

ALASKA LEGISLATURE COMMITTEE FILES, 1989-1990 8672
5806 HOUSE JUDICIARY

CORRECTION

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HOUSE COMMITTEE REPORT

(9)

Date Referred: January 19, 1990

FURTHER REFERRALS:

JUDICIARY

Date of Committee Action: 3/14/90

The RESOURCES Committee considered:

HB 432

HOUSE BILL NO. 432

PROHIBITION OF FINFISH FARMING

"An Act prohibiting finfish farming; and providing for an effective date."

RECOMMENDATIONS:

- [X] be replaced with CS HB 432 (RES) [] the same title
[] a new title
[] have attached amendment(s)
[X] do pass
[] do not pass
[] no recommendation
[] individual recommendations
[] additional referral to the _____ Committee

ADOPTS: _____ letter of intent

ATTACHES NEW FISCAL NOTE(s):
(Dept)

APPROVES PREVIOUS:

(Date/Dept)

[] fiscal impact _____

[] fiscal note(s) _____

[] zero fiscal note _____

[] zero fiscal note(s) _____

[] zero with analysis _____

[] zero fn/analysis _____

SIGNING DO PASS:

Cliff Davidson

Ben Fry

Mike Havens

Bill Hark

Mike Jones

SIGNING:

(Check approp. column)

	Do Not Pass	No Rec	Amend
<i>Cliff Davidson</i>	X		
<i>Ben Fry</i>		✓	

Cliff Davidson
Chairman's Signature



STATE OF ALASKA
OFFICE OF THE GOVERNOR
BILL ANALYSIS

DEPARTMENT Fish and Game	DIVISION FRED	BILL NUMBER SB 397/ 1987	SPONSOR Eliason, et. al., Grussendorf, et. al
SHORT TITLE OF BILL Prohibition of finfish farming			
DEPARTMENT POSITION Neutral			
PREPARED BY Brian J. Allee, Ph. D.	DATE 2/1/90	COMMISSIONER'S SIGNATURE <i>Brian J. Allee</i>	DATE 2/8/90

SUMMARY

OTHER AGENCIES AFFECTED BY BILL Dept. of Environmental Conservation, Dept. of Natural Resources, Dept. of Commerce and Economic Development, OMB, Div. of Governmental Coord.	CONSTITUENT GROUPS AFFECTED BY BILL Commercial fishermen, sport fishermen, PNP hatchery operators, Regional Aquaculture Associations, Recreational Interests, Upland owners and Managers.
ORGANIZATIONAL SUPPORT FOR BILL UFA, various commercial fishing groups and environmental groups	ORGANIZATIONAL OPPOSITION TO BILL Potential private for profit fish farmers

FISCAL IMPACT NONE FISCAL NOTE ATTACHED

BACKGROUND/LEGISLATIVE INTENT

SEE ATTACHED

ANALYSIS OF BILL PROGRAM EFFECTS

SEE ATTACHED

AMENDMENTS PROPOSED

SEE ATTACHED

PLEASE ATTACH A SEPARATE SHEET FOR ADDITIONAL COMMENTS OR ANALYSIS.

FISCAL NOTE

REQUEST:

Revision Date: _____ Agency Affected: Fish and Game
 Title: Prohibition of finfish farming BRU: FRED
 Sponsor: Elison et al., Gussendorf, et. al Components: _____
 Requestor: Steve Cowder

EXPENDITURES/REVENUES: (Thousands of Dollars)

OPERATING	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96
PERSONAL SERVICES						
TRAVEL						
CONTRACTUAL						
SUPPLIES						
EQUIPMENT						
LAND & STRUCTURES						
GRANTS, CLAIMS						
MISCELLANEOUS						
TOTAL OPERATING	0	0	0	0	0	0

CAPITAL	0	0	0	0	0	0
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REVENUE	0	0	0	0	0	0
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FUNDING: (Thousands of Dollars)

GENERAL FUND	0	0	0	0	0	0
FEDERAL FUNDS	0	0	0	0	0	0
OTHER	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0

POSITIONS:

FULL-TIME	0	0	0	0	0	0
PART-TIME	0	0	0	0	0	0
TEMPORARY	0	0	0	0	0	0

ANALYSIS : - (Attach a separate page if necessary)

FY 90
See attachments.

Prepared by: _____
 Division: ADFG, Fish Division

Phone: 465-4160
 Date: 1/20/90

Approved by Commissioner: [Signature]
 Agency: ADFG

Date: Feb 5 1989

Distribution (by preparer):
 Legislative Finance
 Legislative Sponsor
 Requestor
 Office of Management and Budget
 Impacted Agency(ies)

Bill Analysis SB 397/HB432

Background/Legislative Intent

In 1987, the Alaska State Legislature passed SB 297 placing a one year moratorium on finfish farming. The following year HCS SSSB 514 was passed, authorizing the farming of shellfish and aquatic plants, extending the moratorium on finfish farming until July 1, 1990, and establishing the five-member Alaska Finfish Farming Task Force. The shellfish farming program is currently being implemented. HCSS SB 514 also contained a provision for inland farms in closed waters. The Board of Fisheries however, denied a proposal to make surplus coho eggs available to an interior-based applicant proposing to operate a recycle hatchery. In doing so, the Board of Fisheries asserted that public policy questions pertaining to brood stock acquisition and the privatization of a public resource were questions that should be addressed by the legislature, rather than set by precedent by the Board.

Although the task force was authorized in 1988, it was not funded until last spring. The members were appointed by Governor Cowper and began work last July. The task force recently issued its report and recommended that prior to the end of the moratorium on July 1, 1990, the legislature take statutory action to expressly allow or prohibit finfish farming. SB 397 would prohibit finfish farming by not allowing a person "to grow or cultivate finfish in captivity or under positive control for commercial purposes." As drafted, the state and PNP hatcheries would remain unaffected.

Amendments Proposed

On Page 2, lines 1-5, the third finding asserts that serious disease and genetic risks are posed to wild stocks. As the FRED Division has stated on the record, in legislative hearings and to the task force, if a properly managed, regulated, and funded pathology and genetics program were in place, similar to that run by the FRED division for current public and private non profit hatcheries, then commercial farming of finfish would not pose a serious risk to the health and genetic integrity of wild stocks.

Sale of finfish under a scientific or educational permit is not allowed currently. Accordingly on Page 3, Section 2, the department recommends deleting item 3.

With regard to Section 2, item 4, the department recommends extending the sentence. After the word "ponds", insert: "provided these fish are not reared or released into waters of the state."

Original sponsor(s): REP. GRUSSENDORF, Ulmer, Goll, Davidson, Navarre,
Wallis, Hudson, Taylor, C.Davis, Jacko, Kubina, MacLean, Swackhammer

1
2 IN THE HOUSE

3 CS FOR HOUSE BILL NO. 432 ()

4 IN THE LEGISLATURE OF THE STATE OF ALASKA

5 SIXTEENTH LEGISLATURE - SECOND SESSION

6 A BILL

7 For an Act entitled: "An Act prohibiting finfish farming; and providing
8 for an effective date."

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

10 * Section 1. FINDINGS. Based on a legislative examination of the
11 potential effects of allowing finfish farming in the state on the common
12 property resources and on the overall economic well-being of the state; the
13 number of serious concerns associated with finfish farming and the need for
14 study of finfish farming that has caused the legislature to enact two
15 moratoriums on finfish farming and establish a nonlegislative task force to
16 study the issue and to report its findings and recommendations to the
17 legislature; a review of the final report of the Alaska Finfish Farming
18 Task Force which notes several possible benefits and some serious risks of
19 finfish farming; the need for the legislature to take action before the
20 current moratorium on finfish farming expires on July 1, 1990; the recom-
21 mendation of the task force that the legislature not extend the moratorium,
22 but make a final determination to either allow or prohibit finfish farming;
23 and the testimony and evidence received; the legislature finds that

24 (1) the state has the healthiest stocks of wild salmon and other
25 wild finfish in the world and benefits from thriving commercial, sport, and
26 subsistence fisheries for these fish and a growing tourism industry related
27 to sport fishing;

28 (2) the people, economy, and environment of the state are depen-
29 dent in large measure upon the continued health of the state's wild finfish

1 resources;

2 (3) serious risks are posed by commercial finfish farming,
3 including the spread of disease among wild fish by farmed fish, genetic
4 intermingling of wild fish stocks with genetically manipulated farmed fish,
5 degradation of water quality near finfish farms, and land use conflicts
6 over the siting of commercial finfish farms;

7 (4) the state has invested significantly in marketing efforts to
8 promote Alaskan finfish as wild and natural fish products, and this invest-
9 ment in developing the reputation of Alaskan finfish would be lost by
10 allowing commercially farmed finfish to be produced and marketed from
11 Alaska;

12 (5) the cost to the state to regulate the commercial finfish
13 farming industry would be high;

14 (6) few jobs would be generated by a commercial finfish farming
15 industry in the state;

16 (7) the state is responsible for ensuring the protection and
17 wise use of the renewable natural resources of Alaska and providing a
18 framework for a sound economy;

19 (8) a long-term decision must be made regarding the future of
20 commercial finfish farming in the state;

21 (9) avoiding harm to the state's wild finfish, land, and water
22 resources must take precedence over the development of a new speculative
23 and potentially harmful commercial finfish farming industry;

24 (10) the best interests of the state are served by prohibiting
25 commercial finfish farming.

26 * Sec. 2. AS 16.40 is amended by adding a new section to read:

27 Sec. 16.40.210. FINFISH FARMING PROHIBITED. (a) A person may
28 not grow or cultivate finfish in captivity or under positive control
29 for commercial purposes.

1 (b) This section does not restrict

2 (1) the fishery rehabilitation, enhancement, or development
3 activities of the department;

4 (2) the ability of a nonprofit corporation that holds a
5 salmon hatchery permit under AS 16.10.400 to sell salmon returning
6 from the natural water of the state, as authorized under AS 16.10.450,
7 or surplus salmon eggs, as authorized under AS 16.10.420 and 16.10.-
8 450;

9 (3) rearing and sale of ornamental finfish for aquariums or
10 ornamental ponds provided that the fish are not reared in or released
11 into water of the state.

12 * Sec. 3. This Act takes effect July 1, 1990.
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A tale of two islands

One Maine Island community decided to try salmon farming to supplement its traditional income from fishing; the other said, "No way."

By Nancy Griffin
Field Editor

The craggy, convoluted coast of Maine is studded with many islands where shrinking communities of rugged individuals stubbornly cling to a year-round way of life that grows increasingly more difficult to maintain.

Two such communities are Swans Island and Vinalhaven, somewhat different in size but with many common features. Most of the year-round families on both islands have lived there for generations. Most of those families now depend solely on lobstering for their livelihood, which means they saw their incomes drop during the past year along with the price of lobster.

There's another common thing: each community was approached during the past two years by companies from off-island wishing to establish salmon farms. Here the differences begin. Vinalhaven residents resoundingly and unequivocally rejected the aquaculture idea, while Swans Island people wrestled with, studied, argued about and finally accepted the notion.

"We have to use the sea," says Bruce Colbeth of the Swans Island Fishermen's Co-op. "Not everyone wants to be a lobster fisherman, and we don't have the option of commuting 20 miles to work, or bringing raw materials to the island, putting them together and shipping them out. We either work on the island or move out."

Swans Island is 7,500 acres with 350 year-round residents. Summer residents swell the population to 800. Vinalhaven, reached by ferry from Rockland, has 1,200 year-round residents and a summer population that reaches nearly 6,000.

Town officials in Vinalhaven were approached in September 1987 by a Norwegian representing a company called Atlantic Salmon (Maine) Inc. Frank Gjerset sought a 10-year lease for 25 acres of bottom off Vinalhaven, a specific site adjacent to the White Islands area.

"The first most townspeople heard of the proposal was a sheet of paper posted around town announcing the public hearing," says Victoria Dyer, who was then Vinalhaven's town manager. "It would have been nice if a representative of the firm came in first and explained to people what they wanted to do."

Observers say this failure to approach people and win them over to the idea probably did more harm to Atlantic Salmon's cause than anything else. The proposed lease area was prime lobster and scallop bottom, heavily used by the island's fishermen. Not only did lobstermen fear loss of access to the 25-acre spot, but they worried about contamination to nearby bottom from salmon droppings, antibiotics used in the pens, chemicals used in the fish food and diseases such as those that plagued Norwegian fjord-based pens and Swedish pens more than a year ago.

Islanders also expressed concern that the Norwegian company would bring workers from off-island, and, while local fishermen would lose some of their traditional fishing territory, little of the revenue generated by Atlantic Salmon would stay on Vinalhaven.

Five hundred Vinalhaven residents flocked to the public hearing in February 1988 ready to show their opposition to the proposal. They never had the chance. The meeting ended at 2 a.m. with the company still presenting its case and townspeople asking questions.

Officials decided to continue the public hearing in April, when townspeople who had signed up as interveners could present their side. In the interim, the town held a non-binding referendum on the proposal, and voters rejected the idea, 5 to 1. Shortly before the scheduled reconvening, Atlantic Salmon withdrew its proposal.

In a letter to the Commissioner of Marine Resources, the company said its reasons for withdrawing included the emotionalism and misinformation raised by some opponents.

"There's a lot of emotionalism, but also people who attended the meeting had legitimate concerns that were not addressed," says Emily Lane, the current Vinalhaven town manager, then a selectman.

"I did a lot of research, and I still think it's a terrible idea," says Maudeann Warren of Vinalhaven. Her husband, Roger, is a sixth-generation lobsterman. "They talk about jobs, but the average is only about three to five jobs per farm. I think it's tragic to see big corporations taking the life blood of small communities," she says.

A Different Approach

Swans Island residents watched the process with fascination. Just as the Vinalhaven saga was ending, they were approached about a salmon farming operation. The approach, however, was different.

"One man from Ellsworth came and talked first to me," says Colbeth, himself a former lobsterman who plans to return his traps in a few years. "We were interested. But we'd just read in the papers the bad things about aquaculture, so we did a lot of research. We kept an open mind."

Fishermen were invited to discuss the proposal presented by Mariculture Products Ltd. and decide if they wanted to investigate it further. "After that," says Colbeth, "they were the ones with the most to lose."

After three informational discussion meetings, the lobstermen told Colbeth to pursue the project. Together, they checked 465-acre Toothacher Cove, parts of which were heavily lobstered while other parts were not lobstered at all. The ones who fished in those areas were willing to give up for the good of Swans Island.

Then in March, things went haywire, Colbeth reports. "We found handfuls of papers this thick under windshields and the co-op — all over the island — full of bad stuff about salmon farming. After I read three or four pages, I felt sick. The president of the co-op read it and suddenly turned against the project," he says.

Colbeth, however, felt the information packets represented propaganda. "I said, 'I've got to find out the truth.'" He drove to Canada, visited several fish farms, interviewed lobstermen in New Brunswick communities with a video camera, and viewed videos that divers took periodically of the bottom under the pens at 50 different sites.

"The first two questions I asked everyone were: What about salmon pollution? And what about antibiotics?" says Colbeth. "I don't even know how they can call it pollution. What are they going to do, stop all the fish from going to the bathroom in the water? Fish have to excrete. Pollution is not the right word; it's just a scare tactic word."

"One farm I looked at was beside fish weirs, and it also had lobster and clam flats right next to it," says Colbeth. "Everyone I talked to was happy. A lobsterman there who was the biggest opponent of salmon farming now has 25 pens of his own. I said he was wrong."

The sea farming operations Colbeth toured were small, tidal action was strong and no buildup showed under the pens. In addition, Colbeth says the aquaculture ventures were mainly owned by small operators who were often lobstermen.

One of the damning things found in packets distributed on the island was a newspaper picture of a clammer holding a fistful of slime described in the caption as salmon gurry from a pen site. When Colbeth went directly to the office of the *Saint Croix Courier* and asked about the picture, a staffer provided him with a copy of it.

retraction that had run the following week, explaining that the slime was a form of algae, not salmon gurry.

To quell concerns about antibiotics, Colbeth investigated what was used in Canadian pens. It turned out the two antibiotics used are both U.S. Department of Agriculture approved and are commonly used in lobster pounds to prevent red tail. "No one seems to have a problem with using it in lobster pounds," Colbeth says.

Colbeth also checked out stories about disease-ridden salmon farms in Norway. He found out that the Norwegians moved the pens from the still waters of the fjords to the open ocean to solve the problem.

Opposition

Lee McCarthy summers on Swans Island in a camp situated down the cove from the salmon pens. She opposed the farming operation and still does. She says her opposition arises strictly from environmental concerns.

"They sidestepped every possible environmental protection that was part of the law. Those pens violate Department of Environmental Protection minimums for the depth of water under the pens," says McCarthy.

She says intense political pressure brought to bear by Mariculture Products and the state Department of Marine Resources won a three-year probationary permit from the Army Corps of Engineers for the farming venture despite demands from the Environmental Protection Agency, National Marine Fisheries Service, and Fisheries and Wildlife Service that the project be cut back by 90%.

"I quickly found out the position of state agencies is: This will introduce jobs," says McCarthy. "I understand the state is interested in the economic viability of coastal

Bruce Colbeth (standing) of Swans Island visited salmon farms in New Brunswick and talked to local lobstermen and fishermen about their reactions to the operations before he decided in favor of a farm for his community. James Acheson (sitting), from the University of Maine, supports the idea of salmon farms in the state.

communities, but we think they've jumped head first into a difficult issue with side effects people are just beginning to understand.

"Those fish are dropping 1,500-2,000 lbs. of waste products into the cove every day. Lobstering and scalloping are threatened," says McCarthy, who's read of the dangers of disease and pollution around fish farms in reports from Japan, Scotland and Norway.

"If scallops are in any danger from salmon farming, it won't be in Toothacher Cove," says Swans Island fisherman Kenneth Lemoine Jr. He's scalloped during the winter for several years. In a 15-minute tow where the pens are now, he says, you might get five scallops if you are lucky. "More likely you'd get three, or maybe one. As far as scallops go, that's waste bottom. It's just mud," he says.

"The species most likely to be affected by any pollution around salmon pens are the salmon themselves," says James Acheson, University of Maine professor of anthropology and marine studies and author of *Lobster Gangs of Maine*. Acheson toured salmon farms in Norway and Sweden last year and has read extensively on farming operations in other countries as well.

"To my knowledge, no damage is likely to occur to shellfish," he says. "If there was any pollution, shellfish would be more likely to thrive than the salmon. I see a



more serious conflict between salmon farming and industry. Industry wants the right to add some pollution to the water, and fish farms can't stand any."

In Sweden, Acheson says he saw lots of empty fish pens. Fish had been wiped out in 1988 by disease due to overstocking and fish pens placed too close together. "They just didn't have the tidal flushing to get rid of it like we [in Maine] do," he says.

Comparing other countries or even other coasts to Maine is like comparing apples and oranges, says Acheson. "We probably have the ideal environment for fish farming, and using data from other places

involves an interesting use of mis-scientific information."

Acheson believes the objections most people have to aquaculture revolve around a certain image of the state of Maine. Lobster boats are okay, a few other boats passing by are okay, but looking out at fish pens is not. It ruins the view and makes homeowners worry about property values.

Other Problems

If environmental issues were settled suddenly to everyone's satisfaction, salmon farms in coastal Maine still face economic risks, especially in winter. Superchill, which sometimes lowers coastal water temperatures

dramatically, can kill fish. Predators or storms can rip nets and release the salmon, or allow other predators in to destroy them.

A big difference between the experiences of Swans Island and Vinalhaven is that when Mariculture approached Swans Island, it promised to help set up any residents who wanted to get into salmon farming.

"We're using them for jobs, for expertise, for benefits such as insurance," says Colbeth. "We lose a lot of people from the island because they don't want to go lobstering. It's a hard job, and lobstering means you have to be self-employed. We can't have a year-round community without people.

"This is one of the things that can save our coastline. I think the summer people were the start of all this wild emotional speculation. People who come up for two or three weeks, maybe a month, and they don't want to look at salmon pens.

"It's very unfair to the natives who live here," says Colbeth. "I don't mind true facts; I want to hear it. But saying things that are not true is unfair to the people of the coast of Maine. They've made up some nice ones, I'll tell you.

"Fishermen hear it, and it is scary what they're saying. So the fishermen get behind them, like on Vinalhaven. We heard the same stories, but we investigated them and found out they're just not true."

New Brunswick provincial officials and biologists have been compiling a database of information during the past 10 years about the many salmon pens operating in their province.

"Initially, we took the strong position that we wanted to go relatively slow on the numbers of fish in cages; that's one reason the videos show it's clean under the pens. Tidal action is another," says Russell Henry, biologist with New Brunswick's Department of Fisheries and Aquaculture.

"Our whole objective is to carry out environmental studies to establish, from a solid data base, what are good levels. We did it more from a disease perspective," Russell explains. "It all goes together. If there are less fish, there is less stress and less potential for disease. The environmental impact will also be less.

"We can foresee pressure for increasing the numbers over the next three or four

years. We want to be able to say, 'Yes, you can,' or 'No, you can't,' based on site-specific data," he says.

Underway

This winter, Swans Island has seven salmon pens on 18 acres, with plans to open another 11 pens in the spring. Unlike other operations — even New Brunswick's, which raft pens together — Swans Island pens each sit alone on an entire acre. No antibiotics are being used, and some of the 204,000 fish are up to 3 lbs.

When the Norwegians started farming, their pens contained between 8,000 and 9,000 fish per cubic foot of water in 3' tides. A Canadian experimental fish farm operator recommends maintaining only 1 lb. of fish per cubic foot of water to insure against disease.

"We actually have only two-thirds of a pound of fish per cubic foot of water and 10' tides," says Colbeth of the Swans Island operation. "We're not taking any chances. There is not a trace of anything under the pens. Divers go down weekly and check it out."

Four people are employed full time now, with several seasonal part-time employees. The plan is that when the operation expands to 18 pens, the farm will have 10 full-time employees.

"I don't blame Vinalhaven for what they did. If fishermen didn't favor it, I wouldn't," Colbeth says. "I understand the company that approached them was going to bring their own people in and not leave much behind. If that was the case, I don't blame them a bit. All I can say, from what I've experienced and seen and from people I've talked to, there's no problem with the bottom under pen sites."

"At the time [of the Atlantic Salmon proposal], I was caught up in the island's [Vinalhaven] position," says former town manager Dyer. "In the meantime, I've followed with interest what's happened on Swans Island, and I've eaten farmed salmon.

"Now I think it's going to be valuable to Maine. I hope the errors that have been made in other places can be avoided. Maybe people on the coast can have another resource so they don't have to depend only on lobsters for their income," Dyer says. □

A laska

M ariculture A ssociation

TO: House Resources Committee

FROM: Rodger Painter
Executive Director

DATE: March 5, 1990

RE: Finfish Farming Information

Attached are two recent articles that may be of some interest to the committee. The Fish Farming International article contains estimates from the UN's Food and Agriculture Organization that worldwide aquaculture production now tops 13 million metric tons worth \$19 billion. When the legislature first started debating the fish farming issue four years ago, the FAO estimated world production at 10 million tons.

Members concerned about market impacts of farmed fish on Alaska salmon should read the article from the Alaska Fisherman's Journal. The article shows the interest of seafood buyers and consumers in fresh seafood, and underscores the importance of Alaska's involvement in finfish farming to meet market demand.

fish farming

INTERNATIONAL

MONTHLY £1.75

JANUARY 199

HARVEST TOPS 13 MILLION TONS

WORLD production of aquatic products by farming is now estimated to be well over 13 million metric tons a year. Based on figures compiled by the Food and Agriculture Organization (FAO), this is a big increase on the earlier estimate of 11 million tons. The value of the harvest is around US\$19 billion.

Details of farm production by species and countries are given in the December 1989 bulletin of the FAO Aquaculture Development and Coordination Program (ADCP), which points out that part of the apparent rise may be due to more countries reporting their aquaculture harvests. Figures are now based on 142 countries and details in the bulletin are for 1987.

The ADCP terminated at the end of 1989 after 13 years. It began officially in 1977 after the big FAO Technical Conference on Aquaculture in Kyoto, Japan. It was funded by the UN Development Program (UNDP) with the purpose of implementing the Kyoto development strategy.

Among its activities to be continued by FAO will be the publication of the bulletin giving production figures.

*— and it's worth
\$19 billion!*

The latest estimate of 13.2 million tons, shows that 11.1

million tons (84 per cent) was farmed in Asia, 1,647,593 tons (7.93 per cent) in Europe, and 449,993 tons (3.41 per cent) in North America.

China again topped the world league in volume of production, with 5.6 million

tons (42.6 per cent of the total). This was followed by the 1,226,190 tons of Japan, 876,788 tons of South Korea, and 746,300 tons of India.

Finfish (6.8 million tons) accounted for 51.4 per cent of world production, seaweeds (3.14 m tons) 23.8 per cent, molluscs (2.67 m tons) 20.2 per cent, and crustacea (574,906 tons) 4.4 per cent.

Alaska
Fisherman's
JOURNAL
March 1990

Alaska Seafood

The View From

by Laurie Underwood

Alaska product. For Alaska fishermen, it's everything. But for a distributor, Alaska product is just a small fraction of the seafood coming in and out of the warehouse from Asia, Latin America and throughout North America. For retailers, Alaska product is one item stocking the seafood counter—which is just one section of the meat department. And for consumers, Alaska seafoods offer a few more options in a supermarket full of the makings for convenient and affordably priced meals.

So how does Alaska product measure up? To find out, the *JOURNAL* called on seafood distributors and retail buyers around the country. Buyers in California, Oregon, Texas, Minnesota and Washington, D.C., offered insight into what Alaska suppliers are doing right and wrong, and how to compete better in today's fickle marketplace.

In a nutshell, buyers rated Alaska product as "top quality." However,

... in terms of a 52-week-per-year business, I don't even consider Alaskan product anymore.



as competition steps up from cultured and imported product, many say that Alaska suppliers need "to modernize"—to provide more fresh product, "retail-ready" processing, and reliable supply and price information. Here's what they said:

HALIBUT:

Demand Is High; Supply Problems Stifle Fresh Sales

The good news is that halibut seems to have a secure market niche around the country, with demand

for fresh halibut high on both coasts and even in the Mid-West.

"I have to say [Alaska suppliers] have a pretty good thing going in that nothing competes with halibut. I know several people that just go crazy with the fresh halibut season. There's nothing like it," says Jeff Dulcich, vice president of sales and marketing for Pacific Sea Food Company based just outside Portland, Ore. PSF operates five distribution plants in California and Oregon. In the Northwest, Dulcich says, the only competition halibut faces comes from consumers who are not familiar with it. "Shark, swordfish and salmon compete with it head on. And cod competes with people who are very price conscious."

The scene is much the same in Los Angeles. At Von's supermarkets of Southern California, seafood buyer Rory Frank says that halibut is his top Alaska item. However, frozen halibut now competes on the freezer case with oranges roughly from New Zealand and sea bass from Chile. Meanwhile, in the fresh case, many customers are lured by lower-priced fish like "red snapper" (rockfish), perch and farmed catfish.

Even with heightened competition, retailers agree that demand for fresh halibut remains strong. "I don't think it competes really with

the halibut is fished because it is so difficult to market and plan a fresh promotion," says Gryska. "It's a carnival atmosphere for the week it comes in and because of weather and everything, you never know if you're going to get it when you run your ad. And then it's gone. So you just got everybody hooked on the product and it disappears."

"We could all sell more halibut if there was more fresh to sell. If the season were longer," says Ken Mills, director of perishables for United Grocers Inc., based outside of Portland, Ore. "And no one has anything to do with that except the government." Many retailers are supporters of the Seattle-based organization F.I.S.H. (Finding Intelligent Solutions to Halibut), which is working to increase fresh halibut availability by extending the season to nine months.

Besides the short season, retailers also complained that it is difficult to get clear information on openings. "The only problem I have with Alaskan seafood, on fresh side is how confusing the seasons are," says Gryska. "For example, here it is the beginning of the year and I am trying to roughly plan out what my advertising schedule will be. I don't know when there's gonna be an Alaska halibut opening. I have an idea it's going to be May. But whether it's the first week or the last week makes a big difference. If it's going to be something that's planned, let's plan it."

Getting information on supply and price can also be a headache for retailers. "One year, I literally had halibut in the air and I could not get a confirmed price," says Gryska. "Every May and every June, people call me up and say, 'Are you going to run any halibut? Are you going to run any salmon?' And I say, 'Sure. How much have you got available?' I don't know. 'What's the price?' I don't know. 'When are you going to have it? Sometime... Do you want to book any? I mean, Give me a break!'"

WILD SALMON: Stiff Competition from the Farms

Many of the difficulties of short supply and lack of information posed by fresh halibut also plague the fresh wild salmon industry. Some retailers are bitter about being excluded from bidding on fresh salmon destined for sale overseas, predominantly to Japan. "When there's no fresh salmon available out of Alaska because it's all being sold for export, that's aggravating for a retailer and to me as a buyer and the consumer on the West Coast," says Mills of United Grocer, in Oregon. "Here we are, one of the 50 states, and Alaska fisheries sell all of [the salmon] overseas. Shame on them. It doesn't instill a whole lot of loyalty. If they get a better price somewhere else, then God bless them. But at least give us a chance to bid."

The primary difference between

any fish, except in some degree with swordfish and shark, being a whitefish fillet," says Peter Gryska, manager of seafood marketing for H.E. Butt Grocery Company, which operates 160 supermarkets throughout Central and South Texas. "I don't think [halibut] compares with other fish. It has its own place."

While buyers are happy with the demand for fresh halibut, most are unhappy with the supply. The chaotic atmosphere of the derby wrecks havoc on retailers' advertising campaigns. "I really object to the way

The Lower 49

supply problems with salmon and halibut is that, with salmon, many buyers have found a convenient alternative: fresh farmed salmon. Many have turned to it as the leading source of their salmon year round.

"What it's done is it's collapsed the frozen market here," says Dulcich, speaking of the Portland market. "They can get fresh fish all year long, and the perceived value of fresh fish is significant in Oregon. In fresh salmon, it's kept the price down in both wild and farmed."

"I am very sold on aquacultured product," echoes Grynska of HEB. "For consistency in price, consistency in quality, consistency in availability, nothing touches the fresh product out of the Northeast. Yes, during the summertime, chums and silvers are lower in cost than the East Coast product, but in terms of a 52-week-per-year business, I don't even consider Alaskan product anymore."

"It's just so easy for us to order farmed product. Why get all these headaches? Farmed product is always there, you're not waiting, whether you want 500 or 5,000 pounds," says John Hoppenjans, seafood buyer for Giant Food Inc. of Washington, D.C. The 148-store supermarket chain carries a small amount of farmed salmon in retail boxes; they carry fresh farmed salmon (mostly from Scotland) year round.

One of the marketing levers that wild salmon suppliers have relied upon is the perception that wild product has a better taste and texture than farmed. Do consumers around the country perceive a quality difference between the two? Retailers say "yes," but add that preferences vary from region to region.

In the Northwest, there is a perception that wild salmon is richer and more flavorful, says Dulcich. "I think right now, wild has the connotation of being better, in Oregon at least." He adds that, for Oregonians, salmon is seen as an Oregon-area product, which has added appeal for consumers.

The perception is quite different in the Midwest, however, says seafood merchandiser Carson Roper of Lunds supermarkets in Minneapolis. "A lot of our customers were brought up on fish sticks. They equate flavor with 'fishy.' They prefer the milder flavor of farmed salmon."

A former Alaska fisherman himself, Roper believes that with a little consumer education, the market for wild salmon will preserve its niche. "There has been a transformation in the industry. But there will always be a market for wild caught salmon," says Roper. "A 7-to-11 pound king salmon is perfect for steaking. A lot of farmed fish is 1-2 or 2-4 pounds. When it comes to steaks, there'll always be a market for wild salmon."

Another hurdle that wild salmon suppliers face today, especially in

the East Coast, is consumer fear of water pollution. Consumers in the Mid-Atlantic region tend to assume that farmed product is "cleaner and healthier" with "less chance of environmental effects," says Hoppenjans of Giant.

POLLOCK: Filets Still Suffer from Name Games; Surimi Secures Market Niche

Some retailers are still feeling the delayed effects of the 1985 FDA ruling that made it illegal to market pollock under the name "snow cod."

Lunds. The Minnesota based chain of eight stores carries four brands of surimi sticks and flakes. Roper feels that surimi markets will continue to grow as new products are developed. "The first generation was crab. Then came lobster, shrimp and

I know several people that just go crazy with the fresh halibut season.



"It's hurt sales, it really has," says Ron Corno, senior meat merchandiser with Fleming Foods of Milwaukie, Ore. Fleming now markets pollock either as pollock or "Alaska Whitefish."

"We had people programmed," says Corno, referring to snow cod. "Now people think it's a different item. It'll take some time to get its credibility back."

"Whitefish is a pretty generic name," adds Fleming meat deli merchandising manager Roger Kirkhart. "It just doesn't make you hungry at the sound of it."

Under any name, pollock faces stiff competition with other lower-end, price-value items, retailers say. "The way we sell pollock, it is competing directly with things like the farm-raised catfish nugget, frozen Canadian cod, and frozen South American filets such as trout and whiting," says Grynska.

Surimi seems to enjoy a more secure market around the country. "It very much has a niche. We use it in ads regularly," says Corno. "I've not seen any decline in movement. As long as Dungeness and Alaska king crab prices stay at the present level, it'll hold its own."

"There's a strong following for surimi. It's convenient, it's an affordable alternative," adds Roper of

scallops. The third generation will be oven ready products. That to me is the next logical step: surimi pot pie, quiches, things like that."

MEETING BUYER DEMANDS: Retailers Want Fresh Fish, Ready-To-Sell

Throughout the country, buyers had three basic messages to Alaska suppliers: We need more fresh fish; we need it on time; and we need more pre-cut, "retailready" product.

"It's a lot of work, but in the end, the customer wants fresh product," says Bruce Steinberg, senior seafood buyer for Giant. "A lot of us out here would love to sell fresh Alaska product. There's a lot more that could be done if they would promote fresh fish."

"It's always a supplier wanting to sell me 40,000 pounds of frozen pollock," adds Hoppenjans. "I want to say, I'm sorry, those days are over. If you want to deal with supermarkets, that is, give me fresh pollock filets and sell it for three times the cost. We want fresh fish in small boxes. Gear it toward my supermarkets, and I'll buy it."

The view was much the same in Los Angeles. "We're gearing up for fresh fish," says Rory Frank of

Von's. "The quality [of Alaska product] is excellent. In frozen fillets, it would be my first choice. But now we are getting more into fresh fish." The chain now sells some 1.8 million pounds of Alaska halibut yearly, as well as salmon and king crab. However, Frank says his overall purchases of Alaska seafood have diminished slightly in the past five years as the store has shifted toward fresh seafood, and flying in other competitively priced species.

The logistics of air shipping fresh Alaska product poses another problem for buyers around the country, and many recounted halibut and salmon shipping nightmares.

"The biggest deterrent to doing product from Alaska is getting it here on a timely basis with the quality that we expect. It hasn't gotten any better in the eleven years that I've been doing it," says Steinberg of Giant. "You'll find product left in Denver, in Chicago, missed connections. Ask anyone who air freights stuff out of Alaska what a nightmare it is to get it to the East Coast. Just when you think you have got something arranged, the airline downsizes to a plane that doesn't carry containers."

"It's a gamble, especially with halibut," added Roper of Lunds. "Everyone wants to be the first. But you can't all be the first."

Lastly, buyers say Alaska product is difficult to get cut-to-order, or

packed in shipment sizes that are convenient for retailers. "There's nothing wrong with the fish. It's gorgeous fish. It's just the processing and handling," says Steinberg. "When the fish is in season, we need steaks and fillets. We can use a substantial amount if we sell an ad, but there aren't many people that are willing to make the extra commitment to selling us the steaks and fillets... The whole mentality is fish in a 40-pound carton with gel ice and a plane that might make it."

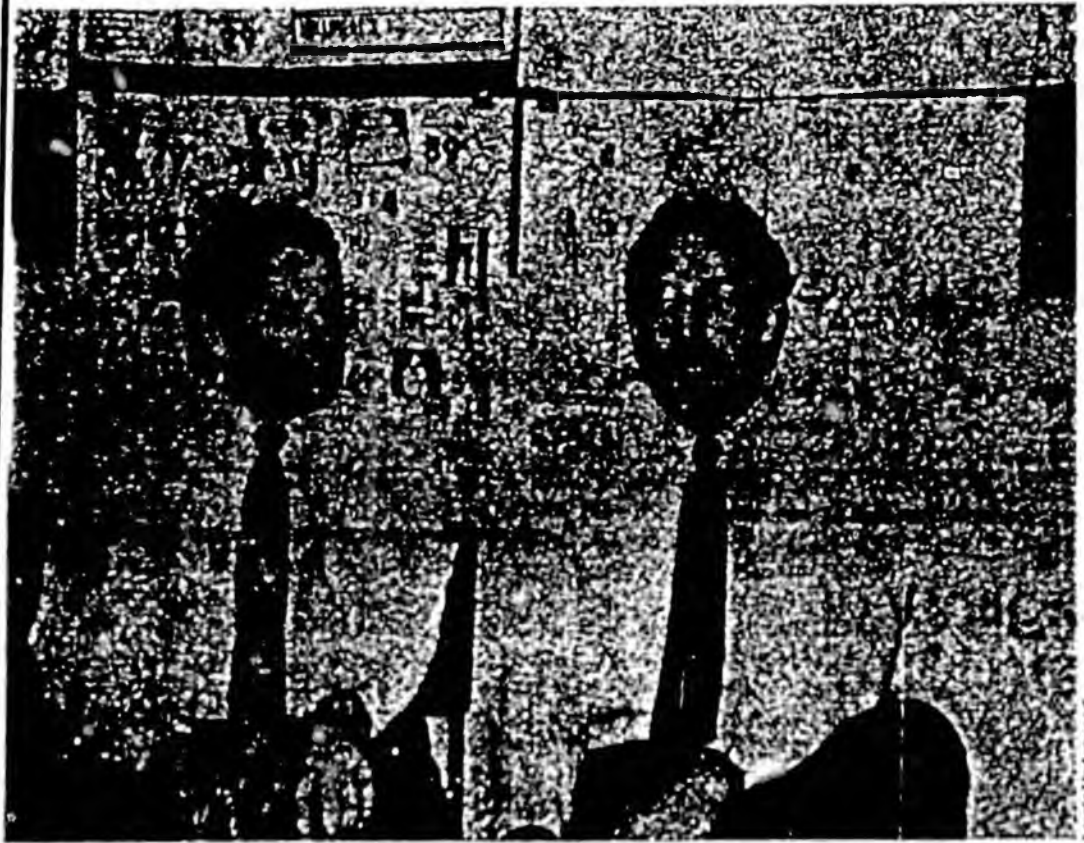
"The main thing is being willing to put product in a retail-ready form. Probably the one package style method that does not meet any specification of what a retail store wants to use is a 50-pound wetlock box. That is such an anathema to a retailer. Even worse is a 100-pound wetlock box," says Gryska. "They're difficult to handle, hard to move around. If people really want to get into business with retailers, they've got to put the product in a package that the retailers can use." Gryska says that most of the frozen product HEB carries comes steaked or filleted and ready to sell.

"If someone on the docks of Alaska wanted more money for their product, they could trim the halibut there. Don't just send it down here with the nape on and the tail on. Cut the wings off, cut the tail off, cut the collar bone off, get it into block-ready form. Then the product is worth more," says Gryska, adding, "[Alaskan processors] are much more adept at processing Alaska product than someone in Texas or Kansas."

**FEEDING THE CONSUMER MARKET:
Stress Health, Convenience**

While buyers say Alaska seafood enjoys a good reputation and healthy demand, competition is fierce and getting fiercer. Ultimately, the fish needs to appeal to consumers. Here's what retailers say about marketing Alaska product to consumers:

*sell more halibut if there was
sell, if the season were longer.'*



ser. Roger Korkhart (left) and Ron Corno of Fleming Foods tell what it takes to sell fish in the

At the consumer level, the seafood industry's biggest competition comes from the rest of the meat department—a fact that few seafood suppliers realize. As Jeff Dulcich assesses the future of the industry, competition from other meats has him a bit worried. "I would think that seafood is in for a little bit of turbulence. One of the concerns that I have is that the beef and chicken councils, all of these other protein items that we compete with, have a good cooperative advertising budget and seafood lacks that," says Dulcich. "You don't compete with just fish, you compete with every protein item in the case—the price of hamburger, the price of chicken."

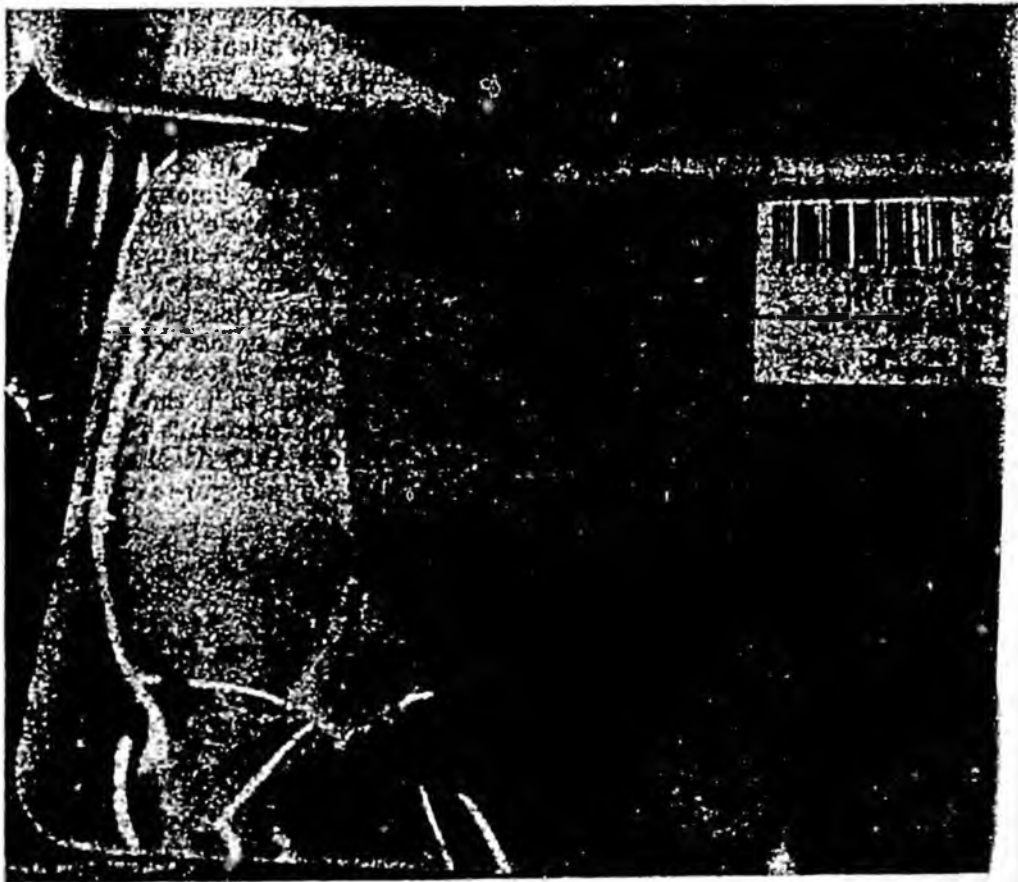
On the up-side, the endorsement of seafood from the medical and health fields should continue to boost seafood sales, says Dulcich. "The American Medical Association has done wonders for the seafood industry. If that continues, I would expect (demand) to continue to grow."

A lot of Alaska seafood's ability to sell boils down to how it is promoted in the stores. Reports on the quantity and quality of literature provided through ASMI varied around the country. All buyers ranked ASMI publications among the best in the nation; however, the four buyers interviewed in Portland complained of receiving virtually no information. ("They do a marvelous job with

what they produce. It's just a matter of getting it to me," says Dulcich, who says he has never been contacted directly by ASMI). Meanwhile in D.C., buyers at Giant say they receive "tons" of ASMI literature, but it isn't promoting the kind of product they are looking for.

"How excited can you get about

*'One year, I literally had halibut
and I could not get a confirmed*



The freezer longliner of
the future is here NOW.

A M
Alaska Marine Safety

the same frozen salmon steak and the same piece of frozen halibut that they've been selling for 20 years?" asks Steinberg, adding that his customers demand fresh fish and are not enticed by the terms "flash frozen" or "fresh frozen" seafood. "If someone from Alaska marketing could get us some fresh product, we'd be excited about it. We could run a beautiful ad: Fresh Alaska sole, air freighted from the icy waters of Alaska...doesn't that sound appetizing?"

'How excited can you get about the same frozen salmon . . . and the same piece of frozen halibut that they've been selling for 20 years?'



"Point of Purchase" materials provide another avenue for promoting Alaska seafood, and most retailers said they could use more of them. "The number one marketing tool is recipes. The next thing after that would be brochures, where they talk about nutrition, handling, various ways of cooking," says Kirkhart of Fleming Foods, who adds that charts can help offset competition with other meat items. "Nutritional charts show how much better for you seafood is than the other proteins."

POP materials can also coax consumers who are unfamiliar with Alaska product into trying it. "A lot of people are still unfamiliar with fish. People are always leery of something new. The easier to prepare the more liable they are to buy," says Carson Roper of Lunds. Overall, Roper says that Alaska product simply competes with many more choices than it used to—a

trend that will continue. "It's a much more competitive industry. Seafood is hot. Even with all the bad press we're getting, it's becoming more and more competitive."

What can Alaska suppliers do to better promote their product? "Cooperate within the industry. It's difficult when you're up in Alaska to think about where your product is going. But we need a dialogue established between retailers and suppliers and fishermen," says Roper. "It reminds me of a poster in a cannery I worked in in Alaska. It said: 'Remember, fish is food'." □

F.I.S.H. Flap

continued from page 13

they're willing to support an individual quota system if it does the job.

F.I.S.H. members say they hear their customers demanding fresh product on a regular basis. What they don't see is why the bulk of a 60-million-pound resource has to be harvested in three or four openings. The derby fishery not only glutts the market, but promotes wastage and poor quality, F.I.S.H. claims.

Led by fish aficionados like Joe Rowley of Fish Works! and executive chef John Melchior of the Pacific Regent in Bellevue, Wash., F.I.S.H. has taken its message not only to the North Pacific Fisheries Management Council and the Halibut Commission, but it's taken the battle to the street corner with

By Rep. Ben Grussendorf and
Sen. Dick Eliason

EXPLANATION OF CS FOR HB 432 AND SB 397
(Draft CS dated 3-12-90)

This proposed committee substitute version of HB 432 (and SB 397) has been drafted in response to concerns expressed by both the Fish and Game Department and the general public about the need to clarify the final section of the bill.

The only changes in this CS from the original HB 432 (and SB 397) are on page three, section 2 (b). This section spells out what activities are allowed once the finfish farming ban is in place. First of all, we deleted the original number (3) as Fish and Game pointed out that sale of fish used for scientific and educational purposes is already not allowed so that exception was unnecessary.

Next, in the sub-section that was number (4) in the original bill and is number (3) in the CS, in the first line the word "ornamental" has been added before "finfish" to more clearly spell out the intent ("ornamental fish" is defined in AAC5.41.100(4)). In that same sub-section, at the request of the Fish and Game Department, we've added the words, "provided that the fish are not reared in or released into water of the state."

Finally, in section 2. (b) (2) we amended the language to make it more clear that private non-profit hatcheries may not do any finfish farming, but may continue to do the "cost recovery" fish sales that they currently do, and may sell surplus eggs to the state or to other PNPs as currently allowed by statute.

None of these changes affect the original intent of the bill, but are designed to simply clarify it.

I would hope that committees would adopt this version to work from in deliberations on HB 432 and SB 397.

See attached copies of statutes and regulation referenced in the new CS.

5 AAC 41.080

5 AAC 41.090

FISH AND GAME

5 AAC 41.100

(g) Stocks of fish in hatcheries or rearing facilities in which a Class II disease has been detected must be immediately destroyed by the permittee if the commissioner or his authorized designee determines that the disease poses a threat to the health and perpetuation of native, wild, or hatchery stocks of fish in the hatchery effluent watershed or the intended release location. (In effect before 1988)

Authority: AS 16.05.251(a)

5 AAC 41.090. DELEGATION OF AUTHORITY. For the purposes of administering this chapter, the commissioner may delegate his authority to designated employees of the department. (In effect before 1988)

Authority: AS 16.05.020
AS 16.05.270

5 AAC 41.100. DEFINITIONS. In addition to the definitions set out in AS 01.10.060 and AS 16.05.940, in 5 AAC 41.001 — 5 AAC 41.100

(1) "completed application" means a form, series of forms, letters, or other documents that provide all of the information necessary for the commissioner or the commissioner's designee to issue, condition, or deny a permit.

(2) "department regional office" means the Alaska Department of Fish and Game, fisheries rehabilitation, enhancement and development division offices located as follows:

Region I — Southeastern Region
230 South Franklin Street
Juneau, Alaska 99801

Region II — Central, Westward and
Arctic-Yukon-Kuskokwim Region
333 Raspberry Road
Anchorage, Alaska 99502

(3) "fish pathology section" means the Alaska Department of Fish and Game, fisheries rehabilitation, enhancement and development division, fish pathology section, located at 333 Raspberry Road, Anchorage, Alaska 99502, telephone (907) 344-0541;

(4) "ornamental fish" means a fish commonly known as "tropical fish," "aquarium fish," or "goldfish," which are imported, cultured, or sold in the state customarily for viewing in aquaria or for raising in artificial systems, and not customarily used for sport fishing or human consumption purposes;

(5) "permit" means a fish transport permit, including any amendment or condition issued or approved by the commissioner or the



P.O. Box 72472
Fairbanks, Alaska 99707
March 7, 1990

Representative Cliff Davidson, Co-Chair
Representative Curt Menard, Co-Chair
House Resources Committee
P.O. Box V
Juneau, Alaska 99811

Dear Representative Davis:

I am currently trying to obtain the required permits to fish farming in the Fairbanks area. After reviewing the bills before your committee, I have learned that the bill intended to prohibit fin fish farming actually allows the type of farm I would like to start, whereas the bill intended to promote fin fish farming would effectively prohibit the type in which I'm interested.

Therefore, I would like you to consider the farming of grayling, rainbow trout, lake trout, burbot, arctic char, and non-food fish such as sticklebacks and minnows for their display as aquarium fish. According to the 1984 Yearbook of Agriculture, tropical fish farming is the fourth largest form of fish farming, underestimated at \$20 million per year. There are now cooler systems available to provide the conditions necessary for keeping cold water fish in aquariums. I would like to take advantage of the Alaska mystique currently found in the lower 48 states and export grayling as an exotic species for aquarium lovers.

For this to work, it is necessary to legally:

- own the fish
- sell the fish to the public
- transport the fish
- obtain brood stock
- make a profit

Thank you for your consideration.


Nick Ericson

cc: House Resources Committee

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

February 14th, 1990

Curt Menard
Rm. 110, Capitol
P.O. Box V
Juneau, AK 99811

Dear Mr. Menard:

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 Halford
Fred Zharoff
Cliff Davidson
Jalmar Kerttula
Mike Navarre
George Jacko

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

Cowper Administration Position on Mariculture

Mariculture may provide substantial economic benefits to our coastal communities and help diversify and stabilize our economy if it is developed in an orderly fashion which provides the maximum benefit to Alaskans while ensuring protection for our fisheries resources, other resource users and the environment. In order to accomplish these objectives, any legislation authorizing a mariculture industry must satisfy the following principles:

1. The mariculture industry must benefit Alaskans.

The mariculture industry must be developed in a manner which does not result in unfair competition with existing fisheries or cause undue economic displacement in our coastal communities. Legislation should, to the extent possible under the law, provide for local hire at mariculture facilities and give preferential access to mariculture permits and mariculture related tidelands leases to Alaskans.

2. The mariculture industry must pay for itself and the state should get a fair return for the use of state resources.

Legislation should contain provisions for recovering administrative and other state costs associated with managing the industry. The legislation should also ensure that the state gets a fair return for the use of tidelands and other resources.

3. The development of the mariculture industry in Alaska should be done in an orderly fashion which encourages a stable, dependable industry.

Legislation should provide general criteria which will lead to the development of a regulatory program which discourages speculation on permits and tidelands leases, encourages sound financial planning, and provides for a diverse industry ranging from "Mom and Pop" ventures to larger corporate operations.

4. The mariculture industry must meet all state and federal requirements for human health, product quality and sanitation.

Legislation should ensure that mariculture facilities meet all state and federal requirements for human health, safety, and sanitation. Legislation should also require that mariculture products meet or exceed

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 ensure 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.



STATE OF ALASKA
OFFICE OF THE GOVERNOR
BILL ANALYSIS

DEPARTMENT Fish and Game	DIVISION FRED	BILL NUMBER SB 397	SPONSOR Eliaison, et. al., Grussendorf, et. al.
SHORT TITLE OF BILL Prohibition of finfish farming			
DEPARTMENT POSITION Neutral			
PREPARED BY Brian J. Allee, Ph. D.	DATE 2/1/90	COMMISSIONER'S SIGNATURE <i>Brian J. Allee</i>	DATE 2/8/90

SUMMARY

OTHER AGENCIES AFFECTED BY BILL Dept. of Environmental Conservation, Dept. of Natural Resources, Dept. of Commerce and Economic Development, OMB, Div. of Governmental Coord.	CONSTITUENT GROUP(S) AFFECTED BY BILL Commercial fishermen, sport fishermen, PNP hatchery operators, Regional Aquaculture Associations, Recreational Interests, Upland owners and Managers.
ORGANIZATIONAL SUPPORT FOR BILL UFA, various commercial fishing groups and environmental groups	ORGANIZATIONAL OPPOSITION TO BILL Potential private for profit fish farmers

FISCAL IMPACT NONE FISCAL NOTE ATTACHED

BACKGROUND/LEGISLATIVE INTENT

SEE ATTACHED

ANALYSIS OF BILL PROGRAM EFFECTS

SEE ATTACHED

AMENDMENTS PROPOSED

SEE ATTACHED

PLEASE ATTACH A SEPARATE SHEET FOR ADDITIONAL COMMENTS OR ANALYSIS.

FISCAL NOTE

REQUEST:

Revision Date: _____
Title: Prohibition of finfish farming

Agency Affected: Fish and Game
BRU: FRED

Sponsor: Elison et. al., Gussendorf, et. al
Requestor: Steve Cowder

Components: _____

EXPENDITURES/REVENUES: (Thousands of Dollars)

OPERATING	FY 89	FY 90	FY 91	FY 92	FY 93	FY 94
PERSONAL SERVICES						
TRAVEL						
CONTRACTUAL						
SUPPLIES						
EQUIPMENT						
LAND & STRUCTURES						
GRANTS, CLAIMS						
MISCELLANEOUS						
TOTAL OPERATING	0	0	0	0	0	0

CAPITAL	0	0	0	0	0	0
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REVENUE	0	0	0	0	0	0
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FUNDING: (Thousands of Dollars)

GENERAL FUND	0	0	0	0	0	0
FEDERAL FUNDS	0	0	0	0	0	0
OTHER	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0

POSITIONS:

FULL-TIME	0	0	0	0	0	0
PART-TIME	0	0	0	0	0	0
TEMPORARY	0	0	0	0	0	0

ANALYSIS : (Attach a separate page if necessary)

FY 90
See attachments.

Prepared by: [Signature]
Division: ADF&G FRED Division

Phone: 465-4160
Date: 1/30/90

Approved by Commissioner: [Signature]
Agency: ADF&G

Date: Feb 8 1989

Distribution (by preparer):
Legislative Finance
Legislative Sponsor
Requestor
Office of Management and Budget
Impacted Agency(ies)

7

Bill Analysis SB 397/HB432

Background/Legislative Intent

In 1987, the Alaska State Legislature passed SB 297 placing a one year moratorium on finfish farming. The following year HCS SSSB 514 was passed, authorizing the farming of shellfish and aquatic plants, extending the moratorium on finfish farming until July 1, 1990, and establishing the five-member Alaska Finfish Farming Task Force. The shellfish farming program is currently being implemented. HCSSSB 514 also contained a provision for inland farms in closed waters. The Board of Fisheries however, denied a proposal to make surplus coho eggs available to an interior-based applicant proposing to operate a recycle hatchery. In doing so, the Board of Fisheries asserted that public policy questions pertaining to brood stock acquisition and the privatization of a public resource were questions that should be addressed by the legislature, rather than set by precedent by the Board.

Although the task force was authorized in 1988, it was not funded until last spring. The members were appointed by Governor Cowper and began work last July. The task force recently issued its report and recommended that prior to the end of the moratorium on July 1, 1990, the legislature take statutory action to expressly allow or prohibit finfish farming. SB 397 would prohibit finfish farming by not allowing a person "to grow or cultivate finfish in captivity or under positive control for commercial purposes." As drafted, the state and PNP hatcheries would remain unaffected.

Amendments Proposed

On Page 2, lines 1-5, the third finding asserts that serious disease and genetic risks are posed to wild stocks. As the FRED Division has stated on the record, in legislative hearings and to the task force, if a properly managed, regulated, and funded pathology and genetics program were in place, similar to that run by the FRED division for current public and private non profit hatcheries, then commercial farming of finfish would not pose a serious risk to the health and genetic integrity of wild stocks.

Sale of finfish under a scientific or educational permit is not allowed currently. Accordingly on Page 3, Section 2, the department recommends deleting item 3.

With regard to Section 2, item 4, the department recommends extending the sentence. After the word "ponds", insert: "provided these fish are not reared or released into waters of the state."

SECRETARY
BEN GRUSSENDORF

P.O. Box 927
SITKA ALASKA 99833
907 747-8458

RULES COMMITTEE
LEGISLATIVE COUNCIL

OFFICE
LEGISLATIVE
COUNCIL
SITKA
ALASKA

Alaska State Legislature



House of Representatives

RULES COMMITTEE CHAIRMAN

MEMORANDUM

TO: House Resources Committee Members

FROM: Rep. Ben Grussendorf

DATE: March 5, 1990

RE: HB 432

I am forwarding the attached material for your information. You may find the articles interesting as you are considering HB 432 which prohibits finfish farming in Alaska.

(c) The hearing shall be conducted by the department. At a hearing for a permit under AS 16.10.400(a)(1), the applicant, shall present a plan for the proposed hatchery, describing the capacity of the hatchery and other relevant facts that may be of interest to the department or the public. Interested members of the public shall be afforded an opportunity to be heard.

(d) The department shall record and consider objections and recommendations offered by the public at the hearing conducted under this section. It shall respond in writing, within 10 days after the hearing is held, to any specific objections offered by a member of the public at the hearing. (§ 2 ch 111 SLA 1974; am § 5 ch 14 SLA 1988)

Effect of amendments. — The 1988 amendment, effective March 31, 1988, repealed and reenacted subsection (c), which formerly related to the transferability of the hatchery permit.

Sec. 16.10.450. Sale of salmon and salmon eggs by hatchery.

(a) Except as otherwise provided in a contract for the operation of a hatchery under AS 16.10.480, a hatchery operator who sells salmon returning from the natural waters of the state, or sells salmon eggs to another hatchery operating under AS 16.10.400 — 16.10.470, after utilizing the funds for reasonable operating costs, including debt retirement, expanding its facilities, salmon rehabilitation projects, fisheries research, or costs of operating the qualified regional association for the area in which the hatchery is located, shall expend the remaining funds on other fisheries activities of the qualified regional association.

(b) Fish returning to hatcheries and sold for human consumption shall be of comparable quality to fish harvested by commercial fisheries in the area and shall be sold at prices commensurate with the current market. (§ 2 ch 111 SLA 1974; am § 5 ch 154 SLA 1977; am § 6 ch 14 SLA 1988)

Effect of amendments. — The 1988 amendment, effective March 31, 1988, designated the formerly undesignated two sentences as subsections (a) and (b), added "Except as otherwise provided in a con- tract for the operation of a hatchery under AS 16.10.480" at the beginning of subsection (a), and made a series of minor stylistic changes throughout the section.

Sec. 16.10.480. Contracts for the operation of state hatcheries.

(a) If the department determines that it is unable to continue operating a state-owned hatchery or that it is in the best interest of the state to provide for the operation of the hatchery by another person or by another person in cooperation with the state, the department may enter into a contract for the operation or cooperative operation of the hatchery.

(b) Notwithstanding AS 36.30, when selecting a contractor under (a) of this section, the department shall give a preference to the re-

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§ 16.10.420

FISH AND GAME

§ 16.10.430

Sec. 16.10.420. Conditions of a permit. The department shall require, in a permit issued to a hatchery operator, that

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

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

(3) no salmon eggs or resulting fry, sold to a permit holder by the state or by another party approved by the department, may be resold or otherwise transferred to another person;

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

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

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

(7) surplus eggs from salmon returning to the hatchery be made available for sale first to the department and then, after inspection and approval by the department, to operators of other hatcheries authorized by permit to operate under AS 16.10.400 — 16.10.470;

(8) if surplus salmon eggs are sold by a permit holder to another permit holder, a copy of the sales transaction be provided to the department;

(9) *[Repealed, § 5 ch 110 SLA 1980.]*

(10) a hatchery be located in an area where a reasonable segregation from natural stocks occurs, but, when feasible, in an area where returning hatchery fish will pass through traditional salmon fisheries. (§ 2 ch 111 SLA 1974; am § 5 ch 110 SLA 1980)

Sec. 16.10.430. Alteration, suspension or revocation of permit. (a) If a permit holder fails to comply with the conditions and terms of the permit issued under AS 16.10.400 — 16.10.470 within a reasonable period after notification of noncompliance by the department, the permit may be suspended or revoked, in the discretion of the commissioner after the regional planning team for the area in which the hatchery is located is notified and granted an opportunity to comment upon the proposed suspension or revocation.

(b) If the commissioner finds that the operation of the hatchery is not in the best interests of the public, the commissioner may alter the conditions of the permit to mitigate the adverse effects of the operation, or, if the adverse effects are irreversible and cannot be mitigated sufficiently, initiate a termination of the operation under the permit over a reasonable period of time under the circumstances, not to exceed four years. During the period of time that the operation is being terminated, the permit holder may harvest salmon under the terms of

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 entire fjords to farming where

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."

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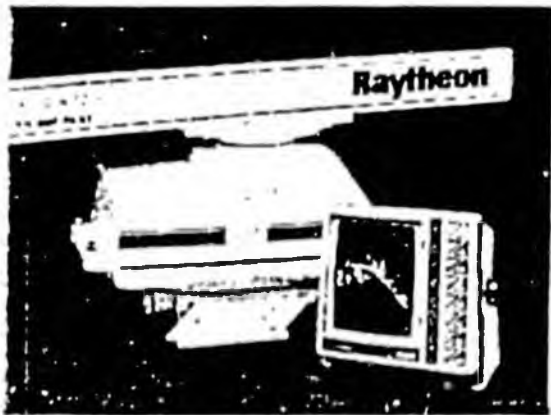
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The Fisherman (B.C.) Dec 188

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.

HEAWI loses close vote

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 (Midtlyng, 1985). The 1984 figure for Tribissen, nitrofurazolidon and sulfamerazine is 30,204 lbs (Midtlyng, 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 McErlane 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 Kucera 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 I 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 orhthomeprim)	Sulfisoxazole
Sulfamerazine	Kanamycin
Tribrissen ^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

Pesticides

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
Tribrissen	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 chorlide
- Menadione
- alpha tocopherol acetate
- p-aminobenzoic acid
- Retinol acetate
- Vitamin A
- Vitamin B12
- Vitama D3
- BHA-BHT, antioxidant

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 *Sechel 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.

A NEW PROBLEM FOR FISH FARMERS

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."

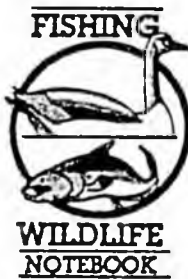
Landholt said they disinfect and destroy all fish in all infected hatcheries as well as those downstream.

Seattle Post-Intelligencer

February 25, 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,

one on 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.

Should corporations use public waters for private profit?

By John de Young
in Olympia

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 60 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 increase any increase of fish farming in the state's waters and to deem any environmental problems that aquaculture may bring.

The official mandatary is the Department of Agriculture's Dr. John Pitta, 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 push back 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 you 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 quota spreading over the large-tributary-depends 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 32 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.

Now 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 rail state attention to limit build-up beneath pens, a build-up that kills clams, oysters and other bottom dwellers and can release poisonous hydrogen sulfide gas, which



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 60 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 Pitta 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, esthetic

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 a 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 Tallfin Inc. proposes, in a main salmon and trout-fishing cove between East Point and Bella Beach on the west side of Whidbey Island, where from her home Margaret Johnston looks out across Saratoga 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 aquatic 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 revolution as the main drive behind the opposition to what he characterizes as a clean, beneficial industry with great prospects.

"It's more than esthetic. It's an intrusion into a life style that they don't like and they're using environmental problems as a cover-up. 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 unwelcome.

"The net pen issue raises a fundamental issue of public policy that involves more than just the environmental questions 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 get it better stated, to site more pens in pristine salt and fresh water (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 should be blind to permit ourselves to putting major sources of pollution in our unpolluted watersheds and in waterways we're trying to clean up.

The frenzy of Norway's rivers demonstrates that

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 Shoreline Hearing Board, with Pitta certain to show up to put the stamp of Gardner's administration on having the permit granted.

Dwan Coffey, 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 ensure 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 scientist running the Paradise Bay Co. net farm at Port Townsend, and John Forster, a Ph.D. in aquaculture running Tall Fin Farm Washington's similar

De Yonge was right on fish-farm perils

By Arthur H. Whiteley, John W. Brookbank and Annemarie 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 carbon is derived from the 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. They 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. Annemarie K. Johnstone is a marine microbiologist. Soapbox columns are contributed by readers.

Senator P. L. ...

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.

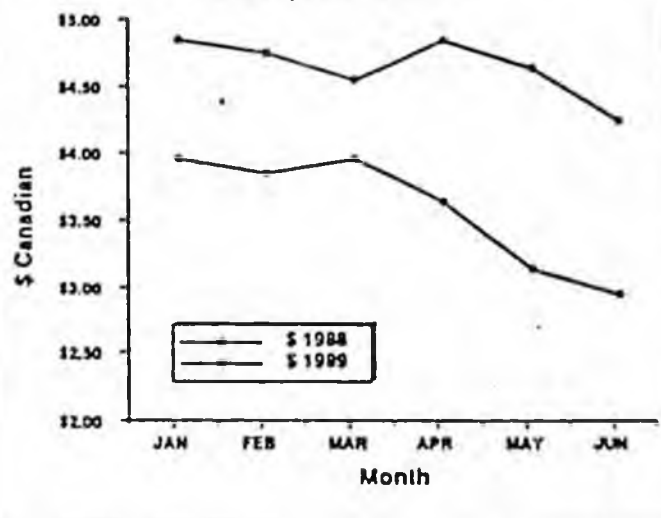
As a general comment, it can be said that the farms with some of the worst financial problems are in the Sechelt area. This is where the goldrush started in 1984

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.

vestment, 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 Sechelt 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

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

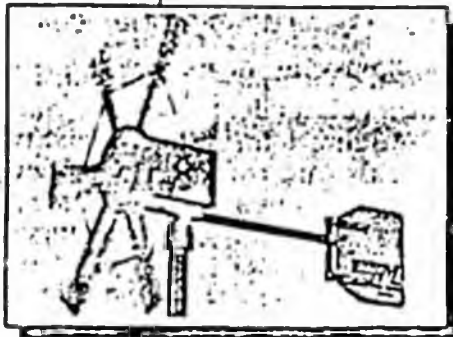
"At the end of the day salmon farming will end up like other producing sectors with only the low-cost producers surviving."

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

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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

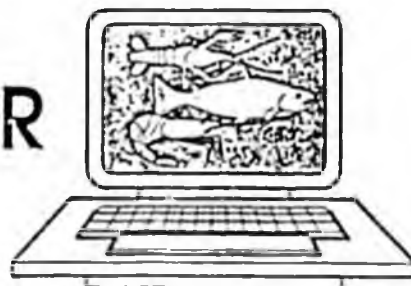
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W. C. SHAKE-OUT

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 fish. It was no surprise that fish in cages moored in the bay were blown 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 installation cages within a few miles of their own, which is why whole rivers in Sweden are allocated to one firm.

From time to time disease outbreaks appear in farmed salmon. Every year Pancreas disease appears 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 jute for food in the confinement of the cages. Right: distribution of the main races of Atlantic salmon

compete with the natives for spawning areas and their young will compete for food. As a result, fewer native fry may survive to set off for the sea as smolts and consequently fewer adult natives will return after a year or more to complete the reproductive cycle. (A young salmon passes through fry, parr, smolt and grilse stages before becoming a mature adult.)

The situation is so serious that regular escapes from farms could eventually wipe out all native salmon. Research in Norway, where salmon have been farmed for much longer than in Scotland or Ireland, shows that in some rivers up to two-thirds of the fish are already of the farmed variety. 'If genetic pollution continues at its present rate, the hereditary variations of some of the river species will be halved within seven years,' says Professor Harald Skjervo whose research findings in this field all point to this alarming conclusion.

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 manages 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. Farms 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



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.'

• 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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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

Please see Back Page, FISH FARMING

Anchorage
Daily News
2-20-90

FISH FARMING: Young industry has run into resistance

Continued from Page A-1

job 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 smolt to fat-bellied salmon 2 feet long.

A half-dozen workers tend the pens from metal walkways, 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 in Norwegian investment capital helped the number of fish farms soar from five to 135 in the past six years. But not 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.

Genetic fears of pen salmon are real

□ By SONJA CORAZZA

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

Page 4 February 27, 1988 Peninsula Clarion

Other View

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.

SONJA 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 Lúdviksson, managing director at Icelandic 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 opportunity. If the króna is devalued, everything will change overnight."

NEWSNET

PROCEEDINGS against Mike Ikenze, the former Icelandic Consul in Nigeria who acted as an intermediary in attempts to sell stockfish from a group of Icelandic producers 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 Eidey 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, Thorbjörn Danielsson and Eiríkur H. Sigurgeirsson, have been assisted by chef Sigmar B. Hauksón in marketing whelk and crab in Sweden 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



In tons	June	Jan-June
	1988 (1987)	1988 (1987)
Cod	80 624 (99 492)	211 500 (200 500)



Hopes high for capelin

The capelin season began on 10 July, with 49 Icelandic vessels sharing a provisional quota of 398,000 tons. With the prices for meal and oil rising because of poor soya harvests in the USA and growing demand in the Far East, hopes are high for a successful season. The quota is to be 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 rivers, which flow through the eastern part of Reykjavik and are popular with local residents, are complaining that large numbers of the salmon they are landing are "escapees" from aquaculture stations and are consequently smaller and less attractive 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 entered Ellidaár, a significant number in terms of the genetic effect on the local stock. Studies from Norway show that up to 10% of the fish in rivers near large aquaculture stations can be "escapees."



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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.

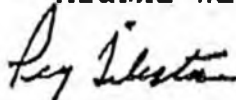
WHEREAS: There are among the so far identified dangerous diseases and infestations those that are demonstrably able to be transported from country to country and from continent to continent under present conditions.

WHEREAS: Among these afflictions there are disease infestations for which there is no known treatment and parasitic infestations which once established would require the routine 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 not 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

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-raised 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.

Alaska Department of Fish and Game
 1225 West 12th Avenue
 Homer, Alaska 99607
 Jan 23, 1990

Dear Resource Committee Members,

Finfish Farming, whether Shore based or in Ocean Pens, if introduced to Alaska's Economics at this time will be disastrous.

As a Alaskan Sport and Commercial Fisherman for 30 years, when Fin Fish Farming was first introduced my interest was overwhelming. To think I could have it all. Thirty years of fishing the most abundant stocks of Sea life any where in the world. And now, Reap the benefits, and do so in my back yard without dealing with mother nature on such a competitive bases, in addition to Flare openings, 24 hour Halibut openings, 1/2 hour Herring openings, total closures on King and Tanner Crab and many other hardships that the Alaskan Fishing Industries along with the State of Alaska and its Tax payers have had to suffer.

After many hours of research and questioning of people in and out of the Fin Fish Industries I am sorry to say, this is one time I CANT HAVE MY CAKE AND EAT IT TO. Here are some of the examples:

1. ADEC involvement
 - a. On site Pollution of diseased fish
 - b. Containment of fish waste and discarded feed
 - c. Disposal of fish carcasses at time of brood stock take
 - d. Drainage of circulation waters needed for Tank Farms, and disposal when polluted
 - e. Standard requirements for Fish processing under State Law
2. Alaska Dept of Fish and Game
 - a. Genetic pollution of wild stocks
 - b. Allocation of broodstock
 - c. Full time monitoring of disease control
 - d. The assurance that disease is not transmitted by bird species
3. U.S. Army CORPS
 - a. Protection of Ecosystem
 - b. Protection of Wet Lands

The list could go on. One that could choke any Alaskan Mom Pop group desiring to enter into this new Field of Farming. What we are trying to convey and hope you will consider is the direct benefit will again be only for a few, as like Limited Entry. And although Fin Fish Farming might well be a Legacy some Senators would like to add to their collection, to not allow the enactment of State laws Banning Fish Farms, is totally Irresponsible to the Tax Payers at this time, and is another burden placed on future generations.

With all the regulations, immense disease and genetic possibilities, high cost of doing business in Alaska, along with unproven marketing due to the increasing numbers of Indian farms in the world, less than a handful of farms could survive. Self benefit and control as access to the risk to the wild stock environment just doesn't add up.

With such a high level of demand with the States Environment and Natural Resources or all Alaskan user groups, you really have bigger and better things to commit yourselves to achieve.

am in full support of Senate bill number 397, and House Bill Number 432

Sincerely,

John W. Hillstrand

John W. Hillstrand

cc: Betty Fannekants
Jaimar Herttula
Richard J. Eliason
Steve Frank
Dick Halford
Anissa Stungulewski
Fred E. Zaroff
Curt Menard
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George G. Jack
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House of Representatives

RULES COMMITTEE CHAIRMAN

MEMORANDUM

TO: Rep. Cliff Davidson
Rep. Curt Menard

FROM: Rep. ^B Ben Grussendorf

DATE: March 5, 1990

RE: HB 432

Attached is a draft CS for HB 432 which I would like to propose for adoption by the House Resources Committee. Senator Eliason (the prime sponsor of the companion bill SB 397) and I drafted this CS in response to concerns expressed by both the Fish and Game Department and the general public about the need to clarify the final section of the bill.

The only changes in this CS from the original HB 432 (and SB 397) are on page three, section 2 (b). This section spells out what activities are allowed once the finfish farming ban is in place. First of all, we deleted the original number (3) as Fish and Game pointed out that sale of fish used for scientific and educational purposes is already not allowed so that exception was unnecessary. Next, at the request of the Fish and Game Department, in the item that was number (4) in the original bill and is number (3) in the CS, we added the words, "provided that the fish are not reared in or released into water of the state."

Finally, in section 2. (b) (2) we amended the language to make it more clear that private non-profit hatcheries may not do any finfish farming, but may continue to do the "cost recovery" fish sales that they currently do, and may sell surplus eggs to the state or to other PNPs as currently allowed by statute.

None of these changes affect the original intent of the bill, but are designed to simply clarify it.

I would hope that the committee could adopt this version to work from in its deliberations on HB 432.

Alaska Mariculture Association

TO: House Resources Committee

FROM: Rodger Painter
Executive Director

DATE: March 5, 1990

RE: HB 432 (Prohibiting Finfish Farming)

House Bill 432 and its companion measure (SB 397) would impose a ban on all finfish farming activities. The Alaska Mariculture Association (AMA) believes this is an unreasonable response to the concerns of fishing groups which have focused on the net pen rearing of salmon in the marine environment.

The Alaska Finfish Farming Task Force spent several months grappling with these concerns, and determined that net pen rearing of salmon can be regulated in a manner minimizing environmental and biological impacts. The task force also stated that upland finfish farms present few potential problems, and the impacts of marine culture of non-salmon species would be much less than salmon in net pens.

While AMA agrees that the marine farming of salmon can be carefully managed to result in minor impacts on wild stocks or the environment, we respectfully request that you take care to separate upland farms and marine culture of non-salmon species from the net pen rearing of salmon. These are very different issues and should not be treated with the broad brush approach of lumping together all forms of finfish farming.

Upland fish farming virtually eliminates the potential for escapees and impacts on the genetic integrity of wild stocks. Likewise, the potential for transfer of disease from fish cultured in upland farms to wild stocks can be eliminated with proper treatment of wastewater discharges.

We urge you to question why operations such as the small-scale coho salmon farm in Fairbanks two years ago should be banned. Under a narrow exception in the three-year moratorium on finfish farming, Andy and Pam Wescott of Fairbanks started farming in tanks in their workshop.

The operation utilized water from a private well, and wastewater was disposed in the city sewer system. The broodstock came from surplus salmon returning to a local stream. The operation had no disease problems, and the director of the state's hatchery program said the fish were very healthy and were in excellent condition.

Yet, the Wescotts were forced to close down their farm when the Board of Fisheries refused to approve the required authorizing regulations.

There are numerous small freshwater salmon, trout and arctic char farms extending throughout the Pacific Northwest as far north as Whitehorse. Should Alaskans be denied these same opportunities? What are the objections to these land-based aquatic farms? Are there valid public policy reasons to ban an environmentally and biologically sound industry?

AMA believes a similar case can be made for the marine farming of non-salmon species, such as arctic char, steelhead, black cod and halibut. We urge you to question the necessity for prohibiting marine net pen culture of these species.

The fishermen's concerns always have been the net pen rearing of salmon. The primary objection to other forms of finfish farming is that it represents the camel's nose under the tent and it might set the stage for later approval of salmon farming. Is that how Alaska is going to diversify its economic base? What kind of statement would be made about the legislature's commitment to economic development by the passage of HB 432 in its present form?

FISCAL NOTE

REQUEST:

Revision Date: _____ Agency Affected: Fish and Game
 Title: Prohibition of finfish farming BRU: FRED
 Sponsor: Elison et al., Gussendorf, et al Components: _____
 Requestor: Steve Cowder

EXPENDITURES/REVENUES: (Thousands of Dollars)

OPERATING	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96
PERSONAL SERVICES						
TRAVEL						
CONTRACTUAL						
SUPPLIES						
EQUIPMENT						
LAND & STRUCTURES						
GRANTS, CLAIMS						
MISCELLANEOUS						
TOTAL OPERATING	0	0	0	0	0	0
CAPITAL	0	0	0	0	0	0
REVENUE	0	0	0	0	0	0

FUNDING: (Thousands of Dollars)

GENERAL FUND	0	0	0	0	0	0
FEDERAL FUNDS	0	0	0	0	0	0
OTHER	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0

POSITIONS:

FULL-TIME	0	0	0	0	0	0
PART-TIME	0	0	0	0	0	0
TEMPORARY	0	0	0	0	0	0

ANALYSIS : (Attach a separate page if necessary)

FY 90
See attachments.

Prepared by: [Signature]
 Division: ADFG, FRED Division

Phone: 465-4160
 Date: 1/20/90

Approved by Commissioner: [Signature]
 Agency: ADFG

Date: Feb 8 1989

Distribution (by preparer):
 Legislative Finance
 Legislative Sponsor
 Requestor
 Office of Management and Budget
 Impacted Agency(ies)

Bill Analysis --

Background/Legislative Intent

In 1987, the Alaska State Legislature passed SB 297 placing a one year moratorium on finfish farming. The following year HCS SSSB 514 was passed, authorizing the farming of shellfish and aquatic plants, extending the moratorium on finfish farming until July 1, 1990, and establishing the five-member Alaska Finfish Farming Task Force. The shellfish farming program is currently being implemented. HCSSSB 514 also contained a provision for inland farms in closed waters. The Board of Fisheries however, denied a proposal to make surplus coho eggs available to an interior-based applicant proposing to operate a recycle hatchery. In doing so, the Board of Fisheries asserted that public policy questions pertaining to brood stock acquisition and the privatization of a public resource were questions that should be addressed by the legislature, rather than set by precedent by the Board.

Although the task force was authorized in 1988, it was not funded until last spring. The members were appointed by Governor Cowper and began work last July. The task force recently issued its report and recommended that prior to the end of the moratorium on July 1, 1990, the legislature take statutory action to expressly allow or prohibit finfish farming. SB 397 would prohibit finfish farming by not allowing a person "to grow or cultivate finfish in captivity or under positive control for commercial purposes." As drafted, the state and PNP hatcheries would remain unaffected.

Amendments Proposed

On Page 2, lines 1-5, the third finding asserts that serious disease and genetic risks are posed to wild stocks. As the FRED Division has stated on the record, in legislative hearings and to the task force, if a properly managed, regulated, and funded pathology and genetics program were in place, similar to that run by the FRED division for current public and private non profit hatcheries, then commercial farming of finfish would not pose a serious risk to the health and genetic integrity of wild stocks.

Sale of finfish under a scientific or educational permit is not allowed currently. Accordingly on Page 3, Section 2, the department recommends deleting item 3.

With regard to Section 2, item 4, the department recommends extending the sentence. After the word "ponds", insert: "provided these fish are not reared or released into waters of the state."

Sec. . AS 16.40.100 is amended by adding a new subsection to read:

(e) The commissioner may not issue a permit under this section for the aquatic farming of finfish in nets, pens, or other enclosures located in the marine or estuarine water of the state. Aquatic farming of finfish may be permitted only at an upland location.

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

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

(1) a subspecies, race, or variety of Pacific salmon that does not occur and reproduce in the state or the water of rivers that cross the border between the state and Canada;

(2) Atlantic salmon.

Sec. . AS 16.40.130 is amended to read:

Sec. 16.40.130. IMPORTATION OF AQUATIC PLANTS, FINFISH, OR SHELLFISH FOR STOCK. A person may not import into the state an aquatic plant, finfish, or shellfish for the purpose of supplying stock to an aquatic farm or hatchery unless authorized by a regulation of the Board of Fisheries.

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

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

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

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

(1) an aquatic farm; or

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

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

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

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

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

* Sec. AS 16.40.105 is amended to read:

Sec. 16.40.105. CRITERIA FOR ISSUANCE OF PERMITS. The commissioner shall issue permits under AS 16.40.100 on the basis of the following criteria:

(1) the physical and biological characteristics of the proposed farm or hatchery location must be suitable for the farming of the finfish, shellfish, or aquatic plant proposed;

(2) the proposed farm or hatchery may not require significant alterations in traditional fisheries or other existing uses of fish and wildlife resources;

(3) the proposed farm or hatchery may not significantly affect fisheries, wildlife, or their habitats in an adverse manner; and

(4) the proposed farm or hatchery plans and staffing plans must demonstrate technical and operational feasibility.

* Sec. AS 16.40.120(a) is amended to read:

(a) A person may not acquire aquatic plants, finfish, or shellfish from wild stock in the state for the purpose of supplying stock to an aquatic farm or hatchery required to have a permit under AS 16.40.100 unless the person holds an acquisition permit from the commissioner.

* Sec. AS 16.40.120(g) is amended to read:

(g) Aquatic plants, finfish, and shellfish acquired under a permit issued under this section become the property of the permit holder and are no longer a public or common resource.

* Sec. AS 16.40.120(c) is amended to read:

(c) The commissioner shall specify the expiration date of an acquisition permit and may attach conditions to an acquisition permit, including conditions relating to the time, place, and manner of harvest. Size, gear, place, time, licensing, and other limitations applicable to sport, commercial, or subsistence harvest of aquatic plants, finfish, and shellfish do not apply to a harvest with a permit issued under this section. The commissioner [OF FISH AND GAME] shall issue or deny a permit within 30 days after receiving an application.

* Sec. AS 16.40.140(a) is amended to read:

(a) A private hatchery required to have a permit under AS 16.-40.100 may sell or transfer stock from the hatchery only to the department, to an aquatic farm or other hatchery that has a permit issued under AS 16.40.100, or to a hatchery that has a permit issued under AS 16.10.400; except that shellfish stock may also be sold or offered for sale to an aquatic farm or related hatchery outside of the state.

* Sec. AS 16.40.199(2) is amended to read:

(2) "aquatic farm product" means an aquatic plant, finfish, or shellfish, or part of an aquatic plant, finfish, or shellfish, that is propagated, farmed, or cultivated in an aquatic farm and sold or offered for sale;

* Sec. AS 16.40.199(5) is amended to read:

(5) "hatchery" means a facility for the artificial propagation of stock, including rearing of juvenile aquatic plants, finfish, or shellfish;

* Sec. AS 16.40.199(8) is amended to read:

(8) "stock" means live aquatic plants, finfish, or shellfish acquired, collected, possessed, or intended for use by a hatchery or aquatic farm for the purpose of further growth or propagation.

* Sec. AS 43.75.015 is amended by adding a new subsection to read:

(d) Aquatic farm products produced at an aquatic farm are subject to the tax levied under this section.

4/3/90

...To whom it may concern,

I am in full support of House Bill 432 to prohibit finfish farming in Alaska. I have been a resident of Alaska since 1959 and have been a commercial fisherman for 17 years. The uncertainties of finfish farming are very scary to me as well as my entire crew. I am also a veterinarian in Anchorage so my income is not entirely based on fishing but I strongly feel that the commercial fishing industry is vital for Alaskan economy. I feel it would be a big mistake to allow finfish farming in Alaska.

Thank you for your consideration.

Sincerely,

Riley K. Wilson DVM

Riley K. Wilson D.V.M.

2101 Tudor Hills Dr

Anch AK 99507

hm 561-4657

wk 563-3945.

Original sponsor(s): REP. GRUSSENDORF, Ulmer, Goll, Davidson, Navarre,
Wallis, Hudson, Taylor, C.Davis, Jacko, Kubina, MacLean, Swackhammer

1
2 IN THE HOUSE

3 CS FOR HOUSE BILL NO. 432 ()

4 IN THE LEGISLATURE OF THE STATE OF ALASKA

5 SIXTEENTH LEGISLATURE - SECOND SESSION

6 A BILL

7 For an Act entitled: "An Act prohibiting finfish farming; and providing
8 for an effective date."

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

10 * Section 1. FINDINGS. Based on a legislative examination of the
11 potential effects of allowing finfish farming in the state on the common
12 property resources and on the overall economic well-being of the state; the
13 number of serious concerns associated with finfish farming and the need for
14 study of finfish farming that has caused the legislature to enact two
15 moratoriums on finfish farming and establish a nonlegislative task force to
16 study the issue and to report its findings and recommendations to the
17 legislature; a review of the final report of the Alaska Finfish Farming
18 Task Force which notes several possible benefits and some serious risks of
19 finfish farming; the need for the legislature to take action before the
20 current moratorium on finfish farming expires on July 1, 1990; the recom-
21 mendation of the task force that the legislature not extend the moratorium,
22 but make a final determination to either allow or prohibit finfish farming;
23 and the testimony and evidence received; the legislature finds that

24 (1) the state has the healthiest stocks of wild salmon and other
25 wild finfish in the world and benefits from thriving commercial, sport, and
26 subsistence fisheries for these fish and a growing tourism industry related
27 to sport fishing;

28 (2) the people, economy, and environment of the state are depen-
29 dent in large measure upon the continued health of the state's wild finfish

1 resources;

2 (3) serious risks are posed by commercial finfish farming,
3 including the spread of disease among wild fish by farmed fish, genetic
4 intermingling of wild fish stocks with genetically manipulated farmed fish,
5 degradation of water quality near finfish farms, and land use conflicts
6 over the siting of commercial finfish farms;

7 (4) the state has invested significantly in marketing efforts to
8 promote Alaskan finfish as wild and natural fish products, and this invest-
9 ment in developing the reputation of Alaskan finfish would be lost by
10 allowing commercially farmed finfish to be produced and marketed from
11 Alaska;

12 (5) the cost to the state to regulate the commercial finfish
13 farming industry would be high;

14 (6) few jobs would be generated by a commercial finfish farming
15 industry in the state;

16 (7) the state is responsible for ensuring the protection and
17 wise use of the renewable natural resources of Alaska and providing a
18 framework for a sound economy;

19 (8) a long-term decision must be made regarding the future of
20 commercial finfish farming in the state;

21 (9) avoiding harm to the state's wild finfish, land, and water
22 resources must take precedence over the development of a new speculative
23 and potentially harmful commercial finfish farming industry;

24 (10) the best interests of the state are served by prohibiting
25 commercial finfish farming.

26 * Sec. 2. AS 16.40 is amended by adding a new section to read:

27 Sec. 16.40.210. FINFISH FARMING PROHIBITED. (a) A person may
28 not grow or cultivate finfish in captivity or under positive control
29 for commercial purposes.

1 (b) This section does not restrict

2 (1) the fishery rehabilitation, enhancement, or development
3 activities of the department;

4 (2) the ability of a nonprofit corporation that holds a
5 salmon hatchery permit under AS 16.10.400 to sell salmon returning
6 from the natural water of the state, as authorized under AS 16.10.450,
7 or surplus salmon eggs, as authorized under AS 16.10.420 and 16.10.-
8 450;

9 (3) rearing and sale of finfish for aquariums or ornamental
10 ponds provided that the fish are not reared in or released into water
11 of the state.

12 * Sec. 3. This Act takes effect July 1, 1990.

Alaska

FINFISH FARMING TASK FORCE

REPORT

to the

ALASKA

LEGISLATURE

January 15, 1990

Alaska Finfish Farming Task Force

REPORT TO THE ALASKA LEGISLATURE

January 15, 1990

Alaska Finfish Farming Task Force
P.O. Box AM
Juneau, AK 99811
907/465-3568

Sen. Tim Kelly, President of the Alaska Senate
Rep. Sam Cotten, Speaker of the Alaska House of Representative
Pouch V
Juneau, AK 99811

Senator Kelly and Representative Cotten:

Transmitted herein is the final report of the Alaska Finfish Farming Task Force. The task force has met its charge as stated in Ch. 145 SLA 1988; the findings and recommendations included in this report reflect that mission.

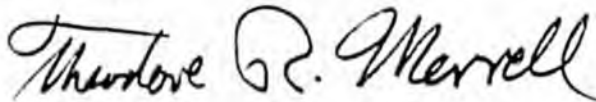
These findings and recommendations have resulted from our review of prior research, inspection of finfish farms, the testimony of experts, and public comments. This report represents the consensus of the entire task force. All of our findings and recommendations were agreed upon by every task force member.

The time constraint on the task force prevented us from considering every issue in great depth. We have focused our efforts on those issues over which there is the most controversy and on the issues for which more definitive answers are available. We hope that you will find this report useful to your deliberations.

With the submission of this report, the task force will cease to exist as a formal body. However, our project coordinator has been retained to be available as needed through the legislative session to assist in the deliberations of this important issue.

Finally, on behalf of the task force, I would like to take this opportunity to thank you for creating this opportunity to participate in an important public policy issue.

Sincerely,



Theodore R. Merrell, Chairman
Alaska Finfish Farming Task Force

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Chapter i

INTRODUCTION

The viability and desirability of finfish farming in Alaska, particularly salmon, has long been a subject of controversy. The state is currently under its second finfish farming moratorium. This one expires on July 1, 1990.

The Alaska Finfish Farming Task Force was created by the Alaska Legislature in 1988 (Ch. 145 SLA 1988) to study the socioeconomic, biological, and environmental issues related to finfish farming. The task force was charged with addressing finfish farming in Alaska in freshwater, in marine environments, and in tanks or other upland structures containing marine water. In addition, the task force was to consider hatchery operations related to finfish farming.

By statute, the composition of the task force must represent a variety of perspectives. Specifically, the task force is comprised of one representative of the commercial salmon fishermen, one aquatic farming advocate, one private economist, one fisheries biologist, and one public member with no involvement in the seafood or aquatic farming industry. State employees were not eligible to serve on the task force.

Although the legislation authorizing the task force was passed in 1988, the Legislature did not fund the task force until its 1989 legislative session. In July 1989, Governor Cowper announced his appointments to the task force; the first meeting was held in late July.

This task force is not the first body in the state to consider the issue of finfish farming. During the Sheffield Administration, the Governor's Mariculture Advisory Committee was formed to look at the issue. In addition, the Alaska Legislature has considered various pieces of legislation pertaining to aquatic farming.

One of the first actions of the task force was to familiarize itself with the work that preceded it. In addition, it considered new information on social, environmental, and economic impacts that has recently become available from the operation of West Coast and foreign salmon farms. The world markets for salmon are changing dramatically; many assumptions regarding salmon farming economics and marketing that are based on historical data may not be relevant today.

not construe any finding or recommendation pertaining to a specific issue to be either endorsement or disapproval of finfish farming in Alaska.

For clarity, a brief explanation of a few terms used in this report and in the discussion of finfish farming is provided below.

- **Finfish** is used as a generic term for finfish indigenous to Alaska, except where noted.
- **Finfish farming** is the growing of fish to market size in an enclosed environment. **Aquatic farming** includes sea plants and shell fish as well as finfish.
- **Ocean ranching** is the release of hatchery-reared fish into the public waters for eventual recapture.
- **Aquaculture** is the cultivation of fish and plants in both fresh and salt water. However, in Alaska, the term is specific to the State's and private nonprofit hatcheries' ocean ranching programs.
- **Mariculture** is fish cultivation in salt water. However, in Alaska, the term is used to refer to all aquatic farming activities.

To avoid confusion, we have tried to be explicit in our references to finfish farming and ocean ranching by avoiding the more general terms, mariculture and aquaculture.