Three Months as a Graduate Intern with the Alaska Department of Commerce and Economic Development

by

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Internship Report

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The Internship

This report is a summary of my internship experience during the summer of 1984. From June, 1984 through September, 1984, I worked as a Graduate Intern II for the Alaska Department of Commerce and Economic Development (ADCED) in Juneau, Alaska. Specifically, I was associated with the Office of Commercial Fisheries Development. This office is responsible for increasing the development and utilization of Alaska's diverse fishery resources in an economically sound manner. My immediate superiors were Mr. Richard Reynolds, Development Specialist, and Mr. F. Gregory Baker, Director of the Office of Commercial Fisheries Development. Both men were exceedingly helpful in giving direction and were responsible for creating a very comfortable working/learning atmosphere. My initial period of hire was for two months and was extended upon procurement of sufficient funds.

Initially the purpose of my internship was a mystery. During the first three days I was given no duties, directives or purpose. Rather, I was informed that Mr. Baker would assign tasks to me shortly and until that time I was to read back issues of fishery related journals and magazines. Presumably, this was in part to help familiarize me with the status of fisheries in Alaska. Perhaps in larger part it was the result of indecision as to what my duties would entail. (Though I am certain that my production was valuable to the agency, the decision to hire an intern in the first place was probably motivated more by excess monies than by need.)

During my period of employment with the Office of Commercial Fisheries Development, I worked on numerous projects. Having survived the insipid qualities of the first few days, I was given a number of directives with which to busy myself. Most of the work I did entailed the obtaining of answers to key questions associated with various development projects and strategies. Because I was involved in such a diverse number of projects, I will break my discussion into sections in order to facilitate a better comprehension of what my internship actually involved.

1) Baseline Determination

My first assigned task was to write an issue paper the purpose of which was to outline the general process for delineating the baseline from which the territorial sea and 200 nm limit are drawn (Appendix 1). The exact location of this baseline has potential economic consequences for it is upon the baseline that the definition for internal waters is based.

The Magnuson Fishery Conservation and Management Act as amended June 1, 1982 (16 U.S.C. 1856(C)) allows qualified foreign fishing vessels to engage in fish processing within internal waters of a state of the United States with the appropriate governor's permission. "Internal waters of a state" is defined to mean, ".....all waters within the boundaries of a state except those seaward of the baseline from which the territorial sea is measured."

One of the requirements under the amendment, for internal waters processing, is that the governor determine if the ".....fish processors within the state have adequate capacity, and will utilize

such capacity, to process all of the United States harvested fish from the fishery concerned that are landed in the state." If they do not, and other criteria are met, permits may be granted. Since Alaska processors have not always had adequate capacity, foreign processing permits have been issued in the past. It is likely that Alaska processors will continue to lack adequate capacity in some fisheries, so that further issuance of foreign processing permits appears likely. Thus, it is clear that correct determination of this baseline is of utmost importance.

The ADCED has been involved in numerous projects requiring the issuance of internal waters processing permits. I found it quite interesting that no one in the agency had any notion of the processes involved in baseline determination, especially when one notes the potential economic ramifications. Apparently, in the past there had been no need to comprehend the rules.

The ADCED became involved with a Japanese processing vessel wishing to utilize excess chum salmon in Norton Sound. The problem involved the fact that the fishing grounds from which these chum salmon were to be captured by U.S. fishermen were a considerable distance from a baseline shown on a recent NOAA chart. In addition, this NOAA baseline differed by a large area from a point by point delineation given in the Alaska Administrative Code (5AAC 39975). The impetus for inquiry into the process of baseline delineation was the desire to determine which of these lines was legally correct, if either. We also wished to ascertain if any possibility existed to legally change the position of the baseline. For, if the position of the

baseline could be altered, it could potentially be shifted in a manner that would facilitate closer placement of the Japanese vessel to the fishing grounds.

One of the largest problems associated with this project was that no one seemed to know where to begin and our library facilities were severely lacking. Consequently, the telephone became my closest ally. A number of phone calls were made before I was able to locate a Coast Guard manual from which I was able to piece together the rules that regulate baseline determination. These rules are founded on the 1958 Territorial Sea and Contiguous Zone Convention.

As it turned out, the NOAA baseline followed the legal rules of delineation while the AAC baseline did not. There was additionally no legal approach available for altering the baseline nor was the construction of additional baseline feasible. There was, however, one potential avenue available for legally locating the processing vessel near the fishing grounds. It involved the notion of Constructive Ports. The Alaska Administrative Code (5AAC 39.198) makes reference to a Constructive Port with the stipulation that it be located within internal waters. Does this mean that the designation of a Constructive Port outside internal waters infers or creates additional internal waters? We were informed by U.S. Customs, who has the power to designate Constructive Ports, that it did not. Therefore, to further pursue the union of U.S. fishing boats with the Japanese processing vessel in Norton Sound was concluded to be economically unpracticable.

2) Saltcod Corporation

The ADCED became involved in a project with a Puerto Rican entreprenuer by the name of Paulo DaCuhna. Mr. DaCuhna was interested in obtaining Alaska cod and pollock for use in his salt-cod processing plant in San Juan, Puerto Rico provided that transportation costs were not prohibitive. He was interested in ways to increase the profitability of his operation. The situation was complicated by the fact that Canadian salt-cod was being dumped on the Puerto Rican market.

This project had three facets that were undertaken concurrently:

a) investigation of anti-dumping regulations and assistance programs to determine if the Saltcod Corporation met the qualification

b) determination of age class structure and size relationships of Alaska pollock to ensure that capture of adequate sizes for the salt-cod plant was feasible

c) inquiry into the practicability of transporting cod and pollock from Alaska to San Juan, Puerto Rico

It was upon the third objective that I spent the bulk of my time on this project. Mr. DaCuhna felt that even in the absence of Canadian dumping, the most important factor of profitable production was cost effective transportation.

The project called for 800,000-900,000 pounds of partially salted product to be delivered to Puerto Rico each month where it would be further processed. The plan was to transport salt from Inagua Island in the Carribean on the return trip, for use in partially

salting the cod and pollock. Initially I was informed by people who ought to know of the intricacies of marine transportation, that locating a suitable sized U.S. hull available for charter would be impossible. (The Jones Act precludes use of a foreign hull, which is considerably cheaper, between a U.S. point of origin and a U.S. destination, including a U.S. territory like Puerto Rico.) These same people advised me that Sea-Land Transportation Company was the only feasible method of delivering the product to Puerto Rico and the salt to Alaska.

Richard Reynolds encouraged me to continue looking for an appropriate U.S. hull in the hope that one might be found that could better the Sea-Land price. Numerous phone calls and many days work succeeded in locating an available vessel. Once contact was made with the owner of one vessel, discovery of other vessels soon followed. I eventually even made contact with unemployed tuna vessels whose owners might desire to cover their fixed costs. The results of these inquiries are given in Appendix 2a. Immediately obvious is the fact that in reality many appropriate U.S. vessels were available on the west coast that could significantly better the Sea-Land price.

Investigation of dumping regulations and assistance programs was a far easier task. As nearly as we were able to tell, Mr. DaCuhna's operation did not qualify for any direct monetary assistance. We were, however, able to establish contact between Mr. DaCuhna and the agency responsible for administering the anti-dumping regulations. Anti-dumping procedures have since been initiated and a determination has been made that the Canadian product met the legal criteria for dumping.

Finally, we needed to know something of the age class and size structure of pollock in Alaska waters, including their catchability. Mr DaCuhna felt that a minimum size of 22 inches was needed in order to ensure fillets of the proper dimensions. In order to determine the probability of this desire, I conversed with a number of prominent Alaska fishermen. The results of these conversations are given in Appendix 2b. The responses I received were sufficiently positive for continued investigation into this project. In any case, even if it were discovered that the pollock in Alaska waters were not sufficiently large, Mr. DaCuhna could still target solely upon cod.

The nature of an Alaska development project is slow and cumbersome. Because this is true, I was not able to see this project to its conclusion. Upon termination of my internship, there were still many unanswered questions concerning its practicability.

3) Report to the Fisheries Mini-Cabinet

Certainly the most time consuming project I undertook during my three months with the ADCED was the report I wrote for the Fisheries Mini-Cabinet (FMC). Governor Sheffield charged the FMC to focus attention on the issues of developing Alaska's full fishery potential and to optimize the benefits of this development to the state. Specifically, on January 10, 1984, the governor's directive outlined eight specific issues which "require attention in the immediate future." I was given the task of preparing a report that might augment the effectiveness of the FMC in dealing with charges 4 and 6 which are:

4. Develop policy and strategy recommendations that will promote and Alaskanize domestically under utilized fisheries while insuring the continuing viability of our fully utilized traditional fisheries.

6. Develop policy and strategy recommendations that will maximize the participation of both rural and urban Alaskans in the harvesting, processing, employment and marketing sectors of the seafood industry.

In order to facilitate completion of this task I was given four major categories upon which to focus:

(a) A section on the status and structure of the Alaskan fishing industry.

(b) A section on the reported growth potential and patterns for the Alaska fishing industry.

(c) A section outlining problem statements.

(d) A section outlining solution statements.

There were three major problems associated with the explanation of these four categories. First, the categories were very general and had the potential of enveloping an overabundance of information. Secondly, research materials were not overly plentiful. As a result, it was necessary to limit my discussion to information that could be found readily in periodicals and journals, and through telephone solicitation. Finally, I was not thoroughly familiar with the Alaskan fishing industry. As such, I was not in a cogent position to judge the legitimacy of the information I collected. Seeing something in print is not synonymous with truth. Nor does the spoken word of an "expert" translate to veracity.

Accordingly, I relied heavily upon Richard Reynolds to edit my work and cull out that which was obviously inaccurate. The result of my efforts is given in Appendix 3.

4) Aquaculture Overview

There were many times during the course of my internship that issues came up requiring my swift attention. Gregory Baker informed me one morning that he would be attending a meeting that same afternoon. He required several paragraphs summarizing aquaculture trends. In the available time I was able to compile 5 pages of information giving a general overview of aquaculture worldwide (Appendix 4). Mr. Baker seemed especially pleased as this information would allow him to speak as one well aquainted with the topic.

5) Comparative Tax Structures

Another very quick project I undertook was the preparation of comparative tax structures between Washington and Alaska (Appendix 5). Richard Reynolds was asked by an Alaskan fisheries interest to locate information comparing taxes relative to the fishing industry between Washington and Alaska. Dick assigned the task to me.

What makes this project interesting is not the actual tax structure comparison. Rather, its value was in helping me to realize the unwieldy character of state government. What should have been a fairly easy assignment quickly became difficult. It took many phone calls to both states before I was assured that I had collected all the available information. In fact, it proved less difficult to extract information from Washington than it did from Alaska. This is

especially interesting because my office was in the same building I was calling to locate the Alaskan tax structure!

6) Piloting Issue

The ADCED became involved in a joint venture processing project. The project was to take place in an area that would require pilots to board the foreign vessels at certain areas; the Alaska Administrative Code sets forth specific guidelines and criteria for the piloting of vessels in "inside waters." This would have added a cost to the venture sufficient to make it unprofitable.

I became involved because there was a conflict concerning the definition of "inside waters." The Office of Commerical Fisheries Development maintained that "inside waters" were in fact "internal waters." We were given some, but not absolute, support of our position by Diane Colvin of the State Attorney General's Office. I was included because I was the only one well versed in the criteria for determining internal waters and because this issue presented a good learning opportunity.

Piloting in Alaska is regulated by the Pilots Board. The board consists of eight members, four of which are pilots representing various areas of jurisdiction, and four of which are non pilots. As it turned out, the Pilots Board is a very powerful and somewhat hostile entity. This is because piloting is a very lucrative profession and the board members who are pilots wish to protect their interests. Many believe that piloting in Alaska is a tremendous scam. Not only does the AAC require pilots in certain areas, virtually guaranteeing

a source of employment, but it also indirectly places severe restrictions upon the total number of pilots who may be licensed. In addition, we were told that often the pilot does nothing more than board a vessel, allow the captain to proceed on his own, disembark, and collect an exorbitant fee.

After some thought, we determined not to press the "inside waters"/"internal waters" disparity. Rather, we approached the problem from a political slant. We decided to try to obtain a vote for an exemption from piloting for this particular circumstance. Since the pilot members of the board represented different jurisdictions and since the four non pilot members presumably had no vested interest, we were optimistic at our chances for an exemption for this specific area. However, there was one hitch. We would have to wait for the board to convene and that wasn't scheduled for several months.

My internship was completed before the vote was taken. Thus, I was unable to see if our strategy was successful. I was, however, able to become exposed to the very real political nature of many of the encounters of the ADCED. This political focus requires that great care and savvy be utilized when confronting a powerful assembly like the pilots board.

7) Salmon Carcass Utilization

The last project in which I was able to take part was one directed at a more complete utilization of Alaska's salmonids. The impetus, in part, was Weyerhauser's purchase of the rights to pink salmon carcasses from a Juneau private, non-profit hatchery (PNP).

Weyerhauser's hope was to develop a minced product that could be frozen and directed at the U.S. market. Since many thousands of pounds of fish flesh goes unutilized each year from Alaska's multitude of state and privately operated hatcheries, we decided to investigate the feasibility of collecting and processing them.

Many of Alaska's hatcheries are very remote. This presents a severe logistic problem in regard to the collection and transportation of carcasses to a processing site. In order to get a complete understanding of the complexities involved, I was flown to a remote hatchery site 50 miles south of Juneau. This experience was sufficient to convince me of one endeavor I do not want to undertake as my life's work - remote hatchery management. I was also enlightened as to the tremendous difficulty that would be involved in coordinating a project of this kind from even one hatchery, much less statewide.

Another problem associated with this project involved the nature of PNP's. Since these hatcheries are non-profit how can direct purchase of carcasses be justified? PNP's are allowed under Alaska statutes to recover costs. Cost recovery is defined as the following:

a) reasonable operating costs

b) debt retirement

c) reserves - up to a certain point; one or two years of your operating costs to allow for biological disasters

Our office requested information from Martha A. Fox of the State Attorney General's Office on the ability of an independent non-profit fish hatchery to expand into the areas of processing, packaging,

distribution and marketing of its own finished or semi-finished salmon product. Under the Non-Profit Corporations Act the potential scope of activities of a non-profit corporation is very broad. AS 10.20.005 provides that a non-profit corporation can be organized "for any lawful purpose." In order to expand its activities, a non-profit hatchery would have to amend its articles of incorporation to include the expanded functions as long as they were for a lawful purpose. Processing, packaging, distributing and marketing are all apparently lawful purposes. However, the test for non-profit status is whether any part of the income or profit of the corporation, other than reasonable compensation for services, is distributable to the members, directors or officers of the corporation. If income is distributed, the corporation is organized for the pecuniary profit of its members and cannot be non-profit. This does not preclude payment of salaries. Thus, a non-profit corporation is not prohibited from earning a profit as a legal entity, as long as the profit is used for the purposes set forth in the articles of incorporation.

If income from the operation of a combined hatchery/processing facility exceeded funds necessary to meet normal operating expenses (including salaries) and the establishment of reserves, the excess money would have to be used for expansion or improvement of facilities, hatcheries research or other authorized purposes of the regional association within which the corporation is located. Therefore, we determined that PNP's could become involved in selling and processing carcasses provided they remained within the aforementioned parameters.

It was also necessary to estimate the total carcasses available from hatcheries in Alaska. Since I only had several days within which to complete this task, I concentrated on southeast Alaska. The results of these inquiries are given in Appendix 6. Again, because of the length of my internship I was not able to see this project to its conclusion.

8) Other Projects

During the course of my internship I became involved in many other projects. Among these were the determination of available splitting and filleting machines including their size and capacity specifications, and inquiring into pink salmon price negotiations in Prince William Sound, Alaska. In addition, I did some studying on the impact of Norwegian pen-reared Atlantic salmon upon the marketing and sales of Alaskan salmon.

The Value of the Internship

The value of my internship with the ADCED was very similar to the value of my Marine Resource Management experience. The worth of the MRM program, in my opinion, is not to be found in the specific, detailed information imparted to me, although I received some interesting and useful facts during my two years at Oregon State. Rather, the importance of the MRM program lies in its ability to prepare the student for difficult situations via the processes of learning, of developing discipline, and of instilling a confidence that very little is beyond my capabilities of comprehension. Likewise, the qualities of my internship that I found most important were not specific techniques

of development but the "muddling through" characteristics of each particular project.

In association with this, my internship allowed me to see more completely that it is ok to say, "I don't know." Often in academia students are surrounded by pretense. As students we are sometimes given the impression that we should know all things, that our knowledge should be capable of immediate recall, and that others somehow accomplish this. In fact, I very rarely used classroom knowledge. I did, however, reason through many problems that I otherwise may have not been able to, due to my MRM exposure. I was impressed by the lack of pretense I found at the ADCED. Whenever a problem surfaced whose answer was unknown, Mr. Reynolds said, "I don't know, but I'll find out." I believe an attitude of this kind will be invaluable to me no matter what course my career follows.

As I mentioned earlier, the ADCED is involved in a diverse number of projects at any one time. As such, developments often take place at a swift pace. Thus, it is important for the internee to demonstrate flexibility as well as to wisely apportion time. This is certainly one of the most important truths that I learned. Without flexibility and wise time management I would have been quickly lost and could not have been nearly as effective. There were many times when I found myself immersed and making significant headway in a certain project, only to be told to drop it and direct my attention to a more pressing goal. This was difficult for me to do, but very necessary given the nature of fisheries development.

Despite the fact that many projects are undertaken concurrently, little actually gets done, Perhaps this is simply the nature of government. It takes a lot of valuable time to weave through bureaucracy. Consequently, it is difficult to realize the fruits of your labor. Often, a project might be given attention for months on end, only to develop an insurmountable problem such that it must be abandoned. This could become very discouraging were it not for isolated victories along the way. This is not to suggest that the ADCED is inefficient or has little worth to the state. Given the complexities that must be dealt with, they are actually quite successful.

Perhaps it is inherent in government to be wasteful because of this complexity. I reviewed several reports written for the ADCED on contract. Some of these reports were immensely expensive. Five thousand to ten thousand dollars has been spent on several occasions for work, which in my judgement, is inferior. Any student in the Marine Resource Management program could easily produce a superior report for a fraction of the cost. It is possible that my understanding of the state's finances is lacking. It is also possible that because of Alaska's oil revenue, money is spent with little regard for value.

Not only does facing an unwieldy bureaucracy increase the difficulty of the tasks presented to the ADCED, but the very real political nature of the organization and the projects it must undertake further complicates the situation. I was unaware before this internship of the pervasiveness of politics. It permeates into every crevice and cranny of a project, turning the simple into the complex.

The director of the Office of Commercial Fisheries Development has to be particularly cognizant of this political scope for his position is appointed by the current governor. Therefore, it would be difficult to make decisions in an unbiased fashion for he must be almost completely partisan. Never before did I realize the far reaching influence of the party in power of a state. It is overwhelming.

Often projects I undertook required telephone solicitation. I learned quite early on that the first answer one receives may not in fact be the correct one. Many times I would be given an answer or direction over the telephone only to find out by persistently placing more calls, that it was not correct. I've since come to the conclusion that it takes a great deal of effort to extract a correct answer even from a pool of experts.

All in all my experience in Juneau during the summer of 1984 was a good one. I learned many things which will undoubtedly be useful in the pursuit of a career. I've learned what qualities to look for in a job and what qualities to avoid. I'm thankful to the state of Alaska for giving me the opportunity to intern with the ADCED.

APPENDIX 1

BASELINE DETERMINATION

The Magnuson Fishery Conservation and Management Act as amended June 1, 1982 (16 U.S.C. 1856(c)) allows qualified foreign fishing vessels to engage in fish processing within internal waters of a state of the United States with the appropriate Governor's permission. "Internal waters of a State" is defined by the amendment to mean, ". . . all waters within the boundaries of a state except those seaward of the baseline from which the territorial sea is measured."

One of the requirements under the amendment, for internal waters processing, is that the Governor determine if the ". . . fish processors within the State have adequate capacity, and will utilize such capacity, to process all of the United States harvested fish from the fishery concerned that are landed in the State." If they do not, and other critera are met, permits may be granted. Since Alaska processors have not always had adequate capacity, foreign processing permits have been issued in the past. It is likely that Alaska processors will continue to lack adequate capacity in some fisheries, so that further issuance of foreign processing permits appears probable.

Accordingly, since the definition of internal waters is dependent upon the baseline, it is necessary to have a lucid concept of the standards for determining the baseline from which the territorial sea is measured. It is also necessary to identify relative issues for the discussion of internal waters.

Measurement of the U.S. Territorial Sea: Baseline Construction.

The territorial sea of any state is an offshore zone measured from certain points along the coast. The United States traditionally recognizes a zone of three nautical miles in breadth and uses the 1958 Territorial Sea and Contiguous Zone Convention as the rule. The actual area is of little significance. What is notable is that definite knowledge as to whether any given offshore point lies within internal waters or inside of or beyond the territorial sea may be of the utmost consequence.

In order to have the territorial sea charted as exactly three nm in breadth at any point along the coast, the following rule must be applied: Every point on the outer limit of the territorial sea must be plotted precisely three nautical miles from the nearest point on the coast along which it is measured. Such a rule not only provides a sound base for delineating a geometrically perfect territorial sea but has practical application as well. For example, it fulfills the requirements of any ship's captain who wants to know his position in relation to the territorial sea. Any other method of plotting the line denoting the outer limit of the territorial sea would not meet the requirement of having every point exactly three miles from the closest coastal point.

The outer limit following the above rule, can be marked on a chart by constructing an envelope of arcs of circles. Arcs of circles within radii of three miles are swung from every point along the coast in order to project the outermost limit as far seaward as possible, as illustrated in figure 1.

It would appear that the formula for delineating the territorial sea would be relatively simple, with the coast itself serving as the baseline from which to measure. To a degree, this is true for the mean lower-low tideline along the coast is recognized in international law as constituting the normal baseline. One of the problems in Alaska is the general lack of accurate tidal datums. This deficiency of information has resulted in disputes between State and Federal Government.

Many shorelines have a complex configuration making the measurement, of a point on the shore to one three nm out, most difficult. Mouths of rivers, bays, islands, shoreline indentations and other natural coastal features create problems difficult to resolve by formula. In addition, man-made features such as breakwaters, piers, and other harbor installations may modify the exact placement of a baseline from which to measure the territorial sea. When important issues are at stake, such as the foreign processing of excess Alaska fish, the precise determination of a baseline delineating the territorial sea from internal waters is of concern.

Where a coastline is broken by water inlets or outlets, it is necessary to employ a geometric baseline, for there is no actual shore from which to measure the breadth of the territorial sea. A river or stream emptying into the ocean is a commonplace example of a break in the coastline. Here a straight line extending across the mouth of the river, referred to as a "closure," provides the link necessary for a continuous coastal baseline.

In order to differentiate a bay from a mere curvature of the coastline, the semicircle test is made, first by drawing a straight line between the natural entrance points of the indentation. The water so closed off forms a bay if its area is as large as, or larger than, that of a semicircle the diameter of which is equal in length to the closing line. The upper indentation in figure 2 qualifies as a bay; the lower one does not.

The Convention on the Territorial Sea and the Contiguous Zone limits the entrance of any bay to not more than 24 nautical miles. If the distance between the natural entrance points of a bay exceeds that distance, a straight baseline of 24 miles is drawn within the bay in such a way as to enclose the maximum water area that is possible with a line of that length. Such a bay is illustrated in figure 3.

Because of the placement of islands in the vicinity of their entrances, bays may have several channels of entrance. If this is the case, an individual closing line is drawn across each entrance. To be identified as a bay, the area of water enclosed must be as large as, or larger than, that of a semicircle the diameter of which is equal to the sum total of the individual closing lines. This rule might be stretched in the case of an island located closely offshore from a coastal indentation, to designate internal waters.

Islands have their own territorial sea, which may or may not coalesce with the territorial sea of the mainland. In either case, the determination of internal waters remains the same, as an island located within three miles of the coastline simply creates an extension of the territorial sea, i.e, there must be an indentation in the mainland regardless of the presence or absence of an island in the territorial sea. The sea between the island and the mainland is not considered internal unless there is some indentation.

"Low-tide elevation" is a term referring collectively to shoals, reefs, and drying rocks-offshore features which are exposed at low-tide but submerged at high-tide. Such features are not entitled to territorial seas of their own. However, if a low-tide elevation (internationally accepted is exposure at mean lower-low tide) lies within or partially within a territorial sea of the mainland or an island, its low-water line may be used as a baseline for measuring the breadth of that sea. This may be important in the determination of internal waters if these low-tide elevations lie at the entrance to a bay. Such a case is shown in figure 4.

Additionally, the outermost of certain permanent installations associated with port facilities are construed as parts of baselines and the breadth of the territorial sea is measured from them. Piers and breakwaters are the most commonplace examples. They must be connected with the shore itself or an installation of the shore. A breakwater extending into the sea in such a way as to protect a shallow coastal indentation from winds would be a case in point.

From the above discussion and examples, it is evident that irregularity of a coastline in itself does not imply an irregular baseline. Bays, estuaries, sounds, lagoons, and other coastal indentations, in most instances, insure use of a straight baseline segment to close off internal waters, which, by international law, are not part of the territorial sea.

Actual situations along the coast of Alaska frequently fail to conform to the simplified examples discussed and illustrated above. A highly irregular coastline with numerous offshore islands may call for a baseline involving a combination of rules that are difficult to apply. For example, what placement must an island have with

respect to the entrance of a bay to be considered part of that bay? Figure 5 illustrates this question. The upper island is obviously within the confines of the bay whereas the position of lower islands in relation to the bay might be disputed. Such questions form the basis of disputes between the State and Federal Governments.

Baseline Committee

The State's baseline sometimes differs from the federal baseline. A case in point is the Norton Sound area. The State delineated the baseline on a point-by-point basis in the Alaska Administrative Code (5 AAC 39.975(13)). This would have the State closing off all of Norton Sound from "the westernmost tip of Cape Romonzof" to "the westernmost tip of Cape Rodney," an area far greater than the baseline indicated on the NOAA chart. The NOAA chart would close off only Norton Bay and Golovin Bay. Why the difference?

It appears that in this particular case, the State was using different criteria than that which was being used by NOAA. NOAA's basis is as follows: "The lines delimiting the territorial sea and contiguous zone represent an interdepartmental committee's interpretation of legal principles as applied to geographic information shown or by re-interpretation of the legal principles involved." The Federal Government develops the baseline from the best existing data unless challenged. On the other hand, the State drawn lines in question were adopted by the Board of Fisheries from a somewhat obscure federal line called the Gharrett Scutter line. They were meant only to be defined and adopted for use as management boundaries. Prior to the adoption, the State contacted both the NPFMC and the State department informing them of the construction of these lines and making clear that it was not at attempt to usurp federal powers. Nor was the State declaring sovereignty. Neither the NPFMC nor the State Department voiced any objections, but, if they had, or if in the future the matter comes into conflict, the Baseline Committee would be the adjudicator.

The Baseline Committee is an interagency federal committee whose sole purpose is to arrive at correct salient points. There is no State agency representation on the committee. As previously mentioned, the U.S. uses mean lower-low-tide-line as a basis for construction of the baseline. Although the Federal Government develops the baseline from the best existing data, unless challenged, NOAA and the U.S.G.S. are involved in low-tide photography reconnaissance in order to accurately identify low-tide elevations. In addition, they are providing collected tidal data to the Baseline Committee. The committee considers all the available geographic information and applies the 1958 Territorial Sea and Contiguous Zone Rules before arriving at salient points. In certain instances, when data are unavailable, a baseline is drawn based on a judicial situation. The

committee will entertain requests from anyone to draw a baseline where there is no baseline. Such was the case in April of 1978 when the interagency committee constructed a baseline near Kulukak Point (near Togiak) after receiving a request to do so.

Coastal and Marine Boundary Program

The placement of the baseline determines some State revenues and potential revenues. As petroleum production and fisheries are Alaska's two leading industries, the State is highly interested in the process for the formation of the baseline. The Department of Natural Resources, Division of Technical Services' Coastal and Marine Boundary Program is responsible for delimiting the shoreline boundary in Alaska.

Most of the State shoreline mapping was undertaken in conjunction with navigational charting operations and is inadequate for legal boundary determinations because it lacks information pertaining to mean lower-low tide lines and low tide elevations. This inadequacy results in ineffective planning, creates the potential for costly litigation and precludes the effective management of oil and gas, fisheries, recreation and related issues. Development in coastal areas is hampered by the lack of tidal datums, a necessary step in all boundary determinations.

To reduce or eliminate the problems associated with inadequate boundary determination, the Coastal and Marine Boundary Program has three basic and necessary aspects: (1) accurate tidal datums are determined which serve as the basis for all coastal boundary delimitation. Almost half of Alaska's 34 thousand miles of shoreline either lack or have inadequate tidal datums; (2) research into boundary issues in potential problem areas is accomplished to identify the nature and extent of disputed areas; and (3) finally, a new or revised mapping project is initiated.

The program affords cooperation with federal agencies to provide more efficient boundary determination through the sharing of data, technology and expertise.

Constructive Ports

Although constructive ports do not enter directly into the discussion of baseline formation, there is some question about their relationship to internal waters. In fact, there remains some question about what a constructive port actually is. In an old copy of the Administrative Code (5 AAC 39.198) reference was made to a "Constructive Port" with the stipulationn that it must be designated within internal waters.

It appears that a constructive port is simply what U.S. Customs refers to as "out of port service." The provision for out of port service is given in 19 C.F.R. 101.4(a) which reads: "A vessel shall not be entered or cleared at a Customs station or any other place that is not a port of entry, unless entry or clearance is authorized by the district direction for the district in which such station or place is located . . . ." Then in 19 C.F.C.R. 101.4(d): "Customs stations may be designated for a temporary time only, to provide Customs facilities where needed because of certain large-scale operations." There is no stipulation about where this temporary port can be located. It is possible to locate it within territorial waters.

Given that a boat or operation has requested out-of-port service and permission has been granted by the District Director, Customs officials fly to the location. The boat or operation is responsible for payment for the flight and must do and pay for everything as if it were a normal port of entry.

Definitions (as used in this paper)

salient point - a promontory projecting above mean lower-low water from which the territorial sea is measured.

mean lower-low water - the average of the lower-low waters of each tidal day over a period of 19 years.

island - a naturally formed area of land surrounded by water which is above water at mean high tide.

territorial sea - the area from the mean lower-low water line to a line three nautical miles seaward, plus an additional three nautical miles from low-tide elevations that are within the first three nautical miles.

Further information may be obtained by contacting:

Jim Anderson
Technical Services Director
Department of Natural Resources
Anchorage, Alaska
(907) 276-2653

David A. Colson
Baseline Committee Chairman
Office of Asst. Legal Advisor for Oceans,
Environment & Scientific Affairs
Washington, D.C. 20520
(202) 632-1700

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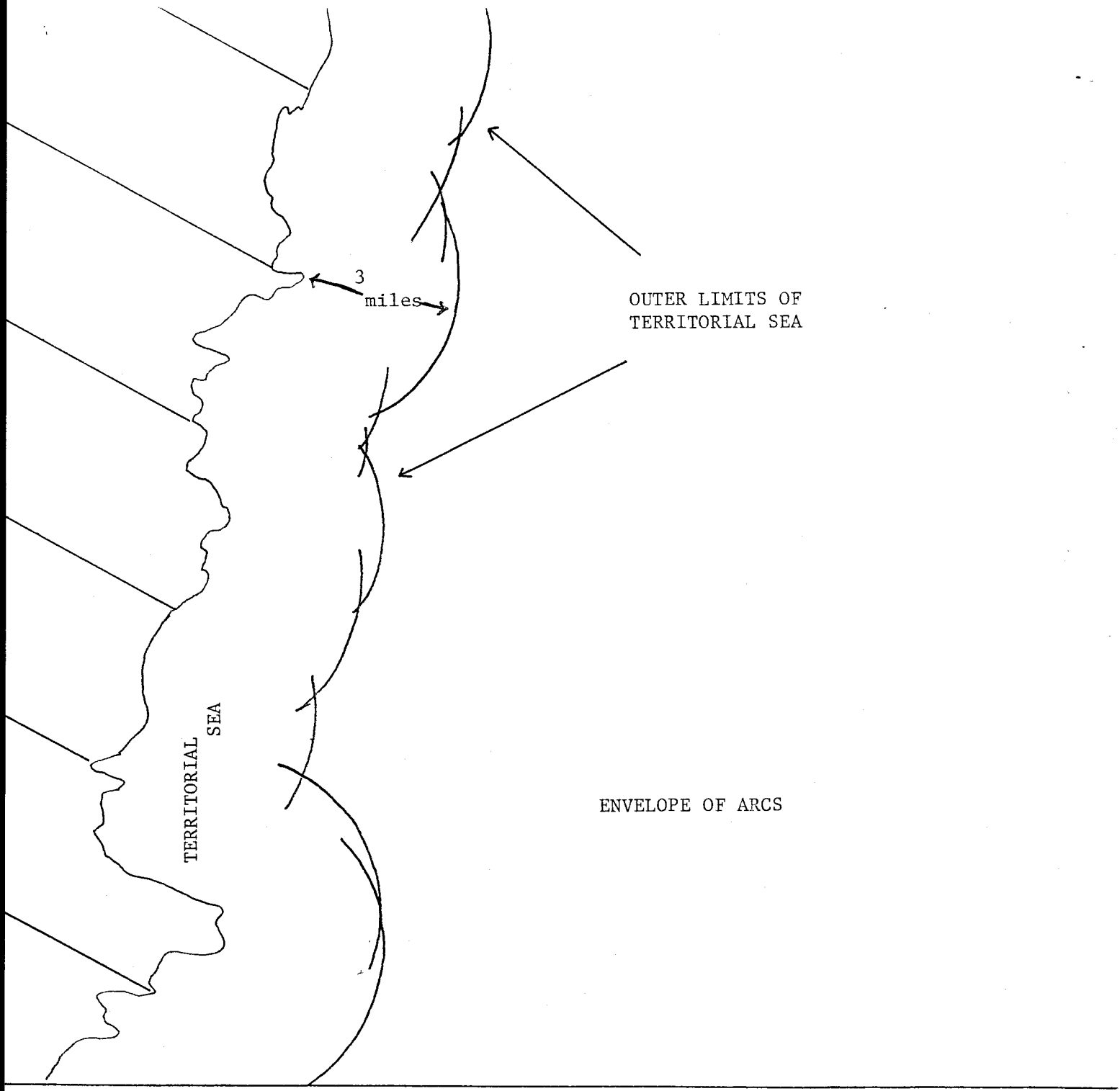
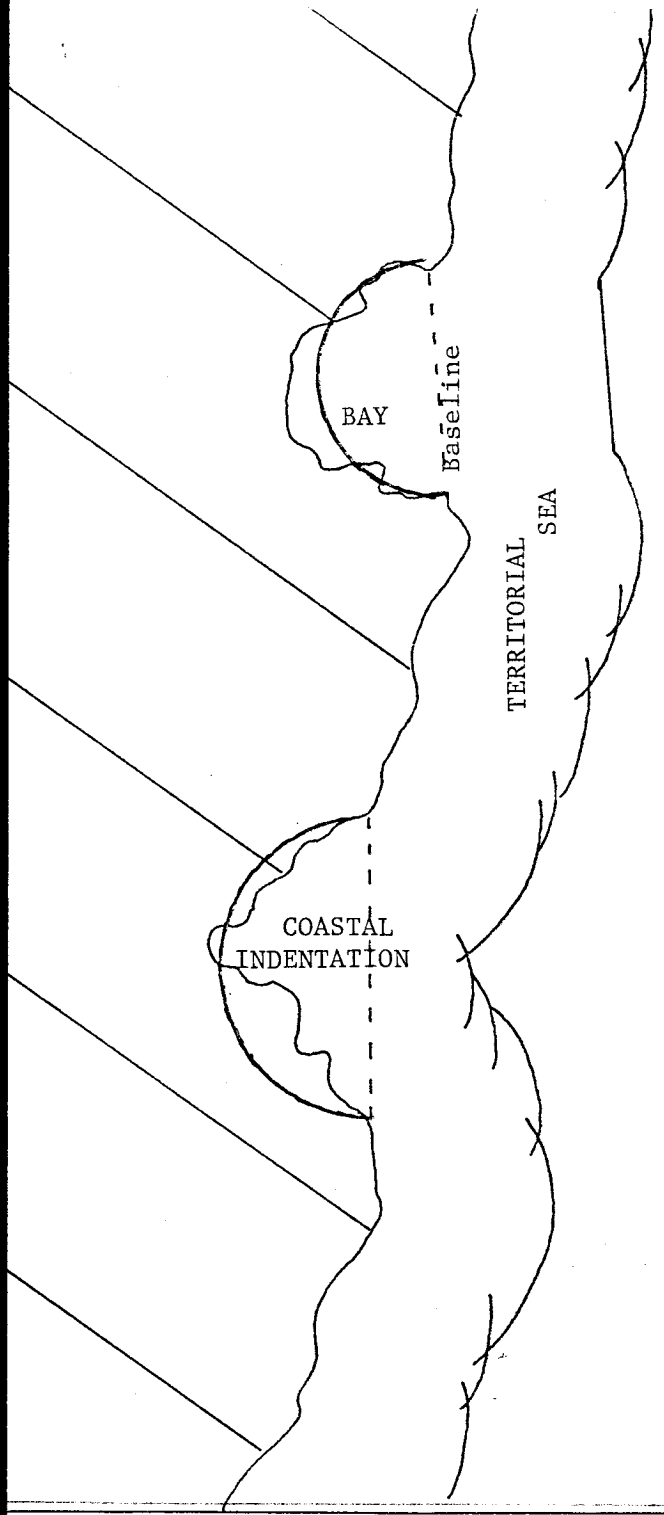

3
miles
OUTER LIMITS OF
TERRITORIAL SEA
TERRITORIAL SEA
ENVELOPE OF ARCS

Figure 1



Water area must exceed that of semi-circle to qualify as a bay.

BAYS and COASTAL INDENTATIONS

Figure 2

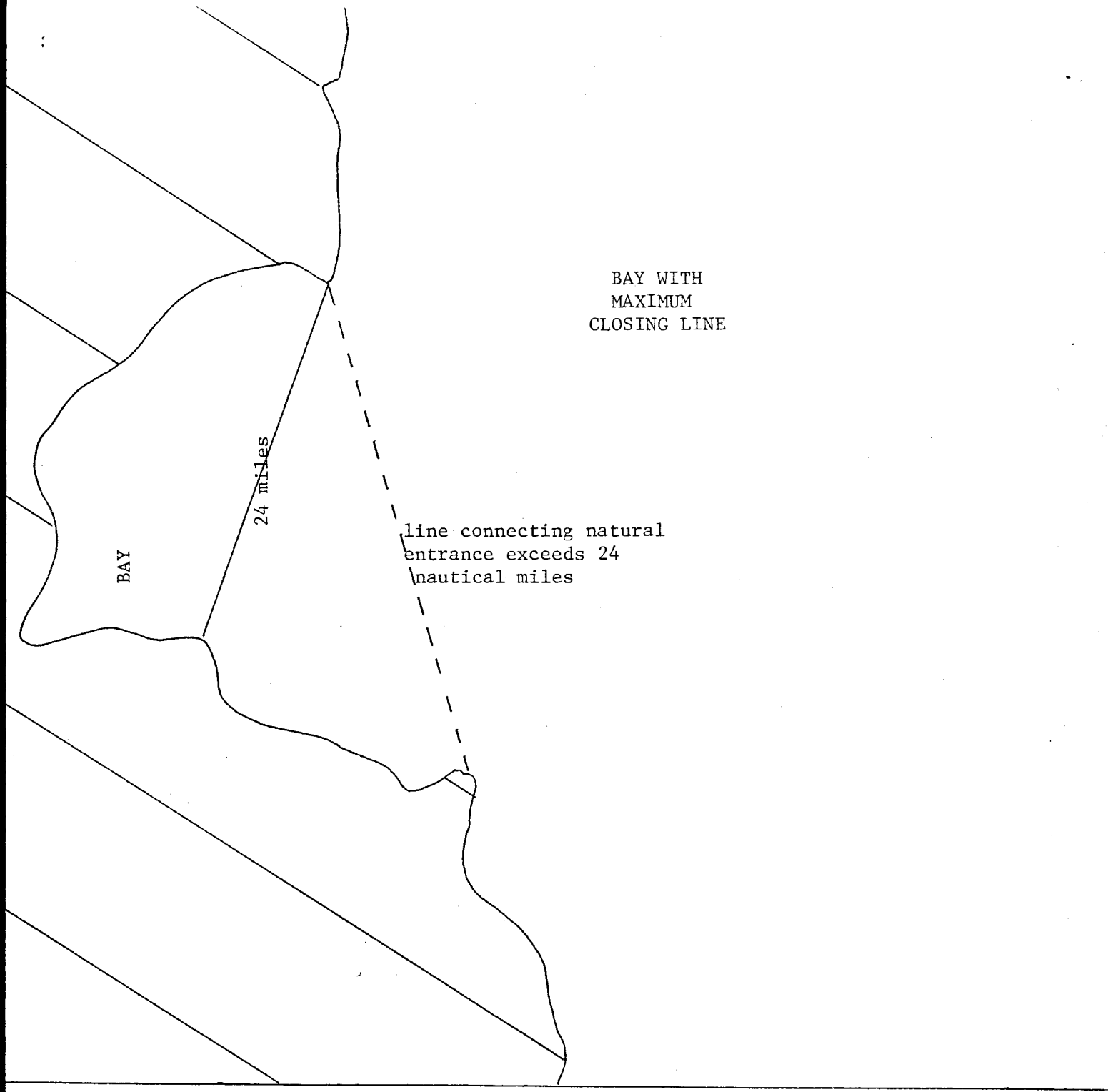

BAY WITH
MAXIMUM
CLOSING LINE
24 miles
BAY
line connecting natural
entrance exceeds 24
nautical miles

Figure 3

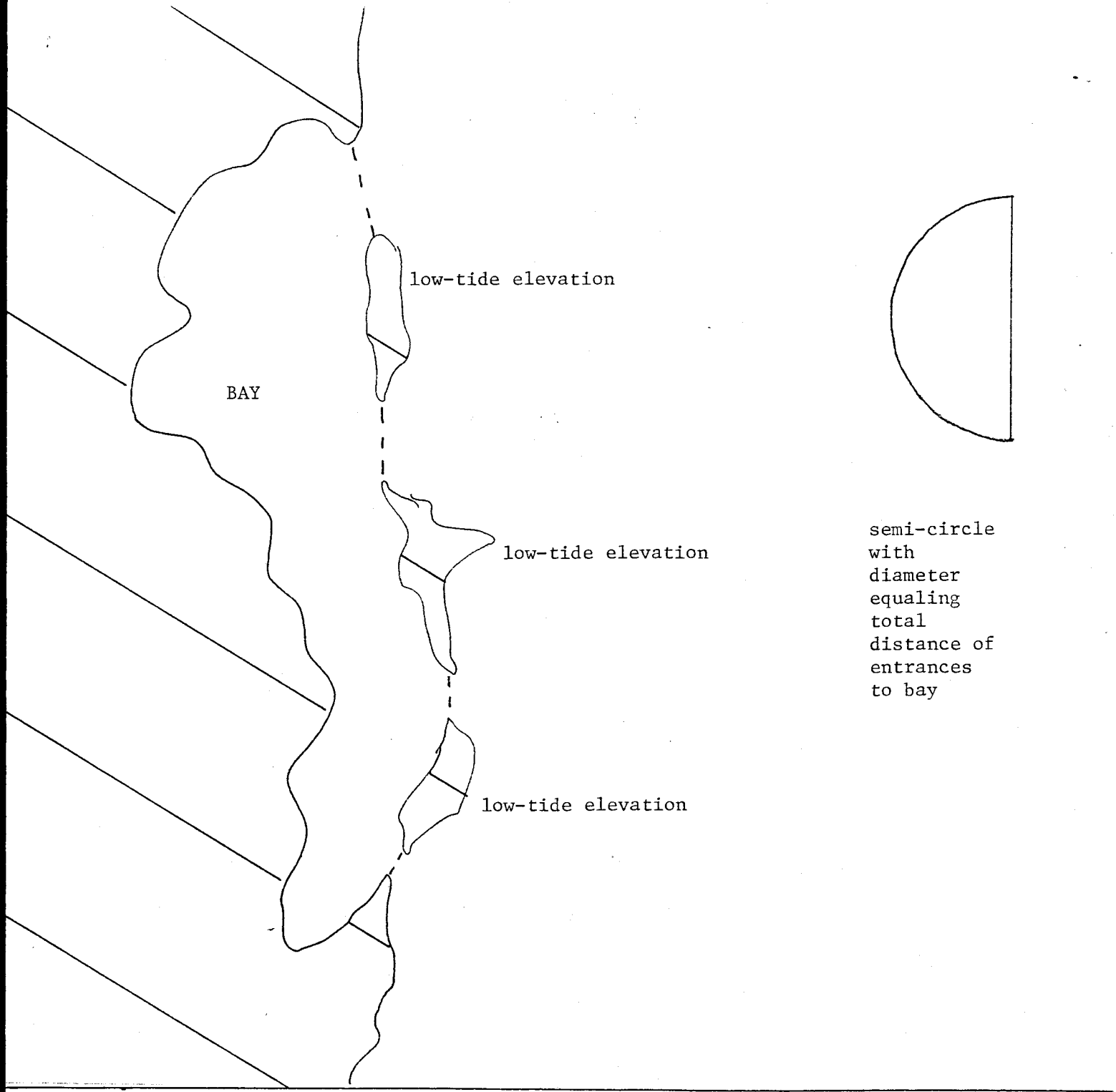
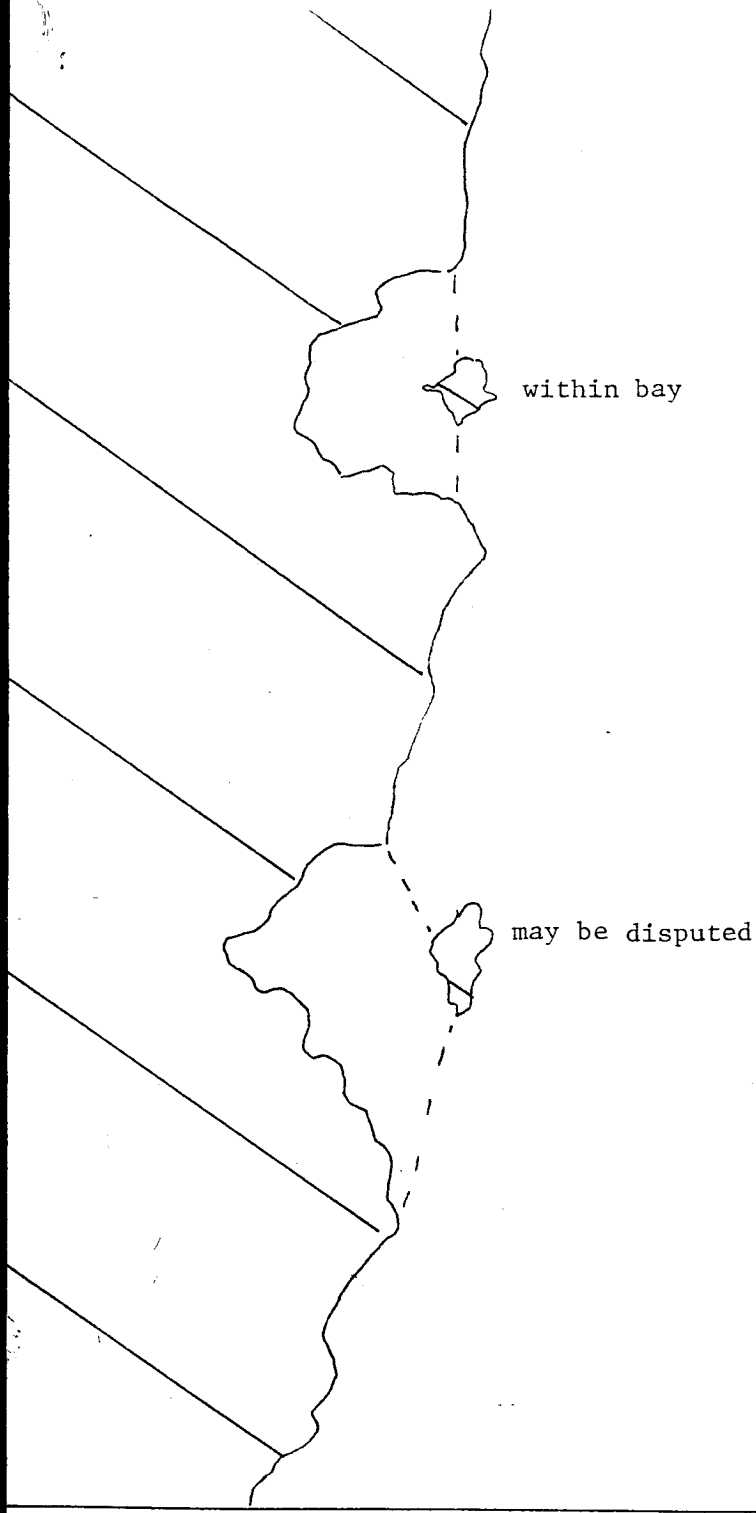
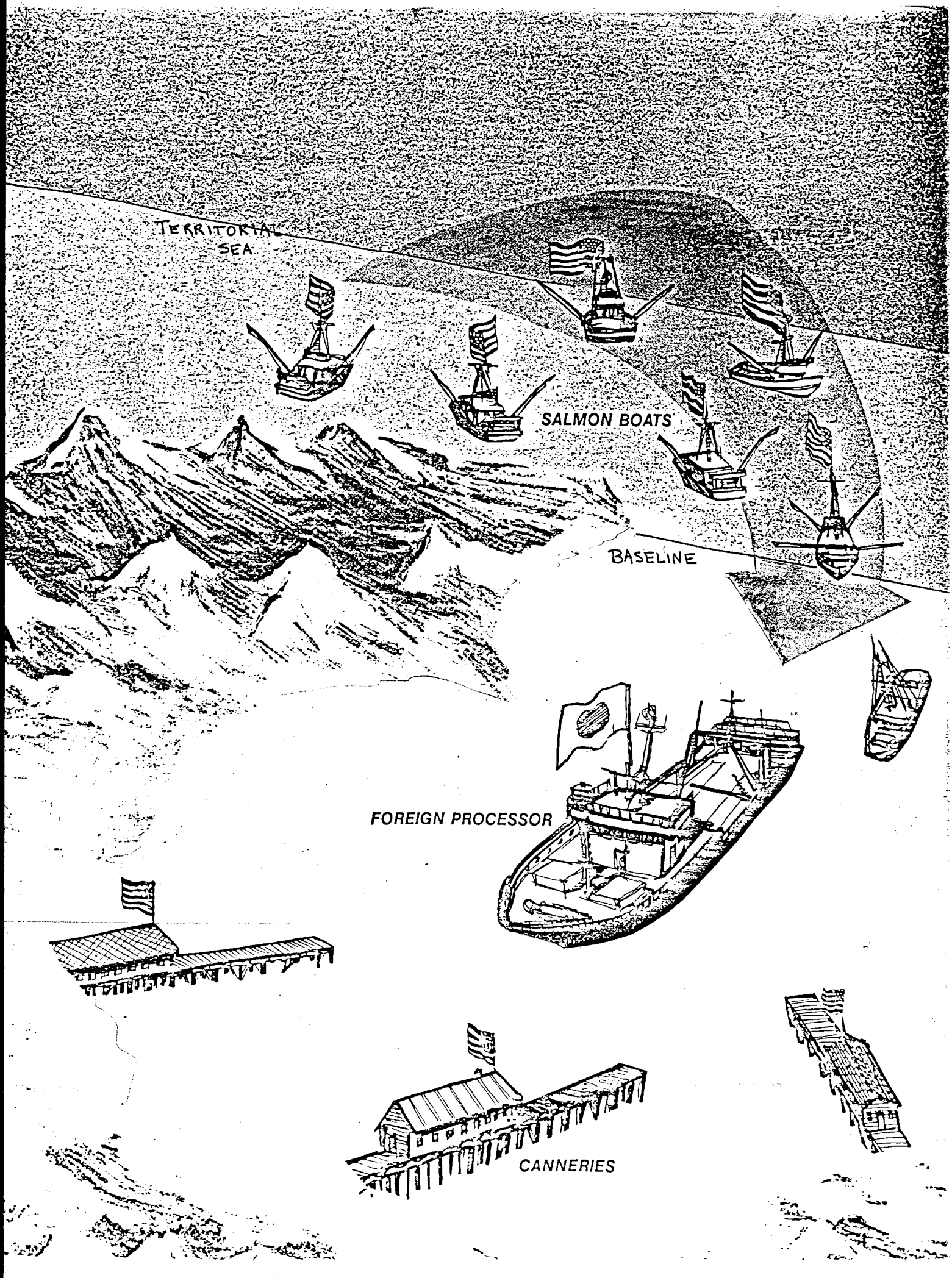

low-tide elevation
BAY
low-tide elevation
low-tide elevation
semi-circle with diameter equaling total distance of entrances to bay

Figure 4



ISLANDS IN
RELATION TO
BAYS

Figure 5


TERRITORIAL SEA
SALMON BOATS
BASELINE
FOREIGN PROCESSOR
CANNERIES

APPENDIX 2a

Fish Transport Information

SEA-LAND

Regular call at Dutch Harbor every two weeks

35' containers
44,000 lb. minimum per container

A. Newman Wilson Inc. utilizing Sea-Land - John Schneider (503) 222-3577

$ 4.62/100 lbs. to Seattle
$ 1.02/100 lbs. terminal charges @ Seattle
$12.47/100 lbs. to P.R.
$ .10/100 lbs. terminal carges @ Seattle
$ .10/100 lbs. terminal charges @ P.R.
$ .093/100 lbs. wharf charges

$18.403/100 lbs = $.184/lb.

B. Sea-Land Quote = Tayna Johnson (206) 938-6304

[Figures based on a 46,000 lb. load]

$ 4.62/100 lbs. to Seattle
$ .63/100 lbs. terminal charges @ Seattle
$12.47/100 lbs. to Puerto Rico
$ .10/100 lbs. terminal carges @ Seattle
$ .10/100 lbs. terminal charges @ P.R.
$ .093/100 lbs. wharf charges

$18.013/100 lbs = $.1801/lb.

Charter Vessels

$2,000 each way for canal - ship
$30,000 each way for canal - barge

A. SUNMAR - Hans Morrison (206) 583-0008

vessel capacity - 1,200 tons
vessel speed - 12 knots
running price/day - $4,000-$6,000

$4,000/day

$$14{,}000 \text{ mi.} \times \frac{1}{12 \frac{\text{nm}}{\text{hr}}} \times \frac{1 \text{ day}}{24 \text{ hr}} = 48.6 \text{ days} \times \frac{\$4{,}000}{\text{day}} = \$194{,}444$$

1,200 mt -> $194,444 ÷ 2,688,000 lb. = $.07/lb.
600 mt -> $194,444 ÷ 1,344,000 lb. = $.14/lb.

$6,000/day

$$14{,}000 \text{ mi.} \times \frac{1}{12 \frac{nm}{hr}} \times \frac{1 \text{ day}}{24 \text{ hr}} = 48.6 \text{ days} \times \frac{\$6{,}000}{\text{day}} = \$291{,}600$$

1,200 mt -> $291,600 ÷ 2,688,000 lb. = $.11/lb.
600 mt -> $291,600 ÷ 1,344,000 lb. = $.22/lb.

This vessel is undergoing reoutfitting and will not be ready to function until April 1985. Depending upon the final negotiated rate, the cost would range from $.07/lb. to $.22/lb. Mr. Morrison though the price would be closer to the higher end of the range. This especially true if only 60 mt are transported each time.

B. FOSS ALASKA - Blaine Elliot (206) 281-3854

Tug and ocean going barge
$.20/lb. dedicated service

C. WESTERN PIONEER - Amigo Sorinao (800) 426-6783

vessel capacity - 1,000 mt
vessel speed - 10 knots
running price/day - $4,000-$4,500

$4,000/day

$$14{,}000 \text{ mi.} \times \frac{1}{10 \frac{nm}{hr}} \times \frac{1 \text{ day}}{24 \text{ hr}} = 58.3 \text{ days} \times \frac{\$4{,}000}{\text{day}} = \$233{,}200$$

1,000 mt -> $233,200 ÷ 2,240,000 lb. = $.104/lb.
600 mt -> $233,200 ÷ 1,344,000 lb. = $.17/lb.

$6,000/day

$$14{,}000 \text{ mi.} \times \frac{1}{10 \frac{nm}{hr}} \times \frac{1 \text{ day}}{24 \text{ hr}} = 58.3 \text{ days} \times \frac{\$6{,}000}{\text{day}} = \$262{,}350$$

1,000 mt -> $262,350 ÷ 2,240,000 lb. = $.117/lb.
600 mt -> $262,350 ÷ 1,344,000 lb. = $.20/lb.

Depending upon the final negotiated rate, the cost would range from $.104/lb to $.20/lb.

D. PRIBILOF - Bob Bingham (206) 789-1565

carrying capacity - 400-500 tons
vessel speed - 20 knots
running price/day - $2,500-$3,000

$2,500/day

$$14{,}000 \text{ mi.} \times \frac{1}{20 \frac{\text{nm}}{\text{hr}}} \times \frac{1 \text{ day}}{24 \text{ hr}} = 29.16 \text{ days} \times \frac{\$2{,}500}{\text{day}} = \$72{,}916$$

400 mt -> $72,916 ÷ 800,000 lb. = $.091/lb.
500 mt -> $72,916 ÷ 1,000,000 lb. = $.073/lb.

$3,000/day

$$14{,}000 \text{ mi.} \times \frac{1}{10 \frac{\text{nm}}{\text{hr}}} \times \frac{1 \text{ day}}{24 \text{ hr}} = 29.16 \text{ days} \times \frac{\$3{,}000}{\text{day}} = \$87{,}480$$

400 mt -> $87,480 ÷ 800,000 lb. = $.109/lb.
500 mt -> $87,480 ÷ 1,000,000 lb. = $.087/lb.

The running price per day of $2,500-$3,000 can be negotiated and may in fact be lower as this was a quick estimate given over the phone. Bob Bingham is very interested in the project and has suggested the possibility of buying a vessel to suit the specific needs of transporting this volume of cod and pollock.

E. NAUTALUS - Tony Trutanich (213) 833-3564

This vessel is owned by Pan Pacific

carrying capacity - 900 mt
vessel speed - 12 knots
running price/day - $1,200

$1,200/day

$$14{,}000 \text{ mi.} \times \frac{1}{12 \frac{\text{nm}}{\text{hr}}} \times \frac{1 \text{ day}}{24 \text{ hr}} = 48.6 \text{ days} \times \frac{\$1{,}200}{\text{day}} = \$58{,}320$$

600 mt -> $58,320 ÷ 1,344,000 lb. = $.04/lb.
900 mt -> $58,320 ÷ 2,016,000 lb. = $.03/lb.

This is a bare boat charter.

F. OAKSMITH SHIPPING BROKERS - Steve Oaksmith (206) 283-1000

Denali

carrying capacity - 400-600 mt
vessel speed - 12 knots
running price/day - $2,200

$2,200/day

$$14{,}000 \text{ mi.} \times \frac{1}{12 \frac{\text{nm}}{\text{hr}}} \times \frac{1 \text{ day}}{24 \text{ hr}} = 48.6 \text{ days} \times \frac{\$2{,}200}{\text{day}} = \$106{,}920$$

400 mt -> $106,920 ÷ 896,000 lb. = $.115/lb.

600 mt -> $106,920 ÷ 1,344,000 lb. = $.079/lb.

G. COASTAL TRADER

vessel capacity - 400-600 mt
vessel speed - 12 nm/hr.
running price/day - $3,000

$3,000/day

$$14{,}000 \text{ mi.} \times \frac{1}{12 \frac{\text{nm}}{\text{hr}}} \times \frac{1 \text{ day}}{24 \text{ hr}} = 48.6 \text{ days} \times \frac{\$3{,}000}{\text{day}} = \$145{,}800$$

400 mt -> $145,800 ÷ 896,000 lb. = $.162/lb.
600 mt -> $145,800 ÷ 1,344,000 lb. = $.108/lb.

There are basically only two ways to save money on such a venture. One is to utilize a foreign hull. By stopping at Trinidad Tobago or Panama for insignificant further processing, a foreign hull can be used and will satisfy the requirements of the Jones Act. This would greatly reduce costs as there are many inexpensive foreign hulls available. The second way is to transport larger quantities on the U.S. hull which may not be a viable option due to the optimum processing characteristics of the project. It is necessary to remember that the speed of the vessel will be an important detriment of total transportation cost.

There are specific licensing requirements of a fishing vessel consigned to carry cargo. The vessel needs to carry the proper documentation. This would require that coastwise trade appear on the endorsement. In addition, the vessel would need to be inspected by the Coast Guard if it is carrying freight for hire. This would include inspection of pipes and electrical systems, as well as examination of the structural health of the vessel. All vessels over 15 GRT need to be certificated in this manner. Finally, the operator of the vessel must be properly licensed to run a vessel that is carrying cargo. Most vessels will already possess the proper documentation and licensing.

There is little chance that an exemption to the Jones Act could be obtained in order to utilize a foreign vessel. If this was a route being considered, the Federal Maritime Commission is the place to start.

Salt and Salt Transportation Information

2,000-2,500 lb. polyurethane bags available
Bulk West International, Chicago, makes the bags
Bags good for up to ten trips
Cost = $20.00/bag
This would add a cost of $2/ton of salt if used 10 times

Inagua Island

$15 F.O.B. per ton.
It will be very difficult to deal with quantities as high as the 4,000-5,000 tons it appears is necessary. However, if one could buy the required quantity but only load 500 tons per trip it might be feasible.

Morton Salt

Morton is undergoing problems with their salt source. They do not feel as thought they can commit to any other sales and are going as far as to consider rationing salt to previous customers.

Leslie Salt Company

$65/ton bagged @ Seattle [+$20/bag].
There is a plant in San Francisco processing sun-dried ocean salt. Might be cheaper if picked up in San Francisco by a vessel that could handle bulk salt.

Seattle to Dutch Harbor - SEA-LAND
4 trailers - 160,000 lbs. minimum
$4.20/100 lbs. - Terminal)
288.73/container wharfage) —— .049/lb.

45.75/ton at dock - Oakland) + dockage
45.75/ton at dock - Richland/San Francisco) + stevedoring
need to order 2 weeks in advance
need to order 2 cars at a time - 56 bags/car

PS/kkk/K32
81684b

APPENDIX 2b

FACTS

It is not known if the pollock population in the Bering Sea is composed of a single stock or several. Opinions regarding stock identity differ. At this point, we have to assume that we might be looking at stocks somewhat analogous to the major fishing concentration, in the Gulf of Alaska, the Bering Sea, off the outer Aleutian Islands, along the Kamchatka Peninsula, in the Okhotsk Sea, in the Korean Bight where historically there have been major concentrations of pollock, and off northern Japan. But in reality, stock identity and genetic makeup are not well known.

Like many of the gadoids, pollock tend to have an offshore-inshore movement that is of a seasonal character; generally moving to deeper waters and forming concentrations of higher density during the late fall and winter months, during the spawning period which is generally in the winter and early spring; moving back onto the continental shelf into what are referred to as feeding areas during the summer months.

The history of the fishery has generally demonstrated a relatively high degree of stability.

You will be looking for the older pollock if you are keying in on the fillet market. But because of the biology of the pollock, you must recognize that it is not on an average a large fish.

One of the characteristics of Alaska pollock is the apparent rather high incidence of parasites.

Al Birch - Alaska Draggers Association

Will not be able to catch pollock of the required size in the midwater trawl mode. However, you might be able to catch fish that average 22" provided you are not fishing during the spawning cycle. Fishing on the east side of the islands would probably be the best bet.

Mel Wick - Alaska Draggers Association

It is possible! However, you will catch sole and codfish. This incidental catch could go as high as 20%.

Arctic Trawler - Trans Pacific

Pretty tough to target just on big pollock. Everyone would like to. Shape of pollock such that all fish slip through unless you have a very small mesh. Schools are dense so it makes it hard to determine the size of the fish.

Lee Alverson - (206) 285-3480

When you are talking about pollock larger than or equal to 22" you are talking about only 3-5% of the fish available. You can always design a mesh selectivity thing. In a bathymetric, depth and time sense, there are also things that can be done.

It would be something like targeting on halibut over 200 lbs. You get some but you don't get a lot.

Bob Alberson - (206) 284-4720

You can do a mesh size thing.

The J.V. with the Germans has done this and used a larger mesh size. They were using pollock for filleting operations.

There is likely to be a political or management problem in the near future. If you catch them when they are 10" long, you can't catch them when they are 22" long. Conflicting use desires. Mesh clogging will cause you to still catch some small fish even if targeting on large fish.

Mr. Schmedke (206) 282-6014 - Nordstern

Says you get larger fish off midwater trawl as opposed to bottom. Probably won't get a large quantity of 22" fish. (Pollock disappear when full moon comes.)

PS/kkk/K31
81584a

APPENDIX 3

REPORT TO THE FISHERIES MINI-CABINET

Prepared by
Alaska Department of Commerce and Economic Development
Office of Commercial Fisheries Development
August, 1984

TABLE OF CONTENTS

2.0 Introduction

The Governor's directive to the Fisheries Mini-Cabinet on January 10, 1984 outlined eight specific issues which require "attention in the immediate future." The purpose of this paper is to facilitate the Mini-Cabinet's decision making process concerning the Governor's charges 4 and 6 which are:

4. Develop policy and strategy recommendations that will promote and Alaskanize domestically underutilized fisheries while insuring the continuing viability of our fully utilized traditional fisheries.

6. Develop policy and strategy recommendations that will maximize the participation of both rural and urban Alaskans in the harvesting, processing, employment and marketing sectors of the seafood industry.

In order to examine the specific areas where each agency can make a contribution, individually and collectively as a mini-cabinet, an outlined report has been prepared containing the following major categories:

(a) A section on the status and structure of the Alaska fishing industry.

(b) A section on the reported growth potential and patterns for the Alaska fishing industry.

(c) A section outlining problem statements.

(d) A section outlining solution statements.

Finally, the information contained within this report should help the Fisheries Mini-Cabinet in determining what role State Government should have when dealing with these issues.

3.0 Status & Structure of Alaskan Fisheries

During the period 1975-1983, landings at ports in the Alaska region increased almost five-fold in value to the fisherman, from $130 million in 1975 to $600 million in 1983. Viewed on a state-by-state basis, in 1981, Alaska ranked second nationally in volume of fish and shellfish landings with 975 million pounds. In dollar value, the 1983 landings in Alaska of about $600 million led the nation and were more than double that of second ranked California.

The individual fisheries which comprised Alaska's landings in 1980 are summarized by volume and value in Figure 1. The dominance of salmon, king crab, and Tanner crab is apparent since

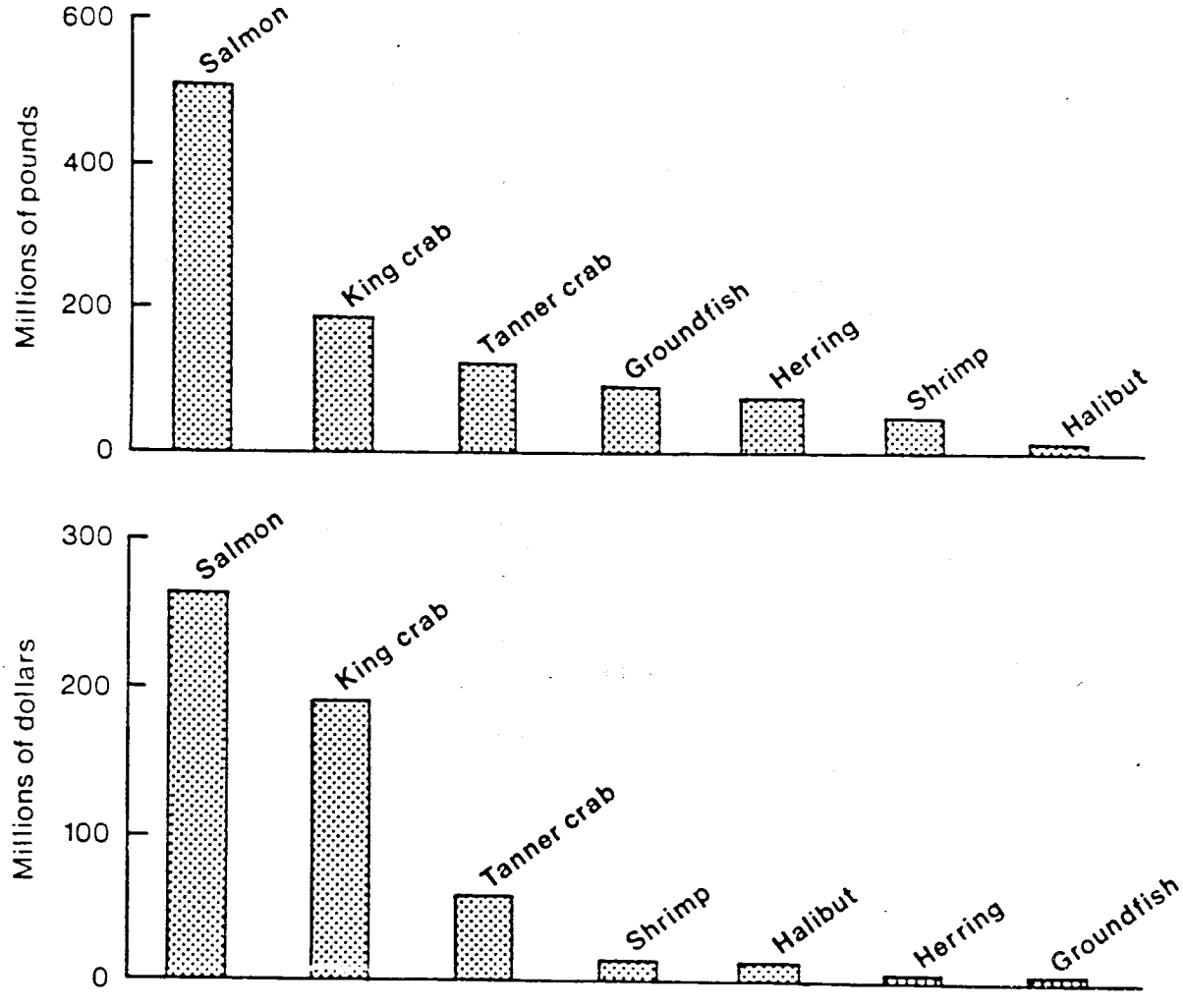


Fig. 1. Volume and value of fish and shell fish landings in Alaska, 1980. Groundfish includes deliveries to foreign processors operating in joint ventures.

they comprised over 83 percent of the volume and over 92 percent of the value of all commercial landings in Alaska.

Associated with these fisheries were 506 companies and cooperatives licensed to buy and/or process seafood in Alaska in 1983. According to Department of Labor estimates, there were 22,401 jobs on fishing vessels and another 15,629 people employed in processing plants at the peak of the 1981 salmon season. In 1983, there were 17,537 registered fishing vessels and 27,585 commercial fishing licenses (crew).

An attempt has been made to individually describe the fisheries involved in order of their economic importance. Emphasis has been placed on showing the volume and value of the fisheries in Alaska in order to illustrate their importance.

An historic review has been added to illustrate the dynamics of each fishery and its current status and structure relative to long-term trends. This will also help in understanding growth potential for each fishery.

3.1 Salmon

The Alaska salmon industry began with the purchase of Alaska from Russia in 1867 and has traditionally been the State's leading fishery. Annual U. S. landings increased steadily from a decade average of about 70 million pounds per year during 1890-1899, to over 700 million pounds per year during the 1930's. Average annual landings decreased to about 250 million during the 1950's, 1960's and 1970's. Since 1975, there has been a strong resurgence in the Alaska salmon industry. Salmon landings totaled 442.7 million pounds in 1979, 511.4 millions pounds in 1980 and an estimated 612 million pounds in 1983.

Alaska is the world's leading salmon supplier. U.S. landings of Alaska salmon accounted for over one-fifth of world production from 1961 to 1975, and over one-third of world production from 1976 to 1980. In 1980, the Alaskan salmon catch was 46 percent of the world total.

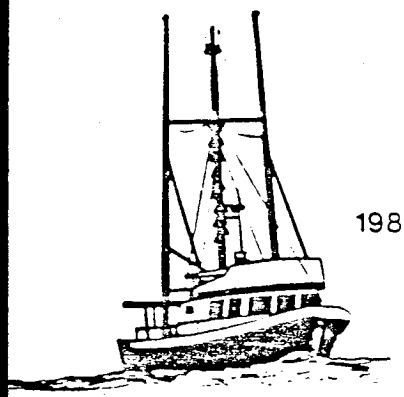
Commercial salmon fishing is conducted in coastal waters primarily by use of seines, gillnets and trolling gear (Figure 2). Over 11,600 units of commercial gear and 7,000 vessels fished in Alaska's salmon regulatory areas during 1983. The vast majority of catches was accounted for by seines and gillnets. Of the 9,837 salmon permits issued through 1981, 7,542 were held by Alaskan residents while 2,295 were held by non-Alaskans (Table 1). The Southeast seine fishery saw the involvement of the largest number of non-Alaskans with 53.1% of the permits being held by nonresidents, while the nonresident level in the Bristol Bay drift gillnet fishery was 44.1%.

SALMON

Hand troller

1980

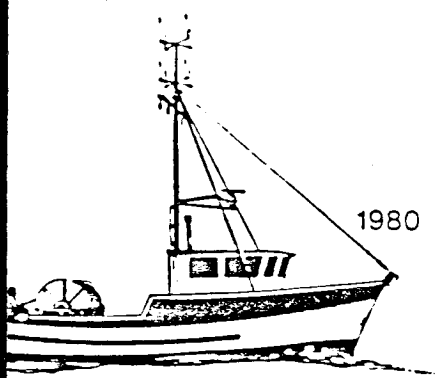
1,557 vessels
2.3 million lbs
3.1 million $



Power troller

1980

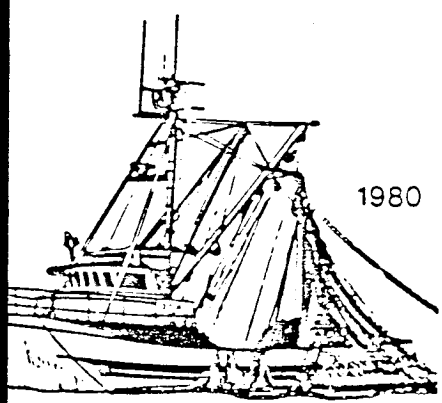
863 vessels
80 million lbs
12.7 million $



Gillnetter

1980

3,374 vessels
163.2 million lbs
91.3 million $



Purse seiner

1980

1,243 vessels
241.1 million lbs
97.7 million $

All fleets

1980

7,068 vessels
414.6 million lbs
204.8 million $

	1981	1982	1983
	612	544	612
	398	310	327

Fig. 2. Number of commercial vessels, catch, and value for 1980.

TABLE 1
Numbers of 1981 Permit Holders by Fishery
and by Resident Type

	SE SEINE	SE DRIFT	POWER TROLL	YAKUTAT SETNET	P.W.S. SEINE	P.W.S. DRIFT	P.W.S. SETNET	COOK INLET SEINE	COOK INLET GILLNET	COOK INLET SETNET	KODIAK SEINE	KODIAK B.SEINE	KODIAK SETNET	CHIGNIK SEINE	PEN/ALUE SEINE
Alaskan	194	316	707	145	191	396	24	73	374	684	280	30	140	72	98
Non-Alaskan	220	148	232	19	68	135	5	2	180	60	95	4	46	18	19
TOTAL	414	464	939	164	259	531	29	75	554	744	375	34	186	90	117

	PEN/ALUE DRIFT	PEN/ALUE SETNET	BR. BAY DRIFT	BR. BAY SETNET	U. YUKON GILLNET	KOTZEBUE GILLNET	KUSKKWIM GILLNET	L. YUKON GILLNET	NORTON SOUND GILLNET	TOTAL PERMITS
Alaskan	99	96	961	710	63	208	784	703	194	7,542
Non-Alaskan	57	14	759	205	1	3	1	3	1	2,295
TOTAL	156	110	1,720	915	64	211	785	706	195	9,837

About 124 million salmon were taken in 1983. Pink salmon represented approximately 48 percent of the catch, while sockeye totaled 42 percent. Chum, coho, and chinook salmon, in that order, made up the remainder.

Deliveries of fresh catches are commonly made on a daily basis to nearby shore-based or floating processors or they are delivered to packers who transport catches from the grounds to processing facilities.

About 90 percent of Alaska's processing plants processed salmon in 1980. Canned, frozen, fresh, and cured salmon products produced in 1980 at these facilities totalled 331 million pounds with a wholesale value of $601 million. The pattern of use of the Alaska salmon catch has changed notably in recent years. The share of the catch marketed in fresh and frozen forms has greatly increased, while the portion that is canned has shown a corresponding decrease.

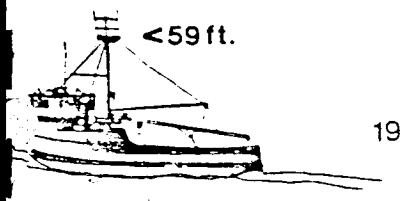
3.2 King crab

Eighty percent of the total world-wide king crab catch in 1980, over 185 million pounds, was accounted for by U.S. fishermen in Alaska. U.S. landings of king crab increased steadily between 1960 and 1966 due largely to fisheries around Kodiak. After landings there declined during the late 1960's, strong growth in the U.S. fishery again prevailed in the Bering Sea until 1981.

Following the 1980 record landings of 185 million pounds, valued to U.S. fishermen at $190 million, Alaska king crab abundance dropped drastically in 1981 and 1982 when state-wide landings totaled only 88 million pounds and 39 million pounds respectively. This recent decrease in abundance has continued and near future landings are likely to be well below those of 1981 and 1982.

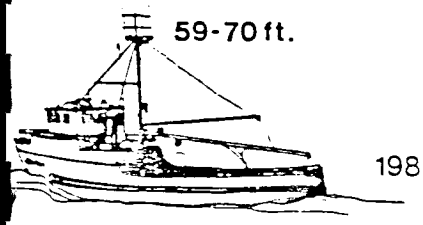
Recently, the most productive fisheries have occurred in the Gulf of Alaska Central district from Kodiak west and in the southwest Bering sea/eastern Aleutian Islands western district. King crab catches from grounds in the Southeastern and Central district are obtained largely by Alaska-based vessels while western district catches are dominated by vessels homeported in Washington state. The king crab/Tanner crab fleet, which operated in 1979 and 1980, totaled about 700-800 vessels and was comprised of a wide variety of west coast-style combination boats measuring 30-90 feet in length and more specialized crab vessels of 70-180 feet in length equipped with circulating sea water tanks holding up to 100,000 pounds of live crab (Figure 3). The majority of vessels over 91 feet in length operated in the Bering Sea/Aleutian area and were Washington-based, whereas small vessels more commonly operated in the remaining Alaska regions and were predominantly

KING CRAB



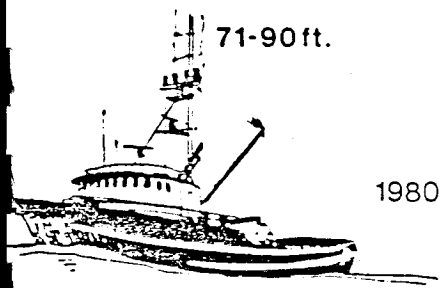
1980

289 vessels
12.37 million lbs
11.74 million $



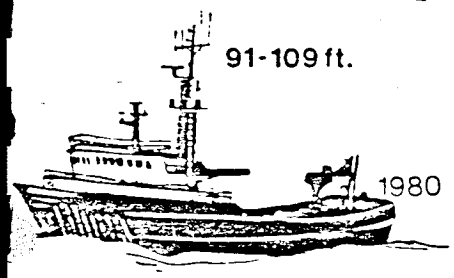
1980

54 vessels
8.74 million lbs
8.76 million $



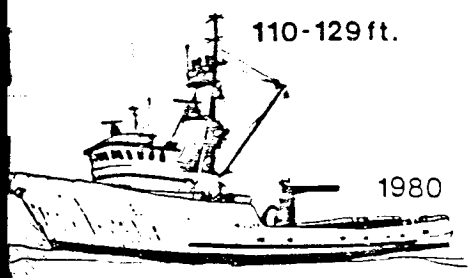
1980

169 vessels
48.12 million lbs
44.58 million $



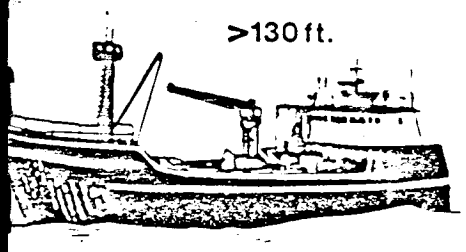
1980

141 vessels
62.68 million lbs
57.31 million $



1980

52 vessels
32.73 million lbs
29.72 million $



38 vessels
19.35 million lbs
17.57 million $

All size vessels

1980

743 vessels
183.99 million lbs
169.69 million $

	1981	1982	1983
	88	38.5	21.2
	151.7	114.6	64.8

Fig. 3. Number of commercial vessels, catch, and value for 1980.

Alaska-based. A portion of the unutilized crab fleet-vessels -large enough to be converted to mid-water trawling--have found employment in Alaska's growing joint venture fisheries for groundfish. But this has not been a viable option for most skippers because of the costs involved.

King crab processing facilities are widely distributed throughout coastal Alaska and include both shore-plants and floaters. The greatest volume of catches in recent years has been delivered to facilities in Dutch Harbor, Akutan and Kodiak. Canning was the favored method of processing in the early years of the fishery but frozen, cooked and uncooked or green sections now constitute 95 percent of the product.

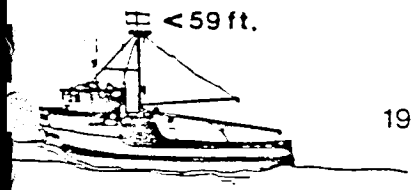
The king crab fisheries provided seasonal employment for both fishermen and processors. About 3,400 fishermen and 60 processing facilities participate in the king crab fishery. Periods of operation vary somewhat from year-to-year since each fishery is closed when assigned catch quota guideline harvest levels are reached.

3.3 Tanner Crab

In addition to producing about 80 percent of the world's king crab catch in 1980, U.S. fishermen operating in Alaska also harvested about 55 percent of the Tanner crab landed worldwide. Although the U.S. Tanner crab fishery in Alaska did not begin until the mid-1960's, it rapidly expanded to where the domestic landings during the past five years have exceeded 100 million pounds annually. The 1980 catch totaled 122 million pounds and yielded over $60 million to U.S. fishermen. The catch fell dramatically to just 69 millon pounds in 1982.

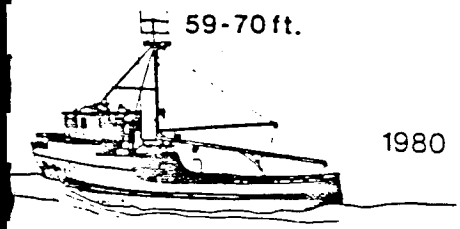
The U.S. Tanner crab fishery developed rapidly in the wake of the king crab fishery due to improved market demand for "snow crab," increased prices, readily available harvesting and processing facilities, and abundant resource supplies. Tanners are fished by essentially the same vessels and crews which harvest the king crab. With slight modifications, they also employ the same pot gear and handling techniques. The U.S. Tanner fleet which operated in 1979-1980 totaled 650-700 of the vessels in the parent king crab fleet (Figure 4).

Of the 60 facilities which processed king crab in 1981, over 50 also processed Tanners. The seasonal periods of the king and Tanner crab fisheries generally complement each other, thus extending the overall period of crab fishing and processing. The major Tanner fisheries typically begin during December and January when the fall-winter king crab operations are winding down, and terminate in May or June as the catch quotas are filled.



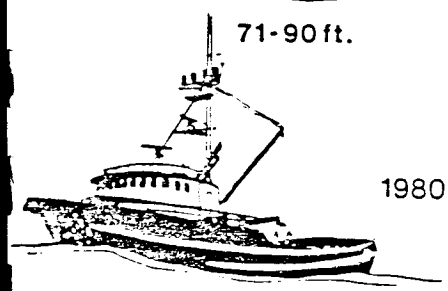
1980

320 vessels
18.78 million lbs
12.10 million $



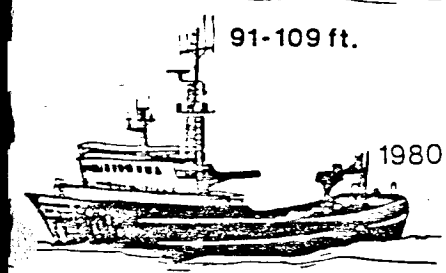
1980

59 vessels
6.68 million lbs
4.26 million $



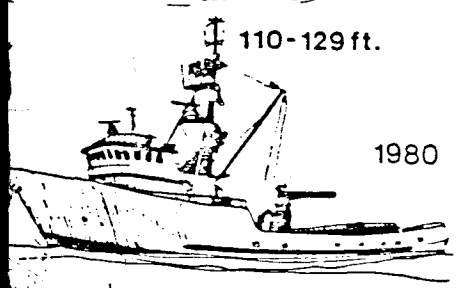
1980

156 vessels
37.71 million lbs
18.25 million $



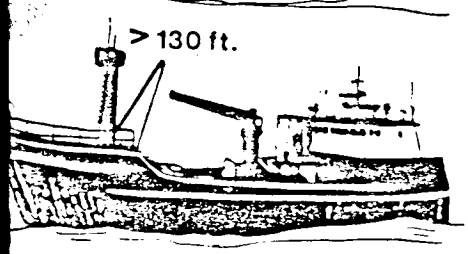
1980

103 vessels
32.70 million lbs
15.94 million $



1980

37 vessels
16.33 million lbs
7.53 million $



20 vessels
7.67 million lbs
3.31 million $

All size vessels

1980

695 vessels
119.87 million lbs
61.39 million $

	1981	1982	1983
	107.7	69.7	61.1
	47.3	72.7	53.9

Fig. 4. Number of commercial vessels, catch, and value for 1980.

The 1980 Tanner pack totaled 62.7 million pounds with a primary wholesale value of $99.5 million.

3.4 Shrimp

Pink shrimp resources have supported substantial trawl fisheries and short-based processing operations in Alaska since the early 1960's. This fishery originated in Southeast Alaska near Petersburg in 1915 and remained primarily a southeastern fishery until the mid-1950's. During that period, shrimp landings were less than 30 million pounds annually, most of which was cooked, hand-peeled and frozen for specialty markets.

Alaska's modern-day shrimp industry developed rapidly after 1958 due largely to the introduction of mechanical peelers in the lower Cook Inlet and particularly in the Kodiak area where large stocks of shrimp existed. Between 1960 and 1971, over 90 percent of the State's annual catch was harvested from bays and near-shore areas around Kodiak. Presently, both fishing and processing extends further west to the eastern Aleutian Islands.

During the early 1960's, when shrimp harvesting and processing capabilities in Alaska were expanding and rebuilding, Japanese and Soviet distant-water trawler fleets initiated fisheries on pink shrimp stocks in the eastern Bering Sea and Gulf of Alaska. The Japanese operated primarily on a virgin resource northwest of the Pribilof Islands. Between 1961 and 1968, the cumulative Pribilof harvest exceeded 200 million pounds, with a peak annual catch in 1983 of 69.5 million. This stock became commercially extinct in 1968 and has not recovered enough to support a fishery. Soviet fisheries were conducted in the Gulf of Alaska between 1961 and 1974, primarily along the Alaska Peninsula and east of Kodiak. Their landings totaled about 120 million pounds and peaked in 1967 at 25 million pounds. Foreign shrimpers were phased out in 1967 due to passage and enforcement of a 1967 law which established a 9-Mile contiguous zone seaward of the 3-Mile territorial waters.

Between 1976 and 1982, annual statewide shrimp landings fell from a record 129 million pounds to just 27 million. The sharpest drop in production occurred in 1981 and 1982, shattering any hope that this fishery had bottomed out and was beginning to rebound. On a statewide basis, shrimp trawlers landed about 27.3 million pounds in 1982, the lowest catch since 1965 and nearly 25 million pounds less than in 1980. Landings of 18.7 million pounds in the Kodiak area led the State in 1981, but were only 68 percent of that region's 1980 landings and 27 percent as large as the record 70.5 million pounds harvested around Kodiak in 1973.

The Alaskan shrimp trawl fleet numbered 75-80 vessels during the 1980-1981 period, down considerably from the peak fleet size of about 125 vessels in the mid-1970's. Over one-half of the 1980-1981 vessels were 71-90 feet in length and most were double-rigged.

3.5 Halibut

Traditionally, the Pacific halibut fishery has been conducted jointly by U.S. and Canadian fishermen who operated until 1981 under reciprocal fishing agreements. In 1980, U.S. fishermen took 6,460 metric tons of halibut from Alaskan waters, which represents 66 percent of all U.S. halibut caught and over one-third of world halibut landings. The extension of fisheries' jurisdictions by the United States and Canada, followed by the termination of reciprocal fishing privileges, left a larger-than-traditional share of the potential harvest available to United States fishermen because the stocks of halibut are larger off Alaska than off British Columbia. As a result, Alaska fishermen took 7,700 metric tons (17.2 million pounds) in 1981. In 1982, the Alaska catch rose to 12,900 metric tons (28.9 million pounds).

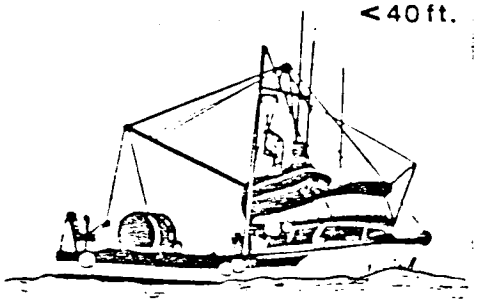
The Pacific halibut resource has undergone some major long-term fluctuations in abundance, as evidenced by historic landing trends, and several other changes have recently occurred which greatly affect the economic viability of the fishery. Most notable has been the addition of about 900 U.S. vessels to the halibut fleet between 1977 and 1981. With over 3,000 vessels in the fleet in 1981, that year's catch quota in Southeast Alaska was reached after only seven fishing days and in the Central Gulf Area, after only 13 fishing days. Such intense deliveries of the traditional iced fresh halibut to shore plants have necessitated increased production of fresh halibut in terms of % of total catch. This acts as a safety valve ensuring freezing capacity and allows the processors to avoid costly storage.

The traditional Washington-based component of this fleet comprises the majority of vessels which measure 60 feet and larger; however, the recent influx of new vessels which are primarily "day boats" and small vessels from ports in Alaska has constituted a major change in the "old schooner fleet." (Fig. 5)

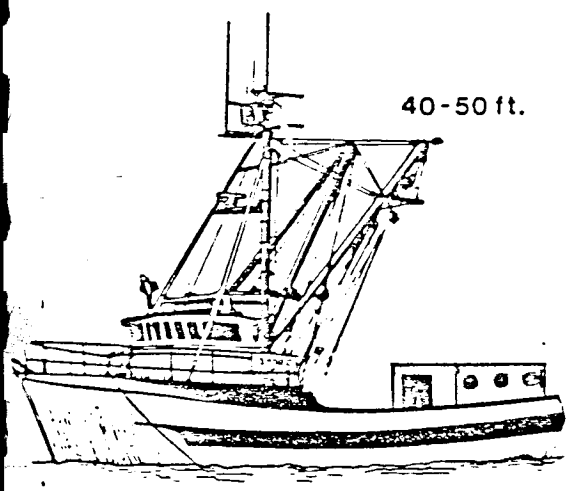
3.6 Herring

Fisheries for Pacific herring have a relatively long and colorful history in Alaska. This resource has traditionally served as a subsistence food source for Alaska Natives, and in modern times has supported both domestic and foreign commercial fisheries. Commercial fisheries since the late 1800's have undergone extensive fluctuations in harvest levels due to variations in resource abundance, markets and demand for herring products.

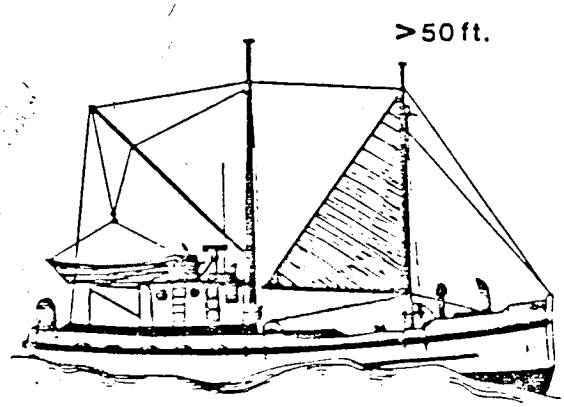
HALIBUT



2,365 vessels
6.71 million lbs
8.24 million $



388 vessels
3.60 million lbs
7.03 million $



214 vessels
4.89 million lbs
13.40 million $

All size vessels

2,967 vessels
15.20 million lbs
28.67 million $

	1980	1981	1982	1983
	14.2	20.1	22.3	32.8
	20.0	20.2	21.7	37.9

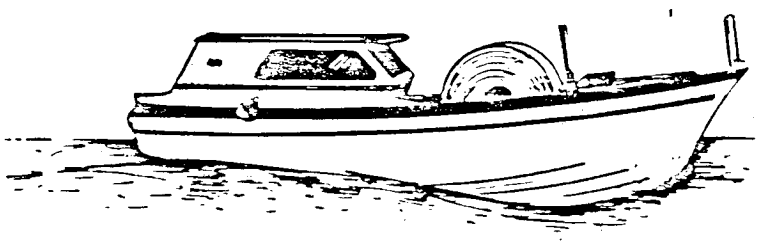
Fig. 5. Number of commercial vessels, catch, and value for 1979

Over 90 percent of all herring landed in Alaska between 1929 and 1966 was processed into meal and oil. The reduction fishery began in the late 1800's and peaked in the Southeastern district during 1925-1935 and in the Central district in the late 1930's. The combined catch in these two districts reached a peak of about 264 million pounds in 1937. At least 17 herring reduction plants were in operation that year, supported by over 70 purse seiners. Reduction fisheries ended in 1966 when foreign competition for fish meal and oil markets, high labor costs and restrictive regulations, made the manufacturing of meal and oil from Alaska uneconomical.

The Southeastern and Central districts have continued to produce large numbers of fish with the 1981 catches being 18.1 million pounds and 55.2 million pounds, respectively. However, until the late 1970's, domestic landings from the Bering Sea comprised only a minor portion of the herring catch in the State. Foreign fisheries dominated the fishery until 1977 when a significant purse seine and gillnet fishery developed along northern Bristol Bay. Motivation for the rapid U.S. development of the present herring fishery included strong Japanese markets for roe, and the phase-out of foreign fisheries under regulation of the MFCMA.

The Alaska herring catch of 89 million pounds represented about 78 percent of the 1980 U.S. landings of Pacific herring and 3.8 percent of the world catch of Atlantic and Pacific herring. The 1980 landings in Alaska were valued at $15 million to U.S. fishermen. Herring fisheries in Alaska are totally domestic and managed by the Alaska Department of Fish & Game.

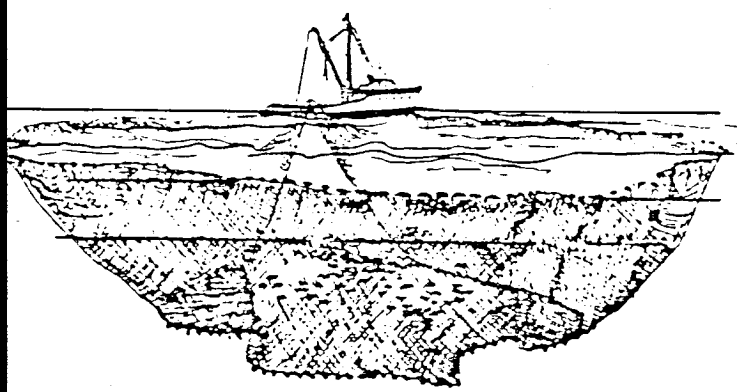
The domestic fishery for herring in Alaska is conducted primarily by seining and gillnetting during winter and spring periods as the fish move inshore for spawning (Fig. 6). As in the salmon fisheries, vessels operate primarily on a daily basis and deliver fresh catches to floating processors at shore plants. About 90 percent of the recent catches has been sold to Asian markets as roe herring, extracted roe skeins or roe on kelp. Most of the remaining 10 percent is typically sold for crab or halibut bait. Fishing, tendering and processing efforts in the more productive fishing grounds were impressive in 1982 and 1983. For example, a two-hour opening in the 1982 Prince William Sound fishery yielded about 14 million pounds to 100 purse seiners. The 1982 Togiak fishery scooped up about 43 million pounds of herring in 96 hours through the efforts of about 200 gillnetters, 125 purse seiners, 70 tenders and about 30 floating processors. This indicates the tremendous capacity of the fleet to over-harvest and necessitates a need for close surveillance of the fishery.



Gillnetter

1980

974 vessels
16.5 million lbs
2.0 million $



Purse seiner

1980

341 vessels
54.8 million lbs
9.1 million$

All fleets

1980

1315 vessels
71.3 million lbs
11.1 million $

	1981	1982	1983
	92.1	104.9	119.8
	18.6	20.2	28.9

Fig. 6. Number of commercial vessels, catch, and value for 1980.

3.7 Groundfish

First of all, the term "groundfish" or "bottomfish" needs to be clearly defined. As used in this paper, "groundfish" and "bottomfish" refer to a large species complex. Species intended to be included by the use of these terms are Pacific cod, Pacific Ocean perch, Alaska pollock, sablefish, various species of rockfish, and various species of flounder and sole. Although the use of the generic terms are not damaging in most circumstances as long as they have been defined, they can be very misleading and inappropriate for use in technical planning. Each specie has its own biological, environmental, technological and marketing characteristics. To group diverse species together for planning purposes is to ignore the very differences upon which success of the planning effort may depend.

Gulf of Alaska

Diversity of commercial bottomfish species in the Gulf of Alaska is intermediate between the Bering Sea, where the fewest species occur, and the Washington-California region, where the most species are present. The relative abundance of fish in the cod family is different compared to ther regions. Pacific hake, the most abundant of the cod-like fish off Washington-California, is present only in the southern portion of the Gulf and generally not in commercial quantities. Pollock, the dominant "cod" and largest element in the bottomfish biomass of the Bering Sea, is much less abundant in the Gulf of Alaska and becomes progressively scarcer to the south until it is practically absent off Oregon. However, the abundance of pollock in the Gulf of Alaska has increased by perhaps an order of magnitude during the past decade or so coincident with a reduction in the abundance of Pacific Ocean perch and sablefish. Pollock now appear to comprise the largest exploitable biomass within the gadoid community in the Gulf with an estimated optimum yield of 416,000 mt (931.8 million pounds) in 1984.

Another abundant groundfish that has been the target of fisheries in the Gulf is the sablefish. Sablefish is found from California waters northward into the Gulf of Alaska and Bering Sea, but reaches its greatest abundance in the Gulf of Alaska.

Many of the flounders present in the Gulf of Alaska also occur in the Bering Sea and Washington-California region; however the relative abundance of different species varies greatly between areas. In the Bering Sea, yellowfish sole dominates the flounder community, but is comparatively scarce in the Gulf. Petrale sole and English sole are important components of the flounder community off Washington-California but they are scarce in the

Gulf of Alaska and for all practical purposes absent in the Bering Sea. The arrowtooth flounder, or so called turbot, is widely distributed along the Pacific and Bering Sea coasts of the United States and appears to comprise the largest part of the exploitable biomass of flounders in the Gulf of Alaska. Other abundant flounders in the Gulf include the rock sole, starry flounder, flathead sole, rex sole, and, in deep water, the dover sole.

The oldest fisheries in the Gulf of Alaska are the Native subsistence fisheries for Pacific halibut, cod and herring. Catches were traded and sold to the Russians and later to the Americans after the purchase of Alaska by the United Staes in 1867. Groundfish and herring are still important sources of food to many groups of Alaskan Natives, although these subsistence harvests are now dwarfed by commercial operations.

The first commercial groundfish fishery in the Gulf was a setline fishery for cod by U.S. nationals in 1867. Later U.S. fisheries developed on halibut, sablefish, and other groundfish. Canadians have been involved in groundfish fisheries in the Gulf since the beginning of this century and have directed most of their effort on halibut.

Canadians began fishing Alaskan waters around the turn of the century when they participated to a very limited extent in the former setline fishery for cod. It is not clear whether such participation occurred prior to 1900 during the early period of the cod fishery, but it is known that one or two Canadian operations for cod took place off Alaska about 1902 and 1913. Information on the extent and area of origin of these Canadian catches of cod is not available so it cannot be determined whether they were caught in the Gulf of Alaska or in the Bering Sea.

Canadian involvement in the North American setline fishery for halibut in the Gulf of Alaska dates back to the 1920's and has continued until recently. Canadian vessels also take relatively small amounts of other groundfish (sablefish, cod, ling cod and rockfish) in the Gulf of Alaska, entirely from Southeastern Alaska waters.

Soviet fishing vessels first appeared off Alaska in the eastern Bering Sea in 1959, and by 1962 Soviet trawling operations had expanded into the Gulf of Alaska. Their principal target species was Pacific Ocean perch, but with the decline of these stocks in the late 1960's and early 1970's, the Soviet fisheries shifted to less heavily exploited fish, such as pollock, Atka mackerel, and flounders. In contrast to Japan's fishery, which includes both trawls and longlines, all fishing by the U.S.S.R. in the Gulf of Alaska has been with trawls.

The Asian trawl fisheries on Gulf of Alaska groundfish began in 1960 when several small Japanese trawlers were diverted there from the Bering Sea to carry out exploratory operations. Exploratory probes continued in the Gulf through 1962, and commercial operations by Japan commenced with the assignment of several large independent trawlers there in 1963. In 1962, the Soviet fleet had 70 trawlers and support ships targeting on Pacific Ocean perch, an abundant bottomfish of the outer continental shelf and upper slope and to some degree the initation by Japan of a full scale fishery for groundfish in the Gulf was precipitated by the start of this Soviet fishery. The combined effort of the Asian fisheries on Pacific Ocean perch resulted in excessive annual catches of this species that ranged from 240,000 mt (537.6 million pounds) to 380,000 mt (851.2 million pounds) in 1964-1966. Since then the catch of Pacifc Ocean perch has dwindled to almost nothing. The annual catch by Japan alone in the Gulf of Alaska groundfish trawl fishery rose rapidly and by 1966 was approximately 85,000 mt (190.4 million pounds). In addition to Pacific Ocean perch, Asian trawl fisheries also target on pollock, sablefish, flounders and Atka mackerel. The harvest of groundfish by Asian nationals greatly dwarfs that of the United States.

The domestic sablefish fishery began about 1906, and was relatively unimportant until about 1935 when the catch began to increase. The peak was reached in 1946 when slightly more than 2,800 mt (6.2 million pounds) were landed. From 1971-1975 annual catches averaged less than 1,000 mt. However, in 1983, sablefish catches in the Gulf reached 3,761 mt (8.5 million pounds). The fishery is centered in the inside marine waters of southeastern Alaska where over 90 percent of the annual harvest occurs. It is an offseason fishery that is pursued mainly by Alaska halibut fishermen after the close of the halibut season in the early fall. A few crab and salmon fishermen also switch over to sablefish in the fall. Some vessels have begun using traps for sablefish.

The 1983 domestic, joint venture and foreign catches for the Gulf of Alaska are given in Table 2 by species. It is clear that the bulk of the catches is made up of pollock followed by Pacific cod.

Bering Sea/Aleutians Islands Area

The Bering Sea supports about 300 species of fishes, the majority of which are found near or on the bottom. There is a general simplification in the diversity of bottomfish species in the Bering Sea compared to the more southern regions of the Gulf of Alaska and Washington-California. As a result, certain species inhabiting the Bering Sea are some of the largest bottomfish resources found anywhere in the world. In terms of biomass, the bottomfish community in the Bering Sea is much larger than its counterparts in other areas of the northeastern Pacific. The commercial production by all nations from the

TABLE 2
Catches by Species in the Gulf of Alaska
in 1983 (metric tons)

	Domestic	J.V.	Foreign
Pollock	123	134,131	81,357
Sablefish	3,761	275	4,965
Pacific Cod	4,266	2,425	29,777
Pacific Ocean Perch	15	1,974	5,416
Rockfish	421	301	2,428
Atka Mackerel	0	789	11,470
Flounders	344	2,691	9,530

Bering Sea/Aleutians ranged from 1.6 to 2.3 million mt during the five-year period of 1971-1975, representing 69-86% of the groundfish catch for the entire region from the Bering Sea to California.

Relatively few roundfishes for aggregations in the eastern Bering Sea and Aleutian Islands areas are large enough to attract target, or occasional target fisheries. Pacific cod, Pacific Ocean perch, sablefish, Atka mackerel and rattails are present in sufficient numbers.

In contrast to the relatively few species of commercially exploited roundfishes, the flatfish community of the Bering Sea is very diverse. Yellowfin sole dominates this group and has the longest history of intense exploitation by foreign fisheries. Other flounder species that are known to occur in aggregations large enough to form target species are Greenland turbot, rock sole, flathead sole, and arrowtooth flounder. Alaska plaice is also relatively abundant, but has not been intensively fished, apparently because of their low market value. A number of other flounders having commercial importance in regions to the south, also occur in the eastern Bering Sea, but their abundance is low.

Commercial catches illustrate the much greater magnitude of groundfish stocks in the Bering Sea/Aleutians area compared to the Gulf of Alaska region. For the year 1983, the all-nation commercial catch in the Bering Sea/Aleutians was 1.4 million mt compared to only 296.5 thousand mt in the Gulf of Alaska. The major share of the catch in the eastern Bering Sea in 1983 (1.1 million mt or 78%) was made up of pollock. Other roundfish contributed 8% to the catch and flounders 11%. Roundfish also contributed to the major share of the catch in the Gulf of Alaska area (95%), and principal roundfish species in the Gulf region was pollock followed by Pacific cod. Catches of flounders in the eastern Bering Sea in 1983 were predominated by yellowfin sole (108,471 mt), but catches of Greenland turbot (56,875 mt) have been improving. Rock sole, flathead sole and arrowtooth flounders were other principal species of flounders taken in the eastern Bering Sea. Flounders form only an incidental part of the catch in the Aleutian Islands area with Greeland turbot the principal species in that area. The 1983 joint venture, foreign and domestic catches in the Bering Sea/Aleutians area are given by species in Table 3.

The principal roundfish in the eastern Bering Sea/Aleutians area all-nation catches after pollock was Pacific cod with a catch in 1983 of over 97,000 mt. The next most abundant roundfish species were Atka mackerel (11,721 mt) and sablefish (3,342 mt).

The earliest fisheries for groundfish in the eastern Bering Sea and Aleutian Islands were the Native subsistence fisheries. They were an important part of life of the Native people, and dependence on demersal species of fish may have been critical to their survival in periods of the year when other sources of food were scarce or lacking. Fishing

TABLE 3
Catches by Species in the Bering Sea/Aleutians
Area in 1983 (metric tons)

	Domestic	J.V.	Foreign
Pollock	951	149,013	891,463
Sablefish	51	114	3,177
Pacific Cod	41,356	14,363	41,506
Pacific Ocean Perch	8	136	962
Rockfish	0	7	993
Atka Mackerel	0	10,511	1,214
Other Flounders	4	11,693	23,545
Yellowfin	----	22,528	85,943
Turbot	----	84	56,791

was in nearshore waters utilizing such species as cod, halibut rockfish and other species. These small-scale subsistence fisheries have continued to the present time.

The first commercial venture for bottomfish occurred in 1864 when a single schooner fished for Pacific cod in the Bering Sea. The cod fishery did not commerce on a regular basis until 1882. This domestic fishery continued until 1950 when demand for cod declined and economic conditions caused the fishery to be discontinued. Fishing areas in the eastern Bering Sea were from north of Unimak Island and the Alaska Peninsula to Bristol Bay. Vessels operated from home ports in Washington, Oregon and California and from stations in the eastern Aleutian Islands.

The cod fishery reached its peak during World War I when the demand for cod was high. Numbers of schooners operating in the fishery ranged from 13-24 in the period 1915-1920. Estimated catches during the peak of the fishery ranged annually from 12,000-14,000 mt. Numbers of vessels in the fishery declined following 1920 until the fishery was terminated in 1950. The fishery has since resumed and the 1971-1975 annual average catch was 55,000 mt. The 1983 catch was 97,225 mt representing a substantial increase.

Nationals from six foreign countries have conducted groundfish fisheries in the eastern Bering Sea and Aleutian Islands. Japan has the longest history of exploitation in the region and has mounted the greatest effort over the years. The first documented fishery for demersal species by the Japanese in the eastern Bering Sea dates back to the exploratory effort in 1930. This was followed by a relatively small scale fishery which had its origin in 1954. Excluding Canada, the second foreign nation to send demersal fishing fleets to the eastern Bering Sea and the nation having the second largest removal of groundfish in the region has been the U.S.S.R. Their fisheries commenced in 1958.

Following the initial exploratory effort by two trawlers in 1930, the Japanese returned in 1933 to the eastern Bering Sea with a mothership-catcher boat operation. The fleet was composed of an 8,000 ton mothership and several catch boats. Fishing was off Bristol Bay with the emphasis on pollock for the production of fish meal. The catch was processed aboard the mothership and transported back to Japan aboard transport vessels. This fishery continued to operate until 1937 when prices of fish meal declined causing the fisheries to terminate. Catches in this period ranged up to 43,000 mt with pollock the major species taken. A second mothership-type operation was conducted in the eastern Bering Sea by Japan in 1940-41. Target species was yellowfin sole. Catches in the two year period were 9,600 mt and 12,200 mt respectively.

With the signing of the peace treaty between the United States and Japan in 1952, restrictions on Japanese distant-water fisheries were removed, and in 1954 fishing in the eastern Bering Sea was resumed. The Japanese post-war fishery for groundfish developed into several components, the four principal ones being the mothership fishery, North Pacific trawl fishery, North Pacific longline-gillnet fishery, and the land-based trawl fishery. The mothership fishery can be further divided into four types depending on the target species and processing methods. These are the freezing fleets which targeted on flounders in the period 1954-60; the freezing fleets operating since 1960 that continued to target on flounders; but also targeted on other species; the meal and minced fish fleets which originally took flounders for fish meal, but since 1964 have targeted on pollock for the production of minced fish; and the longline-gillnet fleet which took halibut, cod, sablefish and herring for freezing.

The first commercial-scale operations by the U.S.S.R. off Alaska, following exploratory work in 1957-1958, was a fishery for flounders in the eastern Bering Sea starting in 1959. Like the Japanese, the Soviets have expanded their fisheries since their inception in terms of effort, target species and fishing areas. There have been three major groundfish fisheries in the eastern Bering Sea and Aleutian Islands: a flounder fishery in the southeastern Bering Sea, a rockfish fishery primarily in the Aleutian Islands, and a pollock fishery along the outer continental shelf from Unimak Pass to northwest of the Pribilof Islands.

The Soviet flounder fishery was a winter operation throughout its history extending usually from November to April and peaking in February or March. The first few years of the Soviet flounder fishery (1959-1963) involved about 30 trawlers supported by a factory ship and refrigerated transport vessels. Catches in that period ranged from 60,000 mt - 155,000 mt, primarily yellowfin sole. In the next three years, effort was increased in this fishery with the number of trawlers rising to 40 in 1964, 50-60 in 1965, and 70-100 in 1966. The fishery peaked in terms of numbers of trawlers from 1966-1968 with the maximum number reaching 70-100 in the peak months of fishing in January, February or March. Starting in 1969, the Soviet efforts for flounders generally declined, presumably because abundance of yellowfin sole was lower than in previous years. The numbers of vessels in peak months decreased to between 50 and 80 in 1962-1972. Although a peak of 70 vessels fished in 1972, there was a sharp drop in catches of flounders to about 13,000 mt from over 70,000 mt or more in the previous three years. In 1973, the flounder fishery failed to develop. Effort was limited to a two-week period by four trawlers.

The Soviet fishery for Pacific Ocean perch and other rockfish began in 1960 when 25-30 trawlers fished along the edge of the continental shelf in the eastern and central Bering Sea. In subsequent years, the fishery became centered in the Aleutian Islands and Gulf of Alaska. Following concentration of effort for Pacific Ocean perch in the Aleutians

and Gulf of Alaska in 1963; directed effort to Pacific Ocean perch in the eastern Bering Sea decreased and was eventually eliminated. Catches from this region in later years were a by-catch of the pollock fishery. The early years of the Aleutian Islands fishery were the most productive with reported catches of 61,000 mt in 1964 and 71,000 mt in 1965.

Whereas the fishery was continuous through 1965, effort in 1966 was sporadic, apparently because of reduced abundance of rockfish. The effort in 1967 and 1968 was approximately the same as in 1966 with fishing starting in the spring months and continuing through the end of the year. In 1969, there was further reduction in effort with only one-half to two-thirds the number of vessels fishing compared to 1968. By 1973 and 1974, the fishery was at an extremely low level with catches of only about 3,000 mt in 1973 and 800 mt in 1974. Catches in 1975 to present were somewhat higher ranging from 7,000 mt to 8,000 mt.

The fishery that eventually developed into the Soviet pollock fishery began in 1967, but initially targeted on sablefish and large flounders (arrowtooth flounder and Greenland turbot) in the region immediately north of the eastern Aleutian Islands. Sablefish and arrowtooth flounder were the principal species taken just north of Dutch Harbor, but further north, pollock, cod, rockfish, and various flatfish were prinicipal species. In 1969 and 1970, the fishery targeted on arrowtooth flounder, sablefish, and pollock with incidental catches of cod, rockfish and other bottomfish. Emphasis of the fishery shifted mainly to pollock in 1971 with catches rising from about 36,000 mt in 1970 to 234,000 mt in 1971. Pollock have remained the predominant species in the catch until the present time.

Domestic Fisheries

In contrast to the important role which U.S. fishermen play in world harvests of salmon, king crab, Tanner crab and halibut, less than 7% of the groundfish harvested off Alaska is presently caught by U.S. fishermen.

Despite its low volume relative to foreign landings, the U.S. catch of Alaska groundfish is growing rapidly and this growth is likely to continue. U.S. groundfish landings in Alaska, led by joint venture fisheries, increased from about 7,300 metric tons in 1979 to approximately 113,000 metric tons in 1981. While groundfish has a relatively low value to tonnage ratio, it should be noted that the tonnage of these groundfish landings in 1981 exceeded the record catch by U.S. fishermen from waters off Alaska of king crab, was more than double the record catch of Tanner crab, and was almost 12 times the 1981 halibut catch.

While the salmon, king crab, Tanner crab, halibut and herring fisheries are fully utilized by U.S. fishermen and are limited by resource

availability, the potential for U.S. expansion of groundfish fisheries in Alaska is very large. With an annual potential yield of 2.6 million metric tons, predominantly pollock, yellowfin sole, starry flounder, cod, and rockfish, the potential importance of such resources to the economy is enormous. While the potential harvest is much greater than the present harvest, the danger to overharvest an individual stock exists due to fleet effort and distribution. Therefore, the state must remain an active participant in the development and management of groundfish.

Three variations of domestic fisheries are presently conducted for Alaska groundfish. They are over-the-side joint venture trawl fisheries, the at-sea harvesting/processing of cod for salting and production of frozen fillets, and the delivery of mostly cod to shore plants for processing (Fig. 7). Each fishery is managed under authority of a fishery management plan administered by the NPFMC.

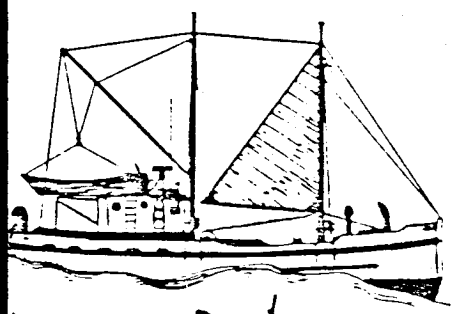
3.7.1 Joint Ventures

These fisheries involve at-sea transfer and sale of fish caught by U.S. trawlers to foreign factory ships. Such operations are conducted on a high volume, low value basis and require minimal domestic manpower. Approximately 33 U.S. trawlers delivered 95,000 metric tons of fish in Alaska joint ventures fisheries in 1982. Fifty-seven U.S. trawlers participated in Alaska over-the-side joint venture fisheries and delivered 351,000 metric tons of fish in 1983. Participating vessels come principally from the larger vessels of the king and Tanner crab fleets which have the capability to operate heavy duty trawl gear. Of the 33 vessels participating in joint venture fisheries in 1982, 25 were Washington based, three were Alaska based and five were from various other areas.

Vessels commonly fish for periods of 3-4 months and remain at sea on the grounds except for two to three-day port calls once a month for fuel and provisions. Small vessels may be used because the trawl catches are delivered to foreign processers by cod end transfers which eliminates the need to handle fish aboard the U.S. catcher vessels. Crew requirements are limited to four or five people per vessel.

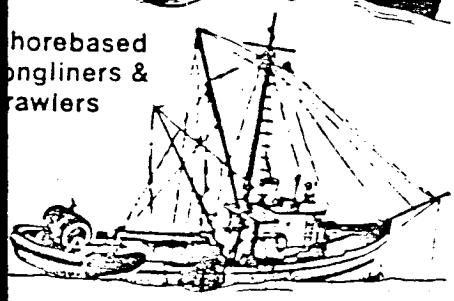
3.7.2 At-Sea Salt Cod and Factory Trawler Fishery

Trawlers which harvest and process cod into salted product or frozen fillets at sea accounted for about 15,000 metric tons of catch (round weight) in 1981, or 14 percent of that year's U.S. domestic groundfish harvest from Alaska. Vessel splitting and green salting cod aboard have faded since 1982 due to their dependence on world salt cod markets over which they have no



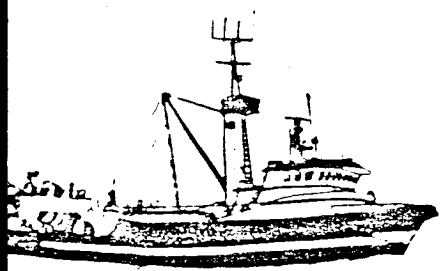
horebased
ngliners &
awlers

995 vessels
9.6 million lbs
2.3 million $



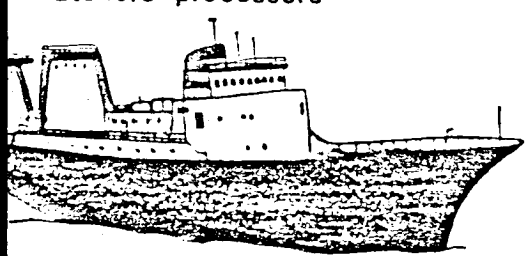
oint venture
awlers

33 vessels
210 million lbs
10.1 million $



d catchers-processors

7 vessels
37 million lbs
8.8 million $



All vessels

1035 vessels
256.6 million lbs
21.2 million $

	1982	1983
	40.9	78.0

Fig. 7. Number of commercial vessels, catch and value for 1980.

control, the strong U.S. dollar, and a glut of Atlantic cod. However, we have heard that about six catcher processors are under construction in the Pacific Northwest, with the construction of an additional six vessels not far behind. However, these fisheries are more labor intensive, more costly and provide a higher value per unit weight of catch to the U.S. fisherman than joint venture fisheries.

Salt cod vessels are primarily 105-122 feet in length, crewed by 9-11 people and operate around the Aleutians and in the southeastern Bering Sea. Their fishing capabilities and characteristics are much like joint venture trawlers. Unlike trawlers operating in joint venture fisheries, catches are landed aboard, sorted, and the cod headed, gutted and machinesplit for salting in the fish holds.

3.7.3 Shore-based Fishery

Deliveries of fresh groundfish to shore-based plants for processing into fresh, salted, or frozen products have been small-scale relative to joint venture catches or catches by at sea catchers/processors. Fresh fish landings by coastal trawlers had increased in 1982 and 1983 due to installation of shore-based cod splitting and salting facilities in Dutch Harbor, Akutan, and Sand Point. Major constraints have been competition with foreign products, high overhead costs, inconsistent deliveries of fresh fish, and some low quality product.

Compared to joint venture trawlers and cod trawlers, which process at sea, fresh fish vessels strive to operate in coastal areas near their delivery plants and are confined to trips of a few days' duration rather than weeks. Coastal fresh fish trawlers have typically been less than 90 feet in length and fish shrimp or crab as their primary endeavor.

4.0 Growth Potential of Alaskan Fisheries

If there is one generalization that can be made about the Alaska fishing industry, it is that anything can happen. Dynamic, often unpredictable, change is the rule rather than the exception.

4.1 Salmon

Although the record of biological predictions has improved with time, there is still considerable uncertainty associated with salmon forecasts. In 1982, for example, when biologists appeared to come within 2.6 million fish of the actual harvest for Southeastern Alaska, the figures turned out to be too high by 9.4 million fish in the southern half of the region, and too low by 6.8 million fish in the northern part.

Salmon runs tend to be cyclical in nature. The recent, large Alaska catches have occurred at what can be viewed as a cyclical high, with history leading us to expect the resource pendulum to swing back toward a cyclical low in the years ahead. It seems unlikely, however, that future declines will be as low as those in the past. Modern research has produced better understanding of the factors governing natural production, while resource managers have improved their ability to obtain desired escapements both in terms of the number and distribution of fish. Habitat rehabilitation projects have provided better access to spawning grounds, and state, aquaculture association, and private hatcheries have boosted the human contribution to salmon reproduction. The combination of all these factors should help alleviate any adverse impacts on Alaska's salmon stocks wrought by Mother Nature.

While catches may decline somewhat in the years immediately ahead, they should not drop to the disastrously low level that prevailed in the mid-1970's. Over the long-term, it seems likely that improved Alaska salmon resources, fueled by good management practices, will result in catches greater than the highest past averages. This would provide a degree of stability that would be missing in the "boom or bust" character of the salmon industry as it has existed up to now.

The potential for growth is intimately associated with prevailing market conditions and processing capacity. In 1982, an unusually large return of pink salmon went mostly unharvested in Norton Sound because of poor market conditions. If salmon production is to grow, then we must be prepared to utilize most of the salmon returning beyond escapement needs.

4.2 Crab

The depressed status of most major stocks is expected to result in a continued short supply of both king crab and Tanner crab for at least the next few years. The problem is critical for red king crab stocks in Bristol Bay and the Kodiak area where recent surveys have shown sharply-reduced numbers of legal sized males (postrecruits) to sustain the fishery in years ahead. Aside from possible increases in the production of brown king crab, it seems likely that king crab harvests in Alaska's westward region will not improve much until after the mid-1980's.

Although the general status of most Tanner crab stocks is also poor, they appear to be in better shape than their larger relations, the king crab. There are signs of bairdi Tanner crab on the important Kodiak and Bering Sea grounds, and the St. Matthew Island stock of opilio Tanner crab appears to be in good condition. Based on these encouraging signs, there is reason to expect some resurgence in the westward region harvest of Tanner crab.

Aside from recovery in the traditionally-exploited stocks of king and Tanner crab, the best hope for raising future production is by utilizing smaller opilio Tanner crab and by increasing the harvest of brown king crab. At present, the marketplace demands that opilio measure at least 4-1/4 inches across the carapace. If opilio as small as 3.1 inches, the minimum size established by the state of Alaska, could be profitably utilized, it is likely that catches of this species could be at least doubled.

Not much is known about the life history, stock compositon, or potential yields of brown king crab. They are a deeper water species (depths to 500 fathoms) than the red and blue varieties, which are caught generally at depths of 100 fathoms or less. Coupled with strong tides, the deep waters where brown king crab are being fished in the Aleutians, make it difficult to use conventional king crab gear. New or modified fishery methods may be the answer to the profitable use of this resource. Some investigators believe that brown king crab may be able to provide yearly catches of some 20 million pounds. That level of production would greatly help the Alaska crab industry during the present period of reduced stocks.

4.3 Shrimp

A close look at the shrimp production in particular areas provides no reason to expect quick turn-around in abundance. The failure of shrimp populations almost everywhere to respond to closures and other restrictions of fishing has served to highlight the importance of nature in determining stock sizes. Both fishermen and researchers have been impressed by an apparent build-up in populations of predatory cod and pollock that has coincided on some grounds with a great reduction in the numbers of both small and large shrimp. It is possible the the decline in shrimp stocks is the result of increased predation by cod and pollock. In addition, biologists see a correlation between the decline in the Kodiak shrimp stocks and the increase in ocean temperature in the northeast Pacific in recent years.

For most areas, the state follows a conservative management policy that reduces harvest rates as the health of a stock deteriorates, and permits no fishing on depressed stocks. The next few years will be pivotal for the Alaska shrimp industry. Unless an unexpected upturn occurs in the abundance of shrimp, both fishermen and processors can expect to continued hard times.

The suspicion remains that the fluctuating abundance of pink shrimp in Alaska, and elsewhere along the West Coast, may be loosely related, or perhaps unrelated, to the size of annual harvests. If this is true, only nature and perhaps the reduction of increased

predatory cod and pollock stocks through greater fishing pressure will cause a rebuilding of the shrimp resource. (Stock assessments of cod show a seven-fold increase in biomass between 1975 and 1979.) In the meantime, some Alaska fishermen are rerigging their vessels to cash in on what they hope is a new bottomfish era.

4.4 Halibut

The IPHC has drastically limited the catch of the domestic halibut fishery since the 1960's to rebuild stocks. Some improvement in halibut abundance has occurred since the late 1970's, and domestic catch limits were increased slightly in 1981 and 1982. The improved status of the halibut resource was reflected by the 30.6 million-pound catch limit established for the combined 1983 U.S.-Canada fishery. This was a 3.1-million-pound increase over the 1982 recommended catch limit and a 5.6 million pound increase over the corresponding 1981 figure. All of the 1983 increase was allotted to Alaska grounds in the central western Gulf of Alaska around the Aleutians and in the Bering Sea. The domestic catch limits, however, are still far below those in the 1950s and 1960s, and the length of the halibut fishing season is extremely short, partly as a result of the low catch limits.

Marketing is generally not considered to be a big factor in growth potential. Halibut has well defined historical patterns. What is of concern, however, is the competition with Canadian product. Early Canadian halibut openings have allowed their fish to enter the market before Alaskan fish and thus create an advantage.

The outlook beyond the present is clouded by uncertainties about how abundant incoming year classes of halibut will be. Their abundance will be determined by both nature and the extent of mortalities resulting from fisheries targeting on other species. An additional complexity is that researchers have not been able to explain why the availability of halibut in the Gulf of Alaska was unexpectedly high, while, at the same time, it was aberrantly low off British Columbia. The only certainty seems to be that the rebuilding of halibut stocks will be a slow process because of the long-lived nature and late-maturing characteristics of the species. Catches by the directed setline fishery will not likely approach anywhere near their former high levels during at least the next decade. Part of the reason for this is the effect of incidental halibut catches. Because the incidental catch is unspecified and not directly controlled, it can result in excessive exploitation and reduce the productivity of the resource. This apparently happened during the 1960's and early 1970's when the combined directed and incidental catch exceeded the equilibrium yield.

4.5 Herring

The best indication of current herring abundance is the result of Alaska Fish and Game aerial surveys which have been conducted in coastal spawning areas since 1976. These surveys determine the relative abundance of herring through an index based on school counts weighted by surface area. These abundance indices are combined with age frequency data from fisheries and research catches to determine stock conditions. Length and age frequency data indicate that catches in the late 1960's and early 1970's were composed of larger and older herring than in the past few years. These data suggest that recruitment was poor until recently and may have been a major contributing factor in decreased herring abundance.

A major problem in assessing the current status of stocks is a lack of knowledge on stock interrelationships. If these relationships were better understood, it would be possible to use estimates of herring abundance on the high seas to predict the strength of future runs.

4.6 Groundfish

There is no question that the groundfish stocks in Alaska waters are bountiful. But, for years, they were largely unutilized by the domestic fishermen. The major development in the fledgling Alaska groundfish industry is the establishment of a viable domestic catching-processing-marketing sequence based on flourishing stocks of Pacific cod and joint venture fisheries for Pacific pollock.

Stock assessments show a seven-fold increase in the cod biomass between 1975 and 1979. The population explosion seems related to a significant warming of the Bering Sea, coincident with the apex of the natural cycle of year-class strength in Pacific cod. Because the year-class of Pacific cod that brought with it such significant changes peaked in 1979-1980, it is difficult to predict how long the high yields will last or how quickly they will drop again in their natural cycle. The natural cycle of the biomass is expected to bring a decline in the year-classes after 1984, which will decrease the optimum yield. Until biologists learn a great deal more about the natural cycle, few predictions about the future of the cod supply beyond 1984 can be made.

The story on Pacific pollock is much the same as cod. The question is whether or not the Alaska stocks will sustain current production levels, and to what extent natural factors govern their abundance. Not much is known about these factors, but the catch records since the development of large-scale foreign pollock fisheries in the later 1960's suggest a relatively stable supply.

With the exception of Pacific Ocean perch, Pacific halibut, and sablefish, all other groundfish species in the Bering Sea/Aleutians region are believed to be at levels of abundance equal to or greater than those that would produce MSY. This would include all flatfish species which appear to be in adequate condition to sustain the current level of production in the years ahead. In addition, there is no specific evidence of natural phenomena that could be expected to cause either serious biological or socioeconomic consequences, although the possibility of undetected year-class failures, declines in growth rate, or other adverse symptoms cannot be completely discounted.

There is reason to believe that the Gulf of Alaska ecosystem has changed significantly over the last decade. Pacific Ocean perch, which had been a dominant groundfish form, is no longer so, but pollock and Atka mackerel populations appear to have increased greatly in abundance and in distribution. Thus, it is clear that the groundfish complex has not been stable over the recent past and the combination of increased exploitation and the unpredictable nature of the environment most probably will result in continuing instability. However, the short-term outlook for stock conditions is good.

It has been estimated that 1984 joint venture production will reach 580,000 metric tons. This estimate is projected to consist of about 360,000 metric tons of pollock from Japanese joint ventures, 100,000 mt of pollock in South Korean, West German and other joint ventures, and 120,000 metric tons of yellowfin sole, other flounders, cod and rockfish in Soviet Union, South Korean, Taiwanese, Spanish and Portuguese joint ventures.

Given the condition of the bottomfish resource and the current rate of exploitation, the potential for development is enormous. Further, if the level of foreign fisheries is reduced and replaced by domestic fisheries, the potential becomes even greater. There are several forms of domestic development opportunities available. The following appear most likely:

1) Fringe expansion into bottomfish by those who seek minimal modification to existing vessels, gear and plants but who desire to obtain off-season use of their capital assets.

2) Expansion from existing operations through major conversions of vessels and plants or through the addition of vessels and plants.

3) Major new entrants from the food manufacturing industry. The form of entry could be through internal expansion or acquisition of existing companies.

4) Major new entrants from the manufacturing industry. The form of entry could be through internal expansion or acquisition of existing companies.

However, if this potential is to be realized, certain existing impediments in the industry must be overcome. Impediments exist in areas of support infrastructure, experience and technology, entrepreneurialship, and the legal and institutional climate.

4.7 Other Potential Resources

Although resources of commercial quantity and quality exist in many regions of Alaska, their potential for economically successful development is often determined by "outside" forces. Other U.S. or international supplies and prices have traditionally and directly influenced the economic viability of developing a fishery or an Alaskan resource. Although such factors make it difficult to prioritize the Alaskan resources most likely to support new or expanded domestic fisheries, they probably include Atka mackerel, the Korean hair crab, clams, octopus and squid, among others.

4.7.1 Atka Mackerel

Contrary to the common name, Atka mackerel is a greenling rather than a mackerel. It is widely distributed throughout both the eastern and western North Pacific Ocean, including the Bering Sea. They are pelagic much of the year but occupy a demersal and shallow water habitat during their June-August spawning season. They typically form extremely dense schools and have a patchy distribution. It is estimated that the Atka mackerel MSY in waters off Alaska is 85,000 metric tons annually. Currently, most of the Atka mackerel catch is by joint ventures. The 1983 over-the-side joint venture catch was 11,300 metric tons while the catch by foreign vessels was 12,684 mt. The 1984 optimum yield for the Bering Sea/Aleutians area, where most of the Atka mackerel harvest occurs, is 35,000 metric tons (78.4 million pounds). Foreign vessels will be allowed only a by-catch in 1984. The Atka mackeral catches could go as high as 66,000 mt by the year 2000.

4.7.2 Hair Crab

Korean hair crab is valued as a specialty food item in Japan, but is not utilized by U.S. consumers. It is most valued as a live product but is also sold in cooked-frozen whole form. A U.S. fishery for hair crab developed to a notable degree in 1981.

U.S. hair crab landings by king crab and Tanner crab vessels totaled about 2.2 million pounds in 1981. The 1982 catch of hair crab in Alaska totaled 887 thousand pounds. The Alaska hair crab resource is expected to sustain annual catches of about 10-15 million pounds.

4.7.3 Clams

In the late 1960's, the Bureau of Commercial Fisheries estimated that Alaska had sufficient clam resources to sustain an annual harvest of around 50 million pounds known to occur primarily along the intertidal and near-shore areas of Southeast Alaska and the Gulf of Alaska. These resources were believed to consist largely of the razor clam, butter clam and cockle. In 1977, a subtidal stock of Alaska surf clam in the southeastern Bering Sea was assessed to be capable of yielding about 39 million pounds annually.

The principal constraint to development has been a periodic toxicity problem known as paralytic shellfish poisoning (PSP). Until it becomes possible to test accurately and quickly for the presence of PSP, development of Alaska's clam resources will not be viable.

4.7.4 Octopus

The giant octopus is widely used in Alaska as bait in longline fisheries for halibut and sablefish. Alaska octopus resources are viewed by many as likely to be more fully utilized for human consumption in the near future, particularly because they can be harvested from small vessels working inshore and in protected waters using inexpensively constructed pots. The fishery could be associated with the shrimp pot fishery and could reach 7,000 mt by the year 2000.

4.8 Aqualculture Potential

There are many marine and freshwater species that could conceivably be cultured in Alaska. Among these are clams, mussels, oysters, trout and Pacific salmon. Unquestionaby, Pacific salmon receives the most attention and probably rightly so as Alaska offers many sites perfectly suited for the husbandry of salmonids.

Of the entire North Pacific Rim, Alaska has the greatest potential for producing salmon through habitat protection, enhancement and rehabilitation efforts. Its nearly 600,000 square miles of land and water, 34,000 miles of shoreline, and an estimated 6,000 salmon-producing streams are unequalled.

Fishery scientists generally agree that regulation of the harvest alone cannot produce the numbers and mix of salmon species desired by the user groups, especially when the user groups demand that the production be in specific geographical areas. Economics of the industry cause resistence to the curtailments of harvests, which are necessary to restore depleted stocks. Some stocks are so decimated that regulation of the harvest, by itself, is no longer effective. Harsh environmental conditions often negate the best management practices. Enhancement and rehabilitation techniques, e.g., hatchery propagation of fish, fishway construction, lake fertilization, lake stocking, and habitat alteration, in concert with good harvest regulation, will enable salmon production goals to be achieved and maintained.

The Alaska Salmon Fisheries Plan lists a long-term objective of 51 million supplementally produced adult salmon for harvest. The plan correctly recognizes that certain areas of the state have greater potential for employing enhancement and rehabilitation techniques than others.

To help put the plan into perspective, part of the long-term goal was to have been achieved by hatcheries, and to accomplish this part of the goal, it was estimated that it would have required 51 hatcheries of approximately 60 million eggs each. Considering available technology, Alaska does not have 51 sites for hatcheries of this size. The lack of sites, however, can be offset somewhat by advances in hatchery technology and habitat alteration techniques. For example, two to four times as many salmon fry are now being produced in the same amount of water and space that was assumed to be possible in the mid 1970's.

Southeast

Although "ideal hatchery sites" may not be as numerous as originally thought, sites with adequate volumes of water but with marginal water quality may be usable with new water purification techniques. Alaska still has many excellent hatchery sites that have not been developed. Many of these sites are located in Southeastern Alaska. Using present technology, these Southeastern sites could produce between 5 to 10 million adult salmon per year in addition to the 4 to 5 million supplementally produced salmon now scheduled.

Prince William Sound

Prince William Sound possesses several excellent sites for hatcheries, fishways, lake enrichment, and releases of sport and commercial species. Considerable opportunities exist for the enhancement of the sport fishery.

Cook Inlet

Cook Inlet has the potential to produce more than 5.5 million adult salmon through artificial production technology. Hatchery production could be increased by even more if hatcheries are constructed with hydoelectric power site development.

Kodiak

The Kodiak area offers opportunities for increased salmon production at several potential hatchery sites, some of which may be related to hydoelectric power development. Opportunities for additional fishways also exist. The Kitoi Hatchery could be improved through expansion, rebuilding, and gradual development of its chum and coho stocks. The Karluk sockeye system is in the initial stages of rehabilitation and could be accelerated by increasing the scope of the streamside incubation project on the Thumb River, a tributary to the lake.

Bristol Bay

Rehabilitation in Bristol Bay is somewhat more controversial than in other parts of Alaska. Enhancement and rehabilitation in this area would result in a much smaller percentage change in adult salmon numbers. However, enhancement could help to temper the effects of poor years in the cycles of wild sockeye salmon, such as the lower than expected run in 1982. Areas with poor spawning habitat but with good rearing areas could be stocked with hatchery fry.

Alaska Peninsula

Enhancement opportunities on the Alaska Peninsula are few. The hatchery at Russell Creek is hampered by design flaws and cannot fulfill its present production goals. A consultant has estimated that with appropriate reconstruction, the facility could return 1.4 million adult salmon for harvest annually.

Interior & Arctic-Yukon-Kuskokwim

Of all areas in the state, the Arctic-Yukon-Kuskokwim (AYK) is least understood in regard to salmonid enhancement potential, largely because of the constraints of applying known technology in areas of extreme environmental conditions. FRED hatcheries near Kotzebue and Fairbanks are testing the "meshing" of fish culture technology and engineering under extreme environmental conditions. If successful, opportunities for chum and chinook enhancement in AYK will be great.

Summary

Except for possibly the AYK area, present technology is not the obstacle to expanded rehabilitation and enhancement in Alaska. FRED utilizes the most up-to-date methods that are available and continues to be a leader in advancing the technology. In some cases, broodstock availability controls the rate of development. Availability of funds by and large, is the governing influence on the speed at which the enhancement goals are reached. Decision makers must balance salmon rehabilitation and enhancement with other programs.

Private Aquaculture

The potential contribution of private aquaculture to Alaska's salmon resource cannot be overlooked. In 1983, over 170 million fish were released from Alaska PNP as juveniles, representing an increase of over 43 million fish from 1982. Over 4 million either returned to their facilities or were captured as adults in common property fisheries. Twenty PNP hathcery permits have been issued thus far and 11 more applications are now pending. It is clear that if potential sites are realized, salmon production by ranchers could increase many fold. Salmon farming, which differs from ranching in that fish are not released but held in pens or cages, also holds substantial potential.

Primary constraints to the rapid expansion of aquaculture production are political, administrative and economic. The constraints include competition for land and water aras and markets, regulations on federal, state, territorial and local levels, inadequate transfer of information and technical assistance, and uncertainty about profitability. Coordinated and successful action to overcome these barriers has been lacking.

4.9 Summary of Factors Influencing Development

The possibility of developing Alaska's extensive groundfish resources and underutilized shellfish and pelagic fish reserves has received considerable attention since the passage of the MFCMA. Development opportunities have been touted in the state Legislature, assisted through state and federal programs, promoted by national legislation and explored and discussed in a number of public seminars.

Expectations for development were based on the extensive shellfish and groundfish resources inhabiting the continental shelf and slope areas adjacent to Alaska. Our knowledge of these resources has improved and there can be little argument that there are extensive stocks of pollock, cod, flounders and other groundfish species. In addition to the bountiful supply of groundfish resources, there may be large populations of smelts and other forage fishes as well as clams, squid, sea urchins, etc.

The fishing industry has, in the past several years, been put in an economic squeeze. Operation and construction costs have soared, while world markets for fish products have softened. In Alaska, the situation has been aggravated as a result of abnormally large runs of salmon into both Japan and Alaska, which have saturated world markets and lowered retail prices. Concurrently, there has been a collapse of crab stocks which has had a tremendous impact on crab vessel owners. If alternatives such as joint ventures or other opportunities do not become available, many boat owners will be unable to meet payments.

Although salmon fisheries are normally considered to be fully developed, we cannot ignore the impact of salmon fisheries on development. The salmon resources of Alaska have been highly dynamic over the past decade. Not only have the resources shown major changes over a relatively short period, but the industry itself has undergone significant restructuring. Most of the existing salmon processors and buyers have a broader base of product interest than their predecessors. Although salmon and crab processors are adjusting to changing natural production and economic events, most are not in a financial position to make significant commitments to groundfish development. Expansion of the crab and salmon industries into groundfish is constrained by the seasonal nature of historical operations as well as the location and character of shore facilities available, construction costs, cost of money and potential profit margins, if any.

We have not progressed at the rate that many would have preferred and perhaps we have expected too much too fast. The Alaska industry did respond quickly to the Tanner crab opportunity. There is an expanding fishery for Pacific cod. There has been marginal growth of other groundfish products taking advantage of "select" markets for fresh and quality products. We have entered in a large way into Japanese herring roe markets. Finally, joint venture arrangements between foreign and domestic fishermen have offered substantial markets to whitefish trawlers.

Many of the problems confronting development have been limited to the underlying economic status of our nation and are not fishing issues per se. Some are associated with long standing trade policies that may not have been in the best interest of fishermen. Finally, our expectation may have been unrealistic in terms of the array of economic, technical and legal difficulties confronting developers, but opportunity for development remains.

5.0 Problem Statements

Fisheries development is an integrated process in which the various components all contribute to the establishment of the environment necessary for profitable development to take place. Six principal components of fisheries development are: (1) resource availability; (2) harvest capability; (3) processing capacity; (4) established or establishment of markets for the final products; (5) competitive access at appropriate levels to new or existing markets; and (6) a national, regional and local business climate that will attract capital. Associated with these are activities and/or strategies that specifically enhance development of the Alaskan fishing industry. They include (1) in-state secondary processing which captures additional income from value-added seafood products; (2) more Alaska fishermen in the limited entry and other traditional fisheries in which nonresidents currently have significant participation; (3) expanded markets for Alaska seafood products; and (4) more Alaska-based fishermen and processors operating in the FCZ which is currently dominated by foreign and out-of-state fishing enterprises. A complete investigation of the fisheries development problem of promoting Alaskanization of domestically underutilized fisheries and maximizing the participation of both rural and urban Alaskans in the harvesting, processing, employment, and marketing sectors of the seafood industry would logically seek to provide information to each of the above strategies. All problem statements will directly or indirectly revolve around at least one of the components or strategies.

5.1 Political Process

Government's role should be to smooth the course for private industry to develop, manage, and expand its operations and its opportunities commensurate with the goals and needs of the industry. Government should complement and support the needs of private industry as they relate to specific development goals and needs. By and large, both State and Federal Government have not performed in accordance with this role.

Government probably does not understand the needs of private industry as it relates to fisheries and, in particular, to development needs. This points to the need for increased interaction between the fishing industry and government in order to specify problems and solutions and smooth the course for the future.

The continued evolution of national policy concerning the FCZ, such as national support for the fishing industry and administrative commitments to achieving the industry development envisioned in the MFCMA, will play a major role both in the character

and rate of growth of the Alaskan fisheries. But, the political process at present, appears to many to be hampering the progress of development of the domestic fishery. Institutional obstacles are among the impediments which hinder the expansion of Alaska-based fishing operations. They include: (1) governmental coordination, (2) permitting process, and (3) loan programs.

5.2 Joint Ventures & Foreign Operations

The large increases in joint venture production over the past several years have had their roots in government and industry pressure to more effectively use the "fish and chips" amendment to the MFCMA. Recent efforts to promote a phase-out of all foreign fishing represent a relatively new thrust on the part of the fishing industry. It may run counter to joint venture enthusiasts, but even participating fishermen share the attitude that some strategy should be found to enhance the prospect of greater domestic processor participation in the growing groundfish industry.

The role of joint ventures is meaningful in relation to domestic development of underutilized specie fisheries in the FCZ. Since 1978, when the first joint venture was proposed, joint venture harvests have increased from zero to an anticipated 700 million pounds plus in 1984. While this volume of production is used to exhibit the success of expanded domestic activity in the FCZ, it is important to note that all processing of the harvested product is performed on foreign factory ships by their crews; and of the relatively small number of joint venture vessels involved in harvesting, less than five are from Alaska. Thus, the beneficial result to Alaska, to the processing industry, and to the country has been minimal. In addition, there is the concern of indirect as well as direct market competition.

The uncontrolled growth of joint ventures, as they currently exist, may actually be serving as an impediment to the development of a totally domestic industry. A great deal of scrutiny should be placed on the overall value of and the benefits being produced by such operations.

5.3 Limited Entry

In 1973, the Alaska State Legislature enacted Alaska's Limited Entry Law for commercial fisheries. There is no doubt that limited entry is an effective means to regulate a fishery by reducing fishing effort. What is in question, however, is the ability of limited entry to protect the interests of Alaskans.

A legal prerequisite of the Limited Entry Act was that permits not be locked in the hands of those who were originally issued them. After much study and debate, the Legislature finally chose free transferability. Free transferability encourages permit turnover and promotes exchange and overall economic efficiency. In addition, it would allow parents to transfer permits to their children, permits to be inherited upon death of holder, allow persons to enter and exit fisheries at times opportune to them, and would obviate the need for our expensive bureaucratic process to handle permit reallocation.

Despite the numerous benefits of free transferability, many persons have remained concerned that it will eventually result in distributional consequences which they deem as undesirable. Many fear that permits will leave the state, or that permits will disappear from isolated fishing communities which are "local" to a limited fishery, thereby eroding the economic base. There is also the problem of skyrocketing permit prices.

Of the 10,210 entry permits issued through 1981, 78.0 percent were issued to Alaskans, and 22.0 percent to non-Alaskans. The highest nonresidents levels were the Southeast purse seine fishery (53.1%) and the Bristol Bay drift gillnet fishery (44.41%), two of the most productive Alaskan fisheries. By the end of 1981, as a result of transfers, migrations and revocations, the percentage of permits held by nonresidents had risen to 22.8%. Over the entire period, nonresidents obtained a net increase of only one permit through transfer activity, but obtained a net increase of 85 permits through migrations by permit holders. Permit prices for the Southeast purse seine fishery rose from an average of $10,000 in 1975 to an average of $37,000 in 1981. During the same period, average permit prices for the Bristol Bay drift gill net fisheries rose from $1,000 to $82,000. Understandably, these trends have created great concern among officials from rural areas over the ability of future generations to buy their way into the fishery. Many Native leaders continue to fear that high prices will bring an exodus of permits from villages heavily dependent upon fishing.

Of the 10,210 permanent entry permits issued through 1981, 5,059 (49.5%) were initially in the hands of rural Alaskan residents. Of these, 4,766 permits (94.2% of rural permits) were issued to rural residents who lived in the "local" area contiguous to the permit fishery. Through 1981, as a result of the transfers, migrations and revocations, the number of permits held by rural residents state-wide had dropped to 4,692 (46% of total). Also during this time, the number of permits held by rural residents who live in the "local" area contiguous to the permit fishery, dropped by 383 permits.

5.4 Allocation Decisions

The catch of Alaska groundfish fisheries can be divided into four categories: 1) target species; 2) by-catch species that are sufficient commercial value to retain; 3) by-catch species that are not of sufficient commercial value to retain; and 4) high valued by-catch species for which retention is prohibited by fishery regulations. The last group, referred to as prohibited species, includes crab, halibut and salmon. Despite the prohibition on retention, the by-catch of prohibited species results in fishing mortality due to the stress associated with capture. Therefore, the by-catch of prohibited species is a competitive use of fishery resources which reduces the availability of these species to domestic crab, halibut and salmon fishermen, and fishery managers are confronted with the problem of both determining acceptable levels of by-catch and assuring that such levels are not exceeded.

Allocation decisions are made in a number of ways by various state agencies and boards. Often they are made indirectly and informally through the defintion of fishing areas, gear restrictions, time allocations and allowable catch levels. Allocation is a topic which many fish managers would prefer to avoid, but it is a fact of life when managing Alaska's fisheries. The Board of Fish, the NPFMC and the INPFC all make allocation decisions, as do fish managers themselves.

Two striking examples of the problems associated with the allocation process occur in the "incidental" catches of halibut and crab in Alaska trawl fisheries. In 1983, approximately 60% of the halibut taken in the Bering Sea was taken by trawls. These fish are discarded, so that this "allocation" to the trawl fishermen represents an economic loss to the longline fleet that is allowed to utilize the species. It is also a pure biological loss, since few of the creatures survive a trip to the surface in a trawl. The status of king crab stocks in Bristol Bay was so dismal in 1983 that there was no directed commercial harvest, yet there was an "allocation" of king crab made to the bottom trawl fishery for yellowfin sole that occurs in the same area. Domestic joint ventures took approximately 500,000 crab with no size or sex restrictions. These are "allocations" in every sense of the word. They result in a biological loss just as targeted fisheries do, and yet they produce no economic return. Nor are they part of any conscious allocation scheme. Clearly, there are some serious problems posed by the present allocation scheme.

5.5 Groundfish Impediments

If the potential of groundfish is to be realized, certian existing impediments in the industry must be overcome. Impediments exist

in areas of support infrastructure, experience and technology, entrepreneurialship and the legal and institutional climate.

Several impediments to shore-based Alaskan bottomfish development which pertain directly to the need for more community infrastructure have been identified. They are:

1. Berths, docks and boat maintenance facilities vary in availability and adequacy.

2. Labor supplies are limited, transient, and seasonal, and wage levels are neither competitive nor attractive for a sustained effort.

3. Current utility services are capacity limited, operate on a small scale, and are geared to seasonal operations and transient operations.

4. Existing community facilities, services and housing are not always adequate for year-round permanent operations.

5. Transportation services are often unreliable and uncapable of handling significant volume at reasonable rates, especially to remote sites.

6. Suitable land for building is at a premium.

The need to assist coastal communities with construction of additional port and harbor facilities; water, sewer and power lines and new housing units in order to develop the bottomfish resource is unquestionable.

Although bottomfish production is an established commodity industry worldwide, it is a fairly new business to Alaskans. As such, it is inherently filled with risk, much more so than the existing high-value fishery where knowledge and experience abound. Harvesters and processors are naturally reluctant to invest capital, or divert equipment and facilities away from fisheries where their economic productivity is known and more certain.

Lack of information and inexperience are the two major barriers to harvesting:

1. Complete resource information is lacking.

   Not enough information has been generated by Alaskans concerning the location of fish stocks, catch rates, and expected species mix. Nearly all current harvesting information has come from the foreign fleets, both as reported by them to NMFS and as reported by NMFS observers

aboard foreign vessels. Because of substantial differences between foreign fishing vessels and operations and the anticipated Alaskan operations, the experience of foreign vessels can provide only an approximation of the probable Alaskan harvesting experience.

2. Experience in harvesting and handling bottomfish is limited.

Many current participants are employing traditional fishing gear and methods. Other means and techniques have been developed which would be more effective in many instances. Alaskan fishermen need training in proven bottomfish harvesting and handling techniques during the early stages of industry development to assure production efficiency and product quality.

3. Bottomfish harvesting and processing must develop simultaneously.

Unless fishermen are ported at or have easy access to existing bottomfish processing facilities, it is unattractive for them to enter the bottomfisheries. The bottomfish industry can only develop as processing plants become available to receive the fishermen's catch. Processing facilities are only feasible if harvesters will supply bottomfish.

4. Bottomfishing represents a break with tradition.

Alaskans have traditionally pursued high-value species. Leaving a traditional fishery to enter the bottomfish fishery entails significant adjustment. The majority of Alaska fishermen operate in the salmon fisheries. These fisheries are conducted near shore during the summer months and with boats under 55 feet in length and of specialized design. Some types of bottomfishing gear are suitable for use on Alaska salmon boats, however, the bulk of bottomfish production is generated by larger trawl vessels operating on a year-round basis, often far from shore. Many existing Alaska crab and shrimp vessels are equipped to trawl or can be converted with different degrees of investment, and are of sufficient size to properly handle bottomfish and operate year round. However, as with salmon fishermen, serious involvement in the bottomfish fisheries will involve substantial changes in fishing and handling techniques.

5. Fleet availability lacking.

Alaska has a great many fishing vessels and a substantial number of fish processing plants. However, the existing vessels have not lent themselves to a fishing fleet that could harvest the groundfish bounty off Alaska. A number of factors contribute to this; among them are: controlled markets, lack of adequate processing skills and equipment, inadequately powered and sized vessels, and limited financial capital to promote rapid change.

It is obvious that in order to build a fleet, fishing vessels must be available. An adequately sized, adequately financed boat can harvest groundfish efficiently and retain a well trained crew. Obtaining such a vessel has been exceedingly difficult due to federal laws and the uncertainty in financial sectors of the stability of groundfish investment.

The Jones Act and 46 U.S.C. 251 have been major stumbling blocks. They mandate that vessels used in domestic fisheries must be constructed in U.S. yards. Domestic fishermen must build their vessels at domestic shipyards pursuant to the Jones Act in order to register their vessels in the United States. Likewise, only vessels registered in the United States can be utilized in domestic fisheries. This is a major impediment as U.S. boats are built at an estimated 30 percent additional cost compared to foreign built boats.

These additional costs are noteworthy in that bottomfish investments are not likely to be profitable unless capital costs of vessels can be kept down. Those costs can be kept down in three ways:

1. renovate existing vessels;
2. gain heavy government subsidies to build new boats;
3. use American built foreign flag trawlers owned by current foreign investors in American fishing.

Few domestic boats fishing Alaska are large enough to conduct large scale groundfish operations with 95 percent of Alaska's 14,000 commercially licensed vessels less than 50 feet. Those crab vessels that can be converted to groundfish gear do so at great expense, ranging from $500,000 to $1.0 million per boat. large government subsidies have not been forthcoming to develop a domestic groundfish fleet. Foreign operated U.S. platforms serve to defeat the goal of shoreside employment and a truly domestic fishery. Therefore, the present economic climate needed for the building of a U.S. groundfish fleet is not present.

Inexperience is a primary barrier to the processing sector:

1. Domestic experience in bottomfish processing economics is lacking.

   Processing bottomfish is a commodity product. Price and quality are the basis for competition. The commodity nature of the product dictates that the processor be a low-cost producer. However, the previous experience of Alaskan processors has been in high-value species, not in low-cost, commodity products. Low-cost production requires that the processor have reliable operating data for effective cost control. Through experience, knowledge of operating costs and market conditions can be gained. Feasibility studies of processing operations and cost reports on pilot or demonstration plant operations could be made available through state programs.

2. Domestic experience in production techniques is minimal.

   Many bottomfish processing techniques and product forms are new to Alaskans. The U.S. market represents a highly processed market, with much of the fish sold as frozen products such as fillets, steaks, and fish sticks. The Japanese market prefers a less processed product and more fresh and raw fish is consumed. Processing technology can be borrowed from Japan and Europe and adapted for use in Alaska processing plants. However, processors will need assistance in identifying and evaluating available technologies and equipment for use in Alaska.

3. Quality requirements of the work markets are not well known in Alaska.

   Alaskans know little about the quality standards of the worldwide bottomfish markets. In general, Japan and Western Europe are considered to be highly conscious of quality, more so than the United States where fish is most often served breaded, fried, and masked with sauce. Alaskan fishermen products have a reputation as being relatively low in quality. To be successful, Alaska's industry must not only be cost competitive with producers elsewhere, but Alaska's product quality must equal or exceed industry standards.

4. Processing plants are lacking.

   Processing plants face large scale investment problems. Shore-based processing affords advantages over floater processing, such as high plant capacity and flexibility of

the species and product for handling. However, it requires large capital investments and entails tremendous risk associated with fixed location. The economics are marginal at best, and require a continuous supply of high quality groundfish.

There are currently about 90 fish processing plants in Alaska and several floating processors, but few accept groundfish. A major pioneering venture was launched in 1982, with construction of a large processing plant at Akutan, in the Aleutian Islands, by Trident Seafoods Corporation. The $12 million multi-species plant began processing cod in June 1982. There are also floating domestic processing vessels like the American No. 1, Northwest Enterprise and Sea Alaska. Sea Alaska processes trawl caught groundfish in Dutch Harbor while the others are trawlers that have added processing and freezing capabilities and can catch and process groundfish nearshore or on the ocean. There is also the Golden Alaska, a 302 foot vessel that operates as a mothership for a fleet of catcher boats.

Inexperience is a primary market barrier:

Some of Alaska's market barriers have been indicated above: limited experience in the major bottomfish markets, lack of familiarity with many of the forms of bottomfish product preferred in foreign markets, and a generally low quality image. Additional market barriers include lack of knowledge of market prices and of channels of distribution, high freight rates and foreign protectionism.

1. Alaskan fishermen and processors need price information.

   Alaska fishermen and processors need current and ongoing market price and transportation cost information to help them monitor markets and judge the likely profitability of prospective ventures.

2. Alaskans are not familiar with either domestic or foreign channels of distribution.

   Alaskan processors' lack of experience in the U.S. bottomfish market expands to the channels of distribution utilized in the market. It is possible for a nonintegrated operator to serve the U.S. market since the channels of distribution are composed of independent entities. There are brokers to act as intermediaries between the Alaska processing dock, the lower 48 dock, the distributor, and the retail grocery or food service operator.

The Alaska fishing industry is substantially owned and operated by people and firms residing or headquartered outside of the state. There is a need to encourage the active participation of residents in enterprises related to fish harvesting, processing, distribution and sales, and in supportive businesses such as vessel construction and repair, equipment fabrication, and gear supply. Increased participation of residents in fishing related businesses will help to insure that money and jobs generated by expansion of the fishing industry remain in the community and contribute fully to the local economic and social base. Because the population of Alaska is small and the level of private commercial activity is comparatively low, the pool of experienced business people and investment capital available to take advantage of opportunities presented by expansion of the fishing industry is also quite limited.

A wide range of legal, organizational and institutional factors work to directly and significantly influence the climate for development and profitable operations of the bottomfishing industry in Alaska. Such factors in combination can be more influential than any other in determining how the industry will develop. Examples include, but are not limited to:

1. Taxes imposed by the state and municipalities on the value of fishery resources processed, real and personal property, inventories and fuel.

2. Standards adopted by federal and state agencies concerning seafood waste disposal, plant sanitation and employee safety.

3. Import restrictions, duties and quotas imposed by foreign countries (prospective markets) on fishery products.

4. Federal shipping laws which affect the use of foreign-built or owned vessels in the U.S. fisheries.

5.6 Marketing, Quality Assurance and Consumer Education

It is a basic tenet of development that marketing provides the base upon which development can occur.

Alaska's seafood industry would greatly benefit by programs aimed at building and maintaining a stable demand for Alaska seafood products. If viable commercial fisheries are to be developed to their fullest, an important factor to be addressed in working toward such development is marketing. At present, markets for Alaska's most valuable renewable resource are uncertain. Each year, large volumes of fish go unutilized simply because there is not a market for them. While Canada has just committed $50 million in marketing subsidies to its fishing industry for the next five

years and while everyone is concerned with the needs of the fishing industry with the general goal of maximizing, the industry's benefits to Alaskans, the key ingredient to that maximization has been reduced.

The seafood industry is still recovering from the 1982 recalls of canned salmon, illustrating the need for some kind of quality assurance. In addition, there has been a substantial increase in the marketplace of competition from pen-reared salmon. Coupled with these is the level of bias of the consumer. A fresh salmon is often perceived as higher quality, and, thus, more valuable than a frozen salmon. Since there is no easy way to distribute salmon fresh when they are in good supply, and pen-reared salmon may essentially be supplied year-round, these perceptions pose a big problem to the industry. (Salmon has been used as an example but these principles apply to other fish as well.)

With respect to domestic markets, one of the greatest immediate needs is for an organized, coordinated regional consumer education effort. It has been well documented that consumers in general do not know how to properly select, handle, store and prepare seafood.

5.7 Education

Seafood is Alaska's most important renewable resource industry and is second only to oil and gas in terms of value. Yet, there are 450,000 people in Alaska who are largely uneducated in terms of the seafood industry. If the fishing industry is to become more Alaskanized, this must be remedied. This is particularly true in terms of the lending community, which is largely unknowledgeable of the industry. Accordingly, their continuing reliance upon government loans, as private lenders are unwilling to take a risk on something they know little about.

Formal fisheries education in Alaska is also suffering. In light of the importance of the seafood industry to Alaska's economy, the university system needs to become more developed. The University's Institute for Social and Economic Research does very little economic analysis of the fisheries industry and instead concentrates much of its efforts on petroleum. There appears to be an inadequate variety of programs offered by the University. Because the educational and research roles have been filled primarily by the University of Washington and institutions to the south, the Alaskan industry often finds itself defenseless when competing for resource allocations with our southern neighbors. We have neither the academic, technological nor research capabilities to compete at this point. Who better to help manage the Alaskan industry than an Alaskan properly educated in Alaska! In addition, a well-developed university system will foster research beneficial to the specific needs of the industry.

5.8 Product Development

One cannot consider fisheries development without also giving advertence to the development of fish and fish-based products. The expansion of the exploitation of underutilized stocks such as groundfish is dependent upon establishing a viable use for them. One way to accomplish this is by the creation of new products. Another way is to assure that the form of the product is acceptable to consumers or that it fills characteristics already sought after in the marketplace.

Recently, a new product was conceived which utilized pollock. On May 3, 1984, the Royal Alaskan Seafoods processing plant at Dutch Harbor produced the first commercial pollock surimi in the United States, marking the birth of a new industry in this country. With it came the promise to utilize more pollock domestically, a fish with huge resource potential.

One of the major problems with the U. S. seafood industry is the general lack of envisaging of new products and the associated lack of effective marketing for new products. We have the resources but lack the impetus necessary for successful exploitation of both the fisheries and the marketplace.

5.9 Aquaculture Problems and Questions

The purpose of salmon aquaculture in Alaska is to promote the economic well-being of the seafood industry and the recreational enjoyments of Alaska and Alaska tourists by 1) increasing the quantity of salmon available for harvest; and 2) promoting the stability of salmon populations available for harvest.

The state has chosen to achieve this goal through the creation of a salmon aquaculture program that involves 1) a state-funded and state-operated aquaculture program (FRED); 2) regional non-profit aquaculture associations; and 3) private, nonprofit aquaculture corporations.

The Governor's Fisheries Policy Task Force identified several problems with the state's aquaculture program. They include:

1. Coordination and open communication between agencies involved in enhancement matters and between agencies and participants of the program in the private sector need to be improved.

Program managers and staff, both public and private, should be concerned above all else with the overall rational development of the enhancement program as a whole. Their first obligation must be to the resource and to the people who utilize the resource.

2. There are indications that some sectors of the public are not satisfied with production of FRED hatcheries.

   Public support and understanding of the FRED program needs to be regained. The FRED program should not be reduced or otherwise crippled. However, an internal review of each individual facility and program should be conducted to determine operational performance in line with strategic plans. Brood build-up to design capacity should be accomplished as rapidly as facility status and donor stock availability permits. A thorough review of capital needs to bring all facilities to either existing or proposed design capabilities should be conducted.

3. The current allocation formula (base plus x percent) which is used to determine funds needed to pay for operational costs of the state hatchery system, does not adequately meet the needs of the facilities as they progress from start up to full production. There is also the unresolved question regarding the ability of the state to fund ongoing operational costs for a full fledged, state-operated enhancement system, given the diminishing nature of the state's revenue.

4. The regional salmon enhancement planning process is an important prerequisite to funding enhancement goals and objectives by region and statewide. However, there is a need for greater statewide coordination between participating agencies in that planning process so that the procedures and guidelines are more consistent on a statewide basis. There is also a need to develop analytic criteria; a need to increase input from the public; and, in some instances, a need to improve responsiveness by planning teams to public input.

5. There is a need to address professional biases and public misconceptions about the interrelationships of hatchery and wild salmon, so as to clarify questions regarding:

   a. Harvesting of hatchery and wild salmon in mixed stock fisheries to ensure that exploitation rates of wild stocks taken incidental to fisheries targeted on hatchery fish do not become detrimental.

b. Genetic implications of interactions between hatchery and wild fish.

c. Disease control in both hatchery and wild fish. Little factual information is available to the public that explains how the Alaska salmon enhancement program deals with these issues. There is a need for a public awareness program for fisheries issues and educational programs to ensure that the fishing industry is recognized by the public as a major contributor to the economic well-being of the state and its citizens.

6. There is a need to continue disease control in aquaculture activities and to continue supporting a program of strict state regulation to ensure the continued health of the state's salmon resource.

7. There is a necessity for maintaining the nonprofit status for private aquaculture in the state. Any efforts to change that status should be considered a threat to the industry.

In addition, there are many other fundamental questions and issues that need to be addressed. Among them are:

1. Financial Issues

The financial issues centers on deciding just how much the state wishes to expend on its rehabilitation and enhancement program. There are constraints imposed by the availability of funds. It is true that funds can always be reprogrammed from other state programs to support aquaculture. It is unlikely that enough reprogramming would be done to sufficiently maintain the program at present levels, much less expand during a decade when overall revenues are declining.

Another part of the financial issue is to determine whether or not certain portions of the program are in need of state subsidy and, if so, how the state will seek repayment. Often when General Fund investments in publc hatcheries are discussed, opponents claim that harvesters of hatchery production, i.e., sport or commercial fishermen, are the exclusive beneficiaries of that production and, therefore, are responsible for paying the development and operational costs of hatcheries. In reality, a multitude of industries receive benefits and pay taxes on those benefits. Commercial fishermen and sportsmen are not the sole beneficiaries of that

investment, nor are the processing and retail service industries. Furthermore, infusion of nonrenewable resource revenues through the general fund into hatcheries will flow into many different areas of the economy, not just to fishermen and processors.

If the rate at which the rehabilitation and enhancement program develops is to be increased or the size of the program is to be increased, then the "pool" of funds must be increased. This point should not be confused with how monies are put into the "pool" or drawn out. The rehabilitation and enhancement program has always competed with other public programs and should continue to do so. One important factor needs to be reinforced, however, and that is that most projects, such as hatcheries, do not achieve results instantaneously. This necessitates long-range planning that must be coordinated statewide and in accord with other aspects of the industry.

There have been several schemes suggested to increase revenues for the program. Some of these are as follows: have the state sell fish; give the hatcheries away; provide for selective private take-over of the hatcheries; reprogram state funds; fund hatcheries via the Renewable Resource Development Fund; contract the operations; increase enhancement tax or other taxes; establish a new tax; establish an endowment fund and use the interest for operations. However, only a few of the suggestions carry the possibility of increasing the amount of funds "dedicated" to the fisheries rehabilitation and enhancement programs. The current program is supported by general fund monies which are derived in part from specific taxes, in some cases these taxes take the form of a voluntary or a mandatory assessment on those who benefit most. Most of the program, however, is funded by oil and gas revenues.

The program size and speed is controlled by the amount of money made available. The public has already spoken out against allowing private-for-profit hatcheries in Alaska; when one reviews the recent history of the Oregon experience and some of the fears expressed in British Columbia, the question of who controls the fish becomes closely linked with how a rehabilitation program is funded.

Current statutes mandate that the Department of Fish and Game (FRED Division) carry out a rehabilitation and enhancement program. These statutes also allow and encourage the private sector (nonprofit) involvement and assist in this program. Loan funds are provided

to assist these private programs. Loan approval is made by the Alaska Department of Commerce and Economic Development, assisted by the Department of Fish and Game.

2. There is a need to evaluate the costs and benefits of current fisheries programs with special attention given to the state's salmon enhancement activities, including private nonprofit and regional association programs. Several papers addressing this issue are currently being prepared, one by DCED and one by ADFG (FRED Division). There is some question about the economic efficiency of producing salmonids at a state-run hatchery as opposed to a private facility.

3. There is a need to address the appropriateness of farming vs. ranching. The economics involved with farming salmonids in Alaska are largely unknown. The viability of ranching has been proven and it has been shown to be cost effective. The questions surrounding this issue would necessarily revolve around market trends, production costs including labor intensity costs and feed costs, facilities construction costs and site availability and appropriateness.

6.0 Solution Statements

6.1 Political Process

6.1.1 Governmental Coordination

There are approximately 20 state agencies within seven departments that have a substantial involvement in different aspects of the Alaska fishing industry. In the past, the level of coordination has not been strong among the numerous public agencies. Rather agencies interact and cooperate informally out of necessity when their particular program responsibilities, funding or goals overlap. Effective coordination among the myriad of state agencies depends less on specific regulations than it does upon policies articulated by the state's executive leadership. As such, a concerted effort must be undertaken to ensure agency cooperation.

6.1.2 Permitting Process

There are a number of permits required for seafood processing. A seafood processor may require as many as 36 permits from nine different state agencies to begin processing. The processor may need up to 11 federal permits obtained from six agencies, as well as any permits required on the local level. The number and types of permits required by each applicant depends on the nature of

the operation. Hence, the permit process may be different for each applicant. In addition, the permitting process is very complex because each department develops its own separate requirements in accordance with its regulations and statutes.

As it currently exists, the permitting process may discourage new and smaller processors from entering the seafood industry. It has been suggested that the state could do several things to improve the process, such as:

(1) publish a complete step-by-step guide for applicants;

(2) provide the applicant with information on the time each permit, license and bond will require, and the order in which applications should be submitted;

(3) improve communication with the applicants concerning which permits, licenses and bonds are required and why;

(4) increase the number of staff available to work with applicants; and

(5) improve coordination between agencies requiring permits. (This discourages the duplication of required information.)

6.1.3 Loan Programs

The State of Alaska has three loan programs specifically geared to the needs of the fishing industry: The Fisheries Enhancement Revolving Loan Fund, Fishery Product Revolving Loan Fund, and Commercial Fishing Revolving Loan Fund. Currently, state loan programs are geared toward harvesters and hatcheries. It is thought that most fishermen in Alaska are overcapitalized relative to the present value of their products while most processors are undercapitalized. The state does not have any loans specifically designed for processors and most private lending institutions are hesitant about providing loans to processors given the depressed state of the industry. Some form of financial assistance needs to be provided to the processing sector of the industry.

6.2 Joint Ventures & Foreign Operations

Effective use of the "Fish and Chips" amendment to the MFCMA at present, combined with a phase-out strategy acceptable to both harvesters and processors, may be the key to duplicating for U.S. processors the progress made by harvesters. Effective use of the "Fish and Chips" policy would require that specific actions be undertaken to directly benefit Alaska. Some examples would include: (1) require buying of finished products from Alaska, and (2) require taking Alaskans into the foreign marketing organization for instruction. It is essential that fishing allocations be based principally on foreign economic cooperation with our industry.

In conjunction with national policy developments, fisheries legislation could also assist development strategy. Of particular interest is the outcome of legislation designed to: (1) allow greater use of foreign workers on at-sea processors; (2) attempt to circumvent regulations preventing use of foreign hulls; and (3) minimize risk involved with entering the processing sector.

The fact remains that, until we are able to provide domestic processing for stocks showing a surplus, joint ventures are our best alternative. Domestic processing capacities in some areas are simply insufficient to adequately handle potential supplies.

Joint investors could play a meaningful role in domestic development if they are applied properly and in such a way as to bridge the gap between 100 percent foreign utilization and 100 percent domestic utilization of particular FCZ resources. It is therefore critical that the state and the NPFMC follow up developing policies with respect to joint venture fishing activities and foreign processing operations in internal and FCZ waters as soon as possible.

The state should continue along the lines found in the Governor's Statement on Joint Ventures (the statement is in draft form) wherein the following elements are mentioned:

1. A clearly scheduled and defined phase-out of direct foreign harvests in the FCZ to:

    a. provide for higher domestic Catch Per Unit Effort (CPUE) by reducing foreign competition on the fishing grounds;

    b. improve the relative market position of U.S. processing products;

    c. encourage improvement in size/age distribution of key species to maximize production of products suited to U.S. markets;

2. Specific activities incorported into internal waters and FCZ joint venture permits that will promote the development of a fully integrated U.S. seafood industry including but not limited to:

    a. purchase of finished or partially finished products from U.S. processors;

    b. cooperative marketing of joint venture products using U.S. marketing/sales firms (with constructive U.S. equity ownership);

c. use of U.S. labor;

d. transfer of pertinent technology;

e. transfer of capital;

f. investment in infrastructure;

g. meaningful relaxation of stated and unstated trade barriers on products being produced in joint venture operations;

h. U.S. secondary processing or reprocessing of products produced in joint ventures; and

i. supplying timely accurate market information.

3. The NPFMC and the Federal Government should refrain from rewarding increases in joint venture activity with direct foreign allocations unless there is significant development activity such as listed above on the part of the foreign operator.

As far as concerns of indirect and direct market competition, merely excluding the foreign fleets from Alaska waters is "a false flag to wave" because the industry will still be faced with a flood of imported products from other nations. A nation like Canada is capable of raising or lowering prices as much as 30 percent to manipulate a market: competition the small-time Alaska entrepreneurs cannot withstand. Rather, Alaska should increase its efforts to bring the at-sea joint ventures on-shore in various forms to provide employment, income and tax revenues to these states. The character and composition of the joint ventures themselves should become increasingly more Alaskan as the management councils give greater support to those joint ventures which make the greatest contribution to the Alaska economy. In this regard, we should like to see strictly over-the-side sales arrangements to foreign cash buyers being replaced by operations where Alaskan interests control the processing and marketing of the finished products.

6.3 Limited Entry

In reality, there is no easy solution to the problems posed by the limited entry system. To get by the constitutional barriers, a program was built around economic and social considerations with a keen eye for protecting residents as much as the law would allow. The result is an extremely complicated system that makes it difficult to suggest any far-reaching solutions.

But what is the alternative? Perhaps there wasn't justification to impose limited entry. Maybe a better method of protecting residents could have been devised, but it is too late to debate those issues. The important point now is what would happen if the system were abolished. With the current high level of interest in Alaska's salmon fisheries, the lifting of limited entry would invite a gear stampede rivaling the Klondike gold rush.

Although the cost of buying a permit adds a big barrier to entering the fishery for rural Alaskans, state loan programs can give the edge to residents. The programs will cover 90 percent of the market value of permits, and "targeted loans," designed to help rural residents, may carry 100 percent of the cost. Permits can be used as collateral only under state loan programs.

Since limited entry, in certain fisheries is widely seen as an evil made necessary by the lack of alternatives, continuing support of the program by lawmakers, with a careful eye given to the problems and needs of Alaskans, appears to be the best and only solution.

6.4 Allocation Decisions

The first step in developing a comprehensive approach toward real accounting for ocean resources is to eliminate terms like "incidental," "trash" and "discard" from our thinking. All catch is an exploitation no matter what euphemisms are used to describe it. And, once it has been determined what is going to be exploited and at what biological rate, all else is allocation and must be regarded in terms of its total impact on the resources and the fleets.

How precarious is the development of the bottomfish fishery? Certainly, imposing restrictions on the bottomfish fishery will slow its development pace but if it does so by protecting an established fishery, it will be worthwhile. The answer is not to eliminate by-catch all together. Nor is it to continue to allow unlimited by-catch to the domestic and joint-venture bottomfish fisheries. Rather there is a midpoint whereby the benefits of management may be maximized for both the existing fisheries and the developing groundfish fishery. Possible solutions for protecting by-catch affected species would include the following:

1. economic disincentives;
2. by-catch quotas;
3. transferable by-catch quotas;
4. gear restrictions;

5. time/area closures;

6. voluntary restraints; and

7. combinations of 1-6.

Economic disincentives include penalties for taking prohibited species or rewards for taking less prohibited species by-catch. The penalties or rewards can be monetary or nonmonetary. For example, a compensatory payment of $50 per halibut is a monetary penalty, an increase in the Pacific cod allocation of 100 tons for each one ton reduction in halibut by-catch is a nonmonetary reward.

By-catch quotas can be constant or they can be dependent on any combination of by-catch rates, the status of groundfish stocks, and the status of the prohibited species stocks. Once a fleet takes its quota for any prohibited species a time/area closure would be invoked for that fleet. Foreign fleets could be defined by nation or nation and gear. It may be more difficult to define domestic fleets. Alternatively, quotas could be for the entire groundfish fishery with no separate allocations by fleet. The quotas can be in terms of the estimated levels of by-catch, by-catch mortality, or by-catch impacts on the domestic fisheries.

The same methods of setting quotas are available whether or not the quotas are transferable; however, the initial methods of allocating quotas are much more diverse with transferable quotas because the initial allocations need not be to those who would eventually use the quotas. For example, quotas could be issued each year to domestic crab, halibut and salmon fishermen; domestic groundfish fishermen; or they could be periodically auctioned to the highest bidders. Quotas could be issued to and be transferable among vessels and/or fleets.

Time/area closures and gear restrictions attempt to decrease by-catch by reducing fishing effort in times and areas and with gear for which prohibited species are most vulnerable. Voluntary restraints include self-imposed changes in fishing strategies to reduce by-catch. Examples of combinations of these management measures are: 1) quotas that trigger fees rather than closure; 2) fees and quotas that trigger closures; and 3) quotas that trigger gear restrictions.

The state must determine the cost both to the industry and to the resource of allocating species among different user groups.

6.5 Groundfish Impediments

The two most general problems with the groundfish industry appear to be lack of information and inexperience. These are shortcomings

that may be easily overcome. The state, via a responsible "fish and chips" policy, can require that the necessary knowledge and experience be transferred to Alaskans. Additionally, by supporting education programs, the state can further remedy the lack of knowledge and inexperience problems that plague the development of the groundfish industry.

In a strict political sense, the North Pacific FCZ fishery resources represent a viable and important bargaining chip for the Federal Government in terms of international politics. This has not produced benefits for the U.S. seafood industry or for Alaska. It is therefore critical to the development of the domestic seafood industry that the exploitation of this resource be used primarily as a tool for the domestic development of the industry itself, not in exchange for other trade concessions, inapplicable to fisheries. The Federal Government has developed specific guidelines for determining how much a foreign user gets. The quota to the foreign government is dependent upon what that foreign operator gives back to benefit the U.S. fishing industry. A similar and complementary policy should be developed on behalf of the State of Alaska in order to surmount the problems surrounding the development of the groundfish industry.

The completion of the investment picture to promote fleet development must come from either foreign investment, or domestic government investment. Domestic private investment to date has not been forthcoming due to the high risk and the intensive up-front capital investment nature of the Alaska domestic groundfish industry.

There are numerous reasons why foreign firms can and will invest in the American fishing industry. Some are reacting to the import substitution program signaled by the FCMA. Others are seeking access to maintain supplies for the markets in Japan, South Korea, and the Soviet Union. A few want American warehousing for purposes having to do with hoarding. For these and many other reasons, about $150 million of foreign capital has been invested in American notes, bonds, and equity to date, and more could be forthcoming.

Another major reason why foreign firms invest in the U.S. fishing industry has to do with gaining control of American fishing vessels so that their access to the resources they seek can occur at the very beginning of the production-marketing cycle.

Foreign investment will occur if the government takes the following measures:

1. Reduce foreign fishing so that supplies available to Americans increase and foreign fishing interests are compelled to purchase their fish from American firms instead of catching them off the U.S. coast.

2. Increase trade barriers against foreign fish imports so that U.S. processors alone will be able to dominate the American market.

3. Put controls on international joint ventures involving foreign floating processors so that U.S. processors need not have to share the increased harvest with foreigners and the price they offer fishermen need not be driven up by competition.

4. Put restrictions on foreign investment designed to control U.S. fishing.

(The international implications of these measures may be too intense to make these wholesale changes possible.)

6.6 Marketing, Quality Assurance and Consumer Education

Continued support of agencies such as ASMI is the key to successfully promoting marketing, quality assurance and consumer education. ASMI is currently undertaking promotional programs to assure the presence of a stable market. Such media as TV, radio and nationally circulated magazines have been used and have shown good success. Magazines offer the best alternatives since they can show a delicious seafood meal and include a recipe. Innovative televised seafood restaurant ads can also be effectively used. Quality assurance programs include education of fishermen and processors on proper seafood handling techniques. In addition, product specification guidelines and quality seal programs have been created to enhance the perceived value of various products. Finally, consumer education has been undertaken to help build and maintain stable demand for Alaska's seafood products. This means helping to establish a change in America's long-term eating patterns, instead of relying on a media blitz to stimulate "impulse" purchases. Continuity is recognized as the formula for success.

Manipulating the harvest to maximize resource potential and economic gain is an important first step in the markeing strategy. The first part of marketing is to work with the geological researchers and industry to find out what species and products are available throughout the year. Working closely with researchers and managers, marketing potential in tons by month should be fixed at minimum harvest levels, then maintained at those levels by regulation. From that, an aggressive marketing of small case lots in targeted cities should be undertaken. City selection would be based on an ease of transport to that city, market accessibility based on final price at sale (not consumer interest which can be artifically peaked by ingenious advertising and attractive counter dis-

play), and interests of retail chains to attract a constant, high quality groundfish.

Since ASMI is already currently involved, it would be beneficial to leave such activities to this state-sponsored, industry-directed organization. The market should be artificially controlled by government subsidy restraint so that gluts are prevented and only a limited, quality product is delivered on a consistent basis. As the reputation grows for quality spot market availability of Alaska groundfish, additional regional projects can be undertaken.

Successful selling of Alaska groundfish to domestic consumers will require marketing them in either a form familiar to consumers, or providing recipes and ideas easily integrated into the consumer's weekly meal plan.

Fishery products are sold to consumers based on the consumer's perception that there is a need for the product. Marketing can develop that consumer need, but no amount of salesmanship can keep the consumer returning unless the product is consistently available, of high quality and reasonably priced. Delivery takes fish from the sea, through processing on into the final retail outlet. Delivery can assure the product marketed can sell.

Fresh fish from the sea is the primary step in the long chain of events leading to final production on the shelf. Failure at this stage destroys the whole process. Government or industry sanctioned regulations should be provided to give an industry wide quality standards criteria. Fresh fish should be delivered at a maximum temperature and flesh condition should meet minimum standards. Frozen, partially processed fish should receive other kinds of minimum scrutiny, and final products should be regulated in yet a third way. All this minimum criteria should be used and inspected deliveries approved by industry funded inspectors. If fish of certain high quality are required for sale, then this will automatically force appropriate handling techniques.

Once caught and processed, groundfish enter a critical period between processor and consumer. Transportation of the product becomes the primary concern. No matter how many fish are available, or how good the product is leaving the processor, if the product goes to the consumer spoiled or second rate, no advertising blitz or future improvements can save it. It should be the public sector's responsibility to initially encourage air, sea and rail transportation links to transport fish products at continuous low temperatures, in tightly sealed containers, to consumer outlets without extensive delays that could result in fish product deterioration.

6.7 Education

The state must realize its role as a stimulous for the education system. Consideration must be given to funding specific fisheries programs at the university level, as well as undertaking programs to inform the average Alaskan. The university needs to offer a greater variety of programs on the academic, technological, research and applied levels in the form of a curriculum that integrates the disciplines of scientific biological research, fishery management and business management programs specifically directed at the seafood industry. The university should become involved in more economic analysis of fisheries and more fisheries industry management.

6.8 Product Development

The problem of product development essentially has an easy answer. As in the problem marketing, such agencies as ASMI should be given as much support as possible. Successful product development is highly reliant upon effective marketing schemes.

The ability of the university level education system as an impetus for the development of new products cannot be overlooked. The establishment of a competent food science program is imperative in undertaking new product development.

Finally, much of the load for product development must rest upon the shoulders of the industry itself. State support of industry in this endeavor would be highly beneficial.

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APPENDIX 4

AQUACULTURE OVERVIEW

by

Office of Commercial Fisheries Development

DEPARTMENT OF COMMERCE & ECONOMIC DEVELOPMENT

Prepared by
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Graduate Intern

July 1984

Aquaculture Trends

Salmonid aquaculture is a rapidly expanding circumpolar endeavor. The diverse aquaculture efforts of countries in Europe, Asia, and South America are particularly important to Alaska as virtually all of our salmon is exported or sold to other states. Consequently, what is done elsewhere has an important bearing on our salmon industry.

Salmon are, of course, not limited to North America. The mean, long-term total (catch plus spawning escapement) run size is almost 300 million fish annually, with about 176 million fish returning to Asia, and 110 million to North America. Harvests are about 70% of total run size, with Asian catches averaging 123 million fish and North America 77 million.

Northern Europe, with its farmed Atlantic salmon and rainbow trout, has entered the fresh retail and quality restaurant markets, long the domain of our troll-caught kings and silvers. In a relatively short period, European production (Norway alone may export 40 million pounds in 1984) has grown to be 50% of the total U. S. king and coho harvests. The Europeans are occupying a market niche that Alaska, without aquaculture, finds it difficult to compete in -- that of fresh, very high quality product that is available in quantity virtually year around.

Sweden

Although the Swedish production of salmonids is not exceptionally large compared to other countries, the development has been very rapid. The annual production was 250 mt in 1978. Since that time, the annual production has doubled every year and was 2,000 metric tons in 1981.

Denmark

There are over 50 salmonid farms in Denmark with over 1,000 persons employed in primary production. Most farms are large with an annual production of 200 mt being quite usual. In 1981, Danish farms produced 12,000 metric tons.

Norway

Norway's fish farming industry has enjoyed amazing growth in the last few years and appears to have the potential for considerably more growth. The industry consists mainly of small producers, numbering about 400, who farm salmon and trout with "pen rearing" techniques in Norway's fjords. Entry is strictly controlled by a system of government licensing. The average Norwegian fish farm produces about 30-40 mt a year, but one large firm, MOWI, harvests 500 mt a year and is easily the industry's leader.

The growth in production has been dramatic in recent years, and exports have been increasing by roughly 50% a year. In 1982, total production of farmed salmon and trout reached almost 15,000 mt with a firsthand value of almost $66 million. Total 1983 output of farmed salmon and trout was about 20,000 mt. The combined totals for 1984 could, according to industry forecasts, go as high as 25,000 mt and, in 1985, output could reach 30,000 mt. This represents a large potential influx to the U. S. market.

Year	Rainbow Trout	Salmon
1971	450	100
1973	1,000	200
1976	2,000	1,400
1978	2,000	3,000
1980	3,000	5,000
1981	4,500	8,500

Japan

Japan's hatchery system includes 256 hatcheries operated by the federal and prefectural governments, fisheries cooperatives, and several government research centers. Virtually all of Japan's salmon begin life in one of these hatcheries as the Japanese feel that natural spawning is an economic waste. The system is effective with regard to both biology and economics. Average marine survival is approaching 2.5 percent, and the cost of production is about five percent of the value of adult fish produced. That is, for every dollar spent on raising salmon, $20.00 are realized in finished product.

What Japan has done for chum salmon via the hatchery system is remarkable. Chum salmon populations have increased from near zero, because of adverse spawning conditions in polluted streams and rivers, to a level almost twice their historic numbers. Japan is currently producing 2 billion fry that result in 25-30 million returning adults. As cost-benefit ratios are right, and the infrastructure is in place, the culture of other salmon species can be expected.

Russia

Russia has made a significant national commitment to aquaculture. The Russians are building up their salmon ranching system in Asia and in the Baltic Sea. Their expansion plans call for increasing pink and chum salmon fry production in the Sakhalin Islands 5-fold during the period 1980-2000, to 5 billion.

Oregon

Weyerhauser is taking the lead in salmon ranching in Oregon but it isn't alone. The state has issued 20 licenses to 12 firms or individuals for a potential annual release of 180 million smolts.

Ore-Aqua 23 million coho smolts (@ permit level)
500,000 chinook smolts (permit level = 20 million)
3.2 million chum fry (permit level = 40 million)

Of the 1.06 billion artifically reared salmon - both smolt and fry - that were released into the environment by U. S. and Canadian Pacific Coast hatcheries last year, some 31.6 million were released by Oregon ranchers.

Pacific Rim

Over 3.6 billion salmonids (smolts and fry) are released into the Pacific every year. Two and a half billion of these are released by Japan and Russia. The remainder is primarily released by the U. S. and Canada.

Canada

The objective of the federally-financed Canadian salmon enhancement program is to double salmon catches to 50 million through aquaculture. Canada has, in recent years, been the third most significant importer of our fresh/frozen salmon (after Japan and France) and the second most important importer of canned product.

Others

Chile and New Zealand are beginning efforts to successfully operate salmon ranches. Though they are in infant stages, they represent even further potential for world aquaculture of salmonids. Of great interest are the huge populations of antarctic krill on which the salmonids would feed.

Alaska PNP

Twenty PNP salmon hatchery permits have been issued thus far and 11 more applications are now pending.

The establishment and growth of PNP hatcheries are contributing to the State's effort to rehabilitate depleted and depressed salmon fisheries. In 1983, PNP corporations estimated that, of over 170 million fish released as juveniles from PNP hatcheries, 4.1 million either returned to their facilities as adults or were captured in common property fisheries. That is an increase of over 43 million fish over 1982 releases.

Summary of Pink Salmon From PNP Hatcheries

Year	Fry Released	Total Return	Special Harvest
1976	3,653,666	-	-
1977	12,093,184	160,147	108,718
1978	25,732,238	160,397	114,188
1979	28,204,674	356,498	244,555
1980	31,690,000	1,504,878	346,168
1981	78,800,000	2,491,345	838,037
1982	102,550,000	5,253,378	1,354,732
1983	126,890,000	4,086,552	701,399
TOTAL	409,613,762	14,013,195	3,707,797

Summary of Chum Salmon Production From PNP Hatcheries.

Year	Fry Released	Total Return	Special Harvest
1976	66,075	-	-
1977	264,068	-	-
1978	1,064,000	543	-
1979	924,400	3	-
1980	3,340,000	1,588	-
1981	21,900,000	20,518	6,115
1982	23,590,000	22,133	378
1983	41,770,000	126,783	35,099
	92,918,543	171,568	41,592

Summary of Coho Salmon Production from PNP Hatcheries

Year	Smolts Released	Total Return	Special Harvest
1977	3,102	-	-
1978	0	27	-
1979	2,700	-	-
1980	557,200	-	-
1981	900,000	52,050	6,141
1982	700,000	61,709	11,500
1983	1,570,000	71,781	7,396
TOTAL	3,733,002	185,567	25,037

Summary of Chinook Salmon Production from PNP Hatcheries

Year	Smolts Released	Total Return	Special Harvest
1982	150,000	3,500	3,500
1983	140,000	872	872
TOTAL	290,000	4,372	4,372

Most PNP hatcheries are still developing brood stock and, therefore, have not reached their permitted egg capacities. Permitted capacities at PNP hatcheries now total 875.5 million eggs, which could result in releases of more than 700 million juvenile fish. This would represent almost a four-fold increase over current releases and could result in a similar increase in adult returns if current levels of marine survival are maintained.

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Japan Salmon Release

The Japan Fishery Agency recently announced the details of their plans for this year's salmon fry release program. A total of almost 1.7 million fish are to be taken for eggs. The breakdown, by species, is as follows.

Chum	1,418,000 Fish
Pink	249,000
Cherry	13,000
Sockeye	400
Kokanee	11,000
Total	1,692,300 Fish

The release projections of fry from the eggs collected this year, as compared with the actual number of fry released in 1983, are as follows.

Specie	Projection	Actual 1983
Chum	1,049,300,000	1,135,633,000
Pink	114,440,000	159,230,000
Cherry	14,800,000	6,145,000
Sockeye	161,000	74,000
Kokanee	1,000,000	1,041,000
Total	1,179,701,000	1,302,123,000

Note: Eggs are collected from the kokanee (*himemasu* or land-locked sockeye) and released in the hopes that they will go to sea.

High-Sea Chum Salmon

Deliveries of salmon by the medium-class drift-net salmon vessels are only about one-fourth of the projected volume. This is resulting in a seemingly steady climb in the prices. On the 14th, the high-sea chum (*toki*, 10/box) sold for between ¥1,300 and ¥1,330/kilo ($2.44 - 2.50/lb); this is about ¥100/kilo ($0.19/lb) higher than the previous week.

Bristol Bay Sockeye

The latest reports from the salmon buyers is that the Bristol Bay run has fallen off since the 12th. It now appears that the catch will be only about 20 million fish. The Japanese buyers are now projecting a supply of between 34,000 and 35,000 tons of sockeye salmon from this year's season, down considerably from the 65,000 to 70,000 tons last year. An estimate of the imports, by region, are as follows.

Bristol Bay	Round	6,000
	Dressed	11,500
Chignik/False Pass	Round	1,000
	Dressed	6,000
Kodiak		2,000
Cook Inlet		5,000
Southeast		3,000

APPENDIX 5

WASHINGTON AND ALASKA: COMPARATIVE TAX STRUCTURES

WASHINGTON:

1. No Corporate Income Tax

2. Sales Tax

   tax any tangible purchaser

   rates vary according to local determination

   5.9%-8.1% (combined State and local sales tax)

   no sales tax on purchases intended for resale

   no sales tax on wholesale transactions as that implies resale

   the seller must be certified as a wholesaler by Washington

   likewise, sales out-of-state are not taxed if the product is for resale

   if buyer is a consumer, there is a sales tax

   if delivery is taken in Washington, there is a sales tax

   if delivery is made outside Washington in vehicles owned by seller, tax applied

   if delivery is made outside Washington via common carrier, no sales tax

   nonresidents can obtain permits for exemption, individuals and businesses

3. General Business Tax - (B&O)

   the rate of the tax depends on business type

   manufacturing - .00484
   retailing - .00471
   attorneys, doctors, etc. - .015
   this is a tax on gross sales, gross receipts or gross income
   fish processing is considered manufacturing

4. Fish Privilege Tax

rates vary according to species

the Department of Fish and Game used to administer this tax

Department of Revenue now administers

Chinook, Coho and Chum - 5.35% of price paid by first commercial processor

Sockeye and Pink - 3.21%

all other food fish - 2.14%

based on value as a sport fish and on the amount of state money utilized for production

it doesn't matter where the fish come from. However, if a tax has already been paid elsewhere, credit is given.

5. Municipal Business Taxes

There are four principal types

a. a percentage of receipts - 1/20 to 2/10 of one percent
b. fixed fees for particular types of business
c. fees based on number of employees
d. fees based on the square footage of business

Most cities opt for 2/10 of one percent of receipts.

ALASKA:

1. Corporate Income Tax

similar to federal income tax

graduated percentage

unitary tax provisions - corporations that are members of a unitary group of corporations having income from both within and without Alaska must determine their Alaska source income by use of the combined method of accounting. Under the combined method of accounting, corporations that are subject to tax by the State of Alaska must determine their income by apportioning the total income of the unitary group.

Rates

Income	Tax is	Plus	of excess over
0 - 10,000	0	1%	0
10,000 - 20,000	100	2%	10,000
20,000 - 30,000	300	3%	20,000
30,000 - 40,000	600	4%	30,000
40,000 - 50,000	1,000	5%	40,000
50,000 - 60,000	1,500	6%	50,000
60,000 - 70,000	2,100	7%	60,000
70,000 - 80,000	2,800	8%	70,000
80,000 - 90,000	3,600	9%	80,000
90,000 - +	4,500	9.4%	90,000

2. Fisheries Business Tax - (Raw Fish Tax)

Established Commercial Fisheries

a. salmon canned at a shore-based business, 4-1/2% of the resource value
b. shore-based fisheries, except salmon canned at a shore-based business, 3-1/2%
c. floating business, 5% of resource value

Developing Fisheries (on list provided by Fish and Game)

a. shore-based business, 1% of resource value
b. floating business, 3% of resource value

3. Seafood Marketing Assessment

made on all fisheries business with total seafood values in excess of $50,000. The assessment rate is 2/10 of one percent (.002).

Value means the actual price paid for fisheries resources by the fishery business, including indirect consideration such as fuel, supplies, or gear, whether paid at the time of purchase of the fisheries resource or tendered as a deferred or delayed payment, except that "value" means the market value of the fisheries resource if the fisheries resource is taken by company-owned or company-subsidized boats operated by employees of the fisheries business or in boats that are operated under lease or other arrangements.

4. Business Inventory Tax (local)

   standard mill rate times inventory at January 1.

   around 10 mill for Juneau

   $1,000,000 inventory = $1,000 taxes

5. Bristol Bay Borough - Local Raw Fish Tax

   collected on all fish harvested or sold within the Borough. It is withheld from fishermen by the processors.

   3% of the value of all fish harvested or sold

   local raw fish taxes exist for several Boroughs in Alaska

STENKAMP/wfs0489W
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APPENDIX 6

The following is a list of anticipated egg take sites with the number of carcasses for 1984. An exact listing of places and dates will be available at a later date.

Location	Date	Species	Adults
Hidden Falls Hatchery			
Hatchery	Jul/Aug	Chum	40-70,000
Snettisham Hatchery			
Hatchery	Jul/Aug	Chum	12,000
Crystal Lake Hatchery			
Hatchery	Oct/Nov	Coho	3-7,000
Klawock Hatchery			
Hatchery	Sep/Oct	Chum	5,000
Kitoi Hatchery			
Kitoi Creek	Aug/Sep	Pink	50,000
Kasilof Hatchery			
Crooked Creek	Jul	King	100
Big Lake Hatchery			
Fish Creek	Sep	Coho	1,000
Other locations	Sep	Coho	1,000
Tutka Hatchery			
Tutka Creek	Jul/Sep	Pink	25,000
" "	Jul/Sep	Chum	70
Cannery Creek Hatchery			
Cannery Creek	Aug	Pink	40,000
Bear Creek Weir			
Bear Creek	Oct	Coho	1,000
Main Bay Hatchery			
Main Bay	Aug	Pink	40,000

Average weights for adult salmon:

Pink	4 pounds
Chum	8.5 pounds
Coho	8 pounds
King	20 pounds
1) King "jack"	3 pounds