ANALYSIS AND REVIEW OF POLICY, DECISION MAKING AND POLITICS REGARDING FINFISH AQUACULTURE IN ALASKA

by

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Section 1. OVERVIEW

1.1 Introduction

Aquaculture, broadly defined, is the production of finfish, shellfish and aquatic plants in fresh or saltwater involving control of one or more phases of their biological cycle and/or the environment in which they develop. Two of the primary rearing techniques specific to the culture of finfish include ocean ranching and finfish farming. Ocean ranching includes culturing finfish up to the smolt stage in a hatchery and then releasing them into fresh water streams, rivers, or the ocean. Fish are then harvested upon return to the hatchery. In waters adjacent to the Northwest states, British Columbia and Alaska ocean ranching is limited to salmonid production for the commercial and sport fisheries and enhancement of existing wild stocks.

In contrast fish farming consists of not only the hatchery production of smolt but also the culture of the fish to maturity in total captivity, usually in rearing structures such as marine net pens or upland tanks or ponds. For commercial production fish are reared until they reach a marketable size then taken from the water and processed and delivered to market. Cultured finfish species commonly reared by this method of aquaculture include salmon, trout, catfish, carp and talapia. In the colder waters of the North Pacific and North Atlantic commercial fish farming is primarily limited to the culture of salmonids. However, research on the culture of other cold water species like halibut, turbot, sablefish and cod is in progress with promising results for commercial operations.

During the past 25 years cultured aquatic species have become a significant share of the world's supply of seafood, increasing from 2 percent to 12.2 percent over the period 1962 - 1983. The National Marine Fisheries

Service expects aquaculture's share of total world production of fish and shellfish to increase to 24.3 percent by 2010.[1]

One of the most successful aquaculture industries to emerge over the past 20 years has been the salmon farming industry in Norway. This country's production of farmed Atlantic salmon increased from 170 metric tons (mt) in 1973 to 117,000 mt in 1989 worth over $600 million. Norway's production is expected to reach an estimated 150,000 mt in 1990.[2] Motivated by Norwegian success, other nations endowed with the necessary natural resources have also begun to develop salmon farming industries including Scotland, Canada, Chile, Japan, Denmark, Iceland, New Zealand, Australia and the United States.

1.2 Statement of Problem

The recent success of commercial salmon farming throughout the world spurred interest in development of a finfish farming industry in Alaska. Individuals from the private sector believed that Alaska had the necessary natural resources and infrastructure to support a viable finfish farming industry, and seven years ago began advocating for development of this new industry. However, due to a number of reasons which will be examined in this paper, potential Alaskan aquaculturists found their efforts continually obstructed during the public policy development process. Their efforts recently culminated in their most serious defeat; the prohibition of all Alaska commercial finfish farming in both fresh and salt water.

The debate on whether to allow commercial finfish farming in Alaska has involved many individuals and groups, including the legislature, governor, state

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[1]"The Outlook for Salmon and Shrimp Aquaculture Products in the World Markets", U.S. Department of Commerce, National Marine Fisheries Service, January 1985

[2]"Current Developments in World Salmon Markets: Implications for the Canadian Salmon Farming Industry", Report Prepared by B.C. Salmon Farmers Association for the Department of Fisheries and Oceans. Ottawa, Ontario. Report No. 46, January 1990

agency personnel, commercial fishing groups, aquaculture industry advocates, environmental groups and the general public. The nature of the debate and the response of decision makers, while is some cases unique to the Alaska situation, typifies many of the issues which characterize U.S. marine resource management.

1.3 Objectives and methods

This paper focuses on the explosive and controversial growth in finfish farming in general and salmon aquaculture in particular, and the response of Alaska policy makers to this emerging industry. It seeks to define and analyze why Alaska policy makers chose to prohibit all commercial culture of finfish at a time when commercial aquaculture production of finfish throughout the rest of the world continues to increase at a steady rate.

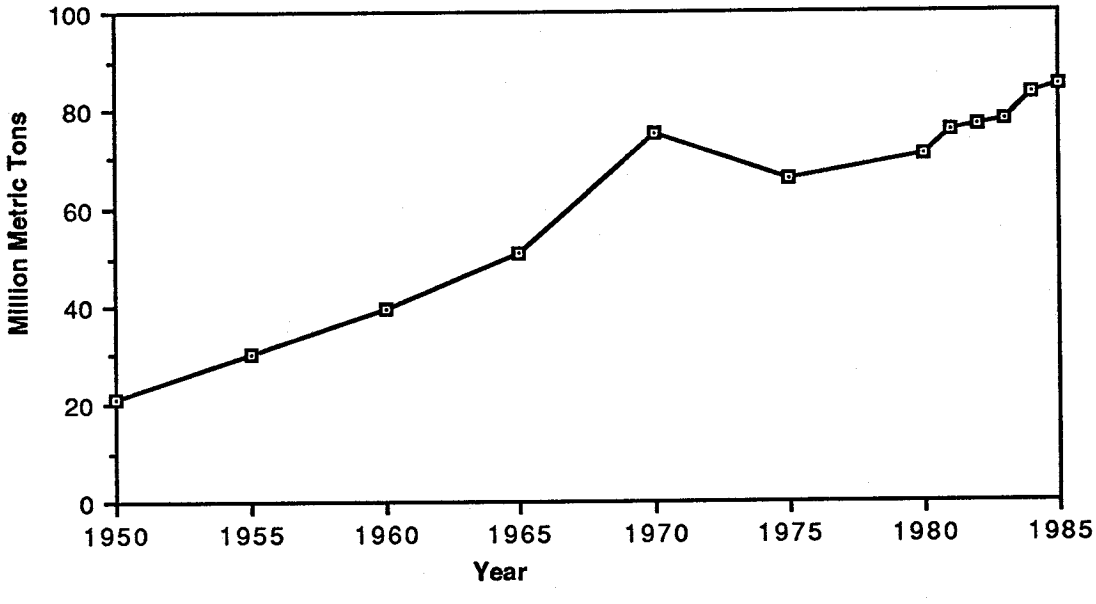
Section two of this paper provides an overview of the historical development and current economic situation of worldwide aquaculture production, and in particular, salmon farming production. The third section discusses aquaculture development in Alaska with a focus on the major policy issues and the role of the Alaska Finfish Farming Task Force in providing information to policy makers. The forth section describes in more detail the political context characterizing the salmon farming controversy and summarizes the results of a survey of the Alaska State Legislature. The paper concludes with a discussion regarding development of resource and aquaculture policy in Alaska and the role of information in guiding this development. This includes analysis of several reasons why Alaska policymakers enacted such an extreme policy regarding commercial finfish farming and how the Alaska situation and policy problem differs from other coastal U.S. states in marine aquaculture and salmon aquaculture.

Section 2. REVIEW OF WORLD AQUACULTURE DEVELOPMENT

2.1 Global Trends

More than three decades ago, the oceans were thought to contain an enormous untapped supply of marine fishery resources. Between 1950 and 1970, the world catch increased from 21.1 million metric tons (mt) to 66 million mt (Figure 2.1). Per capita consumption grew from 8.4 kilograms to 17.8 kilograms over the same period, as the annual growth rate in catch outpaced the increase in world population .

Figure 2.1. Trends in World Catch of Finfish by Capture Fisheries



After 1970, however, this situation reversed itself. From 1970 to 1985, world catch increased 29.5 percent, while world population grew 33.2 percent.[3] The Food and Agricultural Organization of the United Nations (FAO) projects that global demand for fish at today's prices (all aquatic species) could reach 114 million mt by the year 2000.[4] Production is estimated at 94 million mt,

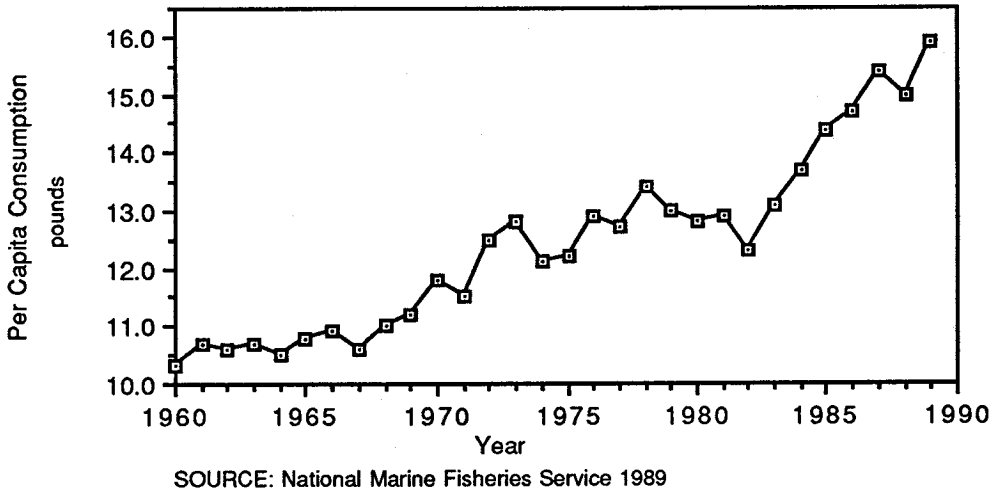
[3]"Aquaculture and Capture Fisheries: Impacts in U.S. Seafood Markets" U.S. Department of Commerce, National Marine Fisheries Service, Report pursuant to the National Aquaculture Improvement Act of 1985, April 1988, p. viii.

[4]"Development in International Trade in Fishery Products, 1960 - 1985". Food and Agricultural Organization of the United Nations. Report from the Committee on Fisheries, Sub-Committee on Fish Trade. Rome, October 1986.

resulting in a shortfall of 20 million mt. These numbers suggest that the supply of seafood products will need to grow at rates well above those of recent years to keep pace with the anticipated increase in demand.

In fact, world seafood markets are expanding. The 1983 annual world per capita consumption of fish and shellfish was approximately 28.6 pounds (live weight equivalent) and is expected to grow to 34 pounds by the turn of the century.[5] One market, the U.S. seafood market, is regarded by many in the seafood industry as the largest underdeveloped market in the world. Consumer demand for seafood products in the United States has grown steadily in the 1980's. Between 1980 and 1988, U.S. per capita consumption rose from 12.8 pounds to 15.0 pounds, an increase of almost 15 percent.[6] (See Figure 2.2.) Factors that have led to the rise in consumption include increases in income, changing lifestyles and a greater awareness of the health benefits of seafood.

Figure 2.2. U.S. Per Capita Consumption of Fish and Shellfish 1960 - 1988



SOURCE: National Marine Fisheries Service 1989

[5]"Future of Aquaculture: Profile of a Growth Industry," International Aquaculture Foundation, February 1985, p. 8.

[6]"Aquaculture and Capture Fisheries: Impacts in U.S. Seafood Markets" U.S. Department of Commerce, National Marine Fisheries Service, Report pursuant to the National Aquaculture Improvement Act of 1985, April 1988, p. vii.

Given the need for new supplies, what are the potential sources? Catch trends for the world's principal fishery resources indicate that these resources are close to their biological limits. In some cases stocks have been over-fished. The National Marine Fisheries Service (NMFS) forecasts an annual increase in capture fishery landings of only 0.3 percent through 2110.[7] Therefore it is highly unlikely that traditional capture fisheries will meet continued market growth.

This situation of increasing market demand for seafood coupled with the relatively flat growth in production of seafood by world capture fisheries has important implications for producers of seafood. One implication is that current and future increases in demand for seafood provide an incentive for development and expansion of aquaculture production. The National Marine Fisheries Service predicts that world aquaculture production is expected to increase at a 5.5 percent annual rate over the next 25 years.[8] Coastal countries and states with the necessary endowment of natural resources and supportive aquaculture policies will be able to take advantage of this situation in world seafood markets. Norway is one example of a country whose aquaculture industry benefited from these characteristics.

Other implications resulting from the increases in aquaculture production for seafood producers and resource managers and policy makers may be characterized by the following questions: (1) Will the additional seafood supplies come from domestic or foreign sources? (2) What seafood products will experience the greatest increase in consumer demand? (3) Will the additional supplies come primarily from capture fisheries or aquaculture? (4)

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7 "The Outlook for Salmon and Shrimp Aquaculture Products in the World Markets", U.S. Department of Commerce, National Marine Fisheries Service, January 1985

8 "The Outlook for Salmon and Shrimp Aquaculture Products in the World Markets", U.S. Department of Commerce, National Marine Fisheries Service, January 1985

Does a domestic aquaculture industry represent a threat to traditional capture fisheries? (5) And will the political, economic, and social framework of U.S. marine resource management allow the development of a viable aquaculture industry?

Analysis of these questions relative to the Alaska debate over finfish farming can provide an understanding into how and why Alaska policy makers placed a total ban on commercial finfish aquaculture production. This section of the paper includes the review of world commercial salmon production by capture fisheries with emphasis on Alaska . Secondly the history and development of salmon farming in other parts of the world will be reviewed with an analysis of several country's public policy toward aquaculture development. By examining the success of Norway's salmon farming industry it can be clearly demonstrated how this country was able to capitalize on changes in demand for aquaculture products in world seafood markets. This paper focuses on salmon farming because it is currently the most wildly practiced form of cold water aquaculture and was the focal point in the Alaska debate. Focusing the debate directly on salmon farming rather than on generic finfish aquaculture and how this affected the final determination will be discussed in a later section of the paper.

2.2 World Commercial Salmon Fishery Production

The world supply of salmon historically has been derived from the capture fishery. The commercial fishery capitalizes on the salmon's natural life cycle which involves returning to their native river system to spawn. To help put farmed salmon production into context, it is important to first examine the production from commercial salmon fisheries.

The world output of commercial salmon fishery production (Pacific) by species for the period 1977 to 1987 is shown in Figure 2.3. Total wild salmon

landings increased 24 percent from 469,000 mt in 1977 to 655,000 in 1987. Pink salmon is the largest tonnage captured, averaging about 200,000 mt a year, followed closely by chum. Sockeye catches have ranged from 30,000 to 53,000 mt. Chinook represent the smallest species captured, ranging between 18,000 to 26,000 mt.[9]

Total capture fishery production by country is shown in Figure 2.4. Note that these production figures include salmon produced by ranching. The U.S. was the largest producer over the 1977-1987 period followed by Japan. World salmon production by the capture fishery is expected to stabilize at around 700,000 mt. Production will vary according to enhancement efforts, fishery quota management and historical cycles in species.[10]

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[9]Egan, d., & P. Leitz, "Perspectives On Worldwide Salmon Supplies To The Year 2000." Aquaculture International Congress Proceedings, Vancouver, 1988.

[10]Egan, d., & P. Leitz, "Perspectives On Worldwide Salmon Supplies To The Year 2000." Aquaculture International Congress Proceedings, Vancouver, 1988.

Figure 2.3 Captured Salmon Landings By Species 1977 - 1987.

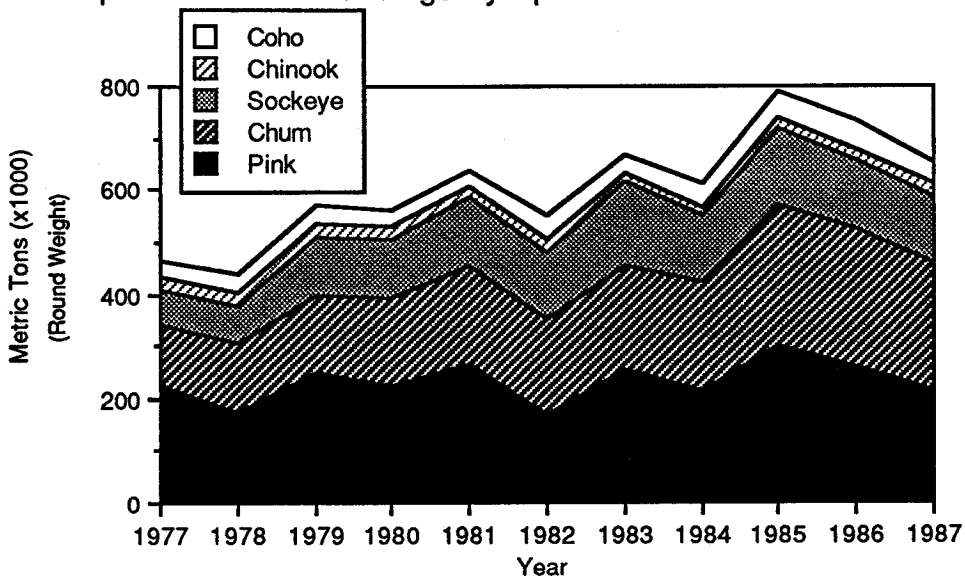
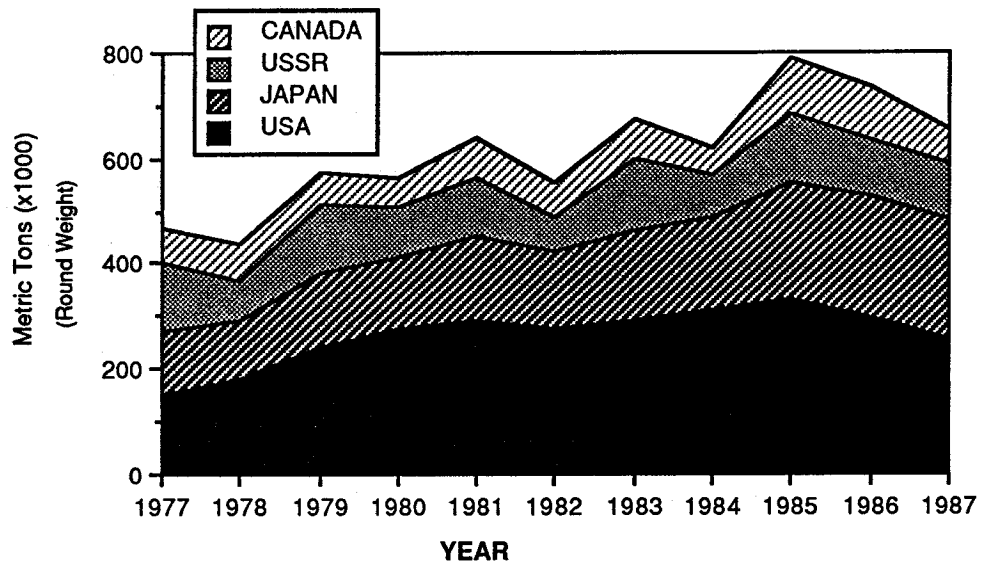


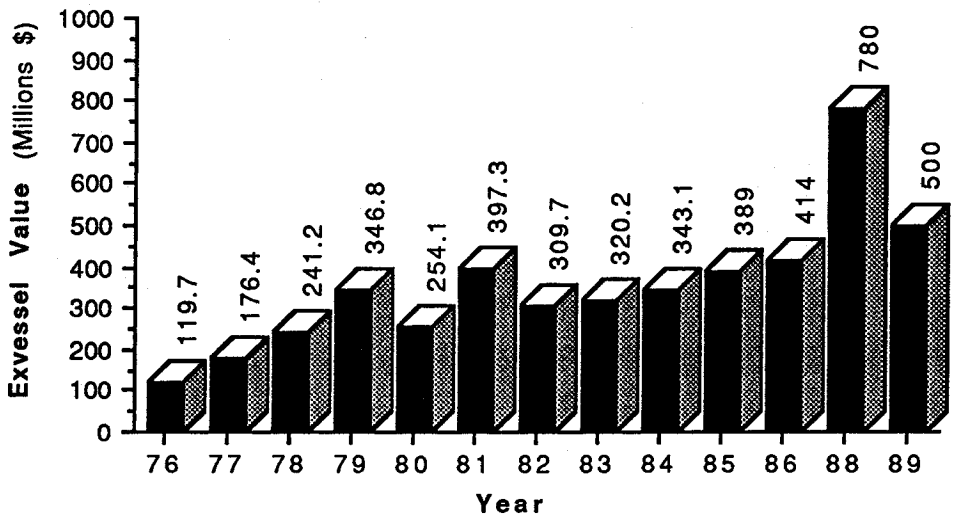
Figure 2.4. Captured Salmon Landings By County 1977 - 1987.



Alaska's commercial salmon fisheries presently account for almost one-half of the world's catch of Pacific salmon and approximately 90 percent of U.S. commercial landings and has experienced record harvests during the past ten

years.[11] The record 1989 commercial salmon catch produced over 152 million fish weighing nearly 316,363 mt, with an ex-vessel value (revenue to fishermen) of approximately $500 million. This harvest exceeded the previous record of 146.3 million fish taken during the 1985 season.[12] The 1989 fishery was the second highest value for Alaska salmon fisheries in history, surpassed only by the 1988 season which was worth an estimated $780 million. In 1989, salmon prices were approximately one-half to one-third lower than those paid in 1988. Factors contributing to the lower 1989 prices included the reduced buying power of the Japanese yen (20 percent less than the previous year), surplus salmon inventories in Tokyo that were over 100,000 mt greater than existed the previous year, and increased supplies of farmed salmon in international markets. Ex-vessel value (price paid to fisherman) for Alaska's commercial salmon fisheries for the years 1976 - 1989 are presented in Figure 2.5.

Figure 2.5. Ex-vessel value (in millions of dollars) of Alaska's Commercial Salmon Fisheries.



SOURCE: Alaska Dept. of Fish & Game, Division of Commercial Fisheries

[11]Sea Fare Group, "World Markets for Salmon: Pen-Reared Salmon Impacts," April 1988, p. 74.
[12]Anonymous, "Preliminary Review of the 1989 Alaska Commercial Salmon Fisheries." State of Alaska Department of Fish & Game Staff Report. Juneau, Alaska, October 9, 1989.

The State of Alaska has invested heavily in salmon ocean ranching production during the past 12 years and has 36 state and private-non-profit hatcheries throughout the state. Hatchery contributions to the Alaska capture fishery harvest are substantial and average about 18 percent of total harvest. For the 1989 commercial salmon fishery hatchery contributions were estimated at 26,894 mt.[13]

In summary, Alaska currently has a very profitable and valuable salmon resource worth close to a billion dollars annually and employing thousands of Alaska residents. Because of this, fishermen groups are quite active in the legislative process and have received favorable actions by state policy makers. As will be discussed later in this paper, this strong dependence on the traditional capture fishery, and the powerful political position held by advocates of this interest group, had a large effect on why Alaskan policy makers decided to prohibit all finfish farming in Alaska.

2.3 Historical Background of Salmon Farming's Growth

Salmon farming, or salmon net-pen culture is generally practiced in protected coastal waters such as bays, sounds or fjords (Figure 2.6). The typical farm is a hectare or less in area and consists of four to twelve pens, each approximately 15 meters square and up to 20 meters deep. The nets are hung from floats and rigid floating walkways that are linked in a rectangular array and anchored in place.

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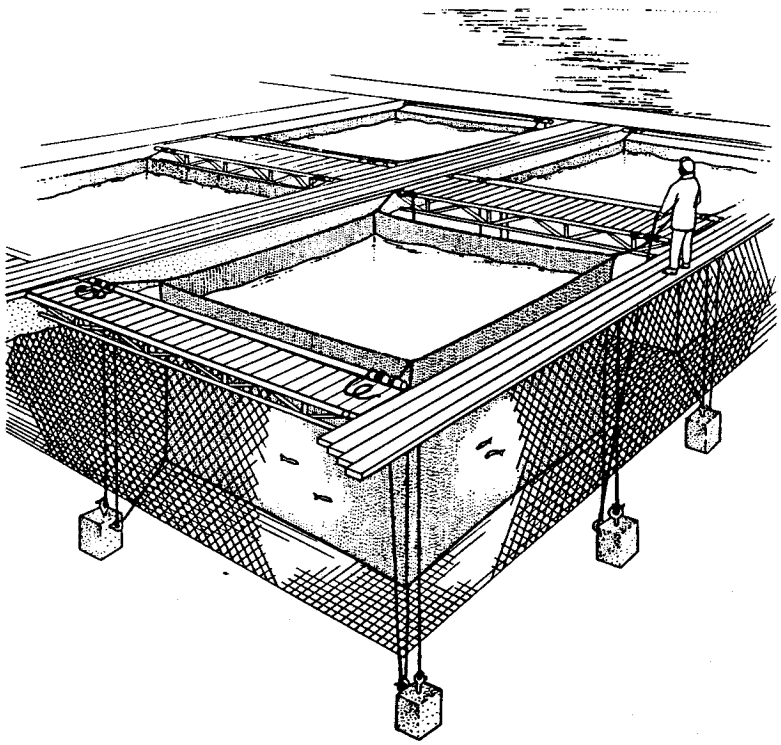
[13]Anonymous, "Alaska Department of Fish & Game FRED Division 1988 Annual Report to the Alaska State Legislature on the Funding of the Fishery Enhancement Program," Juneau Alaska, January 1988.

Figure 2.6. Illustration of a Salmon Farm Float and Netpen.



The net-pen culture of salmon is a young industry having largely developed since 1970. It began experimentally in Norway in the 1960s with rainbow trout raised in saltwater. Five or six years later, a family of fishermen, the Grontvedt brothers, used their knowledge of fishing techniques to build experimental net pens and successfully produced the first Atlantic salmon (*Salmo salar*) reared in saltwater enclosures.

Since Norway first began production of farmed Atlantic salmon in 1973 with sales of 171 metric tons, rapid development of salmon farming has occurred worldwide. Fifteen countries now produce farmed salmon.[14] (See Table 2.1.)

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[14] Alaska Sea Grant Program, World Salmon Farming, an Overview University of Alaska, Aquaculture Note No. TBA April 1986

Table 2.1. Total Farmed Salmon Production 1985 - 1990

	1985	1986	1987	1988	1989	1990
Norway	28,655	46,675	47,400	80,300	117,000	150,000
Scotland	6,921	10,300	12,700	18,000	28,500	36,000
Canada	469	1,026	2,515	10,300	16,900	23,000
Japan	6,990	7,554	12,227	14,060	17,080	20,120
Chile	870	1,000	2,900	3,220	8,690	13,600
Others	3,895	3,829	10,046	13,940	21,340	28,490
Total	47,800	70,384	87,788	139,820	209,510	271,210

SOURCE: B.C. Salmon Farmers Association & The DPA Group Inc., 1990

With the advent of rapid air transportation and inexpensive insulated boxes, producers of farmed salmon throughout the world can move fresh product to market 6,000 miles away in less than 48 hours after harvest. More importantly salmon farmers are able to produce a product that is consistent in size, high in quality and available on a year-round basis. In many companies, sales and air transportation of salmon are forward contracted before the fish are harvested and processed.

The estimated worldwide production of farmed salmon in 1990 is 271,210 metric tons.[15] Production has increased an average of 30 percent annually over the past 15 years and 50 percent annually during the past five years. This growth is illustrated in Figure 2.6. Although the market will still be dominated by Norway with a projected market share of 52 to 63 percent, competition in the market will increase as the salmon farming industries in countries like Scotland, Canada, Chile and Japan continue to grow and mature.

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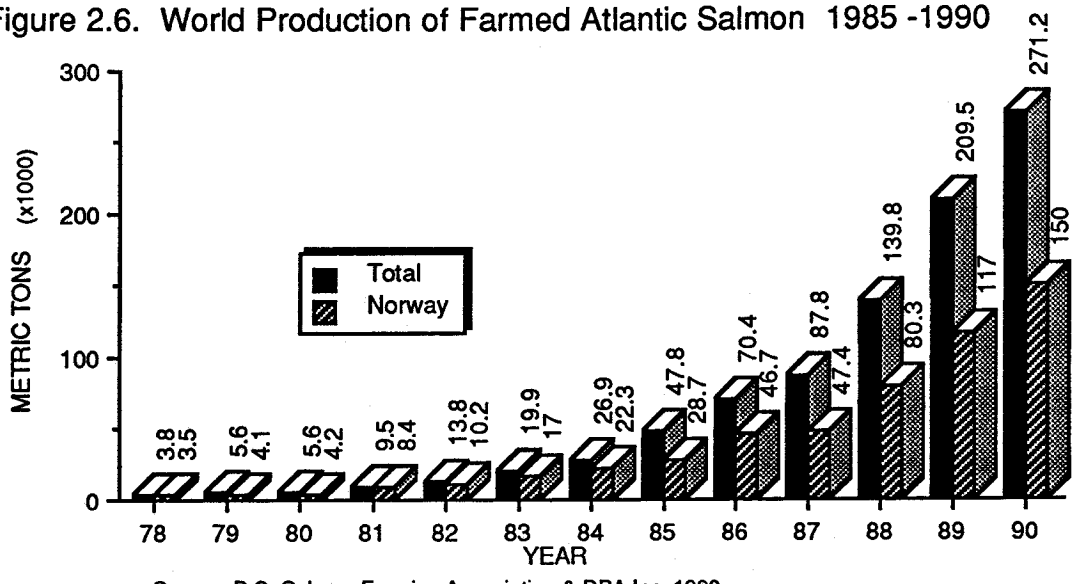
[15] Current Developments in World Salmon Markets: Implications for the Canadian Salmon Farming Industry", Report Prepared by B.C. Salmon Farmers Association for the Department of Fisheries and Oceans. Ottawa, Ontario. Report No. 46, January 1990

Figure 2.6. World Production of Farmed Atlantic Salmon 1985 -1990



Source: B.C. Salmon Farming Association & DPA Inc. 1990

2.3.1 Norway

In the mid-1960s Norway pioneered the development of salmon farming. It began by entrepreneurial efforts of a few individuals in an attempt to provide an alternate means of fish production in the wake of severely reduced landings of salmon, herring and cod due to overfishing.[16]

In 1971 Norway's production was approximately 100 mt of Atlantic salmon. Due to the increase in demand for high quality fresh fish in world seafood markets and the ability of Norwegian farmers to produce a high quality product on a consistent basis they were able to command premium prices in the market place. Because of favorable market conditions, significant returns on investment were obtained for the farms in operation during the late 1970s and early 1980s. By 1990, the industry had grown to a production level of 150,000 mt.

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[16]Current Developments in World Salmon Markets: Implications for the Canadian Salmon Farming Industry", Report Prepared by B.C. Salmon Farmers Association for the Department of Fisheries and Oceans. Ottawa, Ontario. Report No. 46, January 1990

The development of this industry was firmly supported by government policies. By 1973 the Norwegian government viewed salmon farming as a high-priority industry because fish farming was a way of utilizing the skills of people in coastal communities to bring economic development to depressed fishing economies.[17] One law enacted to ensure family ownership was a limitation on the size of a Norwegian fish farm. The Norwegian government limited the size of each farm to 8,000 cubic meters (i.e., about 200 mt) in order to encourage maximum economic and employment benefits to be realized in the coastal communities.

Other components of the Norwegian government's aquaculture policy include government loans and guaranteed loans to farmers, basic and applied research for the industry through various government agencies and the universities, and the creation of the Fish Farmers Sales Organization (FFSO) in 1978 to assist in the marketing and sales of Norwegian farmed salmon.

The FFSO, comprised of all Norwegian fish farmers, is financed through a 2.5 percent duty on all farmed salmon sales. This organization serves several functions. One is to implement quality control standards by establishing criteria for slaughtering, bleeding, cleaning, grading, packing, and handling of the finished product. This serves to maintain Noway's reputation of high quality and consistent supply throughout the year.

All first hand sales of farmed salmon, trout and shellfish and the farm-gate buyers must be approved by the FFSO. This has effectively limited the number of potential exporters of farmed salmon from Norway. This in turn has given the industry some degree of control into the market by setting quality

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[17]Kjell Tommeras, President, Norwegian Fish Farming Equipment Association, "Norwegian Fish Farming -- Equipment and Technology Experience and Future Trends," remarks to the Norway Fish Farming Seminar, Seattle, Washington, June 1986.

standards for fish to be exported and coordinating the supply of product from the individual farms to the export markets.

The Norwegian government in 1985 also decided to loosen its restrictions on smolt production facilities. Until 1985, smolt production had been a limiting factor in the development of the industry. This expansion of Norway's hatchery sector in 1985-86 resulted in a tremendous growth in the number of smolts entering seawater for grow-out in 1987. Production levels had stabilized at about 46,000 mt in 1986 due to high premature harvests because of disease problems. However in 1987 production almost doubled to 80,300 mt in 1988 and then again to 117,000 mt in 1989.

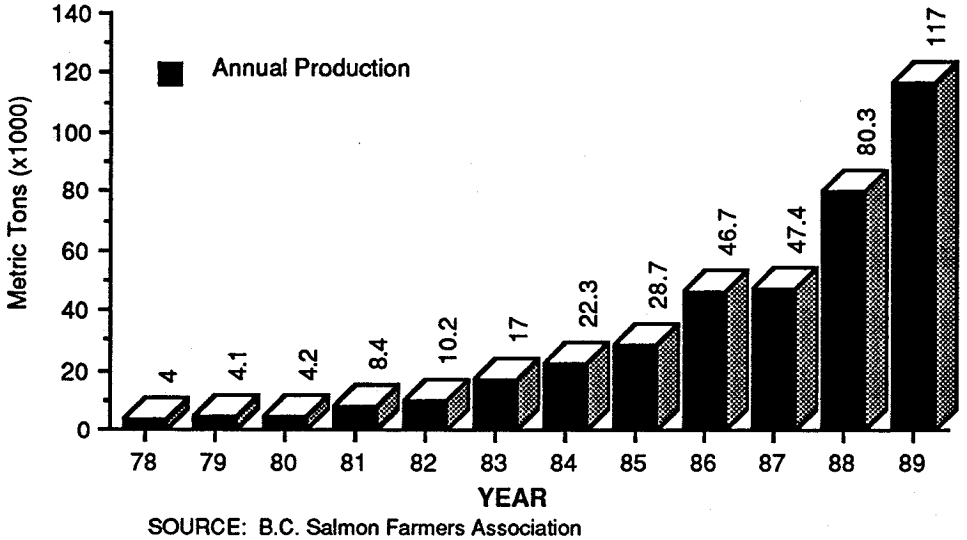
Table 2.2 summarizes key facts on the present size of the salmon farming industry in Norway. Figure 2.7 shows the production for Norway from 1979 to 1989. Many salmon producing counties have blamed the rapid increase in Norwegian production in 1989 for the current financial distress facing the industry and the subsequent decline of global market prices for salmon. The strong prices of 1987 and early 1988 began dropping in July, 1988. Prices have since continued to drop to a level where they are now 30 percent to 40 percent of their level in 1988. This will be discussed in greater detail in Section 2.4.

Table 2.2. Key statistics on Norway's Salmon Farming Industry

Number of Marine Growout Sites (1989)	790
Number of Smolt Production Sites (1989)	370
Smolt Production in 1989	62 million
1989 Production	117,000 mt
Major Markets (1988)	**Metric Tons**
France	18,700
Denmark	14,200
USA	10,000
West Germany	7,500
Spain	3,700
Others	9,923
Total	64,023

SOURCE: B.C. Salmon Farmers Association

Figure 2.7. Norwegian Farmed Salmon Production 1979 - 1989



SOURCE: B.C. Salmon Farmers Association

In 1988 the export value of farmed salmon and trout from Norway was more than $615 million. The industry employed about 5,000 people directly, and as many more in related sectors.[18]

Contributing factors in Norway's success in salmon farming include: (1) excellent environmental conditions such as good quality seawater and freshwater and a long coastline with fjords and islands that protect fishfarms from heavy weather; (2) sufficient fish byproducts from the traditional fish industry to provide raw materials for the fish feed industry; (3) excellent existing infrastructure along the coast; (4) experience in research production and trade in Atlantic salmon; (5) and a legal framework introduced in 1973 which included policies favorable to the developing industry in the coastal zone.[19] In addition, Norway's nearshore fishing industry did not take an adversarial stance on the emerging industry, rather, many fishermen and processors became involved in fishfarming in addition to their traditional fishing operations. The development also came at a time when many of the nearshore fisheries were in a state of decline, including a permanent closure to gillnetting of salmon in 1988 and extremely limited quotas in the herring and cod fisheries.

2.3.2 Scotland

The development of finfish aquaculture in Scotland began in the mid 1960s. The English-Dutch multinational Unilever corporation set up a wholly-owned subsidiary, Marine Harvest Ltd.,. They were the first to examine the prospects of large-scale commercial aquaculture of various marine species. Their research division addressed several species of crustacea, flat fish and

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[18]Eidem, Bjarne Mark,Minister of Fisheries for Norway, World Aquaculture"The Norwegian Fisheries Industry from Capture to Cultivation". Vol.20(3) September 1989, pp 60-68.
[19]Eidem, Bjarne Mark,Minister of Fisheries for Norway, World Aquaculture"The Norwegian Fisheries Industry from Capture to Cultivation". Vol.20(3) September 1989, pp 60-68.

salmonids. By late 1968, Unlever had selected Atlantic salmon as the species for commercial development. They developed a grow-out site on Scotland's west coast. In 1973, Marine Harvest produced 50 mt of salmon.

At this time the Highlands and Islands Development Board (HIDB) began to take an active interest in the development of the industry in Scotland. The HIDB is a crown corporation whose mandate is to stimulate economic and social development in rural areas of the EEC. The Highlands and Islands region had been plagued by continued out-migration, high unemployment, and a relatively lower per capita incomes and standard of living than the rest of Scotland.

The HIDB saw salmon farming as an industry that would be compatible with the natural resources in Scotland and a lifestyle of the people living in coastal areas of Scotland. The HIDB played a vital role in the aquaculture industry's development, providing financial assistance with start-up grants and loans to companies.

In contrast to Norway, there is little federal involvement in the Scottish salmon farming industry. The provincial government controls most development and has actively sought industrial sector participation. Consistent with national policies, outside investment has been actively pursued. For example, the Scottish government did not place a limit on the size of an individual farm. Thus several large Norwegian companies wishing to expand their interests invested in large farming operations in Scotland.

Unlike Norway, where competing coastal zone user groups are not a significant factor, Scottish farmers have been forced to contend with opposing interest groups.[20] During the 1970s, recreational salmon fishing advocacy

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[20]Sylvia, G., "An Economic Model for Net-Pen Salmon Aquaculture Development." University of Rhode Island, Ph.D. Dissertation, 1989

groups slowed marine salmon farming development. More recently, environmental groups have delayed site approvals. As a result the site licensing process has become longer and more expensive.

As with the Norwegian industry, premium prices commanded by the product allowed for good returns on investments in Scottish salmon farms during the 1970s and early 1980s. Key statistics on the current size of the Scottish salmon farming industry are indicated in Table 2.3. Figure 2.8 presents Scotland's annual salmon production history.

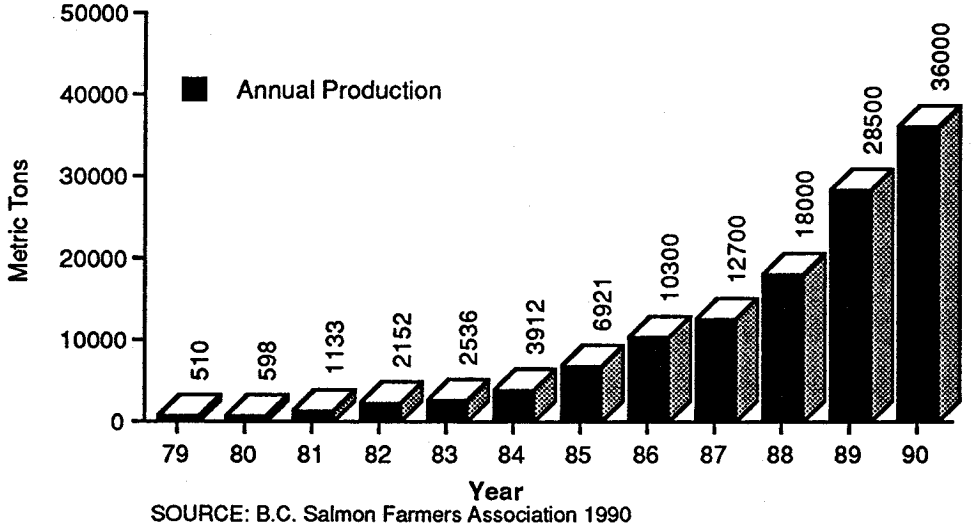
Table 2.3. Key statistics on Scotland's Salmon Farming Industry

Number of Marine Growout Sites (1989)	360
Number of Smolt Production Sites (1989)	176
Smolt Production in 1989 (Atlantic)	18 million
1989 Production	28,500 mt
Major Markets (1988)	**Metric Tons**
France	4,324
Netherlands	641
USA	449
Others	1,420
Total	6,834

Note: Only about 40 percent of Scottish production has been exported in recent years.

SOURCE: B.C. Salmon Farmers Association

Figure 2.8. Scottish Salmon Production 1979-1990



SOURCE: B.C. Salmon Farmers Association 1990

2.3.3 Canada

The success of Norwegian and Scottish Atlantic salmon farming industries by the early 1980s contributed to the development of salmon farming

in British Columbia and New Brunswick by demonstrating that the culturing of salmonids was both technically and financially feasible. In the 1980s, Canada already had considerable technical expertise in salmon enhancement on both coasts. The Salmon Enhancement Program (SEP) provided valuable experience in the hatchery production of Pacific salmon smolts. The provision of surplus wild salmon eggs by the SEP to the farming industry was instrumental to the salmon farming industry's initial growth.

The concurrent growth in seafood consumption in the U.S., especially for fresh fish, and Canada's geographical location to these U.S. markets also stimulated the industry's rapid development. Favorable government financial support for the industry's development was another important factor.

2.3.3.1 British Columbia

The commercial salmon farming industry in British Columbia began in the mid 1970s with attempts at rearing pan-sized coho and some chinook salmon. Most of these early attempts failed due to a variety of problems. Among these were high mortality rates, technical difficulties and limited financing. These pioneering efforts of farming Pacific salmon provided the experience necessary for the subsequent growth of the industry in the 1980s.

The majority of the industry's growth occurred during 1985 to 1988 in which most of the current salmon farming marine sites and hatcheries were developed. Marine sites grew from just ten in 1984 to an estimated 139 in 1989.

The status of the industry is shown in Table 2.4. Production figures are shown in Figure 2.9. Production levels were only 100 - 200 mt during 1979 to 1985. The first significant production occured in 1987 with 1,200 mt, rising to 6,000 mt in 1988, and expecting to reach 23,000 mt in 1990. One reason for

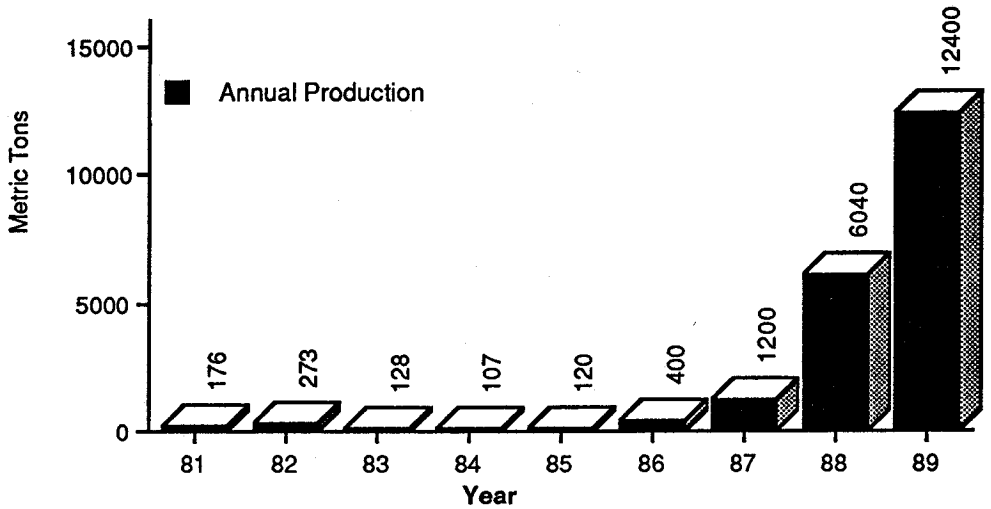
this rapid expansion during this time was the importation of Norwegian capital, equipment and technical experience.

Table 2.4. Key statistics on British Columbia's Salmon Farming Industry

Number of Marine Growout Sites (1989)	135
Number of Smolt Production Sites (1989)	25
Smolt Production in 1989	27.3 million (Pacific) 1.3 million (Atlantic)
1989 Production	11,400 mt (Pacific) 1,000 mt (Atlantic)
Major Markets (1989	Metric Tons
USA	8,700
Canada	2,700
Japan	1,000
Total	12,400

SOURCE: B.C. Salmon Farmers Association

Figure 2.9. British Columbia Farmed Salmon Production 1981-1989



SOURCE: B.C. Salmon Farmers Association 1990

2.3.3.2 New Brunswick

New Brunswick's salmon farming industry began in the late 1970s with research on Atlantic salmon by the Department of Fisheries and Oceans' researchers. Local residents, including fishermen, utilized this research and

with the assistance of government financial aid and technical advise constructed small, low cost operations on the Bay of Fundy in southeastern New Brunswick. The industry grew slowly as more experience in husbandry and technical aspects of low-cost cage design and mooring were gained. By 1985, the region produced 350 mt of farmed salmon.

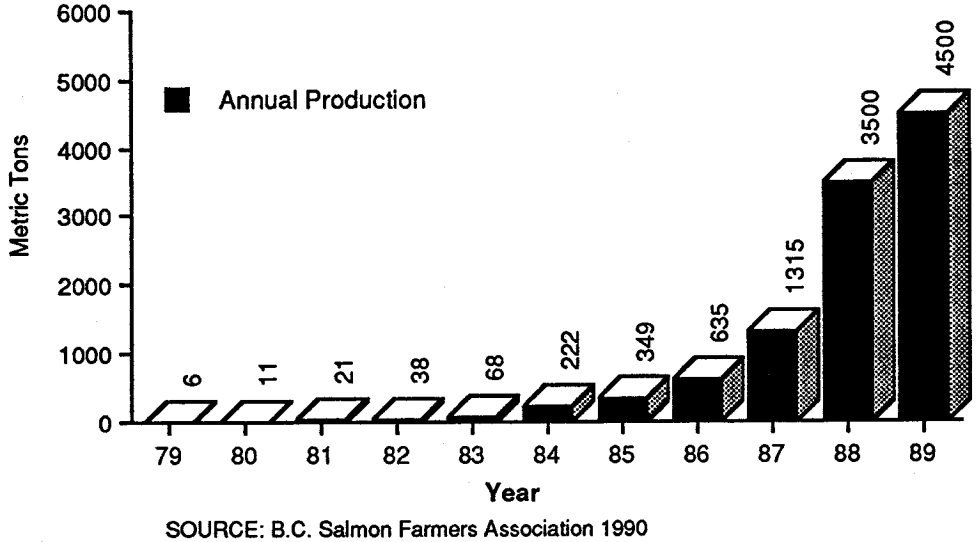
In 1987, New Brunswick produced 1,000 mt of salmon, and expects to produce 4,500 mt in 1989. The industry's strength is in its small and manageable farm size. This has kept financial debt to a minimum and reduced the level of risk to the owners Table 2.5 presents key statistics on the New Brunswick salmon farming industry and Figure 2.10 displays the salmon production history.

Table 2.5. Key statistics on New Brunswick's Salmon Farming Industry

Number of Marine Growout Sites (1989)	42
Number of Smolt Production Sites (1989)	10
Smolt Production in 1989	2.1 million (Atlantic)
1989 Production	4,500 mt
Major Markets (1989	Metric Tons
USA	3,150
Canada	1,350
Total	4,500

SOURCE: B.C. Salmon Farmers Association

Figure 2.10. New Brunswick Farmed Salmon Production



SOURCE: B.C. Salmon Farmers Association 1990

2.3.3.3 Salmon Aquaculture Policy in British Columbia

The recent explosive growth of salmon farming in Canada has increased pressure from both pro- and anti- aquaculture groups. In response, the government placed a moratorium on finfish aquaculture in British Columbia in November of 1986 which lasted until April of 1987. During this time an inquiry was conducted by David Gillespie for the British Columbia Ministry of Forests and Lands. He collected information gathered from public and private meetings

and presented this information, along with several recommendations in a report titled "An Inquiry Into Finfish Aquaculture In British Columbia"[21]. The report summarized various concerns, especially those related to impacts on both the environment and the commercial fishing industry. It also recommended that the moratorium be terminated and that certain guidelines be enacted to assist permitting agencies in their review of applications. The most important recommendations from the report are listed below:

1. continue to encourage private sector initiatives as the basis for growth and development of the finfish aquaculture industry;

2. proceed immediately to establish a master agreement with the federal government concerning approvals, regulation, monitoring, and servicing of the finfish aquaculture industry;

3. continue to rely upon market forces to dictate farm and wild salmon prices;

4. establish a mandatory environmental monitoring and data gathering system for each aquaculture site and surrounding area, the results of which should be submitted on a regular basis for review of changes in environmental quality;

5. establish, in conjunction with industry, environmental practices for fish farms addressing aesthetic considerations, disposal of dead fish and human waste, predator control, and efficient feeding practices;

6. encourage local governments to develop or amend local zoning bylaws to address finfish aquaculture operations within their boundaries; and

7. initiate a program of coastal resource identification studies for use in directing aquaculture applications away from major resource and user conflict areas.

In summary, the rapid growth of the aquaculture industry has forced the Canadian regional governments to address the issues surrounding the development of this new industry. The government has developed a policy

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[21]Gillespie, David, " An Inquiry into Finfish Aquaculture in British Columbia," Presented to the Government of British Columbia. Ministry of Forests and Lands. December 12, 1986.

which supports the development of the aquaculture industry, yet in so doing has considered the views of opposing groups and where appropriate, made changes in its permitting and regulating process to include these concerns.

2.3.4 Chile

Chile's salmon farming industry began primarily from the export of capital and technology from successful salmon farming counties like Norway and Japan. In 1978 the Nichiro Fishing Corporation, who had pioneered pen-rearing Coho salmon in Japan, invested in a salmon farm and hatchery in Chile. In addition a U.S. company, ITT, joint ventured with the Chilean government in 1978 to produce Coho salmon smolts for the industry.

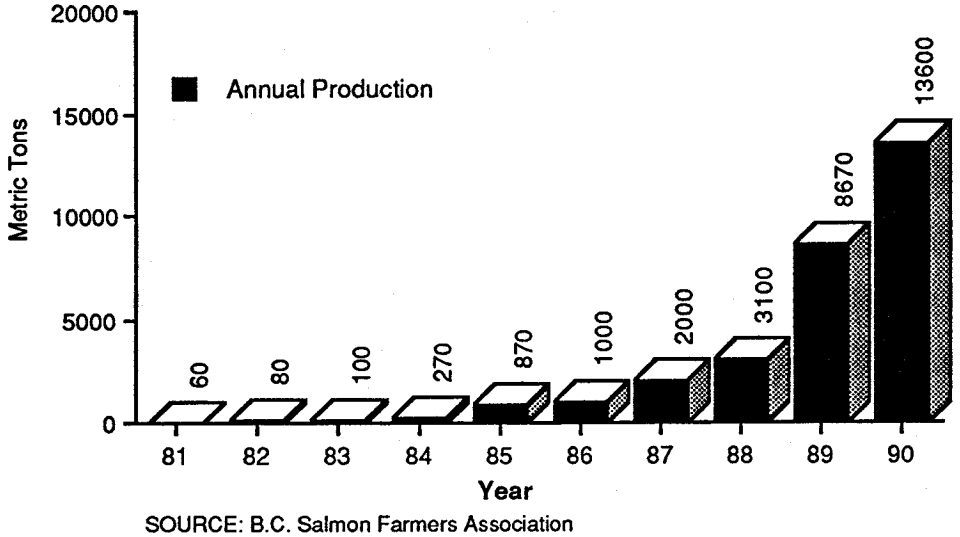
The Chilean industry focused on Coho production, harvesting 60 mt in 1981. By 1985, production has grown to 870 mt. Due to Chile's vast coastline, low labor costs, and government policies supporting the industry's development two major Norwegian companies invested in Chile's salmon farming industry in 1985. These companies decided to culture Atlantic salmon rather than Coho because of the limited marine grow-out phase in Coho. Sales for Coho salmon are confined sales to a four month period in December to March because Coho mature after 18 months in saltwater. With the harvest of 1,200 mt of Atlantic salmon in 1989 the Chileans now provide salmon through out the whole year. Table 2.6 shows the status of the industry in Chile. Figure 2.11 shows the history of production.

Table 2.6. Key statistics on Chile's Salmon Farming Industry

Number of Marine Growout Sites (1989)	215
Number of Smolt Production Sites (1989)	100
Smolt Production in 1989	5.3 million (Pacific) 1.2 million (Atlantic)
1989 Production	6,900 mt (Pacific) 1,770 mt (Atlantic)
Major Markets (1989	Metric Tons
Japan	5,000
USA	2,050
Latin America	125
Total	7,700

SOURCE: B.C. Salmon Farmers Association

Figure 2.11. Chilean Farmed Salmon Production 1981-1990



SOURCE: B.C. Salmon Farmers Association

2.3.5 Washington State

Salmon farming in Puget Sound started in the early 1970s with a few companies capitalizing on the research on salmon culture conducted by state, federal and University of Washington scientists. For decades, state and federal

agencies have hatched and reared salmonids in order to enhance commercial and recreational fisheries. In 1969 the National Marine Fisheries Service (NMFS) established the Manchester Field Station in the sate of Washington in order to develop the art and science of salmonid cage-culture.[22] Based on this research private companies began to rear pan-sized coho salmon. By 1971 Domsea Inc. began commercial sales. Research was also conducted on the cage culture of Atlantic salmon at Manchester and results indicated that this species was more suitable to cage culture than either coho or chinook salmon. Today, seven firms have leases at thirteen sites in Puget Sound.[23] Successful Norwegian salmon farming companies have invested in the Puget Sound industry, including two of the largest producers, Sea Farm Washington and Scan-Am. Both are raising Atlantic salmon exclusively.

Although the industry has a potential for expansion, this has been hampered by a fragmented government policy and by recent concerns over environmental and aesthetic impacts. Requirements for salmon farms differ from county to county in Puget Sound, and at least one local government has placed a moratorium on permitting new operations.

In response to the environmental and aesthetic concerns the State of Washington has conducted extensive scientific investigations into the potential effects of finfish farms to the environment and developed guidelines for siting of aquaculture facilities, and developed a statewide environmental impact statement on aquaculture. These documents serve to assist resource agency

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[22]Kerns, C., "World Salmon Farming: AN Overview with Emphasis on Possibilities and Problems in Alaska." Alaska Marine Advisory Bulletin #26.

[23]Sylvia, G., "An Economic Model for Net-Pen Salmon Aquaculture Development." University of Rhode Island, Ph.D. Dissertation, 1989

personnel on the technical aspects of siting and permitting aquaculture facilities.[24]

Efforts to expand the industry in Puget Sound have met with well-organized resistance by commercial fishermen, environmentalists, and shoreline residents. For example in Island County, Sea Farm Washington was forced to abandon its plans for a salmon farm near the San Juan Islands when the county, spurred on by an activist, anti-salmon aquaculture coalition group called POWER (Protect our Waters, Environment, Resources) required a comprehensive environmental impact statement that Sea Farm claimed would cost $100.000. In a more recent example, Swecker Family Salmon Farms, a land based smolt producer and pan-sized coho producer, recently has spent over $300,000 during the past three years in attempts to obtain the necessary permits to site a 10 acre farm in South Puget Sound. The state did approve Swecker's EIS; however, the Department of Environmental Quality (DEQ) will not issue a non-point source waste discharge permit because they do not have regulations in place and the Sierra Club has threatened to sue DEQ if they issue this permit to Swecker.[25] Historical production figures for the State of Washington are presented in Figure 2.12.

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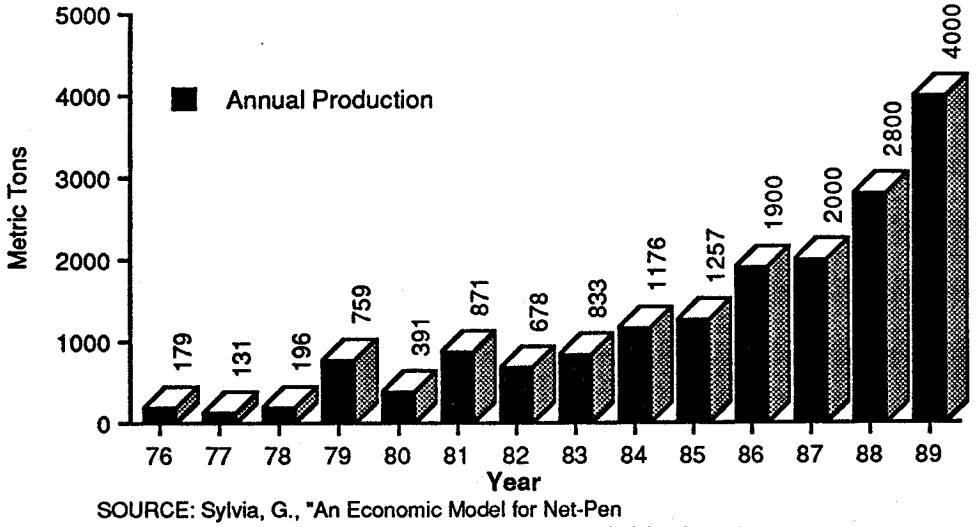
[24]"Draft Programmatic Environmental Impact Statement: Fish Culture in Floating Floating Net Pens," prepared by Parametrix, Inc. for Washington State Department of Fisheries, January 1989.

[24] Weston, Donald. "The Environmental Effects of Floating Mariculture in Puget Sound," University of Washington, School of Oceanography, Report WB-10, August 1986.

[25]Pitts, J., Personal Communication. September 1990.

Figure 2.12. State of Washington Farmed Salmon Production 1976-1989



SOURCE: Sylvia, G., "An Economic Model for Net-Pen Salmon Aquaculture Developmant." University of Rhode Island, 1989.

2.3.6 Finfish Aquaculture Policy in the United States

The lengthy permit process and vocal opposition by interest groups experienced by finfish farmers is not only present in Washington State. Other states with active marine aquaculture ventures also experience these confrontational activities. One reason for this is the extensive use of the coastal zone of the United States and the increasingly restrictive management regime of the coastal zone as governed by the U.S. Coastal Zone Management Act. Because U.S. coastal areas are intensively exploited by competing groups, any attempt at a non-traditional use is met with severe scrutiny. This has been true for salmon aquaculture. First, finfish aquaculture is a relatively new activity in the coastal zone and few laws have been designed to effectively promote the industry's development. This was evident in the early 1980s when interested individuals in Alaska, wishing to begin salmon farming ventures, went to the legislature because there were no laws specifically allowing for this kind of development in the coastal zone. Second, land use restrictions and

environmental regulations create a lengthy, expensive, and uncertain permitting process, as seen in Washington State. Another example is California, where 42 federal, state, and local permits are required for an aquaculture venture.[26] Third, state government agencies and legislatures account to diverse constituency groups. This was especially true in Alaska as will be discussed later in this paper. Even where legislation and regulation provide the industry with legal status, a complex and uncertain permitting process may preclude aquaculture ventures. For example, in Washington and Maine, the major anti-aquaculture group appears to be coastal property owners concerned about aesthetics and property values. Local property owners have organized opposition groups on grounds of environmental harm, navigational impediments, or conflict with traditional fisheries. Examples of this were presented in Section 2.3.5.

Unlike other salmon producing nations including Norway, the policy debate in the United States primarily centers on ways to mitigate the industry's effects on other user groups. Except for policies that provide for the legal establishment of the industry, policies are generally not designed to actively promote the industry. The result for individual fish farmers is that they must spend their energies and financial resources on mitigation and lobbying which adds to the cost of production. The result for the aquaculture industry as a whole is relatively greater difficulty in becoming a viable, established industry.

One major difference in other state's aquaculture policies relative to Alaska's is in Alaska the anti-aquaculture groups were able to prohibit this type of coastal zone development before it was permitted through the legislative process. As experienced in other states aquaculture development is restricted

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[26]Sylvia, G., "An Economic Model for Net-Pen Salmon Aquaculture Development." University of Rhode Island, Ph.D. Dissertation, 1989, page 99.

through the permit review process. This will be developed later in Sections 4 and 5 of this paper.

2.4 Market Impacts Due to Increased Production of Farmed Salmon

The growth of the salmon farming industry since the mid - 1980s has had a dramatic impact on world salmon markets. The 1987 world farmed salmon production level of over 87,000 mt more than tripled to 270,000 mt in 1990. In comparison, the 1989 annual commercial salmon catch by the four largest producing countries was close to 725,000 mt. As shown in Table 2.7, the world salmon farming industry has grown from comprising an additional 6 percent of the total world production in 1985 to 22 percent in 1989.[27]

Table 2.7. Growth of Farmed Salmon Production Relative to the Commercial Fishery (Metric Tons)

	1985	1986	1987	1988	1989
World Pacific Salmon Landings	791,200	736,400	655,600	642,800	724,600
World Farmed Salmon Production	47,800	69,400	87,800	139,800	209,500
Total	839,000	805,800	743,400	782,600	934,100
Farmed Salmon Production as a Percentage of Total World Salmon Harvest	6%	9%	12%	18%	22%

SOURCE: The DPA Group Inc., and the B.C. Salmon Farmers Association, 1990

This rapid expanse of farmed salmon production has resulted in broad and irreversible effects on premium salmon markets worldwide. While landings

[27]Anonymous, "Current Developments in World Salmon Markets: Implications for the Canadian Salmon Farming Industry", Report Prepared by B.C. Salmon Farmers Association for the Department of Fisheries and Oceans. Ottawa, Ontario. Report No. 46, January 1990

of premium species of wild salmon (coho, chinook & sockeye) remain relatively constant, farmed production is expected to continue to increase steadily, if at a slower rate than at present. Though market constraints will limit the growth rate in production of farmed salmon, it has now taken the lead in terms of market share of worldwide fresh and frozen salmon.

The underlying decline in Alaska's market share is clear. In 1985, Norway displaced the U.S. as the largest supplier of fresh/frozen salmon to Europe and last year became the leading exporter of fresh salmon to Japan.[28] The 1988 Alaska harvest of premium species (coho, chinook, and sockeye) totaled 155,593 metric tons,[29] while new farmed production totaled approximately 139,000 metric tons. As of this year, current worldwide farmed production is now greater than Alaska's harvest of premium species. The Food and Agriculture Organization (FAO) of the United Nations predicts that by the turn of the century, farmed salmon may account for approximately one-half of worldwide production of all salmon.[30]

Future production estimates until 1993 are shown in Table 2.8. These figures are based on the egg and smolt production estimates. The number of smolts going into the water is now related to market conditions in the next few years rather than technology limitations. This will serve as a tool to limit the amount of supply entering the market in the near future and help support higher prices. For example, the Norwegian Fish Farmers Association has requested their members not to transfer more than 80,000 to 100,000 smolts a year to each of the 785 seawater grow-out sites. In addition, the Norwegian Fisheries

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[28]"Request of the Alaska Seafood Marketing Institute for FY 1988 Targeted Export Assistance," Alaska Seafood Marketing Institute, July 20, 1988, p. 11

[29]"Preliminary Review of the 1988 Alaska Commercial Salmon Fishery," ADF&G, Division of Commercial Fisheries, October 17, 1988.

[30]As reported in "Worldwide Farmed Salmon Forecasts to the Year 2000," DPA Group, Inc. 1988

Minister has postponed indefinitely the granting of licensing for seawater farms.[31] Norway is also increasing marketing efforts of the Norwegian Fishfarmers Sales Organization. This marketing organization recently committed $9 million to target new market opportunities in Japan for frozen farmed Atlantic salmon.

Table 2.8. Total Farmed Salmon Production Estimates 1990-1993 (mt)

	1990	1991	1992	1993
Norway	150,000	140,000	130,000	140,000
Scotland	36,000	43,000	45,000	50,000
Canada	23,000	28,000	32,000	34,000
Japan	20,120	21,200	22,200	24,200
Chile	13,600	17,250	20,300	23,350
Others	28,490	37,290	42,390	46,190
Totals	271,210	286,740	291,890	317,740

SOURCE: Worldwide Farmed Salmon Production To the Year 2000, The DPA Group Inc., March 1988

Countries with established salmon farming industries have been able to expand from this base and venture into research and development of coldwater aquaculture of other commercially important species such as sablefish, halibut, cod and turbot. Venture capital from profitable salmon farming companies combined with government and university research in countries such as Norway and Canada provides the means to develop new culture strategies for these other species.

The rapid increase in the supply of farmed salmon was not matched by an equal increase in market demand, resulting in a decline in prices for both farmed and capture fishery salmon during the past two years. Figure 2.13 shows the decline in prices for farmed salmon over the past two years. Prices

[31]Anonymous. "Norway's Production Limits." Fish Farming International Vol17(6) 1990.

are FOB Vancouver for B.C. farmed salmon (4-6 lbs.) during the first six months of 1988 and for the first six months of 1989.[32] New producers, (e.g. British Columbia) who have unamortized development costs and have not been able to get production costs under control, are now particularly vulnerable. For example, Chilean salmon farmers, which have relatively low production costs, sold frozen Chilean cohos this past winter at about $2/lb FOB Valparaiso. In contrast, production costs for raising Pacific salmon by farmers in British Columbia are estimated to be over $2/lb.[33] As a result of increased competition and declining prices, a number of the newer farms in Canada went into receivership this past year and the British Columbia industry as a whole is experiencing a major shake up. This restructuring has resulted in reducing the total number of operating companies in the industry from 75 in 1989 to 50 in 1990. There is a greater degree of vertical integration in the B.C. industry, with nine companies producing about 70 percent of the industry's total production.[34]

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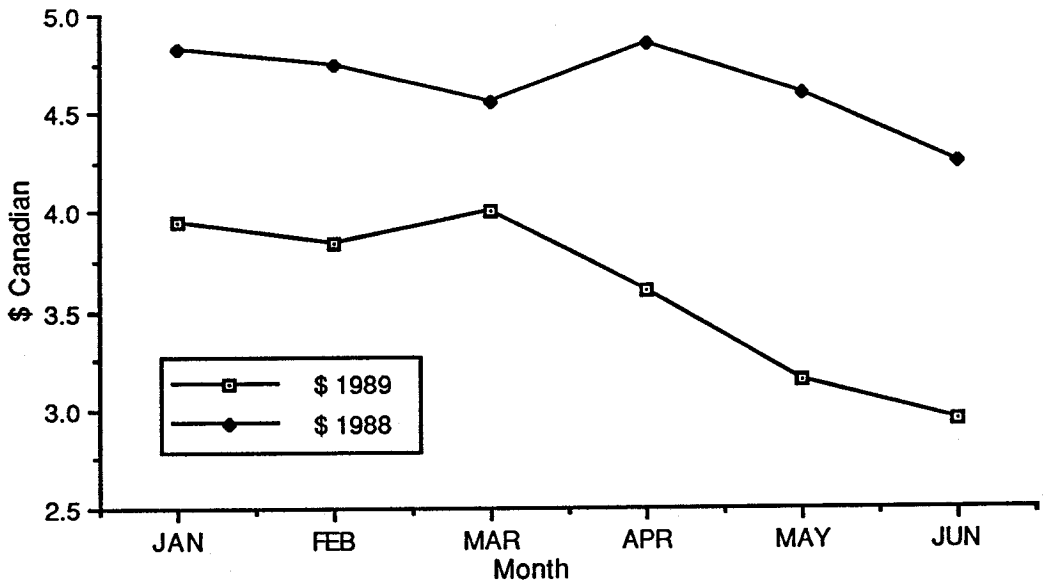
[32]Chettleburgh, Peter, Canadian Aquaculture, "West Coast Shake-out," September/October 1989 p. 21

[33]Chettleburgh, Peter, Canadian Aquaculture, "West Coast Shake-out," September/October 1989 p. 21

[34]Anonymous, "Current Developments in World Salmon Markets: Implications for the Canadian Salmon Farming Industry", Report Prepared by B.C. Salmon Farmers Association for the Department of Fisheries and Oceans. Ottawa, Ontario. Report No. 46, January 1990

Figure 2.13. Fresh B.C. Salmon Prices 4-6 lbs.



SOURCE: Canadian Aquaculture, Sept./Oct. 1989

In summary, the rapid development of the salmon farming industry has been rather dramatic. Up until 1988 producers were able to either enter traditional salmon markets and displace existing capture fishery product or expand into new markets. More recently the increase in supply has exceeded the increase in demand, causing prices to decline and less efficient producers to experience economic hardship. As with most new industries, the first to develop become the most profitable. For the potential salmon farming industry in Alaska, the initial window of opportunity may well have been closed due to market constraints even if policy makers did allow for its development. However the chance to prove this belief will not be forthcoming due to the prohibition on salmon farming.

Section 3. FINFISH FARMING IN ALASKA

3.1 Introduction

Ironically, as other countries developed successful salmon farming industries in the 1970s and 1980s, the U.S., with advanced biotechnical research and favorable environmental conditions, chose to limit or prohibit the development of this industry. Much of the technology employed by Norwegian fishfarmers during their development period resulted from research conducted on Pacific salmon in Puget Sound by the University of Washington and the National Marine Fisheries Service at its Manchester research station. For example, one problem limiting the Norwegians in the early 1970s was inadequate feed composition. The breakthrough in understanding the correct makeup of protein, fat and essential ammino acids in the formulation of salmonid diets was developed by Dr. John Halver at the University of Washington. In addition, Dr. John Fryer at Oregon State University developed a vaccine for use against diseases caused by *Vibrio* spp. This vaccine is now used extensively throughout the world's salmon aquaculture industry. These advances contributed greatly to the Norwegian industry's success. The broodstock for the "salmon trout" that many of the early Norwegian growers used before they developed their Atlantic salmon broodstock was developed by Dr. Loran Donaldson in his laboratory at the University of Washington. The University of Washington also assisted in the development of the Chilean salmon farming industry by providing training, pathological services and culture technology and was an early source of Coho salmon eggs.

The U.S. had the technology, the proper environment, and private sector interest. During the 1970s two states, Washington and Maine, allowed for the development of a salmon farming industry. Given these factors, why didn't the

U.S. salmon farming industry grow at a rate equal to other industries in other parts of the world?

What the U.S. industry faced that these other nations did not was a lack of supportive government aquaculture policy and planning as explained in the previous section. Instead aquaculturists were constrained by a political and administrative burden that hampered development of new industries in the coastal zone.[35] In addition, the U.S. coastal areas are intensively exploited by competing groups and any attempt at a non-traditional use is met with severe scrutiny. Due to opposition by other users of coastal resources and a difficult and lengthy permitting process, Washington and Maine did not experience the growth that occured in Norway even though research proved that both Atlantic and Pacific salmon could be successfully cultured in the U.S. With this in mind, individuals focused on Alaska as one area of potential for developing a fish farming industry.

3.2 History of Events in Alaska

During the late 1970s when Norway's production of farmed salmon was entering the fresh salmon markets in Europe and the U.S., a few interested individuals in Alaska began to consider the possibility of farming salmon in Alaska. They believed that Alaska could compete in the market for farmed salmon due to a number of comparative advantages, including availability of quality sites, the existence of smolt producing hatcheries, and the proximity to domestic markets. It was their assumption that the main competition for Alaska farmed salmon in West Coast markets would be from British Columbia. Transportation costs from Europe would put the Norwegian and Scottish producers at a disadvantage in the U.S. marketplace. It was assumed that

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[35]Bowden, G., Coastal Law and Policy. Boulder, CO Westview Press, 1981.

production from Washington would not increase even though this state had existing laws allowing for salmon farming due to lack of suitable sites, water quality problems, and opposition from environmental and other resource user groups.

Potential salmon farmers approached state agencies responsible for regulating activity in the state's coastal zone (e.g. Alaska Departments of Fish & Game, Environmental Conservation, and Natural Resources) to determine what permits were necessary for farming salmon. Agency personnel, however, did not know how to respond because state statutes and regulations did not explicitly deal with the commercial farming of fish. In October of 1983 the Commissioner of the Alaska Department of Fish & Game (ADF&G) requested the Department of Law (DOL) to issue an opinion on the legality of net pen rearing of salmon in Alaska. In January of 1985 the DOL issued an opinion that stated marine netpen salmon rearing would not pose any constitutional problems but was not specifically authorized in state statutes.[36] The question then arose as to whether or not a person could farm salmon given that the statutes made no reference. The DOL determined that because no mechanism existed under fish and game statutes for smolts to be legally owned by private individuals or companies, salmon farming could not occur without amending these statutes.[37] Thus the DOL was of the opinion that there was no legal basis for creating regulations that would authorize the acquisition of smolts for rearing from Alaska hatcheries and eventual commercial sale by potential fish farmers.

This was not considered a controversial decision since few individuals were actively pursuing a fish farming industry in Alaska at this time. However,

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[36]Spengler, Larri I. Memorandum to Don W. Collinsworth, ADF&G, on marine net pen salmon rearing. State of Alaska, Department of Law , . File Number 366-187-84. January 31, 1985.
[37]Spengler, Larri I. Memorandum to Don W. Collinsworth, ADF&G, on marine net pen salmon rearing. State of Alaska, Department of Law , . File Number 366-187-84. January 31, 1985.

those that were felt the statutes were ambiguous and open to interpretation. If the current administration were to have actively supported fishfarming development, then there could possibly be an interpretation of the statutes such that fishfarming was legal even though there was no clear policy providing legal guidance.

These two points, ambiguous statutory and regulatory guidance and lack of clear policy position on commercial aquaculture from the administration perhaps were crucial factors that led to the legislature's decision to ban all fishfarming within the state. These points will be discussed later in this paper.

In response to the growing confusion about the legality and regulation of mariculture, two government agency groups were formed to investigate the potential development of a fish farming industry. In 1985, the governor established the Governor's Fishery Mini-Cabinet Mariculture Advisory Committee, which served to advise him on mariculture issues. This group consisted of individuals representing fishing organizations, fish processors, a Native corporation, governmental agencies, the University of Alaska and individuals in the private sector interested in mariculture development. The committee was charged with formulating a workable and effective mariculture policy to guide the development of the industry in Alaska. This group divided the issues in aquaculture development into three general categories: 1) the existing ocean ranching program (i.e., salmon hatcheries); 2) pen rearing salmon; and 3) other forms of mariculture like shellfish and plants. They did not consider other types of net-pen farming except salmon because little was known at this time about marine commercial culture techniques for other temperate finfish species. In their report to the governor, the committee advised the administration to proceed with shellfish and plant mariculture but cautioned

that finfish farming required further study.[38] The individuals on this committee representing the fishing community felt that not enough information was known about the impacts to the environment and to the existing wild stocks of salmonids by salmon farming.

The second group, the Alaska Mariculture Technical Work Group, was formed in 1986, and consisted of state and federal researchers, fish biologists, and resource managers. The group's mission was to study policy issues and make recommendations about the environmental, biological and public health issues raised by mariculture development in Alaska. Late in 1986, the group issued a series of technical papers outlining proposals for managing and regulating mariculture development, including the pen rearing of salmon. These reports clearly addressed the legal and regulatory changes needed to clarify the status of mariculture and also addressed environmental impact, farm siting, and disease and genetic issues.[39]

3.3 Legislative Review and Action

In February 1987, aquatic farming legislation was introduced in both the Alaska State Senate (SB 106) and the House of Representatives (HB 108) which allowed for the commercial culture of finfish, shellfish and plants in Alaska. The introduction of these bills and their subsequent journey through the legislative process, which included committee hearings, lobbying efforts, visits to Norway, and public hearings ignited the political battle that lasted through the spring of 1990.

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[38]Alaska. Department of Commerce and Economic Development and Department of Fish and Game. Proceedings of the Governor's Ad Hoc Mariculture Advisory Committee September 15-17, 1985, Juneau, Alaska.

[39]"Mariculture in Alaska: An Examination of Government Programs," Alaska Mariculture Technical Work Group, December 1986

During the legislative hearing process on the aquatic farming bills in 1987, two sides quickly emerged to lobby their views on fish farming development. One group, headed by the Alaska Mariculture Association (AMA), supported passage of legislation that would allow for salmon farming and other forms of commercial aquaculture such as shellfish and mollusk farming and other species of finfish. This state-wide organization, formed in 1986 to advocate finfish farming, consisted of approximately 100 members. The other group was headed by fishermen organizations and environmental groups, organized to fight the passage of any legislation enabling commercial aquaculture in Alaska. Their debate arena was the Alaska State Legislature composed of 60 individuals who at the time knew very little about aquaculture and finfish farming.

The first victory in this political battle was won by anti-fish farming forces with the introduction and enactment of SB 297. Senator Dick Eliason, a fishermen from Sitka, sponsored SB 297 which placed a moratorium on finfish mariculture through July 1, 1988. The bill was introduced in early May 1987 and passed the legislature during the final hours prior to adjournment in June. Senator Eliason, a ranking member of the Senate and strongly opposed to commercial aquaculture, was unable to obtain the votes to defeat SB 106, which by this time had worked its way through the committee process and was in Senate Rules committee, ready to go to the Senate Floor. Therefore he proposed a one year moratorium, which he was able to get enough support to pass through the legislative process. The passage of this bill successfully circumvented and thus killed SB 106 and HB 108. Senator Eliason was also aware of a March 1987 Department of Law opinion which reconsidered DOL's 1985 opinion. This new opinion stated that under existing law, ADF&G had

authority to develop regulations allowing finfish farming.[40] Therefore, even though there were no active fish farms in Alaska at this time there was a possibility that state resource managers could allow fish farming under existing statutes. Thus a moratorium on this activity was a strategy by anti-fishfarmers to first, delay any official policy development by passage of enabling legislation and second, to prohibit any possible permitting of fishfarms based on promulgation of new regulations based on interpretation of existing statutes.

At the beginning of the next legislative session, in February 1988, aquatic farming legislation was reintroduced (SB 482) sponsored by Senator Arliss Sturgulewski with the support of the AMA. In April 1988, legislation (SB 514) was introduced by Senator Eliason to counter SB 482, which allowed for only shellfish and aquatic plant farming. In May 1988, SB 514 was amended to include a two-year extension of the finfish moratorium and the establishment of the Alaska Finfish Farming Task Force. SB 514 passed into law on June 8, 1988. (see Attachment A)

The enactment of this legislation effectively delayed any decision on finfish farming for another two years. Interestingly, the legislature provided no funding for implementing the shellfish and plant regulations and also failed to provide funding for the task force. The Finance Committees were holding a limit on funding for new legislation. One way to accomplish this was to pass legislation without a fiscal note attached. Thus no funds from the state budget would go to implement this legislation once passed. This behavior is somewhat fiscally irresponsible. Finally, one year later, in May 1989, the legislature appropriated $50,000 for funding of the finfish task force.

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[40]MaCracken, Sarah E. Memorandum to Don W. Collinsworth, ADF&G, on marine net pen salmon rearing. State of Alaska, Department of Law , . File Number 661-87-0360, March 10, 1987.

An important question to ask is whether those legislators proposing and enacting these delay tactics understood how this would change the probabilities of allowing commercial aquaculture over time. As will be shown, this strategy was successful; by buying time, anti-fishfarming advocates were able to garner the support needed to achieve their goals.

At the beginning of the 1989-90 legislative session the Alaska Finfish Farming Task Force submitted its report to the legislature. Section 3.5 will review the findings and recommendations presented in this report. Two days after the task force submitted its report, legislation banning all finfish farming, including farming in both upland freshwater facilities and marine net pens, was introduced. This legislation was sponsored by Senator Dick Eliason, (R) Sitka, a salmon troller and leading opponent of finfish farming. Senator Bettye Fahrenkamp, (D) Fairbanks, a long-time supporter of finfish farming and Chairman of the Senate Resources Committee, held Senator Eliason's legislation in her committee, where it died. To circumvent Senator Fahnenkamp's tactic, Representative Ben Grussendorf, also from Sitka, introduced identical legislation to Senator Eliason's in the House of Representatives. Using his clout as chair of the House Rules Committee and as Speaker of the House for the previous six years, Representative Grussendorf was able to push his legislation (HB 432) through the committee process. Subsequently, HB432 passed the House on a vote of 29-8.

However, upon arrival in the Senate, HB 432 was referred to the Senate Natural Resources Committee. When Senator Fahrenkamp held HB432 in her committee, the Sitka lawmakers began taking hostages --bills favored by Fahrenkamp and fellow Fairbanks legislators-- to get her to move the bill out of committee. Senator Fahrenkamp reciprocated by holding up a dock project in Eliason's district. But the situation took on entirely new dimensions when

Representative Grussendorf threatened the passage of a $130 million coal mine co-generation project which was located in the Fairbanks area. This capital project represented the biggest single project under consideration by the legislature as well as an opportunity for employment and new energy production for Alaskans living from Fairbanks to Anchorage.

Consequently, the pressure on Fahrenkamp was intense. Her standoff with Senator Eliason became an issue of concern to hometown unions, fellow lawmakers committed to the energy project, Fairbanks officials and business leaders, as well as some of Alaska's most influential lobbyists. Working with the Alaska Mariculture Association, Senator Fahrenkamp attempted to work out a compromise with her opponents: a ban on finfish farming in the marine environment and natural lakes and ponds; a ban on the farming of salmon in upland tanks utilizing salt water; an authorization of fresh water land-based tank farming; and a series of tight regulatory controls and restrictions. However, Senator Eliason made it clear he would settle for nothing less than a total ban, and the co-generation coal project remained a hostage in the House Rules Committee chaired by Representative Grussendorf.

With three days left before adjournment of the legislative session, Senator Fahrenkamp finally backed down. As part of her settlement with Senator Eliason, she extracted a non-binding legislative letter of intent supporting upland tank farming of non-salmon species and a letter from Senator Eliason expressing his support for the concept. On May 9,1990, the legislature in the last hour before adjournment passed HB 432 into law. The Senate approved HB 432 by a 14 to 6 vote with the adoption of Senator Fahrenkamp's letter of intent. (see Attachment A).

The Alaska Mariculture Association (AMA), the group leading the charge for finfish farming, issued a statement shortly after the senate vote calling HB

432 "a dangerous precedent in management of Alaska's resources." The AMA stated

> The failure to provide for land-based tank farming of non-salmon species of finfish this year cannot be justified on biological, environmental or economic grounds. While the opposition to salmon farming is at least understandable, the extension of the concern to uplands tank farming is incomprehensible. The passage of HB 432 essentially means that one industry can effectively veto a potential competitor. Is that the way we are going to diversify our economy? Are we to apply this test to other industries?[41]

Shortly after the senate vote on HB 432 the *Anchorage Times* ran an editorial saying:

> it is hard to imagine a more short-sighted and ludicrous move by the state to try to block progress and change. In a different time and in a different place, the 1990 edition of the Alaska Legislature may well have outlawed the horseless carriage and flying machine. No matter that other nations are beginning to eat Alaska's lunch by selling pen reared salmon to eager markets around the world. No matter that there is no evidence that properly managed aquaculture would endanger wild species and wild runs. Alaska may not like it, but it can't forever keep its commercial fisheries in the horse and buggy days.[42]

A columnist from the *Anchorage Daily News*, wrote a scathing condemnation of "Senator Dick Eliason and the other shameless shill" who pushed for the ban on fish farming. He wrote:

> In fact, what's going on is the most blatant example of using political power to protect the pocketbooks of a special interest group since the Smoot-Hawley Tariff. ...So what's really going on here? Remember those western movies where the big cattle barons, rich from running their cows on public land for free, try to keep the sodbusters from claiming and fencing the range? Remember the smooth-talking senators who helped them? That's what's going on here.[43]

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[41]Alaska Mariculture Report, "Alaska Bans Finfish Farming," Second Quarter, 1990, Page 3.
[42]Anchorage TIMES
[43]Anchorage Daily News.

3.4 Major Issues Presented in the Finfish Farming Debate

Four basic public policy issues evolved during the course of the debate over salmon farming in Alaska. The task force recognized and addressed each issue individually. These issues included:

- Disease and genetic concerns
- Environmental impacts
- Site conflicts and aesthetic issues
- Market Implications

These four issues were not unique to Alaska, as other areas of aquaculture development like Washington and Maine experienced these concerns. See Section 2.3. Issues unique to the Alaska debate will be presented and discussed in Section 4. A detailed inquiry into the issues underlying these areas of concern as presented in the Alaskan debate follows.

3.5.1 Disease and Genetic Concerns

The threat of transmitting diseases from farmed to wild fish with substantive adverse impacts is a primary concern of opponents to salmon farming. The following quote from an editorial by Senator Dick Eliason (R-Sitka) in the Anchorage Daily News sum up this concern:

> The subject of fish disease has generated heated controversy.... The effects of large concentrations of biomass in a limited area are largely unknown. The presence of unconsumed fish feed and feces provides a nutrient-rich environment conducive to the growth of bacterial populations harmful to fish, and no matter how clean the environment of the pen, there is always the risk of disease: bacterial, viral and parasitic. The most disturbing aspect of the subject of fish disease is that most diseases can even be borne in the water by currents. One can only speculate upon the impact of intensive pen-rearing of salmon on wild fish stocks. It won't

necessarily be detrimental, but not enough scientific research has been conducted to prove that it won't be detrimental.[44]

In response to these concerns advocates of fish farming point to recent scientific research conducted within the fish farming industry in other west coast states and in the anadromous hatchery programs in Alaska. Alaska disease and genetics experts have provided technical papers on finfish farming which state that existing policies "... appear to provide adequate safeguards for the protection of native and cultured stocks."[45] A report to the legislature by the Interagency Mariculture Workgroup concluded that the fish farming industry could be accommodated without significant threat of disease to existing wild and hatchery stocks if the state continued to meet its responsibilities in fish disease control, and importation of species from outside the state, such as Atlantic salmon, remained prohibited.[46] Alaska has some of the most rigorous disease and genetic control regulations in the world which are designed to protect the integrity of wild fish stocks.[47] According to the state fish pathologist, Dr. Ted Meyers, disease and genetic issues for salmon farming are nearly identical to those in the ocean ranching program, with which the state has a great deal of experience.[48]

A review of the major environmental studies of finfish mariculture in Washington State revealed no evidence of significant damage to wild stocks

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[44] Anchorage TIMES "Approach Fish Farming with a degree of Caution," Page C-5, November 2, 1987.
[45] "Mariculture in Alaska: An Examination of Government Programs," Alaska Mariculture Technical Work Group, December 1986, p. ii.
[46] "State of Alaska Interagency Mariculture Workgroup Report on Activities Over the Legislative Interim," page 15, January 12, 1988
[47] "Alaska Dept. of Fish and Game Genetic Policy," Alaska Dept. of Fish and Game, FRED Special Report, June 11, 1985.
[48] Dr. Ted Meyers, personal communication, August 4, 1989.

by transmittal of disease.[49],[50] One researcher from Washington, Dr. Donald Weston, stated that:

> Cultured fish may be more susceptible to diseases than wild fish, with the degree of susceptibility determined, in part, by the extent to which good husbandry practices are followed by the culture operator. Despite the potential for disease in a culture environment, there is little evidence to suggest that this potential represents a threat to wild fish. In fact, there are several examples of diseases which have had more than adequate opportunity to infect wild fish, but have failed to do so. ...There are many examples of wild fish transmitting disease to cultured fish. While it is more difficult to document disease transmittal to wild fish, there are no known examples of a culture operation providing a site for disease organisms to multiply, become more virulent and reinfect the wild population.[51]

Despite the conclusions of state experts and environmental studies, many fishermen still believed that wild stocks of fish would suffer adverse impacts if fish farming was permitted. Review of legislative committee hearings on salmon ranching legislation 18 years ago reveals that this attitude was present when commercial fishermen opposed the state's ocean ranching program. In fact Senator Eliason opposed the legislation that has enabled the creation of one of the world's most successful salmon ranching industries.[52] Today, the public and the private non-profit hatchery programs have been successful at supplementing natural returns and have not negatively impacted the wild stocks with the transfer of diseases. The fishing industry has enjoyed the revenues generated from returning hatchery fish, which accounted for over 16 percent of

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[49] "Draft Programmatic Environmental Impact Statement: Fish Culture in Floating Floating Net Pens," prepared by Parametrix, Inc. for Washington State Department of Fisheries, January 1989.

[50] Weston, Donald. "The Environmental Effects of Floating Mariculture in Puget Sound," University of Washington, School of Oceanography, Report WB-10, August 1986.

[51] Weston, Donald. "the Environmental Effects of Floating Mariculture in Puget Sound'" August 1986, pages 85 and 90.

[52] Pierce, Brad. Personal communication, September 6, 1989.

the commercial salmon catch in 1988.[53] Nevertheless, a substantial number of fishermen appear convinced that salmon farming is inherently different from ocean ranching and poses much greater risks to wild stocks.

Given the evidence presented by qualified pathologists and fishery biologists that salmon farming poses equal or less risk to wild stocks than does salmon ranching, given the 20 year history of salmon ranching in Alaska and no known incidence of hatchery stocks negatively impacting the wild stocks, given that salmon ranching is quite accepted in Alaska as a form of aquaculture, why do fishermen behave this way?

One possible reason is that commercial fishermen are the direct recipients of the state and PNP salmon ranching programs. When the salmon ranching program was first implemented twenty years ago, total annual harvests of all salmon species averaged approximately 20 million fish. During the past five years this average has been holding around 130 million fish. Because of the depressed salmon stocks two decades ago, there was a move to do whatever was needed in order to restore the state's salmon runs to historic averages. Enhancement by ocean ranching was an important instrument in achieving this goal.

Another concern expressed by opponents to fish farming is the threat of farmed salmon escaping from the pens, intermingling and perhaps interbreeding with wild stocks. Opponents argued this action could reduce the genetic integrity of wild fish due to interbreeding with selectively bred farmed stocks which could alter the genetic characteristics of wild stocks and reduce the survival rates of wild fish. Proponents countered this position by stating that laws and policies that guide the existing ocean ranching program ensure that

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[53] "FRED Annual Report," Alaska Dept. of Fish and Game, Division of Fisheries Rehabilitation, Enhancement and Development, 1988.

salmon ranching does not impact the genetic integrity of existing natural stocks. If the farming industry operated under the same genetic policy which does not allow the importation of stocks from outside the state or the transporting of stocks between major geographic regions in the state, and if the industry operated under strict siting restrictions, proponents argued that risk of negative genetic impact to wild stocks would be slight or non existent. For example, siting requirements would prohibit locating a farm near an anadromous stream that has salmon of the same species as the farm. Prince of Wales Island, for example, has no Chinook salmon spawning streams, and the possibility of salmon escaping from a farm sited in this region and impacting wild chinook stocks is unlikely.

In their report to the legislature, the Interagency Mariculture Workgroup summarized the issue of genetic integrity by stating:

> Assuming that the 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.[54]

In addition, a critical variable in evaluating potential genetic effects is the number of cultured fish that escape relative to the size of the wild population. The potential for a negative impact on the wild stock depends upon the number of fish escaping and may be significant only when the proportion of escaped fish is large in comparison to the wild breeding population. Weston summarizes this by stating what he believes to be the worst effect of interbreeding:

> In the worst case, there may be temporary reduction of reproductive capability of the wild population since

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54 "State of Alaska Interagency Mariculture Workgroup Report on Activities Over the Legislative Interim," page 18, January 12, 1988

> reproductive effort may be wasted in producing less fit genotype against which selection may occur.[55]

If escaped fish congregated to spawn in one particular area and therefore comprised a large portion of the total breeding population, a problem could potentially occur. Proponents believe that proper siting of the farm can prevent that from happening. They also state that the odds of cultured fish ever reaching a spawning stream are quite small, given that cultured fish lack the "imprint" of a home stream, thus do not have a sense of spawning migration. If farmed salmon did locate a spawning bed with salmon of the same species, chances are they would be competing with thousands of individuals in a particular stock in efforts to successfully reproduce and pass on their genetic material.

In summary, given the existing genetic guidelines for the state's ocean ranching program, given potentially applicable siting requirements developed in other salmon farming regions and given a clear understanding of the odds of escapement and successful interbreeding, , an understanding of the level of risk incurred is known, as is a realistic understanding of the impacts to the genetic integrity of wild stocks of salmon by salmon farming.

3.5.2 Environmental Impacts

The primary concern involving environmental impacts is that waste materials, such as uneaten feed and fecal material, could adversely affect water quality by reducing dissolved oxygen, increasing natural levels of nutrients like nitrogen and phosphorus, increasing the biochemical oxygen demand (BOD), and destroying benthic productivity. In addition, some fear that predator control

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[55] Weston, Donald. "the Environmental Effects of Floating Mariculture in Puget Sound'" August 1986, page 94.

measures employed by fish farmers could adversely affect bird and mammal populations and violate federal laws.

Fish farming proponents state that adverse environmental impacts from aquaculture can and do occur. The question is really how adverse are the impacts on environmental quality. These potential effects can and should be controlled, as this is in the best interest of the farmer. A farm's effect on the environment is mainly a function of applied technique, site location, size of production, and capacity of the receiving water.[56] With salmon farming, there are three main ways of minimizing the impact on the benthos and surrounding waters: 1) the use of proper feed which results in as little waste as possible, 2) careful husbandry practices and 3) suitable site selection. Factors evaluated in site selection include water depth, current velocity and bottom topography.[57]

The State of Washington, through the implementation of recommendations in "The Environmental Effects of Floating Mariculture in Puget Sound" and "Recommended Interim Guidelines for the Management of Salmon Net-Pen Culture in Puget Sound" has set standards for siting salmon farms that are designed to minimize impacts to the environment. Dr. John Pitts, Aquaculture Coordinator for the Washington Department of Agriculture, states that:

> The Guidelines, if applied by local governments as siting criteria will control and regulate potential pollution from fish farms at minimal expense to the state. ...The state agencies support this approach as a safe and responsible approach to finfish aquaculture in Puget Sound. [58]

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[56] Ackefors, Hans. "The Environmental Impact of Mariculture," Presentation at the Sunshine Coast Fish Farming Conference. Department of Zoology, University of Stockholm, September 1987.

[57] Ackefors, Hans. "The Environmental Impact of Mariculture," Presentation at the Sunshine Coast Fish Farming Conference. Department of Zoology, University of Stockholm, September 1987.

[58] Personal interview with John Pitts, Washington Department of Agriculture, Seattle, October 29, 1987

The Guidelines require field studies at numerous net-pen sites. Based on these studies and a literature review, including utilizing a sediment transport model, an estimate of an acceptable rate of organic input is obtained.

Salmon farmers point out that the degradation of water quality is something to avoid, as the first thing to be affected by poor water quality is the health of the fish. Dr. Pat Moore, founder of Greenpeace and current fish farmer on Vancouver Island states that:

> When I hear people say fish farming will pollute water, I say, 'Yes, but the fish in the farm are like the canary in the coal mine - they'll feel the pollution first'. Fish farming is an important obstacle to water degradation. ...A billion dollar program in aquaculture equals a billion dollar insurance policy against water degradation. B.C. has a billion dollar wild fishery, but no wild fisherman has the right to defend water quality in the courts. But me, with my two-bit fish farm ... I can go to court! If a pulp mill, steel mill, toxic waste dump, etc. is degrading my water, I have a case.[59]

3.5.3 Site Conflicts and Aesthetic Issues

Potential land use problems associated with mariculture include: displacement of public uses such as recreation and subsistence, conflicts with other commercial uses of tide and submerged lands and impacts on adjacent land holders.

Some residents believe fish farm sites may block or inhibit public access to important recreation and subsistence use areas. The expectation and desire for seclusion when recreating in rural Alaska is highly valued. If the sense of seclusion is lost, an important part of the aesthetics of many bays may be lost, and the recreational experience is less valuable. Some believe a fish farm will essentially eliminate that sense of seclusion for recreational users.

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[59] Alaska Fishermen's Journal "The Philosophy of Fish-Farming" page 5 March 1987.

Some contend that the best sites for fish farms may often be the best sites for other uses such as mineral or timber transfer and support facilities, log storage, commercial fishing grounds or anchorages, or commercial recreation development.

Loss of tidelands access, boat moorage, view and privacy are a few of the concerns expressed by adjacent land owners. With any permitted activity in the coastal zone, the adjacent land owner has a number of ways to influence the siting of commercial facilities in the marine environment. They can participate in development of state land use plans and local comprehensive plans. The adjacent owners are notified by mail of pending applications and are given an opportunity to comment on the project in public hearings. The pertinent agencies review these comments and weigh the use and enjoyment of the adjacent owner against what is considered to be the state's best interest. These determinations are made on a case-by-case basis.

Fish farming proponents argue that the availability of potential farm sites is one of the few comparative advantages Alaska has over other localities. Because the coastline is relatively uninhabited, opposition from organized groups of waterfront homeowners, as has occurred in Puget Sound, is not a significant obstacle to development. They also contend that Alaska has a very formalized coastal zone management process, cited in a recent report by the British Columbia Ombudsman Office as a model for resolution of conflicts between government agencies, individuals and local communities.[60]

Agency officials charged with managing, regulating and permitting mariculture operations have been discussing siting issues for over three years, as the governor's office and legislature have evaluated various mariculture

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60 "Aquaculture and the Administration of Coastal Resources in British Columbia," Legislative Assembly, Province of British Columbia, Ombudsman, Public Report No. 15, December 1988, page 58.

proposals. The 1988 legislation authorizing shellfish and aquatic plant farming (SB 514), enacted specific procedures for permitting mariculture sites and regulating operations. The following briefly explains the state's existing permitting process for shellfish and plant mariculture projects as provided for by the enactment of SB 514.

The Division of Governmental Coordination (DGC), the state agency that houses the Alaska Coastal Management Program, orchestrates an interagency review of applications and is the lead agency for the permit process. Other agencies involved in permitting and screening applications include: the Alaska Department of Fish and Game (ADF&G), Divisions of Habitat and Fisheries, Rehabilitation,Education and Development (FRED); Department of Natural Resources (DNR), Divisions of Land and Water Management and Parks and Outdoor Recreation; and Department of Environmental Conservation (DEC), Divisions of Environmental Quality and Environmental Health. Federal permitting agencies include the U.S. Army Corps of Engineers and the U.S. Forest Service if it is the upland land owner. Each agency may have its own permit requirements and the applicant can go directly to DGC for assistance in finding out which permits are required from each agency.

After an initial screening of applicants, DNR issues preliminary findings for those projects consistent with other uses of the coastal zone. Thirty days notice is provided in order to gather oral and written public comment, during which time a public hearing is held in the district in which the applicant is planning to establish the farm. Based on information provided in the permit applications and the public comment period, the various agencies determine a best interest finding. Only after this process has been successfully completed, all state permits have been acquired, and DNR and DGC have issued final consistency findings, can the aquatic farmer begin operations.

In sum, Alaska has a very thorough system in place to resolve site conflicts and regulate and monitor commercial operations within the state's coastal zone. The same system, with proper funding and minor modifications, could also accommodate finfish operations.

3.5.4 Market Concerns

The primary market concern of salmon farming opponents is that salmon farming in Alaska would tend to undermine the price of wild salmon by increasing the salmon supplies, thus adversely affecting Alaska's existing commercial fishing industry. In response, proponents contend that whether or not Alaska has salmon farms is irrelevant to the world supply of salmon because of the major production and sales of farmed salmon by other nations. They argue that regardless of what Alaska does or does not do, farmed salmon production will continue to increase as the industry and the markets continue to evolve until supply exceeds demand and prices fall. Proponents maintain that instead of asking if Alaska should allow salmon farming, Alaskans should ask who is benefitting from the additional production of salmon from this relatively new industry. Alaska fishermen will face competition from farmed salmon regardless of whether or not they come from Alaska farms.

Alaska currently accounts for approximately 90 percent of U.S. salmon landings and is currently losing market share to farmed salmon in every segment of traditional markets for premium species --chinook, coho and sockeye.[61] For example, between 1981 and 1987, U.S. fresh/frozen salmon consumption attributable to imports increased from 10 to 48 percent, while Alaska's contribution to domestic salmon supplies declined from 97 to 48

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[61] "Fisheries of the United States, 1986," U.S. Department of Commerce, Nation Oceanic and Atmospheric Administration, National Marine Fisheries Service, Current Fisheries Statistics No. 8385, April 1987, page viii.

percent.[62] With steadily declining production costs occurring in the farmed salmon industry, it appears that Alaska's competitive problems in premium markets may continue.

Salmon farming opponents have recently developed an additional market related argument. If Alaska allows salmon farming, then Alaska's status of producing only wild caught salmon would be compromised, invalidating a market strategy designed to promote the "wild, natural" virtues of Alaska wild salmon. In addition opponents contend there are negative public perceptions about farm raised animals, because of the chemical additives and husbandry techniques employed in their rearing.

In response, proponents state that quality is the most valued attribute and farmed salmon are higher in quality than wild caught fish. Two years ago the Alaska Department of Commerce and Economic Development commissioned a study of domestic markets for fresh and frozen salmon which concluded that quality was the most prized attribute by consumers, followed by freshness, price and product form.[63] The product's origins and whether the product was wild or farmed ranked comparatively low on wholesalers/retailers/restauranteurs scale of desirable overall attributes in most domestic markets. Salmon farming advocates argue that if this market information is correct, advertising efforts emphasizing "wild salmon from the pristine waters of Alaska" may not be much help in overcoming consumers' growing preference for high quality, fresh fish.

3.5 The Alaska Finfish Farming Task Force

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[62] "World Markets for Salmon: Pen-Reared Salmon Impacts," prepared for the Alaska Department of Commerce, Division of Business Development by Sea Fare Group, April 1988.
[63] James L. Anderson, "Analysis of the U.S. Market for Fresh and Frozen Salmon," Staff Paper Series, University of Rhode Island, department of Resource Economics, May 1988, page iii.

As mentioned previously, in July 1989, Governor Cowper appointed five members to serve on the Alaska Finfish Farming Task Force: a fisherman, an economist, a biologist, a public member and a mariculture advocate. I served on the task force as the mariculture advocate because I was familiar with the issue, knew key people in the governor's office and was fairly open-minded and non-adversarial. The task force held eight meetings, travelled to fish farms in Washington, heard hours of testimony from experts and interest group representatives, debated the issues, and submitted a consensus report to the legislature and governor. The format of the report was such that it presented the concerns and facts on the issues, and then presented recommendations to policy makers. The task force's report was submitted to the legislature in January 1990 [64] (see Attachment B.)

The issues investigated by the Alaska Finfish Farming Task Force closely corresponded to the issues described above. This included: disease and genetic concerns; sources and ownership of broodstock; environmental impacts and user conflicts; the cost of regulating a fish farm industry; and the impact to the existing wild salmon market by the increase of supply of farmed salmon. During the evaluation of these issues, the task force heard testimony from more than two dozen authorities on specific aspects of finfish farming and reviewed dozens of relevant documents. These examinations generated a series of findings and recommendations. A summary of the task force recommendations includes the following.

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[64]Alaska Finfish Farming Task Force Report to the Alaska Legislature," Prepared by the Alaska Finfish Farming Task Force. January 15, 1990

Disease

1. The finfish farming industry can be accommodated without significant threat of disease to wild and hatchery stocks if the state continues to meet its responsibilities in fish disease control and if monies are provided for additional health services or private pathological services are created.

2. Current policies prohibiting importation of live salmonids, including gametes, should be placed into statute and rigorously enforced.

Genetics

1. The existing state genetics policy is adequate to protect the genetic integrity of the state's fisheries and should be rigorously applied to fish farming.

2. Current policies prohibiting importation of live salmonids, including gametes, should be placed into statute and rigorously enforced.

3. The state should not permit the siting of finfish farms within a 20 kilometer radius form the mouth of a stream that has significant production of the same species

Siting of Finfish Farms, Environmental Impacts

1. The state should use existing siting guidelines to develop a set of criteria specifically applicable to finfish net pen farming in Alaska. These include the State of Washington's Recommended Interim Guidelines for the Management of Salmon Net-Pen Culture in Puget Sound and the Alaska Department of Natural Resources' Etolin Island Area Mariculture Pilot Project. Guidelines for siting should also reflect the Alaska Department of Fish and Game's disease and genetics policies.

2. The state should use the Consistency Review Process of the Alaska Coastal Management Program in permitting finfish farm sites. The Alaska Coastal Management Program provides a framework for local and public participation in state decisions, and a mechanism for the resolution of conflicts between government agencies, individuals and local communities.

Siting of Finfish Farms, User Conflicts

1. Area planning represents the best method of determining consistency of uses (in the coastal zone). However, where area plans do not exist, the consistency review process must allow for expanded public review to ensure consistency with activities that do not require state permits.

2. Fish farms and ancillary use of adjacent uplands must be compatible with zoning and designated use of the uplands. No finfish farms should be permitted in waters adjacent to state and federal parks.

3. Special provisions for public notice of finfish farming permit applications, including requirements for newspaper display ads with location maps and direct agency notification to interested parties, should be developed to encourage the greatest degree of public involvement. Applicants should bear the cost of these public notice provisions.

Cost of Regulating a Finfish Farming Industry

1. The finfish farming industry should pay economic rent for use of public resources. Forms of rent include local and state property taxes, state income taxes, sales taxes, permit fees, tideland leases, and a raw fish tax of three percent of the farm gate value.

Costs and Benefits Accruing to Alaska and its Residents

1. The State of Alaska should not subsidize finfish farming beyond the amount needed to regulate the industry.

Marketability of Alaska Salmon

1. Alaska must develop a strategy to respond to its eroding market share for salmon sales.

2. A mandatory quality assurance and inspection program for the Alaska salmon industry that would include catcher boats, tenders, and processors should be implemented as soon as possible.

3. In conjunction with improved quality, marketing efforts should be extended to include an aggressive, world-wide marketing program, extolling the virtues of Alaska wild salmon.

In the summary chapter, the task force concluded that the environmental and biological impacts of finfish farming could be minimized through careful attention to proper siting and enforcement of the conservative regulatory policies. The task force determined that current fisheries management techniques were designed to minimize disease and genetic problems and that risk management of disease and genetic problems found in finfish farms would be no different than for current fisheries management.

The task force contended that the cost of providing adequate regulation of a finfish farming industry would be high, but successful development would bring employment and other benefits to Alaska. It estimated that approximately $500,000 would be required annually by State agencies to regulate a finfish farming industry, assuming 10 to 15 permit applications per year. The report stated that the legislature is the proper place for deciding where to rank state funding of fish farming regulation with other state programs. It also concluded that while current market conditions for farmed salmon are poor, a developing salmon farming industry in Alaska could find some marketing opportunities because of the established market contacts, lack of international borders to cross, availability of excellent sites and the existing smolt producing hatcheries.

In regards to global development of salmon farming, the report explained that markets for Alaska seafood will be adversely affected by the global development of salmon farming, regardless of what happens to salmon farming in Alaska.

In its general recommendation, the task force did not directly state an unequivocal "yes" or "no" as to whether a particular type of finfish farming should be permitted. Rather the task force concluded by stating:

> If the Legislature decides to allow finfish farming, it is imperative that the necessary regulatory framework be in place in advance of

> any farming activity. If this caveat is satisfied, the task force concludes that fish farming would have little or no adverse effect on wild stocks in the environment. Most of the necessary regulations can be adapted or extended without change from those that are already in effect for the State's ocean ranching and hatchery programs, but additional funding must be provided to extend them to fish farming.[65]

As previously noted, two days after the task force report was submitted to the legislature, HB 432 was introduced. This bill, which was eventually enacted into law, prohibited all finfish farming in both fresh and salt water.

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[65]"Alaska Finfish Farming Task Force Report to the Alaska Legislature," Prepared by the Alaska Finfish Farming Task Force. January 15, 1990, page 32.

Section 4. DECISION MAKING. POLITICS AND POLICY FORMATION

4.1 Introduction

The state legislature is vested with the power to make decisions and formulate policy regarding the use of the state's natural resources in the near-shore waters. After seven years of research, debate, legal opinions, two moratoriums and a task force, the state legislature on May 7, 1990 chose to prohibit commercial farming in Alaska of all finfish species in both marine and fresh water upland facilities. The House voted 29 to 8, with 3 absent, and the Senate voted 14 to 6, in favor of prohibiting finfish farming. Attachment C, a timeline of state government actions on finfish mariculture, illustrates the extensive amount of time and energy expended on this issue.

A number of hypotheses could be proposed in explaining why the Alaska State Legislature took such as prohibitive position on development of finfish farming, especially given that other counties endowed with the resources to culture fish are successfully engaged in this rapidly growing industry. In addition, given the task force's consensus recommendation after thorough review of the issues that "fish farming would have little or no adverse effect on wild stocks and the environment", why did policy makers take such a restrictive stance with no possibility for compromise? This analysis may provide insight into how decisions are currently made concerning uses of our natural resources within the coastal zone. This in turn can provide beneficial information to potential resource users in terms of how to best prepare and structure policy proposals that receive favorable results.

Several reasons influencing Alaska policy makers in their decision to prohibit all forms of commercial finfish aquaculture in Alaska are proposed. These include:

1. Historical importance of the existing commercial salmon fishery, including salmon ranching, its current value and the control of the salmon resource by commercial fishermen;

2. The relative political strength and support (perceived and actual) of the commercial fishing industry and of the advocates of finfish aquaculture;

3. Poorly planned policy and bargaining strategies by aquaculture advocates;

4. Lack of clear policy development and planning regarding aquaculture development by the Cowper Administration;

5. Additional competition of State general fund revenues for resource management between existing industries and finfish aquaculture; and

6. Confusion about salmon aquaculture and other finfish.

4.2 Control over the Salmon Resource.

Alaska has a colonial history of fisheries development that is relatively recent compared to other resource dependent industries in the United States. The "fish trap politics" of the pre-statehood era, when out-of-state packers controlled the salmon resource under federal management, is within living memory of many fishermen and political leaders in the state. In those pre-statehood days, local fishermen had very little say in fisheries management and their livelihoods depended upon their working relationship with the packers. Fishermen had to have a buyer in order to fish and the packers controlled the business by being the only market for the fish, providing financing for boats and equipment, or in many cases owning the boats that the fishermen used.[66] In addition the packers owned the rights to the fish traps that were extremely efficient in harvesting salmon.

The territorial legislature's early efforts, such as creating the Alaska Department of Fisheries and a Fisheries Board in 1949, were aimed at

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66 "The Alaska Board of Fisheries: Fisheries Management Alternatives," Alaska State Senate Advisory Council, October 1987, p. 18

promoting conservation efforts, resident ownership of vessels and gear, and assisting the U.S. Fish and Wildlife Service in managing and allocating the resource. One of the new state legislature's first acts in 1959 was to abolish fish traps, which had become a symbol of out-of-state domination over the salmon resource. Since statehood, the major theme characterizing fisheries initiatives in the state legislature has been to increase the income of Alaska residents in the fishing industry.[67] Examples include state investment of over $150 million into its hatchery program and the creation of the Fisheries Rehabilitation Enhancement and Development (FRED) Division in the Alaska Department of Fish and Game in 1971.

In 1974, voters approved limiting entry to the state's salmon fisheries. A major factor in this decision was the infamous Boldt case that was pending in federal court in Washington State at the time. There was concern that if a major portion of the salmon harvest in Washington was allocated to Indian tribes, large numbers of fishermen would be displaced to Alaska to compete with residents. With limited entry, commercial salmon fishermen in Alaska gained personal harvest rights and greater independence from processors. Today, commercial fishing group representatives exercise effective control over the Board of Fisheries, which allocates the harvest among user groups, and the boards of the Regional Aquaculture Associations, which guide private nonprofit hatchery production decisions. The majority of members on these boards are commercial fishermen.

After decades of struggle to gain control over the salmon resource, it was not surprising that commercial fishermen in Alaska balked at sharing political power with another special interest group, in this case fish farmers with

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[67] Brad Pierce, "The Alaska Controversy: Commercial Fishing vs. Finfish Mariculture," Alaska State Legislature House Research Agency, September 1989, p.2.

potentially divergent goals and objectives. Many fishermen were concerned that a salmon farming industry would be controlled by out-of-state interests like Norwegian salmon farmers or the Weyerhauser Company or possibly the native corporations. For many fishermen, private ownership of salmon in netpens and exclusive use of tideland acreage for fish farms was perceived as another form of the outlawed fish trap because farmers would have private ownership of a public resource. Today the Alaska commercial salmon fishermen control a resource that is "owned by all but harvested by few". Thus control over the salmon resource and fear of outside domination were underlying themes in the debate over salmon farming in Alaska.

In addition, the commercial fishing interest groups, their lobbyists and key legislators supporting the commercial fishermen's position against finfish farming presented the argument of the importance of the wild fishery to residents of the state in terms of employment and economic opportunity. It was argued that any risk, perceived or actual, to this existing valuable renewable resource was not worth the potential benefits. As presented earlier in Section 2.2, Alaska's commercial harvest of salmon presently accounts for almost one-half of the world's 550,000 metric ton (mt) catch of Pacific salmon and 90 percent of U.S. commercial salmon landings.[68]

Since statehood the commercial fishing interest groups have been successful in obtaining important legislative acts supportive of their industry, including the Limited Entry Act of 1974, the Salmon Enhancement Program and the funds to capitalize it, and the creation of the Alaska Seafood Marketing Institute. With this existing positive relationship with state policy makers, when fishermen stated their strong opposition to finfish farming, and in particular,

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[68] Sea Fare Group, "World Markets for Salmon: Pen - Rearing Salmon Impacts," April 1988, p.74

marine net-pen rearing of salmon, they had a captive audience within the legislature and also non-elected officials within the state government.

When confronted with an adversarial group who's history is very much intertwined with the history of the state, advocates of a new industry experienced difficulties in convincing policy makers of the potential benefits of a new use of the coastal zone. Because the issue was structured into a "win-lose, us-them" debate, policy makers perceived a positive policy for finfish aquaculture as not so much advancing the development of a new industry but rather creating a potential risk or liability to a very strong, established industry that is very much valued by the state.

One of the major arguments presented by commercial fishermen was that if allowed, commercial aquaculture would provide nothing for them. Instead fishermen would only experience losses. These losses would include: increased conflicts over use of marine resources such as siting an aquaculture facility in areas of traditional commercial fishery uses; having to share a finite amount of state revenues for resource management with another industry; the potential threat of negative impacts (disease and genetic) to wild stocks of fish which they are dependent on; and the loss of markets for their products.

By focusing the debate on how the finfish farming industry would negatively impact a "favorite son" industry, discussion on the major forces affecting and driving world aquaculture development as presented in Section 2.1 was diminished, and policy makers concentrated their efforts more on impacts to the state rather than impacts occurring globally by changes in the production of seafood products.

Because of the historical relationship between commercial fishermen and policy makers and the power fishermen had in the legislature by having key legislators in strategic positions and effective lobbying efforts, (such as Senator

Eliason and Representative Gruessendorf) it really did not matter if the issues presented in the debate where in fact valid. What mattered was whether or not legislators believed these concerns and in turn how they would vote on this issue.

In reviewing the development of other successful aquaculture industries throughout the world, this factor of having such an important existing resource user group, like the Alaska commercial salmon industry, opposing development was not present. For example, one reason Norway experienced such success was that a smooth transfer of resources from the nearshore commercial fishing industry into the developing salmon farming industry occured. Since Norway's nearshore fish stocks were depleted by overfishing, aquaculture provided an opportunity for traditional rural coastal residents to make a living. In Washington state, the commercial fishing industry did not present arguments against aquaculture development as their industry is also in a massive state of depression. In fact many of the fishermen living in Washington fish elsewhere, including the Alaskan fisheries.

In addition, fishermen presented the argument that Alaska already had a successful salmon aquaculture industry, the salmon ranching program, and did not need to develop another form of aquaculture, especially if the benefits would flow directly to private individuals using state owned resources. They felt that if the state wanted to increase its production of salmon, then the existing ranching program could be expanded. Interesting to note, however, is that the direct recipients of the state salmon ranching program are primarily commercial fishermen, and the commercial fishermen control all of the regional ranching associations.

4.3 Political Strength and Policy Strategies

Another possible reason for the outcome of this issue is the lack of political strength of the group advocating for new aquaculture development in Alaska and its lack of a well planned policy and bargaining strategy. The major advocacy group, the Alaska Mariculture organization was comprised of approximately 100 members, and was formed in 1987. This, in combination with the lack of having an existing industry to provide funding for lobbying efforts and educational campaigns put this group at a disadvantage when compared to the organization of the commercial fishing industry.

On the other hand, anti-aquaculture groups like the commercial fishing organizations and environmental groups were quite organized and well funded. When the finfish farming legislation was first introduced and then throughout the debate, the commercial fishing organizations organized a campaign to present their opinions. One example is the hundreds of letters and calls from individual fishermen throughout the state to legislators. At any one time during the legislative session lobbyists from groups like the Alaska Trollers Association, the United Fishermen of Alaska, The North Pacific Fisherman's Association, and the regional aquaculture associations (salmon ranching) would visit the State Capital lobbying against passage of any finfish aquaculture legislation. This included meeting directly with legislators, testifying at committee hearings, and publishing articles in newspapers and submitting reports to the legislature. For example, of the hundreds of responses received when the Finfish Farming Task Force requested public comments, over 90 percent of the letters were from individuals and organizations urging the task force to recommend that fishfarming be banned in Alaska.

The AMA lacked this kind of organization and consisted of four or five individuals and the Executive Director serving as the organization's lobbyist in Juneau working with a few legislators supporting legislation. In addition the

annual budget of the AMA was approximately $10,000. These funds came primarily from membership dues.

This was not the case in Washington State where the industry advocacy group, the Washington Fishgrowers Association, raised over $40,000 a year from its members to pay for the services of an effective lobbyist in Olympia. Through his efforts, this organization was able to get its legislative agenda through the legislative process. One example of this was to transfer the oversight of the industry from the Department of Fisheries into the Department of Agriculture where it would experience more favorable regulation. Through having an active, well funded industry advocacy group the Washington fishfarming industry was able to effectively present their issues to policy makers and in return experience desirable results.

4.4 Policy Development and Planning

A common factor present in all successful emerging aquaculture industries throughout the world is having clear governmental policy in place which directs development of the new industry. This includes establishing objectives and implementing plans to achieve the stated objectives.

The Norwegian experience speaks directly to this issue of the role of public policy in guiding the development of an industry in an orderly fashion that encourages a stable, dependable industry. From the beginning the Norwegian government issued policies regarding siting requirements, participation, marketing and infrastructure development consistent with national objectives. These objectives included generating export earnings, fostering the development of remote regions and encouraging the development of family-

oriented businesses.[69] In the early stages of the industry's development the Norwegian government recognized that the salmon farming industry met all three criteria, and during the early 1970s the government implemented an array of policies to encourage the expansion and success of family managed salmon aquaculture firms. This did not include a lengthy, expensive and uncertain licensing process, nor did it include political debates over whether or not this industry should exist. Instead policies governing salmon farming offered a means to mitigate resource user group conflicts, provided for regional employment opportunities and included education programs. This involved government personnel in resource agencies and research institutions committed to the success of the private aquaculture industry.

In contrast to the Norwegian experience, one major element missing throughout the entire finfish farming debate in Alaska was the presentation of policy goals for aquaculture development and a plan of action by the Governor and his administration. The State of Alaska lacked a clear governmental policy toward private aquaculture development. Because of this void the debate in the legislature evolved into an "us vs. them" battle with ultimately one group losing and one winning. The governor's only contribution to this issue was a "Position Statement on Mariculture". This provided no policy objectives or plan of action. Instead it provided guidelines for what a commercial aquaculture industry could be. The following are the eight points of this position statement:

1. The mariculture industry must benefit Alaskans.

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

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

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[69]Eidem, Bjarne Mark,Minister of Fisheries for Norway, World Aquaculture"The Norwegian Fisheries Industry from Capture to Cultivation". Vol.20(3) September 1989, pp 60-68.

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

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

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

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

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

Perhaps if the governor had provided a more directed plan including objectives, guidelines for development and a strategic plan, the legislature's actions would have been less of a judge determining who wins and who loses. Rather, they could have been reviewers and amenders to a proposed plan.

If the governor opposed finfish farming development in Alaska, then it would follow that he would propose objectives and policies to address the growing share of farmed salmon entering into the world salmon markets and the decreasing share of one of the state's most important fisheries. While Alaskan landings have remained relatively constant, the production of premium quality farmed salmon from countries like Norway has increased dramatically over a relatively short time period as illustrated in Section 2.3.

In fact government leaders and fishermen have done very little to react to this situation. One reason for this is precisely why the governor did nothing in the finfish farming debate: there is no action towards looking into the future, no setting of objectives, and no policy development put into place to achieve these objectives. Instead Alaskan fishermen continue to be a price takers in markets where they have traditionally held large shares. For example, The Norwegian fishfarming industry is actively pursuing expanding their markets by targeting

the frozen Japanese salmon market. The Norwegian Fishfarmers Sales Organization spent over $10 million in a marketing campaign in Japan during 1989 to develop inroads into the market which Alaska sells over 90 percent of its production.[70] Norway is not the only fishfarming industry targeting this market. As pointed out in Section 2.3.4 the Chilean fishfarming industry sold 5000 mt of frozen coho salmon to Japan in 1989. This was 4500 mt more than was sold to Japan in 1988. Due to its dependence on their historical markets it would seem that Alaska policymakers should be pro-active in addressing these changes in world salmon markets.

4.5 Competition for State Funds

The fishing industry's increasing political power has been accompanied by massive state financial support. During the past 18 years, the state has spent about $80 million to construct public hatcheries and other enhancement projects and $146 million for FRED Division operations.[71] About $61 million in public funds has been loaned to the regional aquaculture associations to construct and operate private nonprofit (PNP) hatcheries at discounted interest rates. The state has provided about $203 million in commercial fishing loans for permits, boats and gear. The current value of transferable limited entry permits is approximately $1.2 billion.

In addition, the state spends significantly more on fisheries management than it receives in direct revenues from the industry.[72] The ex-vessel value of all 1987 commercial fisheries catch (FY 88 tax year) was $1.11 billion, with approximately $34.6 million returned to the state from taxes, licenses and fees

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[70]Atkinson, Bill, Testimony before the Alaska Finfish Farming Task Force, September 29, 1989.
[71] "FRED Annual Reports," Alaska Dept. of Fish and Game, Division of Fisheries Rehabilitation, Enhancement and Development, various years.
[72] Brad Pierce, "The Alaska Controversy: Commercial Fishing vs. Finfish Mariculture," Alaska State Legislature House Research Agency, September 1989, p. 4.

paid by the fishing industry. During the same time period the State of Alaska expended $44.46 million in general fund revenues to manage its fisheries.[73] The high level of public support is the result of legislators responding to the desires of their constituents and effective political organizations within the industry. To the extent that finfish farming will require public funding for management, regulation and development, it will compete with commercial fishing for state revenues assuming state revenues are finite. As long as fishermen view salmon farming as a threat to their public funding, rather than an opportunity for investment, opposition will continue.

Since oil was first discovered at Prudhoe Bay in the late 1960s Alaska has been dependent on petroleum production to fund state operating and capital budgets. Currently state petroleum revenues account for over 85 percent of all state revenues, and has averaged approximately $2.25 billion over the past few years.[74] Because of this Alaska has no state income tax and taxes other industries lightly, including the fishing industry.

Industries like fishing, timber, tourism and mining have come to enjoy the benefits of these state petroleum revenues; as pointed out above the state spends more on management of its fisheries than the revenues it receives from this industry. Because of this situation, these industries spend a lot of energy and time lobbying state legislators for their "share" of the state operating budget. Another industry competing for these state revenues for management would only mean a decrease in other industries' share. The commercial fishing lobbying groups pointed this out in their arguments against finfish farming. Ironically, the only means of maintaining current state revenue generation given

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[73] Pierce, Brad "The Alaska Controversy: Commercial Fishing vs. Finfish Mariculture," Alaska State Legislature House Research Agency, September 1989, p. 4.
[74]Goldsmith, Oliver, "The Alaska Fiscal Gap"ISER Fiscal Policy Papers, Institute of Social and Economic Research, University of Alaska Anchorage, No1, August 1989.

that petroleum production is declining without establishing an income tax is to expand the industrial tax base within the state. This apparently is not a consideration given the recent decision to ban increased uses in the coastal zone of the aquaculture industry.

4.6 The Kingdon Model of Public Policy Formation

Several models have been developed to explain how public policies evolve. Kingdon in his book Agendas, Alternatives, and Public Policies presents one such model used to analyze why some policies occur while others are neglected.[75] Successful policy development requires key participants who effect agenda setting and also requires the presence and coupling of three types of streams of processes, including problems, policies and politics. Further, each of the participants and processes can act as an impetus or as a constraint. As an impetus, the participant or process boosts a subject higher on an agenda, or pushes an alternative into more active consideration. As a constraint, the participant or process dampens consideration of a subject or alternative. In addition successful policy development requires the assistance of "policy entrepreneurs".

The problem stream deals with how some problems occupy the attention of policymakers and includes the means by which officials learn about conditions and the ways in which conditions become defined as problems. Indicators, focusing events and feedback are key elements in explaining how means affect the policy process. Indicators are used to assess the magnitude of the condition. Second, a focusing event like a disaster, crisis or powerful symbol draws attention to some conditions more than others. Third, policy

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[75]Kingdon, J. W., 1984. "Agendas, Alternatives and Public Policies," Little, Brown and Company

makers learn about conditions through feedback about the operation of existing problems. Problem recognition is critical to agenda setting.

The second group of explanations for high or low agenda prominence is in the political stream. This stream flows along according to its own dynamics and own rules. Influences such as swings in national mood, elections, and interest group prominence are factors in the political stream. Developments in the political stream are powerful agenda setters.

Consensus is built in the political stream by bargaining more than persuasion. Participants in this stream build consensus by bargaining --trading provisions for support, adding elected officials to coalitions by giving them concessions that they demand or compromising from ideal positions to positions that will gain wider acceptance.

In regards to the policy stream, the generation of policy alternatives is seen as a selection process influenced by such criteria as technical feasibility, congruence with the values of community members, and the anticipation of future constraints, including a budget constraint, public acceptability, and politicians' receptivity. Proposals that are judged infeasible --that do not square with policy community values, that would cost more than the budget would allow, that run afoul of opposition or that would not find acceptance among elected officials --are less likely to survive than proposals that meet these standards. In addition there is a long process of softening up the system. Thus the importance of policy entrepreneurs that can track the system, broker people and ideas and wait until a "policy window" presents itself.

An open policy window is an opportunity for advocates to push their pet solutions or push attention to their special problems. Windows are opened by events in either the problems or political streams. A new problem appears, for instance, creating an opportunity to attach a solution to it. Or such events in the

political stream as turnover of elected officials, swings of national mood, or vigorous lobbying might create opportunities to push some problems and proposals to the fore. Windows are scarce and small and do not stay open for long.

Policy entrepreneurs are people willing to invest their resources in return for future policies they favor. They include elected officials, career civil servants, lobbyists, academics or journalists. As to problems, entrepreneurs try to highlight the indicators that dramatize their problems. Because they know that focusing events can move subjects higher on the agenda, entrepreneurs push to create such things like public hearings and symbols that capture their problem in a nutshell. As to proposals, entrepreneurs are central to the softening-up process. They write papers, give testimony, hold hearings, try to get press coverage and meet endlessly with important people.

The probability of an item rising on a decision agenda is dramatically increased if all three elements --problem, policy proposal, and political receptivity --are linked in a single package and an effective entrepreneur is present to push the issue through the "open window" when it presents itself.

The Kingdon model can be applied to the issue of finfish aquaculture in Alaska in order to help explain why policy makers enacted a total ban on commercial finfish aquaculture.

In regards to the problem stream, the indicators, focusing events and feedback tended to favor the anti-finfish farming advocates. Indicators in this case were issues such as the potential impact of farmed salmon on existing wild stocks, impacts of marketing of salmon from the traditional capture fisheries and the impacts on state funding of the capture fisheries. All of these indicators as presented in the debate were favorable to the commercial fishing groups. One reason for this is found in the effectiveness of the "policy entrepreneurs".

Because of their effectiveness and importance in the legislative process, commercial fishermen, their lobbyists and key legislators supporting their position were successful in framing the debate in terms of how this new industry would negatively impact a favorite existing industry. On the other hand, the entrepreneurs representing the fishfarming advocates lacked key indicators, focusing events and feedback. In addition they lacked the ability to present their problems due to limited funding, lack of a strong organization, and limited access to legislators. The AMA was primarily the only organization lobbying for this new development and it had only one individual present lobbying the legislature.

One focusing event, the Exxon Valdez oil spill, was in fact an event that drew attention to the potential negative impacts of commercial development on the coastal zone. Commercial fishermen used this disaster to its fullest in arguing for no additional development in the coastal zone.

In regards to the policy stream, criteria such as technical feasibility, congruence with the values of community members and anticipation of future constraints all favored the anti-aquaculture advocates. Technical feasibility was unknown regarding the development of an Alaskan finfish farming industry, especially at a time when many British Columbia salmon farming companies were declaring bankruptcy and the market prices for fresh salmon were sharply dropping. Community values for coastal residents were very clear during hearings on this issue in the legislature and throughout Alaska: most communities, public interest groups and the commercial fishing community testified against any finfish farming development in Alaska. Regarding future constraints, in a state where general fund revenues are declining due to declining petroleum production entrepreneurs representing the fishing interests argued that any state money going toward management of a new industry

would come from "their" share of the state budget. Because of these factors, policy makers judged the proposal for finfish farming in Alaska as infeasible at the current time. It did not square with community values, it would cost more than the budget would allow, and would not find acceptance among elected officials.

Examination of the political stream present at the time of the debate also indicates why the outcome went against advocates of finfish aquaculture. Because consensus is built in the political stream by bargaining more than persuasion, and because the major advocacy group, the AMA, had very little to bargain with, they were unable to build a consensus, or to attain a compromise. In addition, the other group, primarily commercial fishermen, was unwilling to bargain. They believed they had nothing to gain and only a lot to lose if finfish farming were to occur in Alaskan waters. Because of this and because of the weak organization, the AMA was unable to bargain with the opposition. Instead of bargaining, the AMA attempted to persuade policymakers that finfish farming should occur; the AMA had nothing to trade and no concessions to make.

One concession that the AMA could have made early into the debate was the prohibition of marine farming of salmon. The major opposition by the fishermen's groups to commercial finfish farming was primarily the marine rearing of salmon. Perhaps if this option had been removed from the debate, opponents to finfish farming would have agreed to legislation allowing for the commercial culture of other species of finfish like halibut, sablefish and cod. The Board of Directors of the AMA in 1987 voted not to split salmon farming from any legislation allowing for commercial finfish aquaculture. The reason for this decision was the Board's belief that salmon farming was the only viable form of cold water marine aquaculture. Initially salmon farming would be the success to get an Alaskan finfish farming industry through its early growth stage

and provide a financial basis to then foster development of species still in the experimental stages of aquaculture development. AMA felt that financial backing would only become available to farms rearing species with proven positive financial returns to investors. Rearing species like halibut and sablefish was quite risky and speculative because the development of the culture of these species was still in the research and design stage by countries quite advanced in cold water aquaculture such as Norway and Canada.

In terms of policy entrepreneurs, the major players supporting aquaculture development included the AMA and a few legislators. These legislators however did not hold key positions or have high ranking in the majority in either the Senate or the House. On the other hand the legislators leading the opposition to finfish farming included the Senate Rules Committee Chairman (Senator Eliason), and the Previous Speaker of the House and current House Rules Committee Chairman (Rep. Grussendorf). In addition, the passive position by the governor on this issue as previously presented did nothing to support this issue.

Section 5. SURVEY OF THE ALASKA STATE LEGISLATURE

To understand the role of information in the decision making process, a survey was conducted of the Alaska State Legislature. In May 1990, a two page questionnaire was sent to all forty Representatives and twenty Senators of the Alaska State Legislature (see Attachment B for a copy of the questionnaire). Two follow-up letters and a follow-up survey were sent to those who had not returned the first questionnaire within four weeks. By the end of August, 35 legislators or 58 percent returned completed questionnaires.

The survey was designed to meet three objectives. The first objective was to analyze the role of information and how it affects political decision making. This included testing whether the task force report influenced or changed the position of the legislators. Was the information useful or not useful in assisting legislators in making their decision? In other words, did the task force's work make a difference in the legislative decision making process on this issue or was it a misuse of state monies?

The second objective of the survey was to examine how important the issues or concerns raised in the debate on finfish farming (i.e., environmental impacts, genetic and disease concerns, employment opportunities) were in determining the position of individual legislators on this issue. This included discovering how legislators ranked these issues in importance relative to one another.

The third objective concerned the legislative process. Through the survey an inquiry was made into how issues such as finfish farming were decided by elected officials. Did the public policy process boil down to tactics such as lobbying efforts of special interest groups, vote trading, political favors, or holding other bills hostage (i.e., "power politics)? What factors really influence or motivate an elected official?

5.1 Role of Information

To help determine the role of information and what effect it had on individual legislator's positions, the survey posed several questions. One question asked legislators to rate how useful the task force report and other sources of information were in deciding whether finfish farming should or should not be permitted in Alaska. Figure 5.1 presents how respondents ranked various sources of information. Responses indicate that the Alaska Finfish Farming Task Force Report (coded One A) was not as useful at the other sources of information like Testimony and Information from the Public (One C); Written Reports from Government, Public Interest Groups and Industry (One B); Testimony from Government Agency Personnel and Experts (One D); Testimony from Interest Groups like UFA, AMA or the Environmental Lobby (One E); and Research Conducted by You or Your Staff (One F).

In addition, 91 percent of the respondents indicated the information in the task force report was unbiased while 9 percent stated it was biased toward finfish farming. Ninety percent agreed that the report provided factual information on the issue. Regarding new information, 47 percent agreed and 34 percent disagreed with the statement "the AFFTF report provided you with new information on this issue". Nine percent strongly agreed with this statement and 9 percent did not know if the report provided new information.

Figure 5.1 Responses Indicating Usefulness of Various Sources of Information to Legislators Regarding the Finfish Farming Issue.

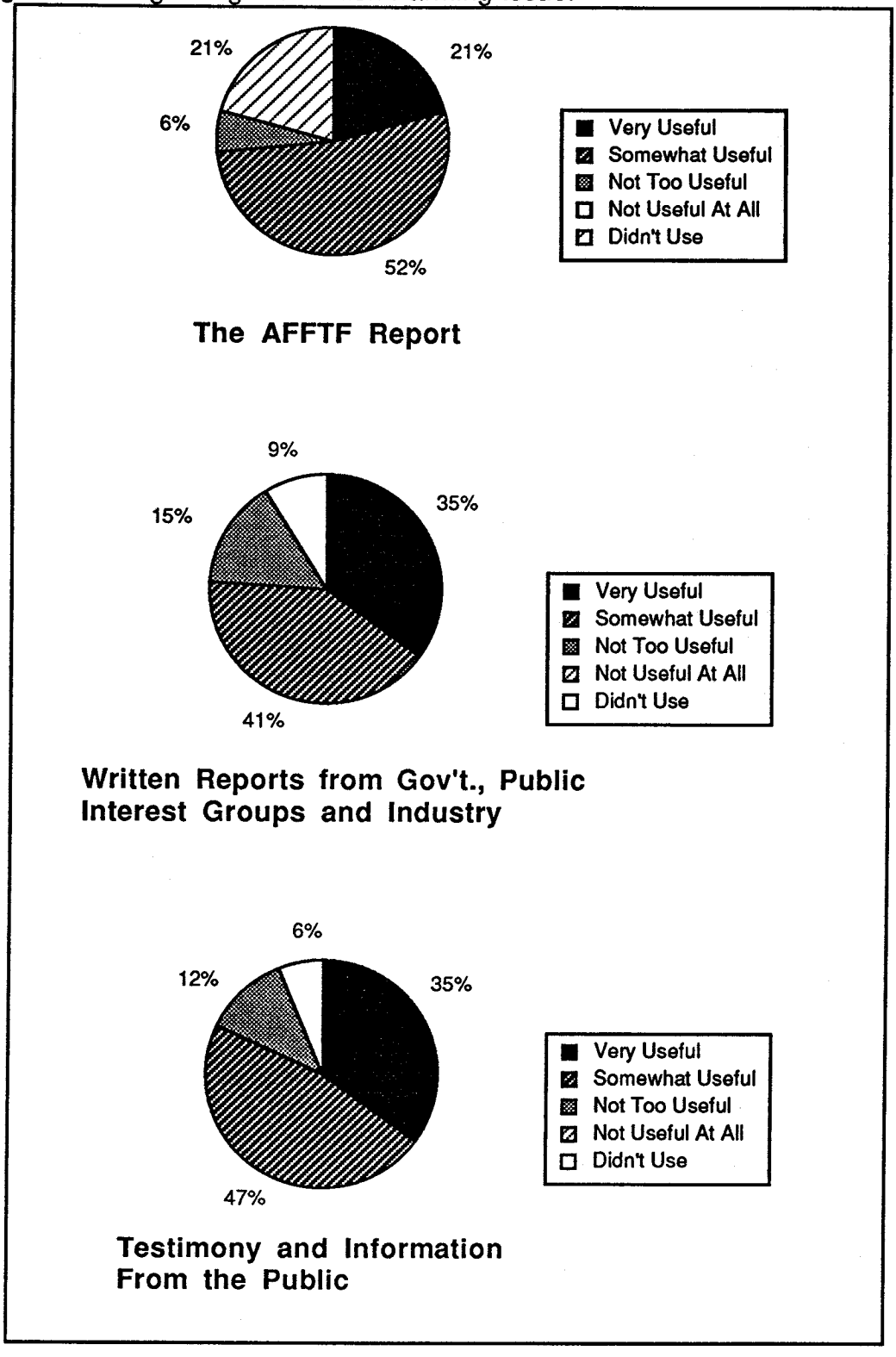
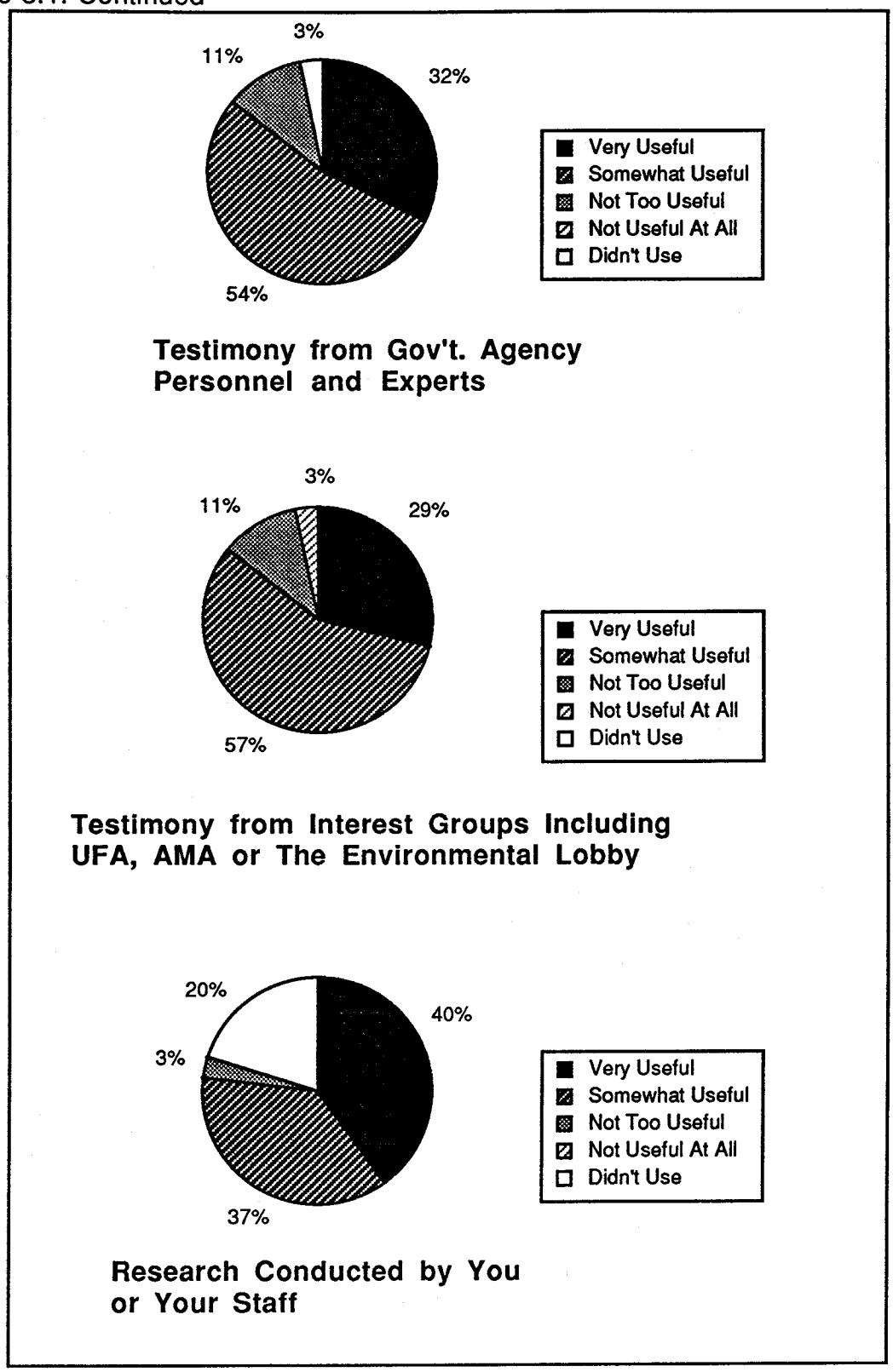


Figure 5.1. Continued



5.1.1 Statistical Analysis, Comparisons Among Sources of Information

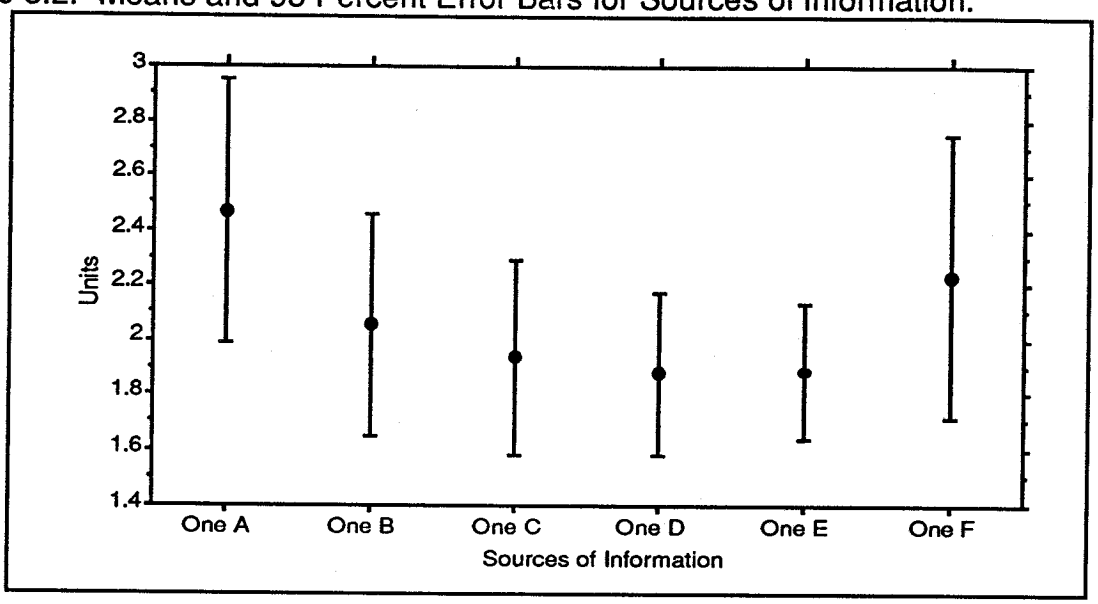
The relative scores of each of the six sources of information were first examined and are summarized in Table 5.1. The scoring was based on an integral scale from 1 to 5, (1 = Very Useful, 2 = Somewhat Useful, 3 = Not Too Useful, 4 = Not Useful at All, 5 = Did Not Use).

Table 5.1. General Descriptive Statistics for Sources of Information

Code	Source of Information	Mean	Std Dev.	Min	Max	N	Missing Cases
One A	AFFTF Report	2.471	1.398	1	5	34	1
One B	Written Reports from Gov't. public Int..Groups & Industry	2.059	1.153	1	5	34	1
One C	Testimony and Information from Members of the Public	1.941	1.013	1	5	34	1
One D	Testimony from Government Agency Personnel & Experts	1.882	0.884	1	5	34	1
One E	Testimony from Interest Groups like UFA, AMA or Environmental Lobby	1.886	0.718	1	4	35	0
One F	Research Conducted by You or Your Staff	2.229	1.497	1	5	35	0

The lowest (most useful) scoring source was Testimony from Government Agency Personnel and Experts, followed by Testimony from Interest Groups like UFA, AMA or the Environmental Lobby, and Testimony and Information for Members of the Public. Interestingly, the highest (least useful) scoring source was the AFFTF Report. Figure 5.2 presents the means and 95% error bars for the six sources of information.

Figure 5.2. Means and 95 Percent Error Bars for Sources of information.



The differences between the six sources of information were also examined using statistical tests on the paired comparisons between each of the six source types. To test which of the sources of information were significantly more useful to legislators than others (alpha < 0.05 designated by **) a two-tailed paired t-test was conducted on all the combinations of information. Results of this analysis are presented in Table 5.2

Table 5.2. Paired t-Test Analysis on Sources of Information

Comparison	Mean X-Y	DF	Paired t Value
One-B vs One-A	0.412	33	1.839
One-C vs One-A	0.529	33	2.209**
One-D vs One-A	0.515	32	2.089**
One-E vs One-A	0.558	33	2.147**
One-F vs One A	0.235	33	0.849
One-C vs One B	0.118	33	0.572
One-D vs One B	0.091	32	0.392
One-E vs One B	0.176	33	0.797
One-F vs One-B	0.176	33	0.649
One-D vs One-C	0.03	32	0.226
One-E vs One-C	0.059	33	0.387
One-F vs One-C	0.294	33	0.99
One-E vs One-D	0	33	0
One-F vs One-D	0.353	33	1.262
One-F vs One-E	0.343	34	1.291

The statistical analysis demonstrates that there were few significant diversions between the scoring in each of the comparisons. Only in the differences

between the AFFTF Report and Testimony from Government Agency Personnel and Experts, Testimony and Information for Members of the Public, and Testimony from Interest Groups was there a significant difference. In other words, at the 95 percent confidence level, Testimony from Government Agency Personnel and Experts, Testimony and Information for Members of the Public, and Testimony from Interest Groups like UFA, AMA or the Environmental Lobby were significantly more useful to responding legislators than the Task Force Report.

This suggests that information from interest groups, the public and government agency personnel was more important than written reports including the AFFTF report. This is surprising because it indicates that there was little use for a task force in assisting legislators in their decision on this issue.

5.1.2 Statistical Analysis, Relations Between Voting Behavior and Sources of Information

Correlation analysis was used to test the correlation of the sources of information affecting how legislators voted on the legislation banning finfish farming in Alaska. Results of this analysis are presented in Table 5.3.

Table 5.3. Correlation Analysis Comparing Voting Record on HB 432 and Sources of Information

		Sources of Information					
		One A	One B	One C	One D	One E	One F
Vote on HB432	Correlation	-.282	-.091	.23	.173	.554	-.147
	R-Squared	.08	.008	.53	.03	.296	.021

The results from Table 5.3 demonstrate that there was very little correlation between how legislators voted and the sources of information. No strong correlations were found between the Vote on HB432 and One A, One B, One C, One D and One F. Testimony from Interest Groups like UFA, AMA or the

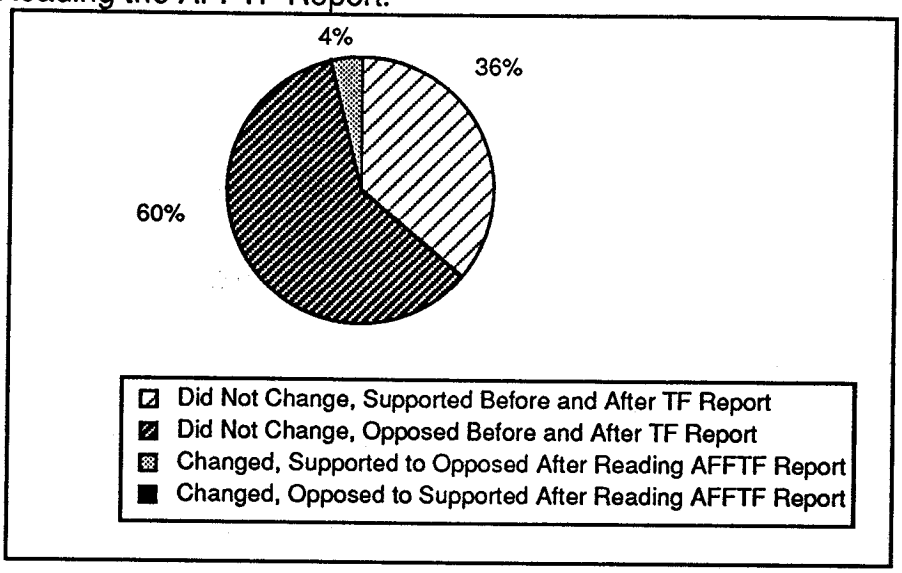
Environmental Lobby (One E), was moderately correlated with a "yes" vote on HB432. This suggests that those legislators voting for banning finfish farming possibly felt that Testimony from Interest Groups like UFA, AMA or the Environmental Lobby was useful. Interesting to note is the weak negative correlation between the Vote on HB 432 and the usefulness of the Task Force Report (-.282).

This result is not surprising as interest groups like United Fishermen of Alaska, the Alaska Trollers Association and the Environmental Lobby actively campaigned for a ban on this issue and were quite present during the legislative review of this issue.

5.2 Factors Determining the Elected Official's Position

Three questions were designed to ascertain how the legislators determined their position on finfish farming. First, legislators were asked if the task force report had changed their position on the issue of finfish farming. To the question asking the legislators to describe their positions after reading the task force report, 60 percent responded that their position had not changed. They supported prohibition of finfish farming in Alaska both before and after issuance of the task force report. Thirty six percent responded that their position had not changed; they supported development of finfish farming in Alaska both before and after issuance of the task force report. Only 4 percent changed from supporting finfish farming to opposing its development and no respondents changed from opposing finfish farming to supporting its development after review of the task force report. (See Figure 5.3)

Figure 5.3. Responses Indicating Whether Policymaker's Position Changed after Reading the AFFTF Report.



When asked whether the report assisted them in coming to a decision on the issue of finfish farming, 57 percent of the respondents indicated that the report had assisted them in making a decision while 37 percent felt it had not assisted in making a decision. Six percent did not know. This could mean that if the report assisted a majority of the respondents in making a decision but that they did not change their position after reading the report, then their position was already established before reading the report and the information in the report either provided support for their position or the information was such that it did not change their position.

It is interesting to compare the survey results regarding legislators' position on this issue with their actual voting behavior on HB 432, the 1990 act prohibiting finfish farming, and SB 514, the 1988 act placing a two year moratorium on finfish farming. In the May 1990 vote prohibiting finfish farming (HB 432), forty three legislators, (72%) voted in favor of this measure and fourteen legislators, (23%) voted against it. Three members were absent. In the May 1988 vote on SB 514, extending the moratorium on finfish farming for two

years, fifty legislators (83%) voted in favor, nine voted against (15%) and one was absent. In addition, for the fifty two legislators who were in office for both 1988 and 1990, and voted on both SB 415 and HB 432, very few changed their position on this issue. Only four legislators changed their vote from originally opposing finfish farming to supporting it (they voted yes for SB 514 and no on HB 432), and only one changed their position from that of supporting to opposing it (no on SB 514 and yes on HB 432).

This information indicates that additional information in the form of a task force report, studies, and public hearings and debate had little effect on individual legislator's positions on this issue. Both the survey questions addressing the issue of position and analysis of the legislature's voting history confirm this result. In addition, when asked how much of the report they had read, only 26 percent of the respondents indicated they had read all of it, 23 percent indicated they just read the general findings and recommendations, 31 percent used it as a reference document, and 20 percent had not read it at all.

Another issue that can be analyzed regarding the position legislators took on the issue of finfish farming is what factors affected or contributed to their position In the questionnaire legislators were asked to indicate how important six factors were in determining their position. The six factors, which appeared repeatedly during the debate on fish farming, were: A) environmental impacts such as marine pollution; B) employment opportunities; C) competition with the wild capture fishery; D) site use conflicts and incompatibility with existing user groups; E) genetic and disease impacts on wild fish stocks; and F) economic development in coastal communities. Figure 5.4 presents the responses from legislators on these factors.

Figure 5.4. Responses Indicating Importance of Certain Factors/Issues in Determining Policy Makers' Position on the Finfish Farming Issue.

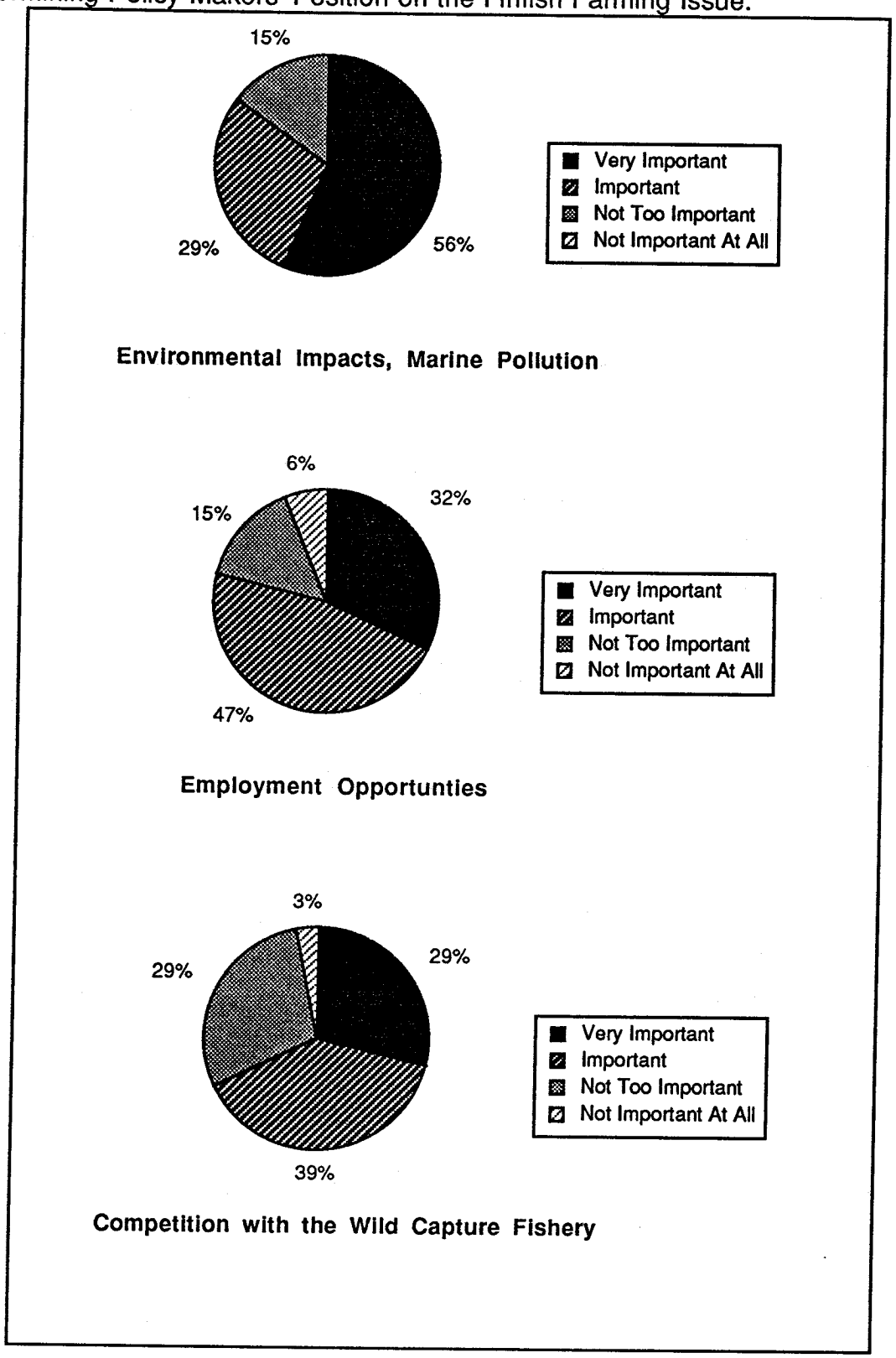
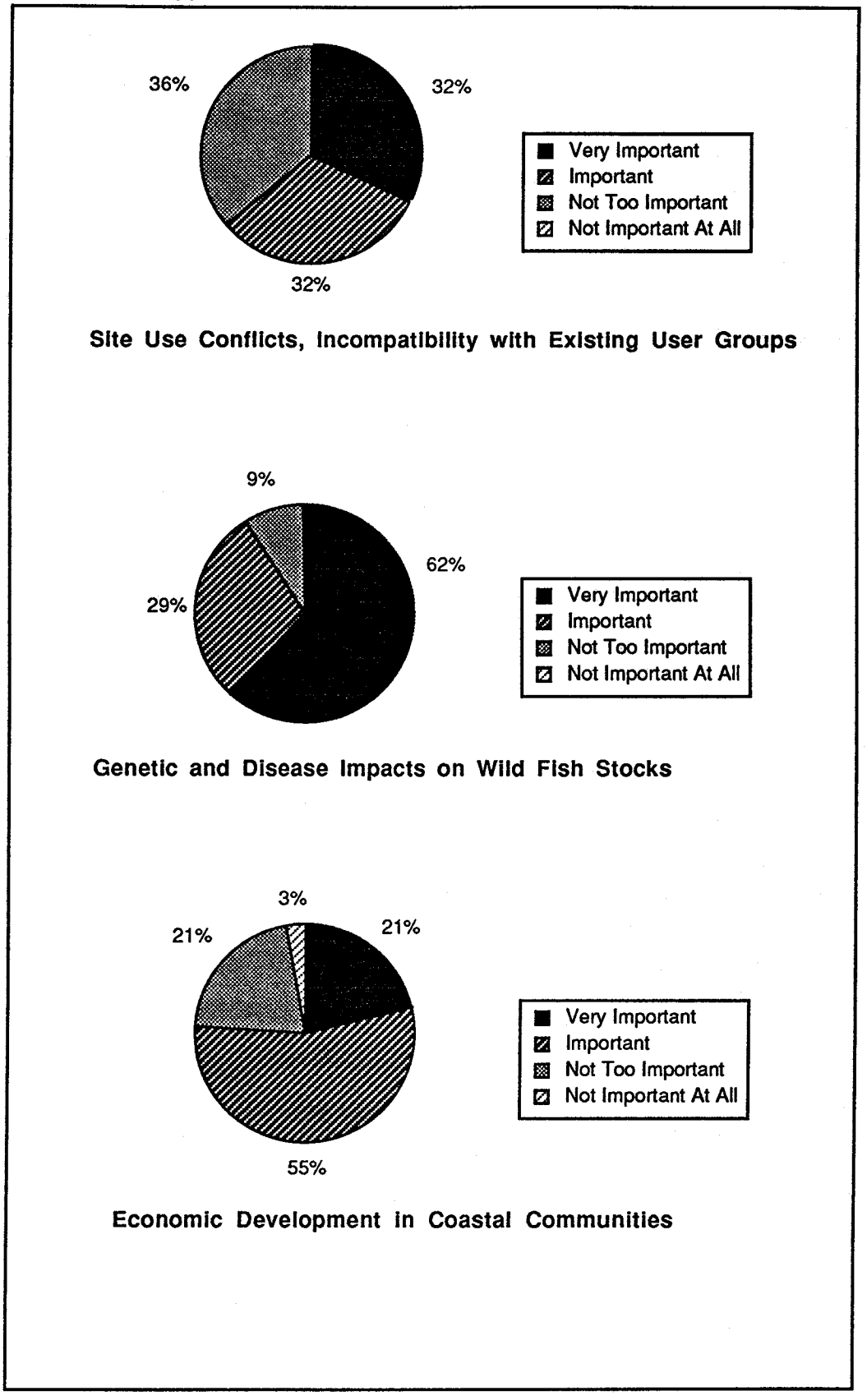


Figure 5.4. Continued.



Genetic and disease impacts appeared to be one of the most important factors followed by Environmental impacts, Employment opportunities, Site Use Conflicts, Competition with the Wild Capture Fishery and lastly, Economic Development.

5.2.1 Statistical Analysis, Comparisons Among Issues

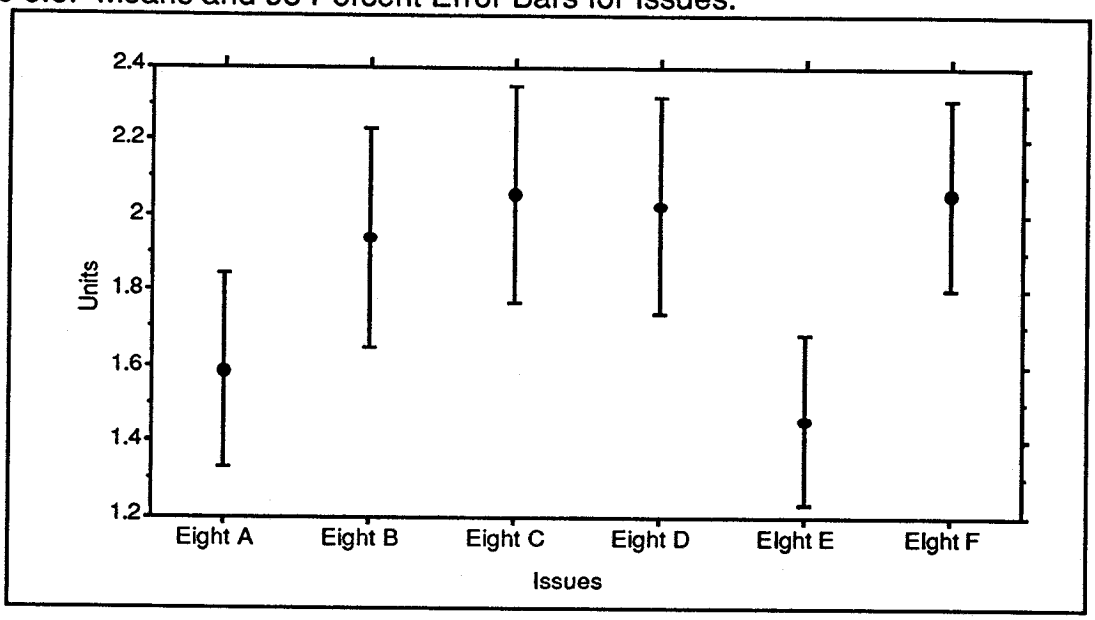
The relative scores of each of the six issues were first examined and are summarized in Table 5.4. The scoring was on an integral scale from 1 to 4, (1 = Very Important, 2 = Important, 3 = Not Too Important, 4 = Not Important at All).

Table 5.4. General Descriptive Statistics for Factors Determining Position

Code	Factor/Issue	Mean	Std Dev.	Min	Max	N	Missing Cases
8 A	Environmental Impacts	1.588	.743	1	3	34	1
8 B	Employment Opportunities	1.941	.851	1	4	34	1
8 C	Competition with the Wild Capture Fishery	2.057	.838	1	4	35	0
8 D	Site Use Conflicts, Incompatibility with Existing User Groups	2.029	.834	1	3	34	1
8 E	Genetic and Disease Impacts on Wild Fish Stocks	1.457	.657	1	3	35	0
8 F	Economic Development in Coastal Communities	2.061	.747	1	4	33	2

The lowest scoring factor (Most important) was E) genetic and disease impacts on wild fish stocks, followed by A) environmental impacts such as marine pollution and B) employment opportunities. The highest (least important) was F) economic development in coastal communities. Means and 95 percent error bars are presented in Figure 5.5.

Figure 5.5. Means and 95 Percent Error Bars for Issues.



The differences between the six issues were also examined using statistical tests on the paired comparisons between each of the six issue types. To test which of the issues were significantly more useful to legislators than others (alpha < 0.05 designated by **) a two-tailed paired t-test was conducted on all the combinations of information. Results of this analysis are presented in Table 5.5.

Table 5.5. Paired t-Test Analysis on Sources of Information

Comparison	Mean X-Y	DF	Paired t Value
8-B vs 8-A	.353	33	1.787
8-C vs 8-A	.471	33	3.325**
8-D vs 8-A	.441	33	2.774**
8-E vs 8-A	.147	33	1.153
-F vs 8-A	.471	33	2.541**
8-C vs 8-B	.118	33	.529
8-D vs 8-B	.088	33	.423
8-E vs 8-B	.5	33	2.511**
8-F vs 8-B	.118	33	.849
8-D vs.8-C	.029	33	.15
8-E vs 8-C	.6	33	4.19**
8-F vs 8-C	0	33	0
8-E vs 8-D	.588	33	3.708**
8-F vs 8-D	.029	33	.19
8-F vs 8-E	.618	33	3.27**

As Figure 5.5 and Table 5.5 demonstrate, there were a number of diversions between the scoring in each of the comparisons. There was significant differences between environmental impacts (A) and: competition with the wild capture fishery (C), site use conflicts and incompatibility with existing user groups (D), and economic development in coastal communities (F). There was also significant differences between genetic and disease impacts on wild fish stocks (E) and: employment opportunities (B); competition with the wild capture fishery (C); site use conflicts and incompatibility with existing user groups (D), and economic development in coastal communities (F).

Interpretation of this analysis indicates that two issues, A) environmental impacts and E) genetic and disease impacts on wild fish stocks, were significantly more important than the other four issues to legislators in determining their position on the finfish farming issue. This is consistent with what I expected as environmental impacts and genetic and disease impacts were the two major issues presented by the commercial fishing interest groups in their campaign to ban finfish farming. This result suggests that this group was effective in convincing the legislature that these issues are of major concern.

5.2.2 Statistical Analysis, Relations Between Voting Behavior and Issues

Correlation analysis was used to test the correlation between the sources of information and how legislators voted on the legislation banning finfish farming in Alaska. Results of this analysis are presented in Table 5.6.

Table 5.6. Correlation Analysis Comparing Voting Record on HB 432

		Issues					
		Eight A	Eight B	Eight C	Eight D	Eight E	Eight F
Vote on HB432	Correlation	.303	-.327	.251	.128	.472	-.49
	R-Squared	.092	.107	.063	.016	.223	.24

The correlation analysis indicates that there was a moderately positive correlation between a Yes vote on HB432 and Genetic and Disease Impacts (Eight E) and Environmental Impacts (Eight A). A yes vote on HB432 was negatively correlated with Economic Development in Coastal Communities (Eight F) and Employment Opportunities (Eight B). These results suggest that environmental impacts and genetic and disease impacts were important for those legislators voting for HB432 while employment and economic development were important for those voting against HB432. This again in not surprising as legislators interested in environmental impacts and genetic and disease impacts would be more likely to not support commercial industrial uses within the coastal zone.

5.3 The Role of Politics and the Legislative Process

Measuring the role of politics in policy making in an objective manner is a difficult undertaking. In general, this is one reason why only single correlations were used to explore the possible relationship of information and voting behavior. We can only make inferences into this area based on subjective responses some legislators included in the questionnaire and actions observed during the legislative debate on the issue of finfish farming.

One Senator, who voted against HB 432, nicely summarized a possible explanation of why the legislature took such a prohibitive position on the issue of finfish farming in Alaska. In reference to the task force report he wrote:

> Good summary work of the impacts, but ironic that its conclusions said basically the issue was a political decision, and of course, that's what the final result was - a political decision - regardless of the lack of evidence that a closely monitored finfish farming project would cause significant environmental problems. It's good to have studies as part of the process but they do not necessarily affect legislative outcome!

Another legislator, one who represents a Southeast Alaska fishing community, stated his views by concluding the questionnaire with these words: "Disease, pollution, competition issues were all established and documented already (before the task force). The question was 100% political." He also felt the money spent on the task force was not well spent. He voted for HB 432.

Two Anchorage legislators representing a non-fishing community provided opinions supporting the idea that this issue was decided by politics, rather than facts. One stated that his decision was one of 'pragmatic politics' and in responding to the question about which factors determined his position he stated that "politics" was very important, and that the task force was a "delay tactic". He voted for HB 432. Politics in this sense is defined as having the power to determine the outcome of an issue based on manipulating and controlling the political system, in this case, the legislature. The other Anchorage legislator stated," I believe that for some legislators the task force was an easy excuse to rationalize delaying a final decision on finfish farming. Still, since the report came out, it helped clarify the issues." He voted against HB 432.

A review of the legislative history of HB 432 in Section 3.3 gives additional insight into what "politics" actually means and how it affects decision making. In considering the legislative history on the fish farming issue and the comments expressed in response to the survey, it is clear that political tactics significantly impacted the outcome of this issue. The fishermen's organizations and their key legislative members were able to politically out maneuver their opponents and create the perception that finfish farming would negatively impact the State of Alaska, its natural resources and residents. The AMA and the few legislators supporting a finfish farming industry apparently failed in their attempt to develop laws and policy that would support an emerging finfish

farming industry. In terms of the Kingdon policy model, the advocates of finfish farming lacked the "problem, policy and political processes", the "policy entrepreneur" and "'policy window" necessary for favorable results.

Section 6. CONCLUDING REMARKS

From a political science perspective, the Alaska controversy over salmon farming is fascinating. The bitterness and rancor expressed in the debate reveals a profound ambivalence in our attitudes towards development and the extraordinary role that politics plays in the economy of a state. Allowing one industry to exercise veto power over another seems like third world politics. In a sense it is given Alaska's history of fisheries development.

On one level, the controversy is a classic example of an established industry attempting to protect itself from new competing technologies. Even if proponents were able to refute all arguments and prove that fish farming in Alaska would have no negative impacts on traditional fisheries, it is likely many would still oppose this emerging industry, in part because it involves new technology, new values, and new people. This includes a new user of the state's marine resource, additional requests for state funds and a new concept of producing seafood which employs husbandry techniques as opposed to hunting and capturing fish. As one commercial fisherman stated during a public hearing on finfish aquaculture, "Commercial fishermen are, I think, by and large philosophically unprepared for this kind of change. I am a high seas hunter."[76]

Granted, the burden of proof is on the new industry to show that salmon farming will result in relatively few, or minor, impacts to the environment, natural stocks of fish, and the existing fishing industry. Proponents need to prove that the benefits outweigh the costs and risks. If however the opponents do not allow any form of salmon farming, then the proof will never be forthcoming, a simple "catch 22". One exception to this would be to analyze information from

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[76] Gillespie, David, " An Inquiry into Finfish Aquaculture in British Columbia," Presented to the Government of British Columbia. Ministry of Forests and Lands. December 12, 1986, page iii.

other regions and nations as their aquaculture industries mature. If empirical information from these areas can discredit arguments used by the commercial fishing industry, perhaps then Alaskan policymakers will decide to allow for the development of this industry.

However, given the manner in which decisions concerning resource uses are made and the current political strength of commercial fishermen's organizations and environmental groups, it is highly unlikely that finfish farming will occur in Alaska in the near future. In other words, finfish farming will occur in Alaska only if commercial fishing representatives agree to it in some form or another. Only until finfish farming appears to provide benefits to the commercial fisherman it is unlikely they will support development of this industry in Alaska.

If Alaska intends to remain a global seafood power, it cannot afford to ignore what is happening in the rest of the world. The Alaska salmon industry currently is not providing what the market demands: high quality, fresh seafood on a year-round basis. Economic analysis of this situation would lead one to conclude that the Alaska seafood industry would benefit by supplementing wild production with farmed products.

Policy makers play a large role in shaping the future of the Alaska seafood industry. They are vested with the power to control what activities occur in the state's coastal zone. With this power comes the responsibility to stay abreast of new developments in the seafood industry outside of Alaska and to plan not just for the present but for the future. This responsibility includes weighing the findings of factual sources of information and then balancing this information with political realities, to reach some sensible compromise. The outcome is the shaping of state policies which guide the seafood industry securely into the future.

As presented previously, over fifteen countries have developed regulatory regimes to accommodate salmon farming. Many have had to overcome some sort of political opposition. However, no other government has allowed special interests to exercise veto power over aquaculture development. There are many legitimate concerns about salmon farming, but economic protectionism should not be one of them.

Failure to meet the responsibility of creating rational policies can result in missed opportunities and in the worst case, tragedy. We all remember how, in the early 1970s, Detroit automakers ignored the underlying trends in the marketplace in favor of short-term profits. Finally they lost so much of their domestic market share to higher quality Japanese imports they were forced to seek protection from the federal government through import quotas. Alaska currently is the General Motors of salmon producers. By not taking advantage of the salmon farming opportunity, and build a foundation for a future aquaculture industry with other marine species, the commercial fishing industry is in danger of becoming a victim of its own political power.

Looking toward the future, the information provided in this paper can provide insight into what requirements need to be in place to gain a favorable outcome in the policy development process regarding commercial uses in the coastal zone or perhaps any use of publicly owned resources. These include the following:

1. A well organized, properly funded organization. This includes developing strategic plans incorporating policy objectives and having an effective "policy entrepreneur" in place, including effective lobbyists and key legislators and administrative people supporting your effort.

2. Ability to negotiate and bargain with the opposing interest groups. This includes knowing in advance what the group is willing to bargain away in

order to achieve a desirable compromise. This also includes having something to bargain with.

3. Time to develop proper educational campaigns and to wait for "windows of opportunity" to present themselves and to allow for a "softening up" process to occur.

ATTACHMENT A

FINFISH FARMING BILLS INTRODUCED BY THE ALASKA STATE LEGISLATURE

Offered: 3/16/90
Referred: Judiciary

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

IN THE HOUSE BY THE RESOURCES COMMITTEE

CS FOR HOUSE BILL NO. 432 (Resources)

IN THE LEGISLATURE OF THE STATE OF ALASKA

SIXTEENTH LEGISLATURE - SECOND SESSION

A BILL

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

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

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

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

(2) the people, economy, and environment of the state are dependent in large measure upon the continued health of the state's wild finfish resources;

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

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

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

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

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

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

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

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

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

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

(b) This section does not restrict

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

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

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

(c) In this section "ornamental finfish" means fish commonly known as "tropical fish," "aquarium fish," or "goldfish," that are imported, cultured, or sold in the state customarily for viewing in aquaria or for raising in artificial systems, and not customarily used for sport fishing or human consumption purposes.

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

Offered: 5/9/88 5-2170X
For Today's Supplemental Calendar

Original sponsor: Rules Committee

IN THE SENATE BY THE RULES COMMITTEE

HOUSE CS FOR CS FOR SENATE BILL NO. 514 (Rules) "

IN THE LEGISLATURE OF THE STATE OF ALASKA

FIFTEENTH LEGISLATURE - SECOND SESSION

A BILL

For an Act entitled: "An Act relating to the farming of aquatic plants and shellfish; prohibiting the farming of Atlantic salmon; extending the moratorium on finfish farming until July 1, 1990; establishing the Alaska Finfish Farming Task Force; and providing for an effective date."

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

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

(1) aquatic farming in the state would

(A) provide a consistent source of quality food;

(B) provide new jobs;

(C) increase state exports;

(D) create new business opportunities; and

(E) increase the stability and diversity of the state's economy; and

(2) development of aquatic farming in the state would increase the availability of fresh seafood to Alaskans and would strengthen the competitiveness of Alaska seafood in the world marketplace by broadening the diversity of products and providing year-round supplies of premium quality seafood.

(b) It is the policy of the state

(1) to encourage the establishment and responsible growth of an aquatic farming industry in the state; and

(2) that allocation of aquatic farming sites be made with full

consideration of established and ongoing activities in an area.

* Sec. 2. AS 16.40 is amended by adding new sections to read:

ARTICLE 2. AQUATIC FARMING.

Sec. 16.40.100. AQUATIC FARM AND HATCHERY PERMITS. (a) A person may not, without a permit from the commissioner, construct or operate

(1) an aquatic farm; or

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

(b) A permit issued under this section authorizes the permittee, subject to the conditions of AS 03.05 and AS 16.40.100 - 16.40.199, to acquire, purchase, offer to purchase, transfer, possess, sell, and offer to sell stock and aquatic farm products that are used or reared at the hatchery or aquatic farm. A person who holds a permit under this section may sell or offer to sell shellfish stock to the department or to an aquatic farm or related hatchery outside of the state.

(c) The commissioner may attach conditions to a permit issued under this section that are necessary to protect natural fish and wildlife resources.

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

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

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

(2) the proposed farm or hatchery may not require

significant alterations in traditional fisheries or other existing uses of fish and wildlife resources;

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

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

Sec. 16.40.110. PERMIT APPLICATION, RENEWAL, AND TRANSFER. (a) An applicant for an aquatic farming or hatchery permit required under AS 16.40.100 shall apply on a form prescribed by the commissioner. An application for a permit must include a plan for the development and operation of the aquatic farm or hatchery, which must be approved by the commissioner before the permit is issued.

(b) An application for renewal or transfer of a permit must be accompanied by fees required by the commissioner, a report of the disease history of the farm or hatchery covered by the permit, and evidence that satisfies the commissioner that the applicant has complied with the development plan required under (a) of this section. The commissioner may require a health inspection of the farm or hatchery as a condition of renewal. The department may conduct the inspection or contract with a disease diagnostician to conduct the inspection.

(c) A person to whom a permit is transferred may use the permit only for the purposes for which the permit was authorized to be used by the transferor, and subject to the same conditions and limitations.

Sec. 16.40.120. AQUATIC STOCK ACQUISITION PERMITS. (a) A person may not acquire aquatic plants or shellfish from wild stock in the state for the purpose of supplying stock to an aquatic farm or hatchery required to have a permit under AS 16.40.100 unless the

person holds an acquisition permit from the commissioner.

(b) An acquisition permit authorizes the permit holder to acquire the species and quantities of wild stock in the state specified in the permit for the purposes of supplying stock to

(1) an aquatic farm or hatchery required to have a permit under AS 16.40.100;

(2) the department.

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

(d) The commissioner shall deny or restrict a permit under this section upon finding that the proposed harvest will impair sustained yield of the species or will unreasonably disrupt established uses of the resources by commercial, sport, personal use, or subsistence users. The commissioner shall inform the Board of Fisheries of any action taken on permit applications for species that support commercial fisheries subject to limited entry under AS 16.43 and of any permits denied because of unreasonable disruption of an established use. A denial of the permit by the commissioner must contain the factual basis for the findings.

(e) The Board of Fisheries may adopt regulations for the conservation, maintenance, and management of species for which an acquisition permit is required.

(f) Except as provided in (d) of this section or in a regulation

adopted under (e) of this section, the commissioner shall issue a permit if

(1) wild stock is necessary to meet the initial needs of farm or hatchery stock;

(2) there are technological limitations on the propagation of cultured stock for the species sought;

(3) wild stock sought is not fully utilized by commercial, sport, personal use, or subsistence fisheries; or

(4) wild stock is needed to maintain the gene pool of a hatchery or aquatic farm.

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

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

Sec. 16.40.140. LIMITATION ON SALE, TRANSFER OF STOCK, AND PRODUCTS. (a) A private hatchery required to have a permit under AS 16.40.100 may sell or transfer stock from the hatchery only to an aquatic farm or other hatchery that has a permit issued under AS 16.40.100, except that shellfish stock may also be sold or offered for sale to an aquatic farm or related hatchery outside of the state.

(b) Stock may not be transferred to or from an aquatic farm or hatchery required to have a permit under AS 16.40.100 without prior notice of the transfer to the commissioner. A notice of transfer shall be submitted at least 45 days before the proposed date of transfer.

(c) A notice of transfer must be accompanied by a report of a

health inspection of the stock. The department shall conduct the inspection or contract with a disease diagnostician to conduct the inspection. The cost of inspection shall be borne by the department.

(d) The department may restrict or disapprove a transfer of stock if it finds that the transfer would present a risk of spreading disease.

(e) A person may not sell, transfer, or offer to sell or transfer, or knowingly purchase or receive, an aquatic farm product grown or propagated in the state unless the product was grown or propagated on a farm with a permit issued under AS 16.40.100. The permit must be in effect at the time of the sale, transfer, purchase, receipt, or offer.

Sec. 16.40.150. DISEASE CONTROL AND INSPECTION. (a) The department shall order the quarantine or the destruction and disposal of diseased hatchery stock or of aquatic farm products when necessary to protect wild stock. A holder of a permit issued under AS 16.40.100 shall report to the department an outbreak or incidence of disease among stock or aquatic farm products of the permit holder within 48 hours after discovering the outbreak or incidence.

(b) A holder of a permit issued under AS 16.40.100 shall allow the department to inspect the permit holder's farm or hatchery during operating hours and upon reasonable notice. The cost of inspection shall be borne by the department.

(c) The department shall develop a disease management and control program for aquatic farms and hatcheries.

(d) The department may enter into an agreement with a state or federal agency or a private, state-certified provider to provide services under (b) and (c) of this section, or inspections under AS 16.40.110(b).

Sec. 16.40.160. REGULATIONS. The commissioner may adopt regulations necessary to implement AS 16.40.100 - 16.40.199.

Sec. 16.40.170. PENALTY. A person who violates a provision of AS 16.40.100 - 16.40.199, a regulation adopted under AS 16.40.100 - 16.40.199, or a term or condition of a permit issued under AS 16.40.-100 - 16.40.199, is guilty of a class B misdemeanor.

Sec. 16.40.199. DEFINITIONS. In AS 16.40.100 - 16.40.199

(1) "aquatic farm" means a facility that grows, farms, or cultivates aquatic farm products in captivity or under positive control;

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

(3) "aquatic plant" means a plant indigenous to state water or that is authorized to be imported into the state under a permit issued by the commissioner;

(4) "commissioner" means the commissioner of fish and game;

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

(6) "positive control" means, for mobile species, enclosed within a natural or artificial escape-proof barrier; for species with limited or no mobility, such as a bivalve or an aquatic plant, "positive control" also includes managed cultivation in unenclosed water;

(7) "shellfish" means a species of crustacean, mollusk, or other invertebrate, in any stage of its life cycle, that is indigenous to state water or that is authorized to be imported into the state under a permit issued by the commissioner;

(8) "stock" means live aquatic plants or shellfish

acquired, collected, possessed, or intended for use by a hatchery or aquatic farm for the purpose of further growth or propagation.

* Sec. 3. AS 03.05.011(a) is amended to read:

(a) To carry out the requirements of this title, the commissioner of environmental conservation may issue orders, regulations, permits, quarantines, and embargoes relating to

(1) examination and inspection of premises containing products, articles, and commodities carrying pests;

(2) establishment of quarantines for eradication of pests;

(3) establishment of standards and labeling requirements pertaining to the sale of meat, fish, and poultry;

(4) tests and analyses which may be made and hearings which may be held to determine whether the commissioner will issue a stop order or quarantine;

(5) cooperation with federal and other state agencies;

(6) regulation of fur farming; for purposes of this paragraph, "fur farming" means the raising of and caring for animals for the purpose of marketing their fur, or animals themselves for breeding stock;

(7) examination and inspection of meat, fish, and poultry advertised for sale or sold to the public;

(8) enforcement of quality assurance plans developed in cooperation with appropriate industry representatives;

(9) establishment of standards and conditions for the operation and siting of aquatic farms and related hatcheries, including

(A) restrictions on the use of chemicals; and

(B) requirements to protect the public from contaminated aquatic farm products that pose a risk to health;

(10) monitoring aquatic farms and aquatic farm products to ensure compliance with this chapter and with the requirements of the national shellfish sanitation program manual of operations published by the Food and Drug Administration.

* Sec. 4. AS 03.05.040(a) is amended to read:

(a) On any business day during the usual hours of business the commissioner or an authorized inspector may, for the purpose of inspecting agricultural, [OR] fisheries, or aquatic farm products or aquatic farm sites subject to regulation, enter a storehouse, warehouse, cold storage plant, packing house, slaughterhouse, retail store or other building or place where those products are kept, stored, processed or sold.

* Sec. 5. AS 03.05.100 is amended to read:

Sec. 03.05.100. DEFINITIONS. In this chapter,

(1) "agricultural products" does not include fish or fisheries products;

(2) "aquatic farm" and "aquatic farm product" have the meanings given in AS 16.40.199;

(3) "fish or fisheries products" means any aquatic animal, including amphibians, or aquatic plants or parts of those plants, animals or amphibians that are usable as human food.

* Sec. 6. AS 16.05.050 is amended by adding a new paragraph to read:

(17) to permit and regulate aquatic farming in the state in a manner that ensures the protection of the state's fish and game resources and improves the economy, health, and well-being of the citizens of the state;

* Sec. 7. AS 16.05.251 is amended by adding a new subsection to read:

(f) Except as expressly provided in AS 16.40.120(d) and (e) and 16.40.130, the Board of Fisheries may not adopt regulations or take

action regarding the issuance, denial, or conditioning of a permit under AS 16.40.100 or 16.40.120, the construction or operation of a farm or hatchery required to have a permit under AS 16.40.100, or a harvest with a permit issued under AS 16.40.120.

* Sec. 8. AS 16.05.930 is amended by adding a new subsection to read:

(g) AS 16.05.330 - 16.05.720 do not apply to an activity authorized by a permit issued under AS 16.40.100 or 16.40.120, or to a person or vessel employed in an activity authorized by a permit issued under AS 16.40.100 or 16.40.120.

* Sec. 9. AS 16.05.940(14) is amended to read:

(14) "fish or game farming" means the business of propagating, breeding, raising, or producing fish or game in captivity for the purpose of marketing the fish or game or their products, and "captivity" means having the fish or game under positive control, as in a pen, pond, or an area of land or water <u>that</u> [WHICH] is completely enclosed by a generally escape-proof barrier; <u>in this paragraph, "fish" does not include shellfish, as defined in AS 16.40.199;</u>

* Sec. 10. AS 16.10 is amended by adding a new section to read:

Sec. 16.10.269. LIMITATIONS. AS 16.10.265 - 16.10.267 do not apply to the purchase or sale of aquatic farm products from a holder of a permit issued under AS 16.40.100 or stock from a holder of a permit issued under AS 16.40.120.

* Sec. 11. AS 16.43.140 is amended by adding a new subsection to read:

(d) This chapter does not apply to activities authorized by a permit issued under AS 16.40.100 or 16.40.120.

* Sec. 12. AS 16.51.180(5) is amended to read:

(5) "seafood" means finfish, shellfish, and fish by-products, including but not limited to salmon, halibut, herring, flounder, crab, clam, cod, shrimp, and pollock<u>, but does not include aquatic</u>

farm products as defined in AS 16.40.199;

* Sec. 13. AS 38.05 is amended by adding a new section to read:

Sec. 38.05.083. AQUATIC FARMING AND HATCHERY SITE LEASES. (a) The commissioner may offer to the public for lease a site that has been developed for aquatic farming or related hatchery operations under a permit issued under AS 38.05.856. Before offering the site to the public, the commissioner shall offer the site to the permittee.

(b) A site shall be leased under this section for not less than the appraised fair market value of the lease. The value of the lease shall be reappraised every five years.

(c) A lease under this section may be assigned, but if the assignee changes the use of the site the lease reverts to the state.

(d) Before entering into a lease under this section, the commissioner shall require the lessee to post a performance bond or provide other security to cover the costs to the department of restoring the leased site in the event the lessee abandons the site.

* Sec. 14. AS 38.05 is amended by adding new sections to read:

Sec. 38.05.855. IDENTIFICATION OF SITES FOR AQUATIC FARMS AND HATCHERIES. (a) The commissioner shall identify districts in the state within which sites may be selected for the establishment and operation of aquatic farms and related hatcheries required to have a permit under AS 16.40.100.

(b) 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.

(c) Based on applications received under (b) of this section, and after consultation with the commissioner of fish and game and the commissioner of environmental conservation, the commissioner shall

make a preliminary written finding under AS 38.05.035(e) that proposes sites in each district for which permits may be issued under AS 38.-05.856.

(d) After notice is given under AS 38.05.945 and a hearing is held under AS 38.05.946(b), the commissioner shall issue a final written finding under AS 38.05.035(e) that identifies sites in each district for which permits shall be issued under AS 38.05.856 and that specifies conditions and limitations for the development of each site.

Sec. 38.05.856. TIDELAND AND LAND USE PERMITS FOR AQUATIC FARMING. (a) The commissioner may issue a tideland or land use permit for the establishment and operation of an aquatic farm and related hatchery operations. A permit under this section is valid for three years after the date of issuance. The permit may not be transferred.

(b) Before renewing a permit under this section, the commissioner shall allow interested persons to submit written or oral testimony concerning the renewal to the commissioner within 30 days after the date of the notice. The commissioner may hold a hearing to take testimony.

(c) Before issuing or renewing a permit under this section, the commissioner shall consider all relevant testimony submitted under this section or AS 38.05.946(b). The commissioner may deny the application for issuance or renewal for good cause, but shall provide the applicant with written findings that explain the reason for the denial.

(d) Before issuing or renewing a permit under this section, the commissioner shall require the permittee to post a performance bond or provide other security to cover the costs to the department of restoring the permitted site in the event the permittee abandons the site.

(e) The commissioner shall adopt regulations establishing

criteria for the approval or denial of permits under this section and for limiting the number of sites for which permits may be issued in an area in order to protect the environment and natural resources of the area. The regulations must provide for the consideration of upland management policies and whether the proposed use of a site is compatible with the traditional and existing uses of the area in which the site is located.

* Sec. 15. AS 38.05.945(a) is amended to read:

(a) This section establishes the requirements for notice given by the department for the following actions:

(1) classification or reclassification of state land under AS 38.05.300 and the closing of land to mineral leasing or entry under AS 38.05.185;

(2) zoning of land under applicable law;

(3) a decision under AS 38.05.035(e) regarding the sale, lease, or disposal of an interest in state land or resources; [AND]

(4) a competitive disposal of an interest in state land or resources after final decision under AS 38.05.035(e);

(5) a public hearing under AS 38.05.856(b);

(6) a preliminary finding under AS 38.05.035(e) and 38.05.855(c) concerning sites for aquatic farms and related hatcheries.

* Sec. 16. AS 38.05.945 is amended by adding a new subsection to read:

(g) Notice at least 30 days before action under (a)(5) or (6) shall be given to appropriate

(1) regional fish and game councils established under AS 16.05.260; and

(2) coastal resource service areas organized under AS 46.40.110 - 46.40.210.

* Sec. 17. AS 38.05.946 is amended by adding a new subsection to read:

(5) identification and analysis of appropriate sources of supply of stock for finfish farms, including but not limited to private nonprofit hatcheries, private for-profit hatcheries, and wild stock, and their likely effect on existing state policy; and

(6) strategies for improving the marketability of Alaska salmon, particularly those high-value species competing with farmed salmon for domestic and export sales.

* Sec. 21. Section 4, ch. 70, SLA 1987, is amended to read:

Sec. 4. Section 1 of this Act is repealed July 1, 1990 [1988].

* Sec. 22. This Act takes effect immediately under AS 01.10.070(c).

LAWS OF ALASKA

1987

Source

HCS CSSB 297(Res)

Chapter No.

70

AN ACT

Placing a moratorium until July 1, 1988, on the issuance or granting of licenses, permits, leases, or authorizations for commercial finfish farming; providing for a bivalve spat collection permit; and providing for an effective date.

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

THE ACT FOLLOWS ON PAGE 1, LINE 12

UNDERLINED MATERIAL INDICATES TEXT THAT IS BEING ADDED TO THE LAW AND BRACKETED MATERIAL IN CAPITAL LETTERS INDICATES DELETIONS FROM THE LAW; COMPLETELY NEW TEXT OR MATERIAL REPEALED AND RE-ENACTED IS IDENTIFIED IN THE INTRODUCTORY LINE OF EACH BILL SECTION.

Approved by the Governor: June 15, 1987
Actual Effective Date: June 16, 1987

AN ACT

Placing a moratorium until July 1, 1988, on the issuance or granting of licenses, permits, leases, or authorizations for commercial finfish farming; providing for a bivalve spat collection permit; and providing for an effective date.

---

* Section 1. FINFISH FARMING MORATORIUM. (a) Except as provided in (b) of this section, the following licenses, permits, leases, or authorizations may not be issued or granted for the construction or operation of a commercial finfish farm:

(1) authorization for use of an interim-use permit for the experimental commercial taking of a fishery resource (AS 16.05.050(10));

(2) fish farming license (AS 16.05.340(a)(14));

(3) collection permit (AS 16.05.340(b));

(4) land use or tidelands permit (AS 38.05.035);

(5) a land lease (AS 38.05.070);

(6) fish transport permit (5 AAC 41.005);

(7) permit to appropriate water (11 AAC 93.120);

(8) temporary water use permit (11 AAC 93.210 - 11 AAC 93.220).

(b) A fish farming license and a fish transport permit may be issued for commercial finfish farming in a privately owned freshwater body that has no outlet to state water.

* Sec. 2. NO PREFERENCE INTENDED. A license, permit, lease, or authorization described in sec. 1 of this Act that is issued or granted for a

purpose other than commercial finfish farming and that is in effect during the period of the moratorium imposed by sec. 1 of this Act does not create a right or preference with regard to the issuance, granting, or renewal of or conditions or limitations placed on, any license, permit, lease, or authorization for aquatic farming after the period of the moratorium.

* Sec. 3. AS 16.05.340(b) is amended to read:

(b) The commissioner of fish and game may issue without cost a permit to collect fish and game, including fur animals, subject to limitations and provisions that are appropriate, for a scientific, propagative, or educational purpose. <u>The commissioner also may issue a permit for the collection of bivalve spat for use in connection with an aquatic farm.</u> In addition, the commissioner shall issue a permit for the collecting of wild fur animals for improving the genetic stock of fur farm animals. Permits issued under this subsection shall be in accordance with current sustained yield management practices for the species of wild game for which the permit is requested. The annual permit fee for an Alaska resident to collect wild fur animals for fur farming purposes is the same as the fee for resident trappers.

* Sec. 4. Section 1 of this Act is repealed July 1, 1988.

* Sec. 5. This Act takes effect immediately under AS 01.10.070(c).

ATTACHMENT B

QUESTIONNAIRE FROM THE SURVEY OF THE ALASKA STATE LEGISLATURE ON THE ALASKA FINFISH FARMING TASK FORCE

SURVEY ON THE ALASKA FINFISH FARMING TASK FORCE

1. Please rate how <u>useful</u> the following sources of information on finfish farming were to you in making your decision on whether finfish farming should or should not be permitted in Alaska. (*Circle one number for each*)

	VERY USEFUL	SOMEWHAT USEFUL	NOT TOO USEFUL	NOT USEFUL AT ALL	DID'NT USE
A. The AFFTF Report	1	2	3	4	5
B. Written reports from government, public interest groups and industry	1	2	3	4	5
C. Testimony and information about finfish farming from members of the public	1	2	3	4	5
D. Testimony from government agency personnel and experts	1	2	3	4	5
E. Testimony from interest groups like UFA, AMA or the environmental lobby	1	2	3	4	5
F. Research conducted by you or your staff	1	2	3	4	5

2. Looking again at the sources in question 1, which one source was most <u>useful</u>, which was <u>second most</u> useful, and which source was <u>least</u> useful. (*please place the letter in the appropriate box*)

☐ MOST USEFUL

☐ SECOND MOST USEFUL

☐ LEAST USEFUL

3. Did the AFFTF report assist you in making a decision on the issue of finfish farming in Alaska, or not? (*Circle one number*)

1 YES
2 NO
3 DON'T KNOW

4. In your opinion was the information presented in the AFFTF report biased toward finfish farming, biased against finfish farming, or unbiased? (*Circle one number*)

1 UNBIASED
2 BIASED TOWARD FINFISH FARMING
3 BIASED AGAINST FINFISH FARMING

5. Please indicate if you strongly agree, agree, disagree, strongly disagree with each of the following statements about the AFFTF report. (*Circle one number for each*)

	STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE	DON'T KNOW
a. The AFFTF report provided <u>factual</u> information on this issue	1	2	3	4	5
b. The AFFTF report provided you with <u>new</u> information on this issue	1	2	3	4	5

(Please Turn the Page)

6. After your review of the AFFTF report which one of the following best describes your position on this issue? (*Circle one number*)

1 DID NOT CHANGE, I SUPPORTED DEVELOPMENT OF FINFISH FARMING IN ALASKA BOTH BEFORE AND AFTER ISSUANCE OF THE AFFTF REPORT

2 DID NOT CHANGE, I SUPPORTED PROHIBITION OF FINFISH FARMING IN ALASKA BOTH BEFORE AND AFTER ISSUANCE OF THE AFFTF REPORT

3 CHANGED FROM SUPPORTING FINFISH FARMING TO OPPOSING ITS DEVELOPMENT

4 CHANGED FROM OPPOSING FINFISH FARMING TO SUPPORTING ITS DEVELOPMENT

7. About how much of the AFFTF report did you read? (*Circle one number*)

1 ALL OF IT
2 THE GENERAL FINDINGS AND RECOMMENDATIONS
3 USED IT AS A REFERENCE DOCUMENT AND READ PARTS OF IT
4 JUST GLANCED AT IT

8. Please indicate how important each of the following factors are to you in determining <u>your</u> position on the finfish farming issue. (*Circle one number for each concern*)

	VERY IMPORTANT	IMPORTANT	NOT TOO IMPORTANT	NOT IMPORTANT AT ALL	NO OPINION
a. Environmental impacts, marine pollution ..	1	2	3	4	5
b. Employment opportunities	1	2	3	4	5
c. Competition with the wild capture fishery .	1	2	3	4	5
d. Site use conflicts, incompatibility with existing user groups	1	2	3	4	5
e. Genetic and disease impacts on wild fish stocks	1	2	3	4	5
f. Economic development in coastal communities	1	2	3	4	5
g. Other. Please list _____	1	2	3	4	5

9. Looking again at the factors in question 8, which one factor was most <u>important</u>, which one was <u>second most</u> important, and which factor was <u>least</u> important to you.. (*please place the letter in the appropriate box*)

☐ MOST IMPORTANT

☐ SECOND MOST IMPORTANT

☐ LEAST IMPORTANT

10. The Legislature appropriated $53,400 to the task force. In your opinion was this money well spent or not? (*Circle one number*)

1 YES, WELL SPENT
2 NO, NOT WELL SPENT

11. Briefly explain why you feel the money was or was not well spent. If you feel the money was not well spent, how could the money have been better spent?

(Thank you for your participation.)

ATTACHMENT C

TIMELINE OF STATE GOVERNMENT ACTIONS ON FINFISH MARICULTURE

Oct. 1983	Commissioner of ADF&G requests Dept. of Law opinion on the legality of net pen rearing of salmon in Alaska.
Jan. 1985	DOL issues opinion that marine netpen salmon rearing would not pose any constitutional problems but is not specifically authorized in state statute.
Sept. 1985	Governor's Fisheries Mini Cabinet Mariculture Advisory Committee is formed.
Jan. 1986	Mariculture Advisory Committee issues its report, which advises the administration to proceed with shellfish and plant mariculture but cautions that finfish farming requires further study.
Dec. 1986	The Mariculture Technical Work Group issues a series of technical papers outlining proposals from state agencies for managing and regulating mariculture development.
Feb. 1987	SB 106 and HB 108 -- aquatic farming legislation introduced, which would allow finfish, shellfish and plant mariculture in Alaska.
March 1987	DOL issues an opinion that under existing law, ADF&G has the authority to allow finfish farming.
May 1987	SB 297 -- placed a moratorium on finfish mariculture through July 1, 1988 was introduced and passed.
July 1987	DOL clarifies its March opinion and states that the Board of Fisheries had the option to allow or disallow finfish farming through its regulation of permits to hold live fish.
Feb. 1988	SB 482 -- aquatic farming legislation reintroduced.
April 1988	SB 514 -- shellfish and aquatic plants only bill introduced
May 1988	SB 514 -- expanded to include a two-year extension of the finfish moratorium and establishment of a finfish task force. SB 514 was passed with no funding for regulatory agencies or for the task force.
June 1988	DOL issues an additional clarifying opinion stating that salmon farming is not allowed under current ADF&G statutes or BOF regulations.
May 1989	Funding for finfish mariculture task force ($50,000) and state agencies charged with managing and regulating shellfish and plant mariculture is included in the state operating budget.
Jan. 1990	Alaska Finfish Farming Task Force issues its recommendations.
Jan. 1990	HB 432 -- a bill banning all finfish farming, was introduced and quickly moved through the committee process.
May 1990	Legislature in the last hour before adjournment passes HB 432 into law.

ATTACHMENT D

COPY OF THE

ALASKA FINFISH FARMING TASK FORCE REPORT

Alaska Finfish Farming Task Force

REPORT TO THE ALASKA LEGISLATURE

January 15, 1990

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

THE ALASKA FINFISH FARMING TASK FORCE

Members:

Ken Castner, Homer -- Representative of Commercial Fishermen
Mary Lou Cooper Elton, Juneau -- Public Member
Theodore Merrell, Juneau -- Fisheries Biologist, Chairman
Brent Paine, Anchorage -- Aquatic Farming Advocate
John Weddleton, Anchorage -- Private Economist

Staff: Jon Sherwood, Project Coordinator
Martha Fischbach, Publication Specialist

The following individuals held the part-time clerical position:

Fran Armon
Chris Clark
Martha Fischbach

Acknowledgements

Many individuals and organizations helped the task force in its efforts, and we gratefully acknowledge their efforts.

In addition, the task force would like to express its appreciation to Mike Nizich and the staff of the Office of the Governor, Division of Administrative Services for providing the task force with administrative support; to John Lucas and the staff of the Office of Management and Budget, Division of Audit and Management Services, particularly June Baker and Donna Voss, for providing office space and support for the task force staff; and Sen. Arliss Sturgulewski and her staff, for arranging conference rooms, recording equipment, and teleconferencing services for task force meetings.

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

Senator Kelly and Representative Cotten:

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

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

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

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

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

Sincerely,

Theodore R. Merrell

Theodore R. Merrell, Chairman
Alaska Finfish Farming Task Force

TABLE OF CONTENTS

Chapter 1

INTRODUCTION

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

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

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

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

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

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

In 1989, the State of Alaska implement its plant and shellfish mariculture regulations, giving state officials additional experience in the regulation of an industry that shares many of the characteristics of the proposed finfish farming industry.

To ensure that it evaluated finfish farming based upon the most current information available, the task force took testimony from experts on every major issue. In addition, the task force toured salmon farms and hatcheries in the Puget Sound area. It visited both salt water marine pen farms and fresh water smolt and pan-sized fish farms.

Due to the limited time available to the task force to perform its mandated tasks, it has focused on the specific issues set forth in Ch. 145 SLA 1988:

-- protecting the health of the existing fisheries resource;

-- siting of farms to protect the environment and minimize use conflicts;

-- the supply of finfish farming broodstock;

-- the cost of regulating finfish farming;

-- the economic benefits and costs of finfish farming; and

-- strategies for improving the marketability of Alaska salmon, particularly those species that compete with farmed salmon.

The task force has incorporated other concerns into its evaluation of these issues as appropriate.

The remainder of this report addresses the six major topics listed above. Each of these topics is divided into its component specific issues. Each issue is defined in broad terms, and a set of findings, briefly summarizing information pertaining to the issue that was collected by the task force, is provided. Where pertinent, the trade-offs associated with the different approaches to addressing each issue are discussed. Finally, the task force presents its recommendations as to the manner in which future State efforts should address each issue and some general conclusions and concerns about the role of finfish farming in Alaska.

The task force did not begin its work with any supposition that finfish farming is desirable or undesirable for Alaska. To address some of the issues included in the legislation authorizing the task force, however, it is necessary to presuppose the existence of a finfish farming industry. For example, one cannot determine the cost of regulating a finfish farming industry without assuming that an industry will exist. The reader should

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

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

-- **Finfish** is used as a generic term for finfish indigenous to Alaska, except where noted.

-- **Finfish farming** is the growing of fish to market size in an enclosed environment. **Aquatic farming** includes sea plants and shell fish as well as finfish.

-- **Ocean ranching** is the release of hatchery-reared fish into the public waters for eventual recapture.

-- **Aquaculture** is the cultivation of fish and plants in both fresh and salt water. However, in Alaska, the term is specific to the State's and private nonprofit hatcheries' ocean ranching programs.

-- **Mariculture** is fish cultivation in salt water. However, in Alaska, the term is used to refer to all aquatic farming activities.

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

Chapter 2

THE HEALTH OF THE FISHERIES

Any effort to initiate finfish farming in Alaska must provide for the maintenance of the health of the state's existing commercial, recreational, and subsistence fisheries. There is continuing public concern regarding the effects of finfish farming on disease transmission and genetic alterations in wild stocks.

Finfish farming also could affect the health of existing fisheries through its impacts on the environment. This issue is addressed as the first concern in Chapter 4.

DISEASE

Concern

Can diseases from finfish farms be transmitted to wild and hatchery finfish stocks, with substantive adverse impacts on those stocks?

Findings

a. Fish raised in farms are subject to increased stress from handling and from the high density of fish per volume of water; this increased stress makes farmed fish more susceptible to disease than are fish in the wild.

b. Diseases occurring in farmed stocks also occur in the marine environment and in wild stocks.

c. Disease transmission between captive stocks and wild stocks is a two-way problem. Captive stocks are probably more susceptible to disease because of increased stress. The potential for disease transmission between captive and wild stocks exists in both ocean ranching operations and fish farm operations.

d. The importation of nonindigenous stocks poses the risk of importing diseases that are not present in existing wild and hatchery stocks. To control the spread of disease,

the State has imposed strict regulations limiting the movement of salmon and their gametes within Alaska and prohibits the importation of live fish or gametes from outside the state.

e. Disease pathogens can travel through the water table in land-based farming operations. Upland finfish farming can result in the contamination of the water table with pathogens that infect fish.

f. The risk of disease transmission from captive to wild stocks increases in direct proportion to the degree to which captive fish and the water they use contact wild fish. Of the three alternatives for finfish farming (upland freshwater, upland marine, and marine pens), marine pens, with the certainty of fish escapement, pose the greatest risk of spreading disease.

g. Upland marine and fresh water facilities pose less risk of contamination of natural waters than do marine pens.

h. The addition of finfish farming to aquaculture activities in Alaska would increase the demand for the pathology services necessary to control disease. Providing these services to a finfish farming industry would strain existing State technical and financial resources.

i. Pathology services are available in other fish farming regions from private laboratories.

j. Pathological services can be provided by persons certified by the American Fisheries Society under State authority. This practice currently exists in the ocean-ranching program.[1]

Recommendations

1. The finfish farming industry can be accommodated without significant threat of disease to wild and hatchery stocks if the State continues to meet its responsibilities in fish disease control and if monies are provided for additional health services or private pathological services are created.

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[1] This finding is repeated in Chapter 5, as finding f.

2. Current policies prohibiting importation of live salmonids, including gametes, should be placed into statute and rigorously enforced.[2]

3. To ensure adequate control of disease in the finfish farming industry, the State will need to provide for the development of private pathology services or increase staff and funding for existing State services.

4. If the State allows private pathology services, there should be a licensing or certification process.

5. Water discharged from upland marine and fresh water facilities should be screened and the effluent treated.

GENETICS

Concern

Does escapement of farmed finfish pose a threat to the genetic integrity of wild stocks?

Findings

a. Each finfish stock has its own unique genetic characteristics. Therefore, the interbreeding of wild stocks with selectively bred farmed stocks could alter the genetic characteristics of wild stocks.

b. Fish farmers would practice selective breeding to enhance characters that are best suited for the farm environment. Over time, farmed fish stocks will diverge genetically from the donor wild stocks; the characteristics for which farmed stocks are bred diminish their suitability to life in the wild.

c. The greater the extent of fish escaping from fish farms, the greater the possibility that farmed fish will either interbreed with or compete with wild stocks.

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[2] This recommendation is repeated in Chapter 2, as recommendation 2 in the section on genetics.

d. The survival capacity of escaped farmed stocks is uncertain. While it is possible for farmed stocks to survive outside a farm environment, it is not clear what percentage would breed successfully.

e. The genetic impact on stocks of wild fish resulting from interbreeding with escaped farm fish would depend on the ratio of farmed fish to wild fish of the same species in the stream.

f. The State's genetic policy prohibits the importation of live salmonids into the state.

g. The State's genetic policy does not allow for stocks to be transported between major geographic regions of the state.

h. The State's genetic policy has been adopted to protect Alaska's diverse natural salmon and trout stocks; however, it is not always rigorously followed.

i. Several options exist for protecting the genetic integrity of wild stocks, including: restricting farming to upland marine or fresh water tanks; using triploid farm stocks (fish that have a third set of chromosomes, rendering them sterile); and establishing wild stock genetic reserves.

Recommendations

1. The existing State genetics policy is adequate to protect the genetic integrity of the state's fisheries and should be rigorously applied to fish farming.

2. Current policies prohibiting importation of live salmonids, including gametes, should be placed into statute and rigorously enforced.[3]

3. The State should not permit the siting of finfish farms within a 20 kilometer radius from the mouth of a stream that has significant production of the same species.

4. The task force concurs with the Alaska Chapter of the American Fisheries Society resolution on genetic sanctuaries:

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[3] This recommendation is repeated in Chapter 2 as recommendation 2 in the section on disease.

One recommendation for the protection of wild stocks in the Genetic Policy is the establishment of wild stock sanctuaries. These sanctuaries would be areas in which no enhancement activity is permitted except gamete removal for broodstock development. Populations of fish in these areas would represent "gene banks" of wild-type genetic variability. Sanctuary status could also be a conservative use status for the protection of particular significant or unique wild stocks.

[Editor's Note: the task force uses the term reserve, instead of sanctuary, elsewhere in this report.]

5. The State should form an ad hoc committee to determine whether the State is strictly adhering to its genetics policy.

Chapter 3

BROODSTOCK

The major broodstock issues are the sources of donor broodstock for finfish farming activities in Alaska and the creation of finfish broodstock as privately-owned resources.

OWNERSHIP OF BROODSTOCK

Concern

Should the State allow the private ownership of broodstock?

Findings

a. Finfish broodstocks are a common property resource.

b. Finfish farmers would need control over their broodstock to develop domesticated stocks most suitable for farming.

c. Private ownership of broodstock could lead to the exportation out of state of gametes or live salmonids that are now unique to Alaska.

d. Private ownership of broodstock could lead to patentable genetic alteration based on the indigenous species.

e. A system of private nonprofit hatchery regulations could be designed that would allow farmers to develop pedigreed broodstock without losing State ownership.

f. Finfish farming hatcheries would require a new statutory authorization for operation.

Recommendations

1. The State should not permit private ownership of broodstock.

2. All finfish gametes should remain in the ownership of the State by requiring that hatchery production for finfish farming be done under State permit and authority.[4]

3. All hatcheries within Alaska should be operated under nonprofit status.

4. A new permit allowing the cultivation of eggs and the sale of smolt to the finfish farming industry should be required. Existing hatcheries may be limited or precluded from participation by the conditions of their existing permits.

5. The State should create a new statutory authorization for the operation of finfish farming hatcheries.

6. There should be a statutory ban on the export of indigenous finfish stocks.

SOURCES OF BROODSTOCK

Concern

How can finfish farmers be provided secure sources of donor broodstock? How can finfish farmers be allocated broodstock to minimize the impact on the common property resource?

Findings

a. The State of Alaska owns all finfish broodstock; there are no privately-owned broodstock in Alaska.

b. Current laws, policies, and aquaculture activities do not provide for a source of broodstock for finfish farming.

c. Given current State policy on disease and genetics, the initial source of broodstock for finfish farming would have to come from State hatcheries, private nonprofit hatcheries, or wild stocks.

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[4] This recommendation is included in Chapter 3 as part of recommendation 1 in the section on sources of broodstock.

d. Existing genetic policy limits sources of donor broodstock to stocks found in the general vicinity of a net pen or upland tank farm.

e. Sources of donor broodstock for enclosed freshwater systems can be less restrictive than broodstock for marine net pen farms, both in species and in stock selection, because of the lower potential for impacts on wild stocks from enclosed freshwater systems.

f. Use of indigenous broodstock would provide finfish farms with stocks that are more resistant to naturally occurring diseases.

g. Some broodstock sources are more desirable than others because of characteristics such as fish size, color of flesh, reduced tendency toward premature sexual development, and size of the donor population.

h. Finfish farmers require a high degree of control over their selective breeding and husbandry practices in order to develop broodstock biologically and economically suited to farm operations.

i. Finfish farmers eventually would be able to develop their own broodstock with State permits and could supply new farms with smolt.

j. Current salmon management practices fully allocate returning adult salmon to either natural spawning escapements or to the sport, commercial, and subsistence fisheries.

k. Salmon egg surpluses do occur in the State and private nonprofit hatchery systems; however, current statutes would prevent these surpluses from being used as sources of donor broodstock for finfish farming.

l. Private nonprofit hatcheries harvest and sell fish to cover their costs. There is no provision in current statutes for private nonprofit hatcheries to sell eggs or smolt for cost recovery.

m. Egg surpluses occur due to overescapement up rivers and streams. Overescapement is one source of broodstock for existing hatchery programs. Current statutes prohibit the use of overescapement as a source of broodstock for finfish farming.

n. Direct sales from fishermen holding live fish transport permits would be the least desirable method of broodstock acquisition for finfish farming due to the lack of disease and genetic control.

o. A single hatchery may maintain several genetically different broodstocks as long as each is segregated from the others.

p. Sources of broodstock for finfish farming could be identified by Regional Planning Teams.

Recommendations

1. All finfish gametes should remain in the ownership of the State by requiring that hatchery production for finfish farming be done under State permit and authority. Cultivation and in-state sale of broodstock and smolt by finfish farmers should not be prohibited.[5]

2. The finfish farming industry should develop its own stocks under new State provisions for nonprofit finfish hatcheries.

3. New private nonprofit hatcheries under State authority would be required to rear broodstock for finfish farming operations.

4. The preferred initial source of broodstock is surplus hatchery eggs. Other sources include overescapement, cost recovery fish, and allocation by the Board of Fisheries.

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[5] Part of this recommendation is repeated in Chapter 3 as recommendation 2 in the section on ownership of broodstock.

Chapter 4

SITING OF FINFISH FARMS

Physical characteristics of finfish farm sites affect the degree to which farms alter the local environment, and farms may interfere with other users of water and adjacent uplands. Physical characteristics of sites also affect the economic viability of finfish farms.

ENVIRONMENTAL IMPACTS

Concerns

What are the environmental impacts of finfish farms? How can they be minimized?

Will predator control measures by finfish farmers adversely affect populations of birds and mammals?

Findings

a. Proper siting of finfish farming facilities is the most important element in minimizing the transference of disease, genetic interference with wild stocks, degradation of water quality, aesthetic degradation, and predation by marine mammals, and in avoiding conflicts with existing users and designated uplands uses.

b. The primary environmental impacts of net pen farming stem from increased sedimentation, changes in the benthic infauna (bottom-dwelling organisms), and reduced water quality in the vicinity of the pens resulting from the deposition of fecal material and uneaten feed.

c. The degree of impact of net pen farming varies inversely with the degree of flushing, which depends largely on water depth and current.

d. The degree of impact of net pen farming varies directly with the surface area occupied by pens and the stocking density of the fish farms.

e. Criteria for the siting and intensity of farming activities can be used to reduce the environmental impacts of marine pen farming in an area.

f. Pre-site surveys and periodic monitoring of water quality and the benthic community beneath pens are essential to ensuring minimal environmental impacts.

g. The primary environmental impacts from fresh water and marine upland tank farming operations stem from their use and disposal of water.

Recommendations

1. The State should use existing siting guidelines to develop a set of criteria specifically applicable to finfish net pen farming in Alaska. These include the State of Washington's Recommended Interim Guidelines for the Management of Salmon Net-Pen Culture in Puget Sound and the Alaska Department of Natural Resources' Etolin Island Area Mariculture Pilot Project. Guidelines for siting should also reflect the Alaska Department of Fish and Game's disease and genetics policies.

2. The State should use the Consistency Review Process of the Alaska Coastal Management Program in permitting finfish farm sites. The Alaska Coastal Management Program provides "a framework for local and public participation in State decisions, and a mechanism for the resolution of conflicts between government agencies, individuals, and local communities." However, special provisions for public notice of finfish farming permit applications, including requirements for newspaper display ads with location maps and direct agency notification to interested parties, should be developed to encourage the greatest degree of public involvement.

3. Only nonlethal predator control measures, such as bird and mammal exclosure nets and electric fences, should be allowed for finfish farming.

USER CONFLICTS

Concerns

Will the presence of finfish farms restrict, preclude, or degrade current or potential uses of sites and adjacent areas by others for commercial, recreational, and subsistence activities?

How can the State identify potential conflicts with existing uses of uplands and coastal areas, especially where those uses do not require State permits?

Findings

a. Net pen farms may have adverse aesthetic impacts on upland land owners or other users.

b. An average finfish farm would take up one to two acres of surface area. Additional subsurface area would be required.

c. Net pen farms may interfere with navigation around the site and restrict access to uplands.

d. Finfish farms may preclude or interfere with other commercial and recreational uses of farm sites or adjacent uplands.

e. Year-round commercial activities by finfish farms may be incompatible with use of uplands set aside for wild or scenic purposes, such as State and federal parks, monuments, and wilderness areas.

f. The State does not have a complete inventory of existing uses of State waters other than those operating under a specific State permit, except for Etolin Island, Prince of Wales Island, and Prince William Sound. The use of State waters for navigation, sport and commercial fishing, water sports, or anchorage are activities for which State permits are not usually required.

g. The State's consistency review procedure for coastal permitting and its existing aquatic farm permitting procedures provide some mechanisms for identifying and resolving user conflicts.

h. The State's salmon enhancement program uses marine net pens, and they are routinely permitted under existing regulations.

Recommendations

1. Area planning represents the best method of determining consistency of uses. However, where area plans do not exist, the consistency review process must allow

for expanded public review to ensure consistency with activities that do not require State permits.

2. Fish farms and ancillary use of adjacent uplands must be compatible with zoning and designated uses of the uplands. No finfish farming should be permitted in waters adjacent to State and federal parks.

Chapter 5

COST OF REGULATION

The development of a finfish farming industry in Alaska will require the development of some new regulatory programs and the expansion of some existing ones.

Concerns

What is the cost of providing necessary regulation and oversight to a finfish farming industry? How could the finfish farming industry bear some of these costs?

Findings

a. Success of the finfish farming industry will require the support and cooperation of the government agencies charged with monitoring, permitting, and enforcement.

b. The cost of conducting site evaluation, preparing adequate site plans, and other work anticipated in the permit application process is a significant front-end cost to finfish farmers.

c. The Department of Environmental Conservation, the Department of Fish and Game, the Department of Natural Resources, and the Division of Governmental Coordination would all have regulatory responsibilities related to finfish farming.

d. The task force estimates that approximately $500,000 would be required annually by State agencies to regulate a finfish farming industry, assuming 10 to 15 permit applications per year requiring the equivalent of 5 additional full-time positions.[6]

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[6] The exact cost of regulating finfish farming will vary according to the specific provisions contained in enabling legislation and the number of permit applications that are received. Recent draft estimates provided by State agencies project a cost of $1.15 million to regulate an industry with 50 permit applications per year. The fiscal note to CSSB 106 (L&C) (1987) estimated that it would cost approximately $640,000 to regulate all forms of aquatic farming.

Federal and local governmental agencies would also experience some costs associated with regulating finfish farming.

e. The cost of administering regulatory requirements for hatcheries would be similar whether for ocean ranching or finfish farming.

f. Pathology services can be provided by persons certified by the American Fisheries Society under State authority. This practice currently exists in the ocean ranching program.[7]

Recommendations

1. The State should reduce its regulatory expenses by encouraging the use of private pathology services.

2. The finfish farming industry should pay economic rent for use of public resources. Forms of rent include local and State property taxes, State income taxes, sales taxes, permit fees, tideland leases, and a raw fish tax of three percent of the farm gate value.

3. Special provisions for public notice of finfish farming permit applications, including requirements for newspaper display ads with location maps and direct agency notification to interested parties, should be developed to encourage the greatest degree of public involvement. Applicants should bear the cost of these public notice provisions.

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[7] This finding is repeated in Chapter 2 as finding j in the section on disease.

Chapter 6

ANALYSIS OF COSTS AND BENEFITS

Development of a finfish farming industry will provide economic benefits to finfish farmers, their suppliers and processors and, through taxation, State and local governments. At the same time, costs will accrue to State and local governments, and users of coastal marine waters, tidelands, and uplands. The costs and benefits to the state of this new industry must be weighed carefully.

In addition, it is important to look closely at the economics of finfish farming, to avoid making false assumptions about the economic viability of the industry.

COSTS AND BENEFITS ACCRUING TO ALASKA AND ITS RESIDENTS

Concerns

Do the socioeconomic, environmental, and biological costs associated with the introduction of finfish farming to Alaska outweigh its benefits?

Are the benefits associated with finfish farming likely to be concentrated among few individuals and businesses, who may or may not be Alaskan, while costs associated with finfish farming are likely to be borne by many Alaskans?

Findings

Costs:

a. The State's fishery management and limited entry programs, State and private nonprofit ocean ranching efforts, and federal management of the 200-mile economic zone have improved the economic health of the commercial salmon fisheries in Alaska.

b. Allocation of broodstock to finfish farming could result in fewer smolt available for common-property ocean ranching programs.

c. The commercial fishing industry could suffer economic loss from lower prices caused by the increase in supply of fish resulting from finfish farming. (See Appendix B for detailed estimates.)

d. The existence of a finfish farming industry in Alaska would preclude the use of a marketing strategy that equates Alaska salmon with wild salmon and emphasizes its desirability as a natural product.[8]

e. The costs associated with disease, genetic change, diminished water quality, loss of anchorages or recreational opportunities, and loss of other commercial opportunities can be mitigated through proper regulation of the finfish farming industry.

f. Non-Alaskan investment in the finfish farming industry would lead to the exportation of profits.

g. The costs associated with the finfish farming industry would not be evenly dispersed geographically.

h. An indirect impact of finfish farms could be diminished public concern for protecting the habitat of wild stocks.

Benefits:

a. The finfish farming industry would create jobs. Finfish farming might provide jobs in rural areas with otherwise limited employment opportunities.

b. There would be a year-round supply of fresh salmon from Alaska, benefiting processors and consumers.

c. Secondary industries, such as pathological services and transportation, would benefit from a finfish farming industry.

d. Existing ocean-ranching facilities seasonally use large amounts of fish feed. Land-based fish processing plants in Alaska produce by-products suitable for the meal used

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[8] This finding is repeated in Chapter 7 as finding g in the section on competition between farmed fish and Alaska commercial fisheries.

in fish feed. The addition of finfish farming could eventually bring fish feed demand to levels high enough to sustain in-state fish feed production.

e. Current waste disposal practices by fish processors may not be tolerated by regulatory agencies in the future; development of in-state fish feed production for the finfish farming industry could utilize this waste. In addition, fish processors might purchase some currently underutilized species of fish for use in fish feed.

f. Finfish farming could provide an alternative source of revenue for hatcheries, although the task force does not advocate State and private nonprofit hatcheries' moving away from their original purposes.

g. Benefits from finfish farming would not accrue immediately upon authorizing the industry. If legislation were passed in 1990 allowing finfish farming, eggs would not become available until 1992 at the earliest because of the need to allocate eggs for that purpose. Fish would enter marine pens in the spring of 1993 and would not reach market size for another eighteen months. Therefore, finfish farms would not achieve a positive cash flow until late 1994, at the earliest. (See the time line in Appendix A for a complete explanation.)

Recommendation

1. The State of Alaska should not subsidize finfish farming beyond the amount needed to regulate the industry.

ECONOMIC VIABILITY OF FINFISH FARMING IN ALASKA

Concern

Will the present economics of finfish farming constrain the ability of individuals to enter the industry?

Findings

a. Finfish farming is a high-risk industry for which there are very few insurers.

b. People with no experience in fish farming or cultivation will probably be uninsurable.

c. Insurance for unanticipated losses will be a requirement for obtaining conventional financing for finfish farms.

d. Growth rates and food conversion rates of farmed fish are very important factors that influence the cost of growing fish to market size.[9]

e. Low water temperatures that characterize Alaska waters slow growth rates and, by extending the time needed to grow fish to market size, may increase the debt service cost associated with finfish farming.

f. There are economic incentives toward vertical integration in salmon farming to take advantage of all profit centers.

g. A few small, family-owned, **fresh water** farming facilities exist in Washington; they cater to specific market niches.[10]

h. Net pen farms in the Pacific Northwest are, for the most part, owned by corporations and are capital intensive.

i. For a two-acre net pen farm, it is estimated that capital of at least $1 million over a 30-month period would be needed before a cash flow from market-sized salmon would begin.

j. High capitalization and other costs required for finfish farming may limit its growth in Alaska.

k. The present poor world-wide economic climate for farmed fish will limit entry of Alaskans into the finfish farming industry and may help avoid the boom and bust cycle experienced by the finfish farming industry in British Columbia.

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[9] This finding is also contained in Chapter 7, in the section on marketing opportunities for farmed Alaska salmon.

[10] This finding is also contained in Chapter 7, in the section on marketing opportunities for farmed Alaska salmon.

Chapter 7

MARKETING

There have been major changes in world markets for Alaska finfish recently. In 1982, Alaska produced 59 percent of fresh and frozen salmon (includes chinook, coho, sockeye, and pen-reared) in the world; pen reared salmon accounted for 5 percent. In 1987, Alaska produced 43 percent of fresh and frozen salmon; pen reared accounted for 32 percent.

Neither the potential for finfish farming in Alaska nor its impacts on the commercial fishing industry can be properly evaluated without considering the marketing issues involved. Nor is it possible to evaluate the impact of the industry to the state without considering other alternatives for Alaska to respond to the widespread availability of farmed salmon on the world markets.

MARKET POTENTIAL FOR ALASKA FINFISH FARM PRODUCTS

Concern

What is the market potential for Alaska farmed finfish?

Findings

a. Species of finfish that have been commercially reared in net pens and are indigenous to Alaska include chinook and coho salmon, rainbow trout, steelhead, and Arctic char. Other indigenous species with the potential for farming include sablefish (black cod), grayling, sheefish, and sockeye salmon.

b. Black cod and halibut farming are still in the research and development phase, but are very promising.

c. Alaska farmed finfish will have to compete in already crowded world markets.

d. There are some market niches (for example, Arctic char) that have yet to be exploited.

e. Some finfish farmers in Washington and British Columbia have stopped raising chinook and coho salmon (species indigenous to Alaska) in favor of Atlantic salmon for economic reasons.

f. Feed composition can be used to modify color and nutritional quality of farmed salmon to increase its market value.

g. At current prices, there is an estimated surplus of 100,000 metric tons (about 14 percent of demand) of salmon on world markets, resulting in continued downward pressure on prices.

h. Prices for farmed salmon have fallen during 1989 along with the prices for wild salmon. Salmon filling specific market niches have been able to avoid dramatic price drops, e.g., pan-size coho salmon.

i. On the average, a farmed finfish will cost more per pound to produce than a wild fish.

j. Production of pen-reared salmon has recently outpaced market demands for fresh fish, and a considerable volume is now entering the frozen market. Fresh and frozen Atlantic salmon now compete with Alaska sockeye and coho in the Japanese market.

k. World production of farmed salmon in 1989 exceeded projections. Norway had projected farmed salmon production of 120,000 metric tons in 1989, up from 89,000 metric tons in 1988. Norway's actual production in 1989 is now estimated to be 150,000 metric tons.[11]

l. Projections for world-wide production of farmed salmon in 1990 are 186,000 to 220,000 metric tons.

m. Alaska is a price taker in a world dominated by pen-reared salmon.

n. There is presently room for expansion in the market for high quality, fresh finfish, especially in the Midwest.

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[11] David Aiken, World Aquaculture, "The Economics of Salmon Farming," Vol. 20(3), September 1989, p.15.

o. Downward pressure on prices will persist as a result of increased production of both wild and farmed salmon.

p. Currently, the demand for pan-sized (under 2 lbs.) salmon and salmon over 6 lbs. is good; there is little market demand for salmon between 3 and 6 lbs.

q. Growth, survival, and food conversion rates of farmed fish are very important factors that influence the cost of growing fish to market size.[12]

r. Small, family-owned, **fresh water** farming facilities exist in Washington; they cater to specific markets.[13]

s. A guaranteed year-round supply of fresh Alaska salmon (wild and farmed) could enable processors to attract and hold customers, who prefer certainty of supply from a single source.

COMPETITION BETWEEN FARMED FISH AND ALASKA COMMERCIAL FISHERIES

Concern

Will salmon farming in Alaska tend to undermine the price of wild salmon, adversely affecting Alaska's existing commercial fishing industry?

Findings

a. Markets for Atlantic and Pacific salmon raised in fish farms overlap with salmon taken in the Alaska fisheries. As production increases, competition will increase. (See Appendix B.)

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12 This finding is repeated in Chapter 6, in the section on the costs and benefits to the finfish farming industry.

13 This finding is repeated in Chapter 6, in the section on the economic viability of finfish farming in Alaska.

b. Some market-niche fisheries have been hit harder than others; troll-caught salmon, for example, historically have earned a premium price on fresh and quality-sensitive markets but now face stiff competition from pen-reared Atlantic salmon.

c. Alaska has lost most of its European market for salmon for smoking to farmed Atlantic salmon from Norway and Great Britain.

d. Alaska salmon has been displaced in U.S. fresh salmon markets east of the Mississippi River by farmed Atlantic salmon grown in Norway and on the coast of Maine and in Canada's Maritime Provinces.

e. Alaska salmon has been displaced in U.S. fresh salmon markets west of the Mississippi River by farmed Atlantic salmon grown in Washington, British Columbia, and Chile.

f. More pen-reared salmon is appearing in frozen salmon markets; an estimated 17,000 metric tons will be sold in the Japanese frozen market in 1989. Alaska frozen salmon sales to Japan compare at 100,000 metric tons in 1989.

g. The existence of a finfish farming industry in Alaska would preclude the use of a marketing strategy that equates Alaska salmon with wild salmon and emphasizes its desirability as a natural product.[14]

h. Competition in world markets between farmed salmon and Alaska wild salmon will continue to occur whether or not Alaska permits finfish farming.

MARKETABILITY OF ALASKA SALMON

Concern

What strategies exist for improving the marketability of Alaska salmon, especially those species that compete with farmed salmon?

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[14] This finding is repeated in Chapter 6 as finding d in the section on costs and benefits accruing to Alaska and its residents.

Findings

a. The three most important factors affecting the marketability of Alaska wild salmon are price, consistency of supply, and quality.

b. Market forces will determine the price of Alaska wild salmon.

c. No biological strategy exists for improving the consistency of supply of Alaska wild salmon throughout the year.

d. Strategies for improving the marketability of Alaska wild salmon are limited to focusing on quality.

e. Alaska does not have a mandatory quality inspection program.

f. On world markets, Alaska salmon are perceived as not being of consistently high quality.

g. Improved quality assurance and inspection programs would improve the position of Alaska salmon in world markets.

h. New markets can be developed for profitable value-added finfish products such as easy-to-prepare specialty items.

i. Negative public perceptions about chemical additives associated with farmed salmon may enhance market opportunities for Alaska wild salmon.

Recommendations

1. Alaska must develop a strategy to respond to its eroding market share for salmon sales.

2. A mandatory quality assurance and inspection program for the Alaska salmon industry that would include catcher boats, tenders, and processors should be implemented as soon as possible.

3. In conjunction with improved quality, marketing efforts should be expanded to include an aggressive, world-wide marketing program, extolling the virtues of Alaska wild salmon.

Chapter 8

GENERAL FINDINGS AND RECOMMENDATIONS

Throughout their deliberations, the foremost consideration of the members of the Alaska Finfish Farming Task Force has been to ensure that Alaska's stocks of salmon and other species of fish and their pristine environment are not jeopardized. To this end, the task force evaluated all of the major issues; it invited testimony from more than two dozen individuals who are authorities on specific aspects of finfish farming (Appendix C) and reviewed dozens of relevant documents (Appendix F). The products of these examinations are a series of factual findings and recommendations concerning specific issues based on these facts. The issues and recommendations are summarized as follows:

The environmental and biological impacts of finfish farming can be minimized through careful attention to proper siting and enforcement of the conservative regulatory policies outlined in Chapters Two and Four.

Current fisheries management techniques are designed to minimize disease and genetic problems. Risk management of disease and genetic problems found in finfish farms would be no different than for current fisheries management.

The State should retain ownership of its valuable finfish stocks. Ultimately, the goal of finfish farming broodstock development is to use farmed fish as broodstock, thus minimizing continued dependence on publicly owned broodstock. The preferred initial source of initial broodstock is surplus hatchery eggs. Other sources include overescapement, cost recovery fish from nonprofit hatcheries, and allocation by the Board of Fisheries.

The cost of providing adequate regulation of a finfish farming industry would be high, but successful development would bring employment and other benefits to Alaska. Although development of finfish farming eventually might bring in enough revenue to offset the costs to the State, costs would accrue to the State from the permitting and regulatory programs even if the industry fails. The Legislature is the appropriate body for deciding where to rank development of finfish farming in its funding priorities at a time when State revenues remain low and show signs of future declines.

Current market conditions for farmed salmon are poor. However, a developing finfish farming industry in Alaska may find some marketing opportunities.

Markets for Alaska seafood will be adversely affected by the global development of salmon farming, regardless of what happens to salmon farming in Alaska, and a long-term strategy to improve the marketability of Alaska salmon should be developed.

As directed by the enabling legislation, the task force examined various finfish farming activities. It has determined that risks differ among these farming activities. When compared to marine pens, the impacts of upland enclosed systems are greatly reduced by isolation, species limitation, and fewer potential user conflicts.

The potential genetic and socioeconomic impacts of rearing non-salmon species of finfish in marine net pens also appear to be less than those involved with salmon net pen culture, although farming of most of these species is still in the research and development phase.

The task force did not address some of the specific concerns expressed in written public comments on the draft report, because these issues are already covered by existing regulations (e.g., disposal of dead fish in hatcheries, use of antibiotics and food additives, and treatment of diseased fish).

The task force concludes that the findings, Alaska's unique position as a leading seafood producer, and the broad range of potential types of finfish farming activities do not support an unequivocal "yes" or "no" as to whether any particular type of finfish farming should be permitted. That is a political decision that will have to be made by the Legislature. Further study and debate are unlikely to change significantly the task force's findings of fact; consequently, there is no reason to extend the current moratorium beyond its expiration date of July 1990. Therefore, the task force's final recommendation is as follows:

> The Legislature should resolve the issue of finfish farming by statutory permission or prohibition before the moratorium expires.

If the Legislature decides to allow finfish farming, it is imperative that the necessary regulatory framework be in place in advance of any farming activity. If this caveat is satisfied, the task force concludes that fish farming would have little or no adverse effect on wild stocks in the environment. Most of the necessary regulations can be adapted or extended without change from those that are already in effect for the State's ocean ranching and hatchery programs, but additional funding must be provided to extend them to fish farming.

SUMMARY OF RECOMMENDATIONS

Chapter 2

Disease

1. The finfish farming industry can be accommodated without significant threat of disease to wild and hatchery stocks if the State continues to meet its responsibilities in fish disease control and if monies are provided for additional health services or private pathological services are created.

2. Current policies prohibiting importation of live salmonids, including gametes, should be placed into statute and rigorously enforced.

3. To ensure adequate control of disease in the finfish farming industry, the State will need to provide for the development of private pathology services or increase staff and funding for existing State services.

4. If the State allows private pathology services, there should be a licensing or certification process.

5. Water discharged from upland marine and fresh water facilities should be screened and the effluent treated.

Genetics

1. The existing State genetics policy is adequate to protect the genetic integrity of the state's fisheries and should be rigorously applied to fish farming.

2. Current policies prohibiting importation of live salmonids, including gametes, should be placed into statute and rigorously enforced.

3. The State should not permit the siting of finfish farms within a 20 kilometer radius from the mouth of a stream that has significant production of the same species.

4. The task force concurs with the Alaska Chapter of the American Fisheries Society resolution on genetic sanctuaries:

One recommendation for the protection of wild stocks in the Genetic Policy is the establishment of wild stock sanctuaries. These sanctuaries would be areas in which no enhancement activity is permitted except gamete removal for broodstock development. Populations of fish in these areas would represent "gene banks" of wild-type genetic variability. Sanctuary status could also be a conservative use status for the protection of particular significant or unique wild stocks.

5. The State should form an ad hoc committee to determine whether the State is strictly adhering to its genetics policy.

Chapter 3

Ownership of Broodstock

1. The State should not permit private ownership of broodstock.

2. All finfish gametes should remain in the ownership of the State by requiring that hatchery production for finfish farming be done under State permit and authority.

3. All hatcheries within Alaska should be operated under nonprofit status.

4. A new permit allowing the cultivation of eggs and the sale of smolt to the finfish farming industry should be required. Existing hatcheries may be limited or precluded from participation by the conditions of their existing permits.

5. The State should create a new statutory authorization for the operation of finfish farming hatcheries.

6. There should be a statutory ban on the export of indigenous finfish stocks.

Sources of Broodstock

1. All finfish gametes should remain in the ownership of the State by requiring that hatchery production for finfish farming be done under State permit and authority. Cultivation and in-state sale of broodstock and smolt by finfish farmers should not be prohibited.

2. The finfish farming industry should develop its own stocks under new State provisions for nonprofit finfish hatcheries.

3. New private nonprofit hatcheries under State authority would be required to rear broodstock for finfish farming operations.

4. The preferred initial source of broodstock is surplus hatchery eggs. Other sources include overescapement, cost recovery fish, and allocation by the Board of Fisheries.

Chapter 4

Environmental Impacts

1. The State should use existing siting guidelines to develop a set of criteria specifically applicable to finfish net pen farming in Alaska. These include the State of Washington's Recommended Interim Guidelines for the Management of Salmon Net-Pen Culture in Puget Sound and the Alaska Department of Natural Resources' Etolin Island Area Mariculture Pilot Project. Guidelines for siting should also reflect the Alaska Department of Fish and Game's disease and genetics policies.

2. The State should use the Consistency Review Process of the Alaska Coastal Management Program in permitting finfish farm sites. The Alaska Coastal Management Program provides "a framework for local and public participation in State decisions, and a mechanism for the resolution of conflicts between government agencies, individuals, and local communities." However, special provisions for public notice of finfish farming permit applications, including requirements for newspaper display ads with location maps and direct agency notification to interested parties, should be developed to encourage the greatest degree of public involvement.

3. Only nonlethal predator control measures, such as bird and mammal exclosure nets and electric fences, should be allowed for finfish farming.

User Conflicts

1. Area planning represents the best method of determining consistency of uses. However, where area plans do not exist, the consistency review process must allow for expanded public review to ensure consistency with activities that do not require State permits.

2. Fish farms and ancillary use of adjacent uplands must be compatible with zoning and designated uses of the uplands. No finfish farming should be permitted in waters adjacent to State and federal parks.

Chapter 5

1. The State should reduce its regulatory expenses by encouraging the use of private pathology services.

2. The finfish farming industry should pay economic rent for use of public resources. Forms of rent include local and state property taxes, state income taxes, sales taxes, permit fees, tideland leases, and a raw fish tax of three percent of the farm gate value.

3. Special provisions for public notice of finfish farming permit applications, including requirements for newspaper display ads with location maps and direct agency notification to interested parties, should be developed to encourage the greatest degree of public involvement. Applicants should bear the cost of these public notice provisions.

Chapter 6

Costs and Benefits Accruing to Alaska and its Residents

1. The State of Alaska should not subsidize finfish farming beyond the amount needed to regulate the industry.

Chapter 7

Marketability of Alaska Salmon

1. Alaska must develop a strategy to respond to its eroding market share for salmon sales.

2. A mandatory quality assurance and inspection program for the Alaska salmon industry that would include catcher boats, tenders, and processors should be implemented as soon as possible.

3. In conjunction with improved quality, marketing efforts should be expanded to include an aggressive, world-wide marketing program, extolling the virtues of Alaska wild salmon.

Chapter 8

1. The Legislature should resolve the issue of finfish farming by statutory permission or prohibition before the moratorium expires.

APPENDIX A

PRODUCTION SCENARIO FOR A 200 METRIC TON CHINOOK SALMON FARM

Appendix A presents a scenario for the operation of a hypothetical salmon farm in Alaska if enabling legislation were passed in 1990. The scenario is composed of 1) estimated timelines for the development of a marine net pen salmon farm and a fresh water hatchery; 2) an overview of the production of salmon, including a growth/mortality model, a production schedule, and a feeding and marketing model; and 3) an economic review, including a cash flow/operating expenses model and a brief discussion of the economic returns to the state.

The scenario assumes that the most economically viable finfish farm in Alaska would be a salt water net pen salmon facility with the following characteristics:

a. The size of an individual farm site, whether a family-operated farm or a corporate farm, would be between one and two surface acres. It would produce between 200 and 400 metric tons annually (100,000 to 200,000 fish), depending on the size of the fish and production.

b. The farm could be operated by a family with some part-time labor or by a corporation with three to five full-time employees.

c. Major infrastructure for a 200 metric ton farm includes six to eight 15 x 15 meter steel or plastic net pens, nets for each pen, anchors and lines for the farm, work boat, and a storage facility for supplies and fish feed.

I. ESTIMATED TIMELINE FOR THE DEVELOPMENT OF A CHINOOK SALMON FARM IN ALASKA

Table 1 provides an approximate timeline for the major steps in the development of a salmon farm, assuming that legislation providing for finfish farming is enacted in the 1990 legislative session. It includes the time frame for the development of the marine pen facility and for the development of a fresh water hatchery to serve the farm.

Table 1. TIMELINE FOR ESTABLISHING AN ALASKA FINFISH FARM

ACTIVITY	TIME
Finfish Farming Legislation enacted into law[1]	July 1990
Finfish Mariculture Regulations Adopted[2]	January 1991
Potential Applicants Identify Farm Locations, Broodstock Sources and Permit Requirements	July 1990 - April 1991
DNR Publishes Notice of Districts Open for Applications[3]	Prior to April 1, 1991
State Agencies Accept Consolidated Finfish Farm Applications	April 1, 1991 - June 1, 1991
State Review of Applications	June 1, 1991 - Dec. 1, 1991
All Necessary Permits Issued	December 1, 1991
Secure Supplier of Smolts (State or PNP Hatchery)[4]	Winter/Spring 1992
Smolt Supplier Begins Fresh Water Growth of Eggs/Fry	Fall 1992
Net Pens Placed in Water[5]	Spring 1993
Smolts Delivered to Marine Farm Site[6]	April - June 1993
Harvest/Sales Begin[7]	November 1994

[1]Assumes legislation enacted at the beginning of new fiscal year. Could be earlier depending on effective date of enabling legislation.

[2]Assumes agencies can promulgate regulations (similar to existing Aquatic Farm Regulations) in six months.

[3]Assumes finfish farming permit process to be similar to existing Aquatic Farm permit process.

[4]Assumes smolt production to be contracted out to an existing State or PNP hatchery. Eggs could be surplus to the hatchery, from cost recovery fish, or egg take from surplus wild stock.

[5]If surplus smolts were available, pens could go into the water as early as spring 1992.

[6]Assumes one year of fresh water growth for smolt before going into salt water. Another operation is to use "zero-check" smolt (no over winter of fish in fresh water, instead fry are placed directly into salt water).

[7]Sales begin after 19th month in marine growout facility and continue into the 25th month.

TABLE 1. (CONTINUED)

ACTIVITY	TIME
Development of Fresh Water Hatchery Facility:	
Identify Source of Fresh Water and Location of Hatchery[8]	July 1990 - January 1991
Application for Fresh Water Hatchery Permits	January 1991
Permits for Finfish Farm Hatchery Issued	November 1991
Eggs Placed into Hatchery[9]	July - October 1992
Smolt from Finfish Farming Hatchery Placed into Salt Water Pens	April - June 1993
Egg Take from Captive Broodstock	July - October 1995, 1996

[8]Assumes the fish farm company will develop its own fresh water hatchery at the same time as it develops the marine growout facility.

[9]Assume sources of eggs to be from one of the following: surplus eggs from existing hatcheries, cost recovery fish from PNPs, or wild egg take.

II. PRODUCTION OVERVIEW

The production cycle includes the following:

-egg take or purchase of fertilized eggs,
-incubation of eggs and the production of fry,
-fresh water rearing of fry to smolts,
-marine growout of juvenile salmon to market size, and
-marine growout of mature salmon for broodstock.

1. EGGS AND SPAWNING

Initial sources of eggs before a farm develops its own broodstock include purchase of either surplus eggs or eggs from cost recovery fish from existing State or private nonprofit hatcheries. A farm that produces 200 metric tons annually will require 100,000 smolt. Fifty-seven female chinook salmon would be required to produce 100,000 smolt, assuming 2,500 eggs per individual salmon and a 30 percent mortality rate from egg to smolt. [100,000 smolt/(2,500 eggs/female x 70% survival rate.]

Assuming a conservative male/female ratio of 1:2, a 200 metric ton farm will require about 85 chinook salmon. Thus, for a 10,000 metric ton industry, 4,250 adult chinook salmon are needed for broodstock annually.

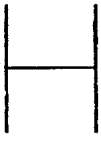
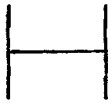
2. SIZES OF FISH

When fry emerge from the substrate and start feeding, they average about 0.4 grams each and are transferred into a freshwater raceway. At an average weight of twelve grams, they are transferred to the growout net pens in sea water. When they reach six to eight pounds, they are slaughtered and sold.

3. SCHEDULING THE PRODUCTION CYCLE

Scheduling is based primarily on the physiological activity of the fish in the different phases of operation and secondarily on economic considerations (e.g., when to harvest). Table 2 provides an outline of one complete production cycle. This table can be cross-referenced with Tables 3 and 4 to determine the sizes and the biomass of the production at various stages of the production cycle.

TABLE 2. PRODUCTION SCHEDULE FOR A SOUTHEAST ALASKA CHINOOK SALMON FARM

TASK	----YEAR 1 ----- JASONDJFMAMJ	----YEAR 2----- JASONDJFMAMJ	----YEAR 3----- JASONDJFMAMJ	----YEAR 4----- JASONDJFMAMJ
FRESH WATER GROWTH •EGG TAKE[1] •SPAWNING •FERTILIZATION •HATCHING[2]				
•FRY EMERGE FROM INCUBATOR[3] •TRANSFER TO PONDS •START FEEDING				
•SMOLTING •TRANSFER TO SALT WATER CAGES[4]				
SALTWATER GROWTH • FEED FISH • SEPERATE BY SIZE • MAINTAIN PROPER DENSITY • MAINTAIN FARM				
HARVEST/SALES START[5]				
BROODSTOCK • SPAWNING • FERTILIZATION • INCUBATION IN FW				

NOTES

1 Wild egg take or purchase from existing hatchery (state or PNP) until development of own broodstock
2 50 to 75 days after fertilization (900 Temp. Units)
3 100 to 150 days after fertilization
4 Smolting occurs 60 - 150 days after emerge from incubator
5 Sales begin after 19th month in marine growout facility

4. GROWTH AND MORTALITY MODELS

Growth and loss patterns are presented in Table 3 for the freshwater rearing stage and Table 4 for the salt water rearing stage. These tables can be used to aid in planning management strategies for stocking, transferring and grading farmed fish, installation of net pens, and timing sales. The tables assume a strategy of getting the largest smolts possible into saltwater as early in the year as possible to take advantage of seasonally warming ocean waters. The strategy also times sales in the winter months when wild salmon are in short supply.

The data in Tables 3 and 4 are based on the following assumptions:

a. The average size of fry is 0.4 grams when "buttoned up," during the month of November, and they are transferred to salt water as 12-gram (average) smolts.

b. The farm will experience a monthly mortality rate of one to two percent (fresh water cumulative mortality of approximately six percent and a salt water cumulative mortality of about 34 percent).

c. The average water temperature is approximately 12 degrees C for fresh water growth, and in salt water, the average temperature is 10 to 15 degrees C during summer months and above 6 degrees C in winter. (These temperatures were taken from data for mean monthly sea surface temperatures in southeast Alaska.)

d. Salt water growth rates for Chinook salmon are based on actual rates experienced in northern B.C. and at the NMFS Little Port Walter station in southeast Alaska.

e. Mortalities assume fish losses due to disease, precocity, predation, algae blooms, and unknowns. The model uses a B.C. industry-wide standard of two percent average mortality per month. Column 10 in Table 4 presents the cumulative mortality expressed in percentage of the original number of fish.

TABLE 3. GROWTH/MORTALITY MODEL FOR FRESH WATER REARING

MODEL OF A 100,000 FISH SALMON FARM

MONTH	MONTHS IN POND	NUMBER OF FISH	AVG WEIGHT FISH (g)	DAILY GROWTH RATE	% MORTALITY (Assumed)
November (start feed)	0	113000	0.4	0.000	0
December	1	110740	1.1	0.034	2
January	2	109633	2.7	0.030	1
February	3	108536	5.0	0.021	1
March	4	107451	8.0	0.016	1
April	5	106376	12.0	0.014	1

TABLE 4. GROWTH/MORTALITY MODEL FOR MARINE GROW OUT

MODEL OF A 100,000 FISH (INITIAL) PACIFIC SALMON FARM IN SOUTHEAST ALASKA

MONTH/YR	MONTHS IN GROWOUT	NUMBER OF FISH	AV. WEIGHT/ FISH (lbs.)	DAILY GROWTH RATE (%)	BIOMASS (lbs.)	MORTALITY % Assumed	NUMBER FISH LOST	BIOMASS LOST	CUMULATI % MORTAL
January (Year 1)									
February									
March									
April	0	100000	0.026		2600	0	0	0	0
May	1	95000	0.051	2.246	4845	5	5000	255	5.0
June	2	92150	0.100	2.244	9215	3	2850	285	7.9
July	3	91229	0.195	2.226	17790	1	922	180	8.8
August	4	90316	0.381	2.233	34410	1	912	348	9.7
September	5	89413	0.510	0.972	45601	1	903	461	10.6
October	6	88519	0.601	0.547	53200	1	894	537	11.5
November	7	87634	0.702	0.518	61519	1	885	621	12.4
December	8	86757	0.801	0.440	69493	1	876	702	13.2
January (Year 2)	9	85022	0.900	0.388	76520	2	1735	1562	15.0
February	10	83322	1.001	0.355	83405	2	1700	1702	16.7
March	11	82489	1.201	0.607	99069	1	833	1001	17.5
April	12	81664	1.450	0.628	118412	1	825	1196	18.3
May	13	80847	1.800	0.721	145525	1	817	1470	19.2
June	14	80039	2.600	1.226	208100	1	808	2102	20.0
July	15	79238	3.604	1.088	285574	1	800	2885	20.8
August	16	77653	4.350	0.627	337792	2	1585	6894	22.3
September	17	75324	4.805	0.332	361931	3	2330	11194	13.3
October	18	73817	5.405	0.392	398983	2	1506	8143	26.2
November (Sales Begin)	19	73079	5.955	0.323	435187	1	738	4396	26.9
December	20	72348	6.057	0.057	438214	1	731	4426	27.7
January (Year 3)	21	70901	6.206	0.081	440014	2	1447	8980	29.1
February	22	68774	6.305	0.053	433622	3	2127	13411	31.2
March	23	68087	6.406	0.053	436163	1	688	4406	31.9
April	24	66725	7.007	0.299	467541	2	1362	9542	33.3
May	25	66058	7.808	0.361	515778	1	667	5210	33.9

5. FEEDING AND MARKETING MODEL

The feeding and marketing model presented in Table 5 projects feed consumption, weight of fish, and sales revenue over the production cycle. It can be used to plan feed purchases, storage capacity, and sales revenue.

The model assumes an average conversion rate (pounds of feed required to produce one pound of salmon flesh) of 1.7, with a range of 1.3 to 1.9. This rate is based on actual data from the NMFS Little Port Walter research.

The model utilizes feed cost assumptions for extruded feed from Moore-Clark in LaConner, Washington. Extruded feed is more expensive than dry feed ($.46/lb. versus $.32/lb. FOB Sitka, Alaska).

The model assumes sales occur after the fish reach a six pound average to obtain maximum value for the crop. Thus, sales begin in November (the 19th month) of the second year in salt water and continue at a rate of 15 percent of the biomass through May (25th month).

III. ECONOMIC CONSIDERATIONS AND BUDGET ANALYSIS

Cash flow requirements for a 200 metric ton southeast Alaska Chinook salmon farm are presented in Table 6. Growth, mortality, and feed conversion rates and sales are from Tables 2, 3, and 5.

CAPITAL EXPENSES

Pens. The analysis assumes the use of premanufactured steel net pens, assembled and installed by the supplier. Two 15 x 15 meter net pens, necessary for initial smolt growth and required for the first year, cost $19,000 each. A total of four of these pens are required by the start of the second year. Two large 33 x 33 meter pens valued at $38,000 each are needed during the second year. Cost data are from Viking Pacific Seacage Systems (Oppdrett Service Canada LTD) in North Vancouver, B.C. The cost includes the cost of anchoring the cages. Also included in the model are two 15 x 15 meter wooden net pens in the second year to be used as mobile enclosures to transfer fish from one pen to another and for grading fish.

Nets. Nets for smaller pens are assumed to cost $3,000 each; the larger pens require nets assumed to cost $10,000 each. A space net is planned for each size. The cost also includes the price of a predator net. Nets have a life expectancy of five years. Replacement costs are included.

Power Plant. The model includes the purchase of a 20 kilowatt generator. Cost of maintaining and rebuilding it are included.

Boat. The model assumes a work boat is needed at a cost of $14,000 for boat and motor. Another $5,000 is needed every two years for motor replacement. A replacement boat is planned for year six.

TABLE 5. FEEDING/MARKETING MODEL

MODEL OF A 100,000 FISH (INITIAL) PACIFIC SALMON FARM IN SOUTHEAST ALASKA

MONTH/YR	MONTHS IN GROWOUT	BIOMASS (lbs.)	CONVERSION RATE	FEED CONSUMPTION (lbs./month)	CUMULATIVE FEED CONSUMPTION	FEED COST/ MONTH ($0.46/lb)	CUMULATIVE FEED COST	NUMBER OF FISH SOLD	AV. WEIGHT/ FISH (lbs.)	PRICE ($/lb)	GROSS SALES REVENUES
January (Year 1)											
February											
March											
April	0	2,600	0	0	0	0	$0	0	0.03	$0.00	$0
May	1	4,845	1.3	2,919	2,919	1,343	1,343	0	0.05	0.00	0
June	2	9,215	1.5	6,555	9,474	3,015	4,358	0	0.10	0.00	0
July	3	17,790	1.5	12,862	22,335	5,916	10,274	0	0.20	0.00	0
August	4	34,410	1.5	24,931	47,267	11,468	21,743	0	0.38	0.00	0
September	5	45,601	1.6	17,904	65,171	8,236	29,979	0	0.51	0.00	0
October	6	53,200	1.6	12,159	77,330	5,593	35,572	0	0.60	0.00	0
November	7	61,519	1.6	13,310	90,640	6,123	41,694	0	0.70	0.00	0
December	8	69,493	1.7	13,555	104,196	6,236	47,930	0	0.80	0.00	0
January (Year 2)	9	76,520	1.7	11,946	116,142	5,495	53,425	0	0.90	0.00	0
February	10	83,405	1.7	11,705	127,847	5,384	58,810	0	1.00	0.00	0
March	11	99,069	1.7	26,628	154,475	12,249	71,059	0	1.20	0.00	0
April	12	118,412	1.7	32,884	187,359	15,127	86,185	0	1.45	0.00	0
May	13	145,525	1.8	48,802	236,161	22,449	108,634	0	1.80	0.00	0
June	14	208,100	1.8	112,636	348,797	51,813	160,447	0	2.60	0.00	0
July	15	285,574	1.8	139,453	488,251	64,149	224,595	0	3.60	0.00	0
August	16	337,792	1.8	93,992	582,243	43,236	267,832	0	4.35	0.00	0
September	17	361,931	1.8	43,449	625,693	19,987	287,819	0	4.81	0.00	0
October	18	398,983	1.8	66,693	692,386	30,679	318,498	0	5.41	0.00	0
November (Sales Begin)	19	375,637	1.9	83,980	776,366	38,631	357,128	10,000	5.96	$2.06	$122,673
December	20	317,680	1.9	58,492	834,858	26,906	384,035	10,000	6.06	2.41	145974
January (Year 3)	21	256,925	1.9	8,291	843,149	3,814	387,849	10,000	6.21	2.77	171906
February	22	190,143	1.9	8,780	851,929	4,039	391,887	10,000	6.31	2.77	174649
March	23	127,197	1.9	3,825	855,753	1,759	393,647	10,000	6.41	2.77	177446
April	24	66,277	1.9	2,001	857,755	921	394,567	10,000	7.01	2.77	194094
May	25	0	1.9	0	857,755	0	394,567	9,459	7.81	2.77	216282
TOTAL				857755		$394,567		69,459			1203023

Note: Sales are assumed to begin in November of the second year (19th month) and continue at a rate of 10,000 fish/month through May of year 3 (25th month).
Sale prices are for round fish sold to processors.

TABLE 6 . CAPITAL AND OPERATING COSTS AND YEARLY CASH FLOW PROJECTIONS FOR 200 METRIC TON ANNUAL PRODUCTION

(Thousands of U.S. Dollars)

CAPITAL COSTS:	1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	TOTAL
Pens	76	86	0	0	0	0	162
Nets	15	32	0	0	0	15	62
Anchoring	5	5	0	0	0	1	11
Automatic feeders	1	1	0	0	0	1	3
Power plant	10	0	2	0	0	10	22
Equipment	8	8	5	10	10	10	51
Accomodations	100	0	0	0	0	0	100
Boat	14	0	5	0	5	9	33
Miscellaneous	20	16	8	8	8	8	68
Depreciation	19	29	29	29	29	29	164
TOTAL CAPITAL EXPENSES	268	177	49	47	52	83	676
OPERATING EXPENSES:							
Smolts ($0.50 each)	50	50	50	50	50	50	300
Feed	48	340	395	395	395	395	1968
Labor	104	104	104	104	104	104	624
Management	50	50	50	50	50	50	300
Insurance	6	52	93	93	93	93	430
Medicine/Vet.	8	8	8	8	8	8	48
Maintainance & Fuel	16	16	16	16	16	16	96
Contingency	24	24	24	24	24	24	144
TOTAL OPERATING EXPENSES	306	644	740	740	740	740	3910
TOTAL EXPENSES	574	821	789	787	792	823	4586
SALES REVENUE	0	441	1203	1203	1203	1203	5253
NET REQUIREMENT	($574)	($380)	$414	$416	$411	$380	$667
CUMULATIVE NET REQUIREMENT	($574)	($954)	($540)	($124)	$287	$667	

Return on investment = net req./total investment

Equipment. This category covers everything from diving gear and hydraulic winches to water testing equipment and rain gear.

Accommodations. The model assumes the farm will conduct support activities from a barge attached to the net-pen structure. The facilities include living quarters, storage shed for feed, work shop, lab, and office. It is budgeted to cost $100,000.

Depreciation. Net pens, accommodations, power plant, and boat are depreciated at 10 percent per year for a ten-year useful life.

OPERATING EXPENSES

Smolts. The model assumes the farm will initially purchase smolts until its own broodstock mature. The cost per smolt is assumed to be $.50.

Feed Costs. Costs are based on quotes from Moore-Clark's Washington plant for container shipments from Seattle, with freight rates for delivery in Sitka provided by Lynden Transfer.

Labor. The cost of a farm manager is budgeted at $50,000.The salaries of five production employees (production supervisor, two culturists, and two laborers) are budgeted at $104,000 per year. The culturist and laborer positions are budgeted at $8 per hour. For both the laborer and culturist positions, one eight-hour shift per day is required during the six months of reduced daylight, and two eight-hour shifts per day are required for the other six months. Supervisor wages are budgeted at $10 per hour and the position is full-time year round.

Insurance. Insurance coverage for fish stocks is calculated at four percent of the market value of the fish held in net pens, which is the B.C. industry standard.

Medicine/Veterinarian. This $8,000 is based upon the expenses of a B.C. farm for vaccinations and pathology services performed by private veterinarians and pathologists.

Sales revenue. The model assumes a farm site price of $2.77 per pound round weight.

ECONOMIC RETURN TO THE STATE OF ALASKA

The state will receive economic rent from the finfish farming industry in the following ways:

Aquatic farm product tax for finfish. This revenue is estimated to be three percent of the farmgate value (gross sales). This tax is similar to the raw fish tax. For a farm that produces 200 metric tons annually, the estimated annual gross sales revenue is $1,203,000 (from Table 6, assuming the farm is operating at capacity). Thus, the aquatic farm product tax for a 200 metric ton farm would be $36,090 annually. For a 10,000 metric ton industry (fifty 200 metric ton farms), the total annual farm product tax is estimated at $1,804,500. Note that the revenue from this tax is split evenly between the local municipality or borough and the State.

Tideland lease from the State. Currently, there are no tideland leases from the State for shellfish farms; as a result, no estimates are available. However, the revenue to the State from the tideland lease is based on the appraised fair market value. An average farm of two surface acres would lease the amount of tideland utilized, which includes the area up to location of the anchors. Thus, depending on depth, current, and location, the area of the lease would range from approximately 10 to 20 acres per farm.

Permit fees. Current fees include a $50 filing fee, $100 annual permit fee, and a $50 per acre fee if utilizing a permit rather than a lease for tideland use.

Corporate income tax. Estimated at $4,500 up to the first $90,000 of net income, plus 9.4 percent of all net income over $90,000.

Local property tax. Varies depending on the municipality or borough in which the farm is located.

Local sales tax or raw fish tax. This revenue varies depending on whether the local taxing authority has a sales or raw fish tax, and whether the farm is located inside a local taxing authority (municipality or borough).

APPENDIX B

IMPACT OF FARMED SALMON PRODUCTION ON SALMON PRICES

Increased worldwide production of farmed salmon has put downward pressure on the price of Alaska wild salmon. Alaska's salmon fishermen are concerned that production of Alaska farmed salmon will further this price erosion. With available data, we can estimate a range for the lost revenue to Alaska commercial fishermen resulting from an increase in the production of farmed salmon.

In Appendix A, the operation of a 200 metric ton salmon farm is described. The task force has envisioned that over a period of 5 to 15 years from the date finfish farming may be permitted, the industry will grow slowly from 10 to 100 fully productive farms of about 200 metric tons each.

Recent estimates of the elasticity of demand for pacific salmon can be used for a rough estimate of the effect that a farmed salmon industry in Alaska could have on the price of Alaska wild salmon.

It is difficult to provide an accurate estimate of the elasticity for salmon since demand for salmon is increasing and the composition of production is changing with more farmed salmon on the market. Also, the elasticity of demand for salmon depends on the markets in which it is sold. The results provided here should be considered ballpark estimates.

From elasticities provided in Anderson (1988), assuming our maximum estimate of 100 farms each producing 200 metric tons, and assuming a world production of 568,000 metric tons with an exvessel price of $3.00 per pound, we get a range of loss to the Alaska commercial fishing industry due to a decline in price of $15-51 million (See Table 1).

The lower end of this range would occur if wild and farmed salmon competed mostly in the Japanese market, a likely scenario. The high end assumes competition only in the expensive seafood restaurant market, less likely since this market could not absorb more than a small fraction of the total production of wild salmon.

These estimates are based on mostly negative assumptions. It is unlikely that the Alaska salmon farming industry would produce 20,000 metric tons for many years to come. Also, most farmed salmon fills market niches that do not compete with wild salmon. Also, the markets that would be targeted by Alaska farmed salmon producers would likely be filled by another producer if Alaska does not permit finfish farming.

The contribution of salmon farms to the economy may be larger than the negative effects. Refer to Appendix A for information on the economic benefits of salmon farming.

TABLE 1
IMPACT OF ALASKA FARMED SALMON ON ALASKA PRICES

	ELASTICITY	CURRENT PRICE PER LB.	WORLD PACIFIC SALMON (MT)	ALASKA CATCH (MT)	HYPOTHETICAL ALASKA FARM OUTPUT (MT)	RESULTING PRICE CHANGE PER LB.	LOSS TO AK COM. FISHING
N.E. SUPERMARKETS	-1.69	$3.00	568,000	200,000	200	(0.00)	($275,023)
N.E. FISH STORES	-2.19	$3.00	568,000	200,000	200	(0.00)	($212,232)
EXPENSIVE SEAFOOD	-0.9	$3.00	568,000	200,000	200	(0.00)	($516,432)
JAPANESE TRADERS	-3.1	$3.00	568,000	200,000	200	(0.00)	($149,932)
N.E. SUPERMARKETS	-1.69	$3.00	568,000	200,000	1,000	(0.00)	($1,375,115)
N.E. FISH STORES	-2.19	$3.00	568,000	200,000	1,000	(0.00)	($1,061,161)
EXPENSIVE SEAFOOD	-0.9	$3.00	568,000	200,000	1,000	(0.01)	($2,582,160)
JAPANESE TRADERS	-3.1	$3.00	568,000	200,000	1,000	(0.00)	($749,659)
N.E. SUPERMARKETS	-1.69	$3.00	568,000	200,000	10,000	(0.03)	($13,751,146)
N.E. FISH STORES	-2.19	$3.00	568,000	200,000	10,000	(0.02)	($10,611,615)
EXPENSIVE SEAFOOD	-0.9	$3.00	568,000	200,000	10,000	(0.06)	($25,821,596)
JAPANESE TRADERS	-3.1	$3.00	568,000	200,000	10,000	(0.02)	($7,496,592)
N.E. SUPERMARKETS	-1.69	$3.00	568,000	200,000	20,000	(0.06)	($27,502,292)
N.E. FISH STORES	-2.19	$3.00	568,000	200,000	20,000	(0.05)	($21,223,230)
EXPENSIVE SEAFOOD	-0.9	$3.00	568,000	200,000	20,000	(0.12)	($51,643,192)
JAPANESE TRADERS	-3.1	$3.00	568,000	200,000	20,000	(0.03)	($14,993,185)

(1) FROM "WORLD MARKETS FOR SALMON: PEN REARED SALMON IMPACTS"

ELASTICITIES ARE FROM P.189.
PACIFIC SALMON PRODUCTION IS FOR 1987 P.73.

THESE IMPACTS ASSUME ALASKA FARMED SALMON COMPETES ONLY WITH PACIFIC SALMON AND DOES NOT ACCOUNT FOR INCREASING DEMAND FOR SALMON.

TO THE EXTENT THAT ALASKA FARMED SALMON COMPETES WITH ATLANTIC SALMON AND AS DEMAND INCREASES, THE IMPACT ON ALASKA COMMERCIAL FISHING INDUSTRY DIMINISHES.

APPENDIX C

SUMMARY OF TASK FORCE ACTIVITIES

CREATION OF THE TASK FORCE

The Alaska Finfish Farming Task Force was created by the Alaska Legislature under Chapter 145, SLA 1988; the effective date of the act was June 9, 1988.

Under Ch. 145, SLA 1988, the task force was charged with providing an interim report, due by January 30, 1989, and a final report, due by January 30, 1990, to the Legislature addressing "finfish farming in fresh water, in marine environments, and in tanks or other enclosed structures that contain marine water and that are located on land." The task force was also to consider related hatchery operations.

The legislation directed the task force to examine:

(1) whether the farming of finfish can be conducted in a manner that protects the health of the state's fishery resources;

(2) criteria for the siting of finfish farms to minimize land use conflicts and to protect the environment;

(3) net economic costs and benefits of finfish farming in the state to state residents, including jobs created or lost for state residents, tax revenue (assuming an appropriate tax rate), cost of State regulation and monitoring, and effects on markets for salmon caught by the state's commercial fishing fleets;

(4) the cost of providing adequate regulation of finfish farming to protect wild stocks, the environment, public health, and existing beneficial uses of the state's coastal water and land, and the role of the private sector in providing pathological and other services;

(5) identification and analysis of appropriate sources of supply of stock for finfish farms, including but not limited to private nonprofit hatcheries, private for-profit hatcheries, and wild stocks, and their likely effect on existing state policy; and

(6) strategies for improving the marketability of Alaska salmon, particularly those high-value species competing with farmed salmon for domestic and export sales.

No funds were appropriated for task force operations until the 1989 legislative session. As a result, the original deadline for the interim report passed before the task force was established.

Following the 1989 legislative session, the Office of the Governor began organizing the task force. For administrative purposes, the task force was located in the Office of the Governor, Division of Administrative Services. A project coordinator was hired in late June.

TASK FORCE MEMBERS

In late July 1989, Governor Cowper appointed the following task force members: Ken Castner, representative of commercial salmon fishermen; Mary Lou Cooper, public member; Gordon Harrison, private economist; Theodore Merrell, fisheries biologist; and Brent Paine, aquatic farming advocate. Mary Lou Cooper was designated chairman.

In August 1989, Gordon Harrison resigned from the task force to take a job as director of the Legislative Research Agency. Under Ch. 145, SLA 1988, State employees were not permitted to serve as task force members. John Weddleton was appointed as Mr. Harrison's replacement in September 1989.

On October 16, 1989, Mary Lou Cooper resigned as chairman while continuing to serve on the task force. Theodore Merrell was elected chairman by unanimous consent of the task force.

FUNDING

During the 1989 session, the Legislature appropriated $50,000 to the task force. Of this, $16,600 was appropriated for FY 89 and $33,400 was appropriated for FY 90. Because task force activity did not commence until after July 1, 1989, the appropriation for FY 89 lapsed.

In September 1989, the task force received $10,000 from the Department of Commerce and Economic Development through a reciprocal service agreement (RSA). In early November 1989, the Legislative Council awarded $10,000 to the task force. In total, the task force had $53,400 to spend on its efforts.

TASK FORCE MEETINGS

The task force held a series of meetings for the purpose of collecting information and developing its report to the Legislature.

The meetings are briefly described below. A list of persons testifying at each meeting is provided. For additional information, see the minutes of the meetings in Appendix D.

July 31, 1989, Juneau

Topics: Review enabling legislation and budget; develop goals and objectives; plan future activities.

Individual Testifying:

Deborah Greenberg, Special Assistant, Alaska Department of Fish and Game

September 6 & 7, 1989, Anchorage

Topics: Disease, genetics, and broodstocks; report format.

Note: While in Anchorage, task force members also attended various sessions of the American Fisheries Society Convention concerning aquatic farming and related issues.

Individuals Testifying:

Conrad Mahnken, National Marine Fisheries Service, Northwest and Alaska Fisheries Center
Dr. Lee Harrell, National Marine Fisheries Service, Northwest and Alaska Fisheries Center
Dr. Brian Allee, Director of Fisheries Rehabilitation, Enhancement and Development, Alaska Department of Fish and Game
Alex Wertheimer, National Marine Fisheries Service, Auke Bay Laboratory

September 27 & 28, 1989, Juneau

Topics: Siting and marketing; presentation from Tim Kennedy, Cordova fisherman and part owner of fish farms in Washington and British Columbia; presentation from Bill Heard, with the National Marine Fisheries Service, Auke Bay Laboratory.

Individuals Testifying:

Laura Dameron, Southeast Alaska Conservation Council
Rodger Painter, Alaska Mariculture Association
Diane Mayer, Office of the Governor, Division of Governmental Coordination
Janet Burleson, Department of Natural Resources, Division of Land and Water Management
Brian Allee, Department of Fish and Game, FRED Division
Sonja Corazza, United Fishermen of Alaska
Tim Kennedy, commercial fisherman and salmon farm owner
Paul Peyton, Department of Commerce and Economic Development, Division of Business Development
Bill Atkinson, Private Consultant on Japanese markets for seafood (by teleconference)
Bill Heard, National Marine Fisheries Service, Auke Bay Laboratory

October 16 & 17, 1989, Juneau

Topics: Review of previous findings; broodstock ownership, siting, disease, genetics; and commercial fisheries economics, regulation, and management.

Individuals Testifying:

Dr. Anthony Gharrett, University of Alaska and National Marine Fisheries Service
Gale Good, Alaska Trollers' Association
Sonja Corazza, United Fishermen of Alaska (by teleconference)
Ken Parker, Director, Alaska Department of Fish and Game, Division of Commercial Fisheries
Rodger Painter, Alaska Mariculture Association

November 5 & 6, 1989, Juneau

Topics: Regulating finfish farming; costs and benefits of a finfish farming industry; marketing issues; findings and recommendations.

Individuals Testifying:

Chip Toma, private citizen
Rick Harris, Sealaska Corporation

December 5, 1989, Work Session by Teleconference

Topic: Review of draft report and public comments received.

December 18, 19 & 20, 1989

Topic: Finalize report to Legislature.

ADDITIONAL ACTIVITIES

September 24 - 26, 1989, Tour of Puget Sound Fish Farms

On September 24, 25, and 26, task force members Ken Castner, Mary Lou Cooper, Theodore Merrell, and Brent Paine toured finfish farms in the Puget Sound area. Also present on the tour were Rick Harris, Sealaska, Tom Moyer, Legislative Aide to Sen. Bettye Farhenkamp, and Jon Sherwood, project coordinator for the task force.

On the afternoon of September 24, the task force visited the Squaxin Island marine pen fish farm and ocean ranching facility and viewed the proposed site of Swecker Farms marine pen fish farm, both in south Puget Sound.

On the morning of September 25, the task force .visited Swecker Farms' processing facility in Olympia and its fresh water tank farm and hatchery facility in Rochester. That afternoon, the task force visited the Sea Farms Washington marine pen fish farm at Port Angeles. In addition, the task force conducted an aerial inspection of several marine pen operations in north Puget Sound.

On the evening of September 25, the task force met with representatives of the Marine Environmental Coalition, a group opposed to most aquatic farming in Puget Sound.

On the morning of September 26, the task force met with several members of the University of Washington faculty, addressing to them questions on disease, genetics, broodstock development, environmental impacts and research activities.

The faculty members were Dr. Ken Chew, Dr. Marsha Landolt, Dr. Bill Hershberger, Dr. Bob Stickney, and Dr. Donald Weston.

The trip to Puget Sound was hosted by Sealaska Corporation. The task force paid for its airfare to and from Seattle and for its food and accommodations. Sealaska Corporation paid for transportation within Washington and for the rental of a meeting room at the University of Washington campus for the morning of September 26. (An ethics report is on file with the Department of Law.)

November 17, 1989, Draft Report Released

On November 17, the task force released its interim report, including the draft version of its final report, to the Alaska Legislature. By November 20, copies of the report were mailed to the 130 people on the task force's mailing list, as well as all of the Legislative Information Offices.

A press release announcing the release of the report was also sent out. The task force received additional requests for the report. Eventually, a total of approximately 300 copies of the report were distributed to interested parties.

The task force received over seventy separate written comments on the draft report.

Throughout its existence, the task force gathered relevant information on finfish farming. Individual task force members collected data on various related topics, and information sent the task force from any source was distributed to the task force or (in the case of a few lengthy documents) summarized for the task force by the project

coordinator or a task force member. (See Appendix F, Bibliography, for a complete listing of sources.)

The task force developed a mailing list numbering approximately 150, including legislators, state and federal officials, various advocacy groups, and interested members of the press and public. Anyone who asked was put on this mailing list. After each meeting, the task force sent out letters summarizing the meeting and setting forth upcoming task force activities.

APPENDIX D

MINUTES OF MEETINGS

ALASKA FINFISH FARMING TASK FORCE
July 31, 1989

MINUTES

The meeting was called to order at 9:00 by Mary Lou Cooper, Chairperson of the Task Force. Task Force members present were: Mary Lou Cooper, Ken Castner, Gordon Harrison, Ted Merrell, and Brent Paine. No members were absent.

Mary Lou Cooper introduced the members of the task force and staff to the audience. Members of the audience identified themselves.

Mary Lou Cooper reviewed the rules and methods of operation of the Task Force.

Jon Sherwood, project coordinator for the Task Force, provided a brief overview of the legislation authorizing the Task Force. He explained that the Task Force is to produce an interim report by December 1, 1989 and a final report by January 15, 1990. He also reviewed the Task Force's budget. The Task Force is funded for $33,000.

Task Force members then engaged in a discussion of their goals and how they would like to achieve them. Ted Merrell stated that the American Fisheries Society was holding its annual meeting in Anchorage in September and there would be a symposium on pen rearing salmon at the meeting. The Task Force decided to meet in Anchorage during the AFS meeting to take advantage of the expertise that would be available there.

Deborah Greenberg, Special Assistant with the Department of Fish and Game, addressed the Task Force on the legislative history of aquatic farming in Alaska. She then explained the Cowper administration position on mariculture. She also summarized the issue papers on finfish farming prepared by the interagency working group on mariculture. The issues included land use, water quality, disease, brood stock, habitat protection and product wholesomeness.

Ted Merrell asked whether minutes of the meetings would be provided. The Task Force decided that minutes indicating who spoke, the general topics, any formal decisions, and a list of observers should be kept.

The Task Force held a discussion of the topics for consideration included in its authorizing legislation. Members asked questions and exchanged information on finfish farming. Much of this discussion focused on the issue of minimizing land use conflicts. The task force identified a number of people to contact for additional information on this issue.

At 12 p.m., the Task Force adjourned for lunch.

The meeting was reconvened at 1:20 p.m. The task force members continued their discussion of the issues contained in the authorizing legislation. As each issue was discussed, contact persons were identified.

The issue of broodstock was addressed briefly. The task force then returned to their discussion of land use conflicts and siting.

Mary Lou Cooper raised the cost-benefit issue. Gordon Harrison stated that it would be a major task and depend on the assumptions made by the task force. Task force members discussed loss of jobs in the fishing industry, market niches, reasons for farming finfish, the cost of regulation, taxation of finfish farming, and the need to look at the three possible types of farming operations: freshwater, upland tanks, and marine pens.

Jon Sherwood handed out travel authorization forms for reimbursement of travel and per diem costs. He also passed out an article on salmon farming provided to the task force by Frank Homan, of Senator Sturgulewski's staff.

The task force discussed the cost of regulation issue contained in the authorizing legislation. Ken Castner said that this issue duplicated parts of the cost-benefit issue, except that it addressed the role of private sector in regulation. He stated that this role is a policy question. A brief discussion was held on this issue.

Mary Lou Cooper raised the issue of broodstock sources. Ken Castner suggested that the task force should review the debate before the Board of Fisheries in December of 1988. Brent Paine stated that he had put together papers on broodstock supplies while working for the Legislature. The task force discussed the practical and policy issues associated with supply of broodstock.

The task force discussed the issue of improving the marketability of Alaska salmon. Ken Castner suggested calling the producers of the Seafood Report radio program in Kodiak for the name of a good marketing person. Mary Lou Cooper mentioned ASMI as a possible resource. Ted Merrell suggested contacting the Alaska Trollers Association.

Ken Castner commented on how the task force members should conduct themselves in public. He said he did not want to see the task force members be perceived as public experts, and suggested that task force members keep their comments private. He stated that he did not want to do anything to poison or damage the quality of the task force's report.

Following the discussion of the issues, it was decided to divide the topics for consideration into five subjects: siting, cost-

benefit analysis, the amount and cost of regulation, broodstock-genetics-disease.

The task force discussed how to proceed. It was decided that each member would take one topic and work with Jon Sherwood to prepare a presentation for one of the meetings.

Ken Castner stated that he would like to teleconference with the other task force members for an hour or so before the next meeting. The task force agreed to do so, acknowledging that Gordon Harrison, and possibly Ted Merrell, would be unavailable to participate.

Mary Lou Cooper offered to take the marketability issue, Brent Paine the broodstock-genetics-disease issue, Gordon Harrison the cost-benefit analysis, Ted Merrell the siting issue, and Ken Castner the cost of regulations.

The task force briefly discussed the structure and intent of the marketability issue.

The task force decided to address the regulation and broodstock-genetics-disease issues at the next meeting. It was decided that the siting and marketing issues would be addressed at a meeting in the last week in September, and the cost-benefit issue would be addressed in an October meeting.

Ken Castner stated that he would like to have Jon Sherwood begin working on early drafts of the report soon. He said that the task force should devote 25 percent of its time to discuss writing.

The task force members updated their addresses and phone numbers for one another. The meeting was adjourned at approximately 5:30 p.m.

List of persons in attendance

Greg Erickson
Deborah Greenberg
Rick Harris
Sheila Helgath
Frank Homan
Eric King
Karl Ohls
Sandy Perry

APPROVED 9/7/89

ALASKA FINFISH FARMING TASK FORCE

September 28 & 29, 1989

MINUTES

The meeting was called to order at 8:35 a.m. on Thursday, September 28, by Mary Lou Cooper, Chairman. All task force members were present: Mary Lou Cooper, Ken Castner, John Weddleton, Ted Merrell, and Brent Paine.

Members of the task force introduced themselves to the new task force member, John Weddleton. Jon Sherwood introduced Fran Armon, who assists Jon in the office, providing administrative support for the task force.

Ken Castner reviewed the task force's past activities for John Weddleton. He listed the five catagories of issues under consideration: broodstock, genetics, and disease; siting; cost of regulation; markets/marketing; and benefits and costs. Brent Paine reviewed the minutes from the last meeting for John Weddleton to provide a general idea of what the task force has accomplished to date.

The task force discussed siting issues, including local control, conflict minimization, environmental concerns, and the Washington interim guidelines for siting.

The task force members identified questions for Bill Atkinson, a fish marketing consultant, to be faxed to Atkinson so he would be prepared to answer them during the conference call on Friday.

Laura Dameron, with SEACC, spoke with the task force stating her concerns: impacts of the coastal environment and socio-economics and lifestyle impacts. SEACC opposes all fish farming because of upland impacts, pollution, water demands, and the potential loss of desire for habitat protection.

Rodger Painter, with the Alaska Mariculture Association, spoke with the task force on the need for rational policy guidelines for siting of finfish farms. He pointed out that state regulations for shellfish farming provide for local control and that the Washington interim siting guidelines address important siting criteria. He also offered his thoughts concerning the economic viability of finfish farming and how state regulation might affect it.

The task force adjourned for lunch and reconvened at 1:30 p.m.

Diane Mayer, with the Division of Governmental Coordination, discussed the state's Project Consistency Review procedures for use of coastal waters.

Janet Burleson, with the Division of Land and Water Management, discussed how the state's permitting process works for aquatic farms.

The task force addressed several questions to Brian Allee, Director of the FRED Division, Department of Fish and Game.

Sonja Corazza, with United Fishermen of Alaska, discussed negative impacts of finfish farming. Her concerns were that pens change the habitat of wild fish, that fish escape in large numbers, and that marketing farmed salmon on Alaska wild salmon quality is wrong. She also addressed siting issues, stating that area planning is very important. She suggested requesting mapping positions with the Department of Natural Resources and the Department of Fish and Game to consolidate habitat and use charts for public use.

The meeting was adjourned at 5:15 p.m.

The meeting was reconvened Friday at 8:30 a.m. by Ken Castner. Due to illness, Mary Lou Cooper was not present; all other members were present.

The task force approved the minutes of the last meeting with amendments. They then discussed the draft of the report's introduction and health of the fisheries section and suggested changes to be incorporated by the project coordinator.

Tim Kennedy, commercial fisherman and salmon farm owner, spoke with the task force. He stated that Alaska finfish farming would not be economically viable without raising Atlantic salmon, and noted that he would not start a fish farm up here.

Paul Peyton, with the Division of Business Development, discussed the economics of fish food production and addressed the outlook for salmon in world markets.

The meeting was adjourned for lunch at 11:25 a.m. and reconvened at 12:45 p.m.

The task force reviewed the siting issues discussed the previous day.

Bill Atkinson, expert on Japanese markets for seafood, was contacted via a conference call. Atkinson addressed several questions on Japanese markets for seafood and the impacts of farmed salmon on these markets.

Bill Heard, with the National Marine Fisheries Service at Auke Bay Laboratories, addressed research in raising salmon at Osprey Bay. He stated that indigenous species could be raised successfully, although he could not speak about the economic viability.

The meeting was adjourned at 5:00 p.m.

Minutes approved October 17, 1989

List of persons in attendance:

Brian Allee, Department of Fish and Game
Susan Bradley, Coastal Zone Management
Janet Burleson, Division of Land and Water/Department of Natural Resourses
Sonja Corazza, United Fishermen of Alaska
Laura Dameron, Southeast Alaska Conservation Council
Bill Heard, National Marine Fisheries, Auke Bay Laboratories
Sheila F. Helgath, Legislative Research
Frank Homan, Senator Sturgulewski's staff
Bill Janes, Environmental Conservation
Tim Kennedy, Fish Farm Owner
Amy Kruse, Environmental Conservation
Diane Mayer, Division of Governmental Coordination/Office of the Governor
Robert Mikol, Northern Deep Sea Fisheries, Inc.
Rodger Painter, Alaska Mariculture Association
Sheila Peterson, Senator Eliason's staff
Paul Peyton, Commercial Fisheries Development/Department of Commerce and Economic Development
Rick Reed, Habitat Division/ Department of Fish and Game
Lana Shea, Habitat Division/ Department of Fish and Game
John S. Thiede, Department of National Resources

ALASKA FINFISH FARMING TASK FORCE
September 6 & 7, 1989

MINUTES

The meeting was called to order at approximately 1:30 p.m. on September 6 by Mary Lou Cooper, Chairperson. Task force members present were Mary Lou Cooper, Ken Castner, Ted Merrell, and Brent Paine. No members were absent.

Mary Lou Cooper noted that Gordon Harrison had resigned his position on the task force to take a job with the Legislative Research Agency. She stated that the Governor's Office had not found a replacement for Mr. Harrison at that time.

The task force discussed the questions it wanted to resolve at the meeting, a proposal from Sealaska Corporation to tour operating farms in the Puget Sound area, and correspondence received from Sen. Fahrenkamp regarding the task force.

Conrad Mahnken, with the National Marine Fisheries Service, Northwest and Alaska Fisheries Center (NWAFC), joined the task force in a discussion of the genetic and broodstock issues. Both Atlantic and Pacific salmon were discussed..

Dr. Lee Harrell, fish pathologist with NWAFC, discussed the incidence of disease in pen-reared salmon and the potential for spreading disease to the wild stock.

At approximately 5 p.m., the task force adjourned for the afternoon.

The task force reconvened at 9 a.m. on September 7. Dr. Brian Allee, director of the Alaska Department of Fish and Game FRED Division, discussed disease, genetics, and broodstock issues with the task force.

Dr. Allee spoke to the state's existing hatchery programs, efforts to cultivate indigenous species of finfish, and the concept of creating areas free of salmon farming near critical salmon streams.

After breaking for lunch, the task force continued their discussion of Sealaska's invitation to take the task force on a tour of finfish farming operations in Puget Sound. The task force decided to accept the invitation.

The task force discussed the report with project coordinator, Jon Sherwood, who outlined some of the options for structuring the report. The task force directed the project coordinator to begin writing the report using an issue-by-issue format.

Alex Wertheimer, with the National Marines Fisheries Service, Auke Bay Laboratories, spoke to the task force regarding protection of the wild salmon stocks from disease.

The task force approved the minutes of the last meeting. Ken Castner requested that the word "produces" on p. 2 be corrected to "producers." The task force concurred.

The task force discussed developing its preliminary recommendations on the disease, genetics, and broodstock issues.

The task force then enacted its preliminary recommendations as follows:

-- Only indigenous broodstocks should be used in finfish farming in Alaska. No stocks should be imported from out of state.

-- The State will need to allow the use of private pathology services for the finfish farming industry to grow.

-- Current state policies on disease control should be applicable to finfish farming.

The meeting was adjourned at approximately 5 p.m.

ALASKA FINFISH FARMING TASK FORCE
October 16 & 17, 1989

MINUTES

The meeting was called to order in Juneau at 8:34 a.m. on October 16 by Mary Lou Cooper, Chairman. Task force members present included Ken Castner, Mary Lou Cooper, Ted Merrell, Brent Paine, and John Weddleton.

Ms. Cooper announced her resignation as chairman and asked for the selection of a new chairman. By unanimous consent, the members approved Ted Merrell as the new chairman of the task force. Brent Paine took over as chairman of this day's meeting.

Jon Sherwood, project coordinator of the task force, apprised the members that state ethics requirements compel the members to report the services they received from Sealaska Corporation during the September meeting. Although the services do not constitute a conflict of interest, each member must report receipt of those services. Jon Sherwood will submit the required report on behalf of task force members.

Mr. Castner presented an Alaska Native Brotherhood resolution opposing finfish farming and a 1987 study on how commercial fishing affects Homer.

After reading various materials, the members discussed the format of the task force report. They reviewed a series of questions to ask Dr. Anthony Gharrett, a biologist with the University of Alaska Southeast Auke Bay Laboratory and the National Marine Fisheries Service. Mr. Gharrett made comments concerning the destrction of discrete genetic pools in the Pacific Northwest and encouraged the task force to prevent that occurence in Alaska.

Mr. Merrell recounted his interviews with state officials regarding the relationship among state resource agencies, the permitting process, siting issues, and the establishment of sanctuaries. The members talked about these issues, the role of infrastructure for the economic survival of mariculture, and the question of public versus private ownership of broodstock.

The task force then discussed siting. Mr. Castner stressed the importance of this issue by stating that "siting is everything in this game" and that any legislation authorizing finfish farming should contain a fiscal note that reflects the costs of siting. Mr. Paine agreed and said that conflict and confrontation can be diffused if siting is set up properly.

Members concurred that the proper siting of finfish farms should address the transference of disease, genetic interference with wild stocks, environmental degradation, aesthetic degradation, conflicts with existing users, avoidance of marine mammals, avoidance of water-borne organisms lethal to the farmed stock, and avoidance of conflict with designated uplands or neighborhood uses.

Members also wanted to include mention of the state of Washington's interim guidelines for siting and of the Alaska Coastal Zone Management Plan's permitting process for resolving siting issues.

Mr. Paine suggested that siting and the permitting process should be addressed as two separate issues. Mr. Merrell suggested that the Alaska Coastal Zone Management Plan's permitting process be used as a model for the finfish farming permitting process. He then asked for clarification on the structure of the task force report. Mr. Sherwood outlined the distinctions between conclusions and findings. Conclusions, he explained, should be statements of public policy. Findings should be points of agreement among the task force members on matters of fact.

Members then discussed the permitting process. Ms. Cooper and Mr. Merrell supported the inclusion of maps in the public notification process. Questions then arose about the adequacy of the state's inventory of sites.

At 10:30 a.m., Dr. Anthony Gharrett discussed disease and genetics among salmon, the homing habits of various salmon species, siting, how the Alaska Department of Fish and Game enforces its genetics guidelines, the genetic differences that exist among lakes within the same area, patentable gamete production, and the aquaculture research by Japan and the Soviet Union. He distributed a proposal calling for the Alaska Department of Fish and Game to implement its genetic policy by establishing, on a regional basis, sanctuaries for wild fish populations. Mr. Gharrett entertained questions from the members until 11:35. Discussion then returned to siting and permitting.

After lunch, the task force members heard testimony from Gale Good, member of the Alaska Trollers' Association. Mr. Good described his industry and voiced his opposition to finfish farming.

The members spent the rest of the day discussing findings and conclusions relating to siting. Specific issues addressed were: water quality; effluents; water circulation; the use of uplands; predation; disease; aesthetics;

pollution; user conflicts; having finfish farmers produce annual performance reports to governmental agencies; the distinctions among marine pens, marine upland tank facilities, and freshwater upland facilities; distances between farms and wild anadromous streams; distances between farms; and, the incremental implementation of finfish farming.

The meeting was adjourned at 5:14 p.m.

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The task force reconvened at 8:45 a.m. on October 17. John Weddleton presided over the day's meeting. Task force members present included Ken Castner, Ted Merrell, Brent Paine, and John Weddleton. Due to illness, Mary Lou Cooper was absent.

The members adopted, with corrections, the minutes from the September 28 and 29 task force meeting and briefly discussed broodstock issues.

At 9:00 a.m., the task force members listened to United Fishermen of Alaska's Sonja Corazza's testimony on the history of the Alaska fishing industry, the limited entry program, the ocean ranching program, and the implementation of the 200-mile limit. She pointed out that in Anchorage alone, 3900 fishermen contributed $126 million to the economy. Because of the underfunding of the Alaska Department of Fish and Game, she claimed that errors in fisheries management have incurred losses to fishermen. She ended her testimony by voicing her opposition to finfish farming.

After listening to Ms. Corazza's testimony, the members resumed their discussion on broodstock selection for enclosed freshwater systems, the importation of eggs, the use of Atlantic salmon in the Pacific Northwest, the selling of smolt, and other broodstock issues.

At 10:10 a.m., the members heard testimony from Ken Parker, Director of the Division of Commercial Fisheries, Alaska Department of Fish and Game. Mr. Parker presented a fiscal history of his division and described its duties. He provided information about the catches and ex-vessel values among various fisheries; the number of fisheries permits, licenses, and processors and buyers. He showed the relationship between receipts and expenditures for commercial fisheries management before entertaining questions from the members.

Mr. Parker's testimony ended at 11:15 a.m. The members continued their discussion on broodstock issues.

At 11:35 a.m., Rodger Painter, President of the Alaska Mariculture Association addressed the task force, urging support for the development of finfish farming in Alaska. In addition to handing out the latest edition of the "Alaska Mariculture Report" (Volume 3, No. 6), he distributed a paper responding to concerns relating to the permitting process, the ability of regulatory agencies to deal with finfish farming issues, the impacts on wild stocks, disease control, support of adequate funding for regulatory programs, the demands on Alaska's environment by every industry -- from tourism to logging, public use issues, Alaska's declining market share of salmon, and the obtaining of salmon eggs for mariculture. He also addressed the role of private non-profit groups in the cultivation of broodstock. Citing his past experience at the Alaska Seafood Marketing Institute, he noted how the state still has a poor quality assurance program.

After the lunch break, the task force members discussed their agenda, the testimony they had received, developing strategies for retrieving Alaska's 1988 market share of salmon, and issues relating to quality, allocation, habitat, broodstock, costs/benefits, recapitalizing the fishing fleet, permit costs, and marketing.

After a brief break at 3:00, the members established the following meeting dates and deadlines:

November 5 & 6.....Task Force Meeting in Juneau
November 17.....Release of Draft Report
December 5.....Work Session on Draft Report
December 13.....Deadline for Public Comments
December 17 & 18.....Task Force Meeting in Juneau

Citing previous testimony, the members summarized their findings on marketing issues.

The meeting was adjourned at 5:35 p.m.

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The following people attended the task force meetings:

Sonja Corazza, United Fishermen of Alaska*
Laura Dameron, Southeast Alaska Conservation Council

Dr. Anthony Gharrett, Biologist, University of Alaska Southeast Auke Bay Laboratory and the National Marine Fisheries Service
Gale Good, Alaska Trollers' Association
Deborah Greenberg, Special Assistant, Alaska Department of Fish and Game
Sheila Helgath, Legislative Research Agency, Alaska State Legislature
Frank Homan, Aide, Senator Arliss Sturgulewski
Michael Kaill, Biologist, Fisheries Rehabilitation, Enhancement, and Development Division, Alaska Department of Fish and Game
Dale Kelly, Alaska Trollers' Association
Eric King, Alaska Trollers' Association
Richard Lauber, Pacific Seafood Processors' Association
Lynn Morley, Teleconference Moderator, Legislative Affairs Agency, Alaska State Legislature
Dave Moses, Aide, Senator Paul Fischer*
Karl Ohls, Aide, Senator Fred Zharoff
Rodger Painter, President, Alaska Mariculture Association
Ken Parker, Director, Division of Commercial Fisheries, Alaska Department of Fish and Game
Sheila Peterson, Aide, Senator Dick Eliason
Chip Thoma, Observer

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* Participated via teleconference

Minutes were approved 12/19/89.

ALASKA FINFISH FARMING TASK FORCE
November 5 & 6, 1989

MINUTES

The meeting was called to order in Juneau at 9:45 a.m. on Sunday, November 5, 1989 by Ted Merrell, Chairman. Task force members present included Ken Castner, Ted Merrell, Brent Paine, and John Weddleton. Mary Lou Cooper was absent.

Jon Sherwood, project coordinator of the task force, distributed copies of a required "ethics" report on task force activities and the draft report of findings and recommendations dated October 29, 1989. He discussed the maintenance of task force records and announced that on Friday, November 3, the Alaska State Legislature's Legislative Council approved $10,000 additional funding for the task force.

The members discussed task force staffing and agreed to have Mr. Sherwood on contract to testify on behalf of the task force before committees during the upcoming legislative session. They also discussed how to distribute the draft report, the press release that would accompany the report, and what an interim report should contain.

Mr. Merrell announced that Mary Lou Cooper spoke to him about the possibility of her resigning from the task force and that he had requested that she not do so. Members concurred with having her remain on the task force.

At 10:20 a.m., Chip Thoma addressed the task force. He voiced his strong opposition to allowing finfish farming in Alaska. He stated that finfish farming would undermine the marketing of Alaska salmon as a "pure, fresh, cold" commodity that would benefit from the "increasing trend in consumer buying and eating habits [by] stay[ing] away from raised or harvested foods that are linked with pesticides, toxins, or additives..."

The task force then discussed the costs of regulation caused by the introduction of finfish farming to Alaska. Mr. Paine cited fiscal notes from earlier legislation authorizing finfish farming. The members discussed this, the fiscal demands of siting requirements, the number of possible permits to administer, the fiscal impact on other resource programs with the introduction of finfish farming, and the spin-offs of those new demands to other regulatory agencies such as the Board of Fish.

Discussion then resumed on the draft report the task force planned to release on November 17. Several members voiced their concern about the public misconstruing the document as

being conclusive or as representing each individual member's position.

Mr. Sherwood suggested having a cover letter accompany the draft report, in which the task force could solicit public comment while emphasizing that the document is only a draft.

After lunch, the task force discussed costs/benefits issues, including: the volatility of salmon prices; market niches for farmed and wild salmon; the history and purpose of the limited entry program and its conservational and economic repercussions; marketing strategies; the threat finfish farming poses to the livelihood of fishermen; the effects on the market of price, quality, and consistency of supplies; the possible losses to wild salmon stocks from using gametes to start farming operations; finfish farming as an allocation issue; having hatcheries profiting from the sale of smolts; the possible benefits of sharing facilities between finfish farmers and ocean ranchers; incremental start-up of finfish farming; establishing genetic reserves; and, the production of fish meal.

At 4:25 p.m., Rick Harris, of Sealaska Corporation, spoke in support of allowing finfish farming in Alaska and its possible benefit to coastal areas. He argued that finfish farming can help market Alaska salmon as a commodity that is available year-round. Mr. Harris suggested that one form of economic rent would be the servicing of a remote site net pen for common property benefit. The fish would be provided by the state or non-profit hatcher. The finfish farmer would beed the fish until their release and provide and faintain the pen facility.

After a brief break, the task force members resumed their discussion of costs/benefits.

The meeting was adjourned at 6:10 p.m.

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The task force reconvened on Monday, November 6, 1989, and was called to order at 8.43 a.m. by Chairman Ted Merrell. Task force members present were Ken Castner, Ted Merrell, Brent Paine and John Weddleton. Mary Lou Cooper was absent.

The task force began discussing the profile of finfish farmers and the role they would play in the various aspects of the fishing industry. Mr. Castner was concerned that they might not defend the issues that affected the commercial fishing industry, but rather look after only their personal interests. Mr. Paine disagreed, stating that good

The task force adopted the November 2, 1989 draft labeled "Draft with Ted's Changes" for purposes of discussion.

It was decided that costs and benefits needed to be broken into two categories: 1) State of Alaska; and 2) the industry. It was determined that a time line to show the development of a fish farm to market stage was needed for inclusion in the report.

Mr. Castner requested that duplicate references under a heading be footnoted, for purposes of cross-referencing.

The task force decided that the costs associated with the beginning of the industry (insurance, markets, etc.) needed to be included in the report. Time frame estimates were predicated on a 1991 allocation, leaving site approval for 1991, with smolt and fish availability in 1992.

After a brief break, the task force discussed marketing. Findings were clarified and regrouped. The task force decided that separate findings were required for fresh and frozen markets.

The task force discussed: competition between farmed and wild salmon; improved marketing of wild salmon through quality assurance programs; and marketing wild salmon as natural, chemical-free salmon.

The task force recessed for lunch at 12:18 p.m. and reconvened at 1:30 p.m.

The task force briefly returned to its discussion of quality assurance.

Mr. Castner recommended that the report introduction contain a section on the make-up of the task force. He also thought definitions were needed on mariculture, aquaculture and finfish farming.

Several findings in the draft report were amended to provide clarifying language.

Having completed its review of the draft report, the task force verified the November 17, 1989 release of the draft report.

The meeting was adjourned at 5:22 p.m.

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The following people attended the task force meetings:

Laura Dameron, Southeast Alaska Conservation Council
Deborah Greenberg, Special Assistant, Alaska Department of Fish and Game
Rick Harris, Sealaska Corporation
Frank Homan, Aide, Senator Arliss Sturgulewski
Tom Moyer, Aide, Senator Bettye Fahrenkamp
Sheila Peterson, Aide, Senator Dick Eliason
Kate Tesar, Aide, Representative Fran Ulmer
Chip Thoma, Observer

Minutes were approved 12/19/89.

ALASKA FINFISH FARMING TASK FORCE
December 5, 1989
WORK SESSION

MINUTES

The work session teleconference was called to order at 2:30 p.m. on Tuesday, December 5, 1989, by Ted Merrell, Chairman. Task force members present were Ted Merrell, Mary Lou Cooper, Ken Castner, Brent Paine and John Weddleton.

Opportunities for public comment and participation were discussed. A request by Chuck Piedra, of Elfin Cove, to expand the public comment period and testimony methods, was noted. It was decided to continue the same comment procedures as in previous meetings of the task force. No written comments relative to substantive changes in factual findings in the draft report had been directed to the task force as of the December 5 meeting. The task force reiterated that written comments on the draft report should be received by December 13, 1989, to ensure consideration.

The task force reviewed and edited the final chapters of the draft report. Jon Sherwood, project coordinator, discussed the format and content of the final chapter of the report.

The work session was adjourned at 4:42 p.m.

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The following people observed the task force meeting:

In Juneau--

Chip Thoma, Observer
Mary McDowell, Aide to Senator Dick Eliason
Frank Homan, Aide to Senator Arliss Sturgulewski
Gordy Williams, Angoon
Karl Ohls, Aide to Senator Fred Zharoff

In Anchorage--

Valerie Brown, Alaska Wildlife Alliance
Jay Nelson, Aide to Representative Cliff Davidson
Bryce Edgemon, Aide to Representative George Jacko
Charles McKee, Observer

Minutes were approved 12/19/89.

ALASKA FINFISH FARMING TASK FORCE
December 18-20, 1989

MINUTES

The Alaska Finfish Farming Task Force meeting was called to order on December 18, 1989, in Juneau, at 1:19 p.m., by Ted Merrell, Chairman. Members present were Ted Merrell, Mary Lou Cooper-Elton and John Weddleton. Brent Paine and Ken Castner were absent due to weather and eruption of Redoubt Volcano causing flight cancellations.

Format and appendices of the final report were discussed. Mr. Merrell noted patterns to the public comment received. Members felt that comments from the public sector about the draft report indicated a need for clarification of numerous points, but no significant changes in format or content. Minutes of October 16-17, November 5-6, and December 5, 1989 meetings were reviewed and corrected. Final approval was postponed pending Mr. Castner's approval.

Brent Paine arrived at 2:28 p.m. The task force recessed at 2:30 p.m., returned at 3:29, and adjourned at 3:30 p.m.

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Ted Merrell called the task force to order on December 19, 1989 at 8:53 a.m. Members present were Ted Merrell, John Weddleton, Mary Lou Cooper-Elton and Brent Paine. Ken Castner was absent but arrived later at 9:34 a.m.

Members began reviewing the revised draft on an item by item basis, starting with the Cost of Regulation (Ch. 5). The consensus was that the actual costs will depend on the legislation that is passed.

Discussion of regulatory costs continued, including taxation and public notice costs. A recommendation limiting predator control to non-lethal methods was adopted. The task force addressed the compatibility of wilderness areas and national monuments (Ch. 4) with finfish farming, and modified the recommendation on that subject.

The task force recessed for lunch at 12:30 p.m. and reconvened at 1:45 p.m.

Minutes of October 16-17, November 5-6 and December 5, 1989 meetings were approved as corrected.

The task force continued its review of public comments on the draft report and adopted many changes in wording to clarify the findings and recommendations.

Brent Paine's Production Model draft and timeline of a typical finfish farm was discussed. The task force agreed that a clear

description of a finfish farm should be included in the production model section.

The Health of Fisheries (Ch. 2) was taken up next. Disease transmission, genetics and risks were clarified. A consensus was reached on content and format of the final chapter of the report: All recommendations in the body of the report should be repeated; the facts do not support an unequivocal "yes" or "no" to finfish farming in Alaska; the legislature should not extend the current moratorium; and finfish farming could be done without harming fishery resources if strictly regulated. Ted Merrell agreed to prepare a draft of the chapter for review by the task force next morning.

The task force was adjourned at 6:45 p.m.

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Ted Merrell reconvened the task force at 8:15 a.m. on December 20, 1989. Members present were Ted Merrell, John Weddleton, Ken Castner, Brent Paine and Mary Lou Cooper-Elton.

The task force completed Chapter 8, General Findings and Recommendations. Costs and Benefits (Ch. 6) were considered and clarified. Marketing (Ch. 7) was discussed and it was decided that it needed to be revised and expanded to reflect numerous comments by the public. John Weddleton agreed to rewrite this section and return a revised draft to Jon Sherwood as soon as possible.

Jon Sherwood will prepare a final draft of the task force's report, incorporating all the changes that were adopted and the additional sections from Brent Paine and John Weddleton. This draft will be sent to task force members for approval by the first week of January, 1990.

No further meetings of the task force will be necessary, but a final teleconference to approve any changes in the report to the legislature, may be required.

The meeting was adjourned by Chairman Ted Merrell at 1:05 p.m.

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The following people attended the task force meeting:

Rodger Painter, Alaska Mariculture Association
Mary McDowell, Aide to Senator Dick Eliason
Frank Homan, Aide to Senator Arliss Sturgulewski
Sheila Helgath, Legislative Research Agency
Kate Tesar, Aide to Representative Fran Ulmer
Barnaby Dow, Aide to Representative Mike Davis
Chip Thoma, Observer
Gordon Williams, Self/Alaska Trollers/Angoon F&G Adv. Committee

APPENDIX E

LIST OF PERSONS SUBMITTING COMMENTS ON DRAFT REPORT

ALASKA FINFISH FARMING TASK FORCE

PUBLIC COMMENT TO DRAFT REPORT

#	Name	Organization	Address
1.	James Kallander		PO Box 2272, Cordova, AK 99574
2.	Joe Craig		Box 941, Douglas, AK 99824
3.	Lonnie Haughton	F/V China Cove, Inc.	PO Box 3006, Ketchikan, AK 99901
4.	News articles	Seattle P.I. &	Alaska Fisheries Journal
5.	William Royce	AFS	10012 Lake Shore Blvd NE,SEA,WA 98125
6.	Paul Zimmerman	Keener Packing Co.	PO Box 890, Kenai, AK 99611
7.	Sen. Zharoff	State Legislature	PO Box 405, Kodiak, AK 99615
8.	Barry Griffin	Nor'Eastern Trawl	7910 NE Day Rd W, Bainbridge Is, WA
9.	William Wilson	AIFRB	13611 Capstan Dr., Anc., AK 99516
10.	Rep. Jacko	State Legislature	PO Box 47001, Pedro Bay, AK 99647
11.	James Mackovjak	Pt. Adolphus Seafoods	PO Box 63, Gustavus, AK 99826
12.	Concerned citizens	Elfin Cove	Elfin Cove
13.	Charles Piercy	F/V Tuckahoe	PO Box 1025, Ward Cove, AK 99928
14.	Charles Piedra		Box 4, Elfin Cove, AK 99825
15.	Jeff Hetrick		PO Box 7, Moose Pass, AK 99631
16.	Joseph Mehrkens	SE AK Nat Res Center	PO Box 20212, Juneau, AK 99802
17.	Kathryn Troll	SE AK Seiners Asso.	PO Box 9579, Ketchikan, AK 99901
18.	Brian Paust-see#60	Coop Ext Svc-Sea Grant	PO Box 1329, Petersburg, AK 99833
19a.	Ralph Mackie	Craig Fishery Adv Com	(see #28 below-dupl.)
19b.	Julie Hursey	F/V Thunder	Box 213, Petersburg, AK 99833
19c.	Debra Lyons		Box 296, Petersburg, AK 99833
20.	Chris Nerison	Cordova Dist Fshrmn Un	PO Box 939, Cordova, AK 99574
21.	Charles Piedra		Box 4, Elfin Cove, AK 99825
22.	Shirley Piedra		Box 4, Elfin Cove, AK 99825
23.	Denby Lloyd	Office of Governor	Box A, Juneau, AK 99811
24.	Rosemary Enderle		PO Box 10, Elfin Cove, AK 99825
25.	David Bedford		PO Box 1211, Petersburg, AK 99833
26.	Ralph Guthrie		Box 595, Petersburg, AK 99833
27.	Chris Sharpsteen		Box 1255, Petersburg, AK 99833
28.	Ralph Mackie	Craig Fishery Adv Com	PO Box 252, Craig, AK 99921
29.	Sid Cox	United Cook Inlet Drft	Box 4649, Kenai, AK 99611
30.	Jerry Wickstrom		3605 Arctic #745, Anc, AK 99503
31.	Pete Granger	Seafood Producers Coop	2875 Roeder Ave, Bellingham, WA 98225
32.	Mardi Hutchens		11340 Borealis, Eagle River, AK 99572
33.	Chip Thoma		
34.	Nick Yurko	Gast Channel F&G Adv C.	9412 Longrun Dr., Juneau, AK 99801
35.		United Fishermen of AK	211 4th St. Ste 106, Juneau, AK 99801
36.	Cheryl Sutton	Kenai Pen Fshmns Asso	Box 546, Soldotna, AK 99669
37.	Wolf Benson	Benson Sea Farms	PO Box 1541, Petersburg, AK 99833
38.	Laura Dameron	SE AK Conservatn Cil	PO Box 21692, Juneau, AK 99802
39.	Roger Painter	AK Mariculture Asso	130 Seward St., Ste 201, Juneau, AK
40.	Cathy Conner	Juneau Audubon Society	PO Box 21725, Juneau, AK 99802
41.	David Rogers	Sea Culture of AK Inc	130 Seward St., Ste 504, Juneau, AK
42.	Paul Barnes	AK Fish Trade	Box 211121, Auke Bay, AK 99821
43.	Rebecca Knight		PO Box 1331, Petersburg, AK 99833
44.	Robert Martin	T&H Reg Electrical Aut	PO Box 210149, Auke Bay, AK 99821
45.	Wallace Fields	Kodiak Reg Aquaculture	Box 1691, Kodiak, AK 99615
46a.	Sen. Fahrenkamp	Sen. Resources Com	PO Box V, Juneau, AK 99811
46b.	Sheila Helgath	Leg. Research Agency	PO Box Y, Juneau, AK 99811-3100

#	Name	Organization	Address
47.	Sen. Jones	State Legislature	352 Front St., Ketchikan, AK 99901
48.	Scott Swanson		3800 Valley Ave, Juneau, AK 99801
49.	Valerie Brown	AK Wildlife Alliance	PO Box 202022, Anchorage, AK 99520
50.	Paul Peyton		1647 Harbor Way, Juneau, AK 99801
51.	David McFadden	F/V Sand Dab	PO Box 668, Petersburg, AK 99833
52.	Geron Bruce	Unit SE AK Gillnetters	PO Box 021186, Juneau, AK 99802
53.	Oliver Holm	Kodiak Reg Aquaculture	Box 3407, Kodiak, AK 99615
54.	John Nielsen	AK Shellfish Grower's	Box 220029, Anchorage, AK 99522
55.	William Heard	(replcemnt) NMFS-AukeB	PO Box 210155, Auke Bay, AK 99821
56.	Sen. Eliason	State Legislature	PO Box V, Juneau, AK 99811
57.	Rep. Ulmer	State Legislature	PO Box V, Juneau, AK 99811
58.	Bruce Smith		PO Box 45, Gustavus, AK 99826
59.	Steve Pennoyer	NOAA, Marine Fish.	PO Box 21668, Juneau, AK 99802-1668
60.	Brian Paust's art.	Coop. Ext. Svc.	(see #18)
61.	Rep. Davidson	House Resources Com.	PO Box V, Juneau, AK 99811
62.	Richard Harris	SEALASKA Corp.	One Sealaska Plaza, Juneau, AK 99801
63.	Neil Kinney		(Homer?)
64.	Brad Pierce		
65.	Dennis Watson	City of Craig	PO Box 23, Craig, AK 99921
66.	Rebecca Knight		PO Box 1331, Petersburg, AK 99833
67.	Dan Hull		310 N 46th #402, Seattle, WA 98103
68.	Nick Barlett		Box 4032, Homer, AK 99603
69.	Jim Green		1033 Millar St., Ketchikan, AK 99901
70.	Dan Berkshire		13010 Sher Circle, Anc, AK 99516
71.	Nevin Holmberg	US F&W Svc	PO Box 021287, Juneau, AK 99802-1287
72.	Doris Howe	(From Sen. Eliason)	Box 67, Gustavus, AK 99826
73.	Brian Allee	ADF&G, FRED Div.	PO Box 3-2000, Juneau, AK 99802-2000
74.	Chip Toma	(articles from indiv.)	
75.	Dale Kelley	AK Trollers Asso.	130 Seward St.,#213, Jnu, AK 99801
76.	Concerned citizens		Juneau, Douglas, Auke Bay, Hoonah,Tok

APPENDIX F

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