure to recognize the overall potential impact of this industry on Puget Sound water quality. If, as a mitigation, full secondary treatment of fish farm effluent were required as is done for upland hatcheries, we would find that this industry can only exist at the expense of the public.

Approval of this EIS will cast serious doubts on the integrity of the Department and can only result in increased litigation as citizens are forced to do what the State should be doing - protect Puget Sound.

Best regards,

KATO & WARREN, INC.

Richard E. Warren, P.E.
Principal

REW/ap

cc: Governor Booth Gardner
Ms. Chris Gregoire, Director DOE
Ms. Kathy Fletcher, PSWQA
John de Yonge, Seattle P.I.

RESPONSE TO LETTER NO. 4: RICHARD E. WARREN

1. Section 5.2 of the FEIS discusses the potential effect of fish farms on water quality. It also discusses regulations such as the NPDES permit program that ensure compliance with water quality standards. Section 5.3 of the FEIS discusses the potential impacts on nutrient sensitive areas of Puget Sound.

LETTER NO. 5

KITSAP COUNTY DEPARTMENT OF COMMUNITY DEVELOPMENT
(206) 876-7181 (WASH. 1-800-872-4503) RON PERKEREWICZ, Director
614 DIVISION STREET PORT ORCHARD, WASHINGTON 98366

March 30, 1989

Mr. Ron Westley
Project Manager
Washington Dept. of Fisheries
General Administration Building
Olympia, WA 98504

Re: Draft Programmatic Environmental Impact Statement, Fish Culture in Floating Net Pens

Dear Mr. Westley:

Having reviewed the above-referenced document, it is clear that it should be considered as being a quite comprehensive study of the net pen industry from a technical aspect. However, as to the accuracy or adequacy of the technical reports cited, there remains some question. In part, this concern lies with the State's position regarding net pen fish culture, in that by becoming an advocate for the industry their creditability from the publics perspective has been severely compromised. 1

The approach of anaylzing "four different levels of development" as possible alternatives is somewhat disappointing and the repeated statement "with proper siting" leaves the question; what is proper siting unanswered. In fact, the entire PDEIS process seems to have created more questions than answers and more unsolved problems unresolved. 2

The major concern is with the concept of the State's commitment to "properly site" 100 new net pen facilities. Is this truly the intent of the State? If so, then one must question why the PDEIS has been drafted in the first place, especially in light of the four conclusions outlined (page ix) and of the listed major potential impacts (pg ix, x). These items 1 through 8 do nothing to resolve the numerous conflicts which plague net pen proposals, if anything they emphasis the State's commitment to support the net pen industry regardless of the environmental impacts, water quality issues, sediment loading, disease or land use conflicts. 3

The State's answer to these issues remains; "with proper siting".

During the scoping process for the PDEIS we were lead to believe that the document would "provide a single authorative discussion of the possible impacts for use by State agencies, local government, fish farmers and interested citizens". And that we could look forward to being provided with "the guidelines necessary for proper management of the industry".

4 The document currently being circulated falls short of meeting our expectations. The document does, however, support one position quite strongly; the position local government has stated all along. There is no clear, concise, quick way to resolve the conflicts stemming from net pen projects. Local government has been struggling with this fact for sometime, without the benefit of support from the State agencies, who up until now have been holding on to their mandate to support the industry. If the PDEIS does achieve one goal it will be to alert the State agencies that the issues are broader and more complicated than can be resolved by a document prepared in light of the industry's desires.

Best Regards,

Renee Beam

Renee Beam
Shorelines Administrator

RB:jmm

LETTER NO. 5: KITSAP COUNTY DEPARTMENT OF COMMUNITY DEVELOPMENT

1. Comment noted.

2. The alternatives have been revised in the FEIS to evaluate the impacts of fish farming under a No-Action Alternative of existing regulations and guidelines, and under a Preferred Alternative of expanded regulations, additional guidelines, and recommendations for further research.

3. See the response to Question 3.

4. Comment noted.

LETTER NO. 6

March 15, 1989

Mr. Ron Westly
Project Manager
Washington Department of Fisheries
115 General Administration Building
Olympia, WA. 98504

Re: Draft PEIS-January,1989

Dear Sir:

As a shoreline land owner and resident of Whidbey Island, I, along with other residents and countless visitors, have enjoyed observing and using the magnificent, pristine waters of Puget Sound for fishing, crabbing, clamming, swimming, boating, water skiing and most of all, enjoying the special views over undisturbed waters.

Plans of the State of Washington to continue the commercialization of Puget Sound by increasing the salmon net pens placed by industry disturbs me a great deal. I strenuosly object to this **exclusive** use of **PUBLIC** property. These waters have always been for the use and enjoyment of **EVERYONE.**

I have studied the Draft PEIS published by the Department of Fisheries and wish to make the following comments:

1. For many years our goal has been to eliminate the discharge of waste such as human sewage and industrial wastes into Puget Sound. To this end we have constructed treatment plants, both primary and secondary. The PEIS states (Summary, page ix,1.) "**The major impacts of net pen culture can be prevented by proper farm siting to assure dispersion of wastes, flushing of the site, and protection of sensitive areas.**" **YET A SINGLE NET PEN PRODUCES POLLUTANTS EQUIVALENT TO UNTREATED SEWAGE FROM APPROXIMATELY 10,000 PERSONS!!** (Taken from article by columnist John de Yonge in Seattle Post Intelligencer, March 5, 1989.) Allowing discharge from salmon net pens certainly is not consistent with the requirements for discharge from sewage treatment plants. 1

2. The PEIS also states (Summary, page ix,6.) "**The accidental introduction of an exotic disease into state waters remains a risk.**" This I believe happened in Norway (where fish pens were permitted) and their wild fish runs were virtually destroyed. Recently VHS (a very dangerous fish disease) was found in two of our state hatcheries, necessitating the destroying of all fish. This has never occurred before in our state. It must have been brought in from Europe but to date no answer has been found. We should not take these unnecessary chances. Our natural salmon runs are too valuable. 2

Mr. Ron Westly, Project Manager
Washington Department of Fisheries

3. The composers of the PEIS admit that visual impacts cannot be avoided. Puget Sound is known worldwide for its beauty and has been enjoyed by all. We should not impair this wonderful natural body of water by **corrupting** it with more salmon pens. 3

4. No mention was made in the PEIS of the possible effects on humans from the use of antibiotics, and chemicals used to treat or prevent fish diseases. We also do not know what effect these chemicals would have on other sea life. 4

5. The PEIS speaks of reviews by many state and federal bodies such as Departments of Fisheries, Ecology, Environmental Protection, Coast Guard, etc. What **power** do these agencies have when it comes to regulation of aquaculture? **AND WHAT SAY DO LOCAL RESIDENTS, PRIVATE CITIZENS AND OTHER INTERESTED PARTIES HAVE IN ESTABLISHING NEW COMMERCIAL NET PENS AND OTHER AQUACULTURE IN PUGET SOUND?** 5

6. Evidently industry would be required to submit reports on their waste discharges, chemicals used, number of salmon harvested, etc. I believe that this is too serious a matter to allow self-policing. Industry should be required to pay for established, competent independent laboratories to inspect and test their sites periodically. 6 7

Again I emphasize that most aquaculture has no place in Puget Sound. I am firmly convinced that particularly salmon pens in any number would do irreparable damage to these waters.

William G. Langdon

William G. Langdon
3159 S. Eastpoint Dr.
Langley, WA. 98260

RESPONSE TO LETTER NO. 6: WILLIAM G. LANGDON

1. Mr. de Yonge, of the Seattle Post Intelligencer, quoted from the document, *The Environmental Effects of Floating Mariculture In Puget Sound* by Weston (1986). Mr. de Yonge neglected to add the last half of the sentence from which he quoted. The language from Weston (1986) follows:

   > The quantities of nutrients and associated BOD from the culture of 250,000 kg of salmonids are comparable to those produced by about 10,000 persons, but the water which passes through the net-pens on a daily basis is equivalent to the domestic use of 25 million persons (based on 0.25 cubic meters per day per individual). Thus, the concentrations of nutrients and BOD are very dilute compared to sewage and most other discharges to the marine environment.

2. See the response to Question 29.

3. Comment noted.

4. Antibiotic use in fish and associated human health concerns are noted in Section 5.4 of the FEIS.

5. The regulations used by State and federal agencies to manage the fish farm industry are discussed throughout the FEIS. Local citizens can participate in the decisionmaking process through a variety of means such as the SEPA review and the local shoreline permitting process.

6. See the response to Question 9.

LETTER NO. 7

4042 Smugglers Cove Rd.
Greenbank, WA 98253
March 16, 1989

Ronald E. Westley, Project Manager
Washington Department of Fisheries
115 General Administration Building
Olympia, WA 98054

PEIS Fish Culture in Floating Net Pens

The following comments are offered on behalf of SAVE OUR SHORES, a citizen organization on Whidbey Island:

We find this document inadequate and disappointing for a number of reasons. As nearly as can be discerned, the consultants employed represent organizations that have a previous history of advocacy for the industry as well as those agencies that have been promoting the aquaculture industry for a number of years. (1)

The choice of alternatives does not include a Null Alternative, but rather starts from the position that there will be a fish pen industry, and that the question is not debatable. What then follows is an organized attempt to refute all previously expressed objections. (2) In short, the Fisheries Department has abandoned objectivity and instead developed an advocacy paper. The report is further burdened by an inadequate budget for a study of such a complex subject. (3)

The most glaring deficiency in the report is the section on disease. Obviously the recent revelation of the presence of VHSD in Puget Sound renders this portion of the study obsolete and incorrect. It calls for a major supplement that includes a broadening in terms of the list of potential diseases and a description of disease problems in Canada, Europe and Asia. (4) It should address the increased susceptibility of penned fish to diseases which are carried by wild fish, and the probability of the development of more dangerous strains of those diseases. (5) It is inconceivable that the discussion of VHSD was treated so carelessly, when fisheries scientists have known of its existence for some weeks, and were

also aware that other areas--Oregon, Idaho and British Columbia--consider it to be so dangerous that they will no longer accept fish or eggs from Washington State hatcheries.

The report makes extravagant claims about the high quality of Puget Sound's water, yet makes no mention of the massive cleanup program that
6 Puget Sound Water Quality Authority has been asked to study. PSWQA has named the impact of fish pens on water quality as an issue for its future study agenda.

There is presently a good deal of concern about the proliferation of plastics in marine waters, yet the report does not mention how net pens
7 could exacerbate this problem. The Sechelt Peninsula in British Columbia has experienced severe problems from the more than one million plastic feed bags used in that small area each year. There will undoubtedly be additional problems with the larger pieces of plastic broken from the pens that were destroyed during this winters' storms.

During the scoping meetings we were assured that negative economic impacts would be assessed and weighed against those that are positive. This has not been done in the report. However, the appendix includes
8 unsubstantiated sweeping statements to the effect that the positive factors outweigh the negatives. This work should be done correctly and incorporated into the main report or be stricken from the appendix. Fisheries staff has advised us that because the work was of such poor quality it was not included in the report.

In view of the fact that no assessment of regulatory and monitoring costs
9 has been included in the report, it is assumed that the industry is to be self-regulating. If that is true, the report should so state.

The local impact section is not well developed. For example, much could
10 be learned from the Canadian experience in terms of disposal of dead fish (35%), amounting to more than one hundred tons in the local landfill annually. Beginning in 1985, this burden has shortened the capacity of the Sechelt land fill by three years. Also, there has been a substantial increase in burglary and vandalism in the area, beginning shortly after the
11 industry arrived in Sechelt, and there is reason to believe some of it may be du[illegible] influx of casual laborers, who are employed only on an hourly

basis, as slaughtering and processing require them. In addition, the
(12) industry has placed new burdens on roads and traffic control. Local governments are involved in all of these effects-- monitoring, complaint response, and development of regulatory programs and litigation.

The choice of sites for the study of dispersion of wastes was unfairly conceived. One site is in an area well known for its strong currents, and the other is a relatively new site. It was predictable that only small
(13) accumulations of waste would be found beneath these pens. The Department is well aware which sites would have revealed a much different picture. It is also well known that in both Canada and Norway the industry has requested "fallow" sites because most pens must be relocated every few years.

The limitations of the dispersion model as described in the appendix
(14) (P. 53 - 58) reveal that it has little validity and should not be relied upon. It is not enough that there is no better model available. The use of such a model violates the principles of acceptable scientific practice.

Of great public concern is the issue of proliferation. There is no defined outer limit of floating aquaculture, but this report suggests it will include
(15) at least one hundred salmon "farms". The report should include a map illustrating what Puget Sound would look like with one hundred salmon
(16) "farms", together with the projected seaweed, oyster, mussel and other floating installations.

The report did not include freshwater fish pens, although the industry is
(17) already moving toward such installations in the Columbia River, Lake Roosevelt, Rufus Woods Reservoir, and elsewhere.

The report ignores the Federal Clean Water Act and its NPDES permit
(18) requirement. This question may be decided in litigation brought by the Sierra Club Legal Defense Fund, but it certainly should be addressed in the PEIS.

The report should properly discuss the industry's financing problems,
(19) including the reluctance of Canadian and American banks to underwrite these ventures because of the high risk involved. This matter has become

more urgent since the announcement in British Columbia that Norwegian banks plan to withdraw from further funding, unless support is immediately forthcoming from the B.C. government or private sources.

(20) Critical questions have been raised concerning the industry's displacement of other users, and the study should include an extensive analysis of the Public Trust Doctrine as it applies to floating aquaculture.

(21) The comments on aesthestics speak only to how net pens look under ideal conditions. The suggestion is made that some viewers may even find fish pens attractive. Whereas there are many examples of attractive office buildings, apartment houses, and industrial parks, the basic principles of land use planning would preclude them in residential areas because of their different and incompatible character. Exactly the same compatibility rules that guide land use decisions can and should apply to aquatic areas as they relate to upland properties. Additionally, the visual impact study considered only a low profile style of fish pen, when in fact they may be almost any height. One example is an application in Clallam County for permission to site pens that would stand 25 feet above the water. (22)

(23) The section on land based fish pens was fairly well done but neglected to mention two key elements. The high capital cost of such a rearing technique is largely offset by its ability to produce an eight pound fish in twelve months. In addition, diseases that may be impossible to contain in water-based pens can be controlled in those on land, and they do not endanger wild stocks. Also, the report should note that land based facilities are subject to local zoning codes. Most of the siting problems might be solved if the same rules applied in the aquatic environment.

(24) The study was contradictory in a number of its mitigation suggestions. For example: "If the pens interfere with navigation they can be moved closer to shore" -- "If the pens impair the views from upland property they can be moved further out." "Bright colors should be used to protect navigation" -- "Aesthetic views will be enhanced by neutral colors."

The report minimizes the potential for escape by large numbers of penned fish. Note should be taken of the massive escape of fish from pens in

British Columbia during the winter storms of 1988-89. Estimates of escape in the Jervis Inlet area range from 100,000 to 2,000,000. Last autumn Seattle area newspapers carried a story concerning a large escapement brought about by seals tearing holes in fish pens. The report should address the impacts of large scale escapes, however unlikely they may be. (25)

Finally, it is urgently requested that this study be given a major revision and supplementation, particularly in the disease and pollution section. If the study is not to be expanded there must, at the very minimum, be a substantial extension of the review and comment period, perhaps 120 to 180 days. The study embraces a number of extremely complex issues, with more, apparently, to be faced, and they should be treated comprehensively. (26) (27)

Joe Miller, Chairman
Save Our Shores

RESPONSE TO LETTER NO. 7: SAVE OUR SHORES

1. See the response to Question 2.

2. SEPA requires a No-Action Alternative which was represented in the DEIS by the 13 farms which currently exist in Washington. The FEIS evaluates the fish farming industry under two regulatory alternatives: (1) The No-Action Alternative is the existing regulations and guidelines that presently affect the industry, and (2) the Preferred Alternative which includes expanded regulations, additional guidelines, and recommendations for further research.

3. Comment noted.

4. See the responses to Questions 25, 26, and 27.

5. See the responses to Questions 25, 26, 27, and 29.

6. See the response to Question 13.

7. This has not been a problem in Washington. The Preferred Alternative in Section 6.9 of the FEIS recommends that fish farm proponents supply information on waste disposal as part of their shoreline permit application.

8. See the response to Question 12.

9. See the response to Question 9.

10. See the response to Letter 1, Comment 88.

11. Comment noted.

12. Comment noted.

13. Comments noted. The choice of sites illustrates the need for adequate circulation around farm sites. European and Canadian fish farms typically have much higher fish densities and less rigorous siting review processes and consequently do not provide legitimate examples of the extent of sedimentation that could occur here.

14. See the response to Question 15. It is important to realize the limitations of any tool for assessing environmental impacts. However, limitations in a mathematical model does not mean that the model is invalid as you suggest. Limitations of a model such as this must be considered when reviewing the results from the model. As stated by Weston in Appendix A, "the model has performed well in both Puget Sound and Scotland."

15. See response to Question 3.

Response to Letter No. 7: Save Our Shores (continued)

16. A map such as you describe would be misleading for two reasons. First, the figures in this document, such as Figure 1, are drawn to a scale of 1 inch equals 16 miles. A square drawn on the map to represent a fish farm with sides 1/16 of an inch in length would be 640 acres in size. Therefore, a typical 2-acre fish farm would not be visible at this scale. Second, there is no way to project the number or locations of floating seaweed, oyster, mussel, or salmon facilities that may be sited in the future.

17. The scope of the EIS is limited to the marine waters of the greater Puget Sound area and is not intended to discuss any freshwater farming activity.

18. See the response to Question 17.

19. There is no requirement in SEPA to evaluate the specific financial status of an industry in an EIS.

20. A discussion of the Public Trust Doctrine has been included in Section 8 of the FEIS.

21. Comments noted.

22. Comment noted.

23. Comments noted. Land-based tank farms are outside of the scope of this EIS. This discussion has been moved to Appendix I of the FEIS.

24. See response to Question 10.

25. When the EIS talks about potential impacts of farm fish interbreeding with or competing with native stocks, it is addressing large-scale escapements. Small-scale escapements would be of negligible concern.

26. Comment noted.

27. Comment noted. See response to Question 7.

LETTER NO. 8

The Mountaineers
300 Third Avenue West • Seattle, Washington 98119 • (206) 284-6310

BRANCHES IN TACOMA, EVERETT, OLYMPIA AND BELLINGHAM

March 22, 1989

Mr. Ron Westley
Project Manager
Washington Department of Fisheries
115 General Administration Building
Olympia, WA 98504

RE: Draft Programatic Environmental Impact Statement on Fish Culture and Floating Net Pens

Dear Mr. Westley:

The Mountaineers is a conservation/outdoor club with more than 11,000 members, primarily in the Puget Sound corridor. We have consistently supported a clean and naturally productive Puget Sound for fisheries and other aquatic life and for recreation. We'd like to offer the following comments on the Draft Programatic EIS on Fish Culture and Floating Net Pens.

Based on the information in the DEIS, the Mountaineers feels the biological impacts on water quality from aquaculture requires serious concern. There is no evidence that Atlantic salmon pens will (1) not have a negative impact on native salmon runs. The fact exists that escaped exotic fish like the Atlantic salmon could establish self-sustaining populations and compete with indigenous fish such as steelhead trout.

The DEIS also does not discuss the problems occurring in the established fish pen industry in Norway where wild Atlantic salmon (2) runs have been devastated from diseases associated with the net pens. There is alot to be learned from an established aquaculture industry that the DEIS does not consider.

Based on the information in the DEIS the Mountaineers can only support a total moratorium on further siting of net-pen fish farms. (3) Until more in-depth information is researched and made available to prove that the biological vigor and ecological health of the Puget Sound will not be harmed, we cannot support additional fish pens in our waters.

Sincerely,
The Mountaineers

Carsten Lien

Carsten Lien
President

RESPONSE TO LETTER NO. 8: THE MOUNTAINEERS

1. The fact that all previous attempts, including several in the Pacific Northwest, to establish Atlantic salmon outside of their natural range in areas with indigenous salmonid populations have failed is evidence of the minimal risk of establishment here.

2. The wild Atlantic salmon stocks in Norway were not devastated by diseases associated with the fish farming industry. A serious reduction of the population was the result of acid rain, overfishing, and hydroelectric development before the fish farming industry was established. The situation in Norway is very different than what would occur in Puget Sound. In Norway, fish farms sited in fjords are essentially situated in river mouths of rivers with small, fragile populations of salmon. In Puget Sound, the small likelihood of impacts from escapement would be spread throughout the system. A small number of strays relative to a larger population of salmon is a natural occurrence.

3. Comment noted.

LETTER NO. 9

WASHINGTON STATE DEPARTMENT OF
Natural Resources

BRIAN BOYLE
Commissioner of Public Lands

OLYMPIA, WA 98504

April 5, 1989

Ron Westley, Project Manager
Washington Department of Fisheries
Mail Stop AX-11
Olympia, WA 98504

Dear Ron:

We have reviewed the "DPEIS, Fish Culture in Floating Net Pens". This appears to be a thorough, accurate report which we believe will be very helpful in resolving siting conflicts.

We suggest a correction to the list of permits and approvals on page 9. "Marine Lands Lease" should be changed to "Aquatic Lands Lease" and the citation should be RCW 79.90. On page 10, the discussion about DNR should read as follows:

> The Department of Natural Resources acts as the proprietary manager for state-owned aquatic lands. Aquatic lands are managed to provide a balance of public benefits for all citizens of the state. These benefits include encouraging direct public use and access, fostering water-dependent uses, ensuring environmental protection, utilizing renewable resources, and generating revenue in a manner consistent with the above benefits.

1

Thank you for coordinating with us during preparation of this document. We look forward to the final EIS.

Sincerely,

Steve Tilley, Assistant Manager
Division of Aquatic Lands

c: Stan Biles

t.32

RESPONSE TO LETTER NO. 9: WASHINGTON DEPARTMENT OF NATURAL RESOURCES

1. The language has been revised for the FEIS.

LETTER NO. 10

NOOKSACK INDIAN TRIBE
P O Box 15
Deming, Washington 98244
Telephone (206) 592-5176

March 22, 1989

Duane E. Phinney, Chief
Habitat Management Division
Washington Department of Fisheries
115 General Administration Building
Olympia, Washington 98504

Dear Mr. Phinney:

We received a copy of the Draft Programmatic Environmental Impact Statement: Fish Culture in Floating Net Pens last week. I called your division to see if the deadline for comments had been changed, since the copies were so late in distribution--- and was told that there was no change, except that they would accept comments until Friday, March 24th. Our Tribe would like to make a response to the document, but under this schedule we will not be able to make the deadline with the kind of detail a response like this requires. (1)

There are three salmon net pens being proposed in our area at this time, and we have taken the time to research something of the nature of potential threats we perceive from developments of salmon aquaculture like these.

Establishing salmon aquaculture needs to be examined in the contexts of non-point pollution (especially under the Puget Sound Water Quality Authority programmes of Monitoring and Research), fisheries management, and the more general aspects of environment that are traditional uses for impact statements. Since there is a current epidemic of a virus (the VHS reported on Orcas Island and at Neah Bay) that has never been reported in our area before and we do not know how it was transferred to our area---it seems that this problem needs considered attention and not a hurried process without the benefit of the independent biological staff such as is represented by our tribe and others. (2) (3)

Legislation that has been sponsored for consideration by Harriet Spanel of our District has passed the House of Representatives and is now in the Senate. This would require that guidelines to regulate the operations of floating aquaculture facilities would be written into local Shoreline Master Plans. In our experience, going before the County Hearing Examiner to describe our concerns with the salmon net pens proposed in our area, the ambiguity in the local shoreline plan was a difficulty. (4)

We feel that more time is needed to adequately review the DPEIS you have circulated, and so we must ask that the deadline be extended for comments on the document.

Sincerely,

Douglas E. Dobyns
Fisheries Biologist

RESPONSE TO LETTER NO. 10: NOOKSACK INDIAN TRIBE

1. See the response to Question 5.
2. Comment noted.
3. See the response to Question 29.
4. Comment noted.

LETTER NO. 11

Northwest Indian Fisheries Commission

6730 Martin Way E., Olympia, WA 98506 Phone (206) 438-1180 FAX #456-3032 FTS #434-9476

April 4, 1989

Mr. Ron Westley
Project Manager
Washington Department of Fisheries
115 General Administration Building
Olympia, Washington 98504

Dear Mr. Westley:

The Northwest Indian Fisheries Commission is providing the following comments on your Draft Programmatic Environmental Impact Statement - Fish Culture in Floating Net Pens.

We are pleased to see that the PEIS addressed this topic in such a comprehensive manner. This document addresses many of the topics brought up before State and local hearings regarding floating net pens, and therefore should be very valuable to those decision making bodies, which must address permit applications.

SPECIFIC COMMENTS

Section 3, Page 105 -

1 This section does not adequately address the rights of Treaty Indians to fish in their Usual and Accustomed Fishing Areas. U & A's can be described as broad geographic areas and also as site specific locations. The right to fish in these areas cannot be permitted away by local, State, or Federal permitting agencies. The only way that a site, which conflicts with treaty fishing can be permitted, is with the agreement from all tribes who fish at that site. Obtaining agreement from the tribes may require some form of mitigation, depending on the importance of the site. Important fishing locations may have to be excluded from consideration for net pen siting.

Section II(3c), Page 77 -

2 Unfortunately, with the recent discovery of Viral Hemmorhagic Septicemia (VHS), in Washington, the section on VHS needs to be re-written. The comments pertaining to VHS transmission need to be more carefully worded to explain that vertical transmission (inside the egg) rarely, if ever, occurs and that horizontal transmission (fish to fish or on the outside of the egg) is the most common route (see Holt, ODF&W Studies at Elk River on IHNV transmission; Ken Wolfe's book "Fish Viruses & Fish Viral Diseases"). In lieu of this, I would like to change the opening sentence on page 77 to include "for introducing exotic pathogens in <u>or</u> <u>on</u> eggs imported..."

Appendix D - Infectious diseases of Salmon

3 This section should be strengthened with increased descriptive material about the problems that pathogens cause, i.e. the how, when, where and why pathogens may have impacts on net pen reared fish and the implications of each in terms of transferring that pathogen to wild fish in the area. The current discussion has also left out IPN, and needs to be updated to include VHS.

Sincerely,

Terry Wright

TERRY E. WRIGHT
Manager, Enhancement Planning

TEW:cac:netpen.wp

RESPONSE TO LETTER NO. 11: NORTHWEST INDIAN FISHERIES COMMISSION

1. The text has been revised for the FEIS to include a more detailed discussion of Treaty Indian rights. See Section 6.3 of the FEIS.

2. Comment noted. See the response to Question 29.

3. See Appendix G.

LETTER NO. 12

MEMBERS

Dunlap Towing Company
Foss Maritime Company
General Construction Company
Knappton Maritime Corporation
Manson Construction & Engineering Co.
Olympia Towing Company
Puget Sound Freight Lines
Puget Sound Tug & Barge Company

'45 N.W. 85th STREET, SUITE 103 • SEATTLE, WASHINGTON 98117 • (206) 782-3860

23 March 1989

Mr. Ron Westley, Project Manager
Washington Department of Fisheries
General Administration Building
Olympia, WA 98504

Ref: Draft Programmatic E.I.S.
Fish Culture in Floating Net Pens

Dear Mr. Westley:

The comments submitted by the Northwest Towboat Association apply to the section on Navigation commencing on page 102 of the E.I.S..

1 a. Reference is made throughout this section to Puget Sound while the study area includes a much greater area than just Puget Sound. Are the contents of this section applicable to just Puget Sound or are they to be applied to the entire study area?

2 b. Page 103, 3rd Para.,3rd Sentence. Suggest rewording as follows " Towboats with large barges normally use the main shipping lanes while towboats with log tows and small barges may hug shorelines...".

3 c. Page 104, 2nd Para. In the past, at present and in the future log towing will be a part of the maritime business in the E.I.S. study area. Essential to the safety and economics of log towing is the continued availability of anchorages for both safety from wind and waves and while awaiting favorable tidal/current conditions. In particular, few people understand the damage that wind and waves create for log tows and realize the drastic affect adverse currents/tides have on the speed of advance of a large log tow capable of making only a few knots. Therefore, the loss of a currently used embayment is a serious set back to the log towing industry.The establishment of a fish pen in a location needed by the log towing industry results in the loss of that area for 24 hours every day of the year. While the paragraph suggests " towboats and other boaters may have to travel to the next available safe anchorage" this option may not be available and thus comes the problem.

4 d. Page 104. 3rd Para. The comparsion of net pens to a long dock, a marina or series of anchored boats as stated in the first sentence is not a valid comparsion. While the

distances from shore and depths of water vary by large amounts, net pens may be 800 feet or more from the shore and in depths of water exceeding 60 feet.The pens thus create obstructions to navigation much greater than the comparsion stated in the first sentence. The last sentence is the more likely situation, with the net pens located far enough off shore to hazard log towing operations.

e. Page 104. 4th Para. The statement that location of net pens in more remote areas is typical of recently permitted pen sites is subject to debate. When navigating over the water a remote area is difficult to define as all areas are equally accessible. Perhaps the reference is made to land areas and the presence or non-presence of homes, buildings, etc. determines if the area is "remote". 5

f. Page 104, Section c., Mitigation Measures. Generally speaking, the listed measures appear to be a partial answer to reducing impacts to navigation, but upon close examination that may not be the case. Examples: 6

(1) Avoid Placing nets in established areas - In the study area I believe any agency will find it difficult to locate an area which is not an established area to some group of maritime users.

(2) Site pens close to shore - Inadequate water depth, more pollution of the bottom, insufficient flow of water appear to be problems. 7

(3) Place pens adjacent to existing structures - Same concerns as noted above. 8

(4) Consolidate farms in area of limited navigation - Comments in (1) apply plus concern of concentration of fish pens causes impact on water quality and bottom pollution. 9

g. Page 105. d. Unavoidable Adverse Impact. Concur with this statement, but should include study area not just Puget Sound. This one sentence sums up the position of the Northwest Towboat Association on the subject of placing net pens in the navigable waters of the study area. 10

The Association appreciates the opportunity to comment on the Draft E.I.S. on the Fish Culture in Floating Net Pens. The Association also request full consideration be given to our concerns in the final draft of this document.

Sincerely,
Northwest Towboat Association

Boone C. Taylor

Boone C. Taylor
Executive Secretary

RESPONSE TO LETTER NO. 12: NORTHWEST TOWBOAT ASSOCIATION

1. As stated in Section 3 of the FEIS, the term "Puget Sound" in this document refers to the greater Puget Sound marine waters from the west end of the Strait of Juan de Fuca, north to the Canadian border, and south to Olympia. This includes Hood Canal and all marine bays, harbors, inlets, and passages.

2. Comment noted.

3. Comments noted.

4. As was stated in the text, a farm located close to shore would have the same effect on navigation as would anything, such as a dock, that extends from the shore. The paragraph goes on to say specifically that "The further offshore the structure is located, the greater the navigational risk . . ."

5. The context of the paragraph is the relationship of fish farms to potential boating emergencies. Recently permitted farm sites are in areas without upland development that could provide quick assistance to boaters, and that is why the term "remote" was used.

6. Comment noted.

7. Siting a farm near the shore would reduce the potential impact on navigation, but may increase other potential impacts. Evaluation of potential farm sites should include an assessment of navigation as well as other factors such as water depth and current.

8. Placing farms adjacent to an existing structure such as a dock, that already affects navigation, would minimize the effect of the farm on navigation. See the response to Comment 7 above.

9. See the response to Comment 7.

10. See the response to Comment 1.

LETTER NO. 13

JAN TVETEN
Director

STATE OF WASHINGTON

WASHINGTON STATE PARKS AND RECREATION COMMISSION

7150 Cleanwater Lane, KY-11 • Olympia, Washington 98504-5711 • (206) 753-5755

March 23, 1989

TO: Mr. Ron Westley, Project Manager
Washington Department of Fisheries

FROM: Ron Effland, Environmentalist
Environmental Coordination

SUBJECT: Fish Culture in Floating Net Pens Draft Programmatic EIS (DPEIS).

The following are comments from the staff of the Washington State Parks and Recreation Commission on the above subject.

1 Recently we received a News Release from the U.S. Fish and Wildlife Service dated February 24, 1989. The information in that paper seems to require that diseases on page 77, paragraph 2 in the DPEIS be rewritten.

The news release reported that at the Makah National Fish Hatchery 3.4 million viral hemorrhagic septicemia (VHS) infected fry and fingerling coho, chum and fall chinook salmon, steelhead trout and fish eggs had to be destroyed in an effort to contain the virus. This disease is native to Europe but is new to North America. The report also says the virus could pose a major threat to Pacific salmon and steelhead resources. Some of the infected adults migrated to the hatchery's water supply and infected other salmon and steelhead being raised there.

The paper reported further that a VHS-like virus in chinook salmon was discovered at the Glenwood Springs salmon rearing facility on Orcas Island. 435,000 chinook salmon fry and fingerlings had to be destroyed and the hatchery disinfected. The article goes on to say that VHS is native to Europe, where it is known to cause high mortalities in salmonid species, particularly in the commercial production of rainbow trout. Biologists cannot yet explain how a disease from Europe suddenly surfaced in western North America. For more than 20 years, the U.S and Canadian governments have required the inspection of European salmon and trout and their eggs before they enter the two countries in an effort to prevent introduction of any potential diseases.

The News Release was very informative. We have also heard speculation on the news that there is a high probability that the virus VHS came from Atlantic Salmon eggs imported from Europe and that Washington's Pacific salmon and steelhead are in danger.

2 We agree with the mitigation measures to reduce potential impacts on navigation addressed on pages 104 and 105 except the use of highly visible colors in the design of the facility. The requirement to have navigational lights on all four sides of net pen facilities has less visual impact and greater safety.

3 The Washington State Sport Catch Report says that in 1987, 456,000 sport anglers caught an estimated 783,000 salmon. 672,000 of the salmon were caught in marine waters. The salmon anglers took nearly 1.5 million trips averaging 1.97 fish per person and 0.44 fish per trip. This shows that there is a lot of salmon sport fishing taking place.

4 Finally, the mitigation measures for impacts to recreation listed on page 120 (copy enclosed) in the DPEIS should have a recreational dollar value applied. If a proposal occupies a recreational salmon fishing hole or area and the project can not be located elsewhere, the proponent should provide contributions to a Pacific Salmon raise, hold and release project in the area. Should the proposal displace an area that is a recreational bottom fish site the proponent then should make contributions to construct an underwater reef park near by the project location. The amount of the proponents contribution should be based on TABLE 6, Page A-7 in the Department of Community Development document titled Economic Impacts and Net Economic Values Associated with Non-Indian Salmon and Sturgeon Fisheries. Table 6 (copy enclosed) shows recreational benefit values per salmon fishing trip to various areas through out the state. These values range from a low of $71.08 in South Puget Sound to a high of $136.24 on the coast. Each net pen proposal must be analyzed on a site by site basis for mitigation of impacts to recreation, and the analysis shown in the project EIS.

Thank you for the opportunity to comment.

vc
Enclosures
cc: Tom France, Assistant Director
Dave Heiser, E.P. Chief, Environmental Coordination
John Pitts, Dept. of Agriculture

Floating net pens can also have positive impacts on recreational activities. Personnel from net-pen facilities could provide assistance during boating emergencies, and the net pen structure itself could be used for temporary moorage during an emergency.

c. Mitigation Measures

Recreational activities within an area proposed for a net-pen facility will be dependent upon the nature of the area, its intrinsic value, presence of destination objectives, and its accessibility to the public. Efforts to avoid or minimize adverse impacts on recreation must, therefore, be based upon an evaluation of the specific nature of recreation in the area. Below is a list of some measures that could be used to reduce any impacts.

- Avoid the placement net pens in areas of high recreational use or value when the farm will adversely affect those values.

- Consult with resource agencies (especially WPRC and WDF), with the local planning department, and with local user groups (fishing clubs, dive clubs, yacht clubs) to identify current recreational uses and potential conflicts.

- Avoid areas of intense recreational use (such as fishing "holes", SCUBA dive sites, or destination moorage areas).

- Avoid areas where pens would adversely affect the intrinsic recreational value (for example, within 2000 feet (610 m) of state park beaches).

- In other areas, minimize adverse impacts on recreational use, including navigational, aesthetics, noise and odor. Specific mitigation measures are discussed in the appropriate sections of this PEIS.

- Provide public benefits to offset any adverse impacts to recreation. Specific activities will be project specific and would depend upon agreement between the net-pen proponent and interested parties. Such activities could include:

  -improving public access at access sites used for farm operations;

  -cooperative projects with fishing clubs, schools, tribes and the state to use available pen space to enhance wild fish stocks.

d. Unavoidable Adverse Impacts

With proper net-pen site selection, there will be no significant adverse impacts to recreational activities. Where lesser impacts are unavoidable, these can be minimized through the design, configuration, and placement of the pens at the site. In addition, activities can be undertaken in association with the net-pen operation to enhance recreational uses in the area.

TABLE 6

RECREATIONAL BENEFITS PER TRIP

GROUP NUMBER	USER GROUP	THE COAST (1)	THE STRAITS (2)	PUGET SOUND NORTH (3)	PUGET SOUND SOUTH (4)	COLUMBIA RIVER (5)	WASHINGTON STATE
	COMMERCIAL (non-Indian)						
1	Ocean Troll - Large	0	0	0	0	0	0
2	Ocean Troll - Small	0	0	0	0	0	0
3	Gillnets	0	0	0	0	0	0
4	Purse-Seines	0	0	0	0	0	0
5	Reef Nets	0	0	0	0	0	0
	AVERAGE COMMERCIAL	0	0	0	0	0	0
	RECREATIONAL						
6	Shore Fishermen	$79.26	$79.26	$79.26	$67.21	$79.25	$79.17
7	Private/Rental Boats	$87.19	$87.19	$87.19	$69.73	$87.19	$80.75
8	Charter/Party Boats	$177.94	$145.51	$155.51	$123.81	$120.61	$164.14
	AVERAGE RECREATIONAL	$136.24	$93.00	$90.59	$71.08	$83.00	$88.59
	AVERAGE WASHINGTON (non-Indian)	—	—	—	—	—	—

Description

This is the dollar value of a recreational fishing trip as determined by surveys of recreational fishermen's "willingness to pay" to fish or their "willingness to accept payment" to forego the opportunity to fish. This dollar value is always at least as high as the dollar amount recreational fishermen actually spend to engage in recreational fishing. The difference between the amount recreational fishermen would be willing to pay per trip (B/T) and the amount they actually pay (e/T) represents the net economic benefits per trip (see documentation for Table 17).

Method of Estimation

No primary data collection was undertaken for this study. Instead the results of a number of recent surveys and economic analyses related to Pacific coast recreational fishing and northwest salmon fishing in particular were used to estimate values. Although several poorly designed surveys of recreational fishermen conducted in recent years have resulted in outrageous estimates of recreational value, many well-designed surveys have been conducted which provide credible and fairly consistent estimates of gross and net economic values for various kinds of salmon fishing.

References Used

Through direct research and subcontracts, all empirical economic studies of U.S. recreational fisheries using the Contingent Valuation Method (CVM), Travel Cost Method (TCM), and Hedonic Pricing Method (HPM) were reviewed and summarized. Several studies by NMFS, UW, and OSU provided the most recent and the most objective estimates; these were corroborated with the results of other similar studies and used to estimate mid-point values for each type of recreational fishing used in the analysis.

Selected References used include: 10, 11, 13, 14, 15, 16, 17, 18, 19, 25, 30, 33, 38, 40, 42, 43, 44, 49, 51, 55, 57, 62, 63, 66, 69, 70, 72, 73, 76, 81.

Comments

1) On a statewide basis, the relationship between Benefits and Expenditures by various recreational users can be summarized as follows:

	Charter Boat	Private Boat	Bank
Recreational Benefits per Trip	$164	$ 81	$ 79
Expenditures per Trip	115	56	32
Net Recreational Benefits per Trip	$ 49	$ 25	$ 47

2) Recreational benefits were not assigned to fishing conducted under a commercial license (see Section 2.1.1 Classifying Fishermen).

RESPONSE TO LETTER NO. 13: WASHINGTON STATE PARKS & RECREATION COMMISSION

1. See the response to Question 29.

2. Comment noted.

3. Comment noted.

4. Calculating the compensation value for any adverse impact to recreation can be done several ways and should be determined on a case-by-case basis.

LETTER NO. 14

Point No Point Treaty Council

Port Gamble Klallam • Lower Elwha Klallam • Jamestown Klallam • Skokomish

April 5, 1989

Mr. Ron Westley
Project Manager
Washington Department of Fisheries
115 General Administration Building
Mail Stop AX-11
Olympia, WA 98504

RE: DRAFT PROGRAMMATIC EIS ON FISH CULTURE IN FLOATING NET PENS

Dear Mr. Westley:

The Point No Point Treaty Council has had an opportunity to review the draft PEIS on Fish Culture in Floating Net Pens. Although some of the member tribes of the PNPTC may wish to submit their own detailed comments on the PEIS, the following general comments are submitted on behalf of the four member tribes: the Skokomish, Port Gamble Klallam, Jamestown Klallam, and Lower Elwha Klallam.

PERMITS AND APPROVALS

It is imperative that tribes be listed on pages 10-12 among the governmental entities or agencies who review permit applications for fish farms. The Point No Point Treaty Council regularly reviews any new development located within the usual and accustomed fishing area of our member tribes to determine the effect of the project on treaty fishing activities and finfish or shellfish habitat. While many tribes, such as the Jamestown Klallam, do not oppose some net pen development in their usual and accustomed area, location of a net-pen at a usual fishing station could constitute an illegal infringement on treaty fishing rights. If such a conflict cannot be resolved with the affected tribe(s) during the permitting process, the tribes have recourse through the Federal court to block such a project. (1)

Although we have established contacts with local permitting entities such as county planning offices, occasionally the tribes or PNPTC fail to receive the appropriate notification. This situation occurred regarding a fish farm shoreline permit application in Jefferson County in 1987. The County's failure to notify us became the grounds for an appeal to the Shorelines Hearing Board. Notification to tribes at the earliest possible stage of a proposal will help to alleviate potential conflicts. (2)

Section II. E, Relationship to Land Use Plans and Regulations, discusses the role of local governments related to planning efforts in the siting of aquaculture facilities. As local governments, tribes must be included in any planning efforts pertaining to floating net pen facilities, and be given full opportunity to establish their own net pens for either fish farming or enhancement.

COMMERCIAL FISHING

In this section several references are made to the impact of net-pens on the allocation of fish between treaty and non-treaty fisheries which are biased towards non-treaty commercial fishermen. Page 113, paragraph 5 states that, "if opportunities for harvest are reduced in established non-tribal fishing areas, and the fish migrate into areas open only to tribal fishing..... then the non-tribal fishers may lose part of their court ordered allocation of salmon." There are three factors which make this statement erroneous. In the first place, there is no allocation reserved to the State. Only the treaty fishery is a distinct right which is reserved to the tribes. As stated in the conclusions of law in U.S. v. Washington:

3

> Because the right of each treaty tribe to take anadromous fish arises from a treaty with the United States, that right is reserved and protected under the supreme law of the land, does not depend on state law, is distinct from rights or privileges held by other, and may not be qualified by any action of the state.

Secondly, we wish to point out that the attainment of treaty/non-treaty allocation is subject to management plans which allow the State considerable flexibility in adjusting fishing opportunity across a wide geographical area and schedule. A scenario opposite to the one outlined on page 113 is more likely to happen, since tribal fisheries are place and stock specific. For example, a tribe which is displaced from Quilcene Bay cannot move to Bellingham Bay to fish. This lack of geographical flexibility makes it more likely that if a net pen were to displace fishing activities, it would preclude opportunity for a tribe rather than the state, and disrupt inter-tribal fishing allocation agreements.

4

Page 113 goes on to say that fishing opportunity could be lost to all fishers and, "fish return to their native streams." Since the state prohibits commercial fishing in rivers, it is possible that some non-Indian harvest would be lost in the unlikely event that a fish farm eliminated all commercial harvest in a marine terminal area. However, it is doubtful that the tribes would also forego the opportunity to harvest fish in the freshwater terminal area and allow, "an unnecessary loss to the fishing industry."

5

In summary, it is our opinion that the section on commercial fisheries does not accurately describe the management system as it currently operates, particularly with respect to the attainment of treaty/non-treaty allocation. Since conflicts with treaty fisheries are an important consideration in the siting of net-pens, the section should be rewritten.

DELAYED-RELEASE PENS

The PEIS is deficient in its discussion and evaluation of environmental impacts related to delayed-release net pen projects. Discussion is restricted to Section B., Background on the Net-Pen Industry, page four, where it is stated:

> "...this PEIS does not specifically evaluate the impacts of delayed-release pens. However, many of the environmental impact discussions in this PEIS also pertain to delayed-release pens recognizing that the smaller size and temporary nature of the net pens will result in proportionally reduced impacts."

The last sentence is true as far as it goes; however, the PEIS fails to recognize significant differences and potential interactions between delayed release and commercial net pen projects that are important in considering environmental impacts. 6

Should limitations on net pen siting be imposed, either for all of Puget Sound (as implied by the listing of alternative levels of development on page eight) or in localized areas, then consideration of factors not included in the PEIS becomes important. This holds true particularly if the number of sites (surface area) is restricted.

Delayed-release net pens are salmon enhancement projects. They produce fish that benefit the recreational and commercial fisheries of Washington State, whereas, commercial net pens are, to date, either strictly private ventures or tribal economic development enterprises. If there are a limited number of sites available for net pens, and as permits are issued to commercial net pen projects, then the potential opportunity for development of delayed-release programs may be restricted, and in some cases, eliminated. In other words, the development of commercial net pen projects could restrict future development of salmon enhancement projects of benefit to recreational and commercial fisheries. This constitutes an impact on commercial and recreational fisheries that is not addressed in the PEIS' discussions of impacts - Section B.3., Commercial Fishing and Section B.5., Recreation. 7

It is possible that a delayed release program could be incorporated into a commercial project as a mitigation measure. This option would only be possible if it were consistent with the regional fishery management provisions of the area where the 8

project is located. Development of such a delayed release program would need to be in cooperation with the State and treaty fishing Tribes of the area.

IMPORTATION OF EXOTIC SPECIES

We agree that the potential for adverse impacts from the accidental release of atlantic salmon is small. However, it is important to remember that salmon plants into the Great Lakes were unsuccessful for 100 years before the great successes of the 1960's. The inadvertent release and subsequent explosion of the pink salmon population in Lake Superior is another example of unexpected and unwanted consequences of exotic releases. One safeguard against a successful colonization of an exotic such as atlantic salmon is the maintenance of healthy natural production of native stocks. Pacific salmon in the Great Lakes did not succeed until the native species were essentially replaced or depleted. (9)

DISEASE

In view of the recent outbreak of VHS virus in local freshwater hatcheries, we recommend an updated discussion of this disease including its origins and method of transmission. The statement on page 77 that "this viral disease may be transmitted vertically from the adult brood fish to eggs and fry " conflicts with other recent information and should be clarified. (10)

The PEIS should elaborate on disease risks to wild fish from existing freshwater culture facilities to allow comparison of risks relative to net-pen operations. The severity of measures that are now used to correct an introduction of an exotic disease necessitates an impact evaluation in the PEIS. We are referring to the decision to poison the Sooes River in response to the discovery of VHS disease at the Makah facility. (11)

ECONOMICS

Economic impacts covered in the Appendix were largely limited to employment, state and local revenues, and waterfront property values. A detailed and informed discussion of the potential economic and cultural displacement of treaty and non-treaty commercial fishing communities is needed to complete the economic analysis of commercial net pen fish culture. (12)

Sincerely,

Randy Harder

Randy S. Harder
Treaty Council Director

RSH:ys

RESPONSE TO LETTER NO. 14: POINT NO POINT TREATY COUNCIL

1. The agencies listed in Section 4 are directly involved in regulating the fish farming industry. The Preferred Alternative in Section 6.3 of the FEIS includes recommendations that tribes be notified of fish farming proposals through the SEPA review and shoreline permit public notices to ensure that important fishing areas are identified. See the response to Question 8.

2. See the response to Comment 1.

3. The text has been revised for the FEIS to clarify the allocation process.

4. The scenario you suggest is also a possibility and has been added to the FEIS.

5. Comment noted.

6. See the response to Question 21.

7. See the response to Question 21. The potential environmental effects of delayed release facilities are substantially different in scale than commercial fish farms. It is unlikely that commercial farms and delayed-release facilities will compete for similar sites.

8. As stated in the discussion of mitigation measures in the Commercial Fishing section of the DEIS, final approval of a delayed-release program incorporated into a fish farm would require approval by both WDF and tribal biologists.

9. Comments noted.

10. See the response to Question 29.

11. Comment noted. See the response to Question 26, and the response to Letter 1, Comment 16. The scope of the EIS does not include an evaluation of freshwater hatchery facilities.

12. See the response to Question 12.

LETTER NO. 15

PORT GAMBLE KLALLAM TRIBE

P.O. BOX 280
KINGSTON, WASHINGTON 98346

206-297-2646
478-4583
464-7281

April 5, 1989

Joseph R. Blum
Director
Washington Department of Fisheries
115 General Administrative Building
Mail Stop AX-11
Olympia, WA 98504

Re: Draft Programmatic EIS on Fish Culture in Floating Net Pens.

Dear Mr. Blum,

The Port Gamble Klallam Tribe appreciates this opportunity to review the draft PEIS on Fish Culture in floating net pens. The scope of the PEIS needs to be defined, please consider this definition, net pen culture of fish: The rearing of fish species under artificial conditions, in marine and fresh waters and meeting the following criteria inclusive. Fish held in unnaturally high densities that are fed a formulated diet and are not allowed to reproduce naturally within the culture operation. This definition is intended to exclude operations which would not functionally impact the environment as would net pen culture of salmon. Operations excluded from this PEIS would then be: 1

1. Kelp and algae culture
2. Herring spawn on kelp fisheries
3. Oyster and mussel intensive culture
4. Clam relay and intensive pen culture
5. Abalone culture where a formulated diet is not utilized

Salmon net pen operation is technically advanced while the others listed are just developing technically in Washington State. To view, for permit consideration, these developing technologies in the same light as Salmon Net Pen operations will confuse, and have already caused serious confusion, to the very agencies that the PEIS is directed at to aid, further it will strongly tend to delay development and diversification of marine aquaculture. This very diversification of resource utilage is viewed by this tribe as instrumental for the future of it's cultural development and economic viability.

Please consider two major categories of net pen fish rearing: 1) primary rearing which is best done in sheltered, low flow areas and optimizes conditions for fish from smolt size to about .75 fish to the pound and; 2) secondary or growout rearing best done in high flow deep water areas. The 2 operation modes are quite distinct in facilities, operation and potential impact. By requiring separation of the categories optimum utilage of available space will be ensured and impacts of every sort minimized while reducing inherent risk to the fish farmers. Sites under approximately 100 feet deep at low water should probably be reserved for the primary rearing mode while sites of high flow and deep water reserved for the 2nd mode. By formalizing this principal, which is already widely accepted as an optimal culture scenario by the industry and making it mandatory it would ensure that competition between farms would be directed towards greater efficiency in both economic and environmental terms. I suggest making this principal a planned benefit of the PEIS that would then be quickly realized by the industry it self.

2

Consider requiring that as a new net pen farm is proposed that an intregal part of each proposal be a full economic evaluation aimed at predicting how the farms' production will effect prices paid to local commercial fishermen for their catch. This will incrementally tend to develop and expand the market available and benefit both farmer and fishermen with more stable growth market. Without an indepth and responsible assessment of market impacts of farmed salmon upon commercial fishermen, commercial fishermen, particularly many tribal fishermen, will not be able to accept the risk. Representing Port Gamble Klallam Tribe throughout the Tribes Usual and Accustomed fishing area, this type of economic risk combined with loss of fishing area and opportunity will continue to prevent acceptance of large scale net pen operations. If other Tribes view the concern similarly the area available for private net pen operations in the State of Washington will never expand significantly over what is now already utilized. It would be in the best interest of all parties concerned to have an ongoing economic assessment built into the Programmatic Environmental Impact Statement.

3

Sincerely,

Craig A. Olds
Port Gamble Klallam Tribe
Fisheries Manager

RESPONSE TO LETTER NO. 15: PORT GAMBLE KLALLAM TRIBE

1. The scope of the EIS is defined in the Fact Sheet and Summary as the evaluation of the commercial culture of fish in floating net pens. The other forms of aquaculture you mention are not within this scope.

2. Comments noted.

3. Comments noted. It is outside the scope of this EIS to evaluate the economic relationship between farm fish production and prices paid to the commercial fishing industry.

18 March 1989

Ron Westley
Project Manager
Washington Department of Fisheries
115 General Administration Building
Olympia, Wa. 98504
(206) 753-6642

COMMENTS ON FISH CULTURE IN FLOATING NET PENS

JANUARY 1989 PEIS

My review of this PEIS left me with two separate categories of feeling. The first was one of outrage and indignation over the fact that the
1 Department of Fisheries would have the audacity to use public monies to fund such a blatant attempt to favor a category of private special interests which the general public has expressed not only no support of, but generally has vigorously opposed. The second was of greater distress to realize that the same department had accepted a product from a consultant that not only is
2 extremely lacking in objectivity, but is simply not accurately done, and thus of little or no value. The comments which follow are intended to develop these two lines of thought.

OUTRAGE AND INDIGNATION COMMENTS

1. After a review of SEPA Rules under Chapter 197 - 11 WAC, I have concluded that I am unable to find any legitimate status for a "Programmatic" Environmental Impact Statement as part of the SEPA
3 process. Time for commenting does not permit a thorough research of this point, however even if there is some administrative practice or regulation for doing a PEIS, the Department of Fisheries should remain in a regulatory role not an advocacy role. This PEIS is simply a thinly veiled attempt to provide a "Generic" EIS for all time for net pens in Puget Sound.

2. The statement of item "J" of the Fact Sheet needs to be clarified by the inclusion of a statement saying "this PEIS was conducted for evaluation purposes only and the required case-by-case SEPA reviews conducted on subsequent projects are not limited in any respect by the findings or conclusions herein". This would make this item consistent with the statement on page x following Phased Review. (4)

3. I find it difficult to understand why the Department of Fisheries would issue a document such as this. Your proper role is to manage the natural and hatchery fishery resources of this state for the benefit of state as a whole, commercial and sport fishery alike. This proposal has significant negative impacts to both. It competes with and offers high risks to the very resources you are supposed to be protecting and enhancing. Why should the public tax itself to clean up the Sound while you actively promote a program which introduces vast new pollution sources? (5)

4. Public money would be better spent on putting together a strong WAC which covered "Minimum Functional Standards for Fish Culture in Floating Net Pens". The remaining questions regarding Net Pens can be accommodated within the SEPA Rules process alone, at the local level. (6)

Lack of Objectivity and Accuracy Comments

1. The Summary or Abstract of a document is very important because most people trust them, and in fact will either read only the Summary or perhaps at least decide how much of the rest of the report to read, based upon what they find in it. The Summary presented on pages ix and x is not objective nor is it accurate. It does not even coherently convey the material contained within itself. The Summary does not even make good sense on its own terms. An example of this is contained on page x which I have reproduced below: (7)

"UNAVOIDABLE SIGNIFICANT ADVERSE IMPACT: No unavoidable adverse impacts were noted; however, efforts to minimize some impacts may exacerbate others. Thus in particular situations adverse impacts may be unavoidable." (sic)

This passage is perhaps the most specious one in the entire report. Notice first that the key word SIGNIFICANT appears only in the bold and underlined subtitle, not in the statement that follows it. The writer would like us to believe that there are some adverse impacts, that efforts to

minimize them may make some some of these worse, and perhaps unavoidable in particular situations. Most of all, the writer wants us to believe that none of these unavoidable adverse impacts could possibly be SIGNIFICANT! The factual material in the text of the report itself will not support this view, even those facts contained elsewhere in the Summary will not.

Is what we are asked to believe true? I do not think so, but let us check. Examine the preceding section of the Summary, and note that the writer lists eight categories of "MAJOR POTENTIAL IMPACT". Here again the writer chose not to use the word *Significant,* which has a clearly defined meaning under SEPA. The word *Major* was used, which has no meaning under SEPA when used independent of *Significant* (please see WAC 197-11-764 and 794). The heading should read "MAJOR POTENTIAL SIGNIFICANT IMPACTS...." since there is a reasonable likelihood of more than a moderate adverse impact on environmental quality in each of these eight areas of concern.

8

Having established that the PEIS has identified eight Potentially Significant Impacts; the question is simply which, if any, are unavoidable. Actually there are only seven impact areas because of Item 8. on page x . This Item does not even come under the title given on page ix. Item 8. is a non sequitur, since it does not cite a major or significant adverse anything, impacts included. Nor does this Item present any mitigating actions. My view is that all of the remaining seven are unavoidable. For sake of argument, I submit that five of these are clearly unavoidable based on simple logic and the facts stated in the summary alone. These are Items 1,3,4,6,&7. The reasons are explained in individual paragraphs that follow.

2. The impact to navigation in item 7. is clearly an unavoidable one. We are not considering the installation of a small floating aids to navigation here. We are not talking about a clam or oyster bed either. The size, profile, and obstructive nature of their presence, makes floating fish pens a hazard to safe navigation; particularly at night and during low visibility. There is no means to effectively mitigate against this hazard. As the summary correctly states, the mitigations of items 1.and 6. conflict with attempts to mitigate this problem.

9

3. The very wording of item 6. says "Visual impacts cannot be avoided and their significance will depend upon the specific site and the perceptions of the viewers". This is probably the most accurate statement of fact in the report. I think it means the visual impact is "unavoidable". Since the significance of visual impacts are dependent upon the perceptions of the viewers, this in itself betrays a recognition by the writer of a definite unavoidable element in impact assessment.

10

4. Item 4. is missing the word *the* before *greatest*, but goes on to say that careful screening can minimize, but not eliminate the risk of disease. That appears to be a fair description of an unavoidable situation. The report itself contains the following statement on page 73: "The introduction of an exotic species into a new area always posses (sic) unavoidable risks." This is (11) an example of how the authors have correctly reported a fact within the report, but turned it around and put a "good face" on it by the time it got to the Summary. Fortunately, the document was done incompetently enough to include a spelling error at this key point. Thus one has reason to pause here and reflect upon what is being said, and compare it to what had been stated previously in the Summary. There is no question that risk of disease is an Unavoidable and Major Potential Significant Adverse Impact within both the context of this PEIS itself and SEPA.

5. Item 3. says escaped non-native fish could establish self-sustaining (12) populations and further that some escape is inevitable. The mitigation proposed is mere fantasy; however, the facts stated clearly describe an "unavoidable impact" and one that is as inevitable as escapes are.

6. Item 1. describes the process by which the pollution from a net pen eliminates all animals immediately below it unless the material is dispersed (13) by currents and deep water. Therefore dilution is the solution to the pollution. This clearly indicates that the pollution itself is unavoidable but it can be mitigated in some cases. The question is, should all of these additional unavoidable sources of pollution be placed in the Sound? The PEIS is strangely silent in this regard.

7. The part of the Summary titled **MAJOR CONCLUSIONS OF THE DRAFT** (14) **PEIS,** is where the authors failed most in providing good service to the taxpayer. These are not conclusions of the kind one finds in a competently prepared technical paper or proposal. One where the foundation is evidence and verifiable facts that are assembled within the limits of a disciplined and proscribed process. One where opinions are always based on the evidence or facts from which the they were derived. Finally, where conclusions can be traced back thru the opinions to the basic facts and evidence. This document severely lacks that integrity and has lost contact with the facts along the way. We are offered illusions under the heading of conclusions! A brief discussion of each of the four Items in this section follows:

ITEM 1 - This statement has the same problem with the lack of the (15) word *significant* and improper use of *major* as was explained in paragraph 1. above. The implied conclusion is that there are no significant impacts and all

that remain are trivial and can be made to go away in every case by site selection alone. The unfortunate truth is that the body of the report does not support such a conclusion. The impacts to pollution, navigation, and visual are potentially significant in every instance. Mitigation measures for these criteria are generally mutually in conflict with each other. To say that these impacts "can be prevented by proper siting" is simply not true. This conclusion should be reworded to read "The major significant impacts of net-pen culture can be mitigated in some cases by proper farm siting to assure dispersion of wastes, flushing of the site, and protection of sensitive areas. Success will be limited because many of such measures will be in direct conflict with each other."

ITEM 2 - The idea that the removal of net pens holds the key to reversal of any and all impacts is ridiculous. How can native stocks killed off by exotic disease and non-native self-sustaining populations of the inevitable (16) escapees which successfully replace native stock, be reversed by pen removal? A proper conclusion is that some, but not all impacts, can be reversed by pen removal.

ITEM 3 - This report makes no basis to support the use of the word *accidental* in this conclusion. The conclusion is correct when *accidental* is deleted. We are intentionally introducing non-native fish that present definite risks of carrying exotic diseases such as VHS, known to be common (17) to them yet, disastrous to native species due to their susceptibility. We are not talking about an accident, this is an anticipated event for which we simply do not know the exact where or when it will occur. Introduction of disease will not be accidental, it will be the proximate result of an intentional action.

ITEM 4 - The report quite definitely does not support the conclusion that 100 farms would not have a significant impact on the aquatic environment. The section titled CUMULATIVE IMPACTS IN PUGET SOUND, on pages 131,132 and 135 says the opposite. There we read that the 100 pen production level is considered by some to be in excess of that which could be permitted. We also read that 100 pens produce a BOD loading greater than any (18) single sewage treatment plant. This section ends with the statement "Furthermore, conflicting uses of the water (navigation, fishing,aesthetics) may limit the number of farms to production levels well below the maximum production levels considered here." These are hardly the kind of factual statements needed to support such a sweeping conclusion regarding the probable impact of 100 pens! The statements in the text are accurate. The conclusions provided in the Summary clearly show a distortion that is not consistent with the facts reported in the text.

RECOMMENDATIONS:

I recommend that this PEIS be rejected as unacceptable by the Department of Fisheries due to the many inaccuracies it contains and the lack of professional competence that it exhibits. This document reflects unfavorably upon the Department and the State of Washington itself. No further expenditures of public funds should be awarded to the parties who prepared it. The possibility of recovering as much public money as possible from the contractor(s) involved should be investigated. (19)

In conclusion, I strongly suggest that the Department of Fisheries concentrate the limited resources it has on creating and maintaining a strong WAC that establishes a rigorous set of "Minimum Functional Standards for Net Pens". Your job is to protect and enhance the natural fishery resources of this state, not to help pave the way for their elimination for the financial benefit of a few!

Sincerely ,

T. Carl Pickel Jr.

T. Carl Pickel Jr.
P.O. Box 869
Allyn, Wa. 98524

Phone: (206) 275 - 4680

Copy to:

Puget Sound Water Quality Authority
Hood Canal Environmental Council
Mason County Commissioners

RESPONSE TO LETTER NO. 16: T. CARL PICKEL, JR.

1. Comment noted.

2. See the response to Question 2.

3. A programmatic EIS is called a nonproject EIS in SEPA (WAC 197-11-774). See the response to Question 1.

4. Review of proposals under the *State Environmental Policy Act* should use all relevant and available information. This EIS provides information to decisionmakers and does not limit any future SEPA review.

5. As stated in Section B of the Fact Sheet, WDF was directed by the Washington State Legislature to prepare this EIS.

6. Comment noted.

7. The Summary of the EIS has been rewritten for the FEIS to include a brief discussion of each issue.

8. Comment noted.

9. Comments noted. See the response to Question 10.

10. Comment noted.

11. Comments noted. It seems as though the reviewer is saying that unless there is absolutely no possibility of any risk, the EIS must state that exotic disease introduction is a potential significant adverse impact. We do not agree.

12. See the responses to Questions 22, 23, and 24.

13. Dispersion of waste from farms over a larger area minimizes significant accumulation and allows bottom organisms to assimilate the organic waste.

14. The purpose of an EIS is to discuss the environmental impacts of a proposal and provide information to decisionmakers to allow them to make intelligent decisions. The format and purpose of an EIS is not the same as that of a scientific research paper.

15. Comments noted.

16. Comment noted.

17. Comments noted.

Response to Letter No. 16: T. Carl Pickel, Jr. (continued)

18. Item 4 in the DEIS Summary states that 100 farms, properly sited in Puget Sound, would not have a significant impact on the aquatic environment. However, Item 4 goes on to state that small bays could be adversely affected by overdevelopment.

    The Cumulative Impact section of the DEIS states in the first paragraph that the analysis of different levels of farm development was used to determine if there was an upper limit of fish farm development in Puget Sound beyond which water quality as a whole would be reduced. The EIS found that the effects of 100 fish farms properly dispersed throughout Puget Sound would not have a significant impact on Puget Sound water quality.

    In addition to the existing 13 farms, the alternatives of 25, 50, and 100 farms represent a range of development. As stated in the EIS, the number of uses competing for space on Puget Sound will probably prevent 100 farms from being sited. Competition for space on Puget Sound will limit the overall development of the fish farm industry, not the effect on the aquatic environment of properly sited farms.

19. Comments noted.

LETTER NO. 17

KATHERINE FLETCHER
Chair

STATE OF WASHINGTON
PUGET SOUND WATER QUALITY AUTHORITY
217 Pine Street, Suite 1100 • Seattle, Washington 98101 • (206) 464-7320

March 20, 1989

Ron Westley
Project Manager
Washington Department of Fisheries
115 General Administration Building
Olympia, Washington 98504

Dear Mr. Westley:

Thank you for the opportunity to comment on the Draft Programmatic Environmental Impact Statement for Fish Culture in Floating Net Pens. The document provides a great deal of useful information that should help resolve issues surrounding the development of this industry in Puget Sound, and we commend the effort your staff has put into it. We do feel that additional documentation and analysis is needed on certain of the topics covered. Our comments address those areas.

Our primary concern is that while the document is titled "programmatic", it proposes and analyzes no program for managing net-pen development in Puget Sound. The draft PEIS concludes that up to 100 farms could be properly sited in Puget Sound. To translate this conclusion into a programmatic proposal, it will be important for the public to evaluate how siting and mitigation decisions will be made and by whom. It is our hope that the Department of Fisheries will clarify in the PEIS (1) what implementation steps are being proposed; and (2) how public comment will be considered before the program is put into effect. (1)

We suggest reframing the alternatives analysis from numbers of farms (25, 50, 75, 100) to types of management strategies, including a preferred alternative management system. Our reading of the legislation (ESHB 1221) leads us to think this kind of analysis would be consistent with your charge. (2)

Additional general comments on major elements of the draft PEIS are listed below:

1. A discussion should be included in the final PEIS to clarify the use of the PEIS versus the need for site-specific EISs for new proposed facilities given that specific siting is such a key concern. This issue is obviously linked to the (3)

nature of the management/siting program discussed above.

2. How does this document relate to the existing Recommended Interim Guidelines for the Management of Salmon Net-Pen Culture in Puget Sound? The final PEIS should evaluate the effectiveness of these guidelines and recommend revisions where necessary, assuming that these guidelines will continue to be used. (4)

3. As correctly stated in the Summary, efforts to minimize some adverse impacts may exacerbate others. This document could help resolve this problem by weighing the pros and cons of the actions that are designed to minimize each environmental impact. The environmental trade-offs associated with the proposed mitigation actions should be more thoroughly addressed in the final PEIS. (5)

4. This document should include an analysis of how many potential sites actually may be available for the siting of floating net-pen facilities in Puget Sound, given the full range of environmental constraints that are discussed in the document. It should be possible to do some modelling to generally identify the number acres of potential sites (not specific locations or boundary delineations). (6)

5. While we assume that avoiding impacts to wetlands will be part of the siting criteria, the PEIS should include a discussion of the potential for significant adverse impacts to wetlands in the development of net-pen support facilities. (7)

6. The impacts associated with each alternative listed on page 8 should be discussed more specifically. (8)

7. The final PEIS should include a discussion of the components of a detailed water quality monitoring program for each net pen facility. (9)

8. Especially given the high degree of public interest and the sometimes conflicting information in the media and else where, a more thorough discussion should be included about the net-pen industry and research on the occurrence of fish diseases in Norway and British Columbia and other countries. (10)

The Authority staff will provide additional specific comments

under separate cover for your use in revising the PEIS. These comments focus on issues of water quality, fish disease and genetic impacts, and impacts on benthic biota.

Thank you for the opportunity to comment on this Draft PEIS on fish culture in floating net pens. If you have any questions regarding these comments, please feel free to contact me or my staff Joanne Richter at Scan 576-6891.

Sincerely,

Katherine Fletcher
Chair

RESPONSE TO LETTER NO. 17: PUGET SOUND WATER QUALITY AUTHORITY, KATHERINE FLETCHER

1. The DEIS did not conclude that 100 farms could be properly sited in Puget Sound. As stated in the DEIS Summary, with proper siting 100 farms would not have a significant impact on the aquatic environment. There has been no attempt to evaluate site-specific factors to identify 100 potential farm sites. The text has been revised for the FEIS to evaluate regulations and guidelines and includes recommendations for further actions that State agencies and local governments can take to further address potential adverse impacts.

2. Comment noted. The alternatives have been changed for the FEIS to evaluate the regulatory framework that affects the fish farming industry.

3. The text has been revised to assess current regulations and guidelines in the FEIS. As stated in the FEIS Summary under Phased Review, this FEIS can be used by state agencies and local governments to assist them in making SEPA threshold determinations, shoreline permitting decisions, help them define additional information that may be required of a fish farm proponent, and help them properly site fish farms in Puget Sound.

4. The EIS has been revised to include an evaluation of existing regulations and guidelines, and includes recommendations for revisions to the existing framework for managing the fish farming industry.

5. See the response to Question 10.

6. To produce a reasonably accurate count of potential sites in Puget Sound would require considerable site-specific analyses, which are outside the scope of this programmatic EIS.

7. The scope of this EIS does not include an evaluation of the potential environmental impacts of support facilities associated with floating fish farms. Any land-based support facilities would have their own SEPA review process.

8. The alternatives have been changed for the FEIS.

9. A detailed water quality monitoring program should be addressed in a management plan. It is outside the scope of the EIS.

10. The Appendices have been expanded to provide additional information on management programs and regulations in Norway and British Columbia. See Appendix H.

LETTER NO. 18

KATHERINE FLETCHER
Chair

STATE OF WASHINGTON
PUGET SOUND WATER QUALITY AUTHORITY
217 Pine Street, Suite 1100 • Seattle, Washington 98101 • (206) 464-7320

March 21, 1989

Ron Westley
Project Manager
Washington Department of Fisheries
115 General Administration Building
Olympia, Washington 98504

Dear Mr. Westley:

Attached are additional specific comments from PSWQA staff on the draft PEIS for Fish Culture in Floating Net Pens. We hope these comments are helpful to your and your staff. We would be happy to sit down with you to discuss these comments, if you like, and provide specific language or other assistance. We are certainly aware of all the hard work and long hours that must of gone into preparing the draft and hope that the attached comments will assist in your revisions.

Please feel free to call either me or my staff Joanne Richter (Scan 576-6891) if you have any questions regarding the comments, or if you would like to set up a meeting in Olympia.

Sincerely,

Kirvil Skinnarland

Kirvil Skinnarland
Director of Planning and Compliance

ADDITIONAL PSWQA STAFF COMMENTS ON NET PEN DRAFT PEIS

	Page #	Comment
1		The document should discuss the possibility of eliminating imported broodstock in favor of reliance on Puget Sound (Pacific salmon) stocks.
2	2	The second paragraph from the bottom should reference the page numbers in the document where "approaches to regulatory agencies could use to best manage this industry" are discussed. This is a major issue for the PEIS to analyze. We were not able to locate this discussion in the document.
3	4	Background should include a discussion of tribal involvement in net pen operations. Also, there should be a recognition that siting criteria must include a requirement that there be no interference by net-pen operations with tribal usual and accustomed fishing areas.
4	8	Under Permits and Approvals, further discussion is needed on how "these rules may be modified as the result of this PEIS."
5	8	Under Substantial Development Permit (WAC 90.58) insert "except single family residences" after "All development activities."
6	9	Under Water Discharge Permit (RCW 90.48) update the discussion to reflect Ecology's recent adoption of policy on state waste discharge permits for aquaculture facilities.
7	11	The discussion on Section 404 should be moved to page 10 under Permits and Approvals. Also, at the end of this sentence add "into waters of the state." Following the description of the Department of Agriculture, include a discussion of the Puget Sound Water Quality Management Plan. We suggest the following language: Puget Sound Water Quality Authority. The Washington State Legislature established the Puget Sound Water Quality Authority in 1985 in recognition that Puget Sound is a "unique and unparalleled resource" and that its utilization carries a "custodial obligation for

preserving it" (RCW 90.70.001). The Legislature charged this agency with preparing the Puget Sound Water Quality Management Plan, to be implemented by existing state and local government agencies. The Puget Sound plan was originally adopted in December 1986 and was recently revised and adopted in October 1988. While this plan imposes no additional permitting requirements on net-pen or other aquaculture facilities, state agencies and local governments are required to carry out their own statutory mandates in a manner consistent with the plan. The goal of the plan is to prevent increases in the introduction of pollutants to the Sound and its watersheds and to reduce and ultimately eliminate harm from the entry of pollutants to the waters, sediments, and shorelines of Puget Sound.

13 Under Affected Environment, clarify whether the discussion pertains to net pen facilities located in Puget Sound or located around the world. For example, are most net pens in Puget Sound "sited in areas having fine-grained sediments and moderately flat bottoms?" (8)

17 In the last sentence of the fourth paragraph, clarify what the ranges of organic carbon and nitrogen values refer to (i.e., worst case vs. typical Puget Sound?). (9)

17 Last paragraph: Benthic infauna and small epifauna are of greater importance to the benthic food web than macrofauna. Infauna and small epifauna should be highlighted (or at least mentioned) for risk for burial and filter clogging due to excessive sedimentation of organic matter. (10)

24 In the second sentence of the second paragraph, clarify where the "redox potential at the southeast corner was strongly negative." (11)

24 The second to last sentence in the third paragraph is misleading. Few net pens have been installed using the Recommended Interim Guidelines, and they have not been in place long enough to show significant accumulation of sediment (whether they were sited properly or not). This statement also highlights the need for the final PEIS to include an analysis of the adequacy of the interim siting guidelines and specific recommendations as to how they should be amended, based on information developed for the PEIS. (12)

25 Factor 2. Pen size needs to be rewritten to clarify. For example, "with the same loading" (as what?); "over a relatively smaller area" (than what?); "thus the (13)

effects" (of what?); "the area affected is less" (than what?).

27 Under Mitigation Measures, the recommendation to "use mechanical techniques such as vacuuming to remove accumulated wastes under the pens" should be deleted. This practice could result in significant harm to existing benthic communities, which might be worse than allowing wastes to accumulate. (14)

27 In the second sentence under Unavoidable Adverse Impacts, indicate that "impacts probably can be minimized ... by the methods presented above." The methods may not always minimize every benthic effect in every situation. (15)

28-33 There are inaccuracies in the description of Puget Sound circulation, as well as omissions as to seasonal effects on stratification. Authority staff could work with WDF staff to improve discussions of vertical stratification and its effect on nutrient and phytoplankton dynamics. (16)

35 The first sentence under Affected Environment should be followed with: "In addition, the Puget Sound Water Quality Management Plan lays out a coordinated long-range strategy for protecting Puget Sound and its resources. It is implemented by Ecology and other state agencies and by local governments, with cooperation by the tribes and federal agencies." (17)

35 In the second sentence of the last paragraph, clarify that failed on-site wastewater disposal systems are a primary source of bacteria problems, and add the following sources to this list: stormwater, and boats and marinas. Also add: "Other sources of water quality impairment include erosion from forest practices and streambank alterations, and loss of water quality functions due to degradation or destruction of wetlands." (18)

35 The third sentence in the last paragraph needs to be referenced to properly document the statement that "natural factors ... are the primary source of organic enrichment and dissolved oxygen problems in Puget Sound." How does "natural" organic enrichment compare to organic loadings contributed from municipal sewage treatment plants, combined sewer overflows, failing septic tanks, stormwater, and industrial sources such as pulp mills? (19)

37 The last sentence in the second to last paragraph needs to be referenced to substantiate the statement that "dissolved oxygen problems also occur in many areas in summer and fall from the natural upwelling of deep bottom waters." This is generally not true in Puget Sound. (20)

39 Under Turbidity, the second to last sentence in the first paragraph needs further discussion to substantiate the statement that "the loss of fish food and feces from net pens would also increase turbidity, but to a lesser degree than net cleaning." (21)

45 Second to last paragraph: Effects of additional nutrient inputs to the water column are described which do not take into account whether waters are nutrient limited. If nutrient limitation is not occurring, ratios of nitrogen in the water column and in phytoplankton are irrelevant. Also, it is confusing to say that plankton assimilate nitrogen from the water-zooplankton excrete dissolved nitrogen. (22)

46-47 References to Thom et al. (1984, 1988) are inappropriate as these studies were all conducted in waters of less than 10 meters depth. Net pen siting in such shallow waters is not practicable. (23)

48 The second sentence on this page should be preceded by a description of the October 1988 outbreak of PSP in South Puget Sound. (24)

48 After the second sentence of the first paragraph, note "however, some researchers believe nutrient blooms may contribute to outbreaks of some Gonyaulax." (25)

49 Third paragraph: Nutrient limitation is again not taken into account in this rationale. (26)

51 Sensitive Area Management: In Puget Sound embayments, temperature, rather than salinity is the major contributor to vertical stability, particularly during the summer and fall periods cited. (27)

Areas with low phytoplankton standing crop should be targeted only if they are not nutrient-limited at any time throughout the year.

51-52 The discussion of using nitrogen flux as an index of nutrient sensitivity is very hard to follow. It is not clear where nitrogen is fluxing from, or to; nitrogen is thought to flux from the atmosphere, from below the pycnocline, from plants, animals, and detritus. (28)

52-55 The nutrient box model shown is difficult to follow. The implication that phytoplankton respire dissolved nitrogen is difficult to understand. Leakage from phytoplankton and zooplankton are not shown (or that "phytoplankton respiration"?), and detritus (the largest source and sink of small particulate nitrogen in the system) is not shown at all. (29)

56 Table 2: Units in this table should be checked. (30)

57 Mitigation Measures, bullets 8 & 9: Use of slower sinking feed and more digestible feed are a two-edged sword - both will increase the diffusion and leakage of nitrogen from feed into the water column, thus increasing the nitrogen source which the measures seek to control. (31)

59 The entire fourth paragraph should be rewritten for clarity. (32)

64 We question whether operation of aerators under low hypoxic conditions could result in net-pens having a positive impact on dissolved oxygen. Occurrence of such low oxygen conditions might indicate either excessive crowding, or inappropriate siting in areas prone to low dissolved oxygen problems. (33)

65 Oysters are not limited to intertidal beaches. Puget Sound also contains areas where oysters are cultured subtidally. (34)

67 In the second line, add the word "invertebrates" between "immobile" and "will." (35)

69 In the second to last sentence in the second paragraph, add the word "species" after "native." (36)

70 The last sentence in the third paragraph needs to be rewritten because it tends to downplay the possibility that net-pen Pacific salmon and indigenous populations of salmon could interbreed. More discussion of this issue is needed. (37)

71 Statements in the second paragraph need to be substantiated with references. (38)

71 The last paragraph states that "net-pen fish do not necessarily have to be very [genetically] different from wild fish. Efforts can be made to infuse wild genes into the hatchery population if desired." What source of wild genes is envisioned for this purpose? (39)

This concept seems inconsistent with the Mitigating Measure on page 80 recommending development of regional broodstock.

72 Statements in the third paragraph need to be substantiated with references. Deleterious genes which undergo balancing selection can persist in populations indefinitely. (40)

73 The second sentence on this page could be misleading. Not all of the nine million cultured smolts that are released annually into Puget Sound live to reproduce, as implied. Since post-smolt salmonids have much lower mortality rates than juveniles, escaping sub-adults fish may actually have very high rates of survival. (41)

73 A worst case estimate of escapement from net pens should be provided. The statement that "it is highly unlikely that escapement from net-pen farms would approach this number" needs to be substantiated by reference. There are indications that large numbers of Atlantic salmon have been accidentally released in Puget Sound. An estimate of these releases and their impacts on Puget Sound fish and fisheries should be included. (42)

74 In the last paragraph, "Waknitz 1988" needs to be added to the list of references. Also, a referenced discussion should be added as to whether Atlantic salmon are <u>capable</u> of spawning in Puget Sound rivers, and if not, why not. (43)

75 In the first clause under <u>Mitigation Measures</u>, how is "probable risk" defined or determined? (in the statement "deny applications that pose a probable risk of adversely affecting native fish stocks"). (44)

75 We suggest that these <u>Mitigation Measures</u> be clarified and elaborated on. For example, should stocks be used which have the greatest similarity or dissimilarity from nearby wild stocks? Which alternative is better? What minimum distances should net pens be sited away from streams with wild populations? Should net pens also be sited minimum distances from hatcheries? Is the technology of producing sterile or mono-sexual fish currently available? Do any existing operations use this technology? Also, because so many concerns about disease and genetic impacts hinge on escapement rates, we suggest that the following be considered: that some percentage (five percent, or so) of all net pen fish be coded wire tagged so that escapements can be monitored. If recovery in fisheries and on spawning grounds proves (45)

to be minimal over a five to ten year period, tagging could be discontinued.

75 <u>Mitigation Measures</u> should address the need for specific, practical measures for maintaining adequate genetic diversity, with or without continued importation of gametes. The long term propagation of finite breeding populations inevitably leads to loss of genetic diversity, and this loss may be accompanied by a gradual increase in disease susceptibility over many generations.

(46)

77 The last sentence in the third full paragraph needs to be replaced with a description of the February 1989 occurrence of VHS and an analysis of its probable origin. The discussion should also include possible VHS prevention measures.

(47)

(48) 78 In sentence one of the first paragraph, add the words "and tribal" between "state" and "resources."

79 Given the recent heightened public concern about fish diseases, it would be useful to include a discussion of disease problems associated with Atlantic salmon farming in Norway and Scotland or elsewhere in the world.

(49)

80 In paragraph one, the appropriateness of the statement that husbanded stocks of animals are usually at greater risk from the transmission of infectious diseases from wild stocks should be documented. Unlike many domesticated animals, net-pen salmon exist in environments containing large populations of wild fish.

(50)

80 The document does not discuss Canadian regulations to prevent introduction of diseases. With the large numbers of net-pen farms in British Columbia, are adequate measures in place to reduce the risk of disease transmission across the Canadian border?

(51)

95 Modify the fourth sentence in the second paragraph as follows: "...perpendicular to shore <u>has</u> the greater visual impact <u>at distances greater than 600 feet</u>, although..."

(52)

96 Figure 17 should be clarified by the following additions: the units of the horizontal axis of all three diagrams should be labelled as being in feet; and the horizontal angles of view occupied by the net pen should be added in diagrams A and B.

(53)

98 In the second paragraph, it needs to be clarified what

Figures 19, 20, and 21 are trying to show. Is net-pen density control using area by square footage preferable to using area by shoreline footage or area by radius? What are the advantages and disadvantages of each? Clarify what "similar measures could be adopted into local shoreline master programs." (54)

107 Table 5 is missing from the document. (55)

113 Fourth paragraph: It may not be possible to provide fishers with compensatory fishing opportunities for fishing areas displaced by net-pens. Depending on the specific site, fishing even in relatively nearby areas may result in decreased catch per unit effort or undesirable levels of harvest of non-targeted stocks, thus upsetting harvest management or allocation goals. Consideration should be given to avoiding the siting of facilities in areas where such conflicts could occur. (56)

114 In the first Mitigation Measure, insert "the tribes," before "commercial fishing organizations." In the last Mitigation Measure, insert the words, "and tribal" after "WDF." (57)

117 In the third paragraph under Impacts to Human Health, the first two sentences are not well linked; there appears to be some missing information. Also, as stated in the last sentence of this paragraph, it is doubtful that "fish farming may help prevent shoreline activities that contribute bacterial contamination to embayments..." (58)

118 In the first sentence under Mitigation Measures, insert "that are" after "Puget Sound."

120 In the first clause under Mitigation Measures, insert "of" after "placement."

121 The first paragraph under Affected Environment needs to be rewritten to clarify what L_{eq} refers to. In addition, insert the fourth sentence after the first. (59)

122 In the last sentence of the second paragraph, define L_{dn}.

126 This section needs to discuss wetlands protection, as explained in comment #5 under general comments. It should also discuss the need for sources of fresh water to supply on-shore ancillary hatchery facilities. (60)

126 The Authority's State of the Sound Report projects a 20 percent population increase in Puget Sound by the year (61)

2000. The Authority could assist WDF in obtaining accurate population growth projections.

129 The discussion of Impacts of Alternatives is incomplete. For example, no analysis of the impacts of net-pen facilities on shoreline property values is discussed. (62)

130 The last paragraph under Impacts to Local Services needs to be rewritten for clarity. (63)

131 In the section titled CUMULATIVE IMPACTS IN PUGET SOUND, the analysis of the impact of various levels of net-pen development should include additional factors besides water quality. The upper limit of Puget Sound's capacity for net pens is not limited only by water quality concerns, but by a whole suite of siting criteria as discussed in the PEIS. In addition, the reference to "excessive" degradation in the second paragraph is inconsistent with state and federal water quality laws that include an anti-degradation policy. (64)

131 Second paragraph: Scientists and managers no longer feel that assimilative capacity is a valid concept that can be used to examine loading to complex estuaries like Puget Sound. Nearshore areas and isolated embayments in Puget Sound are at risk from nutrient loading and degraded water quality, whereas the deep basins and high current areas are less likely to be affected. By using assimilative capacity to determine the upper limit of nutrient loading in Puget Sound, nearshore areas and isolated embayments may be put at risk for extensive degradation. This analysis could encourage numerous erroneous conclusions and misquotations about this report. (65)

131 The last sentence in paragraph four should be referenced. As stated in our official comment letter, there should be a discussion of how many potential net-pen sites there are in Puget Sound, given all of the constraints that are imposed by physical and biological siting requirements and competing uses. Finally, in this section or elsewhere in the document, the PEIS should lay out a preferred alternative management structure that includes the prevention of negative cumulative impacts to Puget Sound. (66)

135 The first sentence in the first paragraph needs to be qualified. The impact of net pens on the "overall water quality in Puget Sound would be very weak and largely negligible" only if the pens were distributed throughout the Sound and not concentrated in only a few (67)

areas.

135 The remainder of the first paragraph needs to be expanded into a much more thorough discussion of the availability of sites in the Sound. How many sites exist where both the effects on water quality and benthic communities, and the interference with conflicting uses, could be minimized? (68)

135 The section titled LAND-BASED TANK FARMS needs an introduction to clarify whether tank farms are being proposed as an alternative to net pens. (69)

135 Add to the list of primary features at the bottom of the page: "A discharge pipe to dispose of effluent from the rearing tanks;" (70)

136 Add to the second to last paragraph the advantage that effluent from rearing tanks could be treated before discharge into Puget Sound. (71)

138 In the third sentence in the second paragraph of the WATER QUALITY section, explain where in Washington the three onshore tank farms are proposed or are being built, and what criteria were used to determine that these are "located in non-nutrient sensitive waters." (72)

138 Last paragraph: Fish reared in tanks can become susceptible to disease under certain conditions (e.g., excessive crowding) just as they can in net-pens. Therefore, antibiotic use in tank farms may not be less than in net-pen farms. (73)

141 In the section titled RELATIONSHIP TO LAND USE PLANS AND REGULATIONS, add a discussion of how this PEIS relates to land use plans and regulations. How could or should the information contained within the PEIS be used by local governments? (74)

143 The following language should be added before Zoning and Other Regulations:

Wetland Protection Programs. The Puget Sound Water Quality Management Plan requires local governments in Puget Sound to adopt Wetland Protection Programs that meet state standards to be promulgated in rule by the Department of Ecology by September 1989. Local wetland programs may result in additional restrictions to siting of aquaculture support facilities in or adjacent to wetlands. (75)

145 The Puget Sound Water Quality Authority should be

76		listed as a state agency, not a regional agency.
77	Figs. 7, 9, 12, 13	The references for Figures 7, 9, 12, and 13 should be cited as "Puget Sound Water Quality Authority 1988," not 1986.

RESPONSE TO LETTER NO. 18: PUGET SOUND WATER QUALITY AUTHORITY, KIRVIL SKINNARLAND

1. The EIS discusses the issue of broodstock importation because this is a worst-case situation. Actually, such importation would not be permitted and only Puget Sound stock would be used.

2. Comment acknowledged. The text has been revised to evaluate existing regulations and guidelines in the FEIS.

3. See the response to Question 8. Tribal usual and accustomed fishing areas are discussed in Section 6.3 of the FEIS.

4. The FEIS evaluates existing regulations and guidelines, and the Preferred Alternative recommends WAC adoptions, additional guidelines, and further research that can be undertaken.

5. There are a few exemptions to the permitting requirements of the *Shoreline Management Act*. The text has been revised in the FEIS to reflect this.

6. See the response to Question 17.

7. The text has been revised for the FEIS to include a discussion of the Puget Sound Water Quality Authority.

8. The geographical scope of the EIS is the greater Puget Sound area described in Section 3 of the FEIS.

9. The ranges of organic carbon and nitrogen indicated are the range of values estimated to be introduced to the sediments under a typical farm given an estimated FCR of 1.5:1 as one extreme and an estimated FCR of 5:1 as the other.

10. The benthic infauna are a diverse array of organisms differing substantially in feeding methods, size, and mobility. The responses of the infauna to the increased particulate deposition would largely be based on relative size and mobility. Immobile organisms would be buried. Mobile infauna could maintain their depth in the sediment if the sediment deposition rates, measured as units of depth per units of time, did not exceed the locomotory rates of the organisms, as measured on the same scale. Some of these species would be expected to migrate laterally out of the area of impact.

    While some of the infauna are suspension-feeding organisms, many are not. The relative abundance of the suspension-feeders is dependant upon physical sediment effects and interactions with other biota. Suspension-feeders would have their filters clogged if the particulate deposition rates were high. At lower rates, at least some of the increased particulate matter would probably be eaten.

Response to Letter No. 18: Puget Sound Water Quality Authority, Kirvil Skinnarland (continued)

Deposit-feeding infauna would become more common under the farms as long as there was sufficient oxygen. Deposit-feeding infauna, such as capitellid polychaete worms, are characteristically members of the guild of opportunistic species that have been seen to increase under farms.

Small, mobile, epibenthic organisms, mostly small crustaceans, worms (polychaete annelids, nemerteans, and turbellarians), and gastropods, would likely not be buried since they would be able to move up and around any deposited particulate material. Most of these animals are micro-scavengers, deposit-feeders, or predators, and their feeding apparatus would not be clogged by the addition of particulate material.

Small, immobile, epibenthic or epifaunal organisms, mostly small tubicolous polychaete worms, bryozoans, hydroids, barnacles, or bivalves, would be found on rocks, shells, or other hard substrata. Most of these animals are suspension-feeders and their filters would be clogged or they would be buried by excess sedimentation. At lower rates of particulate deposition, they would feed on the particulate material.

11. The redox potential at the southeast corner of the Clam Bay farm complex was strongly negative.

12. The has been revised for the FEIS to evaluate existing regulations and guidelines.

13. Comment acknowledged. The text has been revised for clarification.

14. Comment noted. Section 5.1 of the FEIS includes a discussion of vacuuming under the farm.

15. Comment noted.

16. Comment noted.

17. The text in the FEIS has been reworded.

18. The text has been revised as suggested.

19. The reference for that statement is the 1988 statewide water quality assessment Ecology (1988a). It is beyond the scope of this EIS to discuss the difference between the organic enrichment from phytoplankton blooms and upwelling, and the organic loadings from municipal sewage, combined sewer overflows, and failing septic tanks.

20. The text has been rephrased to "shallow bottom waters in poorly flushed embayments."

Response to Letter No. 18: Puget Sound Water Quality Authority, Kirvil Skinnarland (continued)

21. It is reasonable to expect that cleaning heavily fouled nets would increase turbidity to a greater extent than the normal operations of a fish farm.

22. Phytoplankton assimilate nitrogen even when not nitrogen limited. Excess uptake of nitrogen is well documented. Zooplankton do not directly assimilate nitrogen from the water, but do assimilate nitrogen from ingested phytoplankton. Healthy zooplankton will ingest more nitrogen than they excrete.

23. Thom's studies were included as indicative of the recent trend toward research in considering nearshore conditions in Puget Sound as early warning zones for impacts to Puget Sound. Typically, fish farm siting studies involve drogue and current meter studies that may demonstrate periods of flow towards the shallow sub-tidal zone. If farms of significant size were to be located in such areas, and ambient nutrients were severely limited, a farm could enhance the growth of attached algae in the lower intertidal or subtidal zone. Accordingly, Thom's studies were included, and he reviewed the pertinent portions of the text.

24. Carr Inlet is only one area in Puget Sound that appears to have annual blooms of PSP-causing dinoflagellates that develop from with the area. The reference to Nishitani in the previous paragraph refers the reader to her discussion of this topic. Other than studies conducted by one of the authors of this EIS, there was no state, federal, or private investigations of water quality dynamics during that event.

25. According to the available literature, this does not appear to be true. In fact, the opposite is more likely since dinoflagellates generally prosper in the upper layers of stratified water masses that are deplete of, rather than replete with nutrients.

26. See the response to Comment 25 above.

27. Comment noted.

28. The nitrogen flux discussed in the text, and in the *Interim Guidelines*, is in and out of embayments. The other sources mentioned in this comment are insignificant compared to oceanic source found in tidal flux. During summer months vertical mixing is relatively minor in these areas unless strong storms of sufficient duration occur.

29. Respiration includes a series of physiological processes measured by, but not limited to, the consumption of oxygen. These metabolic pathways are a function of the consumption of photosynthetic products during both light and dark periods. This involves the Calvin-Benson cycle ("dark reactions") and the production of glycolate, the major source of protein (nitrogen containing amino acid chains) synthesis.

Response to Letter No. 18: Puget Sound Water Quality Authority, Kirvil Skinnarland (continued)

30. The units are correct. Although molecular (atomic) units are preferable to oceanographers and others working in marine research, the mg/L units were used to avoid confusion of the lay public.

31. The assumption that slower sinking feed will cause an increase in water column nutrients is incorrect. In most areas where fish farms are located, there is no nutrient limitation of phytoplankton growth, or only the surface waters are seasonally limited. Binders incorporated into the feed allow relatively long soaking periods before the pellets disintegrate. These periods are hours, at a minimum, thus the excess pellets are to be found intact, upon the bottom. This has repeatedly been observed in field studies. Finally, if the entire water column is nutrient depleted, more slowly sinking pellets can only aid in mitigating the loss of nutrients into the water column because the fish are more likely to consume the pellets and dispersion of uneaten pellets is greater.

32. Comment acknowledged. The text has been revised.

33. Properly sited, a fish farm would not need an aerator. In low-oxygen conditions, any aerator that caused more oxygen to be dissolved than the amount utilized by the farm operation would cause an overall increase in dissolved oxygen. However, it is not recommended that fish farms be sited in areas where the use of aerators may become necessary.

34. Comment noted.

35. The word organism has been added to the sentence for the FEIS.

36. The phrase "fish stock" has been added to the text of the FEIS.

37. The four pages of text following the third paragraph on page 70 in the DEIS discuss this issue.

38. Comment noted.

39. There are many hatchery stocks in Puget Sound that are indistinguishable from the "wild" fish in the same river system. This is not inconsistent with the intent of the mitigation measure suggested on page 80 of the DEIS. That measure was suggested in the context of eliminating the potential risk of introducing exotic pathogens.

40. Seriously maladaptive genes would probably not be balanced as in balancing selection. However, you are correct in stating that genes of a less serious nature could persist through this process.

41. This is true. However, if you were to assign a 50-percent reduction survival potential to smolt as opposed to post-smolts, the working number would only be

Response to Letter No. 18: Puget Sound Water Quality Authority, Kirvil Skinnarland (continued)

reduced from 9 million to 8.5 million. The 8 million smolts intentionally released are "delayed-release" fish or post-smolts.

42. A worst-case scenario impact assessment has been included in Section 5.7 of the FEIS. This would only apply to escapements of Pacific salmon (and very few farmers are apparently interested in using Pacific salmon). In the case of Atlantic salmon, there is no danger of genetic impacts as they can't interbreed with indigenous species.

43. There is little doubt that the physical requirements that Atlantic salmon need to spawn successfully are present in Puget Sound rivers. The question is whether or not they can compete with the steelhead and salmon as juveniles. Based on the lack of success of efforts to establish them, it is apparent they cannot.

44. Probable risk is determined by the best professional judgment of experts within WDF.

45. The answers to the first three questions have not been determined at this time. Setting a minimum distance from hatcheries would not be useful unless the hatchery was an integral part of the wild stock. The technology for producing sterile or monosexual fish is available and beginning to be implemented on a production basis in Europe. The idea of requiring the tagging of a portion of all farm fish may be a good one and should be evaluated further. Another alternative would be to require genetic markers on all broodstock.

46. This measure should be self-regulating. It is in the farmer's best interest to formulate broodstock programs which maintain genetic variability in the population. The cases where genetic variability reduction have been documented are cases where broodstock programs were ill-conceived, such as where founder population numbers were too small. This happened in some places back when the problem of low genetic variability was not known. Farmers today are aware of the potential problems and take steps to ensure they don't occur.

47. See the response to Question 29.

48. The text has been revised for Section 5.8 of the FEIS.

49. See the response to Question 25.

50. See the responses to Question 26 and Letter 1, Comment 16. Cultured fish are at high risk because they are exposed to pathogens from feral fish, like other domesticated animals such as livestock and poultry which are exposed to pathogens from wild game.

51. State and federal laws (Title 50) are in place to reduce the risk of disease transmission in stocks from Canada. Title 50 is currently under revision.

Response to Letter No. 18: Puget Sound Water Quality Authority, Kirvil Skinnarland (continued)

Appendix H includes some of the British Columbia regulations for your information.

52. The text has been modified to reflect your comment.

53. These changes have been made to Figure 17.

54. This paragraph has been revised to clarify the intent of Figures 19-21.

55. This table has been included as Table 8 in the FEIS.

56. Comment noted.

57. Comments noted.

58. Comment noted.

59. Comments noted.

60. Floating fish farms in marine waters will not affect wetlands. Evaluation of the possible onshore components of floating fish farms such as ancillary hatchery facilities are outside the scope of this EIS.

61. Comment noted.

62 See the response to Question 12.

63. Comment noted.

64. The DEIS noted that conflicting uses of the water would probably limit development of the fish farming industry in Puget Sound before the cumulative impact on water quality becomes a concern.

    Text has been added to Section 7 of the FEIS to clarify that assessing the cumulative impacts of fish farming on the various elements of the environment discussed in the FEIS is a sequential process. Cumulative impacts would be considered during the SEPA review process for each farm proposal using site specific information and the knowledge of other nearby farms.

65. Assimilative capacity analysis does not preclude the importance of proper site selection. The comment raises concerns about localized problems from farms which are largely related to proper siting. See the first two paragraphs of the Section 7 of the FEIS.

66. See the response to Question 4. The EIS evaluates environmental impacts and is not a management plan for the fish farming industry.

Response to Letter No. 18: Puget Sound Water Quality Authority, Kirvil Skinnarland (continued)

67. The distribution of the farms throughout the Puget Sound is an essential condition of this analysis. See the response to Letter 19, Comment 65. Also, see the first three paragraphs of Section 7 of the FEIS.

68. See the response to Question 4. See the first three paragraphs of Section 7 of the FEIS.

69. It is not an objective of the EIS to evaluate land-based tank farms. The land-based tank farm section was added to provide additional information on another form of commercially raising fish and has been moved to Appendix I of the Technical Appendices in the FEIS.

70. Comment noted.

71. Comment noted.

72. Land-based tank farms have been considered in Clallam County along the Strait of Juan de Fuca, in the San Juan Islands, and near Westport on the Pacific coast. The Strait of Juan de Fuca and the San Juan Islands were not considered nutrient sensitive in the *Interim Guidelines*. The Westport area was not evaluated in the *Guidelines*. However, over the last six years at Ecology's North Whitcomb Flat water quality monitoring station near the proposed tank farm, only 7% of the observations showed nitrogen concentrations (sum of ammonia, nitrite, and nitrate) less than 0.1 mg/L.

73. Comment noted.

74. See the response to Letter 17, Comment 3.

75. The scope of this EIS is limited to floating commercial fish farms. Restrictions that may affect siting of onshore facilities associated with floating fish farms is outside the scope of this EIS.

76. The Puget Sound Water Quality Authority is an agency with involvement in the Puget Sound region. The text has been revised for the FEIS.

77. Figures 7, 9, 12, and 13 were based on figures found in the *State of the Sound* 1986 report.

April 3, 1989

Jon Westley—

As a resident of Island County, I feel very strongly about having any "Salmon Pens" I cannot believe any one with any common sense + an eye to the future would allow this to happen.

1

We have enough problems dealing with the lack of good water systems + sewer systems + the end is nowhere in sight.

I don't care if the currents carry the horrible mess we will have down the feces, in a few years the whole Sound will be a mess, cause like anything else in a short time it is abused. And we will not be able to use our Sound for sport fishing, in fact we will

not be able to eat any
fish in the whole area
because of disease.
If we need more fish in the
area - why don't you close the River
down & let the females spawn?
We do not need private industry
eventually crowding out summer
pleasures for a good many
people in this area.

Thank you

Leanne Reid
665 W 1460 S
Camano Island

RESPONSE TO LETTER NO. 19: DEANNE ROTH

1. Comment noted.

April %, 1989 **LETTER NO. 20**

Thomas C. Santos
243 Dungeness Meadows
Sequim, WA 98382
(206) 683- 7112

Department of Fisheries
Ron Westley
115 General Administration Bldg.
Olympia, WA 98504

Dear Mr. Westley:

I would like to submit the following for consideration of the WDF in setting policy for fish culture in floating fish pens.

The primary concern at this time should be the VHS disease, which is believed to have originated in Europe, where it wiped out entire runs. It is also
1 associated with trout. Not unlike the steelhead, the Atlantic salmon is a trout. The Atlantic salmon is suspect of being a carrier of VHS, without itself displaying the symptoms.

Secondly, there is evidence of much waste matter under fish farm net pens, which can increase the BOD to lethal levels. The aquaculture fact finding study done in Norway by Will Soltau mentions one meter deep rotting jelly like material under the pens, encrusted with bacteria that not only puts a
2 huge demand on oxygen, but releases dangerously potential amounts of hydrogen sulfide and methane. This report says that 1 ppm of dissolved H_2S is toxic to salmon. This same study speaks of many hazards, both potential and real, all the way from residual antibiotics to viruses and parasites. It also discusses the 13% of net pen fish that escape, with escapes up to 40%.

Other reports on Puget Sound speak of the 13 commercial fish pen farms in the Sound creating six times more wastage than does Metro's Renton Waste Treatment Plant.

My recommendations would be: (1). No more licensing of fish pen farms until the VHS matter is resolved. (2). Use only native salmon species. (3). All
3 farms to be located off of the water, using tanks. (4). All waters to be filtered in and out of tanks. (5). Pump sea water from areas least likely to affect crab larvae and other small sea life. (6). Locate farms where they would minimize esthetic values. (7). Never locate any fish farm in any bay or harbor.

Sincerely,

Thomas C. Santos

RESPONSE TO LETTER NO. 20: THOMAS C. SANTOS

1. See the response to Question 29.

2. Proper siting of fish farms is essential to mitigate effects such as excessive accumulation of organic matter. This is currently part of fish farm siting studies and can be expected to remain so. Problems in Norway are probably due to the much higher fish densities used there and differences in siting requirements. The Norwegian government has moved many farms to deeper water with more water circulation to correct siting errors made 15 to 20 years ago.

3. Comments noted.

SARATOGA COVE FOUNDATION
Robert J. LaLanne
2257 E. Eastpoint Dr.
Langley, WA 98260

LETTER NO. 21

April 5, 1989

Ron Westley, Project Manager
Washington Department of Fisheries
115 General Administration Building
Olympia, Wa 98054

Net Pen Fish Culture P.E.I.S.

1 When reviewing the P.E.I.S., we found no cognizance taken of the historic public policy against the appropriation of public lands for any private use which would exclude all other uses.

2 Rather, we found a document purported to be a scientific, unbiased study, unmasked as a largely "piecemealed" compilation of prior publications by known paid consultants of the salmon pen industry--some who have openly espoused proponent positions.

Department of Fisheries has touted these preparers as "experts and the best available", yet one of the major contributors recently had a fish pen E.I.S. rejected both for inadequacy and failure to address important issues. One must conclude that this firm is either biased or unqualified.

3 We note that the P.E.I.S. and its appendices are liberally strewn with the words "probably", "possibly", "approximately", "assumed", and "perhaps". These, coupled with statements saying "no samples taken", "sampling not possible", "lacking measurement specifics", and "somewhere in between", are the indecisive conjectures used to make positive statements and declarations.

4 We also find in the draft report that an admittedly unreliable model (actually undergoing testing at the time) was used in studies as a basis for findings and conclusions, that, under the given circumstance, can only be regarded as promotional material.

5 Regrettably, the preparers selected Clam Bay and Squaxin Island as test sites. Both are atypical of Puget Sound pen locations. The highly questionable results may well have been quite different had <u>established operations</u> in more common tidal currents been chosen.

6 The appendix sections on aesthetics and property values attempt to show the positive economic benefits of fish farming through the work of an author who states his inability to assess what, if any, negative effects can be attributed to fish farms.

This author then proceeds in attempts to establish the economic impact on view property by using an elaborate equation formula--virtually any real estate broker specializing in waterfront properties could have supplied better answers.

There is no place for this mediocre work in either the P.E.I.S., or its appendices.

7 The draft P.E.I.S. also fails to include substantial available data from qualified scientists, researchers, and other authorities who hold and present compelling arguments of refutation to conclusions in the draft.

Those responsible for the P.E.I.S. have given dismal treatment to the subject of fish disease. A "passing fancy" attitude of "oneliners", and a few paragraphs which state the unlikely possibility of major disease problems, is no substitute for a comprehensive study.

On this subject we find the state and federal agencies holding diametrically opposing views on VHS. Coincidentally, other authorities are propagandizing that VHS <u>has never been found to occur in Atlantic salmon</u>--this at 8 precisely the same time Clallam County commissioners are being presented copies of scientific journals stating <u>VHS outbreaks have been documented in Atlantic salmon</u>.

Rather than the present cursory treatment found in the draft report, a study must be done, not by public relations employees of industry, but by qualified independent scientists.

It is our conclusion that the P.E.I.S. should not be removed from draft status until disease and the many other incorrect, incomplete, biased, and deficient sections are 9 corrected, revised, or deleted--finally allowing presentation to the public of a professional authoritative, scientific document instead of the present embarrassing proposal.

The Saratoga Cove Foundation supports the comments submitted separately by its secretary, Marie Pickett, and endorses the position paper filed by "Save Our Shores" president, L. Joe Miller.

Robert J. LaLanne

Robert J. LaLanne, President
Saratoga Cove Foundation
2257 E. Eastpoint Dr.
Langley, WA 98260

RJL/rt

RESPONSE TO LETTER NO. 21: SARATOGA COVE FOUNDATION

1. See the response to Question 11.

2. See the response to Question 2.

3. Comment noted.

4. See the response to Question 15.

5. The fish farm in Clam Bay is one of the largest farms in the world and has been in operation longer than any other farm in Puget Sound. The Squaxin farm is smaller and has only been in operation since 1987, but is sited in an area with different hydrographic characteristics. The use of these sites is appropriate to describe a range of impact levels.

6. See Section 4 of the response to comments after the text in Appendix E.

7. Comment noted.

8. See the response to Question 29 and Appendix G.

9. Comments noted. See the response to Question 27.

LETTER NO. 22

3653 S.Bells Beach Road
Langley, Wa 98260

Ronald E. Westley, Project Manager
Washington Department of Fisheries
115 General Administration Building
Olympia, Wa. 98054

Re: PEIS Fish Culture in Floating Net Pens

This document starts from the position that there will be net pens for raising fish in Puget Sound and this position is not debatable. It then proceeds, time after time, to state mitigation measures in order to make adverse impacts tolerable.

"Mitigation" means "to lessen a force or intensity; to make less severe. Applying this meaning to the adverse impacts suggests the following assumptions:

. There is a force that could cause major impacts so it needs to be lessened, softened, or tolerated. In other words, folks, any adverse significant impact of net pens are to be tolerated because steps are suggested to lessen the impact.

The stated purpose (page 1X) of this document is "to evaluate the environmental impacts of net pens on biological and built (human) environment. Evaluate means "weighing the negative and positive".This document contains support for the pens. It disregards adverse impacts on the environment.

An appropriate description of the contents of this PEIS would be that of a POSITION paper written by consultants known to be hired advocates for the aquaculture industry.

To enable this PEIS to be usable by planners and citizens alike, it should have a major overhaul. It needs a careful definition of terms and standards. Furthermore it needs to revise the glaring omissions, contradictions, startling deficiencies in order to accomplish its goals.

AMBIGUOUS STRUCTURE;

Let me illustrate with two examples to indicate how terms need to be define in a variety of ways and structures must be changed to make the meaning precise.

1 The words "significant adverse impacts"(page X) means that fish pens do have adverse impacts. Some impacts are more significant than others. Significant to whom? What measures are used to determine when an impact is significant?

The statement in the summary "No unavoidable adverse impacts" is particularly ambiguous. The word "avoid" according to the dictionary means "keep clear of or keep away from" The prefix "un" means "not" and when combined with avoid creates a reversal of a meaning. Then add the word "no" and one can only guess that the statement means that there are no adverse impacts that can be avoided.

These are only two of the words and sentences throughout the document that require revision in order to be clearly understood.

GLARING OMISSIONS;

1. WASTE MANAGEMENT;

Waste management, I understand, is a county responsibility. However, shouldn't there be a reference to the possibility of large numbers of dead fish,proliferation of plastic feed sacks, and other wastes from the fish pens causing the life-span of a waste disposal site to be shortened by as much as one-third?. This is occurring in British Columbia at the present moment. Shouldn't suggestions be made that counties put into place measures to take care of this problem before fish pens are sited?. (2)

The Federal Clean Water Act and its NPDES permit requirement are ignored. Although this question may decided in the courts it certainly should be addressed/ (3)

2. REGULATIONS;

There is no assessment of the costs of regulation, or the monitoring and enforcement of regulations. If they are to be done by the industry it should be so stated. However, there is always danger when an industry regulates itself. (4)

In Kicket Bay property owners have noted flagrant violations, increased traffic and noise, etc. Repeated calls reveal no one is in authority to enforce any type of regulation and no financial resources available to do any enforcement.

3.PLANKTOM BLOOM

Fish pen operators in British Columbia (Sechelt Peninsula) are concerned with the dire effects of the plankton bloom on the fish.Their pens are sited in more-or-less ideal conditions in deep water (300-600feet) near isolated shores in remote areas. However after two and one-half years they have established during the dangerous summer months plankton bloom watches. Why? Has the plankton bloom increased? Is there a relationship between the weather,increased number of fish farms, and the increased amount of plankton bloom? Such questions deserve scientific examination. 5

On page 57 we find a number of mitigation measures which appear to be testing requirements prior to siting, i.e. test the proposed site to evaluate the nutrients and algae density and then restrict (?) fish farms in areas exhibiting hypernutrification. These seem logical.

In British Columbia the pens are sited in areas with ideal water volume and flushing and are not in confined embayments and yet they have a problem. In view of such a condition paragraph No. 4, page 57 seems redundant and contradictory.

4.BROODSTOCK

The problem of a sufficient supply of broodstock is not addressed, particularly in the light of proposed increases in the number of fish pens. Since some of our hatcheries have destroyed their stock due to VHSD there is bound to be a shortage. Will fish stock be allowed from other areas or countries? Shouldn't the siting of a farm be dependent upon the amount of broodstock available?. 6

5. LAND BASED FISH PENS

The high capital cost of the rearing equipment and technique should be offset by its ability to produce a more favorable looking product in a shorter period of time. Also the reduced amount of antibiotics, feed should also be considered. Less risk of disease should be am important factor along with less danger to wildstock. 7

INADEQUATE TREATMENT

It seems to me that the PEIS should describe a process for disseminating recent developments in fish disease. 8

Other facets that have not been properly dealt with are: the industry's displacement of historical uses of the waters, the potential for fish escapement,effect of storms, reluctance of banks to finance this endeavor, the findings of Puget Sound Water Quality regarding clean-up necessary in Puget Sound and of course the risk of damage to the natural stock by fish disease.

Lastly, I would like to call your attention to RCW 79.90.460 in which it states: The management of state-owned aquatic lands shall preserve and enhance water-dependent uses....In cases of conflict between water-dependent uses, priority shall be given to uses which enhance renewable resources, water-borne commerce, and the navigational and biological capacity of the waters. Doesn't the RCW preclude thee establishment of net pens in areas that do interfere with navigational and biological capacities of the waters? 9

In WAC 173-16-060 paragraph 2 it states "Aquaculture is dependent on the use of the water area and, when consistent with control of pollution and prevention of damage to the environment, is a preferred use of the water area."

The indefinite article "a" is defined in a Random House dictionary as meaning "not any particular or certain one of a class or group such as: a man, a house. "The" is used especially before a noun, with a specifying or particularizing effect as opposed to the indefinite or generalizing force of the indefinite article a or an. For example: the book you gave me, the past.

All of the above references and statements are cited to point out that aquaculture is ONE of the many uses of the waters. RCW 79.90.450 deals with the management of public aquatic lands and articulates a philosophy. RCW 79.90.455 states that there should be a balance of public benefits for all citizens of the state and then lists them. 10

I believe the citizens of the state would NOT support destroying that balance by allowing one commercial industry to DISPLACE navigational and towboat lanes, commercial and sport fishing, or affect the ecosystem of aquatic waters. There is no justification for this!

Marie J. Pickett

Marie J. Pickett, Secretary
Saratoga Cove Foundation
3653 S. Bells Beach Road
Langley, Wa. 98260

RESPONSE TO LETTER NO. 22: MARIE J. PICKETT

1. Significant, as used in SEPA, means a reasonable likelihood of more than a moderate adverse impact on environmental quality. Significance involves context and intensity and does not lend itself to a formula or quantifiable test (WAC 197-11-794).

2. None of the issues you mention have been identified as problems associated with any of the existing farms in Puget Sound. See the response to Letter 1, Comment 88.

3. See the response to Question 17.

4. See the response to Questions 12 and 9.

5. Comments noted. The evaluation of plankton blooms on British Columbia fish farms is outside the scope of this EIS.

6. There is a large surplus of eggs from WDF hatcheries in most years. In 1989, over 50 million eggs of coho and chinook have been bought from WDF and sold to fish farmers and other hatchery operations around the world. There is currently a state of near self-sufficiency in Atlantic salmon broodstock in the Puget Sound area. As the demand increases, so will supplies. Many fish farmers will rear their own broodstock to ensure supplies.

7. Comments noted. It is outside the scope of this EIS to evaluate all aspects of land-based tank farms.

8. The process of disseminating information on fish diseases is largely a professional issue. For regulatory purposes, new information on infectious diseases of fishes is currently monitored by WDF. Thus, this function is covered within the responsibilities of the professional staff in the area of fish pathology in the WDF.

9. Fish farms are not appropriate in areas heavily used for navigation. When there is a case of conflicting water-dependent uses for a particular site, priority will be given to the use that meets the criteria stated in RCW 79.90.

10. DNR will evaluate the impacts of fish farms on a case-by-case basis. Navigation is a high priority use over aquatic lands and siting decisions will consider potential conflicts with navigation and other aquatic land uses and values.

LETTER NO. 23

4654 S. Strawbridge Lane
Langley, Washington 98260

March 31st, 1989

Project Manager Ron Westley
Washington Department of Fisheries
115 General Administration Building
Olympia, Washington 98504

Dear Sir:

Members of Seahorse Siesta Club community wish to go on record for rejecting the Programmatic Environmental Impact Statement for Fish Culture as it is written.

The draft:

1. is negligent in providing credible findings.
2. appears to be biased toward the aquaculture industry in its omission of up-dated research and economic studies. (1)
3. ignores public rights, fishermen, and navigation problems.
4. does not provide funds for controlling the industry.

Much work is necessary to remove the assumptions and inconsistencies contained in the PEIS.

Respectfully yours,

Frank Green

Frank Green, President
Seahorse Siesta Club

RESPONSE TO LETTER NO. 23: SEAHORSE SIESTA CLUB

1. Comments noted.

LETTER NO. 24

SHERWOOD CONSTRUCTION
ROUTE 1 BOX 1444
LOPEZ ISLAND, WA 98261

468-2850

Ron Westley
Washington Dept. of Fisheries
115 Gen. Adm. Bldg.
Olympia Wa

Mr. Westley :

I approve of your Aquaculture EIS as written. Please don't change it too much to suit the "radical fringe environmentalists" who have decided to oppose any form of aquaculture. (1)

Clark G. Sherwood
Home Builder
Lopez, WA.

P.S. No reply nessessary

RESPONSE TO LETTER NO. 24: CLARK G. SHERWOOD

1. Comments noted.

LETTER NO. 25

SIERRA CLUB -CASCADE CHAPTER
Water Quality Chair

Mr. Ron Westley
Project Manager
Washington Department of Fisheries
115 General Administration Bldg.
Olympia, WA 98504

1 April 1989

Re: Draft Programatic EIS for Fish Culture in Floating Net Pens

Dear Mr. Westly,

We sincerely appreciate for the opportunity to comment on the Draft Programatic EIS (PEIS) for Fish Culture in Floating Net Pens. While useful information is being provided in the technical appendix, we regard the application and interpretation of such information in the first volume of the Draft PEIS as most inadequate.

1 While the document is titled "programatic", it does not provide the required informed basis for net pen site selection, net pen management, compliance with aquatic quality preservation and anti-degradation requirements.

2 The document fails to convey the fact that conflicts for uses of Puget Sound marine waters range from high to very high and that net pens can or will create another "use" burden. Not least are the very high public demands to prevent and/or strictly control "Aesthetic Pollution" especially noise, visual, odor and solid waste pollution.

The find the attitudes of net pen promoting state officals denigrating as "elitists" those concerned about the mounting degradation of "aesthetic quality" around Puget Sound as most reprehensible. The PEIS needs to address the issue of "Aesthetic Quality" not as an impediment to net pens but as a positive requirement to preserve citizens rights to enjoy unpolluted open spaces.

3 The PEIS should consider that a " not in my frontyard " citizen's requests for non siting of net pens in front of residential shoreline comunities rates just as high as citizen's demands to control gravel pits, garbage dumps, urban sprawl, high rises and neon jungles.

4 To that effect, the document needs to provide a detailed analysis of how many potential sites might be available for net pen siting considerations, given the full range of environmental and public contraints that must be considered.

* PEIS relationship to the "Interim Guidelines for the Management of Salmon Pen Culture in Puget Sound.

While the statement is made on p.10 of the DEIS that : " . . these guidelines will be updated and possibly formalized as the result, in part, of information developed in this PEIS", discussion on how the information developed in the DEIS will be applied to up date the guidelines is lacking. The DEIS needs to provide an in depth evaluation of the effectiveness of the Interim Guidelines and demonstrate how the new information will be used to make the up dated guidelines more effective in imposing the required stricter environmental protection demands. (5)

* Cumulative Impacts.

The document lists some alternatives but makes little or no serious attempts to distinguish between them in terms of anticipated impacts. The PDEIS fails to follow the required EIS format to discuss in detail the anticipated impacts of the various alternaives being considered. This particularly evident from a scant two pages limited discussion. (6)

The document implies that if 100 or so pens were implanted into Puget Sound, their cumulative impacts would be almost nil. Such an implication is seriously flawed and we strongly recommend that the entire section be rewritten accordingly. The rewrite should be resubmitted as an amended PDEIS.

* NPDES Permit Requirements.

Section 502 (14) of the Clean Water Act defines " concentrated animal feeding operations " as Point Source. Section 502 (13) defines "toxic pollutants" as pollutants or combination of pollutants, including disease-causing agents which after discharge and upon exposure . . . can cause death, diseases . . . ". Sec 502 (12) defines disharge of pollutants as " . . . addition of any pollutants . . .". The discharges from net pens fulfill the intent and substance of the above definitions, thus the requireaments for the net pen pollution be controlled under a NPDES permit is fully mandated. The threat of potential contamination by the exotic Viral Hemorragic Specticimia Disease (VHSD) fully mandates that strict eflluent quality control be imposed. The PDEIS must fully discuss the needs and methodology for effluent control, preferably through pretreatment of the effluent, prior to discharge. (7)

Net Pens are essentially "aquatic feed lots" and as such are major point source polluters. D. P. Weston in his 1986 Report on the "Environmental Effects of Floating Mariculture in Puget Sound" (p.37 - U of W School of Oceanography Report 87-16) projects that a 250,000 Kg salmon net pen facility " . . . would have loading of nitrogen, phosphorus and BOD equivalent to untreated sewage from approximatly 10,000 persons", not counting the solid wastes.

Weston estimates that a 250 metric tons of net pen salmon will generate about 175 metric tons of solid wastes per year, mostly as feces and uneaten food.

For certain, mostly unpolluted embayements net pens are the major pollution source. This fact must be objectively recognized and discussed in the PDEIS. For example, Discovery Bay on the south shore of the Strait of Juan de Fuca has a combined population of less that 1500 peoples dwelling along the immediate perimeter of its shoreline. All household are on septic /leach field systems with no direct discharges into the Bay.

Good circulation combined with sufficient water depth to "flush" the wastes are considered the essential attributes to net pen site selection. D.P. Weston and R.J. Gowen " Assessment and Prediction of the Effects of Salmon Net Pen Culture on the Benthic Environment " in Appendix A provides some interesting insights on the potential behavior and fate of solid waste material generated by net pens.

Of special interest are the behaviors in current patterns illusttrated in Fig.2, p.12 and Fig.11, p.31. The figures illustrate the marked differences in current directions and oscillatory petterns for two different stations within the same net pen sites. The figures serve to illustrate the shortcomings of the Interim Guidelines followed almost without questions by net pen applicants to measure current velocity and direction 6 feet below the surface and at mid-depth at the center of the potential net pen site during a period of "average tide" to determine the "mean velocity".

What constitutes an "average tide" to determine "typical current" can be questioned by scrutiny of the attached illustration on the range variability of the mixed type of tide of the Pacific Coast. The progressive current vectors shown in Figs. 2 and 11 exhibit tidally induced fluctations in speed and direction. The use of progressive current vectors however do not provide information on
8 the eddy motion regime controlling the areal deposition of net pens solid wastes. The PDEIS must be redrafted to incorporate the <u>actual</u> field of motion that will control the deposition patterns of net pen solid wastes.

Conclusions and Recommendations.

The above brief comments illustrate some of the shortcomings of the PDEIS. The document should be considered as an uncomplete early draft document in needs of up dating and revision.

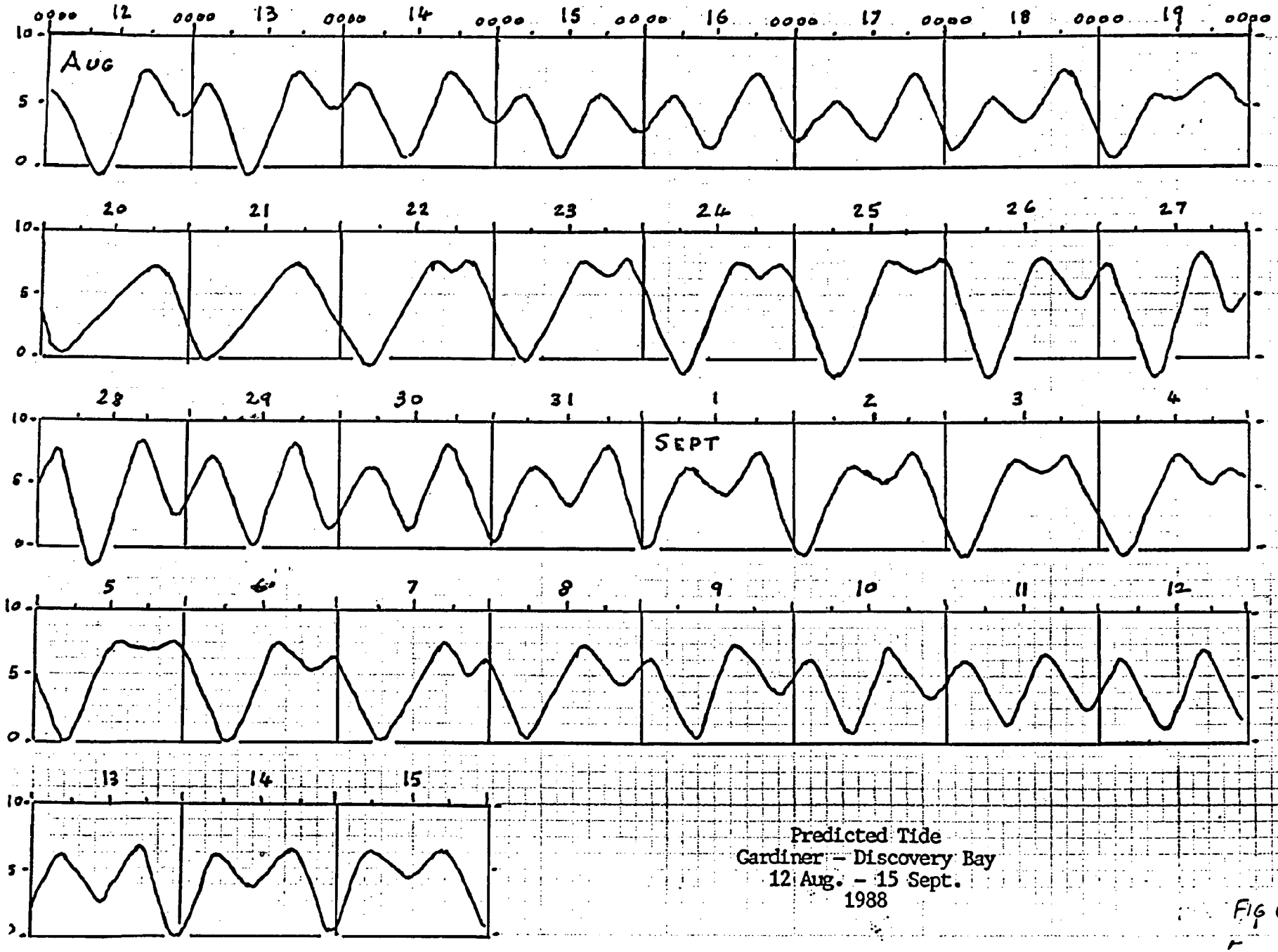
How the information developed in the document will be applied
9 towards integrated, <u>long range</u> planning for net pens, considering all of the environmental, technical and public acceptance constraints for in many instances already "over used" marine environment must still be developed.

We strongly recommend that the PDEIS be recalled and redrafted accordingly.

Again, we sincerely appreciate the opportunity to comment on the PDEIS and shall be most willing to interface with you and your staff in its redraft.

Sincerely yours,

M. Pat Wennekens PhD
Chair
c/o 399 Norman Street
Sequim, WA 98382
(206) 683-4007



Predicted Tide
Gardiner – Discovery Bay
12 Aug. – 15 Sept.
1988

Fig 6

RESPONSE TO LETTER NO. 25: SIERRA CLUB - CASCADE CENTER

1. See the response to Question 1.

2. Comments noted.

3. Comments noted.

4. See the response to Question 4.

5. The text has been revised to evaluate existing regulations and guidelines in the FEIS.

6. See the response to Question 7.

7. See the response to Question 17 and Letter 6, Comment 1.

8. No current vectors are found on figures cited. Also, eddy currents contribute to diffusion of waste material which causes a larger areal distribution, but a lower areal loading. Since impacts are related to areal loading rates, the use of average tidal currents is more conservative than the use of tidal and eddy currents.

9. This FEIS provides information on potential environmental impacts from floating fish farms. The information in this FEIS can be used by State agencies and local governments in any subsequent planning efforts related to the management of the fish farming industry.

LETTER NO. 26

Richard J. Thompson
Acting Secretary

STATE OF WASHINGTON

DEPARTMENT OF SOCIAL AND HEALTH SERVICES

Olympia, Washington 98504-0095

March 29, 1989

TO: Ron Westley, Project Manager
Washington Department of Fisheries

FROM: Gary Plews, Supervisor
DSHS Shellfish Section

SUBJECT: Draft Programmatic Environmental Impact Statement:
"Fish Culture in Floating Net Pens"

1 Thank you for the opportunity to review the above referenced document. It is a thorough, well-researched treatment of this controversial subject. We believe human health concerns have been adequately addressed in the document, and therefore have no comments to make at this time.

RESPONSE TO LETTER 26: DEPARTMENT OF SOCIAL AND HEALTH SERVICES

1. Comment noted.

LETTER NO. 27

SQUAXIN ISLAND TRIBE

April 6, 1989

Duane E. Phinney, Chief
Habitat Management Division
Washington Department of Fisheries
115 General Administration Building
Olympia, Washington 98504

Re: Programmatic Environmental Impact Statement
Fish Culture in Floating Net-pens

Dear Mr. Phinney:

This letter represents the comments of the Squaxin Island Tribe on the PEIS for net-pen culture. We are in a unique position from which to evaluate this document as we have been extensively involved in net-pen culture for over 15 years and we are the subject and site for several studies done in conjunction with this document. We believe we have perhaps the best characterized net-pen site in Puget Sound and the expertise with which to critique your PEIS.

In general we find that the EIS is a well written document that accurately and fairly portrays potential impacts associated with pen culture. We would suggest stronger coverage of issues related (1) to implementation of a net-pen permitting program. It appears certain that every site proposed in Puget Sound will have to provide extensive and site specific environmental documentation. We feel that a better analysis of the programmatic consequences of net-pen permitting and management should be forthcoming.

A different way of presenting the information and alternatives in the PEIS may be appropriate. While alternatives ranging up to 100 farms may be an acceptable way of addressing the potential of cumulative environmental impacts, it does not appear to adequately (2) analyze what type of local and state processes might be used to achieve the permitting and management of 100 such structures. One is left to ask the question if 100 pen facilities are possible in the current regulatory atmosphere. Pen proponents and the general

NATURAL RESOURCES DEPARTMENT / West 81 Highway 108 / Shelton, WA 98584
FAX 426-3971 / Phone (206) 426-9783

public need to have a better understanding of how net-pen proposals will be evaluated in the future.

Currently siting criteria are controlled by the Recommended Interim Guidelines for the Management of Salmon Net-Pen Culture in Puget Sound. What relationship does this document have to those guidelines? Will we continue to use the guidelines or will we develop new guidelines? Are the current guidelines adequate to address the concerns noted in the PEIS? Are they excessively restrictive? The PEIS is conspicuously silent on a large number of issues relating to current and future regulation and management. We suggest that the PEIS specifically address the current management structure in relation to the environmental impacts documented or demonstrated by this document. 3

What is the intention of the PEIS regarding the management of delayed release net-pens? These facilities are surely net-pens and likely will fall under many of the same management constraints. Yet, they have different management concerns and therefore have different impacts on the environment. The PEIS makes a weak attempt to distinguish between strategies, however, on many issues they are innately linked. Is it the intention of the Department of Fisheries to conduct a separate environmental analysis specific to delayed release facilities? If so, then they should be clearly excluded from consideration in this PEIS. If, however, the intention is to include delayed release pens in this environmental analysis, they should be clearly and specifically included throughout the analysis with similarities and differences included on the discussion of each topic. 4

We believe that net-pen structures can have beneficial impacts on some environments. Biostimulation can occur from increased nutrient loads in an otherwise limiting environment. Perhaps more importantly, the physical structure of the pens can act as a floating reef. This introduced habitat may serve as an attachment point for marine invertebrates and marine flora. Mobile organisms may find shelter at a net-pen site. In short, a whole marine community can develop on and around a net-pen site. We do not see this effect documented in the PEIS, and we feel that it should be. These communities themselves have apparent effects on the environment, many of which may be positive. Additionally, these impacts may offset other impacts which are perceived as negative. 5

Commercial fishing is included as a potential impact or interaction. The analysis focused on negative effects of gear interaction. Why did you not examine the potential positive contribution to commercial fishing? Even though you seem to have set aside the delayed release facilities as an issue which I noted earlier, net-pens also can serve as an attraction to free swimming fish. This concentration of fish in proximity to net-pens can aid 6

the commercial as well as the sports fishery in targeting their efforts. We feel that this potential should be noted.

7 The PEIS attempts to examine floating net-pens. This is conveyed in the title and the introduction. Why then do you include a section on tank farms? These operations are very dissimilar and their mention only serves to cloud the issue. Or, alternatively, if the intention is to look at all forms of fish culture, perhaps you should expand the scope to include hatcheries.

8 As we have stated, we feel that WDF has done an excellent job of characterizing the "Affected Environment", including the range of impacts that might be expected and the potential mitigation that could minimize those impacts. We are hopeful that the PEIS can also better address the real programmatic issues involving net-pens. As you state on page 8, existing "rules may be modified as a result of this PEIS". What we all need is an analysis of what modifications are in order and a series of alternatives which give real options for how to proceed.

The Squaxin Island Tribe is in a unique position. It is a proponent of properly sited net-pens and has considerable experience upon which to base its judgments. Yet the Tribe would vigorously oppose poorly sited pens that would have a negative impact on the resources of importance to the Tribe. The Tribe actively participates in research to broaden our understanding of resource impacts. The Tribe's desire is to develop an understanding of whether net-pen management will proceed in a well documented scientifically based manner. Much good information has been presented in the PEIS document. What we do with that information is the focus of our concerns. We urge the Department of Fisheries and the drafters of the EIS to examine more closely the objectives of the document and to provide a better analysis of where we go from here.

Sincerely,

Jeff Dickison, Biologist

RESPONSE TO LETTER NO. 27: SQUAXIN ISLAND TRIBE

1. Comments noted. The information in this FEIS can be used by State agencies and local governments in their subsequent planning efforts related to the fish farming industry.

2. The text has been revised to evaluate existing regulations and guidelines in the FEIS.

3. See the response to Question 2.

4. See the response to Question 21.

5. The creation of new habitat on and near fish farms was noted in the text of the DEIS under the impacts portion of the Fish and Shellfish section.

6. Fish may be attracted to the farm site, but commercial fishing boats would be unlikely to operate close enough to the farm to benefit from any fish near the farm. The positive aspects of farms on the recreational fishing you mention were noted on page 119 of the DEIS.

7. See the response to Question 32.

8. The text has been revised to evaluate existing regulations and guidelines in the FEIS. In addition, the Preferred Alternative in the FEIS includes recommendations for expanded regulations and additional guidelines.

Comments on DPEIS: Fish Culture in Floating Net Pens

General Comment

One potentially serious problem is that this PEIS will be (and apparently already has been) used by local officials to avoid the site specific review process. The main conclusions of the report indicate, however, not that there are no important impacts but that they depend heavily on the specific site. "Proper siting" is the key issue in 2 of the 4 major conclusions (1) and 7 of the 8 impact areas cited. I think the Department should make this chief implication of the EIS clear - that site specific reviews are essential, that this document can be used as background material, but in no case should it be employed as an excuse to avoid a site specific EIS. This should be stated clearly and upfront in the final version.

Comments on Appendix E, Economics of Salmon Farming

Purpose

The Statement of Work for the economics section of this PEIS reads as follows: "What is the potential impact of net-pen operations on the local economy, on the value of adjacent property, and on the local fishing industry?" However the present report deals principally with the fiscal impacts on state & (2) county government, as well as the impacts on business revenues, income & employment. The report addresses but comes up with no valid conclusions on the issue of property value (see below) and fails to address the question of impacts on local fisheries in an unaggregated form. The statewide assessment and assessment of impacts on local government were unasked for.

Methodology

Input/output (I/O) is a standard methodology that puts heavy demands on available quantitative data. In the time-honored tradition, this approach simply ignores impacts which are hard to measure. Stokes follows the tradition. In the present case the important issues of loss of tourist income and the general perception of lowered recreational value are not dealt with.

(3) I/O was developed in the 1930's before the economic implications of environmental deterioration were widely appreciated. In the 1970s the inventor of the procedure, W. Leontief, and several of his followers (R. Costanza, B. Hannon) broadened the approach to take into account environmental losses

due to economic activity. Unfortunately Stokes does not use these more comprehensive matrices, and so misses, in my judgement, one of the major points to be made here - that salmon farming has serious economic consequences precisely because of its envionmental impact. For example I have heard one estimate of the BOD load of a moderately sized fish pen as equivalent to a city of 10,000 people. In the modern methodology this cost (which is easily calculated in $/lb BOD) would be factored into the calculations.

Regional Economic Impacts

Using highly aggregated matrices (e.g. Table 2.1), as is done here, hides specific but important impacts. A case in point is tourism, a flourishing industry in many of the impacted areas. Tthe inputs and outputs of tourism are (probably) divided up among Agriculture, Construction, Retail Trade, Real Estate & Services. There is no way to separate out the impacts on tourism from this analysis. But a decision maker in an area with a decaying resource extraction industry and a strong and growing tourist industry and will want to do precisely this in order to forecast the longer term implications of fish farming. 4

Another question regarding tourism is: How well is this industry represented behind these other categories. Probably not well. It is typical of number crunching methods that they under-represent areas in which numerical data is difficult to obtain. Tourism is one of these. The true dollar flow in the tourist industry is usually much more than is recorded in any statistical summary. However an accurate representation of the tourism industry is critical to this analysis, since tourism may suffer one of the heaviest negative impacts of fish farming. 5

State & Local Fiscal Impacts

The net impact on state finances of a 5 million lb net pen industry, as reported on pp 35-40. are quite ambiguous. Three of the four measures of economic viability indicate a net loss. Yet this basic result is not highlighted. On the contrary the tone of the executive summary in reporting these results is quite optimistic and indicates an unexceptional positive impact - "...Washington's economy would, <u>in any event,</u> benefit from further growth in fish farming..." a conclusion Table 5.5 contradicts. 6

Property Values

The property value analysis Section VI is gratuitous, leading to no conclusion relating to the question at hand - whether salmon farms reduce property values. The author states that answering this question is beyond the resources currently available, which may be true, but does not justify the inclusion 7

of this irrelevancy here.

The author restricts his analysis of the potential impacts of fish pens on property values to visual amenity. The latter is only one of several negative factors associated with fish pens.

The mathematical procedure seems flawed. The author would explain through multiple regression the factors that enter into the determination of the price of real estate and thus show the maximum that visual amenity might contribute to that price. The logic is this: if 90% of the variability in the price of similar land (ocean front property) can be explained by other factors (location, bank size, improvements, etc) then visual amenity must account for no more than 10% of the variance. Unfortunately these variables (location, bank size, visual amenity) are not at all independent of one another, and a great deal of covariance exists. Using such variables undermines the mathematical robustness of multiple regression. The dependant variable can be over-determined (explanatory power over 100%) in these cases, making the exercise very dubious. - In any case this analysis seems to lead only to an estimate of the $ value of visual amenity in general, rather than to an estimate of the impact of fish pens, the question at hand. 8

Benefit/cost Analysis

It is surprising to see the author use benefit/cost analysis as a summary measure of economic feasibility rather than more balanced measures like net present value or internal rate of return. Benefit/cost ratios simplistically emphasize the short term considerations (money that changes hands each year), at the expense of long-term values (property value appreciation, water & air quality). Net present value would have been a more realistic measure. 9

The assumptions on page 57 (10-20% range of reduction in visual amenity, 25-50 miles of affected shoreline) are wholly gratuitous inventions of the author. They are of course labelled as such in the accompanying text. Unfortunately all of the conclusions share this weakness. The entire exercise of Section VII is for "illustration." This characterization of the section by the author is further justified by his selective use of costs and benefits (see below). The underlying assumption of this section, that fishpens have little impact on visual amenity is supported by citing the opinion of an unnamed appraiser in an unpublished report. 10

The point is that such academic exercises as Chapter VII have no place in an EIS. The task put to the author is to deliver the economic facts, both experential and inferential, about fish farming. The danger is that someone (probably many people) will read the conclusions of this chapter as facts, rather than the 11

results of a classroom drill. In fact a reader of the glowing executive summary would be drawn to this erroneous interpretation, if he/she failed to read the proper caveats into such ambiguous expressions as "externally provided assumptions", & "necessary subjective judgments". I suggest that Chapter VII be deleted in the final EIS.

In Conclusion

If the present report is flawed in what it delivers, it fails more importantly in what it fails to deliver. There are many more impacts with economic implications than Stokes deals with here, for example a wide range of lost recreational opportunities by landowners, residents, and tourists from visual, olfactory, & tactile impacts in the water and air as well as on shore. None of the potentially catastrophic issues raised elsewhere in the DPEIS, such as introduction of exotic species and chemicals, is even mentioned here. Some of the fish pen sites (12) under consideration are retirement communities. Locational decisions by future retirees will be severely affected by the suspicion of potential amenity loss (a suspicion strongly associated with fish pen farming at the present time), whether the suspicion is justified or not. Not included in this analysis is the tourist dollar loss to the affected community due to the perception that the area is no longer as pleasant a place to visit, to fish, and to walk the beach. Such costs are very difficult to quantify, but they are real. By electing to use a highly quantitative analytical method, the author has not simply overlooked these difficult-to-quantify or non-quantifiable costs, he has in fact given them a dollar value of zero.

The economics of this project is obscure and the present report has thrown only a little light on it. A simple descriptive balance sheet of private and public costs and benefits including the impacts mentioned above would have been useful in order to clarify the issues at hand. This analysis should have better (13) incorporated the results of the other sections of this PEIS including especially Section E:aesthetics, K:upland & shoreline use, & S:recreation. Laying out the relevant factors, quantifying those that lend themselves, and leaving the rest to the balancing judgment of the decision maker would seem to serve the public need better than delivering a table of 64 dubious numbers that fall out of an admittedly irrelevant methodology.

James Stapleton, Ph. D. (Environmental Science)
P.O. Box 52
Joyce, WA 98343

RESPONSE TO LETTER NO. 28: JAMES STAPLETON

1. As stated in the Summary under Phased Review, each fish farm proposal must comply with the *State Environmental Policy Act*. Local jurisdictions will use the best available information when completing SEPA review to determine the significance of potential impacts related to specific proposals.

2. Comments noted. See the response to Question 12.

3. See Section 1 of the response to comments after the text in Appendix E.

4. See Section 1 of the response to comments after the text in Appendix E.

5. See Section 1 of the response to comments after the text in Appendix E.

6. See Section 3 of the response to comments after the text in Appendix E.

7. See Section 4 of the response to comments after the text in Appendix E.

8. See Section 4 of the response to comments after the text in Appendix E.

9. See Section 5 of the response to comments after the text in Appendix E.

10. See Section 4 of the response to comments after the text in Appendix E.

11. See Section 4 of the response to comments after the text in Appendix E.

12. See Section 1 of the response to comments after the text in Appendix E.

13. See Section 5 of the response to comments after the text in Appendix E.

LETTER NO. 29

RODNEY H. STEBBINS
205 SWINOMISH DRIVE
LA CONNER, WASHINGTON 98257

April 7, 1989

Ron Westly
Washington Department of Fisheries
115 General Administration Building
Olympia, Washington 98504

Dear Mr. Westly:

1 Please see the enclosed copy of my letter of March 12, 1989 addressed to Betsy Stevenson of the Skagit County Planning Department in which I express my opposition to the proposed seaweed farm in Northern Padilla Bay and to any further placement of fish-rearing pens in the waters of Skagit County.

Please include the contents of the enclosed letter copy in your compilation of objections to any further expansion of aqua-culture projects within the waters of Western Washington.

2 Since writing my letter to Ms. Stevenson, I have learned that the State of Washington may well be in violation of our state constitution which appears to prohibit the rental/leasing of the waters in question for any purpose whatsoever! It may be claimed that the State is only leasing the bottom land rather than the surface waters. If such is the case please be sure that all aqua-culture facilities are located at the bottom rather than on the surface of the waters in question.

Please be good enough to keep me informed as to the final disposition of this matter.

Most sincerely,

Rod Stebbins

Rodney H. Stebbins

RODNEY H. STEBBINS
205 SWINOMISH DRIVE
LA CONNER, WASHINGTON 98257

March 12, 1989

Ms. Betsy Stevenson
Skagit County Planning Department
County Administration Building
Mount Vernon, Washington 98273

Dear Ms. Stevenson:

This is to record my total opposition to the proposed seaweed (Nori) farm proposed for the Guemes-Jack Island area in northern Padilla Bay and to any further placement of fish-rearing pens in our County.

Why the Skagit County Commission even considers the approval of such projects is beyond my comprehension. I grant that our County needs to encourage new business in order to increase job opportunities and to enlarge the tax base. However, these enterprises offer very little in the way of new employment opportunities for our citizens and their existence is bound to lower the value of nearby real estate, thus reducing property tax revenues.

The proposed seaweed farm will adversely affect commercial and sport fishing and crabbing and will prove to be a serious hazard to navigation for the commercial and pleasure boaters who make extensive use of the waters involved.

When major efforts are underway to clean up wters of the Puget Sound area it seems ridiculous to encourage the expansion of activities which must surely contribute to the lessening of water quality.

The negative aspects of these projects so greatly outweigh any benefits as to make approval by the County Commission totally inappropriate and not in the best interest of the residents of Skagit County.

Most sincerely,

Rod Stebbins

Rod Stebbins
LaConner

cc: Skagit Valley Herald
Channel Town Press
Anacortes American

RESPONSE TO LETTER NO. 29: RODNEY H. STEBBINS

1. Comments noted.

2. See Section 8.3 of the FEIS which discusses the Public Trust Doctrine.

404 Nachsack Place
La Conner, WA 98257
7 April 1989

LETTER NO. 30

Ron Westley
Department of Fisheries
115 General Administration Bldg
Olympia, WA 98504

Dear Ron:

I had planned to write a letter protesting the development of aquacultural activities in Puget Sound but I realized that all my arguments have been made before and to no avail.

Therefore, I will limit my statement to the following: The Constitution of the State of Washington unequivocally prohibits the State from renting or leasing the waters of the State, except for limited areas adjacent to ports and harbors. The equivocal effort of the State to circumvent the Constitution by claiming to lease the bottom but not the water above it is transparently illegal, is a shameful reflection on this administration and will be shown to be so by judicial finding. (1)

Very truly yours,
Maynard A. Steinberg
Maynard A. Steinberg

RESPONSE TO LETTER NO. 30: MAYNARD A. STEINBERG

1. Comments noted.

LETTER NO. 31

Solveig H. Thomson, Ph.D., P.S.
Clinical Psychology
Psychotherapy

1107 N.E. 45th Street, Suite 405
Seattle, Washington 98105
Telephone: (206) 547-1706

April 4, 1989

Ron Westley
Wash. Dept. of Fisheries
115 General Admin. Bldg
Olympia, WA 98504

Dear Sirs:

We are writing to oppose placing aquaculture pens for salmon breeding in proximity to environmentally sensitive shorelands such as near the Cama Beach recreational area close to Camano Island State Park. (1)

At this time, there are too many serious questions about too many aspects of this plan. Some typical issues include intermingling of wild and farmed fish, gene pools, disease (see Dr. Whiteley's accompanying article), water quality, noxious bottom sediment, effects on birds, mammals, plankton, predators, and chemical effects altering natural immunity of fish. Also more issues relate to aesthetics, noise, odor, human health, recreation, navigation, and upland and shoreline use. Economic issues and local government input are further concerns. Who really benefits and at what cost? What about more focus on building natural fish runs and land-based tank farms? Pollution is pollution! Let us not move hastily on placing questionable salmon pens in our treasured Northwest environment. (2)

Sincerely yours,

Solveig H. Thomson

Sea farm study deficiencies noted

3/29/89

By CAROL BYNG
Island County Correspondent

Shoreline Planner Mike Morton gave the Island County Commissioners a brief review of the Department of Fisheries environmental impact statement covering the effects of salmon-net fish farming in Puget Sound.

Then he listed the deficiencies Island County's attorneys, Keller Rohrback of Seattle, intend to file with the Department of Fisheries during the comment period:

•The draft EIS lacks specific recommendations about separation of wild populations and farmed fish, and they will cite Norway's Coastal Zone Management Program. They will call for an analysis of the compatibility between salmon farms and existing regulations. And they want the Public Trust Doctrine included.

•Department of Fisheries has not performed any studies about the genetic effects if there is interbreeding between escaped and wild fish, such as dilution of the gene pool for wild fish. The mitigating measures proposed are contradictory or ineffective. Conclusions drawn in the EIS are not based on accepted literature or independent research.

•Diseases are not adequately addressed and state regulations are inadequate to guarantee protection of wild or hatchery fish.

•Several aspects of water quality standards were omitted, including the effects of dissolved oxygen, phytoplankton and fecal coliform.

•Many effects on the bottom sediment were not covered.

•Nor were the effects on mammals, birds and predators addressed.

•Chemicals, including anti-biotics and alterations of natural immunity of local fish were not part of the study.

•Economics were not addressed.

•There are no plans giving local autonomy to the county.

•The EIS did not evaluate the impact on local government services, especially the need for enforcement.

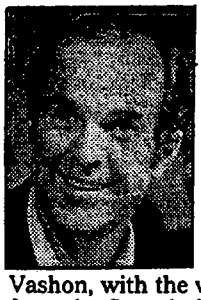
•Aesthetics, noise, odor, human health, recreation, navigation. upland and shoreline use were skimmed over and the long-term effects were not addressed.

•Land-based tank farms were not mentioned.

•And last, but not least, the need for another draft will be discussed.

Public written comments will be accepted until April 7 and can be mailed to: Ron Westley, Washington Dept. of Fisheries, 115 General Admin. Bldg., Olympia, WA 98504.

BOOTH GARDNER 3/29/89
Washington's governor



When Jean and I want to get away for a weekend, our favorite trip is to go home to our cabin on Vashon Island. There's nothing quite like a walk on the beach at Vashon, with the waves rolling in from the Sound, the huge trees all around, the calls of birds, everywhere the signs of life, in water, on land and in the air.

Our special getaway is very much like many other quiet, peaceful island retreat spots throughout Puget Sound and up to the San Juan Island. We've never found a place where it's easier to unwind, to relax, to renew our energy, restore inner calm and prepare to make a fresh start in tackling the day-to-day challenges of life and work. And besides, no place we know of is more certain to encourage an appreciation of the environment with which we in the Northwest have been truly blessed.

We hope he includes Camano Beach on Camano Island.

3/25/89

Stop aquaculture of Atlantic salmon

Arthur H. Whiteley
Special to The Times

ON MARCH 2 your editorial called for cessation of "finger-pointing" at the source of the salmonid virus, VHS, which has appeared in our waters. Those of us in the Marine Environmental Consortium agree: We need to get at the probable cause and correct it (if it is not too late).

This admonition applies to the marine consortium, commercial and sports fishermen, and most of all to the people in the Washington Departments of Fisheries and Agriculture — and you in the media.

The suggestions made by Mr. Blum of the Fisheries Department, that the VHS virus came in on rubber boots or in ship bilge, are improbable. Rhabdoviruses, including VHS virus, are coated with a lipid envelope and are fragile. VHS virus is inactivated by drying or by suspension in water for a few days.

The report by the Fisheries Department (Bill Dietrich's article in the March 2 Times), that VHS has not been found in countries from which the aquaculture industry imports Atlantic salmon eggs (Scotland, Norway and Finland) is incorrect. It has been reported from Norway, from which much of our net-pen culture stems.

The department is wrong also in its contention that Atlantic salmon have the virus only if they are injected with it (although this alone shows that Atlantics can carry the virus).

Atlantics swimming briefly in water containing the virus can pick it up and replicate it extensively in their bodies, without developing symptoms, according to studies in 1982 and 1985.

Thus Atlantic salmon can harbor and replicate this virus without themselves being destroyed, and can thereby carry the virus. The 1982 researchers concluded:

"Taking into consideration the ability of viruses to produce variants and the fact that VHS viruses are able to grow in Atlantic salmon, VHS is obviously a potential threat to intensive salmon culture. Any project to rear Atlantic salmon should apply strict sanitation rules toward VHS."

We don't know if this sad disease has been introduced here by Atlantic salmon products or on someone's boots, but we feel that the latter is the less probable. We get the impression that the U.S. Fish and Wildlife Service thinks so, too.

Instead of dodging this issue, the Fisheries and Agriculture Departments should make certain that net-pen aquaculture of Atlantic salmon has not introduced this virus into Washington. Oregon, Idaho and British Columbia have placed an embargo on importation of salmon smolts and eggs from Washington.

Instead of dodging the issue, state officials should be certain that net-pen operations have not introduced the disease into Washington.

There are plenty of questions that need answers. Do any aquaculture facilities in Washington have this virus?

The state has a three-month quarantine on imported exotic fish eggs before the fry from such eggs can be released into the environment. Does this quarantine ensure that exotic diseases such as VHS, which may have a latent period up to 18 months, are not carried with them?

Such eggs may be treated with iodine compounds to inactivate infectious agents. Pathologists fear that VHS virus particles within the egg membranes would be protected from these treatments and thus could enter our waters despite the quarantine and treatment. Until competent scientists have ruled out such possibilities, we have no business introducing these exotic species into our waters.

We do know, from what has been reported, that this virus is now in the resident adult coho population, with uncertain impact on the commercial and sports future of this species.

These fish inhabit the same streams as do steelhead trout, which are most sensitive to this disease. This great fish is far too important to put further at risk.

Until this whole issue is resolved, a moratorium on Atlantic salmon net-pen aquaculture should be put in place and enforced. A responsible press should demand such a moratorium.

■ Arthur H. Whiteley is a professor emeritus of zoology at the University of Washington.

RESPONSE TO LETTER NO. 31: SOLVEIG H. THOMPSON

1. Comments noted.

2. The purpose of this EIS is to present the existing information regarding potential impacts of siting floating fish farms in Puget Sound, and identify areas where information may be lacking.

LETTER NO. 32

THE TULALIP TRIBES

6700 TOTEM BEACH ROAD
MARYSVILLE, WA 98270
653-4585
FAX 653-0255

Board of Directors:
Herman A. Williams, Sr., *Chairman*
Bernard W. Gobin, *Vice-Chairman*
Debra L. Posey, *Secretary*
Stanley G. Jones, Jr., *Treasurer*
Stanley G. Jones, Sr., *Member*
Dawn E. Simpson, *Member*
Roy E. Hatch, *Member*
Clarence H. Hatch, *Executive Director*

The Tulalip Tribes are the successors in interest to the Snohomish, Snoqualmie and Skykomish tribes and other tribes and bands signatory to ott.

Mr. Ron Westley
Project Manager
Washington Department of Fisheries
115 General Administration Building
Olympia, Washington 98504

March 20, 1989

Dear Mr. Westley,

The Tulalip Tribes would like to submit the following comments regarding the Draft Programmatic Environmental Impact Statement for Fish Culture in Floating Net Pens.

While we believe the document provides much useful information regarding many important issues which must be addressed prior to large scale net pen operations in Puget Sound, the document fails to offer any specific recommendations for mitigating likely impacts, does not mention several types of potential impacts to existing fish stocks, and fails to recognize Treaty Fishing rights, including co-management authority of anadromous fish.

Specifically, we believe the following should have been addressed in the DEIS:

1. The DEIS does not clearly outline what management action is being proposed. The document discusses potential impacts of floating net pen culture in a generic sense but does not propose any specific plan to control future development of this industry. It is not possible for us to assess the advisability of increased net pen culture until a specific management plan is proposed and discussed. (1)

2. The document outlines many valid concerns regarding the effects of net pen facilities on such resources as water quality, benthic biota, marine mammals and birds, commercial and recreational fishing, etc. While this discussion is informative, the document fails to identify any specific proposed mitigation measures. While it may be true that many of the potential impacts to existing resources can be mitigated through proper siting and management, no siting criteria or siting processes are proposed. Without the description and discussion of specific mitigation measures for site specific conditions, it is not (2)

possible to make any meaningful comments regarding increased net pen operations on Puget Sound.

3. While the document mentions that non-Indian fishing activities might be disrupted (pg 113) , thereby placing the state in violation of federal court orders, the document fails to discuss impacts to Indian fishing and their related legal rights.

It has been our experience that state and local government have very little knowledge of treaty fishing activities and have generally taken the position that the tribal fisherman can be displaced to "other fishing areas". Tribal fishing activities
3 are restricted to Usual and Accustomed fishing areas which are limited in size. This is not the case for the non-Indian fishermen. Further, many areas are either less desirable for fishing or are not fishable at all. Reduction of fishing area is of great concern of the Tribes, particularly in the absence of any state policy designed to protect them.

4. Several potential biological effects are not covered by the DEIS. Net pen operations could deplete important populations of food organisms used by existing salmon populations. The fish
4 within the pens are also predators on juvenile fish migrating past and through the net pens. While these impacts would occur locally, they could well have impacts on fish stocks which are important regionally. Without specific locations identified for net pen sites, it is not possible to assess these impacts.

5. The document does not mention tribal co-management authority with the State of Washington over anadromous fish resources. The further development of net pen facilities will
5 effect these resources, their management, and their value, as described by the DEIS and our comments. We believe it is clear that the Tribes share management authority with the state over this matter and should be included in the decision making process as equals with the State.

In summary, the document fails to propose any specific management plan or mitigation measures such as siting criteria, is not supported by any site specific analysis of impacts to the environment, does not describe in any way the impacts to Treaty fishing, and does not recognize the co-management authority of the the Tribes. These deficiencies should be corrected in a revised DEIS.

Net pen aqualculture has the potential to benefit all residents of the state, however this DEIS fails to adequately address the serious issues which must be resolved prior to large scale development of this industry.

Finally, we ask that the State establish a forum for working cooperatively with the Tribes to develop the recommended management plan. It is our desire to develop the potential of net pen aquaculture while protecting existing resources and resource users.

Sincerely,
The Tulalip Tribes

Terry Williams
Fisheries Director

RESPONSE TO LETTER NO. 32: THE TULALIP TRIBES

1. The EIS evaluates potential environmental impacts associated with fish farms, but is not a management plan for the aquaculture industry.

2. Every element of the environment in the DEIS, such as water quality, commercial fishing, and aesthetics, includes a section on specific mitigation measures that could be used to minimize potential impacts. The text has been revised to evaluate environmental impacts of the fish farming industry under existing regulations and guidelines in the FEIS. In addition, the Preferred Alternative includes recommendations for expanded regulations and additional guidelines.

3. The Commercial Fishing section of the DEIS stated that treaty tribes can only fish in their usual and accustomed fishing areas. The text has been revised for the FEIS to clarify the potential effects of fish farms on tribal fishing efforts.

4. If the reviewer is speaking of the loss of salmon food organisms on the bottom, the issue is discussed in Section 5.1 of the FEIS. If the reviewer is speaking of farm fish consuming zooplankton, one has to bear in mind that farm fish are fed many times per day. Zooplankton would constitute a very small portion of their diet. Prey fish would not be expected to enter the pens in significant numbers if hundreds of predators were inside. If prey fish are seen in the pens, then salmon are not eating them.

5. The DEIS specifically stated that the tribes and WDF establish a management plan every year for each salmon species.

LETTER NO. 33

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
2625 Parkmont Lane SW Bldg B
Olympia, Washington 98502
206/753-9440 FTS 434-9440

March 22, 1989

Mr. Ron Westly, Project Manager
Washington Department of Fisheries
115 General Administration Building
Olympia, Washington 98504

RE: Programmatic Environmental Impact Statement - Fish Culture in Floating Net Pens

Dear Mr. Westly:

The Fish and Wildlife service (Service) will be unable to provide detailed review comments on the above referenced document.

The document contains considerable valuable information for the future evaluation of proposed projects subject to federal permits for which the Service has review responsibilities. This additional and separate evaluation by the Service would be conducted pursuant to the Fish and Wildlife Coordination Act (16 U.S.C. 661, et seq), or with other relevant statutes. In the review of site specific project proposals, the Service may concur, with or without stipulations, or object to the proposed work, depending on specific development practices which may impact fish and wildlife resources. (1)

In the event that a permit from the Corps becomes necessary, the project sponsor is encouraged to contact our office (above phone/address), prior to permit application. We may be able to give guidance on design criteria which will facilitate the permit review process.

We appreciate notification of this project and the opportunity to comment.

Sincerely

David C. Frederick
Field Supervisor

JWC:dj
cc: WDE, WDW, EPA

RESPONSE TO LETTER NO. 33: U.S. FISH AND WILDLIFE SERVICE

1. Comments noted.

LETTER NO. 34

4516 University Way N.E.
Seattle, WA 98105
March 22, 1989

Ron Westley
Project Manager
Washington Department of Fisheries
115 General Administration Building
Olympia, WA 98504

Dear Mr. Westley,

The members of the Board of Puget Sound Alliance would like to express their appreciation for your efforts in sending us a copy of the EIS on Fish Culture in Floating Net Pens.

1 We would urge you to establish a moratorium pending additional information and assurances that the biological integrity of Puget Sound and its living resources not be compromised.

We feel that there are too many issues for which we do not have definite answers such as:

2 Where did the HSV come from since it has not appeared in our wild stock before?

3 What impact will the faecal waste from the net pens have on the benthic life in the area?

4 What impact will the Atlantic salmon have on our native stock? Will the Atlantic salmon do in our steelhead?

5 Why should we dirty up the waters of Puget Sound by net pens when we have been trying so hard through the Puget Sound Water Quality Authority to clean up the Sound?

We urge that additional studies be carried out in an attempt to answer some of these questions before we would feel comfortable in having fish pen aquaculture carried out in our waters.

Thank you for your consideration.

Sincerely,

Sally J. van Niel

Sally J. van Niel
Secretary
Puget Sound Alliance

RESPONSE TO LETTER NO. 34: PUGET SOUND ALLIANCE

1. Comment noted.

2. See the response to Question 29 and Appendix G.

3. See Section 5.1 of the FEIS.

4. Atlantic salmon pose a very low environmental risk. Steelhead out compete Atlantic salmon in freshwater as juveniles and adults. Competition in the marine environment would only be of concern if the carrying capacity of the ocean is exceeded. See the discussion in Section 5.6 (Importation of New Fish Species) and Section 5.7 (Genetic Issues) of the FEIS.

5. Comment noted.

LETTER NO. 35

April 5, 1989

Washington Aquaculture Council
1625 Grant Street
Port Townsend, Washington 98368

Washington Department of Fisheries
General Administration Building
Olympia, Washington 98504
Attn: Ron Westley, Project Manager

Re: Draft Programmatic Environmental Impact Statement

Dear Ron,

After careful review of the Draft and Technical Appendices, I would like to thank you for a job well done. The documents do not whitewash the net-pen industry, but do provide a filter of rationality for most of the hysterical and/or scientifically undocumented claims on the negative impacts of salmon farming. The document also highlights the fact that this state has no intention of duplicating some other country's past siting mistakes. One reoccurring attitude I see prevalent with opponents to net-pen culture is the refusal to admit that Washington State already has extensive permitting structures in place to prevent siting errors. Regarding the more technical biological aspects of the document, such as plankton bloom activity, etc., there will be scientists and industry specialists whose comments will be more useful to you. 1

The major problem I see included in the document is described succinctly in the Summary on page x. This is under Major Potential Impacts and Actions to Minimize These Impacts, number 3. Essentially, this statement recommends the use of SEPA to empower localities to pass judgement on which stock can be grown by an individual project. I would like to remind Department staff of a statement which was reiterated with great emphasis at a recent SEPA workshop. This was a conference held on "The Limits of Land Use Regulatory Authority," December 8, 1988 and sponsored by the Institute for Environmental Studies at the University of Washington and the Environmental and Land Use Law Section of the Washington State Bar Association. 2

This statment is that the SEPA process is an overlay. It is designed to fill gaps in regulatory efforts to prevent environmental harm. The SEPA process in itself, is not independent of any other level of authority nor specific regulation that may concern a project. Regarding the choice of stock selection which a net-pen farmer can use, this choice is already subject to regulation by the Department of Fisheries. This regulation must be done in conjunction with the Department of Agriculture, which has equal rule making power over the aquaculture industry and shares this jurisdiction by state law. This ability to regulate all forms of aquaculture is already available to these Departments, and using SEPA authority is unnecessary and inappropriate. SEPA is a tool for protection which is not provided, not an extra layer of regulation duplicating or conflicting with existing oversight.

If a growing a particular animal is a threat to indigenous fish, this threat does not end within a limited geographic boundary. The threat, (if it is not simply a vague potential,) affects stocks in all related waters and must be regulated on a state level. SEPA authority could be abused to pass locally convenient judgements on what animals cannot be grown. This action is quite possible in light of the present (and possibly illegal) moratoria. Such action will not protect public fishery stocks. This action will result in the very hodgepodge of inadequate regulation motivated by concerns other than environmental protection, that the Shoreline Management Act was designed to prevent.

Sincerely,

Lee Ann Bonacker

Lee Ann Bonacker

RESPONSE TO LETTER NO. 35: WASHINGTON AQUACULTURE COUNCIL

1. Comments noted.

2. Comments noted. The statement in the DEIS says that the *State Environmental Policy Act* can be used to prevent damage to local stocks. The SEPA review process is used by both local government and state agencies to review development proposals. Local government does not have the expertise to make decisions regarding fisheries resources. WDF has the expertise and responsibility to manage all fish in marine waters except for steelhead and cutthroat trout, which are managed by WDW. WDF, not local government, uses the SEPA process to review which stock may be appropriate for a proposal.

LETTER NO. 36

Washington Environmental Council

~~P.O. Box 4446~~ 4515 Univ. Way NE
~~16 S. Main Street~~
Seattle, Washington 98104 5
206-623-1483

AAUW — Washington State Division
Admiralty Audubon Society
Air Quality Coalition
Alpine Lakes Protection Society
Audubon Nature Center at Nisqually Reach
Black Hills Audubon Society
Blue Mountain Audubon Society
Camano Island Homeowner's Association
Cascade Bicycle Club
Cascade Wilderness Club
Citizens to Save Puget Sound
Council for Land Care and Planning
Everett Garden Club
Evergreen Islands Inc.
Floating Homes Association
Friends of Cypress Island
Friends of the Columbia Gorge
Friends of Discovery Park
Friends of the Earth — E. WA, N. ID.
Greenpeace — Seattle
Hanford Oversight Committee of WA.
Hood Canal Environmental Council
Issaquah Alps Trails Club
Izaak Walton League of America
Kangley Rural Association
Kitsap Audubon Society
Lower Columbia Basin Audubon Society
Mt. Baker Watershed Protection Association
North Cascades Audubon Society
North Cascades Conservation Council
North Central Washington Audubon Society
North University Garden Club
Northwest Fly Anglers
Northwest Steelhead Salmon Council of Trout Unlimited
Oak Harbor Garden Club
Olympic Park Associates
Olympic Peninsula Audubon Society
People for Fair Taxes in Washington
Pilchuck Audubon Society
Plateau Preservation Society
PRO-Salmon
Protect the Peninsula's Future
Recreational Equipment, Inc.
Save A Valuable Environment
Seattle Audubon Society
Seattle Shoreline Coalition
Sierra Club — Cascade Chapter
Spokane Mountaineers, Inc.
Spokane Audubon Society
Tahoma Audubon Society
The Ptarmigans
The Mountaineers
Town Forum, Inc.
Vancouver Audubon Society
Washington Citizens for Recycling
WA. Council of Fed. of Fly Fishers
Washington Fly Fishing Club
Washington Kayak Club
Washington Roadside Council
Washington Trollers Association
Wetlands of West Hylebos
Western Washington Solar Energy Association
Whidbey Island Audubon Society
Wildlife Society — Washington Chapter
Yakima Valley Audubon Society

April 5, 1989

Mr. Ron Westley, Project Manager
Washington Department of Fisheries
115 General Administration Building
Olympia, WA 98504

Re: Draft Programmable Environmental Impact Statement (DPEIS) on Fish Culture in Floating Net Pens

Dear Mr. Westley:

Thank you for the opportunity to comment on the above-referenced DPEIS.

WEC is committed to long term preservation and enhancement of Washington's environment. Largely responsible for the passage of the State's Shorelines Management Act, we have consistently worked to prevent unnecessary degradation of the shorelines and waters of this State. We are gravely concerned that the DPEIS fails to disclose the full array of probable environmental impacts from additional salmon pen development. Further, the proposed mitigation measures do not reflect the full array of appropriate mitigation for the significant environmental impacts which may occur.

A general defect in the DPEIS is its failure to follow the normal format for an EIS of discussing in detail the anticipated impacts from the different alternatives but makes no serious attempt to distinguish between them in terms of anticipated impacts. This is particularly evident in the extremely brief discussion of participated cumulative impacts, which is limited to two pages. The implication is that if 87 additional salmon pen farms were immediately placed in Washington waters there would be no significant cumulative impact as a result. This is such an obviously flawed conclusion that it is evident that the cumulative impact section needs to be entirely rewritten. (1)

Unless the cumulative impact section is done adequately we would submit it would be illegal under SEPA for any particular new salmon pen applicant to rely on the conclusions in the DPEIS as a justification for avoiding a site-specific EIS which fully addresses the state-wide cumulative impact issues. Of most concern on a state-wide basis are the potential for irreversible impacts from spread of disease to wildstocks from pen salmon and the potential for genetic alteration of native stocks from escaped pen salmon. These and other issues are discussed more fully below. In responding to these comments, please provide complete and detailed information.

Potential Disease Impact. It is critical that a thorough review be presented of the disease transmission to wild stocks experienced in Norway. Salmon pens have been implicated as a key vector for the disease Gryodactylus salaris. The document fails to fully explore the likelihood of the salmon pens in the Washington waters acting as "multiplying stations" for this and other diseases, thereby putting pressures on the wild stocks which did not exist before. The opportunity for wildstocks to swim in, or otherwise have contact with disease from, salmon pens needs to be addressed in greater detail, as does the need for mitigation measures by way of design and siting to avoid any disease transmission. 2

A continuing problem in the document is that it assumes that prevailing technology for salmon pens will be used in the future, without proposing as appropriate mitigation measures better design of salmon pens to prevent escaped fish. Specific mitigating measures, such as strengthened anchoring systems, multiple fail-safe enclosure systems, and criteria to prevent location of net pens in weather-exposed areas must be fully considered. Technical solutions designed to minimize the deposition of potentially contaminated fish feces must be considered to mitigate potential disease transmission. It is technically feasible to use collection tarps, marine vacuums, pumps and other devices to minimize the broadcasting of potentially infectious material into the waters surrounding net pens. The DPEIS completely fails to consider these alternative technologies. 3

The DPEIS fails to consider the additional mitigation of specific improvements to Washington's regulations with respect to importation of eggs or fish to prevent the introduction of new exotic diseases. At page 80, it is ironically stated that the current regulations have effectively prevented the introduction of VHS. The fact that VHS has since arrived, whatever the source, underscores the need for more comprehensive regulations. It would be irreversibly disastrous if new exotic diseases were introduced to wild stocks through the import process. 4

Genetics: The DPEIS appears to assume that any negative genetic impacts from escaped Pacific salmon from net pens will be minimal in comparison to the existing genetic impact on wild stocks associated with the massive hatchery release programs. This neglects the fact that a number of rivers in Puget Sound are not used for hatchery release. The potential genetic impact of escaped Pacific pen salmon on these river systems must be addressed. The DPEIS fails to propose as a mitigation measure specific siting criteria designed to prevent these potential impacts. Again full consideration of Norweign wild stock genetic problems caused by pen salmon must be addressed. (5)

The genetics section also fails to fully consider the link between inbreeding depression and long-term development of disease susceptibility in captive fish populations for those fish growers who use their own brood stocks. It is critical that the possible impact on the genetic structure of wild fish populations from unintentional releases particularly of Chinook and Coho from net pen farms be better addressed. This section should also include a full discussion of first generation hybrid vigor, balancing selection, and other factors which can allow deleterious genes to persist in populations indefinitely. (6)

The document jumps to the conclusion that even if pen salmon escaped and even if some breeding stocks became established, they would be eliminated by natural selection. The selection process is far more complex and must be fully explained. A full discussion of the alternatives of prohibiting the use of non-native Pacific salmon stocks and/or prohibiting excessive genetic manipulation of local stocks needs to be addressed in the mitigation section. (7)

With respect to both disease and genetics there is a clear need for better biological inspection and oversight of the actual practices engaged in by fish farmers. This must be proposed as a mitigation measure. (8)

Other Concerns: The section on impacts to bottom sediments and the benthos fails to consider as a mitigating measure the imposition of National Pollution Discharge Elimination System permits under Section 402 of the Clean Water Act. Further, as previously mentioned, possible mitigation by technical solutions to the deposition of feed and other materials which fall out of salmon pens must be fully considered. (9)

The section relating to impacts on water quality standards fails to integrate the presentation in the cumulative impact section regarding the very alarming levels of biological oxygen demand (BOD) that are likely to result from the proposed numbers of salmon pens. Lay readers of this document need far greater information on the significance of BOD. (10)

With respect to antibiotics, existing Washington regulations and laws appear inadequate to regulate their use on fish farms. There are negative effects from excessive use of antibiotics. The DPEIS should propose as a mitigation measure far greater controls on the procedures and quantities of antibiotics used. (11)

With respect to preventing problems with predators, the DPEIS is inadequate in proposing as a mitigation measure that all net pens farmers should be "encouraged" to install anti-predator nets. (page 88). This sort of easily achievable technical solution to prevent the possibility of massive releases of pen salmon due to net holes caused by seals and sea lions must be required rather than encouraged. (12)

With respect to the problems caused by odor, noise, garbage, and lights, the DPEIS authors apparently failed to investigate the actual experiences of neighbors of existing salmon pens in order to determine future likely impacts and the need for mitigation measures. There needs to be a thorough discussion of the situations where odors have been emitted from existing net pens, where lights have caused disturbance of neighbors and where garbage has washed on nearby shores. Specific mitigation, including more strict enforcement of existing regulations, and consideration of additional regulations necessary to prevent these problems must be considered. (13)

With respect to the discussion of upland tank farms, we consider this limited analysis to be inadequate to serve any useful purpose with respect to the future proposals for specific upland projects. There are numerous additional potentially significant environmental impacts associated with upland tank farms that require consideration through a separate EIS. (14)

Conclusion: The DPEIS is an inadequate basis for consideration of the probable impacts from future net pen development in Puget Sound. It is unreasonable to conclude that immediate development of up to 100 salmon net pens would have no significant impact. This is obvious from the admitted fact in the DPEIS that mitigation for certain potential significant impacts, such as navigation conflicts, can thereby cause other significant impacts, such as aesthetic problems. A far more detailed and specific discussion of the probable cumulative impacts from the alternative levels of development is absolutely essential if this document is going to be of any use in considering future salmon pen proposals. (15)

We look forward to receiving a copy of the final DPEIS in which the problems and defects set forth above have been fully remedied.

Very truly yours,

PETER T. JENKINS
Co-Chair, Coast & Shorelines Committee
2121 4th Avenue
Suite 2300, Fourth and Blanchard Bldg.
Seattle, Washington 98121

DAVID BRICKLIN, President
Suite 1015
Fourth and Pike Bldg.
Seattle, WA 98101

L0028

RESPONSE TO LETTER NO. 36: WASHINGTON ENVIRONMENTAL COUNCIL

1. The FEIS includes an evaluation of the environmental impacts of fish farms under two regulatory alternatives: (1) existing regulations and guidelines (No-Action Alternative), and (2) recommendations for expanded regulations, additional guidelines, and further research (Preferred Alternative).

   As described in the first three paragraphs of Section 7 of the FEIS, the process of analyzing cumulative impacts is sequential. Decisions made on an individual farm will be made with the knowledge of other nearby farms and other farms proposed for an area.

2. See the response to Letter 1, Comments 15 and 16. *Gyrodactylus salaris* appears to have been introduced into Norway by infected Atlantic salmon smolts which were released into rivers for a "wild" fishery by the Ministry of Nature Management not by aquaculture or fisheries.

   Because of many factors discussed in Section 5.8 of the FEIS, it is highly unlikely that fish farms would serve as a focus for new infections in feral stocks.

3. If fish farms were frequently breaking loose from their anchoring systems, specific measures for stronger anchoring systems would be appropriate. However, a need for stronger anchoring systems has not been shown to be necessary. Farmers have a considerable economic investment in their facilities and would not be expected to design insufficient anchoring systems.

   The FEIS discusses techniques such as vacuums and blowers as a means of reducing waste below the pens in Section 5.1.

4. Comment noted. See the response to Question 29.

5. The statement made does not neglect the fact that many rivers are not supplemented by hatchery releases. Strays from any hatchery do not necessarily miss the hatchery and continue upstream. It is more likely to miss the river all together and enter another system.

6. An EIS should be readable by the lay public. For that level of detail about the mechanisms of genetics refer to *Population Genetics and Fishery Management* by Ryman and Utter, 1987.

7. The statement was made that maladaptive genes would eventually be eliminated by natural selection, not that breeding stocks would be eliminated. There is no reason to use non-local stocks of Pacific salmon because Pacific salmon are readily obtainable here. The comment about prohibiting excessive genetic manipulation is mentioned in the FEIS. Only three out of the 27 pending permit applications are planning to use Pacific salmon.

8. See the response to Question 9.

Response to Letter No. 36: Washington Environmental Council (continued)

9. See the response to Question 17.

10. See the response to Question 3. The concern with high biochemical oxygen demand (BOD) levels at a specific site is the potential for the high BOD to lead to a decrease in dissolved oxygen which could affect marine organisms. The potential impacts of a fish farm on dissolved oxygen levels are discussed in Section 5.2 of the FEIS. The effect of BOD is incorporated into the discussion of decreased dissolved oxygen concentrations near fish farms.

11. Comment noted. Regulation of use of antibiotics are extensive and administered by the FDA and USDA.

12. The text has been revised to evaluate existing regulations and guidelines in the FEIS. The Preferred Alternative in Section 5.9 of the FEIS recommends that anti-predator nets be required in areas where WDW, USFWS, or NMFS indicate that predators may be present.

13. The discussions of these potential impacts is based on the authors' and lead agency's experience both observing fish farm operations and hearing testimony of people living near these facilities. While taking account of this experience, the DEIS focused on mitigating potential impacts from current fish farming techniques and operations. Many of the problems cited were the result of out-of-date operational procedures and regulatory controls.

14. See the response to Question 32.

15. Comments noted.

LETTER NO. 37

WASHINGTON FISH GROWERS ASSOCIATION

(206) 329-FISH • P.O. Box 4486 • Rolling Bay, WA 98061

April 6, 1989

Joseph R. Blum, Director
Washington Department of Fisheries
115 General Administration Building
Olympia, WA, 98504

Dear Mr. Blum:

The Washington Fish Growers Association welcomes the continued efforts of the State of Washington to provide accurate information on generic issues concerning fish farming. The Programmatic EIS is a valuable contribution to these efforts.

Our comments on the PEIS focus on four areas: the need to rewrite the Summary to more accurately reflect the findings of the PEIS; specific comments on the contents of the report; the need for the PEIS to reflect the regulations on net pen development already in force, especially in the proposed Mitigating Measures; and finally, the need to relate the PEIS to the standing of the Interim Guidelines and to actions under SEPA and The Shoreline Management Act. The comments are lengthy, but we feel the import of the PEIS and the issues it addresses are worthy of our detailed attention.

I. **SUMMARY:**

The summary of major conclusions and findings is the most important section of the PEIS. It is the only section that will be read by most people, especially policy makers. It should be as accurate as possible as well as comprehensive yet brief.

Unfortunately, the Summary of the Draft PEIS is an inadequate reflection of the fine technical work that went into the study. It is neither accurate nor comprehensive. Despite the primary importance of this section, it appears to have been written in haste and without an adequate appreciation of the technical issues. The sections on Major Conclusions and Major Potential Impacts are weak and unnecessarily negative while distorting the technical findings, as is detailed below. Perhaps most serious, the summary does not reflect the underlying intent of SEPA regarding environmental impact statements. This is indicated by the section on the purpose of the study, as we will now discuss.

1

PURPOSE OF THIS PEIS. The statement that the purpose of the PEIS is "to evaluate the environmental impacts..." is misleading. It implies that all of the elements investigated would have an impact. More proper would have been to say that the purpose was "... to evaluate **alleged** environmental impacts of net pens in terms of their potential, given current laws and regulations, for significantly adverse effects..."

2

MAJOR CONCLUSIONS. These do not seem to have been carefully thought out. Only a couple of major conclusions are presented. Other important results have been ignored, yet several minor points are made.

Conclusion 1. This conclusion is the most important, yet it distorts the actual findings of the PEIS. It starts out with the negative premise that major impacts are inherent to floating fish farms: "The major impacts of net-pen culture can be prevented by proper farm siting to assure dispersion of wastes, flushing of the site, and protection of sensitive areas". The use of the word, major, is inappropriate here and below in **Major Potential Impacts.** The proper SEPA terminology is "significant adverse impact', of which there is considerable discussion and explanation in WAC 197-11. We do not believe the study has shown that net-pens inherently have any such significant negative impact within the intent of SEPA. 3

The **Major Conclusions** section, and the **Summary** as a whole, suffer from a simplistic approach to the conceptual issues involved. No recognition is made here or elsewhere on the relevance of scale of impact, as in the case where a significant adverse impact may occur but to an insignificant extent, as can happen to the benthos by sedimentation. Nor is their recognition of probability, where an impact would be certainly significantly adverse, as in the case of importing exotic disease, but is extremely unlikely. Also no mention is made of existing regulations designed to prevent significant impacts in specific situations. For these reasons, we believe that a more appropriate conclusion is: 4

> **Net-pen fish farms will not have any significant adverse impact on the environment when properly sited, at a suitable scale, monitored, and employing standard husbandry techniques.**

Conclusions 2 and 3. The second major conclusion is reasonable, but we are perplexed by the third, regarding importation of exotic diseases. This conclusion is inappropriate here because it represents a level of greater specificity than the other three conclusions. It is also very misleading, because fish farming in Washington state does not use imported exotic "animals" (i.e., fish), only certified eggs. 5

Conclusion 4. "Proper siting" would not permit overdevelopment of small bays. If the conclusion that the development of 100 farms would not have a significant impact on the aquatic environment needs any qualification, the qualification should be that the location of these 100 farms would depend on site characteristics and siting regulations. The Conclusion should be so worded. Alternatively the Conclusion that 100 farms would have no significant impact could be qualified by statement under **UNAVOIDABLE SIGNIFICANT ADVERSE IMPACT** that siting considerations to minimize one potential impact may exacerbate another. 6

MAJOR POTENTIAL IMPACTS.... We disagree with both the form and substance of this section. We question whether most of the items listed qualify as "major impacts". And, as stated above, we do not believe that "major impacts" is the proper terminology for a SEPA document. We agree that the items listed represent legitimate concerns for potential significant impacts at the time of Scoping. The purpose of the PEIS was to determine whether they indeed were 7

significant, and we believe that the PEIS has clearly shown that they are not. We suggest that the proper heading should be, **Major Findings.**

In addition to the failure to use SEPA terminology, this section, and the Summary in general, are deficient in failing to consider existing laws and regulations. This section speaks of actions, but ignores the key actions which have already taken place. Regulations regarding siting and farm size make improbable any significant impact from sedimentation and nutrient emission. The potential for disease transmission is greatly reduced by the prohibition against importation of live fish and tight controls over the importation of eggs. (8)

1. The impact described is very unlikely to occur under existing regulations, the Interim Guidelines, which are enforced by DNR. But even in those worst case situations where azoic conditions have been found, we have not seen any convincing argument that such situations represent a significant impact on the overall environment. Parking lots and other paved-over or built-over areas are also azoic, yet are permitted. (9)

2. Nutrients... This statement transcends current scientific knowledge in stating that nutrients released from fish farms can stimulate plankton production. Such an occurrence has not been documented for Puget Sound and its nutrient rich waters. It is theoretically possible, however, and the statement should substitute "could possibly" for "can". This statement also suggests actions which could reduce the potential impact, but ignores current regulations aimed at doing just that. (10)

3. Escaped non—native fish.... This statement does not reflect the decades of failure by State and Federal governments to establish runs in the Pacific Northwest of Atlantic salmon, the currently preferred fish for cultivation in Washington. Given this history, it is not correct to say that "escaped non-native fish could establish self-sustaining populations". (11)

4. Introduction of exotic disease with imported fish... It is highly speculative and misleading to say that this is the "greatest potential risk to native species". Speculative, because the impact would depend on the disease; misleading, because the potential, i.e, probability, of this happening is very small given current regulations and procedures. (12)

5. Impacts to marine mammals and birds.... By saying these impacts "appear to be limited," this statement strongly suggests that the impact is not significant and should say so. (13)

6. Visual impacts cannot be avoided.... This is basically true, although submerged fish farms have been attempted. But it is also true of virtually all development projects controlled by SEPA. The issue is whether they would have a significant adverse aesthetic impact, and the PEIS has not shown that they have (see comment ..... below). (14)

7. Pens can interfere... That net-pens can interfere with commercial and recreational navigation and commercial fishing does not mean they have an inherently significant adverse impact. Usually the impact would amount to slight inconvenience, except in intensive commercial fishing areas. However, such areas are protected under SEPA procedures and under Tribal treaty rights, which are vigorously enforced by the Tribes. (15)

8. No probable adverse impacts.... This statement is made unclear by reference to "actions presented above". What actions? In any case, this statement is misleading insofar as impacts to human health are concerned. It suggests that there are potential impacts but which can be "resolved" through actions. This suggestion does not represent the technical findings, which indicate that there is no probable health risk. Because of the importance of the human health element, this positive conclusion should be treated as a separate finding and not grouped with noise, odor, etc. (16)

Another major finding which should be included here is the positive role fish farms have in monitoring and ensuring good water quality, as discussed on p. 129. Although an EIS focuses on the potential for significant adverse environmental impacts and does not need to present a balanced view of all environmental consequences, there is nothing to prevent an EIS from including positive impacts. (17)

(18) The Findings of Appendix E concerning the positive economic impact should be referenced in the Summary.

UNAVOIDABLE SIGNIFICANT ADVERSE IMPACT. This statement belongs in the Major Conclusions section. The statement here should be **None**.

II. SPECIFIC COMMENTS ON THE CONTENT OF THE PEIS

1. I. Alternatives: Permits and Approvals:

The Tribes should be included among those agencies who review permit requests, pages 10-12. It has been the experience of our members that conflict with tribal fishing rights can prevent a site from development for fish farming. Resolution of such conflicts must be done directly with the Tribes concerned. In one case failure to notify the appropriate Tribes of a fish farm application was successfully used as grounds for permit appeal. (19)

At the end of the discussion of commercial fishing, under Mitigation Measures on page 114, paragraph two should include the Tribes along with WDF and commercial fishing organizations.

2. II. Affected Environment: Natural: Impacts to Bottom Sediments.

Technically, this section is very good. But it contains a serious flaw in that it tends to be biased towards worst-case situations which do not reflect most net-pen sites. This occurs in two ways. One is that most case studies have been conducted in atypical situations. Two of the earliest studies, which still remain influential, were of fish farms in Henderson Inlet, which was in very shallow and poorly flushed water, and Clam Bay, with respect to the world's largest (until recently) fish farm in fairly shallow waters. The second bias arises from the fact that these worst-case situations are the most interesting: the changes are more dramatic and there is more for the researcher to study and analyze. (20)

It is indeed useful to know what the worst-case situations can be. But it would be wrong, in a document such as this which is directed at policy makers, to stress atypical situations. Yet, this is what has happened. Prominent at the top of p. 23 is the statement, "Azoic zones are reported under most pens..." followed by several paragraphs of graphic descriptions of azoic conditions reported by a number of researchers. Although not intended (there are qualifications buried in the text), the reader is left with a strong impression that azoic conditions are typical underneath fish farms in Puget Sound.

This impression is false. It is also unnecessary. Sedimentation conditions have been monitored under most, if not all, commercial fish farms in Puget Sound. The normal condition ranges between no visible sedimentation to a (21) spotty or light dusting of Beggiatoa. It would be very useful to have a table listing all of the sites in Puget Sound, as well as those cited in the text for other areas, describing benthic conditions as well as the key variables affecting these conditions: depth, current velocity, loading, and years of operation.

(22) As a final, editorial, comment, it would be useful for Section b., Impacts of New Pens on Benthic Communities, to have more subheadings.

3. **Water Quality:**

This chapter is generally very good to excellent. We particularly welcome the advancements to prevailing knowledge contained in the section on phytoplankton. This is one area where the PEIS goes beyond previous studies of the impact of net-pen culture in Puget Sound. In so doing, however, it raises questions over the suitability of the standards used by the Interim Guidelines in controlling nutrient emissions. It describes the standard of limiting fish farms to one percent of the nitrogen flux in an embayment as using a "very conservative estimate of nitrogen flux." This is (23) because only average surface levels of inorganic nitrogen are used, ignoring typically nitrogen-rich waters at greater depths and organic nitrogen at all levels. (We would also add that it ignores the actual tidal nitrogen flux: the average concentrations of nitrogen in the water coming into the embayment at flood tide, which can be several times greater than average surface levels found within.) The importance of this issue is, of course, that the standard of a one percent increase is used to limit the size of fish farms in 19 embayments. If this one percent level is to be retained, it can be argued (and should be, in certain cases) that the production limits should be increased. This is one area where we expect the PEIS to lead to changes in the current regulations governing fish farms.

Unfortunately, the expert understanding of phytoplankton does not always extend to other parts of the discussion of water quality. Is is wrong to assert, as at the bottom of p. 35, that (along with upwelling) (24) phytoplankton is a primary source of oxygen problems in Puget Sound. Nor is it valid to strongly imply (previously on the same page) that excess phytoplankton led to low dissolved oxygen levels and subsequent fish kills in the innermost areas of Budd Inlet. The cause of these sporadic kills has not been established, and this is only one of several speculative

causes that have been suggested. It is also a rather gratuitous example here, since no fish farmer would consider locating in such poor waters. What appears to be the problem here, and in other sections of the study, is that the scale and significance of small or peripheral environmental disturbances (often naturally occurring) are editorially exaggerated. In other words, the proper perspective stemming from a technical understanding becomes lost, especially in non-technical statements such as introductions or summaries.

On p.36, it is stated that phytoplankton blooms **may** increase dissolved oxygen through photosynthesis during the day (emphasis added). We believe enough is known about photosynthesis to use the word **does** rather than **may**. (25) During the life of phytoplankton, they are apt to be net contributors of oxygen. This is why we object to the statements, cited above, suggesting that phytoplankton adversely affects dissolved oxygen levels. It can happen in extreme situations, such a shallow or stratified embayments, but generally the opposite is true.

(26) The discussion on p. 53 uses an example of five net pens when it means five clusters of net pens, or five farms. This distinction should be maintained throughout the text.

(27) The section consisting of the top three lines on p. 55 and following formula lies outside the text (it is in the nature of a footnote) and should so be identified.

We disagree with the statement on p. 60 that the accumulation of antibiotic residues in shellfish near fish farms has received little study, and we (28) believe the subsequent discussion on pp. 60 and 61 belies this claim. Also, the reference to the Wekell (1989) study should be expanded to indicate that OTC was not found in the sediment samples.

(29) The paragraph on fecal coliforms (p.39) is an example of silly speculative groping for an issue, i.e., impact, when none exists.

The positive role of fish farms in monitoring water quality, alluded to in (30) a later section, should certainly be addressed here. The presence in the public water of users who are dependent on high water quality and who as a part of their operation monitor water quality on a daily basis provides a significant resource for water quality monitoring for general public benefit.

4. Impacts of Exotic Fish Importation

This section is confusing and needs to be reorganized. Only the first (31) three paragraphs deal with exotic fish, i.e., Atlantic salmon. The remainder, over three pages, is concerned with the issue of interbreeding among indigenous Pacific salmon and is irrelevant to exotic fish.

Since Pacific salmon are raised and released on a large scale as a regular part of the State's fisheries enhancement program for commercial and (32) recreational catch, the risks of escaped fish from farms are far less significant than any that might arise from the delayed release component of the State's enhancement program. This is alluded to on page 72 and 73, but

should be highlighted at the beginning of the section. Since "genetic impacts" is a commonly sited concern of the general public, and used by opponents to argue against fish farms, it is extremely important to write this section clearly.

5. **Impacts on Wildlife**

33 References on pages 87 and 89 are made to "some species" which will be impacted. Specific examples would be helpful.

6. **Disease**

34 The section on VHSD, p77, needs to be rewritten. Inclusion of recent experience with this disease would be helpful.

II. Affected Environment: B. Built Environment

7. **Aesthetics:**

35 The information presented here was not used by the author of the The Economics of Salmon Farming,Technical Appendix E. As a consequence his analysis of implications for real estate values is seriously flawed.

36 The introduction to the Aesthetics section, paragraph 3 on page 89, states "Many people perceive any structure placed in open water as creating an adverse aesthetic impact." This does not reflect the findings of the EIS, for example on Page 91 paragraphs 4 and 5. It would be more accurate to say in the introduction that some people perceive any structure placed in open water as creating an adverse aesthetic impact, while others do not.

37 The analysis makes no comparison with other phenomena which have a visual impact on the water and shoreline. This is a serious omission, since aesthetic views may be equally or more significantly affected by log boom operations, marinas, clearcutting or residential development than they would be by a fish farm.

38 There are a number of problems with the Figures in this section. Figure 14 seems to misrepresent the view from House 2 by denoting a structure significantly larger than in the view from House 1. Figure 15 shows a five acre fish farm, not permitted under current regulations. Figures 16 and 17 show a structure 200' by 480', although the typical facility shown in Figure 3. and referred to in the text is 100' by 1000'. Figure 18 uses a 1000' long configuration, and Figures 19, 20 and 21 show "two acres of net pens", no dimensions given. Since the Figures are intended to be illustrations of the visual impact of net pens, it is imperative that they consistently use one set of dimensions if they are to be useful at all. A two acre site, 100' by 1000' is the more typical configuration.

39 Figures 19,20 and 21 are only briefly explained on page 98. Since there are many other siting constraints, it is unlikely that the densities shown on the figures would occur in the real environment. It would be preferable to label and describe these figures as possible systems for regulating the distance between farms, not, as implied, proposed density of development.

8. **Commercial fishing:**

The section discussing the difference in potential impacts on Tribal and nontribal fishing rights (p 105-6) should be reviewed. The system of court-ordered allocation between Tribal and non-Tribal fishery is complex, but the EIS description does not correspond to our understanding of how it works. It is our impression that an imbalance between Tribal and non-tribal catch in one area is offset by catches in other areas or changes in fishing schedules. We find it implausible that fish farms could cause a displacement of commercial fishing which could "place the state in violation of federal court orders". We also question whether the presence of net pens can so greatly impact fish migration as to prohibit their capture. No basis for this scenario is presented in the EIS and we have not previously heard anyone express such a concern. (40)

9. **Upland and shoreline use:**

Buried under this sub-heading is the discussion of the most positive impact a net pen can have on the environment: "it will highlight water quality concerns in the area." In addition, fish farmers monitor water quality as part of their daily operations; we are likely to be among the first to know when water quality is degraded or altered. We also supply regular water quality information in areas where no one else is collecting water quality information, or not on a regular or frequent basis. Because fish farmers are economically dependent on high water quality, we place a priority on maintaining that water quality, to the benefit of the general public as well as ourselves. Your discussion should include these facts, and the subject should be covered under the section on Water Quality as well. (41)

10. **Land Based Farms:**

The initial, and most obvious, point to raise about this section is to ask: Why was it included? Land-based fish farms were not included in the scoping process, and they would appear to be specifically excluded by the statement of the "Nature and Location of Proposal" in the Fact Sheet. Moreover, only a very narrow and relatively new segment of land based fish-farms is analysed: large scale efforts to raise marine species. No mention is made of fresh-water fish farms, such as trout farms. We do not understand the logic which led to giving this segment so much emphasis. (42)

Having expressed our perplexity, we should mention that we have no inherent objection to including land-based farms. Our membership includes land-based fish farmers, and we welcome any reasonable effort to dispel any misconceptions they might face from policy makers. However, the resources allocated to the PEIS were very limited to begin with, and we are disturbed that some of these resources have been directed at issues beyond the stated scope of the study. This point is even more relevant to the economic study contained in the Appendix and discussed below. We believe that the analyses of pertinent substantive issues have suffered because of these misdirected efforts. (43)

Finally, there are many questionable assumptions and errors of fact in this section. Because this analysis may not be included in the Final PEIS, they will not be discussed in detail here. But if it is included, the editors should have it reviewed by operators of land-based farms growing marine fish. A key misconception promoted in this section is that land-based fish farms are experimental. The Icelandic operation, referred to on p. 135 and operated by the parent company of one of our members, has been in production for three years and there are at least two operating farms in eastern Canada. Thus, there is considerable experience on hand for correcting the errors in the analysis.

11. Technical Appendices: The Economics of Salmon Farming

The first paragraph of the executive summary of this report makes a clear statement that the salmon farming industry will have "positive economic gains under all assumptions and substantial gains under assumptions favorable to the industry. It is unfortunate that the body of the report itself is so academic, and includes such flawed assumptions, as to be of little practical use. Of particular concern is the analysis of potential impact on property values. It assumes a negative visual aesthetic impact and a direct negative impact on property values, although no evidence of such impact exists. The report completely ignores the findings contained elsewhere in the PEIS concerning aesthetic impact of net pens. It is well documented and generally agreed that net pens are virtually invisible from less than one half mile away (EDAW: 1500-2000 feet; Alpine Appraisal: 2,400 feet.) Yet this report assumes a preposterous five to ten mile range of impact. Already opponents have selectively quoted from this section claiming that the PEIS proves that net pens will have a negative impact on property values.

44

The report states, on page 40, that it does not examine the underlying assertion that net pens can have negative visual aesthetic effects. "A simpler method is offered instead, which relies only on publicly available property value data." Yet the publicly available data on the actual impacts of existing fish farms on real estate are not examined, except in Note 3 and the References. We propose an even simpler method: include the data referred to as part of the PEIS. It examines the direct effects of net pen development on property values in Kitsap, Mason and Skagit Counties. It is contained in a report entitled "Influence of Floating Net Pens on Real Property Values." It was updated in March,1989 and that version should be used.

45

With respect to the assumptions contained in Table 3.2, we should point out that it is very unlikely for hatchery labor to be in the same county as a fish farm, and this component should have a minimum of zero percent. On the other hand, it is possible for debt service to have a county distribution.

46

III. MITIGATION MEASURES

Outside of the summary, the portions of the PEIS most likely to be read and used are the mitigation measures proposed throughout the various subsections. They are likely to be used by project applicants, project opponents, and decision makers charged with reviewing permit applications, whether or not that was the intention of the PEIS. It is important that these measures should be clearly written, and justified by the findings of the PEIS. We have several concerns with the mitigation measures as they are currently drafted.

1. Included are some very good measures. However many of them are already in place through existing regulations such as the Interim Guidelines, SEPA and SMA procedures, and DNR leasing conditions. For example, sensitive habitats are required to be identified and "buffer strips" specified in section 3.0 of the Interim Guidelines. They are also the subject of State and Federal regulation. Measures already in force should be so noted, for two reasons. One is to avoid regulatory duplication, such as a local government appending conditions on a permit which are already enforced by the State. The other reason is that the lay reader of the mitigation measures proposed in the PEIS may be left with the impression that fish farming is an unregulated industry, when in fact we are subjected to numerous restrictions. (47)

2. Some measures proposed are impractical, for example the suggestion that net pens be sited in areas which historically have dissolved oxygen levels above 6 mg/l. Ambient water, even in the Strait of Juan de Fuca, falls below 6 mg/l at certain times of year. Such a regulation could prohibit fish farming in the state. Any future effort to introduce into regulation the mitigation measures proposed in the PEIS should be done only after careful consultation with fish farmers to ensure that they are a practical means to achieve the desired effect. (48)

3. Some of the measures proposed are not suitable for regulatory action, but are "best management practices". The Washington Fish Growers Association endorses such practices as part of normal farm operations. (49)

4. Some measures are unfairly restrictive, such as requiring boats serving net pens to meet recreational watercraft performance standards for noise. Net pens should not be subjected to regulations more stringent than those applied to other similar water users. (50)

5. Some mitigation measures are proposed for which there is no documented need. In one case, under importation of exotic species, a detailed list of mitigations is given as remedies for possible future farmed species, although it is stated that those species currently farmed require no such mitigation. The inclusion of detailed mitigation measures where no significant adverse impact is found seems to give credibility to alleged impacts. An important contribution of the PEIS should be to lay to rest fears of alleged impacts which are unfounded. (51)

We urge that you review all the mitigation measures in each section with an eye to the way they will be interpreted by a permit reviewer anxious to make use of the PEIS for informed and accurate comment on a particular project.

IV. RELATION OF THE PEIS WITH EXISTING REGULATIONS AND PROCEDURES

An outstanding and urgent question is "What next?" How does the PEIS affect the Interim Guidelines? How will the PEIS be used in the permitting process under SEPA and SMA procedures? As part of, or as an addendum to the PEIS there needs to be a recommended course of action to implement its findings. The PEIS will have no meaning if local and State decision makers do not know how it is to be used. (52)

For the Interim Guidelines, an absolute minimum step should be to endorse the Interim Guidelines as setting adequate or more than adequate standards to safeguard the environment. This endorsement should be part of the PEIS Summary. In addition, any recommended course of action should include a mechanism to relax those Guidelines which are more restrictive than necessary, according to the findings of the PEIS. (53)

For the SEPA and Shoreline Management Act process, the Summary should make clear that those aspects which have no significant negative impacts (such as in Finding Number 8) need not be considered in a generic sense in reviewing individual net pen projects. Of course we agree that site specific considerations will continue to need to be addressed. The Summary could and should serve as a checklist for decision makers, identifying generic issues with which they need not be concerned. (54)

Our comments are lengthy and may appear to be critical. On the contrary, we welcome the considerable effort of the State to provide accurate information on fish farming. Our comments are offered in the spirit of improving an already praiseworthy effort.

Sincerely yours,

John Forster

John Forster, President

RESPONSE TO LETTER NO. 37: WASHINGTON FISH GROWERS ASSOCIATION

1. Comments noted.

2. Comment noted.

3. Comments noted. The wording has been changed to clarify the relative importance of the impacts.

4. The Summary has been rewritten. The FEIS includes an evaluation of existing regulations and guidelines that affect the fish farming industry.

5. The Summary has been rewritten and expanded.

6. The text has been revised.

7. The Summary of the FEIS has been rewritten.

8. The text has been revised to evaluate existing regulations and guidelines in the FEIS.

9. Comments noted.

10. See the response to Comment 5.

11. Even though all attempts to establish Atlantic salmon have failed, it is possible, though highly unlikely.

12. See the response to Comment 8.

13. Comment noted.

14. Comments noted.

15. Comments noted.

16. See the response to Comment 5.

17. The potential benefits of fish farms are indicated in the water quality, navigation, recreation, and upland and shoreline use sections of the FEIS Summary.

18. The Appendices were included to provide additional information. There has been no attempt to evaluate any of the Appendices.

19. See the response to Question 8. The agencies discussed on page 10 through 12 of the DEIS are agencies involved with management of the fish farming industry. Tribes are affected by fish farm development if the farms conflict with tribal

fishing, but they are not directly involved with regulatory management of the industry.

As noted in the Preferred Alternative in Section 6.3 of the FEIS, tribes should be notified of fish farming proposals that may affect their fishing activities.

20. Comments noted. When evaluating potential impacts of a proposal, it is useful to assess worst-case situations.

21. Comment noted. This information is available from DNR.

22. Comment noted.

23. Comment noted. The flux of dissolved nitrogen in and out a semi-restricted embayment may well occur as two discrete boxes, surface versus bottom. Toward the entry of an embayment, one would expect to find a gradient of increasing dissolved nitrogen due to inputs from an outer mixing zone or advection of water of more recent oceanic origin. There may be periods of surface water nutrient depletion and repletion at the surface in these outer areas, dependant on vertical mixing associated with tidal action and/or wind. See the response to Question 18.

24. Oxygen depletion in lower levels of stratified systems due to decay of phytoplankton settling from highly productive surface areas is well established. In such instances, phytoplankton blooms are a negative impact on dissolved oxygen concentration.

25. The text is correct as presented. While the reviewer's statement may be generally true, it is difficult to separate the effect of surface water heating versus phytoplankton oxygen contribution. See Raymont's discussion of photosynthesis to respiration ratios in Plankton and Productivity in the Oceans (Raymount 1980). Only in a detailed research mode such as that used by Emerson (1987) in "Seasonal oxygen cycles and biological new production in surface water of the subarctic Pacific" (J. Geophys. Res. 92:6535- 6544). The respected source of Parsons et al. (1984) concur with this position. The situation becomes even more complex in coastal waters due to water mass mixing.

    Additionally, there is often no measurable oxygen saturation signal associated with phytoplankton production due to the effects of horizontal and vertical mixing, natural variation of water mass source and other factors. Respiration or decay of large phytoplankton blooms is thought to be one factor responsible for low dissolved oxygen values.

26. For clarification, the text has been revised for the FEIS to use the term "fish farm" instead of net pens.

27. Comment noted.

Response to Letter No. 37: Washington Fish Growers Association (continued)

28. The text has been revised.

29. Comment noted.

30. The text of Section 5.2 of the FEIS has been revised to note that the fish farming industry monitors water quality parameters on a daily basis.

31. This has been reorganized for the FEIS.

32. Comment noted.

33. Comment noted.

34. See the response to Question 29.

35. Comment noted. See the response to Letter 2, Comment 12.

36. See the response to Letter 2, Comment 13.

37. Comparisons with other types of development are generally not made in the EIS, because these types of development are not alternatives considered in the EIS. Where the presence of other types of structures may affect visual quality, this is discussed, but not in a comparative manner.

38. See the response to Letter 2, Comment 15.

39. See the response to Letter 18, Comment 54.

40. The text has been revised to clarify the allocation process.

41. See the response to Question 30.

42. See the response to Question 32.

43. Comments noted.

44. See Section 4 of the response to comments after the text in Appendix E.

45. See Section 4 of the response to comments after the text in Appendix E.

46. See Section 2 of the response to comments after the text in Appendix E.

47. The text has been revised for the FEIS to identify and evaluate existing regulations and guidelines used to manage the fish farming industry.

48. Comment noted.

Response to Letter No. 37: Washington Fish Growers Association (continued)

49. Best management practices would appropriately be part of a management plan developed for the fish farming industry.

50. Comment noted.

51. See the response to Letter 2, Comment 11.

52. The FEIS includes many recommendations for WAC adoptions, additional guidelines, and further research.

53. The FEIS evaluates the *Interim Guidelines*.

54. Comments noted.

13244 40th N.E.
Seattle, WA 98125
April 6, 1989

Mr. Ron Westley, Project Manager
Washington Department of Fisheries
115 General Administration Building
Olympia, WA 98504

Dear Mr. Westley:

I realize that the amount of money made available for the Draft PEIS on Fish Culture in Floating Net Pens, and the time constraints for its completion, ordained that it would be incomplete, and that there would be no time or opportunity for research on relevant aspects, but I believe that you had the right to expect, as does the public, a learned and unbiased identification of problems that may exist, and plans for research that should be carried out to attack these problems. Unfortunately, in the sections I have studied, essentially no critical questions are posed nor research identified that needs to be done to protect the Puget Sound environment from net-pen impacts. The result is that, with respect to these sections, the document is badly flawed, remarkably biased, and leaves the marine environment of this state exposed to dangerous and damaging exploitation by the net-pen industry. Therefore, I believe that any growth of this activity in our state should be halted until the problems that should have been dealt with by this PEIS have been properly solved. (1)

Section II A c, Chemicals.

Page Line

59 7-8 The concentration of antibiotics free in the water is of little consequence. The concentrations of concern are those retained within the tissues and gut of the farmed fish, of other marine organisms, and in sediments. The first and third are substantial in and under net-pens. Concentrations of antibiotics in native fish attracted to the pen site, either entering the pen or feeding under it, have apparently never been measured, nor have concentrations in macro-invertebrate fauna (crabs, molluscs, polychaets, sea urchins, starfish, etc.) associated (2)

with the sea bottom near the net-pen site. These are environments where resident bacteria play a fundamental part in the food chain and in recycling of organic material. A number of the macro-invertebrates are food organisms for humans. I believe research on the impact of antibiotics in these environments, and the potential for inadvertant entrance of antibiotics into humans through these routes is necessary and should have been called for by the PEIS.

5911 et seq. At the time of the meeting of the Technical Advisory Committee, to which you appointed me, in November, 1987, to consider the forthcoming PEIS, only one or two papers on antibiotic resistance in relation to net-pens was known to the members of the committee. Since then I have developed a bibliography of 30-40 such references, and it is helpful that some of these have now been considered in the PEIS. Unfortunately, this consideration is incomplete, inaccurate and misleading; nor is there any consideration of questions and problems that remain.

3

This literature shows that in essentially all forms of fish aquaculture in Japan antibiotic resistant bacteria are found in the tissues or guts of the farmed fish and in many cases in bacteria in the water within the pens. Resistant forms are found for essentially all of the kinds of antibiotics used. In all cases multiply resistant plasmids are found. In many cases , perhaps most, R-plasmids can be transferred to other bacteria. In Spain transferable multiply resistant plasmids are found in aquaculture environments. In Norway resistance toward oxytetracycline, sulphadiazine, trimethoprim and others is routinely found, and the newly identified fish pathogen, *Vibrio salmonicida*, which causes Hitra disease, commonly is resistant to oxytetracycline used to comabt it in salmon culture. In Ireland, resistant bacteria are found in salmon culture. In catfish culture in Louisiana resistant *Aeromonas* pathogens are found. In British Columbia*Vibrio anguillarum* strains resistant to sulfonamides are found in isolates from salmon fish tissues from several farms in Area 14. I have never seen that any studies for drug resistant pathogens have been made on diseased salmon from pens in this state. If they

have, the results should have been reported to you, and the public, in the PEIS. If they haven't, then it is a significant omission that such studies are not called for in the PEIS.

The anecdotal comment at the bottom of page 59 that antibiotic treatment in Japan appears to exceed both legal and general practices in the United States needs documentation. The FDA permitted use of antibitotics in this state calls for therapeutic, not prophylactic, use of antibiotics in fish pens yet sworn testimony at hearings indicates that prophylactic use occurs here. It is general knowledge that antibiotics are added to fish food at farm sites here and in British Columbia in excess to that legally provided in medicated food by the fish food manufacturers - sometimes far in excess. I presume this is what is meant by the phrase "general practices" on page 59 of the PEIS. If the authors of the PEIS have evidence that these legal and "general practices" here are exceeded by those in other countries where resistant pathogens are well documented, then the poundages, dosages, and disposition into the environment of the antibiotics used here need to be documented for you and the public in the PEIS. If they don't have such evidence, then the PEIS should contain recommendations on monitoring and recording of antibiotic use in fish pens to obtain it and make it available for policy makers.

60 5-9 The inference from this paragraph may be taken to be that, when antibiotics are taken away, resistant strains will go away and therefore the antibiotic resistance problem in fish culture isn't too serious. To be balanced, it should have been pointed out that, often on withdrawal, the decrease in the frequency of resistant organisms is very slow compared to their initial appearance, as is shown in the attached graph from a paper by Stuart Levy, and secondly the organisms containing the R plasmids haven't disappeared, but have only diminished in proportions relative to the others, and become reestablished on retreatment with antibiotics.

60 11 et seq. and 62 26 The several references to R-plasmid transfer occurring at"laboratory temperatures" and

"highly controlled conditions" lead the authors of the PEIS to the conclusion that transfer "is not representative of phenomena that occur in the environment". This is entirely misleading and would grossly misinform a lay policy maker. Controlled laboratory conditions are typically used for comparative purposes and to accelerate the transfer. The essential point of such laboratory experiments is to demonstrate whether the molecular mechanisms permitting such R-plasmid transfer from one species of pathogen to another are or are not present in the genetic makeup of the plasmids and the molecular structure of the bacterial surfaces. There are a number of experiments that demonstrate such transfer occurs under typical environmental, as contrasted to laboratory, conditions (Colwell and Grimes, 1986; O'Morchoe et al., 1988). When these PEIS conclusions were read to scientists who work in this field, their unscientific comment was "that is a lot of hogwash".

The conclusions that should have been reached in the PEIS are: (1) in almost all cases tested, the molecular mechanisms leading to R-plasmid transfer between fish pathogens and other bacteria, including human pathogens, are in place; (2) conjugal R-plasmid transfer can and does occur under conditions found in nature. A prediction which the PEIS could judiciously make from these points is that, given time, the transfer of such R-plasmids, carrying multiple resistance genes, is very likely to occur from fish pathogens to other pathogens including those of human concern. This prediction has been made by research scholars in this area (e.g., Colwell and Grimes, 1986).

60 15-17 While the pathogen *Vibrio parahaemolyticus* is not infrequently found on or in cultured fish products in Japanese fish markets, to date isolates carrying R-plasmids haven't been dectected in this human pathogen. However, isolates carrying R-plasmids of another bacterium pathogenic to humans and fish, *Aeromonas hydrophila*, have been made from cultured fish which had been treated with antibiotics. It can be concluded that use of antibiotics in fish culture has generated human pathogens carrying resistance factors.

60 41 et seq. Jacobsen and Berglind reported persistence of oxytetracylcine in sediments beneath all four fish farms tested in Norway, not just three of the four as reported here, and concentrations ranged as high as 4.9 mg/kg, not 4.0 as reported here. Further, this highest concentration was found in sediments 12 weeks after medication.

9

The tenor of this paragraph in the PEIS is to indicate that the persistence of oxytetracycline in tank sediments is measured by a half-life of only ten weeks, and at concentrations that are barely inhibitory to bacteria. Actually the article indicates that the experimental conditions probably led ten weeks to be a conservative estimate of the half-life persistence of oxytetracycline in field conditions. Moreover, anaerobic conditions in the sediments enhanced by the OTC are expected further to stabilize the OTC to degradaton. The authors' overall conclusion, which is minimized in the PEIS, is that the levels of OTC in bottom sediments under fish farms are such that antimicrobial effects in the environment and (antibiotic) bacterial strain selection can be expected in these sediments for more than 12 weeks after administration of OTC in the fish feed.

Considering that OTC is often administered in Puget Sound net pens for episodes of 10 days, 3 times a year, this means that for about 40 of the 52 weeks a year these conditions may be predicted to exist. This is a message that the PEIS should have made to policy makers.

61 22 Aside from the probability of selection of resistant strains of bacteria in the pen sediments, the more generalized ecological impacts of these sediment antibiotics needs analysis. The direct measurements of amounts of sediment antibiotics by Jacobsen and Berglind (1988) are more significant than the calculated levels of OTC in fish pen sediments referred to here in the PEIS. In their concluding paragraph Jacobsen and Berglind suggest that these levels can be expected to have effects on marine ecosystems, and in a letter (copy included) indicates that a research program to assess these effects is being launched in Norway. This observation of the Norwegians opens up an impact of net pens that has been essentially ignored, and that requires careful study. This conclusion has also been expressed by British Columbia

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and Japanese microbiologists. I believe that the PEIS considerably underplays this point.

61 45 It is difficult to understand these comments about the concentrations of antibiotics in and near Norwegian farms. I refer you again to Jacobsen's letter and the paper of Jacobsen and Berglind that document development of resistant strains of bacteria in Norwegian pen culture, and the high persistent concentration of oxytetracycline in pen sediments, which stand in direct contradiction to these statements.

11

62 7-17 The implications here that Puget Sound conditions don't favor (permit?) development of antibiotic resistance is truly hard to understand. Resistance is found in nearby British Columbia farms, and in Norwegian farms (see above). Are the authors of the PEIS comments proposing that Puget Sound conditions are so different, or Puget Sound fish farmers so much better or more constrained to follow the rules than those in BC and Norway that the fundamental biological process of conjugal R-plasmid transfer can't occur here?

12

62 23 The PEIS has referred earlier and again here to failure of Tibbs et al., in unpublished observations, to find detectable levels of OTC in shellfish (mussels, clams and oysters) suspended within coho salmon pens during feeding of medicated food. These are filter feeding organisms and would hardly be expected to engulf OTC-laced particles the size of fish pellets. Nor would they be expected to engulf OTC from solution in the sea water after the antibiotic had leached from pellets or fish feces.

13

The only critical point in these experiments would have been to determine if these shellfish had filtered from the water in the net-pen antibiotic resistant bacteria generated either in the cultured fish or in the net water environment. Given that it is known that antibiotic resistant bacteria are frequently found in the sea water within net pens (many papers of Aoki), and that shellfish easily concentrate bacteria from the sewage-enriched sea water by filtration, including pathogens carrying resistant plasmids (Morgan et al., 1976), it is surprising that this important feature

apparently wasn't determined in these experiments, or wasn't reported in the PEIS.

With reference to the statement that antibiotics don't accumulate in marine invertebrates other than shellfish, there is no documentation in the draft that any such invertebrates have been tested by the authors of the PEIS or the Department of Fisheries - either for accumulation of antibiotics or resistant bacteria. In preference to referring to negative results of experiments that seem not to have been done, it would be more useful for the authors of the PEIS to describe experiments that should be done to obtain needed information.

(14)

62 29 It is correct that R-plasmid containing variants of *V. parahaemolyticus* have not been reported from Japan to date. There are honest differences in opinions among investigators in this area whether this signifies that transfer of R-plasmids from pathogens that contain them, such as *V. anguillarum*, to the human pathogen cannot occur, or whether it simply has not yet been detected. Among scientists and medical authorities associated with the biology of *V. parahaemolyticus*, however, it is essentially undisputed that this organism causes human illness. Reports that have been made locally that this form of vibriosis causes trivial human illness and is practically absent from Northwest populations are quite at odds with the local medical records. As long as we know that R-plasmids can transfer from *V. anguillarum* (a fish pathogen) to *V. parahaemolyticus* (a human pathogen), it would seem prudent to avoid conditions that would generate resistant strains of the former in our marine waters.

(15)

116 38 The finding by Wekell of*Salmonella cubana* in moist fish pellets raises the question whether other species of salmonella that are pathogenic to humans are present in this fish food and could enter the human food chain through this route. If there are, there is the potenial that the use of antibiotics in fish culture would lead to selection of resistant strains, thus adding to the growing burden of salmonellosis in human populations that has been related to the excessive use of antibiotics in

(16)

animal husbandry (Cohen and Tauxe, 1986; enclosed letter from Cohen).

Dr. Wekell's observation extends reports of other recent instances of salmonella presence in fish moist pellets in Northwest salmon culture. It would have been prudent for the PEIS to have required an extension of her observations to determine the frequency of such contamination, and the presence or absence of resistant salmonella in cultured salmon that might have been fed contaminated food.

(17)

63 31-35 These two summary sentances are truly remarkable. Antibiotics have indeed been shown to select for resistant bacteria in any number of cases of fish culture, in the field, in essentially all of the countries engaged in this aquaculture, perhaps excepting this state. The relevant question is: why does not the PEIS call for a strict search for resistant bacteria here?

(18)

The statement that "development of antibiotic resistant bacteria in Puget Sound is virtually impossible" is totally without merit.

An additional relevant topic seems to have been excluded from consideration in the PEIS: what is the duration of persistence of antibiotics in cultured salmon tissue after an episode of feeding with medicated pellets? I believe FDA regulations call for a period of 21 days after last feeding with medicated pellets before harvesting the fish, but analyses reviewed by Austin and Austin (1985) indicate that OTC may persist in fish tissues after conventional feeding regimes for as long as 100 days, and they review relevant literature for some other antibiotics used in fish culture. The Austins indicate the need for additional examination of this problem, which would have been an appropriate recommendation for a PEIS considering impacts of floating fish culture. This examination should include a consideration by qualified public health officials of (a) the potential for antibiotics carried over in marketed salmon to cause microbial medical problems, and (b) the potential for such entrained antimicrobials to cause allergic reactions in consumers.

(19)

Summary. I have attempted to indicate, and to document, that this section of the Draft PEIS presents for policy makers an incomplete, inaccurate, biased and erroneous consideration of the potential impacts of the use of antibiotics in floating fish culture. Should you need it, I will try to provide additional documentation on specific points.

I believe that this section should be withdrawn from the PEIS and redone by other authors.

References cited:

Austin and Austin, 1985. Bacterial Fish Pathogens: Disease in Farmed and Wild Fish. John Wiley and Sons.

Cohen, M.L. and R.V.Tauxe, 1986. Drug-resistant salmonella in the United States: an epidemiologic perspective. Sci., 234: 964-969.

Colwell, R.R. and D.J.Grimes. 1986. Evidence for genetic modification of microorganisms occurring in natural aquatic environments. in: Aquatic Toxicology. Ninth Volume, pp. 222-230.

Levy, S.B., 1986. Ecology of antibiotic resistance determinants. in: Banbury Report 24: Antibiotic Resitance Genes: Ecology, Transfer, and Expression. pp. 17-29.

Jacobsen, P. and L. Berglind. 1988. Persistence of oxytetracycline in sediments from fish farms. Aquaculture, 70: 365-370.

Morgan, R.C., P. Guerry, and R.R.Colwell. 1976. Antibiotic resistant bacteria in Chesapeake Bay. Chesapeake Science, 17: 216-219.

O'Morchoe, S.B., O.Ogunseitan, G.S.Sayler, and R.V.Miller. 1988. Conjugal transfer of R68.45 and FP5 between *Pseudomonas aeruginosa* strains in a freshwater environment. Appl. and Env. Microbiol., 54: 1923-1929.

Section 3a. Impacts to Aquatic Organisms. Fish and Shellfish.

In a state document that has as its objective "to assess the impacts of net pens on the biological environment..." it is unfortunate that, in the present section on aquatic organisms, only organisms of direct commercial interest are dealt with. While surely these are important, equally important to the health of these marine waters is the well being of the entire biotic community. The basic communities of animals in Puget Sound are generally well known to zoologists, who also know that these communities are interacting networks of organisms, and that care must be taken in disrupting some components lest adverse effects be felt throughout the whole community including those species of economic significance. This concept of ecological interdependance of the plant, animal and microbial members should play an important part in the discussions in this section, and instead plays no part. The impacts of net pens on Puget Sound water quality, and thereby on the viability and health of these intertwined assemblages must be evaluated by some significant state agency, and logically should at least have been touched on in this PEIS. (20)

It is true that often a community is dominated by "key-stone" species that play distinct roles, and which, therefore, should receive special protection to maintain a healthy community. Sea-urchins and geoducks are examples. In the recent past and present, these animals have been unconscionably commercially exploited in Puget Sound, and the PEIS deserves credit for recognizing that net pens may impact them. (21)

Page	Line	
67	1-9	The impact of these lines is to indicate that good things will happen under pens. Reference should have been made to the abundant literature that details the desolation that occurs as sediment accumulates - at least there should have been repetition of the relevant comments from pages 19-20 that more adequately describes the impact for the lay policy maker seeking to understand the relationships. Terms such as "opportunistic worms" and "enhanced" (line 5), and "indicative of organic enrichment" (p. 21, l. 42), while taken in context by the trained ecologist, are loaded terms to the lay person. He should know that these words mean that "the worm *Capitella* occupies a niche in marine areas so degraded by pen sludge and sewage that the normal communities of animals have been driven out,

(22)

just as in freshwater environments of human sewage plants the worm *Tubifex* displaces normal communities".

67 11 The idea that excess pen food is an attractant to wild fish and macro-invertebrates doubtless is true. The PEIS should point out that these organisms thereby receive an unknown and unstudied dosage of antibiotics from the pens, which may unwittingly be transmitted to humans who catch and eat them. In addition these organisms may be exposed to disease organisms from the pens, as has been documented. The PEIS should have recommended study of both of these issues.

(23)

69 70 It is generally pointed out, as in the bottom paragraph of this page, that penned stocks are selected because they have different traits than wild or free-run fish. The idea, in the last paragraph of p. 71, that this difference can be undone by selective breeding therefore becomes counterproductive.

(24)

72 23 Here and at the bottom of the page it is argued that gene differences would tend to disappear if escapes bred with free-runs, and that genetic dilution isn't going to occur significantly. This argument ignores the converse experience of Norway, where destruction of wild runs through this means is feared as the major deleterious impact of net pen fisheries.

(25)

This section underplays the magnitude of the problem of escaped fish, both Atlantic salmon here and cohos and chinooks in BC. Norwegian officials report their escapes measure in the thousands. The big storms in the Northwest this winter caused heavy damage to many farms in BC liberating an anecdotally reported 100,000 onchorhychus. Lesser storms badly damaged a pen in North Skagit Bay. Local commercial fisherman report catches of Atlantic salmon in numbers that imply substantial populations of such fish in the wild. These are numbers that this PEIS should have documented objectively before concluding that "major escapements are rare".

(26)

73 3 The conclusion from this argument is that one is averaging the total escapement from farms over the

entire Sound. The greater danger comes from escapement from pens near major salmon river mouths. The state has permitted one pen, and seeks to add a second, in the estuary of the Skagit River. One can assume that escaped salmon from these farms will preferentially enter the Skagit, thus concentrating the impact, rather than averaging out over the Sound, thus diluting it as suggested by the PEIS. The nature of this impact in terms of disease transmission to "natural" fish, eggs and fry, or by competition, or, if *Onchorhynchus*, in genetic dilution should properly be dealt with by the PEIS.

(27)

73 22 If these arguments are correct, why is the similar problem in Norway found to be extremely serious?

(28)

74 10 As indicated above, the case can be made that escapes in the Northwest and in Norway are much more numerous than this paragraph suggests.

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74 42 A point that needs evaluation by a PEIS is whether Atlantic salmon that have spent all their lives in Puget Sound pens, acclimating to these waters, will survive better when they escape from pens and enter these rivers as adult fish ready to spawn than will Atlantic salmon smolts freshly introduced from abroad. The two are quite different experiments.

(30)

Repeatedly this section has pointed up risks that occur when exotic species are transplanted - the high potential for introduction of new viral, bacterial and parasite diseases; the genetic dilution questions; the question of competition with native species. Distinguished fish microbiologists and biologists have urged that exotic species not be introduced for farming. It remains unclear why, then, this dangerous and probably unnecessary experiment has been permitted.

(31)

C. Disease

I have seen the critique of this section developed by Dr. Annamarie Johnstone, with which I am in agreement.

77 12 In this paragraph concerning VHS there are two significant exceptions from recent newspaper reports attributed to WDF.

(1) This paragraph expresses concern about importing this virus with Atlantic salmon eggs from Europe, whereas WDF press releases have denied that this is a possibility because of WDF's belief that Atlantic salmon can't carry the virus, and

32

(2) this paragraph states that VHS may be transmitted vertically from adult brood fish to eggs and fry, whereas WDF press releases indicate that only horizontal transmission from one fish to another through the water is possible.

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Policy makers and the citizens need explanations of these discrepancies.

77 25 I believe that the Washington quarantine period calls for a 90 day disease-free period prior to release of exotic fish such as Atlantic salmon into state waters. Here and elsewhere in this section it is indicated that this is adequate - at least "successful to date" - to protect this state against exotic diseases. Some important diseases have latent periods that extend well beyond this quarantine period. Wolf (1988) reviews an outbreak of VHS (viral hemorrhagic septicemia) 18 months after trout were transferred from a farm registered free of VHS. He reports that this virus "is silent or latent much of the year" and that "low temperature is apparently required for the virus to break latency". He reports that this virus is shed with eggs.

34

These points suggest that the Washington state importation laws are not adequate to prevent importation of exotic fish diseases, and leave open the possibility of exotic disease organisms being introduced with fish eggs and escaping detection for 90 days because of latency.

If this loop hole in the importation laws is correct, the PEIS should discuss it and call for corrective measures. If it is not correct, the PEIS should clarify why not.

79 13 Clearly, the Washington State importation laws as

80 3 administered by the Washington Department of Fisheries
80 33

have been unsuccessful in preventing the serious exotic disease, VHS, from being imported into our salmonid fisheries. The PEIS should recommend appropriate steps to mitigate this situation and improve these importation regulations and their enforcement, rather than indicate in numerous places that the regulations are adequately protective.

(35)

This disease is now confirmed in coho, chinook and steelhead in this state. Whether this introduction is an impact of the net pen fishery remains fully to be determined. In view of the long latency period for this virus and the capacity for the virus to be transmitted from farms registered free of VHS, (reviewed by Wolf as described above) this determination for all of the farms and brood stock hatcheries will be a difficult task.

80 1 Sworn testimony by Svein Mehli, of the Norwegian Directorate for Nature Management, in this state in November, 1987, indicated that in Norway furunculosis, BKD, redmouth and *Gyrodactylus salaris* in all probability have all entered the Norwegian wild fishery from net pen husbandry. There are other instances cited by A. Johnstone, page 5 in her critique of this PEIS, of transmission of disease from pen to wild fish, and the VHS issue in this state remains to be clarified.

(36)

The PEIS cites no instance of a well conducted study that clarifies this issue one way or the other. Simple repetition of the concept that disease organisms can move only in one direction in this relationship is not a substitute for such a study.

A problem that relates to this issue evolves from a consideration of net pen permitting policies of the state agencies. As stated above, one salmon farm has been permitted just north of Hope Island, and a second is being considered south of Hope Island, within a mile or so of the mouth of the Skagit River, and clearly in its estuary. The Kiket Bay study made in the early1970's in evaluation of a nuclear plant on Kiket Island documented that perhaps over 23,000,000 salmon fry in a year may pass through or very close (less than 1000 feet) to these net pen sites. These fry will be stressed osmotically,

having just entered salt water, will be stressed by new predators, different temperatures, and doubtless in other ways. At this critical phase in their life they will passing through waters that may be expected to carry fish disease organisms enhanced by the presence of the net pens, judging from the history of the salmon net pen industry. If the PEIS is correct, then they will pass through safely. If not, then the natural salmon runs of this river may be adversely affected.

(37)

An issue that relates to disease transmission and environmental impact from net pen husbandry that has not been considered in the PEIS is the disposal of dead fish from net pens. In BC it is well known that hundreds of thousands of "morts" are disposed of in landfills without disinfectant. It is surprising that the PEIS has neither discussion of nor recommendation on the important issue of the proper method of disposal of dead and diseased fish from salmon farms.

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81 2 The Norwegians are often cited as pre-eminent in this industry, and yet their literature has frequent reference to illegal and incorrect voluntary efforts by their operators in this husbandry that have created pollution and spread disease. Although it is to be hoped, it is unlikely that voluntary efforts on the part of net pen operators here would be any better, and it is depressing to think that the best the PEIS can suggest is that "voluntary compliance with fish disease regulations is the most effective insurance that regulations will be followed".

(39)

Reference cited:

Wolf, K., 1988. Fish Viruses and Fish Viral Diseases. Cornell Univ. Press. Chapter 18. Viral hemorrhagic Septicemia.

Summary on Section 3.

The impacts on basic marine ecology have been badly understated, and generally couched in terms that appear to place a good light on an unsatisfactory situation. There is no consideration of

potential detrimental effects of pen wastes and residual antibiotics on the natural fauna, some of which may be consumed by humans.The magnitude of problems resulting from escapes from pens is minimized in light of recent experiences. Essentially no credence is given to substantial Norwegian experience with pen escapes, genetic dilution, and disease transmission.

Great emphasis is placed on the adequacy of the Washington regulations governing importation of exotic species and exotic diseases, which in fact have proven extremely inadequate to prevent importation of the serious disease, VHS. Among other things, these regulations and their enforcement have inadequately taken into account the reality of latent periods in development of such diseases. The PEIS almost consistently takes the view of the pen aquaculturists that disease transmission can occur only from wild fish to the penned fish, ignoring the substantial Norwegian experience to the contrary, and the wisdom of many microbiologists, and nowhere provides any evidence supporting their stand, nor does the PEIS call for studies to test the issue. There is no comment or evaluation of permitting policies that have placed pens in estuaries in the direct path of outward bound salmon fry, stressed by entry into salt water and therefore, by the criteria of the net pen operators, highly susceptible to disease.

There is no consideration, evaluation, or proposal for mitigation of the serious problem of proper and sanitary disposal of the thousands of dead and diseased fish arising from net pen operation.

The suggestion that the most important mitigation procedure for the disease issues is "voluntary compliance with fish disease regualtions" is unrealistic in the light of experience.

In my opinion the document will serve no useful purpose for the citizens and policy makers of the state who are concerned with the broader issues of protection of the quality of waters of state wide interest, but instead will mislead them on many critical issues. It is
40 improbable that a simple rewriting or even heavy editing will improve it adequately. The issues are so important to the health and welfare of these marine waters, and the various phases of the state economy that depend on the Sound, that the only prudent course, in my view, is a moratorium on this industry until these matters can be properly resolved.

Sincerely yours,

Arthur N. Whiteley

(continued)

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Your ref.	Your letter	Our ref.	Date
		JAC Snr: Jnr:3330/88	October 24, 1988

The widespread use of drugs in aquaculture is, in my opinion, a problem which until now has been given to little attention. Except for the finding of resistant strains of fish pathogens, we know nothing about ecological impacts of antibiotics from fish farms.

The information you request on resistant pathogens in relation to fish farms is availlable as laboratory reports (in norwegian). Resistance towards oxytetracycline, sulphadiazine, trimethoprim and others is routinely encountered in laboratories. I believe that resistance is coupled to processes in sediment. Land based systems seem, at least so far, to avoid this problem. As far as I know, nothing is published in english on resistance in norwegian aquaculture.

Norwegian environmental authorities are launching a research program on effects on antibiotics on the marine environment this year. We hope to get financial support for further studies on persistence, biodegradation, toxicokinetics and effects on processes in marine sediment. We have not made any other studies on these matters than the one you are referring to.

My knowledge on the biology and preferences of Gyrodactylus salaris is limited. The parasite has spread to many good salmon rivers in Norway, and caused serious effects on our populations of wild salmon. Eradication of fish and parasite by use of rotenone is tried in some

rivers. I sure hope you will never see this pest in your part of the world.

Yours sincerely
NORWEGIAN INSTITUTE FOR WATER RESEARCH

Pål Jacobsen

Pål Jacobsen

RESPONSE TO LETTER NO. 38: ARTHUR H. WHITELEY

1. Comments noted.

2. See the response to Questions 33, 34, and 35.

3. Comment noted. As the reviewer points out, it is not uncommon for fish pathogens to develop resistance to certain antibiotics. Not surprisingly, this phenomenon occurs in Washington State. When pathogens are to be treated, it is a common practice to conduct drug sensitivity tests prior to the application of antibiotics as is commonly done in human or other livestock treatments.

4. Comment noted. Regulations of the use of antibiotics is by FDA and USDA - not the State of Washington.

5. Comment noted. The paragraph referred to is balanced in its presentation as it stands.

6. The presentation in the DEIS is not "entirely misleading" as alleged in this comment. The literature cited in the document indicates that plasmid transfer to human pathogenic strains of bacteria such as *Vibrio parahemolyticus* has never been found in Japan, despite extensive use of antibiotics and extensive surveys attempting to demonstrate such transfer. It is well known that many processes can be forced to occur under controlled laboratory conditions, but do not occur outside of these highly controlled conditions.

7. Comment noted, but disagree with the suggested conclusions of the reviewer. The treatment in the DEIS is the most appropriate interpretation of the available technical data. The suggestion that the transfer of R-plasmids from fish pathogens to human pathogens is very likely is not supported by the technical literature.

8. The reviewer's conclusion is not supported by the technical literature.

9. The comment is correct, but the issue results from the cited study's use of the terms "sites" and "farms." In the cited study, the authors state on page 368 that "OTC was found on all but one site." However, OTC was found at another site on the same farm.

   The text has been revised in the FEIS to indicate concentrations of up to 4.9 mg/kg rather than the 4.0 mg/kg cited in the DEIS.

10. Comment noted. This subject is discussed to the extent that information is available in the first paragraph on page 59 of the DEIS.

11. Not clear what comments the writer has difficulty with. The description of the Jacobsen and Berglind study, as corrected, is accurate and reflects the substantive conclusions that can be drawn from their data.

Response to Letter No. 38: Arthur H. Whiteley (continued)

12. The DEIS does not state that antibiotic resistance could not occur in Puget Sound. However, the last sentence in the second paragraph of the summary on page 63 of the DEIS is inaccurate and has been eliminated. This is the sentence that states, "The development of antibiotic resistant bacteria in Puget Sound is virtually impossible at the low temperature and low concentrations of antibiotics around net pens in the Sound." Once this sentence is removed, the DEIS discussion gives, in the opinion of the writer, a balanced view of the estimated risks in Puget Sound. Furthermore, the mitigation measures on pages 62 and 63 of the DEIS give additional measures to reduce the risks that do exist.

13. The Tibbs study is now published in the NW Environmental Journal. The conclusions of the study are merited in the opinion of the EIS writer. Shellfish would be expected to accumulate particulate material (disintegrating uneaten fish feed or fecal material) and thus would serve to monitor the accumulation of OTC in this material if it was present.

14. The DEIS does not state that antibiotics cannot accumulate in the invertebrates other than shellfish. Recommendations for further research were made in the DEIS and are part of the Preferred Alternative in Section 5.4 of the FEIS.

15. Comment noted. The interpretation of the available data as presented in the DEIS is the most supportable conclusion in the opinion of the writer.

16. The DEIS contained recommendations for further research and better storage of fish feed on page 118, and in Section 6.4 of the FEIS.

17. See the response to Comment 16.

18. Comment acknowledged. The sentence has been deleted from the FEIS.

19. This is an issue which is covered by the U.S. Food and Drug Administration which has standards in place. If new information indicates that these standards need to be modified, FDA is responsible for taking the necessary actions to modify these standards.

20. Potential impacts to water quality were addressed in the Water Quality and Cumulative Impacts sections of the EIS. In addition, the EIS discussed the potential impact on phytoplankton. Section 5.1 of the FEIS discusses the potential effects of farms on benthic communities.

21. Comment noted.

22. *Capitella*, and its relatives, while capable of withstanding and thriving in highly organically enriched environments, are nevertheless normal and common species in many of the marine benthic assemblages in Puget Sound (Lie 1968, 1974; Word et al. 1984). Capitellid dominated communities are normal for an area receiving substantial organic input. Although communities dominated by capitellids are not

Response to Letter No. 38: Arthur H. Whiteley (continued)

diverse, they are productive and help to cycle the benthic nutrients into other components of the food chains.

23. Comment noted.

24. Yes, it would be counter-productive to the fish farmer.

25. The fish farming industry was not responsible for the destruction of wild salmon runs in Norway. The genetic impact potential is a function of the degree of domestication of the farm stock and the proportion of interbreeding. In Norway, there are over 780 farms producing an estimated (1989) 125,000 metric tons of Atlantic salmon (275 million lb. or 27.5 million-10 lb fish). Their rivers have relatively small populations of wild salmon. The small wild populations resulted from overfishing, acid rain, and other factors that occurred before the development of the fish farming industry. In addition, the older Norwegian farms are not as well constructed as more recent farms which utilize newer technology.

    We have much larger populations of wild fish in general. The fish farming industry in Puget Sound may never be the size of the Norwegian industry, and the Puget Sound industry uses current technology. Therefore, the situation in Norway is very different than here in terms of impact potential. The proportion of escapees to wild fish in Norway is orders of magnitude higher than it will ever be in Washington.

26. Major escapements are rare. The escapement to which you refer, was the largest to date on the West Coast. Because one happened last year does not imply such occurrences are frequent.

27. The issue of a farm escapement near a river mouth with a salmon population was discussed in the DEIS.

28. The scope of this EIS does not include an evaluation of the fish farming industry in Norway.

29. In Norway there are a lot of old, low technology fish farm operations which are much more likely to have escapements.

30. Yes they are, and there are important differences. Survival in terms of natural processes would undoubtedly be higher. However, since a high degree of residency would be expected (as in the case of fish in the WDF delayed release program) a much higher rate of exploitation would occur on escapees than ocean-going fish. Also contributing to that scenario is the fact that maturing fish will have no home river attractions will wander, and thus become more vulnerable to commercial and sport fisheries.

31. Actually, Atlantic salmon have a lower risk of environmental impact than Pacific salmon. Most of the permits pending for fish farms in Washington are planning

to use Atlantic salmon (24 out of 28). The fish farm industry in Washington has their own local Atlantic salmon brood stock and has a limited need to import.

32. See the response to Question 29 and Appendix G.

33. See the response to Question 29 and Appendix G.

34. The reviewer raises the issue of whether a 90-day quarantine period is adequate. As he states, it is possible for pathogens to be latent for extended periods. The WDF disease control program does not rely solely on a quarantine period to prevent pathogen introduction. WDF also considers additional factors such as disease history of exporting facility and health certifications on the broodstock in question. The reviewer cites an example of an outbreak of VHS 18 months after trout were transferred from a "VHS" free farm and thus implies that the same phenomena would occur here.

    WDF allows eggs to be imported, not fish, and only from farm and geographic areas where certain diseases are known not to exist.

    Washington state laws and policies exceed federal and other state laws in describing and taking precautions in preventing disease introduction. The risk of introducing "exotic fish diseases" is very low. There are few activities in resource management that are 100% risk free.

35. The comment that WDF policies have been unsuccessful is without merit. See Appendix G.

    There does not appear to be any relationship between the isolation of VHS in Washington State and the administration of import laws by federal and State authorities. See the response to Question 29 and Appendix G.

36. The testimony referred to is simply the opinion of the individual giving the testimony. This individual does not have technical credentials in the area of fish diseases. Thus, the conclusions in the DEIS are professional opinions based on the best available technical information.

37. Svein Mehli is not recognized as an expert on fish pathology or fish diseases. The pathogens that are found in fish in fish farms are not unique to the farms. Indeed, the freshwater pathogens that are carried to marine pens by the fish such as BKD, furunculosis, and redmouth were likely as a result of infection of hatchery stocks by the feral indigenous stocks. Pathogens contracted in seawater are indigenous to the sea and, therefore, do not provide a new opportunity for exposure to feral fishes.

    Also see response to Question 29 and Letter 1, Comment 16.

38. Comment acknowledged. The text has been revised for the FEIS.

Response to Letter No. 38: Arthur H. Whiteley (continued)

39. Comments noted.

40. Comments noted.

LETTER NO. 39

CURT SMITCH
Director

STATE OF WASHINGTON

DEPARTMENT OF WILDLIFE

600 North Capitol Way, GJ-11 • Olympia, Washington 98504-0091 • (206) 753-5700

March 7, 1989

Ron Westly
Department of Fisheries, AX-11
115 General Administration Building
Olympia, Washington 98504

Draft Programmatic Environmental Impact Statement: Fish Culture in Floating Net Pens

Dear Mr. Westly:

Your document was reviewed by our staff as requested; comments follow.

1 We found this document generally well written and very informative. It is not clear, however, how it relates to the current Interim Siting Guidelines and it is not clear which mitigation measures will actually be required. Long-term monitoring for example should be required.

2 In the affected environment section (p. 64) no mention is made of anadromous game fish. At least sea-run cutthroat and steelhead trout should be referenced in this section. Also, pages 69 and 70 are missing from our copy of the impact statement.

3 The map on page 85 of major waterfowl is very general. If desired, our agency can provide more detailed information.

4 As a final comment, discussions concerning VHSD should be updated in light of the recent outbreaks of this disease. Apparently it can be transmitted horizontally as well as vertically.

Thank you for the opportunity to provide comments at this time.

Sincerely,

Fred H. Maybee

Fred Maybee
Regulatory Services
Habitat Management Division

FM:mjf

cc: Dept. of Ecology

RESPONSE TO LETTER NO. 39: WASHINGTON DEPARTMENT OF WILDLIFE - FRED MAYBEE

1. The text has been revised to evaluate existing regulations and guidelines in the FEIS.

2. The text has been revised to include steelhead and sea-run cutthroat trout.

3. More detailed information will be required during reviews for specific fish farming proposals.

4. See the response to Question 29 and Appendix G.

LETTER NO. 40

CURT SMITCH
Director

STATE OF WASHINGTON

DEPARTMENT OF WILDLIFE

16018 Mill Creek Blvd., Mill Creek, WA 98012 Tel. (206) 775-1311

March 24, 1989

Ron Westley
Project Manager
Washington Department of Fisheries
115 General Administration Building
Olympia, WA 98504

re: comments, DEIS Fish Culture in Floating Net Pens

Dear Mr. Westley:

Thank you for the opportunity to review the Draft EIS. The following are my comments on the DEIS specifically concerning bald eagle impacts as discussed on pages 86 and 87:

Potential impacts of such projects on eagles are probably greater than implied by the discussion. The first impact is related to the loss of foraging habitat due to pen locations. Of five projects in northern Puget sound that are either proposed or existing, every one is located just below an active eagle nest. Since the majority of foraging by eagles that nest on shorelines usually takes place within a few hundred feed and just below the nest tree, these projects may be eliminating that habitat. Evidently, eagles select the same calm embayments for foraging that are preferred for rearing fish. (1)

The second impact relates to disturbances associated with pen construction and operation. Pen construction can occur outside the nesting season to minimize the short-term impacts. However, the long-term impacts involve not only activities in the water, but also upland areas (boat launching, facilities etc.). These were not mentioned in the discussion. (2)

Therefore, simply moving the pens away from the nest tree may not be the only concern. No study has been conducted to determine the impacts of such projects on eagles, but as potential pen sites become more limited such a study will be imperative. (3)

My final comment concerns a correction to the information on page 87. The sentence that begins "When no federal permit..." is incorrect. The state mandate is for protection of eagle habitat on state and private lands and applies irregardless of the issuance of a federal permit. Counties or local jurisdictions have the responsibility to notify the WDW of all proposed net pen projects prior to their approval so management plans can be developed as per WAC 232-12-292. (4)

Please contact me if you have questions related to eagle protection.

Sincerely,
THE DEPARTMENT OF WILDLIFE

Jim Watson
Wildlife Biologist

cc: Lora Leschner, WDW
DAVE MUDD, WDW - HABITAT MANAGEMENT

RESPONSE TO LETTER NO. 40: WASHINGTON DEPARTMENT OF WILDLIFE - JIM WATSON

1. See response to Question 30. A discussion of existing fish farms and evaluation of specific proposed facilities is not within the scope of this EIS.

2. See response to Question 30.

3. Comment noted.

4. The text has been revised for Section 5.9 in the FEIS.

March 20, 1989

Dept of Fisheries
Ron Westley

Dear Sir.

I spoke at the public meeting in regards to the siting of fish pens in Saratoga Passage.

Since all of the owners of property along the beach, own the tide flats and do pay taxes on them, we feel especially wronged that our own land will be polluted.

(1) Nowhere else would we be allowed to throw waste on anyone else's property but that is exactly what the state is planning to let the fish pen owners do.

Yes, I understand that they make the point about the area of the pens will flush with the current + the rising + falling of the tide, but the waste will need to go

somewhere. As I watch daily the tidal action and currents on the beach and see what comes in on the tide flats, we can only think with horror what it would be like with fish pens.

In the area of the pen site, there are mussels growing naturally on the rocks, clams of varying kinds are all up and down the beach. For years we have relished in the fact that we have had a fresh, clean source of shellfish for eating. Since we know how susceptical all the shell fish are to any pollution, if the pens were allowed, our supply would be cut off.

On warm weekends during the year and daily during the summer, many children come to play in the sand on our sandbar. Many do go north of us as well to play in the cove of site 1-B.

This has gone on for many years with children, grandchildren and great grandchildren.

Is this all to be taken away from us?

With so much being done to clean up Puget Sound, salmon pens with their pollutants cannot be allowed to reverse the action.

2

We invite you to come to Bells Beach on a low tide and see the area yourselves.

Sincerely,

Wohlhueter

Lowell & Beverly Wohlhueter
3585 S. Bells Beh. Rd
Langley, Wa 98260

RESPONSE TO LETTER NO. 41: LOWELL & BEVERLY WOHLHUETER

1. Comments noted. See the response to Question 1.

2. Comment noted.

Ron Westly
Washington Dept. of Fisheries
115 General Adm. Bldg.
Olympia, WA 98504

RE: Floating fish net pens E.I.S.

Sir:

I have the following questions regarding net pen culture which were inadequately addressed in the E.I.S.

How much net pen farming is now being done in this state -- By the Dept. of Fisheries itself?

1 Under contract from the Dept. and, if so, with whom?

By private enterprise?

Where are these pens located?

What is the present condition of surrounding sea bed, sea life, water quality?

2 How much of the Department budget is devoted to fish pen farming or research there-on?

Who is bringing in Atlantic salmon eggs to this state?

How long has this been done?

3 Where are the hatcheries for these eggs?

Who operates these hatcheries, and under whose supervision?

Who certifies eggs to be virus free?

4 Where are eggs held in quarantinetime?

Is 90 days sufficient quarantine-time?

5 Why are atlantic salmon eggs imported from Norway, when it is known to be an area where Atlantic salmon are virus-infested?

6 Is it true that Atlantic salmon have been imported in this state for 30 years?

7 The E.I.S. mentions "local broodstock would be desirable". Has no regulation been developed concerning this?

8 Are the private fish farms presently located in the state financially viable without public subsidy?

9 What income from bed leases has accrued to the state?

(10) Why have any fish pens been allowed when regulations on sediment levels, disease controls, are not yet in place?

(11) How are the fish pens cleaned? It is stated that chemical anti-foulant is prohibited, but the accepted method is not clearly stated, nor the effect on environment explained.

(12) Successful fish pen farming requires high quality of water, yet such farming proceeds to degrade such water quality.

The remedies and/or costs to operators are not listed.

(13) No dollar value is given to water quality degradation, reduction of free passage in such waters by native fish or people. No comparison has been made of these costs in fish pen operation or promotion to the costs to restore and promote natural spawning stream beds in our state.

If the environmental costs to our waters and the bureaucratic costs of supervision were actually charged the fish pen operator, would his fish farm still be financially feasible?

(14) Authority over our water resources is so spread out among national and state agencies that no <u>one</u> has enough authority, knowledge, or responsibility to govern the resource wisely. Before encouraging greater sea bed uses, may we have some remedies in this regard, and all regulations and safeguards in place.

Respectfully,

Margaret Yeoman

Margaret Yeoman
1620 - 11th St.
Anacortes, WA 98221

RESPONSE TO LETTER NO. 42: MARGARET YEOMAN

1. As stated in the EIS, there are currently 13 commercial fish farms in operation in Puget Sound. Their locations are indicated in Figure 2. WDF manages some net-pen facilities for research and delayed release enhancement programs. A discussion of these facilities is outside the scope of this EIS, but more information can be obtained by contacting WDF or DNR.

2. Your question is outside the scope of this EIS. That information can be obtained from WDF.

3. No permits have been issued in the last year or two for the importation of Atlantic salmon from abroad. Atlantic salmon eggs were first imported into Washington in the 1930s. The importation of Atlantic salmon eggs for the purpose of seawater fish farm culture began in 1981. A number of hatcheries are developing broodstock. They are spread throughout Puget Sound (South Sound, Tacoma, Manchester, Port Angeles, San Juans). The donor stock for these hatcheries originally came from the East Coast states, Canadian Provinces, and Europe (Waknitz personal communication 1988).

4. Fish health inspections are conducted by qualified technicians approved by the federal and Washington state governments. WDF also inspects laboratories and methods used.

   Eggs are held in quarantine on fish farms isolated from other fish stocks on the farm. The effluent water is required to be disinfected.

   See the response to Letter 38, Comment 34.

5. All eggs imported into Washington from other states or countries must come from areas and parents demonstrated to be virus free. When eggs were allowed from Norway, they were from virus-free parents as required in our rules and policies. Since the enactment of state disease policies regulating imports in 1987, there have been no import of Atlantic salmon eggs from Norway.

6. Atlantic salmon eggs were imported into Washington during the 1930s and 1950s for unsuccessful attempts to establish Atlantic salmon runs. Eggs have been imported into the State for commercial fish farming purposes since the mid-1970s.

7. There are no regulations requiring local broodstock.

8. Commercial fish farms in Washington do not receive any public money.

9. Your question is outside the scope of this EIS. That information can be obtained from DNR.

10. There has been sufficient review of fish farm proposals through HPA, Shoreline, and Section 10 permitting programs; as well as through the SEPA review process.

Response to Letter No. 42: Margaret Yeoman (continued)

11. Fish farm nets in Puget Sound are typically cleaned with a water hose sprayed against the net to dislodge any matter that has attached to the nets. The first paragraph on page 16 of the DEIS states that Weston (1986) found the amount of material entering the water from net cleaning and settling to the bottom to be a relatively small portion of the overall sedimentation from a fish farm. On page 39 under Turbidity, the DEIS states that cleaning a severely fouled net may increase turbidity levels beyond State water quality standards.

12. Comment noted.

13. Comments noted. See the response to Question 12.

14. Comments noted.

LETTER NO. 43

Department of Fisheries –
Joseph Blum, Director and
Ron Westley, Habitat Division

Thank you for continuing the discussion of fish culture in floating pens as the excuse that the land is polluted is no excuse to pollute water. It is merely a reason to clean up air, land and water; and fish pens will not help.

Fish pens are located in traffic patterns, are a disaster for eel-grass, geoducks and other marine life. (1)
The bank deposit will only be a token of the degradation occurring from disease, antibiotics, fish feces, entrails, excess food, dead fish and escaped fish to contaminate wild fish. This interest represents a few profiteers not the public benefit. Protect wetlands instead please. Thank you – vegetarians live longer we hear?

295 Fleet Drive
Port Ludlow, WA 98365

E. ZAHN

RESPONSE TO LETTER NO. 43: E. ZAHN

1. Comments noted.

LETTER NO. 44

4 April, 1989

Ron Westley
Project manager
Washington Department of Fisheries
General Administration Building
Olympia, Washington 98504
USA

Dear Mr. Westley:

I am writing with respect to the Draft Programmatic Environmental Impact Statement--*Fish Culture in Floating Net Pens*. I have had a chance to give this document only a brief review, some sections more thorough than others, but would offer a few comments.

First, a general statement. In my view, it appears that at least some of the authors of this document were not sufficiently thorough in their approach. For example, I would cite R.L. Stokes on *The Economics of Salmon Farming*--the bottom line according to some decision makers. I see no evidence that Stokes considered such things as the potential costs that might result from the introduction of exotic disease--such as VHS (now a reality)--to the natural fishery, both commercial and sport. Nor costs associated with maintaining regulatory agencies, nor those associated with a reduction in recreational opportunities, etc. The only costs he appears to have addressed in any depth are those associated with a reduction in land values of upland owners. This particular section seems very cursory and in my view, virtually meaningless. Yet, it is a very important section for decision makers. 1

Secondly, I believe many of the summaries relating to *Mitigation Measures* and *Unavoidable Adverse Impacts* attempt to minimize potential problems, most of which are not well understood. As an example, I rather doubt that, "adverse impacts can be mitigated through the measures identified above and through the fish disease control regulations now in place" (p81) when it comes to the recent finding of VHS in Washington State (almost certainly due to the introduction of Atlantic salmon). That quote already is outdated. I have the impression that potential adverse 2

impacts on wildlife, on native fish populations, on shellfish, etc. are often played down, though many of the real impacts are unknown. The tone of the writing in these sections appears strongly biased toward furthering expansion of the industry.

As another example of the latter concerns, I would cite quotes from pp 72 and 73 concerning genetic impacts by escaped farm fish on wild stock:

> "This discussion considers potential impacts of escaped fish interbreeding with wild stocks on purely theoretical grounds. Impacts associated with interbreeding between wild stock and net-pen fish is undocumented." (p72)

> and, in two concluding sentences to this section, "Without constant infusion by escaped fish, these maladaptive genes would disappear gradually due to selective pressure, making any impacts temporary. Compared with the large numbers of hatchery releases, the genetic impact of escaped farm fish on wild stocks would be negligible." (p73)

The first quote, as I read it, says we don't know what the impact might be, and this, I believe. In view of this, I consider it unjustified to try to play down the potential impact in the second quote. As well, as now seems to be developing, there may be constant infusions of escaped fish into the wild. And, to try to compare the release of hatchery fish to escapees from farms appears to be setting up a straw man, for " 'normal' hatchery fish may or may not be very different from wild populations..." (p71), whereas, with selective breeding and genetic engineering, farm fish likely soon will be very different from wild stock.

3

In my view, there are too many unknowns to allow a significant expansion of the net pen industry, as is, unfortunately, occurring here in British Columbia. With new environmental horror stories surfacing almost daily, a complete moratorium on any expansion of fish farming on this coast, and close monitoring of present facilities for at least 10 years, would seem the most judicious approach. I'm sorry, but I find many of the arguments in the PEIS not very convincing. I enclose a copy of a recent manuscript about VHS prepared by my wife and myself, soon to be released

4

in a local newsheet, that illustrates in more detail some of our concerns about the development of this industry.

I hope that the few comments I have provided will be of some use to you in your deliberations. My major comment would be that I feel that the general tone of the PEIS is to downplay potential problems, at least one of which (VHS) has already surfaced, in favor of promoting the industry.

Sincerely yours,

Fred C. Zwickel
Professor Emeritus
Department of Zoology
University of Alberta
Box 81
Manson's Landing, B.C.
Canada V0P 1K0

VHS--FOR THE RECORD by Fred and Ruth Zwickel (26 March 1989)

We have a new fish disease on our coast, **viral hemorrhagic septicemia**, or **VHS**. Previously identified only from northern Europe, VHS has recently been found in coho and Chinook salmon in Washington State (according to reports, these fish had been in the wild). In view of its potential effects, it behooves us to know more about this disease.

In Europe, VHS has been found primarily in rainbow trout, and more recently in Atlantic salmon. Two current publications provide revealing information about this disease. Most quotes below are from Textbook of Fish Health (1987) by Dr. George Post, but where noted, are from the Washington State Draft Programmatic Environmental Impact Statement on Fish Culture in Floating Net Pens (January 1989), denoted here as PEIS. Enclosures in brackets are ours.

On the Dangers of Introduction of VHS to North America: "VHS is one of the highly contagious diseases which has not been brought to North America. Fish health agencies should be especially alert to all possible ways this virus could enter the continent and devise methods to block entry,..."

"Of specific concern in North America are Atlantic salmon eggs imported from Europe and the potential risk of introducing viral hemorrhagic septicemia..." (PEIS)

"A primary concern with the growth of the net pen industry in Washington is the possible increased risk of introduction of exotic diseases. This risk is minimal because regulations are in place to restrict importation of serious exotic pathogens of salmon. One such pathogen, viral hemorrhagic septicemia (VHS), develops during the salmon's freshwater phase. All eggs imported into Washington must be certified free of VHS." (PEIS)

"It is such diseases which could pose a significant risk to native fish." (PEIS)

"...the risk of transmission of disease from net pens to wild fish is possible but not likely a significant problem." (PEIS)

These statements are, of course, already largely out of date. VHS is here.

On Susceptibility to, and Mortality from, VHS: "The rainbow trout is a relatively new introduction to the European continent and may have

no natural resistance to the virus,..." [rainbow and steelhead trout are the same species]

"Morbidity [mortality] levels among rainbow trout in which epizootics [outbreaks] are occurring is probably nearly 95%."

"The virus has been inoculated into brown trout, brook trout and coho salmon... The same course of the disease follows as in rainbow trout."

one outbreak indicated that, "...severity in saltwater environments is just as great as in freshwater."

in one study, brook trout were placed in contact with infected rainbow trout and, "...all of the 24 experimental brook trout died."

We can now add Chinook salmon to the list of susceptible species. All five Pacific salmon, and steelhead trout, none of which was previously exposed to this virus, may have little resistance to it. They are now at risk.

On Carriers and Control of VHS: "Location of carrier fish is difficult..."

"Survivors of the disease are always suspected carriers."

"...serological [blood] surveys of fish populations to locate carriers...are impractical for control of the disease."

"One of the greatest problems in the control of fish virus diseases has been the location of viral carriers in the tremendous populations of fishes found in many fish culture facilities."

"There are no therapeutic [treatment] procedures for VHS. Prevention is the best control."

Present attempts to test for VHS in culture facilities and the wild may be fruitless, especially if it is dormant in carrier fish (VHS tends to be seasonal and, "highest mortalities occur during the winter months.").

On Transmission of VHS: "Transmission...is by contact with virus-contaminated water."

"Water from fish culture facilities undergoing epizootics of VHS could carry the virus to wild-ranging fish..."

"Demonstration of the virus in latent [dormant] cases is especially difficult... Fish with latent VHS will begin to shed large numbers of viral particles when the latent stage changes to acute as a result of environmental stress."

"This virus can infect the egg while the egg is still in the mother and be passed to offspring." (PEIS)

Note that identification of VHS is difficult, especially if dormant. And, fish under stress, for example those in net pens, are especially susceptible to it. Should they become carriers, they may serve as a reservoir for the disease. Since VHS is waterborn, it can potentially be introduced into the wild during tidal flushing through net pens, or in waste-water from hatcheries.

On Infectivity of VHS Outside Living Tissue: "The virus is extremely heat sensitive (inactivated at 60^{0}C in 15 minutes, and loses at least 50% infectivity in 15 minutes at 31^{0}C)."

"The virus loses infectivity in dead fish tissue within 24 hours at 0^{0}C..."

Apparently VHS has a short period of infectivity outside living tissue, as with some other viruses. If so, attempts to blame its introduction into North America on the pumping of bilge water from ships is a red herring (hopefully, VHS-free).

How Did VHS Get Here? We will never know for sure. Suggestions such as pumping of ship bilges have been advanced by some proponents of fish farming. But, the weight of evidence points strongly to its introduction by the fish farming industry itself. It seems more than coincidence that VHS arrived here only recently, following the expansion of Atlantic salmon culture on this coast.

The warnings were here. Some, such as, "Transmission...with eggs is suspected but not proved." were sounded in the 1960's. We consider it irresponsible for governments to have allowed, and entrepeneurs to have introduced, Atlantic salmon into an area with an already thriving natural fishery. Five species of Pacific salmon, plus steelhead trout, and perhaps other species, are now in jeopardy. Hopefully, control measures taken to date will stop the spread of VHS, but we may not know for years to come. The paternalistic "don't worry, be happy" assurances of some government and industry experts, <u>that everything is/was under control</u>, now, more than ever, ring hollow.

RESPONSE TO LETTER NO. 44: FRED C. ZWICKEL

1. See Section 1 of the response to comments after the text in Appendix E.

2. Comments noted.

3. The DEIS addresses the interbreeding question on theoretical grounds because no scientific evidence exists to support interbreeding of salmon that escape from fish farms with naturally occurring stocks. As noted in the third paragraph of page 69 in the DEIS, Atlantic salmon are not capable of cross-breeding with any of the indigenous species.

   The DEIS also addresses the concern that farmed Pacific salmon will escape and interbreed with wild populations having an adverse affect on the wild-gene pool. Paragraphs one and two on page 72 of the DEIS point out several natural barriers that escaped farm fish would have to overcome prior to establishing an effective reproducing population.

   The meaning of the second paragraph quoted is "without constant infusion of large numbers of escaped fish, maladaptive genes would disappear gradually due to selective pressure." Even in the advent of major escapement, occasionally the numbers of escapees returning to rivers would be relatively small (see Letter 1, Comment 9 and Question 9). The FEIS text in Section 5.7 has new material giving perspective to the relative numbers of wild salmon and predicted escapement from fish farms.

4. Comments noted.

LETTER NO. 45

Ron Westley
Wa. Dept. of Fisheries
115 General Admin. Bldg.
Olympia, WA 98504

Mr. Westley,

I am glad to have the opportunity to share my views on the net pen issue that has been heating up over the past few years.

It seems the wheels have been once again set in motion to negatively impact the quality of life available here in the Puget Sound Area.

1 Of course it is difficult to balance the needs of business, government, and the general public. In this case it is time to move strongly in the direction of what's good for Puget Sound and the general public that use and appreciate it so.

This question has to be asked: Can we really justify the probable pollution, fish diseases, and eyesore brought on with these additional net pens?

THE ANSWER IS NO!!

Unfortunately, the door has been opened with some currently operating net pen operations. Even though this is taking place it doesn't mean we have to open the door further. The present operations should be given another three to four years and then be forced to close.

The parties in favor of these pens are only there because they stand to gain by having pens scattered throughout the Sound. It's a shame the the average citizens interests haven't been put above those of these special groups. It's time they were!

I and many like me have lived, worked, and played on and around Puget Sound all my life. I've seen the slow decay of many different species of fish, animal, and bird. We have taken almost all that this fantastic body of water has to give. It is now time to vigorously defend the Sound and start putting back what we have taken.

Sincerely,

Jeff Bakeman
509 NW 70th
Seattle WA. 98117

RESPONSE TO LETTER NO. 45: JEFF BAKEMAN

1. Comments noted.

LETTER NO. 46

March 11, 1989

Dear Sir:

Thank you for allowing me to comment on the P.E.I.S.. I represent a community on Camano Island of 24 families. We are angry over the whitewash perpetrated on the public by this biased and contradictory report. According to the authors, there are no adverse impacts that cannot be "mitigated" by "if"s. Who is going to swallow this? The state wants at least 100 more salmon pens. These farms will produce 55 metric tons of oxygen-demanding waste per day. That's 18 more tons a day than Metro's Renton and West Point treatment plants together produce from the sewage of one million people. To say this will all be "mitigated" by a hundred "if"s is patently ludicrous.

1

We want a non-political impact statement. If the state ever comes out with one, Puget Sound won't be paved with these odorous obstructions.

Sincerely,

Carol Church

Camano Cove Community Club
Carol Church
16524-37th N.E.
Seattle, Wa., 98155

RESPONSE TO LETTER NO. 46: CAMANO COVE COMMUNITY CLUB

1. See the response to Question 3.

LETTER NO. 47

March 14, 1989

Re: Salmon Fish Pens

Mr. Mark Westley:

Read in the Skagit Valley Herald about the audience and statements made at the public meeting about Fish Pens.

We need salmon pens; they can be placed at various places which can be judicially thought out.

It will employ a few people. It will bring in tax money. Other countries have fish pens. I listened to news from Vancouver B.C. and heard they did not have a fear of a virus. Also they keep check on what is going on in the world, having scientists bactorioligists, etc.

1

It is known that down thru' the ages people do not want change, especially if it is near their habitation.

Get in the news what other countries are doing about fish pens. Educate the people. The shoreline owners do not speak for all.

We are urged to eat more fish for healths' sake. Now it is about $5.00 a pound which is very expensive for senior citizens and folks on low salaries.

Thank you, Sincerely,

Mrs. Zella Lutterloh
a Senior Citizen

ZELLA M LUTTERLOH
826 JAMESON ST
SEDRO WOOLLEY WA
98284 1724

RESPONSE TO LETTER NO. 47: ZELLA M. LUTTERLOH

1. Comment noted.

LETTER NO. 48

9327 220th S.W.
Edmonds, WA 98020

February 20, 1989

Eric Hurlburt
Aquaculture Coordinator
Department of Fisheries
Olympia, WA 98504

Dear Mr. Hurlburt:

I am writing about the article, "Keeping the Old Farm Afloat" dealing with fish farms. Many people are concluding that salmon farms are polluting the environment. Also, the fish are weaker than natural wild-run salmon. As a sports fisherman, I go along with salmon farms. If not for fish farms, fishing season would be short or not even at all for the fear of salmon extinction. The fish farm makes for hours of fun time for sports fisherman on a lazy, relaxing day. (1)

Sincerely,

Terry Maxwell

Terry Maxwell

RESPONSE TO LETTER NO. 48: TERRY MAXWELL

1. Comment noted.

LETTER NO. 49

Pacific Troller Association

March 5, 1989

Mr. Ron Westley
Washington Dept. of Fisheries
115 General Administration Bldg.
Olympia, Wa. 98504

Dear Sir:

Enclosed is my statement on behalf of the Pacific Trollers association in regard to fish farm aquaculture.

Sincerely,

Wilbur H. Barker
Program Manager for Salmon Enhancement

March 5, 1989

To members of Hearing Committee

My name is Wilbur Barker. I am program manager for Salmon Enhancement for the Pacific Trollers Association.

Our organization is opposed to the expansion of salmon net pen
(1) farming because of the threat of spread of diseases from escaped fish from fish farms to Washington native and hatchery salmon stocks.

In addition, the additional threat
(2) of the production of resistant bacterias resulting from the high use of antibiotics to treat bacteria is of concern.

The above concerns are supported in previous testimony by Svein Age Mjelde, head of the division of Norway's Directorate for Nature Management and Arthur Whitely zoologist.

Attached are media reports of portions of their testimony to support this position.

Thank you.

The Fisherman (B.C.) 13 December 1988

Norway sees mounting disease, pollution threat from fish farms

The deadly salmon disease furunculosis, previously unknown in Norwegian waters, is breaking out of fish farms and threatening beleaguered wild stocks, says a top government official.

Svein Aage Mehli, head of the division of Norway's Directorate for Nature Management which is charged with protection of wild salmon, told a Washington State regulatory hearing Nov. 14 that 5,000 farmed salmon infected with the disease escaped this summer into Hjorundfjorden near Molde.

Despite an intensive fishery to catch the fish and a system of net barricades at the mouths of salmon rivers, an infected fish was found in fresh water, he testified.

"If the disease spreads to natural stocks, the situation may be out of control in Norway," Mehli said.

"I feel we are on a sharp edge with diseases. If we have (the parasite) *Gyrodactylus salaris* in more rivers we may just accept our wild salmon is extinct."

(Furunculosis is present in B.C. waters and leads to loss of appetite, fluid retention, ulcers and eventually death in up to 60 percent of affected stocks. It had not been found in Norway until smolt transfers from outside the country were undertaken. Gyrodactylus also has been linked to fish farming and is treated by killing all host fish with rotenone.)

Mehli was qualified as an expert witness at a hearing in Lacey, Wash., of the Shoreline Hearings Board, which is hearing an appeal of a Skagit County decision to reject a fish farm in the mouth of the Skagit.

The fish farm proponents, a tribal group, are appealing the refusal of the Skagit County commissioners to issue permits for the farm on the basis that it threatens Skagit salmon and could pollute the sensitive estuary.

Proponents have denied there is any evidence of a disease threat to wild stocks from farmed salmon.

As a result, the appeal hearing has turned into a deep investigation of the environmental impact of salmon farms on wild stocks. Mehli was flown from Norway to testify on behalf of county commissioners, who backed up their decision by referring to the Suzuki Foundation report on Norway called *Journey to the Future*.

• Svein Aage Mehli, of Norway's environmental agency, testified last month to a Washington State regulatory agency.

Mehli responded angrily to suggestions by fish farm proponents that there is "no conclusive evidence" of disease spreading to wild stocks from farms.

"We are very concerned," he said. "It is not right to ask for conclusive evidence at such an early stage."

Furunculosis imported on smolts destined for salmon farms broke out two years ago and authorities felt they had eradicated it, he said.

This year's outbreak was a shock, as was the continued spread of bacterial kidney disease (BKD), which is very difficult to treat even with antibiotics.

"BKD poses a problem for natural stocks because it was diagnosed for the first time in 1980 and previously did not exist in nature," Mehli said. "It is very easy to see a connection between BKD (in salmon farms) and wild stocks in the river."

"It's reasonable to conclude" BKD spread from farms, he said, and Norwegian scientists "see logic in such a connection." BKD is diagnosed or suspected in 100 netpen operations and hatcheries.

Antibiotic use on Norwegian fish farms climbed to 48 tonnes last year, equal to the requirements for human use and animal husbandry combined.

"If you see the first diagnosis of redmouth disease in Norway just two years ago, it's impossible to ask what happened in such a case," Mehli continued. "Veterinarians underline the seriousness of that situation, that net pen operations have an impact."

Mehli said redmouth now is present in 300 facilities but was unknown until 1985.

"Net pen operations may function as a multiplying station for disease," Mehli said. "They will give greater disease pressure on natural stocks that we didn't see before netpen operations."

Mehli said further studies on the straying of farmed fish into rivers show a sharp increase in the presence of farmed fish. A year ago, 18 percent of the fish found in the rivers studied were of farm origin. In 1988, the figure rose to 40 percent. The origin was confirmed by scale samples and electrophoresis.

Asked if strong regulations could control disease, Mehli agreed they could "minimize problems if they go far enough. Norway has not gone far enough."

Norway is proposing a ban on the transfer of eggs and smolts between regions of the country, he said, and considering a ban on all imports of sexual products like eggs and milt.

Even though existing regulations list diseases which must not be present in imported eggs, the list is limited and "in Norwegian cage culture we know other diseases are knocking at the door."

In theory, he said, fish farmers "want to get rid of disease, but if they see profit in the short term they may react in a different way."

Mehli also confirmed fears of negative genetic effects of farmed fish on wild stocks if they interbreed. "We are very afraid it could affect their ability to migrate."

Netpen salmon have undergone careful selection for size and growth rate, he said, but researchers may have inadvertently selected other characteristics which could have a negative impact if reintroduced into wild stocks.

"First there is a genetic problem and second an environmental problem. If Atlantic salmon (escaping in Pacific waters) have the same requirements as coho or steelhead trout — and we know that salmon escape in great numbers — then you will have competition for space in the rivers."

As to their ability to spawn, "we see them in rivers, they are mature, ready to spawn and we are very worried of what will happen."

New zoning regulations now being implemented in Norway will ban farms within 20 kilometres of salmon rivers and close entire fjords to farming where salmon rivers are present.

The Fisherman, 15 December 1988

Fish farm use of antibiotics poses threat

The widespread use of antibiotics in fish culture poses a serious potential threat to public health, says a Washington State zoologist, and should be strictly controlled.

Arthur Whiteley, a zoologist with a long-standing interest in microbiology, told a Washington State Shorelines Hearing Board inquiry Nov. 14 that antibiotic use on fish farms will produce antibiotic resistant bacteria in the human food chain.

If these resistant bacteria occur in humans, "the diseases caused by that organism could not be medically treated.

"It would eliminate from the tools of the physician those he would want to control disease."

Whiteley was qualified as an expert witness in the hearing, which was set up to hear an appeal against a decision by Skagit County to deny permits for a fish farm near the mouth of the Skagit River.

Whitley produced a pile of scientific studies which show that "in almost every case resistant bacteria is selected by the use of antibiotics in fish culture."

In other words, use of antibiotics to treat bacteria causing fish disease kill all but the bacteria which is resistant to the medication.

Studies have proved that this resistance can be transferred from one type of bacteria to another, Whiteley said, and can create resistance to several types of antibiotic.

Whiteley said this type of transference has been documented in the case of a vibrio bacteria which causes disease in fish. In a laboratory, this resistance was transferred to different bacteria which exist in the North Pacific food chain and are pathogenic to humans.

"This has not been observed in the wild," he said, "but there is a probability it could occur. Experiments indicate the genetic mechanism is in place . . . and we can predict it will occur in nature under certain conditions."

The Centre for Disease Control in Atlanta has found the same phenomenon in beef and poultry, he said, and blame it for a dramatic increase in salmonella.

The only solution, he said, is to ban the use of antibiotics in fish culture which are used in human treatment.

In B.C., both oxytetracyline and erythromycin are used in fish culture even though they also are used in human medicine. There is no inspection to determine whether or not this transference of resistance is occurring in B.C. or whether fish sold to consumers is free of antibiotics.

DFO experts agree wild

RESPONSE TO LETTER NO. 49: PACIFIC TROLLER ASSOCIATION

1. See the discussion of the potential for spread of disease in Section 5.8 of the FEIS. Also, see the response to Questions 25, 26, 27, 28, and 29, and Technical Appendices D and G.

2. See the discussion of antibiotics in Section 5.4 of the FEIS.

LETTER NO. 50

March 3,1989

Ron Westley
Project Manager
Washington DOE
115 Gemeral Administration Building
Olympia, Wa. 98504

To Whom It May Concern:

1 I am requesting that the date of the March 23 deadline for comments on the PEIS be extended due to the following reasons:

1. The PEIS, consisting of two volumes,has an issuance date of February 6, 1989 but we did not receive our copies until approximately two weeks later. Now it is expensive for obtain additional copies that could be passed around for examination and study.

In other words it costs money and takes a block of time as the EIS, in certain areas, requires the use of people who will volunteer to interpret the meaning of much of the analysis of water quality, fish disease, etc. It takes time to find, contact, furnish copies, and give them time to study the proposal.

Public meetings have been cancelled due to the inclement weather. Poor road conditions prevented many people in my area from going, in our case, to Mount Vernon.This meeting I assume would be re-scheduled. That would require some time to advise interested parties.

Right now there is a great deal of new information being released regarding the effect of fish disease, virus, etc. in Puget Sound. Waiting awhile may reduce hysteria and phobias and produce some facts.

Please advise me as to when this cancelled open meeting will be re-scheduled. I do wish to be advised as to your decision regarding the extension of the comment period so that I can advise others.

Thank you for your cooperation in this matter.

Sincerely yours,
Marie J. Pickett
Marie J. Pickett
3653 S. Bells Beach Rd.
Langley, Wa. 98260
1-206-321-4862

RESPONSE TO LETTER NO. 50: MARIE J. PICKETT

1. See the response to Question 5.

LETTER NO. 51

3643 South Bell's Beach Road
Langley, Washington 98260

March 10, 1989

Project Manager Ron Westley
Washington Department of Fisheries
115 General Administration Building
Olympia, Washington 98504

Dear Sir:

We find the Programmatic Environmental Impact Statement for Fish Culture in Floating Net Pens unacceptable and incomplete. A revision and updating a new draft is recommended.

The PEIS is inadequate:

1 using out-dated data
omitting specific scientific findings
2 excluding studies from other countries (Norway, Canada)
3 not considering recommpense for aesthetic damages
4 ignoring forfeiture of public rights
5 not providing funds for enforcement of pollution and noise offenders
6 omitting adverse effects on clam and oyster beds
7 confusing methods for evaluating economic effect on local communities
8 not protecting the tourist dollar
9 not writing in straight forward way for general reader's comphrehension
10 not fully covering navigation problems.

11 The report is full of assumptions and inconsistencies. A new PEIS should be prepared by persons not involved in the aquaculture industry. No conflicting interests please.

Respectfully yours,

Gladys and Bob Shipek

Robert H. and Gladys Shipek

RESPONSE TO LETTER NO. 51: ROBERT H. AND GLADYS SHIPEK

1. Comment noted.

2. See the response to Question 6.

3. See the response to Question 12.

4. See the response to Question 11.

5. This document addresses only those issues which alter or affect the environment near a fish farm. Questions concerning funding sources for enforcement are beyond the scope of this document.

6. See Section 5.5 of the FEIS.

7. Comment noted.

8. See the response to Question 12.

9. Comment noted.

10. See Section 6.2 of the FEIS for a discussion of potential navigation impacts.

11. See the response to Question 2.

LETTER NO. 52

Gina McMather, President
SOUTH POINT COALITION
PO Box 506
Port Townsend, Washington 98368
March 5, 1989

TO: Ron Westley
Project Manager
Washington Department of Fisheries
115 General Administration Building
Olympia, Washington 98504

COMMENTS ON THE DRAFT PROGRAMMATIC EIS ON FISH CULTURE IN FLOATING NET PENS

I. I regret I was unable to attend the public hearing on the draft EIS on net pens held March 1 at Silverdale due to weather conditiona and transportation difficulties.

It was brought to my attention that Judith Freeman from WDF maintained that VHS, which has recently infected stock in two Washington hatcheries and which has necessitated the destruction of nearly 4 million salmon, could not be transmitted through eggs but was rather transmitted through water from fish to fish. (1)

I would like to point out that these observations are direct conflict to the discussion of VHS in the draft EIS which states on p. 77:

> Of specific concern in North America are Atlantic salmon eggs imported from Europe and the potential risk of introducing viral hemorrhagic septicemia disease (VHSD). This viral disease may be transmitted vertically from the adult brood fish to eggs and fry. The virus can infect the egg while the egg is still in the mother and be passed to the offspring.

Is the draft EIS presentation defective? --Or is Freeman, a WDF shellfish director, misinformed? This is an official request: Will a recognized fish pathologist, with his reputation on the line, please answer this question?

If the EIS is wrong, what else is it wrong about? If Freeman is wrong, at whose direction and for what purpose did she introduce this 'information' at a public hearing?

II. Here follows the general remarks on the draft EIS such as I might have delivered orally had circumstances permitted:

I attended a public hearing on the scoping of this programmatic EIS held Oct. 13, 1987, in Port Townsend. The overriding concern I expressed at that hearing was that the EIS be conducted objectively by an impartial agency. I find my fears were justified.

(more....

Parametrix, the principal author for the draft EIS has performed as a paid consultant to fish farm developers. My contact with that company's work was with their EIS for International Marine Farms, which sought unsuccessfully to gain a permit to site net pens and a hatchery at Harding Creek in Kitsap County on the Hood Canal.

Jack Rensel of Rensel Associates, another author has also served as a paid consultant to fish farmers.

I think it is logical to assume both of these companies hope to stay in business supplying studies for fish pen developers. It is in their interest to appear to be objective. It is not however in their best interest to be truly objective, I think this conclusion is borne out by their work. I am not surprised to have major objections to this document --more often for what it omits than what it includes.

A quick perusal of the authorities cited in the reference section supports my concerns about this document being inherently biased. Parametrix cites itself as an authority twice, one of the references being the revised Final EIS sumbitted in support of the Harding Creek fish pens proposal. The sufficiency of that document was hotly contested. Although the Kitsap County commissioners returned a finding that the final version of the draft was not insufficient, they denied that permit by a 3-0 decision.

Jack Rensel appears as an authority eight times --including reference to studies submitted in support of a net pen project for Discovery Bay. The permit for that project and the supporting data again has been vigorously challenged and a decision from the state Shorelines Hearings Board has not yet been rendered.

J. Lindbergh, an "independent consultant" is, I presume, Jon Lindbergh, known on the Olympic Peninsula for his long-time association with Sea Farms of Norway. Conrad Mahnken turns up in a number of citations regarding genetic impact without any reference to his contributions to the net pen industry.

All of this might not be so disturbing had I also seen a few authorities who are less sanguine about the future of fish farming. Why has not Svein Mehli been included, for instance? As Norway's Director of Nature Management with the responsibility for managing that country's anadromous fish stocks, his experience is invaluable.

(more....

In fact, Norway's problems with disease transmision and genetic pollution of native stocks is ignored and/or downplayed in the draft EIS, both in the materials presented and in the conclusions drawn.

For instance, one item in Mehli's testimony given in a recent hearing before the state Shorelines Hearings Board is relevent to the VHS controversy. He remarked that the number of fish diseases present in the country's wild salmon population increased dramatically following the growth of salmon net pen farming. In his estimation, net pens acted as "multiplying stations" for disease.

Our state's aquaculture coordinator, John Pitts, testified in his official capacity (while at the same time being paid as a private consultant) to the effect that Norway's problems could not happen here. I have heard him say much the same thing on another public occasion. BUT IT IS ALREADY HAPPENING HERE!! The draft EIS acknowledges the serious consequences posed by an outbreak of VHS but decides Washington's regulations are adequate. Clearly, they have <u>not</u> been adequate!

Mehli also spoke of the great amount of penned fish escapement and the problems it has caused Norway. The draft EIS minimizes the present extent of escapement at the same time it fails to attach sufficient weight to the possible consequences. How about including information on the disappearance of a British Columbia net farm in the recent winter storms? Mehli's testimony before the Shorelines Hearings Board is now a matter of public record. There is no excuse for not including his expert testimony in the final version of this EIS.

(Svein Mehli is not an unknown. I don't know why he was not included unless the draft's authors found his views inconvenient. He figured prominently in the Suzuki Report published in the British Columbian periodical, The Fishermen, which detailed the findings of a group of Canadian fishermen and writers who went to Norway to view fish farming first hand. What they found out about fish pens was seriously disturbing. Why have their sources not been contacted?)

Speaking of commercial fishing, where did the authors come by their information on that subject? I don't see any input noted from the Puget Sound Gillnetters Association or the Purse Seine Owners Vessels

(more....

Association representatives, for instance? The EIS section on commercial fishing appears to have been lifted from the rough draft of the DOE's Boyce report, "Use Conflcits and Floating Aquaculture in Puget Sound."

When the draft of the Boyce report was issued, I submitted extensive comments --a large number of which found their way into the final version released this past December. (Alas that the diagrams of hypothetical mitigation measures were not corrected by deletion.)
6 Why must I now waste my time repeating many of the same obvious and not-so-obvious points that I made in commenting on the Boyce report?

Just who did the EIS authors contact in compiling their section on commercial fishing? Nobody who ever left the dock on a fishing boat, it seems to me. I submit, the authors of the EIS are aware of the existance of the South Point Coalition, as we were one of the first citizen groups to raise the issue of use conflicts with the commerical fishery. I submitted an entire notebook of evidence relating to the Hood Canal Bridge area to our county officials and I know one copy was sent on to the WDF. So, why does Parametrix feel free to cite examples from this same area <u>without ever having contacted anyone in the South Point Coalition?</u> I, myself, or another board member would have been glad to assist. Perhaps then, the authors might have been spared, for example, the damning and
7 embarassing omission of the fact that non-Indian gillnetters fish AT NIGHT, a very material fact to the discussion of user conflicts between gillnetters and floating structures.

I can only presume that, knowing of our existence, the authors chose not to contact me. Although the authors avail themselves of information from fish farmers and consultants "by personal communication,
8 they used the telephone or interview process very selectively. I conclude I was never contacted because I have taken a public position opposing two net pen proposals which the authors have been allied with. THIS DOCUMENT HAS CLEARLY BEEN COMPILED BY AND DRAWN PRIMARILY UPON SOURCES WHO FAVOR DEVELOPMENT OF THE FISH FARM INDUSTRY.

Having completed my preliminary observations and general remarks, I will go on to cite specific paragraphs where corrections are needed. This does not mean that these are the only corrections and changes I

(more.....

would like to see made, merely the ones I feel best able to address. (Additions are indicated by underlining.)

DISEASE AND ESCAPEMENT

P. 72 ¶ 5.....Extend this discussion to include Norway's experience with escaped pen fish. Why discuss this "purely on theoretical grounds" when experience is available? Testimony by Svein Mehli refutes the contention that escapement numbers are small and the impact inconsequential. I suggest Greg Peterson, director of the Puget Sound Gillnetters Association, as a source for figures of Atlantic salmon appearing in the commercial catch.

9

P. 73 ¶3 ....."Local experts agree that significant genetic impacts on wild populations due to widespread net-pen farming in Puget Sound is unlikely." Who are these 'local experts?' Are they fish pen 'experts' as in Mahnken's case, or are they 'experts' on natural selection in wild fish populations?

To compare penned fish with fish hatchery-reared but released into the wild is to compare apples and oranges. Hatchery fish are of "wild" stocks and prove their fitness by returning to spawn. Increasingly, penned stocks of indigenous species will be interbred to promote rapid weight gain, docility and other characteristics desired by fish farmers. These characteristics would be maladaptive in the wild population, whether wild or hatchery-produced. (Note the research on interbreeding to produce more desirable pen fish being conducted at UW under the auspices of Washington Sea Grant studies.)

10

P. 77, 78 re. VHS...See general comments above. What about new diseases? According to Mehli, how can you check for a disease which is has yet to be identified?

11

P. 80 Mitigation measures.....A requirement for reporting incidence of disease should be mandatory, and failure to do so incurring stiff penalties. However, how can you enforce this when, a) reporting a disease may be economically disadvantageous to the pen operators, b) nobody goes out to the pens except the fish farmers, c) by the time many diseases are detectable, the damage is done.

Who pays for the cost of the damage? Is the net pen industry going to pay for the 4 million salmon destroyed at the hatcheries infected with VHS? No way, Jose! When even the Director of the WDF is pointing to mud on shoes as a possible source, and by the way, Atlantic salmon also get it, it only goes to prove that this state's administration is just going to nod sympathetically when fish pen operators shrug and swear, "It isn't us!"

The taxpayer pays, that's who. And the commercial fishing industry, and the tribal fishermen, and the sports fishermen.....

12

P. 74 (out of order).... Ditto comments on escapement

P. 75 Escapement mitigation measures... Encouraging commercial, sport and tribal fishermen to harvest escaped fish demands, a) the fish are of mature size and suitable for harvest b) they can be caught in sufficient quantity to make the effort economically viable, c) the fish are of a size to "fit" gillnet mesh size for harvestable species, and D) that the escape occurs during a time of year when boats are geared up for fishing, and yet would'nt have to forego

13

(more.....

regular fishing opportunities and e) that the WDF is flexible enough to permit and/or direct such an operation, which is unlikely.

How would river mouths be closed to escaped fish found to be diseased? Note Svein Mehli's testimoney before the SSHB on how one batch of fish escaped which was infected with furunculosis. They were intensively fished, and then 13 rivers were closed to the fish. Nevertheless, biologist found one diseased fish at least who made it up into spawning grounds!

AESTHETICS

P. 91 ¶4.....Name six people who do not have a financial interest in a fish pen who find it entertaining, interesting and attractive to live next to a fish pen complex --and who wouldn't prefer that it wasn't there. To talk about a pen's entertainment value for nearby residents is ludicrous and insulting propaganda. (14)

P. 91, last several ¶s..The visual effect of a fish pen complex bears little relationship to the portion of the view it may occupy when it interjects a discordant note into the visual environment. (15)

Diagrams, figure 15..Line drawings do not suffice to determine the impact. I drive past a fish pen complex every time I enter Port Townsend to my work. Only under overcast, stormy conditions, does it approach the relative inconspicuousness suggested by the line drawings. At most hours, the direction of the light reflects off the water at an angle creating light play on the water. The fish pen complex stands out as a big, flat, gray, industrial structure that absorbs light rather than reflects it. It draws the eye in the manner of the proverbial "sore thumb." (16)

Substitute these line drawings with color photos of real fish pens photographed at various distances under the following lighting conditions: bright overhead sunshine; oblique early morning light; cloudy, overcast conditions with diffused light; a highly colored sunset. This would give a far truer representation of what the viewer would see. A matte surface may reduce glare but it also exacerbates the tendency of the pens to appear as dark, gloomy globs on the water's surface.

P. 104....."Net pen sites are usually staffed 24 hours a day." I question this statement. Even if a pen complex were regularly babysat 24 hours a day, which I doubt, all personnel would be removed for safety in stormy or windy conditions. (17)

COMMERCIAL FISHING

This section was written by someone who obviously has no first-hand knowledge of the subject nor a source with first-hand knowlege. Why is this?

(more.....

P. 105, 1st ¶ of section 3, 3rd sentence. (insert underlined text)
"This displacement could reduce the catch potential for all fishermen fishing in a given area durin a given opening, reduce the overal catch..."
(18) [NOTE: We are not talking theoretical 'fishers' here. We are talking about real, honest-to-God, flesh-and-blood men and women who are out on boats, handling gear, dealing with the elements and trying to earn a living doing what they love to do!]

(19) P. 107, last ¶.....Who is Clocksin? He does not appear in the references.

P. 111.....This comment re. congestion at the bridge is less relevent to gillnetters than to seiners as more purse seiners
(20) can fish in a small area if they choose to do so. Gillnetters, by gear and technique differences must spread out over a large area.
(21) I FIND NO REFERENCE TO THE VERY IMPORTANT FACT THAT NON-INDIAN GILLNETTING OCCURS, UNDER PRESENT MANAGEMENT, AT NIGHT!

(22) P. 112, ¶2.....shoud read: "...kept relatively vertical in the water by attaching a weighted line to the bottom of the net.

P. 112 ¶3....."Gillnetters usually set their nets perpendicular..."
(23) A fishermen may also set his net "up and down the creek," which is to say, parallel to the current, depending on the congestion of boats or the configuration of the shoreline or other factors.
"...by a power-operated drum ~~and~~. The fish are removed or "picked from the net as the net is reeled aboard. The process of 'picking' typically takes twenty minutes to several hours
(24) depending on the nuber of fish caught and the amount and type of debris entangled in the net such as seaweed patches or logs. Mechanical breakdowns, snagging the bottom or an obstacle or an adverse riptide can also aggravate the picking process. During.."

P. 112 ¶7....."Placing a fixed object in the midle of a drift forces forces gillnetters to avoid the immediate area or to attempt to ~~pull~~pick their neats ~~near-the-pens~~before approaching the pens and/or
(25) risk entanglement."
Note also this ¶, current does not run through points of land, which generally aids the fisherman in avoiding land masses. Fish pens and other floating structures allow the current to go through and around them, which means they act as a seive, straining debris, nets, etc. from the water without redirecting the current.

P. 112, ¶ 7.....The importance of WDF management boundaries are way overemphasized here.
Seiners are looking for the greatest concentrations of fish.
(26) Gillnetters need as much open water as possible before their nets (assuming fish are there). That may make the boundary a good spot but tight quarters. Gillnetters especially need to spread out and give their nets room to fish.
AGAIN, I CANNOT OVEREMPHASIZE THE IMPORTANCE OF THE FACT THAT ALL CITIZEN GILLNETTING OCCURS MAINLY DURING THE HOURS OF DARKNESS. I.E. POOR VISIBILITY
ALSO, DUE TO LIMITED NUMBER OF FISHING OPPORTUNITIES ("OPENINGS" IN FISHING LINGO), ALL CITIZENS FISHERMEN MUST FISH WHATEVER
(27) THE WEATER. WDF DOES NOT TAKE INTO ACCOUNT WEATHER CONDITIONS WHEN SCHEDULING OPENINGS. THEREFORE, ANY FISHERMAN WHO HOPES TO HAVE A PROFITABLE SEASON MUST BRAVE THE WEATHER AND FISH HIS BOAT TO ITS LIMITS, AND SOMETIMES BEYOND. ADVERSE WEATHER MAY RESTRICT CHOICE OF LOCATION AND

(more....

P. 113 ¶1 "...during the fishing season. In some other areas, fishing is much less congested..." Obviously the writer has never observed fishing activity in Areas 9 or 10 when the coho or chum are running. Concentrations of boats depend on a number of factors including: what other areas are open, concentrations of fish expected, concentrations of fish encountered, current and weather predictions, current and weather conditions as they develop. (28)

Fishermen frequently change location, even travel from one area to another at some distance, during the opening depending on what success they are having and what success fishermen elsewhere are having. (Gillnetters at night, remember)

P. 114, ¶2 ..... Crab are not necessarily attracted to fish pens. The area near Bluewater Farms (pens) in Port Townsend used to be a productive crabbing area. It no longer is. (29)

P.±±3 ¶ 4..... Many errors in this paragraph.

Fishermen do not have the same opportunity to catch elsewhere. The fish are not always to be found in a given location... A seiner needs to take advantage of areas where fish have a tendency to school. Gillnetters like that too but need more open water to drift. Both types of gear may be set off the beach or may choose to fish midchannel --it all depends on the fish. Lots of variables here. All fishermen are to some extent dependent on luck in intercepting a profitable quantity of fish. Fish also travel at various depths, often below the depth of the nets, only to come up again elsewhere. There is no assurance that fish missed at one location can be intercepted in another. Besides, there are no 'relatively large' management areas in Puget Sound given the large number of boats which can be expected to fish any given All Citizens opening. (30)

P. 113, last ¶, ..."...an unnecessary loss to the fishing industry, TO THE COMMUNITIES WHICH DEPEND ON THIS INDUSTRY AND TO THE STATE WHICH COLLECTS TAX ON THE ALL CITIZEN CATCH." (31)

(32) P. 114 Mit. measure #1..."Such areas can be identified by consulting with commerical fishing organizations, licensed fishermen and WDF.

(33) 2nd: Locating net pens near existing obstructions, etc. is not necessarily a good idea in some cases, simply because it could reduce a marginal area to an impossible area.

(34) 3rd: Not through the USCG notice to mariners alone.It should also go through organization newsletters and by prominent notice in the fishing trade publications such as Fishermen's News.

(35) 4th: "locate pens neare shore..". Not good enough. If its deep enough for fish pens, it's likely to be deep enough for many net fishermen, especially those with nets tapered shallower at one end to let them get in closer to the beach.

(36) 5th:"Locate pens away from WDF salmon management boundaries." Too gener. which side of the boundary? The only mitigative measure that has any real merit is the one which says, site net pens away from areas of intensive fishing.

(37) P. 129 re water quality.."increased concern about water quality, etc." is pure propaganda. Fish pens are marine feedlots. They produce pollution. This is an egregious and unnecessary paragraph.

(more...

What about lowering of property values? What about monitoring? All these discussions of impacts rely on standards being met and ideal husbandry practices being followed. But how to ensure that will happen?

Look at the example of Jefferson County. No monitoring of any consequence, if any. No resources to do so.

P. 131 ¶6 .....Note: Parametrix was a paid consultant for a proposed net pen complex in Discovery Bay and the results of many of their tests are being contested before the state Shorelines Hearings Board. If these results are cited, conflicting data provided by opponents should also be incorporated.

38 Some of the data (and maybe all of it, for all I know) selected by Parametrix to support siting pens in Discovery Bay was conducted on tides which would produce readings favorable to the net pen project and purported to be typical" tides. The point that there is no such thing as a "typical" or "normal" tide was illustrated by oceanographer Pat Wennekens of the Sierra Club's Twanoh chapter at the EIS Scoping hearing in October, 1988. Include Pat Wennekens as a source in this EIS. He too has conducted studies on Discovery Bay tidal action, etc.

P. 132.....Note the comparison that 25 to 50 net pen capacities are similar to a large wastewater treatment plant. A large wastewater treatment plant is a horrendous polluter, one we are apparently stuck with due to human biological imperatives. Fish pens are not so necessary.

39 I have fished near Point Madison when the treatment plant at West Point was discharging (i.e. on the opposite side of that body of water). Our nets repeatedly came up coated top to bottom with brown, foul-smelling residue. It was so obnoxious that some boats in Port Townsend installed water pumping devices to wash the nets as they came aboard. A large plant such as this must have an incredibly adverse effect on Puget Sound. I think it is hardly a recommendation that 100 fish pens, which this document seems to promote as a reasonable number, would equal two to four large treatment plants. I have seen what a single treatment plant can do and it's appalling. To argue that the pens would be spread apart only means that it might be less noticable --not that it wouldn't be there.

APPENDICES.....Finally, a note on that so-called study on the economics of salmon-farming by Robert L. Stokes. By virtue of being included in a public document, does that render it in the public domain for purposes of dramatic presentation? Please advise me. I have no idea what the chapter on property values is saying, if anything. But I don't think it matters since the author admits that

40 he had insufficient time and resources to use such methods as those employed in empirical inquiries. As literature, it rates far below Lewis Carroll's Jabberwocky, but it has entertainment possibilities nevertheless. I am sure the owners of waterfront and water view properties will find it highly amusing reading or listening once they can get their blood pressures back down.

A FINAL NOTE: WHERE DO THE AUTHORS GET THEIR AUTHORITY TO SUPPOSE

41 THAT 100 SALMON PENS IN PUGET SOUND IS A PLAUSIBLE OR ACCEPTABLE NUMBER? WHO HAS DIRECTED THEM TO USE THAT AS SOME KIND OF GIVEN?

<u>HAS THE STATE DIRECTED THE AUTHORS TO DEVELOP A BIASED REPORT?</u>

######

RESPONSE TO LETTER NO. 52: SOUTH POINT COALITION

1. See the response to Question 29.

2. See the response to Question 2.

3. Svein Mehli is not an expert in salmonid diseases or genetics. See the response to Question 25.

4. See the response to Questions 25, 26, 27, and 29.

5. Svein Mehli is a natural resource administrator in Norway. There is some debate concerning the validity of his testimony because his credentials are as an administrator and not as a scientific expert in the field.

6. Comments noted.

7. Comment acknowledged. The text has been revised to clarify that gillnetters fish at night.

8. Comments noted. See the response to Question 2.

9. Norway's experience with escaped farm fish is not as applicable to the situation here as you indicate. See the response to Letter 38, Comment 25. Testimony by Svein Mehli did not give the evidence of genetic impact that you implicate.

10. Svein Mehli is not an expert in salmonid populations genetics. Dr. Herschberger is an expert on this subject as is Mr. Seidel.

    While it is true that farm fish may be different in 20 to 50 years due to selective breeding, they aren't different now. If farm stocks become highly domesticated, perhaps very few escapees will survive to maturity. 3 out of 27 pending permits plan to use Pacific salmon. Genetic impacts are not an issue with Atlantic salmon.

11. Methods of disease screening identify known, and previously unknown, pathogens as well. Svein Mehli is not recognized as a fish disease expert.

12. Fish farm operators are required to report the occurrence of certain diseases. Also, periodic visits are made to aquaculture sites by WDF personnel.

13. This mitigation measure is not applicable to all situations. In all likelihood, diseased escapees would be infected with pathogens already found naturally occurring in our rivers.

14. The discussion of observer attitudes focused on visual quality and did not state that some observers would find fish farms "entertaining" to watch. However, some people do find over-water activity and structures visually interesting at

Response to Letter No. 52: South Point Coalition (continued)

certain locations because these activities and structures add complexity to the landscape.

15. Visual impact includes both whether the impact occurs and the magnitude of the impact. A fish farm facility that can barely be seen will have a substantially different visual impact than a facility that is immediately adjacent to the observer. The discussion of how various locational parameters affect visual quality indicated how the magnitude of visual impacts might change with observer location and facility placement.

16. Comments noted. Color slides of various Puget Sound fish farms are available from the Shorelands Division of Ecology.

17. Comment acknowledged. This statement has been deleted from the text for the FEIS.

18. Comments noted.

19. Clocksin has been added to the references.

20. Comment noted.

21. Comment noted. See the response to Comment 7.

22. The text has been revised for the FEIS.

23. Comment noted.

24. The text has been revised to include the time element.

25. Comments noted.

26. Comments noted.

27. Comments noted.

28. Comments noted.

29. Comment noted.

30. Comments noted.

31. It is not within the scope of this EIS to evaluate potential positive and negative economic effects of the fish farming industry.

32. Commercial fishing organizations include licensed fishermen.

Response to Letter No. 52: South Point Coalition (continued)

33. The language in the EIS reflects that fish farms should be located near natural obstructions which would normally force a gillnetter to avoid that area, or require drift nets to be pulled before encountering the obstruction.

34. As stated in the DEIS, the Notice to Mariners was used as an example of a means of notifying the commercial fishing industry. The Preferred Alternative includes a recommendation for additional notification to the commercial fishing industry.

35. There are areas in Puget Sound where commercial fishing activity takes place close to shore with tapered nets. The text has been revised to clarify this point in the FEIS.

36. Comment noted.

37. Comments noted. See the responses to Questions 9 and 12.

38. Comments noted.

39. Comments noted. See the response to Question 3.

40. Comment noted.

41. See the responses to Questions 3.

LETTER NO. 53

March 6, 1989

Writing & Design
for Public Relations
[redacted]
Seattle, WA 98104
(206) 622-2797

Governor Booth Gardner
Washington State Capitol Building
Olympia, WA 98504

re: enclosed

Dear Booth:

I realize you and your administration have been strong advocates of expanding floating net pen aquaculture in our state, but as a Democrat I hope you will support our Party's traditionally strong stand on environmental protection now by calling a moratorium on any new aquaculture projects until a politically neutral scientific inquiry can be conducted.

In addition, I would like to suggest that you and the various relevant state agencies contact Svein Mehli of Norway's Nature Management Ministry as a valuable resource and possible consultant. Mr. Mehli testified on behalf of Skagit County last November on the environmental hazards of salmon net pen aquaculture and has not only been involved in Norway's aquaculture issues, but also is a member of an international North Atlantic agency addressing these questions. He also might be able to suggest other scientists who would provide information and assistance in determining how to prevent the spread of disease to our valuable salmon resource. His address is:

Svein Aage Mehli
Head of Division
Directorate for Nature Management
Tungasletta 2
N-7000
Trondheim, Norway.

This is an extremely technical and complicated matter, but I understand there is scientific evidence suggesting the initial Dept. of Fisheries' statement that VHS has never appeared in Atlantic Salmon was in error. For this reason, and because so many potential diseases threaten salmon, I believe the only responsible thing to do now is to convene a thorough scientific inquiry into this industry.

Warm regards,

Barbara

Barbara Stenson
Partner

copies: Karen Marchioro, Chair, Washington State Democrats, L. Joe Miller, President, Marine Environmental Consortium

STATE OF WASHINGTON
OFFICE OF THE GOVERNOR

OLYMPIA
98504-0413

BOOTH GARDNER
GOVERNOR

March 14, 1989

Ms. Barbara Stenson
Powers, Stenson, Espinoza
616 First Avenue
Suite 200
Seattle, Washington 98104

Dear Ms. Stenson:

Thank you for your recent letter to Governor Gardner regarding aquaculture. The Governor has asked that I respond to your concerns.

I have attached a copy of the Governor's aquaculture policy which does not, as you say, strongly advocate expanding net pen aquaculture. Rather, this state's policy is to recognize that properly sited, environmentally sound aquaculture facilities can play a role in enhancing the production of aquaculture products.

The Governor is committed to environmental protection, and his policy reflects that commitment. The Department of Fisheries has expended a substantial amount of time preparing the draft programmatic environmental impact statement. Also, because of the importance to the state of our native salmon runs, the Department of Fisheries and Department of Wildlife are devoting extra time to disease issues.

Again, thank you for writing, and know that I have forwarded your letter to Eric Hurlburt at the Department of Fisheries for reference.

Sincerely,

Kaleen Cottingham

Kaleen Cottingham
Executive Policy Analyst

Enclosure

cc: Eric Hurlburt

RESPONSE TO LETTER NO. 53: BARBARA STENSON

1. Comments noted.

2. See the response to Question 29 and Appendix G.

LETTER NO. 54

March 10, 1989

Ron Westley
Dept. of Fisheries
115 General Administration Building
Olympia, Wa. 98504

Dear Sir:

1 As a waterfront owner I am extremely concerned about placement of the salmon pens in Puget Sound. A large group of them has been zoned to be placed between Bells Beach and Fox Spit on Whidbey Island.

I read in the papers about the new study done by or for the Dept. of Fisheries that says in one place that fish pens are good and don't pollute, but then seems to turn around and say that if they are in the wrong place or poorly run they can cause environmental problems. "Fish feces and uneaten food can accumulate on the bottom and deplete oxygen, making the sediment and water toxic, Etc." It goes on to say these pens can cause odors and algae bloom.

Placement beside waterfront residential property has got to be considered the wrong place by any criteria.used. The feces and excess feed plus the antibiotics used will wash onto the shores in front of the homes. Last Fourth of July weekend I counted over 100 small children playing in the sand and shallow water just within my limited view. Many more would have been farther up the beach and at Fox Spit. This happens most weekends during the summer. These children should not be exposed to pollution from salmon pens.

If you believe the feces, etc. would be washed out rather than onto the beaches all you would have to do in the summer is get onto a rubber raft and try to get out onto the water. If you don't row you are continually pushed onto the shore. The driftwood pieces follow the same pattern. The south end of our beach is a prime collection spot, as is the shore between Bells Beach and Fox Spit. So the tides would bring the pollution in, not out.

We also pick mussels on that beach. Just north of the last houses is a great area, the mussels grow large and sweet. They would be inedible with the pens nearby.

I understand the Fisheries Dept. believes the fishpen owners and operators will not throw dead or diseased fish into the water. Oh yes, just like the other industries did not dispose of their wastes

illegally. That's why we are having to clean up so many sites now. What makes you think these people are more honest and sentientious than other business people? Laws are needed to control the operators, and most impertantly salmon pens need to be kept away from residentical property. (2)

I firmly believe the counties should have control over this placement as they know their areas better than someone in Olympia who probably has never seen most of the sites. (3)

Thank you for reading this letter.

Yours truly,

Jacqueline Maner

Jacqueline Maner
2725 91st St. S. E.
Everett, Wa. 98208

RESPONSE TO LETTER NO. 54. JACQUELINE MANER

1. Comments noted. The EIS did not evaluate any individual sites. See the response to Question 1.

2. Comments noted. See the response to Question 9.

3. Comment noted. Counties and State agencies work together through various regulatory mechanisms such as the shoreline permitting program to ensure that fish farms are properly sited.

FRIDAY HARBOR LABORATORIES
UNIVERSITY OF WASHINGTON
620 UNIVERSITY ROAD
FRIDAY HARBOR, WA 98250
3 March 1989

Dr. Ron Westley
Project Manager
Washington Dept. of Fisheries
115 General Administration Building
Olympia, WA 98504

Dear Dr. Westley:

This letter is a comment on the draft progammatic EIS, Fish Culture in Floating Net Pens.

1 My first comment is that the effort that you and others at the State Dept. of Fisheries have put into it is greatly appreciated. The material will be a very useful reference.

2 The programmatic EIS will be read and used by non-scientists. In reading sections on benthos I noticed several places where additional information or rephrasing would help non-specialists understand the probable and possible effects of net pens.

3 Suggestions on mitigating impacts look good to me, but it is often unclear which procedures have been proven to work and which are expected to work on the basis of available evidence. It would take only a few additional statements to make the distinction obvious to the non-scientist.

4 p. ix: Someone reading the major conclusions would not realize that immediately beneath and near the pens the sea life on the bottom is usually severely affected. Recovery times are a few years for many animals and probably much longer for others. I would expect recovery of geoducks to take quite a long time. It would be more informative to say, "Locally the effects of sea pens on the seabed are usually severe, but these effects extend only a short distance from the pens and nearly complete recovery is expected within 5 to 15 years after removal of the pens." The question of recovery times also appears on p. 24. In addition to benthic surveys following pen removal, estimates could be based on rates of recruitment and growth of sedentary large animals such as clams.

5 In the text, the order of presentation of effects on the benthos moves progressively towards the pens. Readers need some advanced statement of the range of effects. It would help to have a brief topic statement on the usual effect beneath the pens (anaerobic sediment with almost no macroscopic animal life) and the distances at which effects are usually indetectable.

6 pp. 21, 22 and elsewhere: Species that are indicators of pollution should be described as such where they are mentioned. *Capitella capitata* is one example. "Indicative of organic enrichment" doesn't carry enough information to the non-specialist.

On mitigating impacts: I found it difficult to evaluate evidence and criteria on mitgation of impacts and a few added statements would help greatly. The qualifying statements on the model will be useful for non-specialists. Can a similar brief evaluation of the data be included? (7)

I was left unsure about the expected time-course of changes under pens over deeper water in faster currents. The Squaxin Bay study (Technical appendix A) seems to suggest gradual changes over about 1.7 years but I could not tell if changes resulting from the pens had stopped. Have studies continued long enough to determine whether effects would continue to increase in that situation? Are there any long established pens here or in Europe or Japan that are in deeper water with faster currents and have shown the effects over a longer period? (Also, if there are no data for pens over deeper water and faster currents beyond two years, this should be mentioned.) (8)

p. 26: It would help if the merits of small effects over a larger area were explicitly compared to severe effects in a smaller area. (9)

p. 68: It is suggested "Where adverse impacts are unavoidable, require mitigation through enhancement of the affected species at the site or in the immediate area." I strongly agree with the recommendation as far as it is practical. It would be very helpful to give some practical examples and references for successful cases for benthic animals. (10)

It is outside my field, but is the viral disease now reported for some salmon in Washington possibly from imported species? If there is much reason to suspect this, it should be mentioned in the revised EIS. (11)

Thanks for the opportunity to review the draft. I'm used to having two or three reviewers for manuscripts. It must be interesting to have hundreds.

Sincerely,

Richard Strathmann

Richard Strathmann
Resident Assoc. Director, Friday Harbor Laboratories

RESPONSE TO LETTER NO. 55: UNIVERSITY OF WASHINGTON FRIDAY HARBOR LABORATORIES

1. Comment noted.

2. The text has been revised to address your concerns.

3. Comment noted.

4. Comments noted. The effect of fish farms on bottom-dwelling organisms cannot be characterized as usually severe. Some of the Puget Sound farms sited in the 1970s, such as at Lopez Island, did have a severe impact on the benthos beneath the pens because of inadequate depth and currents. However, with sufficient depth and current velocity some of the more recently sited farms are showing little impact on the benthos.

5. Comments noted. Distances at which effects are undetectable varies with site specific conditions such as water depth and current velocity. Studies that measured the distances where a number of parameters were undetectable were discussed in the EIS.

6. Comment noted. *Capitella capitata* is widely distributed throughout Puget Sound in both enriched and non-enriched environments. It is not in-and-of-itself an indicator of pollution, but rather it achieves high abundance in areas that have significant environmental organic loading. "Indicative of organic enrichment" is a more precise term than the general term "pollution" and is used here to specifically indicate the type of perturbation occurring in the benthic environment. See also the response to Letter 38, Comment 22.

7. Comment noted.

8. There are no known studies of long term impact of deposition under salmon farms under similar conditions to those found in Puget Sound. European and Canadian farms typically have much higher fish densities and less rigorous siting review processes and consequently are not reliable sources of information on the long-term impacts of sedimentation.

9. Concentration of the fish farm sedimentation in a smaller area could result in substantial deleterious effects which were documented in the DEIS. Spreading the same sedimentation and organic enrichment load over a larger area would dilute the effects of the sedimentation and retain a more normal benthic community.

   As the diversity of organisms would likely remain higher in the area where the sediment deposition is more diffuse, the food-energy pathways would be more diverse, and the increased nutrient effect of the sedimentation would be utilized more rapidly. Thus, although the effects of the farm would be spread over a larger area, the relative per unit area perturbation of the benthic community would be less and of shorter duration.

10. Comment noted.

11. Viral infections of salmon such as IHNV, IPNV, VEN, and EIBs are indigenous to Washington. VHS, which was found last year in a limited area in Washington State, was not known to previously occur here. We have no evidence to suggest that this pathogen was introduced in imports. See Appendix G for further information.

LETTER NO. 56

SUITE 4400 · 1001 FOURTH AVENUE PLAZA · SEATTLE, WASHINGTON 98154 · (206) 624-3600

Riddell, Williams, Bullitt & Walkinshaw

LAW OFFICES

January 29, 1988

RODNEY L. BROWN, JR.

Mr. Duane Phinney, Chief
Habitat Management Division
Department of Fisheries
Mailstop AX-11
Olympia, Washington 98504

Re: Aquaculture Programmatic Environmental Impact Statement

Dear Mr. Phinney:

Our office earlier submitted comments on behalf of Save Our Shores, a citizens group concerned about the environmental and use impacts of salmon net pens in Puget Sound. We are now writing to express our concerns about some information that we recently received regarding the PEIS.

We have recently been told that the Department of Fisheries will exclude from the PEIS the impacts of aquaculture on existing commercial and sport fisheries. If this information is correct, we want to register our strongest objections. Aquaculture in the form of salmon net pens could have serious impacts on commercial and sport fisheries, both environmental and economic. For example, escaped fish can transmit disease and genetic deficiencies to the free-swimming fish population. Other environmental impacts, such as destruction of herring habitat or fish nursery sites, can also harm the fisheries resource. Finally, the physical obstruction of salmon net pens can remove certain waters from fishing. (1)

Since salmon net pens could cause these impacts and since the impacts would be severe, the PEIS should study these impacts on commercial and sport fisheries and should analyze alternatives to mitigate or prevent the impacts. We would appreciate hearing how the Department intends to address these impacts. If you have any questions, please do not hesitate to give us a call at any time.

Sincerely,

Rodney L. Brown, Jr.

Rodney L. Brown, Jr.

RLB:aag
cc: Mr. Joe Miller

TELEX RCA 296338 RWBW UR · TELECOPIER (206) 467-1914

RESPONSE TO LETTER NO. 56: RODNEY L. BROWN, JR.

1. Comments noted. The FEIS discusses the potential impacts to commercial fishing in Section 6.3, and recreational fishing in Section 6.5.

LETTER NO. 57

AQUATOX
P.O. BOX 53
INDIANOLA, WASHINGTON 98342

March 14, 1989

Ron Westley, Project Manager
Washington Department of Fisheries
115 General Administration Bldg,
Olympia, Washington 98504

Dear Mr. Westley:

Enclosed you will find a line item comment review of the Draft Programmatic Environmental Impact Statement for Fish Culture in Floating Net Pens.

Thank you for your attention.

Sincerely,

Annamarie K. Johnstone

Annamarie K. Johnstone, Ph.D.
Marine Microbiology, Toxicology

cc: RM
JM

DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

FISH CULTURE IN FLOATING NET PENS

LINE ITEM COMMENTS

Prepared by:

Annamarie K. Johnstone, Ph.D.
AQUATOX
P.O. Box 53
Indianola, Wa. 98342

Page Line	
P.16, L.28,29	Weston (1986) reported that food conversion ratios for salmon raised in Puget Sound are typically 2:1, the production of 1 kg of salmon requires 2 kg of feed. The University of Stirling (1988) related a typical feed conversion ratio (FCR) of 2:1 for Scottish net-pen farms, as well.
P.17, L.16,17	Weston (1986) estimated that 1600 lbs of solid waste (excess feed and feces) would be produced for every 2200 lbs of fish grown. The DPEIS used the word sediment rather than the term solid waste to describe his statement. I would argue that sediment is not produced, rather that solid waste is produced.
P.17, L.21,22	The DPEIS stated that an FCR of 1.5 may better represent current culture activities. Weston (1986) related an FCR of 2:1 for Puget Sound. Sediment is used again as opposed to solid waste.
P.21, L.38	Reich (1972) suggested that the presence of large numbers of *Capitella capitata* is indicative of polluted and semi-polluted conditions.
P.23, L.1-3	Methane production below salmon net-pens can stimulate the growth of methaneogenic bacteria. These bacteria are able to convert mercury to toxic methyl mercury, which can be bioaccumulated in shellfish and fish (Sieberth, 1979).
P.23, L.3-6	Leiffrig (1985) described H_2S production beneath salmon net-pens to be 10X greater than reference levels. A concentration of .002 ppm H_2S is the upper limit of continuous exposure for optimum fish health. Jacobsen and Berglind (1988) reported that the use of antibiotics in fish feed will cause an increase in sulphide ion activity of 10 to 100X reference levels.

	Page	Line	
7	P.23	L.10-12	Beggiatoa bacteria result from overfeeding in aquaculture and indicate an H2S habitat (Sieberth, 1979).
8	P.23	L.37-39	Beggiatoa is found primarily in habitats rich in H2S, such as waters polluted with sewage, as this bacterial species utilizes H2S as an energy source (Brock, 1970).
9	P.60	L.29-35	The DPEIS indicated (p.16,line 40) that food pellets do not decompose appreciably as they settle to the bottom. Therefore, considering 5%-20% feed wastage (p.17, lines 14,17) and 20 to 30 days antibiotic treatment per year (Weston, 1986), a significant amount of antibiotic could accumulate on the substrate below the net-pens. In addition, 90% of the antibiotic in ingested feed is excreted by the fish (p.58, lines33-36) due to calcium affinity. As feces account for 1/3 of all ingested feed (Weston, 1986) and if 90% of the antibiotic in feed is excreted, approximately 33% to 44% of antibiotic fed is eliminated from the net-pens.
10	P.60,L.39-40		Jacobsen and Berglind (1988) recorded the half life of the antibiotic (OTC) in sediments below net-pens to be about 10 weeks and in one case as much as 12 weeks.
11	p.60,L.40		Antibiotic accumulations were found to be relatively persistent in anoxic sediments.
12	P.60,L.42		In the field study, OTC was found in sediments from four of the four farms surveyed. In eight samples from the four farms only one was negative.
13	P.60,L.42 P.61,L.1		Antibiotic levels in the sediments were 0.13 to 4.9 ppm.
14	P.61,L.1-3		Jacobsen and Berglind (1988) reported that OTC concentrations in the pilot study were high and strong effects on microorganisms might be expected. The levels of OTC in fish farms indicated that antimicrobial effects and strain selection in the sediments could be expected for more than 12 weeks after administration of OTC to fish. They added that long term exposure of microbes to low concentrations of antibiotics was known to enhance development of resistant microbial strains.

Page Line	
P.61, Line 4	Jacobsen and Berglind (1988) related that degradation and leakage from the surface layer was probably enhanced in their study because of stirring and aeration due to sampling. They indicated that the observed half-life of OTC in sediments (10 weeks) may be a conservative estimate of the true half-life under similar field conditions.
P.61, Line 7,8	In the pilot study, the authors noted that OTC enhances the development of anaerobic conditions and is relatively stable in anoxic environments.
P.61, Line 10,11	The Wekell (1989) citation is an unwritten study at this time, so that a publication is not available for perusal and critique. Information concerning location of suspended oysters in relation to net-pens (between pens or below bottom surface of pens), number and duration of antibiotic treatments to fish, concentration of antibiotic fed to fish, location of control shellfish in relation to the net-pens, specific species and quantities of bacteria isolated from both net-pen and control shellfish and duration and dates during which the experiment was conducted is not provided by the DPEIS.
P.61, Line 16-25	See Jacobsen and Berglind (1988) notes above and on page 2 of this comment review.
P.68, Line32-34 P.69, Line 1,2	Atlantic salmon (Salmo salar) are susceptible to salmonid diseases of proven viral etiology namely IPN, IHN and VHS (MacKelvie and Artsob, 1969, Mulcahy and Wood, 1986, Wolf,1988 and DeKinkelin and Castric,1982) as well as diseases in which a viral etiology is suspected such as VEN and UDN (MacMillan, 1980,Lounatmaa and Janatuinen, 1978). Bacterial diseases of proven susceptibility in S. salar include Bacterial Kidney Disease, Cytophaga sp. infections, a new Aeromonas infection and Vibriosis (Paterson et al, 1981,Kent et al, 1988a, Cox et al, 1986, Sawyer et al, 1979). Salt water reared Atlantic salmon are subject to pancreas disease of unknown but probably infectious etiology. Documented protozoan parasite diseases of S. salar include Ichthyobodo, Costia (Ellis and Wooten, 1978) and Kudoa thyrsitis (Harrell and Scott, 1985).
P.69,Line 3-7	The disease effect of introduced non-native stocks is subtle, according to Mills, 1982. The causative agents of disease are already present in the environment but do not normally

Page	Line	
P.69	Line 3-7 (cont.)	cause disease, as the native species usually have developed the appropriate immunity. When non-native species (such as the Atlantic salmon), with no immunity, are introduced into the environment, they can be susceptible to the new disease agent. This allows the pathogen to become more prevalent in the environment, which in turn permits more virulent strains of the pathogen to be selected. The virulent strains can then infect the native species of fish.
P.73	Line 38-40	The risks involved with disease transmission by an introduced exotic species may be predicted. Introduced species can cause disease if they are carriers of an exotic disease or if the introduced species is without immunity to a disease in the new habitat. Certification of eggs may eliminate carriers, but the procedure will not address immune deficiencies. A survey of known diseases of the former and future habitats of the proposed introduction (such as Salmo salar) will indicate if introduction is a valid option.
p.74	Line 9-13	Catastropic structural failure of net-pens is not rare. A "1000-year" storm event, which caused the break-up of net-pens, occurred during the week of February 5th 1989 in British Columbia. Severe winds were responsible for damage or loss of pens at seven separate locations. Fifty percent of the pens at one location were washed away and thousands of fish escaped, all were Pacific salmon species (Harrower, 1989, Personal Communication). As net-pen farms are established in deeper water, to facilitate better flushing, wind effects to net-pen structures will become more of a problem. Unfortunately strong winds occur frequently.
P.76	Line 24-29	See comments to pp. 68, 69 of DPEIS on pp. 3,4 of this comment review.
P.77	Line 10-15	Confirmatory tests have now established that returning coho and chinook salmon at two hatcheries in Washington state carried the VHS virus (Viral Hemorrhagic Septicemia). This disclosure in February 1989 indicates that a European viral salmonid pathogen is now present in the indigenous salmon species of the Pacific N.W. Wolf (1988), in his noteworthy description of VHS, related that a native, European salmonid such as the Atlantic salmon (Salmo salar), Brown trout (Salmo trutta) or the Danube trout (Hucho hucho) were possibly the historical source of VHS disease in Europe, eons ago. Rainbow trout

Page	Line	
P.77	Lines 10-15 Cont.	(Salmo gairdneri), indigenous to N. America, were introduced in Europe in 1879 where they were subjected to virulent epizootics of VHS disease, due to their lack of immunity to the viral pathogen. At this time, scientific evidence indicates that VHS virus is shed with the eggs, vertical transmission is rare, does not occur or has yet to be documented. Natural infections are caused by horizontal transmission of waterbourne viruses, which are shed during epizootics or by asymptomatic carriers (fish recovered from the disease) when water temperatures are low (Wolf, 1988).
P.77	Lines 25,26	As VHS virus is now present in the indigenous Pacific N.W. salmonids, it is evident that federal and state regulations have not been successful in preventing the introduction of an exotic fish disease.
P.77 P.78	Lines 41,42 Line 1	A risk exists, as well, for transmission of disease from pen-reared fish. Egidius et al (1983) reported that yearling Saithe (Pollachius virens), which had been attracted by salmonid feed, were trapped in net-pens at a commercial salmon farm in Norway. The fish died within a few days in June from Vibriosis. Mortality amongst trapped Saithe ranged from 75% to 100%, possibly because Saithe in the salmon farm were novices to Vibrio epidemics and had not experienced previous infection.
P.78	Lines 25-28	Meyers (1984) also reported that salmonid strains of IPN (Infectious Pancreatic Necrosis) virus have been isolated from several species of marine bivalves. The isolates were biochemically, biophysically and serologically indistinguishable from reference strains of IPN in fish and proved pathogenic for rainbow trout fry. The IPN virus was stable for fifty or more days in the resevoir shellfish.
P.78	Lines 28-31	The example from Meyers (1984), listed above, indicates concentration of IPN virus in shellfish and the implied possibility of disease transmission to wild fish and other shellfish. IPN viruses (Birnaviruses) have been associated with mortalities of Molluscs (Tellina sp.) in England and Atlantic menhaden (Brevoortia tyrannus) on the East coast of the USA (Toranzo and Hetrick, 1982).

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P.78	Lines 41-43	DiSalvo et al (1978) reported that Vibrio anguillarum was isolated as a pathogen of oyster spat from commercial culture in California. The authors indicated that V. anguillarum is routinely found in hatchery waters which are pumped from the ocean.
P.79	Lines 5-7	Lovelace et al (1968) noted severe oyster mortalities in Chesapeake Bay where higher levels of Vibrio were present than at a commercially productive oyster ground.
P.79	Lines13-18	Isolation of VHS virus from returning Coho and Chinook salmon in Washington state last month indicates that the 90 day quarantine procedures in effect in this state are not adequate to prevent the spread of an exotic virus from Europe. British Columbia requires a minimum 12 month quarantine for imported eggs during which the young fish must be inspected at least 4X by a pathologist. The last inspection must occur after smolting. In addition no importation of eggs is permitted from Europe or countries where VHS has been reported or is likely to be present (Weston, 1986). In comparison, Washington state policy allows Atlantic salmon eggs to be imported from European countries which reportedly have had VHS epizootics. Viral inspection of imported eggs by DOF may occur.
P.79	Lines 36,37	Currently there are 13 net-pen farms in Washington state, a total of 100 are planned for in the future (DPEIS, 1989). Implementation of regulations designed to prevent the introduction of exotic fish pathogens has already failed with only 13 farms in operation.
P.79	Lines 41,42	An extremely serious disease introduction has occurred and possibly more will occur before broodstocks are sufficient to maintain 13 farms.
P.80	Lines 1-3	The transmission of disease from net-pen fish to wild fish has never been adequately studied due to the inherent difficulties in research procedures and lack of fiscal support. The latter is probably the significant reason, as studies might indicate an impact on the environment from commercial culture.
P.80	Lines 3,4	See comments to p. 79, lines 13-18 of DPEIS on p. 6 of this comment review.

Page	Line	
P.80	Lines 9,10	The diseases of net-pen cultured salmonids most likely occur with greater frequency and virulence due to captivity and crowding, but the diseases are infectious and are caused by pathogens. Susceptible wild stocks of fish could be infected with these pathogens from cultured fish (See comments to p.77 lines 41, 42, p.78,line 1 of DPEIS on p. 5 of comment review).
P.80	Lines 14,15	Risk of disease transmission from captive net-pen reared fish will continue to increase as the number of salmon farms increase in number.
P.80	Lines 16-18	Salmon net-pen wastes can enrich the bottom sediments so that opportunistic bacteria,such as the Vibrios,can be resuscitated and grow replacing the resident species of bacteria. Vibrio anguillarum which is pathogenic to fish and possibly molluscs could be part of this floral bloom. Opportunistic bacteria can attach to fatty particles common in fish feed and ascend from deep water to surface waters due to bouyancy of the particles. At the surface, the bacteria can be rapidly dispersed toward shore by wind and wave action (Grimes et al, 1986). Shellfish can act as disease resevoirs (Meyers, 1984) and accumulate the particles containing bacteria. Concentrated bacterial populations could be released by the shellfish during depuration.
P.80	Lines 19-21	Vibrio anguillarum has been found in oyster spat mortalities in California (DiSalvo et al, 1978), not just in Europe and the E. coast.
p.80,	Lines 25-30	Importation of salmon eggs from other continents is not advised as the current system of certifying salmon eggs has not been effective in preventing the introduction of exotic diseases such as VHS.
P.116	Lines 25-28 Lines 32,33	By the process of elimination after reading this paragraph, I deducted that Clostridium perfringens, Vibrio parahaemolyticus and Vibrio alginolyticus were possibly isolated in shellfish samples in this unwritten study (Wekell, 1989, Personal Communication). The bacterial species described are known to be human pathogens. Clostridium perfringens is an excellent tracer for incursion of pollution into the sea,

Page	Line	
P.116	Lines 25-28 Lines 32,33 Cont.	where the species can possibly incorporate into fish and shellfish (Sieberth, 1979). Clostridium perfringens causes mild food poisoning with the ingestion of contaminated fish (Zinsser,1980). The clinical affects of V. parahaemolyticus and V. alginolyticus were described on p.115, lines 23-26 of the DPEIS.
P.116 P.117 P.118	Lines 34,35 Lines 24,25 Lines 8-10	I would concur with Wekell (1989, Personal Communication) that further research to determine the bacterial characteristics of fish feed would be desirable. Although Salmonella cubana, which was found in fish feed by Wekell and associates,is not a human pathogen, its presence is an indicator of improper feed preparation or storage. Temperatures below 40°F halt Salmonella proliferation in foods, while temperatures above 140°F kill the organisms (Zinsser, 1980). A publication from one proposed salmon farm related that fish mortalities collected daily at the net-pen site would be resold to feed manufacturers for incorporation into their product (Swecker Salmon Farm,1988).
Appendix Fish Disease P.2	Line 40	In vitro studies by Toranzo and Hetrick (1982) indicated that IHNV and IPNV survived longer than Poliovirus in estuarine and sea water at 15°C. and 20°C. The survival of IHNV was favored in fresh water as compared to IPNV.

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Summary:

The DPEIS appears to be biased in favor of net-pen finfish culture. To enhance this bias, data was arbitrarily selected from cited scientific literature. As an example, unproven, but possible viral accumulations in shellfish were described from Meyers (1984), while proven viral accumulations in shellfish were not reported from the author's paper (See p. 78, lines 25-28, 28-31 of line item comments). 44

In addition incorrect data was presented in the Statement as compared to data contained in scientific papers. For example, antibiotic accumulations in sediments and the number of sites involved were incorrectly reported from Jacobsen and Berglind (1988)(See p.60, line 42, p.61,lines 1-3 of line item comments). 45

An unwritten study by Wekell (1989) was reported in the DPEIS which described an assay for human pathogens in shellfish near fin-fish net-pens. A reader is left with the process of elimination rather than information to ascertain the impact from accumulations of harmful bacteria, possibly three species of human pathogens were isolated (see p. 116, lines 25-28,32-33 of line item comments). 46

Rewriting the DPEIS will not correct the significant impact problems of net-pen culture, such as the occurrence of an exotic European disease in spite of current quarantine procedures (See p. 79, lines 13-18,36,37,41,42 of line item comments). Disease studies involving wild fish, exotic fish and cultured fish are needed (See p. 80, linesl-3,p. 68, lines 32-34, p.69, lines 1,2), epidemiological surveys for the introduction of exotic species should be initiated (See p. 73, lines 38-40,p. 69, lines 3-7) and radical changes in quarantine procedures for exotic egg imports are essential (p.80, lines 25-30). In my opinion, a moratorium in aquaculture development and egg imports from Europe is advised, until these problems can be properly addressed. 47

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RESPONSE TO LETTER NO. 57: ANNAMARIE K. JOHNSTONE

1. A 2:1 food conversion ratio is considered conservative. Recent studies at the Norwegian Institute of Aquaculture Research (Åsgård et al. 1988) have shown FCRs as low as 0.94:1. As stated in the text of the DEIS, FCRs range from 1:1 to 2:1.

2. Comment noted.

3. Comment noted.

4. Comment noted.

5. Comment noted.

6. See the responses to Letter 38, Comment 22; and Letter 55, Comment 6.

7. Comment noted.

8. Comment noted.

9. Comment noted. This subject was discussed in the DEIS.

10. Comment noted. This subject was discussed in the DEIS.

11. Comment noted. This subject was discussed in the DEIS.

12. The text has been revised for the FEIS.

13. The text has been revised for the FEIS.

14. Comment noted. This subject was discussed in the text of the DEIS.

15. Comment noted. This subject was discussed in the text of the DEIS.

16. Comment noted. This subject was discussed in the text of the DEIS.

17. The information was obtained from FDA and is all that is available at the time of publication.

18. The text has been revised for the FEIS.

19. The reviewer indicates that Atlantics are susceptible to infection by fish pathogens that affect all other salmonids. The comment is a statement of fact.

20. It is true that in some situations, native stocks have more resistance to a "local" pathogen that a non-native stock of fish. For example, steelhead trout native to the Columbia River have more resistance to *Cecatomyxa shasta* than Oregon

coastal stocks. Observations of Atlantic salmon, which are native to North America, appear to have more resistance to native pathogens than our native stocks. Of particular note is the tolerance of BKD by Atlantics while chinook and coho are quite susceptible to bacterial kidney disease. It should be noted that any disease occurrence comprises a complex situation involving the pathogen, the environment, and the host. Though it may be possible for a susceptible (exotic) host to amplify the number of pathogens more than indigenous stocks, this has not been observed in net pen culture in Puget Sound. Furthermore, amplification of a pathogen does not necessarily result in an increase in virulence.

21. Comment acknowledged. Prior to the introduction of an exotic species, it is prudent to determine if indigenous pathogens could cause catastrophic loss in the imported species. As stated previously, and in Comment 20, the disease process is complex and composed of many elements. Your generalization concerning pathogen amplification may or may not be valid. Furthermore, Atlantic salmon in particular are no longer considered to be exotic to Washington State or North America. Their demonstrated ability to survive after exposure to indigenous pathogen provides contrary evidence to your comment.

22. Comment noted.

23. See response to Comment 19.

24. See Letter 1, Comments 18, 19, and 20. Also, see the response to Question 29.

    Also, our native steelhead and rainbow experience loss to IHNV (a native pathogen at a level which is equal to or exceeds losses in rainbow to VHS in Europe). The reviewer assumes that the isolation of VHS was the result of transfer from Europe and inadequate regulations. There is no evidence to support that hypothesis.

25. See response to Comment 24.

26. The study you site (Egidius et al. 1983) also pointed out the Saithe experience mortality in natural environs due to vibriosis with no connection to fish farms. However, it is not a surprise that a fish which likely was not immunized, as are cultured fish, and was trapped in the pen environs subsequently became infected and died. This in no way can be construed to demonstrate that pathogens in net pens cause disease in wild stocks.

27. The draft contains an accurate summary of the study mentioned.

28. See the response to Comment 27.

29. As noted in the DEIS, *Vibrio anguillarum* is not a species of bacteria that has been associated with oyster larval mortalities in the Pacific Northwest.

Response to Letter No. 57: Annamarie K. Johnstone (continued)

30. The association of oyster mortalities with areas high in vibrios does not demonstrate cause and effect.

31. See Appendix G. There is no demonstration of connection between Atlantics and isolation of VHS in chinook and coho. Furthermore, this phenomenon is not related to a 90-day quarantine period. Washington State policy does not allow any live eggs from any species to be imported from geographic areas where VHS is known to occur.

32. See Appendix G.

33. See the response to Question 29.

34. See the response to Question 26 and Letter 1, Comment 16.

35. See the response to Question 26 and Letter 1, Comment 16.

36. See the response to Question 26 and Letter 1, Comment 16.

37. See the response to Question 26 and Letter 1, Comment 16.

38. The point of the comment is not clear. The subjects mentioned in the comment are addressed in the DEIS and the FEIS.

39. Comment acknowledged. The phrase "the east coast of" has been eliminated from the text of the FEIS.

40. See response to Comment 31.

41. The point of the cited study is to compare shellfish from fish farm and non-fish farm sites. As noted, no differences were found.

42. Recommendations regarding food storage and further research were included in the DEIS, and are included in the Preferred Alternative in Section 6.4 of the FEIS.

43. Comment noted. Even though IHSV and IPNV may survive longer than poliovirus in seawater, that period is still very brief.

44. The important point is the meaning of results indicating the presence of fish viruses in shellfish. The DEIS makes a reasonable interpretation of the technical findings.

45. Comment acknowledged. The text has been revised for the FEIS.

46. See the response to Comment 41. At stated in Appendix G, the isolation of VHS in Washington was not as a result of inadequate regulations.

47. Disease studies continue throughout the world on a variety of species and pathogen, and these studies need to continue. However, there is no evidence to suggest that a moratorium on aquaculture development, or the prohibition of importing eggs from Europe under the existing regulations and policies, will result in a decrease in risk to the wild or cultured resource. For informational purposes, no legal Atlantic salmon eggs were imported in 1988 and 1989 and only a limited number were imported in 1985, 1986, and 1987.

These comments include pages 1 through 3 and an addendum, page 4 which addresses fish pen net cleaning.

LETTER NO. 58

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1834 West 7th St.
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April 4, 1989
page 1 of 3 pages

Department of Fisheries

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Re: draft Programmatic Environmental Impact Statement
Fish Culture in Floating Net Pens

Following are commentson the above draft environmental impact statement.

I am making these comments because I live in Port Angeles, Washington and Sea Farms of Norway has the equivalent of 90 fish pens now sited in Port Angeles Harbor.

To my knowledge, the Sea Farms installations are totally free of any monitoring, regulation or enforcement by any State, County or City agency. (1) How can the public be assured that there is no pollution of water, sedimentation pollution, damageto vegetation, natural sea life or shorelines?

Further, these 90 fish pens are not subject to real estate tax, sales tax, or B/O tax. Sea Farms is subject to a token fee of approx. $250 per acre, which amounts to approx. $2000. a year for their eight acre site.

90 fish pens have the capacity to raise 900,000 lbs. of fish per year at a selling price of $3.50 to $5.00 per pound. (2)

What other business, major or small, in Washington State has this kind of tax advantage??

Following is a brief history of Sea Farms of Norway, (name has, I believe now been changed to Sea Farms of Washington).

The original permit for Sea Farms was to raise only Atlantic Salmon.

In February, 1984 Sea Farms requested and received an amendment to their permit to also raise rainbow trout in their pens. The reason stated by Jon Lindbergh, Sea Farms' agent was that "The number of Atlantic salmon smolts available in 1984 will be less than anticipated and Sea Farms would (3) like to use the pen space for another cash crop." The number of trout to be raised was never stated. (Daily News, Port Angeles, WA. Feb. 27, 1984)

Sea Farms is an international company and operates fish farms in Europe and North America as well as hatcheries which provide smolts (young salmon) to other salmon farms. Do they import these smolts from Europe and what kind of monitoring does the State do to regulate same?

In December, 1984, Sea Farms began operation of a 50 pen fish farm in Port Angeles Harbor.

August 15, 1985, their permit was amended to permit the raising of Coho and Chinook Salmon.

Dept. Fisheries, Ron Westley
Re: draft Fish Culture in Floating Net Pens

In 1986, Sea Farms applied for a second fish farm site to house 50 pens, (later reduced to 40 pens) to occupy a total of eight acres for both sites. I believe they hurried to site these additional pens in order to make sure they were not governed by the issuance of State guidelines then in process for the siting of fish pens.

In 1987 Sea Farms got a revision in their permitsto change plastic pens to galvanized steel and to increase the size of the pens but reduce the number of pens at the second site from 40 to 32 and still occupy the same harbor space and produce the same quantity of fish. (The two sites contain the equivalent of the original 90 total fish pens).

What type andto what extent does pollution in various forms exist at the siteof these Port Angeles fish farms? There is no way of knowing because there is no agency regulation of these fish pens, the water quality, sedimentation pollution below the pens, pollution of natural vegetation and sea life.

The Puget Sound Water Quality Authority has stated: "Sediment contaminatio has beenassociated with diseases in fish and damage to the other animals that live in and on the bottom. The fact that significant sediment contami tion exists in Puget Sound, when water quality is considered good, implies that existing water quality programs have not protected the sediments from degradation. Regulatory programs have focused almost entirely on water rather than sediment quality."

Sea Farms stated a 50 pen capacity gives them capacity to harvest about 500,000 poundsof fish per year. They have the capacity for 90 pens which gives them the capacity for 900,000 pounds of fish per year. Multiply product production by potential pollution areas and there is reason for major concern.

Some of these potential pollution problems and other concerns of the public are mentioned hereafter.

4 There is no guarantee that the appearance of the new fish virus called VHS has no relation to fish farming in Washington waters.

5 Nutrients, fish feces, antibiotics do enter the water in the fish pens, around the fish pens and in the sediment under the fish pens.

An article in the Seattle Times, March 15, 1989 speaks to problems with fish farms:

"British Columbia fish farmers have been plagued with outbreaks of disease and plankton blooms that have decimated their crops...estimated mortality has averaged 30 percent." "estimated a third of the district's landfill space now going to dead farm salmon." "200,000 (two hundred thousand) salmon smolts in a typical farm would consume a ton of fish food per day plus about 200 pounds of antibiotics over a ten day period."

Dept. Fisheries, Ron Westley
Re: Draft Fish Culture in Floating Net Pens

The article also states that Pacific salmon, ~~cho~~ coho and chinook species could interbreed with wild fish stocks. The SeaFarms fish pen sites in Port Angeles harbor have permitsto raise rainbow trout, Atlantic salmon and Coho and Chinook Salmon. How is this being regulated or monitored?

It takes one to three pounds of fish meal to produce one pound of fish. What is the potential for pollution with this kind of demand for fish meal, much of which has antibiotics added to it, in 90 fish pens in close proximity with the ability and capacity to produce 900,000 lbs. of fish per year? In Port Angeles harbor?

The article also states "the Fisheries Department environmental impact study states if 100 fish farms were built in Puget Sound, they would produce 55 tons of oxygen consuming fish feces and uneaten food per day--more than that discharged into the Sound by the West Point and Renton sewage treatment plants combined. The 13 farms already here contribute 7.3 tons." A graph from the Washington State Department of Fisheries is reproduced in thearticle and shows said oxygen depleting waste which is produced by fish farms and comparedto other sources such as sewage treatment plants.

The article also states that the concentrations of nutrients and oxygen depleting waste are very diluted compared to sewage and that there is disagreement whether the pollution produced is serious enough to restrict aquaculture.

Port Angeles, Washington is under mandate to build a secondary treatment sewage plant. The mandate is from federal and state agencies.

What impact will the potential for pollution from Sea Farms penshave on water quality in Port Angeles harbor?

It is not enough to assume and speculate that all is well with the fish farming industry in Washington State. Each fish farm site must be monitored on a regular basis, as a separate entity, to truly determine the level and potential for pollution at that site relating to water quality, natural sea life, sedimentation and surrounding waters and shorelines.

Siting of new fish farms should be stopped until factual information relating to pollution of all kinds, at each specific site of each existing fish farm is documented.

Realistic lease fees must be levied on current and any new fish farm sites to pay for needed enforcement and monitoring by State agencies qualified to do so.

This is the only way the public can have a reasonable degree of confidence that there is a legal means to preserve our natural resources, Washington State's quality of lifeand the health and welfareof the general public.

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Port Angeles, W. 98362

Dept. Fisheries, Ron Westley

Hattie L. Berglund
April 4, 1989
Addendum page 4

Port Angeles Daily News
Friday, June 10, 1988

Net's sea aroma wrinkles PA noses

PORT ANGELES — Call it a sea smell that ripened.

That's the aroma that was noticeable in parts of downtown Port Angeles on Wednesday and Thursday when a 2,300-pound net covered with dead mussels, sea grass and kelp soaked up the sun on a port dock near North Oak Street.

Sea Farm Washington, an aquaculture company that operates fish pens in Port Angeles Harbor, had removed the net from one of its 43 fish pens in order to clean it of mussels, kelp and grasses, said Dan Boldt, Sea Farm manager.

Sea Farm hangs the 255-square-meter nets underneath its floating fish pens in order to keep seals and other predators away from the enclosures, said Ray Wilson, Sea Farm maintenance manager.

The company periodically cleans the nets of sea life by trucking them to a farm near Joyce and spreading the nets in an open field. Mussels and grasses dry and fall off of the nets in a couple of months, Boldt said. The nets are then reused.

Boldt said Sea Farm crews were delayed in moving the net because they were busy with shipments of fish.

But the nets' periodic days in the sun may be coming to an end, Boldt said. The company is looking into buying a washer that would strip the nets of sea life.

The above newspaper headline, "Net's sea aroma wrinkles PA noses" poses some important questions relating to the cleaning of fish farm pen nets. (11)

As stated, one net, from under one pen in Sea Farm' Port Angeles fish farm operation weighs 2300 lbs. and was covered with dead mussels, sea grass and kelp Multiply this by the equivalent of 90 fish pens and the potential for water quality degradation and sediment contamination beneath the pens from the multitude of dead sea life and sea vegetation which can be caught and trapped in each net is tremendous. How much falls into the water and settles to the bottom when each net is removed for cleaning?

The news article states that removing the netsand drying them in the sun off-sit will be discontinued and cleaning will be accomplished in awasher the company intends to buy and use which will strip the nets of sea life.

This is a June 10, 1988 news release (almost a year ago). Where is this washer sited? How are the nets removed for cleaning, or are they not removed? What is the water source for the washer? Does the processinvolve addition of chemicals to aid in removing the dead sea life and vegetation and in the disintergration of same? How is the water purified before disposal and where andin what quantities is it dumped? (12)

Again, my comments include the history of Sea Farm fish pens in Port Angeles harbor because there is no real, factual data compiled and documented by qualified State, County or City regulatory agencies which relate specifically to this site and this fish farm operation. (13)

Again, each site for fish pens needsto be regulated, monitored and enforcement policies adopted by law in order to adequately protect our environment and natural resources and the health and welfareof the general public.

Hattie L. Berglund

Submitted by Hattie L. Berglund
1834 West 7th Street
Port Angeles, WA. 98362

RESPONSE TO LETTER NO. 58: HATTIE L. BERGLUND

1. The text has been revised for the FEIS to evaluate existing regulations and guidelines that affect the fish farming industry. See the response to Question 9.

2. A discussion of taxation is outside the scope of this EIS.

3. Comments noted. This EIS does not evaluate individual sites. See the response to Questions 1 and 9.

4. See the response to Question 29.

5. Comments noted.

6. The FEIS contains an evaluation of existing regulations and guidelines. See the response to Question 9.

7. A food conversion ratio of 1.5 pounds of feed to 1 pound of weight gain is more typical of fish farms. Evaluation of specific sites is beyond the scope of this EIS.

8. Evaluation of specific sites is beyond the scope of this EIS.

9. WDF monitors every individual farm site. See response to Comment 8.

10. Comment noted.

11. The first paragraph on page 16 of the DEIS states that Weston (1986) found the amount of material from net cleaning that enters the water and settles to the bottom to be a relatively small portion of the overall sedimentation from a fish farm.

12. Evaluation of the operation of the Port Angeles farm is beyond the scope of this EIS.

13. Comments noted.

LETTER NO. 59

Mrs. Paul F. Betzold
Post Office Box 152, Freeland, Wa. 98249

March 22, 1989

Mr. Ron Westley
Washington Dept of Fisheries
Olympia

Dear Mr. Westley

After listening to many objections, by members of the audience, on the dept. of Fisheries E.I.S. in Mt. Vernon March 9, I feel I must add my own comments

At a meeting at Sechelt, B.C. Feb. 17 and 18, the Canadians said a veto is possible for upland property owners

So that a salmon pen is
1 not put in front of their property.
Interested?

I didn't see the word
"drogue" as I skimmed the
E.I.S. draft (which I was unable
2 to get a copy of). Drogue tests
in every bay would give a
pretty good idea of whether there
is flushing action. I've seen it
work.

Please begin again on a
3 new E.I.S. — not one with
a bias as big as Parametrix,
Inc., Consultants.

I do understand your

Mrs. Paul F. Betzold
Post Office Box 152, Freeland, Wa. 98249

predicament somewhat when your job depends on following the present governor's orders.

And remember that human beings are part of the environment, too. Some good. Some bad.

Yours truly,
Doris R. Betzold
(Mrs. Paul F.)

Get rid of fish diseases first

RESPONSE TO LETTER NO. 59: DORIS R. BETZOLD

1. Comment noted. The regulations affecting the fish farming industry are discussed in the FEIS. Shoreline property owners can make their concerns known to their local government through the SEPA and shoreline permitting processes. In addition, there are established processes for appealing any decision made by a local government.

2. Comment noted. Drogue studies to determine current rates to calculate flushing rates are incorporated into the *Interim Guidelines*. Drogue studies have been a component of most recent fish farm applications.

3. Comment noted. See the response to Question 2.

LETTER NO. 60

Alexander H. Bill, M.D.

RT. 1 BOX 1426
LOPEZ, WA. 98261

TELEPHONE
(206) 468-2515

3/22/89

To/ Ron Westley
W.D.F.
115 General Admin. Bldg
Olympia -

Re Fish Culture/Net Pen
E.I.S.

I have reviewed the E.I.S. carefully and find its conclusions reasonable. It has been thoroughly done. I was able to find a few areas in the appendix with which disagreement could be pointed out. However none of them affected the conclusions.

(1)

Taken as a whole - it is an excellent job, thoroughly researched and understandably written -

Alexander H. Bill
President
San Juan Islands Aquaculture Assn.

RESPONSE TO LETTER NO. 60: ALEXANDER H. BILL

1. Comment noted.

LETTER NO. 61

4503 Old Gardiner Road
Port Townsend, Washington 98368
April 3, 1989

Washington State Department of Fisheries
Olympia, Washington

Dear Ron:

I would like to express my concern regarding fish culture in floating pens. I have recently become acquainted with a fisherman from Norway. After hearing of the Norwegian problems with fish pens, I am totally opposed to their use in Washington State.

1

Yours truly,

Charles D. Broders

RESPONSE TO LETTER NO. 61: CHARLES D. BRODERS

1. Comment noted.

LETTER NO. 62

P.O. Box 307
Belfair, WA 98528
March 21, 1989

Ron Westley, Proj. Manager
Wash. Dept. of Fisheries
115 General Administration Bldg.
Olympia, WA 98504

RE: Draft EIS
Fish Culture in Floating Net Pens

Dear Sirs:

After plowing through the DPEIS and the Technical Appendices some thoughts become quite clear. They are as follows:

1. The State Dept. of Fisheries apparently is taking the position of "Lead Agency" when in fact you should be protecting/managing our resources, not doing the work for the public sector. (1)

2. The addition of pollutants to our waters cannot be deemed "acceptable" under any circumstances. This report glosses over the water pollution factor, this cannot be mitigated. (2)

3. Introducing non-native species and their diseases (VHS?) is taking a risk with native stocks which are already in jeopardy. This is fool hardy at best and should not be endorsed by the very agency whose responsibility it is to manage our native salmon, etc. (3)

4. This report is a contradiction of your departments mission. (4)

The fact the Dept. of Fisheries is embarking on this project when its efforts should be concentrated on our already troubled resources is very sad. I would like to ask "who is guarding the Hen House?"

Perhaps all involved should read "Mountain in the Clouds" by Bruce Brown and then return to reality.

Finally the monies wasted on this should be recouped and put to better use.

Respectfully yours,

Donald R. Cady
P.O. Box 307
Belfair, WA 98528

CC: PSWQA
Mason Co. Commissioners
Pt. No. Pt. Treaty

RESPONSE TO LETTER NO. 62: DONALD R. CADY

1. SEPA states that the "lead agency" is the agency with the main responsibility for complying with SEPA's procedural requirements (WAC 197-11-758). WDF is not taking the role of a proponent.

2. Comment noted.

3. Comment noted. See the response to Question 29 and Appendix G.

4. Comment noted.

LETTER NO. 63 15 pages Enclosed

2919 Mayfair Ave, North
Seattle WA 98109
April 4,1989

Re: Comments on PEIS
Fish Culture in Floating
Net Pens

Mr Ron Westley, Project Manager
WA Dept. of Fisheries, Olympia, WA

Dear Mr. Westley,

Thanks to the Dept. for extension of time for reply to this DEIS. Events in past week of Alaskan oil spill and its future consequences makes the production of fish in Puget Sound waters even more important as a source of protein food for the state, nation and export markets.

In this issue the so-called 'environmental' effects are of less import than the social and economic effects, yet the latter are only minimally considered in any EIS.

1 Puget Sound waters are pastures of the sea and just as land pastures, they are and can be farmed for both vegetable and animal production. If similar constrictions and demands were placed on Kansas wheat or Iowa corn farmers as are on salmon net pen operators the nation would have a hunt-and-gather agricultural economy.

2 The single important environmental problem is how the pen-reared fish will affect stocks and survival of native wild salmon. Unfortunately not the Dept. of Fisheries - nor any other agency with ** responsibility for these animals - as the Corps of Engineers, Dept. of Ecology, irrigation districts, Bureau of Reclamation, etc, etc, - has done anything over the past years but make trivial gestures towards protection of the wild runs. On the contrary, these agencies have routinely promoted projects which destroy habitat, i.e. marinas in sensitive habitats as estuaries, U.S.Navy Homeport in Everett, clear-cutting in regions of spawning streams, refusal to renovate dams or their energy production means, failure to restrict river depletion by agriculture practises, etc.

Q Is pen rearing now to be made the scape-goat for any future declines in wild populations? On the other hand, is net pen farming the wave of the future to substitute for any intensive effort to restore native stocks ? Is restoration to the historic levels now an abandoned effort ?

Q

3 Why has no EIS ever been issued which would bring together all facets of projects necessary to restoration of wild salmon runs ? Each facet, i.e. water quality, forest practises, marina development,is dealt with individually with no effort to synchronize what is needed for volume production which could equal or better productivity from net pen rearing of Atlantic species .

4 This DEIS should be corrected to display a comparison between potential productivity - that possible with significant actions by government agencies - of wild versus reared salmon.

** excepting DOI-FWS and NMFS

AESTHETICS _ PAGE 89 +

The EIS should be revised to present information relative to property 'ownership' of the waters affected. My understanding is that the waters are not capable of 'ownership'. The State acts as a trustee for the people of the state. The Corps of Engineers is, in effect, the trustee for the nation as these are navigable waters, protected by the navigation servitude. The Public Trust Doctrine is now acknowledged to be affirmed in Washington, and it thus shelters the use of waters to navigation, fisheries, and recreational use requiring waters - as a more recent component. (5)

Where local regulations are put into effect, as components of shoreline master programs or zoning prohibitions, limiting or prohibiting mariculture or aquaculture, these are violations of doctrinal policy. The DEIS should present legal priorities attached to the usages of water stream and surface. (6)

The concerns of shorelines residents opposed to net pens were an instigation for the EIS. The EIS should be revised to describe how limited are the uses of Puget Sound waters due to such continual objections. Such owners use the same pseudo-enviromental arguments to exclude people from public-owned beaches and tidelands. With the aid of their politicians they fight any state or local agency trying to develop beach access facilities, claiming that a nearby park will damage their private property values. (7)

Island Co. planners reject beach improvements

COUPEVILLE — The Island County Planning Commission approved construction of a new bulkhead at a little-known public beach on Camano Island Tuesday, but balked at providing a boat ramp and beach access because of concerns that residents wouldn't make the public welcome.

The small public beach, called Tillicum Beach, is snuggled between two community beaches at Tillicum and Sierra Vista, making it hard for the general public to find, said Camano planning board member Maxine Geisel.

"I object to the county spending money for a community beach that will only be used by its members," she added. "If the county pays for it, the public should be able to find it and use it."

The county road department came before the planning board to obtain permits to build a riprap bulkhead, a boat ramp and beach access. Total cost for both projects was estimated at $5,500, said Planning Director Syd Glover.

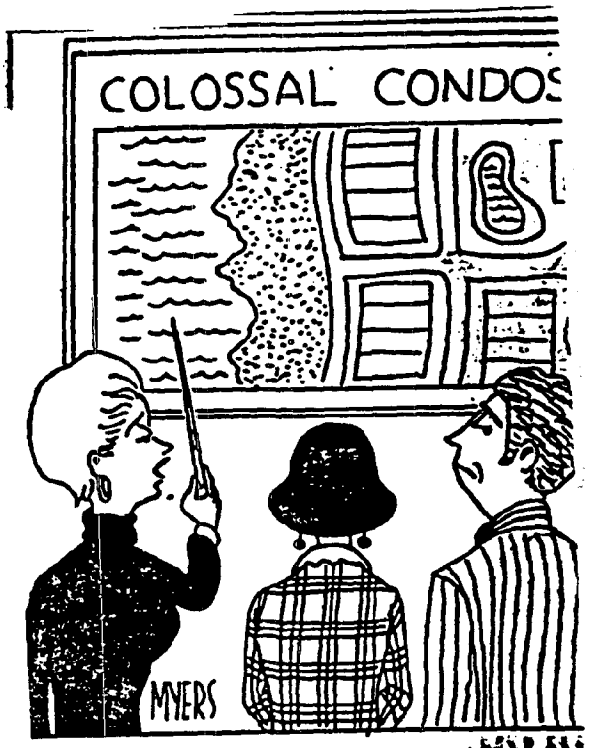
But finding some of the smaller public beach accesses on Camano and Whidbey Islands can be a problem, board members agreed.

Planners have tackled the dilemma in the past only to be thwarted by neighbors who did not want strangers in their territory, said planner Bruce Smith. Limited parking, litter and a lack of security have prompted area residents to tear down county signs denoting the public's right of access, he said.

"The county wasted money putting signs up at a similar place at Lagoon Point," said commissioner Marie Bevers. "The longest lasted about two weeks."

The board's final decision was to let the county pick up the tab for the bulkhead.

Everett Herald Feb 9, 1983



"Here's our community pool and spa, and here's our community tennis court and clubhouse, and here's our community ocean!"

Los Angeles Times

Part VII / Sunday, November 29, 1981

But its not merely people whose use of beaches and waters in public ownership is denied. They also battle commercial farming of mussels and oysters, clam harvesting, and now salmon pens. They claim exclusive use of property for which they lack legal rights, the waters, and so decimate public rights, state and local revenues, and jobs that could be developed for recreation, tourism, and aquaculture industries. By limiting the use of waters to their personal enjoyment they reduce the supply of high quality protein food. Most of the canned seafood on grocery store shelves is imported from Thailand, Malaysia, or India, and may yet be salmon from Norway.

A very significant study is in the appendices of this DEIS, that is the results of the survey of 335 shorelines properties in five Puget Sound counties which have potential for net pen siting. A standard ploy of shorelines property owners is that they should enjoy unimpaired views of the waters because their taxes are increased to reflect the value of the views.

By showing that the taxes paid on assessed value are often miniscule relative to market values, and that this exists despite state legal standard of full market value for assessments, the DEIS performs a valuable public service.

By showing that the'threat' of net pens has not reduced the skyrocketing market values of these properties, not reduced their attractiveness to buyers, the owners' claims are shown to be specious.

WATER QUALITY _ PAGE 35+

Q To what extent have otherwise suitable pen sites been rendered unusable due to failing septic tanks and drainfields of shoreline residences ? How many known failing sewage systems like this have been corrected in past 5 years - sufficient to demonstrate improved water quality in the vicinity ?

8

What Puget Sound communities now meet federal or state water quality standards for effluent discharge of sewer treatment plants, to secondary or better standards ?

9

Q

I ask these questions that you will evaluate the validity of the claims that water quality could depreciate by presence of fish rearing pens. A double standard should not be permitted relative to fecal matter of fish versus that of humans.

Q Toxic chemicals : What levels of toxic organic tin are presently measured in waters and sediments of marinas from prior or current use in anti-fouling paints on pleasure boats, and does this present a hazard to pen fish in the vicinity ?

10

IMPACTS OF EXOTIC FISH IMPORTATIONS -page 69+

"---a large portion of salmon in the North Pacific are from hatchery stocks."

I contend that the high dependence of hatchery rearing for salmon

production is of greater hazard to the survival of wild stocks than is the pen rearing techniques. Hatcheries are located inland in streams and rivers where the food supply for smolts can be eradicated by released hatchery stocks - leaving a paucity for stocks of truly wild, free-living which survive the'normal' hazards from egg production onwards. (11)

Q Please evaluate the competition from hatchery production on wild stocks, and genetic integrity , survivability, etc. equally as you have that of pen rearing effects. (12)

RECREATION --- page 118+

The statement that'Puget Sound offers some of the finest opportunities in the country for recreations in a marine environment' (page 118) is an extreme exaggeration. The opportunities are limited to those persons either living on the shores or owning a boat. Access to the beaches for all others is severely limited and such sites are frequently crowded or totally undeveloped where the property is in public ownership. Confirmation of is easily located , and references are provided in this response. (13)

Using data from DNR publication TOTEM of August 1986 one finds that where 78% of 370 miles of tidelands are in state ownership in the San Juan Islands, a mere 9.3 miles is usable by non-boat owners - at a mere three sites. on three islands served by state ferries.

Please examine the enclosed page from the Dept of Ecology 1983 survey of public access volumes and the more recent DOE book Washington Public Shore Guide, Marine Waters, and reconsider how little sand or gravel beach is useable except by privileged groups, Shorelines public access is a farce in Washington State.

GENERAL COMMENTS ON DEIS

In Washington these conditions here listed are ordinary activities, promoted and/or tolerated by government at all levels:: (14)

1. Marina waters are known sources of fecal bacteria, oil and overboard junk, with enforcement control casual at best.

2. Fish and invertebrate shallow water habitats are covered by private and public marinas, and private docks which together occupy more water surface than any amount of salmon net pens now contemplated, and are deteriorating to water quality and fish survival.

3. Free use of public owned submerged land for private docks, encouraging habitat damage, is encouraged by State Supreme Court decision.

4. Port authorities fill tidelands and wetlands indiscriminately, the Port of Seattle having filled 650 acres since 1965 at the last count I have, and Congressional action was required tocontrol the Port of Greys Harbor fills of habitat, after it filled vast reaches of that estuary.

5. Despite publicity and citizen activity, wetlands fills and

6. The Dept of Fisheries gave permission for a +35,000 cu yd fill on the beach and into the tidelands at the site of a now defunct marina project, the Elliott Bay Marina; this permitted the applicant to do the fill at a time which would normally be prohibited for such activity in interest of migratory species. Great volumes of this fill have since been washed into the waters, smothering a reasonably rich habitat in sand and gravel excavated from downtown Seattle. Pollution of the waters from the fill continues to be visible, nearly ten months later. The site, one of the last remaining feeding and resting areas for fish leaving the Duwamish river, is an ecological disaster with minimal control of future washout.

7. Enjoying an exemption from control under the SMA, shoreline residential property owners continue in the practise of bulkheading in the tidal shallows purporting erosion control and using the newly created dry land for badminton courts and landscape improvements, lawns, etc.

   When Corps permis were required for this invasion of waters the count of such bulkhead permits (always granted) was in the hundreds per year.

8. Permits for new marinas in sensitive areas are routinely granted by state agencies, Dept of Fisheries and Dept. of Ecology - and are often funded with public moneys. SequimBay Marina, East Bay Marina, Lummi Bay marina, Elliott Bay Marina, with certain habitat damage derogated as 'insignificant' , and no respect for the incremental consequences to fish stocks.

9. The commercial fishing industry opportunity for berthing and working space continually declines by the gentrification of urban waterfronts; the industry can't compete economically with the condos, office buildings, restaurents,etc. which local governments favor on the shores, however derogatory these are in the long term to the states economic interests. (example - H.C. Henry Pier,Seattle, noted on attached clipping)

10. While land-based farming is subsidized by multiple tax breaks loans guaranteed, marine farming seems to be routinely defeated and obstructed, esp. by local government bodies.

11. The State legislature demonstrates its support for improved water quality in Puget Sound by imposing a sin tax on tobacco users.

Since events and conditions listed above are routine and tolerated governmental hypocrisy is sovereign. Under the policies listed in this DEIS the salmon net pen industry would be required to meet standards for siting and water quality not even met by the sewage systems industry. No other user or abuser of water quality has such conditions imposed. The "concerns" and the "growing controversy" (page 1) are generated as a means of stifling a new and competitive industry, render it economically infeasible.

15

For destroying one of the greatest gifts of nature than any country could be blessed with, and giving mean and stinting recompense for the crime, the state of Washington should be indicted at least for destruction of a food supply by other states of the Union, whose citizens had a right to productivity of navigable waters of the U.S. The U.S. is now recognized for thecolonial status it has achieved, one that exports raw materials while importing finished manufactured - or canned goods.

For those who have forgotten or have never known of the extent of the criminal slaughter of billions fish since statehood, the book by Bruce Brown, Mountain in the Clouds, should be required reading. Wiping out entire species and genera indiscriminately is not a practise limited to third world or uneducated peoples - as Washington's history proves. (reviews of that book enclosed.)

Many people devoted to the cause of fish and wildlife survival and habitat protection are employed by governmental agencies here, but find their work tasks subverted by the state legislature with members having their own re-election survival as competing goal.

After careful examinationof theDEIS I must conclude that those persons interested in salmon net pen investments would be best advised to look to other countries. This is only the first round - the "programatic" EIS, and surviving this one only means that other rounds will be continuing. The shorelines residents are many of the most influential and affluent people in the state, and the effort to site pens - given the restrictions seemingly endless in number to be overcome - will be futile. There should be countries where food production - an essential for human survival - is valued.

Population expansion and increased water pollution are further detrimental to expectation of business success. Rearing pens will not survive as a business given the delays in sewage treatment plant funding, and poor levels of treatment consequential.

Nearly twenty years after the Clean Water Act the largest sewage system in the state, King County's, has massive plant still using primary treatment only at West Point operated by Metro - with the cooperation of the EPA .

I have tried to be optimistic in reviewing this DEIS - but REALITY kept breaking through. I would not invest a dime in salmon net pen rearing business - despite that I think it a necessity if the state is going to raise anything but views from picture windows from the waters of Puget Sound.

The 10 pages here attached are intrinsic portions of this EIS comment, confirmation from various sources of statements made herein.

I will be pleased to receive a copy of the Final EIS, and thank you for receipt of both draft and final.

Very truly yours,

Benella Caminiti

Ms Benella Caminiti

Books

Mountain in the Clouds

by Bruce Brown
Simon & Shuster
pp. 239, $12.95.

by John N. Cole

Telling us he has nothing more to write, Huck Finn ends his narrative saying: "I reckon I got to light out for the territory ahead of the rest, because Aunt Sally she's going to adopt me and sivilize me, and I can't stand it. I been there before."

Bruce Brown, the angry author of *Mountain in the Clouds,* share's Huck's view of civilization. And, like Mark Twain, Huck's progenitor, Brown knows how to write memorably about the penalities civilization imposes on the free spirits of man and salmon.

"The . . . process of civilization," Brown writes in his opening chapter, "has been at work on the Pacific salmon since the California gold rush of 1849. During the intervening years, Pacific salmon have declined to less than half their former numbers along the entire West Coast of North America. Many significant runs have been wiped out entirely."

It is a loss that Brown feels in his soul. He makes this clear in the passages that describe and record his meetings with each of the several species of Pacific salmon: pink (humpback), sockeye (red), chum (dog), coho (silver), and chinook (king). Wading in the stunning cold of the streams and rivers of Washington's Olympic Peninsula, Brown meets salmon in the creature's element, and in prose that is as crisp and lucid as the waters he walks, Brown reveals the depth of his feeling for the fish. He is not sentimental, he does not indulge in Peter Rabbit, lippetylop, green meadow nature writing, nor does he preach about the glory of a salmon's presence.

What he does is rare: he writes matter-of-factly (as the journalist he is) about what he observes. We feel the chill water on our thighs, we see the 40-pound salmon in their shallow home streams, we walk alone with Brown on a midnight exploration of a spawning bed. And through his observance and comprehension of these natural events — episodes which rise here and there in narrative like boulders in a rushing stream — we perceive the man's love and respect for the creature that is the hero and the chief protagonist of this fierce book.

The book's mainstream, the torrent of documentation that rushes by those boulders of personal experience, is a litany of evidence that man is the salmon's most destructive enemy — especially 19th and 20th Century American Man wielding the implements of the Industrial Age.

Spawning streams blocked by dams without fish ladders, gravel beds scattered and silted by wanton lumbering, entire rivers diverted for crop irrigation, home waters heated beyond tolerance by nuclear power plant discharge, and returning salmon taken at sea by mechanized trollers before the fish have a chance to reproduce the species — these are the several systems working in combination to deplete the wild salmon that Brown sees as a metaphor for all of what pure nature can mean to man.

And, as the salmon are diminished, the struggle intensifies for the few fish that remain. Commercial fishermen and sports fishermen tussle with each other, physically on stream banks and metaphysically in the courts and state capitals. And then each joins the other as allies to obliterate Indian claims to salmon streams that have sustained the tribes of the Northwest for 10,000 years. In response, Indians become white, catching illegal salmon for capital gain instead of sustenance.

Throughout the documentation — detailed expository prose charged with the invisible electricity of Brown's outrage — the author builds a careful, almost judicial, case against man. He has learned his journalistic lessons well; he cites chapter and verse; he quotes directly from the record.

Nevertheless, there will be those in the Northwest who will dispute vehemently Brown's thesis. The salmon, some hatchery managers and state bureaucrats

---

John Cole *is the author of* Striper, A Story of Fish & Man. *Editor's Note: Since the publication of Brown's book the National Marine Fisheries Service has pressured the Oregon Fish and Wildlife Commission to stop sports fishing for Coho salmon in state waters off the coast. The action was taken in response from fish biologists that this year's run is the smallest in 20 years. Continued fishing could have threatened the Coho run with extinction.*

will say, are not dangerously depleted. Indeed, the hatcheries which public funds and private hush money have built are producing more salmon each year.

Brown acknowledges the hatchery fish, but, for him, they are not salmon. His fish are wild; they are the creatures that have followed the same incredible urges for 10,000 years—compulsions that take them across thousands of miles of open ocean and then bring them back to their home stream years later to spawn and die. Hatchery fish, Brown tells us, are not the same: they are lesser; they are vulnerable to disease; and they are not the possessors of wild, free souls.

In addition to its considerable presence as the authoritative text on the west coast salmon decline, this book is also a personal lament. It is Brown's cry for the loss of natural truths, for the denial of the wild, the destruction of waters that once were pure. It is the fierceness of that lament that stays with the reader more powerfully than the sorry details of the salmon's destruction.

"There is no saying where the Northwest salmon story will eventually conclude," the author tells us, "but it is certain that Man and salmon will be linked, for as the Indians said from the start: the fate of one mirrors the fate of the other."

We, all of us, Brown tells us, are as diminished and denied as the wild salmon by the excess of our exploitation of natural resources. If there is to be a cultural shift, an attempt to repair some of the damage, it will be books like this one that will bring such change to pass. And if the people of the Northwest want to know what has to be undone to restore the wild salmon, they have this book to guide them.

They can start at the beginning and undo each of the deeds, dams, and destructions Brown has so meticulously and passionately documented.

8/

NORI PRODUCTION BEGINS IN TRAMP HARBOR

On September 18, 1983, the American Sea Vegetable Company of Vashon Island began implementation of the research and development stage of nori production. Using seeded nets obtained from the Department of Natural Resources, the company placed one test frame work (with two to four nets) into the waters of Tramp Harbor. After a grow-out phase, the company (with assistance from the department) will harvest and reset the framework with new seeded nets. This rotation will continue throughout the growing season.

After harvesting, American Sea Vegetable plans to freeze-dry the cut seaweed and ship it to Japan for processing. Processing is not yet available in the United States. After a year of testing the production potential of Tramp Harbor, American Sea Vegetable will seek funding for full scale production beginning in 1984-85.

Getting into the water has been a lengthy process for American Sea Vegetable. An opposition group appealed the original King County shoreline permit and further appealed a Shorelines Hearings Board decision upholding that permit (see *Coastal Currents*, May, 1983). A motions court order of August 8 allowed the company to proceed with test farming while the appeal went through Thurston County Superior Court. Just prior to trial, the opposition group dropped the appeal. This outcome is of great importance to all aquaculturalists. This was the first aquaculture siting case taken before both the state Shorelines Hearings Board and the Thurston County Superior Court.

The Department of Natural Resources nori project (see above) works closely with American Sea Vegetable. Ideas, equipment and expertise are shared in an effort to promote a new, clean industry for Puget Sound.

Board Upholds Seattle on Controversial Permit

A recent decision by the Shorelines Hearings Board upholds the city's approval of a permit for a multiple use development on Lake Union. The heart of the controversy was the displacement of several water dependent and water oriented uses now at the site. The existing businesses serviced marine vessels by providing dockside moorage, maintenance, repairs and refurbishing.

The proposed multi-use development includes restaurants, retail shopping, accessory offices, a 42-slip marina, and a two-level parking garage on the H.C. Henry pier.

The board found the proposal to be consistent with the Shoreline Management Act and Seattle's Master Program policies and regulations. In the absence of a master program provision dealing with the displacement of existing preferred uses, it was felt that this alone was not a proper criterion for overturning the permit.

The city of Seattle is currently reviewing its master program and the needs of water dependent uses. Perceiving a trend which may be contrary to city goals and policies, city planning staff may recommend amendments that clarify a shoreline priority for water dependent uses both existing and potential.

Above - from DOE Coastal Currents Oct/Nov '85

NORTHWEST B

'Mountain in the Clouds': Babylon vs. Wild Salmon

By KELLY T. SMITH

Mountain in the Clouds by Bruce Brown. New York: Simon and Shuster. Cloth, 239 pp., $12.95.

THE BITTER AND PERSONAL power Bruce Brown sustains throughout *Mountain in the Clouds: A Search for the Wild Salmon,* can possibly be dated to the January, 1981 agreement between the state Department of Fisheries and the state Indian treaty tribes.

Through his book, Brown presents an historically methodical indictment of this state's fisheries management. Mixing the most wondrous descriptions of the fascinating salmon creatures in our waters with a deep cultural and political awareness, Brown makes a passionate, if perhaps hopeless, plea for the survival of trickling wild salmon runs.

By the point late in the book when the 1981 agreement is discussed, we are hoping, like Brown, for some justice and a happy ending to the plight of the wild salmon. Instead we're presented with a sad irony.

After nearly a century of industrial assault and rapid displacement by the inferior, but proliferating, hatchery fish, Brown and no doubt others looked for the wild salmon's salvation in the so-called "Boldt II" decision reached by U.S. District Court Judge William Orrick in September, 1980. The judicial followup to the 1974 Boldt decision giving the treaty tribes half the state's catch, the "Boldt II" decision gave the treaty Indians strong control over the environmental impact on harvest.

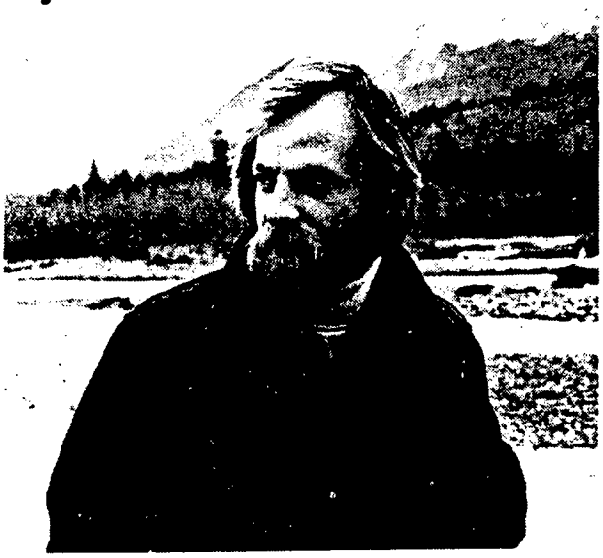
But this chance to remedy much of the abuse of the wild salmon disappears as we recognize that the treaty Indians have one important trait in common with the environmentally ravaging industrialist, the bought-off politician and the empire-building bureaucrat: greed.

The harbinger was the January, 1981 agreement, stipulating that plants of hatchery Chinook and coho would be increased to the highest Chinook level on record.

That first-of-a-kind agreement also assured that the tribe would itself get into the salmon hatchery business. "Explaining why the fish are released at a stage that maximizes residualization (pooling in such large numbers that the food cycle is disrupted and both wild and hatchery fish die) and conflict with wild salmon, the tribe echoed the rationale used by Washington Fish Commissioner A.C. Little in 1899. 'Rearing and releasing steelhead is an expensive venture,' said Terry Martin, tribal fisheries biologist. 'Ideally, the steelhead are reared for two years until they become smolts and then released, but costs (approximately $20,000) are prohibitive at this time for the tribe to hold them for that period.'"

The Indian's quick recognition that there was more to be made reaping half the catch of hatchery salmon, with the hatchery's promise of capital-intensive production, is a hard economic case to counter.

But Brown does counter the hatchery policy with an even more powerful economic case, done with such subtlety in the book that it's almost overlooked. Brown's review of the history of Washington Public Power Supply System's nuclear plant construction on the Satsop River is an illustration still vivid in our minds of the folly of such large-scale centralized projects. It's the conflict with nature, mysterious and powerful in its intricacies, that Brown brings to contrast so well.



Bruce Brown, author of "Mountain in the Clouds," worked as a Seattle journalist and now lives with his wife, Lane Morgan, in the Fraser Valley.

Recounting the WPPSS Satsop plants sliding down the hillside during their 1979 erosion problems, Brown makes clear the overriding sense of cultivating natural, wild salmon runs over those reared in concrete hatching ponds. It might be summed in the universal maxim: "Don't fool with Mother Nature."

During the time that Brown appears to have concentrated on writing his book, near that time around January, 1981, other circumstances besides the Indian-state agreement were looking black for his cause. The state's hatchery program was burgeoning under the 1977, $43 million Salmon Enhancement Program. Brown notes the entry into the fish hatchery business of many of the same industrial powers that have already stripped other resources at the expense of the wild salmon.

"When the administration of President Ronald Reagan killed the effort to place the wild salmon of the Columbia River on the threatened or endangered species list because 'enough conservation programs already exist,' it appeared that no one remained to speak for the wild salmon in their hour of greatest need."

But there was certainly Brown, and with his book there will certainly be others.

10/

SOURCE: AN EVALUATION OF PUBLIC ACCESS TO WASHINGTON'S SHORELINES - Since passage of the Shoreline Management Act of 1971.

State Dept. of Ecology, Sept. 1983

FIGURE 4

SHORELINE INVENTORY
(Distances in Miles)

COUNTY	ALL SHORELINES						MARINE SHORELINES		
	TOTAL SHORELINE		PUBLICLY OWNED SHORELINE		ACCESSIBLE SHORELINE		Publicly Owned Tidelands With Coincident Publicly Owned Uplands	OCEAN	
	Freshwater	Saltwater	Freshwater	Saltwater	Freshwater	Saltwater		Indian Reservation	Seashore Conservation Area
Adams	172.3	--	16.4	--	16.4	--	--		
Asotin	255.3	--	53.2	--	53.2	--	--		
Benton	189.9	--	83.2	--	72.4	--	--		
Chelan	321.9	--	65.1	--	65.1	--	--		
Clallam	593.3	180.1	19.9	150.2	5.5	70.8	32.5	12.0	38.3
Clark	527.8	--	66.2	--	46.2	--	--		
Columbia	152.1	--	4.1	--	4.1	--	--		
Cowlitz	1229.6	--	25.6	--	25.6	--	--		
Douglas	209.3	--	19.7	--	6.5	--	--		
Ferry	209.9	--	6.7	--	2.0	--	--		
Franklin	190.6	--	24.9	--	24.9	--	--		
Garfield	66.2	--	1.8	--	1.8	--	--		
Grant	733.0	--	121.2	--	121.2	--	--		
Grays Harbor	1183.3	146.0	33.7	91.3	27.7	28.0	3.8	20.8	28.0
Island	14.0	240.0	4.3	106.5	4.3	27.0	27.0		--
Jefferson	164.6	206.7	29.6	110.4	29.6	51.4	27.7	4.8	27.7
King	1168.8	90.8	248.8	14.1	144.8	14.1	14.1		--
Kitsap	62.7	228.6	1.4	55.0	1.4	9.0	9.0		--
Kittitas	528.9	--	44.9	--	30.9	--	--		--
Klickitat	375.8	--	44.3	--	.25.3	--	--		--
Lewis	1221.3	--	38.3	--	38.3	--	--		--
Lincoln	253.8	--	96.0	--	96.0	--	--		--
Mason	476.5	199.5	15.1	58.1	15.1	6.7	6.1		--
Okanogan	1015.1	--	187.1	--	163.8	--	--		--
Pacific	446.8	155.2	10.3	56.7	10.3	56.7	33.4		25.7
Pend Oreille	297.4	--	14.2	--	5.0	--	--		--
Pierce	574.3	216.6	111.9	8.4	60.9	8.4	8.4		--
San Juan	12.8	372.7	8.7	341.2	8.7	88.7	88.7		--
Skagit	724.2	127.0	95.4	17.7	95.4	17.7	17.7		--
Skamania	521.9	--	18.6	--	10.3	--	--		--
Snohomish	1256.9	62.4	132.9	57.2	139.9	7.5	7.5		--
Spokane	455.3	--	34.4	--	34.4	--	--		--
Stevens	369.3	--	328.2	--	328.2	--	--		--
Thurston	257.0	90.0	7.6	12.5	7.6	3.5	3.5		--
Wahkiakum	275.1	--	12.0	--	12.0	--	--		--
Walla Walla	390.0	--	5.8	--	5.8	--	--		--
Whatcom	487.2	105.9	196.8	7.8	121.8	7.8	7.8		--
Whitman	454.8	--	8.0	--	8.0	--	--		--
Yakima	293.0	--	38.6	--	35.0	--	--		--
TOTALS	18211.9	2421.5	2274.9	1087.1	1905.4	397.3	286.7	37.6	119.7

Source: Washington Department of Ecology, and
Washington Interagency Committee for Outdoor Recreation

Note the Problem — as for King County: large vol. of shore is Not accessible when Port or "public" owned

Nancy Thomas

Whose Coast Is It?

While officials press for public access to state-owned tidelands, coastal landowners resist what they view as intrusion on their private domain

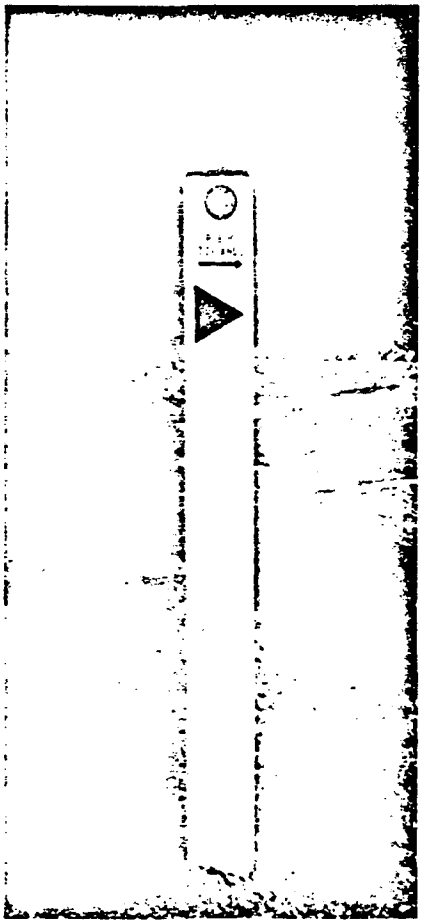
To a child of the Northwest, going to the beach is synonymous with summer. The beach is toe-warming sand and gritty sandwiches, slippery cobbles and scuttling shore crabs, goose bumps and jittery teeth and the classic utterance. "I'm *not* cold and I don't *want* to go home yet!"

What most of us call "going to the beach" has in the past decade been formalized by officialdom. In government-ese, it's called "public access." As a term, public access is doing very well. Its "enhancement" is a goal of every shoreline planning document. But somewhere between the stated policies and their implementation, something is being lost —and, on the saltwater beaches of Puget Sound, Hood Canal and the San Juan Islands, that something is public access itself.

Things are different on the ocean. Oregon law requires access at least every three miles along the ocean beaches. Two-thirds of that state's parks and "waysides" (day-use areas) are located along or near the coast. "Fundamentally, we haven't got an access problem on the ocean beaches," said Neal Coenen of the Land Conservation and Development Commission's coastal program. "And it's usually pretty easy to find public access on the estuaries."

Washington state parks planners were less confident, partly because neither the legislature nor the parks commission has addressed the question of access spacing on ocean beaches. However, the state is *still* acquiring and developing routes to the beach, sometimes with strong opposition from local residents.

In both states, once you get onto the ocean beach it's yours to roam. Almost all of the ocean tidelands are publicly owned. An Oregon Supreme Court decision and a Washington attorney general's opinion agree that the ocean beach up to the line of vegetation is open to the public through the doctrine of "custom." Essentially, that means the people have a right to use it because they always *have* used it. (The Washington opinion excepts the Quinault Indian Reservation whose 28 miles of ocean beach were closed in 1969, according to reservation attorney Bud Ullman, because of vandalism, the threat of development, and littering by visitors.)



Markers like this one designate the boundary between public and private tidelands in Washington.

Washington's inland saltwater beaches have a different history. From the time of statehood until the legislature banned the practice in 1971 the state could, and for many years was required to, sell tidelands to the upland owner. Tidelands lie between the line of ordinary high tide and the extreme low tide line. Because of these sales, more than half of Washington's inland saltwater beaches are now in private hands, and much of this private ownership is near the metropolitan areas where public recreation needs are greatest.

The state retains about 1,100 linear miles of beaches, but only 222 miles have adjacent publicly owned uplands. The rest of these public tidelands front private property. Upland owners, often aided by local officials and sometimes by state legislators, are amazingly adept at keeping the public away from public beaches, beaches that then become the upland owner's *de facto* front yard.

The Department of Natural Resources (DNR) manages most state-owned tidelands. For more than a decade the department has tried to get access from the uplands to some of the public beaches, and to mark the ownership boundary on

"One fellow said, 'You'll be blown off this beach if you come to mark it,' but he must have calmed down because we're still here"

other beaches so boaters may use them. On these public beaches the state owns the tideland portion, but private parties own the uplands that extend onto the upper beach, usually down to the line of ordinary high tide. State markers therefore must be placed at both ends of public ownership and along the high tide property line as well.

"We usually get into a big fight with local government," said Ralph Beswick, supervisor of the Department of Natural Resources, "because the segment of society that lives along the shore knows how to work the political system. Realistically, there's a limit to the amount of flack any agency finds it feasible to take," he said. "As long as the silent majority stays silent, local residents will use the Shoreline Management Act and other permit procedures to block the public from using public beaches. It's that simple."

Fred Winningham headed DNR's tideland marking program for five years. Winningham says the department explains the program to the landowners before marking the beach and tries to settle objections. "Usually it's just one or two owners who raise a howl," he said. The objections are nearly always the same: fear of trespass, fire, vandalism and littering. Owners of high-bank property are just as likely to fight the marking as those with cabins right on the beach. "One fellow said, 'You'll be blown off the beach if you come to mark it,' but he must have calmed down because we're still here," Winningham remarked. "A lot of Hood Canal landowners didn't want the beaches marked, but they thought nothing of going down and taking oysters from the public tidelands themselves."

One long-time Hood Canal landowner phrased the landowners' concerns somewhat differently. "It's only right that the public have access to lands that are rightfully theirs; after all, I'm the public too. What I object to is the lack of controls regarding trespassing on bordering private lands and shellfish depletion on public lands.

"I've worked for 30 years to buy myself a quiet place outside the city and I don't appreciate holier-than-thou bureaucrats telling me how to live."

Doug Magoon, natural resources manager with DNR, said that there are "inevitably a handful of trespass problems" resulting from the opening of such beaches and that he doesn't know any way around them. "Problems exist on both sides," he continued, "but in the end it comes down to public rights versus private rights."

The department does an annual litter pickup on marked beaches, but Winningham said he thought most of the litter had floated in on the tide. "Funny thing," he added, "with all the fuss beforehand, not one owner has come back to complain *after* we marked the public beach." Magoon reported that he had had only one or two complaints after the marking.

The Interagency Committee for Outdoor Recreation prepares the state's outdoor recreation plan and approves state and local recreation projects for government matching funds. "Water access in general is Washington's most critical recreational need," said Gerald Pelton, the committee's chief of planning services. "It's one of our top priorities. If you don't include DNR tidelands, only about five percent of the state's public recreation sites are on salt water."

Most matching money now goes to growing urban areas, but figures show that people who live in cities still seek out rural beaches. Whidbey Island and the San Juans are favorite destinations. Island and San Juan counties have many expanses of public beach ideally suited for beachcombing and clam digging, but both counties have consistently stonewalled state agency efforts to get access from the uplands.

About 10 years ago, DNR got an easement for a path down a 100-foot bluff to Taylor Beach at Whidbey's Useless Bay and bought several upland lots to park 33 cars. Below the cliff is a public beach a mile and a half long, averaging 1,000 feet in width at low tide.

Early in 1971, the Useless Bay Homeowners Protective Association sent a letter to the department stating its members felt the proposal "infringed on their constitutional and statutory rights, was unrealistic, ill-conceived, ill-advised and intolerable" and that the only "honest, just, proper and logical solution" would be to abandon the project. A department interoffice memo dated a week later said plaintively, "We have a rather serious community relations problem . . . which has now spread and is involving a number of legislators." State and county couldn't reach a compromise. Island County denied shoreline and health permits. An interagency committee "post-completion" report dated January, 1979, said, "The site is currently undeveloped and receives no public use though it provides access to an excellent stretch of sand beach on salt water."

"Thirty-five families have sole access to a million dollars worth of public beach," said Terry House, a department recreation specialist. "Technically it's usable if people know where the land is, but some of our field staff were ordered off public property one day. It's easy to outbluff people if they're not sure they have a right to be there. Besides, people don't go to the beach to get in a hassle."

Bella Tierra, 20 acres near Lopez Island's Flat Point, has a paved county road on one boundary and 690 feet of waterfront opening to three and one-half miles of public beach on the other. The department bought it in 1976, intending to develop three to five acres for bicycle and boater camping with 20 parking spaces for day users. Local residents and San Juan County objected to the acquisition. Faced with likely refusal, the

department has not yet applied for development permits. Like Taylor Beach, Bella Tierra is usable, if you know where it is.

Tired of that rejected feeling, DNR finally went to battle over a proposed boating campsite on San Juan Island. The county refused a shoreline development permit. The department appealed and won. Then the county and some neighbors appealed the previous decision. DNR won again. The case has now escalated to the State Court of Appeals.

Other agencies have similar stories. State parks' environmental planner David Heiser says it's not by desire that his agency has no campsites on San Juan Island. "People see a park as a threat to the island life-style they moved up there to get," he said.

Several years ago, the parks department had a somewhat heavy-handed plan to develop its land on Stuart Island. "We had to fight over everything, even the water system for fire suppression," Heiser said. "We gave up the dock, and we let the county commissioners choose the campsites themselves. But we did talk them out of making us build a chain link fence around the park."

Petitions circulated by neighbors helped block the Department of Fisheries from getting upland access to its public shellfishing beaches in Whidbey Island's Penn Cove. The same device encouraged Skagit County to reject an interpretive center on the Game Department's 13,000-acre Skagit Wildlife Recreation Area. "Sure, some people do cause problems for the neighbors," said retired shellfish biologist Cedric Lindsay. "But what it still boils down to is if you have a little private domain you don't want it available to the public even when the public owns it."

Department of Ecology shoreline planner Don Peterson reluctantly agreed that "some good projects with public access have been turned down because local property owners objected." He said emphasis now is on redevelopment of urban waterfront; that's where the planning grants are going and where new access is opening up. Only a few of these are beaches. More typical are museums such as Bellingham's Maritime Heritage Center and Seattle's Elliott Bay Shorelines exhibit, walkways along city waterfronts, street-end miniparks, and fishing piers. A Willamette Greenway Plan was also adopted in Portland last year that will provide river access and hiking and biking trails along the four-mile stretch of the river south of the Broadway Bridge.

"Cities are becoming more livable now that interest is focused on the waterfront," Peterson maintained. Seattle shoreline planner Rosemary Horwood agreed and said private projects are to date the major sources of new access. If a proposed shoreline development is not dependent on a waterfront site, Seattle's shoreline master program requires that it compensate for the use of valuable shoreline by including public access and view corridors.

Seattle does have several real beach projects planned: replacing the old seawalls at Lincoln and Alki parks with gravel berms to make a more natural beach, and enlarging a small existing beach at Myrtle Edwards Park.

A big winner in city access programs is the Department of Fisheries' urban fishing pier. These are large-scale structures, each with 1,000 feet of fishing rail, benches, shelters, restrooms, bait and tackle concessions. The first was built at Edmonds, Washington, and drew more than 112,000 anglers and 63,000 other visitors during its first year. Artificial reefs attract fish, but Edmonds also hung a salmon rearing pen under its pier. Now the anglers are waiting to see whether the coho return to the pier as "fishable" adults. Fishing piers are also slated for Seattle, Tacoma and Bremerton.

Street ends are legal accesses to the water in many communities, but they are seldom developed for public use because the neighbors object. Seattle, however, has made excellent use of street ends for parks and viewpoints. The University of Washington built one about six years ago at the foot of Brooklyn Avenue N.E. It's partly on the street right-of-way, partly on university land, has trees, grass, benches, a lovely view of Portage Bay, and it looks brand new. University spokesman Rolfe Kellor said they don't get complaints about vandalism, trespass or litter.

"To tell the truth," he said, "the biggest problem we have is cleaning up after the geese."

SALMON-PEN BATTLE

Please, keep them away from my waterfront home

As a waterfront owner, I have been closely following the continuing saga of the salmon pens. It's been called a battle, and that is true.

Brian Boyle, commissioner of public lands, wants to raise money by leasing fish pens he says in order to develop water-related public areas. To do this, he is going to destroy the privately held lands.

Around Whidbey Island, all areas zoned for fish pens are immediately upon the sandy shores.

Boyle says the fish-pen developers want to come in because of our pure water. How long would it stay pure with the salmon pens in place? Even the new study done by the Fisheries Department, which is lauded as saying pens are good and won't pollute the bay in general, does admit that, in the wrong place or when poorly run, they can cause environmental problems.

"Fish feces and uneaten food can accumulate on the bottom and deplete oxygen, making the sediment and water toxic, etc." This is what Gov. Gardner wants to put right by a beach where children play? Please!

In addition, the same report says these pens cause odors and algae bloom. Should this be placed in residential areas? Even if the tide washed some effluent away, it would only go onto the shores.

This is the main reason for the salmon-pen battle – not visual problems, although those are important too.

The state says careful siting will take care of all the problems. All right, be careful and don't place salmon pens by waterfront residences.

– **Jacqueline Maner, Everett**

Seattle Times
March 2, 1987

Tidelands

Birds and wildlife abound

John Edwards
Assistant Manager
Land Leasing and Recreation

Welcome to the San Juan Islands, one of the most beautiful and unique areas in the state of Washington.

There are some 370 miles of tidelands of which 78 percent are still state-owned. The typical San Juan beach is narrow, steep and rocky. However, the tidelands of the region vary from wide, sandy beaches to vertical cliffs – from open expanses to hidden pocket beaches.

Birds and wildlife abound on many of the smaller islands and rocks, which are part of the San Juan Islands National Wildlife Refuge. Many of these seemingly insignificant islands and rocks are important nesting and breeding areas. Visitors are reminded to keep a safe distance to minimize disturbance to wildlife.

Because the abutting uplands are in private ownership many of the public tidelands can only be reached from the water.

As a general rule the public ownership is only that portion of the beach that extends seaward from mean high water. Mean high water is usually well below a line delineated by deposits of kelp, debris and logs. If you are in an area where there are drift log or other debris, in many cases you are on private property.

To keep these islands special takes special care.

The majority of the public tidelands do not have any amenities such as sanitation facilities or garbage receptacles. Please honor the adjacent private upland owner's rights, keep to the public tidelands and pack out all garbage.

Islands are isolated. Many of the smaller islands in the San Juans are lacking ferry service, fire and police protection. To these island residents, fire is a major concern. Beach fires can easily spread to the adjacent uplands causing major damage.

During the dry season fires are prohibited. If you are building a beach fire with beach wood, you are probably trespassing when you go to the drift log area to obtain fire wood.

Numerous developed recreation facilities are provided by the state Parks and Recreation Commission, the Department of Natural Resources and local government.

DNR sites

The DNR manages five sites in San Juan County:

- Cattle Point -- San Juan Island.
- Obstruction Pass – Orcas Island.

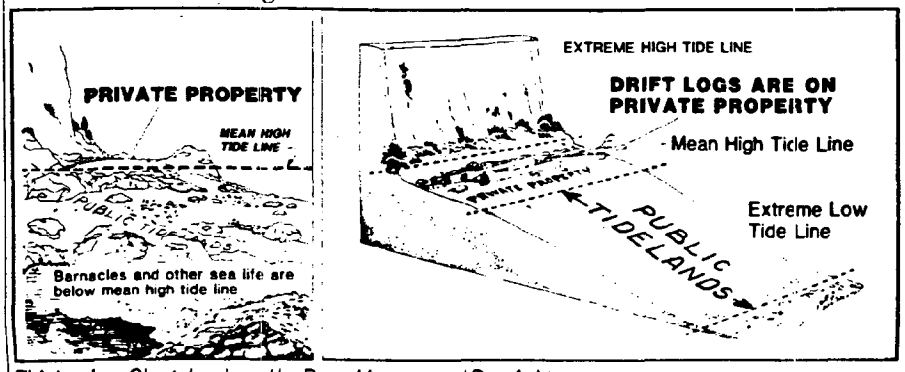
John Edwards *photo: Julianne Crane*

- Shark Reef -- Lopez Island.
- Griffin Bay -- San Juan Island.
- Pt. Doughty – Orcas Island.

Cattle Point, Obstruction Pass and Shark Reef can be reached by road, providing public access to nonboating islands visitors. Griffin Bay and Pt. Doughty can only be reached by water.

A few of the sites have buoys. Depending on location, other facilities can include vault toilets, picnic tables and tent spaces. Water is available at some sites.

There are many recreational opportunities available in the San Juans. The publication "Your Public Beaches -- San Juan Islands" contains maps and photographs of public access beaches. Write to Photo and Map Sales, 1065 Capitol Way South, Mail Stop: AW-11, Olympia, WA. 98504.



Tidelands. *Chart developed by Doug Magoon and Don Ashton*

*
370 x .78 = 288 miles of Tidelands (linear) in San Juan Islands State-owned

9.3 miles of beach at Cattle Pt, Obstruction Pass, + Shark Reef.

the islanders

ENETAI Aug 25-Sept. 8, 1980

chad haight

FORT WARD STATE PARK on the southern end of Bainbridge Island is a precious retreat from the populated and trafficked world around it. The tree-tiered hillside and low-bank shoreline are natural microcosms, minimally maintained, infinitely appreciated and ecologically balanced. The park is a wildlife sanctuary for passive human enjoyment and recreation, a visible example of what pastoral and woodland environs can be when left alone to thrive undisturbed.

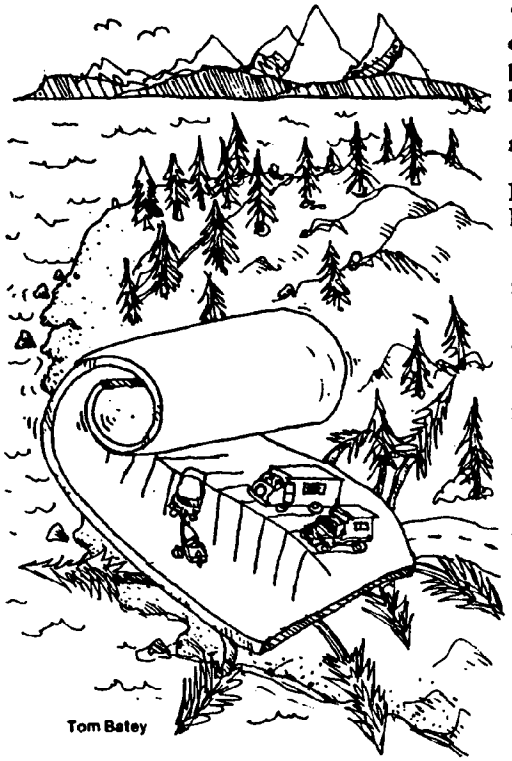
Park neighbors respect the gates barring automobile traffic citing the parks' undeveloped 137-acres as justification for such intrusions. This assures uninterrupted walks, bicycle rides along the one-lane roadway by the waterfront, or hikes up the meandering trails that traverse the woods. The still and quiet scenery is broken occasionally by soaring bald eagles and hawks, the idle chatter of cormorants and gulls on nearby pilings and various hoots and screeches from the animals that take refuge there.

Now efforts are underway by Washington State Parks to begin incremental modifications of the park at Fort Ward, changes that are to begin soon with asphalt automobile parking areas and trailways, public "vault" latrines and waterside picnic grounds before eventual implementation of RV facilities, two 50-unit campgrounds and a peripheral roadway. "We are under the gun to do something," Larry Fankhauser, superintendent of state parks, told a group of 40 distressed islanders last Thursday at the high school.

Standing in a battle zone between sets of comprehensive blueprints of the state's proposed plans, color-coded for imminent and future prospects, and a roomful of concerned and vocal oppositon three state officials dutifully and categorically explained the hands-tied position of the state: it is under obligation to the conditions of acquisition from the federal government (the park was part of the U.S. Army fort until 1962) to develop the site for recreational use; and more importantly, that $86,500 has already been appropriated by the state legislature to be used before the end of the current biennium, June 30, 1981. Failure to spend the money, they warned, would forfeit the funds and could jeopardize state control of the park itself.

The official delegation's tack was straight into the wind. The gathering's vehement reaction could have blown them into the *next* biennium. The officials asked for questions about the specific plan and additional changes for recommendations. What they got was something just short of total rejection of any and all proposals, sometimes politely, often intoned with frustration and always earnestly challenging.

Residents living near the park objected to additional traffic, teenage noise and disturbances, concerns of sewage disposal, people pollution and threats to wildlife. Dale Spoor of the Audubon Society read an impassioned plea for preservation of waterfront ecology and nesting habitats, asking for distinct modifications to accommodate the area's wildlife. Other attacks were made on the state's definition of "recreation," which lay immersed somewhere under concrete trails and "maintenance-free" facilities. Strenuous arguments were directed, by Jack Cooper, at the state's assessment of the plan's impact as "non-significant," and thus bypassing the need for an Environmental Impact Statement.



Tom Batey

"How was it decided that your plan was environmentally nonsignificant?" asked Cooper.

"Because I made that determination, myself," replied David Heiser, head environmentalist for Washington State Parks.

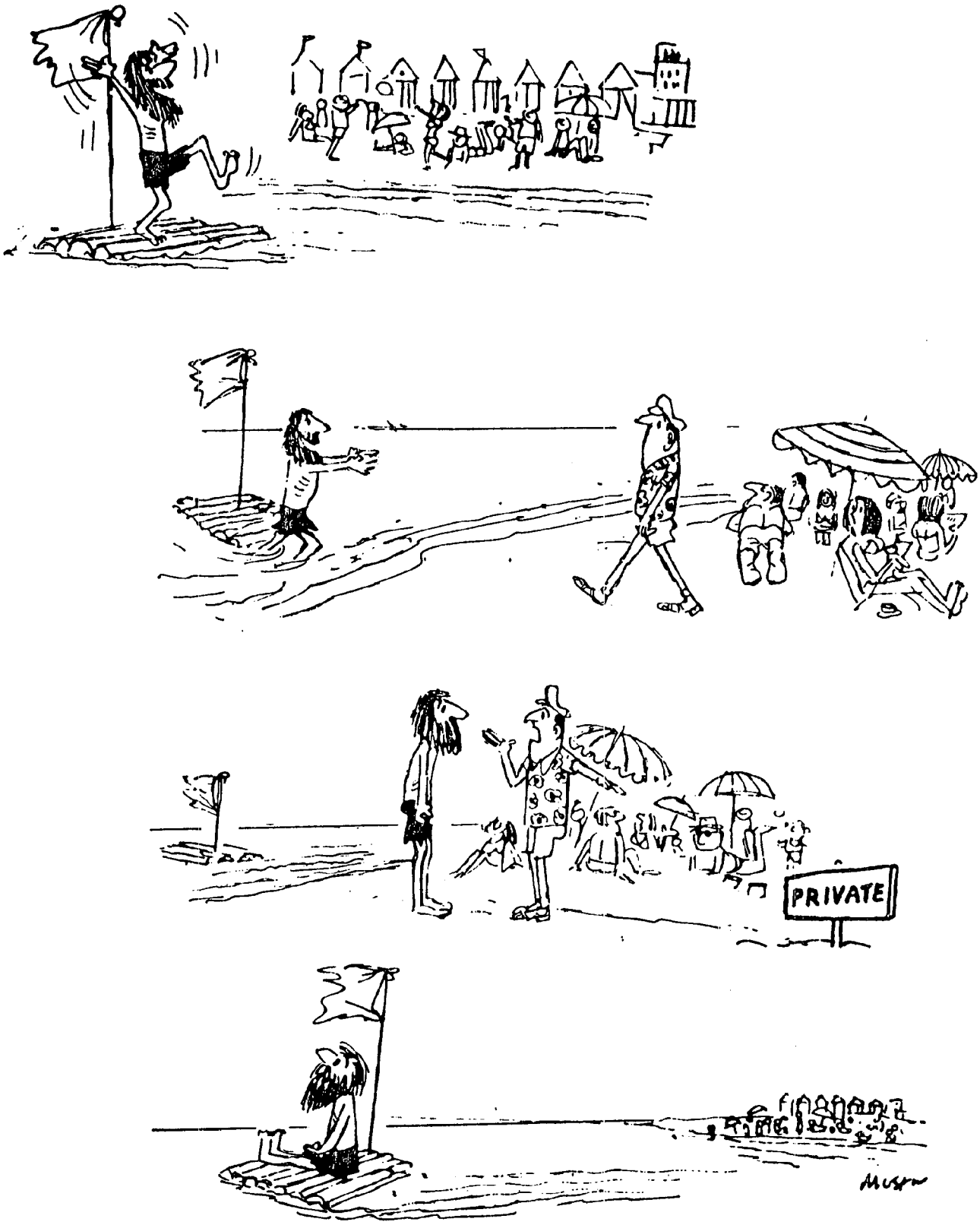
To many unhappy islanders it was a clear case of unsurrendering appeasement by seasoned professional state planners who had obviously been through the public forum gauntlet countless times before. Armed with documented expertise and lists of prior example they calmly and methodically answered questions and dispelled arguments with "proven" facts and rehearsed clarity; never bowing to tempermental rebuttal but instead unleashing their arsenal of state power, legal precedence and "the people's will."

The islanders' hopes of nullifying the proposed plan were apparently never an issue. The state officials had their plans, were obligated to hold a community hearing, but seemingly were not bound by local opinions or recommendatons. Redress was discouraged by the intertwining and confusing mandates of federal and state agencies, some no longer existing, others far removed in Washington, D.C. and none with any final jurisdiction over the matter. A Kitsap County denial of a shoreline development license was all that the state still needed before beginning immediate ground moving.

There are few public areas that have retained a natural cohesion of wilderness with limited public access. Indeed, wherever man goes an altered state of affairs exists. But in as much as we, too, are part of the environment, a coexistant life form, a certain degree of "intrusion" is normal and only nominally upsetting. Fort Ward State Park is presently in such a delicate balance but its frailty would be vulnerable and threatened by skateboards, campers, noise and "maintenance-free" facilities.

The pleading words of Kenneth Brustad, whose house faces the proposed entrance to the new 37-car parking lot, bespoke the islanders' consensus:

"Isn't that enough?"



Hans Moser

© 1970 Hans Moser

(Great Cartoons of the World. Series Four
edited by John Bailey. Crown Publishers, Inc., N.Y. 1970)

PHONE: 283-1052

2919 Mayfair Ave, North
Seattle, WA 98109

March 4, 1989

Letter to the Editor, Seattle Times

Dear Editor,

In her letter a shorelines property owner protests the use of Puget Sound for salmon rearing pens, offering possible pollution of waters near her home as the reason (Times, March 2).

Such owners use the same pseudo-environmental arguments to exclude people from public-owned beaches and tidelands. With the aid of their politicians they fight any state agency trying to develop beach access facilities, claiming that a nearby park will damage their private property values.

They also battle commercial farming of mussels and oysters, clam harvesting, and now salmon pens. This privileged group claims exclusive use of property for which they lack legal rights, the waters, and so decimates public rights, state and local revenues, and jobs that could be developed for recreation, tourism and aquaculture industries. By limiting the use of waters to their personal enjoyment they reduce the supply of high quality protein food, our export market potential. Most of the canned seafood on grocery store shelves is imported from Thailand, Malaysia, or India, and may yet be salmon from Norway.

What property taxes are paid for this exclusive use and views ? In appendices of the draft impact statement (DEIS) now circulating from the Dept. of Fisheries are revealing details. A survey study was made of 335 shorelines residential properties in Clallum, Jefferson, Kitsap, San Juan, and Skagit counties. The findings are that market values (asked or sold as reported by realtors and multiple listing services) were on average $223 per FRONT FOOT higher than the assessed values.

High value properties in San Juan County assessed at $305,000 have market value of $2,000,000. Lesser valued properties assessed at $97,711 have market value of $164,000. Similar discrepancies are common in those counties despite that current, full maket value is the legal standard for property assessment in Washington.

Threat of salmon net pens has not depreciated market values. Neither will it affect the many shore properties owned by the elite of the state's social, political and financial world who are able to prevent any salmon pens sited in their vicinity.

Officials of the Departments of Natural Resources and Fisheries are to be commended for efforts to enhance economic value of our natural resources and distribute these for benefit of the people of the state. They deserve our support.

Very truly yours,

Benella Caminiti

Ms Benella Caminiti

SALMON-PEN BATTLE

Please, keep them away from my waterfront home

As a waterfront owner, I have been closely following the continuing saga of the salmon pens. It's been called a battle, and that is true.

Brian Boyle, commissioner of public lands, wants to raise money by leasing fish pens he says in order to develop water-related public areas. To do this, he is going to destroy the privately held lands.

Around Whidbey Island, all areas zoned for fish pens are immediately upon the sandy shores.

Boyle says the fish-pen developers want to come in because of our pure water. How long would it stay pure with the salmon pens in place? Even the new study done by the Fisheries Department, which is lauded as saying pens are good and won't pollute the bay in general, does admit that, in the wrong place or when poorly run, they can cause environmental problems.

"Fish feces and uneaten food can accumulate on the bottom and deplete oxygen, making the sediment and water toxic, etc." This is what Gov. Gardner wants to put right by a beach where children play? Please!

In addition, the same report says these pens cause odors and algae bloom. Should this be placed in residential areas? Even if the tide washed some effluent away, it would only go onto the shores.

This is the main reason for the salmon-pen battle – not visual problems, although those are important too.

The state says careful siting will take care of all the problems. All right, be careful and don't place salmon pens by waterfront residences.

– **Jacqueline Maner, Everett**

Ten years old – but valid still !

in 3 years in the Philippines, and the 2-fold and 4-fold increases in Romania and Poland, respectively, in 3 years.

The importance of aquaculture in food production is perhaps best illustrated by the example of China. In his 1975 survey, Pillay[17] ranked China first in aquaculture production, with an estimated total yield of some 2.5 million metric tons. This amounted to about 40 percent of total estimated world production by aquaculture. More recently, however, Ryther[18] visited Chinese aquaculture facilities and estimated that annual production from fresh water aquaculture in China might approach 17.5 million metric tons! Marine aquaculture production was much smaller, but growing. If Ryther's estimate is more nearly correct, then this one country's aquaculture production is more than four times that of the rest of the world combined and equivalent to approximately 25 percent of today's total world fishery production.

Even in the United States, which is not traditionally a nation of fish eaters, aquaculture is quite significant, producing more than 151,000 metric tons of fish and shellfish annually.[17] Here private aquaculture alone produces some 78,000 metric tons of fishery products, which amounts to about 3 percent of the U.S. fishery landings and 2 percent of U.S. consumption of fishery products.[9] This private production includes over 40 percent of our supply of oysters, 50 percent of our catfish and crawfish, nearly 100 percent of our rainbow trout, plus smaller quantities of several other species.[9] In addition, 30 percent or more of all Pacific salmon landed in the U.S. originated in public or private hatcheries.[2] Besides these, public (especially) and private aquaculture operations sustain major recreational fisheries for trout, salmon, striped bass, catfish and a number of other species. These recreational fisheries are probably worth, conservatively, hundreds of millions of dollars. Also, much of the substantial U.S. production of ornamental fish is through aquaculture.

What Can Aquaculture Do In The Future?

Based on his production estimates for 1975, Pillay[17] projected a doubling of aquaculture production by 1985 just with expanded application of available technology and a 5 to 10-fold increase by the year 2000. Such production levels could easily amount to 30-50 percent or more of total world fishery production, considering present estimates of fishery potential and the aquaculture production example of China. In the U.S. alone, aquaculture production has been projected to increase to perhaps as much as 1 million metric tons by the end of the century.[9] Thus, I believe that aquaculture can:

- contribute significantly to the animal protein resources of developing and developed countries;
- increase significantly the production of luxury seafoods such as shrimp, salmon, lobsters, oysters, etc. for domestic consumption or export;
- increase opportunities for and revenues from recreational fishing and shellfishing;
- help to rehabilitate depleted natural stocks of certain sport and commercial fishery species;
- introduce and maintain new commercial and recreational fisheries where they did not exist before;
- provide bait for recreational and commercial fishing;
- convert low grade "trash fish" and organic waste products into high grade animal protein for human consumption;
- produce materials (e.g., pearls) for industrial applications;
- increase production of ornamental fish for domestic or export pet markets;
- assist in solving waste water treatment and energy production/conservation problems;
- assist in the diversification and integration of farming operations; and
- increase domestic revenues and provide significant agrarian employment opportunities.

However, as Pillay[17] has pointed out, much of this potential will remain unrealized without massive infusions of capital, much expanded extension programs for technology transfer, accelerated research and manpower training efforts, and development of the necessary infrastructure. Recognizing this, the FAO Technical Conference on Aquaculture, held in 1976 in Kyoto, Japan, adopted the following declaration in an attempt "to elevate aquaculture to an appropriate level in national and international priorities:"[19]

Kyoto Declaration on Aquaculture[20]

"The FAO Technical Conference on Aquaculture, assembled in Kyoto, Japan, on 2 June 1976, after a week-long review of present status, problems, opportunities and potential for the culture of fish, crustaceans, molluscs and seaweeds, declares:

(1) That aquaculture has made encouraging progress in the past decade, producing signficant quantities of food, income and employment; that realistic estimates place future yields of food at twice the present level in ten years, and five times the present level in 30 years if adequate support is provided.
(2) That aquaculture, imaginatively planned and intelligently applied, provides a means of revitalizing rural life and of supplying products of high nutritional value, and that aquaculture, in its various forms, can be practised in most countries, coastal and land-locked, developed and developing.
(3) That aquaculture has a unique potential contribution to make to the enhancement and maintenance of wild aquatic stocks and thereby to the improvement of capture fisheries, both commercial and recreational.
(4) That aquaculture forms an efficient means of recycling and upgrading low-grade food materials and waste products into high-grade protein-rich food.
(5) That aquaculture can, in many circumstances, be combined with agriculture and animal husbandry with mutual advantage, and contribute substantially to integrated rural development.
(6) That aquaculture provides intellectual challenge to

AQUACULTURE TECHNOLOGY SOCIETY JOURNAL Vol. 13, 35-39, 1979
Paul R. Sandler
"The necessity for Aquaculture development"

RESPONSE TO LETTER NO. 63: BENELLA CAMINITI

1. Comment noted.

2. Comments noted. Evaluation of the current status of wild runs of salmon and the measures necessary to protect them and restore them to historical levels are outside the scope of this EIS.

3. See the response to Comment 2 above.

4. See the response to Comment 2 above.

5. See the response to Question 11.

6. Comments noted. A discussion of existing regulations and guidelines has been incorporated into the FEIS.

7. Comments noted.

8. Evaluation of failing septic systems and their effect on water quality is outside the scope of this EIS.

9. Comments noted. Evaluation of the status of wastewater discharge from Puget Sound communities is outside the scope of this EIS.

10. Evaluation of the impact of organic tin (TBT) at marinas, relative to boat painting activities, is outside the scope of the EIS. Tributyl tin compounds are in extremely low concentrations in the water and do not pose a threat to pen fish. Higher concentrations are found in some sediments, but farm fish do not come in contact with sediments since the pens do not extend to the bottom.

11. Comments noted.

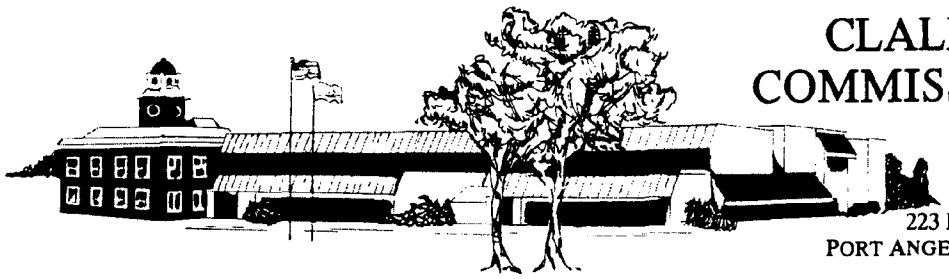
12. The purpose of the EIS is to evaluate the commercial culture of fish in floating fish farms in the Puget Sound region. An equivalent evaluation of fish from hatcheries is beyond the scope of the EIS. However, the subject of the interaction of hatchery and wild stocks has been studied in other reports. Contact WDF for further information.

13. Comments noted.

14. Comments noted.

15. Comments noted.

LETTER NO. 64



CLALLAM COUNTY COMMISSIONERS' OFFICE

COURTHOUSE
223 EAST FOURTH STREET
PORT ANGELES, WASHINGTON 98362-3098

(206) 452-7831, EXT. 233
SCAN 575-1234

BOARD OF COUNTY COMMISSIONERS

DAVE CAMERON, DISTRICT I
DOROTHY DUNCAN, DISTRICT II
LAWRENCE GAYDESKI, DISTRICT III

March 28, 1989

Mr. Ron Westley, Project Manager
Washington State Department of Fisheries
General Administrative Building
Olympia, WA 98504

Dear Mr. Westley:

Thank you for the opportunity to review the Draft Programatic Environmental Impact Statement regarding fish culture in floating net pens. Clallam County looks forward to the development of a Final PEIS and, eventually, the adoption of siting guidelines for floating net-pen aquaculture by the state.

The Board of Clallam County Commissioners believes the following items should be addressed in the Final PEIS:

1 - During numerous permit applications for salmon net-pen facilities in Clallam County, there has been testimony to the Board to the effect that the Atlantic Salmon will consume juvenile salmon and herring attracted to the shelter of the pens.

2 - There has also been testimony to the effect that these facilities attract baitfish and blackmouth to hold under and around the pens, thereby limiting their availability to sports fishermen.

- Although there is a very detailed description and analysis in the DPEIS of the potential hazards of disease, including the introduction of exotic diseases and the transfer of disease from penned fish to wild stock, this issue has been brought up continuously by concerned citizens.

3 Because of these concerns, a more detailed description of the impacts of disease is warranted. This description should include an analysis of existing regulations governing the control of disease in the State of Washington and the agencies which are mandated with this regulatory function.

Once again, Clallam County appreciates the opportunity to comment on the Draft PEIS and looks forward to reviewing the final document. If you have any questions regarding the above information, please contact the Commissioner's Office or Grant Beck of the Department of Community Development at 452-7831, ext. 324.

Sincerely,

Board of Clallam County Commissioners

Dorothy Duncan

Dorothy Duncan, Chair

Dave Cameron

Dave Cameron

Lawrence Gaydeski

Lawrence Gaydeski

c. Grant Beck, Associate Planner
Shoreline Advisory Committee

corre:westley.doc

RESPONSE TO LETTER NO. 64: BOARD OF CLALLAM COUNTY COMMISSIONERS

1. See the response to Letter 32, Comment 4.

2. Sports anglers can fish around the farm. Fish farms would not attract a significant percentage of salmon to make a difference to sports anglers.

3. Comment noted. See the response to Question 29.

LETTER NO. 65

CLALLAM COUNTY
ECONOMIC DEVELOPMENT COUNCIL

102 E. FRONT • P.O. BOX 1085 • PORT ANGELES, WA. 98362 • (206) 457-7793

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Lucille Schmitt, Partner
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Ted Simpson, Commissioner
PUD No. 1

Ted Spoelstra, Commissioner
Port of Port Angeles

Russ Thomas, President
Pay & Save Foods

March 27, 1989

Ron Westley, Project Manager
Washington Department of Fisheries
115 General Administration Building
Olympia, WA 98504-6642

RE: Draft Programmatic Environmental Impact Statement: Fish Culture in Floating Net Pens

Dear Mr. Westley:

The Clallam County Economic Development Council views aquaculture in various forms as an extremely promising industry for future economic diversification in our county. We have worked with many net pen proposals during the past several years and now have four years' experience actually living with Sea Farm Washington's two facilities in Port Angeles harbor. We understand that the industry is not without potential problems and limitations, but our experience with well-sited pens operated under professional management has confirmed our assessment that these facilities can be a valuable addition to our local economy.

Most of the mitigating measures proposed in the DPEIS are measures which a professional, prudent fish farmer would need to adopt for good fish husbandry. In fact, it is fish farming's need for continuing high water quality that makes it compatible with so many of the other demands on our marine resource. How often do mitigating measures imposed on an industry also lead to higher productivity?

We have two specific comments: 1) The discovery of VHS in two hatchery facilities in the state necessitates an update in the discussion of fish diseases. Again, it is important that a standard, factual reference be available for decision makers regarding the interaction of this virus with net pen farming. It is also important that panic regarding this virus not be allowed to cloud discussion of other net pen issues. (1)

2) We have also recently worked with a firm proposing a land-based tank farm in Clallam County, and suggest that the discussion of suitable sites emphasize the rarity of such sites. There are two site requirements not mentioned in the DPEIS which further limit suitable sites: The water offshore must meet very high standards, and there must be a high level of assurance the quality will remain high for about 20 years. The level of investment cannot be made unless the facility can operate for at least that long. The other factor limiting sites which might be physically suitable is the interest of the landowner in even considering such facilities.

2

The DPEIS is an important step forward in bringing some standard basis of factual information to discussion of net pen facility development. A major impediment to the development of the industry has been lack of a standard reference for information about issues that rightly concern the citizens of the state: especially water quality and protection of other marine life. But how many proposals which can enhance rural economies would result in the "no impact" or "low impact" conclusions that the DPEIS reaches regarding fish farm impacts? We will continue to encourage Clallam County residents to adopt an accommodating attitude to the visual and navigational concerns that arise.

We urge your early adoption of a Final Programmatic Environmental Impact Statement.

Sincerely,

Margaret Crawford

Margaret Crawford
Assistant Director

RESPONSE TO LETTER NO. 65: CLALLAM COUNTY ECONOMIC DEVELOPMENT COUNCIL

1. See the response to Question 29.

2. Comments noted. Both floating fish farms and land-based tank farms require high quality water for their operations. A thorough evaluation of tank farms, however, is outside the scope of this FEIS.

LETTER NO. 66

April 1, 1989

Ron Westly
Dept. of Fisheries
115 Gen. Admnin. Building
Olympia, WA. 98504

Dear Sir;

I appreciate the extension for public comment regarding the fish pen controversy your department has seen fit to grant. With the rapid deterioration of water quality becoming an ever increasing reality, its time that government agencies stop treating our bays and oceans as dumping grounds, rearing pens and shipping lanes for gross profits at the expense of those who in the end must pay when things go wrong. The sad fact is that "public comment " is usually disregarded while the "experts" rush head first into a controversy with little or no thought or preparation for what can be a disastrous end. To wit: Valdez AK.

The relationship between an oil spill and a fish pen can be a very close one when you realize and ponder the nature of nature itself. Atlantic Salmon are being raised in pens of Pacific waters because the "Atlantic coast slips toward being a biological desert." to paraphrase a headline in the (4/2) Seattle Times. We can no longer accept the mentality that allows the disturbance of our waters in any way, shape or form. (1)

To permit a Canadian firm the right and license to install fish pens in Kiket Bay against the wishes of the people of Skagit Co. and specifically the property owners in the surrounding region is as gross a violation as permitting oil tankers to be built without double hulls. The magnitude may differ "when somethig went wrong", but the blatant arrogance is an outrage none the less.

In the past twenty years there have been nearly ten seperate Acts of Congress written to deal with and minimize ocean dumping and polluting, from the Ocean Dumping Act to the Water Quality Act. But the dumping and mismanagement of industries responsible goes on. We have the power to deplete our coastal waters of the oxygen that is vital to sustain sealife. Do we have the power to stop?

Yours Truly,

Larry Collinge
1520 Snee-oosh Rd.
La Conner, WA. 98257
466-3431

RESPONSE TO LETTER NO. 66: LARRY COLLINGE

1. Comments noted.

LETTER NO. 67

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX C-3755
SEATTLE, WASHINGTON 98124-2255

REPLY TO
ATTENTION OF

Planning Branch

Ron Westley, Project Manager
Washington Department of Fisheries
115 General Administration Building
Olympia, Washington 98504

Dear Mr. Westley:

We have reviewed the draft environmental impact statement (EIS) for Fish Culture in Floating Net Pens with respect to the U.S. Army Corps of Engineers' areas of special expertise and jurisdiction by law as designated by the President's Council on Environmental Quality on December 21, 1984.

1 Technical Appendix F. Regarding permits which may be required for an aquaculture project, change the wording "Dredge and Fill Permits" to "Section 10 Permits." Generally, net pens do not require dredge or fill, but do require a Department of the Army permit under Section 10 of the Rivers and Harbors Act. Contact Sam Casne at the Regulatory Branch at telephone 764-3495 for further information.

2 Page 87, First Paragraph. Clarify that the USFWS can recommend that conditions be attached to a permit. Final responsibility in this regard rests with the Corps of Engineers.

The following are offered as general observations and in the interest of improving the EIS.

3 • There are proposals in existence to site net pens for salmon rearing (including Atlantic salmon) in freshwater--specifically, at Lake Rufus Woods, at Chief Joseph Dam on the Columbia River. Suggest the final EIS include a brief overview of such proposals with some emphasis on potential differences with respect to key issues (water quality, benthic impacts and escape of reared fish, for examples).

4 • Page 19, first paragraph: Second sentence should read ". . . at different depths in the sediment . . ." Should the fourth sentence be changed to "In organically enriched sediments . . ." (as opposed to oxygen-enriched)?

5 • Page 23, the last two lines: It appears the units in the mathematical equation may not be accurate--should it really be kg carbon/m/yr (or g carbon/m/day)?

6 • Page 67, line two: A word seems to be missing here.

7 • Page 75: The fact of a successful introduction of Atlantic salmon in Argentina is evidence that, while establishment of this species outside its normal range is unlikely, it is possible. This indicates the need for extreme caution in setting up any new operation. The presented guidelines look good.

8 • Page 114: The mitigation for commercial fishery issues states that pens should be aligned parallel with shore. However, the organic waste mitigation guideline (page 26) states that pens should be oriented perpendicular to currents. Since currents often run parallel to shore, there seems to be a conflict between these two guidelines.

9 • There are several typographical errors, including the generic name for lingcod on page 66 (should be Ophiodon, not Ophioclon).

Thank you for the opportunity to review this statement.

Sincerely,

Frederick C. Weinmann
Chief, Environmental Resources
Section

RESPONSE TO LETTER NO. 67: UNITED STATES ARMY CORPS OF ENGINEERS

1. The text has been revised.

2. See the response to Comment 1.

3. Freshwater aquaculture is outside the scope of this EIS.

4. The text has been revised for clarification.

5. Weston and Gowen (1988) report units of kg carbon/m^2/yr. Note, the values reported in the EIS differ from the Weston and Gowen report in units of kg carbon/m^2/yr, but are the same as the Weston and Gowen report in units of kg dry wt./m^2/yr. The values have been modified to agree with Weston and Gowen (1988).

6. See the response to Comment 1.

7. Comment noted. Despite numerous efforts to establish a run of Atlantic salmon in the Pacific Northwest, all efforts have failed.

8. See the response to Question 10.

9. Comment noted. The document has been proofread in an attempt to eliminate typographical errors.

LETTER NO. 68

Thomas Croley, MD
16407 Olympic View Rd. NW
Silverdale, WA 98383
(206) 692-1444

21 March 1989

Donald Weston
Project Manager
Washington State Department of Fisheries
115 General Administration Building
Olympia, WA 98504

Dear Sir;

I am writing in response to the recently release Draft Programmatic Environmental Impact Statement (DPEIS), Fish Culture in Floating Net Pens published by the Washington State Department of Fisheries, January 1989. I have had the opportunity to read this document in detail, and consider it at length. I will comment on what I consider to be its substantial inconsistencies, conflicts, and inaccuracies.

1. Conclusions reached by the DEPIS often appeared to be incompatible with the data presented in the report. The term "significant" was used to verbally mitigate negative impacts. What are the parameters used to establish the threashold of significants in each instance and how and who established them? Has this broad-brush approach been used to avoid acknowledging negative impacts mentioned in the PDEIS and those easily demonstrated at currently existing sites? Common sense would lead one to believe that similar negative environmental effects could occur at new net-pen sites. An

1

example can be made of the reported effects of feces and uneaten food fallout upon benthic organisms located beneath net-pens. Some currently existing sites have resulted in an azoic zone beneath net pens. Yet, this profound and devastating change in the local environment is not considered significant if it does not impact commercially important species. I disagree with the reports interpretation of the observed effects. The report should not be limited to economic parameters. Setting thresholds of what is concidered significant must honestly reflect the effects on all species at the site. The same argument can be made regarding, aesthetics, risk to indigenous species (e.g. VHS.), escape, recovery after removal and upland developemnent associated with net-pen opperations. Perspective provided by the report is too narrow and favors commercial over environmental interests.

2. The main contractor of this report, Parametrix, has also produced a DEIS for International Marine Farms (IMF),and their proposed Harding Creek Aquaculture Project in Kitsap County. How can the public be reassured that a coporation working for salmon culture industry, will be able to produce and interpret data that is unbiased, and make interpretations from a perspective that does not favor industry and developement interests. The fact that Parametrix is working for both the State and IMF leads to an immediate impression of conflict of interest. The suspicion

2

of conflict of interest is hightened by the conclusions of the report.

-

-

3. No recommendations were made regarding monitoring of future sites, and no stratgies were discussed regarding what action could or would be taken in the event that built sites were found to be negatively impacting the surrounding environment. This omission is particularly surprizing and disturbing when one sees data presented which casts doubts on the accuracy of predictive models. (See page 26 and the dicussion regarding the model of fallout from the pens and comments which indicate that it is not predictive in all cases). If pre-siting current measurements are not
3 completely reliable or predictive, then monitoring is essential. If surprizes are found, such as those demonstrated at the Squaxin Island site, then all parties involved should know what actions will be taken in the event of unexpected outcomes. This type of approach would be in the best interests of all those involved, developer and resident alike.

These comment reflect a global pattern in this report. It seems to attempt to justify events that have clearly shown to be problematic...even in its own text. I would write the conclusions in the following manner:

1. Impacts of net-pen culture cannot be prevented, and not all impacts can be acurately predicted.

2. Although the impacts of net pens are reversible it may take many years for affected areas to revert to their undistrubed state.

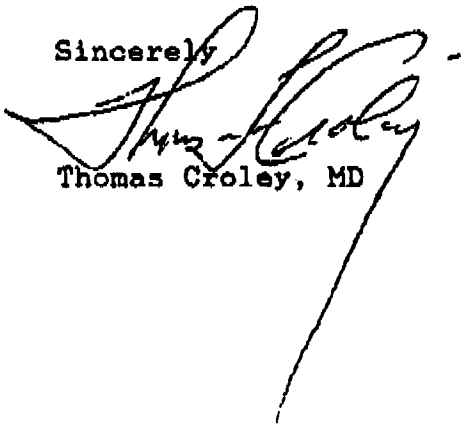
3. Unchanged.

4. Siting of 100 farms would have impacts on the aquatic environment. Small bays would certainly be more severely affected.

This reports sould be reconsidered and the conclusions redrawn prior to acceptance. I would also hope that the State will encourage further comment from the public in the form of more public meetings and an extended period of written comment. The adoption of this technology in a wide spread fashion suggested by the reports conclusions, represents a step that should be taken very cautiously irrespective of pressures for economic development. These projects will probably draw outside capital and thus lead to outside profit. The working public will be offered few jobs which pay less that average pay. The risk benefit ratio

will be high and I question that this report in its current form will lead Washington State in the proper direction.

Sincerely



Thomas Croley, MD

RESPONSE TO LETTER NO. 68: THOMAS CROLEY

1. The word "significant" has a specific meaning in a SEPA document. A significant impact is one that has "a reasonable likelihood of more than a moderate adverse impact on environmental quality" (WAC 197-11-794). SEPA also states that "EISs need analyze only the reasonable alternatives and probable adverse environmental impacts that are significant" (emphasis added) (WAC 197-11-402 [1]). The authors of the EIS included a discussion of the issues of concern that were identified during the scoping process.

2. See the response to Question 2.

3. The development of monitoring programs is not within the scope of this EIS. A monitoring program would be a component of a management plan for the fish farming industry.

4. Comments noted.

5. Comment noted. See the response to Question 7.

6. Comment noted.

LETTER NO. 69

Dunlap Towing Company

LaConner, Washington 98257

LaConner (206) 466-3114
Everett (206) 259-4163

General Towing Contractor

Complete Log Handling Facilities

March 28, 1989

Mr. Ron Westley, Project Manager
Washington Department of Fisheries
General Administration Building
Olympia, Washington 98504

Re: Draft E.I.S. Fish Culture in Puget Sound

Dear Mr. Westley:

I would like to take this opportunity to comment on the draft E.I.S., Fish Culture in Floating Net Pens beginning on page 103:

1. Paragraph 3 suggests that towboats primarily use the main shipping lanes. This is true for barge work but when towing log rafts a tug will spend very little time in the designated traffic lanes. Tugs with log tows hug the shoreline to make use of favorable tidal conditions as they move throughout the navigable waters of the state. (1)

2. Page 104, paragraph 3 indicates that commercial vessel traffic tend to stay in deeper water thus avoiding areas where fish pens would be located. It is my understanding that fish pens require a minimum of 45 ft. of water, a depth which we consider navigable. Our log boats have a maximum draft of 12 ft. which is more than the log tow. We routinely tow in water depths of 35 ft. or less. (2)

   Net pens can hardly be compared to a long dock or marina. In some instances they can be located in excess of 1000 ft. from the shore as in the case of the proposed net pens in Discovery Bay. This would create a much greater hazard to navigation than the paragraph suggests. (3)

3. Page 105. d. There are unavoidable impacts that can't

General Towing Contractor

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March 28, 1989

4 be mitigated that are especially threatening to our operations. It should be pointed out that the affected waters are all waters of the state, not just Puget Sound as the E.I.S. suggests.

I appreciate the chance to comment on the Draft E.I.S. put together by the Department of Fisheries. More consideration must be given to our concerns over navigation because it is an integral part of the economy of Washington State.

Sincerely,

Jim Sanford
Dunlap Towing

RESPONSE TO LETTER NO. 69: JIM SANFORD

1. The FEIS acknowledges that tugs towing log rafts will hug shorelines as conditions warrant. The potential impacts to navigation are determined by the USCG as part of each ACOE Section 10 permit.

2. Comment noted.

3. As stated in the same paragraph from which you quote, "The further offshore the structure is located, the greater the navigational risk . . ."

4. While it is true that fish farming operations can be operated in a variety of aquatic environments, the scope of this document is floating fish farms in the Puget Sound region.

LETTER NO. 70

CHRISTINE O. GREGOIRE
Director

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Mail Stop PV-11 • Olympia, Washington 98504-8711 • (206) 459-6000

April 7, 1989

Mr. Duane E. Phinney, Chief
Habitat Management Division
Washington Department of Fisheries
115 General Administration Bldg.
Mailstop AX-11
Olympia, WA 98504

Dear Mr. Phinney:

Thank you for the opportunity to comment on the Draft Programmatic Environmental Impact Statement on Fish Culture in Floating Net Pens. Following are our major comments on the DEIS. I have also attached a set of specific staff comments.

The purpose of an EIS should be to provide decision makers with the information and analyses necessary to make decisions which might affect our environment. This document presents a great deal of good data. The compilation, collation and presentation of this data under tight time frames is particularly commendable.

1 However, the wording regarding the lack of impacts from up to 250 acres of net pens should be reconsidered. Without saying how or where these would be sited, it leaves people with the impression that the State of Washington has concluded that 250 acres are acceptable. This could propel aquaculturists in actions based on a misunderstanding of overall approval.

2 Secondly, this draft does not clarify the necessary management and policy issues. (The most serious question concerns the need for a program to develop net pen siting criteria.) To be useful to state and local officials, the FEIS should compare the environmental effects of different management approaches. The alternatives as written and analyzed do not lend themselves to impact comparisons since they all display the same lack of impacts.

We would urge that a commitment be made to address differing management schemes to meet a common objective. For instance, alternatives could be built around the objective outlined on page 2 which is to manage the industry to ". . . assure farms are located in appropriate areas and

operated in a suitable manner to prevent unnecessary impacts even if these impacts are deemed to be non-significant." Under this objective, possible alternatives and subsequent analyses of mitigation measures could be:

1. Case by Case Approach: A management approach which would require the evaluation of each proposal using modeling or other approved techniques to determine anticipated impacts.

2. State Siting Criteria: An approach which would establish siting and operating standards which any proposal would be required to meet. This alternative would be similar to adopting the interim guidelines as mandatory regulation.

3. Local Governmental Management Approach: This approach envisions minimal state regulation and non-mandatory guidelines. State requirements would basically be geared to specific permit and leasing authorities of state agencies.

The document would lend itself to discussion of these alternatives. Under these alternatives, each "environment" section would discuss the relative environmental consequences of these alternative approaches. Even if no preferred alternative were selected, such a discussion would move us towards committing to the management framework that should follow. Perhaps an introduction could carry the message of a commitment to pursue an evaluation of management approaches.

In addition, we note there are references in the DEIS to requirements currently in place regarding new and existing net pens (page 40). However, the exact nature of these and other requirements and thus the degree of public and environmental protection afforded is not contained in the DEIS. The background statement should contain a summary of existing rules, policies and programs which relate to net pen management to be used as a common basis of departure. This should include a fuller discussion of the legislative background leading up to this EIS. 3

The FEIS should include general discussion of the public policy issues associated with private use of a public resource. This would give the reader and decision makers a better understanding of the nature of the controversies and provide general guidance. Economic activities of a permanent or semi-permanent nature occurring on public lands or, in this case, on public waters are not necessarily governed nor should they be governed by the same criteria as economic activities on privately owned property. 4

Again, thank you for the opportunity to comment. If you should have any questions, please contact Marvin Vialle at (206) 459-6018.

Sincerely,

Steve Hunter

Steve Hunter
Assistant Director
Central Programs & Enforcement

SH:v
0405b

Enclosures

cc: Kaleen Cottingham, OFM
Carol Jolly, WDOE
Dick Cunningham, WDOE
Greg Sorlie, WDOE
Stan Springer, WDOE
Marvin Vialle, WDOE

DEPARTMENT OF ECOLOGY STAFF COMMENTS

ON DRAFT PEIS - FISH CULTURE IN FLOATING NET PENS

* Editing - an editorial review is needed to correct redundancies, typos, etc. Some examples are:

Misspellings and typographical errors - the word "south" should be "Sound: in the 3rd paragraph of page 33.

5 Incomplete sentences - 1st sentence of 4th paragraph of page 49; 1st sentence of 4th paragraph of page 59.

Incorrect conversions of units and measures - 3rd paragraph of page 28, 6 knots = 3.1 m/sec, not 6 m/sec; 4th paragraph of page 55, 56.8 g/day should be 56.8 kg/day.

* Authoritative statements are often made without supporting evidence or documentation. For example:

4th sentence of final paragraph of page 7 ("These stocking ...").

8th sentence of 3rd paragraph of page 24 ("Net pens ...").

6th sentence of 2nd paragraph of page 40 ("Ammonia and ...").

3rd sentence of 3rd paragraph of page 43 ("Current speed ...").

5th and 6th sentences of 5th paragraph of page 45 ("If the ...").

5th sentence of 3rd paragraph of page 138 ("A dilution ...").

* Literature citations under "IV. REFERENCES" (pg. 149) are inconsistent, incomplete, or missing altogether. For example: Gowen and Bradbury, 1988 (pg. 13); Heggberget 1988 (pg. 69); and Asgard et al 1988 (pg. 136).

The following review comments are less general in nature and are presented in paginal sequence:

Section	Page	Comment
Summary	x	8th paragraph: Unavoidable impacts were noted (aesthetics and navigation).
I.A&D	2,8	The basis for the upper range of industry development (100 farms) should be given earlier than page 131 (last sentence of 5th paragraph). Also, the phrase "within the next few years" should be defined.

I.B 4 The PEIS should evaluate the potential impacts of delayed-release pens because: 1) they have been sited in restricted Puget Sound waters (pg. 49); and 2) WDF has proposed to greatly expand their use as part of a long-term fishery enhancement program.

8

4 Paragraph 4 states that all new net pens are limited to ... less than two acres. Who limits them, who enforces, etc.?

9

9 Not all permits issued by state and local government are subject to SEPA.

10

9 Suggest combining Shoreline Management Act and Substantial Development Permit under common heading. Also "substantial development" permit should be corrected to "shoreline" permit to include other types of required permits. Concerning such permits "uses and" should replace "development" in the corresponding paragraph.

11

10 An addition to the reference to Waste Discharge Permit (RCW 90.58) on page 10 would amplify and clarify the intent of the Department of Ecology. We suggest that the last sentence of this paragraph be deleted and the following inserted: "These

12

standards will include requirements for sediment dilution zones for discharge activities (sediment impact zones) and cleanup activities (sediment recovery zones). When adopted, these sediment dilution zone requirements may be incorporated into any waste discharge permits issued for net pen operations.

(13)	11	Other entities with involvement include tribal and the Puget Sound Water Quality Authority.
II.A.1. (14)	13	As with other sections of the draft PEIS, the introduction to this section should describe the objective(s) of the mitigation measures presented within.
(15)	24	Last sentence of 3rd paragraph: The guidelines recommend a minimum depth of 20-60 feet, depending on mean current velocity and annual production.
(16)	25	1st paragraph: Intuitively, one would expect larger pens, with the same loading, to deposit sediments over a relatively larger area.
(17)	26	1st paragraph: The Gowen model predicts carbon deposition, not redox potential.

(18)		5th paragraph: This mitigation measure implies that sites with low biological productivity are, to a certain extent, expendable.
(19)	26,27	Under mitigation measures it states, "Where accumulation is unavoidable, select sites having little biological productivity." Under Unavoidable Adverse Impacts it states, "If accumulation is allowed..." Both of the statements imply that there are locations where accumulation can be avoided or techniques which can be employed which will prevent accumulation. If this is the case, to what degree will accumulation be permitted? Who will decide?
(20)	27	Add some discussion of the experience of collecting waste (from Braeten '83).
II.A.2. (21)	39	2nd paragraph: Were any turbidity measurements taken during or shortly after feeding, when feed wastage would peak and fish activity could dislodge net-fouling organisms?

43 2nd sentence of 6th paragraph: Earlier discussion noted that violation of turbidity standards may occur during net-pen cleaning (pg. 39) and that violation of dissolved oxygen standards had already occurred (pg. 42).

22

43 Noise, odor, and water quality impacts resulting from cleaning of nets on the uplands need to be addressed.

23

46 Last 2 sentences of 2nd paragraph: Are these areas therefore considered "potentially nutrient sensitive" (pg. 51)?

24

50 Rensel's report (Appendix C) is reviewed later in this memo; some of the review comments carry over to the discussion on page 50.

25

51 1st complete sentence: Since this finding is not supported by sufficient data, it should not be presented in the PEIS.

26

52 1st paragraph: Stratification limits mixing between surface and deep layers, thus nutrient-rich waters at depth may not contribute a significant nitrogen load to surface waters.

27

2nd paragraph: This discussion is somewhat confusing and the point not readily evident.

53 Was Kieffer and Atkinson's phytoplankton-nutrient model verified by field studies?

28

54 The model schematic requires clarification. For example, it is unclear how phytoplankton lose nitrogen through respiration. Also, non-grazing algal mortality does not appear to be accounted for.

29

55 1st paragraph and equation: Both are out of sequence. Also, the model equation is given for winter, but not summer.

30

2nd paragraph: The model uses a value of 1.5 tidal cycles per day; 2 cycles per day would be a closer approximation.

4th paragraph: It is unclear why a solubility correction of 87% is applied; the nitrogen load is already expressed as a dissolved value.

56 Table 2: Parameter coefficients and mass-balance results should be provided for each model run.

31

57 Paragraph 9: Nutrient production in sensitive areas could also be minimized through reduced fish loading during critical periods. (32)

Paragraph 11: It is unclear how an increase in nitrogen digestibility would reduce ammonia excretion since ammonia is largely excreted through the gills (Lagler et al., 1977. 'Ichthyology'. John Wiley and Sons, New York). (33)

61 4th paragraph: The title of Carlucci and Pramer's paper implies the study of a single species, yet results are generalized to "non-pathogenic bacteria". The 1st paragraph on this page indicates antibiotic effects may be exerted in sediments below fish farms. The potential impact of antibiotics on benthic detrital bacteria should be explored further, as loss of these forms would likely accelerate sedimentation beneath the pens. (34)

63 Last sentence of 6th paragraph: The word "unlikely" should be substituted for the phrase "virtually impossible". (35)

36	II.A.3.	79-81	Do the discussion and conclusions of this section merit revision in light of the recent discovery of viral hemorrhagic septicemia in Puget Sound salmon and consequent destruction of all fish at the two affected hatcheries?
37	II.B.1.	91	Aesthetics: No mention of sheds or buildings occurred in the text, frequency of sheds on existing 13 permits should be cited. Discussion of their impact should occur.
38	II.B.3.	114	The 5th mitigation measure is implicit in the 1st measure. The 4th measure potentially conflicts with a guideline to prevent sedimentation (item 4 on page 25) because current movement typically parallels the shore.
39	II.B.7.	124	3rd paragraph: The mitigation objective should be similar to that for noise (pg. 121) -- i.e., to prevent odors from adversely affecting nearby human activities, especially shoreline habitation.
40	II.C.	131	6th paragraph: How do these loading rates compare to literature values? Why were the loading rates presented earlier (e.g., nitrogen - page 55) not used here?

132 7th sentence of last paragraph: What is the impact threshold and how was it derived? The cumulative impact analysis appears to exclude the 50% daily tidal reflux to Puget Sound (pg. 33). (41)

3rd sentence of 2nd paragraph: The progressive vector diagram of Weston and Gowen (Appendix A) suggests a net-southward transport of pen wastes. If true, perhaps the southern reference site would demonstrate far-field effects of nutrient enrichment. (42)

TECHNICAL APPENDICES

9 1st paragraph: The tidal data provided is insufficient for the reader to interpret survey results. The time and stage of all tides should be provided for both sampling dates. In addition, sampling times should be reported for all collected data. (43)

3rd paragraph: The distinction between inorganic, dissolved, and total nitrogen is unclear throughout the report. Nitrate, nitrite, and ammonia constitute "total inorganic nitrogen". If the sample is filtered prior to analysis, the complex (44)

is referred to as "dissolved inorganic nitrogen". "Total nitrogen" and "dissolved nitrogen" would include organic forms. Nutrient results should be expressed as mg-N/L or mg-P/L.

15 3rd sentence of 1st paragraph: If this is true, wouldn't the same response be expected at the net pen site due to the influence of southern Peale Passage waters?

45

Last sentence of 1st paragraph: The error bars should be included so the reader may confirm that the variation was small.

46

2nd sentence of 2nd paragraph: This statement is misleading -- half of the nitrogen values in June were lower than the growth limiting concentration, compared to none in May.

47

3rd sentence of 2nd paragraph: It appears that the word "lower" should be replaced by "higher".

48

Last sentence of paragraph 4: For clarity, the phrase "near the net pens" should be inserted after "productivity".

49

21 1st paragraph: Productivity patterns before and after release may have appeared similar, but variability was high. To this reviewer, a more "striking feature" of the analysis was the statistical difference in productivity between the net-pen and reference sites prior to release, compared with no significant differences after release.

50

2nd paragraph: Nitrogen did not appear to be in short supply, but the ammonia excreted by fish may be more usable by phytoplankton.

51

22 1st sentence of 2nd paragraph: Reference stations should have been sited in shallow water to facilitate comparisons to the net-pen station. This sampling design would have reduced the "noise" associated with water depth, proximity to land, current movement, mixing, etc.

52

23 Last sentence of 1st paragraph: This statement does not appear consistent with the data in Figure 3a.

53

54 1st sentence of last paragraph: Given the problems with sampling design and data interpretation noted above, this conclusion may be premature.

55 25 Last sentence of 2nd paragraph: Source should be cited.

In summary, most sections of the draft PEIS and technical appendices were reasonably comprehensive. However, several areas require further attention, namely:

56 * A short section on net-pen culture in Japan, Norway and Scotland would be beneficial and help to reduce much of the misunderstanding surrounding net-pens. Included for each country should be a short history of net-pen industry, any environmental impacts or concerns of their relevance to the Puget Sound, current and historical production levels, and existing and historical regulatory controls within each of the countries to control environmental and disease impacts.

57 * Proper documentation of source material is essential. This would included: 1) citation of authoritative statements; and 2) cross-checking of citations in the text against the list of references.

* Impacts of delayed-release facilities should be evaluated in light of their potential for future expansion, as well as their potential for siting in restricted embayments. 58

* The Kieffer-Atkinson model should be presented in greater detail. The model's importance in assessing nutrient-phytoplankton dynamics merits its inclusion as a separate technical appendix. 59

* The discussion concerning land-based tank farming should either be expanded or omitted entirely. If an objective of the PEIS was to evaluate the impacts of land-based facilities, then a more detailed environmental assessment is warranted, with provision of mitigation measures mandatory. 60

* Portions of Appendix C are unclear or misleading. Study findings should be more carefully examined, especially as they relate to the main body of the PEIS (pg. 50). 61

* Throughout the EIS, almost no discussion was made of the technological methods that could be used to reduce or eliminate the water or sediment impacts of net-pen culture. For example, evaluation of sedimentation mitigation measures including feed/feces collection of periodic removal of sediments below net-pens should be included. 62

63

* State law requires all discharges to state waters be provided with "all known, available and reasonable methods of treatment," regardless of receiving water quality. Are there reasonable methods of treatment available for the wastes discharged from net-pen operations?

RESPONSE TO LETTER NO. 70: WASHINGTON DEPARTMENT OF ECOLOGY

1. Comments noted. Proper siting of individual farms is essential to preventing significant impacts.

2. The purpose of this EIS is to evaluate environmental impacts and a management plan is not included. The FEIS evaluates existing regulations and guidelines. From this evaluation, a management plan can be formulated.

3. Numerous sections contain descriptions of regulations that affect the fish farm industry. The EIS includes evaluations of existing regulations and guidelines that are currently being used to manage the industry.

4. See the response to Question 11.

5. Comment acknowledged. The text of the EIS has been edited and proofread.

6. The Summary has been rewritten.

7. Comment noted.

8. See the response to Question 21.

9. A Commissioner's Order from DNR limited the size of fish farm proposals to two acres or less. This Order has expired, but the State, industry, and local governments continue to use this size limitation as a guideline.

10. Comment acknowledged.

11. The shoreline permit and the *Shoreline Management Act* have been combined in the FEIS.

12. Comment noted.

13. The list provided in Section 4 of the FEIS includes agencies directly involved with the management of the fish farming industry.

14. Comment noted.

15. The text has been revised for the FEIS.

16. The reference cited used the ratio of impacted area to farm area and found this ratio to be larger for smaller farms. The conclusion that the larger farms cause higher concentrations of sediments is incorrect. The larger farms distribute the sediment over a larger area and therefore have lower sediment concentrations.

17. Comment acknowledged.

Response to Letter No. 70: Washington Department of Ecology (continued)

18. Comment noted.

19. Comments noted. The amount of accumulation allowed under fish farms will be determined through siting regulations and guidelines, and the NPDES permit system. Ecology is currently formulating the NPDES permit requirements.

20. Techniques for collecting waste are described in Section 5.1 of the FEIS.

21. No known measurements exist under the conditions described in the comment.

22. Instances when water quality standards were violated occurred at farms located in poorly circulated embayments. No violation of standards are expected for a properly sited fish farm. Part of proper siting is to determine that the circulation is sufficient to prevent violations of water quality standards.

23. The evaluation of activities associated with floating fish farms which occur on upland areas are outside the scope of this EIS.

24. The specific areas mentioned at this point are potentially nutrient sensitive, pending further studies and analyses of existing data. Nutrient sensitivity may be viewed as a continuum in varying degrees, not a simple yes or no situation.

25. Comment noted.

26. Other portions of the same referenced study were significant (e.g., the ammonia levels noted around the pens) so the reference was presented. The study is useful because it is one of the only other field studies conducted in recent years dealing with phytoplankton production, radiocarbon uptake, and salmon farms. It also demonstrates poor siting practices that have occurred in other countries (e.g., pens sited within a fjord with a nearly-blocking sill at the entry).

27. The reviewer's statement is correct, nevertheless, the present method of calculating nitrogen flux in and out of embayments far understates the true amount as the deep waters are not accounted for in the analyses. The solution is to use a one-box (surface) model in areas of limited vertical mixing for modeling during summer conditions that may occur in embayments with strong thermal and salinity stratification.

28. See the response to Question 19.

29. Respiration involves more than simple oxygen consumption and carbon dioxide discharge. See the response to Letter 18, Comment 29. Non-grazing algal losses are covered by system loss rate, illustrated in the lower portion of Figure 11 of the text.

30. The summer equation is the same as the winter equation during periods of steady-state biological action, but column of Table 2 now shows that 95% of the

nitrogen, as a worst case, is converted into phytoplankton biomass and is later partitioned into 1/2 zooplankton biomass. Non-steady-state conditions are included in the model, but the other calculations are elaborate differential and simultaneous equations that involve use of a main frame computer. See Kiefer and Atkinson (1988) for a more detailed description of the model including those equations. Dr. Kiefer and Atkinson's model is presently under study by EPA for its broader application to all of Puget Sound's embayments.

The use of 1.5 tidal cycles per day is more conservative than 2 tidal cycles per day since there is less tidal exchange in the later. Additionally, most areas in Puget Sound and its approaches average about 1.5 or more tidal cycles per day.

The 87% is to account for the 13% portion of waste nitrogen that is present in the feces and is generally transported to the bottom area, out of the surface layer. The prior sentence has been altered to refer to total nitrogen (inorganic and organic forms).

31. The coefficients of the steady-state model are given in the text. Additional non-steady-state coefficients are given by Kiefer and Atkinson (1988, 1989). A sentence has been added to explain the partition of nitrogen between phytoplankton and zooplankton stocks.

32. Comment acknowledged. The suggestion has been added to the text. Typically fish biomass does not peak until the early winter period in most commercial farms, so it is doubtful that the suggestion could have practical application.

33. The paragraph has been altered to discuss the providing of a balance of protein (containing nitrogen), fats, and carbohydrates in the diet. By providing the optimum balance, proteins (amino acids) that may have been deaminated as an energy source are "spared" for incorporation into fish flesh, resulting in reduced excretion of nitrogen via the glutamine/glutaminase/carbonic anhydrase/gill pathway.

34. Comment noted and WDF agrees.

35. Comment noted.

36. See Appendix G.

37. The more a fish farm projects above the water surface, the more visually evident it becomes and the greater the resulting visual impacts. Sheds or buildings are located on several existing farms and they increase the visual impact of these farms. One of the design recommendations contained in the EIS text (page 98 of the DEIS) is that structures project a minimum distance above the water line. Followed strictly, this could preclude placing sheds or buildings over the water.

38. Comment noted.

Response to Letter No. 70: Washington Department of Ecology (continued)

39. Comment noted.

40. Loading rates on page 131 of the DEIS are annual rates and obtained from a different source than the daily rates found on page 55. Both are within the range of literature values.

41. Impact estimate of nitrogen loading was based on amount of nitrogen required to cause a noticeable increase in phytoplankton. Since this is a subjective estimate, the impact was given as an order of magnitude estimate only. The 50% daily tidal reflux was not used in this calculation. The calculation was based on a surface layer volume only. Refluxing of the surface layer entrains surface waters into incoming marine water. No attempt was made to estimate the rate of return of refluxed surface water from the bottom water to the surface and the extent of mixing with marine water. Finally, the order of magnitude estimate makes such small scale adjustments irrelevant.

42. Comment noted.

43. Times of sampling are given in Tables 2, 3, and 6 relative to high or low tide. All sampling was conducted within an hour of the slack tide period.

44. The methods and references for nutrient analyses were cited on page 9. It was stated that the sample was not filtered to avoid problems associated with that method. The text was consistent in the use of the terms dissolved nitrogen or total nitrogen. Dissolved nitrogen was defined as nitrate + nitrite + ammonium. Most oceanographic researchers use this or a similar term since most nitrogen in the sea exists as molecular forms such as nitrate, nitrite and ammonia in addition to some amino acids and urea, not as particulate forms. The term "dissolved" has no meaning without an accompanying filter size since it refers to that portion of a sample whose particles pass through a filter of a certain size (often 0.5 or 1 uM, See APHA 1985).

    Total nitrogen is all forms of nitrogen, inorganic and organic, and is generally less useful in determining dynamic of phytoplankton processes as it includes forms that are not available for uptake and growth. To further clarify this situation, any reference to total nitrogen and phosphate has been deleted from the text and Table 4 has been revised to report solely the dissolved N:P ratios and concentrations.

    There is no single correct protocol for reporting the results of nutrient studies, although the reviewer should note that the units used by the Department of Ecology (mg-N/L) are virtually never used in reporting the results of oceanographic studies, but stem from wastewater/engineering protocol (APHA 1985). However, it is universally agreed among oceanographic researchers that molecular (atomic) units are most appropriate for these types of studies. The rationale for not using the molecular units for most of the dissolved nutrients was stated at the

Response to Letter No. 70: Washington Department of Ecology (continued)

end of the second paragraph on page 9. The units used conform with the *Puget Sound Water Quality Authority's Puget Sound Ambient Monitoring Program Final Report* recommendations (1988).

45. One might expect such a response, but there were only a few samples collected between stations so there is no means to be certain. The text has been altered to state that the pattern wasn't seen at high tide, when values were higher at the farm site.

46. The sample variation was so small that it was graphically impossible to show 5 of the 6 error bars. Variation statistics are presented in Table 3 that would be more useful to a critical reviewer than graphical values.

47. The statement in the text was correct and indicated the lack of any obvious pattern of nutrient values after release of the fish. As stated in the same paragraph, there was no statistical difference between the samples, so the discussion and comment are really moot. Both that sentence and the next have been deleted.

48. See the response to Comment 46.

49. For clarity, the suggested word has been inserted in the text of the FEIS.

50. As stated in that paragraph and shown in Figure 5a, there was no difference in productivity among the stations at high tide. Accordingly, it is incorrect to make generalized statements about productivity from the samples collected before the fish were released.

51. Ammonium is preferentially absorbed by most phytoplankton. See experiment B and Appendix B of this same report for a discussion on the fate of ammonia.

52. Maximum depths in all but the most southern portions of Peale Passage are little more than 10 m deep. There are no streams flowing into Peale Passage and relatively little human development. It is unclear how moving inshore when the entire passage was within the euphoric zone (see secchi disk values and apply coefficient of 2 to 3), is unclear from the reviewer's statement. There was no "noise" in the data attributable to any of the factors mentioned in this comment.

53. The text is correct. The term "similar" was applied in reference to the values 0.07 and 0.09 mg/l dissolved nitrogen, which is indeed a very small difference. For example, this difference is much less than would be detectable in most analytical instruments including Ecology's routine monitoring program which reports values no smaller than 0.10 mg-N/L nitrate equivalent to 7.1 uM nitrate and 0.44 mg/L nitrate.

54. There are no acknowledged problems with the sampling design. Nor are any of the reviewer's comments acknowledged to be significant, as mentioned in the

above discussion. Moreover, prior to public and agency review, the text was reviewed by Dr. Donald Weston, aquaculture impacts expert, and Dr. Dale Kiefer, widely known authority on phytoplankton ecology, as well as other phytoplankton experts at the University of Washington. The conclusions of experiment A are rather clear since the objective of monitoring during a period of near nutrient depletion was not possible. Given the great variation in ambient nitrogen concentrations seen during the study, the minor "signal" emitted by the nitrogen release from the pens was totally lost.

Finally, the conclusions to experiment B are entirely straightforward.

55. Literally, thousands of scientific papers and many textbooks note nitrate is not as preferred as ammonia by phytoplankton. There are exceptions, for example, at low light levels there does not seem to be any advantage to some phytoplankton in using ammonia versus nitrate (Thompson et al. 1989. Limnol and Ocean. 1014-1024). For a most recent study and review, see Davies and Sleep 1989, Journal of Plankton Research 11:141-164.

56. It is outside the scope of this EIS to include a thorough discussion of the status of fish farms throughout the world. Countries where fish farming is an active industry have different hydrographic characteristics, different indigenous species, and a different governmental structure and perspective. To include only a small portion of that information may mislead readers into drawing erroneous parallels to the situation in Puget Sound. See the response to Question 6.

57. Comments noted.

58. See the response to Question 21.

59. The model is available to interested parties and has been described in more detail in the by Kiefer and Atkinson (1988 and 1989). It is a highly technical model that utilizes advanced mathematics and a mainframe computer due to the complex calculations that are required. Therefore, the interested reviewer may contact Dr. Kiefer, or examine the Washington State Shoreline Hearing Board proceedings where the model has been presented on two separate occasions.

60. The section on land-based tank farms was included to provide the reader with additional information on the commercial salmon farming industry. This section has been moved to the Technical Appendices to clarify its purpose.

61. The final report has included modification to respond to the reviewer's comments, where appropriate. The draft report was reviewed by a number of experts including Dr. Donald Weston and Dr. Dale Kiefer, as mentioned in the text.

The conclusions of experiment A, put in very simple terms, indicate that ambient water column values of nitrogen fluctuated more due to tidal stage than from any possible human caused source. The study site and timing were the worst-

available case and timing that could have been examined in western Washington. This serves to illustrate how remote a fish-farm-caused phytoplankton bloom would be in marine waters of Washington state, particularly under the current stringent siting guidelines.

Few field studies of the effects of fish farms on phytoplankton populations have been conducted anywhere in the world, compared to studies of nutrient discharge and dissolved oxygen depletion. This is due to the complexity of studying phytoplankton in the field and to the general belief in the scientific community that impacts from fish farms on phytoplankton populations in most cases are very unlikely (Weston 1986). Theoretically, nutrient effects from fish farms on phytoplankton populations should be measurable only in summer, within nutrient depleted surface waters of areas with strong vertical stratification and very limited horizontal mixing. These conditions were sought in the present work through the prior measurement of ambient nutrient conditions. The present study serves to illustrate the complexity of field studies and the need for modeling (which has been accomplished).

Ecology's specific comments about Appendix C are discussed at another point in the EIS.

62. The text has been revised to include a discussion of technological methods that could be used to reduce or eliminate sediment impacts. See Section 5.1 of the FEIS.

63. Fish farms are now required to obtain NPDES permits which will ensure that farms meet applicable State and federal water quality regulations.

LETTER NO. 71

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April 6, 1989

Mr. Ron Westley
Project Manager
Washington Department of Fisheries
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RE: Comments to Draft Programmatic Environmental Impact Statement--Fish Culture in Floating Net-Pens

Dear Mr. Westley:

These comments on the Programmatic Environmental Impact Statement ("PEIS") on fish culture in floating net-pens in Puget Sound are submitted on behalf of the Gunstone family, which has commercially harvested native littleneck clams and other types of commercial clams in Clallam and Jefferson Counties for over 50 years. The Gunstones, as shoreline residents who earn their livelihood from the shoreline environment, are vitally concerned about the potential impacts of the development of commercial net-pen culture in the Puget Sound region and the efforts of the state and local governments to manage this burgeoning industry to prevent unacceptable impacts. The PEIS, a long-awaited document, unfortunately falls far short of our reasonable expectations for documentation and analysis of potential impacts from net-pen aquaculture.

These comments are submitted pursuant to WAC 197-11-455; we request substantive responses from the department as required by WAC 197-11-560. These comments address the areas of particular concern to the Gunstone family in the order in which they appear in the PEIS.

I. General Comments

The impact of the PEIS can be enormous because, as the document acknowledges at i-ii, state and local officials will use it to "develop policies for future development and regulation of the net-pen industry." As with any EIS prepared pursuant to the State Environmental Policy Act ("SEPA"), it is essential that the document impartially carry out its mandate. SEPA regulations describe the purpose of an EIS as follows:

> An EIS shall provide <u>impartial</u> discussion of significant environmental impacts and shall inform decision makers and the public of reasonable alternatives, including mitigation measures, that would avoid or minimize adverse impacts or enhance environmental quality.

(Emphasis added). WAC 197-11-400. Unfortunately, in this case, the list of authors and principal contributors to the EIS at the beginning of the document raises a genuine concern of inherent bias which permeates its analysis.

The principal author of the PEIS is Parametrix, Inc., which has had numerous contracts with the aquaculture industry. Parametrix has prepared an EIS on an application for a massive aquaculture complex, including net-pens, at Harding Creek on Hood Canal--an EIS initially declared inadequate by the Kitsap County Hearing Examiner on an application ultimately denied unanimously by the Board of Kitsap County Commissioners. Parametrix also has provided and is slated to provide expert testimony on behalf of net-pen proponents on a number of net-pen proposals throughout Puget Sound.

1 Another PEIS preparer is Jack Rensel of Rensel Associates, who has been a primary consultant and advocate for numerous net-pen projects. The Gunstones are particularly concerned by Mr. Rensel's participation in light of his erroneous statements in reports prepared for the Discovery Bay net-pen proposal, now before the Shorelines Hearings Board for decision; Mr. Rensel's misstatements concerning the commercial viability of the Gunstones' clam beaches--were made without even consulting the Gunstones. This is not a track record that breeds confidence.

Another of the PEIS preparers, Battelle Pacific Northwest Laboratories, has provided expert witness testimony on behalf of the net-pen industry in at least one contested case (Discovery Bay), has assisted in another (the Harding Creek project in Hood Canal), and is slated to provide such testimony in another net-pen case scheduled for an April hearing before the Shorelines Hearings Board.

While Dr. Donald Weston's track record may be less weighted toward advocacy of net-pen proposals, the PEIS fact sheet indicates that he provided only "technical review."

The roster of PEIS authors and principal contributors thus, at the outset, creates a very significant appearance of <u>partiality</u>--an appearance that clearly should have been avoided given the well-known controversy surrounding the issue of net-pen development. Where the principal author and major contributors to

the PEIS have and will continue to benefit economically from contracts with the net-pen industry, this appearance of partiality is unacceptable.

The contents of the PEIS document validates this view. It consistently cites sources who have supported development of the fish pen industry or who are a part of the industry itself, while neglecting qualified sources who have urged caution or have openly opposed headlong development of the industry. It is not an excuse for the Department of Fisheries to claim that it chose contributors with experience in aquaculture. The one-sided experience of those involved does not justify a draft PEIS that purports to be impartial but is not, either in appearance or in practice.

This concern should not be swept under the rug simply because the draft document has already been prepared. Any delay that might inhere in the selection of a new principal author and contributors with no such blatant biases will be more than offset by the advantage of an impartial discussion of impacts and mitigation measures.

II. Specific Comments

1. Summary. The PEIS will be used by local governments making decisions on the siting of net-pens. As non-scientists, local officials will be particularly dependent upon summary sections. It is therefore extremely important that such sections be presented in an understandable, straight-forward, and logical manner. The initial PEIS summary, at ix-x, falls short of this goal. The first of the "Major Conclusions of the Draft PEIS" begins by stating that "the major impacts of net-pen culture can be prevented . . ." PEIS at ix. Stating that conclusion as such, rather than presenting, first, a summary of the major impacts before claiming that they can be prevented, reverses the logic and format of the EIS itself.

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This is not merely a question of semantics, but one of presentation and tone. The same defect is repeated in the other "major conclusions." The second conclusion is that the "impacts of net-pens [still not disclosed] are reversible, and after pen removal any affected areas will revert to their undisturbed state." PEIS at ix. This conclusion creates an unfortunate and incorrect impression that all net-pen impacts are reversible and that the adverse effects will disappear rapidly. However, even the PEIS itself concedes potential genetic and disease impacts are examples of adverse effects that may not be reversible. See PEIS at 68-81. A report co-authored by Dr. Weston emphasizes that "[t]he importation of an exotic species or disease organism poses the greatest environmental risk in mariculture, for unlike other environmental effects, the consequences may be widespread and

irreversible." (Emphasis added) Rosenthal, Weston, Gowen, and Black, "Environmental Impact of Mariculture," Cooperative Research Report No. 154, International Council for the Exploration of the Sea (March, 1988) at 28.

The summary section is critical in any EIS because it sets the tone of the document and presents an overview of its analysis and conclusions. While the summary, by definition, should be brief, it should not, as in this case, present inadequate and misleading conclusions.

2. Impacts to Sediments and Benthos. This section of the PEIS (at 13-27) analyzes the effects of "sedimentation" and "organic enrichment" on the bottom environment and benthic community. However, net-pens do not produce "sediments." With respect to the impacts considered in this section, net-pens produce solid wastes in the form of fish feces and uneaten fish feed, wastes which are commonly termed "pollutants." See, e.g., Weston, "Measuring the Effects of Organic and Toxicant Inputs on Benthic Communities," in Proceedings: First Annual Meeting on Puget Sound Research, Volume II (1988) (Dr. Weston uses the terms "organic enrichment" and "pollutants" or "pollution" interchangeably). The PEIS, however, appears to avoid appropriate terms such as "solid wastes" or "pollutants" in preference for terms which have little meaning for lay persons and have been criticized by experts. See PEIS comments submitted by Dr. Annamarie K. Johnstone, at 1 ("I would argue that sediment is not produced, rather that solid waste is produced."); PEIS comments by Dr. Richard Strathman, March 3, 1989, at 1 ("species that are indicators of pollution should be described as such when they are mentioned . . . 'Indicative of organic enrichment' doesn't carry enough information to the non-specialist."). The effect of Parametrix's deliberate choice of words is to down play the pollutant nature of what is produced by net-pen facilities.

3

Further, the PEIS discussion of mitigation measures for impacts from solid waste accumulation on the bottom community (PEIS at 26-27) is far from adequate. That inadequacy begins with the claim that "measures can be taken to prevent harmful accumulations of organic wastes below net-pens." PEIS at 26. The mitigation measures proposed, however, will in most cases not prevent harmful accumulations, but rather may serve to reduce (not eliminate) such accumulations, or, in some cases, remove them. Moreover, there is little or no discussion of the efficacy, practicality, or even the possible adverse effects of the mitigation proposed. The proposed use of underwater blowers, vacuuming under pens, and use of collection devices are, for example, only discussed in one sentence each. PEIS at 27. These measures themselves raise numerous questions, not discussed, such as the ultimate fate of the wastes (underwater blowers), impacts of turbidity created (underwater

4

blowers), and effects on the benthic community by their use (underwater blowers, vacuuming, and collection devices).

The mitigation recommended is so general as to provide little concrete guidance for local decision makers. For example, the PEIS recommends "avoiding sites overlying important biological communities (for example, geoduck and other clambeds and important spawning areas) where they may be adversely affected." PEIS at 26. This mitigation measure raises numerous questions. For example, how close, as a general rule, can net-pens be located safely with respect to such communities? The Department of Ecology Interim Guidelines for net-pens recommended specific distances between net pen facilities and important habitats. Indeed, the announced "goal of the guidelines" was "to avoid significant adverse environmental effects from net-pen operations permitted prior to completion of the Programmatic EIS." Interim Guidelines at 1. Yet the PEIS, in its draft form, makes no attempt through its recommended mitigation measures or elsewhere to either confirm the adequacy of the original guidelines or to offer revisions. The PEIS <u>must</u> evaluate these guidelines and recommend necessary revisions based on trustworthy original research by impartial scientists, <u>not</u> glib speculation by biased contributors. Otherwise, the PEIS is but a propoganda document that does not even measure up to the interim guidelines which were, themselves, inadequate. (5)

3. <u>Impacts to Water Quality</u>. In the discussion (PEIS at 27, 57), of "Impacts on Water Quality Standards," the problem of inadequate discussion of mitigation measures surfaces again. For example, in discussing cumulative impacts (with respect to dissolved oxygen only) of multiple farms, the PEIS states that "the potential of one net-pen facility affecting the dissolved oxygen near a second net-pen is highly unlikely if the net-pens are placed even 100 meters (330 ft.) apart." PEIS at 42-43. The impact on the surrounding environment, other than the net-pens themselves, is ignored and dismissed with the claim that the net-pen facility would be affected before the surrounding environment. PEIS at 42. The PEIS then cautions that "it is highly improbable that sediment impact requirements and aesthetic considerations would allow siting net-pens closer than a few hundred meters apart." PEIS at 43. Yet the discussion of mitigation measures in this section, as well as the sections on sediment (solid wastes-pollutant) impacts and aesthetics, do not provide guidance on acceptable distances between pens. (6)

Any distance limits recommended should, however, be conservative and based on, <u>inter alia</u>, research and answers to biological questions that are seemingly dismissed in the PEIS. The experience in British Columbia and in Norway, for example, where net-pen development is far greater than that in Washington, has prompted far greater restrictions than those vaguely suggested in

the PEIS. British Columbia prohibits net-pen facilities from locating within three kilometers of other net-pen facilities. Norway prohibits net-pen facilities from locating within 500 meters of other facilities and within 20 kilometers (12 miles) of a salmon producing river. Absent site-specific studies which would show that adverse effects are not possible at closer distance, net-pen facilities in Washington state should not be located within at least one mile of other facilities and other existing aquaculture uses. Net-pen facilities should not be located at all in embayments with limited or poorly understood circulation. (7)

The discussion of the effects of fish farms on phytoplankton productivity addresses the effect of nutrient input from fish farms only with respect to nitrogen despite the fact that other fish farm nutrient additions may also stimulate phytoplankton activity and blooms. For example, the PEIS, at 40, discusses the role of phosphorous in phytoplankton growth:

> The primary nutrients of interest in relation to net-pens are nitrogen and phosphorous; both may cause excess growth of phytoplankton and lead to both aesthetic and water quality problems. Generally in marine waters, phytoplankton growth is either light or nitrogen limited, and phosphorous is not as critical a nutrient as it is in fresh water.

However, the two modeling approaches to phytoplankton impacts focus exclusively on nitrogen and the effects of phosphorous introduction from net-pens is completely ignored despite the PEIS acknowledgement that it is one of the "primary nutrients of interest in relation to net-pens." If there is some scientific justification for this, it is not presented. The lay reader is left to wonder about the significance of phosphorous input to marine waters from net-pens. (8)

Similarly, there is no discussion of other nutrient additions from net-pens that may potentially affect phytoplankton activity. For example, vitamins (biotin) introduced through fish feed (see attached fish feed label) can be a factor in phytoplankton growth ("Nutrient Enrichment and Plankton Ecology of Sequim Bay, Washington," Battelle Marine Research Laboratory (1984)), as well as enhancing the toxicity of dinoflagellates. See, "The Reduction of the Impact of Fish Farming on the Natural Marine Environment," University of Stirling (1988) at 109 ("Vitamins are important microbial growth promoters, and studies have shown that the toxicity of the dinoflagellate Gyrodinium aureolum is enhanced in the presence of biotin which could potentially leak from salmon diets."). Although the effects of vitamin and other additions from fish feed may not be as significant as that of nitrogen and (9)

phosphorous, they nevertheless merit discussion concerning their possible contribution to phytoplankton growth.

4. Chemicals. The use of antibiotics in fish farm operations raises potentially significant human health concerns that are inadequately addressed in the PEIS (at 58-61). In particular, the development of antibiotic resistance among bacteria in the marine environment, including resistance to antibiotics used in treatment of humans (e.g., OTC), and the transfer of that resistance to human disease-causing bacteria is a potentially very serious impact. (10) Please review the comments submitted, under separate cover, by Dr. Arthur H. Whiteley, who has studied this issue at length and presents an alternative view to that presented by fish farm proponents and regurgitated in the PEIS. In particular, Dr. Whiteley emphasizes that, despite the evidence of antibiotic-resistant bacteria in net-pen culture in other countries (other than just Japan), no studies have been conducted in this state nor does the PEIS call for any. Dr. Whiteley also emphasizes that, contrary to PEIS dismissal of this potentially very significant issue, the transfer of resistance to pathogens of human concern is a very real possibility.

5. Impact to Shellfish. A major concern of the Gunstones--impacts to intertidal shellfish beds--merits but one line in the PEIS discussion of shellfish impacts: "The depths necessary for net-pens preclude direct impacts to intertidal shellfish and fish (11) habitats." PEIS at 67. The sentence raises some obvious questions such as the following: Apart from the lack of support for this sweeping conclusion, the sentence raises some obvious questions about issues not addressed. Are there any indirect impacts to intertidal shellfish habitats? What are those impacts and how could they be avoided? How does the presence of significant intertidal shellfish habitats affect the siting of net pens?

An EIS must discuss direct and indirect impacts. WAC 197-11-060(4)(d). Indirect effects to sensitive shellfish habitats located in the intertidal zone are certainly possible. Stimulation of a phytoplankton bloom for example, would have impacts well beyond the immediate area of the net-pens, and effect the intertidal zone. Other potential impacts may be more subtle, but (12) cannot be completely ignored. For example, the effect of a large facility on water movement and wind or waves may affect beach productivity, the amount of food that will reach shellfish habitats, the composition of beach substrate, and larvae movement. Moreover, the use of antibiotics, inadequately discussed in the PEIS, can have significant implications for shellfish growers. The potential for the transfer of antibiotic resistance, including to human pathogens, can affect the marketability of shellfish which can function as bioaccumulators of such antibiotic-resistant strains.

Nowhere in the PEIS is there any acknowledgment that commercial clam harvesting is an aquacultural use that merits protection from and on a par with other aquacultural uses, such as net-pen facilities. Net-pen development in areas near existing, commercial shellfish harvesting areas, as identified in the DSHS "Second Annual Inventory of Commercial and Recreational Shellfish Areas in Puget Sound" (January 1989), should be avoided. Potential impacts to littleneck clam harvesting areas may be irreversible given that such clams seed naturally and attempts at artificially seeding them have failed. (13)

6. Disease. As you are undoubtedly aware, the discovery of VHS virus in two hatcheries in the Puget Sound region highlights the potentially very significant impact of the introduction of exotic fish and shellfish pathos. The PEIS must be revised accordingly to reflect the implications of this outbreak, including the adequacy of federal and state regulations to prevent the introduction of such exotic diseases. See, comment letter of Dr. Annamarie Johnstone at 5, submitted under separate cover ("As VHS virus is now present in the indigenous Pacific N.W. salmonids, it is evident that federal and state regulations have not been successful . . ."). (14)

Moreover, the discussion of transmission of disease to wild fish, at 77-78, is confusing, and neglects some important sources of this phenomenon. The unstated assumption of the discussion is that the transmission of disease from pen fish to wild fish has not occurred and, with the exception of exotic pathos, is not a significant risk. PEIS at 77-78. There is no discussion of the Norwegian experience, which was comprehensively presented in November, 1988 by Svein Mehli, of Norway's Directorate of Nature Management, in testimony before the Shorelines Hearings Board. In his testimony, Mehli discussed how Norway's wild salmon populations have experienced a dramatic increase in disease since the development of that country's net-pen industry and that the connection between the two phenomena is clear. Similarly, there is no reference in the PEIS to Moring's study entitled "Aspects of Growth, and the Effects of Some Environmental Factors on Pen-Reared Chinook," in which he describes the transmission of furunculosis from penned fish at the NMFS facility in Clam Bay to wild fish.[1] Moring, at 148-149. The failure of the PEIS to include these sources in its discussion of disease transmission is inexcusable. (15)

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[1]Rensel, in his study of phytoplankton in the PEIS Technical Appendices, does refer to Moring's study, but not with respect to the issue of fish disease and its transmission from penned to wild fish.

7. Impacts on Aesthetics. The PEIS section on aesthetics is tainted by its own background discussion. PEIS at 91. In our extensive involvement with net-pen proposals in numerous counties throughout the Puget Sound region, it is rare to find anyone, other than net-pen applicants and state employees promoting aquaculture development, expressing the opinion that net-pen facilities may be "interesting and attractive." The overwhelming opinion of shoreline uses and residents is that net-pen complexes are an extremely adverse visual intrusion, except possibly in already-developed commercial or industrial areas. The effect of the PEIS claim is to undermine the credibility of its entire discussion of aesthetics.

The PEIS would be much more helpful in presenting the aesthetic issue by printing honest (undoctored) photographs of actual net-pen facilities in the Puget Sound environment such as (16) that now established in Kiket Bay, Skagit County. Line drawings, such as presented in the PEIS at 92-93, are uniquely incapable of presenting the reality of a net-pen's visual presence.

Review of and reference to literature having to do with visual resource analysis would also be helpful in assessing aesthetic impacts. There exists a body of literature on aesthetics that addresses viewer preferences in both natural and urban settings. It apparently was not even considered in the PEIS analysis.

Further, the PEIS does little to resolve the complex issues involved with aesthetic impacts and efforts to mitigate them. For example, increasing the distance of net-pens from the shoreline to lessen their aesthetic impact, suggested in the PEIS at 98, can create greater impacts to navigation and commercial fishing, as (17) acknowledged in the PEIS at 102. Yet the PEIS makes no effort to resolve such issues. The potential siting of 100 net-pen facilities (see, PEIS at 131-135) would likely cause a chaos of conflicting interests--a prospect which concerns the PEIS preparers only in passing.

In sum, aesthetics is a complex issue. While often belittled by net-pen proponents, it deserves a more thorough analysis than that presented in the PEIS.

8. Cumulative Impacts in Puget Sound. This section should not be, but is no more than an adjunct to the section discussing water quality impacts. The cumulative impacts considered here apparently relate solely to water quality. Thus, the conclusion (18) that the impact of 100 net-pens in Puget Sound would be negligible is not based on a consideration of the myriad impacts that net-pens may cause. The PEIS discussion of cumulative impacts should extend to impacts on other aquacultural uses, navigational and commercial fishing impacts, aesthetics, and wildlife impacts including impacts

on wild fish. Further, the discussion of cumulative impacts should also consider the possibility of more than 100 farms being developed; although they are sorely needed, there are no regulations currently in place to prevent this. Far from using a worst case analysis, the PEIS uses an arbitrary limit on the number of pens and a narrowed focus of impacts to present a deceptive view of cumulative effects. While far fewer than one hundred facilities should be allowed, the industry to date has succeeded in blocking regulations which would limit its freedom of action in any material respect. Therefore, the PEIS should look at potential cumulative effects on a broad range of numbers, starting at ten and proceeding well past one hundred.

Finally, as recommended by the Puget Sound Water Quality Authority in its comments (March 20, 1988 at 2) to the PEIS, the document "should include an analysis of how many potential sites actually may be available for the siting of floating net-pen facilities in Puget Sound, given the full range of environmental constraints that are discussed in the document."

(19)

9. Technical Appendices. This letter will leave specific comments on the scientific studies presented in the technical appendices to those with expertise in those areas. However, we will present a few general observations.

With respect to Mr. Rensel's "Phytoplankton and Nutrient Studies Near Salmon Net-Pens at Squaxin Island, Washington," it is unclear from reading the study why Mr. Rensel chose this particular site, involving a relatively small facility located in a channel, (as opposed to an embayment with a more complex and self-contained circulation), and what significance his results have with respect to much larger facilities in other locations with different water movement dynamics. Although the PEIS, at 50, claims the Squaxin Island presents a worst-case scenario, no basis for this conclusion is presented, nor, even absent his industry ties, is Mr. Rensel (a fisheries biologist but not an expert in water dynamics of oceanography) qualified to make this judgment which involves issues outside of his area of expertise.

(20)

Further, the Rensel study admits some significant shortcomings not acknowledged in the PEIS. At 22, Rensel claims that only "[s]ome of the dissolved nitrogen concentrations during this study were below the threshold of limitations for diatom growth." Accordingly, Rensel admits that "[t]o show maximum effects this study should have been conducted when surface waters were nearly depleted of all forms of nitrogen (dissolved and total), if it ever occurs, to test the possibility that the pens could cause or sustain a phytoplankton bloom." Id. This possibility is, however, the very possibility that the PEIS and studies conducted for it should have analyzed, but evidently did not.

(21)

The discussion of "The Economics of Salmon Farming," by Robert L. Stokes, is incomprehensible, except for the undocumented thread running throughout to the bald effect that salmon farming is of economic benefit because it is. Moreover, it is unfortunate that, in choosing to present an economic analysis, the PEIS authors completely ignored the experience and expertise of Dr. James A. Crutchfield who has spoken at numerous forums on the issue of the economic impact of aquaculture. 22

III. CONCLUSION

An adequate PEIS on net-pen aquaculture in Puget Sound should thoroughly and impartially disclose, discuss, and substantiate the impacts of net-pen development. The PEIS does not come close to meeting this standard. Moreover, bias pervades the entire document. This is an extremely important topic, on an issue of significant and widespread interest. The Department of Fisheries has apparently taken it too lightly. 23

Consequently, a new draft by new authors should be prepared to overcome the inadequacies of the original draft. The new draft should then be recirculated for public comment, as required by WAC 197-11-455. Failure to do so will only result in continual controversy concerning the state's refusal to analyze honestly the environmental impacts of salmon net-pen facilities.

Respectfully submitted,

PETER J. EGLICK & ASSOCIATES

Peter J. Eglick
Robert R. Meinig

RRM:dmc

WESTLY-L.GUN

MOORE-CLARK'S SELECT
EXTRUDED SALMON PELLETS

Guaranteed Analysis

Crude Protein Minimum.....45%
Crude Fat Minimum.....20%
Crude Fiber Maximum..... 3%
Moisture Maximum.....11%
Ash Maximum.....12%
Vitamin A Minimum.....15000 IU/Kg*
Vitamin D3 Minimum..... 250 IU/Kg*
Vitamin E Minimum..... 300 IU/Kg*

INGREDIENTS: Fish Meal, Whole Wheat, Wheat Flour, Soybean Meal, Fish Oil, Cane Molasses, Ascorbic Acid; Choline Chloride, Vitamin Premix Containing: Vitamin A Acetate, Pyridoxine Hydrochloride (B6), Vitamin B12, dl alpha Tocopherol Acetate (E), Menadione Sodium Bisulfite Complex (K), Riboflavin (B2), Thiamine Mononitrate, Niacin, Inositol, d-Calcium Pantothenic Acid, d-Biotin, Folic Acid, Vitamin D3, A Mineral Premix Consisting of: Zinc Sulfate, Manganese Sulfate, Copper Sulfate, Ethylenediamine Dihydroiodide, Selenium, BHA-BHT an Antioxidant.

*Actual levels added and levels found naturally in the ingredients far exceed these guaranteed minimums.

This feed must be stored in a cool, dry place.

FEEDING DIRECTIONS: Feed As The Sole Ration To Salmon.

8/88

Manufactured By:
MOORE-CLARK CO., Inc.
LaConner, WA 98257
Net Weight 25 Kg.

Canadian Agent:
MOORE-CLARK CO., Inc.
1350 E. Kent Ave.
Vancouver, B.C. V5X 2Y2
Reg. No. 810550

RESPONSE TO LETTER NO. 71: PETER J. EGLICK

1. Comments noted. See the response to Question 2.

2. Comments noted.

3. Some of the surficial sediment in Pacific Northwest benthic marine habitats consists of particulate organic material, including fecal material from a large number of animal taxa. Up to 20% of the benthic sediments may be particulate organic material in some of the British Columbia fjords (Thomson 1981). In that most of the fish wastes and uneaten food are particulate organic material, once they are on the substrate, they can be considered to be sediment. Organisms living in and on the bottom will treat the material deposited under the pens as sediment.

   Many areas of Puget Sound have relatively low levels of particulate organic material, and any increase in the organic content could be considered to be pollution. "Organically enriched material," however, is a more precise term than the general term "pollution" and was used here to specifically indicate the type of perturbation occurring in the benthic environment.

4. Section 5.1 of the FEIS includes a discussion of collection devices, blowers, and vacuuming under farm sites.

5. Comments noted. The text has been revised to evaluate regulations and existing guidelines in the FEIS.

6. See the response to Question 18.

7. Comments noted. The Preferred Alternative in the FEIS recommends that the hydrographic studies identified in the *Interim Guidelines* be adopted into WACs.

8. See paragraph 1, page 40 of the DEIS. The following sentence states: "Generally in marine waters, phytoplankton growth is either light or nitrogen limited, and phosphorus is not as critical a nutrient as it is in fresh water" (Ryther and Dunstan 1971, Welch 1980). Additionally, salmon produce proportionately much less phosphorus than nitrogen, and that phosphorus is mostly in the form of solids, transported to the bottom and out of the surface waters. Note that phosphorus is discussed again on page 46 of the DEIS and page 43 of the FEIS.

   Although there has been no systematic comparison of N:P ratios in every division of Puget Sound, in every case where nutrient limitation was suspected, nitrogen appears to have been the limiting nutrient or at least was in relatively less abundance, using the index of Redfield ratio of N to P found in "normal" waters (16:1 molecular ratio for plant tissue, about 10:1 molecular ratio for water samples, see URS 1986).

Response to Letter No. 71: Peter J. Eglick (continued)

9. The first cited study did not show that leachates of other nutrients from farm feeds influenced phytoplankton growth in Sequim Bay, because there are no salmon farms in that bay.

   The second study, referred to by the University of Sterling publication, indicated that biotin increased the toxicity of one type of dinoflagellate (not found in Puget Sound) under depleted conditions of that compound. Increased growth or toxicity of a noxious dinoflagellate would be expected when a necessary ingredient was not available in the culture system. The real question is whether biotin is an important regulator of either the toxicity or the growth of marine dinoflagellates. The best answer is no. Biotin, like several other trace materials required by certain algal forms, apparently doesn't limit their growth frequently in natural systems. This has been repeatedly shown by the full-growth response nearly always attained with the addition of nitrogen (Welch 1980) to marine phytoplankton cultures.

   The cited report did not indicate that biotin is in short supply in the marine environment. Moreover, the quote appears to be taken out of context without the summarizing section which follows . . . "At present, the leaching of these compounds (i.e., vitamins) into the aquatic environment has not been generally recognized as an area for concern."

   An important principal to this discussion was initially advanced by Liebig's in 1843 and is yet to be discredited. That principle states that plant yield is essentially determined by the amount of <u>one</u> nutrient which is in the shortest supply. There is little doubt that nitrogen is the factor of concern for marine environments and that if it is in short supply, any amount of biotin added to the water would not have an effect on algal populations.

   Biotin, like many enzymatic precursors and cofactors, is required only in extremely small amounts by cells. It is not an energy source but is a catalyst of certain reactions. In contrast, nitrogen is required at a much greater rate. Moreover, biotin is a very small component of fish feed (0.03%) relative to nitrogen bearing protein (40-50%). Uneaten food is transported by gravity to the bottom where physical or biological processes remove biotin and other components.

   There are many other trace minerals and vitamins that are sometimes required by certain phytoplankton under certain conditions. The DEIS did not address these as they are generally recognized as of secondary importance. A short discussion of biotin and other trace nutrients has been included in the same section of the FEIS.

10. See the responses to Questions 33 and 34.

11. Significant shellfish habitat is protected through the HPA permitting and SEPA review processes. WDF has the responsibility to preserve, protect, perpetuate, and manage shellfish resources under RCW 75.08.

Response to Letter No. 71: Peter J. Eglick (continued)

12. See Section 5.4 of the FEIS. The Preferred Alternative includes a recommendation for further research related to accumulation of antibiotics in shellfish.

13. WDF protects shellfish habitat under RCW 75.08. The HPA permitting and SEPA review process provide the opportunity to identify important shellfish habitats.

14. See the response to Question 29 and Appendix G.

15. See the responses to Questions 33, 34, and 35. Also, see the response to Letter 38, Comment 35.

    Mr. Svein Mehli is not recognized as a fish health expert. While there are situations in which the Norwegians believe that certain pathogens were introduced into Norway as a result of moving infected smolts/fish into Norway from infected sites, these fish were brought in and released as part of "wild" or feral stock enhancement, and not as a result of commercial marine fish farms. Furthermore, a significant impact on stocks in Norway has been the result of eradication programs and not necessarily clinical disease and mortality of fish. Inquiries on fish health issues should be made to WDF.

16. See the responses to Letter 52, Comments 12 and 14. Literature on viewer preferences indicates that the background setting contributes to a viewer's "expectation" or sensitivity to alterations in visual character. In general, viewers in a "natural" setting tend to expect fewer human-made alterations to the landscape than they would in urban settings where the visual character may be dominated by human artifacts. A fish farm facility would probably have fewer visual impacts in an urban setting than in a "natural" setting. The type of activity engaged in by the observer also affects their visual sensitivity.

    A good reference for the issues relating to observer preferences are the articles in the 1979 volume *Proceedings of Our National Landscape* edited by G.H. Elsner and C. Smardon and prepared by the USDA, Pacific Southwest Forest and Range Experiment Station, Berkeley, California. Other articles can be found in the journals *Landscape Planning* and *Landscape Architecture*. For example, the 1977 article entitled "Who values what?: Audience reactions to coastal scenery" in *Landscape Architecture* Vol. 67, pages 240-243.

    Observer preferences, despite these studies, cannot be meaningfully summarized for an area as large as Puget Sound. For this reason, the EIS discusses this topic in a general way. Local jurisdictions may attempt to assess observer preferences and take them into account when making changes to their local shoreline programs.

17. See the response to Question 10.

Response to Letter No. 71: Peter J. Eglick (continued)

18. See the response to Question 18.

19. See the response to Question 4.

20. The DEIS and technical appendix did not state that the Squaxin Island area was a "worst-case analysis" as the reviewer asserts (see page 50, first full paragraph). The text explicitly stated that the study area was the "worst-available case" (emphasis added). See the response to Question 20 for further information on the rationale.

21. The investigator had no control over the natural variation of nitrogen concentrations in the study area. The study had to be conducted during a narrow time window of late spring when maximum fish biomass was present, during calm weather, and moderate tidal exchange. Moreover, initial testing of the waters a few days prior to the survey of late May was conducted to see if low nutrient concentrations were prevailing. The results (DEIS, Technical Appendix C page 6 last paragraph) indicated that nutrients were in relatively short supply, and thus it would be appropriate to conduct the study.

22. See Section 1 of the response to comments after the text in Appendix E.

23. Comments noted. See the response to Question 7.

LETTER NO. 72

April 7, 1989

To: Ron Westley, Project Manager
Washington Department of Fisheries
115 General Administration Building
Olympis, WA 98504

From: Dr. Carol Ehlers
1356 Wind Crest Lane
Anacortes, WA 98221

Re: DPEIS Fish Culture in Floating Net Pens

I appreciate the opportunity to comment on those areas within my expertise and to add information or raise issues that should be of use.

Housekeeping items:

1) A postmark deadline is much more fair than a receipt deadline; it gives those of us miles from Olympia the same time for work and reflection as those in Olympia. I recommend that ALL future issues be given a post mark deadline.

2) While I recognize that, in northern Puget Sound, WWSU, the University of Washington, Seattle and Everett city libraries are the depositories of Washington documents and are therefore, of course, sent such documents as the DPEIS, there are whole sections of the state affected by these documents who do NOT have access to these libraries. WDF should establish a list of county libraries where documents of this nature are received as a matter of course. Skagit Valley College has offered to house these at the main library in Mt. Vernon and the 3 branches on Whidbey Island. Anacortes library also wishes copies. Other areas should be asked if they wish to have them.

I trust that I, and the above libraries, will receive copies of the final version of the EIS.

PEIS text:

The bibliography included in the text is characteristic of a research document. I note, however, that there are no references to guidelines established by other

nations or states who have or are developing salmon-net pen culture. I find this a serious weakness in view of the extensive literature cited of problems extant and nascent in these other areas. For that reason I urge that the testimony of Svein Mehli before the Shoreline Hearings Board on November 14, 1989 (SHB No. 88-14 Skagit Systems Cooperative vs. Skagit County and the Department of Ecology) be read and included in the PEIS. It is now available in text form. (I received my copy this morning.) In view of the fact that Washington officially expressed concern this winter about the needs of sport fishermen and that Mr. Mehli's job in Norway is to preserve wild runs for their genetic value and for sport fishing, his concerns about the need for greater distances between net-pens and rivers containing wild salmon (p. 28), the establishment of security zones with no pens allowed at all (29-40), the need for stricter guidelines (62-64, 68-69, and 106-136) and his comments on specific current Washington rules, guidelines and recommendations (recent Norwegian experience indicates that some of these need major modification) should not be ignored.

Washington should get the international organization regulations and guidelines and establish connections with agencies abroad that have current information. Again referring to the cited bibliography and to what I have heard at SHB sessions, it must be remembered that there is often a delay of several years between the recognition of a problem, admission of its size or potentiality, and solutions. Academic publications often never do address issues, so to depend heavily on these sources is foolhardy. Further, basic data and research may never be published; I am told that the UW and WDF have extensive data on crab, but it is unavailable to those who need it. Information unavailable cannot be helpful; those ignorant of data or problems are condemned to experience them just as those ignorant of history often find they are forced to repeat.

Technical appendices:

I note that Robert Stokes "The Economics of Salmon Farming" appears not in the text but only in the appendix. Despite the money paid for its production, it should be removed entirely. The explanations are difficult to follow - when given, the model is flawed, and the data used are questionable. A study like this should be replicable, should have refernces and a methodology that can clearly

lead to the conclusions reached. I do not mean by this to criticize Mr. Stokes personally; he kindly gave me an explanation of his research methods that have improved the report and reduced the frustrations of those trying to read it. I have serious qualms about the results.

I was bemused by his comment that the input-output model assumes that any job is filled by a newcomer to the area, with family, when the industry is promulgated as a way of reducing local unemployment. I worry about an assumption 6 that ratios remain the same even though economic conditions nationally, regionally and locally are best represented by calculus showing non-concurrent cycles of growth and recession. I doubt models that show how wonderful X is after learning the number of times in history when the national or regional data, or model, shows all is well and the populace/small businesses are being 7 destroyed. I question an algebraic model: in the 1980's, major economists and industries are using calculus. The assumptions on pp. 13-15 are questionable; 8 I find it fascinating that these farms will impact mining and wholesale trade in San Juan county but not in others, and that the impact various so greatly re. federal, state and local government. What Tables 4.2-7 mean in real life 9 is unclear. As I understand others will address the model, my comments will focus on the property section.

The Skagit County Assessor, a member of the Board of Equalization and I have tried to replicate the data used for Skagit County. We cannot. The Assessor, Paul Mahoney, wishes to be able to address these issues to you directly. He notes that the assessment rates are vastly under reported, that it appears that 10 tideland assessments were used rather than waterfront, and that the sites selected are not representative. Specifically, it is incorrect to compare assessed value (which must be, by law, close to market value) with what is here called market value but really is asking price. On Burrows Bay recently, the asking price was $179,000; the price received was $105,000. The difference is too great to ignore in a study of this kind. There were to be no sites included within municipalities; of the 80 listed, 4 are in Anacortes. A map of the county shows that Sinclair Island is a small proportion of the total area and that there is no ferry; 11 of the sites, or 14% (608 acres) of the total sites are from Sinclair. While no site on the Guemes north Beach (where

aquaculture is proposed) is included, a site on Cypress Island above at least three current salmon pen sites is - in an analysis of the potential of what might happen. All told, 30 sites of the 80 are on islands, some 37.5 %. Burrows Bay is represented by lots ranging from 3.92 to 206 acreas. We cannot find the 206 acre site, and Mr. Stokes agrees that it might not be there but somewhere else. But in Skagit County, where a site is makes all the difference in how it is assessed. The assessor notes also that, since the waterfront assessed valuation is much higher than described, all conclusions arrived at via the computer program are incorrect. Further, if the data in other counties are parallel to those in Skagit, the whole study must be done over -- with less debateable methodology.

I am equally concerned by how this data can be mis-used in the future. If, for example, the home sites on Burrows Bay really are that large, then the owners really would be wealthy. But neither is true. Most have front footage of 75-100 feet, and depth of 100-200 feet. Instead of 4-206 acreas, most lots are .4-.8 acreas - not counting the land going vertically down a cliff. The implications are vastly different. I hope Skagit County will not have to spend money to defend itself from the mis-use of the data.

11

RESPONSE TO LETTER NO. 72: CAROL EHLERS

1. Comment noted.

2. Comment noted.

3. Mr. Mehli provided testimony on the problems associated with the fish farming industry in Norway. The environment and history surrounding the Norwegian problems are different than what exists in Puget Sound and drawing simple parallels would not be appropriate. Norway has natural wild runs of Atlantic salmon whose populations have declined due to overfishing, acid rain, and hydroelectric development. Norwegian fjords have poor water circulation. The Norwegian governmental structure has a different means of reviewing development proposals for environmental impacts. Biologists, geneticists, and fish disease experts working in Washington are aware of the problems in Norway and the guidelines they use in management.

   Mr. Mehli's testimony included an admission that he had no knowledge of the fish farming industry in Washington, or the State regulations that currently exist in Washington to prevent problems such as those found in Norway (page 13 of the transcript).

4. Comments noted.

5. Comment noted.

6. See Section 2 of the response to comments after the text in Appendix E.

7. See Section 2 of the response to comments after the text in Appendix E.

8. See Section 2 of the response to comments after the text in Appendix E.

9. See Section 2 of the response to comments after the text in Appendix E.

10. See Section 4 of the response to comments after the text in Appendix E.

11. See Section 4 of the response to comments after the text in Appendix E.

LETTER NO. 73

12110 S.E. 16th Place
Bellevue, WA. 98005
March 20, 1989

Ron Westley
Project Manager
Washington Department of Fisheries
General Administration Building
Olympia, Washington 98504

Reference: Draft Programmatic Environmental Impact Statement

Dear sir:

The referenced Programmatic Environmental Impact Statement does not adequately address my concerns as a waterfront property owner adjacent to one of the planned sites. While the referenced Statement addresses pollution, visual blight, and noise it does not:

1. Recognize the impact on privately owned beach property from the pollution washing ashore. My surveyed property line is at approximately the mean tide level. Many waterfront properties include the tide lands. Depending on the winds and tides, debris is washed up on my property from the adjacent waters. Salmon feed and fish feces would wash up on privately owned land making that expensive land unsuitable for the recreational pursuits which make the land valuable. The state will undoubtedly be sued by property owners because of the pollution of their private property from fish feed and feces. (1)
2. Recognize the extent of the noise pollution in a quiet area. Noise from the water carries extremely well in a quiet environment. We can many times hear conversations from people on boats. At night the activity on salmon pens would be the predominant noise in the whole area. Noise in a quiet area has an entirely different impact than noise in a noisier area, and that is not recognized in the statement. (2)
3. The importance of visual blight to expensive waterfront property is not recognized in the Statement. The loss of revenue to the state from the decrease in property values from that item alone is just not adequately recognized. (3)
4. Recognize the importance of easy access to open water for waterfront property. (4)
5. Recognize the large impact to the property tax revenue that the state will receive, or the potential cost of suits by private property owners when their property is polluted because of actions of the state. (5)

Yours truly,

Marvin E. Eisenbach

Marvin E. Eisenbach

RESPONSE TO LETTER NO. 73: MARVIN E. EISENBACH

1. Comments noted.

2. See the response to Letter 1, Comment 59. The different background levels of noise and the consequent differences in impacts are discussed on page 121 (third paragraph) and 123 (first paragraph) in the DEIS, and in Section 6.6 of the FEIS.

3. Property values are discussed in Appendix E. The conclusion of this study is that visual quality impacts associated with fish farms may affect property values, but this affect is difficult to separate from the many other locational factors that could affect property values.

4. The issue of navigation for both commercial and recreational vessel traffic is discussed in Section 6.2 of the FEIS. A substantial impact would result if a fish farm facility impaired navigation to and from a particular property.

5. SEPA does not require this type of analysis.

Mr. Ron Westley, Project Manager
Washington Department of Fisheries
115 General Administration Building
Olympia, Washington 98504

7 April 1989

Re: Draft Programatic EIS on Fish Culture in Floating Net Pens

Dear Mr. Westley,

Thank you for the opportunity to comment on the DPEIS. Although I am not opposed to the practise of net pen culture in the waters of Greater Puget Sound, I feel strongly that the DPEIS does not adequately address a variety of concerns I have about the way in which such activities are currently conducted. In addition, the DPEIS does not provide adequate guidance for managers to make decisions critical to the siting of future operations in the Sound.

For this document to be useful for managers, it will be necessary to distinguish where its findings are in conflict with the current interim guidelines and to specify the types of monitoring programs needed to meet to the standards the State wants to uphold. In addition, the generic nature of this document cannot adequately address site-specific concerns. As written, this document does not do away with the need for individual impact statements to be written for each new site. This point is particularly relevant to the limited discussion on cumulative impacts. Water quality impacts need to be addressed on a site by site basis, not in terms of the effects on the BOD of the entire Sound. 1

While there has been substantial documentation of ways to mitigate the benthic perturbations resulting from typical net pen operations, simply siting future net pens in regions of high current velocity does not preclude the need to obtain NPDES permits from EPA. The justification for this ascertion is eloquently stated in Sierra Club Legal Defense Fund's February 8, 1989 letter of intent to sue EPA under Section 505(a)(2) of the Clean Water Act, 33 U.S.C. 1365 (a)(2), for failure to require the State of Washington to require NPDES permits for salmon net pen facilities. 2

The primary concern I have with current net pen operations is use of Atlantic salmon species. On page 69 of the PEIS it is stated that, "Many introductions of exotic species worldwide, however well meaning, have led to ecological disasters. Not only might the animal itself spread unchecked, but diseases these animals may carry might spread to native species." There is still a paucity of information regarding the potential impacts to native salmon stocks from parasites and diseases introduced by non-endemic species commonly used in net pen culture. Regardless of the cause of the recent outbreak of VHS, the fact that it occurred demonstrates that our wild stocks are susceptible to diseases carried by Atlantic salmon and that our current precautionary measures are not adequate. The fact that an abundance of adult Atlantic salmon were caught in the San Juans this past summer (see enclosed article) and that the PEIS states that occassional Atlantic salmon have also been observed in the Nooksack, Skagit and Nisqually Rivers demonstrates that these issues still need to be adequately resolved. In the mean time, Washington State should put a temporary moratorium on granting new net pen 3 4

permits or at least follow the example Alaska has set by limiting their net pen culture to species endemic to the North Pacific.

The extent to which Atlantic species have been observed in Washington's streams and fisheries should be better quantified in the final PEIS and a monitoring program should be specified. Although previous attempts to establish runs of Atlantic salmon have not been successful, it should be noted that those attempts were primarily limited to the introduction of juvenile fish which have a low survival rate. A minimum siting distance from natural rivers should be established for all future operations to reduce the likelihood of net pen fish competing with natural runs. If it is found that Atlantic salmon have to be used, despite the risks they pose to this state's billion dollar sport and commercial fisheries, a sterile form should be bred to minimize the likelihood of impacting native runs. 5

I am also concerned about the potential net pens have of creating scenes throughout the sound like we have at the Ballard Locks. "Hershel" and his associates have shown us that marine mammals have the ability to learn where the easiest meals in the Sound are to be found. Once these sea lion soup kitchens are discovered, they are not readily abandoned. Page 81 of the PEIS states, "The presence of captive fish and a floating habitat usually attracts predatory birds and marine mammals." Page 82 of the PEIS states, "There are only a few isolated incidences where intentional killing (of marine mammals) has occurred." The number, location and species of such intentional killings should be specified in the final PEIS as well as the number of permits currently held by net pen facilities to lethally remove salmon predators. The interim guidelines recommend that a net pen should not be sited within 1500 feet of a marine mammal haul-out or bird colony. What is the biological basis for this recommendation and what are the criteria that a permitting agency must follow to enforce such recommendations? Similarly, why is it only recommended, and not required, that net pens use anti-predator nets. The requirements should also specify the mesh size of such nets to minimize the likelihood of entangling marine birds and mammals. 6

The fact that killer whales were not mentioned as potential predators on net pen salmon is a particular oversight to be addressed when considering siting of future net pens. Over 80 resident killer whales frequent the waters of Greater Puget Sound. Intensive field studies conducted since 1976 have shown that these animals movements and behaviors are adapted for salmon predation (Thomas and Felleman 1988; Felleman et al. 1989). Regions frequented by resident killer whales have been quantified (Heimlich-Boran 1988 see figure). These regions should be avoided by net pen operations to prevent unnecessary interactions with a species too powerful to be restricted by anti-predator nets and too well loved by the public to be subject to intentional harassment. 7

Finally, the DPEIS should compare the net economic benefits of standard net pens with land based tank farms. While it is asserted that tank farms have significantly higher start-up costs, these expenses should be evaluated in context with the various benefits tanks have over pens. It is my opinion that most of the concerns raised over net pens could be mitigated by the siting tank farms instead. These benefits include: 1) overall higher survival rates and harvest rates; 2) decreased food costs because of higher conversion ratio; 3) greater control over the environment; 4) ability to add oxygen, 8

thereby lowering the risk of disease even at higher stocking densities; 5) not dependent on weather for routine operations; 6) no water dependent use conflicts; 7) avoidance of predator problems; 8) point source discharge can be treated and easily regulated with NPDES permits; 9) easier to observe and sample fish to monitor disease; 10) less need to use chemicals and antibiotics; 11) less likelihood of fish escaping, thereby enabling non-endemic species to be raised without jeopordizing native stocks.

The above mentioned benefits of tank farms amply justify a closer analysis of their net economic viability. However, special consideration should be made to the placement of the intake pipes needed to pump water into the tanks. Regulations should be established which define the appropriate depth of the intake pipes and means by which entrainment of wild fish could be minimized.

In conclusion, the DPEIS does not provide adequate justification for its conclusion that no significant impacts will occur with the immediate development of up to 100 salmon net pens in Greater Puget Sound. I hope the above comments help to make this document more useful to managers and more responsible to the citizens of Washington State who greatly value and depend on the marine environment for the livelihood and enjoyment. 9

Sincerely,

Fred Felleman, MSc.
Conservation Biologist
4007 Latona Ave NE
Seattle, WA 98105

REFERENCES

Felleman, F.L., J.R. Heimlich-Boran, R.W. Osborne (1989 in press). Feeding Ecology of Killer Whales (Orcinus orca) in Greater Puget Sound. In: K. Pryor and K.S. Norris (Eds) Dolphin Societies. U. of California Press, Berkeley.

Heimlich-Boran, J.R. (1988). Behavioral Ecology of Killer Whales (Orcinus orca) in the Pacific Northwest. Canadian Journal of Zoology 66(3):565-578.

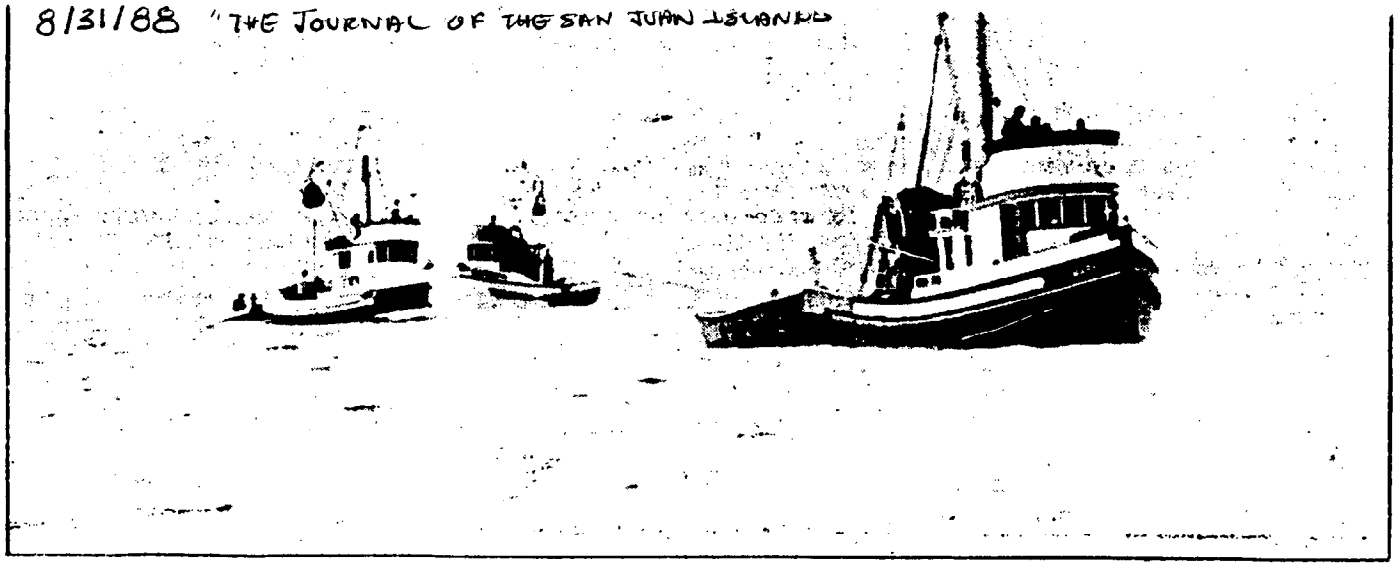
Thomas, G.L. and F.L. Felleman (1988). Acoustic Measurement of the Fish Assemblage Beneath Killer Whale Pods in the Pacific Northwest. Rit Fiskideildar Vol. 11: 276-284.

References Not Found in the DPEIS:

MacCrummon and Got (1979)

Quinn (1982)

8/31/88 "THE JOURNAL OF THE SAN JUAN ISLANDS"



Frank Leeming photo

Local fishermen were the first to catch Atlantic salmon in Northwest waters. The fish have never been known to survive in the Pacific before.

Atlantic salmon caught in San Juans

By ILENE ANDERSON and JIM LEHDE

Atlantic salmon began last week flopping aboard gillnetters and seiners fishing Salmon Bank off San Juan Island's Cattle Point.

Never before have Atlantic salmon been known to survive in Pacific waters.

Identifying characteristics are a wide mouth, X-shaped spots, and a fairly straight tail with no spots, "resembling a steelhead as much as any breed," said Dennis Austin, chief of harvest management of the state Department of Fisheries.

ATLANTIC SALMON are successfully pen-raised in hatcheries, but have never been known to survive in the wild.

Eric Hurlburt, aquaculture coordinator for the state Department of Fisheries said there have been many unsuccessful attempts during the past 90 years to introduce Atlantic salmon into Pacific waters.

He said the attempts usually started with either eggs hatched into fingerlings acclimated in the west or smolts released, "never to be seen again once they were released into the sea.

> 'Nowhere have Atlantics survived and reproduced away from native waters.'
>
> —Eric Hurlburt
> State Department of Fisheries

"Runs have not developed and it's been a universal situation – around the world – that nowhere have Atlantics survived and reproduced away from native waters of the U.S. eastern seaboard," he said.

Theories are many and rumors abound at the state level about where these fish came from, according to Austin.

Island fishermen speculate they escaped from rearing pens on Cypress Island, followed the wild sockeye out into the ocean and are coming back in.

Fisheries officials are guessing Atlantics are escapees from pens of U.S. origin because of where they are being caught. "But they can be Canadian," said Austin.

The possibility of pen-reared fish escaping and mixing with wild breeds raises many questions of genetics and disease control.

ISLAND FISHERMEN are reporting catching Atlantic salmon at a pretty fair ratio.

"One to four fish per salmon landing have been reported by north Puget Sound buyers," said Austin.

About three hundred are reported to have been caught by an enterprising sockeye seiner after chumming (with rock-salt) what appeared to be a school of giant, hungry trout on the surface.

Fish buyers report the "hot" new salmonid is commanding Coho prices of between $1.50 to $2 a pound. The fish weigh an average of nine to 12 pounds.

However, Austin said they're illegal to catch and sell commercially. "Atlantics in Washington are classified as a game fish unless being reared in a pen. They have to be treated exactly as incidentally-caught steelhead – released live if possible."

By ALLISON ARTHUR

Tom Grant could be paid more than $500,000 because of a leg wound he suffered four years ago when detective Ray Clever shot him on Orcas Island.

Grant is the only person in San Juan County history to have been shot by a sheriff's deputy.

INITIALLY FOUND GUILTY of assaulting Clever, a judge found him innocent of the charges in 1985 by reason of insanity.

In an out-of-court settlement reached recently, the county's insurance company, Lloyd's of London, agreed to pay Grant $193,000 in cash and $700 a month for the rest of Grant's life.

Grant's attorney, Jerry Schumm of Bellingham, estimates that if Grant, now 37 years old, lives 36 more years, he will be paid $510,800.

In exchange for the settlement, Grant has agreed to drop a lawsuit filed against the county and the deputies involved in the two-day incident in April 1984 at his home on Orcas.

Barry Johnson, a Seattle attorney hired by Lloyd's of London to represent the county, said yesterday there is no admission of liability by the county in the settlement.

The decision to settle was the insurance company's, he said. The insurance company paid $193,000 in cash and less than $100,000 for an annuity, which will pay Grant $700 a month for life. The insurance policy also paid Johnson's attorney fees.

"I was ready to go in and defend them," Johnson said of the deputies involved. "The officers were only trying to do the right thing.

"(But) I think the fact that there is a settlement is a recognition that there was a chance of losing.

"IF WE HAD LOST, he (Grant) probably would have been awarded more than that. The injury is quite substantial," Johnson said.

At one point, physicians thought Grant's leg might have to be amputated. Initially, Grant sued the county for $10 million.

Please see GRANT *on Page 3-A*

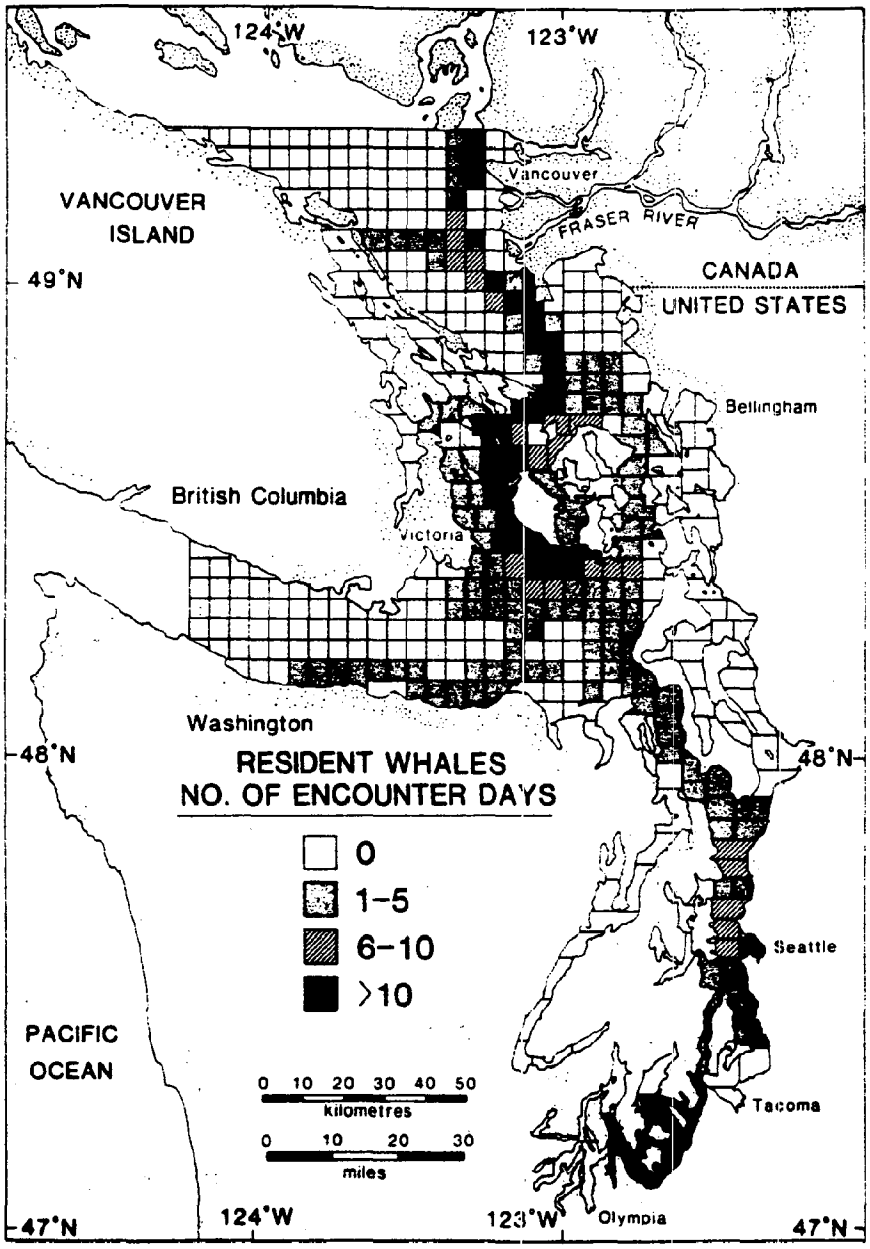


FIG. 3. Distribution map of resident whale encounters.

Source: Heimlich-Boran, J.R. (1988).

RESPONSE TO LETTER NO. 74: FRED FELLEMAN

1. The text has been revised for the FEIS to evaluate existing regulations and guidelines. This EIS was not intended to replace site-specific analysis. See the response to Question 1.

2. See the response to Question 17.

3. See the response to Question 29.

4. See the response to Letter 38, Comment 31.

5. Smolts may have a lower survival rate, and they have released about five million to date without success. A minimum siting distance from rivers may be developed as part of a management plan. The technology to produce sterile fish is available.

6. Comments noted. The *Interim Guidelines* were developed using the best available information, professional judgement of experts in the field, and undertaking a conservative approach. In Section 5.9 of the FEIS, the Preferred Alternative includes a recommendation that anti-predator nets be required in areas where WDW, USFWS, or NMFS indicate that predators may be present.

7. The text has been revised for the FEIS to include a discussion of killer whales as potential predators at fish farms.

8. SEPA does not require this type of economic analysis. A complete evaluation of tank farms and comparison to floating fish farms is outside the scope of this EIS.

9. Comments noted.

LETTER NO. 75

March 20, 1989

Mr. Ron Westley, Project Manager
Washington Department of Fisheries
115 General Administration Building
Olympia, WA 98504

Dear Mr. Westley:

Thank you for the opportunity to respond to your Draft PEIS on salmon net pens in the Puget Sound region. My response includes a summary of my remarks at the hearing in Mount Vernon on March 9, and some additional information which there was not enough time to discuss at the hearing.

I live just north of Hope Island on the bay. We have been living with fish pens for almost two years. The pens are located almost exactly 2,000 feet off shore from my home. There are no other commercial operations in this residential recreational area.

I would like to address the sections in the PEIS relating to noise, odor, aesthetics and recreation.

ODOR is addressed on Page 124 and we certainly agree that the odor is bad from the variety of sources listed. Odor is particularly objectionable on warm days with the prevailing winds. Odors are especially strong during net cleaning operations. Mitigating measures in the PEIS on Pages 125 and 126 include increasing the distance of the pens from residents and placing the pens downwind to reduce the smell. Downwind just transfers the problem to someone else and moving them offshore would put them in shallow water and would move them closer to the State Park beaches. These are not practical solutions.

1

NOISE (Pages 122, 123). We residents are bombarded by noise from a variety of sources related to the pens. These include trucks, automobiles, and loading operations at the shore launch site; motor boats going to and fro several times a day; radios and loud speech at the pen site (sound travels over water); and compressors running for long periods during net cleaning operations. Employees at the site set out numerous crab pots and tend them from the pen site via the pen motor launches. Various night-time operations are conducted with larger vessels operating with flood lights. The PEIS suggests mitigating methods such as farther away, avoid siting in small populated bays. These don't work in Skagit Bay because there are only two small restricted locations where fish farming is feasible even though the interim guidelines state differently.

2

RECREATION (Page 118). Again the mitigating factors suggested by the PEIS are largely impractical in the case of the net pens already in place. Example: avoid areas of intense recreational use such as fishing holes. The two fishing holes north and south of Hope Island are the only deep enough and protected places to put fish pens in Skagit Bay. Example: Avoid areas within 2,000 feet of State Park beaches. These pens are already there. (3)

AESTHETICS (Page 89). I live 2,000 feet from the fish pens. They do not appear as a line on the horizon. We see it all including floats, nets, buoys, boats, people, a 10 x 20 foot shack, stacked supplies, a lifting boom, etc. (4)

On Page 4 of the PEIS the railing height of the pens is listed as 3 to 4 feet above the water surface. Figure 3 drawing on Page 6 shows the railing height at 6 feet above the water. In the Aesthetics section of the PEIS where the visual effects of the pens are developed the railing height is specified as 1 meter or 39 inches. I personally measured it at just under 5 feet. Figures 14 through 18 showing the pens as a line on the horizon at 2,000 feet are deceptive and unbelievable and should be redone using the actual railing heights used in practice. (5)

The mitigating measures listed for Aesthetics conflict with navigation and fishing regulations and are mutually exclusive. (6)

Example: "Materials used should be non-reflective and somber hued."
Navigation states: "Use highly visible colors."

Example: "Site pens further off shore."
Navigation states: "Site pens close to shore."

Example: Use small sets of pens instead of one large complex.
Again, this conflicts with navigation and fishing.

Similar conflicts occur in the Noise and Odor sections.

A final Aesthetic conflict is the effluent from these pens on top of the existing fecal coliform pollutants coming from other sources.

I conclude from reading your draft EIS that your proposed policy is highly dependent on the "Recommended Guidelines for the Management of Salmon Net Pen Culture in Puget Sound." This document was issued in 1986 and while this was a useful document at that time, it should not in my opinion be used now as a basis for policy. The reasons for this are manifold and can be summarized as follows: (7)

The Guidelines are not site specific and therefore should not be considered for the wide variety of potential locations in the Puget Sound area. This point was eloquently brought out by Svein Mehli, the Director of Nature Management for the Norwegian Ministry of Environment, in testimony before the Shoreline Marine Board in November, 1988. He testified in opposition to the siting of salmon pens in Skagit Bay. When asked by the appellant's attorney if various of the Puget Sound Interim Guidelines were valid he refused to generalize and based on his 15 years of experience with over 700 net pen installations in Norway, testified that each site is unique and the Norwegian regulations are far more specific and stringent than the Washington Guidelines. Nevertheless they are still faced with numerous disease problems: Gyrodactylus Salaris in 30 rivers, BKD (Bacterial Kidney Disease) in 100 net pens, Red Mouth Disease in 300 facilities, and Furunculosis. The only way to eradicate some diseases from the rivers is to destroy all fish life in the rivers by poison and then restock the rivers, which they are doing. The Norwegian fish pen industry uses 48 metric tons (105,000 lbs.) of antibiotics annually attempting to control these diseases.

Following are examples of some of the Norwegian regulations to prevent the spread of these diseases:

8 1) No pens sited within 20 Km (12.4 miles) of a salmon river.

2) Establishment of 51 Security Zones within which no pens are allowed in order to separate existing pens from wild stocks.

9 3) No pens allowed where water salinity is less than 25 ppt (parts per thousand). Nowhere in your draft EIS do I find any reference to concerns about transfer of disease in brackish waters.

The only site specific information contained in the Puget Sound Interim Guidelines is in Table 5 "Calculations for Water Quality Guidelines." The authors developed an empirical formula based on the premise that nitrogen concentrations in each Puget Sound embayment could safely be

10 increased by 1% as a result of effluent from fish pens. They then extrapolated this number into allowed fish production in pounds. In the case of Skagit Bay which is heavily polluted (the beaches are closed to shellfish collection and recreational use) and already has the highest nitrogen concentration of any bay in Puget Sound, the 1% increase by formula worked out to 5.9 million pounds annually. This, amazingly, in the shallow polluted estuary of the Skagit River, the largest salmon producing river in

Puget Sound. This annual production number is far higher than that for any other embayment and is always quoted by the fish pen proponents. The reality is that there are only two small holes, one each north and south of Hope Island, that are deep enough for siting fish pens outside of the navigational channels. These holes are approximately 3 miles north of the mouth of the Skagit River and are in the same tidal stream. Because of the fresh water effluent from the Skagit River the water salinity is low, and varies from 7.3 ppt to 29 ppt. The examples of Norwegian regulations cited above, if implemented here, would prohibit fish pens anywhere in Skagit Bay on several counts instead of allowing 5.9 million pounds of annual production.

Finally, the Interim Guidelines on their face state they are not intended to replace existing regulations, Shoreline Master Programs, or local ordinances. In developing these guidelines no public hearings were held and SEPA procedures were not followed. (11)

Based on the above we are concerned that the guidelines are out of date and are being used far beyond their intended scope. Policy on net pen aquaculture should in our view be driven by the Shoreline Management Act and updating of the Counties Shoreline Master Programs to reflect the current understanding of the technology. Your draft EIS falls short of providing the necessary information to accomplish this. (12)

Sincerely,

Dale E. Fisher

Dale E. Fisher
1614 Snee Oosh Road
La Conner, WA 98257

RESPONSE TO LETTER NO. 75: DALE E. FISHER

1. Placing a facility downwind of a residential area may reduce impacts if upwind land uses are not sensitive (for example, industrial uses) or if upwind uses are fewer than downwind uses. Placement of facilities in respect to predominant wind direction is a locational parameter that should be considered in specific cases. It may or may not provide a solution in an individual case.

2. Comments noted.

3. Fish farms sited before January 1989 did not have the information in the DEIS available during the siting process.

4. Comment noted. Where structures such as sheds and buildings exist or where equipment remains on the farm, the farm would be more visually evident.

5. Comments noted.

6. See the response to Question 10.

7. The text has been revised for the FEIS to evaluate the impacts of fish farming under existing regulations and guidelines, including the *Interim Guidelines*. Mr. Mehli testified at the Shoreline Hearings Board that he had no knowledge of the existing regulations used in Washington to control disease. Each fish farm proposal is given site specific review through the HPA, Shoreline, and Section 10 permitting programs; and through the SEPA review process.

8. Comments noted.

9. The same concerns should exist for fish in salt, brackish, or fresh water. There is nothing unique about brackish sites in terms of pathogen movement.

10. Comments noted. The maximum production values in the *Interim Guidelines* are not guaranteed amounts. There was no site specific determination whether a sufficient number of sites are available to reach that maximum production level.

11. Comments noted. The *Interim Guidelines* are guidelines and not regulations. However, they could be adopted into WACs in the future.

12. Comments noted.

LETTER NO. 76

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Food and Drug Administration
Seattle District
Pacific Region
22201 23rd Drive S.E.
Bothell, WA 98021-4421

Telephone: 206-486-8788

March 22, 1989

Mr. Ron Westley
Project Manager
Washington Department of Fisheries
115 General Administration Building
Olympia, WA 98504

Dear Ron,

I have read the Draft of the Environmental Impact Statement for Fish Culture in Floating Net Pens. It is an impressive document. I have a few comments that are given below:

1. Most of the narrative regarding VHS will have to be rewritten due to the recent finding of the virus in Washington State. In light of this, it might be helpful to provide more details about how VHS is detected, how exactly the eggs are certified as to being free of VHS and what exact precautions are taken to avoid the introduction of this and other viruses. To put VHS in proper perspective, it would be useful to discuss other viruses of fishes. (1)

2. p. 115
More information can be given on V. vulnificus. This species causes two distinct clinical infections. Wound infections can occur in healthy individuals. The second more serious infection has most frequently been associated with ingestion of contaminated raw oysters and can result in a primary septicemia and a mortality rate exceeding 50% in individuals most at risk (patients with prior or ongoing liver dysfunction resulting in high serum iron levels). This organism is more prevalent on the Gulf Coast compared to the West Coast, however. Kaysner et al (1987) found a low incidence (5.9%) of V. vulnificus in water, shellfish, and sediment (N=529), sampled on the West Coast. In Washington State only 1 sample was found positive for V. vulnificus of 112 samples analyzed of sediment, water, and shellfish from various estuaries of the State. The positive sample of sediment was taken from Willapa Bay. (I have enclosed some papers on V. vulnificus). (2)

3. V. parahaemolyticus was found specifically in 3/48 samples (6%) and only in August if you need the exact level. Also, most of the predominant Vibrio species we have found so far in our net pen study has been V. alginolyticus. (3)

   Although V. alginolyticus is not considered a pathogen in the U.S., it has been implicated in illness associated with consumption of seafood in other countries (Chapman, 1987).

4. p. 117
Regarding the fish feed, care may also need to be exercised in not only storage but also production of fish feed. (4)

Eric Hurlburt and I sampled Port Angeles and Manchester on 2/14/89. As soon as the data are available, I'll send them. We have to sample at Squaxin Island when we can arrange it. I hope these comments will be helpful to you. Best wishes.

Marleen

Marleen M. Wekell, Ph.D.
Director, Seafood Products Research Center

Enclosures

cc: Dr. Ralph Elston

RESPONSE TO LETTER NO. 76: UNITED STATES FOOD AND DRUG ADMINISTRATION

1. See the response to Question 29 and Appendix G.

2. Comment noted. See the response to Question 33.

3. See response to Comment 2.

4. Comment acknowledged. Storage and production methods are important in order to maintain feed quality.

LETTER NO. 77

James Fox
P.O. Box 1188
Friday Harbor, WA 98250
378-5513

April 6, 1989

Mr. Ron Westley
Project Manager
Washington Department of Fisheries
115 General Administration Building
Olympia, WA 98504

RE: Draft Programmatic Environmental Impact Statement
Fish Culture in Floating Net Pens

Dear Mr. Westley,

Enclosed please find my comments on the draft PEIS, Fish Culture in Floating Net Pens. I have confined my comments to the section in the Technical Appendices titled The Economics of Salmon Farming by Robert L. Stokes.

I appreciate the extension of the deadline for public comment on the PEIS. The document is highly technical and sufficient time was necessary for adequate public review.

Sincerely,

James R. Fox

James R. Fox, Ph.D.

COMMENTS BY J. FOX ON:

"The Economics of Salmon Farming"
Technical Appendix to Fish Culture in Floating Net Pens

This study estimates the economic impacts of five "typical" salmon farms, one in each of five Puget Sound counties. For most of the counties the study appears to be based on a generic input-output model that has been scaled down to fit the local economy. Since, to my knowledge no specific input-output model exists for all of these five counties, I feel that the county-level impacts (and therefore the sum of these impacts) must be viewed with great caution. The sensitivity analysis should also address the inadequacies of the model itself, in addition to testing the sensitivity to the assumptions concerning the inputs to the model. (1)

The estimates of state-wide direct and indirect impacts on employment (257-303 jobs) for 5,000,000 lbs/year fish production differ from numbers derived from estimates by Crutchfield[1], suggesting 140-200 jobs resulting from a similar yearly production. Insufficient information is given by either author to evaluate this discrepancy. The difference may result in part by the use of a $4/lb sales price by Crutchfield and $5/lb by Stokes, which would effect the number of jobs created due to indirect effects. (2)

Competition with the commercial fishing industry

A major economic impact of salmon farming ignored in the PEIS is the effect of competition with the commercial salmon fishing industry. In 1987, 9.4 million lbs. of salmon were produced by salmon farms in Washington[2] (or 3.4 million lbs as stated in the PEIS) compared with a commercial salmon landing of 56.4 million lbs[3]. However if the annual production of farmed salmon reaches predicted levels of 45-75 million lbs (based on a prediction of $225,000,000 annual sales[4]) there will undoubtedly be competition with the commercial fishing industry for existing and new markets and a resulting price decrease. (3)

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[1] Crutchfield, J. Aquaculture: A rose with plenty of thorns. Pacific Northwest Executive 5:1, 1989.

[2] Heggelund, P. Salmon farming in Washington: The issues and the potential. Pacific Northwest Executive 5:1, pp 2-6, 1989.

[3] Washington Department of Fisheries, personal communication

[4] Heggelund, P. Salmon farming in Washington: The issues and the potential. Pacific Northwest Executive 5:1, pp 2-6, 1989.

The economic impacts of Washington's commercial fishing industry have recently been estimated[5]. Due to diminishing natural runs, increased necessity for regulation, and to other factors, this industry is hovering on the point of extinction. A major reason for its continued viability is the connection with Alaska fisheries. The economic impact of the Alaska fishery on Washington (due to Washington boats and fishermen fishing in Alaska and to importation of Alaska-caught fish for processing) has also recently been estimated[6]. Were Washington to loose its commercial fishery, many Alaska fishermen would no longer have a reason to live in Washington and to base their boats here. Based on the above-mentioned studies, the combined effect of the Alaska and Washington fisheries on Washington employment (both direct and indirect) is over 11,000 FTE jobs. Thus any disruption of the Washington commercial fishing industry due to competition by salmon farming could have potentially serious economic consequences. The effect state-wide could more than negate any advantages of salmon farming, and on a local level where some communities depend to a great extent on commercial fishing for their economic survival, the results could be even more serious.

Impact on government revenues and expenditures

An economic impact on State and local government expenditures omitted from the PEIS is the cost of providing government services specifically to salmon farming. This includes support of the Aquaculture division of the Department of Agriculture, the cost of permit processing by a number of agencies, and the cost of monitoring compliance with requirements or restrictions placed on permits.

4

Economic impacts to local governments were not considered in the PEIS. Local government incurs many costs in providing services to the industry (planning, permit processing, monitoring) as well as services to employees the industry will attract to the locality. The fraction of new salmon farm jobs filled by non-resident workers will be much greater on a county level than on a state level. In addition, the tax revenues generated by fish farming primarily go to the State and are not returned to the county. Thus, although the net economic impact of salmon farming to state government may be positive, it is more likely that the impact will be negative at a local government level. This means that local residents effectively will have to subsidize fish farms with their tax dollars. The net result will be determined

---

[5] Economic impacts and net economic values associated with non-Indian salmon and sturgeon fisheries. Washington State Department of Community Development, 1988.

[6] Bourque, P. Alaska economic impact on Puget Sound. Ranier Bank Economic Research, Columbia Group, 1988.

partly by the number of non-resident employees, the amount of non-local financing, and local economic multipliers.

Impacts on the local economy

Discussion in the PEIS of the aesthetic impacts of fish farms took into account only the impact on residents living within sight of the farm. The impacts on the general public and on visitors (tourists) was ignored. In San Juan County, as an example, the driving forces in the local economy are tourism, growth and retirement--all directly resulting from the quality of the environment, especially the visual environment. Anything that degrades that environment will undoubtedly effect the local economy.

5

One crude measure of the economic value of the "quality of life" of a region is the wages that workers are willing to sacrifice in order to live in that region. San Juan County had a 1987 workforce of 5340 persons who worked for an average annual income per worker of $14,680, compared to a state average of $22,727[7]. The difference between the county and the state average income, multiplied by the number of County workers is nearly $43,000,000 per year. Much of this can be attributed to the "quality of life" in the County.

The value of the tourism industry to the San Juan County economy has been estimated as $15,000,000 per year in 1982 in taxable retail sales directly attributable to tourism[8].

Although it is difficult to estimate the effect of degradation of the visual environment on these figures, it is clear that there would be some effect, and that there is a lot at risk.

Summary

In conclusion, three major economic impacts were omitted from the PEIS: the effect of competition with the commercial fishing industry; the effect on local government revenues and expenditures; and the effect of degradation of the visual environment on the local economy. Each of these factors could be highly significant. Adding to these impacts is the risk of reducing the wild salmon runs due to disease or dilution with inferior fish and the resulting loss to the commercial and sports fisheries.

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[7] Fox, J. and Hodgkin, C. 1988 economic and demographic almanac of Washington counties. Information Press, Eugene, Oregon, 1988.

[8] Tourism in San Juan County: Final report of the San Juan County Tourism Planning Committee, 1985.

It seems that at best salmon farming simply trades one industry for another, redistributing jobs and wealth, but with a net advantage that, even if greater than zero, offers little compared to the unpopularity of the salmon farming industry and the risk to wild salmon runs--one of Washington's greatest treasures.

RESPONSE TO LETTER NO. 77: JAMES FOX

1. See Section 2 of the response to comments after the text in Appendix E.
2. See Section 2 of the response to comments after the text in Appendix E.
3. See Section 1 of the response to comments after the text in Appendix E.
4. See Section 3 of the response to comments after the text in Appendix E.
5. See Section 1 of the response to comments after the text in Appendix E.

FRIENDS OF THE EARTH

7 April 1989

Ron Westley
WA Department of Fisheries
115 General Administration Bldg.
Olympia, WA 98504

Dear Mr. Westley:

We have received a copy of the Draft Programmatic Environmental Impact Statement for Fish Culture in Floating Net Pens. The following are the comments of the N.W. Office Friends of the Earth:

GENERAL COMMENTS

According to the DPEIS summary (p. ix)., the Washington State Legislature directed the Departament of Fisheries to evaluate the environmental impacats of net pens on the biological and built environments. We are extremely disappointed that the Department of Fisheries did not prepare this document under its normal State Environmental Policy Act obligations. We do not believe that it is necessary for the State Legislature to activate the preparation of Programmatic Environmental Impact Statements. (1)

In addition, we find the DPEIS does not adequately present upland fish farms as an alternative. (2)

We further question the participation of Parametrix in the preparation of this DPEIS. Please provide a listing of all contracts which Parametrix has had with the fish-pen industry, or any State Agency on this subject. (3)

More specific comments are as follows:

SUMMARY p. ix. Please provide a copy in the Final PEIS of the legislation directing the Department of Fisheries to evaluate the environmental impacts of net pens. (4)

B. DESCRIPTION OF ALTERNATIVES, p. 8

Up-land fish farming is a viable alternative to in-water net pens. The advantages include being able to treat the effluent prior to discharge into a water body. An up-land fish farm operation has been proposed for Westport, WA. While a discussion of up-land fish farms is found beginning on page 135, it is clearly not one of the four alternatives listed on page 8. We request that up-land fish-farms be considered as part of the alternatives to be considered. (5)

Northwest office 4512 University Way NE Seattle, Washington 98105 (206) 633-1661

Four alternative levels of development are proposed in this section. On what legal basis could the state set a maximum number or acreage of fish farms? In other words, since there is no current mechanism for setting a maximum limit on fish farms, the "net" result for the state, will simply be the cumulative decisions of multiple local jurisdictions. Therefore, the PEIS must set out a "worst-case-scenario". With the state actively promoting fish farming and the Ecological Commission vetoing local efforts to managing this industry, the PEIS should examine a far greater number and acreage of fish farms than Alternative 4, which might result from these policies. (6)

Permits and Approvals pp. 8-12. According to the Department of Ecology, aquaculture (include fish pens) is now a preferred shoreline use. Since the Departments of Natural Resources and Agriculture are firmly on record as promoters of this industry, where in state government is there an opportunity for an impartial decision on such developments? (7)

Department of Ecology p. 11. Provide a reference for the statement that "WDOE is responsible for planning for the accommodation of competing interests in the use of thes resources." Ecology can not be both the protector and planner for development in this state. (8)

Environmental Protection Agency p. 12. Please add that under the Federal Clean Water, Congress established a national goal of zero discharge of pollution to our nation's waters. (9)

c. Mitigation Measures p. 26. "Dispersion" is not a mitigation technique. While state law still permits dilution as a solution to pollution, the Federal Clean Water Act does not provide for "dispersion" as either a best management practice or best available technology. We request that this section be deleted from the FPEIS. (10)

c. DISEASE pp. 76-81. Please describe where and how the disposal of diseased fish is carried out. (11)

What is the magnitude of the impact from transmission of disease to wild fish under a worst case scenario? (12)

Marine Mammals p. 82. Please list the number of marine mammals which have been killed by net-pen operators and the number of permits given by the National Marine Fisheries Service for this purpose since 1972. (13)

Birds. p. 84. Please list the number and species of birds which have been killed by net-pen operators and the number of permits given by the U.S. Fish and Wildlife Service since 1972. (14)

Description of impacts. p. 98. It states that net-pen density could be controlled by measures adopted into local shoreline master programs. A large portion of Hood Canal, as well as other portions of Puget Sound are split between two counties. Just north of Henderson Inlet, for example, Mason, Pierce and Thurston Counties all come together. How can local shoreline (15)

master programs take into account what the adjacent local master programs contain? Doesn't it make more sense for a State Shoreline Management Act to set state policies and not rely on a a hodge-podge of local decisions?

SUMMARY

In conclusion, we find the DPEIS has ignored a worst-case-scenario, both from the standpoint of accidental introduction of an exotic disease into state waters and from failure to examine the impacts from more than 100 farms. It is inconsistent to state that the accidental introduction of an exotic disease into state waters remains a risk and at the same time conclude that 100 fish farms would not have a significant impact on the aquatic environment. (16)

We find that there is little to be gained and perhaps much to be lost in rushing ahead with fish-pen projects in Puget Sound. No further fish-pen projects should be permitted until the Puget Sound Water Quality Plan has been fully developed and implemented. We do not need another polluting industry on Puget Sound at the same time extensive efforts are underway to clean it up.

Please send us acopy of the Final PEIS when it is available. Thank you for the opportunity to comment.

Sincerely,

David E. Ortman
Northest Representative

DEO:jwp

RESPONSE TO LETTER NO. 78: FRIENDS OF THE EARTH

1. Comment noted.

2. The EIS evaluated the use of floating fish farms. The description of land-based tank farms was included to provide additional information on the commercial fish farming industry. This section has been moved to the Technical Appendices to clarify that it is meant as additional information.

3. See the response to Question 2.

4. The legislation directing WDF to undertake an environmental assessment of the fish farming industry is included as Appendix J.

5. Comments noted. See the response to Comment 2 above.

6. Comments noted. In the DEIS, the State did not set a maximum number or acreage of fish farms, but rather presented a range of industry production levels that the industry may or may not attain in Puget Sound. See response to Question 3.

7. The Legislature determined that aquaculture is a preferred use of the state's shorelines.

8. *The Shoreline Management Act* (RCW 90.58.020) states: "It is the policy of the state to provide for the management of the shorelines of the state by planning for and fostering all reasonable and appropriate uses." Ecology is responsible for administering the *Shoreline Management Act*.

9. Comment noted.

10. The fish farm industry will be required to obtain NPDES permits to comply with federal water quality regulations. See Section 5.2 of the FEIS.

11. Dead fish from public and private hatcheries and fish farms are removed from the site and disposed in a sanitary manner; such as at an approved landfill or sold to a rendering plant.

12. Comment noted. See the responses to Questions 25, 26, 27 and 29. Also, see the response to Letter 1, Comments 15, 16, 18, 19, and 20.

13. See the response to Question 30.

14. See the response to Question 32.

15. Establishing a maximum fish farm density to control potential aesthetic impacts on a State level would not allow the necessary flexibility to account for different

Response to Letter No. 78: Friends of the Earth (continued)

local conditions. Local government is the appropriate entity for determining what aesthetic standards should be used for their jurisdiction.

16. Comments noted.

LETTER NO. 79

April 6, 1989

Ron Westley, Project Manager
Washington Department of Fisheries
General Administration Building
Olympia, Washington 98504

Re: Fish Culture in Floating Net Pens

Dear Mr. Westley;

Thank you for sending along to me copies of the Draft Programmitic Environmental Impact Statement: Fish Culture in Floating Net Pens. I have looked at the material in the copies sent and have also attended three workshops being held in my County. As of this time I feel comments here regarding net pen culture would be too voluminous. In short, listed below are items that I feel still remain unsatisfactorily unanswered.

1. Impact on water quality and bottom sediments in confined areas are bound to conflict with present conditions.
   a. Fish and Shell fish
   b. Aquatic organisms

1

2. Impact on Built Environment would be almost uncontrolable regarding the following:
   a. Aesthetics
   b. Navigation
   c. Commercial fishing
   d. Human health
   e. Recreation
   f. Noise
   g. Odors
   h. Oil spills

2

3. Upland and Shoreline Use.
   It is unfortunate that only five pages were reserved for upland and shoreline use.

3

STATEMENT: Through all the hundreds of thousands of dollars spent in the introduction of Fish Culture in floating net pens in Puget Sound, the thousands of hours of testimony, volunteer committees, untold dollars by opponents of fish pen culture, it is unbelieveable there are those who live and work in Washington on or near the shores of the Sound are trying to find ways and justification for polluting "The Sound", endanger native fish and shellfish, and make this pristine body of water a cesspool and with the introduction of floating net pens around its shore they would be allowing the introduction of visual pollution as well. Insofar as the citizens of the state are being forced to accept aqualculture let it be upland where this commercial venture can be regulated as a business should be, and most unknows and critical impacts can be controled.

Sincerly,

Barry Graham

Barry L. Graham
784 Olympus Blvd.
Port Ludlow, WA. 98365

RESPONSE TO LETTER NO. 79: BARRY L. GRAHAM

1. Comments noted.
2. Comments noted.
3. Comments noted.

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GREENPEACE

Greenpeace USA • 4649 Sunnyside Ave N • Seattle WA 98103 • Tel (206) 632-4326
• Fax (206) 632-6122 •

March 21, 1989

Ron Westley, Project Manager
Washington Department of Fisheries
115 General Administration Building
Olympia, WA 98504
(206)753-6642

RE: Draft Programmatic Environmental Impact Statement- Fish culture in floating net pens. Washington Department of Fisheries, January 1989.

Dear Mr. Westley:

Greenpeace U.S.A., an environmental organization with 35,000 supporters in the state of Washington, and one million supporters in the United States, appreciates the opportunity to comment on the above-referenced document.

Greenpeace is well established in environmental issues, and is perhaps best recognized for work involving ocean policy and marine wildlife. The culture of marine fish in floating net pens, and the implications of its widespread practice in Washington state's marine waters, is therefore within our tradition scope of interest involving environmental and ecological concerns about the ocean.

While in general we find that the Draft Programmatic Environmental Impact Statement (DPEIS) discusses many relevant issues regarding the placement and operation of aquaculture facilities in state waters, we believe that in several areas the DPEIS is inadequate. It is our desire that our comments be utilized to develop a more adequate Programmatic Environmental Impact Statement (PEIS).

1 In particular we believe the DPEIS to be inadequate in regards to describing the species and population status of wildlife that are likely to interact with the net pen facilities, in assessing the potential and probable impacts to marine mammals and marine birds, and in defining appropriate mitigation measures to limit the impacts of net pens to wildlife.

2 A first example is that marine mammals and birds are extremely mobile animals, and undoubtedly will be attracted to the facilities. Not only bird, seal and sea lion species have the potential for interacting with aquaculture facilities. The very real potential exists that orcas (killer whales) could discover the feeding opportunities present at salmon pens. Orcas are already documented to adapt to fish industry activities, interacting on a regular basis with long-line and trawling operations in Alaska, causing significant damage to harvests in

RECYCLED PAPER

the former (Matkin 1988, Dalheim 1988). The PEIS should discuss the forms of anti-predator nets that would be required to mitigate interaction between cetaceans and net pens because the newly reauthorized Marine Mammal Protection Act (MMPA) prohibits any intentional harassment or killing of any cetacean, including orcas. The PEIS should also discuss siting that would prohibit the pens from areas frequented by orcas.

A second example is that to truly anticipate sites where interactions may be likely to occur, siting criteria should be based not upon an arbitrary 1,500 foot separation between habitats of special significance and pens, but instead upon a more comprehensive review of bird, cetacean and pinniped movement patterns between migration, transit, haulout, feeding, and resting sites. And in any case, a mere 1,500 foot separation between birds, marine mammals and net pens is unrealistically small as an effective mitigation measure. (3)

A third example is that the PEIS should discuss that the needs of aquaculture may compete with those of marine birds for euphausiids, an important prey for planktivorous birds. An example is the harvesting of euphausiids by fish farmers in British Columbia. At present the euphausiid fishery in British Columbia is small at 500 tons per year, but is projected to increase to 100,000 tons by 1995 if euphausiids are used as the sole protein source in salmon feeds. If the trend of harvesting euphausiids continues, many planktivorous birds may be detrimentally affected by the loss of a high-energy food usually obtained prior to breeding (Vermeer et al. 1987) (Vermeer and Morgan, 1988). (4)

The PEIS should address whether euphausiid harvesting will be allowed in Washington state's waters, whether imports of euphausiids harvested in British Columbia will be allowed, and the resulting potential impacts from this activity. (5)

(6) Our general recommendations for adoption into final regulations concerning the permitting of net pens are that:

- anti-predators nets be mandatory at all net pen facilities, and/or where they are not installed that any harassment, trapping, or lethal removal of marine birds or mammals be explicitly prohibited;

- siting criteria be strengthened to establish significantly greater separation than 1,500 feet between net pens and wildlife "habitat of special significance," and that such habitat be more comprehensively defined;

- the terms of the recently reauthorized and amended Marine Mammal Protection Act (MMPA) be reported in better detail to communicate that it is currently illegal to harass or intentionally take any cetacean (including orcas), or intentionally lethally take any northern sea lion or northern fur seal.

- euphausiid harvesting in state waters, or importation from British Columbia, for fish feeds be prohibited until more is known about the harvestable euphausiid biomass and the importance of euphausiids to marine birds and other organisms.

Our specific comments and questions on the DPEIS follow, along with recommendations for the PEIS:

Page 73

7 The PEIS should estimate the total number of net pen Atlantic and coho salmon that are expected to escape annually into Puget Sound, and/or estimate the escapes per net pen facility.

8 The PEIS should discuss in greater detail the genetic distinction between hatchery-cultured fish already being intentionally released into Puget Sound, and the preferred net pen stocks, such as those of coho salmon, that will be accidentally released into Puget Sound.

9 The PEIS should include genetic models illustrating the potential impacts of net pen stocks of Pacific salmon interbreeding with variously sized populations of native salmon.

10 The PEIS should explicitly state that the "differential mortality" that would result from native fish hybridizing with net pen fish possessing traits maladaptive to natural conditions, would result in a decline in fish survival rates in the wild.

Page 74

11 The PEIS should list in detail the anecdotal as well as documented captures by commercial and recreational fishermen of Atlantic salmon in the ocean waters of Washington and British Columbia during 1988 and earlier years, and attempt to explain the likely origin of the fish and the escape levels that produced them.

12 The PEIS should discuss the ecological threat posed by escaped Atlantic salmon to native fish species under scenarios where the Atlantic salmon do and do not establish a breeding population.

13 The PEIS should discuss in greater detail the funding and status of current and future monitoring programs to assess the level of mature Atlantic salmon and domestic coho salmon returning as a result of accidental releases to Pacific rivers and streams.

Page 75

14 The PEIS should describe the program in southern Argentina, in particular the number of fish released, which successfully establish Atlantic salmon outside the species' natural range.

Page 79

15 The PEIS should describe in detail everything that is known about the disease and the recent outbreak of the serious exotic pathogen, viral hemorrhagic septicemia (VHS), in Puget Sound salmon.

The PEIS should discuss the fish species known to carry and be effected by the disease.

The PEIS should explore the likely vectors of VHS, such as imported Atlantic salmon eggs.

The PEIS should describe the impacts to hatchery operations when VHS is discovered, and the recommended protocols for preventing spread of the disease in hatcheries, net pens, and free-swimming populations such as those in rivers.

The PEIS should assess the possibility of net pen fish acting as reservoirs of VHS, and describe the comprehensive testing program that is now necessary in Washington and British Columbia for all stocks to assess the spread of the disease.

Page 81

16 The PEIS fails to discuss adequately the potential of direct impacts to marine birds by accidental entanglement and drowning in net pens, and by shooting of birds by farm operators, and indirect impacts by alteration of the birds' habitat and food supply.

17 The PEIS fails to discuss the regulations in Washington State and British Columbia concerning the intentional lethal taking of predatory birds, such as those existing which prohibit killing of certain species under the Migratory Bird Treaty Act (MBTA). What regulations would prohibit or control shooting of birds?

18 If circumstances exist which would allow the lethal removal of certain birds, the PEIS should estimate potential mortalities in Washington State and British Columbia, and assess potential impacts to the appropriate resident and migrant bird population.

Page 82

19 Marine mammal interactions with the facilities are discussed and acknowledged to be likely to occur. However a recommended guideline that operators locate net pens at least 1,500 feet from mammal habitats of special significance is poorly defined, unrealistic and inadequate. What is a "marine mammal habitat of special significance?" For instance, numerous channels between islands are key transit points for animals between the various bodies of water. Are these areas considered "habitats of significance?"

The PEIS should describe "habitats of significance" for cetaceans such as orcas, Dall's porpoise and harbor porpoise.

20 The PEIS should list all permits that are required by net pen operators to harass and lethally control birds, pinnipeds, and cetaceans, and list the species that can be controlled under such permits.

21 The PEIS should list all facilities in Washington, or elsewhere in the U.S. which have successfully controlled predators with anti-predator nets.

22 Population status and potential impacts to marine mammals are inaccurately and inadequately discussed. The statement "Since implementation of the Marine Mammal Protection Act, seal and sea lion populations in Puget Sound and other Washington bays have increased in size and range" is inaccurate concerning the northern sea lion, the population of which has not recovered significantly and remains low averaging around 250 animals during the winter months. This species is under consideration for designation as depleted under the MMPA. The PEIS should state as much.

23 The PEIS fails to discuss the occasional presence of northern fur seals, a depleted species, in the state's marine waters.

Page 83

24 Are all haulouts shown in Figure 12 considered habitats of special significance?

Page 84

25 What marine mammal predator control methods referred to by Gibson are or were used at the SeaFarm Washington facility?

26 Since "observers often do not distinguish between California sea lions and northern sea lions", as a responsible conservation measure the PEIS might propose that no lethal take of sea lions be allowed because of the risk of killing rare northern sea lions. Such a measure would help insure from the outset compliance with the newly amended MMPA, which now prohibits the intentional killing of any northern sea lion, except to protect humans from physical injury.

27 What predation control method is proposed for river otters? Are leg-hold traps a legal option for control of this species, or pinnipeds?

28 What bird species, other than the example cited with bald eagles, are documented to be benefited by net pens?

29 The PEIS should include a list of the permits, administered by the U.S. Fish and Wildlife Service, that are currently held by aquaculture operators to kill and trap nuisance birds in the state, and should also list permits and estimate kills of birds in British Columbia.

30 The PEIS should estimate how many additional permits will be issued, and the overall mortality, harassment, and trapping of birds the could potentially result in Washington State and British Columbia, as the bird populations are homogeneous.

Page 85

31 Does Figure 13 illustrate marine bird habitats of special significance?

Page 86

32 The PEIS should list or summarize all information gained to date regarding harassment or selected killing of certain marine mammals that threaten aquaculture facilities.

33 In past years the National Marine Fisheries Service issued "certificates of inclusion" under the Marine Mammal Protection Act to various aquaculture operations in Washington, Oregon, and California, that allowed if necessary the lethal removal of California sea lions and harbor seals. The PEIS should contain and list the holders of and numbers of certificates of inclusion issued, the required annual reports describing marine mammals interacted with or killed, the marine mammal species involved, estimates of annual marine mammal harassment, injury, or death under the certificates, and aquaculture losses to marine mammals.

34 The PEIS should contain maps or other data describing and identifying sensitive wildlife species and habitats, if figures 12 and 13 do not identify such.

Page 87

35 The PEIS should describe the "zone of separation" utilized by the USFWS to protect bald eagles or other endangered species from development activities.

36 The PEIS should describe what is meant by "potential impacts to wildlife will be dependent upon site-specific considerations such as types and numbers of species in the area and proximity to sensitive habitat areas" by establishing criteria of species types and numbers which when met would allow development, or when not met, would prevent development.

37 Please provide citations for the statement, "However, because non-lethal methods provide effective control, significant impacts on [marine mammal] populations are not expected", that would support a contention that lethal measures are not needed to control predation.

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38 The PEIS should contain the National Marine Fisheries Service policy on the current and future actions that can be taken by aquaculture operators to protect their facilities from marine mammals predation, including an estimate of the level of lethal removal that could be allowed under the recently reauthorized MMPA by the NMFS. The PEIS should also describe the reporting requirements and level of government observation that will be required by the NMFS under the terms of the MMPA, and the enforcement capability within the state.

39 The PEIS should make clear that is is illegal for aquaculture operators to harm any cetacean, northern fur seal, or northern sea lion.

40 The PEIS should describe the program that will allow operators to be educated to distinguish between northern sea lions, northern fur seals, harbor seals, and California sea lions, so that no lethal removal of the first two species occurs.

41 Because salmon net pens could be considered an attractive nuisance to marine mammals, some non-lethal methods to reduce or control predation should be required rather than simply "recommended guidelines." Double-walled pens, designed to effectively protect the fish while preventing entanglement of seals or sea lions, should be required on all fish pens. Ideally, such anti-predator nets should be designed if possible to protect against predation from both marine birds and mammals, while minimizing the likelihood of entanglement of the animals.

42 The PEIS needs to discuss the types of anti-predator nets that are most effective at reducing bird and marine mammal predation while simultaneously preventing entanglement of the birds and marine mammals. The mesh size specifications provided "less than five inches" very likely will result in marine bird entanglement. In addition, materials specifications are needed that discourage monofilament webbing that may increase entanglement. If there is a lack of accurate information on what sort of netting is most effective at reducing predation while preventing entanglement, such research should be performed and described in the report.

In conclusion, Greenpeace U.S.A. appreciates the opportunity to comment on the DPEIS, sincerely hopes our questions and comments are integrated into the final PEIS, and desires that our recommendations be incorporated into any final regulations that are developed. If you have any questions or comments regarding this document feel free to contact me at our Seattle office.

Prepared by: Ben Deeble
NW Ocean Ecology Campaigner
Greenpeace USA

References

Dalheim, M.E. 1988. Killer whale (Orcinus orca) depredation on longline catches of sablefish in Alaskan waters. National Marine Mammal Laboratory, NMFS NW. 31 p.

Matkin, C.O. 1988. Status of Prince William Sound killer whales and the sablefish fishery in late 1987. Unpubl. Rep. to University of Alaska, Sea Grant Advisory Program, 10 p.

Vermeer, K., Szabo, and P. Greisman. 1987. The relationship between plankton feeding Bonaparte's and Mew Gulls and tidal upwelling at Active Pass, British Columbia. J. Plank. Res. 9: 483-501.

Vermeer, K. and Ken H. Morgan, 1988. Mariculture and bird interactions in the Strait of Georgia. Canadian Wildlife Service, c/o Institute of Ocean Sciences, PO Box 6000, Sidney, British Columbia, Canada. 11p.

RESPONSE TO LETTER NO. 80: GREENPEACE

1. Comment noted.

2. The text of the FEIS now specifically notes the presence of killer whales in the area. The *Interim Guidelines* currently provide the ability to screen out areas regularly used by killer whales by designating them as habitats of special significance.

3. The 1,500-foot recommendation made in the *Interim Guidelines* is intended to be applied site-specifically, based on many factors including those mentioned in the comment. This process will occur as proposals for each fish farm are reviewed.

4. A study of a potential fish food industry based on harvest of euphausiids is beyond the scope of this EIS.

5. See the response to Comment 4.

6. The Preferred Alternative in the FEIS includes a recommendation for requiring anti-predator nets.

7. Comment noted. The FEIS includes an estimate of escapement in Section 5.7.

8. There is no perceptible difference between normal hatchery fish and farm fish except perhaps at the Global-Aqua facility in Clam Bay where some selection has occurred. There will probably be a difference in 30 to 50 years unless selection programs are restricted.

9. Modeling is possible to forecast reductions in variability. However, modeling fitness reductions due to the presence of hypothetical maladaptive genes which may or may not exist in the future is not possible.

10. The text has been revised for the FEIS.

11. Comment noted. The FEIS includes information about the 1988 Atlantic salmon catch statistics.

12. See Sections 5.6 and 5.7 of the FEIS.

13. SEPA does not require a discussion of funding issues in an EIS.

14. Release figures would be very hard to come by. The stocking program began in 1904 in Argentina, and a hatchery was established in 1937 in Patagonia. The important point to note is that there was no competition from other salmonids in their rivers; whereas there would be significant competition with existing salmonid populations in our rivers.

15. See the response to Question 29 and Appendix G.

Response to Letter No. 80: Greenpeace (continued)

16. As discussed in the text, the potential impacts to bird populations by lethal removal will depend on the degree and extent of its use and on the population size of the affected species. The USFWS does not allow lethal removal of birds that are a nuisance to fish farming activities.

17. The FEIS discusses existing regulations and guidelines.

18. The USFWS does not allow lethal removal of birds that are a nuisance to fish farming activities.

19. The text of the FEIS discusses habitats of significance.

20. The text of the FEIS discusses the permit systems of NMFS and USFWS.

21. Comment noted.

22. Northern sea lion populations in the Pacific Northwest are considered stable by NMFS. Section 5.9 of the FEIS discusses the federal status of this animal.

23. The EIS does not specifically discuss every species remotely occurring in the study area, but instead addresses representative members of those groups of animals likely utilizing the area. Northern fur seals observed in Washington usually are well offshore along the coast, and are not typical of the marine mammals found in State waters.

24. Not all haulouts shown in Figure 12 are necessarily considered habitats of special significance. Habitats of special significance are defined by the WDW. Designation of these areas may change over time as additional information is gathered by the agency.

25. Gibson was referring to anti-predator nets used at the SeaFarm facility when he made his comment.

26. Comment noted.

27. Predation control methods for river otters are the same as for marine mammals and birds: the primary method remains predator nets.

28. Species such as grebes may congregate at fish farms due to wild fish attracted to the area and by additional feeding opportunities associated with the added nutrients of an artificial feeding system.

29. See response to Question 32.

Response to Letter No. 80: Greenpeace (continued)

30. The necessity for additional permits will depend in large part on where the new facilities are located and on the wildlife utilization of the area. Determination of need for a permit will be made as each proposed farm is reviewed.

31. Figure 13 illustrates major waterfowl habitats in Puget Sound. WDW makes the determination of whether each is a habitat of special significance.

32. See response to Question 30.

33. Certificates of inclusion are no longer issued by NMFS. Section 5.9 of the FEIS discusses the new requirements of the revised *Marine Mammal Protection Act*.

34. Sensitive wildlife species and habitats are defined by WDW using an information system based on continually updated information. Discussion of these animals and habitats is appropriate during reviews for each proposed farm, when more precise location information is important.

35. Comment noted.

36. The current guidelines specify that fish farms be at least 1,500-ft from habitats of special significance, as defined by WDW. Additionally, facilities must meet the terms of numerous federal and state statutes relating to wildlife. Current procedures allow consideration of site-specific wildlife conditions; establishing more specific criteria can remove the flexibility of the system, making it less responsive to any special needs of an area. See the response to Question 1. This request is outside the scope of this EIS.

37. The statement was made based on conclusions of resource managers and individuals experienced in fish farming culture.

38. See the response to Question 31.

39. Comment incorporated into text.

40. Discussion of this program is outside the scope of this EIS.

41. Comment noted.

42. Comment noted. Section 5.9 of the FEIS includes a discussion of specific anti-predator net requirements.

LETTER NO. 81

Ron Westley
Department of Fisheries
115 General Administration Building
Olympia, Wash. 98504

March 25, 1989

Dear Mr. Westely:

I am strongly against your policy to make Puget Sound into a fish farm for three reasons.

First, as a trained biologist and as a professional in the Environmental Health field, I am concerned with the introduction of a foreign species into our waters. Historically, the introduction of new species has met with disaster for the existing species. In many cases the existing species did not compete as well. This could be due to aggressive feeding habits, aggressive breeding habits, disease, etc. (1)

This has been documented numerous times. In the bird and mammal kingdoms, the examples are many. Two well known examples are the introduction of starlings into North America and mammals into Australia. Their aggressiveness reduces the available food and habitat for the existing species. Man should not tamper with these gentle balances.

Secondly, I am also concerned with the salmon genetic gene pool. The mixing of one new species into another can spell death to the original gene pool. Already these Atlantic salmon have been found in our salmon breeding grounds. (2)

Finally, if as your Fisheries Department contends, the VHS virus that now causes great concern to our fishery is **not** from the introduced species then why has British Columbia now banned the import of live salmon? I believe that they must have suspicions or they would not have taken such action. I see this policy as a license to degredate the wild salmon that have survived here so long. (3)

I believe that you want the best for the Puget Sound. But if you really believe in the protection of Puget Sound then do not tamper with this precious ecological system. It might be too late already.

If you truly want to preserve the special habitat and it's inhabitants, then protect it from this aggressive policy and halt further fish farms. At a minimum, impose a moratorium until all the facts are in.

Sincerely,

Lorna Parent Haycox
1141 Bayview-Edison
Mt. Vernon, Wash. 98273

cc: Governor Booth Gardner
Sen. Pat McMullen
Rep. Harriet Spanel
Rep. Jim Youngsman

RESPONSE TO LETTER NO. 81: LORNA PARENT HAYCOX

1. See Section 5.6 of the FEIS.

2. See Section 5.7 of the FEIS.

3. Comments noted. The State of Washington does not allow the importation of live fish. Only eggs certified to be free of disease are allowed. See the response to Question 29 and Appendix G.

LETTER NO. 82

MEMORANDUM
April 6, 1989

To: Ron Westley, Project Manager
Washington Department of Fisheries
115 General Administration Building
Olympia, WA 98504

From: Robert F. Hull
220 South Palmer Drive
Port Townsend, WA 98368

Subject: Comment on Draft Programmatic Environmental Impact Statement: Fish Culture in Floating Net Pens.

1 The authors' recommendation in regard to impact of excess feed and fish feces is a good one for *any* of the impacts discussed: keep the fishpens remote from any environmentally-valued location.

2 The authors' treatment of nutrient release is transparently superficial. There was a time when low concentrations of nutrient elements in marine waters were recognized to naturally limit the growth of phytoplankton, resulting in few algae in the water column. Nutrient-starved phytoplankton could not, it seemed, overaccumulate.

Of the two principal nutrients involved, phosphorus and nitrogen, phosphorus is commonly bound in benthic sediments, while available oxygen in the overlying waters favors strong retention of phosphorus in those sediments. In late summer and early fall, when nitrogen inputs are naturally low and water temperatures rise, conditions of low oxygen concentration normally occur and the liberation of dissolved phosphorus by chemical processes is greatly accelerated. This occurrence of low oxygen concentration would arise in exacerbated fashion with sedimentation from fishfarms of excess food and fish feces.

These elevated phosphorus levels do not stimulate growth in marine water systems of nitrogen-fixing organisms, which are capable of using gaseous nitrogen from the atmosphere. The nitrogen concentration in the water, in natural conditions, remains low enough to limit the growth of phytoplankton that are

obligated to use bound nitrogen, not atmospheric nitrogen. During this crucial season of late summer, early fall, however, additional nitrogen inputs, as from fishfarms, must be expected to increase the growth rates of nitrogen-limited phytoplankton. The fishfarm's input of dissolved nitrogen into the euphotic zone of the water column is much greater than its deposit of nitrogen-loaded sediments to the bedlands.

Seasonally foreseeable is a self-accelerating phenomenon of phytoplankton increasing faster than they can be foraged by the consumer organisms of the food chain. These plants will cloud the waters and settle to depths where they die from lack of light. In death, they are food for bacteria which, growing beyond their normal bounds, can consume virtually all of the oxygen in their immediate environs and produce hydrogen sulphide. The resulting anoxia of the deep saltier layers of the marine waters is fatal to bottom dwelling organisms and it displaces fish and other motile organisms from that saline habitat.

Of course, not all of the biostimulated productivity of nutrient-enriched waters disappears into the saltier depths. As pointed out by Thom et al (1988) in their argument for nutrient limitation in the nearshore system, seaweed and other organic detritus ends up in shallow waters and on beaches, with consequences to creatures inhabiting and foraging those areas -- including the human constituencies of the local jurisdictions.

The authors are too facile in attributing adverse impacts simplistically to "nutrient depleted, poorly flushed bays," and in promising measures that "can prevent adverse plankton blooms." The measures advanced, "identification of sensitive bays, proper placement of pens, and limits on total fish production," will not "*prevent*" biostimulation of plankton growth; they merely improve the fishfarmers' odds of avoiding mortalities among their own cultured fish.

RESPONSE TO LETTER NO. 82: ROBERT F. HULL

1. Comment noted.

2. This is incorrect. Virtually all scientific investigations have noted that light, not nutrient, is the main controller of phytoplankton populations in most of Puget Sound. Some of the semi-restricted embayments are subject to nutrient (nitrogen) limitations at times, as discussed in detail in the text.

   The reviewer's discussion of noxious phytoplankton blooms and their significant adverse impacts generally applies only to very poorly flushed areas of the Sound such as the inner harbor of the Port of Olympia. Location of fish farms in such areas is not foreseeable. The identification and avoidance of fish farm placement in nutrient sensitive embayments is a primary basis for the State's *Interim Guidelines*.

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