

ALASKA LEGISLATURE SPECIAL COMMITTEE/SUBJECT FILE 8672
1891 SCOMM 75: MARICULTURE (FISH FARMING), 1987-1990

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all state and federal product quality and human health standards, and provide the means to ensure that state regulators can protect human health and product quality.

5. Mariculture activities must be managed to protection of the biological integrity of natural plant and animal stocks.

Legislation must address the issues of pathological and genetic protections for natural sea vegetable and fish stocks.

6. Mariculture activities must be managed in a manner which ensures adequate environmental safeguards and habitat protection.

Legislation must ensure that mariculture facilities are sited, designed and operated to protect air and water quality, to provide for proper disposal of wastes, and to minimize adverse effects to important fish and wildlife habitat.

7. Mariculture facilities must be sited to minimize land-use conflicts, maintain navigation and ensure access to upland areas.

Legislation should provide guidance for siting facilities to minimize conflicts with other tidelands users, reducing visual and aesthetic impacts, maintaining navigation and ensuring access across state tidelands.

8. Broodstock acquisition for mariculture purposes should be carefully regulated, especially for species subject to limited entry fisheries.

Legislation should contain provisions limiting the acquisition of broodstock for species subject to limited entry fisheries. Legislation should grant the Department of Fish and Game the authority to regulate the acquisition, transport, and propagation of mariculture broodstock, and provide the Board of Fisheries the ability to resolve allocation decisions regarding broodstock acquisition if necessary.

Salmon now limited.
Sablefish in process of going limited.

STATE OF ALASKA

DEPARTMENT OF LAW

OFFICE OF THE ATTORNEY GENERAL

STEVE COWPER, GOVERNOR

REPLY TO:

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AG on
Status of
fish farming
if no action
taken

March 23, 1990

The Hon. Dick Eliason
Alaska State Legislature
P.O. Box V
Juneau, Alaska 99835

Dear Senator Eliason:

I am writing to reply to your letter of February 22 concerning the legal status of finfish farming after July 1, 1990. Although your letter was addressed to Larri Spengler, I am responding because I am now handling most of the mariculture issues that come before this office.

You asked the following, "What will the legal situation regarding finfish farming be in Alaska after July first if no bill is passed on the subject this session?" Your question acknowledges the fact that the current moratorium on finfish farming, enacted in ch. 70, SLA 1987 and extended in ch. 145, SLA 1988 will expire on that date. 1/

If current bills that permanently prohibit commercial finfish farming, i.e., SB 397 and HB 432, are not enacted this session, one pertinent statute that will remain is AS 16.05.920. This law says that unless it is authorized by another statute or regulation, a person may not possess fish. Current regulations do allow a person to hold fish if a certain permit is issued by the Department of Fish and Game. 5 AAC 41.001, 5 AAC 41.005. However,

1/ While current law imposes a general moratorium on finfish farming, it does authorize the Board of Fisheries to amend its regulations to allow issuance of a transport permit for finfish farming in a privately owned pond that has no outlet to state water. Sec. 1, ch. 70, SLA 1987. However, the Board of Fisheries has not amended 5 AAC 41.001 to include this type of activity as a permissible purpose for issuing a transport permit. Thus, even though the moratorium was inapplicable, a transport permit could not legally be issued to a fresh water pond farmer. When the moratorium expires in July a saltwater farmer will be in the same situation as a pond farmer; as discussed later in this letter, neither one can be issued a transport permit unless 5 AAC 41.001 is amended by the board.

as we have explained in the past, we do not believe that these regulations authorize the department to issue this permit to a finfish farmer.

The permit, called a fish transport permit, can only be issued for certain purposes. These purposes include the possession of live fish "cultivated for human consumption" or "as part of an aquaculture program for scientific, educational, or propogative purposes." 5 AAC 41.001. We have previously stated that the regulatory history of this permit reveals that the Board of Fisheries probably did not intend that its scope include the holding of live fish for the purpose of commercial finfish farming. See attached 1987 Inf. Op. Att'y Gen. (July 8; 663-87-0454); 1988 Inf. Op. Att'y Gen. (June 24; 663-88-0500).

We believe that the board does have statutory authority to amend 5 AAC 41.001 so that a fish transport permit could be issued for holding finfish in a commercial farm. AS 16.05.-251(a)(9). Unless such a change is made, however, we believe that the department cannot issue the permit for this purpose, and without it, a finfish farm cannot legally operate in Alaska. 2/

Although the inability to obtain a transport permit is the greatest obstacle to establishing a finfish farm in Alaska, there are other legal and practical impediments. One of these is the limited source of stock for the farms. These impediments are more fully discussed in the attached June 24, 1988 informal opinion, cited above.

I hope this answers your question. Please contact me if I can help you further.

Sincerely yours,

DOUGLAS B. BAILY
ATTORNEY GENERAL

By: 
Stephen M. White
Assistant Attorney General

2/ Even if such a change were made to 5 AAC 41.001, we note that under 5 AAC 41.030 the department, before it decides on the issuing, terms, and conditions of a transport permit, must consider the effect of the proposed possession of farmed fish on the continued health and perpetuation of native, wild, or hatchery stocks.

The Hon. Dick Eliason
Alaska State Legislature

March 23, 1990
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SMW:dm

Enclosures

cc: Norm Cohen, Deputy Commissioner
Department of Fish and Game

MEMORANDUM

State of Alaska

Department of Law

TO: Honorable Don Collinsworth
Commissioner
Dept. of Fish and Game

DATE: June 24, 1988

FILE NO: 663-88-0500

TEL NO: 465-3600

SUBJECT: Fish farming:
status under current
statutes and regula-
tions

FROM:

LIS

Larri Irene Spengler
Assistant Attorney General
Natural Resources Section
Department of Law

You have asked that we respond to some questions posed by Senator Jim Duncan with respect to the status under current statutes and regulations of fish farming and of possible stock acquisition sources for fish farms. Under a recently enacted bill, ch. 145, SLA 1988, the legislature has authorized shellfish farms and shellfish hatcheries; the former have been provided for already in regulations, the latter have not. Further, the bill authorized acquisition of stock for those shellfish farms and shellfish hatcheries, prohibited the farming of Atlantic salmon, and extended the moratorium originally enacted in ch. 70, SLA 1987, on finfish farming (other than in some private ponds) until July 1, 1990. 1/

Apart from that, current statutes and Board of Fisheries regulations (1) do not allow finfish farming in private ponds or elsewhere, (2) do not permit private for-profit finfish hatcheries, (3) prohibit the use of eggs, fry, or smolts from a private nonprofit salmon hatchery in a fish farm, (4) prohibit the use of eggs, fry, or smolts taken from the wild for use in a finfish farm, (5) prohibit the importation of eggs, fry, or smolts for use in a fish farm, and (6) prohibit the use of eggs, fry, or smolts from state hatcheries for use in a finfish farm. As discussed below, some of these activities are prohibited by board regulation, which could, consistent with the existing statutes, be amended to allow the activity, and others are prohibited by statutes, which would require legislative action to change the ground rules.

1/ For an analysis of ch. 145, SLA 1988, and its effects, see 1988 Inf. Op. Att'y Gen. (June 7; 883-88-0143), attached.

BACKGROUND

The existing statutes and regulations pertaining to fish farming, apart from those added by ch. 145, SLA 1988, 2/ have been discussed in three relatively recent memoranda from the Attorney General's Office, attached. 1985 Inf. Op. Att'y Gen. (Jan. 31; 663-84-0187); 1987 Inf. Op. Att'y Gen. (Mar. 10; 661-87-0360); 1987 Inf. Op. Att'y Gen. (July 9; 663-87-0454). The 1985 memorandum concluded that there are no constitutional problems posed by fish farming and that it is statutorily provided for as a legal possibility, although not a legal mandate. That memorandum also explained that fish farmers could not obtain stock from private nonprofit salmon hatcheries in the state because AS 16.10.420 allows transfer of hatchery eggs only to other similar hatcheries and to the department. Further, that memorandum noted that fish farmers generally could not import stock from out of the state because 5 AAC 41.070 prohibits importing any live fish (defined in AS 16.05.940(10) to include eggs) other than oysters or ornamental fish.

The March 1987 memorandum reiterated those conclusions, and in answer to the department's inquiry, agreed it was possible that fish farmers could obtain stock from a commercial fishing harvest. However, that memorandum also noted that in order to hold those fish for farming a permit would be needed under 5 AAC 41.001 and 5 AAC 41.005. The memorandum further explained that it was not clear whether a permit could be issued for those purposes as the regulations were written, but that the board had the authority to clarify them. The ambiguity is described in note 7 on pages 4 and 5 of the March 1987 memorandum.

The July 1987 memorandum addressed the question of how the department should interpret the scope of 5 AAC 41.001 and 5 AAC 41.005, governing the transportation, possession, and release of live fish, until and unless they were clarified by the board. The question asked basically was whether the board intended that a 5 AAC 41.005 permit could be issued for commercial fish farming purposes. The memorandum discussed the record of the January 1981 meeting of the Board of Fisheries, when the regulations in question were adopted, as well as discussing other regulations on similar subjects, and concluded that, although the answer was not absolutely clear, the scope of 5 AAC 41.001 and 5 AAC 41.005 (absent a clarifying amendment by the board)

2/ See note 1.

probably did not cover issuing permits to hold live fish for commercial fish farming purposes.

Since the July 1987 memorandum was completed, the language of 5 AAC 41.001, governing the scope of the permits authorized under 5 AAC 41.005, has been amended by the board to include "the transportation and possession of shellfish for commercial purposes in conjunction with a shellfish farming operation." This strengthens the earlier conclusion that commercial finfish farming is not currently provided for by board regulation, because commercial shellfish farming has been specifically addressed, with no similar change being made with respect to commercial finfish farming.

THE SPECIFIC QUESTIONS

1. Are there Board of Fisheries' regulations currently authorizing or regulating finfish farming in private ponds?

As noted above, the July 1987 Department of Law memorandum, attached, concludes that the Board of Fisheries regulations do not currently authorize holding of live finfish for commercial farming purposes. That lack of authorization applies to private ponds as well as to other waters of the state, since AS 16.05.920(a) provides that a person may not possess fish unless provided for in statute or regulation, and AS 16.05.930(c) states that regulations adopted by the Board of Fisheries apply to "rearing and sale of fish from private ponds."

It is true that the bill which last year imposed a moratorium on finfish farming in the state until July 1, 1988, extended until 1990 by ch. 145, SLA 1988, also provided in sec. 1(b), ch. 70, SLA 1987, that "a fish farming license and a fish transport permit may be issued for commercial finfish farming in a privately owned freshwater body that has no outlet to state water." (Emphasis added.) That statement is permissive, rather than mandatory, and does not require that such permits be issued. Thus, the status of finfish farming in private ponds under that bill was the same as the status of shellfish farming -- it was not currently authorized by regulation, but if the board chose to authorize it before July 1, 1990, that was acceptable to the legislature. This is contrasted with the legislative prohibition on finfish farming elsewhere in the state until the specified date, regardless of what the Board of Fisheries might choose to authorize. In fact, as discussed above, the Board of Fisheries did amend the regulations to allow shellfish farming, but has not yet

similarly amended 5 AAC 41.001 to permit finfish farming in private ponds. 3/

2. Absent legislative action, can the Board of Fisheries authorize other types of finfish farming, such as net-pen rearing of salmon?

As discussed in the introductory section above, the moratorium on finfish farming other than in certain private ponds has been extended until July 1, 1990, so currently such activities cannot be authorized by the board. Sec. 21, ch. 145, SLA 1988.

3. Is it legal, under current statutes and regulations, to have a private for-profit finfish or shellfish hatchery to supply a farming industry?

The only fish hatcheries provided for in statute, other than those run by the state itself, are private nonprofit salmon hatcheries, and shellfish hatcheries associated with shellfish farms. The legislature has addressed those in detail in AS 16.10.375 -- 16.10.480 and AS 16.40.100 -- 16.40.199. Thus, under current statutes and regulations, it is not legal to have a private for-profit finfish hatchery for any purpose, including supplying a farming industry.

The Board of Fisheries in AS 16.05.251(a)(9) has the general authority to adopt regulations governing the "live capture, possession, transport, or release of native or exotic fish or their eggs." It might be argued that under that statutory provision, the board has the authority to adopt regulations establishing private for-profit finfish hatcheries. Whether or not the board has that authority is beyond the scope of the question asked here, but it is worth noting that since the legislature has addressed the private nonprofit salmon hatcheries and shellfish hatcheries in such detail, a logical legal conclusion might be that it did not expect other hatcheries -- either private-for-profit salmon hatcheries, or any hatcheries for finfish other than salmon -- to be authorized without a similarly detailed legislative statement.

3/ In the letters of intent accompanying ch. 145, SLA 1988, quoted and discussed on page 9 of the 1988 Department of Law memorandum cited in note 1, both houses of the legislature have encouraged the consideration of such regulations.

4. Could a private nonprofit hatchery supply stock to a fish farm? Can a private nonprofit hatchery sell or give eggs, fry, or smolts to a person for the purposes of supplying a farm?

With respect to shellfish hatcheries, the recently enacted ch. 145, SLA 1988, authorizes shellfish hatcheries (not yet themselves authorized by regulation) to sell or transfer stock to another permitted hatchery or farm. AS 16.40.140. 4/

As noted above, the only other hatcheries currently authorized are private, nonprofit salmon hatcheries. Therefore, your question can be answered on one level by simply referring to 5 AAC 41.001 and 5 AAC 41.005, which, as discussed above, probably do not permit a person to hold live fish for commercial finfish farming purposes. Thus, even if private nonprofit hatcheries could supply eggs, fry, or smolts for that purpose, the recipient could not hold them for that purpose.

Looking at the authorities of the private nonprofit hatcheries, however, the answer is also in the negative. As discussed in the 1985 and March 1987 memoranda from the Department of Law, attached, fish farmers could not obtain stock from private nonprofit hatcheries, because under AS 16.10.420(3) and (7) hatchery eggs and fry may be sold only to another private nonprofit hatchery or to the department, not to a fish farmer. Further, although AS 16.10.450 does allow fish returning to hatcheries to be sold, such fish would be fully grown, since they would already have returned "from the natural waters of the state." Thus, such fish could not be a source of fry or smolts for the purposes of supplying a fish farm, and if they were intended as a supply of eggs, then the purchasing individual would probably actually be engaged in a hatchery operation; "hatchery" is defined in AS 16.10.560 for purposes of the fisheries enhancement loan program as "a facility for the artificial incubation of salmon eggs" As discussed above, private finfish hatcheries are not currently authorized by statutes or regulations.

5. Could eggs, fry, or smolts be taken from the wild to supply a for-profit fish farm? Would this be subject to regulations by the Board of Fisheries?

With respect to shellfish farms, the recently enacted ch. 145, SLA 1988, authorizes the Commissioner of Fish and Game

4/ See the 1988 Department of Law memorandum, cited in note 1.

to issue acquisition permits for wild stock, with provisions also for Board of Fisheries regulation. AS 16.40.120. 5/

As discussed at pages 4-5 of the March 1987 memorandum from the Department of Law, attached, fish could be harvested from the wild in commercial fisheries to supply a for-profit finfish farm, if the board set up a special fishery for the collection of fish for fish farms, or through participation in normal commercial fisheries, assuming the timing and lawful gear made that practical. However, even if an individual could obtain eggs, fry, or smolts in that fashion, the above discussion with respect to the need to obtain a permit to hold live fish under 5 AAC 41.001 and 5 AAC 41.005 is applicable here; as noted above, the Board of Fisheries has not currently authorized permits to be issued for holding live fish for commercial finfish farming purposes, so even if fish could be obtained from the wild through commercial fishing, they could not be held for that particular purpose.

6. Can eggs, fry, or smolts be imported into the state to supply a fish farm?

As explained on page 3 of the 1985 memorandum from the Department of Law, attached, under 5 AAC 41.070(a), fish other than oysters and ornamental fish may not be imported into the state for any purpose. 6/ Further, as discussed above, even if that regulation were changed, finfish could not be held legally for commercial fish farming purposes because of the provisions of 5 AAC 41.001 and 5 AAC 41.005.

7. Can the state hatcheries supply eggs, fry, or smolts to a fish farm? What criteria would be used to judge who would get these eggs, fry, or smolts? Is this an allocation issue which is subject to regulation by the Board of Fisheries?

Preliminarily, even if state-run hatcheries can supply eggs, fry, or smolts to a fish farm, under 5 AAC 41.001 and 5 AAC 41.005 individuals cannot currently hold live fish for commercial finfish purposes, as discussed above. If that were not a

5/ See the 1988 Department of Law memorandum cited in note 1.

6/ Under recently enacted ch. 145, SLA 1988, shellfish may not be imported into the state for use in shellfish farms unless authorized by the Board of Fisheries. AS 16.40.130. No such regulations have been adopted.

consideration, it is probable that the department could sell eggs, fry, or smolts from state hatcheries to fish farms under existing statutes.

Under AS 16.05.050(3), the department is authorized to "design and construct hatcheries ... and other projects beneficial for the fish ... resources of the state." Under AS 16.05.-050(6), the department is authorized to, among other things, "sell or exchange fish ... or eggs for propagating, scientific or stocking purposes." That limitation on sale and exchange of fish or eggs by the department appears at first similar to the scope of activities for which the department may issue a permit to collect fish under AS 16.05.340(b) for a "scientific, propagative, or educational purpose." As discussed in note 5, page 3, of the March 1987 memorandum from the Department of Law, attached, the term "propagating" in AS 16.05.340(b) is not restrictively defined and could be viewed as including breeding for commercial sale. As discussed in that note, the Department of Law believes that the better reading is that "propagative" in that statute addresses purposes similar to "scientific" or "educational" purposes, and that would probably not include commercial uses, such as fish farming.

However, there are different factors to consider in examining the use of the term "propagating" in AS 16.05.050(b). AS 16.05.050 asserts that the commissioner has, "but not by way of limitation," the powers and duties listed there. It may be argued that under AS 16.05.050(6), the purposes listed there for which the commissioner may sell or exchange fish or their eggs -- propagating, scientific or stocking -- need not be read as narrowly as the purposes listed in AS 16.05.340(b) for which the commissioner may issue a collecting permit -- scientific, propagative, or educational. The term "propagating" as used in AS 16.05.050(6) could under that interpretation include commercial farming purposes.

That conclusion is buttressed by AS 16.05.020(2), which mandates that the commissioner shall "manage, protect, maintain, improve, and extend the fish ... resources of the state in the interest of the economy and the general well-being of the state," and subsection (3) of that statute, which gives the commissioner the "necessary power to accomplish the foregoing." Further, AS 16.05.092, which establishes the Division of Fisheries Rehabilitation, Enhancement and Development within the department, specifies that the division shall, among other things, develop a comprehensive state plan for the "orderly present and long-range ... development of all aspects of the state's fisheries for the perpetual use, benefit and enjoyment of all citizens," and "encourage the investment by private enterprise in the technological

development and economic utilization of the fisheries' resources," as well as through development programs "do all things necessary to insure perpetual and increasing production and use of the food resources of Alaska waters and continental shelf areas."

Those broad responsibilities would appear to vest in the department the discretion to sell fish or eggs to commercial fish farms, should those be otherwise authorized by law. In light of those broad authorities and mandates, the term "propagating" in AS 16.05.050 probably includes propagating for commercial purposes, and thus authorizes sale or exchange of eggs by the department for those purposes, in the commissioner's discretion.

With respect to what criteria would be used to judge who would get the eggs, fry, or smolts which might be sold by state hatcheries to fish farms, it is certainly consistent with the commissioner's authorities under AS 16.05.020(3) to adopt regulations setting out those criteria, should he believe that more specific guidelines than the general charges and mandates discussed above would be useful.

Finally, you ask whether such transfer of eggs from state hatcheries to private fish farms would be an allocation issue subject to regulation by the Board of Fisheries. The answer is probably no. Under normal circumstances, fish from state hatcheries are released into the natural waters of the state, and are subject before they return to harvest by subsistence, commercial, sport, and personal use fisheries which may be authorized by the Board of Fisheries. Thus, if the department sold eggs, fry, or smolts from a state hatchery to a fish farm which would otherwise have been released into the natural waters of the state, less fish may be available for those fisheries authorized by the board, but that would not be because of a board allocation decision. (However, it would certainly be acceptable for the department to consult with the board about the advisability of such a transfer.) On the other hand, if the eggs, fry, or smolts which might be transferred by the department to private fish farms were surplus to the hatchery needs, and would not in any event have been released into the natural waters of the state, the fisheries authorized by the Board of Fisheries would not be impacted by the department's decision. Nevertheless, the board's authority in AS 16.05.251(a)(9) over transfer and possession of live fish would still be applicable to finfish, and thus its regulations governing transportation and possession of live fish would apply. 5 AAC 41. Further, it is possible that the recently enacted AS 16.40.120(e) would give the board some authority over such transportation, although that authority may only apply to wild stock acquisition.

SUMMARY

Board of Fisheries regulations currently do not allow any finfish to be held for commercial fish farming purposes, in contrast to the board's authorization of the holding of shellfish for those purposes. 5 AAC 41.001 and 5 AAC 41.005. In addition, the legislature has extended until July 1, 1990 the moratorium of finfish farming (other than in some private ponds). Ch. 145, SLA 1988. Thus, even if there were a mechanism for individuals to obtain eggs, fry, or smolts for finfish farming purposes, under current regulations, they could not be held for those purposes.

Shellfish farms and hatcheries have recently been comprehensively dealt with in ch. 145, SLA 1988, including stock acquisition mechanisms.

With respect to potential mechanisms for stock acquisition for finfish farms, current statutes and regulations do not authorize private for-profit finfish hatcheries for any purpose, including supplying a farm, do not authorize private nonprofit hatcheries to supply finfish (including eggs) for fish farms, and do not authorize the import of fish (including eggs) for fish farming purposes. Under commercial fishing regulations an individual could conceivably harvest finfish for use in commercial fish farms, but in general those regulations do not authorize harvests at times and in locations which would result in the taking of fry or smolts, and if adult finfish were taken for purposes of using their eggs, an individual would be involved in a hatchery operation, which is not authorized under current statutes. Current statutes probably would authorize the sale of fish (including eggs) from state hatcheries to finfish farms, if such farms were authorized.

If you have any further questions, please let me know.

LIS:dlm

Enclosures [4]

cc w/encls.: Norman Cohen, Deputy Commissioner, ADF&G
Warren Wiley, Assistant Commissioner, ADF&G
David Benton, Special Assistant, ADF&G
Brian Allee, Director, FRED Division
Ken Parker, Director, Div. of Comm. Fisheries,
ADF&G
Elizabeth Stewart, Director, Div. of Boards, ADF&G
Gary Slaven, Chairman, Board of Fisheries
Rod Swope, Governor's Office
Liza McCracken, Anchorage AGO

MEMORANDUM

State of Alaska

Department of Law

TO: Hon. Don Collinsworth
Commissioner
Department of Fish and Game

DATE: July 8, 1987

FILE NO.: 663-87-0454

THRU: TELEPHONE NO.: 465-3600

SUBJECT: Current scope of permits to hold live fish

FROM: ^{LIS} Larri Irene Spengler
Assistant Attorney General
Natural Resources Section

You have asked whether the Department of Fish and Game currently has authority under 5 AAC 41.005 to issue a permit to hold live fish for commercial mariculture purposes. Under current law a person cannot hold live fish for that or any other purpose without a permit issued under that regulation. The regulation, which governs issuance of permits to hold live fish, is quite ambiguous with respect to whether a permit could be issued for mariculture purposes. However, as discussed below, it probably does not authorize a permit for that purpose. Although not free from doubt, we believe that, without regulatory action by the Board of Fisheries or legislative action re-structuring department and board authorities and mandates, the department probably does not currently have authority to issue a permit to hold live fish for commercial fish farming.

The existing statutes and regulations pertaining to fish farming have been discussed in two relatively recent memoranda from the Attorney General's Office, attached. 1985 Inf. Op. Att'y Gen. (Jan. 31; 663-84-0187); 1987 Inf. Op. Att'y Gen. (Mar. 10; 661-87-0360). The 1985 memorandum concluded that there were no constitutional problems posed by mariculture and that it was statutorily provided for as a legal possibility, rather than a legal mandate. That memorandum also explained that fish farmers could not obtain stock from hatcheries in the state because AS 16.10.240 limits transfer of hatchery eggs to other hatcheries and the department. Further, that memorandum noted that fish farmers generally could not import stock from out of the state because 5 AAC 41.070 prohibits importing any live fish (defined in AS 16.05.940(10) to include eggs) other than oysters or ornamental fish.

The 1987 memorandum reiterated those conclusions, and in answer to the department's inquiry, agreed that it was possible that fish farmers could obtain stock from a commercial harvest. However, that memorandum also noted that in order to hold those fish for mariculture a permit would be needed under 5 AAC 41.005. The memorandum further explained that it was not clear whether a permit could be issued for those purposes as the regulation was written, but that the board had the authority to clarify it. The ambiguity is described in footnote 7 on pages 4 and 5 of the 1987 memorandum.

You have now asked how the department should interpret the scope of 5 AAC 41.005, until and unless it is clarified by the board. The question is whether the board intended that a 5 AAC 41.005 permit could be issued for commercial purposes, such as fish farming.

Under AS 16.05.920(a), a person may not possess fish unless authorized by statute or regulation. This is reinforced by AS 16.05.930(c), which states that AS 16.05.920 does not prohibit rearing and sale of fish from private ponds under regulations adopted by the board. The board is given the authority in AS 16.05.251(a)(9) to regulate possession of live fish and eggs. Thus, unless the board has allowed possession of fish for a commercial purpose, it is unlawful to hold them in a commercial fish farm.

The purposes for which the board has said a permit to hold live fish may be issued by the department are listed in 5 AAC 41.001, but these do not include "commercial" uses. As discussed in the 1987 memorandum, the only listed purpose that might be construed to include commercial mariculture is "human consumption." ^{1/} We have reviewed the regulatory history of that regulation, in the form of tape number 42 from the Board of Fisheries January 1981 board meeting, and the accompanying log notes to attempt to help resolve the ambiguity. Unfortunately, major portions of that tape are inaudible because of a loud hum superimposed over the discussions. Specifically, the portion of the meeting during which the board went through the proposed regulations governing the transport and possession of live fish is virtually completely inaudible, although from the earlier portions of the tape some clues can be gained about board intent.

The proposed regulations at that January 1981 meeting (which included 5 AAC 41.001 and 5 AAC 41.005) were referred to during the discussion as "fish disease regulations." At the outset, staff of the department explained to the board that these regulations were being proposed because of a bill that passed the legislature in 1980, ch. 110, SLA 1980, relating "to fish disease control and the cost of fish inspections." That legislation

^{1/} Questions might arise over whether "commercial purposes" are encompassed by the language of 5 AAC 41.001, "as part of an aquaculture program for scientific, educational, or propagative purposes." As explained in footnote 5 on page 3 of the 1987 memorandum, we believe they are not.

clarified in AS 16.05.251(a) that the Board of Fisheries not only had the authority to adopt regulations concerning the extent and effect of "predation and competition among fish" and exercising necessary control measures, but also could properly be concerned about "the extent and effect of disease" among fish of the state. Sec. 1, ch. 110, SLA 1980; AS 16.05.251(a)(8). Further, not only could the board prohibit the "live capture, possession, transfer, or release" of fish or their eggs, but it was clarified that the board could also regulate those activities. Sec. 2, ch. 110, SLA 1980; AS 16.05.251(a)(9). The remainder of that bill dealt with fish health inspection authority.

In line with that focus in the bill on fish disease control, the portions of the tape that are audible evidence concern by the department and the board about the risks involved in transporting fish and the importance of the "genetic makeup" of each stock. The only testimony on the proposed regulations came from people involved with private nonprofit hatcheries, who voiced concern about fish disease and genetics as well.

In the portions of the tape that are audible, neither the department nor the individuals testifying nor the board made any mention of commercial mariculture endeavors or any intention to further those. 2/ Because the tape was inaudible during main part of the discussion, in which the department explained each of the proposed regulations to the board, I consulted with staff of the department who were involved in making that presentation and was informed that neither they nor the board ever mentioned that permits to hold live fish would be issued for commercial mariculture purposes. In fact, I am informed that at least the people involved from the department assumed that commercial purposes would not be encompassed by the regulation, since no such endeavors were ongoing at the time.

2/ The only reference to anything related to commercial fish farming was in the summary given by the department of the existing statutes relating to the board's authorities over fish in general. The department, in passing, mentioned the authority of the board in AS 16.05.930(c) to regulate the rearing and sale of fish from private ponds. That reference was one of a laundry list of references given in the department's introduction and is not mentioned again at any time during the audible portion of the discussions.

The above regulatory history seems to indicate that the board did not specifically consider including commercial purposes within the scope of the permits to hold live fish, and in fact did not so intend.

For further guidance, we can turn to regulations and statutes on similar subjects. For example, 5 AAC 41.070(b) specifically authorizes the import of oysters "for aquaculture purposes." This contrasts with the absence of any specific reference to such purposes in 5 AAC 41.001, suggesting that if the board intended commercial mariculture purposes, it would so state. Further, in a statute allowing private possession of fish and game that is analogous in purpose to the regulation at issue here, the legislature specifically provided that surplus buffalo and musk oxen may be granted to private individuals "for commercial purposes." AS 16.40.010. In light of the fact that such clear statements of intent are possible (and have been used) by both the board and the legislature, it would be appropriate for the department to assume that if the board had meant a permit to hold live fish to be issued for "commercial purposes" it would have so specified.

Although the answer is not absolutely clear, it is probably correct that without action by the board clarifying the scope of 5 AAC 41.005 it would be consistent with the regulatory history, and with recognition of analogous regulations and statutes, for the department to refrain from issuing permits to hold live fish for commercial mariculture purposes until the board modifies the regulation. 3/

3/ In this regard, it is worth noting that HCS CSSB 297, passed by the legislature in May 1987, places a moratorium on the issuance of permits under 5 AAC 41.005 until July 1, 1988, with respect to commercial fin fish farming operations. The bill also provides an exemption from that moratorium for fin fish farming in "a privately owned fresh water body that has no outlet to state water." Thus, under the moratorium, until July 1, 1988, the board would be free to modify 5 AAC 41.001 and 5 AAC 41.005 with respect to commercial shellfish farming and commercial fin fish farming in private ponds and have those modifications translate into permits which could be issued. If the board desired to modify those regulations with respect to all other commercial fin fish farming operations, permits for those purposes could not be issued until July 1, 1988.

ALASKA STATE LEGISLATURE - SENATE

SENATOR RICHARD I. ELIASON

LABOR & COMMERCE COMMITTEE, CHAIRMAN
RESOURCES COMMITTEE
RULES COMMITTEE
SPECIAL COMMITTEE ON HIGH SEAS
SALMON INTERCEPTION
SELECT COMMITTEE ON
LEGISLATIVE ETHICS



P.O. BOX 143
SITKA, ALASKA 99835

P.O. BOX V
JUNEAU, ALASKA 99811
(907) 465-4916

FAX (907) 465-4928

April 30, 1990

Douglas Baily, Attorney General
Alaska Department of Law
P.O. Box K
Juneau, AK 99811

Dear Attorney General Baily:

In February I wrote to you to request an opinion about what the legal status of finfish farming would be in Alaska if no bill on the subject is passed by the Legislature this session. I appreciate the reply which was issued through Mr. Steve White of your staff on March 23.

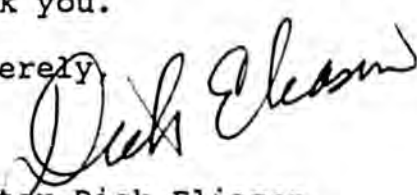
I would like to request your opinion about one aspect of the issue which was not specifically addressed by the March 23 letter. That is the question about how the Department of Natural Resources would handle applications for tideland leases for fish farming if no bill on the subject is passed.

It would seem appropriate to me, given the situation outlined in the March 23 letter, for all agencies involved in regulation pertaining to aquatic farming to recognize that no finfish farming is going to take place without legislative action, and therefore develop a policy under which no associated applications for permits, leases, and so on, would be accepted. Without such a policy, there is a danger of keeping valuable tidelands tied up in limbo status until such time as the Legislature takes decisive action to ban or allow finfish farming. Since finfish farming will not be a legalized activity without passage of a bill, tidelands lease applications ought not be accepted for that purpose, any more than they would be accepted for other unauthorized purposes.

I would appreciate your opinion on this matter as soon as possible.

Thank you.

Sincerely,


Senator Dick Eliason

STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

SOUTHEAST REGIONAL OFFICE DIVISION OF LAND AND WATER MANAGEMENT

STEVE COWPER, GOVERNOR

400 WILLOUGHBY AVENUE
SUITE 400
JUNEAU, ALASKA 99801-1000
PHONE: (907) 465-3400

March 23, 1990

Re: Thorne Ferguson

Honorable Richard I. Eliason
c/o Pouch V
Juneau, Alaska 99811

Dear Senator Eliason:

Research of our records indicates that T. Ferguson Construction, Inc. did purchase U.S. Mineral Survey 419B, known as the Maine, Monterey and San Francisco claims from Georgia-Pacific Corporation, (Warranty Deed, 1984). The property is located at Copper Harbor, Hetta Inlet, on the west side of Prince of Wales Island. In 1985 In 1985 Mr. Ferguson submitted applications intended to obtain approval of what appeared to be a multi-stage development. According to one of the cover letters, the initial stage of construction (development of a seasonal resort for hunting as well as fresh and salt water fishing) was intended to support the second stage (the development of a hatchery and fish farm); see ADL lease application 104488.

In September of 1987 the applicant indicated to DNR they had received a Army Corps of Engineers permit dated in June of 1986. Proposed construction under the Corps permit consisted of a lodge, barge ramp, and docks to be constructed in conjunction with the proposed private fish hatchery. The permit stated that the lodge and docks would supported by approximately 100 piles, and the barge ramp would consist of a timber crib bulkhead placed at M.L>L>W. and back-filled with approximately 1,800 cubic yards of shot rock fill. (see Army Corps of Engineers Public Notice of Application for Permit Hetta Inlet 7, dated September 3, 1985).

However, contrary to the lease application and corps notices, a letter from the State Office of Management and Budget dated August 22, 1985 appears to indicate that the applicant dropped the hatchery portion of its proposal at that time. Mr. Menzies letter of June 2, 1986 appears to furnish the reason. The OMB consistency determination of May 9, 1986 purposely dropped consideration of the hatchery and hydroelectric plant.

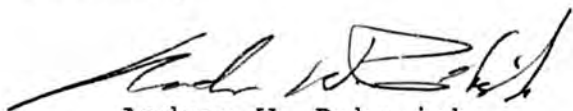
March 23, 1990

The 1986 Army Corps of Engineer Permit is the only document that appears to still imply a remaining interest in a hatchery. None of the State approvals, including Water Use Applications LAS 6089 and 6090 involve the hatchery proposal directly.

It appears clear from the file that the applicant was never assured of being able to develop a hatchery. That although it is something that he wanted to do, he decided to proceed with the lodge with no guarantees that he would be able to construct the hatchery. It is possible that the \$500,000 figure thrown around would include the \$370,000 initial purchase price.

Please let me know if there is anything else I can do.

Sincerely,

A handwritten signature in dark ink, appearing to read 'Andrew W. Pekovich', with a stylized, cursive script.

Andrew W. Pekovich
Regional Manager, SERO

CC: Larry Ostrovsky
Gary Gustafson
Janet Burleson

From the Office of

SENATOR DICK ELIASON

Back-up on
fish farming issue
for Senate Resources
Committee files

HOUSE BILL No. 432 (Resources)

WHAT WE KNOW

- Fishing is the second largest industry in terms of dollars, and **the largest** in terms of employment, in Alaska.
- The wild stocks of Alaska salmon are **healthy** - in numerical strength and because they are virtually disease free.

WHY IS THIS SO ?

- **Because many years ago the people of the Alaska made a commitment.** We said to the federal government and to the exploitive outside interests: "let us control our own destiny and we will be responsible stewards of our natural resources". Some could argue that we haven't always lived up to that commitment as it relates to other natural resources, but I think we've done a pretty good job with our fisheries.
- For it's part, the State of Alaska has **invested** millions and millions of dollars in capital investment for docks, harbors, grids, processing sites; not to mention the numerous loans made to capitalize the fleet. We've appropriated millions more in operating budget funds for fisheries management, enhancement, enforcement, inspection, and a variety of other programs all designed to keep this industry healthy and prosperous. As best we could, **we have honored our commitment.**
- In 1972, the people of Alaska passed a constitutional amendment which paved the way for the limited entry system. There was too much gear in the water - our stocks were endangered and the viability of the industry was in question. Limited Entry was enacted not only to protect the stocks but to allow the Alaskan fisherman to continue making a living. This was not a decision made lightly. Everyone knew that limitation meant that some would not be able to freely participate in the industry; but they made the hard choice. **The people of Alaska honored their commitment to keep the industry healthy.**
- Hand in hand with the Limited Entry program was increased attention to fisheries rehabilitation and enhancement. The State invested considerable amounts in hatcheries and other enhancement programs. The Alaskan fishermen formed aquaculture associations

and taxed themselves to help keep the enhancement effort strong. In the past several years, the responsibility of operating a number of state hatcheries has been turned over to the aquaculture associations, thereby easing the need for state funding of those hatcheries. Remember, hatchery fish come to maturity in the wild and are harvested by all user groups - sport, commercial, and subsistence. **The fishermen who tax themselves and try to keep costs down and returns strong at these hatcheries are honoring their commitment to healthy fisheries.**

- Because we all have kept the commitment we made over thirty years ago, we have a strong, healthy fishing industry, and at the pinnacle of that industry is the wild Alaska salmon; in the opinion of many, the finest seafood in the world.

NOW, IF WE KNOW THIS, WHY WOULD WE WANT TO DO ANYTHING THAT MIGHT JEOPARDIZE THE INDUSTRY WE HAVE ALL FOUGHT SO HARD TO KEEP HEALTHY?

- Some risks associated with fish farming:
 - The health of the wild stocks. I'm not going to print the laundry list of diseases to which farmed fish are susceptible because they seem to be finding previously undiscovered ones every day. Fish kept in captivity until maturity experience much more stress than do wild fish, and this heightened stress makes them susceptible to disease. If diseased fish should escape into the wild, there is a distinct possibility that the disease they carry could be transmitted to the wild stocks with which they mingle. The migration of disease through the wild stocks could be devastating.
 - The reputation for quality that Alaska salmon now possess. In order to control all these diseases, fish farmers must mix large amounts of chemicals into the food pellets given to the captive fish. There is growing concern that these chemicals could make their way into the human food chain. (See "Additives to the Environment of Net-Pen Reared Fish" by zoologist Arther H. Whiteley, included in your bill packet.) Even if these concerns are eventually dealt with through strict regulations, the perception that farmed fish are unhealthy could be detrimental to the marketing of our wild salmon. We all remember the botulism "scare" of the early 1980's and how one or two bad cans of salmon damaged the entire industry.
 - Pressure on a budget built with dwindling revenue. No one seems to know how much the State of Alaska will need to spend should we become involved with fish farming. Licensing, monitoring, enforcement, and siting concerns will all have to be addressed through the State

operating budget. (Not to mention the potential need for State loans or other "bail-out" measures that would have to be looked at down the road. The economic disaster that British Columbia fish farmers recently faced gives some indication of what could be in store for us.) Given that many of our constituents, and a number of the members of this body, believe that we are presently underfunding the agencies that manage and protect our fisheries, I am not ready to gamble millions of State dollars on fish farming.

- Market control. Fish farming evolved in Norway because of that country's concern about its wild stocks of Atlantic Salmon and its fishermen. Norway then instituted its own "limited entry" system: fishermen became fish farmers and the government was able to control "supply" as the demand for fish in the European markets fluctuated. At first Norway did well, capitalizing on the sudden drop in demand for Alaska salmon following the botulism scare of the early 1980's.

Today, however, Norway is faced with a number of growing problems. The market is glutted with farmed fish and prices have dropped. Their own high government officials have now acknowledged that the spread of disease from farmed fish threatens what's left of their wild stocks with extinction. Last Spring the government of Norway was under siege to fund 100 new fish disease specialists and 150 fish veterinarians. They are now paying the price for what they allowed to happen to their own fisheries.

The light at the end of the tunnel for Norway is the exportation of fish farming technology and as much control as they can exert over the world supply and demand of salmon. We all know where the investment dollars will come from for fish farming in Alaska, and who will pay 10¢ on the dollar when the so-called "Mom & Pop" fish farms can't make it and have to sell out. Take a look at which country's corporations started taking over the British Columbia fish farms that went into receivership this past year. It is interesting to note that a fish farmer in the state of Washington has filed suit in U.S. District Court claiming that foreign national interests have attempted to monopolize the industry in his state; that Norwegian concerns operating through American "fronts" have conspired to destroy competition, remove local control, and violate antitrust laws.

- In conclusion, the Norwegian-type farmed fish may have captured a large share of the world market in the short term, but I am convinced that, in the long term, the wild fish - the quality fish - harvested by the Alaskan fisherman will be the winner. We should not risk our dwindling State dollars, and our reputation for a quality product, on a capital intensive, foreign dominated industry that has brought collapsing prices, environmental problems, and questionable genetic practices in its wake.

GENERAL CONCERNS WITH 'UPLAND' FISH FARMS:

1. Groundwater contamination.

Fish diseases are commonly transmitted through water sources. Contaminated water discharged from an upland farm could seep into the water table or surrounding streams.

2. Broodstock.

Broodstock ownership, genetic mutations and alterations of broodstock by private business could threaten common property ownership of fisheries. The source of broodstock for these farms is a major concern because it would have to come from either: (a) hatcheries within the state (which you cannot presume will have the excess eggs or smolt to sell), or (b) sources from outside the state. Importation of broodstock from outside is extremely hazardous in terms of not knowing exactly what you getting. The Finfish Farming Task Force recommended that the importation of salmon broodstock and the private ownership of broodstock be banned.

3. Water appropriation.

Upland farms will use an enormous amount of water. A 200 ton production capacity farm requires 50 cubic feet of water per second, an amount equal to the amount of water the city of Eugene, Oregon uses. The debate over House Bill 210 demonstrated the controversy which exists relative to the appropriation of water in this state.

4. State budget.

Upland farms will still need to be licensed, inspected and monitored for compliance with state laws and regulations. This will take money away from other programs the resource agencies are having a difficult time administering now. Sonja Corazza, the co-chair of the United Fishermen of Alaska's Mariculture Committee testified in House Resources that Southeast shellfish farmers told her that some lease sites had not been checked in three years. DNR didn't have the personnel or the funds to adequately monitor all the sites.

TWO EXAMPLES OF PROBLEMS WITH "UPLAND" FISH FARMS:

1. The Finfish Farming Task Force toured an upland farm in Washington State that is owned by Dan Swecker and a subsidiary of Sealaska Corporation. The farm grows pan-sized coho salmon.

The majority of the facility consists of above-ground swimming pools where the salmon are raised. The water is supplied from several wells. The farm also has a number of small, man-made ponds where the adult brood stock is kept.

Members of the task force noticed that a couple of the ponds were dry and abandoned, and asked why. The answer was that the adult fish in those ponds had passed a pathogen down into the water table and that the pathogen had then travelled back into the wells and had been introduced into the swimming pools containing the juvenile fish. This caused an unexpected, but devastating, outbreak of disease among the population.

It took them quite a while to discover the source of the infection, and the solution was to move the earthen ponds as far away as possible and drain them into an adjacent swamp.

2. The deaths of 100,000 cohos in a river in Washington State have been linked to the seepage of water discharged from a nearby landlocked fish farm, as reported in the Seattle P-I, November 1, 1989.

UFA TESTIMONY TO HOUSE RESOURCES ON HB 432 MARCH 13, 1990

Good evening, my name is Sonja Corazza. I am co-chair of United Fishermen of Alaska's mariculture committee. We support this bill prohibiting finfish farming in Alaska. Our statewide newspapers have lately run articles on the competition Alaskan salmon is getting from farmed salmon. But salmon farmers are in a competition battle with each other and small farms worldwide are losing out to large businesses. B.C. farmers had a economic shake out this fall and large processing companies ended up the winners, buying out small farmers at 20 cents to the dollar. On some farms workers had not been paid in several months and finally walked off the job leaving hungry and dead fish for the Canadian government to dispose of.

Less well known is that Norway is in the same boat. It is estimated that for every fall in price of one Norwegian crown ten small farmers go bankrupt, and Norway is trying to curb new development. Last year Norway increased their production by 80% and ended up freezing a large number of fish. Chile, a country with extremely low labor costs and warm water temperatures is so productive they fear their industry is overcapitalized. We have strong wild runs and successful enhancement programs. Wild salmon as a renewable resource remains our best hope in these days of markets flooded with farmed salmon.

Wild salmon need protection of salmon streams and certain wetlands to survive. Unfortunately, many see salmon farming as a way to avoid protection of salmon habitat. We have a letter from a logging company in S.E. which explains the steps their company took to protect salmon streams but then goes on to say that it was all needless because "Norwegians can grow fish cheaper in bathtubs." He was wrong, Alaskan fish eat free & healthy meals in the North Pacific Ocean; the costs of growing fish are astronomical. How unfortunate some people think wild salmon and the environment are expendable if domesticated fish can be pulled out of tanks. To commercial fishermen, wild fish may be our economic mainstay but they are also a natural treasure.

We are concerned about the budget ADF&G is 1.5 million dollars underbudgeted now. We have commercial fisheries pouring hundreds of millions of dollars into our State and the State has not dedicated enough money to properly assess stocks or do research. We strongly feel that any newly funded money must go into these programs. While working on shellfish mariculture regulations SE shellfish farmers told me about leases that had not been checked in three years..empty logs holding mariculture permits. DNR said they did not have the personnel or money to adequately monitor

all the sites. NO TIME, NO MONEY, NO STAFF...that is the song of the resource agencies. How can anyone ask for funds to go into new programs that are very likely to be dominated by foreign corporations, when the cornerstones of Alaska's resident fisheries are being damaged by underfunding? Finfish farming would not produce any measurable economic benefits for at least five years from its start. The salmon fleet has a capital investment of \$800 million in vessels and onboard equipment and \$900 million in permits. Alaskan residents hold nearly 80% of all salmon permits. The salmon industry pays raw fish tax, license fees, and fuel taxes. Every year salmon fishermen in this state tax themselves \$4 million a year for our Ocean Ranching programs.

Egg surplus from hatcheries is a hot topic. A Department of Fish and Game report States, "The principle reason salmon smolts would be surplus to the common property fishery is that the present ocean ranching program is operating below capacity due to funding constraints." While other countries envy us our success and are trying to improve their own programs, Alaska is neglecting her own. In the fisheries world our biologists are famous and in Alaska we're putting them out of work. This past year there was a major shortage of chum salmon eggs in Southeast. Coho in the northern region of Southeast did not fare well. If a finfish farm had been looking for eggs this last year they'd have been in trouble. No one can assume that a large number of surplus eggs is available and from ADF&G's statement we must assume they should not be any surplus eggs.

If fish farming were allowed in Alaska with a ban on imports of eggs, the pressure to legalize egg imports would not stop because Pacific salmon is not economically profitable to raise. Last spring a company in Washington State destroyed 1,000,000 chinook fry because they would have lost money raising the fish to maturity and marketing them. The company switched to Atlantic salmon. Would future legislatures resist pleas of economic hardship due to an importation ban? Washington State and B.C. did not and now there are hundreds of thousands of escaped farmed salmon in their waters.

Salmon in Alaska are a common property resource which no Alaskan should take for granted. We may squabble over fish allocations but the public as a whole has fish to argue over. Salmon farmers want private hatchery rights...private ownership of one of our most valuable resources. We strongly believe that control of Alaska's egg supply should always remain under control of the State for the good of all the people. All anadromous fish in Alaska are fully allocated between commercial, sport, subsistence and personal use fishermen. If the State of Washington had not exported salmon eggs Chile would not be their competitors in the

marketplace. Nor would Japan have a chum salmon run. Washington gave away the goose that laid the golden egg. Alaska must not make the same mistake.

There is one strong opinion coming from Dutch Harbor that fin fish farming is the best thing since king crab. Dutch Harbor relies on bottom fishing (which is dominated by factory trawlers from Seattle) and crab stocks and herring. Salmon is not a critical issue for Dutch Harbor but it is the economic lifeline for the rest of Alaska's coastal communities.

UFA thanks you for your time tonight and we urge you to pass this bill. Thank you.

Sources of my information
are:

1. 1989 May Issue of "Fish
International Magazine"
(European)

2. Alaska Seafood Industry Study

3. Bill Heard - NOAA

4. FRED Report

Noticed Fishermen 1990

AROUND THE PORTS

ing gillnetters off 1990

FRANCISCO — The San Francisco gillnet-herring season concluded Feb. 15, the last of three gillnet groups met its 4-ton quota.

Para boats and purse seiners were fishing, since the quota is split among various gear groups. The round-haul and a fourth group, receive separate quotas by individual boats, and in mid-February, only four of the 32 boats had reached their limits.

Overall roe herring season on the bay ended Nov. 29, 1989, when the first gillnet designated XH, set out to harvest its

1,999-ton quota, a task it accomplished by Dec. 15.

On Jan. 2, the second gillnet group, known as the "odd platoon," started fishing. They worked week-on, week-off in rotation with the third, or "even platoon." The odd platoon filled its 2,300-ton quota in just 42 hours, leaving the even platoon to fish straight through the month to make its quota.

Though the even-platoon members landed 1,640 tons in a two-day stretch in mid-January, they suffered slow fishing until going over the top on Feb. 5. Roe counts averaged 14.3% for evens, 13% for odds and 11.6% for the XH boats — all up from last season. "Some fish even hit

17%," says John Greenwood of Producers Seafood in Oakland.

Ex-vessel prices were still undetermined in mid-February, though most expected them to settle in the \$1,000- to \$1,100-per-ton range for the baseline 10% roe content, with more money for higher percentages.

— Mick Kronman

April 1990

Noticed Fishermen

VHS disease appears again in Wash. hatchery

BELLINGHAM — A deadly European fish virus surfaced again in a salmon hatchery north of Seattle operated by the Lummi Indian tribe. The outbreak of viral hemorrhagic septicemia (VHS) resulted in the destruction of 2.7 million coho salmon eggs.

The virus, which has killed up to 90% of the fish at trout farms in Europe in the past, was detected for the first time in North America at hatcheries on the Olympic Peninsula and Orcas Island in Puget Sound in

1989. Almost 4 million salmon eggs were destroyed in those cases.

Fisheries authorities had hoped the VHS was contained after the first outbreaks, and they remain puzzled as to the source and continued spread of the disease.

Though many fishermen remain skeptical, state investigators say the state's sea farm industry is an unlikely source for the VHS transmission because eggs used on the farms are sanitized and quarantined. More likely, they say, is transmission from ships passing nearby, though that, too, is a remote possibility.

The Lummi tribe says it will lead an effort to establish a research program to determine the source of the VHS in U.S. waters.

— Brad Matsen

A few examples
of correspondence
Supporting HB432/SB397

Chugiak-Eagle River
Chamber of Commerce
(907) 694-4702

P.O. Box 770353
Eagle River, Alaska 99577

12110 Business Blvd.
Eagle River, Alaska 99577

April 4, 1990

SUBJECT: POSITION ON FIN FISH FARMING IN ALASKA

(PLEASE NOTE: For your convenience, no written response to this correspondence is necessary).

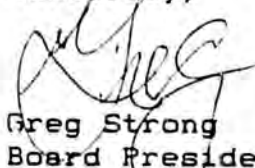
Dear *Senator Eliason*

At our March 22, 1990 regular Board of Directors meeting for the Chugiak-Eagle River Chamber of Commerce, the Board took a position relative to fin-fish farming in Alaska. Despite the fact that the Chamber generally endorses projects which conform to economic development standards appropriate for an arctic environment, it was decided that fin fish farming had some inherent drawbacks. These include the possibility for contamination of wild salmon stocks as well as the possibility of long-term government subsidies necessary to create a viable investment. Certain aquaculture, however, may be demonstrated, to be in the best interests of the state. As a result, the Board passed the following statement regarding fish farming in Alaska:

We, the Chugiak-Eagle River Chamber of Commerce Board of Directors supports the development of the aquaculture industry not including the development of fin-fish -- more specifically salmon farming.

If I can answer questions regarding the above position, please feel free to call the Chamber at 694-4702.

Sincerely,


Greg Strong
Board President

sg

COOK INLET COALITION

C/O Susie Kaiser
P.O. Box 110381
Anchorage, AK 99511

April 2, 1990

The Honorable Steve Cowper
P.O. Box A
Juneau, AK 99811

Dear Governor Cowper:

The Cook Inlet Coalition, an organization consisting of Southcentral Alaskan sport and commercial fishermen, would like to bring to your attention our views regarding the mariculture issue in the State of Alaska. We would also like to make the following recommendations:

The Coalition recommends the support of Senate Bill #397, Senator Eliason's Bill banning finfish farming.

We further recommend that the current policies prohibiting importation of live salmonoids, including gametes, should be placed into statute and rigorously enforced.

After reviewing the **"Finfish Farming Task Force Report to the Alaska Legislature"** we find that we agree with Senator Eliason's assessment and support a total ban on commercial finfish farming.

Some of our concerns, both environmental and economic, are listed below.

A) **ENVIRONMENT**

1) Salt water finfish farming (FFF).

a) **POLLUTION**

- 1) Disease introduction and/or transmission.
- 2) Bacterial (concentrations due to densities of fish, enzyme action of fecal matter, etc.).
- 3) Fecal build-up on seabed.
- 4) Chemical (treatments for skin ailments, antibiotics in feed, etc.).

2) UPLAND TANK AND POND FFF

a) POLLUTION

- 1) Disease transmission to nearby watershed and/or ground water.
- 2) Fecal matter (tanks could possibly dry and treat, this however, is an expensive process. Ponds tend to concentrate and exasperate problem).
- 3) Chemical (economically untreatable).
- 4) Bacterial (again possibly treatable in tanks with UV radiation, but build-up in ponds likely due to absence of flushing action).

3) SITING

a) OCEAN SITING

- 1) Conflicting need for flushing action vs. feed for protection from weather and marine predators)
- 2) Conflict with sport, subsistence, and commercial use.
- 3) Conflict with land owners/developers.
- 4) Need for separation of farms from anadromous streams to prevent intermingling of wild stocks with escaped farmed salmon, thus diluting the wild gene bank and promoting disease transfer (Norway disallows siting within 20 kilometers of anadromous streams).
- 5) Disease transmission to stocks migrating near pens.
- 6) Lack of transportation infrastructure where siting possible.

b) LAND SITING

- 1) Ponds must have no inlet or outlet and must be far enough removed from streams to protect from streams to protect from seepage of pollutants (and disease) to ground water and then streams.

B) ECONOMICS

1) COSTS TO STATE

- a) Cost of setting up regulatory infrastructure.
- b) Cost of additional personnel.
 - 1) Scientific people.
 - 2) Veterinarians.
 - 3) Enforcement.
 - 4) Staff for permitting and regulating.
- c) Cost of transportation infrastructure.

- d) Potential cost to set up, operate, and fund loan programs. (If this is not done, with a start up cost of approximately \$500,000/farm, most investment will necessarily come from outside Alaska, with most profits also leaving.)

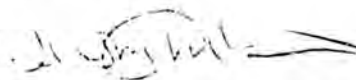
2) OTHER ECONOMIC FACTORS

- a) Few people are actually employed and most of those at minimal wages.
- b) There is a glut of farmed salmon on the world market forcing farmers to sell below cost.
- c) Although there is occasionally a surplus of eggs available it is rare and unpredictable, virtually all eggs are used for sport and commercial projects. In both Washington State and British Columbia the introduction of finfish farming has created vicious competition for eggs with sometime disastrous results to existing industries.

Alaska has the healthiest wild salmon and other finfish stocks in the world, supporting the sport, subsistence, commercial and tourism interest of this State, we feel finfish farming poses unnecessary risks to all parties. As Senator Eliason states, these risks can only be minimized and only then at a substantial cost.

Thank you for your consideration in this important issue.

Sincerely,

 For Coalition Members

The Cook Inlet Coalition
C/O Susie Kaiser

cc: All Members of the 16th Alaska State Legislature
House and Senate Resources Committee
Coalition Members
Don Collinsworth
Brian Allee



ALASKA COUNCIL TROUT UNLIMITED
P.O. BOX 2391, SITKA, ALASKA 99835

March 17, 1990

Senator Dick Eliason
Senate
P.O. Box V
Juneau, AK 99811

Dear Senator Eliason,

The Alaska Council Trout Unlimited (ACTU) would like to express our utmost support for Committee Substitute version of House Bill 432 and Senate Bill 397. We would also like to take this time and thank you personally for your stand on this issue. We feel that any mariculture of finfish poses a disease and allocation problem for the states fishery resources. At this time there has been another bill proposed by the Resources and Finance Committee SB No. 195. We are adamantly opposed to this bill also for the same reasons as stated above. We feel that the resources are too valuable to be used in this manner.

We only have to look at the two out breaks in 1990 of VHS (Viral Hemorrhagic Septicemia) recently in Washington to see the detrimental effects that can be had on our resources. The Lummi Fisheries Program just had to destroy 6.2 million coho eggs and smolts because of this virus. Also, the Washington Department of Fisheries found two cases in the Quillayute River system. One wild coho in the Bogachiel River and one wild coho in the Sol Duc River. This closes down both hatcheries to planting fish anywhere else in the state, causing a major disruption of the hatchery programs for both salmon and steelhead. The Lummi Fisheries Program is in inner Puget Sound near Everett and the Quillayute is on the outer coast of Washington. All three of river systems in the Quillayute drainage produce salmon that come to Alaska. There were also two outbreaks in Washington in 1989, one at the Makah Indian Hatchery on Suez River at the Northwest tip of the Olympic Peninsula and one at a hatchery in the San Juan Islands. So you can see that this disease is not controllable nor stoppable when it gets going.

Can we afford to loose our multimillion dollar fisheries that employs one of the largest segments of the Alaskan population in both the sport and commercial fisheries, for a few?

And would it be Alaskan's or the multinational corporation's taking over wherever there are net pens? As they are in Washington, British Columbia and now are trying to do in Maine. If you want some reading look at the most recent National Fisherman and see what the scientist have to say about the net pens and the pollution they produce.

Also, one of the types of egg takes recommended from the Fishfish Task Force was from wild stocks and this is totally unacceptable to the ACTU.

Senator Dick Eliason

March 17, 1990

As a conservation and resource oriented association I would hope you would consider the total resource user population and not just a few who want to make a buck at the expense of the majority.

Sincerely,

Jack Willis by OSW

Jack Willis
President

**KODIAK SEINERS ASSOCIATION
P.O. BOX 2399
KODIAK, ALASKA 99615
907/487-4939 907/487-2456**

February 14th, 1990

Dick Eliason
Rm. 417, Capitol
P.O. Box V
Juneau, AK 99811

Dear Mr. Eliason:

The Kodiak Seiners Association supports bills HB 432 and SB 397 that would prohibit fish farming in Alaska. Much has been written in the fishing press on this issue. To avoid redundancy, we agree that the reported health and genetic complications arising in fish farms throughout the world, the potential for dangerous health implications for our presently healthy and abundant natural salmon stocks, and the potential for disruption and degradation of wild salmon markets, are reasons enough to justify the ban.

Taxes on Alaska's natural fisheries resources being the second largest source of revenue for the State, it would be irresponsible to place finfish resources at the risk by their possible exposure to disease-prone farm fish. In addition, were the same State monies that would be needed to fund the development and regulation of fish farming devoted instead to the enhancement of existing hatchery and wild salmon runs, the State would realize a certain and almost immediate revenue gain.

Finfish farming would be a counterproductive graft onto the healthy body of Alaska's natural fisheries.

Sincerely,

Kodiak Seiners Association
Board of Directors:

Eric Manzer
Oliver Holm
Dana Reid
Chip Treinen

Dave Kubiak
Jeff Povelite
Chuck McWethy
Armin Reimnitz

cc: Arliss Sturgulewski
Steve Frank
Bill Hudson
Dick Eliason
Bettye Fahrenkamp
Mike Davis
PWS Seiners Association

Rick Haltord
Fred Zharoff
Cliff Davidson
Jalmar Kerttula
Mike Navarre
George Jacko

Gov. Steve Cowper
Bert Sharp
Walt Furnace
Richard Foster
Curt Menard
SE Seiners Association

2 February, 1989

Re: Fin fish farms

Senator Bettye Fahrenkamp
Chair, Senate Resources Committee
P.O. Box V
Juneau, Alaska 99811

Dear Senator Fahrenkamp:

I am a marine biologist, formerly with the Auke Bay Laboratory (NMFS) as a Fisheries Research Biologist. I am not and never have been a commercial fisherman, and there are times when I am not in complete sympathy with their agenda. However, in the case of finfish farming in Alaska, I am entirely in accord with their position.

I don't oppose finfish farming in Alaska because of markets, but because of biology and my deep concern for subsistence and sport fishing here. The concerns about genetics and about disease are valid--in fact I feel they haven't been strongly enough expressed. However, the issues are extremely complex, and it is very hard to express complex issues to the public, and especially to financial interests that do not wish to give them credence.

The scientific evidence of probable harm is strong. The reassurances that no harm will be done should be examined with the same hard nosed skepticism that should have been evidenced when we were assured that oil spills would do little damage (remember the pipeline controversy?) The risks are just too great, no matter what "plans" and assurances are given.

Please reconsider your position on fin fish farming in Alaska. And please remember that biologists in public positions are prevented from speaking out--I can only speak because I no longer work for NMFS. There is plenty of educated opinion out here that fin fish farming is a bad idea.

Thank you for your consideration.

Sincerely,

Natasha I. Calvin
Box 2966
Sitka, Alaska 99835

Nancy L. Hillstrand
Kitoi Bay
Kodiak, Alaska 99607

Greetings honourable Bettye M. Farnsworth,

I am a Fisheries biologist/ Culturist for the State of Alaska. I have 12 years of experience in this field.

I am very concerned about Fin fish farming in Alaska, and it's impact on our healthy productive fish populations.

We have a unique situation in Alaska. Alaskan river systems contain over 60% of all Salmon stocks in the world. We without a doubt must not jeopardize this unique natural wonder for economic gain of select promoters. Senate Bill # 397 and House Bill #432, would help to assure protection of this valuable resource.

The maintenance, and restoration of the chemical, physical, and biological integrity of our waters is the primary building block of our fisheries. Without this our fisheries resource would be jeopardized.

I've traveled to New Zealand and have witnessed the Salmon Farming operations there. I observed farm fish escaping into the oceans with no enforcement oversight. There were continual problems with ocean bottom contamination, and disease had entered into their operations making antibiotics and chemical medications and vitamins an additive to their feeding program. Such would without a doubt be the case in Alaska, where our enforcement over Natural Resources is feeble at best.

Genetics were geared toward selective breeding for docile fast growing fish. I have some photos of some of these sad looking Salmonids, if you would like to see them. These genetic traits would be deleterious to our strong ocean run Salmon.

Lax regulation and oversight to curtail these massive problems of contamination would most likely occur as we have seen this to be human nature.

Ocean run chemically free fish stand on their own merit. To have a fresh ocean run Fish on the market is a market all of its own. In New Zealand farmers admitted that there is no comparison in taste and quality between ocean run and farmed fish. We have the quality product. This will be a specialty item in a comparative market of farm grown, colour added antibiotic filled fish. We must always protect our image of clean fresh wild status, because it is the rare exception and not the rule on Earth and this trait will be a continuing asset in all future dealings of commerce, tourism, and economic well being in the state of Alaska. We have something the rest of the world has lost or destroyed. This is our future Bettye.

The Seafood industry is Alaska's largest private basic industry employer, providing nearly 70,000 seasonal jobs which translates to 33,000 direct, indirect and induced year-round jobs. This doesn't include revenues from our giant Sport Fisheries industry which could also be at risk.

This industry is the second largest revenue generator in the state. Fishermen paid \$27 million in fish taxes during 1987, and were the major contributor to the marine fuel tax.

Expenditures in Alaska on goods and services in support of processing and harvesting are nearly \$300 million.

Alaska leads the nation in value of commercial seafood landings. The 1987 Harvest was worth \$1.1 BILLION. In 1987 the wholesale value after primary processing was \$1.9 BILLION. 1988 exceeded this to \$3 BILLION. The Salmon fishery is the most important, bringing in 42% of all harvest income. This fisheries is critically dependent upon protection of stock genetics, disease prevention and wise management. Under no circumstances must we jeopardize this resource.

Fish are a renewable natural resource if managed and protected properly under the Clean Water Act. Prevention of adverse impact will contribute substantially to the health and welfare of this resource and livelihoods directly and indirectly related to and including tourism, Sport, Commercial, and Subsistence fishing for future generations to come.

The future of the quality of our aquatic ecosystem is on the line. Without this quality we question just how long our fisheries and those in harmony with them will continue to last favourably. We have these viable industries which add great revenues to our economic health. Finfish mariculture and these viable industries cannot and should not be allowed to coexist.

With Kind Regards,

Nancy J. H. H. H.

cc: Jalmar Kerttula

Mike Navarre

Walt Furnace

Bill Hudson

Bert M. Sharp

Richard I. Eliason

Steve Frank

Rick Halford

Arliss Sturgulewski

George G. Jacko

Mike Davis

Richard Foster

cc: Fred F. Zaroff

Cliff Davidson

Curt Menard

Paul A. Fischer

C.E. Swackhammer

STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

SOUTHEAST REGIONAL OFFICE DIVISION OF LAND AND WATER MANAGEMENT

STEVE COWPER, GOVERNOR

400 WILLOUGHBY AVENUE
SUITE 400
JUNEAU, ALASKA 99801-1000
PHONE: (907) 465-3400

March 23, 1990

Re: Thorne Ferguson

Honorable Richard I. Eliason
c/o Pouch V
Juneau, Alaska 99811

Dear Senator Eliason:

Research of our records indicates that T. Ferguson Construction, Inc. did purchase U.S. Mineral Survey 419B, known as the Maine, Monterey and San Francisco claims from Georgia-Pacific Corporation, (Warranty Deed, 1984). The property is located at Copper Harbor, Hetta Inlet, on the west side of Prince of Wales Island. In 1985 In 1985 Mr. Ferguson submitted applications intended to obtain approval of what appeared to be a multi-stage development. According to one of the cover letters, the initial stage of construction (development of a seasonal resort for hunting as well as fresh and salt water fishing) was intended to support the second stage (the development of a hatchery and fish farm); see ADL lease application 104488.

In September of 1987 the applicant indicated to DNR they had received a Army Corps of Engineers permit dated in June of 1986. Proposed construction under the Corps permit consisted of a lodge, barge ramp, and docks to be constructed in conjunction with the proposed private fish hatchery. The permit stated that the lodge and docks would supported by approximately 100 piles, and the barge ramp would consist of a timber crib bulkhead placed at M.L>L>W. and back-filled with approximately 1,800 cubic yards of shot rock fill (see Army Corps of Engineers Public Notice of Application for Permit Hetta Inlet 7, dated September 3, 1985).

However, contrary to the lease application and corps notices, a letter from the State Office of Management and Budget dated August 22, 1985 appears to indicate that the applicant dropped the hatchery portion of its proposal at that time. Mr. Menzies letter of June 2, 1986 appears to furnish the reason. The OMB consistency determination of May 9, 1986 purposely dropped consideration of the hatchery and hydroelectric plant.

A. Pekovich to Senator Eliason -2-

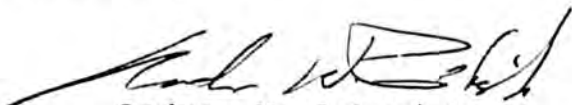
March 23, 1990

The 1986 Army Corps of Engineer Permit is the only document that appears to still imply a remaining interest in a hatchery. None of the State approvals, including Water Use Applications LAS 6089 and 6090 involve the hatchery proposal directly.

It appears clear from the file that the applicant was never assured of being able to develop a hatchery. That although it is something that he wanted to do, he decided to proceed with the lodge with no guarantees that he would be able to construct the hatchery. It is possible that the \$500,000 figure thrown around would include the \$370,000 initial purchase price.

Please let me know if there is anything else I can do.

Sincerely,



Andrew W. Pekovich
Regional Manager, SERO

CC: Larry Ostrovsky
Gary Gustafson
Janet Burleson

The Fisherman (B.C.) Dec '88

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 Hjørundfjorden 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. "Veteri-

narians 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 fjords to farming where

Should corporations use public waters for private profit?

By John de Young
P-I Columnist

Consider these things about floating fish farms:
■ A typical net-pen fish farming operation on Puget Sound produces pollutants "equivalent to untreated sewage from approximately 10,000 persons." That's what a state report says. The pollution comes from fish feces, urine and food pellets deposited in the water and on the bottom of the Sound.

■ There are 13 commercial pens now operating over 69 acres of aquatic lands leased from the state. These 13 operations daily deposit to the bottom of Puget Sound nearly six times as much oxygen-demanding fecal matter and other wastes than does Metro's Renton Waste Water Treatment Plant, which serves 430,000 people. Materials that deplete oxygen can radically change or kill off the life forms in an unpolluted environment.

■ Siting 27 more fish farms, now delayed by opposition from upland property holders, environmentalists and county officials, would add a pollution load to Puget Sound equal to that from building four new cities the size of Everett.

■ The "... proper siting of 100 farms would not have significant impact on the aquatic environment." So says the state's just-issued environmental impact statement on floating net pens.

Those 100 fish farms would produce 53 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 1 million people.

Analysis

The environmental impact statement was prepared by three private organizations that supply fish-farm companies with paid expert witnesses.

Under Gov. Booth Gardner, state policy is to harness any increase of fish farming in the state's waters and to downplay environmental problems that aquaculture may bring.

The official evangelist is the Department of Agriculture's Dr. John Pitts, veterinarian and former Jefferson County commissioner who appears at meetings and hearings — in one case, as a paid witness for a net-pen applicant — to pooh-pooh environmental objections raised by net-pen opponents.

Opponents are not just those who own shoreline property, who howl against a net pen being erected in their aquatic front yard. They've been fired up by what the state's environmental impact statement confirms: A new, nearby fish farm can give view property a one-time, financial knock.

Opponents include environmentalists like David Orman of Friends of the Earth, who says: "Why should we be happy about fish farms that dump tons of fish poop every day into Puget Sound?"

They include commercial fishermen like the Puget Sound Gillnetters, who know something that has largely escaped the notice of sport anglers:

Atlantic salmon, not a salmon but a sea-run trout of the Atlantic seaboard, have escaped by the thousands from net pens here and in British Columbia. The B.C. government booms fish farms with a gusto exceeding even the la-ra-boom-de-ays from Gardner's men and from Brian Boyle, the separately elected head of the Department of Natural Resources, which manages shore bottoms and other public lands.

What's more, hundreds of thousands of Pacific salmon have also escaped from the pens, especially in British Columbia.

So what does that mean?
The state environmental impact statement points out that escaped exotic fish like the Atlantic salmon "could establish self-sustaining populations and compete with indigenous fish," such as steelhead trout.

That may not be far off.
In the North Puget Sound last year, commercial and sports fishermen caught hundreds, probably thousands, of Atlantic salmon weighing up to 10 pounds.

More dangerous by far is that for the first time ever at least three sexually mature Atlantic salmon showed up miles from the sea in the Nooksack River last year, near Bellingham, and one in the Nisqually, near Olympia. Rumor has a fourth Atlantic netted in the Skagit River at Sedro-Woolley.

What's the worry about four fish, though they may be forerunners of thousands to come?

The environmental impact statement warns that accidental importation of "exotic" fish diseases associated with fish farms in Europe could devastate existing salmon and trout runs in state rivers.

Just in the past two weeks the public has learned that such a disease, viral hemorrhagic septicemia or VHS, has shown up at two hatcheries in state waters. It is the first time ever that VHS has been found in North America.

VHS, state fish-disease experts say, has never been found to occur naturally in Atlantic salmon. They say that the chance that Atlantic salmon in pens here are the source of the disease is "virtually zero." The disease was found in chinook and coho salmon, species raised extensively at federal, state and tribal hatcheries and at commercial net-pen operations.

The impact statement does not dwell on what has happened in Norway, where other diseases associated with that country's extensive net-pen industry have ravaged wild Atlantic salmon runs in 33 rivers. The government was forced to poison some streams, set up a salmon sperm bank to preserve wild genes and consider banning any new net pen within 12 miles of a river mouth, an obvious rule not yet under consideration here.

Nor does the statement dwell on the possibility of migrating wild fish catching indigenous fish diseases from net pens here or of net-pen escapes spreading such diseases into our river systems.

Fish farmers themselves helped call state attention to (real) build-up beneath pens, a build-up that kills clams, oysters and other bottom dwellers and can release poisonous hydrogen sulfide gas, which



DUANE HOFFMANN/PI

can kill all fish in a pen in minutes.

In 1984 Commissioner of Public Lands Boyle limited new net pens to sites where the water is at least 40 feet deep at low tide, a mile away from other pens and with enough current to flush away food and fecal deposits. He also limited the surface area of new pens to two acres or less.

These requirements ended up in "Recommended Interim Guidelines" written for the departments of Agriculture, Ecology, Natural Resources and Fisheries, which share regulation of the fish-farm industry, with Agriculture and Pitts calling most of the shots.

With no force of law and offered to help county commissioners site pens under state law, the guidelines deliberately do not talk about navigation problems, use conflicts and, most important, esthetics.

If the two sides could stop feuding and start talking about necessary standards, we could have a safe, considerable industry.

—Peter Katz,
fish farmer

Commissioners have learned that if they turn down a net-pen proposal, the applicant will seek a full rehearing before the state's Shorelines Hearings Board, with Pitts certain to show up to put the stamp of Gardner's administration on having the permit granted.

Dwain Colby, an Island County commissioner, put the matter thus in a 1987 letter:

"While there may be legitimate reasons for denying a permit to locate a salmon net pen, local government has been placed in the position of being able to say 'yes' to such a proposal but not 'no.'"

Under Gardner, the Department of Ecology has refused to require net pen operators to get pollution-limiting discharge permits under the federal Clean Water Act.

The Sierra Club Legal Defense Fund has announced it will sue the U.S. Environmental Protection Agency if necessary to force EPA to force Ecology to force every net pen operator have such a permit.

The state's draft environmental impact statement declares that the major impacts of net pens can be cured by "proper farm siting to assure dispersion of wastes, flushing of the site and protection of sensitive areas."

It's a view that one can come to easily while talking to such eloquent fish farmers as Peter Katz, a marine architect running the Paradise Bay Co. net farm at Port Townsend, and John Forster, a Ph.D. in aquaculture running Sea Farm Washington's similar

operations at Port Angeles.

Both pen systems, clean, low in the water, quiet, full of fat, bright Pacific and Atlantic salmon, are barely noticeable in the working harbors that contain them.

But that's quite different than siting a pen in Frenchman's Cove on the west side of Hood Canal, as International Marine Farms Inc. proposes.

Or siting a pen, as Tailfin Inc. proposes, in a main salmon and trout-fishing cove between East Point and Bell Beach on the west side of Whidbey Island, where from her home Margaret Johnston looks out across Sanitoga Passage to Camano Island. She heads the Marine Environmental Consortium, made up of 20 citizen organizations that oppose fish and other floating farms.

Katz argues for having the state set standards for siting and operating net pens, to ensure that the pens do not harm the environment and to give the net-pen operators a clear but flexible regulatory framework to live with. But Katz feels the industry is getting a bad rap from people like Johnston, who, he says, simply don't want a net pen in their aqueous front yard.

"If the two sides could stop feuding and start talking about necessary standards, we could have a safe, considerable industry..." he says. "But we're years away from that."

Forster, president of the Washington Fish Growers Association, dismisses esthetic revulsion as the main drive behind the opposition to what he characterizes as a clean, beneficial industry with vast prospects.

"It's more than esthetics. It's an intrusion into a life style that they don't like and they're using environmental problems as a smokescreen. Because of that, the debate is dishonest at the moment, terribly dishonest."

Johnston, at a gathering in her home with other members of the Marine Environmental Consortium, characterizes such comments as unworthy.

"The net pen issue raises a fundamental issue of public policy that involves more than us, though the environmental questions are real and cannot be brushed aside by the industry or the state. The big question is: Should the public waters of Washington State be turned over to a few corporations for private profit?"

That's a proper question for us all to ask. It must be answered by political action. Gardner's administration has already answered: Yes.

To me it seems stupid to site more pens in pristine salt and fresh waters (yes, an application is pending in Eastern Washington) until we have better, more extensive scientific information about siting than what the draft environmental impact statement supplies.

Until we know if pens can be sited safely anywhere, we would be blind to commit ourselves to putting major sources of pollution in our unpolluted waterways and in waterways we are trying to clean up.

The tragedy of Norway's rivers demonstrates that.

West Coast Shake-out

Supply and demand tremors rattle B.C. growers.

by Peter Chettleburgh

THE SHAKE-OUT has begun. Sagging salmon prices, excessive debt, high interest rates and a worldwide glut of salmon have triggered a period of consolidation in the west coast salmon farming industry. On the East Coast where prices are firmer and farmers have been more conservative in their approach there is still a margin of profit, but it too is narrowing as prices continue to slide in the face of skyrocketing worldwide production (220,000 tonnes in '89).

Everyone said it would happen, but no one really wanted to believe it. On the west coast, where prices have been hovering at or below production levels for most of the summer, reality has struck home with a vengeance. The need for cash flow has caused many farmers to sell a lot of small pre-market fish for ridiculously low prices - 90¢ a pound was one figure this writer heard mentioned earlier this summer.

Since May we have heard of at least four west coast farms that have been put into receivership, another two that have been sold at fire sale prices and at least a dozen more which are in desperate need of working capital. Everyone else is holding on, praying for higher prices in the fall.

One of the big ones that went into receivership is the Fremstad Group which has four farms, a hatchery and processing plant in the vicinity of Campbell River. It's being handled by the accounting firm of Coopers

and Lybrand which was looking for a buyer as we went to press in August.

Triangel Resources near Tofino on the west coast of Vancouver Island found itself in trouble earlier this spring and was taken over by General Sea Harvest, an affiliate of the Finnish conglomerate, Cultor Ltd. (formerly Finnish Sugar Co.), the parent company of Ewos Canada. General Sea and B.C. Packers were also looking at the assets of Ross Passage Salmon Farm, another west coast operation which found itself in trouble earlier this spring.

One other company that is known to be in receivership is Seagrow Industries Inc. (400 tonne capacity) with two sites in Jervis Inlet. The receiver, Coopers and Lybrand, was still looking for a buyer as we went to press.

There were also some amalgamations before the current shake-up began. For instance, within the last year Five Fishes (Sechelt) and Nordic Ventures (Quadra Island) were purchased by B.C. Packers, the large west coast fishing company-cum-processor owned by Westons. Apparently B.C. Packers is on the lookout for other expansion prospects, but doesn't plan to walk into a situation unless all the biological criteria, etc. are just right.

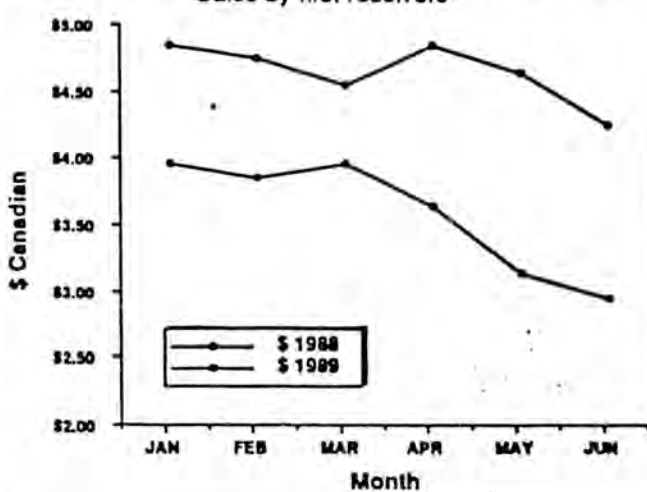
As a general comment, it can be said that the farms with some of the worst financial problems are in the Sechelt area. This is where the goldrush started in 1984

and it is the area that received a lot of the initial debt financing from Norway. Now the Norwegian financing has all but dried up and few investors are prepared to put additional

salmon farms at about \$250 million. And this does not include an additional investment of at least \$50 million in the supply and services sector (cages, feed, nets, etc). Of this total in-

Fresh B.C. Salmon Prices 4-6 lbs.

Sales by first receivers



The graph above tells the story. The top line shows prices for B.C. farmed salmon (4-6 lbs.) during the first six months of 1988, while the lower line shows prices for the first six months of 1989. Prices are FOB Vancouver (Source BCSFA).

money into the farms because of their current debt structure. Adding to their woes are the growing conditions which many in the industry agree are not as good as those north of Campbell River or on the west coast of Vancouver Island. Indeed, some of the salmon farm sites may end up in the hands of oyster growers who are already lining up for a chance at leases that will probably turn out to be better for shellfish than salmon.

\$250 million investment

A recent estimate puts the total investment in B.C.

investment, at least \$85 million has come in through Norwegian banks, much of which is now exposed to major losses, according to a recent report in a Norwegian newspaper.

Even for the smaller farms, those with debt in the neighbourhood of \$2-3 million, the debt servicing costs of 15-18% will skim off between \$300,000 and \$400,000 a year. That's a lot of fish, and a lot of debt relative to inventory, assets and equity, particularly in an industry that has yet to establish a solid production base.

>>>>

Problems for suppliers

Although the depressed prices are toughest on the farmers, the suppliers behind the scenes are also hit hard. Scantech Resources of Sechart folded in July after becoming one of B.C.'s major suppliers of fish farm equipment in just four years. President Clark Hamilton says that he lost everything in the failure but is still a strong believer in the future of the industry in British Columbia.

Another supplier which was hard hit was Powell River Net Loft which ceased doing any further work for the fish farming industry in June. The suppliers that are the most exposed are the companies which specialize solely in fish farming equipment and services for the B.C. market. They don't have the flexibility of companies that serve other industries or those that have national distribution.

What went wrong

It's small consolation that salmon farmers around the world are facing the same problems of overproduction and falling prices. Indeed, both the Scots and

a continued shakeout in the Norwegian smolt producing sector.

In British Columbia the problems seem even worse. Excessive debt financing, high jacking rates and high

"At the end of the day salmon farming will end up like other producing sectors with only the low-cost producers surviving."

Norwegians are taking a serious beating in Europe where production continues to grow at about 50% per year while demand is at about 25%. In Norway the Fish Farmers Sales Organization (FOS) has recommended holding the number of smolts going into the sea at about 50 million this season. This is to reduce production and maintain prices in the years ahead. One of the consequences, however, will be

mortalities from algal blooms and BKD have continued to chip away at profit margins. B.C. growers have also had to cope with a relatively new and untried culture species, chinook. It doesn't have the 20 year track record of the Atlantic species which the Norwegians and Scots have been able to use to their advantage on both the production and marketing sides. It's taken extra time and money for west coast

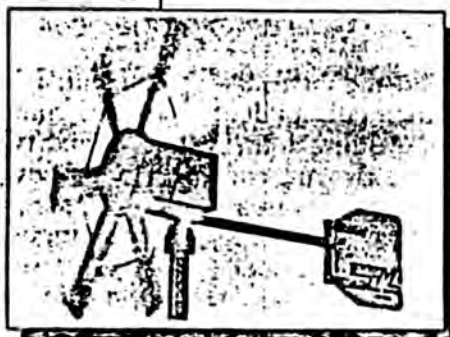
producers who already arrived late in the world growth curve of farmed salmon production.

Glutted markets

As if this weren't enough, world markets are currently glutted with high inventories of frozen Pacifics, a legacy of an oversupply last year and ample reserves of fresh and frozen farmed Atlantics on world markets this year. Farmed Atlantics now take preference in most European and some North American markets, areas that were once dominated by wild Pacifics. Consequently, the price for both farmed and wild Pacifics has seen a dramatic fall since last December with farm gate prices for farmed chinook (6-9 lb.) dropping more than \$1.50 per pound to \$2.50 and lower for a while early this summer. (New Brunswick Atlantics (6-9 lb.) were wholesaling for about \$1.25 more per

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pound than B.C. chinooks of the same size mid-summer, while Norwegian Atlantics were about 50¢/lb less than the New Brunswick product.).

The depressed market conditions came at a particularly awkward time for B.C. growers. The 60 or so companies that started operations within the last four years are at a stage of maximum investment, everything's out on the line, but as yet they haven't had a good chance to make any major earnings and reduce their debt. And now, with salmon prices the way they are, you can be sure that any fish under 4 pounds is being sold below the break-even point.

The worst part is that there aren't any major miracles expected in the near future. Though there should be a modest price rise when the wild-catch season ends this fall, a significant jump in farm gate

World's shrimp producers face same problems

Shrimp producers in southeast Asia are facing the same slide in prices that hit salmon farmers this year. According to a recent article in *Aquaculture Digest* (July 25, 1989) the pond-side price for giant tiger shrimp fell from \$8.50 to \$4.40 per kilo in Taiwan last spring and only recovered slightly during the summer. Taiwanese production costs are about \$5.00 per kilo.

Once again the main culprit is a hyper-active production sector trying to sell product into already-glutted markets. According to *Aquaculture Digest* the winners in the shrimp game are likely to be the low-cost producers in China and Indonesia while the losers are going to be the high-cost, intensive shrimp farmers of Taiwan, the Philippines, Thailand and the rest of the world. Commercial shrimp fishermen will also have problems remaining competitive in the years ahead, the article adds.

prices is not likely since the ever-increasing supply of farmed product from Norway, Scotland, Chile and Ireland is flooding markets in Europe and Japan, and making serious inroads into adjacent turf in the United States. It's a classic case of supply and demand

theory in action and will only be stabilized by market expansion, strong promotional efforts, more efficient production techniques and well organized selling.

Who will survive?

The farms in the best position are those with the

least debt, highest efficiency and deepest pockets, all linked to an efficient means of selling their product. The big integrated national and multinational companies are in a strong position. They can benefit from profits in several segments of the production, processing and distribution chain.

But there is also a future for independent farms if they can maintain a low cost of production. To do so they must run a lean operation, maximizing growth rates, while keeping feed wastage and equipment purchases to the minimum. They will want to have the least expenses possible and get the best prices they can for their product by pursuing niche markets.

Production costs are hard to pin down, but estimates run between \$2.50 and \$3.50 a pound farm gate depending on the site and

... Please turn to page 48

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W. C. SHAKE-OUT

Continued from page 23

what costs are included. This means that in mid August, with farm gate prices hovering at about \$3.00 per pound, B.C. farmers could make a modest profit if they were operating on the lean side or could be losing up to 50¢ a pound if they were on the high side. Unfortunately, for many of them there was no choice but to sell chinook and coho that were starting to mature. A couple of farmers were seriously looking into the possibility of establishing U-catch'em pens catering to wealthy U.S. yachtsmen.

Key to success

One of the most important keys to success in the years ahead will be management. As aquaculture consultant Ted Needham pointed out in a recent issue of UK-based *Fish Farmer* magazine "... every farmer has to find out what his rearing costs really are. ... he can only do this if he works to proper budgets with monthly cash flows projected over two years and updated at least quarterly. All forecasts of fish growth should be based on what has been achieved to date

rather than on some hoped-for improvements." Needham's advice is as sound here in Canada as it is in Scotland. The margin for sloppy record keeping slipped away sometime last winter.

What is the outlook?

Is there any light at the end of the tunnel? Depends on who you talk to, but with another 50,000 tonnes projected to come onto world markets next year (275,000 tonnes total) there's not much hope that prices will again reach 1988 levels.

Who are the consumers?

Who's going to eat all this fine, fresh fish? The European market is nearing saturation and what's left will probably go to Scottish and Norwegian producers. The Japanese market is still available but it takes work to penetrate and, once again, the canny Norwegians are already in there, picking up what the Japanese can't produce for themselves (domestic farmed salmon production for Japan is estimated at about 25,000 tonnes of coho this year). The most accessible market left is our big, convenient neighbor to the south and there's still lots of opportunity there

if the Canadians will make a serious effort to go after it. Marketing and distribution are pivotal. It will take a concentrated, cooperative effort on the part of all Canadian producers of both wild and farmed fish.

At the end of the day salmon farming will end up like other producing sectors with only the truly low-cost producers surviving. They will sell their fish in a well disciplined market where demand will determine the production that is planned and financed. But at this point not even a prophet could say how long the restructuring will take and who the survivors will be. Ω

FRANK SIMON

Continued from page 42

The intense competition in the salmon business doesn't worry Simon either. "There is always room for a producer who's doing things right," he says. "We want to differentiate ourselves on the basis of quality. We believe that if we do everything right, we'll have a prominent position in the market." Ω

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MIX AND MIS-MATCH

Genetic pollution is the most invidious consequence of the escape of farmed salmon, argues Richard Douthwaite, who fears that the mating of farmed with wild fish may eventually eliminate our native stocks

On 9 February 1988 a storm of unusual ferocity hit the west coast of Ireland and swept across the country, leaving a trail of destruction in its wake. In Clew Bay on the Atlantic coast winds were so severe that farmers went down to the beaches the next day with their tractors and collected large quantities of dead fish. It was no surprise that two salmon cages moored in the bay broke up, releasing more than 30,000 fish into the open sea.

It is not always the weather which is to blame for fish farm escapes. One moonless night a few months before the storm, two men in a rowing boat cut the nets of 12 salmon cages moored in Mulroy Bay in Donegal. Almost 10,000 fish, worth £100,000, got away and the farm recaptured less than a quarter of them. The raiders' motive was to catch the escapees in their drift nets and then sell them.

Only recently has concern been expressed about the effects that these escapees might have on wild

salmon stocks. Perhaps the matter should have been addressed earlier. The first Scottish attempts to rear salmon in cages were made in the late 1960s and it was as long ago as 1981 that Scotland's output of farmed salmon exceeded its wild catch, with Ireland reaching that position about four years later.

Today the problem is so large it cannot be ignored. Scottish farmed output is expected to be 54,000 tonnes in 1991, about fifty times the size of the wild catch, and Ireland hopes to produce 15,000 tonnes that year. There is so much salmon in cages at sea that if only two or three per cent break free in any year, they will substantially outnumber the native stock.

Escapes would not matter if the freed fish were genetically identical to those born in the rivers up which they swim. However, this is rarely the case. The salmon in each river—even sometimes in the carrier streams—are unique strains which have evolved in the ten thousand

years since the ice sheets retreated. In most cases escapees will not be of that strain. There are 400 distinct stocks of wild salmon in Scotland, according to a report produced last year by the Scottish Wildlife and Country Link. It also states that wild salmon transferred from one river to another perform less well and have harmful effects on the native stock.

Farmed fish are increasingly being bred, like pigs and cattle, for characteristics which suit life in captivity rather than in the wild. Consequently, if escapees enter a river and mate with wild fish, they will pass on genes which tend towards placid behaviour, late sexual development and more rapid growth. Cross-bred young are therefore less likely than pure-bred natives to survive in the sea and return to the river as adults.

Even if farmed fish turn up in a river but mate with each other rather than with the wild fish, the effects are still adverse. They will

Genetic pollution is not the only threat which fish farming poses to the survival of wild salmon. Disease organisms and parasites multiply rapidly in the confined conditions of a salmon cage and from there they can easily migrate to affect other fish. It is for this reason that salmon farmers become wary if another farm establishes cages within a few miles of his own, which is why whole lochs in Scotland are allocated to one firm.

Now diseases appear in farmed salmon almost every year. Pancreas disease arrived in Ireland in 1984

after occurring first in Scotland in 1976. Seventeen of the 21 farms in Ireland now have it and output is consequently down by 25 per cent because of deaths or stunted growth.

The most worrying disease appeared only last year, in Norway. Salmon Anaemia Syndrome kills 80-90 per cent of young fish. Again, its cause is completely unknown.

In spite of the threat that diseases present both to their own and to the wild stock, some fish farms are their own worst enemy. In Scotland dead diseased salmon are

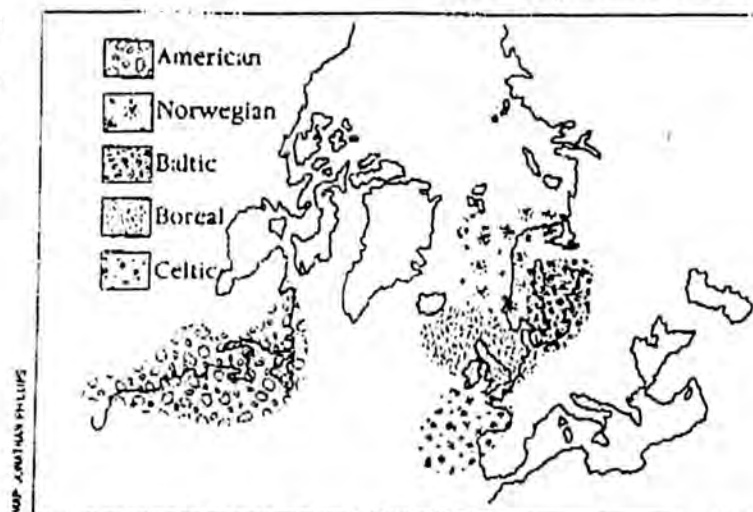
known to have been dumped at sea rather than incinerated on land, spreading pathogens far and wide. There are also two dangerous parasites. One is a tape worm which uses the edible mussel as an intermediate host, then moves on to affect wild fish. The worm weakens wild salmon, rather than killing them directly, lessening their ability to return up turbulent rivers to their spawning grounds and also making them more vulnerable to disease.

The second parasite is a flatworm, *Gyrodactylus salaris*, which has completely wiped out stocks of

wild salmon in 28 rivers in Norway. It was accidentally introduced when farmed fish were imported from infected hatcheries and put out into freshwater cages. The pest attacks parr— young salmon which have not yet developed the physical features that allow them to live in the sea. 'It is the most serious threat to Atlantic salmon in Norway today,' says Rear Admiral D.J. Mackenzie, director of the Atlantic Salmon Trust, Pitlochry. The only cure so far is a drastic one—to poison any remaining salmon in the river and then restock with uninfected fish.



Previous page: grilse from the Spey. Above: fish hostile for food in the confinement of the cages. Right: distribution of the main races of Atlantic salmon



Although fishermen have known for hundreds of years that salmon stocks differ from river to river, scientists have only confirmed this belief within the last 20 years. Using a technique called electrophoresis they can analyse the proteins with which each fish is made up with great precision.

The first finding revealed by this technique was that there are five main races of Atlantic salmon, four of which share a common feeding ground off western Greenland. The Baltic salmon is the exception, feeding as an adult in the sea which gives it its name.

The second finding was that salmon vary genetically to a surprising extent from river to river, even within the same race. Dr Tom Cross, now of

University College, Cork, examined fish from the Bandon and Munster Blackwater rivers in the south of Ireland and found significant differences in their liver enzymes even though they were both of the Celtic race and the river mouths only 80 miles apart. Dr Cross repeated his tests with Boreal fish from the Moy and Carrowiskey in north-west Ireland and found the Carrowiskey fish very different again.

The differences that exist between salmon from different rivers, says Dr Cross, 'are due to the small population sizes and the fact that they have been apart for 5,000 years. How important the differences are to survival, we cannot say. I think we ought at least to keep the the different races apart.'

Any experienced salmon fisherman will confirm that salmon stocks vary from river to river.

'Some are early rivers where large salmon enter in the spring,' says leading salmon geneticist Professor Noel Wilkins of University College, Galway. 'Other rivers have significant runs only in late summer, when the returning fish are smaller and younger. Some rivers are noted for the fine shape of their fish, others are not.'

Andrew Young, who managed the fisheries of the Duke of Sutherland more than 130 years ago, knew why this was: 'Each river has its own peculiar race of fish,' he wrote. 'We have now shown that salmon undoubtedly return to the river where they have spawned and where they belong to the race of fish that inhabit that particular river.' Professor Wilkins agrees: 'Salmon return to their own river with amazing accuracy and mating occurs predominantly between individuals who were born in the same river system.'

It is this inbreeding which has allowed the different strains to develop. In some rivers a higher proportion of fish come back after two or more winters at sea than after one year as grilse. Thus, if all the smolt are killed by disease or pollution one year, others are left to return to the river the following year to spawn, giving a chance for numbers to recover.

Fish farmers are deliberately trying to eliminate this characteristic: what they want are fish with a low grilse rate, because it is more profitable to produce bigger fish which spend two winters in the sea than smaller fish which spend one. Norwegian salmon fit this bill and consequently their eggs have been widely used in Scottish and Irish hatcheries instead of the native strains. Farmers also want their hatched fish to be ready to go to sea after one year in fresh water - it is obviously uneconomical to keep them in freshwater cages for an extra season. But again, in the wild, a stock in which some fish go to sea after one year and some after two has a better chance of surviving than one which does not.

Then there is the question of homing. Tagging experiments have shown that a higher proportion of wild fish return to their native rivers from the sea than do hatchery-bred fish released as fry into streams other than those from which their parents came. However, if any introduced fish which do return are caught and mated, their young will show a better return rate, which will

• Contrary to claims by B.C. salmon farmers that salmon egg transfers pose little threat to wild stocks, an Atlantic salmon advisory body has advised extreme caution to avoid disease and genetic problems.

Report sees genetic threat

"None of the benefits of transfer of young Atlantic salmon and salmon eggs into Canadian waters outweigh the threats to native stocks," says a top body of Canadian fisheries scientists.

Fish farmers, the B.C. government and the federal fisheries department have allowed major imports of Atlantic salmon to Pacific waters, claiming they pose a minimal threat to wild stocks. The imports are scheduled to end in 1989.

But a review of egg imports by the Canadian Atlantic Fisheries Scientific Advisory Committee in 1986 warned that "there are unpredictable genetic risks associated with transferring European salmon stocks to North America and the potential benefits to Canadian aquaculture interests may be low."

CAFSAC is a top scientific advisory group which provides background information for Canadian representatives on international bodies studying conservation of Atlantic salmon.

Its conclusions go a long way to support the call issued by the UFAWU in May demanding a halt on any movement of salmon eggs and smolts, particularly Atlantics, until protection of wild stocks can be assured.

The CAFSAC scientists concluded that most of the benefits of imports accrued to the aquaculture industry because "it could allow the industry to expand as quickly as possible (and) it could be cheaper than purchasing local seedstocks."

In the long run, they said, it would "encourage the multinational nature of the aquaculture industry by allowing surplus seedstock in one country to be moved to another country."

But the imports carry the risk of disease, they warned, pointing to the Norwegian experience with the parasite *Gyrodactylus salaris*.

"Although the Canadian Fish

Health Protection Regulations are considered among the best fish disease control mechanisms in the world," they wrote, "they are not infallible, a fact which, along with the large number of potential pathogenic organisms that are not considered under the Canadian regulations, makes the likelihood of an unwanted pathogen or strain of pathogen entering the country with fish from a certified (disease-free) source a very real possibility."

The CAFSAC report is part of a longer study by the North Atlantic Salmon Conservation Organization, a Scotland-based body supported by Atlantic salmon-producing nations.

B.C. salmon farmers have been enraged by UFAWU calls for controls to avert genetic pollution of wild stocks by farmed fish, claiming such pollution is unknown or unlikely to occur.

But NASCO warns that importation of European Atlantics to Atlantic Canada "provide risks of undesirable impacts on North American Atlantic salmon stocks."

"There are new disease or strains of diseases which may be introduced, also hybridization with North American stocks could result in loss of genetic diversity and reduced productivity."

NASCO concluded there is "an urgent need to develop new techniques to study the effects of hybridization, e.g. potential impacts of genetic impoverishment resulting from 'domesticated' or genetically engineered Atlantic salmon stocks (cultured salmon) spawning with wild stocks and hybridization of different strains of wild stock."

NASCO recommends that until definitive measures are in place to protect the genetic integrity of wild stocks, aquaculture projects should:

• use stocks originating as closely as possible to the project area,

- use sterile fish,
- establish "river preserves where no transfers or hatchery stocks is allowed in order to maintain the genetic integrity of some wild stocks; and
- manage stocks to ensure they are not reduced below a minimum size.

The Fisherman 7-15-88

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Genetic fears of pen salmon are real

□ By SONJA CORAZZA

Page 4 February 27, 1988 Peninsula Clarion

Other View

Alaska fishermen's concerns over genetic pollution and disease problems associated with escaped pen-farmed salmon are not unwarranted. Some 13% to 20% of all farmed fish escape, as documented by Norwegian scientists and European countries.

Also, verily large numbers of fish occasionally escape from pens. Their scientific studies show that the escapees do spawn in rivers up to a proven distance of 20 kilometers from their net pens. As a consequence of this research, and with great concern for the genetic integrity and survival of their wild salmon stocks, Norway has just imposed a series of new regulations on the pen-farmed salmon industry.

No salmon farms will be located within 20 kilometers of salmon rivers, and entire fjords will be closed to farming where salmon rivers are present.

This past December in Jarvis Inlet, B.C., 300,000 pen-farmed salmon escaped in winter storms that hit Canada. Floating net pens were found for miles up and down the coast.

Norway, in the salmon farming business for 20 years, has found itself combatting new diseases in net pens every year. Last spring, fish farmers requested that the government hire 100 new fish disease specialists (adding to their 60 disease specialists and nearly 150 fish veterinarians) before allowing any new permits to be issued in their country. A group of farmers who have lost tons of their farmed salmon due to a deadly salmon disease called *furunculosis* and government controls is suing the Norwegian government for \$25 million. Last summer 5,000 fish infected with *furunculosis* escaped in Norway. Despite intensive efforts to capture the diseased fish, an infected fish was found in a freshwater stream.

In order to control disease in pens, Norway's use of antibiotics in pen farming has risen 170% in the past two years to reach a level of 48 tons, more than the use in animal husbandry and human use combined. With the present focus on health and nutrition, how does this

reliance on antibiotics fit our view of pen-farmed salmon as a healthy addition to our diets?

Norway's most severe threat to their wild salmon stocks is from a parasite called *gyrodactylus salaris* that is responsible for wiping out 30 wild-salmon rivers. The *gyrodactylus salaris* parasite entered Norway via imported salmon eggs from Sweden. Importing eggs was prohibited by regulation, but those regulations were lifted as the result of pressure by farmers with economic concerns. The only control for the fatal parasite is by treating the rivers with a chemical called rotenone; unfortunately, rotenone kills everything in the rivers, not just the parasite, hence the loss of wild salmon by the tons in Norway.

Ownership of the pen-farming industry continues to be an issue. In Washington state, a local fish farmer is suing foreign corporations, primarily Norwegian, for attempting to monopolize the industry. Who would own the farms in Alaska?

The Alaska State Legislature should fund the Mariculture Task Force, a forum where these concerns and others need to be researched.

SONYA CORAZZA of Homer heads the Mariculture Committee of the United Fishermen of Alaska. This article came "signed" by United Fishermen of Alaska, as follows: Alaska Crab Coalition, Alaska Independent Fishermen's Marketing Association, Alaska Longline Fishermen's Association, Alaska Trollers Association, Bering Sea Fishermen's Association, Bristol Bay Drift-netters Association, Concerned Area M Fishermen, Cook Inlet Aquaculture Association, Copper River Fishermen's Cooperative, Cordova District Fisheries United, Kenai Peninsula Fishermen's Association, North Pacific Fisheries Association, Northern Southeast Regional Aquaculture Association, Peninsula Marketing Association, Petersburg Vessel Owners Association, Prince William Sound Aquaculture Corp., Prince William Sound Seiners Association, Seafood Producers Cooperative, Southeast Alaska Seiners, Southern Southeast Regional Aquaculture Association, United Cook Inlet Drift Association, United Southeast Alaska Gillnetters, Western Alaska Cooperative Marketing Association, and at-large delegates, Bill Hall, Ruel Holmberg Sr. and Bob Honkola.

seafood producers have turned to an increasing degree to foreign suppliers. The reason is that the cost of local packaging has risen to 20-40% more than that of imported products.

Spokesmen for Kassagerd Reykjavikur and Plastprent, two of the main manufacturers, said demand was always subject to fluctuation and that no massive change had yet taken place. Eggert Hauks-son, Plastprent's managing direc-

tion had never been so tight, with so little tolerance of price increases on the market. Bjarni Lúð-viksson, managing director at Ice-landic Freezing Plants Corporation, said that as yet only a fraction of the corporation's packaging needs had been supplied from abroad. "Obviously we have to hold our own costs down, and while the dollar is so weak we must use the opportuni-ty. If the króna is devalued, every-thing will change overnight."

NEWSNET

PROCEEDINGS against Mike Ikenze, the former Icelandic Consul in Nigeria who acted as an inter-mediatary in attempts to sell stock-fish from a group of Icelandic pro-ducers in 1984, have been dropped following his agreement to repay one-quarter of the GBP300,000 which he received for use in landing sales contracts.

SHRIMP CATCHES around Eldey off the southwest of the country are likely to be banned for some time following poor results of trial catches in the area. Only 20kg were caught in a two-hour trial haul recently. Closure of the area could have serious results for

local fishermen, who have in many cases filled their quotas for other species.

LUMPFISH CATCHES this season have been very poor, and production of lumpfish caviar is expected to amount to only about 9,000 barrels, against 27,000 last year.

A NEW EXPORTING enterprise has begun in Sandgerdi, a village in the southwest of the country, where two local residents, Thor-björn Daníelsson and Eiríkur H. Sigurgeirsson, have been assisted by chef Sigmar B. Hauksson in marketing whelk and crab in Swe-den and France. Sales to a Swedish restaurant have already been agreed, and exports to France are to start in the autumn. The Swiss market is also being considered.

JUNE CATCH FIGURES



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Hopes high for capelin

The capelin season began on 10 July, with 49 Icelandic vessels sharing a provisional qu-ota of 398,000 tons. With the prices for meal and oil rising because of poor soya harvests in the Far East, hopes are high for a successful season. The quota is revised in November.

News from Iceland August 1988

Salmon fishing:

Problems posed by sea-cage escapees

Salmon fishermen trying their luck this season in the Ellidaár riv-ers, which flow through the eastern part of Reykjavík and are popular with local residents, are complain-ing that large numbers of the salm-on they are landing are "escapees" from aquaculture stations and are consequently smaller and less at-tractive than the wild types.

According to biologists studying the problem, the fish are fairly easy to recognize. They generally have damaged fins and are shorter and

fatter than the true natives of the river. In many cases they weigh only about one pound.

Biologists are concerned about the effects of the presence of the cultivated fish in rivers. A survey made two years ago estimated that 60-70 cultivated salmon had en-tered Ellidaár, a significant number in terms of the genetic effect on the local stock. Studies from Nor-way show that up to 10% of the fish in rivers near large aquaculture stations can be "escapees."



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Fish Farming still draws opposition

By DAVID FOSTER
The Associated Press

RICH PASSAGE, Wash. — The history of salmon-fishing in the stormy North Pacific is filled with tales of brave fishermen riding the wild seas, but its future is being shaped in calmer waters.

Thousands of salmon in this sheltered arm of Puget Sound are captives in sunken pens the size of basketball courts. Crowded fin to fin, they swim endless laps, gobbling feed pellets and being fattened toward the day they'll be scooped up and whisked to market.

Yet while the crenulated coastline and pristine waters that stretch from Washington's Puget Sound to southeastern Alaska might be ideal for fish farming, the political climate is not so welcoming.

In Alaska, where commercial fishermen are a powerful

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Anchorage
Daily News
2-20-90

FISH FARMING: Young industry has run into resistance

Continued from Page A-1

lobby, bumper stickers in fishing towns proclaim "Real Fish Don't Eat Pellets," and the legislature is considering a permanent ban on fish farms when a two-year moratorium expires in July.

In Washington state, salmon farmers have the official blessing of the legislature, but that has helped little in the face of challenges from fishermen and environmental groups, which have defeated several proposed farms.

The fish waste produced by a two-acre salmon farm is equivalent to the sewage produced by a town of 5,000 people, claims a Washington citizens group called the Marine Environmental Consortium.

Environmentalists also fear introduced species such as Atlantic salmon — favored because they fetch a higher price and are more docile than Pacific salmon — will corrupt the local gene pool and spread disease. Wealthy owners of shoreside homes, meanwhile, don't want fish farms spoiling their views.

Promoters call fish farming an efficient way to help meet the world's growing appetite for fish. Not only does it provide a year-round supply of fresh salmon to supplement the seasonal wild catch, they say, it also creates jobs free of the hazards of commercial fishing, one of the nation's most dangerous occupations.

They also contend salmon-farming provides an economic incentive to preserve clean water.

"We're the best environmentalists of all, because we're dependent on it," said Jerry Polley, site manager for Global Aqua, the nation's largest salmon farm. "If something's wrong with the water quality, we're going to be the first to complain."

Production of farm-raised salmon, here and abroad, has boomed in five years, flooding markets traditionally held by wild salmon and driving down prices.

"For the first couple of years, as more salmon was around on a year-round basis, the farmed fish seemed to help the wild market," said commercial fisherman Randy Babich. "Now it's a battle at the retail counter."

Fish farming, or aquaculture, is hardly a new concept. For years, farmers have raised oysters in the Northwest, rainbow trout in Idaho and catfish in the Southeast. But techniques have developed more slowly in domesticating salmon, the mainstay of fisheries off Oregon, Washington, British Columbia and Alaska.

For years, it was practiced only by the Norwegians, forced into salmon farming by their declining wild fish populations. But interest has spread quickly since 1985, after Norway refined methods to raise salmon cheaply enough to compete with the wild catch.

In 1983, world production of farm-raised salmon was 23,500 metric tons, just 3 percent of the 670,000-ton wild salmon catch. By last year, farm-raised salmon production had soared to an estimated 202,000 tons, or 30 percent of the relatively constant wild catch.

Norway still leads the pack, producing about 75 percent of the world's farm-raised salmon, but other places, including Scotland, Chile, Canada and Iceland, are catching up.



Daily News file photo

Alaska Department of Fish and Game technician feeds penned salmon at Little Port, Walters in southeast Alaska.

The United States, with 50 fish farms in Washington state and Maine, lags far behind, producing 1 percent of the total.

Many of the U.S. salmon farms are run by Norwegian companies, including Global Aqua's four-acre operation in Rich Passage, 10 miles west of Seattle.

Global Aqua's farm is fairly typical: a huge raft anchored offshore holds 40 pens, each lined with a net holding as much as 15 tons of fish, which range from finger-size smolts to fat-bellied salmon 2 feet long.

A half-dozen workers tend the pens from metal walk ways, filling automatic feeders and mending nets. At harvest, workers herd fish into one end of the pens, scoop them out with an oversize dipnet and load them onto a boat. The salmon are still kicking when they reach a Seattle processing plant 30 minutes away.

In the three years it takes to raise salmon to harvest, farmers contend with prowling otters, hungry sea lions and diseases that can wipe out whole farms if left unchecked.

Aquaculturists say their operations will never be a major blot on the coastline.

"It would take just 40 acres of farms to produce all of the salmon that was imported into the United States in 1988," said Chris Gibson of Sea Farm Washington in Port Angeles. "The industry does not need a lot of space."

It may need even less space in coming months. Worldwide growth of salmon farming and recent overproduction in Norway have glutted the market with fish. Prices have plunged, and many farms are selling below cost just to keep cash flowing.

In British Columbia, lax regulation and a surge of Norwegian investment capital helped the number of fish farms soar from five to 135 in the past six years. But now many are in trouble. Nineteen have filed for receivership in the past year, and small businesses are being bought out by large investors better able to outlast the lull in prices.

Aquaculture boosters profess confidence in their long-term place in the salmon trade.

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The Fisherman (B.C.) Dec 188

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.

Whiteley 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 oxytetracycline 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.

IFAWI loses close vote

Farms offer 'surplus' chinook

Surplus chinook smolts offered to the fisheries department by the B.C. Salmon Farmers Association should be destroyed, says the UFAWU, rather than released in a makeshift enhancement scheme.

At least eight farms offered the smolts for sale earlier this month, suggesting that some kind of technological breakthrough led to survival rates above their forecast.

In fact, the proposal to sell the "surplus" chinook to the Salmonid Enhancement Program is a bid for a bail-out by an industry facing collapsing prices, said the UFAWU May 10.

"Prices for farmed salmon have tumbled a dollar a pound in the past few months," said union spokesman Geoff Meggs. "They simply can't afford to feed these fish and are hoping the taxpayer will bail them out."

Fisheries department spokesman Ted Perry said at least six

million fish were available in farms and hatcheries from Duncan to Powell River. He said DFO would not buy any fish, nor accept donations of fish that were not genetically pure Big Qualicum or Robertson Creek stock.

The fish would be released by DFO into the wild.

At press time, the farmers were insisting on selling the fish, which will starve unless fed by mid-June.

"Release of these fish poses a disease threat to wild stocks and would open the door to private ocean ranching," Meggs said. "Fish farmers have resisted every effort to win appropriate govern-

ment regulations, but they're not shy about asking for government money when times get tight."

Uncontrolled growth of the industry has seen farm fish harvests rise to 6,000 tonnes last year from 387 tonnes in 1986. Prices have crashed from an average annual farm gate value of \$3.17 to \$2.27, according to B.C. provincial statistics.

"Spending on salmonid enhancement has been frozen," Meggs said, "but apparently money may be found for this boondoggle. It's a slap in the face to SEP volunteers who have donated thousands of hours and faced steady funding cuts to even to consider this kind of a scheme."

Consumer group urges farm salmon controls

Both levels of government should step up their regulation of the fish farming industry, says the Consumers' Association of Canada (CAC), to protect the consumer and wild salmon stocks.

In a comprehensive task force report on the industry released April 17, the CAC declares that "a self-regulated industry is not in the consumer's best interest."

Farmed fish is being sold "without specific regulations since pre-existing legislation is being used to govern a new industry," the report says.

In particular, the task force recommends:

- stepped-up provincial government monitoring and regulation of the aquaculture industry;
- public sector testing of fish for market to determine levels of residues;

- monitoring of environmental impacts and prosecution of regulatory violations; and
- consumer labelling to distinguish farmed and wild fish and to report harvest dates.

The report also urges the B.C. Salmon Farmers Association to rejoin the Canadian General Standards Board committees on feed and feed additives to seek ways to reduce residues and contaminants.

The task force expressed concern about colorants, drugs and other medication used in aquaculture "which may remain in the product at the point of consumption."

Antibiotics are a very real problem, the report says, because "long-term consumption of sub-clinical dosages of antibiotics by humans (for example, by consuming antibiotic-containing fish) can lead to the development of resistant strains of bacteria in the body system."

Treatment of infection in humans can be undermined by such doses, the report notes and "there is a potential for allergic reactions by individuals sensitive to antibiotic traces."

(The farm industry has established a Quality Assurance program with spot-checking which it says will control this problem. Fish must be held 42 days after drug treatment before going to market. The provincial government is recommending at least double that time.)

The task force recommends much tighter controls and monitoring of antibiotic use, including certification of farmed staff handling drugs.

The CAC proposes an industry commitment to "produce, catch and process fish without negative impact to the environment."

All types of fish, farmed and wild, should be checked for chemical residues, PCBs and pesticides.

Consumers should insist on protection of wild stocks, the CAC concludes. "A fish farm industry at the expense of the wild stock would, in fact, reduce the choices of fish for the consumer."

Algae, disease, low prices hammer B.C. salmon farmers

British Columbia's fish farming industry, wracked by collapsing prices, disease, algae blooms and bankruptcies, is facing a major corporate shakedown.

Despite continued assurances by industry leaders that all is well, signs of trouble include:

- ★ a rash of receiverships affecting about 12 farms and three companies;

- ★ devastating algae blooms throughout the Strait of Georgia which have wiped out some farms and crippled others;

- ★ industry agreement that the Sunshine Coast, the scene of a salmon farming goldrush only three years ago, may see an exodus of operations to colder, algae-free waters; and

- ★ continued low prices which are driving down wild salmon prices and forcing more producers to the wall.

The most visible problem has been the algae blooms, which sweep in on hot, calm days and suffocate salmon in their pens within hours. Persistent low levels of algae are believed to contribute to stress and disease.

Losses to various diseases continues to be high on many B.C. farms, according to industry publications.

According to the *Sechelt Press*, a plankton bloom during the Labor Day weekend wiped out five farms, severely damaged five others and destroyed 300 tons of salmon worth about \$2 million. The regional dump, which was to be closed to farm waste Oct. 20, was opened especially to handle the emergency.

Farms in Agamemnon Channel took the brunt of the assault, but the entire

region was affected. Local fishermen heard radio chatter from farmers seeking some place to dispose of the sudden large volumes of dead fish.

Professor Larry Albright of Simon Fraser University told a public meeting on the impact of fish farms later that month that the entire Strait of Georgia is so infested with the algae that farms will be removed from the area completely.

Meanwhile, prices continue to drop, heading below \$1 a pound according to some market reports. The break-even point is estimated to be around \$2.25 to \$2.50 a pound level.

The crunch of falling prices, provoked in part by aggressive marketing by Norwegian producers, is hitting farms hard in many areas.

Coopers and Lybrand, receiver for three firms put into receivership by secured creditors, reports continued financial problems for farms in the Campbell River area.

Eric van Soeren, receiver for North American Salmon Corp., operator of six sites around Quadra Island, and Sea

Grow, with operations at Nelson Island, said Sept. 19 that new buyers had not been found.

But both firms were thrown into receivership by Norwegian banks seeking to slow their losses on loans to B.C. producers. Now van Soeren is seeking a buyer for Atwood Bay farm near Desolation Sound and expects a busy fall with other troubled firms. He would not disclose who is buying the farm.

As a result of the chaos, the normally boosterish industry is shying away from an optimistic DFO analysis of the industry which predicts production could hit 80,000 to 100,000 metric tons by the year 2000.

Product of 50,000 tons is very realistic, the Price Waterhouse report claims. But industry spokesmen believe that disease and other problems will keep them in the low-growth range of about 20,000 tons until the turn of the century.

(Ed: The above article was reprinted with permission from *The Fisherman*, Geoff Meggs, Editor)

Fish farmer sues foreigners

A Washington state fish farmer and his corporation have sued in U.S. District Court alleging that foreign national interests have attempted to monopolize the commercial fish farming industry in his state. Lee A. Holley III of Lopez Island in northern Puget Sound alleges in his suit that foreign business interests, primarily

Norwegian, operated through American national fronts to destroy competition in the industry, remove local control and violate antitrust laws.

Holley, owner of Northern Nights Fish Farms Inc., is suing several Norwegian corporations that have either sole or partial ownership of farms in Puget Sound. Also named in the suit are state officials and other individuals who allegedly contributed to illegal activity. Holley charges that large financial contributions were made to state political campaigns by the foreign interests, which, he says, also assisted in defeating a moratorium proposed against new businesses in San Juan County, where Holley lives.

Comments from the Norwegian companies and state officials were being withheld pending litigation, according to several reached by telephone.

— Brad Matsen

The Fisherman January 25, 1989

Fish farm drug hits wild stock

Fishermen harvesting shellfish off Scotland say a chemical used by salmon farmers is killing marine life.

Scientists at Aberdeen University have linked the chemical with increasing numbers of wild salmon going blind.

The controversy has erupted over Nuvan 500, which farmers use to control pests. Its byproduct, dichlorvos, is listed by the 1987 North Sea Conference as one of 26 most dangerous chemicals in waterways.

The debate highlights the severe problems salmon farming disease treatment can pose for

the marine environment and other marine life.

According to the *London Observer*, in a report on its wire service Jan. 11, scientists at Norway's Institute of Marine Research in Bergen have found the chemical could be damaging sensitive lobster and crab larvae around the farms. Mussel and oysters also absorb the chemical.

Nuvan is strictly controlled on land, but salmon farmers have easy access because they are not subject to the same regulations.

Fishermen and environmentalists are demanding a ban on Nuvan, but farmers say they will

be decimated by sea lice if Nuvan is taken from their arsenal. They favour voluntary controls.

Nuvan is not registered for use in Canada, meaning it is unavailable. Valery Brooks, of the B.C. Salmon Farmers Association, said sea lice are not a problem in this province, but a special session on lice is scheduled for an aquaculture conference in Dartmouth next month.

Scientists there have concluded that sea lice threaten the viability of salmon farming in Atlantic waters and 96 percent of farms must use treatments to control the parasite.

Foes of Puget Sound pens make an issue out of virus new to Northwest

By Jane Hadley
P-I Reporter

An exotic virus that caused fisheries officials to order almost 4 million fish and eggs destroyed at two hatcheries last week has given new ammunition to foe of fish-raising pens in Puget Sound.

Opponents of the net pens said yesterday they plan to make an issue of the virus at hearings tomorrow and Thursday on a state Department of Fisheries environmental impact statement on net pen fish farming.

But proponents of expanded fish farming on Puget Sound say it would be irresponsible to speculate on the source of the virus. They said there is no evidence pointing to Atlantic salmon or net pens as the cause, as some opponents charge.

But, Jerry C. Grover, of the U.S. Fish and

Wildlife Service said logic pointed to the Atlantic salmon.

There are 13 existing net pen operations in the state, most of which grow the Atlantic salmon. Close to 20 other net pens have been proposed.

The virus, known as viral hemorrhagic septicemia or "VHS," was found in cell cultures in two hatcheries in December and positively identified Feb. 17. It has never before been reported in North America. It has caused substantial fish losses in Denmark and other European countries.

No fish reportedly have died of the disease in Northwest waters to date.

The virus was found in cell cultures at the Fish and Wildlife Service's Makah Hatchery near Neah Bay and a joint state-private hatchery at Glenwood Springs on Orcas Island.

"From the conversations I've heard, everyone's

looking at the net pen aquaculture industry in Puget Sound and Canada," said Grover, fisheries associate manager for the U.S. Fish and Wildlife Service regional office in Portland.

Grover said it's important "not to be finger-pointing because we don't know" and labeled such a guess as "speculation."

He added, "It doesn't take too much gray matter to put two and two together. You have to ask how the thing leap-frogs from Europe to Puget Sound. The common denominator would be Atlantic salmon. That's what the scientists are talking about."

The state Department of Fisheries, several scientists and an industry spokesman immediately jumped on Grover's comments.

"I'm certain this issue will be thrown at the

See FISH, Page B4

Fish: Virus origin to be probed

From Page B1

industry, when, in fact, I think it's groundless," said Anne Kirske, executive director of the Washington State Fish Growers Association.

But environmentalists were just as indignant yesterday and accused the state Fisheries Department of being a "booster" of net pen farming.

"This is really a terribly threatening thing," said L. Joe Miller, president of the Marine Environmental Consortium, a coalition of numerous local groups fighting proposed net pen operations around Puget Sound.

"It's the kind of thing environment groups we work with have been anticipating and dreading and, now, here it is," he said. "The state and industry have said, no, this is not a realistic concern. They've said we're only worried about our views. Now they say this (virus) has come in on somebody's boot, which is really an

insulting suggestion."

Grover discounted the "boot" theory and some other suggested sources. He said it's "kind of far-fetched, even impossible" to believe that somebody who traveled in Europe brought the virus in on his or her boot. The virus can survive only a short time outside living tissue, he said.

Grover said his agency, the state Fisheries Department, the Wildlife Department, and Indian tribes are launching a massive testing program to try to track down where the virus might have spread. The U.S. Fish and Wildlife Agency, for example, will test the 35 miles of the Sooes River and its tributaries that are upstream of the Makah Hatchery.

The current theory, he said, is that Sooes River fish shed the virus and it got into the hatchery through its water intake.

The Fisheries Department will test saltwater around Glenwood Springs as well as some net pen operations. He said test results

should be available in late March.

Grover and Dr. Marsha Landholt, a fish pathologist at the University of Washington, said the rainbow trout is the most susceptible species of fish to get the disease from the virus. Coho salmon can carry the virus and pass it on without getting sick. But fisheries experts are worried about steelhead, because they are a type of rainbow trout.

Several weeks ago, Washington state rainbow trout were injected with the VHS virus in a federal laboratory and suffered "a high incidence of mortality," said Peck of the Fisheries Department. Landholt said VHS may seem "like a scourge to us because it's a new disease. But if you talk to people in Denmark and Europe that have VHS, they don't seem to worry to the degree we are. They seem to manage around it."

Landholt said they disinfect and destroy all fish in all infected hatcheries as well as those downstream.

Seattle Post-Intelligencer

February 22, 1987

Puget Sound anglers hooking Atlantic salmon

by Brad O'Connor
Times staff reporter



Steve Loop caused quite a stir in June when he showed up at Seacrest Boathouse in West Seattle with a 5½-pound Atlantic salmon he'd caught while fishing for blackmouth near the Southworth Ferry landing.

Atlantics are not supposed to be swimming around Puget Sound and it was only the second Dave Nelson, Seacrest manager, had seen in his 17

years at the boathouse.

Atlantics — 1 million or more of them — are in the Sound, but all are supposed to be confined to net pens where they are reared by private growers for markets mostly in the south, the East Coast and California.

Loops' Atlantic was an escapee.

Since June, Nelson has weighed about a dozen others, all caught on hook and line, which is remarkable. While Atlantics provide some of the world's greatest freshwater sports fishing, they rarely are caught on sports gear in salt water.

"Ponder this," said Nelson, "if we've seen a dozen here, there must be many, many more swimming around out there."

He's correct. There are more.

Will Sandoval, biologist for the Muckleshoot Tribe, said his tribal fishermen have told of netting several Atlantics during summer and fall salmon seasons.

"Some told of catching three or four a day," he said.

Three that Sandoval checked during a state and tribal test fishery for sockeye in July were approaching sexual maturity.

"What concerns me is that they may have been looking for somewhere to spawn. Even if they can't spawn successfully, there's a risk they could be carrying some exotic disease."

Decades ago, attempts were made to establish spawning runs of Atlantics in Washington and British Columbia. All failed and the belief among some fisheries scientists is that further attempts to establish Atlantic runs on the West Coast also would fail.

In fact, most fisheries managers nowadays shudder at the thought of Atlantics spawning in any West Coast stream — not only because of the risk of disease, but because of increased competition for food and space with native trout and salmon.

Reports of Atlantic catches are funneled to Lee Hoines, a Department of Fisheries biologist at Olympia. Of the 203 reported to him last year, most were caught by commercial fishermen in the Bellingham area and around the San Juans.

However, two were caught in fresh water, including one last October near the Nooksack River and another in July in Cedar Creek, a tributary of the Nisqually.

What if they did spawn successfully?

"My assumption is that they can't. I can't say that absolutely is the case, but I hope they don't," said Tim Flint, another WDF biologist.

De Yonge was right on fish-farm perils

By Arthur H. Whiteley, John W. Brookbank and Annamaria K. Johnstone

In his article (P-I Op-Ed, March 29), State Land Commissioner Brian Boyle took severe exception to John de Yonge's March 5 Focus Section article on fish farms.

We believe that de Yonge's pithy comments were right on target.

Boyle argues against relating fish-farm pollutants to untreated human sewage. In terms of organic sludge whose decomposition consumes dissolved oxygen from the water, and loading of the water with various nitrogen compounds and phosphate which act as fertilizers, the two pollutants are essentially alike.

The question of dilution of these discharges is relevant.

Metro's West Point Wastewater Treatment Plant dumps its soluble discharge into the main channel of Puget Sound at considerable depth, permitting dispersion. Fish-pen wastes are deposited on the site as feed pellets and feces, which settle as sediment and dissolved components, that enter the water column. The sites are channels or embayments with restricted water flow, not rivers, with a one-way flow that flushes things away. Tides flow and ebb and currents in bays create eddies, leading to retention and accumulation of the pen wastes.

Metro sewage must undergo treatment, at substantial and justified expense to our citizens who create this waste. Discharge is monitored by a permit, mandated by federal Clean Water Act. The fish-pen solid waste enters the bay raw, untreated, without disinfection — and free to the fish farmer. Washington's pens have avoided the federal discharge permits, although the Sierra Club Legal Defense Fund threatens the state with legal action if this requirement is not enforced.

real, just as it has been in Norway.

Boyle's understanding of the *Gyrodactylus salaris* issue in Norway is at variance with reports from Dag Dolmen of the Directorate for Nature Management in Trondheim. This trematode parasite has been introduced into Norway, according to Dolmen's analysis, "through stocking with salmon parr from infected hatcheries/fish farms." Johnson and Jensen report that total salmon catches in infested Norwegian rivers (1970 to 1984) dropped to 16 percent of levels in uninfested rivers. These were mostly wild fish, which have been nearly decimated by a parasite spread through "hatchery/fish farm" stockings. The smolts that are stocked in salt water fish farms are reared as fry in fresh water hatcheries.

In November, Svein Mehli, head of the division of the Directorate for Nature Management concerned with protection of wild salmon in Norway, testified for Skagit County before the State Shorelines Hearing Board. Mehli reported the escape into Norway waters of thousands of pen-reared salmon carrying furunculosis, the appearance of bacterial kidney disease in farmed stock, the presence of redmouth disease in 300 salmon pens — a disease previously unknown in Norway — and of his concern about "other diseases knocking at the door." Given these facts, we disagree with Boyle's position that "environmental arguments against fish farms are essentially specious."

Boyle objected to de Yonge's extrapolation of the targeted 100 fish pens to the sewage equivalent of Seattle's sewage outfall — as "scientifically absurd." But Boyle can find a graph on pages 133 and 134 of the draft Programmatic Environmental Impact Statement to which he referred that shows that 100 pens will load Puget Sound with biological oxygen demand (organic sludge) 150 percent higher than that of the West Point plant, and add an amount of dissolved nitrogen to the embayments equal to that from this sewage plant. We think de Yonge stated things correctly.

In Norway, which has much smaller farms than are permitted here, pens are moved every couple of years, to try to mitigate environmental problems. Moreover, they are located closer to the open water at the mouth of fjords. In some regions, alternate fjords are kept free of pens to create security zones between sites.

Atlantic salmon can become diseased in their pens and they do escape. This year commercial fishermen have recorded many Atlantics caught along with native salmon south of San Juan Island and between Bellingham and Point Roberts. Escaped Atlantics have been picked up in the Nooksack, Skagit and Nisqually rivers. These are adult fish, apparently ready to breed. We feel that there remains a possibility that they will breed, that they will become established and that they will compete on the breeding grounds with native salmonids — how successfully neither we nor Boyle knows yet. The presence of potentially diseased pen escapees among breeding natives poses a danger that in our opinions is

Boyle must be well aware of the current concern about appearance of viral hemorrhagic septicemia (VHS) in resident salmonids and doubtless has seen the U.S. Fish and Wildlife Service summary of March 3, 1989, which reports that this virus is confirmed in yearling coho and steelhead trout and fall chinook salmon fry from the Makah hatchery. We assume that he is aware of the opinion from the U. S. Fish and Wildlife Service that the logical, though not proved, avenue for entry of this new disease is via Atlantic net-pen culture. If these are proved to be "specious arguments," then we can drop them.

Is it fair for "the working stiffs" on the gillnet boats, purse seiners and reef boats — white and Indian alike — to be crowded off their fishing grounds, or worse, to have their resource diminished? Should clam growers, who have husbanded their rich resource for three generations, be forced to contend with pollution from a fish pen?

In order to generate new jobs and revenue, a wiser course for our state would be to accept the mitigation measure in the draft EIS — to culture salmon in tank farms. These should be on privately owned land with effluent monitored and regulated by permit and then discharged into deep water. In this way the negative impacts of floating mariculture — navigation hazards, storm-caused breakup of pens, dissemination of disease, release of untreated wastes, difficulties with antibiotics and impairment of aesthetics — would be eliminated. Lastly, land-based fin-fish culture would place the costs of this industry on those who profit from it.

■ Dr. Arthur H. Whiteley is professor emeritus of zoology at the University of Washington; Dr. John W. Brookbank is professor emeritus of microbiology and cell biology at the University of Florida; Dr. Annamaria K. Johnstone is a marine microbiologist. Soapbox columns are contributed by readers.

Senator Eliason

Juneau Empire
2-20-90

Japanese buying up Norwegian fish

Surplus of pen-reared fish threatens Alaska's seafood markets in Japan

THE ASSOCIATED PRESS

ANCHORAGE — Norwegian fish farmers are attempting to sell a huge surplus of pen-reared salmon in Japan, long the main market of Alaska seafood processors.

The 88 million pounds of frozen fish could add to an already glutted Japanese salmon market, and drag down prices for this summer's Alaska salmon harvest, according to a U.S. embassy cable from Japan.

More than 80 percent of Alaska's salmon goes to Japan, most of it frozen.

The Norwegians so far have been unable to sell most of their frozen fish, but may cut prices in order to move it, according to the cable released by the U.S. International Trade Administration. If that happens, the Norwegian salmon "will be a threat to U.S. frozen, chum, coho and sockeye salmon," the cable said.

"If they dump it on the market, that would create one hell of a mess," said Roger Dahlke, market-

ing manager for Trident Seafood, a Seattle processor with plants in Bristol Bay and the Aleutians.

Dahlke said Trident is currently trying to sell a lot of Alaska salmon in Japan. But the company is making little headway in a market swamped with both fresh farm-raised fish and frozen fish left over from last season.

As of December, wholesale prices for sockeye salmon had dropped by more than a third from summertime levels, according to Pacific Fishing Magazine. Prices haven't moved much since then, according to industry officials.

Bill Atkinson, publisher of a seafood newsletter that tracks Japanese markets, doubts the Norwegians will be willing to drop their price low enough to compete on the glutted frozen market.

"The Norwegians are not really interested at selling at a loss," Atkinson said. "And the Japanese are not going to accept a high price for them when there are all the other less ex-

pensive fish available."

But one unnamed importer cited in the embassy cable said at least 44 million pounds of the frozen Norwegian fish probably will end up in Japan, knocking down salmon prices just as Alaska's annual harvest begins.

"This scenario, if true, is very critical for U.S. salmon fishermen," embassy officials said. Japanese buyers might import Norwegian salmon in an attempt to force down Alaska salmon prices during pre-season negotiations, the cable said.

"With this type of volume they could start eroding traditional (Alaska) sockeye markets," said Gary Ervin, president of the Kenai Peninsula-based Seafoods From Alaska.

Pen-reared salmon production has been expanding rapidly since the Norwegians pioneered the aquaculture technology in the early 1980s. Salmon farming has been banned in Alaska but is legal in Europe, South America, the South Pacific, Canada and the Pacific Northwest.

Farmers feed the salmon until they reach market size. They offer the fish fresh on a year-round basis. Most Alaska salmon is sold frozen or canned.

Within the past five years, farm-raised salmon have taken over most of the European market, as well as much of the East Coast market, according to a report by the state-funded Alaska Finfish Farming Task Force Force.

Last year Norway produced more than 330 million pounds of salmon, a nearly 60 percent increase from 1988, and farmers have been unable to sell all that fish.

That production, combined with a record Alaska salmon harvest and a strong Japanese chum harvest, created a huge glut on the worldwide market. The amount of unsold fish is estimated by the state finfish task force at more than 200 million pounds. That equals the entire 1989 export of Alaska salmon to Japan.

When Norwegian fish farmers could not sell all their fish, they froze large amounts and began pushing it toward Japanese markets long claimed by Alaska.

"I think the impact of farm-reared salmon on traditional Alaska markets is profound, and simply going to accelerate," said Chuck Becker, Anchorage district director of the U.S. Commerce Department's International Trade Administration.

ADDITIVES to the Environment of Net-Pen Reared Fish
Pacific Marine Fisheries Commission 42nd Annual Meeting
Seattle, Washington, October 16-18, 1989

PHD Arthur H. Whiteley and Annamarie Johnstone

We have been asked to address our remarks to the matter of additives to the environment of net-pen reared fish. In this particular forum, we assume the emphasis should be on additives that may have an impact on humans when these fish come to market, rather than the impact on the plant and animal communities in the natural environment, though these are not wholly separable.

By its very nature, net-pen rearing of salmon requires the use of numerous chemicals, sometimes in large amounts, some used in the fresh water hatcheries to produce the fry and smolts, some used in the grow-out period in the marine pens, and others used during processing of the fish for the market. Partial lists are shown in Table 1, compiled from Austin and Austin, 1987, from a 1988 report for the Nature Conservancy Council by the University of Stirling, and from other sources.

The lists include chemicals used in salmon and in other forms of fish culture, both in this country and in foreign countries. Inasmuch as farmed fish are imported from some of these other countries, inclusion of these chemicals in the lists may be relevant to the matter of seafood surveillance in the United States marketplace.

Chemotherapeutics. The most relevant additives for present purposes are antibiotics and therapeutants used to control bacterial diseases. Because of stress, disease may cause losses of 30-40%, sometimes higher. Diseases in salmon farms include *Vibrio anguillarum* (vibriosis), *Aeromonas salmonicida* (furunculosis), *Aeromonas hydrophila* (hemorrhagic septicemia), *Yersenia ruckeri* (red mouth), *Vibrio salmonicida* (Hitra disease), *Renibacterium salmonarum* (bacterial kidney disease). To combat these diseases, medicated food containing antibiotics is supplied. In Washington, the FDA approved antibiotics and therapeutants are oxytetracycline (OTC), Romet 30 (sulfadimethoxine and orhomoprim) and sulfamerazine. In addition, Tribissen (sulfadiazine and trimethoprim) is used in Norway and Scotland, and in British Columbia erythromycin is used to control BKD. In Japanese fish culture a wide variety of antibiotics has been used, but has recently restricted the use of chemotherapeutics in cultured fish (Aoki, 1988, pers. comm).

In the US, Norway, BC and Scotland, doses of drugs are as indicated in Table 1B. It is anecdotal, however, that additional amounts of antibiotics are used by farmers, who may mix the drugs with feed and binders. Control of use of antibiotics in Norway and Scotland is regulated by veterinarians, and this is supposed to be the case in B.C. In the British Isles it is apparently easy to find legal loopholes to permit other antibiotics and doses to be used (Austin and Austin, 1987). In Washington fish farmers are supposed to notify the Department of Fisheries if they use antibiotics, but veterinarian supervision is not required. Generally approval exists for only therapeutic use of these

drugs. Nonetheless they often are used prophylactically inasmuch as sick fish may not take the medicated food.

There appears to be no medical or public health supervision or regulation here, or in the other fish farming countries, on the use of antibiotics and chemotherapeutics other than the requirement of FDA approval of the three drugs and their dosages. There appears to be no monitoring by agencies of the use of these drugs or their persistence in marketed fish.

The amounts of drugs used are enormous. In Norway last year, 48 metric tons (105,000 lbs) of OTC alone were used - more than in animal husbandry and human health uses combined (Mehli, 1988, pers. comm. and press accounts). This figure has grown from 13,691 lbs in 1984 (Midtlying, 1985). The 1984 figure for Tribissen, nitrofurazolidon and sulfamerazine is 30,204 lbs (Midtlying, 1985). Comparable figures for British Columbia and Washington are not at hand. Assuming the dosages cited earlier for the 13 Washington pens, calculation leads to a first approximation of about one ton of OTC, a figure similar to that given by a Washington fish pen operator (Dr. A. Bill, 1989, pers. comm.).

The relevant issue here is "Do these uses affect man?" Consumers clearly would be exposed to residual antibiotics in the fish meat. Because of the potential for these residues producing a serious problem in public health, Japan has recently restricted the use of chemotherapeutics, and does not allow cultured fish to move to market if residual drugs can be detected in fish meat (Aoki, 1988, pers. comm.). The potential for adverse effects has been emphasized by Austin (1988, conference in Vancouver, B.C.; Austin and Austin, 1987). The current regulations for control of such residues are based on admittedly minimal research. The FDA requires a 21 day withdrawal period after the last medicated feeding of OTC and 42 days for Romet 30 before slaughtering for the market. In B.C. the withdrawal period is 42 days, and in Norway 61 days. Very few data exist for measurement of persistence of these drugs in fish flesh after feeding. McCracken et al (1976) measured the presence of trimethoprim in trout muscle 77 days after medication; Salte and Liestøl (1983) calculated that the withholding period for trout receiving OTC should be 100 days at winter temperatures, and for Romet 30 they recommended withdrawal periods of 60 days, above 10°C. All authors emphasize that temperature is a seriously complicating factor - residues of Romet 30 persisted for several months in fish at colder temperatures, leading Salte and Liestøl to recommend using the component drugs only in summer. Clearly these limited data do not support the FDA regulation of 21 days. New, more refined measurements of drug residues in salmon coming to market clearly are needed - a recurrent theme of the Austins. Some of these measurements are being made now at the University of British Columbia by McEriane et al. (1989), and Grondel et al. (1987) have published a pharmacokinetic analysis of OTC distribution in carp. In the absence of more detailed studies, humans ingesting farmed salmon may be receiving subtherapeutic doses of antibiotics. One would like to see regulations established for testing the product, by agencies, as it comes to market to ensure the absence of detectable residues. Methods used should be such as those approved by the National Committee for Clinical Laboratory Standards

used by the Clinical Laboratories, Laboratory Medicine, University Hospital, University of Washington.

The issue extends beyond the limits of the penned salmon. Much of the antibiotic fed escapes into the fluid environment and, notably, into the sediments that accumulate beneath the pens (Jacobsen and Berglund, 1988), where it may be exposed to native fish, shellfish, and other indigenous species, thus providing another avenue to humans who may catch and consume these forms.

The medical consequences of the mis-administration of antibiotics are numerous, and are well discussed in such modern treatises as Goodman and Gilman (1985) and Kucers and Bennett (1987). A number of them are antigenic and elicit immunological hypersensitivity responses; some have toxic effects in various tissues varying with the physiological and health state of the person; some particularly should be avoided during pregnancy; tetracyclines lead to discoloration of infants' teeth and may interfere with bone growth; some, notably the tetracyclines, may lead to the development of superinfections by resistant strains of bacteria; they may interfere with the normal immune response; and the breakdown products of antibiotics, including OTC, can be toxic particularly in individuals with compromised livers. Basically, it is poor medical practice to ingest unneeded antibiotics or deteriorating antibiotics.

Another cluster of problems associated with use and misuse of antibiotics is the generation of strains of pathogenic bacteria that have resistance to the drugs. Such strains have now appeared in essentially all fish culture communities that have been adequately tested. Mostly the resistance factors are carried on R plasmids, which also usually are found to carry resistance determinants for 1 to 8 additional antibiotics, thus showing multiple drug resistance. In high proportions, these R plasmids are transferable to other bacteria, and thus drug-resistance may be disseminated to other ecosystems. Studies at the Centers for Disease Control have shown that outbreaks of salmonellosis could be traced to drug-resistant *Salmonella* derived through the foodchain back to land farms associated with agricultural antimicrobial use (Cohen and Tauxe, 1986). It is prudent to evaluate the possibility for a similar generation of R plasmids in fish farms and their dissemination to human populations in the marketplace. When drug-sensitive populations of pathogens are replaced by drug-resistant populations, then treatment of the affected fish becomes ineffective, and, if the R plasmids are in human pathogens, treatment of patients would be adversely affected. Particularly, it is a general principle that medically important antibiotics, including oxytetracycline, the sulfas and erythromycin, should be restricted in their nonmedical uses to minimize R plasmid selection and transmission.

When antimicrobials are used in fish farms near commercial or recreational shellfish beds, there is the further potential for drug-resistant organisms to be concentrated by the shellfish, through filtration, and thus enter human populations.

Food additives. The dry pellets, fed to the penned fish in the marine environment, contain fish meal, grains, fish oils and carbohydrates, supplemented by minerals and vitamins as indicated in Table 2. While these additives have no direct human import, it is reported that planktonic blooms of

the ichthyotoxic dinoflagellate, *Gyrodinium aureolum*, were enhanced by the biotin in fish farm wastes (Turner et al., 1984). These blooms cause mortalities to cultured fish, and, unfortunately, to wild fish as well (Bullock et al., 1985).

Pigment is added to the feed to produce a colored flesh in farmed salmon, inasmuch as the color of wild salmon flesh is derived from natural food organisms. In Great Britain, the carotenoid canthaxanthin, an analog of astaxanthin common in natural food organisms, is used in the form of carophyll red. It is stated in a report from the University of Stirling that this use is banned in the US because of possible carcinogenic properties of canthaxanthin (NCC Report, 1988). To date a petition for its use has not been submitted to the FDA (FDA, Seattle Office, 1989). A petition is presently under consideration for use of astaxanthin as a colorant. A main local supplier adds canthaxanthin as a colorant. There clearly are gray areas here where research and regulation is sorely needed.

Many wild fish are rich in omega 3, polyunsaturated fatty acids. A higher ratio of omega 3/omega 6 fatty acids is believed favorable for maintaining low cholesterol levels in humans. Cultured fish and other sea foods, because of their artificial diets, may have low levels of omega 3 fatty acids, and thus unfavorable ratios of omega 3/omega 6 (Suzuki et al., 1986; Chanmugam et al., 1986). Consequently, individuals eating farmed salmon in the expectation of gaining this supplement will typically be erring, unless the farmer has specifically added it as a dietary supplement and indicated this in marketing. The dry pellets supplied locally generally do not have omega 3 acids added as a supplement (Moore-Clark Co., 1989, pers. comm.) because these are contained in the fish oils of the fish meal used.

Moist pellets, which are more commonly fed during the hatchery phases of salmon farming, are derived from fish meal that is pasteurized, combined with additives, and frozen. However, moist pellets used in some fish farms in Puget Sound contained *Salmonella* spp. (Draft PEIS, WDF, p. 116, 1989). Moist pellets used in British Columbia have been found to contain *Salmonella* (Kelly, 1988, pers. comm.; Babink, 1988, pers. comm.). In these cases it is unclear whether the pathogens had survived the pasteurization, or had appeared subsequently. These pathogens can persist for a period of time in marine waters, are harbored by fish in polluted waters, without harm to them (Buttiaux, 1963). Marine shellfish can concentrate *Salmonella* and transmit them to humans. There is, therefore, a potential for fish culture to join animal husbandry as a mode for affecting humans in the manner described by Cohen and Tauxe (1986).

Hormones. At this time, hormones are being used in B.C., experimentally and perhaps to an extent in actual culture, to control the sex, size and behavior of penned salmon, both *Oncorhynchus* spp. and *Salmo salar*. Gonadotropin, gonadotropin releasing factor and analogs, and antiestrogens have been used in adult females to modify spawning. Androgens and estrogens are used to cause feminization, and, in combination with other techniques, to produce triploid and tetraploid stocks for production of sterile salmon. A review is provided by Donaldson (1986).

In general, these treatments are used on egg-producing females or on eggs and sperm, and the likelihood of carry-over of hormones to adult, marketable fish is tiny. Anabolic steroids including methyl testosterone,

thyroid hormones, somatotropins, certain pituitary hormones can be used to accelerate growth in juveniles and the timing of smoltification (Donaldson, 1986). If these hormones, or androgens and estrogens, were used for growth acceleration or other effects on near-harvest adults, then there would be cause for concern to human consumers.

Pesticides. A remarkable list of agents are or have been used in salmon culture. Examples are: formalin, malachite green, acriflavin, Nuvan, Neguvon, Chloramine T, MS222, copper sulfate, tributyltin, diquat, in addition to the chemotherapeutics. Some are used in Scotland and Norway which apparently are not used, or not permitted, in the U.S. and B.C. Lists are incorporated into Table 1 of this presentation.

Treatment of salmon lice (*Lepeophtheirus salmonis*). These copepod ectoparasites pose a severe problem for adult penned fish in Scotland and Norway. In Europe, organophosphate pesticides (Nuvan^R (dichlorvos; Scotland) and Neguvon^R (trichlorfon which forms dichlorvos; Norway) are primarily used. Fish are treated by immersion in a concentration of 1 ppm for 1 hr, as needed. In 1984 39,600 lbs of Neguvon were used in Norway (Midtlyng, 1985). They are inhibitors of acetylcholinesterase activity in the cholinergic nervous system. These agents not only kill fish lice, but other crustacea in the environment as well, including commercially important species such as crabs, lobsters and mussels (Egidius and Moster, 1987), and they cause potentially serious problems to the treated fish (Davies and McKie, 1987; NCC Report, 1988). These agents are restricted by the EPA in the U.S. (Seattle EPA Office, 1989). In Washington, the carbamate Sevin^R (carbaryl) has been suggested for use for treatment of salmon lice, and it is used in oyster culture for controlling ghost shrimp. Sevin, also, is an inhibitor of acetylcholinesterase. Sevin has recently been restricted in parts of the United States, and its discharge is regulated by an NPDES permit. BRAVO (chlorothalonil), a fungicide has been suggested for and used recently on fishpen nets, a use banned by EPA because it is a class B carcinogen (EPA, Seattle, 1989).

Disinfectants and Antifoulants. Formalin and malachite green have been used for control of ectoparasites and fungi, usually in the fresh water phases of farming. Malachite green, a potential teratogen (NCC Report, 1988), is now banned. MS-222 is used under certain conditions for anaesthesia, but with a 21-day withdrawal period for clearance from tissues. Hatchery ponds are sterilized with chlorine.

To prevent fouling of nets by growth of algae and encrusting invertebrates, fish farmers have treated nets and pen structures with the antifouling agent, tributyltin (TBT). This substance, at exceedingly low concentrations, has a variety of adverse effects on marine invertebrates and perhaps on vertebrates (Bailey, D.S., 1987). When, in 1987, farmed salmon appeared in the Seattle markets carrying substantial amounts of TBT in their flesh, the state enacted a law prohibiting this use and partially eliminating it from use on boats. A similar law exists in the national statutes, in Great Britain and other parts of Europe. Despite this ban, a Canadian Governmental memorandum on August 11, 1988, titled "Private Salmon Hatcheries and Netpen Facilities, Some Serious Concerns" indicates that 25% of BC pens are still treated with unregistered boat hull paints, sometimes including TBT, which liberate

large quantities of particulate paint into the water, sometimes onto oyster beds, thus creating potential hazards for two kinds of aquacultured products.

If antifoulant is used on nets now, usually it is copper-based. Copper and other heavy metals are highly toxic to many marine invertebrates. Standards for permissible amounts of copper in farmed fish flesh appear to be lacking.

Summary. There are a number of chemicals and additives used in net pen culture now that have the potential for adverse human impact. Often these are used at the discretion only of the user, and with little or no external monitoring. There appears to be little or no input into this regulation by public health agencies.

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Table 1
Chemicals Used in Net Pen Culture of Fish
(From Austin and Austin, 1986; The Nature Conservancy
Report, Scotland, 1988; and other sources)

Chemotherapeutics

Oxytetracycline	Streptomycin
Romet 30 ^R (sulfadimethoxine and orhomprim)	Sulfisoxazole
Sulfamerazine	Kanamycin
Tribissen ^R (trimethoprim)	Fumequine
Erythromycin	Chloramphenicol
Penicillin G	Chloramine T
Oxolinic acid	Acriflavin
Minocycline	Acetic acid
Clindamycin	Formalin
Kitasamycin	Malachite green
Rifampicin	Iodine
Hyamine 3500	Iodophor
Copper sulfate	Benzalkonium
	Nitrofurantoin

Pesticide.

Dichlorvos (Nuvan^R, an organophosphate)
Trichlorfon (Neguvon^R, an organophosphate)
Carbaryl (Sevin, a carbamate; used in oyster culture)
Diquat

Antifoulants and Disinfectants

Tributyl tin - now banned
Copper paint
Bitumen
Chlorine
Chlorothalonil

Anaesthetics

MS-222 (tricaine methane-sulfonate)
Benzocaine
Carbon dioxide

Food additives

Colorants-canthaxanthin
Minerals
Vitamins
Omega 3 fatty acids

Table 1B
Doses of Antimicrobials Commonly Used in Salmon Net-pen Culture

Antimicrobial	Dose, mg/kg of fish/day	Days of Treatment
Oxytetracycline	75	10
Romet 30	50	5
Sulfamerazine	220	14
Tribissen	30	10
Erythromycin	10-25, or unspecified	4-21

These regimens are repeated 2 or 3 times a year

Table 2
Mineral and Vitamin Food Additives
in Salmon Pellets
(Data from Nature Conservancy Council Report 1988, and
Moore-Clark Analysis)

Minerals

Calcium phosphate
Magnesium sulfate
Sodium Chloride
Potassium chloride
Iron sulfate
Zinc sulfate
Copper sulfate
Manganese sulfate
Cobalt sulfate
Chromium chloride
Ethylenediamine dihydroiodide
Selenium

Vitamins

Thiamine hydrochloride
Riboflavin
Calcium pantothenate
Niacin
Pyridoxine hydrochloride
Biotin
Folic acid
Cyanocobalamin
Inositol
Ascorbic acid
Choline chloride
Menadione
alpha tocopherol acetate
p-aminobenzoic acid
Retinol acetate
Vitamin A
Vitamin B12
Vitamin D3
BHA-BHT, antioxidant

Alaska Water Resources Board
Resolution No. 89-22

Possible Impacts of Fish Farming

WHEREAS: A strong market for fresh salmon and therefore a demand for rearing areas exists for pen reared salmonid fin fish.

WHEREAS: The State of Alaska has an abundance of salt and fresh water environments ideally suited for this economic activity.

WHEREAS: There is a persistent and ever growing clamor on the part of fin fish growers to have Alaskan water resources made available to them.

WHEREAS: The State of Alaska has a very large, extremely valuable wild fish population distributed throughout the state upon which very valuable commercial, subsistence and recreational fisheries are also dependent.

WHEREAS: After an initial period of very rapid growth and expansion into lucrative markets for their product the fin fish industry elsewhere in the world is now beset with problems of disease, parasitic infestations and escapement of penned stocks leading to the degradation of wild salmon stocks.

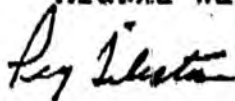
WHEREAS: There are among the so far identified dangerous diseases and infestations those that are demonstrably able to be transported from country to country and from continent to continent under present conditions.

WHEREAS: Among these afflictions there are disease infestations for which there is no known treatment and parasitic infestations which once established would require the roetione treatment of entire river systems to eradicate.

NOW THEREFORE BE IT RESOLVED: The Alaska Water Resources Board recommends that there be no fin fish farming of salmon or trout in Alaska until it can be established that the disastrous consequences of inadequately regulated fin fish farming now being experienced in other parts of the world will nor occur here; and

NOW THEREFORE: The Board further recommends that the Fin Fish Task Force created but not funded by the 15th Alaska Legislature be reactivated, funded and charged with the task of assembling the necessary information to assure that fin fish farming, if allowed, will not constitute a deadly hazard to our wild stocks.

Adopted this 9th day of March, 1989
Alaska Water Resources Board



Peg Tileston, Chairwoman
Alaska Water Resources Board

Copies of
Sen. Fahrenkamp's
CS of 3-26-90
(\$ sectional analysis)

Probably newer versions
coming - check dates

STATE OF ALASKA THE LEGISLATURE

POUCH Y. STATE CAPITOL
JUNEAU, ALASKA 99811
907 465 3800

LEGISLATIVE AFFAIRS AGENCY

MEMORANDUM

April 23, 1990

SUBJECT: Sectional Summary of SB 195(); An Act prohibiting the aquatic farming of salmon in marine or estuarine water of the state; relating to commercial finfish farming and aquatic farm and hatchery permits, certification of private fish pathologists, salmon hatchery permits, the fishery business tax, commercial culture of fish for exhibition or aquarium purposes, and labeling of finfish aquatic farm products; and providing for an effective date.

TO: Senator Bettye Fahrenkamp

FROM: George Utermohle *GU*
Legislative Counsel

This memorandum is a sectional summary of SB 195(), dated 3/26/90.

A summary of a bill is not an authoritative interpretation of the bill. The bill itself is the best statement of its contents.

Section 1 of the bill sets out the findings of the legislature and various policies of the state relating to finfish farming.

Section 2 of the bill amends AS 16.05.092 by adding a new duty to the Fishery Rehabilitation, Enhancement and Development (FRED) Division in the Department of Fish and Game. The FRED division shall establish a program for certification of private fish pathologists.

Section 3 of the bill amends the definition of "fish or game farming" in AS 16.05.940 by deleting references to fish, as a result only the term "game farming" would be defined.

Section 4 of the bill amends the conditions attached to private nonprofit salmon hatchery permits under AS 16.10.420.

Salmon eggs or resulting fry or smolt sold to a private nonprofit salmon hatchery by the state or other approved parties may not be resold or transferred without the approval of the Department of Fish and Game. Private nonprofit salmon hatcheries are authorized to sell surplus fry and smolts, as well as surplus eggs, to the department or to other private nonprofit salmon hatcheries.

Section 5 of the bill amends AS 16.05.450(a) to allow private nonprofit salmon hatcheries to sell fry and smolts, as well as eggs. The operator of the hatchery must then use these proceeds from the transaction for operating costs and the fisheries activities of the regional association.

Section 6 of the bill amends AS 16.40.100(a) in order to allow a person to construct or operate a hatchery to supply finfish to an aquatic farm if the person obtains a permit from the commissioner of fish and game.

Section 7 of the bill repeals and reenacts AS 16.40.100(b) in order to allow a person who has an aquatic farm or hatchery permit to buy and sell stock and aquatic farm products used or raised at the aquatic farm or hatchery. The current restrictions relating to the sale of shellfish stock are deleted.

Section 8 of the bill amends AS 16.40.100(c) in order to allow the commissioner of fish and game to attach conditions relating to water treatment standards for discharge water to aquatic farm and hatchery permits.

Section 9 of the bill repeals and reenacts AS 16.40.100(d) in order to prohibit the commissioner of fish and game from issuing a permit for aquatic farming of or hatchery operations involving a subspecies, race, or variety of Pacific salmon that does not occur and reproduce in water of the state or of an Alaska-Canada transboundary river. The prohibition against issuing permits for aquatic farming of Atlantic salmon is retained.

Section 10 of the bill amends AS 16.40.100 by adding a new section prohibiting the commissioner from issuing an aquatic farming permit for aquatic farming of Pacific salmon in nets, pens, or enclosures in the marine or estuarine waters

of the state. Aquatic farming of Pacific salmon may be permitted only at an upland location.

Section 11 of the bill amends AS 16.40.105 by adding a reference to finfish in the criteria relating to the siting of aquatic farms and hatcheries.

Section 12 of the bill amends AS 16.40.120(a) in order to require an acquisition permit for acquisition of finfish from wild stocks to supply an aquatic farm or hatchery. A person may not obtain an acquisition permit for finfish unless the person has already received a finfish brood stock license from the department.

Section 13 of the bill amends AS 16.40.120(c) by exempting the take of finfish for stock of an aquatic farm or hatchery under an acquisition permit from the restrictions placed on commercial, sport, and subsistence fisheries.

Section 14 of the bill adds a new section to AS 16.40 establishing the finfish brood stock license.

An aquatic farm or hatchery that engages in aquatic farming of finfish may only acquire finfish stock from the department or another aquatic farm or hatchery and possess finfish only under the terms of a finfish brood stock license issued by the department. The conditions attached to the finfish brood stock license are set out. The most notable conditions provide that an aquatic farm or hatchery may not sell or transfer live finfish or live finfish gametes except for specified purposes and that ownership of, and commercial rights in, the genetic material of finfish brood stock and its succeeding generations are retained by the department.

Section 15 of the bill amends AS 16.40.130 by adding finfish to the list of aquatic farm stocks that cannot be imported in to the state unless authorized by the Board of Fisheries.

Section 16 of the bill amends AS 16.05.140(a) in order to allow an aquatic farm hatchery to transfer aquatic farm stock to the department. Finfish stock may be sold or transferred only to the department or to an aquatic farm or hatchery that has an aquatic farm permit and a finfish brood stock license.

Section 17 of the bill amends AS 16.40.160 by adding a new subsection that requires the commissioner of fish and game

to adopt regulations prohibiting the use of lethal means to control vertebrate predators at aquatic farms and hatcheries and to establish guidelines for nonlethal control of vertebrate predators.

Section 18 of the bill makes a technical amendment to AS 16.40.170 in order to conform with sec. 19 of the bill.

Section 19 of the bill amends AS 16.40.170 by adding a new subsection that makes it a class C felony for an aquatic farm or hatchery to engage in the farming of a finfish species, subspecies, race, or variety that is not authorized by a permit and license issued under AS 16.40.100 - 16.40.199.

Sections 20 - 22 of the bill amend the definition of "aquatic farm product", "hatchery", and "stock" by adding finfish to the list of organisms included within each definition.

Section 23 of the bill amends AS 16.40.199 by adding a definition of "Pacific salmon".

Section 24 of the bill amends AS 16.40 by adding a new section relating to the commercial culture of fish for exhibition or aquarium purposes. The department may issue permits for the possession, propagation, and sale of native and exotic fish for certain purposes. The department may adopt regulations necessary to protect native fish from the activities permitted under this section.

Section 25 of the bill amends AS 17.20 by adding a new section relating to the labelling of finfish aquatic farm products.

Section 26 of the bill amends AS 43.75.015 by adding a new subsection providing that aquatic farm products are subject to the fishery business tax imposed on fish processors.

Section 27 of the bill provides that the bill takes effect immediately.

Original sponsor(s): Resources Committee

1 IN THE SENATE

BY THE RESOURCES COMMITTEE

2 CS FOR SENATE BILL NO. 195 (Resources)

3 IN THE LEGISLATURE OF THE STATE OF ALASKA

4 SIXTEENTH LEGISLATURE - SECOND SESSION

5 A BILL

6 For an Act entitled: "An Act prohibiting the aquatic farming of salmon in
7 marine or estuarine water of the state; relating to
8 commercial finfish farming and aquatic farm and
9 hatchery permits, certification of private fish
10 pathologists, salmon hatchery permits, the fishery
11 business tax, commercial culture of fish for exhibi-
12 tion or aquarium purposes, and labeling of finfish
13 aquatic farm products; and providing for an effective
14 date."

15 BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

16 * Section 1. FINDINGS AND POLICY. (a) The legislature finds that

17 (1) proposals to establish a marine-based salmon farming indus-
18 try in the state have been very controversial, and public response in many
19 coastal communities dependent upon wild salmon resources has been negative;

20 (2) land-based finfish farming is very similar to the state's
21 existing hatchery programs and has a well-documented history of minimal
22 effects on the health of wild finfish stocks and on the environment;

23 (3) the Alaska Finfish Farming Task Force concluded that aquatic
24 farming of nonsalmon finfish species in net pens and land-based aquatic
25 farms poses much less risk to wild finfish stocks than does marine-based
26 salmon farming;

27 (4) establishment of a finfish farming industry in the state
28 should proceed cautiously with appropriate safeguards for the protection of
29 the health of the state's wild salmon stocks;

1 (5) the best interests of the state are served by prohibiting
2 aquatic farming of salmon in the marine environment but authorizing other
3 forms of aquatic finfish farming.

4 (b) It is the policy of the state that

5 (1) the Department of Fish and Game and the Board of Fisheries
6 assist the development of finfish aquatic farms by assisting finfish
7 aquatic farms in obtaining finfish brood stock from surplus production of
8 brood stock by state hatcheries and private hatcheries authorized under
9 AS 16.10.400 or from wild stocks of finfish;

10 (2) scientific research projects relevant to the commercial
11 finfish farming industry be incorporated into the fishery research programs
12 of the Department of Fish and Game and the University of Alaska;

13 (3) aquatic farming of Arctic char and Dolly Varden, steelhead
14 and rainbow trout, sablefish, and sheefish, as well as Pacific salmon in
15 fresh water and salt water at upland locations, be permitted in the state.

16 * Sec. 2. AS 16.05.092 is amended to read:

17 Sec. 16.05.092. DUTIES OF DIVISION OF FISHERIES REHABILITATION,
18 ENHANCEMENT, AND DEVELOPMENT. The division of fisheries rehabilita-
19 tion, enhancement, and development shall

20 (1) develop and continually maintain a comprehensive,
21 coordinated state plan for the orderly present and long-range re-
22 habilitation, enhancement, and development of all aspects of the
23 state's fisheries for the perpetual use, benefit, and enjoyment of all
24 citizens and revise and update this plan annually;

25 (2) encourage the investment by private enterprise in the
26 technological development and economic utilization of the fisheries
27 resources;

28 (3) through rehabilitation, enhancement, and development
29 programs do all things necessary to insure perpetual and increasing

1 production and use of the food resources of Alaska waters and conti-
2 nental shelf areas;

3 (4) make a comprehensive annual report to the legislature,
4 containing detailed information regarding its accomplishments under
5 this section and proposals of plans and activities for the next fiscal
6 year, not later than 20 days after the convening of each regular
7 session;

8 (5) establish a program for certification of private fish
9 pathologists qualified to provide fish pathology services to the state
10 and private fish culture facilities and to conduct inspections of fish
11 hatcheries, fish farms, and other fish culture facilities on behalf of
12 the department. *apply only*

13 * Sec. 3. AS 16.05.940(14) is amended to read:

14 (14) "[FISH OR] game farming" means the business of prop-
15 agating, breeding, raising, or producing [FISH OR] game in captivity
16 for the purpose of marketing the [FISH OR] game or game [THEIR] prod-
17 ucts, and "captivity" means having the [FISH OR] game under positive
18 control, as in a pen [, POND,] or an area of land [OR WATER] that is
19 completely enclosed by a generally escape-proof barrier; [IN THIS
20 PARAGRAPH, "FISH" DOES NOT INCLUDE SHELLFISH, AS DEFINED IN AS 16.40.-
21 199;]

22 * Sec. 4. AS 16.10.420 is amended to read:

23 Sec. 16.10.420. CONDITIONS OF A PERMIT. The department shall
24 require, in a permit issued to a hatchery operator, that

25 (1) salmon eggs procured by the hatchery must be from the
26 department or a source approved by the department;

27 (2) no salmon eggs or resulting fry be placed in waters of
28 the state other than those specifically designated in the permit;

29 (3) no salmon eggs or resulting fry or smolt, sold to a

1 permit holder by the state or by another party approved by the depart-
2 ment, may be resold or otherwise transferred to another person, unless
3 the resale or transfer is approved by the department;

4 (4) no salmon be released by the hatchery before department
5 approval, and, for purposes of pathological examination and approval,
6 the department shall be notified of the proposed release of salmon at
7 least 15 days before the date of their proposed release by the hatch-
8 ery;

9 (5) diseased salmon be destroyed in a specific manner and
10 place designated by the department;

11 (6) adult salmon be harvested by hatchery operators only at
12 specific locations as designated by the department;

13 (7) surplus eggs from salmon returning to the hatchery or
14 resulting fry and smolt, be made available for sale first to the de-
15 partment and then, after inspection and approval by the department, to
16 operators of other hatcheries authorized by permit to operate under
17 AS 16.10.400 - 16.10.470;

18 (8) if surplus salmon eggs or resulting fry or smolt are
19 sold by a permit holder under (7) of this section [TO ANOTHER PERMIT
20 HOLDER], a copy of the sales transaction be provided to the depart-
21 ment;

22 (9) [REPEALED

23 (10)] a hatchery be located in an area where a reasonable
24 segregation from natural stocks occurs, but, when feasible, in an area
25 where returning hatchery fish will pass through traditional salmon
26 fisheries.

27 * Sec. 5. AS 16.10.450(a) is amended to read:

28 (a) Except as otherwise provided in a contract for the operation
29 of a hatchery under AS 16.10.480, a hatchery operator who sells salmon

1 returning from the natural waters of the state, or sells salmon eggs
2 or resulting fry or smolt to another hatchery operating under AS 16.-
3 10.400 - 16.10.470 or to the department, after utilizing the funds for
4 reasonable operating costs, including debt retirement, expanding its
5 facilities, salmon rehabilitation projects, fisheries research, or
6 costs of operating the qualified regional association for the area in
7 which the hatchery is located, shall expend the remaining funds on
8 other fisheries activities of the qualified regional association.

9 * Sec. 6. AS 16.40.100(a) is amended to read:

10 (a) A person may not, without a permit from the commissioner,
11 construct or operate

12 (1) an aquatic farm; or

13 (2) a hatchery for the purpose of supplying aquatic plants,
14 finfish, or shellfish to an aquatic farm.

15 * Sec. 7. AS 16.40.100(b) is repealed and reenacted to read:

16 (b) A permit issued under this section authorizes the permittee,
17 subject to the conditions of AS 03.05 and AS 16.40.100 - 16.40.199, to
18 acquire, purchase, offer to purchase, transfer, possess, sell, and
19 offer to sell stock and aquatic farm products that are used or reared
20 at the hatchery or aquatic farm.

21 * Sec. 8. AS 16.40.100(c) is amended to read:

22 (c) The commissioner may attach conditions to a permit issued
23 under this section that are necessary to protect natural fish and
24 wildlife resources, including standards for treatment of water dis-
25 charged by a hatchery or aquatic farm to prevent the spread of disease
26 and pollution of fish and wildlife habitats.

27 * Sec. 9. AS 16.40.100(d) is repealed and reenacted to read:

28 (d) Notwithstanding other provisions of law, the commissioner
29 may not issue a permit under this section for the farming of or