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Alaska Mariculture Association

Gary Gustafson, Director
Division of Land and Water Management
Department of Natural Resources
P.O. Box 107005
Anchorage, AK 99510-7005

Dear Mr. Gustafson:

The Alaska Mariculture Association (AMA) is concerned about the implementation of the land management provisions of Senate Bill 514, including the recent aquatic farm site nominations process and proposed aquatic farming regulations.

Regarding the site nomination process, we were surprised by the solicitation for sites to be excluded from aquatic farming, since these decisions should be made only after multiple use planning efforts or submission of a proposal for development.

While your goal of trying to avoid user conflicts was very laudible, AMA thinks you went about the process wrong. How can you determine whether an activity will be incompatible with historic uses or create user conflicts until you identify the new use? Mariculture projects will range in impacts from extremely minimal to significant, depending upon the size of the project, location, species and other variables.

For example, an oyster raft taking up one/quarter acre of surface area located in one corner of a bay might not conflict with a traditional anchorage for fishing vessels, while a sea vegetable farm encompassing 25 acres of the only protected area in the same bay might be a serious problem.

Fortunately, the Alaska Trollers Association and the Kodiak fishermen figured this out and correctly submitted information on historical uses of areas. These responses should be useful in the future for identifying areas of potential conflicts with a particular mariculture project.

We can only hope that you do not exclude areas from potential mariculture development until you go through a comprehensive land use management process such as the Prince William Sound and Prince of Wales Island area plans. As we have said from the beginning of the mariculture debate, these land use decisions must be based on a case-by-case process.

On a final note about districting, when this concept was discussed in the legislative process I believe most participants envisioned fairly large districts and a simple process. The introduction of the concept of subdistricts suggests the districting process won't be the easy drawing of lines on a map described by DNR in legislative committee hearings.

What we're seeing take shape now will make the already difficult process outlined in enabling legislation become far too complex and time consuming for most farmers to negotiate.

Regarding the draft regulations designed to implement Senate Bill 514, AMA's board of directors recently discussed these on a teleconference, and we are concerned that they make a bad situation (SB 514) worse. As you know, AMA and other aquatic farming groups adamantly opposed SB 514 as being overly restrictive, but we believe these proposed regulations might exacerbate the situation.

These new regulations come at a time when the shellfish farming industry is struggling to emerge in the face of rapidly developing competition in British Columbia and Puget Sound (both of which enjoy strong government encouragement). Our few operational oyster farms are "mom and pop" enterprises located in rural areas. Most have encountered great difficulties in securing financing, dealing with time consuming PSP sampling programs, expensive site certification, and a host of hurdles facing a small aquaculture business.

Despite these challenges, a few farms are beginning to test the feasibility of larger scale production (500,000 and more oysters). At the same time, a number of mussel farmers are attempting to get animals in the water, and there's beginning to be some commercial activity with scallops.

These are very small, struggling rural businesses which we believe will be strangled by the unnecessary red tape presented in the proposed regulations. While we understand that any regulations implementing SB 514, by necessity, will be burdensome, we urge you to examine the regulations closely to determine whether there is some latitude within the letter of the law to ease the load.

We are particularly concerned with the criteria set out in the "Best Interest Finding" section (11 AAC 63.040). While most of the subsections appear to be required by SB 514, we are troubled by number five:

(5) Significant conflicts with existing or planned uses of the site and of the area adjacent to or upland of the site (whether or not in state ownership), including

(A) Impacts on nearby communities or residential land, including the cost of increased wastewater treatment that may be needed to protect water quality at the site for aquatic farming.

Comment--This language makes me wonder if we're talking about the same shellfish farms with which I'm familiar, as it's difficult to envision lower impact commercial operations on the environment, land use and infrastructure. This also implies that shellfish farms may not be approved if they require that water quality be protected.

Yes, most aquatic farming does require good quality water, but I don't think that is in conflict with the goals of the state and federal government to protect water quality. We believe that upland owners should be required to treat their sewage to protect water quality whether or not an oyster farm is within striking distance of discharged coliform. And, we suspect, most Alaskans agree.

(B) Compatibility of aquatic farming with the traditional uses of the area; consideration of this criterion may be combined with a traditional use finding if such a finding is required by AS 38.05.830.

Comment--This language appears to be required by SB 514, but we are concerned about how it might be interpreted. Does this mean that aquatic farming will be considered on an equal basis with traditional uses, or does it mean that aquatic farming won't be allowed if it restricts any existing use, regardless of how significant or beneficial?

(C) Impacts on historic and cultural resources;

Comment--This language does not appear to be required by SB 514. Is it required by other statutes? What are "historic and cultural resources?"

(D) Conflicts with planned commercial or industrial uses of the area, such as log transfer facilities, seafood processing plants, or harbor development, that would be incompatible with aquatic farming;

Comment--This language again does not appear to be mandated by SB 514, and we wonder if it means that aquatic farming will not be allowed if it disrupts any other planned commercial or industrial uses, regardless of the relative benefits of each proposed use. This section is particularly troubling as it implies that mariculture can't even impact planned uses, let alone any traditional or existing uses of state tidelands or uplands.

(8) Other significant social, economic, and environmental effects of the proposed aquatic farming.

Comment--AMA is concerned about such open-ended language which could provide land managers with the built-in ability to raise a myriad of concerns about a proposed farm. We suggest the language be deleted, as we believe DNR ultimately has the ability under existing law to raise any significant concerns about any proposed development on state-owned tidelands. There appears to be no reason to raise red flags such as this provision.

Another major concern with the proposed regulations is the section regarding "nominations, subdistricts and application periods" (11 AAC 63.02). Subsection (b) says, "A subdistrict may not necessarily be opened each year." This appears to be in conflict with the intent of AS 38.05.855 (b), which states: "The commissioner shall schedule at least one 60-day period each year during which a person may submit an application that identifies a site in a district for which the person wishes to be issued a permit under AS 38.05.856."

The language in SB 514 requires DNR to open up each section of our coastline (district) for aquatic farm applications at least one a

year. This language was added in the House Rules Committee by Rep. Ellis with that express intent. Yet, the regulations appears to be attempting to duck that requirement through the creation of subdistricts which may not be opened for development.

We're also troubled by subsection (c) which says DNR's filing guidelines "may include minimum or maximum size limits for aquatic farmsites, minimum distances from stream mouths or anchorages, or a limit on the number of applications a person may file in that district or subdistrict."

SB 514 contains language saying the number of sites in an area may be limited "in order to protect the environment and natural resources of the area." The regulatory language goes far beyond the statutory requirement.

We question why the department would want to set a minimum size in any event. Additionally, it makes no sense to set maximum size limits until you have the opportunity to review a development plan showing potential conflicts and impacts, and mitigation plans. As the Norwegians have discovered with salmon farms, a limit on the maximum size of an operation might increase disease problems over a larger farm with lower stock densities.

We also oppose arbitrary limits on distances from anchorages and stream mouths. Are you talking about anadromous fish streams cataloged by ADFG or just any of the thousands and thousands of streams with and without anadromous fish along our coastline? There's a vast difference in terms of impacts on the farmer.

And, why should there be a limit on the number of applications an individual may submit in a district or subdistrict? Farmers have discovered that it benefits the environment and farm productivity to change culturing locations, much in the way farmers rotate fields and crops. In Norway, farmers saved thousands of tons of salmon by being able to move their cages to other locations to escape huge algae blooms. Having an alternate site available might be crucial to a farmer's success.

Another major concern is the language in 11 AAC 63.010 (c) which eliminates existing statutory tideland lease preferences for upland owners. We find this provision particularly troubling as we believe aquatic farmers will opt for development on tidelands adjacent to private lands because of the uncertainty of locating upland support facilities on public lands.

Public policies can change radically each four years with the election of a new governor or president, and the management of public lands will be shaped by unpredictable political forces. For example, some shellfish farmers are now being slapped by the U.S. forest Service with increases in land use fees for upland caretaker cabins of about 1000 percent.

In the long run, farmers might be best off buying or leasing a piece of private land for his support requirements, but this provision undermines this option.

Additionally, the upland owner preference provides a significant advantage to Native corporations, since the ANCSA corporations own the only private land available in most coastal areas. Elimination of this upland owner provision seriously weakens the position of Alaska

Natives in the development of rural aquatic farms.

Other concerns include:

11 AAC 63.010. APPLICABILITY. (a)...However, a permittee will be granted permission to house personnel on adjacent upland only if the permittee shows that there is no reasonable alternative, that the structure will not be placed on a permanent foundation, and that it would be possible to remove the structure completely within 24 hours.

Comment--This provision appears to be based upon regulations for the shore-based fishery lease act, designed to provide salmon set net fishermen with the ability to secure sites. The problem with extending this model to upland support structures for aquatic farms is that the farms need attention year-round, not just during a two-month season during mild summer months. Shellfish farming caretaker facilities would be occupied 8-12 months per year, and move beyond the temporary structures suitable for set nets.

11 AAC 63.030 (b)...The proposed schedule must be on a scale that makes reasonable use of the site.

Comment--Does this mean that very small operations would be discouraged? We're not sure, but we hope not.

11 AAC 63.030 (d)...If the number of applications filed for a particular area exceeds the number of sites that the commissioner decides to grant, a lottery will be held to eliminate the excess applications.

Comment--What about considering the merits of the operation, such as economic benefits to the area, percentage of Alaskan ownership, feasibility of proposed operations, or other measures. A lottery is the easiest method, but it may not be the best.

11 AAC 63.060 AQUATIC FARMSITE PERMIT. (b) (2) a fee established by the commissioner to provide the state a fair and reasonable return for the permittee's use of the site.

Comment--Would these be comparable to what other tideland users would pay? If not, why should the aquatic farmer pay more for use of the tidelands? We do not think that farmers should pay more than other users and object strongly to any attempt to impose an unfair rent structure.

Is this another way of saying "fair market value?" If so, we do not think it is appropriate to charge fair market value until you get to the lease stage.

11 AAC 63.060 (g) A permittee may apply for a single renewal of the permit...

Comment--This appears to force a farmer to seek a lease after a

maximum of six years. Many operations would still be in the feasibility stage at that point and it might not make sense from the perspective of the farmer or land managers to be prematurely forced into a lease.

11 AAC 63.070. BOND...[all language]...

Comment--SB 514 did require a performance bond, and the House Rules Committee adopted a letter of intent clarifying that the bond was restricted to clean-up activities only. However, this language could require a very large bond, and we request that you closely review this section to determine the appropriateness of the requirements. Keep in mind that we're talking in nearly all cases about floating rafts that can easily be towed away or dismantled.

11 AAC 63.080. TRANSITION FROM PRIOR AUTHORIZATION. [all language]

Comment--SB 514 contained a straightforward grandfather clause [section 18] and we question why it should be made so difficult for the farmer. Why not simply grant permits to anyone who had obtained a tideland permit for aquatic farming prior to June 9, 1988? I believe that was the intent of Senator Eliason when he wrote the bill.

Anyone who filed an application prior to June 9 but was not completely through the process should be taken through the former process under AS 38.05.850 and issued one of the new three-year permits. After all, how many of these people are there? I believe these applicants can be counted on my fingers.

11 AAC 63.090. AQUATIC FARMSITE LEASE. (c) The term of an aquatic farmsite lease is ten years. The term may be extended at the commissioner's discretion for an additional ten years...

Comment--This appears to limit leases to a maximum of 20 years. Why? What happen to a viable farming business at the end of the ten years? AMA does not believe there should be an upper limit.

11 AAC 63.100. GENERAL PERMIT AND LEASE PROVISIONS. (4) The permit or lease may...be amended to change the species being raised or to make minor changes in the boundary or acreage of the aquatic farmsite or the number of rafts or other rearing structures authorized. However, no change of use, as that term is defined in 11 AAC 63.110, will be authorized.

11 AAC 63.110. DEFINITIONS. (2) "change of use" means a change from one species of shellfish to any species other than shellfish or from one species of aquatic plant to any species other than aquatic plants, a change in location of the aquatic farmsite, a significant change in its acreage, or a significant increase in the surface area of the farmsite that is encumbered by rafts or other rearing structures;

Mr. Gary Gustafson
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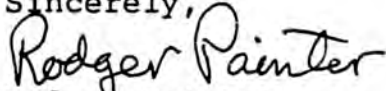
Comment--These sections appear to say if you start small you are doomed to stay small, and the state does not favor diversification. Why shouldn't a successful farmer be allowed to expand his or her farm? Isn't that one of the fundamentals of capitalism? Won't this force farmers to start out larger than what might be prudent? Shouldn't we encourage a cautious approach to development?

Why should a shellfish farmer be blocked from diversifying into the farming of aquatic plants, or vice versa?

I believe Senator Eliason's intent in SB 514 was to prevent shellfish farms from being converted into finfish farms, but not to prevent a small scale shellfish farm from expanding or diversifying into the culturing of kelp.

Thank you for the opportunity to comment on the proposed regulations. I look forward to working with you to incorporate our concerns into revisions of the regulations.

Sincerely,



Rodger Painter
Executive Director

c.c. Senator Zharoff
 Senator Sturgulewski
 Senator Eliason
 Governor Cowper
 Commissioner Brady

Alaska Mariculture Association

Jan. 19, 1989

Senator Bettye Fahrenkamp, Chairwoman
Senate Resources Committee
P.O. Box V
Juneau, AK 99811

Dear Senator Fahrenkamp:

As the session gets underway, the Alaska Mariculture Association (AMA) would like to rekindle the debate over mariculture development in Alaska. This undoubtedly comes as no surprise, as no one expected last year's legislation (Senate Bill 514) to be the final chapter in the shaping of state mariculture policies.

Unfortunately, we have made precious little progress in resolving this thorny issue over the past three years. The 1987 legislature passed a one-year moratorium on finfish farming, and decided to work on the issue over the interim. There were no interim meetings, staff work, or other meaningful actions.

Unsurprisingly, the debate just picked up where it had left off, with opponents and proponents no closer together and the legislature still trying to sort fact from fiction in widely varying claims. This resulted in a deadlock broken only by a last-minute blitzkrieg behind a bill strongly opposed by all mariculture supporters.

Senate Bill 514 set out a burdensome permitting process for aquatic farmers, extended the finfish farming moratorium for two years, and established a citizens finfish task force. As you are aware, the bill's fiscal note was not funded, so the task force remains a concept and the agencies are straining meager existing resources to implement a major change in law.

So, just how has this affected mariculture? The Department of Natural Resources (DNR) stopped accepting applications for shellfish farming permits and began working on a new comprehensive permitting program. While DNR has done an admirable job in mustering enough manpower to develop the sweeping new program, the proposed regulations it recently published are even more objectionable to shellfish farmers than the legislation they are designed to implement.

Faced with an overwhelming volume of red tape threatening to strangle any Alaskan with visions of developing a small, renewable business, shellfish farming advocates are banding together to propose new legislation designed to ease some of the restrictions imposed by SB 514. The Alaskan Shellfish Growers Association, Kodiak Mariculture Association, Kodiak Area Native Association and AMA are working on a measure to address only shellfish and aquatic plant concerns.

This represents a change in course for AMA which has advocated for a comprehensive approach to mariculture policies by the state. While we still conceptually support this approach, it has become quite evident that the controversy over finfish is resulting in undue restrictions on shellfish farmers and a complete separation of the issues is a political necessity.

As you deal with these proposed changes, please keep in mind that our existing shellfish farmers are very small businesses struggling to establish a new industry. We believe Alaska is an ideal environment for aquatic farming, and these biological advantages will offset the added costs of doing business in remote areas with extraordinary transportation costs and no infrastructure.

The thrust of our suggested changes is to provide mariculture an equal footing with other potential uses of state tidelands. In other words, we want multiple use resource management. This does not seem to be an unreasonable request.

We do not want to discard the basic process established under SB 514, only to make it more palatable to aquatic farmers.

The finfish side of the mariculture issue is likely to be more difficult. After going through yet another interim with no work on the issue, AMA believes it is time for the legislative committee system to revive the discussion on finfish farming policies.

The policy vacuum on finfish farming over the past eight months can be attributed primarily to the lack of funding for the Alaska Finfish Farming Task Force, and some are suggesting that funding of the task force is the appropriate legislative action on finfish farming this session.

AMA is not opposed to the funding of the task force, but we think it is important for all lawmakers to fully understand the role of the task force in the legislative process. The task force was designed to simply gather facts and report back to the legislature, so policymakers have an unbiased source of information on the pros and cons of salmon farming.

The task force is not charged with developing recommended policies or solutions, and it will not resolve our current gridlock. The answer is not to fund the task force and wait for its report. Face it, there is little hope of funding being approved and the task force appointed until after this session adjourns.

Controversial issues requiring major policy decisions almost always require two years to wind through the legislative process. The two-year extension of the finfish farming moratorium expires in about 16 months. If you wait for the task force report lawmakers will have a four-month session to make a decision.

Legislative committees can gather good, unbiased information just as effectively as any task force. Let's make the committee process work by systematically examining the major issues involved. There is a wealth of information available, and we'd be pleased to assist in this process. I'm certain the critics of salmon farming won't pass up the opportunity to participate.

As you are well aware, finfish farming is a complex issue and there are many different components of this promising industry. For instance, the farming of arctic char in freshwater tanks or private

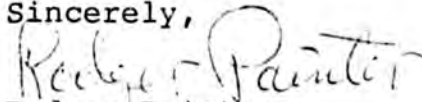
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ponds raises vastly different concerns than the fullscale farming of chinook salmon in marine net pens. Some of the issues involved in finfish farming may be relatively simple to resolve.

We believe the legislature is committed to fully exploring all significant opportunities to diversify our economy, and finfish farming represents one of the best opportunities available. Our economy is too troubled for the legislature to ignore the potential of creating hundreds of new jobs and millions of dollars of income.

We look forward to working with you during the coming months to seek some logical approaches on dealing with mariculture policies and pledge to do our part to make the committee process function. Thank you for considering our comments.

Sincerely,



Rodger Painter
Executive Director

c.c. All Senators

Alaska Mariculture Association

Enhancing the Seafood Industry and Alaska Economy through Mariculture Development

As Alaska attempts to diversify and expand its private industries, an obvious area of emphasis should be the seafood industry. The seafood industry has been a mainstay of Alaska's private economy since the turn of the century, and growing world demand for high value seafood promises great opportunity for expansion.

Yet, commercial fishing has been plagued with cyclical fluctuations of natural stocks, and the industry is having difficulty competing with rapidly increasing production of aquatic farms. Indeed, Alaska's share of U.S. and global seafood markets is slipping as consumption of fisheries products rises.

For example, a recent study prepared for the British Columbia Salmon Farmers Association shows imported farmed salmon comprised about 8 percent of the fresh and frozen salmon consumed in the U.S. in 1984. The report, which was prepared by a noted U.S. seafood analyst, says farmed salmon is expected to account for 45 percent of the U.S. consumption of fresh and frozen salmon by 1990.

The popularity of farmed salmon is apparent even in Alaska--the home of the world's largest salmon fishery--where it is featured in many restaurants and supermarkets. Some Alaska seafood processors find they now have to purchase farmed salmon to satisfy the needs of their customers.

These facts underscore the importance of developing a strong diversified mariculture industry in Alaska; it is vital to the long-range viability of our seafood industry, as well as to our ability to create more private sector jobs tied to renewable resources.

This paper outlines some of the ways mariculture could help stabilize the seafood industry and strengthen Alaska's economy overall.

Seafood Marketing

The addition of a full line of mariculture products would allow Alaska to compete more effectively on world markets. By jointly marketing its wild and farmed seafoods, Alaska would regain its competitive advantage through its ability to supply large volumes of seafood on a year-round basis.

Tremendous amounts of seafood currently are harvested during very short, intensive fisheries which create very small windows of opportunity for marketing fresh seafood. While Alaska has the

advantage of offering volume and competitively priced products, it currently cannot compete effectively for fresh markets with countries able to guarantee year-round deliveries of high quality fresh products.

One of the state's successful seafood processors recently explained to the Alaska State Chamber of Commerce how his company is marketing its products in Midwest supermarkets by utilizing a modular retail counter it calls the Alaska Seafood Express. The only non-Alaska seafood sold from the Alaska Seafood Express is farmed salmon because there simply is no reliable source of fresh product available during winter months.

A diverse mariculture industry also would expand the variety of seafood available in Alaska by adding oysters, mussels, trout, Arctic char and other species. Aquatic farming also could expand the state's year-round supplies of scallops, shrimp, black cod, halibut and abalone.

This flow of new product would allow Alaska's seafood processors to offer customers a broader array--and year-round supply--of high quality seafood; Alaska will regain its position as the seafood producing region with the biggest and best product line.

Salmon Enhancement Programs

Alaska already has one of the world's most successful mariculture programs in the form of its network of state and private, nonprofit salmon hatcheries. State and private hatchery operations this year handled some 1.5 billion salmon eggs, and the return from these eggs in several years will add millions of fish to the catches of commercial and recreational fisheries.

The state and private hatcheries represent one of Alaska's biggest public investments in any industry: voters approved \$56 million in general obligation bonds to build the public hatcheries, private operations have been loaned \$31.8 million (the present value of the loan portfolio is estimated at \$59.7 million), and another \$5.8 in operating funds and grants has been spent of supporting private hatcheries in the past five years.

These hatchery programs have been called one of the best investments ever by the State of Alaska in terms of direct returns to the economy, but cutbacks in state spending threaten to close down many of the public facilities. Repayment of the private loans will require the private hatchery systems to divert substantial amounts of fish from harvests by commercial fishermen for cost recovery programs by hatchery managers.

One of the biggest potential sources of new funding for these public and private enhancement programs could be the sale of juvenile fish to Alaska salmon farmers. The Alaska Department of Fish and Game estimates there were 88.6 million eggs surplus to the needs of state and private hatcheries in 1986. A 44 million pound salmon farming industry in Alaska would require roughly 10 million of these surplus eggs per year.

Should the state or private hatcheries decide to utilize these surplus eggs to produce the juvenile fish (smolts) needed by salmon

farmers, these sales could generate \$7-10 million annually. The additional investments required for operating hatcheries with surplus eggs would be minimal and would not divert from common property enhancement efforts.

Fish Food Manufacturing

One of the significant spinoffs of a salmon farming industry is the manufacturing of fish food, as about half of the operating expenses of fish farms are tied up in feed. A 44 million pound salmon farming industry said feasible in Alaska would require roughly 88 million pounds of fish feed a year (worth \$30-40 million) provided by regionally based meal plants.

That much fish feed would require 264 million pounds of raw product (fish waste or whole fish). At 6 cents a pound (Washington state rates), fish processors could be paid \$15.8 million for waste they now have to spend money to dump in the ocean.

Production of fish feed can enhance the viability of shore-based surimi plants. In fact, Alaska's two largest surimi plants located in Unalaska already utilize their byproducts to produce about 17.6 million pounds of fish meal per month. This meal now is sold to Taiwanese eel farmers.

Export markets for Alaska-produced fish feed could be substantial. One of the major impediments to the growth of the British Columbia salmon farming industry is an adequate source of raw materials for production of fish feed. Canadian analysts say the B.C. industry probably will have to seek Alaska-produced fish feed to meet the future needs of salmon farmers. Although this is an important export market, if this fish meal were used to grow fish in Alaska the value to the state would be multiplied many times over.

Fisheries Enhancement

Mariculture also provides a tool for increasing the amount of fish available for harvest by commercial, sport and subsistence fishermen.

One unusual example of this is an abandoned sewage treatment plant in Fairbanks. Located next to the Chena River, Fairbanks' old treatment plant consists of a series of large concrete ponds located inside a building which also contains office and storage space.

The city was considering demolition of the abandoned sewage treatment plant, but now a group of entrepreneurs is planning to convert the facility into a commercial fish farm, research facility and hatchery capable of releasing millions of juvenile king salmon for harvest by commercial, subsistence and recreational fisheries.

By tapping waste heat from the nearby municipal power plant, a converted facility may be used to commercially farm a high value species such as salmon or shrimp for local sales and export, as well as serve as a hatchery and research station for the University of Alaska's marine science program headquartered in Fairbanks.

Another interesting possibility is a farming and release approach with black cod in Southeast Alaska waters. The Canadians appear to be close to initiating the commercial farming of black cod (one of the

higher value bottomfish caught primarily in Alaska) and have expressed interest in working with Alaska.

Canadian researchers say it might be feasible to raise black cod in a hatchery and release juveniles into Chatham Strait, the site of the world's only significant black cod fishery in protected inside waters. Since budget cutbacks are likely to preclude state loans and financing of a release program, the most logical method of financing such an operation would be through the profits of a related black cod farm.

Such an operation could serve as a model of how commercial fishermen could get actively involved in aquatic farming. The fishing industry could benefit from increased harvests and the ability to sell fish year-round to a broader market through a self-supporting farming/release program.

The Japanese are experimenting with the culture of king crab, and there appears to be some potential for a release program with the high value species. The Kodiak Island community of Port Lions already is conducting some limited experiments with the culturing of king crab.

Tourism

One of the more unique applications for mariculture is a proposal by an Anchorage group, Indicator Inc., to construct a shrimp or salmon farm at the old Ship Creek hatchery near downtown Anchorage. The facility would utilize waste heat from a nearby power plant.

The commercial farming operation would be used as a tourism draw by incorporating glass sides in some of the rearing tanks and conducting a tour through the facility. A restaurant specializing in Alaska farmed seafood would complete the package.

This facility also could be an attractive research and training station for the University of Alaska and local high schools.

Spinoff Benefits

Aquatic farming has a higher secondary economic impact than most of Alaska's primary industries because of the fairly large support structure required by these year-round farming activities. This has particular significance for Alaska's regional hubs, particularly Anchorage which is likely to be the state's biggest service center for aquatic farms.

One of the most important impacts would be in the transportation industry which would be bolstered by exports of fresh seafood during their slowest months. These air cargo backhauls from coastal communities should improve air service to rural areas during the winter months, and allow fishermen or small local processors better access to scheduled air service for sales of commercially caught seafood.

While there are no estimates for the amount of product a fully developed mariculture industry could produce, the projected 44 million pound salmon farming industry alone could account for \$13.2 million in additional airline revenue at a 30 cents per pound rate.

Aquatic farming also could create a wide variety of other

opportunities for support businesses. One example is the special shipping boxes used by salmon farmers to ensure delivery of the highest possible quality product. A 44 million pound industry could require about 1 million of these boxes per year.

These boxes must be manufactured regionally because the styrofoam inserts are considered too bulky to ship empty. The technology and costs of producing these styrofoam inserts could allow smaller scale production on a regional basis. At the current value of \$8 each, the boxes will be worth \$8 million a year.

Conclusion

A fully developed mariculture industry will provide a tremendous year-round boost to Alaska's troubled private economy. It will bring new investment dollars and jobs to rural villages and urban service centers.

Other states and countries throughout the world have realized the economic importance of mariculture and are moving aggressively forward to support this development. Alaska cannot afford to sit idly by and watch our seafood markets be displaced by foreign producers. Now is the time for Alaska to seize this important economic opportunity.

Alaska Mariculture Association

January 21, 1988

Sen. Richard Eliason
P.O. Box V
Juneau, Alaska 99811

Dear Sen. Eliason:

The need to diversify our economy appears to be one few areas of universal agreement among Alaskans. As you face the difficult task of addressing the effects of our recent economic slump, we would like to work closely with you on removing the barriers to one of the state's most promising opportunities--mariculture.

A new industry emerged in British Columbia about five years ago and has become the province's fastest growing economic sector. That industry, of course, is salmon farming. Some B.C. government officials now estimate the value of B.C.'s aquaculture industry will surpass the commercial fisheries by 1995.

Our Canadian neighbors have a much smaller fishing industry and there's little chance of a billion dollar mariculture industry in Alaska, but aquatic farming clearly has great potential in Alaska. The Alaska Mariculture Association believes that, like in Canada and Norway, salmon farming can become a profitable base for diverse aquatic farming industries in Alaska.

The controversy surrounding the issue, unfortunately, has prevented a careful examination of the full potential of mariculture in Alaska. The attached position paper explores some of economic benefits to Alaska, with a particular focus on the seafood industry.

The impact of these developments on the Alaska economy obviously would be great. While no one has attempted to attach figures to a diversified aquatic farming industry in Alaska, a few figures have been developed for salmon farming:

2,640 direct and indirect jobs and a payroll of \$67.8 million on sales of 44 million pounds of salmon valued at \$132 million. (Opportunities and Constraints in Cultured Salmon Products. 1985.)

1,920 direct and indirect jobs and a payroll of \$48.8 million. (House Research Agency. 1987.)

4,000 direct and indirect jobs and a payroll of \$90 million. Final economic effect of \$300 million. (Salmon Farming in Alaska: Economic Feasibility and Socioeconomic Impacts. Robert Logan and John Weddleton, University of Alaska, Fairbanks. 1987.)

Even if these numbers are optimistic, the economic impact of a fully developed aquaculture industry including salmon, oysters, mussels, scallops, kelp, shrimp, trout, steelhead, arctic char, sheefish, black cod, halibut, abalone and other species would be a significant boost to our sagging economy.

Aquatic farming could even be feasible in as unlikely settings as an abandoned sewage treatment plant in Fairbanks or downtown Anchorage. There even is limited potential for small-scale fresh water farms in Interior and Western Alaska utilizing waste heat from village generators.

The best part is that mariculture advocates are not asking anything from the state other than room for private enterprise to go to work. No state loans, grants, tax breaks for other subsidies. AMA has even advocated establishment of a special aquatic farm products tax with proceeds being split between the state treasury and local governments.

We are willing to conform our operations to all existing state and federal environmental laws and regulations, and we want no shortcuts in the permitting process.

AMA believes the state should have full authority to regulate aquatic farmers to ensure disease will not spread from farmed to wild stocks. We support careful siting strategies to minimize environmental and biological impacts, and agree with the focus of the current permitting process on avoiding impacts on ongoing and beneficial uses of public lands and waters.

All we want is the right to exist. The right to attract private investment capital and create year-round jobs in rural Alaska. The right to create substantial support activities in regional hubs. The right to contribute to the economic well being of Alaska.

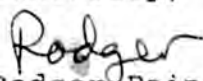
AMA is committed to working out the mariculture issue in the legislative process. We argued in favor of the 13-month moratorium last session as an expression of our good faith intentions of working out solutions to the concerns that have been raised during public hearings.

We remain committed to that process, despite the lack of progress experienced to date in addressing the proposed mariculture legislation.

One of the quickest ways of stimulating our private economy is to pass a comprehensive mariculture bill that provides appropriate safeguards and addresses public policy concerns.

We look forward to working with you. Don't hesitate to request additional information, as we have gathered a significant body of information addressing a wide range of issues related to mariculture.

Sincerely,


Rodger Painter
Executive Director

**Juneau Center
Fisheries & Ocean Science**
University of Alaska 11120 Glacier Highway, Juneau, Alaska 99801
(907) 789 4444

M E M O R A N D U M

Date February 16, 1988

From Bill Smoker

To Bill Heard
Brian Allee
Bob Burkett
Bob Davis
Earl Krygier
Rodger Painter

Subj Genetic Effect of Farmed Fish

In the past month a newsclipping from Fishermen's News has made the informal rounds; it told of renegade fish from salmon farms in Norway invading wild spawning populations and quoted Prof. Harald Skjervold as being concerned about the genetic effect of these fish on wild salmon.

I sent the clipping to Prof. Trygve Gjerdem of the Agriculture University of Norway. He is a PhD genetecist well known for his work on Atlantic salmon breeding in Norway and is, I believe, Prof. Skjervold's successor at the University. He is the current President of the International Association for Genetics in Aquaculture. Last month I asked him for whatever information he could provide about the newspaper article, for his opinion, and whether I could share his comments publicly. Enclosed is his reply to me. I believe Bob Davis has made a similar request of Prof. Skjervold.

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The Agricultural Research Council of Norway

Institute of Aquaculture Research

As-NLH 16.02.88
Sunnalsøra
Averøy
Oslo

Dr. William W. Smoker
Juneau Center
Fisheries & Ocean Science
University of Alaska
11120 Glacier Highway
Juneau, Alaska 99801

Our ref.: TG/mw
Your ref.:

Dear Dr. Smoker,

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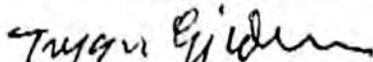
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One should be aware of that a river strain is not a static population. As physical and environmental changes take place in a river, natural selection will change the fish to become better adapted to the new environment.

If renegade fish enter a river and spawn, it is likely that the genetic variation will increase. This will make the natural selection more efficient. The newcomers have to fight the wild. Positive gene will be kept, and negative will be rejected.

This is just some comments from me. You may use them as is most appropriate.

Sincerely yours,


Trygve Gjødrem

Alaska Mariculture Association

Sen. Richard Eliason
P.O. Box V
Juneau, AK 99811

Dear Sen. Eliason:

Salmon farming may be one of the least understood issues pending before the legislature, despite the fact that we have accumulated impressive piles of reports, studies and research, and scores of Alaskans have offered testimony and written comments of pros and cons.

As you are fully aware, this issue of salmon farming has aroused strong opposition among commercial salmon fishermen and has become a highly emotional subject of debate in coastal communities. This opposition has led some lawmakers to believe mariculture, and in particular salmon farming, is a commercial fishing issue.

This is not the case. What mariculture is all about is economic development. It is no more a commercial fishing issue than logging, mining or oil and gas development. Each have potential impacts on fisheries habitats and wild stocks that should be closely examined before decisions are made on how to proceed.

The Alaska Mariculture Association (AMA) believes that the legislature would be setting a dangerous precedent in resource development if it opts to decide the fate of mariculture based upon popularity contest among fishermen. Certainly, it is critical that you carefully weigh the potential adverse impacts on commercial salmon fishing, but a decision to prohibit salmon farming simply because fishermen don't like it would be akin to blocking coal mining to protect oil producers from competition.

AMA urges you to carefully analyze the facts about salmon farming and its potential costs and benefits, and make a good public policy decision. We realize this is difficult on a controversial issue, but resource development issues are never easy to make in Alaska and salmon farming definitely is no exception.

One of the most critical factors to keep in mind is that a prohibition of salmon farming in Alaska really doesn't give salmon fishermen anything except a moral victory. About 20 other countries and even such unlikely states as Minnesota, South Dakota and Pennsylvania will continue to produce enormous quantities of farmed salmon.

The market impacts will not change by Alaska's non-involvement. Alaska restaurants and supermarkets will continue rely on foreign farmed salmon, and our processors will have to continue purchasing farmed salmon from other countries to satisfy consumer demand.

This means Alaska still has all the adverse impacts, but reaps

none of the benefits. We believe this policy option doesn't make sense, and we urge you to firmly reject it.

The potential economic benefits from salmon farming simply cannot be dismissed without serious consideration. AMA believes that aquatic farming is one of Alaska's best opportunities for diversification of our economy and is a necessary step to ensure our long-term competitiveness in world seafood markets. This is particularly true of salmon farming, which currently appears to be a unique opportunity for state government to immediately create long-term jobs and attract significant private investment capital without investing state funds.

Salmon farming does not require government to initiate publicly financed markets campaigns designed to change world demand, convince trading partners to invest their money in Alaska, or provide subsidized loan programs or other giveaways. All the state needs to do is to put reasonable rules in place to protect public health, wild stocks and the environment. The private sector will do the rest.

The attached articles from the leading trade journal Seafood Business on British Columbia's salmon farming industry illustrate the economic development opportunities available to Alaska. The B.C. industry has come a long way in a very short period of time, and government officials now estimate that the value of the province's aquaculture industry will surpass commercial fishing by the early to mid-1990s.

Despite the opposition from commercial salmon fishermen, salmon farming even offers major economic opportunities for the fishing fleets. The attached opinion piece from Pacific Fishing outlines some of the ways AMA believes commercial fishermen could benefit from salmon farming.

One issue which appears to be a major concern to many legislators is the potential effect of salmon farming on our wild stocks. This is valid concern and deserves to be thoroughly examined, as our salmon fishing industry has been a mainstay in the Alaska economy since the turn of the century.

Fortunately, Alaska has tremendous experience in salmon aquaculture. We possess some of the world's leading salmon culturists, geneticists and pathologists. These scientists have studied the issue closely and have determined that salmon farming offers no bigger threat to the wild stocks than our current hatchery program. The enclosed issues papers by the Alaska Department of Fish and Game outline the department's position regarding disease and genetics impacts of farmed salmon.

I have also enclosed a copy of a letter from Dr. Trygve Gjerdem, director of the Norwegian Institute of Aquaculture Research and president of the International Association of Genetics in Aquaculture, to Dr. William Smoker, University of Alaska geneticist, regarding recent news reports that "renegade" farmed salmon were threatening Norway's wild stocks.

Dr. Smoker said the widely publicized "study" actually appears to be what scientists refer to as "anecdotal observations" made by Norwegian scientists while collecting salmon sperm for a wild stock gene bank. Dr. Gjerdem's comments indicate the information gathered by the institute is insufficient to draw many conclusions, and that even if successful spawning were to occur no major problems would be

anticipated.

This is not to suggest that escaped farmed salmon isn't a matter of serious concern, because it is, but only that it should be placed in context. Recent articles from fishermen's newspapers have made it appear that the Norwegians have convincing evidence that escaped farmed salmon threaten the very existence of the country's very small natural runs.

The current debate over the threat of fish farming to the wild stocks is reminiscent of the opposition mounted by many fishermen against the state's salmon hatchery program. The record of Alaska's success at boosting natural runs without adversely affecting wild stocks has convinced most fishermen to strongly support the program. The scientists are convinced that salmon farming could be conducted as safely.

On an final note, I'd like explain AMA's position on the pending mariculture legislation. AMA's board of directors has endorsed sponsor substitute for HB 108 (Ellis, Rieger, et al) and strongly opposes the current versions of SB 482, SB 425, HB 455 and HB 518. AMA believes HB 108 offers a good compromise on the salmon farming issue, while clearing a path for Alaska to take full advantage of its tremendous opportunity in other species.

The other bills mentioned are decidedly anti-mariculture development and are as strongly opposed by AMA's shellfish and kelp members as those interested in finfish. Shellfish farmers are generally satisfied with the recent shellfish farming regulations proposed by the Cowper Administration and do not believe any significant changes should be made.

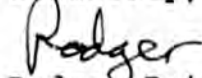
In addition to adversely affecting shellfish and kelp farming, these bills would restrict finfish farming to the uplands where development and operating costs are significantly higher. This decreases the ability of Alaskans to participate and may prevent the farming of such species as arctic char, rainbow trout and black cod. It is vital that we be able to farm these species in net pens in the marine environment. The opposition has been directed at salmon farming in net pens and any restrictions should not extend beyond the five species of Pacific salmon (genus *Onchorynchus*) and, of course, Atlantic salmon.

We continue to support salmon farming, and oppose a decision to prohibit it or to impose a moratorium. There is sufficient evidence available to answer the questions posed during public hearings.

We have tremendous amounts of information available and would be pleased to respond to any questions you may have regarding mariculture.

Thank you for consideration of my lengthy comments.

Sincerely,



Rodger Painter
Executive Director

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DISEASE
Department of Fish and Game
Division of Fisheries, Rehabilitation,
and Development

ISSUE:

Protect native and hatchery stocks from potential disease arising from salmon farming operations.

DISCUSSION:

All populations of fishes, whether in saltwater or fresh, in the wild or in captivity, at some time contain disease agents such as bacteria, viruses, fungi, and invertebrate parasites. In Alaska, endemic disease agents are present throughout wild stocks and the marine environment. Many are opportunistic, causing disease primarily when the fish are crowded or stressed. However, it is extremely important to recognize that populations of fishes differ in the disease agents they carry, and that diseases newly introduced to fish populations can be very devastating.

To control disease in the ocean ranching program, Alaska set in place stringent regulations that govern the movement of salmon and their gametes within the state, and prohibited the import of any fish species or their gametes for aquaculture purposes. These regulations have applied for some 16 years and include requirements for thorough broodstock screening for disease agents, routine treatment of eggs to prevent disease outbreaks, annual inspections and strict reporting requirements, and the destruction of stocks if the state finds that this is necessary to control disease. The state's prohibition on importing species ensures that no new diseases are introduced into the state. For example, many chinook salmon stocks in Washington and Oregon carry IHN virus. Importing these fish could introduce new strains of IHN virus to indigenous stocks. Similarly, importing Atlantic salmon would bring the risk of importing exotic viral and bacterial diseases not found in Alaska. This could have serious impacts on the health of existing native and hatchery stocks, and must be avoided.

To maintain adequate protection of existing fishery resources, any future fish farming industry must be governed by the same fish health regulations currently governing Alaska's ocean ranching program. The species made available for farming should be from native or hatchery stocks having complete and acceptable disease histories. Prohibitions on importing species including Atlantic salmon must be maintained. This way, any diseases would be those already present in wild populations, not exotic diseases which could cause serious harm to the native stocks. All transport and possession of fishes and their gametes needs to be closely

controlled through Fish Transport Permits, and strict reporting and inspection requirements need to be enforced.

However, extending the Department of Fish and Game's fish health services to this new industry cannot be accomplished without the addition of new staff and monies to support these activities. Private sector fish health practitioners could pick up some of this additional workload. Such private practitioners would need to be certified by the state and monitored on a routine basis to ensure acceptable performance, but presently there are no private sector fish health practitioners currently operating in-state.

SUMMARY:

Assuming that imports of Atlantic salmon or other fish species to Alaska remain prohibited, that the state continues to meet its responsibilities in fish disease control, and that monies are provided for additional fish health services, this new industry can be accommodated without the threat of disease to existing native and hatchery stocks of fish.

GENETICS
Department of Fish and Game
Division of Fisheries Rehabilitation,
Enhancement, and Development

ISSUE:

Ensure that salmon farming does not impact the genetic integrity of existing natural and hatchery stocks of salmon and trout.

DISCUSSION:

Preserving the genetic diversity of Alaska's fishery resources has been recognized as an important fisheries management goal. This is especially true for the state's enormous salmon resources.

Alaska, in maintaining the health and perpetuity of its salmon resources, subscribes to the theory that identifiable units of salmon (populations, stocks, races) have through natural selection become adapted to the particular watershed that serves as home. This adaptation is preserved in the genetic make-up (gene pool) of the stock. State fisheries managers have sought to maintain stock diversity to ensure the long-term health of our salmon populations. Loss of stock diversity can occur through dilution brought about by interbreeding with other stocks. For these reasons, Alaska at the outset of its salmon ocean ranching program set in place stringent regulations that govern the movement of salmon and trout within the state and prohibited the import of salmon and trout for aquaculture purposes.

The Department of Fish and Game's genetics policy prohibits the importation of live salmonids (salmon family) into the state, and does not allow stocks to be transported between major geographic areas, such as Southeast, Kodiak Island, Prince William Sound, Cook Inlet, Bristol Bay, and AYK/Interior. The policy has been adopted in order to protect Alaska's diverse natural salmon and trout stocks.

Any new aquaculture venture, such as salmon farming, must be governed by the same policy, transport regulations, and statutes that have applied to the salmon ocean ranching program for the past 16 years. This is particularly true for provisions prohibiting the importation of exotic species, such as Atlantic salmon. Atlantic salmon are actually a trout and are the ecological counterpart of Alaska's indigenous or native steelhead trout. Since these species have not evolved together and thereby have not developed mechanisms to avoid competition with steelhead

trout or other trout, there is a concern about negative impacts on Alaska's indigenous trout.

Therefore, the genetics policy advocates the use of locally adapted stocks of salmon and trout of natural or hatchery origin because this will maintain the state's genetic diversity. This is important in the event of escape or "leakage" through holes in nets or other damage. The magnitude of impact on natural stocks is a function of numbers of fish that escape and that survive to spawn. It is assumed that low levels (less than 5 percent) of escapees can be managed by properly designed net-pen rearing units. Impacts on natural stocks from salmon farming would be minimized because of the policy of using locally adapted stocks.

SUMMARY:

Assuming that imports of exotic species such as Atlantic salmon or other fishes remain prohibited, that current regulations and policies remain in place, and that "leakage" of fish from the pens is kept low, salmon farming can be accommodated without the threat of impact to the genetic integrity of native and hatchery stocks of salmon and trout.



The Agricultural Research Council of Norway

Institute of Aquaculture ResearchAs-NLH 16.02.88
Sundalsøra
Averøy
OsloDr. William W. Smoker
Juneau Center
Fisheries & Ocean Science
University of Alaska
11120 Glacier Highway
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Sincerely yours,

Trygve Gjødrem



Opinion

"Commercial fishermen are, I think, by and large philosophically unprepared for this kind of change. I am a high seas hunter."

This quote from a Canadian fisherman may be the shortest and most accurate summary of the feelings of some in the fishing community toward fish farming. Appropriately for the prevailing pattern of relationships between fishermen and aquatic farmers, the comment was delivered to a government panel studying the effects of B.C.'s newly burgeoning salmon farming during a permitting moratorium.

Fish farming in Alaska does not have to be a neolithic clash between hunters and farmers. Most of the members of my organization have close ties to the fishing industry, and, yes, many are fishermen. I am a fourth generation Alaskan, and my family has always been involved in the fishing industry.

We simply believe aquatic farming is a legitimate business with a great future and can be conducted in a fashion that protects the wild stocks and environment. As for threatening the fishing industry, consider the realities of salmon being farmed in 15-20 countries worldwide and several other states. You don't have to be an economist to figure out that Alaska's participation in salmon farming isn't going to make that much difference in the global supply picture.

The Alaska Mariculture Association is eager to work with the seafood industry in meeting the challenge posed by the phenomenal international growth of salmon farming. We believe Alaska farmed salmon will compete primarily with Norwegian and Canadian cultured products.

Working together makes a lot more sense than battling in the political arena anyway. We're willing to sit down and work out a conservative approach to development of a farming industry in Alaska.

This can be accomplished by legislation that provides adequate disease, environmental, and land use protections for the interests of fishermen, and a system to ensure farmers pay their own way through a mariculture products tax and responsible users fees.

And, importantly, we are willing to accept a reasonable method of phasing in finfish farming in an orderly manner so state agencies can slowly build ade-

quate regulatory and support programs.

Alaskans need to refocus the enormous amount of energy spent discussing the pros and cons of fish farming toward solving the fundamental problems preventing Alaska salmon from creating the kind of excitement in the marketplace as the Norwegians. We all know what they are: quality, marketing, availability of fresh product, and consistency of supply.

These problems can be addressed. The only way for Alaska salmon to regain its premier spot in world markets is to fight back with a superior product, improved marketing, and lots of it.

Despite its loss of status as the almost exclusive world supplier of salmon, Alaska still is the Saudi Arabia of global salmon markets. With farmed salmon added to its product line, the Alaska seafood industry gains considerable strength and versatility. A well-funded joint marketing campaign between Alaska salmon farmers and fishermen could be very effective.

Fishermen should consider the reality that the world salmon farming industry is here to stay, then start exploring ways the fishing community can benefit. Here are two examples:

Hatchery Programs—Alaska's hatchery programs have been called one of the best investments ever by the State of Alaska in terms of direct returns to the economy, but cutbacks in state spending threaten to close down many of the public facilities. Repayment of the private loans will require the private hatchery systems to divert substantial amounts of fish from harvests by commercial fishermen for cost recovery programs by hatchery managers.

One of the biggest potential sources of new funding for these public and private enhancement programs could be the sale of juvenile fish to Alaska salmon farmers. The Alaska Department of Fish and Game estimates there were 88.6 million eggs surplus to the needs of state and private hatcheries in 1986. A 44 million pound salmon farming industry in Alaska would require roughly 10 million of these surplus eggs per year.

Should the state or private hatcheries decide to utilize these surplus eggs to produce the juvenile fish (smolts) needed by salmon farmers, these sales could



Rodger Painter, executive director of the Alaska Mariculture Association, formerly was executive director of the United Fishermen of Alaska, editor of a commercial fishing newspaper, and chairman of the Alaska Seafood Marketing Institute's Quality Committee.

"Fish farming in Alaska does not have to be a neolithic clash between hunters and farmers."

generate \$7-\$10 million annually.

Fish Food Manufacturing—A fully developed salmon farming industry in Alaska would require roughly 88 million pounds of fish feed a year (worth \$30-\$40 million) provided by regionally based meal plants. That much fish feed would require 264 million pounds of raw product (fish waste or whole fish). At 6 cents a pound, fishermen could make \$15.8 million for fish that are now unmarketable.

Production of fish feed can enhance the viability of shore-based surimi plants. In fact, Alaska's largest surimi plant already utilizes its byproducts to produce a fish meal now sold to Taiwanese eel farmers.

The Alaska Mariculture Association remains committed to working with fishermen. With both wild and farmed salmon, Alaska would regain its competitive position in world markets. Now, that's something worth fighting for.

Rodger Painter

figure. Short-term growth in the market for fresh and frozen salmon will most likely come from farming operations.

A rush to the fjords

Much as in the westward homestead rush of the 1850s, salmon farmers are stampeding to the fjords of Maine, Washington, and British Columbia to set up sea pens and claim their share of the market. The U.S. has been slow to embrace sea-pen salmon farming, but British Columbia has issued more than 100 permits for the floating farms.

In July 1984, the B.C. Salmon Farmers Association was formed to allocate eggs from the federal hatcheries (the surplus from the government's salmon-enhancement program) to the farmers. Today the industry-funded group not only divvies up the eggs, but screens them for disease. B.C. farmers are building their own brood stock for secure supply and quality. Garth Hopkins, the association's director of communications, says, "In another five to seven years, we will be self-sufficient on eggs."

Following the Norwegian lead, Hopkins' group is developing a marketing strategy for B.C. salmon. It expects to implement the plan before the end of the third quarter this year. Membership, at 75 firms today, is expected to grow to 250 by next year. B.C. production of farmed cohos and chinooks was about 500 metric tons last year. In 1988, that number is expected to reach 10,000 mt.

Right now, world production of farmed salmon is less than 50,000 mt. But salmon farms in New Zealand and Chile are just beginning to produce salmon in large volumes, and in the U.S., successful farms are expanding in Washington and Maine, while others wait in line for permits.

The world's first land-based fish farm is expected to open in June in Westport, Washington. Financed by Scacom A/S of Norway, the plant will raise pan-sized coho in salt water pumped from the ocean. A second facility is slated to open in British Columbia in August.

In Alaska, where pen-rearing of salmon is illegal, the legislature is considering a bill to develop a mariculture industry.

"Although the Norwegians certainly have a jump on prospective Alaska fish farmers," says Brent Paine of the Alaska Mariculture Association, "we do have some advantages, such as sharply lower transportation costs, no import duties, and the lack of currency fluctuations between producers and customers." Paine has marketed Nor-

1986 U.S. Imports of Salmon			
FROZEN:	(IN METRIC TONS)		FRESH:
136.9	NORWAY		8,871.4
5,078.6	CANADA		2,485.0
4.2	CHILE		680.8
3.0	U.K.		367.5
263.0	OTHER		540.7
5,486.0	TOTAL		12,945.4
GRAND TOTAL FRESH & FROZEN: 18,431.4			

wegian salmon in the U.S. and worked on fish farms in both the U.S. and Norway.

Will prices drop?

These advantages and high wholesale prices are what make the gamble worth it for many aquaculturists in North America. But will rapid growth in the farmed sector mean a drop in prices at the wholesale level?

Norwegian producers are betting their kroner that the market will expand to support price levels, even with the added supply. Their strategy is to provide consistently excellent fish, and sell them with flair. Branded products — not often seen in the fresh-seafood market — will become more common. Designer tags in the gill plate, such as MOWI of Norway's "Superior" tag, have great snob appeal; they also identify the fish and guarantee quality standards. The Scottish Salmon Growers Association now marks its boxes with a special "British Food Quality, Scottish Salmon" stamp. The Shetland Seafood Quality Company and the Shetland Salmon Farmers Association use a grading scheme that awards top quality a "Grade A" sticker.

But not all salmon-farming countries have the quality schemes of Norway, the U.K., or Canada. Some brokers fear that large volumes of farmed salmon may be "dumped" at low prices to gain a foothold in the U.S. market in the next year or so. That could be disastrous to small or recently established farming operations, but the major producers would likely survive.

Just how large could U.S. imports become, and how does that potential compare with domestic supply?

Norwegian salmon farmers are now producing about 30,000 mt per year. Of that amount, about 9,000 mt reached the U.S. market last year, an increase of 34 percent over 1985 imports. Total imports from other countries were just over 18,000 mt.

U.S. fishermen landed 285,000 mt last year, of which about 110,000 mt were exported. About 100,000 tons went into the domestic canned market, leaving about 75,000 mt in the domestic fresh/frozen market. Imports from all countries, then, account for about 24 percent of the domestic supply of fresh and frozen salmon.

These figures could change rapidly. Japanese sea ranching could supply more of that country's needs for salmon, which would leave more sockeyes and cohos for the domestic market. Alaska salmon landings are mercurial, but generally have been increasing over the past decade. Imports are likely to rise — perhaps even double — in the next five years. But a rapidly expanding market will move these supplies quickly. □

What is real?

A word or two about real salmon. There are two genera, or classifications of salmon: *Oncorhynchus* (on ko rin kus) and *Salmo*. Members of the *Oncorhynchus* genus are found in the Pacific and are all called salmon. Members of the *Salmo* genus are most often found in the sea pens of Norway (although there are still some small wild runs in the Atlantic), and are called, depending on the species, either salmon or trout. The fish that created such a splash on the winter market in the early 1980s is *Salmo salar*, or Atlantic salmon. In the wild, both Pacific and Atlantic salmon hatch in streams, migrate to open ocean for a growing period, then return to the streams of their birth to spawn. A major difference between the two groups is that *Oncorhynchus* spawn once and die; *Salmo* spawn several times.

A STIR IN THE SALMON MARKET

How new supplies
are changing the picture.

BY PEGGY PARKER



Salmon farmers are banking on high quality and reliable supply to sell their fresh product, while domestic producers of wild-caught fish are looking to create a market niche based on the price and year-round availability of high-quality frozen salmon.

Despite the salmon family's abundant market forms and diverse species, the attention of today's market seems riveted on fresh and frozen salmon, both farmed and wild.

Much of the stir in the fresh market is due to the Norwegians, who began exporting large volumes of fresh Atlantic salmon to both the East and West coasts in the early 1980s. The Norwegian exports meant that, for the first time, high-quality fresh salmon was available in the winter — and in reliable quantities.

It used to be that fresh salmon was sold only from June to September. There were regional exceptions where winter runs of kings or steelhead (a member of the trout family, often sold as salmon) put fresh salmon on the tables of gourmet restaurants in February and March, but volumes were minuscule. The savvy Norwegians created a whole new market with their product, a market that went far beyond the niche of the domestic product in winter.

The urge to target this market is strong among domestic producers: returns are high, and the potential for growth is excellent. There are only two rules in this high-stakes game, but they must be followed to the letter. First, the product must be of highest quality; and second, supply must be

reliable.

Salmon producers are taking two approaches to the market. One is to join the competition. Interest and investment in farming operations are high on the coasts of both Canada and the U.S. Another is to promote high-quality frozen salmon as a product that meets the aesthetic standards of fresh, yet is available — usually at lower prices — all year.

The Alaska Seafood Marketing Institute introduced "Premium Quality" salmon to the winter market this year in an effort to prove that frozen salmon beats fresh in the overall picture. The cohos selected for the promotion were troll-caught, bled and immediately iced on board, then frozen on shore using meticulous handling techniques.

No time for kid gloves

But it is unlikely that Alaskan plants will produce an elite product in great quantity anytime soon. With half a billion pounds of salmon returning to Alaskan rivers in a period of four months, processors have little time for kid-glove treatment on the majority of the catch.

Harvest timing is more critical with salmon than with any other seafood. Wild salmon must be caught



between the time they enter the fishing grounds (often a several-hour boat run from the fish plant) and the time they reach the fresh water of their spawning streams. It is during this window of time — often only a matter of hours — that wild salmon are at their peak.

Processors market the cream of this crop — troll-caught chinooks and cohos and gillnet-caught sockeyes — to high-ticket restaurants. Like fine wine, they are sold with the area of origin and the date of harvest identified. While the percentage of wild salmon that is sold fresh or frozen is much higher than it was six years ago, growth in this area has slowed. Last year, fresh and frozen salmon amounted to 53 percent of the entire pack, 10 percent below the 1985

Salmon Farming on the Sunshine Coast

By Peggy Parker

To Yvonne Kraft, the salmon she tends aren't just fish. "They're like your kids," she says. "You watch them every day, worry that they're eating enough and staying healthy. Let me show you the females we're raising for brood stock."

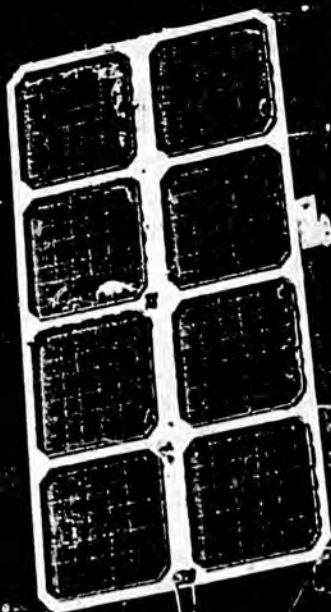


Kraft spent most of 1985 at this grow-out site in British Columbia, living in a plywood and tin shelter set on the floating farm — a series of underwater pens holding young chinook and coho salmon and connected by aluminum catwalks. The site is 40 miles from the nearest town.

"Last winter I'd be out here talking to these fish," she laughs, "talking to my girls."

Kraft is a partner in Aquarius Sea Farms, the largest producer of cultured salmon in British Columbia. In 1985, she was not the only person who was interested in the fish swimming in her net pens. U.S. buyers who had come to rely on Norwegian farmed salmon were realizing that B.C. farms could augment supplies of farmed salmon — at reduced shipping costs — if they could produce reliable quantities.

B.C.'s salmon farmers geared up to meet these demands. Now, after three years of watching the progress of this budding industry, U.S. buyers no longer have to wait. The first harvest of salmon came in September, buyers liked what they saw, and wholesale prices jumped far higher than expected. This year marks the beginning of major production for the new generation of B.C. salmon farmers. In calendar year 1988, 5,000 tons of fresh salmon will be available to U.S. and European buyers, and projected production of 20,000 tons by 1990 is well within reach.

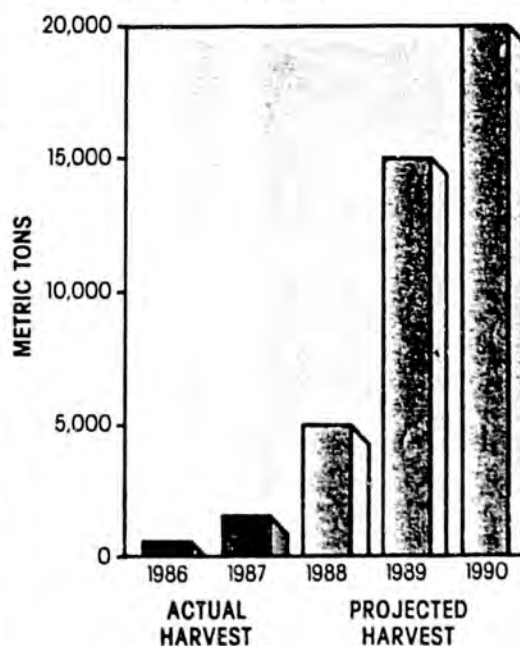




Yvonne Kraft (left) and her husband Norbert think big. Their Aquarius Sea Farms, owned with Norwegian investors, could produce up to 2,200 metric tons this season.

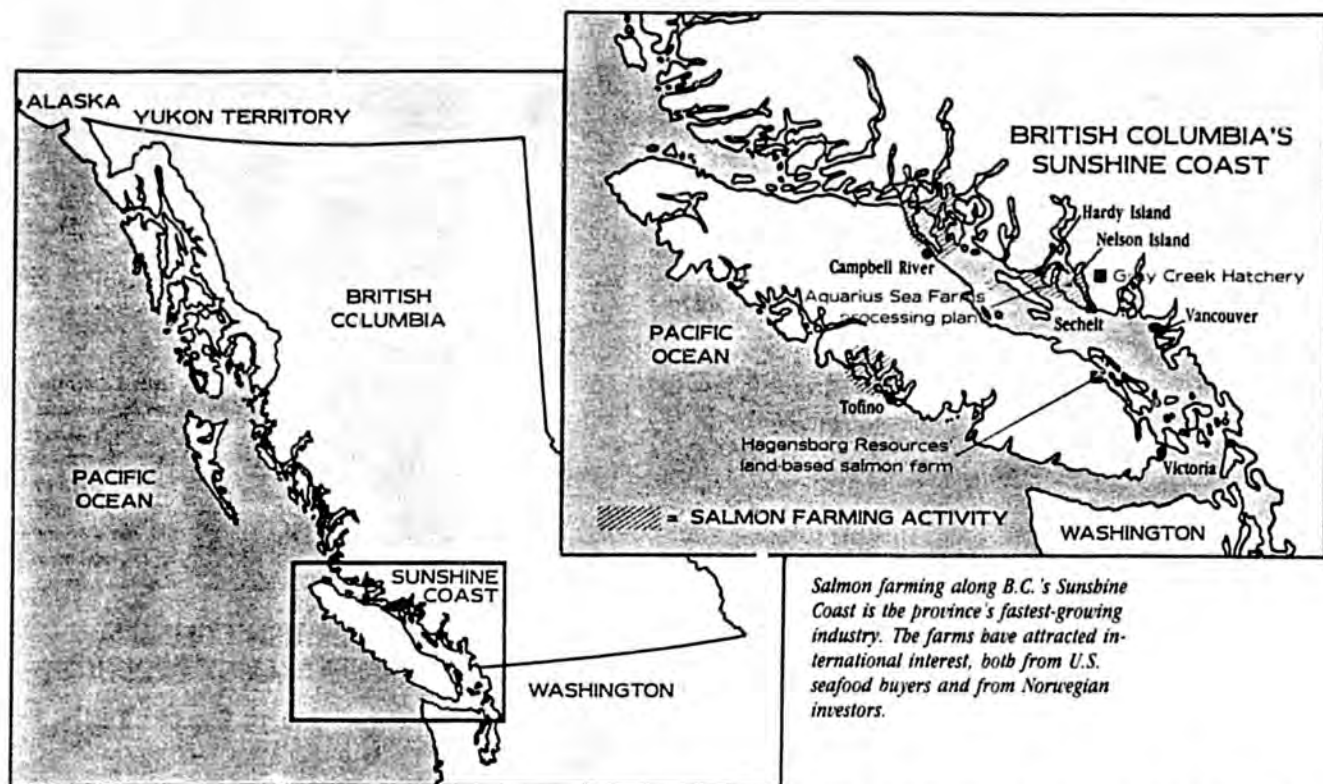
PEGGY PARKER

BRITISH COLUMBIA FARMED SALMON PRODUCTION



British Columbia's salmon farmers will harvest 20,000 metric tons in 1990, according to projections. (For comparison, Norway was expected to produce about 48,000 mt of farmed salmon in 1987.)

AQUARIUS SEA FARMS



Salmon farming along B.C.'s Sunshine Coast is the province's fastest-growing industry. The farms have attracted international interest, both from U.S. seafood buyers and from Norwegian investors.

Unlike the Norwegians, residents of B.C.'s productive west coast, known as the Sunshine Coast, did not turn to fish farming on the rebound from a failing commercial fishing industry. Ironically, many of the province's leading fish farmers got into it as an alternative lifestyle.

Tom and Linda May operated a successful boatyard in Seattle during the 1970s. In 1980 they sold the business, bought a parcel of waterfront on B.C.'s Nelson Island, and began raising chum salmon.

"It was a disaster," says Tom May, now president of Royal Pacific Sea Farms, one of the dominant producers in British Columbia. "In 1981 we shifted to chinook and coho. We have a definite preference for chinook now, but we're putting a large effort into breeding coho, and our emphasis may shift in the future."

This oft-heard refrain is a response to the market. Restaurant buyers pay top dollar for fish that weigh five pounds or more. Chinook will grow to that size without becoming sexually mature. Coho are less likely to reach that size before they begin to show signs of spawning. (As salmon approach spawning, their meat becomes increasingly pale and watery.) In the case of Pacific salmon, spawning is a once-in-a-lifetime event that farmers would like to avoid altogether.

To this end, George Hunter directs a staff of bioengineering technologists at Royal Pacific in a two-pronged approach to sterilization. The most effective current technology is to feed very young coho minuscule amounts of steroids for a 12-week period. Ten days

after the treatment, all trace of the steroids has disappeared.

"Hormonal sterilization is a short-term answer," says Hunter. "The long-range answer is to use other methods. We're doing work on inserting genes into salmon at very early stages of development. We're calling these 'transgenic' salmon." The gene is reproduced in a petrie dish and put into the salmon at the four-cell stage or earlier. Gene manipulation can increase growth rates and disease resistance as well as affect reproductive abilities.

After Royal Pacific's initial setback with chums, the company doubled production every year. In 1986, says Tom May, "We were showing a very, very large profit on a few-million investment. We sat down and decided what direction we wanted to go in terms of the scale of the operation — what kinds of fish to raise and where our profit centers would be. We came up with a needed investment of \$10 million."

Early last year, the company went public. The offering on the Vancouver Stock Exchange was successful, due in large part to the company's solid operating record. In an industry where profits often elude balance sheets for five years after start-up, Royal Pacific made money after two years, and profits have grown each year.

For many fish farming companies in B.C., offering shares on the Vancouver Stock Exchange is the best way to raise large amounts of money. Commercial banks in Canada have not recognized fish farms or their swimming

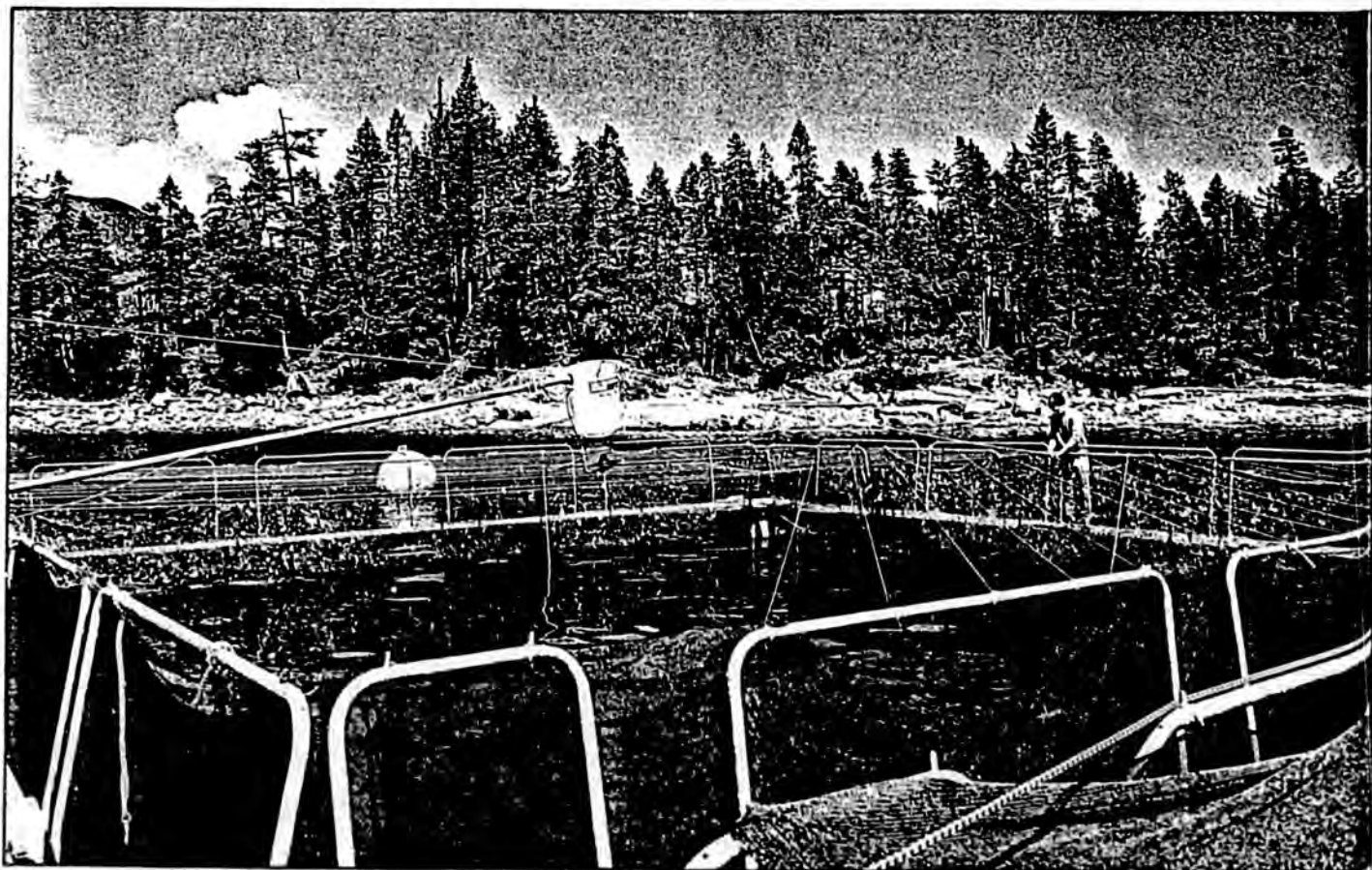
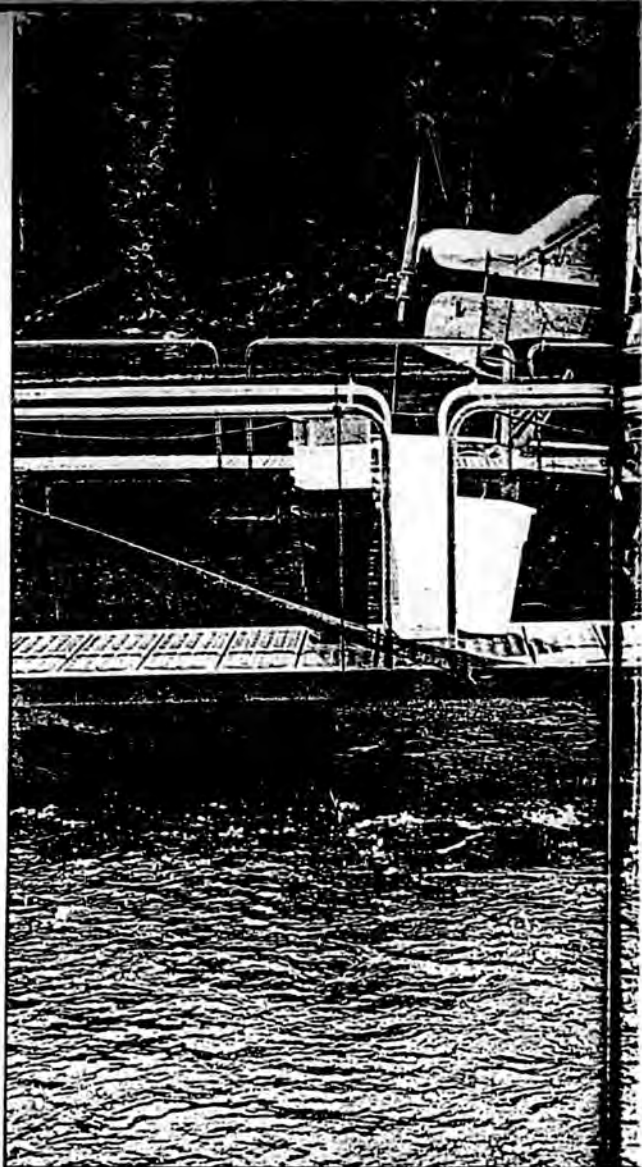
stock as collateral. Norwegian banks, however, familiar with the profits of salmon farms in their country, have invested heavily in British Columbia. Analysts say that of the estimated \$100 million (Canadian) investment in the B.C. industry, about half is Norwegian.

Yvonne and Norbert Kraft, founders of Aquarius Sea Farms, owe much to the faith and financing of the Norwegians. In 1984, Yvonne was a retail florist, and Norbert operated a construction business in Sechelt. A year later, they had fish in the water in a small farm in Hotham Sound. A contingent of Norwegians visited B.C. in 1985 and met with the Kraits, who decided to expand their farm and become leaders in the industry. Norbert went to Norway later that year; he came back with a financial partnership and plans for a hatchery.

This year the hatchery produced three million smolt, about half for sale to outside companies. Five million eggs will be incubated there this winter, but the hatchery will hold 12 million at full capacity — the largest production in B.C.

Yvonne and Norbert Kraft are described as "big thinkers" by their colleagues. Their production and marketing plans reflect that thinking, and the company's performance confirms it. By May Aquarius will have produced 1.5 million pounds of salmon (680 metric tons) — more than any other farm in Canada. This season they plan to harvest 4 to

Hardy Sea Farms' salmon pens eventually will share beautiful Hardy Island; prime lots are being reserved for resort development.





PEGGY PARKER (3)

5 million pounds — four times British Columbia's entire output of farmed salmon in 1986.

They'll probably do it. The Krafts have met every goal they've set for themselves in the past three years, and they've done it on time. Company performance has been strong enough to attract investment from oil-and-mineral tycoon Edgar F. Kaiser, Jr., who recently bought just over 10 percent of the firm.

Aquarius' latest project is a state-of-the-art processing plant with a shift capacity of 20,000 pounds. Centrally located among the company's 10 farms on B.C.'s Sunshine Coast, the plant began processing in November.

Now that harvesting and processing schedules are being met, marketing has replaced production as the farmers' first priority. The B.C. Salmon Farmers Association (BCSFA), an industry group in charge of allocating eggs from the provincial and federal hatcheries to private companies, began marketing studies in 1986. Al Archibald, marketing director for the association, has provided the farmers critical information on market needs in Europe and the U.S.

Armed with this preliminary data, individual companies began developing their own marketing plans in early 1987. Most of them either sought out, or were sought out

by, established brokerages and distributors. Tom and Linda May of Royal Pacific worked out a deal with B.C. Packers, one of the largest salmon packers in North America, to process and market most of their harvest.

The Krafts wanted to sell fresh salmon under the Aquarius label and applied for trademark rights. When Marketing Director Jack McLennan learned that the name was already taken but was not being used, he contacted the company that had the rights to it. Serendipity being what it is, the company that had trademarked "Aquarius" was Clouston

An Aquarius farm — there are 10 in all — takes delivery of smolt (left). The company's hatchery will incubate 5 million eggs this winter; its capacity is 12 million.



Al Archibald (left), marketing director for the B.C. Salmon Farmers Association, and Mike Mulbolland, operations manager for Hardy Sea Farms.

Foods, Canada's premier seafood broker. Clouston is now the exclusive marketing agent for Aquarius.

Pacific Aqua Foods, a huge, vertically integrated company that has been traded on the Vancouver Stock Exchange for several years, signed an agreement with the giant Canadian processor, National Sea Products, in September. The transaction provided \$2 million in financing for PAF, named National Sea Products as the exclusive marketing agent for PAF's products, and put Gordon Cummings, president and CEO of National Sea, at the head of PAF's board.

Another B.C. company, Hardy Sea Farms, is affiliated with Saga Seafoods A/S, a Norwegian firm founded by Thor Mowinckle after he made A/S Mowi the leading salmon producer and marketer in Norway. The Canadian subsidiary owns Hardy Island, a beautiful tract of land off the northern reaches of B.C.'s Sunshine Coast. In these protected bays, Hardy will raise coho and chinook salmon. But it has reserved half of the island for real estate development — a carefully planned collection of prime waterfront lots for resort use.

Hardy produced about 250 tons of chinook and coho last year; it expects to triple that in 1988. "After that, production will more than double every year," says John

Big Players in B.C.

Spence, president of Hardy. "By 1990 we are projecting about two to three thousand tons."

Spence, a Mowinckle protege who ran and is still a shareholder in one of Ireland's most successful farms, Fanad Fisheries, recognizes the market's critical role in his company's success. "We are in a market-driven industry," he asserts. "We need to respond to what the market wants, when it wants it and at what quality."

Hardy's marketing agent is J.S. McMillan, B.C.'s largest family-owned seafood processor and distributor. McMillan will tap its broker network to promote Hardy's pen-raised salmon, but is test-marketing fresh and frozen fillets and vac-packed portions in other markets.

Hardy Sea Farms will be going public this winter, in a move to raise between \$5 and \$6 million. Most of the capital will be used to develop the company's domestic brood stock.

"We are self-sufficient on brood stock," says Spence, "but we've only got two generations behind us." Spence's interest in developing reliable domestic brood stock is prudent. Those companies that now do not have enough of their own brood stock rely on wild eggs allocated by the BCSFA. By controlling production of their own eggs, companies not only gain further integration, but the ability to develop a "signature" product and to plan their production more carefully.

"The farmers have placed orders for 30 million eggs this year," says Al Archibald of the BCSFA. "They've asked for 27 million chinook eggs and 3 million coho. Last year, the mix of chinook to coho was more like 50-50." Clearly, the farmers are not going to get all that they want. When *Seafood Business* went to press, allocations were expected to be only 20 million eggs.

While most B.C. salmon farmers either own or have exclusive arrangements with processing and marketing firms, there are dozens of farmers who have decided to stick to what they do best — raising salmon. This has led to the formation of companies like Sechelt Processing Ltd., a small, custom processor that serves independent farmers up and down the Sunshine Coast. To transport live fish to the plant, Sechelt uses a 40-foot vessel equipped with a "fish well." Each of four compartments has its own circulation and oxygenation systems to keep live fish healthy during a five-hour run.

This winter, farm-raised Pacific salmon will come face to face with Norwegian and Chilean product, at a time when sales of farmed salmon are strong and prices generally high. How the market shakes out will depend as much on marketing methods as on size and species.

With the involvement of such marketing heavyweights as Clouston and National Sea

Aquarius and Royal Pacific are the front-runners in terms of production today, but they are by no means the only — or the largest — players in B.C.'s fastest-growing industry. Many of the companies operating salmon farms in the province have corporate charts that look like detailed road maps.

Pacific Aqua Foods Ltd. (PAF), with interest in both Pacific and Atlantic salmon, was one of the first aquaculture companies to be traded on the Vancouver Stock Exchange. PAF owns Tidal Rush Marine Farms (pen-raised Pacific salmon), Aqua Foods (cultured oysters), Deluxe Seafood (processor and marketer), American Aqua Foods (pen-raised Atlantic salmon), and Nationwide Seafood Distribution Centers (California-based distributor). Its affiliates include Crystal Waters Sea Farm Inc., the largest Atlantic salmon hatchery in British Columbia, and Quatsino Sea Farms, another salmon farm.

Crystal Waters, owned jointly by PAF and Sea Farms Canada, is one of the few companies that have obtained the right to import Atlantic salmon eggs. By 1989, however, it intends to be producing enough of its own brood stock to meet egg needs.



One of Seastar's four grow-out sites.

The economic benefits of vertical integration are not lost on Hugh Cooper, chairman of Seastar Resource Corporation. Cooper grew up in the farm country of southern Manitoba and watched as farmers struggled through bad weather, poor crops, and mounting debt.

"The poor sodbusters in Manitoba never made a buck," he says. "It was the grain companies that made money. And they made it because they sold the farmer his seed grain, his fertilizer, his equipment — and then they marketed his product."

Cooper applied what he had learned when he was hired by Seastar, a former oil, gas, and mining firm that turned to renewable resources in 1985. For the next two years Seastar was in an acquisition mode, culminating in the ownership of two salmon hatcheries, four operating grow-out sites, two processing companies with major cold-storage and freezing capacities, a fish-buying station, a smoked-seafood processor, a fish-food manufacturer, a net-pen manufacturer, and a major marketing firm that imports and exports farmed Norwegian salmon all over the world.

Seastar's production of salmon is in the early stages — 160 tons, mostly coho, will be harvested this year. But once the tonnage is there, Seastar will have everything else in place. Processing will be done primarily at Long Beach Shellfish, the largest shrimp processor in B.C. and "a major cash cow" for the company now. The plant will portion and vacuum-pack salmon for the retail market, which will get about 30 percent of Seastar's production.

ALBERT NORMAND/SEASTAR



HAGENSBORG RESOURCES LTD. (2)

Taking to the Land

One of the most bullish of the publicly held salmon-farming firms is Hagensborg Resources, a company with tremendous vertical integration. With a \$5 million line of credit from Norwegian financiers, Hagensborg is building a land-based facility large enough to produce 1,000 tons of coho and chinook salmon annually — the largest land-based operation on the continent.

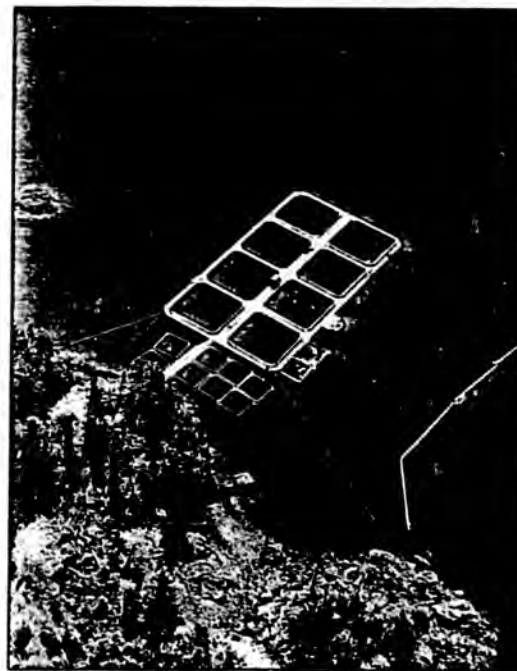
The advantages of land-based salmon farming are numerous: disease control, protection from predators, more efficient feeding, and full control of water temperatures and oxygen levels. The initial costs, however, are much higher than for a sea-pen operation. Smolt will be put into tanks early this year, with the first harvest set for late 1989.

Two company-owned sea pens on the west coast of Vancouver Island are currently producing small quantities of chinook and coho. (About 250 tons of 4/6 coho and chinook are expected to be harvested between November '87 and May '88.) Five more sites — each with production capacity of 900 tons per year — will be in operation there this year. When both land-based and sea-pen operations are in full production, 7,300 tons of salmon will be produced annually.

The base camp in Cypress Bay doubles as a staging center for other farms in the area. Hagensborg owns a ferry boat to bring in supplies from Tofino, the closest town and a major port on Vancouver Island. Space on the ferry is leased to other companies bringing supplies in to their farms.

Last summer, Hagensborg bought a 45-acre dairy farm located above the largest aquifer on Vancouver Island. This unlimited source of water will supply Hagensborg's hatchery, which in turn will provide smolt to the company as well as cash from outside sales.

Hagensborg salmon will be fed food pellets made by another company subsidiary that also sells to other farms. Finally, Hagensborg Foods (a wholly owned subsidiary) will market fresh, smoked, and frozen salmon, as well as salmon pates and other value-added products, through existing broker networks in the U.S., Europe, and Asia.



The drawing (top) shows what will be "Canada's largest Tank Fish Farm," the land-based salmon facility being built by Hagensborg Resources. The company also will have seven sea-pen operations like the one in bottom photo.

Products, B.C.'s farmed salmon will enjoy a higher profile this year than ever before. But it will be the combined efforts of all the brokers and traders handling B.C. product that determine its market position. Many have already made their moves with small amounts of fish in select markets. Besides the firms already linked to the farmers through exclusive marketing arrangements, independent brokers have flocked to the farms on the Sunshine Coast. Demand has grown exponentially since the first big harvests of last year, and B.C. salmon farmers may find that even 20,000 tons in 1990 will not be enough to satisfy everybody. □

Alaska Mariculture Association

Honorable Tony Smith
Commissioner
Department of Commerce & Economic Development
P.O. Box D
Juneau, AK 99811

Dear Commissioner Smith:

I have closely reviewed the cost of production report on salmon farming, and found it to be a good representation of the anticipated costs of producing farmed salmon in Alaska.

I have studied this issue very thoroughly and have completed similar cash flow analyses for two separate private clients. DPA's report generally reflects cost estimates I developed in these confidential reports.

I do want to raise two major concerns about the report: incomplete information regarding feed costs, and the sweeping conclusions made about Alaska's water temperatures.

In the course of my work, I obtained quotes from a major West Coast feed producer (Moore-Clark) for container loads of two separate farmed salmon diets FOB Seattle. I then obtained quotations from two of the state's major freight companies for delivery of the feed to Hollis on Prince of Wales Island.

The more expensive feed was a dry feed mixture called extruded pellets. This high quality feed has only recently become available on the West Coast, and despite some advantages it still is used by only a few farms in British Columbia and Puget Sound because of its cost. This feed would cost \$.46 per pound FOB Hollis which is almost identical to the feed cost assumption in the DPA report.

The second feed was a Moore-Clark dry feed the company calls "new age" dry pellets and is one of the most widely used feeds in farms in B.C and Washington State. This feed would cost \$.32 per pound delivered to Hollis.

These cost differences are very significant since feed accounts for about one half of operating expenses. A 400-ton salmon farm requires about 1.7 million pounds of feed during a projected 25-month growth cycle. This means feed costs could be lowered from \$780,000 to \$541,000 by switching from extruded to dry feed. My figures show feed cost would drop from 54 to 45 percent of operating expenses.

This kind of analysis should have been included in the report, as it makes a significant difference in outlooks of profitability and competitiveness of Alaska producers.

A second major concern I had in reading the report was the heavy emphasis placed on water temperatures and the effect on growth rates of pen reared salmon. While I agree with some of the general observations in the report that Alaska's water temperatures are lower than those in B.C.

and this will mean slower growth rates, I believe these effects have been over-emphasized and that the consultants should have looked closer at some other data before making such sweeping conclusions.

I believe the consultants should have looked closer at water temperatures and transportation infrastructure on the western coast of Prince of Wales Island and the Unalaska/Akutan areas of the Aleutian Islands.

The rearing conditions on the west coast of Prince of Wales Islands are some of the best in Alaska for the pen rearing of Pacific salmon. The water temperatures are very comparable to northern B.C., and the outer coastline is largely undeveloped. The island also has an extensive road system, airport at Klawock capable of landing large cargo planes, regular ferry service, fish processing plants and an underemployed local work force. These elements combine to make POW Island one of the most attractive areas for salmon farming development in the world, yet the area was not mentioned by the report.

Another obvious oversight in the report is the Aleutian Islands, particularly in the area around Unalaska which has good air cargo and barge service. The community's two large surimi plants produce thousands of tons of high quality fish meal weekly throughout the year which now is sold to Taiwanese eel farmers. The community also has several geothermal resources which could be tapped to improve hatchery production.

The area also has excellent water temperatures for pen rearing Pacific salmon. According to a recent report by the Canadian Ministry of Agriculture and Fisheries, the ideal rearing temperatures are: 10-15 degrees Celsius during the summer and seven degrees or better during the winter months. Information obtained from the U.S. National Oceanic and Atmospheric Administration (NOAA) shows the following mean water temperatures in Unalaska: January, 7; February, 7; March, 7; April 8; May, 10; June, 10; July, 12; August, 14; September, 13; October, 12; November, 10; and December, 8.

I believe that Unalaska has the potential of providing one of the lowest costs of production per pound and its location could make it very competitive with B.C. producers in important Japanese markets, yet the area was not mentioned in the report.

Important to recognize in analyzing the results of the study is that the experience of pen rearing Pacific salmon in northern regions is relatively skimpy. For example, I found in my work that northern B.C. and Alaska appear to experience reduced mortality figures, and some farmers and researchers believe these could offset slightly slower growth rates.

Researchers at Alaska's experimental salmon farm on Baranof Island believe that their efforts to date indicate Alaska could have significantly lower losses of stocks due to disease and other factors than B.C.'s primary growing region in the Sunshine coast.

I also discussed this issue with officers of one of B.C.'s largest salmon farming companies which has sites on the Sunshine Coast, Campbell River and Prince Rupert areas. They have analyzed the results in all three regions and believe the Prince Rupert area may be the superior growing region because of improved mortalities, despite slightly lower growth rates due to reduced temperatures.

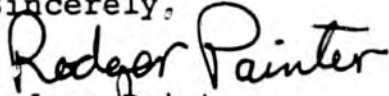
I want to stress that I think DPA did a fine job within the restraints of funding and time available to complete the study. I was particularly impressed with the analysis of the competitive positions of various

Commissioner Smith
Page Three

established salmon farming regions.

However, I also believe it is critical that the results are applied appropriately and policymakers take into account some of the factors outlined in this letter. Thank you for considering my comments.

Sincerely,



Rodger Painter
Executive Director

c.c. Governor Steve Cowper
Senate Resources Committee
House Resources Committee
Rep. Johnny Ellis

Tlingit and Haida Indian Tribes of Alaska.

MARICULTURE EDUCATION WORKSHOPS

Central Council of Tlingit and Haida Indians of Alaska invites you to attend community workshops to discuss the pros and cons of mariculture, and inform you about mariculture income and employment opportunities. Panelists include members of U/A Marine Advisory Program and T&H Mariculture Association. Central Council will report on a special research project recently completed.

Invited Guests

Residents interested in learning
about mariculture opportunities;
Local Fish and Game
Advisory Committees
City Officials

Village Corporations Officials
IRA and T&H Council Members
Sealaska Board and Management.

Meeting Schedule

Klawock Youth Center	October 26, 1987
Klawock, Alaska	7:00 p.m.
Hoonah City Hall	November 2, 1987
Hoonah, Alaska	12 Noon
Angoon Town Hall	November 3, 1987
Angoon, Alaska	12 Noon
Yakutat H. S. Auditorium	November 4, 1987
Yakutat, Alaska	7:00 p.m.
Kake Community Hall	November 6, 1987
Kake, Alaska	12 Noon

P.O. # 2627

Tuneau Empire 10/12/87

- 747-6065

Mary hopes
to attend

Supposedly Rodger Painter has a
\$40,000 contract with T-H to conduct
workshops

Alaska Mariculture Association

M E M O R A N D U M

TO: Senator Jack Coghill, Chairman
Senate Resources Committee

FROM: Rodger Painter, AMA Executive Director

DATE: March 14, 1988

RE: CSSB 482

I have reviewed in detail the original version of Senate Bill 482 and the committee substitute developed by Senator Eliason. While AMA opposes both versions, the committee substitute does offer a couple of important improvements, specifically in making permits transferable and eliminating public notice requirements imposed on applicants for tidelands.

These changes are relatively minor, however, in context of the impact of the bill overall on mariculture development. Our continuing opposition focuses on impacts on shellfish and aquatic plant farming, non-salmon finfish pen rearing, uplands finfish farming, and the prohibition of pen rearing of salmon.

Shellfish/Kelp

Policy--SB 482 should have a findings and policy section to provide better policy direction to state agencies on mariculture development issues. This is critical to all developing resource industries where agencies have to deal with many problems that aren't directly addressed in enabling legislation, and will be especially important in the case of mariculture because of the controversy surrounding the issue.

Criteria--AS 16.40.105 provides criteria for issuance of permits that AMA believes is too restrictive and would not allow flexibility by state agencies. The existing language could be interpreted to say that any degree of adverse impact will result in denial of a permit. This concern has been driven home by the fishing industry's current concerns about the absolute language in the Marine Mammal Protection Act which some environmental groups interpret as saying any taking of an endangered marine mammal could result in a total closure of that fishery.

Sales of Broodstock--AS 16.40.120 (b) restricts the sales of spat or other broodstock gathered from wild sources to Alaska farms and

aquatic farming hatcheries. Participants in the Kodiak scallop farming project have requested that this section be amended to allow sales to out-of-state buyers who already have been calling about potential purchases. Spat fishermen want this flexibility because initial in-state markets could be insufficient.

Oyster farmers who are acutely interested in construction of a shellfish hatchery have requested a similar amendment to AS 16.40.140. Oyster farmers believe sales to outside buyers may be critical to feasibility of an Alaska oyster hatchery.

Releases--SB 482 does not include language provided in SB 106 that specifically precludes the intentional release into common property waters without prior approval of ADFG. This is an important protection for wild stocks. Farmers favor language that prohibits unauthorized releases, while allowing approved releases as a method of lower cost common property enhancement programs involving private hatcheries.

Disease Reporting--AMA endorses language developed at the suggestion of Brian Allee with the FRED Division that requires the reporting of disease incidents within 48 hours of detection. AS 16.40.150 (a) now requires the reporting of disease outbreaks, but lacks a time-certain reporting requirement.

Definitions--AS 16.40.199 (3) limits aquatic farm products to consumptive sales, except for kelp cultivated for use in dyes. This is much too restrictive a definition for aquatic plants which could be used for a wide variety of purposes in addition to dyes. The language also could prohibit, for instance, cultivation of pearls or other non-consumptive uses of aquatic animals. AMA suggests the language be amended to allow the sale of aquatic farming for all consumptive and non-consumptive uses.

Labeling--SB 482 adds language to AS 03.05.020(a) that requires DEC to label all cultivated seafood as aquatic farm products. This is a costly requirement that appears to serve no useful purpose for the farmer or consumer. We particularly question the applicability of this section to oysters and mussels (the only two seafoods presently being produced by Alaska farms) since there are no wild products available on the market from Alaska. This requirement also would apply to aquatic plants and a wide variety of finfish, such as arctic char, rainbow trout, sheefish and other species.

AMA does not believe that such labeling really affects consumer purchases, and will only result in unnecessary government spending. This section appears to be directed at farmed salmon. If commercial fishermen want to distinguish their salmon from farmed salmon then they should take the initiative to label their products as "wild." AMA believes it is inappropriate to impose this requirement on farmers.

Tideland Permit Fees--Perhaps the most objectionable provision of SB 482 is AS 38.05.856(a) which requires DNR to charge aquatic farmers "not less than the appraised fair market rental value" for nontransferable tideland permits. AMA strongly objects to aquatic farmers being charged more than other users of state tidelands. We believe this is unfair, and could result in additional costs that would push many existing farmers out of business. We also believe the required appraisals will be costly and could result in significant

additions to a DNR fiscal note.

Denial of Permits--Subsection (d) of AS 38.05.856 is ambiguously worded and one interpretation is that permit issuance and renewal could be denied simply on the basis of adverse public comments, rather than for public policy purposes. AMA suggests this section be rewritten to clarify that permits applications and renewals can be denied for good cause or if DNR finds it is in the state's best interests.

Culmulative Impacts--AMA also strongly objects to subsection (f) of AS 38.05.856 which directs DNR to adopt regulations providing for limits on the number of aquatic farming sites to be approved in an area to protect the environment and natural resources. These kinds of culmulative impact requirements are extremely difficult for regulatory agencies and for the industry, and result in high regulatory costs in monitoring and determining appropriate levels of growth.

On what basis would DNR determine culmulative environmental and biological impacts? Does the state possess adequate data on aquatic farming upon which such decisions could be based? It appears that significant research could be required before this could be implemented. Such provisions generally end up being tremendously burdensome for the agencies and invite lawsuits from anti-development organizations.

Permitting Freeze--Sections 18 and 19 would impose a freeze on all aquatic farming licensing and permitting and issuance of tideland and land use leases for aquatic farming until regulations are fully implemented. This could take months, and would result in extensive delays for applicants. For example, ADFG started working on the shellfish farming regulations now pending not long after the 1987 session and those proposals were still pending final approval by the Department of Law on the first of March. Once released by DOL, another 30 day waiting period is required before the regulations are implemented. This process, to date, has taken about eight months. These kinds of delays can be very costly to an applicant.

Critical to keep in mind is that ADFG's proposed shellfish farming regulations should become effective before the end of the legislative session and will be in place to deal with shellfish farming applications.

AMA strongly objects to this moratorium since the 40 existing permitted farms represent a tiny fraction of the 2,400 tidelands permits and leases issued statewide. There are no indications that any problems will occur while agencies are working on implementation of SB 482 or other legislation.

Grandfather Limitations--While AMA is very happy that SB 482 includes provisions to grandfather existing shellfish farmers into the lease preference section, we object to the limitations that come attached. The language restricts the grandfathered farmers to conditions of existing permits and preclude the farmer and DNR from negotiating a lease. The grandfathered farmers should be treated like all other lease applicants.

FINFISH FARMING

Sales of Broodstock--SB 482 does not allow private nonprofit hatcheries to sell surplus salmon eggs to upland aquatic farms. Some large surpluses of eggs now exist in some PNP hatchery programs, and AMA believes these operations should be allowed to sell these valuable eggs to upland farmers. Existing language in AS 16.10.420 and AS 16.10.450 prohibit PNPs from selling these surplus eggs to anyone other than another PNP. Consequently, many of these surplus eggs are destroyed.

AMA believes the PNPs should be given the option of selling these surplus eggs to in-state salmon farmers as a method of generating additional revenues to help retire debt obligations incurred under the state's enhancement loan program. This new source of revenue could allow the PNPs to reduce cost recovery harvests, creating the opportunity for increased common property harvests.

These amendments should be made in conjunction with additional amendments specifying that aquatic farm animals may not be intentionally released into public waters without prior approval of ADFG. The language also should require that such releases be subject to the disease and genetics standards of the department.

Salt Water Prohibitions--AS 16.40.100(d) prohibits the farming of finfish in salt water. This language appears to limit upland finfish farms to the use of fresh water. AMA believes it is critical to amend this language to allow upland farms to pump salt water to upland farms, as fresh water salmon and other finfish do not perform very well in fresh water culture. Even such landlocked farms as the Fairbanks' coho salmon farm require the use of some artificially created salt water in incubation and smoltification procedures.

Critical in consideration of this issue is the fact that discharges from upland farms will be subject to the same kinds of treatment requirements now applied to hatcheries. Discharges will be screened and treated so there is no opportunity for disease transference or sediment accumulations by outfalls.

In short, upland farms utilizing salt water will have no greater impact on the environment, natural stocks or use of public tidelands than those employing fresh water cultivation, but will be much more economically viable. AMA believes it is critical that such an amendment be adopted.

Prohibitions on Pen Rearing of Non-salmon Finfish--One of the most critical amendments necessary to SB 482 is the lifting of prohibitions on the pen rearing of non-salmon species of finfish. Upland farming is far more expensive than sea cage based systems from developmental and operational perspectives, and it is vital that farmers be allowed to experiment with sea cage rearing if Alaska is to achieve its potential with the farming of such species as arctic char, rainbow trout and black cod.

The controversy over fish farming has been narrowly focused on the pen rearing of salmon, and we do not understand why the prohibitions on free enterprise has been extended beyond the Onchorynchus genus. There will be no "gold rush" to farm these species as they are more in the experimental stage of development, so government does not have to fear that agencies will be overwhelmed

with applications and face a myriad of land management conflicts.

Should the committee decide it is vital that the pen rearing of salmon be prohibited, then AMA urges you to narrow the prohibitions to the pen rearing of Onchorynchus in the marine environment and estuaries.

Prohibition on the Pen Rearing of Salmon--AMA believes it is poor public policy to pass a permanent ban on the pen rearing of salmon. While it probably is not necessary to repeat the many reasons we oppose such a prohibition, it may be useful to point out that even the most ardent opponents of salmon farming have stated that the issue will not be closed with passage of SB 482 in its present form.

With this recognition, AMA urges you to consider a method for fully resolving the salmon farming issue. We believe the pen rearing issue will not be resolved until there is a full public discussion of salmon farming in Alaska focused on fact rather than emotionalism and power politics.

The best way of settling the salmon farming issue is to impose a moratorium on limited duration on the pen rearing of salmon and appoint a task force to gather factual information on the costs and benefits of salmon farming, including an in depth analysis of disease, environmental, market and fiscal concerns voiced by opponents. The membership of such a task force would have to be well balanced, and specific goals would have to be imposed. It also would be important to give the task force the charge of simply gathering and analyzing existing information so no costly and lengthy studies are required. Its mission should not include policy recommendations as this would politicize the process.

Passage of SB 482 with a flat ban on pen rearing and no public process will only lead to a continuation or even escalation of the current debate which has been driven by wildly divergent claims by proponents and critics. This atmosphere will only serve to make the process increasingly divisive. AMA is fully prepared to accept a legislative ban on pen rearing of salmon following a well informed public policy debate.

Alaska Mariculture Association

Dear Alaska Outdoor Council Member:

Scheduled at the 1988 annual meeting of the Alaska Outdoor Council is a discussion about mariculture or the farming of finfish, shellfish and aquatic plants.

Commercial fishermen have been strongly opposing the pen rearing of salmon and other finfish, and we fully anticipate that you will be asked to join in opposition. I would like to take this opportunity to provide your organization with some pertinent information.

Enclosed are copies of position papers on salmon farming by the Alaska Department of Fish and Game addressing disease and genetics impacts of pen rearing on the natural stocks. As you can see from these papers and the attached Associated Press article, the state's fisheries scientists fully believe that Alaska's natural salmon runs would not be threatened by a properly regulated industry.

Nearly every knowledgeable fisheries biologist I've discussed this issue with agrees that our present ocean ranching program poses a bigger threat to the wild stocks than salmon farming. The disease and genetics problems that have surfaced in the Norwegian salmon farming industry appear to be primarily caused by unwise policies such as importation of non-indigenous eggs and smolts, and excessive culturing densities.

State environmental officials also have clearly stated in legislative committee hearings that proper siting of salmon farms virtually eliminates the risk of habitat destruction. Salmon farming, like other forms of mariculture, depends upon clean water.

Another point of opposition has been that proper regulation of salmon farming will cut into existing fisheries programs in ADFG and other agencies. The facts are that the legislation now pending before the legislature may mean another \$165,000 in legislative funding annually.

Should AOC decide it's important to take a position on pending mariculture legislation, we urge you to consider support salmon farming as a clean water industry offering a great economy with a minimal risk to wild stocks or the environment. If you have doubts, then you should support an extension of the moratorium, rather than prematurely foreclosing a great opportunity for economic diversification.

Thank you for taking time to consider this information.

Sincerely,
Rodger Painter

Rodger Painter, Executive Director

p.s. If you will not be in attendance at the conference, please pass these materials on to the delegate attending the meeting.

DISEASE
Department of Fish and Game
Division of Fisheries, Rehabilitation,
and Development

ISSUE:

Protect native and hatchery stocks from potential disease arising from salmon farming operations.

DISCUSSION:

All populations of fishes, whether in saltwater or fresh, in the wild or in captivity, at some time contain disease agents such as bacteria, viruses, fungi, and invertebrate parasites. In Alaska, endemic disease agents are present throughout wild stocks and the marine environment. Many are opportunistic, causing disease primarily when the fish are crowded or stressed. However, it is extremely important to recognize that populations of fishes differ in the disease agents they carry, and that diseases newly introduced to fish populations can be very devastating.

To control disease in the ocean ranching program, Alaska set in place stringent regulations that govern the movement of salmon and their gametes within the state, and prohibited the import of any fish species or their gametes for aquaculture purposes. These regulations have applied for some 16 years and include requirements for thorough broodstock screening for disease agents, routine treatment of eggs to prevent disease outbreaks, annual inspections and strict reporting requirements, and the destruction of stocks if the state finds that this is necessary to control disease. The state's prohibition on importing species ensures that no new diseases are introduced into the state. For example, many chinook salmon stocks in Washington and Oregon carry IHN virus. Importing these fish could introduce new strains of IHN virus to indigenous stocks. Similarly, importing Atlantic salmon would bring the risk of importing exotic viral and bacterial diseases not found in Alaska. This could have serious impacts on the health of existing native and hatchery stocks, and must be avoided.

To maintain adequate protection of existing fishery resources, any future fish farming industry must be governed by the same fish health regulations currently governing Alaska's ocean ranching program. The species made available for farming should be from native or hatchery stocks having complete and acceptable disease histories. Prohibitions on importing species including Atlantic salmon must be maintained. This way, any diseases would be those already present in wild populations, not exotic diseases which could cause serious harm to the native stocks. All transport and possession of fishes and their gametes needs to be closely

controlled through Fish Transport Permits, and strict reporting and inspection requirements need to be enforced.

However, extending the Department of Fish and Game's fish health services to this new industry cannot be accomplished without the addition of new staff and monies to support these activities. Private sector fish health practitioners could pick up some of this additional workload. Such private practitioners would need to be certified by the state and monitored on a routine basis to ensure acceptable performance, but presently there are no private sector fish health practitioners currently operating in-state.

SUMMARY:

Assuming that imports of Atlantic salmon or other fish species to Alaska remain prohibited, that the state continues to meet its responsibilities in fish disease control, and that monies are provided for additional fish health services, this new industry can be accommodated without the threat of disease to existing native and hatchery stocks of fish.

GENETICS
Department of Fish and Game
Division of Fisheries Rehabilitation,
Enhancement, and Development

ISSUE:

Ensure that salmon farming does not impact the genetic integrity of existing natural and hatchery stocks of salmon and trout.

DISCUSSION:

Preserving the genetic diversity of Alaska's fishery resources has been recognized as an important fisheries management goal. This is especially true for the state's enormous salmon resources.

Alaska, in maintaining the health and perpetuity of its salmon resources, subscribes to the theory that identifiable units of salmon (populations, stocks, races) have through natural selection become adapted to the particular watershed that serves as home. This adaptation is preserved in the genetic make-up (gene pool) of the stock. State fisheries managers have sought to maintain stock diversity to ensure the long-term health of our salmon populations. Loss of stock diversity can occur through dilution brought about by interbreeding with other stocks. For these reasons, Alaska at the outset of its salmon ocean ranching program set in place stringent regulations that govern the movement of salmon and trout within the state and prohibited the import of salmon and trout for aquaculture purposes.

The Department of Fish and Game's genetics policy prohibits the importation of live salmonids (salmon family) into the state, and does not allow stocks to be transported between major geographic areas, such as Southeast, Kodiak Island, Prince William Sound, Cook Inlet, Bristol Bay, and AYK/Interior. The policy has been adopted in order to protect Alaska's diverse natural salmon and trout stocks.

Any new aquaculture venture, such as salmon farming, must be governed by the same policy, transport regulations, and statutes that have applied to the salmon ocean ranching program for the past 16 years. This is particularly true for provisions prohibiting the importation of exotic species, such as Atlantic salmon. Atlantic salmon are actually a trout and are the ecological counterpart of Alaska's indigenous or native steelhead trout. Since these species have not evolved together and thereby have not developed mechanisms to avoid competition with steelhead

trout or other trout, there is a concern about negative impacts on Alaska's indigenous trout.

Therefore, the genetics policy advocates the use of locally adapted stocks of salmon and trout of natural or hatchery origin because this will maintain the state's genetic diversity. This is important in the event of escape or "leakage" through holes in nets or other damage. The magnitude of impact on natural stocks is a function of numbers of fish that escape and that survive to spawn. It is assumed that low levels (less than 5 percent) of escapees can be managed by properly designed net-pen rearing units. Impacts on natural stocks from salmon farming would be minimized because of the policy of using locally adapted stocks.

SUMMARY:

Assuming that imports of exotic species such as Atlantic salmon or other fishes remain prohibited, that current regulations and policies remain in place, and that "leakage" of fish from the pens is kept low, salmon farming can be accommodated without the threat of impact to the genetic integrity of native and hatchery stocks of salmon and trout.

Salmon farming appears to be dead in the water

By HAL BERNTON
Daily News reporter

Alaska salmon-farming enthusiasts appear to be losing their battle to gain legislative approval for launching this mariculture industry.

"This year, it certainly does look like an uphill battle," said Rodger Painter, executive director of the Alaska Mariculture Association. "It's going to be very difficult in an election year to convince the legislature to make any decision."

Outside of Alaska, salmon farming is a major new industry that each year is grabbing larger shares of world salmon markets. Within Alaska, only one small, experimental farm exists.

Mariculture lobbyists have faced fierce opposition from state fishermen who fear the economic competition and environmental problems salmon farming might pose to their industry. At hearings and in one-on-one ses-

sions with legislators, fishing industry representatives have swamped the lobbying efforts of would-be salmon farmers.

"It sounds like a majority of legislators are not in favor of salmon farming," said Kate Graham, executive director of the United Fishermen of Alaska, a coalition of 20 fishery associations that represent 12,000 fishermen.

The United Fishermen also opposes other forms of fish farming, such as pen-rearing cod and Arctic char, Graham said.

Proponents and opponents of salmon farming both say the bill now most likely to move through the legislature is some form of a Senate Resources Committee bill that would allow most forms of fish, shellfish and sea vegetable farming but ban any efforts to raise salmon in the state's saltwater tidelands.

The bill's approach was endorsed late last week by Gov. Steve Cowper, who last week

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SALMON: Fishermen's fears of economic ills, disease may not kill issue for long

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declared his opposition to any bill this year that would allow salmon farming. That opposition, according to Rod Swope, a special assistant to Cowper, was based on potential conflicts between salmon farmers and other users of tidal waters, the uncertain economics of salmon farming and the prospects that outside investors would claim the majority of whatever wealth is created by salmon farming.

The fishing industry's lobbying efforts also helped sway the governor.

"Politics come into any decision, and it certainly was a factor in this one," Swope said.

But concerns that farm-reared Alaska salmon would transmit devastating diseases to wild salmon — a major concern raised by fishermen — was not an issue in Cowper's decision, Swope said.

"Our experts within the Department of Fish and Game have discounted that," Swope said. "They have said, with their professional experience, that is not a concern."

In Norway, Canada, Chile and other nations, salmon farming has emerged as a major aquatic industry producing a year-round supply of fresh fish for restaurants and supermarkets. The salmon are hatched from artificial-

ly-incubated eggs, raised in freshwater raceways until they reach smolt-stage. At that point they are transferred to saltwater pens, where they are fed a protein-rich diet until they reach market sizes varying from a half-pound to more than 10 pounds.

In some nations, salmon farms have been troubled by disease; in others they have ignited protests from other tidal water users who don't like to see bays developed with fish farms.

Despite problems, the industry is rapidly growing. Last year, salmon farms provided more than 6 percent of the world salmon's supply, and that market share is expected to increase to more than 14 percent by 1990, according to a House research report.

Painter, the mariculture lobbyist, said Alaska might as well grab a piece of the action.

"We think by not getting involved in the rearing of salmon, we (Alaska) get all the disadvantages of what's happening around the world, and none of the benefits," Painter said.

"Whatever price impacts that are going to occur on the prices of commercial-caught wild fish are going to occur regardless of whether or not we're involved."

Graham, of United Fishermen, said she fears salmon farmers, once they gained a foothold in Alaska, would push for legislative

approval to import Atlantic salmon to rear in Alaska waters. These fish may grow faster than Alaska species, she said, but could transmit new and dangerous diseases to wild stocks.

Sen. Arlis Sturgulewski, R-Anchorage, a Senate friend of the mariculture industry, said she would like to amend the Senate Resources Committee bill to allow salmon

farming, but she doubted such a motion had enough votes to pass.

She hopes to set up a task force of fishermen, state officials and mariculture proponents to develop a compromise plan for a future salmon farming bill.

"I don't feel that it is appropriate that the state rule out the potential of another area of economic development," Sturgulewski said.