Readings from...

Sea Grant Report 79-5

August 1979

Readings from

ALASKA Seas and Coasts

A Newsletter for the Alaska Commercial Fishing Industry

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The Readings was prepared as a guide for teachers, students and other interested readers to the articles and information which have appeared in issues of *Alaska Seas and Coasts* (February 1973 - February/March 1979).

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INTRODUCTION

Alaska Seas and Coasts first appeared in 1973 as a newsletter for commercial fishermen in the state. Issues have since carried articles aimed at commercial users on topics like fishing gear, biology, public safety, business management, marketing, and loans.

Readings from Seas and Coasts is a compilation of major articles appearing in Seas and Coasts over the past six years. It is part of a continuing effort on the part of the Alaska Sea Grant Program to provide teachers in Alaska with education materials specifically for Alaskan students. Since the state's population is largely coastal and few materials exist for primary and secondary classes discussing marine Alaska, this publication should prove a valuable aid.

The collection has articles on practical matters facing the fisherman, but it also has discussions on state and federal fishing policies that affect fishermen. Articles by experts on both sides of the issue helped Alaska fishermen understand the implications of the 200-mile limit, limited entry and the aquaculture program. These articles now provide students with a historical perspective on how these policies were put in place.

For many readers, the easiest way to use Readings from Seas and Coasts will be to go directly to the index and look for listings that deal with a particular subject. Related topics are grouped together in five sections. Each section looks at commercial fishing from a different perspective. They are:

Section one: Harvesting

Section two: Marketing and Handling

Section three: Resource Management

Section four: Safety

Section five: Sea Science

To help find articles that don't fall neatly under a particular section, a list of articles and a short introduction have been added at the beginning of each section.

We plan to start periodic publication of Readings from Seas and Coasts, adding new articles appearing in the newsletter. Any suggestions you might have for improving the collection would be appreciated and can be addressed to:

Editor, Alaska Seas and Coasts
Alaska Sea Grant Program
University of Alaska
Fairbanks, Alaska 99701

Section one

ALASKA Seas and Coasts

A Newsletter for the Alaska Commercial Fishing Industry

Harvesting

Section one: Harvesting

This section's articles are concerned with catching fish. Some of the articles deal with established fisheries such as salmon, crab and halibut. Articles on underutilized species--geoduck, clams, bottomfish--are also included since they are becoming increasingly important to the fishermen.

Knowing what to fish for is only part of the fisherman's work. He must also know something of running a business. Articles helpful in this area include those on loans and other financing. Finally, the fisherman has to remember his industry is subject to government regulation, pointed out in the article on state attempts to assure both sport and commercial fishermen of a fair catch.

Section One

HARVESTING

Alaska's Underutilized Fisheries Resources

Development of New Fisheries Could Yield One Billion Pound Annual State Harvest

By WALTER G. JONES
Regional Fisheries Extension Coordinator
National Marine Fisheries Service

Are Alaska's commercial fisheries capable of achieving an annual harvest goal of one billion pounds or more of fish and shellfish in the next 10 years? Are there current and potential markets to absorb more than twice the 1973 Alaska harvest of approximately 461 million pounds? Is it economically feasible for Alaska fisheries to commercially harvest and market underutilized fish and shellfish? The answer to all three questions is an emphatic **"yes,"** provided that important changes take place in the industry.

Successful development of the state's underutilized fisheries resources depends primarily on these conditions: (1) Whether Alaska fishermen, traditionally accustomed to harvesting high value species, are willing to fish for abundant, medium-value, underutilized fishery resources and to compete with foreign fishermen; (2) whether fishermen and processors are willing to expend the capital necessary for new equipment and facilities for harvesting and processing the medium-value species, and (3) whether the fishing industry is willing to learn and apply quickly the technical skills and research necessary to develop these resources. There are encouraging signs that the industry is beginning to meet these conditions.

For the purpose of this report, underutilized species are defined as species which are available for harvest by U. S. fishermen, but which are currently not harvested or are fished below the maximum sustained yield potential. This definition includes groundfish, herring and other species that are fished outside the 12 mile, U. S. jurisdictional limit by foreign fleets but not by U. S. fishermen. It also includes species of probably limited production capacity, such as abalone, which can be very important to a few local fishermen. There are at least 60 species of fish and shellfish that can be considered underutilized—15 or more which have immediate harvesting and marketing potential. Underutilized species with the greatest commercial importance to the Alaska fishing industry are described below.

Alaska Pollock

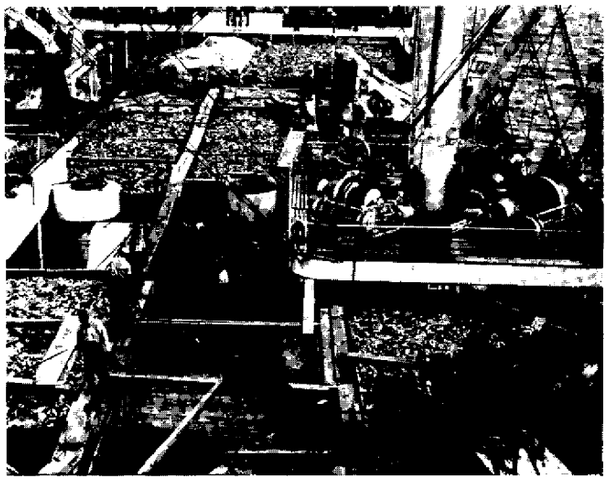
Pacific or walleye pollock (sometimes spelled pollack), a member of the cod family, is considered to be the most abundant commercially harvested species in the North Pacific Ocean. Japanese fisheries harvested around **3.7 billion** pounds of Alaska pollock from the Eastern Bering Sea in 1972, while Soviet and South Korean fisheries took another estimated 500 million pounds. Foreign fisheries take relatively little pollock in the Gulf of Alaska, where the species is reportedly less abundant. However, there are sufficient quantities of pollock in the Gulf to attract an Alaska fishery. Approximately 29 million pounds of pollock fillets in blocks (equivalent to 90-100 million pounds of fish in the round) were imported into the United States in 1972. Pollock roe, which is marketed in Japan, is a potentially valuable by-product for Alaska pollock processors.

Flatfishes

Flatfishes, which include a variety of flounder and sole species, are found on grounds of inside waters in Southeastern Alaska and on the continental shelf off the Alaska coast as far north as the Arctic Ocean. They must be taken on grounds available to trawls. Flathead, yellowfin, rock, rex and Dover soles, and arrowtooth and starry flounder are the more dominant underutilized flatfishes. More than 708 million pounds of these species were taken in 1971 by foreign fisheries in the Eastern Bering Sea and off the Aleutians. This resource has not been exploited by U. S. fisheries inside or outside the 12 mile limit off Alaska, except for a new, small flounder fishery in the Petersburg area.

Herring

Herring currently are harvested primarily for roe products, which are exported to Japan, and for bait. At one time in Alaska, approximately 260 million pounds were harvested for fish meal in a single year. Catch quotas imposed by the Alaska Department of Fish and Game now limit herring production in Southeastern and Central Alaska. There are no



Pictured above are deck scenes aboard two Japanese factory ships engaged in production of minced fish meat and fish meal and oil in the Bering Sea. Contents of the holding bins are principally Alaska pollock. Note the conveyor systems to processing areas below decks. Photos by R. C. Naab, Alaska Region, National Marine Fisheries Service.

catch quotas in the Western Alaska and Bering Sea herring grounds. Although herring food products are in demand in the United States, Europe, and Japan, market prices have been too low to attract Alaska fishermen.

Rockfish

Several species of rockfish are found from inshore waters to deeper outside waters of Alaska. Pacific Ocean perch, the principal species heavily fished by foreign fleets in the Gulf of Alaska, is available to U. S. fishermen. Black and red rockfishes and red "snappers" abound in inshore waters, but are not fished commercially.

Blackcod

Pacific cod and sablefish (blackcod) are two other groundfish species which can be considered underutilized in some areas of Alaska waters. There are indications that Pacific cod stocks in the Gulf of Alaska are increasing after heavy fishing pressure by Soviet fleets. These two species are important to fishermen because of their relatively high value among underutilized groundfishes. The species described above will make up the greater portion of the one-half billion pounds or so of fish needed to reach the billion pound annual production goal.

Shellfish

Shellfish constitute another underutilized resource which is grossly neglected. This resource encompasses a variety of clam species and mussels abundant in Alaska tidal zones and beyond, along with tanner crab and even pink shrimp, which are not fully utilized in all Alaska waters.

Other Underutilized Species

Other species, though less abundant, will be important in helping fishermen who do not have vessels and gear or the inclination to fish in the deeper open ocean waters. These include smelt, capelin, abalone, sea urchins, octopus, sidestripe and coonstripe shrimp, ling cod, sea snails and Dolly Varden trout. These species will give fishermen an outlet to diversify their fishing operations, extend their season and relieve pressure on the overcapitalized salmon, crab and shrimp fisheries.

Eventually, Alaska fishermen will take squid which are abundant in some Alaska waters. Species such as sharks, skates, wolfish, sculpins, blennies and others which are taken in trawls as incidental catches must not be wasted. They will find their way into industrial and animal food markets and eventually into world markets, where they are accepted as food items.

The major factors motivating the Alaska fishing industry to consider underutilized fishery resources as profitable production ventures are increased demand in world and U. S. markets for seafood products; increased prices resulting from the demand; devaluation of the dollar in relation to foreign currencies, and rising inflation in European and Asian countries.

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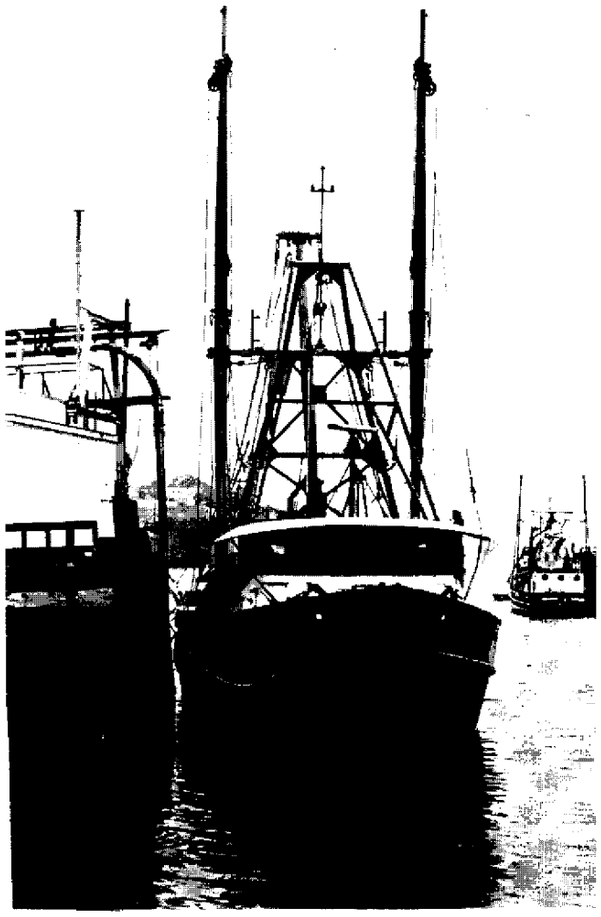
ALASKAN BOTTOMFISH — 1978

By Hank Pennington
Marine Advisory Program
University of Alaska
Kodiak, Alaska

The Fisheries Conservation and Management Act of 1976 was hailed as a turning point for the beleaguered American fishing industry. The 200-mile limit was envisioned as some sort of magic veil, through which foreign competition could not pass. Behind that protective barrier American fisheries could flourish.

High on the list of fisheries to be developed was the Alaskan bottomfish resource. Fishermen and processors responded to the promised protection of a 200-mile limit with expansive forecasts for first-year deliveries. In the April 1977 issue of **ALASKA Seas and Coasts**, *Walt Jones of the National Marine Fisheries Service provided several economic projections for the emerging industry. With one-and-a-half years of experience under the new management system, and with ample opportunity for the industry to explore the new fishery, perhaps it is time to compile a score sheet for the Alaskan bottomfish industry.*



After delivering a mixed load of shrimp and bottomfish, the **Western Dawn** *waits to take on ice in Kodiak. The large fleet of existing trawlers in Alaska, plus the massive king crab fleet, will form the nucleus of Alaska's bottomfish trawling fleet..*

(Photo by Hank Pennington)

The development of Alaska's bottomfish resource was one of the specific goals of the Fisheries Conservation and Management Act of 1976. Since that Act went into effect early in 1977, progress has been made toward that goal. However, many of the early production forecasts for the fishery now seem overly ambitious.

The chart at the bottom of this page summarizes the harvest of the Alaskan bottomfish industry so far this year.

Compared to the anticipated foreign harvest of around three billion pounds, the Alaskan industry has managed to harvest only one-tenth of one percent of the available fish. It is more reasonable to say that the small catch is a result of a slow, deliberate approach to the development of the resource, rather than any failure of the new industry. A look at the problems encountered by the industry and its response to them will bear this out.

INFORMATION SHORTAGE

While the foreign fleets off Alaska have a long history with the bottomfish resource there, it is truly a new frontier for the Alaskan industry. In the finest tradition of the frontiers of the last few centuries, there is little practical information available on the new resource offshore. Scientific surveys have been conducted on the bottomfish populations for many years, but the information from them has proven to be of little use to the individual processor or fisherman. On those surveys small samples are taken over wide areas. Sweeping generalizations are made from these samples about the populations of the bottomfish as a whole.

When it comes to ordering a bottomfish filleting line, selecting appropriate fishing gear, or locating seasonal concentrations of fish, such broad information can only be used as an indicator. Data provided in existing scientific surveys does not meet the needs of individual processors and fishermen. This does not point to any shortcoming in our scientific techniques; rather it highlights the specialized nature of the new industry.

As the industry develops, very specific stock information will have to be developed for it. Much of this information will be generated by the efforts of individual processors and fishermen. The nature of the needed information will be clearer as the discussion of the industry's experiences is developed.

BOTTOMFISH PROCESSING IN ALASKA

Preliminary results from Alaskan

bottomfish plants indicate that there is a definite seasonal restriction on the harvest of at least cod and pollock. While many processors and fishermen have debated the ability of existing American vessels to harvest bottomfish in the stormy winter, the biology of the fish looms as an obstacle to year-round harvesting.

Just prior to spawning the cod and pollock are particularly desirable for their roe, or eggs, yet they are entirely unsuitable for harvest immediately after they spawn. After spawning the flesh of the fish becomes soft and watery. Recovery rates drop and the quality of the flesh is poor. Early experience indicates that at least two, and possibly three, months are required for the fish to recover their prime. To further complicate the picture, however, spawning times vary from place to place. The time necessary for the fish to recover their prime will also vary annually and regionally.

The high cost of labor in Alaska dictates that the majority of bottomfish fillets must be produced by machines. However, the processing machines available today are specific for the size range of fish they will process. If a machine is purchased for a given size range of fish, but it turns out that most of the fish of a region are larger or smaller than the machine will handle, the processor is faced with hand-filleting most of his fish or ordering another machine to replace the one purchased by mistake. Such mistakes cut drastically into the profitability of his bottomfish operation.

While machines are available to fillet pollock as small as 10 or 12 inches, fillet recovery is uneconomical on fish smaller than 15-1/2 inches. Filleting machines produce in terms of fish-per-hour rather than pounds-per-hour. So fillet yield is regulated by the size of the fish. In addition, small pollock seem to put most of their effort into growing longer, rather than fatter.

While 25 percent of the whole weight of a 20-inch fish may be recoverable fillets, there may be only 15 percent recoverable flesh on a 12-inch fish. If a processor is paying fishermen seven cents a pound for whole pollock, a 25 percent recovery rate means that the raw fillets will cost 28 cents a pound before all the other processing costs are figured in. If the recovery rate is only 15 percent, the bare cost on a pound of fillets is 46 cents. Wholesale pollock block prices are currently hovering around 70 cents a pound.

BOTTOMFISH CATCH IN ALASKA, JANUARY-JUNE 1978

(In Pounds)

	Sablefish	Pollock	Flounder	Pacific Cod	Rockfish	Sculpin	Skates	General Groundfish Bait	Others	TOTAL
Western Alaska		950,162	103,047	455,271	549	18,920	1,000		8,314	1,537,263
Central Alaska	945	– 0 –	– 0 –	29,710	135	3,910	– 0 –	81,358	– 0 –	116,058
Southeastern Alaska	858,317	1,251,603	162,779	63,546	– 0 –	10,359	– 0 –	– 0 –	– 0 –	2,346,604
TOTAL	859,262	2,201,765	265,826	548,527	684	33,189	1,000	81,358	8,314	3,999,925

Alaska Department of Fish and Game Summary, August 1978.

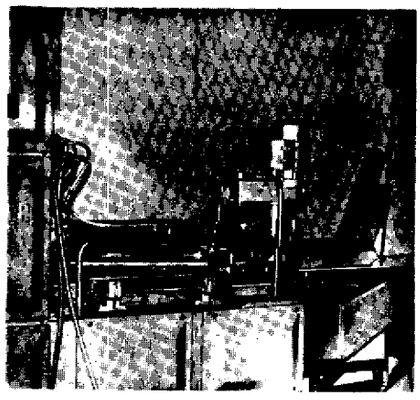
BOTTOMFISH HARVESTING OFF ALASKA

To a large degree the problems of the processors relate directly back to the fisherman. Forty-three 65- to 95-foot shrimp trawlers are registered in Kodiak. More than 150 76- to 130-foot vessels are registered in the Bering Sea. These and the other large crab and shrimp vessels around the state which are presently equipped to harvest bottomfish with trawls demonstrate that our harvesting capacity far exceeds present processing capability. Many of the men running these vessels have experience trawling for bottomfish on the east and west coasts.

In addition to these larger vessels there are many smaller seiners, longliners, gillnetters, and trollers wanting to fish bottomfish with gear other than trawls.

Though the tendency when discussing bottomfish is to focus on the larger boats and experienced fishermen, there are many fishermen on smaller boats who want to enter the fishery, but lack the experience and information to get started. Not all the boats will be suitable for trawling. Conversion of existing vessels to handle new gear types is expensive. If a new fisherman selects a gear type which later proves to be incompatible with the normal operation of his vessel, the mistake could be very costly.

It is interesting to note that preliminary experience with midwater trawls off Kodiak have been less than satisfactory. The *Linda Jean* used midwater gear off Kodiak this spring. This produced a higher proportion of smaller fish per load than another vessel fishing the same waters with conventional bottom trawls. It seems that the smaller fish prefer the midwater regions, while the larger fish tend to reside closer to the bottom. The *Linda Jean* has since replaced her midwater gear with conventional bottom trawls.



A portion of the mechanized fillet line at New England Fish Company in Kodiak sits idle. Seasonal changes in fish quality and competition from other fisheries will shut down Alaskan bottomfish lines for short periods in the foreseeable future.

(Photo by Hank Pennington)

ONBOARD HANDLING

Perhaps the biggest problem for the fisherman to overcome is proper onboard handling of his catch. The production of top quality fillets at the fish plant begins with good handling on the harvesting vessel. While refrigerated seawater appears to hold fish better than ice, conversion to the system is expensive.

New England Fish Company in Kodiak has provided several gutting

machines for use on board the boats delivering to them. The fishermen have found the machines to be too slow to be effective, and their bulk interferes with the operation of the gear on deck. For the most part the machines will only handle about 60 fish a minute. A crewman must leave his normal duties on deck to feed fish into the machine. With the large catches experienced off Kodiak, one gutting machine cannot begin to keep up with the ability of the trawl to bring fish aboard. If two machines are employed, one more crewman must leave the gear, and even more deck space is lost.

Ultimately a requirement for the gutting of fish on board the vessel will mean that the fisherman must employ additional crewmen on deck. While the owner of the boat may be willing to put the machines aboard, it is doubtful that the existing crew will accept smaller shares to compensate for the additional crewmen.

BOTTOMFISH FORECAST FOR ALASKA

The reader expecting to find number-forecasts in this section will be sorely disappointed. The difficulties so far encountered by the fishing industry, the North Pacific Fishery Management Council, and the many associated agencies in attempting to forecast harvest levels point to the futility of any individual's attempt to make similar forecasts. However, it is reasonable to forecast the form that the bottomfish industry will take, particularly as it relates to other fisheries and the existing fishing fleet in Alaska.

While production of bottomfish has been limited so far, the new lines planned for construction this year in combination with the expansion of existing lines should increase the harvest substantially.

Alaska Packers in Kodiak has begun to modify its plant to receive new bottomfish lines which are waiting in Seattle. Pacific Pearl anticipates progress with the development of their lines in the very near future. Peter Pan Seafoods has plans for bottomfish lines in King Cove this season, and New England Fish Company is well on the way toward opening new lines in other ports in Alaska.

The forecasts for the Bering Sea crab fisheries point to general downswings in the crab populations over the next few years. The shrimp fisheries around Kodiak Island and along the Alaska Peninsula are on a downswing of unknown duration. It is reasonable to assume that as those fisheries become less lucrative, the fishermen will turn to bottomfish to fill in their seasons. Conversations with fishermen in those fisheries confirm that they are making very substantial long-range plans for entry into the bottomfish fishery.

While fishermen and processors are presently discarding small pollock, markets will inevitably develop for the fish. At present the Japanese fleet utilizes the small fish for the production of surimi, a fish paste popular in Japan. That potential market for the small pollock is presently denied the Alaskan fishing industry by restrictive Japanese trade barriers. However, it appears that there is a market for small pollock if they are salted and dried. In response to that market a foreign company is making plans for a saltery in Kodiak, where they will purchase pollock as small as 10 or 12 inches in length.

Because of the limitations of the transportation systems in Alaska, it is fair to assume that any new bottomfish efforts will be centered about existing transportation arteries. When one considers the transportation network that will be necessary if the Alaskan industry eventually harvests the whole of the billions of pounds of bottomfish available, it takes no crystal ball to foresee major changes in the transportation systems. However, over the short term, the commercial carriers will be reluctant to establish new routes for a speculative fishery.

SUMMARY

The bottomfish industry in Alaska did fall short of early predictions this year. It is reasonable to assume that a portion of those inflated forecasts can be attributed to an effort to cut into the quotas of their competitors on the high seas. However, marked progress has been made toward opening the doors for development of the new fishery.

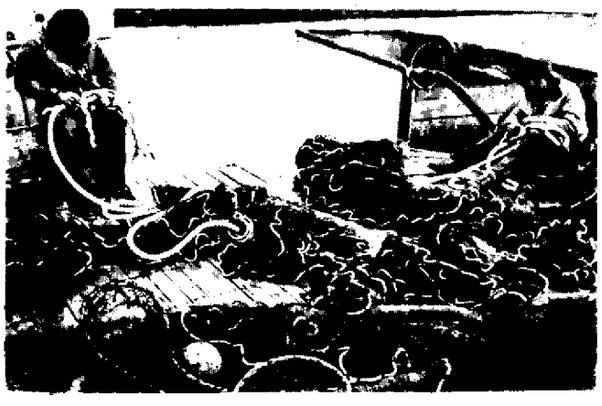
More and more companies are announcing their intentions to construct bottomfish lines in the near future, and more lines will be in operation before the year is out. The information shortage affecting the industry today is being overcome, and it is fair to assume that the development of the bottomfish industry in Alaska is getting ready to snowball.

Early efforts have been successful enough to encourage new entry into the industry. While it will be quite a few years before the offshore foreign fleets are displaced, the Alaskan industry can be expected to put a sizeable dent in the foreign quotas in the near future.

SUGGESTED REFERENCES

For the person seeking the latest and most complete information about the bottomfish stocks off Alaska, perhaps the two best publications are: *Atlas of Groundfish Catch in the Northeastern Pacific Ocean, 1964-76,* by L.L. Low and J. Akada; and, *Trawl Surveys of Groundfish Resources in the Eastern Gulf of Alaska and Southeastern Alaskan Waters, 1976-77,* by Norman B. Parks and Harold Zenger. Both of these publications are available from: National Marine Fisheries Service, Northwest and Alaskan Fisheries Center, 2725 Montlake Blvd. East, Seattle, WA 98112.

In these publications the recent trawl survey data is combined with a summary of the results of past surveys.



Aug. 1978

Bottomfish nets aboard the shrimp trawler **Dawn** *are checked by crewmen P. G. Johnson, left, and Rick Phillips.*

EMERGING BOTTOMFISH FISHERIES
Potential Effects

Alaska fishermen have long watched the foreign fleets harvest bottomfish and have themselves harvested the fish but found few markets. The 200-mile limit has proffered opportunities for the U.S. fishing industry to break into the fishery for Alaska bottomfish at long last.

In the early stages, however, the economics of this new fishery are foggy. Any predictions of the costs and values of such a fishery must necessarily be flexible and generalized. Walt Jones of the National Marine Fisheries Service looks at the growing bottomfish fishery as an economist and provides several projections for the near and distant future.

While opportunities are offered by the 200-mile limit, it will take many years of major investments and a lot of hard work to build a stable U.S. industry.

By Walter G. Jones
Chief, Fisheries Development
National Marine Fisheries Service

A new Alaska fisheries industry is being born – a fishery to utilize bottomfish resources which abound in Alaska inshore and offshore waters. Production trial fisheries and processing has been initiated in Southeast Alaska on pollock and flounders by a major processing firm. Similar efforts are planned by at least two firms in Kodiak this year. Other firms have tentative plans for pilot processing operations on bottomfish. A group of Kodiak fishermen are considering a proposal by a Republic of Korea (ROK) enterprise for delivery of bottomfish by U.S. fishermen to a ROK processing ship at sea.

Stimulus for these development activities has come from higher prices and increasing demand for cod, pollock and flounder products; and from the Fisheries Management and Conservation Act of 1976. Extended jurisdiction will make bottomfish resources more accessible to U.S. fisheries in the newly expanded fishery conservation zone off Alaska, and less accessible to foreign fleets.

The Total Allowable Catch (TAC) allocated to U.S. and foreign fisheries in these waters in 1977 by the North Pacific Management Council and the Federal Government for major bottomfish species is about 3.3 billion pounds, most of which is presently allocated to foreign fisheries. The foreign fleet TAC will decrease as U.S. fisheries increase. It is likely to be many years, however, before U.S. fisheries are capable of harvesting all of the fishery resources off Alaska now allocated to foreign fleets. Available investment capital, economic incentives, technological development, markets, and labor will determine the rate of U.S. expansion.

PROJECTIONS

The purpose of this article is to take a quick look at how much capital investment may be required, how many processing plants and vessels will be needed, what increase in employment can be expected, and what gross income can be anticipated from development of a bottomfish fishery in Alaska.

These projections are rough estimates since there are many unknown economic factors concerning processing and fishing bottomfish in Alaska which can be determined only when full scale operations begin. There is, however, enough information available to evaluate some of the economic impact that development of Alaska bottomfish resources will have on the fishing industry, fishing communities, transportation facilities and investors. Such a picture is needed to aid planning by industry, by fishing communities, and by state and federal government agencies which will be involved in management and development of fishery resources.

COMMENT INVITED

Not all readers will agree with some of the assumptions made and estimates

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presented. This is expected, and comment or criticism is invited. Such comments will help add clarity and depth to what is presented here, or they may change the picture entirely. Much of the information, on which the projections were made, was gleaned from discussions with fishermen and processors and from government agency staffs.

ALTERNATIVE APPROACHES

The means by which industry develops Alaska bottomfish resources will determine the effects and magnitude of economic impact on the fishing industry and communities. Development approaches which are now underway, in planning stages, or being considered, include the following:

(1) U.S. industry encourage foreign investment and joint-venture enterprises with foreign firms in Alaska seafood processing and distribution programs;

(2) U.S. fishermen sell bottomfish species to foreign processing ships within the extended fisheries zone, but outside of 12 miles offshore;

(3) U.S. fishermen deliver trawl catches to existing Alaska processing plants where they would be iced, packed in watertight containers and shipped in-the-round by air transport to processing facilities in the lower 48 states until Alaska processors are ready to accept fish;

(4) U.S. industry develop Alaska bottomfish resources at its own pace with little or no government involvement;

(5) U.S. and State of Alaska governments provide economic incentives to initiate fisheries development enterprises through low-cost government loans and development grants;

(6) U.S. fishing industry, federal and state agencies and universities combine their efforts to initiate an aggressive fisheries development program focused on specific development opportunities. This will be accomplished through cooperative joint-venture projects, increased government-university research and service activities, increased financial assistance programs, and government-industry production trial projects to reduce some of the initial economic risk of development to industry.

PROS AND CONS

The pros and cons of each approach are: (1) It is well known that there is considerable investment by Japanese firms in Alaska seafood processing. Other foreign enterprises are also seeking entry into Alaska fisheries. Such investments would undoubtedly bring new technology to the Alaska fisheries and new markets. It would also help to balance the heavy investments of Japanese firms and would accelerate utilization of the resource by U.S. fisheries. Foreign investment will be needed in the absence of commitments by U.S. capital or to supplement U.S. capital in order to develop U.S. fisheries to the full potential of the available resources.

(2) Delivery of fish caught by U.S. fishermen to foreign processing ships at sea would help U.S. fishermen engage in fishing for species such as pollock before shore-based U.S. processors are tooled up to accept pollock and other species in large quantities. This approach has short term merits. On a long term basis, however, it would yield the smallest economic return to Alaska fishing communities and U.S. fisheries. It is also quite probable in the case of delivery of pollock to ROK floating processors, that much of the Korean pollock product would be marketed in the U.S. to the competitive disadvantage of U.S.-produced pollock products. *(See NPFMC Meeting story, page 5. Ed.)*

(3) Flying round fish to other states for processing would be only a stop-gap measure to allow U.S. fishermen to begin production of bottomfish. It could only be practical with the use of giant cargo planes and would probably require a government subsidy. It would, however, stimulate development of the fishery in its early phases.

(4) and (5) Some Alaska processors and fishermen are taking the initiative to produce pollock, Pacific cod, and flounder products on a production trial basis. They depend on varying degrees of resource assessment, gear research, and technical services from the National Marine Fisheries Service and the University of Alaska Marine Advisory Services. These efforts supplemented by the Alaska Division of Economic Development program, which provides a grant of $300 thousand to reduce some of the initial bottomfish development risk to two processing firms, will produce information which will benefit all of Alaska bottomfish fisheries.

Approaches (4) and (5) listed above are in actuality the initial phases of (6). This is a planned industry-government effort to coordinate and combine industry, state, federal, and university activities in joint venture projects which will focus on specific fisheries development opportunities. This should prove to be the most effective approach to stimulate development of Alaska bottomfish resources within a minimum time period and at reduced economic risk to industry.

PROJECTED ESTIMATES

Projection of costs, values, and other data are summarized in the table on page 3. It is based on factual information where available; on assumptions that certain events will occur on schedule; and, where factual information doesn't exist, the opinions of people knowledgeable in commercial fish production were used. Cost and value figures shown are thought to be conservative. Actual costs and values in 1985 and 1998 will of course be greater since they will reflect increases due to inflation, price increase trends, and other economic factors.

TARGETS

Major target species for development are pollock, flounders, Pacific cod, Pacific Ocean perch, other rockfishes, and sablefish (blackcod).

Target years used in these evaluations are: 1985 – the year used in the U.S. Department of Commerce NOAA/NMFS publication, *A Marine Fisheries Program for the Nation* as a guidepost to measure developments in U.S. fisheries; and 1998 – twenty years after commercial production of bottomfish in Alaska is anticipated to begin in earnest (1978).

GOALS

Production goals for this article are arbitrarily set at 300 million pounds of the target species by 1985 and one billion pounds by 1998. It is believed that these goals will be reached by the target years and very possibly before.

Annual production period – Some plants harvest and process bottomfish throughout most of the year. In most plants, however, production of higher

Summary of Annual Production, Costs and Value Estimates for an Alaska Bottomfish Fishery in 1985 and 1998 Based on 1977 Data

		1985	1998
Whole Fish Production Goals		300	1,000
Ex-Vessel Value of Harvest	(x 1 million)	$20.3	$ 67.8
First Wholesale Value of Products		$66.6	$221.9
Total Number of Processing Plants Needed		15	50
Number of New Processing Plants Needed Over Existing Facilities		0	15
Total Number of Fishing Vessels Needed		100	330
Number of New Vessels Needed Over Existing Fleet		0	120
Investment Costs			
Cost of New Processing Plants		0	$105.0
Cost of Renovating and Equipping Existing Plants		$15.0	$ 35.0
Cost of New Vessels		0	$156.0
Cost of Outfitting Existing Vessels for Trawling		$ 2.5	$ 5.3
Total Costs	(x 1 million)	$17.5	$301.3
Wages Generated			
Total Number of Processing Plant Employees Needed		1,125	4,000
Total Number of Fishermen @ 4/vessel		400	1,320
Additional Fishermen Needed for New Vessels (included in total above)		0	480
Wages for Processing Plant Employees @ $6.50/hr.		$ 8.8	$ 31.2
Wages for Fishermen (45% ex-vessel value)		$ 9.1	$ 30.5
Total Wages	(x 1 million)	$17.9	$ 61.7

value species will take precedence when they are in season. It is estimated that bottomfish will be processed on an average of 150 days per year.

COSTS

Cost of vessels – A new 100 to 110-foot trawling vessel fully equipped with efficient trawling gear and latest electronic equipment costs $1.25 million to $1.50 million. The average cost is estimated at $1.3 million. Equipping and renovating existing limit seiners and shrimp and crab vessels for bottomfish trawling is conservatively estimated by fishermen to cost an average of $25 thousand per vessel. Conversion costs of some larger vessels are estimated as high as $250 thousand, depending on sophistication of gear and electronic equipment installed.

Cost of processing facilities – Costs of a new processing plant with proper freezing facilities, mechanical fillet lines, waste disposal systems, and other necessary equipment will average about $7 million. Renovation and equipment costs of existing processing plants will range between $600 thousand and $1.5 million. An average cost per plant is estimated at $1 million. One mechanical fillet line in place with accessory equipment currently costs $150 thousand to $200 thousand.

LABOR

Processing labor required – One mechanical fillet line will process about 60 thousand pounds per eight-hour shift. At least two – more likely three or more – lines will be needed per plant for sufficient capacity to handle boat deliveries in a minimum time period to maintain maximum quality of fish.

An average of 20 workers will be needed per mechanical fillet line, including crews for trimming, candling, skinning, unloading, freezer loading, shipping, and maintenance. Hand fillet lines will have to be used for odd size fish. Species which cannot be mechanically filleted will require additional employees as will minced fish processing. It is estimated that a crew of 100 workers or more will be needed to process 200,000 pounds of bottomfish per eight-hour shift.

Wages – The hourly wage for plant workers today, including overtime, fringe benefits and lodging, averages $6.50 per hour.

PLANTS

Total processing plants needed – This projection is based on the calculated estimate that seafood processing plants will handle 20 million pounds of round fish per plant on a statewide average.

New plants needed – It is assumed that there are 35 processing plants now operating which will be processing bottomfish by 1998 or before. At least 15 new plants will be required to process one billion pounds.

VESSELS

Fishing vessels needed – The average annual harvest per vessel statewide is expected to be about three million pounds.

It is assumed that 100 to 120 shrimp and crab fishermen and limit seiners will have converted to trawling or other bottomfishing methods by 1985. No new vessels should be required. It is conjectured, however, that a few new vessels or trawlers from other areas will enter the Alaska bottomfisheries by 1985.

An estimated 100 crab vessels, 80 shrimp boats, and possibly 30 seiners will convert to bottomfish trawling by 1998. At least 120 new vessels will need to be added to the existing fleet to harvest one billion pounds of fish.

FISHERMEN

Fishermen needed and wages – An average of four fishermen per vessel including the captain, will be needed for bottomfish trawling. The crew and captain shares are estimated at 45 percent of the gross value of the catch.

EX-VESSEL AND FIRST WHOLESALE VALUE

These values are calculated for 300 million pounds and one billion pounds based on market prices as of December, 1976. It will be assumed for these projections that the breakdown of catch by species will follow the percentage of each species in the TAC for the fisheries off Alaska. It is probable, however, that the more valuable species such as cod and flounders will be fished proportionately more heavily than pollock. Calculations for ex-vessel and first wholesale values as figured for one billion pounds are shown in the following table.

The ex-vessel value of 300 million pounds would be 0.3 of $67.8 million or $20.3 million. Including minced fish, wholesale prices for products from 300 million pounds are calculated at 0.3 of $221.9 million ($176.9 + 45.0) or $66.6 million.

An analysis of the estimated net return on investment is a complex analysis and is outside the scope of this article. It should be noted, however, that there are other fixed and variable costs in addition to wages such as depreciation, interest on investment and operating funds, insurance, overhead, and operating and maintenance costs. These costs must be allocated in proportion to other seafoods processed in the plants, most of which will have multi-species operations.

Ex-Vessel and First Wholesale Value Based on One Billion Pounds

		Ex-Vessel Value				First Wholesale Value			
			A			B	A & B		
	1977 Total Allowable Catch (TAC)	Percentage Breakdown of TAC	Estimated Production Based on 1 billion lbs. (x 1 million)	Ex-vessel Price/lb.	Resultant Ex-Vessel Value (x 1 million)	Edible Weight Percent of Yield	Resultant Edible Weight (x 1 million lbs.)	Unit Value $/lbs.	Resultant Estimated Total Wholesale Value
Pollock	2,367	72%	720	4¢	$28.8	25%	180	0.50	90.0
Flounder	516	16%	160	12¢	19.2	25%	40	1.40	56.0
Rockfishes*	205	6%	60	13¢	7.8	25%	15	0.90	13.5
Pacific Cod	142	4%	40	10¢	4.0	25%	10	0.70	7.0
Sablefish	59	2%	20	40¢	8.0	80%	16	0.65	10.4
Total	3,289	100%	1,000		$67.8		261		176.9
Minced Fish†			300			50%	150	0.30	45.0

* Primarily Pacific Ocean Perch

† It is assumed that by 1998 and possibly by 1985, that deboning of fillet scrap to increase yields will be an established practice. The 300 million pounds of fillet scrap from one billion pounds of fish suitable for minced flesh production is probably a conservative estimate. $0.30 cents per pound for minced fish blocks is higher than the current market prices where such exists. It is assumed, however, that a market acceptable product will be produced which will wholesale at a minimum price of $0.30/lb.

SECONDARY COSTS AND VALUES

It should also be noted that additional secondary investment costs and values will result from development of Alaska bottomfish fisheries through new and expanded businesses to provide services for fisheries operations, employees, and fishermen.

Fishing communities in Alaska are strained to the limit – overtaxed in some areas – to supply housing, recreation, utilities, docks, and labor for current fish and shellfish production during peak seasons. Villages on the Alaska Peninsula, the Aleutian Islands, and the Pribilof Islands, will feel a major impact from development of fisheries in the Bering Sea and Western Gulf of Alaska where the major future fisheries development will occur. Most village communities have inadequate facilities and utilities for any substantial increase in new seafood processing operations.

The availability of a year-round labor source is a problem. Processing plant operators have expressed the need to stabilize the availability and quality of labor resources for processing and fishing operations in Alaska communities. They feel that this can best be accomplished through settlement of families in the communities. This in turn is dependent upon adequate housing and other attractions for family living.

OTHER RESOURCES

Whether the Alaska bottomfish fishery reaches 300 million, one billion, or two billion pounds annually, as it surely will in time, the impact on the economy, social aspects and complexion of Alaska fisheries and fishing communities will be highly significant. The Fishery Conservation and Management Act of 1976 has enhanced the opportunities for the Alaska fisheries, industry, communities, state and federal government agencies, and universities to cooperate in helping the infant bottomfish fishery to grow to its full potential. Similar opportunities exist to develop latent clam and pelagic fishery resources within the U.S. 200-mile extended fisheries conservation zone off Alaska.

April 1977

Alaska Clams
A Resource for the Future

By HOWARD M. FEDER and A. J. PAUL
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Alaska's clams represent one of the great, untapped fisheries resources in the United States. The development of this resource is currently limited by legal restrictions imposed on the marketing of Alaskan clams and by other factors which are described in this issue.

Many suitable clam habitats exist along the state's approximately 33,000 miles of available shoreline and associated, shallow subtidal regions. Although more than 100 species of clams are found in Alaska, only a few species are of sufficient size and abundance for commercial harvesting. Of these few species, the one with the greatest fishing potential is undoubtedly the razor clam, *Siliqua patula*. It was marketed successfully in the past, and today razor clam stocks are found in abundance on many beaches. The clam is always eagerly sought by sport fishermen wherever it is found along the entire west coast of North America.

Currently the consumer market for this highly desirable clam is restricted by legal restraints related to the Paralytic Shellfish Poison (PSP) problem. (See "Paralytic Shellfish Poisoning and the Law" in this issue.) However, the clam is used extensively in Alaska as a prime bait in the fishery for dungeness crab, *Cancer magister*.

Another Alaskan clam capable of supporting a commercial fishery is the butter clam, *Saxidomus gigantica*. This large, hard-shell clam, which formerly supported an important industry in Southeastern Alaska, still is found in abundance on many beaches in that area and in Southcentral Alaska. The butter clam industry was curtailed in the late 1940s by the presence of shellfish toxin in the product. However, one small but successful Southcentral Alaskan processor still markets the butter clam as a gift pack item. This operation, which is continuously monitored by the state to insure the wholesomeness of the product, represents a small-scale example of what could probably be accomplished on a statewide level with an increase in state support of a surveillance program.

Another clam common to Southeastern and Southcentral Alaska is the littleneck or steamer clam, *Protothaca staminea*. This species is generally not as common as the butter clam, but it does occur in commercial quantities on some beaches in the state. The littleneck clam is popular with Alaskans for its excellent flavor, but it has never been commercially harvested in the state. Littleneck clams and a similar species, the Manila clam or Japanese littleneck, *Venerupis japonica*, are imported from Washington for sale as luxury food items in Alaska's supermarkets.

Additional species with commercial potential which exist along the Alaskan coast include the soft-shell clam, *Mya arenaria*, and the pink-neck clam, *Spisula polynema*. The soft-shell clam, which has a distinctive, delicious flavor, is a highly prized and successfully marketed food on the east coasts of the United States and Canada. This species is found throughout Alaska, but has never been exploited as a fishery resource. Its fine flavor is not widely recognized in the state. However, its potential for commercial utilization should not be overlooked. It is noteworthy that the species has sustained continuous harvesting in New England for more than 100 years. Furthermore, replenishment of the species on overfished grounds can be accomplished by transplantation of seed stocks, resulting in a valuable renewable resource.

The pink-neck clam, a large, hard-shell clam, is often found with razor clams in areas that are subject to admixture of fine sediments. The extent of this resource in Alaska is unknown. The pink-neck clam is prized by some Alaskans as an excellent chowder clam. A related, extremely important, commercial species found on the east coast of the United States—the surf clam, *Spisula solidissima*—is one of the major sources of the canned pack of clams in this country.

The cockle, *Clinocardium nuttalli*, is common in some coastal regions of Alaska, but seldom appears to be sufficiently abundant for commercial utilization. It has occasionally been harvested on a limited basis in Alaska.

Two species of gaper of horse clams, *Tresus nuttalli*, and *T. capax*, are found occasionally along the Alaskan coast, although only in numbers sufficient to sustain a sport catch. Diggers often seek these species; the clams provide a source of recreation wherever they are found.

The bay of blue mussel, *Mytilus edulis*, a close relative of the clams, is another molluscan resource that can be abundant in protected coastal waters. It is tasty, and is often preferred to clams by connoisseurs of intertidal seafoods. Intensive fisheries for the mussel exist in various European countries. It has never been popular in the United States, but a special pack of mussels is imported from Denmark for sale as a luxury seafood.

→

Alaska Clams

Unpredictable Paralytic Shellfish Poison levels were responsible for the collapse of the clam industry in the late 1940s. Development of a successful clam fishery in Alaska must await resolution of the PSP problem. This will require development of an effective means to identify toxic clams as well as the solution of legal problems inherent in the clearance of food for intrastate and interstate marketing. However, in addition to the solution of the PSP problem, numerous fundamental questions must be answered prior to development of the fishery to provide for proper management of the resource. Information on distribution, recruitment, age and growth, size-weight relationships, reproductive biology, predators and environmental parameters is essential.

Such information should enable us to answer the following questions about any given species of clam:

1) What is the size, in numbers and weight, of the resource?
2) What is the distribution of the resource?
3) How long does it take for a given clam species to reach a harvestable size?
4) At what size and age should clams be harvested to maintain maximum sustainable yield of the resource?
5) What environmental conditions are essential to maintenance of healthy clam stocks?
6) How will an increase in certain industrial activities along coastal Alaska affect clam stocks?

Above—A clam assessment project is conducted on a large, exposed flat in Prince William Sound as part of an invertebrate fisheries course sponsored by the University of Alaska Sea Grant Program.

Below—An investigator digs for clams in a flat area on Prince William Sound. The instrument at center is used to measure sediment temperatures. Sediment is washed from clams through the framed screens at left.

RESEARCH

Most of these questions cannot yet be answered, but research currently being conducted in Prince William Sound by Richard Nickerson of the Alaska Department of Fish and Game and by the authors should ultimately clarify many of these points. (Research by the authors was sponsored by NOAA Office of Sea Grant, Department of Commerce, under Grant No. 1-36109.) However, additional research elsewhere in the state will be necessary to fully understand the resource.

Information on the biology of all of the species mentioned previously is available, but is often derived from research conducted in regions with environmental conditions different from those in Alaska. However, preliminary information based on research in Prince William Sound is now available for three species of clams—the razor, littleneck, and soft-shell clams. An ongoing, intensive investigation of the razor clam by Nickerson is verifying and extending available information for this species to clam beds in Prince William Sound and other beaches of South-central Alaska.

RAZOR CLAMS

In Alaskan waters, this species usually begins to spawn in July and continues for several weeks as eggs and sperm are discharged into the water. Females may produce six to 10 million eggs annually. The discharged eggs are fertilized externally and develop into small, swimming, larval forms known as veligers. After a period of living in the water and feeding on microscopic plants, these larvae develop shells and settle on the sand. In years of heavy settlement, as many as 1,500 young clams per square foot may be found. Survival of young clams is highly variable, and there are years in which very few individuals survive.

Razor clams grow slowly during the fall and winter, with acceleration of growth during the spring and summer, as temperature, light and food increase. In Alaska, these clams attain a larger terminal size and live longer than those in Washington. An average length of 4½ inches is attained in 3½ years in the Washington beds, as compared to 6½ years on beaches near Cordova, Alaska. Alaskan razor clams reach harvestable size in their fifth or sixth years, and may live to 19 years of age. It is generally possible to determine the age of a razor clam by counting the growth rings on its shell; one ring is added per year in Alaskan waters.

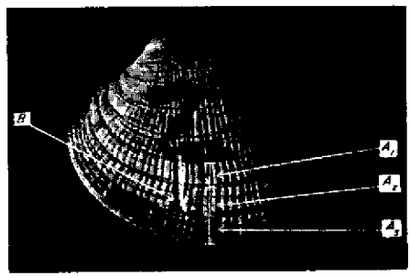
Razor clams are preyed upon by sea stars, drilling snails, crabs, flatfishes, ducks and gulls.

LITTLENECK CLAMS

Studies of the littleneck and soft-shell clams by investigators from the University of Alaska have clarified a number of aspects of the biology of the two clam species in Prince William Sound.

The littleneck clam begins to spawn in March and continues throughout the summer. Settlement presumably occurs in the summer and fall, with some growth taking place before low winter temperatures occur. Littleneck clams grow rapidly in late spring and early summer, as do razor clams. The age of a littleneck clam can be determined by counting the number of its annuli (winter growth rings). To demonstrate that a single annulus is formed each year, annular formation was observed in marked clams (growing in sand on beaches) over a two-year period.

Littleneck clams in Prince William Sound are smaller at a given age than those found in British Columbia and require seven to 10 years to reach a harvestable size, as opposed to three years in the latter area. Growth rates of littlenecks are similar throughout Prince William Sound. The oldest clam examined there was 15 years of age, with a length of approximately two inches.



Photograph of the shell of a littleneck clam shows its annuli (winter growth rings). A1=1970 growth; A2=1971 growth; A3=1972 growth; b=notch used to mark clam. The clam was numbered with plastic paint in the fall of 1971 and recovered in the fall of 1972 from a beach in Prince William Sound.

Predators of the littleneck clam in Prince William Sound appear to be sea stars, drilling snails, crabs, and bottomfishes.

Specimens tested by standard toxin assay for Paralytic Shellfish Poison during the summer of 1970 were not toxic.

Population estimations of clams of harvestable size on three beaches in one bay in Prince William Sound indicated the following mean densities: (1) A pocket beach 200 feet long, 83,000 clams; (2) a beach 650 feet long, 148,000 clams, and (3) a mud flat 900 feet long, 1,160,000 clams.

SOFT-SHELL CLAMS

Studies of the soft-shell clam in Prince William Sound have demonstrated that this clam grows to an acceptable commercial size (a length of two inches), in six to seven years. In other northern areas, such as Maine and Canada, this clam requires five to six years to reach a comparable size. Growth rates for the soft-shell clam in Prince William Sound appear to have been stable for at least 11 years. The Alaska earthquake of 1964, which destroyed approximately 36 percent of the clams in Prince William Sound, had no apparent effect on the growth of individuals that survived the quake.

Although the potential danger of Paralytic Shellfish Poison has seriously affected commercial utilization of clams along the coast of Alaska, there have never been any reported cases of poisoning caused by any clam species within Prince William Sound, and none for razor clams anywhere along coastal South-central Alaska. Our own investigations in Prince William Sound, based on standard toxin assays of clam meats, discussions with residents and personal experience in eating clams for three years, suggest that clams in

this area are probably never seriously toxic at anytime of year.

Prince William Sound and adjacent coastal waters have hundreds of beaches with harvestable populations of clams. Rae Baxter of the Alaska Department of Fish and Game estimates that the northern Gulf of Alaska coast, which includes Prince William Sound, should be capable of sustaining an annual harvest of three million pounds of clams, and that the Kodiak area should supply another eight to 10 million pounds of clams. Thus, it appears that extensive clam resources of the South-central Alaska coast might be readily and safely developed, and could serve as the nucleus for a greater effort to develop an important clam fishery throughout the state.

Although the effects of the 1964 earthquake on clam resources in Prince William Sound were catastrophic, our studies have indicated that densities of harvestable clams currently are high and that intertidal distributions of species are similar to those found before the earthquake. However, butter clams, formerly the most common clam species on intertidal beaches, are still not as numerous as they were before the earthquake. In many areas, butter clams have been replaced by the smaller littleneck clam. Nevertheless, the rapid recovery of clam stocks on some beaches suggests that Prince William Sound will continue to be a good source of clam products. It also indicates that the resource there is indeed a renewable one that might readily tolerate controlled commercial harvesting.

If a clam fishery is to be pursued simultaneously with projected oil-related activities in Alaskan coastal regions, knowledge of both the clam resources and associated organisms, as well as the potential effects of oil pollution of them, is essential. Investigations by the National Marine Fisheries Service and the Institute of Marine Science, University of Alaska, in Prince William Sound will provide important information for use in management of fisheries resources. (See "Oil and Marine Resources," **ALASKA Seas and Coasts,** Oct. 15, 1973). Dr. David Shaw of the Institute of Marine Science is currently pursuing a base line survey to determine the presence of petroleum hydrocarbons in clams in Prince William Sound. His work will reveal the present degree of oil contamination in the resource, set the stage for more accurate measurement of future contamination and make possible comparison of hydrocarbon composition and levels in Alaska clams throughout the state.

CONCLUSION

All indications are that the clam resource in Alaska is extensive, with an anticipated potential annual statewide landing of 50 million pounds. Before a clam fishery can become a reality in Alaska, the problem of PSP must be resolved by development of an effective beach-monitoring system in conjunction with a rapid assay for the presence of toxin in clams or by the neutralization of the toxin in fresh or canned clam meats. The latter procedure seems to be a technical development of the somewhat distant future, while the former measure seems promising. Dr. Richard Neve of the Institute of Marine Science is currently developing a rapid colorimetric test for PSP.

Mechanisms for the effective monitoring of beaches have been used successfully for years in the United States and Canada. A rapid assay for PSP would increase the efficiency of monitoring schemes and make them more applicable to the extensive Alaskan coastline.

Reliance on hand harvesting of clams in Alaska means a higher cost of catch and production, and effectively precludes significant competition with machine harvested east coast clam products. The development and use of suitable mechanical harvesters for clams, especially for razor clams, appears to be an important condition to expansion of the Alaska clam fishery. Using simple hydraulic techniques on beaches in Prince William Sound, we have been able to selectively harvest, with a minimum of damage, up to 1,400 littleneck clams per hour on high density clam beaches. Such gear would permit rapid harvesting of clams under the adverse conditions that exist in Alaska and could enhance the possibilities for effective midwinter harvesting.

The market for clam products in the United States is constantly expanding; a continuous public demand for a greater variety of frozen and processed seafoods is producing a steady and profitable market for these products. However, in recent years, overfishing and pollution are diminishing the availability of the important east coast commercial species. Thus, clam resources are dwindling as the demand for them is increasing. Much of the coastline of Alaska is uninhabited and is not subject to the pollution problems encountered elsewhere. As indicated above, many of its shores contain harvestable populations of a number of species of clams. Thus, an Alaskan clam fishery represents an economic resource of great potential if demand for the product increases while a shortage of harvestable clam species occurs elsewhere.

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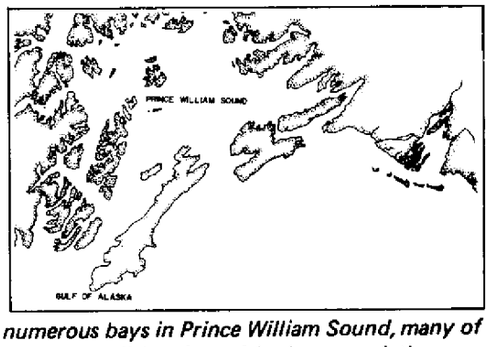
Feb. 1974



Depicted in the above map are the numerous bays in Prince William Sound, many of which have clam beaches. Many similar, small beaches with clam populations are found in other areas of Alaska.

Economic Potential

The Alaska Clam Industry

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Alaska has an important clam resource. The maximum sustainable yield (MSY) of all species of clams in Alaska is for the most part unknown, but is estimated to be very large. In 1968 the Bureau of Fisheries estimated that the annual MSY for Alaskan clams was 50 million pounds (shellweight). To date three species have been harvested commercially in Alaskan coastal waters—razor, butter, and cockle. In 1969 the annual MSY for Alaska butter and razor clams alone was estimated to be 13 million pounds (shellweight).

Once a viable industry, the Alaska clam fishery has become less significant in recent years. Since 1916 the total amount of clams harvested has fluctuated from a high of about five million pounds in 1917 to a low of 44,000 pounds in 1966. The major reasons for this decline are a toxicity problem, the higher cost of catch and production in Alaska, competition from east coast clam producers, regulations barring the use of mechanical techniques for harvesting clams in certain areas, and the destructive effects of the 1964 earthquake upon the clam resource in the Prince William Sound area.

The major problem facing the clam fishery at this time is fear of Paralytic Shellfish Poisoning. To combat this fear it is important for the State of Alaska to become a member of the National Shellfish Sanitation Program. This will allow clam processors in Alaska to market fresh and/or frozen clam products in interstate commerce.

Further constraints are placed upon the Alaska clam fishery by high costs associated with hand harvesting—the lack of willing, skilled diggers and the high price per pound paid to diggers. Machine harvested, east coast canned clam products are cheaper to produce and are publicly accepted. Imported clam products, primarily from Japan and Canada, have created additional competition in the market.

Although the current economic importance of the Alaska clam fishery is not considered significant, data gathered in a University of Alaska study indicates considerable economic potential. In 1971 a total clam catch of 245,121 pounds (shellweight) was commercially harvested from Alaska clam beaches. The exvessel (landed) value was $70,152 and the wholesale value $107,487. The market potential for Alaska razor clams in a fresh/frozen form appears to be especially high on the Pacific Coast where the razor clam is known and accepted as a desirable product. Institutional markets would absorb a significant portion of the Alaska razor clam catch. In 1971 crab bait buyers accounted for 98 percent of the total razor clam catch. Crab bait buyers are competing successfully for the Alaska razor clam harvest and since the mid-1960s have purchased the largest part of each year's catch. They are paying competitive prices for the razor clam and effectively preclude the product from being marketed for human consumption, because relatively cheaper, imported clam products are available. The present catch could be expanded significantly to satisfy the demands of bait buyers.

The expansion of approved beach areas to other known razor clam beaches would allow additional harvesting and catch potential.

The present three approved razor clam beaches (Cordova, Swikshak and Polly Creek) have the potential to produce an annual harvest of at least one million pounds (shellweight). This is based on past catch data and a reasonable estimate of the present beach potential. No complete surveys or population studies have been made to arrive at a maximum sustainable yield estimate.

A one-million-pound harvest with an average price of 45 cents per pound would equate to an exvessel (landed) value of $450,000. Fishery tax revenue to the State of Alaska would be $9,000. A yield of 35 percent meat for human consumption purposes would allow marketing of 350,000 pounds of clam meats at a wholesale price of $2.80 a pound (Seattle area) of a total wholesale value of $980,000.

The potential for expansion of the Alaska clam fishery appears good. The stocks of razor clams in Alaska waters appear high and with the continued development of the clam fishery a renewed industry can, and probably will, be established. **Feb. 1974**

ALASKA'S LATEST FISHE
—Pacific Cod

Cod fishermen of St. Lawrence Island in August, 1897, display a successful catch.

Photo, U of A Archives, courtesy of Arctic Environmental Information and Data Center

By Stephen C. Jewett
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University of Alaska

The following extract is from a 1916 report by John N. Cobb entitled **Pacific Cod Fisheries:**

> In 1857 Capt. Matthew Turner, master of the brig *Timandra,* sailed from San Francisco with an assorted cargo for Nikolayevsk on the Amur River in USSR. He was detained for three weeks at Castor Bay, the head of the Gulf of Tartary, because the Amur River was full of ice. While the vessel lay anchored in three fathoms of water, the crew began fishing over the rail with hand lines simply as a pastime. They were surprised to find plenty of cod, averaging about two feet in length. In 1864 Capt. Turner revisited the Gulf of Tartary on the first cod-fishing voyage.

Thereafter, the Pacific cod *(Gadus macrocephalus),* sometimes known as the gray cod or true cod, was the target of the earliest commercial fishery in the North Pacific.

The Alaska fishery began along the Alaska Peninsula and Aleutian Islands, eventually expanding into the southeastern Bering Sea. Canadians began fishing cod off the coast of British Columbia in the mid-1920s and have continued an active fishery. Japan and the USSR entered the Bering Sea fishery in the late 1950s and early 1960s, causing a dramatic increase in landings in the mid and late 1960s. In recent years, almost half of the Pacific cod harvest has been taken from the eastern Bering Sea, with the remainder divided almost equally between British Columbia and the western Bering Sea. The U.S. harvest now comes from a Seattle-based trawl fishery operating off British Columbia.

Due to increasing pressure on domestic fish stocks, increasing protein demand, improved technology, and investment capital, U.S. fishermen are renewing their interests in the Pacific cod as well as other bottom fish.

Distribution and Abundance

Pacific cod are found from Monterey Bay, California, northwest through the Gulf of Alaska and Bering Sea, and southwest past the Kuril Islands, Sea of Japan, and the Yellow Sea.

A recent standing stock estimate for Pacific cod on the continental shelf of the eastern Bering Sea was 65,000 metric tons (mt) (143 million pounds), of which approximately 58,000 mt (127.6 million pounds) came from the outer shelf area northwest of Unimak Island. An estimated 12,000 mt (26.4 million pounds) of cod inhabit the shelf of the Northeast Gulf of Alaska between Yakutat and Cape Cleare.

According to the results of groundfish surveys from May to September 1973 off the east and west coast of Kodiak Island, the Pacific cod was one of the dominant species inhabiting the area. The resource abundance estimate for the southeast Kodiak area alone was about 36.3 mt (80 million pounds).

These stock estimates, which were based on bottom trawling, are probably low. Although Pacific cod are mainly bottom dwellers, portions of the population may not be sampled because they occupy an area above the sampling gear.

In the 1972-75 Alaska Department of Fish and Game king crab indexing studies in Kodiak waters, nearly 14,000 Pacific cod were caught incidentally in king crab pots. As many as 30 cod were caught in a single pot with the largest fish weighing 12.2 kilograms (27 pounds).

Biology

As temperatures drop in the winter, cod move to relatively deep water (60-70 fm). After spawning in late winter and early spring they move back to shallower water (20-30 fm).

Eggs hatch in eight or nine days at 11°C (52°F) in British Columbia waters, but require nearly 30 days at

2°C (36°F) in northern waters. Newly hatched larvae range from 3.3 to 4.5 mm; the larger larvae are found in southerly waters. In the southern part of their range females reach maturity at about 40 cm (15.7 in) at two or three years of age. However, female cod from northern areas first reach maturity at age five when they are approximately 55 cm (21.6 in) in length.

Food of the Pacific cod includes a wide variety of invertebrates and fishes: polychaete worms, amphipods (sand fleas), crabs, shrimps, clams, snails, sand lances, eelpouts, pollock, and flatfishes. During recent research activities in the Kodiak Island area, more than 4,000 cod were examined for food contents. The most frequently occurring food item was the commercially important snow (tanner) crab.

Defined Fishing Areas

The outer continental shelf of the southeast Bering Sea has been the main fishing area of foreign fleets for the past 20 years. They are indicated on the map below by the crosshatched shading.

The major fishing areas of the earliest codfish fleets of the North Pacific and Bering Sea were the offshore banks. The major banks of the North Pacific were Davidson, Sanak, Shumagin, Albatross, and Portlock. Those of the Bering Sea were Slime and Baird Bank. The banks have a total area of 66,700 km^2 (25,845 square miles).

Davidson Bank

Davidson Bank lies south of Unimak Island and extends westward from the neighborhood of the Sanak Islands to the southern entrance of Unimak Pass. Its eastern end seems to be continuous with the shoal water surrounding the Sanak Islands. The area of Davidson Bank is estimated at about 4,100 km^2 (1,600 square miles).

Sanak Bank

Sanak Bank is located to the east and southeast of the Sanak Islands, is somewhat elongate in shape, and tends northeast and southwest. The center of the bank is approximately 54°20′ west latitude. The estimated area of the bank is 3,300 km^2 (1,300 square miles).

Shumagin Bank

Shumagin Bank lies south and southeast of the Shumagin Islands. Its outer margin follows approximately the trend of the coastline of the adjacent islands. The western edge of the bank extends to about 159°52′ west longitude. East of the Shumagin Islands it reaches north to the upper end of Big Koniuji Island. Its width varies from 28 to 65 km (15 to 35 miles) to the nearest outlying island. Its area has been estimated at about 4,600 km^2 (1,800 square miles).

Albatross Bank

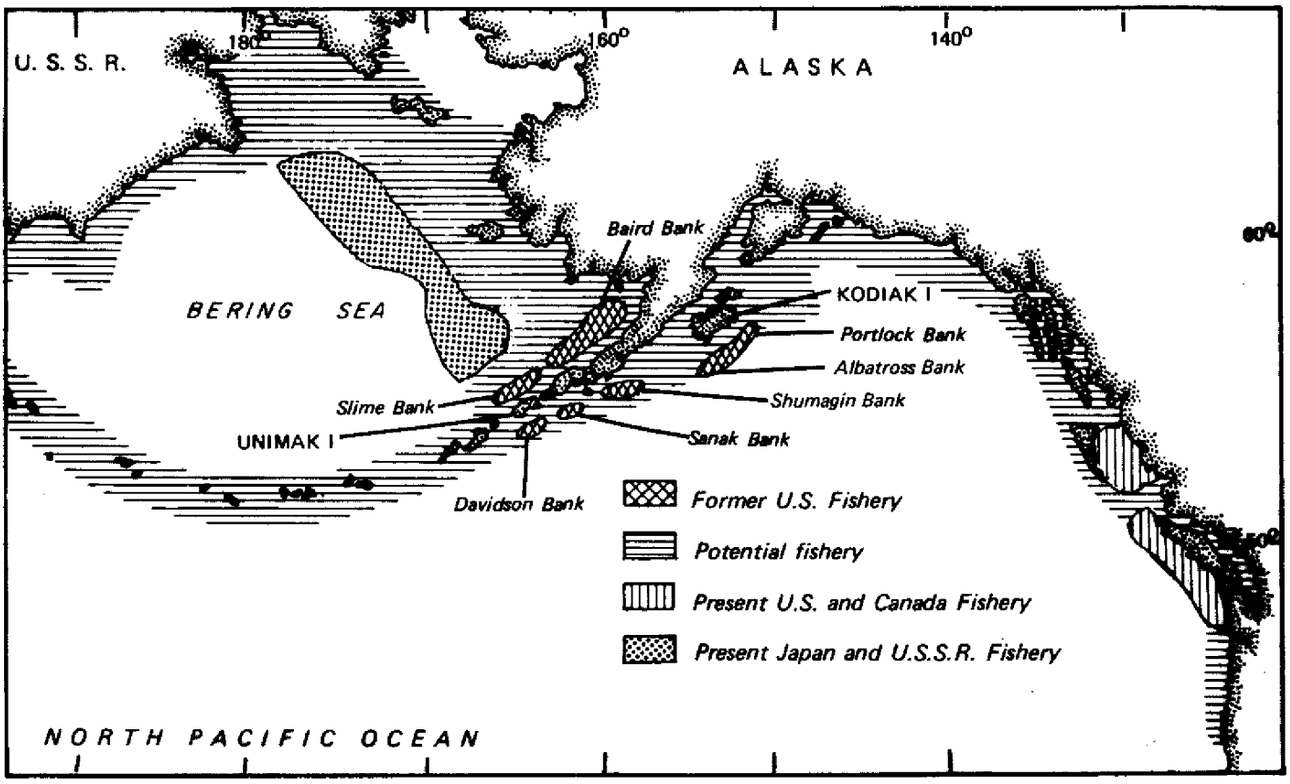
Albatross Bank lies off the southeastern side of Kodiak Island and extends to the Trinity Islands. At the eastern end it is almost continuous with Portlock Bank. This bank has an estimated area of 9,600 km^2 (3,700 square miles). Albatross and Portlock Banks join and appear as one area.

Portlock Bank

Portlock Bank extends northeastward from Kodiak Island to about 148°30′ west longitude, a distance of 204 to 222 km (110 to 120 miles). Its outline, as indicated by a 100-fathom curve, is irregular. It is the largest single bank south of the Alaskan Peninsula; its area inside the 100-fathom curve being about 17,600 km^2 (6,800 square miles).

Slime Bank

Slime Bank begins directly off Cape Sarichef, the northwest end of Unimak Island. It is elongate in shape and



The map shows the former, present and potential Pacific cod fishing areas of the North Pacific.

follows approximately the trend of the adjacent coast to within a few miles of Amak Island. It is almost 157 km (85 miles) long and 31 km (17 miles) in average width, broadening somewhat at the eastern end. Its total area is estimated at about 3,700 km^2 (1,445 square miles).

Baird Bank

Baird Bank lies a few miles east of Amak Island and extends northeastward off the northern side of the Alaska Peninsula to the vicinity of Cape Chichagof at the mouth of the Egegik River, a distance of about 426 km (230 miles). It has an average width of about 74 km (40 miles) and an estimated total area of about 23,800 km^2 (9,200 square miles), making it the largest known bank in Alaska, and some 2,000 km^2 (800 square miles) larger than the famous Georges Bank in the North Atlantic Ocean.

Fishing Methods

Early fishing was done almost exclusively by hand lines from dories. Long lines, gill nets, and beam trawls were used occasionally. Octopus was the favorite bait, but sculpin, halibut, salmon, and herring were also used.

The fishery for cod in British Columbia waters, from its early beginning, has been conducted almost entirely by otter trawling. This might be the best technique for exploiting Pacific cod in Alaskan waters today. Long-lining, as currently used in the Pacific halibut fishery and the use of modified king crab pots may also prove to be efficient means of fishing.

Summary

In summary, Pacific cod have not been commercially harvested in Alaskan waters by U.S. fishermen since World War II. Recently, major catches of cod have been taken by Japan and USSR from the offshore banks of the eastern Bering Sea. Today, the only U.S. harvest comes from a trawl fishery operating off British Columbia by vessels based in Seattle.

Perhaps the advent of the 200-mile limit law may lead to dramatic changes in many of our present and/or potential offshore fisheries and increase Alaskan fishermen's opportunities.

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Feb. 1977

HERRING of the BERING SEA

By Irving M. Warner
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In this article Irving Warner, Research Biologist for the Alaska Department of Fish and Game, discusses the resource and many of the problems surrounding its utilization. In the absence of firm scientific answers to some of the questions posed, he offers his opinions, as he has formed them during his two years of research on Bering Sea herring. – Ed.

Herring in the Bering Sea have remained a mystery to fisheries scientists for years. Little work was done in the United States until the Alaska Department of Fish and Game (ADF&G), under the auspices of the Outer Continental Shelf Environmental Assessment Program (OCSEAP), began research activities in 1976. A good initial question is: Who cares about Bering Sea herring in the first place? The answer is there are three distinct and widely contrasting groups which are deeply concerned with this fish.

Escalating demands for herring products have once again focused attention on the rich herring resources of the Bering Sea. Pending oil development, controversies over allocations of allowable foreign catches under the 200-mile limit, and potential threats to historic subsistence fisheries have emphasized our lack of knowledge about the resource.

FISHERMEN OF THE NORTHERN ICE

Eskimo fishermen have fished Pacific herring for thousands of years. Little is known about fishing methods during pre-historical eras, but today the Eskimo catch herring with gill nets and small beach seines. For the first time in the history of this age-old fishery, domestic catches of herring were accurately documented by the ADF&G in 1976. Eleven Eskimo villages took a combined total of approximately 100 short tons of herring for domestic use during that year. About 114 Eskimo families were involved in this fishery; catch per family amounted to about 3/4 ton.

Most of the catch is dried, dipped in oil and eaten. The relative importance of herring to the native peoples' diet is quite high in villages with small salmon runs, or no salmon runs at all. According to native fishermen, catches of herring vary widely from year to year. During the past decade domestic runs of herring along the Bering Sea coast in Alaska have declined, and local residents are quick to express their opinion that overfishing from commercial interests is the direct cause. This brings us to the second group actively concerned with Bering Sea herring.

U.S. EFFORT GROWS

Commercial harvests of herring first began in the early 1900s at Galovin Bay, about 50 miles east of Nome. The primary market demanded a salt-cured product which was shipped to southern ports and processed into a pickled food

item. This early fishery was quite limited, but later commercial efforts increased until one-half of the central Alaska purse seine fleet fished out of Unalaska in the Aleutian Islands. The Unalaska herring fishery reached a peak in the 1940s when nine herring salteries existed in the Unalaska region. This ended in 1946 as a result of rapid changes in world market structure.

Domestic commercial herring fisheries in the Bering Sea-Bristol Bay region resumed in 1967 with a small commercial fishery in the Togiak Bay area. But the efforts of this spring fishery are directed toward sac roe extraction and spawn on kelp, not toward the salt-cured product of the earlier herring fisheries. Commercial effort since the beginning of the Togiak fishery has yielded about 3,400 tons of sac roe herring, plus over 519 tons of herring roe on kelp.

In 1977 the Togiak herring fishery exploded into a controversial and dynamic fishery with the entry of two American floating factory ships, each accompanied by its own purse seine and gill net fleets. These ships have the capability of freezing many tons of herring per day, and their presence aroused the ire of local fishermen. A controversy broke out before the beginning of the herring season in 1977 which promises to get more intense, and probably less logical.

BONE OF CONTENTION

Subsistence fishermen fear that the commercial purse seine and gill netting efforts combined with the spawn on kelp fishery will destroy domestic stocks of herring and eliminate a valuable fish from their diet. That is the backbone of the argument that developed this year, and this writer forsees the situation getting much stickier as commercial interest in herring increases.

But does the commercial U.S. effort endanger the native subsistence fishery? There is no absolute answer, but there are some strong indicators. Everyone is entitled to his own opinion, including the author. First, a herring school of many tons is not very rare, as any experienced herring spotter will tell you. Frequently, herring schools contain from 10 to 40 tons of fish. In 1976 the domestic subsistence use of herring was documented as about 100 tons – in other words, about two or three good-sized schools of herring. Since herring schools sited in the Bering Sea have exceeded four football fields in length, it is this writer's opinion that Alaskans are dealing with thousands of tons of herring in the Bering Sea area. When you consider that a 40-ton school is about 100 feet across in about two fathoms of water, a school that is four football fields in length must be thousands of tons. Having personally counted hundreds of herring schools in the Bering Sea, it seems to me that threat of over-harvesting herring is not *yet* from domestic sources when we are dealing with that quantity of herring. But that doesn't mean there is no threat to either the domestic commercial or subsistence harvests of herring. That brings us right along to the third group.

RUSSIANS FIRST TO CATCH ON

Soviet research concerning the possibilities of a commercial herring fishery in the Bering Sea began in 1959, when the Russians started an "inventory and assessment" study. This program continued until 1961 when the Russians began harvesting herring in the Bering Sea. They were joined by the Japanese in the mid-sixties, and both nations have continued to fish these stocks until the enactment of the 200-mile limit last March. Up to that time, the two nations had caught over a billion pounds of herring in offshore trawling and gill netting activities.

Now foreign entry into the offshore herring fishery is limited by the Department of Commerce under the provisions of the new 200-mile fishing law. Permits to fish may or may not be issued by the Secretary. Now domestic fishermen are concerned about setting an accurate and rational harvest quota for Bering Sea herring for foreign fishermen. Research will soon be underway to determine the allowable level of harvest. Yet, as was the case before the 200-mile limit, the foreign fleet has a great capacity for catching the herring and the market to utilize it. A mistake in managing these herring stocks when dealing with several large foreign fleets would quickly result in a catastrophe.

ABOUT THE HERRING

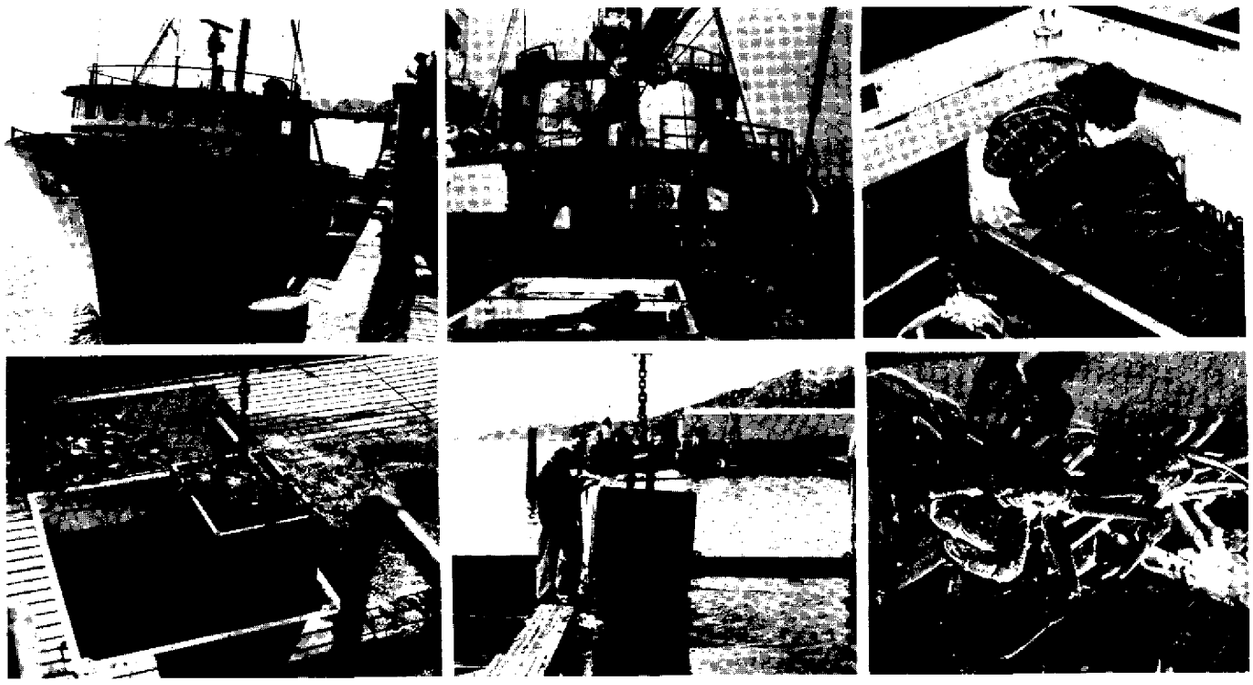
Herring are a mysterious fish throughout the world, as comparatively little is known about any race of them. Even less is known about those found in the Bering Sea. This is astounding considering their worldwide commercial importance. As one who has studied them closely, I probably have more questions than answers. However, I've found out a *few* things during these past two years.

First, to me the most interesting fact I've bumped into is that herring in the Bering Sea do not necessarily come back to the same place to spawn each year. And when I say "same place," I mean a geographic area like Port Moller on the Alaska Peninsula or Cape Vancouver on Nelson Island. This might partially explain the erratic nature of herring "runs," a fact which has hampered the sustained development of many a herring fishery. This means the fish either go some place else to spawn, or they spawn in deep water, as do their Atlantic counterparts. Research is needed to determine which.

It is also important to determine how much herring is in the Bering Sea. Also, a utilized herring fishery must be continually monitored to find out which "year class" (or year classes) of herring is either weak or strong. Since herring mature at four or sometimes three years of age, and often live to be over eight years of age, they may spawn many times during their lifetime. In a sense, one can look upon year classes of herring as you would breakers coming into the beach: some "waves" of year classes are much larger than others. By constantly monitoring the fishery, scientists can determine the magnitude of these strong or weak waves prior to arrival. This is done by determining the age of large samples of herring.

FUTURE HARVESTS

The Bering Sea herring fishery is presently healthy. Two substantial year classes now support this fishery, and this is usually a good sign. The 1978 season will bring fishery scientists further information about the strength of new year classes. Domestic harvest of herring and herring roe in the Bering Sea to meet new demands is just beginning. All future harvests must be watched with cautious scientific monitoring of the herring stocks, or like many uncontrolled fisheries, eventually this fishery will collapse right around the ears of those fishermen who have been more concerned about fighting each other, than getting together and managing the fishery intelligently. It can go either way. Time will give us that answer.



The photographs above show approximately 150,000 pounds of tanner crab being unloaded from the FV NORSEMAN. The NORSEMAN, another crabber of the Royal Viking series, has been fishing along the Aleutian Chain and in the Bering Sea since January. Text and photographs by Nancy Munro, Arctic Environmental Information and Data Center.

THE TANNER CRAB HARVEST — BEGINNING TO LEVEL OFF

The final landings and the return of boats at the end of the tanner crab season are becoming an established rite of the Alaskan spring. Things have changed dramatically from eight years ago when fishermen considered tanner crab a nuisance to be emptied from their king crab pots. Marketing problems and processing techniques have been solved, and tanner crab now support a major Alaskan fishery.

Kodiak was the birthplace of the Alaska tanner crab fishery, and the harvest from Kodiak waters still represents between 50 and 60 percent of the state's total catch. Catch statistics from Kodiak reflect the dramatic growth of the tanner crab fishery. In 1967 tanner crab were harvested as the target species for the first time; 100,000 pounds were caught that year. Two years later the Kodiak harvest had jumped to 6.8 million pounds, and last year the total catch was approximately 30 million pounds. The number of boats fishing for tanner crab had jumped from four in 1967, to 78 in 1972-73, to 106 this year.

Biologists from the Alaska Department of Fish and Game have declined to recommend a quota, but expect that the sustainable yield from Kodiak waters will level off near the 30 million pound mark. The Kodiak season was to be open from November 1, 1973 to June 15, 1974, but a field closure in mid-April (mid-May for Portlock Bank) kept the 1973-74 harvest to 30 million pounds. With the catch in Kodiak leveling off, increased growth of the tanner fishery westward—in Chignik, the South Peninsula, out on the Aleutian Chain, and in the Bering Sea—is expected.

The tanner crab harvest in Prince William Sound and the Gulf of Alaska is less than half of Kodiak's 30 million pound mark. This year the tanner season for this area opened on October 15; however, a long negotiating period over prices halted much of the fishing until the end of February. By mid-May eight million pounds of crab had been caught, and it was expected that the season would close at the end of May because of high percentages of dead loss and soft-shelled crab. In March, the Board of Directors for the Alaska Department of Fish and Game set quotas of 12.5 million pounds for the outside waters and 3.5 million pounds for the inside waters of Prince William Sound, which will be in effect for the 1974-75 season.

Tanner crab fishing in Cook Inlet this year showed a dramatic increase in the catch and in the number of vessels involved. The Alaska Department of Fish and Game reports an increase of more than 100 percent in vessels—up from 40 for the 1972-73 season to 89 this year. Fish & Game personnel expect a harvest of nine million pounds from the Cook Inlet area (up 3 million pounds from last year). The increase in activity seems to be a result of the price paid for tanner crab, which has doubled in the last two years, and concern over limited entry policy. The season began on October 1, 1973 and all districts were expected to be closed through field announcement by the end of May. The next season will open on December 1, 1974 and there will be an eleven million pound quota with Kachemak Bay limited to three million pounds.

ALASKA'S SNAIL RESOURCE

By Richard A. MacIntosh
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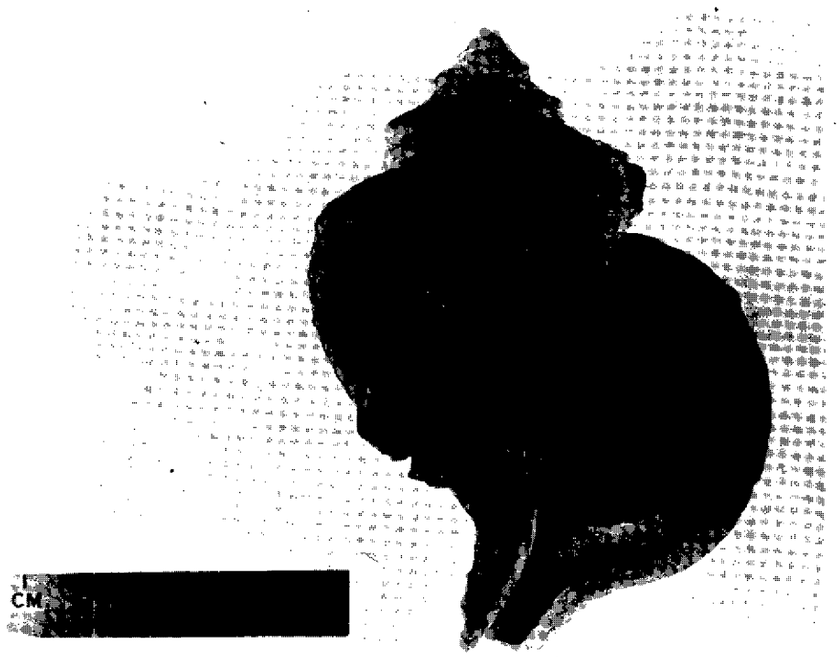
Alaska's drive to develop fisheries for underutilized species is beginning to pick up momentum. As world markets for new species are identified, more and more fishermen and processors are looking into new fisheries to extend their current short fishing seasons.

In any discussion about new fisheries, the topic of marine snails is bound to come up, if only briefly. After all, the Japanese fish them in the Bering Sea, don't they? Yes they do, but is there really an opportunity for American fishermen to develop the fishery?

Richard MacIntosh, fisheries biologist with the National Marine Fisheries Service in Kodiak, is the U.S. authority on the snails of the Bering Sea. **Alaska Seas and Coasts** *is pleased to present his article, which discusses the snail resource of the Bering Sea and Gulf of Alaska, Japan's historic fishery for it, their fishing and processing techniques, the current state of the Japanese market for snail meats, and the prospects for development of an American fishery for marine snails.*
— Editor



The marine snail Neptunea pribiloffensis *is the most common snail taken by the Japanese in their eastern Bering Sea snail fishery. Most crab fishermen from around the state will recognize it as one of the snails that they find adhering to crab pots. Its large size and sweet flesh make it a popular luxury food in Japan.*

During the summer and fall of 1975, the National Marine Fisheries Service (NMFS) conducted a comprehensive trawl survey on 215,080 square miles of the eastern Bering Sea shelf and upper slope. This survey was designed to identify principal deep ocean fish and shellfish communities of the eastern Bering Sea which could be affected by development of continental shelf energy resources. Data on fish and epibenthic (bottom-dwelling) invertebrates were gathered from several hundred locations with a modified 400-mesh eastern otter trawl. The resulting data offered valuable insight into the population and biological characteristics of numerous species of snails.

Snails made up 1.7 percent of the total biomass (weight) and 6.6 percent of the invertebrate biomass in the survey. Distribution of snails throughout the area is patchy, with the areas of highest snail concentration also supporting a high biomass of fish and epibenthic invertebrates. Snail biomass in several areas exceeded 17,000 pounds per square nautical mile.

About fifteen species of large (greater than two-inch) snails are common in the eastern Bering Sea. Members of the genus *Neptunea* are by far the most abundant, both in numbers and biomass. *Neptunea pribiloffensis* (front page photo), the Pribilof Neptune, is probably the most abundant *Neptunea*. *Neptunea lyrata* (page 2, photo 1), *N. ventricosa* (photo 2) and *N. heros* (photo 3) are also very common. The mean shell lengths of these snails are 4, 4.5, 5, and 4 inches respectively.

Six species of the snail genus *Buccinum* were taken in the 1975 survey of the eastern Bering Sea. Of the six species, four were common: *Buccinum angulossum* (photo 4), *B. plectrum* (photo 5), *B. polare* (photo 6), and *B. scalariforme* (photo 7). Their mean shell lengths ranged from 2.27 inches to 2.89 inches. Although they were quite numerous, these small snails contributed relatively little to the total snail biomass in the eastern Bering Sea. *Buccinum angulossum* is representative of the size and general form of the snails.

Most species of the eastern Bering Sea snails do not occur over the entire continental shelf, but are restricted to specific depth and temperature regions. In general those species whose distributions run down into the Gulf of Alaska inhabit the warmer, deeper waters near the continental shelf edge, while those species penetrating from the north into the area inhabit the colder (at least seasonally), shallower, inshore waters.

Neptunea pribiloffensis and *N. lyrata,* basically temperate water snails, are characteristic of the deeper, warmer waters along the edge of the continental shelf. *Neptunea heros* and *N. ventricosa,* which range up into the Arctic Ocean, inhabit the shallower, seasonally cooler waters nearer the Western Alaska coast.

Numerous trawl surveys have been conducted in the Gulf of Alaska, but very little attention has been paid to the snail resource there. Although quantitative data are lacking, it is apparent that *Fusitriton oregonensis* (photo 8), *Neptunea pribiloffensis,* and *N. lyrata* make up the bulk of the biomass of the larger snails. All three species range in depth from at least 120 fathoms inshore to 30 fathoms.

Fusitriton oregonensis and *Neptunea lyrata* extend all the way up into the intertidal zone. Large catches of *Neptunea pribiloffensis* and *N. lyrata* have been made by trawlers and pot fishermen off Ketchikan, Petersburg, Kodiak, and in the Prince William Sound. Overall, species diversity in the Gulf of Alaska appears to be less and distribution of snails appear to be more patchy than in the eastern Bering Sea.

JAPANESE FISHERY

Japan has harvested snails commercially in the eastern Bering Sea since 1971. The fishery occurs east of 175°W longitude on the continental shelf around and northwest of the Pribilof Islands. So little information is available for this fishery that only a fragmentary account of its history can be pieced together.

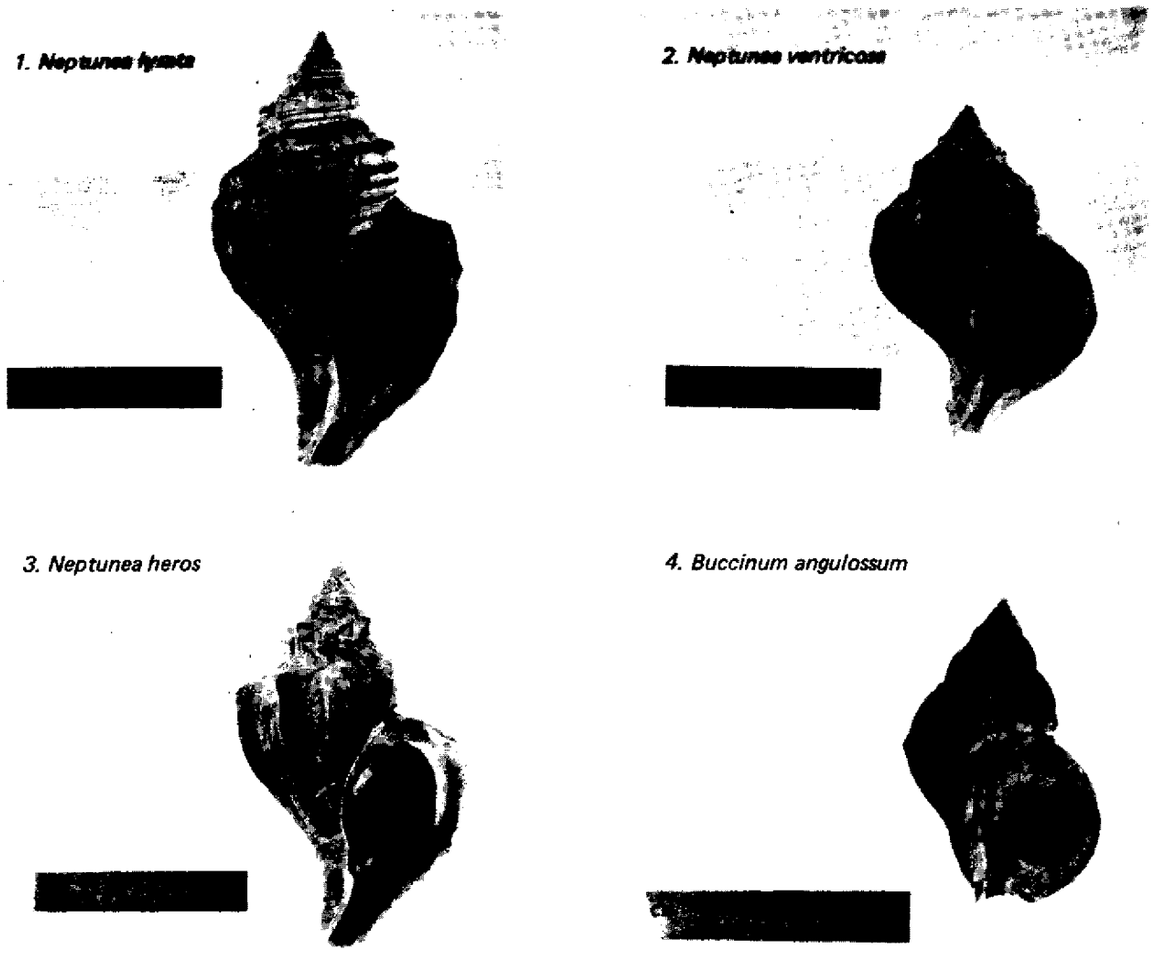
Statistics available since 1972 indicate an annual harvest of about 3,000 metric tons of edible meats (11,000 metric tons live weight) through 1975. Data from both total weight and recovered meat weight of the 1974 harvest indicate an edible meat recovery of 27 percent. A study in 1977 by MacIntosh and Paul with four species of eastern Bering Sea *Neptunea* found comparable meat recoveries of 26.8 to 30.6 percent.

The most common snail in the 1973 Japanese catches northwest of the Pribilof Islands was *Neptunea pribiloffensis,* which made up 70 percent of the catch by weight. *Buccinum angulossum* and *B. scalariforme* accounted for an additional 23 percent of the catch.

Until 1977 the number of vessels involved in the fishery was unknown. In some years the Japanese Fisheries Agency licensed 21 vessels, but it is unlikely that all of these vessels took part in the fishery. National Marine Fisheries Service patrols in the eastern Bering Sea observed only 14, 5, 1, and 6 vessels fishing snails in the years 1971 through 1974 respectively, and no vessels in 1975 or 1976.

In 1977 records submitted by the Japanese in compliance with the Fisheries Conservation and Management Act indicate that three vessels fished in the eastern Bering Sea (east of 175°W longitude) during that year. These vessels were fishing under a 3,000 metric ton meat allocation from the North Pacific Fishery Management Council. Fishing began in June and terminated on October 16. At that time the combined catch of the vessels was 404 metric tons of edible meat, or about 15 percent of Japan's eastern Bering Sea allocation. The average daily catch rate in 1977 was 2.7 metric tons of meat per vessel day.

The 1978 season began in May and ended in November. There was a consid-



The snails shown are examples of the nine species of eastern Bering Sea snails which are of commercial interest. Unfortunately, there are no common names for the species. For reference, one centimeter is equal to about 0.39 inches.
(NMFS Photos)

erable increase over 1977, both in effort and catch, with about 2,200 metric tons of snail meats taken in about 760 vessel days (averaging 2.9 metric tons of meat per day). Fishing effort peaked in August, when nine vessels fished northwest of the Pribilof Islands along the edge of the continental shelf. Vessels licensed for this fishery ranged from 96 to 490 gross metric tons and from 75 to 155 feet (25 to 50 meters) in length. Similar vessels are used in the Japanese longline fisheries in Alaska.

GEAR

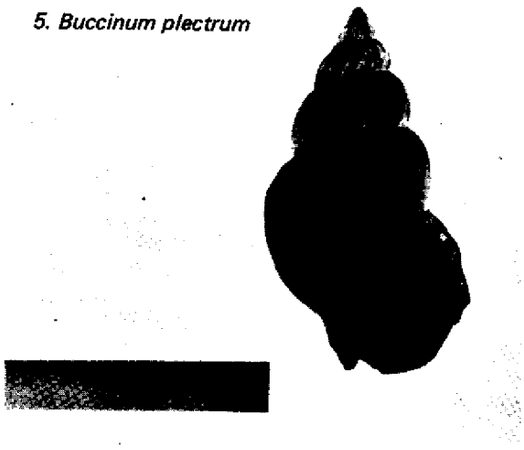
Fishing gear consists of pots fished at intervals on a ground line. Little is known about snail fishing technology, but in 1973 one vessel fished about 6,000 pots on 12 groundlines (500 pots per groundline), and took three days to pick and rebait the entire set of gear. The snail pots are truncated cones 34 inches in diameter across the bottom, 17.5 inches across the top, and 14 inches in height. The diameter of the tunnel in the top of the pot varies from 4.75 to 5.85 inches. The web on the sides of the pot is of two sizes. The mesh is 2.35 inches on the lower 6.5 inches of the side, and 4.7 inches on the upper portion of the side. Since snails are predators and scavengers, they are strongly attracted to pots baited with fish. An average catch of 21 pounds per pot per three-day soak was reported from the 1977 commercial fishery.

All processing of the snail catch occurs on board the catcher vessel. This consists of crushing the shells, briefly cooking the meats, and removing any soft parts and shell fragments afterwards. The meats are graded by size and quality and quick-frozen in trays. Smaller snails in the catch may be frozen whole.

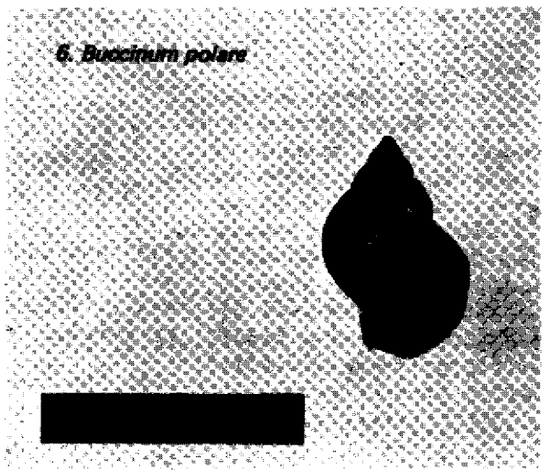
Official figures for the total value of the snail fishery are not available. However, the 1976 and 1977 ex-vessel value of snail meats in Japan was $600 per metric ton. This is $1,000 per metric ton at the wholesale level. At this ex-vessel price the 1977 eastern Bering Sea catch was worth $242,000 and the 1978 catch was worth $1,320,000.

Until recently there was no U.S. regulation of the eastern Bering Sea snail fishery. Implementation of the Fisheries Conservation and Management Act of 1976 provided the United States with a tool to monitor and manage that fishery within the 200-mile zone. A fishery management plan for the Bering Sea snail resource has been developed by the North Pacific Fishery Management Council which identifies the harvest levels. Since there is currently no domestic fishery for snails in the eastern Bering Sea, the total allowable catch has been allocated to Japan, the only nation now involved in the fishery. So little data is available on the snail resource and the fishery that Japan's 1977 and 1978

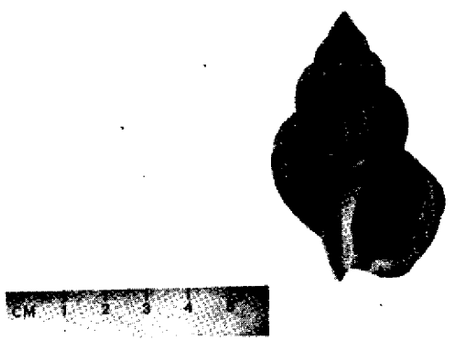
5. Buccinum plectrum



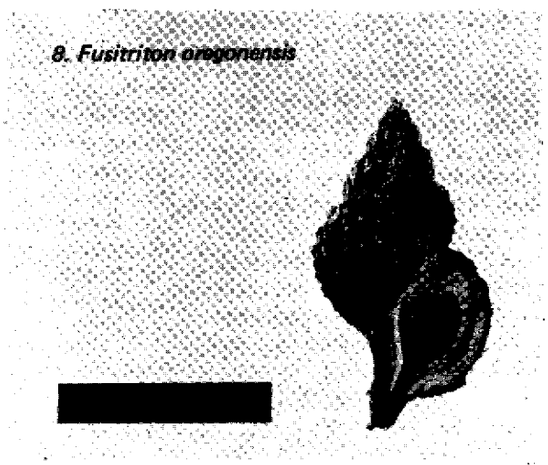
6. Buccinum polare



7. Buccinum scalariforme



8. Fusitriton oregonensis



quotas were set at the same level as their previous yearly catches, 3,000 metric tons of meat.

UNITED STATES FISHERY

Changes in the total allowable catch and Japan's harvest level will depend upon newly acquired biological and socio-economic data. United States fishermen have made little effort to initiate a domestic fishery for snails in the eastern Bering Sea. With only slight modification, domestic crab vessels currently fishing for King and Tanner crab in the eastern Bering Sea could fish for snails.

Although there has been little progress toward a domestic snail fishery in the Bering Sea, seafood processors have made several attempts to initiate snail fisheries in other areas of Alaska. In Prince William Sound, as in many areas of the Gulf of Alaska, snails are regularly taken in crab pots, despite the large mesh used. New England Fish Company, Petersburg Fisheries, Inc., and others have had samples of Alaskan snails analyzed and have explored marketing possibilities.

North Pacific Processors in Cordova, in an effort to build a broad-based Prince William Sound pot fishery, installed a snail crushing machine and purchased snails from crab fishermen during the 1977-78 Tanner crab season. Only 5,000 pounds of snails were delivered during the season. The snail deliveries were attributed to the relatively good Tanner crab fishing, the low price for snails (6 to 10 cents per pound) paid to the fishermen, and the unexpectedly low concentrations of snails encountered.

A current attempt to develop a snail fishery in Nova Scotia should be of interest to Alaskan processors. The Nova Scotia Department of Fisheries has developed an escargot-like product produced from marine snails similar to those found in Alaska. They are attempting to develop a market for the marine snails *Buccinum undatum* and *Neptunia decemcostata*, which are taken in the lobster pot fishery *(The National Fisherman,* October 1976).

SUMMARY

Snails are an underutilized resource in Alaska. Although our knowledge of their distribution and relative abundance is increasing, a data base that provides estimates of stock size and condition is not yet available. Studies on distribution and abundance, species associations, age and growth, trophic (feeding) relationships, and biochemical genetic relationships of four species of eastern Bering Sea Neptunea are now being conducted through NMFS.

The prospects for a rapid development of Alaska's snail resource are uncertain. Snail stocks in the Gulf of Alaska are essentially unexploited, and eastern Bering Sea stocks may well be under-exploited. Recent fluctuations in the snail catch and effort in the Japanese eastern Bering Sea fishery are probably a response to political and economic factors, rather than the availability of snails.

The increase in costs of a distant-water fisheries and the remarkably low dockside value of the snail meats ($600 per metric ton) would seem to limit the viability of the fishery. The recent reduction in Japan's snail allocation in the Soviet Union's 200-mile fisheries zone, however, might have the opposite effect.

Domestic fishermen and processors have expressed interest in the Alaskan snail resource, but their future involvement is more uncertain than Japan's. The rapidly expanding and highly profitable King and Tanner crab fisheries are currently dominating the domestic fishing activity in the area. While these vessels would be well suited to snail pot fishing, most are looking at the eastern Bering Sea and Gulf of Alaska bottomfish stocks as an alternative or supplementary activity.

Attempts to initiate a snail fishery in the Gulf of Alaska have not been productive to date. They have been exploratory in nature, and could show promise as off-season operations in the next few years. As in the eastern Bering Sea, the resource and the harvesting capacity now exist. Innovative processing techniques or an increase in the value of the traditional frozen meat product will be a necessary condition for the initiation of a domestic fisherv.

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Dec. 1978

Dense Geoduck Beds Located

By Jon Rowley
Commercial Fisherman
Ketchikan, Alaska

A geoduck (gwē'duk) survey carried out by the private sector in the Ketchikan area has discovered beds as dense as those in Puget Sound, where five million pounds are harvested annually. Participating in the survey were Robert Earl of Norwest Undersea Harvesters; Del Hansen, Alaska Diving Service; Ketchikan resident Bill Baker; and Dennis Blankenbeckler, Alaska Department of Fish and Game. Norwest Undersea Harvesters is one of the primary geoduck processing companies in Puget Sound.

The geoduck is a large clam generally weighing around three pounds. Ketchikan diver Mick Nicholas reports bringing one in that weighed over twelve pounds. Although very unattractive in the shell, the body flesh has excellent flavor and texture according to Francois Kissel, chef and owner of the restaurant Brasserie Pitsbourg in Seattle, the first northwest restaurant to feature this clam as a menu item.

"It's a matter of getting people to try them," Kissel says. "Once a customer is adventurous enough to try the geoduck, he comes back for more. They are excellent." The tough large neck is usually ground for chowder.

The market for geoducks, buoyed by the depressed East Coast clam industry, is apparently quite strong and able to absorb twice the volume produced in Puget Sound. Norwest Undersea Harvesters market geoducks under the patented name of "King Clam Steak."

As the regulations are currently drafted, commercial utilization of geoducks in Alaska will require certification of geoduck beds by the State, or the development of a reliable on-site test for paralytic shellfish poisoning (PSP). PSP is presently detected by a mouse test which takes three days. Samples collected in the recent survey were shipped to the Northwest Fisheries Center in Seattle for testing.

A viable geoduck fishery is an attractive consideration in the Ketchikan area. The clam can be harvested at all times of the year providing year-round employment for divers and persons involved with processing and marketing. The clam will live three days out of water, which makes harvest in remote areas of Southeastern realistic.

According to Del Hansen of Alaska Diving Service, the group plans to continue surveys of the area. Actual harvest will depend on how quickly the State can formulate management concepts.

Oct. 1973

SHRIMP of the Gulf of Alaska

The Alaska shrimp industry is something of a mystery to most Americans. Though a major share of the world shrimp harvest comes from the Gulf of Alaska, the average citizen associates shrimp with the Gulf of Mexico. In recent years, advances in processing and harvesting technology have catapulted this Alaskan fishery into this position prominence, attracting a sophisticated fishing fleet and sizable capital investment. The management of such a valuable fishery in the face of such pressure has been charged jointly to the National Marine Fisheries Service (NMFS) and the Alaska Department of Fish and Game (ADF&G). In this issue, Paul Anderson of NMFS and Fred Gaffney of ADF&G chronicle the history, development, and expansion of this fishery.

– Ed.

By Paul J. Anderson
and Fred G. Gaffney

This vessel exemplifies a trend developing in the Alaska fishing industry toward highly mobile processing ships. (Photo by Fred Gaffney)

One of the world's major Pandalid shrimp fisheries has developed south of the Alaska Peninsula in the Gulf of Alaska since 1968. The National Marine Fisheries Service (NMFS) began intensively surveying these shrimp in 1972 because of industry interest and rapid increases in commercial exploitation. The Alaska Department of Fish and Game (ADF&G), which has the management responsibility for this fishery, began monitoring commercial catches in 1969 and has conducted intensive annual surveys in the area since 1974.

Pandalid shrimp have provided a valuable commercial fishery in the northeastern Pacific Ocean since the late 1800s. The bulk of commercial shrimp landings in Alaskan waters consists of pink shrimp, *Pandalus borealis*. Statewide landings of shrimp have steadily increased from 7.8 million pounds in 1958 to over 98.5 million pounds in 1975.

The pandalid shrimp industry of Alaska began in southeastern Alaska in

1915 with the development of a small inshore fishery near Wrangell and Petersburg. Catches in this region gradually increased until 1958 when a peak production of 7.6 million pounds occurred.

In the late 1950s the shrimp fishery expanded to include lower Cook Inlet and Kodiak Island. Catches in the Kodiak area rapidly increased to 82 million pounds until catch quotas were implemented by ADF&G in 1972. Seasonal catches have remained at approximately 55 million pounds in the major producing areas since the quotas were instituted. Even though a shrimp fishery had started in earnest in the late 1960s along the Alaska Peninsula, landings did not substantially increase until catches in Kodiak were limited by quota. Catches from the Alaska Peninsula have increased from 5.6 million pounds in 1968 to 45.0 million pounds in 1975, or nearly half of the total state-wide landing. The fishery has continued to expand as far west as Dutch Harbor on Unalaska Island.

The major shrimp producing areas discussed here extend along the Alaska Peninsula from Sutwik to Sanak Islands, a distance of 230 nautical miles. The area has been divided into two management districts by ADF&G. The Chignik area includes the major shrimp grounds in and around Chignik Bay and Mitrofania Island. The other district, termed the South Peninsula, includes all inshore and offshore grounds from Kupreanof Point to Sanak Island.

IMPROVED VESSELS AND GEAR

Recent advances in fishing gear, vessel design, processing techniques, and floating processors have been responsible for the rapid development of the Alaska Peninsula shrimp fishery. When the fishery in the Alaska Peninsula area started in the late 1960s most of the boats in the shrimp fleet consisted of Western seine vessels in the 40-foot to 85-foot class. These stern trawlers were rigged to fish with a single otter trawl. They were followed in 1971 by larger and more efficient Gulf of Mexico style double-rigged shrimp boats. The Gulf-style draggers are large, modern, steel-hulled vessels with holding capacities of up to a quarter million pounds.

Gear has also evolved to increase the overall efficiency of the shrimping fleet. Heavily constructed West Coast semi-balloon shrimp trawls are now used in the fishery. The recent trend in trawls has been to larger overall size, both in footrope length and higher net openings. With the widespread use of sophisticated depth recorders and scanning sonars, fishermen are abandoning the broad, open gulleys in the ocean floor where shrimp were traditionally harvested, in favor of fishing the more productive contour edges. Night fishing has become profitable but generally less so than daylight fishing. Fishing techniques and gear modifications, however, can be as varied as the individual tastes of the fishermen.

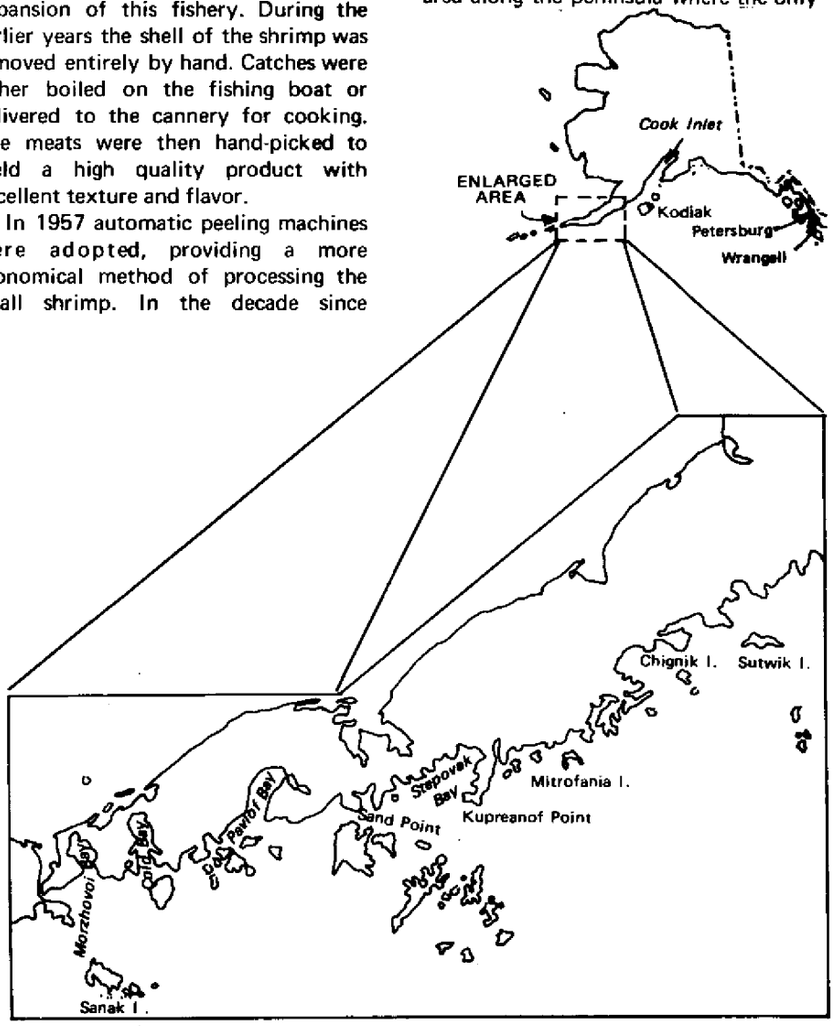
IMPROVED PROCESSING

Advances in processing technology have been the primary reason for the expansion of this fishery. During the earlier years the shell of the shrimp was removed entirely by hand. Catches were either boiled on the fishing boat or delivered to the cannery for cooking. The meats were then hand-picked to yield a high quality product with excellent texture and flavor.

In 1957 automatic peeling machines were adopted, providing a more economical method of processing the small shrimp. In the decade since "peelers" were introduced, harvesting and processing capacity have rapidly increased in the Western Alaska shrimp fishery.

In 1968 there was a single processor in the Shumagin Islands, operating with three fishing vessels and five peelers. In 1972 construction of another facility in the area raised the shrimp processing capacity to 11 peelers. Nineteen peelers were processing by 1973, and this number rose to 44 peelers in 1974. In the 1975 fishing season, processors had 54 peelers and at least 24 vessels. The present processing capability now rivals that of the Kodiak area.

The use of self-contained floating processing facilities has also contributed to the expanding Alaska Peninsula shrimp fishery. The so-called "floaters" are ideally suited to the large isolated area along the peninsula where the only



The major shrimp producing area discussed here extends along the Alaska Peninsula from Sutwik to the Sanak Islands, a distance of 230 nautical miles.

transportation is by boat and amphibious aircraft. Floaters have the advantage of being mobile. They can be shifted from bay to bay to stay near the fishing fleet.

SHRIMP POTENTIAL

NMFS (formerly the Bureau of Commercial Fisheries) commenced exploratory fishing operations off Alaska in about 1940. Forty exploratory cruises have been conducted since 1950 to gather data on the distribution and abundance of pandalid shrimp. The cruises have provided valuable exploratory information to the shrimp fishing industry, but they lacked the systematic coverage needed to adequately estimate shrimp abundance for management purposes. Consequently, emphasis of NMFS exploratory fishing programs was modified in 1971 to provide more information on population levels and to better define commercial concentrations.

A survey plan was implemented to systematically sample the inshore waters and continental shelf from Portlock Bank to Unimak Pass. In general, the procedure for the initial phase of surveys was to examine all commercial fishing and exploratory fishing data available for the areas of study. This information was plotted on charts and a preliminary sampling grid established. Survey results were used to develop a comprehensive monitoring scheme in areas of relatively high shrimp abundance.

The current effort to delineate shrimp abundance along the Alaska Peninsula began with the area from Sanak Island to Simeonof Island in 1972, when it became apparent the fishery was to make further rapid expansion there. In 1973 the survey was extended to include the waters of Mitrofania Island and Chignik Bay, areas of intense commercial interest. In 1974 the survey area was divided; ADF&G surveyed that portion near Mitrofania Island and NMFS intensified surveys of the original area from Sanak to Simeonof Island.

RESOURCE ASSESSMENT

Shrimp surveys are designed to: delineate distribution and abundance of the pandalid shrimp populations; monitor year-class composition; delineate separate stocks within the survey areas; and collect length-weight, growth, mortality, and other pertinent data.

The survey area is concentrated in areas of known commercial importance. Abundance estimates of shrimp biomass are made using an area-swept technique. The survey area is divided into strata in which randomly selected stations are sampled. Sampling is conducted with the NMFS 61-foot, high opening, shrimp trawl towed for one mile or for 30 minutes. Surveys are designed to include as much area as possible within the time limit of the survey, and yet maintain a comparative reliability in the population estimates. The number of tows needed to satisfy the desired confidence of the estimate was initially determined by iterative or repetitive procedure using previous survey data in each unique strata. Since the variance of the strata tows is different for each survey, the number of tows required to complete a strata varies accordingly.

One of the goals of the resource assessment program is to predict changes in abundance of the shrimp resource. One means for predicting the status of stocks is to evaluate year-class strength and to formulate indexes of recruitment. The first information base on year-class strength is being studied today using established data collection systems.

The most significant declines were observed in large offshore areas where little or no commercial fishing occurred. Abundance estimates declined less severely in the traditional inshore fishing areas.

RESEARCH AND MANAGEMENT

The ADF&G is responsible for the management of the shrimp fishery resource. Their management scheme converts historical catch data and survey population estimates into catch quotas. The quotas may later be modified upon examination of commercial catch samples and catch effort data.

In 1968 the ADF&G initiated a logbook program to monitor catch-effort (C/E) rates in quota areas for the Kodiak region shrimp fishery. Since then this system has also been extended to the Alaska Peninsula. Several methods of standardization of C/E are being examined. With the rapid development of gear and fishing techniques annual comparative C/E data can be misleading.

Initial attempts to directly compare C/E data were successful when the fisheries were developing. The few vessels fishing shrimp were fishing essentially the same areas with the same type of heavily constructed West Coast shrimp trawl. Then as the number of vessels increased so did the size of the nets. An attempt was made to standardize C/E data by selecting a single type of gear and comparing it with the footrope lengths of different units of gear. This was reasonably satisfactory until late 1971, with the introduction of the Gulf of Mexico style double-rigged shrimp vessels and their lighter more efficient trawls. The standardization of catch data has become increasingly complex. However, comparison of unstandardized C/E and commercial harvest data does indicate gross trends in the fishery.

During the formative phase of the Alaska Peninsula fishery, fishing seasons 1968-1971, although the total harvest was relatively low, C/E was the highest reported. This is a classic example of what one might expect in a fishery on a virgin stock. Catch effort rates declined rapidly during the next two seasons. Beginning in 1972 the fishery began expanding with increased processing capability and larger double-rigged shrimp vessels. Since the 1973 fishing season catch and effort have stabilized mainly as a result of limited processing capability and adverse market conditions.

FORECAST

Recent survey results indicate a substantial decline in available shrimp in the Alaska Peninsula area during 1975-1976. This decline apparently was not caused by increased fishing effort since the trend was also evident in areas occasionally or seldom fished. Although caution is recommended, it appears the resource will be able to sustain current harvest levels, and expansion of the fishery may occur if areas not currently utilized are harvested. Since the decline was more pronounced in offshore areas, these areas should be approached prudently by fishermen and processors.

PROPER MANAGEMENT

It now seems apparent that the Alaska Peninsula area will perhaps become one of the largest pandalid shrimp fisheries in the world. Lack of

knowledge concerning distribution, abundance, and other parameters of the shrimp resource has frequently been one of the major causes of overexpansion of the industry. Cooperation between the state and federal fishery agencies concerned with the rational management and development of this fishery is an important first step that will lead to full and wise use of this valuable resource.

June 1977

Just for the Halibut

One of Alaska's most enduring romantic images is undoubtedly of the commercial fisherman. How many people have watched the fishing boats coming in and out and dreamed of being on one? Kieth Loan and Bob Manning were two such dreamers until this past summer when they actually went out and did it. In the following interview by Judy Brogan, editor at the Arctic Environmental Information and Data Center, Loan and Manning talk about their brief but colorful experience as Alaskan commercial fishermen.

Cowboys would have called them greenhorns, ninety-eighters would have called them cheechakos, but most of the people who heard their plans just called them fools. Kieth Loan and Bob Manning, two civil servants in their early thirties with no fishing or boating experience, decided to chuck their secure jobs, buy a boat, and head for Seward.

"Actually," explained Manning, "we got drunk one night, didn't sober up for six months, and by that time we'd bought the boat."

Naturally, since Manning has a master's degree in economics and Loan a master's in business administration, the first step was a benefit/cost analysis of their new project. Accurate information did not come easily. Crab pots turned out to be too expensive even to build, so they turned to pot shrimp, which ADF&G catch statistics indicated was a good year-round fishery.

"One weekend we're down working on the boat, carrying stuff down to the boat, and we saw an old-timer we knew carrying his stuff up. I asked him how things were going, and he said, 'Oh not bad. I had a pretty good trip, but I'm hauling all my gear out of the water.'"

"What," we managed.

"Yeah, this time of year the shrimp go off some place, they're not congretated enough to make it worth fishing."

Undaunted, our two young heroes turned to halibut.

Anybody can learn to fish for halibut in two or three years; we set out to learn in two or three months. We started talking to people about what kind of fish halibut are, how do you catch them, and what kind of gear you need. We learned what a reel is (and that we needed one), how hydraulics work, what a skate is, how many hooks to a skate, and what knots to tie.

Once we actually started to fish and the "old heads" realized we were serious, they really began to help us out: "Hey kids, don't you dummies know your hooks are too close together, you don't use that kind of bait, and you don't fish halibut at that depth?" Obviously, we had to learn to communicate with these guys, and they have their own language for everything. Like the night Mac asked if we were going to put lagging on the reel, and I told him no, we were going to wrap a bunch of rope around it, which, of course, is what lagging is.

And the monotony of baiting hundreds of hooks:

You've got 1,000 hooks for two people to bait. You cut the bait, bait the hooks, get them all ready, then set them in the water. We got to where we could set five skates in 45 minutes to an hour. That's 450 hooks. Two and a half to three hours running around with the boat, and the same to bait all the hooks. They can set for nearly four hours before the starfish will be all over them. Takes another hour to hour and a quarter to pull five skates. Meanwhile, you cook, clean up, work on the engine.

Once you have a fish he has to be gaffed. If it's a big one, over 40-50 lbs., you've got to shoot him first. We started out with a .22, but when we got a big one, shot him four times, gaffed him four times, and he still got away, we traded it for a .38. Basically, even a .38 to the head just stuns them. Once they're hit with that gaff, they go bananas. If a halibut over 50 lbs. gets on deck alive, he's liable to beat you to death.

So you've worked 20 hours straight, catch 3-4 hours sleep, get up, and start all over again. You can see why it's depressing to pull up a thousand hooks and find nothing on them – not one, crumby little halibut.

At first we just sort of popped the lines down wherever we thought fish might be. We'd pick out a spot on the map that looked good, but since our fathometer was broken, we often had a hard time locating just exactly where we were. We'd use the ranges on the radar and measure on the map, find out how far a certain shelf was from shore, then go out and start laying line. Well, on some of these shelves it only takes a few yards one way or another and you've missed the whole thing. For the way we were doing it, we were very lucky.

One day early in the season, the wind was blowing probably 10 knots and the waves were probably between one and one and a half feet. Well, we didn't know if we should pull the gear in that kind of weather. By the end of the season, the only weather we wouldn't pull gear in was, well, Typhoon Mary.

If it hadn't been for the way we relate to each other, we never would have made it. It becomes a mutual admiration society. Kieth's working with hooks two and a half to three inches long going by every 10-15 seconds, and I'm working hydraulics and trying to drive the boat. And you have to be careful how you say, "that's my towel" or "you make oatmeal like my Aunt Eileen."

Their advice for the novice:

1. Buy a versatile boat that can be run by the number of people you have available and owe as little as possible on it.
2. Gear is expensive. We built our halibut reel and it cost $1,500. Marine parts are almost twice as expensive as automotive parts.
3. Estimate your cash flow conservatively, then be more conservative.
4. Find out early what permits and licenses you need.
5. Remember that the guys who make it big in salmon, herring, or crab already have alot of money tied up in a boat and

equipment, and they've grown up around it.

6. With a diesel engine you don't ever, ever run out of oil.

7. When laying line.— never get between the rope and the boat.

A good fisherman is doing the one thing in the world he loves. He doesn't miss doing all the other things. Being out on the water is a beautiful, beautiful thing. The reason we quit is because you have to be away from home most of the time. I have no regrets, absolutely none. If I had the chance, I'd do it again.

Oct. 1975

Live - Tanking of Snow Crab

By Franklin Hartsock
Northwest Fisheries Center, Kodiak

The Alaskan fishermen who developed the snow crab fishery in the mid-sixties quickly discovered that snow crab are more susceptible to holding-tank dead losses than king crab. Due to the relatively high dead losses in the early days of this fishery, the National Marine Fisheries Service (NMFS) Kodiak Fisheries Utilization Research Laboratory began a study of the causes and prevention of these mortalities in 1969. In the following article Franklin Hartsock, a staff member at the Kodiak laboratory, highlights the conclusions of this investigation.

Snow Crab Characteristics

Snow crab are adapted to cold water. Their rate of metabolism increases rapidly with a rise in water temperature. As measured by oxygen consumption, the rates of metabolism of some species of northern crabs, approximately triple for every ten-degree centigrade (18° Fahrenheit) rise in temperature.

As the temperature and the metabolic rate increase, the crabs require more oxygen to prevent asphyxiation. Unfortunately, the solubility of oxygen between the gills and tissues is less efficient. Respiration for snow crab therefore occurs most efficiently over a narrow range of low temperatures.

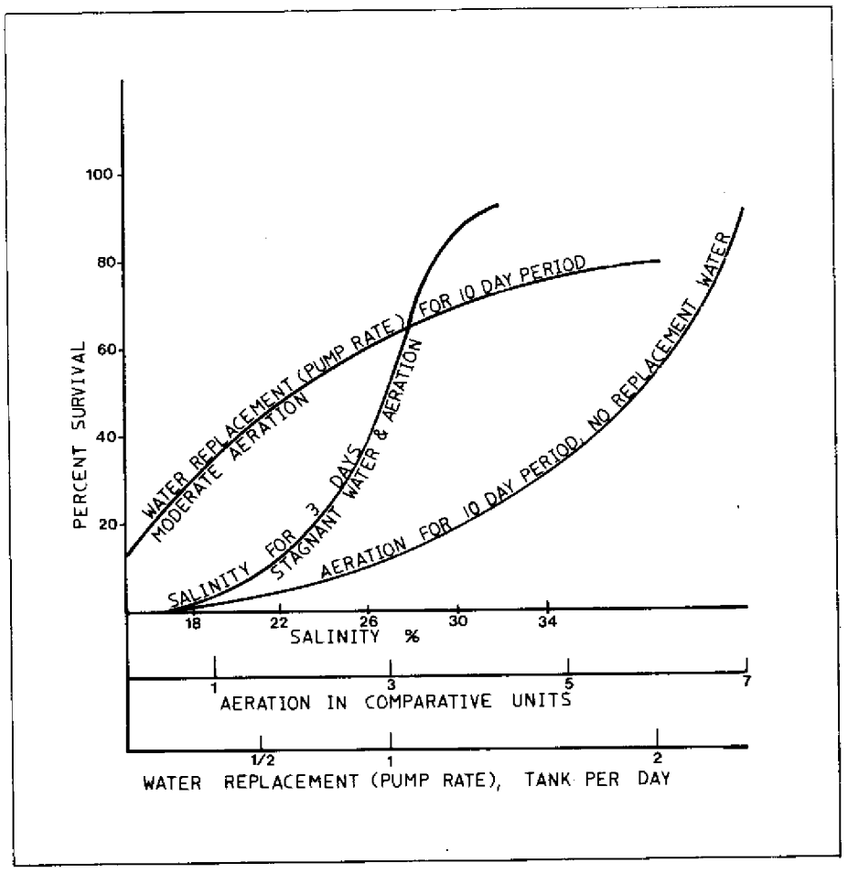
Snow crab require near oceanic salinities since the salt content of their blood is similar to that found in the ocean. More dilute water will enter the crab and carry out body salts when it exits. This loss of body salts could result in death.

In loaded crab tanks the levels of nitrogen containing toxins and hydrogen sulfide usually increase as the crabs are held and are soon far above levels found in clean sea water. High levels of these toxins can be fatal for snow crab, probably because they interfere with the ability of the blood to transport oxygen.

Relative to king crab, snow crab shells are thin and weak. The underwater weight of crabs in a tank compresses the shells and restricts the exchange of water across the gills. This leads to dead losses particularly in the bottom of tanks.

Experiments

Experiments were conducted to determine the effects of loading density on oxygen consumption for snow,



This figure shows the percent survival of snow crabs when subjected to various water pumping rates, salinities, and amounts of aeration.

king, and Dungeness crabs. Crabs used in the experiments were taken directly from the commercial catch and acclimated in tanks of seawater for several days before use. Bioassays were conducted in 750-gallon tanks with flow through seawater and 75-gallon aquaria having stagnant seawater. Salinity, temperature, dissolved oxygen, and toxins were monitored in the tanks.

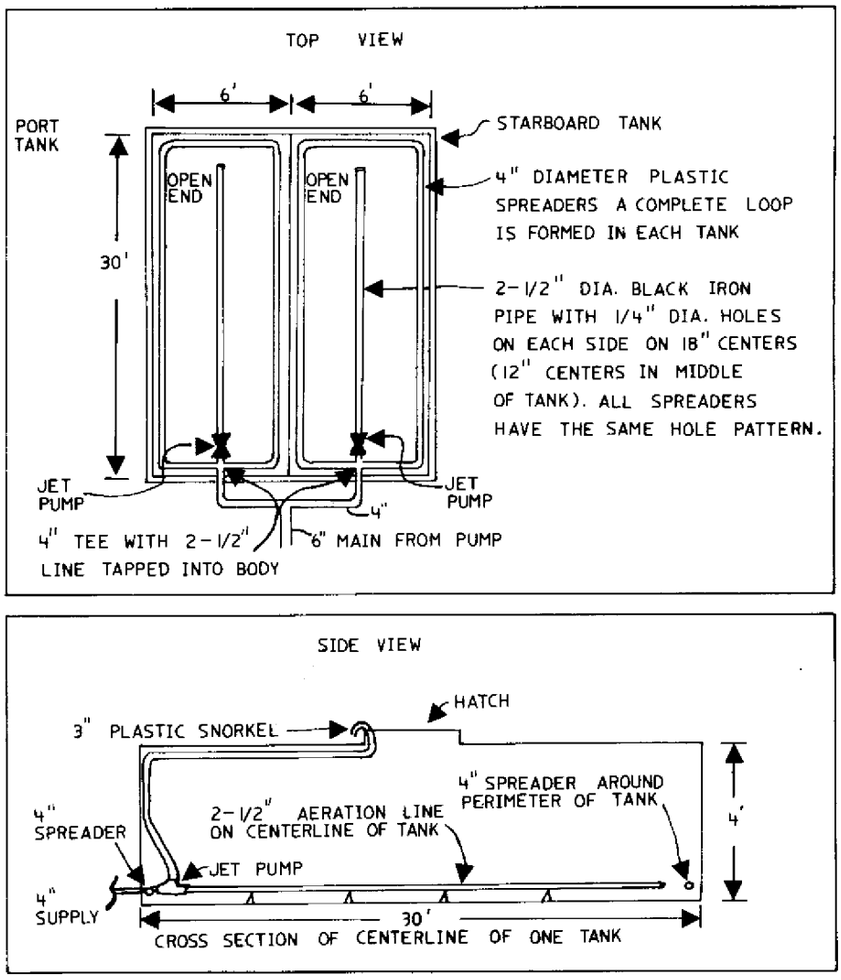
Results of the experiments indicate that as the density of the animals in the tanks increased, oxygen consumption per pound decreased for all three species. This phenomenon can be explained partly by the fact that packed crab are less active than uncrowded crab and partly because packed crab shift partially to anaerobiosis. Anaerobiosis, also termed anaerobic metabolism or anaerobic respiration is energy production without oxygen. Snow crab appeared to be the least efficient at anaerobiosis, probably because their relatively thin shells lack adequate calcium carbonate to neutralize the acids produced by this type of metabolism. An accumulation of these acids usually results in death.

The effect of density upon the oxygen consumption of all three species was approximately the same. Dungeness crab were far superior to the other two species in the ability to extract dissolved oxygen from the sea water.

Increasing temperatures caused increased oxygen consumption in all three species of crab, particularly in the snow crab. Aeration in the tanks benefited crab by increasing the amount of dissolved oxygen and improving circulation. Snow crab subjected to the weight from a pile of crab (under water) greater than about four feet suffered from impaired respiration.

Recommendations

Since crab are under multiple stresses, including starvation, when in a live-tank, there will normally be more dead loss the longer they are held. Dead losses of snow crab can be minimized by increasing the rate of water replacement (Water pumping rate) and controlling temperature and salinity. To reduce dead loss to the lowest levels



This figure depicts an air injection system. Each tank has a capacity for 5,400 gallons and the circulation time is 13.5 minutes. (400 GPM)

the following conditions are recommended:

Salinity	32‰
Dissolved oxygen	9 ppm
Temperature	32-34°F
Toxins as total ammonia nitrogen	0.1 ppm
Crab pile depth	4 feet

Temperature and salinity can be controlled in a closed system when the water is recirculated with little or no new water added, or by sailing only where and when favorable water conditions exist. Small portable instruments for determining salinity are now available at a moderate cost. A venturi or jet pump attached to the incoming water supply can increase the circulation and level of dissolved oxygen in a tank. Improved circulation in a tank will prevent stagnant water pockets from developing, where crab quickly use the dissolved oxygen. A typical venturi system is shown. For a 5,000-gallon tank 150 to 250 cubic feet of injected air per minute is recommended.

A complete aeration system similar to the one shown in Figure 2 but in deeper tanks was installed on a fishing boat for less than $500. The owner enthusiastically credited the system with lowering his crab dead-loss from the highest in the fleet to the lowest. This system has been in operation over two years.

The venturi system is considered safer than a separate air pumping system since the air supply is stopped if the water supply fails. With an air pumping system an air space could develop at the top of the tank which might cause a boat to capsize.

Alaska's Commercial Fishermen Find a Strong New Voice

By PHILIP DANIEL
Secretary-Treasurer, United Fishermen of Alaska

The United Fishermen of Alaska (UFA), a parent fishermen's organization consisting of 20 local groups throughout the state, was established in February of 1972. The UFA represents every fishing area in Alaska except the Yukon-Kuskokwim Delta. The state's 22,000 commercial fishermen harvest a product worth $214 million at the first wholesale price level. The UFA feels that an industry of this magnitude should have a voice at legislative sessions in Juneau. The commercial fishing industry traditionally has been one of Alaska's largest but most silent industries. We would like to make it one of Alaska's most verbal and influential industries. That goal is our reason for existence.

There is little doubt that the governor, the legislature and the various state agencies which provide funding for programs and formulate the laws which regulate our fisheries have in their hands the ability to aid or to harm our fisheries by virtue of their policy making authority. There is also little doubt that they often have wanted to do the right thing by fishermen. They have, however, faced the dilemma of not knowing which of the many voices raised by the fishermen most accurately reflected the view of the majority, because there has been little communication between fishermen throughout the state.

We are particularly pleased to participate in this newsletter, and we wish to acknowledge the enormous service that the University of Alaska's Sea Grant Program has provided for commercial fishermen in editing and publishing this newsletter. Many of us regard this publication as vital to fishermen, because it will provide us with a means to communicate with each other for the first time.

The United Fishermen of Alaska are working to support fishery legislation. Through this newsletter we will bring you current information on bills of interest to you, and we may wish to publish voting results on such bills. Our ability to influence legislation which is favorable to fishermen ultimately will depend on the number of people we represent. We haven't the money or the talent to pursue a fancy campaign in support of a bill, but we do hope to be able to represent the best interests of Alaska's commercial fishermen, and we believe that the legislature will take our efforts seriously.

UFA Feels the Pulse of Alaska's Fishermen

Last month we met with 14 of our organizations in Southeastern and Southcentral Alaska, because the UFA feels that if we are to be effective, we must learn the views of fishermen, and reflect those views as clearly as possible. Highlights of the meetings were recorded on video tape to be used to back UFA's position at the legislature. During the meetings, fishermen expressed their views about the UFA and what it can do for them. They also provided answers to the question: "What do we want done during this session?" On a swing through Ketchikan, Petersburg, Juneau, Cordova and Sitka, upwards of $10,000 was raised through voluntary donations to the UFA. Of equal importance, however, were the discussions of major issues such as limited entry, a raw fish tax and the new, two cents per gallon increase on marine fuel.

Financing the UFA

Financing was a priority item on the agenda at our annual meeting, held Jan. 26-28 in Juneau. (Other highlights of the annual meeting will be reported in the next issue of this newsletter.) We have thus far financed UFA activities through voluntary donations. We plan to maintain a full-time office in Juneau during the session, and we have many other plans and ambitions which require funding. Many individuals have considered this organization valuable enough to encourage its progress through donations. If the UFA is to represent the commercial fishermen in Juneau, it needs your financial support. If every commercial fishermen in the state were to donate five dollars to this statewide organization, we could raise $110,000, but we realize that this is not likely to happen.

If you believe that a statewide commercial fishermen's organization is important to you, we strongly urge you to support the UFA with a donation. You will receive a receipt, UFA decal and UFA Associate Membership card. Persons who send in $25 or more will be placed on our mailing list, and will receive any correspondence addressed to our organizations. You do not have to belong to one of our organizations to support the UFA.

Feb. 1973

en Sport and al Fishermen

By Nancy Munro

Cook Inlet looks like it's about to blow again, but this time the only volcanic signs may be hot air. Conflicts between sport and commercial fishermen over the distribution of fish in the inlet have been smoldering for years, and it looks like another eruption may be coming up.

According to Sam McDowell, fisheries chairman for the Anchorage chapter of the Izaak Walton League, sport fishermen will be gathering signatures this summer for an initiative which would prohibit commercial fishing in the inlet prior to July 1 and after August 15. The initiative, if passed, would shorten the commercial salmon fishing season by about three weeks. Presumably, this would allow more salmon, particularly kings and silvers, into Cook Inlet streams for harvest by the rapidly growing population of sport fishermen in the area.

The idea is not a new one for the inlet, and the debate this time is sure to be as heated as it has been in the past. The problem is that for all of the past controversy and the inevitability of the conflicts, it seems as though very little has been done. What may happen now, as the controversy and political pressure builds, is that a "solution" will be found which, ADF&G biologist Dave Daisy says, "won't solve anyone's problem."

THE SITUATION

The controversy, simply put, is that sport fishermen feel they are getting a rotten deal when it comes to the distribution of fish from Cook Inlet. Sam McDowell says that sport fishermen only want "a fair share of the resource" as determined by their numbers and the amount of money they contribute to the state's economy.

According to a study done for ADF&G, sport fishermen spent $52.03 million in Alaska, that's $315.51 per fisherman, on fishing-related expenses during the summer of 1973. Russ Redick, ADF&G regional supervisor for Sport Fish, commented that sport fishing expenditures have increased substantially since 1973, and ADF&G estimates that the demand for sport fishing increases by about 10 per cent each year.

Sport fishing is also a major drawing card for Alaska's tourist industry. In 1971 the Federal Field Committee reported that 46 per cent of Alaska's visitors were attracted to the state because of the sport fishing opportunities and that 40 per cent returned because of the quality of their sport fishing experiences. Putting that card in context, the state's director of tourism Dick Montague reports that tourists spent $100 million in Alaska last year, and the National Bank of Alaska predicts that tourism in Alaska will increase by 12 per cent each year for the near future.

The drainages of Cook Inlet are particularly important to sport fishermen because they are close to Anchorage, where over half the state's population lives and most tourists deplane or at least visit. ADF&G recently indentified 11 high-use sport fisheries in the state — six of them were in the Cook Inlet area. Of the over three-million man days spent sport fishing in Alaska last year, nearly half were on the Kenai Peninsula

and in the Upper Cook Inlet.

The frustration of sport fishermen in the Cook Inlet area began with king salmon. The kings are almost a legend to sport fishermen. They jump, they fight, they struggle, and they're huge. The kind of fish that dreams are made of.

ADF&G has observed king salmon in 98 different clearwater streams in the Cook Inlet area. Since the early 1960's freshwater sport fishing for kings has been limited to eight of these streams and since 1973 to four streams. Anchor River, Ninilchik River, and Deep Creek are open for three weekends each year (four this year), and the Kenai River offers about six weeks of fishing. Because of the restricted opportunities to fish for king salmon, crowding and elbow-to-elbow fishing are usual, and sport fishermen have become increasingly dissatisfied.

OVERCROWDING

Marge Mullen has lived near the Kenai River since 1950 when she walked from the end of the road in Cooper Landing 50 miles to homestead in Soldotna. Ms. Mullen remembers seeing salmon in the river so thick she thought she could walk on them. This summer she is concerned about the campers and mobile homes which will try to camp on the private road or fields of her homestead.

Ms. Mullen's neighbors echo her concern about the ever-increasing numbers of people who will invade them this summer leaving their trash and property damage behind. This winter one wrote ADF&G Commissioner James Brooks that:

Increased boat traffic on the Kenai River has all but negated a tranquil and rejuvenating fishing experience. There have been numerous collisions and near-collisions from boats drifting within a few feet from each other. The anchored fisherman is especially subject to collision and verbal abuse. Lines are snarled, fish are lost, and tempers and blood pressure soar as peaceful fishermen enter the lower Kenai "arena."

Commissioner Brooks replied that *We realize that boat use on the Kenai River has increased substantially during the past two years, however, it must be realized that this is the only freshwater king salmon angling available in South-central Alaska. At this point we do not believe it is reasonable or necessary to limit participation in the fishery.*

The Izaak Walton League feels that the logical way to satisfy the growing demands of sport fishermen is to put more fish into the rivers and stretch out the sport season. By prohibiting commercial fishing before July 1 and after August 15 the League feels that more salmon, particularly kings and silvers, would enter the river for sport fishermen. Izaak Walton League spokesman, Sam McDowell points out that the shortened commercial season would still allot less than five percent of the total commercial catch to sport fishermen.

Commercial fishermen feel that the Izaak Walton League's proposal is just the latest move of a squeeze play which may eventually push them out of the inlet altogether.

Historically, the commercial salmon fishery on the inlet opened May 20 or 25. It now opens on June 25 and is limited to two 12-hour fishing periods per week. Ray Osborne, past executive secretary of the Cook Inlet Fisherman's Association, commented, "We don't look at this July 1 opening as just losing a week at the beginning of the season. We're looking at the whole month of June which we've already lost. It's just like a cancer slowly whittling us down to nothing." Osborne added that an August 15 cutoff date would only hurt "a very small number of old-timers who are truly dependent on the fishery. Most of the fishermen who have jobs in town have already stopped fishing by August 15 anyway."

THE PROBLEM

The problem is how to satisfy the growing sport demands without trading off the commercial fishery.

Cook Inlet has a long history of both sport and commercial fishing and is notoriously difficult to manage. Spawning streams are often full of glacial silt, which makes accurate fish counts nearly impossible, and the timing of the runs themselves is complex, intermingled, and not well understood.

Red salmon have been the primary commercial species in the inlet since the turn of the century, and ADF&G biologists estimate that the inlet could support a yearly maximum sustainable yield of 1.7 million reds. Overfishing in the early 1950's depleted the runs, however, and recent catches have been below one million fish annually. As the red runs dwindled, so did the commercial fishing periods in the inlet.

When the red salmon swim up the inlet during the summer months they intermingle with substantial king, pink, chum, and silver salmon runs. Although these runs are also depleted from their historic levels, they form a significant part of the commercial catch.

Sport fishermen are particularly interested in the king and silver salmon. The problem is how to limit the commercial effort on these two species without restricting effort on the commercially more important red, chum, and pink salmon runs.

THE FISH

Commercial harvest records for king salmon in the inlet date back to 1924. Between then and 1940 approximately 66,000 king salmon were caught annually in the inlet, and this number is now believed to be the inlet's yearly maximum sustainable yield. Between 1940 and 1953, approximately 109,000 king salmon were taken annually and ADF&G believes that these enormous harvests "broke the back of the great runs in Cook Inlet." Between 1953 and 1962 the average annual catch plummeted to 43,000 fish, and between 1963 and 1971 the annual average was only 11,000 kings.

According to ADF&G, king salmon enter Cook Inlet in two distinct time periods. An early run reaches the nothern district of the inlet in mid-May, peaks in early June, and is essentially in the rivers by June 25, the opening of the commercial season. This early run is presumably destined for the northern district streams with the Susitna River being the major producer. There is also an early June run to the Kenai, Kasilof Rivers.

Since most of this early run of kings is in the rivers before the commercial season opens, it is relatively untouched by the commercial effort. That, however, has not helped many sport fishermen. Because the king runs are depressed sport fishing for king salmon has been prohibited in the northern district for the last four years.

ADF&G believes that a second run of kings, bound for rivers south of the forelands, enters Cook Inlet in the last week of June, peaks in mid-July, and is over by mid-August. This late run, according to ADF&G biologist Dave

Daisy, is almost impossible to segregate as it is intermingled with the inlet's commercial red salmon run.

For the last 15 years the commercial fishery has taken about 5,000-6,000 of these kings every year incidental to their red salmon catch. Daisy commented that "in order to allocate those 5,000-6,000 kings to the sport fishery, you would have to cut out a lot of commercial fishing."

In addition to the kings, sportsmen are particularly interested in silver (coho) salmon. Sam McDowell points out that last year over 38,000 silvers were caught commercially after August 15. McDowell feels these fish could, and should, be allocated to the sports fishery by prohibiting commercial fishing after August 15.

A 10-year average of fishing in the inlet shows that 36,376 salmon of all five species are annually caught after August 15. Ninety-two of those salmon are kings, 462 reds, 4,616 pinks, 10,384 chums, and 20,822 silvers. Russ Redick feels that approximately 13,000 of those silvers would be available to the sport fishery if commercial fishing were prohibited after August 15.

An August 15 cut-off date would probably hurt relatively few commercial fishermen, but it is uncertain whether it would help the sport fishermen. ADF&G biologist Dave Daisy told *Seas & Coasts* that the August 15 cut-off would probably not mean any more silvers for the inlet's northern district. "As near as we can tell, these late cohoes are going to the Kenai-Kasilof area where there are adequate silvers already. The silvers headed for the northern district are already through by August 15."

There is no easy solution to the conflicts in Cook Inlet. Sport fishermen have legitimate complaints, but it is debatable whether the proposal to restrict the commercial season from July 1 to August 15 would solve them. Increased access or the ability to segregate the runs might be better long range plans.

In any event the conflicts between sport and commercial fishermen in the inlet will only increase in the future. The big question is whether ADF&G will come up with a fair distribution scheme or whether the ultimate solution will be a political one.

June 1976

The Rest of the State

How do things look in other parts of the state?

In Southeastern Alaska ADF&G personnel report that the distinction between sport and commercial fishermen is "a rather gray area." Since stream fishing for salmon is prohibited in Southeast, sport fishermen have moved to salt water where they hand troll in small boats. David Cantillon, area management biologist in Juneau, commented that most of these trollers license as commercial boats to avoid the sport fish bag limits and one-pole-per-person restriction. Commercial boats also qualify for a 25 per cent break in fuel costs and are probably used by many as a tax write-off.

With most sport fishermen licensed "sport-commercial", conflicts between the user groups are few and far between. Cantillon feels that any conflicts in the near future will occur around the more populated areas like Ketchikan, Juneau, and Sitka.

John Valentine, ADF&G's management biologist in Ketchikan, feels certain that conflicts "will arise eventually." He adds that for the first time some areas around Ketchikan will be closed to commercially registered vessels this year. In the past a commercially licensed boat could still fish for king salmon with a sport license.

Moving up the coast conflicts are minimal with one sore spot in the Copper River area. ADF&G issues around 35,000 permits each year to Alaska residents for taking red salmon from the Copper River for subsistence purposes. Commercial fishermen in Cordova question the definition of subsistence in this case and the amount of fish which are managed for this dip-net fishery.

The number of salmon taken in the subsistence fishery on the Copper River has varied from 17,000 in 1966 to 45,000 in 1973 to 29,000 last summer. Because of the controversy over what is and what is not subsistence, the subsistence fishermen on the Copper River are now subject to bag limits based on income. If an individual's income for last year was less than $5,000 he may take up to 250 fish and a family up to 500 fish. If their yearly income was over $5,000, however, a family or individual is limited to 40 fish.

Kodiak Island remains a commercial fishing mecca and conflicts between sport and commercial fishermen are at this point minimal. With most of the coastline owned by the Koniag village and regional corporations, access will probably be the biggest problem facing sport fishermen in the near future.

In the Bristol Bay area both sport and commercial fishermen are arguing over the fate of Arctic char. Commercial fishermen see the char as an unwanted predator on salmon smolt. To sport fishermen the char represents "some of the best sport fishing you can imagine."

In response to commercial fishermen ADF&G plans to impound "all the char they can catch" at the mouth of the Agulukpak River this summer. The char will be impounded for about six weeks right in the middle of the sport fish season.

At the nearby Agulowak River ADF&G will be taking a census to estimate the char population and their digestive rate of salmon smolt to predict the number of returning adult salmon which would be saved if char predation in that river were stopped.

The four sport lodges in the area are concerned not only about the impaired fishing but also with losing the area's traditional image as an untouched wilderness fishery and may take ADF&G to court. A census on the number of sport fishermen using the Wood River area will be taken for the first time this summer, but area biologist Lou Gwartney suggests it is at least a thousand.

Gwartney predicts that future conflicts in the Bristol Bay area will be between sport, commercial, and subsistence fishermen over king salmon in the Naknek and Nushagak Rivers. At this point Gwartney says these conflicts seem down the road but adds that "They've promised us oil wells, cities springing up, and roads out here all in the next 10 years, and if that happens we'll have all of these problems a lot quicker."

In the Interior of Alaska manage-

ment biologist George Van Wye reports that conflicts are minimal because of the high cost of transportation and because freshwater salmon fishing is discouraged by the discoloration of salmon by the time they reach the area.

Sheefish, however, may cause some controversy between sport and subsistence users in the near future. Van Wye reports that there has been a dramatic increase in the number of sport fishermen flying in for sheefish in the last five years. He explained that since sheefish are "a big (40 pounds), good fighting, and good eating fish and Alaska is the only place in the 50 states to catch one," the fly-in fishery will become increasingly popular.

Van Wye adds that "as soon as the pipeline and all of this $60 per night for a room baloney is over, the sport fishing industry is going to become a big part of the economic picture in the Interior."

June 1976

Capital Construction Fund

A number of fishermen in recent months have inquired about the Capital Construction Fund. Following is a list of frequently asked questions and their answers:

Question: What is the Capital Construction Fund (CCF)?

Answer: CCF is a federal program provided for under Public Law 91-469. It provides certain tax benefits to commercial fishermen for building a new vessel or purchasing or reconstructing a used vessel, including its gear if the gear is part of the vessel purchase.

Question: How does it operate?

Answer: It authorizes owners or lessees of documented vessels to establish, through an agreement with the Secretary of Commerce, a special fund in a depository that is mutually satisfactory to you and a representative of the Secretary of Commerce. Generally, this means a local bank or savings and loan association which is insured by the Federal Deposit Insurance Corporation (FDIC).

Money earned from your commercial fishing operations can be deposited into this fund and become exempt from taxes. Before CCF was created, you had to buy or improve vessels with the money left over after paying your income tax. Now the CCF offers you a way to use before-tax dollars to buy or reconstruct a vessel.

Question: Who is eligible?

Answer: You are eligible and can enter into a CCF agreement if your answer to the following four questions is "yes."

(1) Are you a citizen of the United States?

(2) Do you own or lease a documented fishing vessel?

(3) Will your new vessel be built or reconstructed in the United States?

(4) Will the vessel be registered in the United States?

Question: Does the Government take any of the money that I put into CCF?

Answer: No, the government does not put money into the fund nor take any money from it. The money you put into CCF is all yours. In fact, you get a tax break on the money you deposit.

Question: How does that work?

Answer: Your taxable income for the year is simply reduced by the amount you deposit in the fund.

Question: Are there any limits to how much I can deposit?

Answer: Yes. In any tax year the amount you deposit cannot exceed the *sum* of the following:

(1) Your taxable income from your fishing operations in the fisheries of the United States;

(2) The net proceeds, including any mortgage you hold, on the sale of your vessel involved in the fund;

(3) Receipts from the investment or reinvestment of amounts held in the fund, and

(4) Depreciation from agreement vessels.

Question: How are deposits into the fund handled?

Answer: There are three accounts in the CCF. They are the Capital Account, Capital Gains Account and Ordinary Income Account.

(1) Ordinary Income Account—This account receives the deposits that would normally be subject to income taxes. This would normally mean the money earned from fishing your eligible vessel. Other money is also credited to this account—short term capital gains, non tax-exempt interest earned and whatever dividends are earned from investments in the fund. That's right: Money deposited in the CCF can be used to purchase interest bearing securities approved by the Secretary of Commerce. If the Secretary of Commerce agrees, you can invest up to 60 percent of the money you have in CCF in the stock of domestic corporations.

(2) Capital Gains Account—If you experience any income that is taxable as long term capital gains, it is deposited in this account. The most common example is that of selling your vessel. If you sell a vessel which you've owned for more than six months for a price higher than its depreciated value, the excess would be placed in this account.

(3) Capital Account—This account receives the money you wish to deposit that ordinarily is nontaxable. Examples are depreciation, tax-

exempt interest received on state and municipal bonds and any money you receive from the sale of your vessel which does not exceed its depreciated value.

Question: How do I get my money out of the fund?

Answer: Your money can be withdrawn by obtaining the consent of the Secretary of Commerce. You can ask for either a qualified or nonqualified withdrawal.

(1) Qualified Withdrawal—You request a qualified withdrawal when you want to use the money to purchase a vessel or to build or reconstruct a vessel.

(2) Nonqualified Withdrawal—This is a withdrawal from the fund for any purpose not specified under qualified withdrawal.

Question: What happens if I make a *nonqualified* withdrawal?

Answer: Money from each of the three accounts is treated differently under a nonqualified withdrawal.

(1) Ordinary Income—Money withdrawn from the ordinary income account is simply added to your taxable income in the year it is withdrawn. You therefore pay tax on it when withdrawn. An additional charge of eight percent of the tax is levied for each year the money was in CCF.

(2) Capital Gains—Money withdrawn from this account will be subject to the capital gains tax rate. The same regulation concerning a payment of eight percent of the tax due applies here.

(3) Capital—Money withdrawn from this account is not taxed since this account receives only money that is nontaxable.

Question: From which of the three accounts do *qualified* withdrawals come?

Answer: The money comes from the accounts in the following order:

(1) Capital Account—None of the money withdrawn is taxed, and the depreciation base of the vessel is not lowered.

(2) Capital Gains Account—None of the money withdrawn is taxed. The depreciation basis of the vessel in which you are interested is lowered by one-half of the amount of the withdrawal.

(3) Ordinary Income Account—None of the money withdrawn is taxed. The depreciation basis will be lowered by the amount of the withdrawal.

Alaskan fishermen who are interested in additional information on this program may contact Jack Kelly, Coordinator, Financial Assistance Programs, National Marine Fisheries Service, P. O. Box 1668, Juneau, Alaska 99801.

Feb. 1973

STATE LOAN FUND ASSISTS FISHERMEN

In 1972 the State legislature created the Commercial Fishing Loan Fund (CFLF) to provide financial aid to commercial fisherman for the upkeep of their gear. Several fishermen have inquired about this program; here are some of the more frequently asked questions and their answers.

Question: What is the Commercial Fishing Loan Fund?

Answer: CFLF is a state program provided for under Alaska statute 16.10.7. It provides funds to commercial fishermen for the repair, restoration or upgrading of existing vessels and gear, the purchase of entry permits, and/or the purchase of construction of vessels.

Question: How does it operate?

Answer: CFLF provides aid to fishermen through long-term, low interest loans. Loans of up to $100,000 may be obtained under this program and shall be secured by acceptable collateral. The amount of a loan can be up to 75 percent of the appraised value or the purchase cost (whichever is lower) of the collateral offered. For example, if a fisherman applies for a $60,000 loan and wants to use his boat as collateral, then the boat with the proposed improvements must be worth $80,000. The effective interest rate on the loans is 7½%, and repayment periods may run as long as 15 years. In certain cases, repayment plans may include extensions for poor fishing seasons.

Question: Who is eligible?

Answer: Any individual commercial fisherman who has been a state resident for a continuous period of five years and has had a commercial fishing license for three years.

Question: Who is responsible for administering this program?

Answer: The Alaska Department of Commerce, Division of Business Loans. Requests for application forms or answers to specific questions should be referred to: Director, Division of Business Loans, Department of Commerce, State of Alaska, Pouch DB, Juneau, Alaska 99801, Telephone: (907) 586-2775.

Question: What information is required in a loan application?

Answer: (1) Letter of Intent; (2) Business Resume; (3) Personal Resume; (4) Year End Financial Statement; (5) Collateral; (6) Evaluation of Collateral by a Qualified Appraiser; (7) Pro Forma Financial Statement; (8) Tax Returns for the Past Three Years; (9) Proof of Vessel and Gear Licenses.

Feb. 1974

COMMERCIAL FISHING LOANS

Where to . . .

How to . . .

By
Craig Wiese and Peggy Parker
Marine Advisory Program
University of Alaska
Cordova, Alaska

Getting a commercial fishing loan need not be as formidable as tradition has made it out to be. There are more loan sources and loan opportunities than most fishermen realize.

No lender will be willing to finance a project which is clearly not economical. But it is probable that a fisherman could find as many different opinions on the soundness of a marginal, or even good fishing investment and the fishermen behind it as there are lenders to review it.

The fisherman armed with a well prepared investment proposal and some experience in the fishing industry is likely to find that funding is available for almost any reasonable fishing project.

The following list of loan sources for Alaska's commercial fishermen is not complete. It includes only the more conventional lending agencies which are in business to solve the financial problems that most fishermen face at one time or another.

If one of these agencies cannot help, then private lenders and venture capitalists are the next likeliest sources to turn to. The description following each loan source includes only the basic points, and interested fishermen should investigate each source thoroughly before making a committment.

State of Alaska: Commercial Fishing Revolving Loan Fund

This state-sponsored loan is available to Alaskan fishermen who have been residents for five years and have held a commercial fishing license for three years. The program is not open to non-residents.

Loans up to $150,000 can be arranged. The repayment period may not exceed 15 years, and the annual interest rate is held at an unbeatably low 7 percent.

The loan funds must go toward repair, restoration, or upgrading of existing vessels and gear, or for the purchase of vessels, new or used. The loan may also be used to finance purchase of an entry permit.

All collateral must be professionally appraised. And, if the collateral is a vessel, a marine survey or new construction estimate must accompany the loan application. No loan will be made for more than 75 percent of the value of the collateral offered to secure the loan.

A service fee of .5 percent will be charged borrowers. This .5 percent will be "revolved" back into the loan

appropriation's fund; it's the state's way of creating a "revolving loan fund."

Income tax returns, business and personal resumes, and financial statements must accompany an application. Application forms and a complete list of pertinent information required to secure the state loan can be obtained by writing:

Dept. of Commerce & Economic Dev.
Division of Business Loans
Pouch D
Juneau, Alaska 99811
(907) 465-2510

An attractive aspect of the state fishing revolving loan fund is that amortization plans for repayment of the loan may include extensions for poor fishing seasons.

State of Alaska: Small Business Loan

This financing is available for Alaska's tender/packing-type vessels and to Alaskan canneries and other businesses related to the fishing industry which are not eligible for a state commercial fishing loan.

Eligibility rests on the business' potential for growth and its contribution to employment in the community. The applicant must also be a resident, employ less than 50 people and make less than $2 million in annual gross sales.

As of September 18, 1977, the ceiling on the State Small Business Loan is $300,000. Loans secured by real estate may be amortized over 15 years. The state will normally consider loaning up to 75 percent of the appraised value of real estate offered, and up to 60 percent of the appraised value of equipment and machinery offered as collateral.

Interest is charged at 8 percent per year. Applications may be obtained by writing to the Dept. of Commerce and Economic Development at the address given above.

Bureau of Indian Affairs (BIA)

Loans from the Bureau of Indian Affairs are available to fishermen who are one-quarter or more Alaskan Native. Application is made through the local BIA Agency Credit offices located in Anchorage, Juneau, Fairbanks, Bethel, and Nome.

There is no set limit on loan size, percent of financing available (downpayment requirement) or collateral required. In fact, the major advantage of BIA loans is that they are designed to assist individuals who cannot meet the downpayment and collateral requirements of conventional lending sources. Another advantage is that interest rates are lower than many – but not all – conventional sources. The rate varies between relending associations, but is pegged between 1 percent and 2 percent above the federal discount rate. The discount rate over the last couple of years has ranged between 6.25 percent and 8 percent and is currently near 7 percent.

The payback period on BIA loans typically averages about ten years. Generally the larger the loan, the longer an individual has to repay. The BIA will lend for new construction, rehabilitation, repair or maintenance of a vessel, but prefers to stay away from working capital loans.

Commercial Banks

Banks are often the first stop for fishermen who are not eligible or cannot qualify for a State commercial fishing loan or a BIA loan. Being in the lending business they are capable of handling loans for all types of fishing and processing activities and all sizes of operations. Banks can also offer valuable management advice. Establishing a good working relationship with a bank can help lead to a successful fishing business.

Bank loan terms vary with the amount borrowed (or requested) and a host of other factors, including past fishing record, personal finances, and income potential of the new investment.

For loans up to $100,000 or $150,000 banks will generally finance 66 percent to 75 percent of the estimated value of new boat construction, or the survey value of a used boat. Payback period on loans in this size-category averages three years. For intermediate-size loans (in the $150,000 to $500,000 range), the level of financing can be expected to remain the same but the repayment period will vary between five and ten years, with seven years a typical figure. For large loans, in the million dollar or more class, financing for up to 15 years is becoming available.

Banks' interest rates vary as we all know, but currently (September 1977) the rate for fishing vessels is around 10.25 percent.

For large loans of several hundred thousand dollars or more, some banks are willing to finance more than 75 percent of the project cost. But the interest rate on such loans can be expected to be higher as well.

Each fisherman seeking a bank loan of more than a few thousand dollars should be prepared to show a loan officer a detailed record of the last three to five years' income and expenses from fishing (tax records are a good source for this information), a financial statement of personal assets and liabilities, and a projection of expected income and expenses over several years from the new investment. These are commonly required by most lending organizations, including most of the loan sources listed in this article.

One final note about banks. Banks are competitive and no two loan officers operate exactly alike. Lending policies can vary from branch to branch of the same bank, and certainly between banks. So if you are seeking a loan and you can't get what you want from the first bank you walk into, don't give up. Shop around. Your luck could very well improve.

One way to substantially improve your chances of obtaining a loan is to qualify for a government guaranteed loan. The loan comes from the bank but the government guarantees payment in case you default. Read on!

Fishing Vessel Obligation Guarantee (FVOG)

This program is a real sleeper. Few fishermen or bankers are familiar with it, but it can be beneficial to both.

The system works this way. The federal government provides certain benefits to banks which in turn offer lowered interest rates to the fishermen. In some cases it can provide the opportunity for fishermen to get bank loan increases when this couldn't be done otherwise. Some of the benefits offered to your banker include:

1. No risk of loss. The government's guarantee is for 100 percent of the loan's principal and interest.

2. No paper work. The government provides credit and feasibility investigations, closing document preparation, and closing service.

3. No collateral servicing. The government holds and services all collateral in its name.

4. Guaranteed notes are classified as Type 1 investment securities. Banks can buy and sell them for their own account without limitation.

For the fisherman, it means that your bank should be able to offer an interest rate reduction somewhere between 1 and 2 percent below the conventional rate. To put this in more practical terms; on a

$100,000 loan over three years, a 1.5 percent interest rate reduction from 10.5 percent to 9 percent can mean a savings of close to $2,600.

If finding a lender, even with the aid of an obligation guarantee, is difficult, the National Marine Fisheries Service Financial Assistance Division (the office administering FVOG loans) will attempt to find a lender for you. They have developed a register of commercial, institutional and private investors across the country who are interested in lending money with the aid of a guarantee obligation.

The FVOG program will guarantee 75 percent of the financing or refinancing of construction, reconstruction, or reconditioning of a fishing vessel of five net tons or over. The obligation guarantee cannot be used for purchasing a used boat or for financing normal operating or repair and maintenance costs.

The guarantee will cover financing up to 15 years for newly constructed boats, and up to seven years for reconditioned or reconstructed vessels.

It would be prudent to allow about two months for processing an FVOG loan. The application procedure will include an application/investigation fee and an interview with a NMFS finance officer as well as the bank's loan department.

National Marine Fisheries Service charges a .75 percent annual guarantee fee on the unpaid principal during the life of the loan. In other words, if the bank drops its interest rate from 10.5 percent to 9 percent of the unpaid balance, the NMFS guarantee fee will move it back up to 9.75 percent. The program still provides an interest rate break as well as other financial advantages to the fisherman.

The first step in applying for a Fishing Vessel Obligation Guarantee is to contact the nearest NMFS financial assistance office. Alaskans and fishermen in Washington and Oregon should contact:

Jim Nickerson
1700 Westlake Avenue North
Seattle, Washington 98109
(206) 442-5532

Production Credit Associations (PCAs)

PCAs operate on a cooperative shareholder's system: for each $100 a fisherman wants to borrow, he much purchase $10 worth of stock in the association. In actuality the borrower winds up borrowing $110 for each $100 needed. Conversely, as the loan is paid off, shares are also retired so that the stock value remains at 10 percent of the unpaid principal value.

Presently the PCA will loan up to 60 percent of the estimated value on new vessel construction and 50 percent of the survey value of an existing vessel.

In addition, the PCA will loan the 10 percent necessary to purchase shareholder's stock. For example, on a $100,000 new construction project, a qualified fisherman may borrow $60,000 toward vessel construction plus $6,000 for shares in the association. The entire $66,000 will be charged the PCA's going interest rate.

The interest rate at the Portland PCA varies, but has remained below 8 percent for the past year. This very competitive rate is partially offset by the fact that a borrower normally must borrow the extra money to purchase stock and then pay interest on it. (Remember that the stock is also sold at the purchase price so nothing is gained or lost in the transaction.) However, with the added interest cost, the effective interest rate is still hard to beat. For example, with a simple interest rate of 7.75 percent on a vessel loan, plus an additional loan of 10 percent for shares, the effective interest rate becomes 7.75 percent + 0.775 percent = 8.525 percent. Still very competitive.

The maximum term of PCA loans is seven years with provisions to easily extend that to ten years. Legislation is presently being developed to allow PCAs to make 15-year loans.

Besides making loans for vessels, PCAs lend for general business operations, including equipment and family living requirements, and to persons furnishing services to fishermen which relate directly to operating needs — boatlifts, warehousing, and parts and repair facilities are examples.

There is no ceiling on loan size. Apply to:

J. E. Herberger, Manager
Northwest Livestock PCA
1212 Commonwealth Bldg.
Portland, Oregon 97204
(503) 222-1713

Federal Small Business Association (SBA)

Banks generally administer SBA loans, which can be used for financing boats which are *under* five net tons. The SBA loans are another form of a federal guarantee on money borrowed. The Small Business Administration will guarantee up to 90 percent of the loan offered by the bank.

Downpayments vary with each loan, but the SBA will allow the borrower to put down as little as 10 percent in some cases.

In order to be eligible for an SBA guarantee, a fisherman must first have applied for and been refused a loan from a bank. Without this rejection, a fisherman cannot apply for an SBA guarantee. A fisherman's inability to receive funding from a bank or from the NMFS's Fishing Vessel Obligation Guarantee program should be explained in detail and attached to his application for an SBA guarantee.

In some cases an SBA loan can be secured through the SBA itself, without dealing with a bank. This is a separate program from the SBA *guarantee* program. Securing loans directly from the SBA is very rare and should be attempted only when all other methods have failed.

Processors

One of the most common loan sources in the past has been fish processing companies. But with the trend toward expensive vessels, large cash needs to cover today's ex-vessel fish prices, and the advent of the State Commercial Fishing Loan program, the processors are generally easing out or simply getting out of the loan business.

For those fishermen seeking financing from processors who are willing to loan, there are two considerations to keep in mind.

First, the processor normally must borrow money from a bank or other lending source in order to lend to you. Consequently, the interest rate charged will be at least what the bank charges and perhaps more.

Second, the terms of the loan (such as collateral requirements, loan size, and repayment schedule) have traditionally been worked out on a one-to-one basis between plant managers and individual fishermen. They are usually dependent upon each fisherman's fishing background reliability in the eyes of the plant manager.

One more consideration. When a processor makes a loan to a fisherman it is generally understood that the fisherman will sell his catch to the processor. There are circumstances where this is not always possible, but it is generally expected.

Some processors who no longer make

direct loans will assist a fisherman in obtaining a loan from another source by guaranteeing the loan or a portion of it. As with direct loans, it is normally expected that the fisherman will sell his or her product to the processor guaranteeing the loan.

Getting It Together

It is not overdoing it to stress the importance of approaching a lender with a well prepared loan proposal. As pointed out by a lawyer working with fishermen in Oregon, "Getting a loan is somewhat of a sales problem and the product to be sold is the fisherman's ability to repay the money at a reasonable rate." The loan proposal should contain the information necessary for the lender to judge your ability to repay.

A complete loan proposal will include:

1. A resume containing references and a business experience summary pertaining to your fishing background.

2. A financial statement of prese assets and liabilities.

3. Income and expense statements for the last three to five years fishing – income tax and catch records are good back-up for this.

4. Income and expense projections for the next three to five years using the new investment.

5. A detailed description of the proposed capital investment – a boat for example would include a description of the design features plus initial cost and operating costs.

6. Insurance information on the new investment.

In this article we have tried to explain what loan sources are available and what kind of information a lender needs to know. It is hoped that borrowing for your fishing business will be a less formidable and more successful enterprise.

Good luck and good fishing.

Oct 1977

LETTER TO THE EDITOR

We want to clarify an aspect of the state fishing loan that we described inaccurately in "Commercial Fishing Loans: Where to . . . How to . . ." in the last issue of *Alaska Seas and Coasts.*

State loans are available for seven percent interest, and loans for documented boats are charged a .5 percent service fee. This half of one percent is charged by the State Department of Revenue for servicing the loan, and is *not* (as stated in the article) revolved back into the loan appropriations.

Another point to clarify is that in order to be eligible for a Production Credit Association Loan (PCAs), the applicant must become a member of the Production Credit Association cooperative. This is done by buying shares in the cooperative. The shares must total 10 percent of the value of the loan desired.

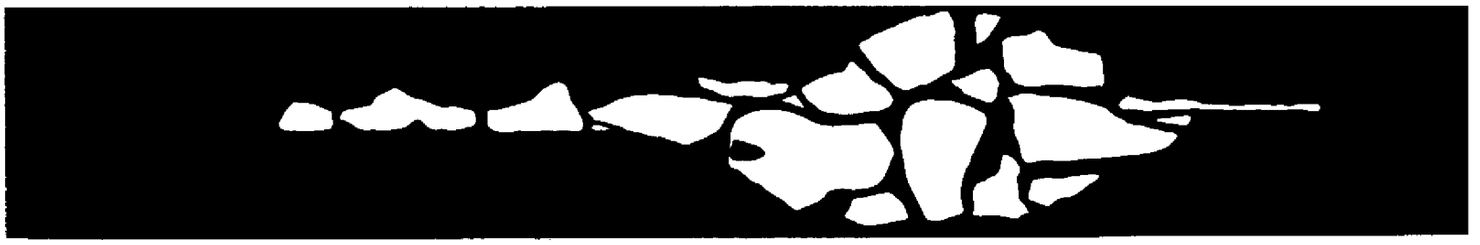
Craig Wiese & Peggy Parker
Marine Advisory Program
University of Alaska
Cordova, Alaska

Dec 1977

Section two

ALASKA Seas and Coasts

A Newsletter for the Alaska Commercial Fishing Industry



Marketing and Handling

Section two: Marketing and Handling

The marketing of Alaska seafood is a dynamic business. Rapid change has come in the form of new government regulation, quality control, foreign markets and new products. Investment from abroad has also become a force in the industry, increasing the options for processors needing investors.

Everyone on the supply side of the industry is interested in getting the highest price possible for harvested fish. Since price depends largely on what condition the fish is in when it reaches the marketplace, particular care must be taken in handling fish on the way. Handling care starts in the field, as noted in the article on handling net caught salmon, and continues right up the processing chain.

Also discussed in this section are new products that can be made from what has been considered waste in processing.

Section Two

MARKETING AND HANDLING

Processors and the Law

In recent years the regulations governing seafood processing have become formidable. One item of equipment in a processing plant may come under the jurisdiction of three or four different government agencies, and many times the standards of these agencies are conflicting. One Kodiak processor probably speaks for many in the State when he says, "it is physically and mentally impossible for any one person or group of plants to keep up on all the requirements." In response to this situation, the Marine Advisory program set up an industry "tell it like it is" conference on regulatory agencies. During the conference, which took place on October 10-11 in Anchorage, processors heard representatives from the Occupational Safety and Health Administration (OSHA), the Food and Drug Administration (FDA), the Alaska Department of Health and Social Services (ADH&SS), and the Environmental Protection Agency (EPA). A summary of each agency's comments, and a sampling of the questions from the audience follow.

OSHA

OSHA is the three-year-old federal agency designed to assure "safe and healthful working conditions and to preserve our human resources." In the seafood industry OSHA is concerned with any place of work. To date, most of its efforts in Alaska have been concentrated on the 10 to 20 floating processors in the State (from Yakutat to Cordova and on out the Chain). OSHA has concurrent jurisdiction with ADH&SS over onshore canneries, but OSHA standards are generally preempted by the State. Darrel Miller, the Assistant Area Director of OSHA in Anchorage, told processors at the conference that "if you would follow State standards for general health and safety, you will have no problem with us." Presently, OSHA has not been out on the high seas or involved with smaller fishing boats, but standards for small boats have been discussed and seem like a possibility for the future.

On the federal level OSHA does seem to conflict with other agencies, especially the FDA. For example, OSHA may require the floor in a processing plant to be rough so employees could not slip, while FDA would require a smooth, slick floor for easy cleaning. Or OSHA might require a shield around a piece of equipment to lessen noise, while FDA would object because the shield made the piece of equipment uncleanable. In these cases of conflicting jurisdiction, the processors' best recourse is to call one of the agencies. That agency will in turn contact the other agency and come up with a solution acceptable to both. Miller stated that OSHA would "never allow an employer to be put in double jeopardy."

When asked by the audience how the Alaska seafood industry rated in terms of safety compared to other types of operations, Miller replied "somewhere in the middle. It is not as good as some, and it is not as bad as some. Due to the nature of the operations there are a lot of inherent hazards."

FDA

The Food and Drug Administration is the federal agency responsible for protecting the public from unsafe foods. In the seafood industry, FDA has traditionally been involved with sanitation. According to LeRoy Gomez, the Deputy Regional Director for Alaska, Washington, Oregon, California, and Idaho, the FDA role is expanding. In the future one can look for increased FDA activity in the regulation of seafood imports, in nutritional information and expanded labeling, in prices, in safety, and in the entire harvest-process-distribute procedure. At the conference representatives from FDA explained how their present program works.

James McGee, an investigator for FDA, described what he checks for during an on-site inspection of a seafood processing plant. First are the raw materials. Is the salmon beginning to rot? are there flies on it? are there signs of rodents in the salt? Second is the control system used to maintain quality. Third is the building. Are the screens adequate? are there uncleanable cracks in the floor? Fourth is the equipment. Is it cleanable? is wood used? Fifth is the processing operation itself. Does the retort operation follow federal standards? Does the employee running the operation understand the regulations? To complete the inspection, samples of the product may be taken for further lab tests.

In cases where there are problems in a plant, FDA has five different approaches to achieve their aim of consumer protection.

1) The Information Letter. This is a warning notice that outlines any problems found during an inspection. It includes observations and requires a response within 15 days.

2) Seizure of Product. This is a civil remedy against the goods, not against a firm or managers. Notice will be sent to whoever has an interest in the product. It is possible to recondition merchandise after seizure, if it is physically and economically efficient.

3) Regulatory letter. This is used where misbranding (i.e. net weight incorrectly labeled), potential hazard situations, or other intermediate violations occur. The regulatory letter is sent by certified mail to the head of the processing plant and gives 10 days for response. If there is not an immediate correction of the problem, a seizure plus legal action is likely.

4) Injunction. This halts a firm from legal violation by stopping that part of the operation which is illegal. The injunction would remain in effect until certain conditions were met (i.e. a quality control program instituted). Short-term injunctions are put into effect by a temporary restraining order.

5) Prosecution. This is a last resort. If a processing plant refuses to submit to FDA regulation, there will be a trial with a maximum penalty of a $1,000 fine and one year in jail.

ADH&SS

The Alaska Department of Health and Social Services was created in 1965 to eliminate the chaos which existed between the State agencies regulating the food industry. Currently seafood sanitation accounts for about 10 percent of ADH&SS's time and effort. In the past ADH&SS has been primarily concerned with educational efforts, but the department is becoming increasingly regulatory in character. Sid Hidersdorf, Assistant Director of ADH&SS, stated that the Department would "no longer tolerate unsanitary conditions," and is beginning "to enforce laws which have been on the books for years."

Ken Torgerson, Seafood Sanitation Coordinator for ADH&SS, underscored Heidersdorf's contentions and outlined the issues which were of concern to him.

—Herring roe processing. The decomposition of fish to get roe is not acceptable, the flesh must be used in some way.

—Salmon roe processing. This operation needs more sanitary facilities.

—Storage. Especially crab and shrimp processors need to protect shipping cartons, salt, etc., from rodents. This is cause for embargo.

—Cannery Housing. This will be controlled by OSHA for both onshore facilities and floating operations.

—Kiln-dried Salt. Objected to because it is more subject to contamination due to nonremoval of impurities during manufacture than other forms.

—Dead crab processing. If a crab isn't moving he's dead. If it seems to the inspector that your butcher is not taking time to check, ADH&SS will embargo.

—Saltwater sources. Require the same standards as potable water, except for salinity.

—Protection of live-held crab. These crab cannot be held in sewage-contaminated water, and the tanks cannot be open for bird contamination.

—Sources of Raw Material. The processor is responsible for the quality of fish they accept.

—Inspectional Aids. ADH&SS will use cameras during inspections. Pictures will not be given to anyone, although ADH&SS files are open and notes may be taken.

—Hair restraints. Hair must be kept out of product. Beards should be under kerchiefs and long hair in nets.

—Outer garments. Employees should be in clean clothes or clothes only used in the cannery.

—Training. Employees need to know proper methods of handling the product and the equipment. If you would like any type of educational program, ask us and we will travel at our own expense.

—Quality Control. No processor can do everything, you need a specific person responsible for quality control.

—Bacterial levels. Bacteria levels are only an indicator of product quality, absence of bacteria does not identify a good product.

—Authority. ADH&SS has the authority to regulate all products in this State.

EPA

The Environmental Protection Agency concerns itself with a wide gamut of topics including waste, air, pesticides, water, and noise. It specifically affects the seafood industry with its regulations on seafood wastes and the disposal of other materials at sea.

The Water Pollution Control Act of 1972 names the EPA as the administrator of a program to restore and maintain the quality of the Nation's streams, lakes, and coastal waters. Under the Act, EPA set up effluent limitations for sources of water pollution (i.e., canneries). Last year EPA published its effluent guidelines for shellfish wastes. Processors are now required to screen shellfish wastes in all nonremote areas (Ketchikan, Juneau, Petersburg, Cordova, Kodiak, Anchorage), and in remote areas to grind and dispose of the wastes at sea. Guidelines for salmon processors were imminent as **Seas and Coasts** went to press.

EPA also affects the industry with its regulations on ocean dumping of wastes other than seafood. For example, if a processor wanted to dump a load of defective cans, under the Ocean Dumping Act he would have to go to EPA for a permit. Seafood waste itself is exempt from the Ocean Dumping Act and may be discarded anywhere outside of harbors, enclosed coastal waters, or other areas where EPA feels dumping could create a health hazard.

Questions

By what date will you require all waste to be turned into meal?

We have a zero discharge goal (not law) for 1985. For remote areas, only grinding and deep water discharge will be required for the foreseeable future.

How is a remote area determined?

Strictly by population. Anchorage, Cordova, Juneau, Petersburg, Ketchikan, and Kodiak are the only places in Alaska considered nonremote at this time.

Please define a deep water discharge.

Seven fathoms or approximately 42 feet below mean lower low water.

Will EPA require more stringent treatment in areas where processors are following the current guidelines but there is still a water quality problem (i.e. requiring air flotation equipment)?

If, after application of best practicable treatment (screening for nonremote areas, grinding and deep water discharge for remote areas) there is still a water quality problem, we will require more. Whether it would be finer screens or air flotation depends on the situation.

Are there any federal or state tax incentives available for voluntary pollution control devices?

Pollution equipment expenditures can be written off on accelerated tax write-off schedules. Information on this is contained in the "Tax Amortization" pamphlet available at EPA.

How far in advance does a processor have to apply for an EPA permit?

For waste water discharge — 180 days prior to discharge. For ocean dumping there is no prescribed period of time.

Where can seafood wastes be dumped without a permit?

Outside harbors, enclosed coastal waters, or other areas where EPA feels dumping could create a health hazard. For a ruling on this subject contact the Alaska Operations Office of EPA.

In harbors where seafood solids have built up are there plans to dredge or clean up?

We're not requiring any dredging at this time. Other actions may be taken by the Army Corps of Engineers.

Is the final report of the National Field Investigation Center of EPA survey on the Alaska Seafood Industry available?

In the Anchorage office we have a copy of the draft report, but have received no word on the final issue date.

Are diffusers being considered for discharge treatment?

Not at this time.

Is there a State or Federal law which will require seafood plant managers to go to school?

No, but operators who thermally process canned foods must have in their plant whenever processing, personnel who have passed the FDA/NCA Better Process Control School.

What materials are required for live tank construction?

No materials, per se, are either good or bad. The important factors are aeration during hot weather and that the intake is as far away as possible from any industrial or domestic discharges.

How do current food processing facilities in Alaska stack up in your inspections?

There are industry problems. The seafood industry in Alaska would probably not compare well with other food processors either within or without the State.

How much was embargoed this year and what was the outcome of the product?

There were six or seven actual embargoes, which means many thousands of pounds. The outcome varied between destruction (three cases) and return. These estimates do not include voluntary destruction.

Why does the State not have specific bacterial standards?

We don't have the money or personnel. Standards will be coming, it's just a matter of time.

If bacteria count in a finished product is not a determining factor in quality control, what is?

Bacteria count is a good indicator of product quality, but equally important are the conditions under which the product was handled.

Why are there no boat inspections or standards?

We don't have the money or personnel.

The WATCHDOGS of Seafood Product Quality

By Landon Asakawa
Quality Control Manager
Pacific Pearl Seafoods
Kodiak, Alaska

Alaskan seafood products are renowned worldwide for high quality and marketability. Ask an Alaskan fisherman why, and he will tell you "It's the water." Perhaps there is some mysterious relationship between Northern Lights and water quality, but Landon Asakawa offers a more plausible explanation.

The high standards evident in Alaskan seafood products are the result of careful and conscientious quality control by the producers. From the fishermen to the processor, and from the broker to the retailer, the preparation and handling of the products are guided by quality control standards and principles designed to assure that the consumer receives the best possible product. In this article Mr. Asakawa discusses the structure, functions and responsibilities of the quality control departments in seafood processing companies. – Ed.

The maintenance of product quality is the responsibility of each person in a seafood processing company. Because such personal attention to detail is often impossible, it is the responsibility of a quality control department to maintain quality. Whether that department is a one-man operation in a small company, or a large group in a major company, the functions are basically the same. The main responsibility of the department is to insure that the product meets the standards ultimately directed by the consumer's desires. In today's marketplace the consumer, whether a housewife or a fast food business, is the final inspector of the product's quality.

In a typical shellfish operation the daily quality control sampling plan would include monitoring the incoming raw product quality, in-line quality, and finished product quality. For example, in a shrimp operation a *raw product check* may look for freshness, temperature, odor, number of shrimp per pound, and proportion of different shrimp species present. A typical *in-line check* would include the filled weight of the container, the number of peeled shrimp per pound, and the number of defects per pound of shrimp. In a *finished product check* the color, flavor, odor, and appearance of the shrimp would be examined.

Though responsibilities will vary from company to company, a quality control department will probably be responsible for establishing specifications and guidelines, developing testing and sampling procedures, and setting up recording charges and reporting forms. They may also be charged with personnel training, waste-water analysis, and sanitation. Obviously such activities must be founded upon an intimate knowledge of local, state, and federal regulations pertaining to food processing.

PRODUCT SPECIFICATIONS

In order to maintain the quality required by the buyer, a set of product specifications must be established. The first-hand knowledge of the sales department, obtained through customer contact, is combined with the quality control department's input to develop realistic specifications for all the company's products.

Once the specifications are developed they are reviewed by the whole organization, and finally endorsed by the top management. The quality control department then uses these standards to develop their programs.

The quality control department then sets up useful procedures to check the product flow and insure that specifications are met. Random sampling is performed throughout the production period at a sufficient frequency to provide reliable data for the production department.

If there are occasions when the

The seafood containers, the quality and quantity of their contents are constantly monitored as the product moves through the stages of processing. Above, Landon Asakawa, Quality Control Manager, performs a double seam tear-down inspection to assure that the cans have the proper seam and seal. Monina James, quality control technician, performs an in-line micro-biological check of the product and a count per pound of the finished product.

processing is not within tolerances, the quality control department immediately notifies the production personnel of the situation and assists in correcting the problem. It is also the quality control department's responsibility to aid in researching any problem and to provide solutions to prevent any recurrence of the situation.

From the specifications of the quality control department, a standardized set of measurements is developed. Long-term recording and compiling of these measurements can provide additional information for the production department. When summarized, these figures can, within the range of the measurements, provide a quick, useful tool for understanding the production flow. With the use of graphs, measurements of functions can even be plotted together to show if certain products are being maintained within specifications. For instance, a chart showing the number of defects in a given sample will show at a glance when the upper tolerance limits for that product are exceeded. The production personnel can respond quickly to correct the problem.

REPORTS

Summarized daily or weekly reporting is also useful for informing other departments of developments in the processing plant. Data compiled in tabular or graphic form shows developing trends that may indicate the need for alterations in the processing procedures.

In addition to reporting for in-plant use, there are reports required by various state and federal agencies. These records include measurements on low-acid, canned foods. Other operations might require that records be retained by the company until the supply of that production run of finished product is completely exhausted on the market.

WASTEWATER SYSTEM

The wastewater system of a processing plant is maintained by the quality control department. They perform the tests required by the Environmental Protection Agency of the federal government. These tests include pH, settleable solids, total suspended solids, and oil and grease. Usually these tests are performed weekly. The department also monitors daily water usage to determine the volume of waste water issuing from the plant. However, the level of monitoring depends on the location of the individual plant.

PLANT SANITATION

The quality control department is also responsible for plant sanitation. They design and initiate a sanitation program for all employees, and oversee the cleanup operations. Sanitation is monitored daily by this department, and reports are submitted to the line personnel in charge of sanitation, as well as to the plant management. A thorough inspection is conducted each day prior to the production shift so that any deficiencies can be corrected before daily production begins.

This inspection may include the dock or receiving areas, storage areas, and the surrounding plant grounds. An inspection will also be conducted immediately following cleanup operations to determine whether the cleanup crew's areas need further attention. The quality control department will train these personnel in proper cleanup methods, including the different detergents used on the various types of surfaces and machinery.

COMPLIANCE WITH REGULATIONS

Knowledge of local, state, and federal government regulations as they pertain to food processing is one of the more important concerns of the quality control department. The department is responsible for insuring compliance with these regulations in the operation. It is also essential that they are aware of changes in the law so they can be adopted in present and future quality control practices.

Quality control personnel accompany governmental inspectors during official plant inspections. The company's employees can then benefit from the inspector's comments and suggestions. Likewise, a knowledgeable representative of the company will be present to answer the inspector's questions about plant procedures.

EXTRA DUTIES

In addition to the regular functions of the quality control department, they may be asked to participate in or initiate a host of special projects. These projects may include development of new products, remodeling existing processing lines, and setting up product specifications and guidelines for new products. The department may also assist in machinery design and product flow analysis to insure that there is a smooth flow pattern through the plant, and the machinery is easy to clean.

Since profits are often a function of recovery from raw product, the quality control department may be asked to consider means of improving recovery and production. Often an extra set of eyes can spot trouble areas overlooked by others. For instance, where production transfers from one belt to another, there may be product spillage. With the help of simple diverters, there could be considerable savings over a period of time.

Presently there are approximately eight full-time quality control laboratories in operation among the 13 or so seafood processors in Kodiak. Twenty-five to 30 full-time quality control personnel are employed. This represents a sizeable investment to industry. Functioning as the conscience overseer for the processing plants, these people are charged with one of the most important jobs in the fishing industry. If the final product does not comply with regulations or is unacceptable to the consumer, all the efforts of the fishermen and the processing plants have been for naught.

When in doubt . . . RED TAG IT

By JOHN WILLIAMS
Marine Advisory Program

During a recent inspection of a processing plant in Kodiak, the company was prosecuted for not having the required safety equipment on a forklift. The forklift had not been used by the plant for a considerable time, and had been stripped of its battery and other essential parts. This situation was simply a misunderstanding, but it is a good example of the type of thing that can be misconstrued during a regulatory inspection.

Another example might be a pallet of canned product, which for some reason was suspect and was put aside in some corner of the plant until the situation could be examined by quality control personnel. If a FDA inspector were to walk through the plant and notice this lot of suspect product, not knowing the intended disposition of the product, he very likely would take samples which could lead to a serious violation.

There is available to the management of processing plants a workable solution to avoid such misunderstandings. Regulatory agencies must respect the right of management to "red tag" any product or equipment that is suspect or that the firm knows is not in compliance with the regulations. This is accomplished by placing a red tag (such as a red laundry tag) with the word HOLD printed on it, and an explanation of why the tag has been attached. This wording should be similar to: "By authority of (company name), the attached materials, equipment, or product must not be further used or moved until proper investigation and determination can be made regarding its disposition." The card is dated and signed by the person applying the tag at the time of application. It is not necessary or advisable to be more specific as to why the tag has been attached. When the product has been checked or the equipment has been cleaned or upgraded to meet safety regulations, the management representative who removes the tag should explain on the back why the material was tagged, and its disposition upon removal of the tag. The explanation is signed and dated. The tag finally is placed in the quality control file. This is important in case future examination of the tag is requested by a regulatory inspector. The tagged product or equipment can be cited by the inspector on his report but cannot be prosecuted as a violation.

This managerial right to red tag is quite extensive. For instance, a management representative during a regulatory inspection can actually walk ahead of an inspector and red tag any equipment, product, or personnel which is out of compliance with the quality control standards of that plant. For example, in an extreme case, a dock worker not wearing a hard hat can be tagged and made to remove himself from the dock area until he complies with safety requirements.

It is important to stress that this is not a management privilege which should be abused. If it becomes apparent to regulatory inspectors that this practice is being used solely to avoid violations during inspections, the regulatory agents can request strict documentation in the quality control files, which if not met by management, opens the channels for violation.

This red tagging is a very valuable addition to any quality control program and, as mentioned previously, can avoid those misunderstandings between regulatory inspectors and management. It is mandatory that management obey the written instructions on the tag, and not use any tagged equipment, or move any tagged product until it has been checked out by the appropriate member of the staff.

June 1974

FISH MEAL
Turning Waste Problems Into Profit

By NANCY MUNRO
Sea Grant Program
University of Alaska

A mushrooming world population is placing ever-increasing demands upon limited natural resources and our basic food supply. Reinforcing these demands are the problems of waste disposal and a growing public concern for the wise use of resources. The combined effect of these circumstances has spurred efforts in the fishing industry to insure "the best and maximum use" of the resource or, in simple terms, to cut down on waste.

In Alaska, the impact of these trends has developed slowly. As late as 1950, approximately nine million pounds of salmon eggs were discarded annually in Alaska. Today economic and legal pressures are placing conservation-oriented restrictions on the commercial fishing industry throughout the state. Nearly all salmon processors now recover the eggs. Herring sac roe fishermen are feeling the pinch of a 1973 State Fish and Game Board directive which stated that the Department of Fish and Game should "manage Alaska's herring fishery in such a manner as to make fullest utilization of the resources," and "that the wasteful herring sac roe fisheries of the state, as such, be phased out."

Increasing world demands and the trend toward conservation have been compounded by the present-day concern with waste disposal. In recent years, the disposal of wastes has become an increasingly difficult problem for the commercial fishing industry, where

waste represents a significant portion of the raw material (80 to 85 percent for crab, 65 to 82 percent for shrimp and 33 percent for salmon). The traditional practice of dumping waste in the open waters beside a processing plant has gradually caused serious pollution problems, particularly in areas where there is a concentration of processors.

At the same time, federal water quality standards have become more stringent. Currently, the disposal of processing wastes in natural bodies of water requires a federal permit, and the proposed federal guidelines for shrimp and crab processors indicate effluent standards which will require screening for solid wastes. Guidelines for salmon processors have not yet been determined, but are expected in the next few months.

In order to solve the problem of waste disposal and to meet increasing world demands for protein, substantial research has been done on methods to maximize product yield from the same basic raw material. Part of the research effort has concentrated on more efficient recovery methods, including mechanical techniques for removing edible flesh from fish. The aim of these recovery techniques is to retrieve all possible raw material as part of the finished product.

Other major efforts to secure "best and maximum use" have centered on the utilization of waste. The search for salable by-products from waste is a perennial one. Ideally, by-products would simultaneously solve the problems of waste disposal and provide capital return.

By-Products

Fish meal is one of the oldest and most important by-products of the fishing industry. It is usually made by drying and grinding whole fish or fish wastes, but the term applies to a variety of meals which result from using different raw materials and methods of production. Because of its protein and mineral content, fish meal is used as fertilizer or as a supplement to feeds for cattle, swine, poultry or fish.

Circumstances, including the disastrously low anchovy catch in Peru during the past few years, have raised the price of fish meal significantly and stimulated production in the United States. Menhaden is the primary fish reduced for meal along the Gulf and East Coast of the United States, but in Alaska the primary sources are fish and shellfish wastes. The declining herring catch in Maine and objections to the waste of the herring sac roe industry have recently redirected interest in Alaska towards herring carcasses as a source for fish meal.

When whole fish or the offal from a relatively oily fish is used as the raw material for fish meal reduction, a significant amount of oil is recovered. This oil can be further refined and added during the canning process (salmon), or used for a variety of nutritional and industrial purposes. Because of its high vitamin content, fish oil is used for medicinal purposes (cod liver oil) and as a supplement to animal feeds. It is often used abroad in the production of margarine, cooking fats or shortening, but such use is prohibited in the United States by regulation of the Food and Drug Administration. Industrial uses of fish oil include soaps, detergents, paints, varnishes, lubricants and printing inks.

When shellfish wastes are the raw material for fish meal, one of the important by-products is chitin, which is the structural material of crustacean shells. The structural properties of chitin and its derivative, chitosan, can be exploited in making fibers, films and gels. The fibers can be woven into fabrics, and the other forms can be used in numerous ways as fillers or thickeners. Commercial possibilities for chitin have generally been uneconomical, but a Seattle firm—Food, Chemical, and Research Laboratories, Inc.—announced in the March issue of **National Fisherman** that they had devised a technique for extracting chitosan and protein from shellfish wastes on a "commercially attractive scale."

Waste Utilization in Alaska

In Alaska the amount of waste utilized has traditionally been minimal. In the 1940s several salmon processors recovered oil and fish meal and one or two reduction plants utilized the offal from surrounding canneries, but these attempts were long ago forced out of business by cheaper foreign imports. The press of recent events—increasingly stringent water quality standards and the high price of fish meal—has, however, induced Alaskan processors to re-examine waste utilization.

The city of Kodiak was one of the first places in Alaska to face this need. A concentration of 14 processing plants in this small urban area created a pollution problem which came to the attention of the Environmental Protection Agency. The agency announced that after April 1, 1973, the city's plants would no longer be allowed to dispose of their processing wastes in the bay. This regulation provided the opportunity for a private firm, Bio-Dry, Inc., to build a one million dollar plant in Kodiak to process the seafood wastes.

Bio-Dry opened last year, and between May and December of 1973 processed more than two million pounds of shrimp and crab wastes. The end product was a shellfish meal of between 30 and 35 percent protein which was sold to animal feed manufacturers. The contracts between Bio-Dry and the seafood processors stipulate that Bio-Dry will pay for the wastes if the price of protein is above a certain level; if the price falls below that level, the processing plants pay Bio-Dry for removing the shellfish wastes. Currently Bio-Dry is paying the processors 88 cents per ton of wet wastes, which is the highest amount specified in the sliding scale contracts.

Last year Bio-Dry processed only shellfish wastes, but the firm is expanding its facilities and this year expects to also process salmon, herring and bottomfish wastes. With the additional equipment, Bio-Dry will be able to process 150 tons of waste per eight hour day.

Two other reduction plants are currently being installed in Alaska by Petersburg Fisheries, Inc. One with a capacity to handle 100 tons of waste per day is being built at the parent site in Petersburg, and another with a capacity of 150 tons per day is being constructed on the Kenai Peninsula at Seward Fisheries, Inc. Both facilities are designed to process all types of waste—crab, halibut, salmon, bottomfish, shrimp, herring—and the end product will be a high protein meal which will be used as a supplement to livestock feed. If all goes according to present plans, the plants should be in operation by mid-April or early May.

The potential for a fish meal industry in Alaska looks good. Fish meal can help meet the expanding world demands for protein through livestock feeds. Water quality standards are becoming more stringent; the reduction of fish

meal provides a non-polluting method of waste disposal. Finally, a fish meal industry makes possible the utilization of many species of bottomfish which are not currently harvested as food fish.

One Solution to Two Problems

FISHMEAL RESEARCH

It is becoming apparent that the impact of the Alaska commercial fisheries industry stretches far beyond the influence suggested by the employment figures.

In the following article, Hank Pennington of the Marine Advisory Program, and Fred Husby of the University of Alaska Experimental Farm describe the results of experiments using processed fish wastes in agriculture. As Alaska's agricultural industry grows, by-products from seafood processing could provide an attractive alternative to the high cost of shipping agricultural products into the state.

By Hank Pennington
and
Fred Husby

In the production of virtually any seafood product, only a part of the total organism is utilized for human consumption. There remains a considerable portion to be disposed of as waste. While in many remote regions seafood wastes are returned to the ocean, the anticipated effluent guidelines to be issued by the Environmental Protection Agency will severely limit this practice. In addition to increasing the difficulty of waste disposal, the imposition of such standards will also mandate the installation of expensive equipment for the extraction of wastes from the effluent waters. Seafood processors will face not only new problems in disposing of seafood wastes, but also additional expenses which limit the profitability of their operation.

The obvious solution to waste disposal problems will be utilization. If the wastes can be processed into saleable products, disposal will not be a problem, and, if the production of such a product is profitable, the additional costs of waste processing can be recovered.

U.S. FISHMEAL PRODUCTION

The traditional product from seafood wastes is meal, whether it is produced from shellfish or finfish. These meals, often referred to collectively as "fishmeal," are used in large quantities in the United States. In 1977, U.S. farmers bought 360,000 tons, of which 283,000 tons were produced domestically. Surprisingly Alaska, the nation's number one fish producer in terms of dollar value of landings, produced only about 7,000 tons of meal. The apparent disparity in Alaskan production figures and national demand is due to a combination of the expense of shipping meal products to markets in the continental United States; the large investment required for the installation of a meal plant; the extreme distances between many of Alaska's seafood processors and the existing meal plants in the state, and the low value of shellfish meals.

At present, companies in three Alaskan communities (Seward, Petersburg and Kodiak) are utilizing seafood wastes for the production of meals. Meal produced from finfish in these plants can be shipped to the continental United States to be sold at a profit, while meals produced from shellfish are produced at a considerable loss. Finfish meals are in high demand as protein supplements for domestic animal feeds, while shellfish meals are used primarily for plant fertilizers.

Since a major portion of Alaskan seafood products at this time is shellfish, it is apparent that either the development of a profitable means of producing shellfish meals must be found, or uses other than plant fertilizers must be developed. Further, if the means to overcome the high shipping costs can be found, the chances of producing shellfish meals profitably are much greater.

A research project funded by the Alaska Sea Grant Program and the Agricultural Experiment Station at the Univer-

Healthy hogs are tended by research scientist Fred Husby at the Agricultural Experiment Station in Fairbanks. These animals are raised from 40 pounds to market weight (220 pounds) on a diet of crab meal and locally grown barley.

(UA Photo by Sabra McCracken)

sity of Alaska may be on the verge of not only developing new uses for shellfish meals, but also creating demands for the product within the state, thereby cutting the transportation costs.

SAVINGS IN COSTS

In the past shellfish meals have not been in demand as animal feed supplements primarily due to the relatively high chitin content, a major component of crab and shrimp shells. Although the breaking down of chitin yields carbohydrates and crude protein, until recently it was considered to be poorly digested by most livestock. However, recent research at the Agricultural Experiment Station has demonstrated that chitin may not be completely indigestible after all.

Currently the most common protein supplement in livestock feeds is soybean oil meal. It sells for approximately $400 per ton in Alaska. If, in fact, the meals from some shellfish were completely or partially digested by livestock and provided a protein source in the feed, then a substitution of that meal for the soybean meal could result in a savings to the feed producer and the farmer. With the current price for king crab meal in Seward at $140 per ton, the potential for considerable savings could quickly create a demand for the king crab meal within the state.

The preliminary results of the research effort, in which king crab meal was substituted in various proportions for soybean meal, show that the substitution is successful. When pigs are fed a diet of corn, up to 25 percent of the soybean meal supplement can be replaced by king crab meal without adverse effects, for a feed savings of approximately $3.30 per pig. The experiments have further shown that if pigs are fed a diet of barley, 50 percent of the soybean meal supplement can be replaced with king crab meal for a current feed savings (as of January 1979) of about $2.90 per pig.

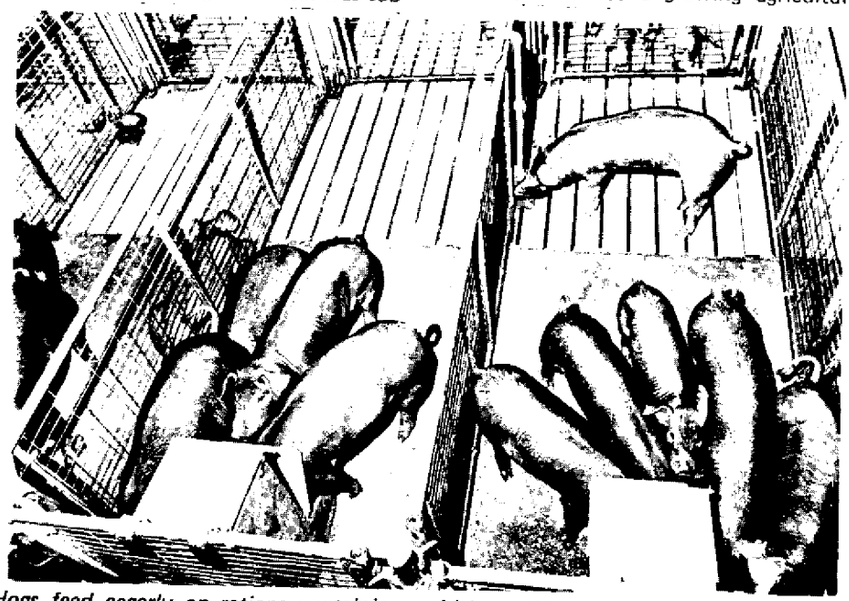
These results and similar indications from research with lactating dairy cattle point strongly to potential Alaskan agricultural use for waste by-products from the Alaskan fishing industry. The research effort is not limited to king crab meal, rather it is also examining the usefulness of meals produced from tanner crab, halibut, roe herring, shrimp, salmon, and bottomfish. The project is also examining the utility of these waste by-products in feeds for other animals, and the effects of further treatment of the meal, such as screening to remove larger particles, on livestock production with supplemental diets of Alaskan seafood waste by-products.

COOPERATION BETWEEN INDUSTRIES

The combination of a rapidly growing fishing industry, a growing agricultural industry, and impending restrictions on disposal of seafood wastes may yield considerable cooperation between the two industries. As the fishing industry grows, its capability for harvesting the resources made accessible through the creation of the 200-mile limit may eventually allow exclusive harvest of the available resource. If, for example, the whole of the pollock quota were harvested in Alaska and all the waste were converted to fish meal, the total meal production in Alaska would more than double the current U.S. production.

The effects of application of this new research could conceivably have an impact on demand for shellfish wastes in the continental United States, and ultimately the demand could help raise the price to a point at which it is profitable to ship it to those markets.

Most fishermen identify to some degree with the farmers, in that they are producers of food, and for the most part operate as individuals. Perhaps the ties are even closer than we realized.



Hogs feed eagerly on rations containing as high as 20 percent shellfish by-products. Flavor is no prob'em. The animals are raised in control groups with the percentage of crab meal maintained the same within a group but varied from group to group. The optimum nutritional diet can be determined in this way.

EDITOR'S NOTE:

In another research project, Per Heggelund and Curt Kerns, specialists in the Marine Advisory Program, are examining a promising technique for overcoming the expense of shipping seafood waste products between the remote processing plants of Alaska and the existing meal plants. To yield a high quality meal product, seafood wastes must be processed before they spoil. The great distances involved and the cost of shipping small volumes of waste versus large shipments prohibit utilization of the wastes of many smaller processing plants before they spoil.

In the research project the process of ensilaging is being evaluated as a means of storing fish wastes without spoilage and with minimal odors. By manipulating the pH of the wastes, it appears that spoilage can be postponed for at least several months, until a large enough volume is accumulated that the shipping cost per unit of waste is reduced to an acceptable level.

For those communities that face stiff EPA waste guidelines, yet do not produce enough waste to justify the expense of a meal plant, the ensilaging process of waste storage holds considerable promise for a solution to the waste disposal problem. It is conceivable that after a salmon season, for example, a tug and barge could be hired to pick up the wastes from several small remote processors for delivery to meal plants. **Feb. 1979**

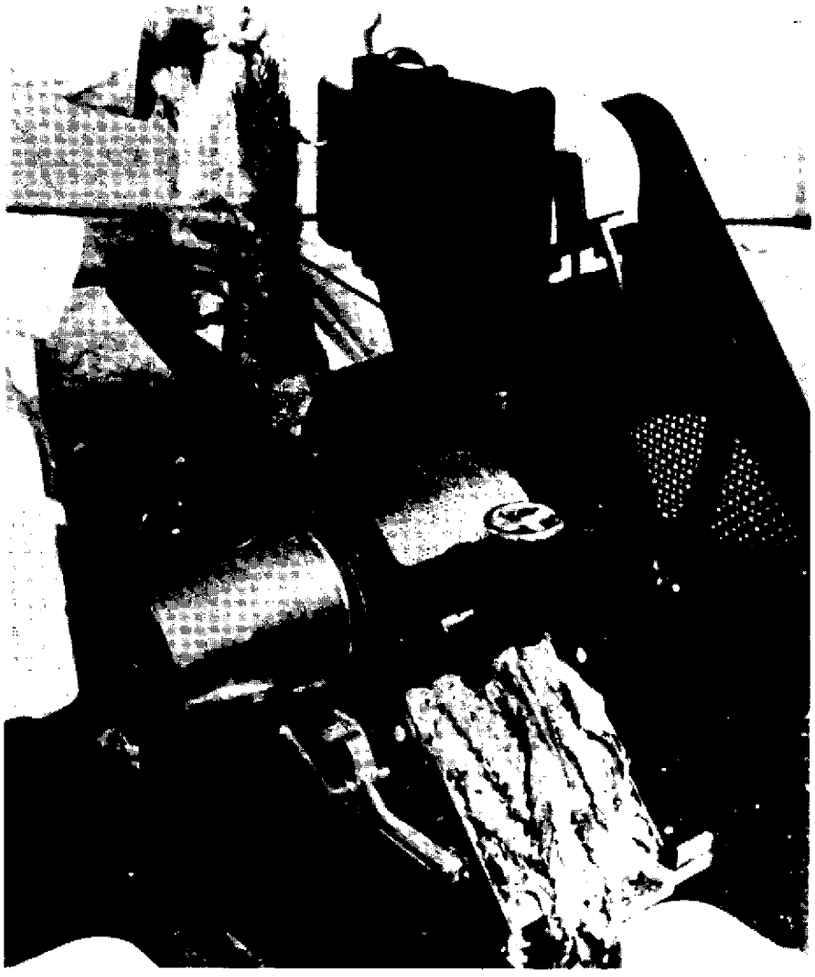
COMMINUTED FISH FLESH

By DR. MAYNARD A. STEINBERG
National Marine Fisheries Service

The April issue of Seas and Coasts included several articles concerning the wise use of Alaska's fisheries resources. Walt Jones examined the potential of Alaska's underutilized bottomfish populations, and Nancy Munro discussed fish meal as one method to cut down on waste in the industry. In this issue Maynard Steinberg, Director of the Pacific Fisheries Utilization Research Center, describes comminution, a processing technique which can increase the yield and the marketing possibilities of a fish catch.

New developments in technology have major implications for fishermen, processors, marketers of fishery products, and consumers. The ramifications of fishery products technology are very broad, because the technology is directly involved in all steps in the preparation of a product for the consumer.

One of the primary concerns of fishery products technology is conservation. This means making the maximum use of our stocks of fish consistent with the maintenance of the resources. Wise use is the essence of the idea of maximum or total use. It is unwise not to use a renewable resource if its use can contribute to the satisfaction of human needs. It is unwise to use fish for animal feed if fish can be used to satisfy human hunger and to please the palate. It is unwise to discard fish at sea simply because we have not yet learned how to market those fish. Finally, it is unwise to market fish at a value below that



This photograph of a Japanese comminution machine shows headed and gutted fish being fed into the machine at the top, the skin and bones coming out at the bottom, and the comminuted flesh piling up on the left.

Comminuted Fish

which is inherent to the value of the nutritional and functional properties of fish muscle protein.

A look at statistics of fish consumption by people living in the United State indicates three main things:

1. The consumer has a definite preference for some fishery products on a species basis—canned tuna, shrimp, salmon, halibut, crabs, lobsters, etc.
2. Products that are not necessarily associated in the consumer's mind with any particular species (fish sticks and portions) can have a high degree of consumer acceptance.
3. There are a large number of food species—groundfish such as rockfish and flatfish, pelagic fish such as mackerel and herring, and industrial species such as menhaden and anchovies—for which there is now little or no demand as food.

It is clear that the wise use of our fishery resources requires that efforts be made to find ways to increase the demand for underutilized species. Fish sticks and portions, which have no ready species identity may offer us a clue in the development of new kinds of products.

One processing technique which would employ this group of underutilized fish is called comminution. This is a fancy term used in the food industry to mean reduction in particle size. A comminuting machine can remove flesh from headed and gutted fish, it can salvage flesh close to the bones of a fish, and it can remove flesh from fish which would be too small or bony to fillet normally. The machine consists of a rotating drum with holes in it, and a rotating belt which runs outside the drum. With the application of appropriate pressure, the fish flesh is pressed through the holes in the drum, ending up in minced form while the skin and bones are left behind. The significance of this processing technique lies in the fact that 1) the altered properties of the flesh make new products possible, and 2) the yield of fish flesh has been increased.

from comminution processing. The increase in yield varies considerably from species to species, but the significance of the savings is important. For example, in 1969 33 million pounds of rockfish were landed on the Pacific Coast. Comminuted, that amount of fish would have produced edible flesh equivalent to 50 million pounds of fish filleted.

The most obvious use for material recovered from headed and gutted bottomfish is the production of fish blocks for further processing into sticks and portions. In 1972 the United States imported approximately 360 million pounds of fish blocks. Fish blocks are not made in the United States because of the high costs of fish, labor, etc. and must be imported from other countries—Canada, Norway, Denmark, Germany, South Africa, Argentina, and Poland. These blocks are made from fish fillets. When converted to round fish, 360 million pounds of blocks are equivalent to over one billion pounds of fish, all of which came from foreign sources—some of which are from resources that we would have thought were our own not many years ago.

Alaska contains fishery resources, particularly in the Gulf of Alaska and in the Bering Sea, which have never been exploited. These resources could be used for the production of blocks or for many of a variety of other products like spreads, patties, or fish cakes.

Another possibility for comminuted fish products which is available to the fish processing industry although it is perhaps a little further down the road than comminuted blocks, concerns functionality. Functionality means that each ingredient in a food system is there to play a special role. Some of these roles are nutritional, others are concerned with imparting special characteristics to the product. A simple example is mayonnaise, which consists of oil, acid or vinegar, and egg. The primary function of the egg is to provide the protein that brings the oil and vinegar together in the form of a stable emulsion that has the appearance, mouth-feel, color, and other characteristics of mayonnaise. Similar functions in food systems include whippability, water-holding capacity, fat-absorption control, etc. These characteristics are usually associated with proteins. Most proteins, regardless of source, have these properties to a greater or lesser degree. Animal proteins usually function better than do vegetable proteins, although they are also more expensive. Animal proteins most commonly used for such functions are casein from milk, egg white, and whole egg.

NMFS researchers have determined that fish muscle proteins function as well as, or better than, other animal protein isolates either when used alone or in combination with other proteins. Furthermore, they can be made to have the essential properties of stability that must be present in a functional protein. Problems that limit the use of these proteins in non-fish food systems are flavor, alterations of properties during stabilization or drying, and stability of

YIELD OF MINCED FLESH AND FILLETS FROM SOME PACIFIC OCEAN SPECIES

SPECIES	YIELD OF EDIBLE FLESH (%)	
	MINCED	FILLETS
ENGLISH SOLE	60	30
STARRY FLOUNDER	47	31
LINGCOD	43	23
PACIFIC COD	38	29

the flavor and odor characteristics during storage. Ideally, a protein product to be used as a functional ingredient should be white in color, soluble or dispersable in water, and without flavor or odor. Two protein isolates which have been developed from fish are fully effective as emulsifying agents. One of these is extremely interesting as a whipping agent. Samples have been made available to several large food-processing companies for evaluation by them.

The fishing industry has access to a source of low-priced raw materials for the manufacture of functional proteins not available to other segments of the animal protein industry. Menhaden, anchovy, and herring, almost none of which are used directly for food purposes in this country, exceed in volume the total domestic landings of food fish. Their prices are necessarily low because they are used almost exclusively for animal feed. This large raw material supply, plus wastes, gives to the U. S. fishing industry a unique opportunity for preparing protein isolates for use by the largest consumer of functional proteins in the world—that is, the U. S. food industry.

As odd sounding as it may be, another possibility for comminuted fish products is as raw material to the meat industry. In 1969 the meat industry produced nearly 4 billion pounds of frankfurters, other sausage products, and lunchmeats. The most expensive component in these products was lean beef. The meat-processing industry has shown some interest in the ability of whole fish muscle to perform as functional ingredients in sausage-type products. The cost to the meat processor need only be fractionally lower than that of lean beef in order to provide him with a considerable economic advantage. The nutritional value of fish flesh is no less than that of the beef that it would replace. Furthermore, if fish flesh were used to replace some of the marginally functional meat used in sausage-type products, the nutritional value of the fish muscle would be considerably better than that of the material replaced. Members of the meat-processing industry have indicated that fish will do for them what they need at a lower price than they are now paying. This could be an interesting new opportunity for the fishing industry.

The problems of the fishing industry will not be solved by comminution. There are problems associated with the process. For one, comminution costs more than processing fillets and blocks. (This may be offset by yield.) This means more capital investment, more maintenance of equipment, and it certainly means an attention to sanitation that we don't pay at the present time. At the same time, comminution offers increased opportunities for the fishing industry by opening new markets and utilizing neglected resources.

Net-caught Salmon HANDLE WITH CARE

By John P. Doyle
Marine Advisory Program
University of Alaska

"One gives nothing so freely as advice." — *Duke de la Rochefoucauld*

Wherever they are found, salmon are an esteemed seafood and fetch a high price on the world food market. Although it has not always been so, no high quality salmon product has to look for a market. The key word here is *quality*. Quality is especially important in today's highly competitive and changing world food market. Salmon is a speciality food and in the foreign markets is frequently processed into some delicacy such as lox.

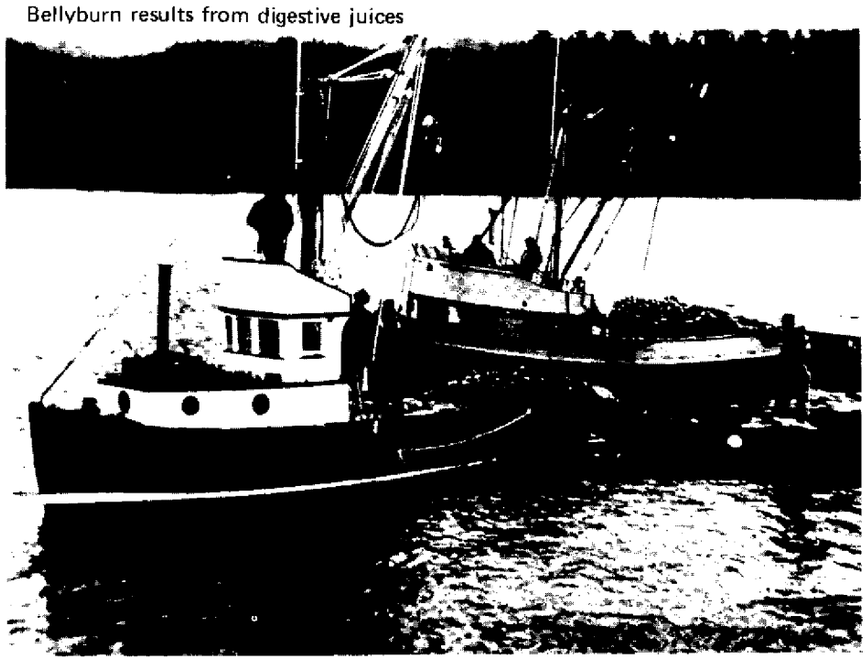
The world market for salmon is undergoing a major change. Demand for

BELLYBURN

Bellyburn results from digestive juices

devaluation of the U.S. dollar has put salmon within the buying range of more people. In Japan, the market is for high quality dressed salmon which have the head on and are sold whole on the retail market. In Europe, the demand is for frozen salmon which are thawed and split for mild curing and smoking. Both markets demand a quality fish with no external or internal blemishes or visible flaws. North America, too, is experiencing a shift toward fresh and frozen salmon for use in the steak and fillet market and, to a lesser extent, the mild cure and smoking market.

Because of these changes in world demand, growth in the market for frozen Alaskan salmon has been substantial. In 1965, for example, 15.1 million pounds were frozen, while in 1975 the amount increased to 33.6 million pounds. ⟶



Prince William Sound seiners waiting to discharge fish to the tender. (Photo by John P. Doyle)

Traditionally, the market for frozen and mild cure salmon had been supplied by troll-caught fish. However, over the past ten years the annual salmon troll catch has remained static at approximately 6.5 to 9.5 million pounds. This means that the balance, actually the bulk, of the frozen product has come from the salmon net fishery. Salmon freezing facilities were mostly confined to Southeastern Alaska until the late 1960s, but over the last ten years freezing capacity has steadily increased along the Gulf of Alaska and in Bristol Bay.

COMPLAINTS ABOUT QUALITY

During this period of expansion in the frozen salmon market there has also been a significant increase in complaints about the quality of Alaskan salmon from both the foreign and domestic markets. These complaints are well founded, and thousands of pounds of Alaskan salmon are being rejected when they reach the overseas buyers. Should these complaints continue, Alaska's status as a supplier of these new markets will suffer, as will the financial return to processor and fisherman alike. This article is intended to help alleviate this problem by indicating its causes and some solutions.

There are two reasons for this increase in the complaints about poor quality salmon. On the one hand, the consumer has become more sophisticated and demands a higher quality food product. On the other hand, the net-caught fish now comprising the bulk of the catch going to satisfy the increased demand for frozen salmon are more susceptible to handling damage than are troll-caught fish, previously the principal source of the product. Net-caught fish which heretofore would have been canned are now high-graded by the processor on the basis of appearance, and frozen. Moreover, many of these fish are being produced in areas of Alaska where neither the fisherman nor processors are accustomed to processing salmon for the frozen market.

FISHING METHODS

Traditionally, salmon troll fishermen stun their fish, then dress and bleed them immediately after they come on deck. The dressed fish are then washed and put below deck in a cool slaughterhouse. The fish are iced individually on a daily basis. Those trollers who do not ice their fish deliver on a daily basis to a tender where the fish are iced. While this sequence is not always followed, it should be for producing high quality fish.

Conversely, net-caught salmon are generally handled in bulk. While troll-caught fish are brought to gaff and killed immediately after they are hooked, net-caught fish struggle for a considerable time in the net and on deck. The fish, of course, is at its highest quality when it comes from the water. After death, it's all downhill. Once quality is lost it can never be recovered by any amount of good handling or processing. Every step in the process from catch to the kitchen is important if the consumer is to get the gourmet item expected.

CAUSES FOR POOR QUALITY

Poor quality fish result principally from four causes: bruising, bellyburn, oxidation, and decomposition. Of the above four factors, bruising is perhaps the most wasteful and difficult to detect in round or butchered fish. Many salmon with bruise spots are found on the market today. Such bruise spots are also progressive in that they promote rancidity and decomposition.

Unfortunately, bad bruises may not be visible in fish until after they have been frozen. As proof of this, research done in Japan on highseas gillnet-caught salmon indicates that 19 percent of Chum salmon split before freezing showed visible bruises, while after freezing, 43 percent of the fish from the same lot showed bruises. And in Pink salmon the percentage of bruised fish was 26 percent in fresh fish and 36 percent in the same lots after the fish had been frozen. Additionally, this same study shows that 10 percent of the flesh of gillnet-caught fish which were frozen and thawed had to be cut away before the fish could be canned.

BRUISES

Bruises on gillnet fish are usually found at the nape or collar, at the base of the dorsal fin, and along the backbone. Bruises in the first two locations generally result from heavy net pressure, whereas the bruises along the backbone are caused by rough handling or especially by pulling a salmon from the net by the tail or picking it up by the tail. Pulling or lifting a heavy salmon by the tail tends to break the backbone in front of the anal fin. When the backbone breaks, the arteries located in the tissue just under the vertebrae also break. These ruptures release blood into the flesh around the break. Moreover, when the backbone breaks, the flesh in the area also breaks, letting the blood flow into the meat. Rough handling, such as dropping or throwing the fish into the hold, can also break the backbone with the same unwanted results.

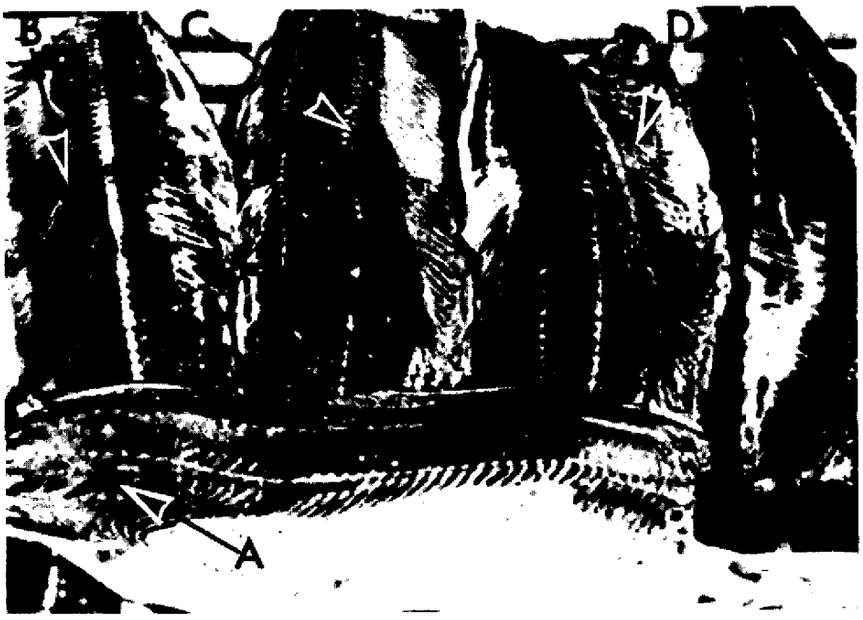
The bruise or blemish may not show up for some time, because fish blood does not coagulate as rapidly as the blood of warm-blooded animals. In fact, at lower temperatures it may stay liquid for a number of days. This may be one of the reasons that a far higher percentage of bruises show up after the salmon is frozen. The Japanese studies also showed a higher percentage of net-caused bruises from fish caught during rough weather. There is yet to be found a fisherman able to control the weather, but all people handling the fish could be more gentle with the product and thus maintain its higher quality.

RANCIDITY

Oxidation, or rancidity, is the result of oxygen attacking the fats and oils in the fish. Fish oils, because they remain liquid at rather low temperatures, are very susceptible to oxidation. Normally, however, rancidity does not show up until after salmon has been frozen for some time. But the oxidation process has its start on the fishing boat. The reaction between fish oils and oxygen is assisted by the presence of iron and also by sunlight. Fish blood, like all other red blood, contains large amounts of iron. Therefore a bruise which allows blood to seep into the flesh will promote the oxidative process. Allowing salmon to lay in the sun for any period of time will also cause rapid oxidation, not to mention several other problems such exposure causes. This problem may be solved by dressing the fish immediately or keeping it cold and out of direct sunlight.

BELLYBURN

Bellyburn results from digestive juices (enzymes) eating through the stomach wall and attacking the flesh of the belly wall. It is a more serious problem with actively feeding fish such as troll-caught Silvers and Kings. But it is also a problem with salmon netted far from their home stream which may still have some



These net-caught salmon from Bristol Bay were frozen and then thawed in preparation for smoking. A. Separation of the flesh caused by lifting the fish by the tail. B. Poor cleaning of the flesh and failure to remove the kidney caused the staining of the flesh. C. This bruise was caused by breaking of the backbone and associated arteries allowing blood to flow into the flesh. D. The bellyburn resulted from improper cleaning of the fish at the time it was caught.

The black spots on these smoked salmon are bruises caused by rough handling resulting in breaking of the backbone. These fish were frozen, thawed, cured, and smoked.

stomach activity even though feeding has stopped.

The best way to counter this problem is to dress the fish immediately after they are caught. When this is not possible due to bulk catching, rapid chilling will reduce the enzyme activity and thus delay the onset of bellyburn. A good rule of thumb is that for every reduction of 10°F in temperature the enzyme activity will be cut in half. Conversely, if the fish are allowed to warm up on deck or in the fish processing facility, the enzyme activity will rapidly increase.

FISH SPOILAGE

Fish in general spoil more rapidly than any other protein food. Salmon, cod, and halibut are more resistant to spoilage than most fish, but are many times more susceptible to spoilage than beef, pork, or its other protein competitors for the consumer dollar. Therefore, to maintain quality it must be processed much more rapidly than other types of protein food.

Spoilage of fish, often referred to as decomposition, occurs in two ways. First, bacterial decomposition is caused by spoilage bacteria attacking and digesting the flesh. Second, enzymatic decomposition is the softening of the flesh by enzymes in the flesh and stomach. The latter enzymes actually aid the spoiling bacteria in the decomposing process.

Live fish have large numbers of bacteria naturally living on the gills, skin, and in the gut. The numbers of these bacteria are held in check by the fish's natural defenses as long as the fish is alive and healthy. Actually, the defense mechanisms continue to work after death until the fish comes out of *rigor mortis*. Therefore, the longer a fish stays in rigor the longer it takes for the number of spoilage bacteria to increase on the surface of the fish and the longer spoilage is delayed.

The length of time a fish is in rigor is controlled principally by its body chemistry, but can be modified by external physical conditions. When a fish swims vigorously or struggles in the net or on the line, it builds up lactic acid in the muscle tissue. The greater the amount of lactic acid in the muscle the faster the fish goes into rigor and the shorter the period of rigor. The temperature at which fish are held can modify greatly the length of time the fish stays in rigor. The higher the temperature the quicker the fish will go through rigor. Mature King, Silver, and Chum salmon which are killed without a struggle and chilled quickly to 32°F will stay in rigor from five to eight days. These are ideal conditions, of course, but the take-home lesson is that the less the fish struggles in the net and the colder the fish is held, the better will be the product delivered to the processing plant.

TEMPERATURE AND QUALITY

The quality of gillnet-caught salmon can be improved by making shorter drifts or by picking the net more often and getting the fish into the hold as soon as

possible. Even without ice, the temperature in the hold will be closer to the water temperature than to the air temperature. The checker and deck inevitably will be warmer than the air temperature whenever the sun is shining.

The buildup of bacterial numbers is also temperature-related. The higher the temperature, the faster spoilage bacteria grow. The buildup is also increased by the fish coming in contact with dirty decks, holds, pen boards, equipment, etc. The skin of the fish provides some protection against bacteria, of course, but a pugh or gaff hook into the flesh not only damages the meat but also introduces a large dose of spoilage bacteria into the flesh. From the standpoint of quality we are fortunate that the fish pugh was outlawed some years ago.

GOOD HOUSEKEEPING

Fortunately, the same handling practices which hold fish in rigor longer also hold down natural bacterial growth. Good housekeeping practices in the hold and on deck are essential for a quality product. Washing the fish as most trollers do will remove a large percentage of the bacteria, but this procedure would be largely nullified if the fish are thrown on a dirty deck, hold, or processing line. All surfaces with which the fish come in contact should be scrubbed with soap and water after each trip, following which all areas should be sanitized with a mixture of one-half cup of household chlorine solution in five gallons of water. If you use a deck bucket, two "glugs" of the jug is just right.

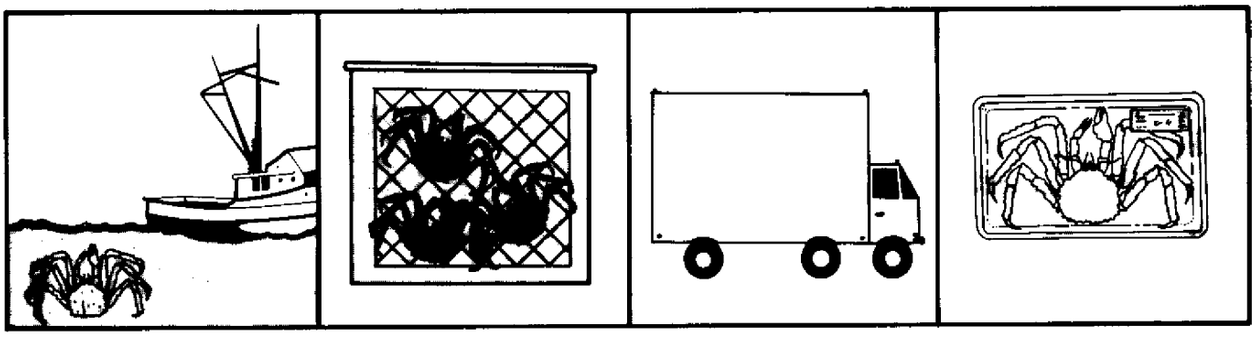
The market for high quality Alaskan salmon is at stake. Canada, Japan and more recently Norway are active in the salmon export business. They are shooting for the highest priced market with the highest quality product. Alaska's salmon processors and cold storage operators in particular need to step up their quality assurance and inspection programs. The salmon processors' slogan should be *Keep it cold; keep it clean; and keep it moving to the freezer.* Gentle handling, low product temperature, good housekeeping practices and care about the product at all steps from harvest to the final market will go a long way toward raising the image of Alaska's fishing industry to the world's number one producer of quality salmon.

June 1978

HOW MARKETING WORKS

As Walt Jones has explained, seafood marketing is having its problems. One of the most annoying elements of the present situation is the low price paid to fishermen and the tremendously high prices charged at the retail level. Part of this problem is the long distribution chain seafood follows from the fisherman to the consumer. As shown in the figures below each link in this chain takes its own cut of the profit, and as the fish gets further from the fisherman the prices get higher and higher. Furthermore, because seafood represents only a small percentage of the products a retailer handles, it receives very little attention. Consequently when prices change at one point in the chain, there is a significant time lag until that change is felt by either the fisherman or the consumer. For example, wholesale prices for king crab dropped from $4.50/lb at the end of November, 1974 to $3.00/lb during the second half of December. During the same period prices for dungeness crab fell from $4.50/lb to $2.75/lb, and prices for snow crab dipped from $6.00/lb to between $4-5/lb. Prices at the retail level are only now beginning to show that decline.

As things stand now, fishermen have three ways to change the marketing situation—bargain for price, create a greater demand for their product through promotion, or become more actively involved in the marketing scheme. Each of these alternatives has the potential to increase the fisherman's income, but the disadvantages should be kept in mind. Although a strong fishermen's association has long-term benefits, bargaining for price is difficult under present circumstances because strikes are nearly impossible to organize with fishermen facing boat payments and a large part of the fleet coming from other states. Promotion is a good idea but it is extremely difficult to divide costs in proportion to the benefits received. Good results could be obtained by fishermen joining with local processors to try new marketing channels, but this would require the investment of a certain amount of time and money in marketing rather than fishing.



Fisherman	$/lb	Processor	$/lb	Wholesaler	$/lb	Retailer	$/lb
King Crab Meat	.40	Costs 20% yield 2.00 Processing .29 Shipping .04 Brokerage .12 Overhead .45 2.90 Profit .10	3.00	Costs Product 3.00 Overhead .30 3.30 Profit .20	3.50	Costs Product 3.50 Overhead 1.05 4.55 Profit 1.85	6.40
King Crab Sections	.40	Costs 55% yield .73 Remainder .47 1.20 Profit .05	1.25	Costs Product 1.25 Overhead .25 1.50 Profit .40	1.90	Costs Product 1.90 Overhead .57 2.47 Profit 1.48	3.95
Snow Crab Meat	.15	Costs 18% yield .83 Remainder .82 1.65 Profit .25	1.90	Costs Product 1.90 Overhead .30 2.20 Profit .08	2.28	Costs Product 2.28 Overhead .68 2.96 Profit 2.59	5.55

The prices shown are accurate as of January 7, 1975. Retail prices for king crab are for San Francisco and snow crab for Minneapolis. Figures courtesy of Fred Smith, marine economist for Sea Grant program at Oregon State University.

Feb. 1975

THE MARKETING CRUNCH

By Walter G. Jones
Chief, Fisheries Development and Marketing – NMFS

The current condition of markets for U. S. seafood can be described, at best, as unstable. For fishermen sitting on the beach with boat payments and living expenses to meet, but no market for their fish, the situation is disastrous.

Current market conditions are equally bad for the processor who has a warehouse full of seafood products which will not move, and for which the wholesale prices are tumbling near or below the break-even point. Mounting warehouse, overhead and interest costs and pressure from the bank to liquidate inventories are today's headaches for the processor-wholesaler.

Purchasing agents for supermarkets, restaurants and institutions, aware that seafood inventories are high and that customers are becoming increasingly cost conscious, are buying cautiously and in minimum quantities.

Retailers, who watch customers pass over high priced seafood products which take up valuable shelf space with mimimal turnover, have cut down or ceased stocking the products and turned to cheaper imported seafoods.

It is a gloomy picture, somewhat oversimplified, but nevertheless true of most current seafood market conditions in the United States. Unfortunately it may get worse. Until seafood prices decrease to become more competitive with meat and poultry prices and consumers are stimulated to buy seafoods again, the situation will not improve.

Fishermen can anticipate that processors will be very cautious about buying until market prices have stabilized and the demand increased. The prices offered to Alaska fishermen this year for king and snow crab have dropped drastically. King crab prices at Kodiak dropped from 85 cents per pound in early 1974 to 35 cents per pound in early January 1975. Fishermen in Kodiak have been offered 12 cents per pound for snow crab this year as compared to the 20 cents per pound paid in 1974. There is mounting pressure by processors to reduce prices paid to fishermen for shrimp.

Processing firms must reduce their crab, shrimp, salmon and other fish inventories in order to get working capital to purchase fish in 1975 and to make room in warehouses and cold storage for the new harvest. When seafoods do begin to move out of the warehouses, it will take three to six months to reduce current inventory levels to where processors will feel confident about buying again.

European and Japanese export markets, which have been major outlets for Alaska crab, shrimp and salmon, are faced with consumer resistance to high prices. The NOAA Food Fish Market Review and Outlook, November 1974, reports that fresh and frozen exports, January–September 1974, to France were down 42 percent from a similar period in 1973. Shipments to the United Kingdom were down 26 percent. Canned salmon exports were down 32 and 58 percent respectively to the United Kingdom and the Netherlands for the first three quarters of 1974 over 1973.

Japanese fishery firms, which have previously bought the lion's share of Alaska snow crab, are practically out of the market except for special orders of highest quality snow crab products packaged for specific markets. Clint Atkinson, former U. S. Fishery Attache for Asian countries, reports that many Japanese fishing companies are in dire financial straits because of high labor costs (39 percent increase over 1973), rising operating expenses, consumer resistance to high priced seafoods and continued high inventories. Japanese fishing firms are being forced to sell overseas holdings, reduce foreign fishing operations and drastically cut operating costs in Japan. Prices paid in 1974 for fish and shellfish are 30-50 percent below 1973. Prices for U. S. fishery imports are expected to remain low and will have a significant effect on Alaska crab and salmon fisheries. The Japanese do not anticipate that their economic situation will show much improvement over the next one to two years.

Causes

The most apparent cause for the current marketing crisis is a reduced demand for seafoods stimulated by consumer resistance to high prices when

their spendable income is decreasing. Inflation and rising fuel costs are partly to blame for increased Alaska seafood prices but not entirely. The rising price trend was set off in 1973 prior to the fuel crisis by Japanese buyers bidding for Alaska crab and salmon. The Japanese bidders drove prices up beyond normal price increases and caused U. S. buyers to meet or beat Japanese bidders in order to obtain products for their plants. Before much of those products could be moved out of inventory the fuel crisis hit and consumers began resisting the inflated seafood prices. U. S. meat prices rose rapidly in late 1973 and early 1974, and seafood prices followed the upward trend. Meat prices, however, have dropped at the retail and wholesale levels while seafood prices have not yet decreased to any appreciable extent. According to the Food Fish Market Review and Outlook, retail prices for meat and poultry products dropped 4 percent from January to September 1974. Frozen seafoods posted a 1.5 percent gain during this period. Beef, pork and poultry prices, except top steak cuts, are generally priced lower than U. S. produced fillets and shellfish, with the exception of mackerel, mullet and a few other locally caught species. Because of the high prices for U.S. produced seafood, imported fillets, shrimp, crab, salmon and other seafood products have begun to supplant U. S. products on the retail shelves and restaurant menus.

What Can Be Done?

The obvious solution is to increase demand. The demand, however, must be at a price for which fishermen can afford to fish and processors afford to produce products of good quality.

Consumer demand would be stimulated by making U. S. seafoods more competitive with imported seafoods, meats and poultry. This is occurring in the marketplaces, but has had negative effects on the prices offered to Alaska fishermen. Higher tariffs and quality controls on imports might help the situation eventually, but offer no hope for the immediate future.

Consumer demand will probably be spurred by the recent proposed tax cuts, but can be further increased through market promotion and consumer education. With the exception of tuna, efforts to promote seafoods in the U. S. have generally been spotty. No continuing, long-range seafood promotion and education efforts to make consumers think of seafoods as regular menu items have been done. To be most effective, price reductions must go hand in hand with market promotion and consumer education campaigns.

A cooperative industry-government seafood market promotion/consumer education program is now underway. Through the efforts of the Southeast Fisheries Association in the Gulf of Mexico states, one million dollars has been made available to the National Marine Fisheries Service's (a component of NOAA in the U. S. Dept. of Commerce) Marketing Services Division to supplement industry promotion efforts. These funds, which are a one-shot deal, were made available by the U. S. Government's Office of Management and Budget (OMB) from the Saltonstall-Kennedy reserves. The S-K reserves are derived from tariffs on imported seafoods.

One million dollars sounds like a lot of money, and it is. However, these funds must be used to help the groundfish fisheries of the Northeast, the shrimp and other fisheries of the Southeast, the tuna fisheries, the bottom fisheries, shrimp and salmon fisheries of California, Oregon and Washington as well as the crab, shrimp and salmon fisheries of Alaska, so the most effective use of the funds becomes a challenge. The funds, which must be spent by July 1977, will be allocated to regional fisheries organizations to supplement or complement industry market promotion efforts. A national marketing advisory committee, consisting of representatives from fisheries organizations, will review and make recommendations for allocation of the monies.

The OMB will only permit the special marketing funds to be used on consumer and merchandising education materials – not on direct market promotion which is considered the responsibility of industry. Consumer and merchandising education activities consist of developing and distributing seafood recipe photographs and transparencies to newspaper and magazine food editors; production of training aids and printed materials for distribution by USDA extension and state home economists; development of TV and radio spot announcements, recipe books, educational audio-visual materials; and training tools for seafood merchandising workshops. The funds can be used for almost anything, in fact, which will help educate home, restaurant and institutional consumers in the preparation of seafoods and help create an awareness of the value and uses of seafoods.

An ad hoc committee headed by Bob Archer, executive director of NCA, and composed of representatives from Alaska, Washington, Oregon and California, and NMFS Marketing staff met in mid-January to develop a consolidated industry-government market promotion/consumer education proposal for West Coast seafoods. The proposal will be presented by Mr. Archer to the national marketing committee of which he is a vice chairman. The NMFS is already planning intensified consumer education activities for crab products during the Lenten season. These activities will be coordinated with industry promotions.

The Alaska fishing industry – fishermen and processors – should begin planning now for the formation of a statewide, all-species marketing organization to help promote Alaska seafoods on a continuing basis. This will help to reduce or eliminate the need for crash marketing efforts and will provide a single strong organization which can more effectively utilize available government assistance.

Feb. 1975

MARKETING FISH IN JAPAN

Part I

By Clinton Atkinson

For over 75 years Americans have been concerned about Japanese interests in Alaskan fisheries. In the early 1900's a Japanese company attempted to establish a salmon saltery on Attu/Agattu. In the late 1930's Japanese king crab and salmon vessels entered the eastern Bering Sea. Most recently, fleets are taking substantial numbers of halibut, salmon, king and tanner crab off Alaska. Based on present international law, these problems have no common solution and are the subject of a continuing series of negotiations.

About 15 or 20 years ago, the fishing pattern in Alaska suddenly changed. Through contacts with their American counterparts, Japanese fishing companies discovered the huge waste of salmon roe in our canneries. Salmon roe was and is a prized and expensive Japanese delicacy. Development of the salmon roe, or "sujiko", business proved to be a profitable and exciting venture for the Japanese companies and a "lifesaver" for a number of our salmon canneries which at the time were on the verge of bankruptcy.

During ensuing years the Japanese economy grew at an unprecedented rate. Prices and costs spiraled upward and profits were high. It was fascinating to watch the Japanese market price for Alaskan fish products rise, compare that rise with our own export price, and predict when the two lines would cross and we would have a new export product. The processing and selling of seafood products for the export market, however, was a new experience for most Alaskans. There were losses and bitter experiences, due mainly to an unfamiliarity with Japanese market quality standards and inexperience in negotiating with Japanese companies.

Because of the affluence of Japan's economy, a trade imbalance between the United States and Japan, and a growing Japanese demand for fishery products, there was a surge of Japanese investment in Alaskan fishing companies. According to *Suisan Nenkan*, Japan's 1975 report on ocean products, Japanese government licenses issued for investment in U.S. companies directly associated with Alaskan fishery products numbered one in 1955, one in 1966, two in 1967, three in 1972, nine in 1973, and one in 1974. The Golden Age of Japanese investment in Alaska's fisheries is over. With the present trade deficit in Japan further investment in U.S. fisheries appears unlikely for the forseeable future.

Alaskan fisherman disagree on the pros and cons of Japanese investment in the U.S. fishing industry. Many welcome the availability of advanced processing technology, the assured acceptability of the product on the Japanese market, and the preferential marketing opportunity built into the U.S.-Japanese companies. Others are opposed to such joint ventures, pointing out the dangers of monopolistic control over landings, prices, and marketing. They note that

Japanese companies would tend to limit production or development of new products which would be in conflict with the company's operations and investments at home or in other countries.

Overshadowing these concerns are the as yet unknown effects of a 200-mile exclusive economic fishing zone on the American fishing industry and the export market.

The purpose of this series of articles is to provide a better understanding of (1) the Japanese environment and their fisheries, (2) fish marketing practices in Japan, (3) exporting fish to Japan, and (4) the organization and operation of Japanese companies. Unfortunately, these are all difficult and complex subjects, involving an almost infinite number of individuals, a variety of processing and marketing procedures, and differences in the companies' policies, interests, and capabilities. These subjects can only be treated in a very general way and there will be variations and exceptions.

THE ISLANDS

Japan is composed of four major islands (Honshu, Hokkaido, Shikoku and Kyushu), surrounded by many smaller islands including Okinawa to the south. This north-south chain of islands extends for a distance of about 1500 miles, about the distance from Anchorage to Attu. Japan is a small country with an area of 143,622 square miles, about one fourth the size of Alaska. On the other hand Japan has a population of about 111 million people, or one half the population of the entire United States. Japan's "people-problem" is further aggravated by the crowding of over half the population into a band of some 14 Prefectures stretching from Chiba (near Tokyo) to Fukuoka (in Kyushu).

The shortage of farm land has been a particularly critical problem for Japan for a number of years and coupled with the need for raw materials for industry, was a prime factor in Japan's expansion into Taiwan, Korea, and China, and provocation of World War II. The amount of land available and suitable for agriculture totals only 13.9 million acres (21,719 square miles), or about half the size of southeast Alaska. This area is decreasing at a rate of about one percent a year because of the demand for residential, industrial, and other uses. At present, Japan imports about 25% of her food.

Japan, however, is located in an area very favorable for the production of marine life. The warm Kuroshio (black or Japan current) flows northward along both the Pacific and Japan Sea coasts of Japan, collides off Hokkaido and northern Honshu with cold currents from the north, and produces nutrient-rich waters to support large populations of fish and other marine forms. The Japanese people use between 500 and 600 fish and fish products.

Regardless of pollution and heavy fishing pressures, the coastal and shore-based fisheries still provide about 60 percent of Japan's total fish production. For example, in 1973 Japan's catch totaled 10.6 million metric tons—2.6 million from the coastal fisheries, 3.9 million from the shore-based fisheries, 4.0 million from the high seas fisheries, and 0.2 million from whales, the freshwater fisheries, etc.

FISH IN THE JAPANESE DIET

From earliest times the Japanese have depended upon fish for food. The early inhabitants of Japan, living in the southern part of the islands, left large mounds of clam shells, primitive fish hooks, and other artifacts as evidence of their dependence on the sea for survival. In the north, salmon was an integral part of ritual and legend for the native Ainu. Salmon was a staple food in their diet and the object of warfare with early Japanese and Russian intruders.

Japanese dependence upon fish was further strengthened in the fifth century with the introduction of Buddhism and abstention from eating animal meat. Despite many changes and reforms in the Buddhist faith in Japan, modern custom and conduct still reflect the influence of these early teachings.

Fish are found throughout Japanese legend and tradition. Ebisu, one of Japan's seven Gods, is depicted with a fishing pole and a large sea bream tucked under his arm. He is the guardian diety of shopkeepers representing wealth and good fortune.

At New Year's, the most sacred of Japanese holidays, fish are used in many ways—losters for long life and rebirth to a more prosperous future life, herring roe for fertility and numerous children, seaweed for happiness and joy, a dried sardine head to guard against famine and evil, and the sea bream for vitality, strength and happiness.

In the doll festival clam shells are used for food and sake—symbolic of fertility, progeny and life itself.

All Americans are familiar with the Japanese custom of flying carp streamers on boy's day. In Oriental lore the carp represents a fish faithfully and successfully ascending the swiftest currents in a stream and is symbolic of courage and endeavor.

In the summer Star Festival, the Milky Way is depicted by some as "the river of the gods" at which the gods spend their time fishing and bathing.

Japan	Calories	Protein (grams)	Fish, Whales, etc.	Meat, Fowl, etc.	Total Animal Protein
1934-36	2,028	52.2	5.0	2.0	7.0
1955	2,217	65.7	13.5	3.4	16.9
1965	2,408	73.7	16.4	10.4	26.8
1972	2,510	78.6	17.3	16.5	33.8
1973	2,526	79.4	17.6	17.0	34.6
United States	3,345	104.7	2.3	71.7	74.0
W. Germany	3,247	89.1	3.6	54.9	58.5
France	3,202	103.3	5.4	61.3	66.7
Italy	3,218	100.2	3.7	40.7	44.4
Britain	3,115	89.2	2.3	53.8	56.1

The chart above compares the daily calorie and protein intakes of the average Japanese diet with those of some other countries. The intake figures for the United States and European Countries are for 1971. Source: "White Paper for Fisheries", Japan Fisheries Agency, 1973 and 1974.

Fish are remarkably important in Japanese tradition and as a source of animal protein in the Japanese diet. Several points should be kept in mind when considering the marketing of fish in Japan. (1) With the exception of the end of World War II (no data) Japan's daily calorie and protein intakes have continued to increase over the past 40 years, (2) Japan's food intake is still well below that of the "western" countries, (3) Japanese people eat about 7½ times more fish and fish products than Americans do, and (4) the consumption of fish is continuing to increase but at a much lower rate than that for meat, poultry, milk, etc. This difference in rates, seems to be associated with the economic "well-being" of the consumer. In any case the figures show that Japan's nutritional needs are not yet satisfied and demand for fish and other food items will continue to increase.

DEVELOPMENT OF JAPAN'S FISHING INDUSTRY

The history of Japan is unique. In 1635 the ruling Tokugawa Ieyasu issued an edict prohibiting any Japanese from traveling abroad. If a Japanese left the country they were not allowed to return. This edict even applied to the return of shipwrecked fishermen. No foreigners were allowed in Japan under any circumstances.

The Tokugawa period of isolation continued for about 220 years and was finally broken by growing internal and external pressures and the sudden appearance of Commodore Perry's ships off Shimoda in 1853. It was during this period, however, that patterns were formed in the organization, marketing, and conservation of the Japanese fisheries.

For example, the local Lords, or Daimyos, claimed the waters along their shores and gave their fishermen exclusive rights to fish those waters. The Daimyos also organized the fishermen, probably for better control, into guilds. Both features are now found in Japan's system of fishery cooperatives.

Although the first market was established in 1590 just before isolation, the system of buying and selling fish by auction was refined and gradually spread to other areas of Japan.

In 1716 a *samurai* by the name of Buheji Aoto built the first "artificial spawning channel"—a simple screened area of stream where the fish could spawn in safety. On another stream the local administration began to transport salmon in a basket to the headwaters where spawning conditions were better. During this period a number of local closures and regulations were enacted in order to protect certain fisheries. During this entire period, Japan's fisheries were confined to the inland and coastal waters.

With the beginning of the Meiji period in 1867, the door was opened and Japan rapidly began to modernize her fisheries. Within a period of 20 years, six ships were built for high seas fishing, and with the assistance of United States specialists, salmon hatcheries were built near Tokyo and in Hokkaido.

Then came the Russo-Japanese war. The resulting treaty gave Japan the "right of fishing, of taking and of preparing all kinds of fish and aquatic products, except fur seals and sea otters, along the Russian coasts of the Japan, Okhotsk and Bering Seas with the exception of rivers and inlets." The related convention provided for the annual lease of shore sites for salmon and other fisheries.

After the Russian revolution, the Soviets began to resist the free hand that Japan had exercised in developing the fisheries in the Far East. They reduced the number of shore leases for Japan and literally forced Japan to turn to the sea. It was then, in the late 1920's, that Japan developed the technology of taking salmon on the high seas. Over the next 10 years Japan rapidly expanded her high seas salmon fisheries to the Okhotsk and western Bering Seas, systematically explored the fisheries in the Bering Sea east of 180°, and even established crab and salmon fisheries in the eastern Bering Seas north of the Alaska Peninsula and Aleutian Chain.

This latter period can best be described as one of rapid expansion and of growing conflict between Japan and the United States, the USSR, and other countries. Needless to say we didn't sell much fish to Japan during this period, but the plentiful supply of salmon, herring, king crab, and other northern species went far to establish these products firmly in the Japanese market. A demand was created that we can now use to our advantage.

AFTER THE WAR

At the end of World War II, Japan's fishing industry was in chaos. Many fishermen had been lost in the war, boats were in disrepair, and nets worn-out. In 1945, the catch was only 169,000 metric tons, or one tenth of the catch six years before. Again, it was the United States that played a dominant role in establishing the pattern for the present fisheries of Japan. Under the direction of Dr. W.C. Herrington and with the assistance of a number of fishery experts from the United States, the fisheries of Japan were soon rebuilt. By 1951 (the end of occupation), the total catch had already exceeded the pre-war level of 1936-1940, and by 1965 Japan had regained its place as the top fishing nation of the world.

In the following years, the Japanese fishing industry went far beyond the original need to feed its people. The large fishing companies are now international, depending more and more for their profit on the export and import of marine products than the landings from distant water fleets.

It is significant to note that the total landings for the past year have declined. There is every indication that this decline will continue for several more years before the catches stabilize at some new lower level. There are several reasons for this decline. (1) The numbers of unexploited fish stocks in distant waters have now been fished down. The catches are becoming smaller and will be more difficult to obtain in the future. (2) A series of international treaties and agreements are rapidly reducing the fishing area available to the Japanese fleets. (3) Severe pollution of coastal and inland waters has eliminated a number of profitable fishing areas, reducing the catch and even making culture of some of the marine species hazardous in these waters. (4) The high rate of inflation and the high cost of labor and fuel pose serious economic problems to all of the fishing companies. All of the companies have suffered a sharp decline in profits and some are on the verge of bankruptcy.

The declining Japanese catch, the increasing demand for animal protein and food, and an established market for northern-type fish and fish products, can only mean an expanding market for Alaskan fish in Japan. This series of articles on the marketing of fish in Japan is designed to provide the fishermen and the industry in Alaska with a better understanding of the Japanese system, and most important, how to sell fish to the Japanese.

Feb. 1976

MARKETING FISH IN JAPAN

Part II

By Clinton Atkinson

Japanese investments and influence in the Alaska fishing industry are a very controversial fact of life. In the last ten years Japanese money has in some cases brought higher prices to fishermen, expanded processing plants, developed new products, and provided a good market for many Alaskan seafoods. The influence and the eventual effects of that money on the structure and operation of the Alaska industry is hotly debated.

In the February, 1976 issue of Alaska Seas&Coasts we published the first section of a three-part series on marketing fish in Japan written by fisheries consultant Clinton Atkinson. This issue includes the second section of that series and an opinion on the ramifications of the Japanese investments by Thomas Casey, manager of the United Fisherman's Association in Kodiak.

Marketing fish in Alaska has become more complicated recently with the growing demand for products to be processed and sold in the export market, mainly to Japan. New products such as salmon and herring roe are being developed which have no previous marketing history in the United States. Just how to determine a "fair price" for a new product which is to be sold in a market several thousand miles away where practices and consumer demands are entirely different from those in our country is a difficult problem. To help in future export trade with Japan this article explains the trends in production and the operation of the fishing industry and domestic markets in Japan.

The Government

The Japanese government wields remarkable influence and control over its fisheries. In order to understand marketing in Japan it is important to know about the following features of their system.

(1) Fisheries authority is vested in the national government, but management of the coastal fisheries and conduct of associated studies have been delegated to the prefectural fisheries agencies.

(2) The Japanese government effectively controls the amount of effort allowed in an area or in specific fisheries by limiting or adjusting the number of licenses. For example, many of the smaller fishing vessels now operating in the North Pacific and Bering Sea (the Hokuten-sen) have been transferred from other fisheries where the catches had become too small to be profitable. The Agency has also reduced the size of the fleet by issuing one permit for construction of a larger boat in return for the surrender of two licenses for smaller boats.

(3) The Japanese Government provides low cost loans, lump-sum payments, or other actions to compensate fishermen for loss caused by pollution, damaged stocks, fisheries abolished by international negotiations, and for other causes beyond the control of the fishermen or the industry.

(4) Distant-water fisheries are often accompanied by exploratory research vessels that determine the areas with the greatest abundance of fish. The government compiles this information and/or similar data from the fishing fleet for release by radio or FAX to the fishing fleet.

(5) Government and industry work closely to develop new fisheries and fish products. Much of this work is financed jointly, and industry vessels frequently do the work. These vessels sell their catch to help cover most of the costs of operation.

(6) Local governments operate over 3,000 fish markets which are located in all important producing and consumer centers in Japan. All fish handled at these markets are sold by auction or tender, providing the highest price to the fishermen and a fair price to the consumer. These markets handle over half of Japan's total catch, and the auction market price controls the price for fish and processed products landed by company vessels and imports.

(7) Fishermen and the fish companies negotiate prices and wages annually. For example, cooperatives engaged in the high seas salmon fisheries annually negotiate a price for salmon, which includes a base price plus a share of the profit from sale. Inspectors for the fishermen, the company, and the

government are aboard each mothership to assure that the catch count is correct.

(8) All fishermen employed aboard company boats as well as seamen aboard any commercial boat must belong to the very powerful All Japan Seamen's Union. This union operates a completely closed shop which can effectively tie up the maritime and fishing industries in order to obtain their demands for higher wages and better working conditions. This union has taken a very strong stand against the reduction of fleets and possible lay-off of their members.

(9) The Japanese government is concerned about the decline in coastal fishery stocks because of pollution and land reclamation projects. They are attempting to restore many of their fisheries through environmental improvements and aquaculture.

The Supply

Japan's marketable catch is composed of over 500 different kinds of fish, shellfish, seaweed, and marine mammals. The total supply of fish and fish products grew very rapidly between 1960 and 1973. Since 1960 the domestic catch has increased by over 80%, exports have nearly doubled, and imports have grown by 10 times.

At present over 10 million tons of fish products are consumed annually in Japan. The coastal fisheries supply approximately 25% of the domestic catch, and the other 75% is divided almost equally between the offshore and distant water fisheries. The domestic catch has probably reached its peak, however, and in the future Japan will be depending more and more on imports.

Japanese statistics show that in 1973 about 41% of the domestic catch was utilized for "paste products," 24% salted, dried or smoked, 18% frozen, 14% fresh, and 3% canned. The rapid rise in the use of paste products (kamoboko, chikuwa, fish-sausage, ham, and luncheon meats, etc.) is particularly significant for Alaskans. New technology and the use of minced Alaska pollack as a base ingredient for paste products greatly stimulated the growth of the Japanese trawl fishery in the Gulf of Alaska and the eastern Bering Sea during the 1960's.

The amount of fresh fish marketed between 1968 and 1973 decreased by 20% while the use of frozen fish increased by 35%. These trends will most likely continue. The increased use of frozen fish in Japan helps to stabilize both supply and price, but the product is still limited to institutional and retail store sales since very few Japanese families can afford the luxury of a home freezer.

The use of lightly salted products such as salmon, mackerel, and cod, and the use of salmon, herring, and Alaska pollock has nearly doubled in the past 10 years. These export products, of great value to the Alaskan fishing industry, are subject to increasing competition from the Republic of China (herring roe) and the Soviet Far East (salmon, herring, and pollock roe). The amounts of dried, dried-salted, smoked, and canned fish have shown little change over the past 10 years.

The Source

The domestic supply of fish in Japan comes from three main sources: (1) cooperatives and associations, (2) fishing companies, and (3) trading companies.

Cooperatives and associations are by far the most important of the three. Approximately 600,000 fishermen, including almost all coastal and offshore fishermen and many high seas fishermen belong to one of the 3,500 local fishing cooperatives. The cooperatives, which are structured in a local-prefecture-national form of organization, provide benefits from mass purchases of fuel, gear, and other supplies and actively assist their members in the financing of new boats with funds from cooperative banks or government subsidies.

The major role of the fishery cooperative is to assist the fishermen in marketing their catch. They advise their members whether to sell locally or ship directly to another market where a better price can be obtained. They operate cold storage plants to freeze and hold the fish until the market is more favorable. They make arrangements to ship the fish to market, and occasionally even operate their own trucks. The cooperatives are politically strong and effectively influence legislation and regulations which might affect the fisherman's livelihood.

Japanese fishing companies are classified by size. The small- and medium-sized companies operate about 9,500 boats of 10-1,000 tons in the offshore waters, and the large companies operate about 200 boats over 1,000 tons in distant waters. The large Japanese fishing companies are international in scope, operate offices in a number of foreign countries, and have substantial investments in Alaska and elsewhere.

Japanese trading companies do not usually operate fishing vessels under Japanese domestic license, but they may own all or part of subsidiary companies that do operate fishing vessels, especially in foreign countries. The role of trading companies in fisheries is basically confined to the buying and selling and the import and export of fish and fish products.

Almost all of the fish handled by fishing and trading companies are processed before being placed on the market and are usually sold through distributors. Some distributors are exclusive agents for a particular company, while others deal in a variety of products from a number of companies. The distributors deal generally with the institutions and the larger retail stores, but if and when the price is favorable they also sell through the consumer market.

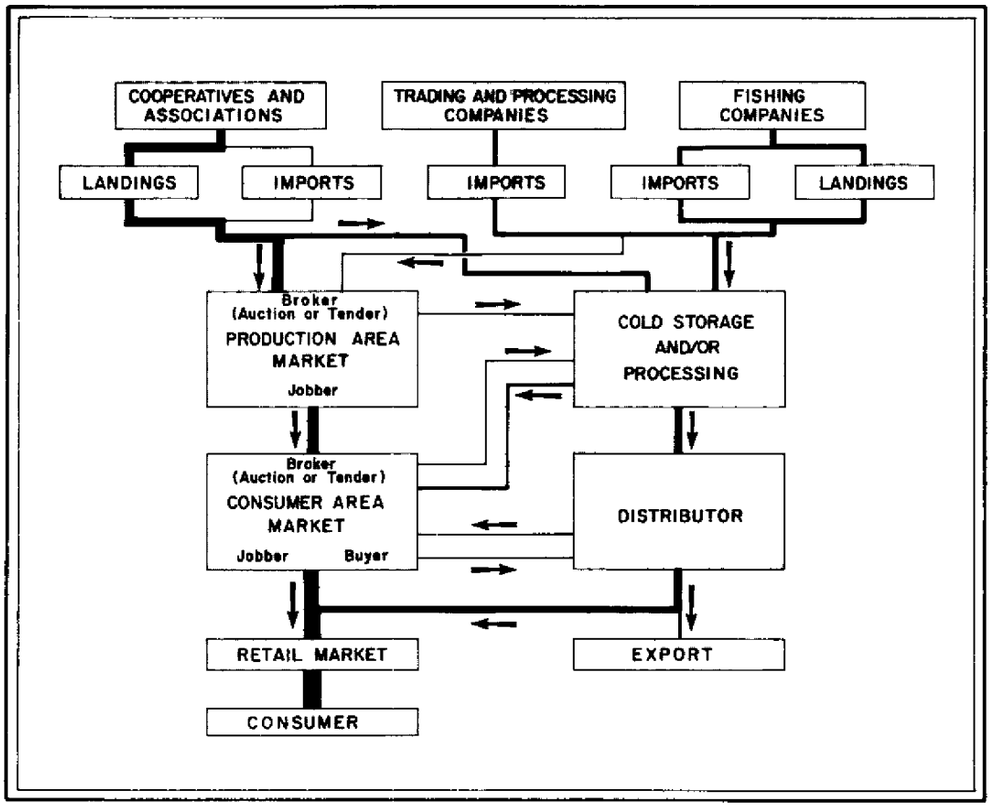
The Public Markets

There are two types of public markets in Japan—one in the production centers where the fish are landed and the other for consumers in the larger cities.

Approximately 2,800 fishing ports are scattered along the coasts of Japan at the present time. About 1,000 of these ports have producing-center markets that are operated by the local municipal governments and equipped with cold storage and ice-making facilities.

The largest consumer-center fish market in the world is located at Tsukiji in Tokyo. The market proper covers an area of about 52 acres and is under regulation and management of the city government. In 1973 the market handled 850,000 metric tons of fresh and processed fish, or about one-third of the total U.S. catch.

Seven broker firms with 150 auctioneers, 1,300 licensed jobbers (middlemen), 1,350 licensed buyers (supermarkets), and several thousand



market employees, porters, and other service personnel handled the fish at Tsukiji in 1973. With very few exceptions all sales are made by auction or tender with the sales beginning at 5:30 AM and usually lasting until 8 AM. All fresh or frozen fish and most processed fish are sold each day.

The Market Price

The price structure for producing-center markets shows a very close, inverse relationship between the amount landed and the price. If the landings are large, the price is low; if the landings are small, the price is invariably high. When the landings are large, fishermen usually freeze the fish and hold them as inventory for sale at a later date.

This volume/price relationship is not often apparent in the consumer market because of the buffering effect of fishermen holding the fish in cold storage. If the volume/price relationship is present at all in the consumer market it is only during periods of real scarcity.

Mark-ups at the wholesale level show no consistent pattern for quantity sold or for the base price per pound. For example, the percent markup for brokers and jobbers varies from 14 to 30 percent for low cost products (fresh jack mackerel, saury, squid, and frozen mackerel), from 18 to 20 percent for medium-priced products (fresh mackerel and frozen squid), and 11 to 25 percent for high-priced products (frozen tuna and cuttlefish, and pink and chum salmon roe). Thus, the mark-up for fish at the wholesale level will range from about 11 to 30 percent in Japan.

Mark-ups at the retail level differ for fish and fish products eaten regularly by the Japanese people and the so-called luxury items. The mark-up between wholesale and retail prices will range from 34 to 46 percent for staple fish and fish products. The retail price for luxury items such as frozen tuna, cuttlefish, and chum and pink salmon roe, is one and a half to nearly five times the wholesale price. The reason for such a drastic mark-up in the retail shops is probably due to the smaller quantities sold, the demand by the consumer for top quality when the price is high, and the greater chance of loss from holding for longer periods of time.

This article has summarized some of the practices, channels, and factors of marketing fish in Japan. The next and final article of the series will examine the dynamics of exporting fish to Japan—export and import controls, quotas, prices and price fluctuations.

April 1976

MARKETING FISH IN JAPAN

Part III

Last in a three part series by Clinton Atkinson.

Since the 1960's when Alaska first began to export *sujiko,* salmon roe-in-skein, many Alaskans have learned that exporting fishery products to Japan can be a very profitable venture. Many have also learned that it is a venture filled with more uncertainties and frustrations than marketing fish products closer to home. Part of this problem is the lack of information in Alaska on the magnitude of supply in Japan, the extent of competition, the legal requirements, and the trends in Japanese market conditions. Although some may have concluded that marketing fish in Japan is a headache, it needn't be.

The Japanese people are well aware of the importance of an adequate diet to their health and productivity. They have seen the results of severe dietary deficiencies suffered before and after World War II, and in more recent years they have watched their children grow taller and with stronger teeth and bones because of a more adequate diet. Daily per capita intake has increased from 2,100 calories in 1934-36 to 2,500 in 1973 and from 52 grams of animal protein to 79.4 grams. The Japanese Government is committed to increasing the daily per capita intake of the Japanese people to 3,500 calories and about 100 grams of animal protein, an intake equivalent to that of other advanced countries.

To plan future food production and policy, the Japanese Government recently studied the estimated population and projected consumption of certain agriculture and fisheries products in Japan by 1985. This study shows that in the next 10 years Japanese demand for fishery products will be about 14 million metric tons annually, an increase of some 3.5 million metric tons over present levels.

The Japanese Government also studied the extent that their domestic fishery could satisfy the demand in 1985 and came to the following conclusion:

As regards production, consideration will be given to the maintenance of resources, while an increase is expected from the improvement of coastal fishing grounds, development of new fishing areas and development and utilization of new resources. Thus, it is planned to secure a turnover of about 12 million tons, or about 90 per cent of demand. (Japan Report, November 16, 1975)

I don't agree with these conclusions. The report is old and does not take into consideration the dramatic change in economic conditions that has occurred since the "oil crisis" of August 1973. In 1974 Japanese fishing companies experienced an average loss of 20 per cent of their earnings. Some of the large, well-known companies were forced to the verge of bankruptcy and others had to borrow heavily from reserve funds in order to remain solvent. Labor and fuel costs have risen rapidly and are critical to the Japanese fishing industry. The powerful Seamen's Union in Japan continues to strike for higher wages and against loss of jobs as the distant-water fishing vessels are withdrawn from operation. These economic factors have markedly decreased the competitiveness of Japanese fishing companies in both the domestic and export markets.

An even more serious blow to the Japanese fisheries has been the unilateral action or international agreements restricting fishing off the coasts of other countries. Almost every Japanese distant-water fishery has been affected by these regulations and the Japanese catch dramatically reduced. The passage of the U.S. 200-mile Exclusive Fishing Zone, and eventually an international 200-mile Exclusive Economic Zone, may be a fatal blow to the Japanese distant-water fisheries. There will be negotiations for that portion of the catch that cannot be taken by the U.S. fleet, but gradually, perhaps by

1985, the unused portion will disappear and along with it the high-seas foreign fishing fleets.

Susumu Yamajo, an editorial writer for *Nihon Keizai,* the *Japan Economics Journal,* recently summarized the Japanese position well.

Regardless of the conclusion reached on this problem at the conference, there is no doubt that the rights of the coastal countries over fishery resources in the waters concerned will be immensely strengthened. This also means a serious turning-point for Japan's fishery industry. It also eventually will become necessary for the Japanese Government to carry out an overall revision of its blueprint of the nation's food supply demand program . . . . .

Japan's fish catches in areas within 200 miles of foreign waters in the northern part of the Pacific Ocean in 1973 amounted to 3,930,000 tons. Included among them were 3,570,000 tons within the sphere of 200 miles along the coasts of the United States, Canada and the Soviet Union. It is certain that these three countries will move to place severe restrictions on Japan's fishing operations in such areas.

Assuming that the fish catches within the sphere of 200 miles of the coasts of foreign countries are halved, the amount of pork to replace the estimated decrease of such fish catches is estimated to reach 90,000 tons, this will require Japan to about double the number of hogs raised to 7.7 million head. The necessary amount of feed to be imported will swell by 10 million tons. The advent of the "200-mile economic zone" age thus will shake the very foundation of Japan's food supply-demand schedule.

The Japanese Government is trying to compensate for the reduced catch by restoring the production of their coastal fisheries through aquaculture, pollution abatement, and environmental enhancement. Even so, the Fishery Agency expects an increase of only 300,000 tons under the present seven-year plan, which is less than one-tenth of the fish lost from catches within the 200-mile zone of the North Pacific.

The Japanese Government is also developing new fishing grounds and products. The present efforts of the Japanese fishing industry to develop a market for Antarctic "krill," now processed and sold in several forms, is a good example. The Government and industry are also beginning a series of explorations to develop a new, deep-sea trawl fisheries beginning off New Zealand. However, the yield from these fisheries will be very small when compared with the average catch of Alaska pollock from the North Pacific over the past 10 years.

Meanwhile the Japanese Government and industry are exploring methods to better utilize the existing catch. For example, the recovery rate for Alaska pollock processed into the paste product *surimi* is only 15 per cent while recovery for the more valuable fillets is 35 per cent. Thus, in time, there will be a tendency to shift from the paste products to fillets.

Taking all of these factors into consideration, the Japanese production of fish probably reached a peak in 1974 and has already begun a decline, which will probably stabilize around seven or eight million tons. The 14-million-ton demand predicted for 1985 will have to be satisfied by an increase in imports from other countries or, if the price is not right, a shift from fish to the production of pork or some other source of animal proten.

COMPETITION

Alaska is in a very favorable position to supply fish products to Japan, but it is not the only source for these products nor in the most favorable location. China, the Koreas, and the USSR are all anxious to export and have already begun to sell salmon, herring, salmon and herring roe, and crab to Japan.

Two years ago Japan imported 12,573 metric tons of processed herring roe – 49 per cent came from China, 34 per cent from Canada, 9 per cent from the Koreas, and 5 per cent from the United States. Within a period of only five years China has attained the dominant position in the export market for herring roe.

In 1974 Japan also imported 4,000 metric tons of frozen salmon – 56 per cent came from the United States, 22 per cent from Canada, 19 per cent from the USSR, and 3 per cent from China and the Koreas. Although the United States dominates the salmon export market at present, the rapid growth of salmon imports from the USSR is notable. Salmon imports from the USSR grew from a negligible amount in 1972 to 174 tons in 1973 and 752 tons in 1974.

The USSR recently announed a five-year plan calling for production of 14 million metric tons of fish by 1980. In the past the USSR has had an uncanny way of meeting her production targets for fish. Most of this increase will probably come from deep-sea trawlers and is destined for domestic markets in the USSR. This increase in production of fish would free more of the USSR's luxury products like salmon and crab for export.

Products from the USSR, China, and the Koreas are generally good, and the prices are low. Americans exporting fish to Japan are no longer dealing in a seller's market and must produce a better product and a dependable supply to compete. Probably the most important steps in successfully marketing fish in Japan are to understand the product preferences of the Japanese people and the sociological, political, and economic trends in Japan itself.

One of the most characteristic preferences of the Japanese is their demand for quality. Fish being processed for export to Japan should receive careful handling from the time it is caught until delivery in Japan. To assure the highest price in the market the product should be carefully selected without scars, discoloration, or broken fins or legs, and should be grouped by size. Emphasis must be placed on the importance of appearance to the Japanese consumer. Americans who have visited the Tsukiji Fish Market in Tokyo are immediately impressed by the appearance of the fish, even on the auction table. These standards must be met to compete with similar products from the Japanese domestic fisheries or with imports from other countries.

Other areas to watch are Japanese import standards and regulations which may vary from those accepted in the United States. In addition to appearance, freedom from dirt, good glaze, and an internal body temperature of less than minus 10°C., the Japanese Government is especially strict on the presence of additives or natural contaminants.

The level of mercury, for example, has now been set by Japan at 0.3 ppm which is slightly lower than the U.S. standard. About four or five years ago in Japan a ban prohibiting the use of sodium nitrate in processing of salmon roe was on the verge of enactment. At the last minute sufficient scientific evidence convinced the Government that proper use of the additive was safe and an exception was granted.

TARIFFS

Immediately after World War II, all imports to Japan were carefully controlled and only those items essential to the economic growth of the country were allowed to enter. Since 1961 this order has gradually been relaxed, and at the present time most items are subject to "automatic" approval without limit or quota. There are no restrictions on the import of processed fish products, nor on fresh/frozen salmon, crab, or shrimp.

Some fish products, however, are still under import control. Of particular interest to Alaskans are: seaweed, Alaska pollock, *surimi,* pollock roe, scallops, and kippered herring. It is expected that these items will eventually be removed from control as the Japanese demand for fish becomes more acute and the supply decreases.

Species and Product	Duty (%)
Salmon (frozen)	5.0
Salmon roe (processed)	7.5
Herring (frozen whole, with roe)	10.0
Herring roe (processed)	15.0
Crab (frozen in sections)	10.0
Shrimp (peeled and frozen)	5.0

Japanese tariffs on common Alaskan products.

PRICE

When all is said and done the price is determined by negotiation between the buyer and the seller, and all the formula in the world cannot predict the outcome. The basic marketing factors reviewed here plus the current financial status and policies of the company and a good deal of personal judgment affect the final price. The seller is at a tremendous disadvantage in price negotiations if unaware of the current price for the product in Japan, what makes up that price, and what the future market may bring.

The component costs that contribute to the final price are fairly standard and a "ball-park" estimate can usually be calculated easily. A summary of the various cost increments for five of the common Alaskan fish export products is shown in the accompanying table. Given the price at one level, one may estimate the price at the three other levels. The negotiable part of the buyer's price lies within the buyer's margin and to a lesser extent in miscellaneous costs dependent on market conditions (e.g., how long the item must be held before marketing).

A major element in the price negotiations is quality. As noted previously the price for fish in Japan is determined by auction after inspection of the product. Fish of the preferred size, good quality and attractively packaged or displayed naturally command the top price. Most surprising, however, is the price range from poor quality to the best. Frequently, a bidder will offer two or even three times the going price for top quality fish. The extra effort needed to obtain a top quality product is well worth the cost when selling fish in Japan.

Several sources of Japanese market information translated to English give current prices. Six to eight Japanese fisheries newspapers give daily market summaries for key products and are available by subscription via surface or air mail. The Japan Bureau of Customs issues a monthly summary of quantity and CIF value for all Japanese exports and imports by groups. Unfortunately, most of these groups cover several different kinds fish or fish products and are of little use in establishing the market history for a single species, such as tanner or king crab. The Ministry of Agriculture and Forestry publishes monthly seafood distribution statistics which include market amounts and prices, imports, exports, and inventories in some detail. Unfortunately these are only for key species, incomplete, and usually about three months late.

Finally, there are a number of annual reports published by both Government and private companies that summarize market conditions and trends. These data are usually about two years old.

Customs reports and an occasional publication by the Fishery Agency or by one of the associations are in English, but most sources of information are in Japanese and of little use unless the reader knows the language or has access to a competent translator.

COST STRUCTURE FOR SELECTED FISH PRODUCTS

Cost Item	Chum Salmon Frozen	Chum Salmon Roe	Herring Frozen	Herring Roe	Tanner Crab Sections
Price, FOB Alaska[1]					
Insurance	0.5%	0.5%	0.5%	0.5%	0.5%
Freight[2]	12¢/lb.	12¢/lb.	10¢/lb.	12¢/lb.	15¢/lb.
Price, CIF Japan					
Duty[3]	5.0%	7.5%	10.0%	15.0%	10.0%
Miscellaneous costs[4]	6.0%	6.0%	6.0%	6.0%	6.0%
Buyer's margin	3-10%	3-10%	3-10%	3-10%	3-10%
Price, wholesale, production-level					
Wholesale market broker's commission	5.5%	5.5%	5.5%	5.5%	5.5%
Price, wholesale, Tokyo consumer-level					

1. FOB Kodiak, Anchorage or Prince William Sound
2. By container, minimum shipment 15 tons
3. Duty assessed on CIF value including costs of technicians in the case of salmon or herring roe
4. Includes Usance charge (4%), customs broker (½%), bank charge (½%), and handling and storage

ESTABLISHING A MARKET

No matter how large or small an American company, the establishment of a market in Japan should evolve from three basic stages of development. 1) Exploratory — to determine whether there is a market for the product in Japan, an examination of the price structure, and if the product is new, a trial shipment to test the market. 2) Developmental — to establish the product in the Japanese market and to stabilize the source of supply, methods of production, and product acceptability. 3) Production — to expand plant

capacity to the optimum level of production, minimize processing costs, and maximize product quality to insure a high return on investment and maintain a good competitive position with similar products from other sources.

During the first stage as many Japanese companies as possible should be canvassed to determine which are interested in handling the product and to obtain some idea of the price or other arrangements. In the second stage, the firms contacted should be only those which have expressed some interest in the product, are established and financially sound, and offer a favorable price. Stage three is characterized by a variety of forms of negotiation which can include an annually renegotiable contract, to a long-term contract which assures the going price plus certain "fringe benefits" (price or otherwise), or joint investment which assures a market for the product, market acceptability, and a share of the dividends.

For those who insist that sale transactions of American fish products be conducted entirely in English and conform to American business methods, there are at least 15 reliable Japanese fishing or trading companies with branch offices in the United States. The staffs in these offices speak English fluently and are well schooled in American business practices. These offices should be the first point of contact for anyone wishing to sell fish in Japan.

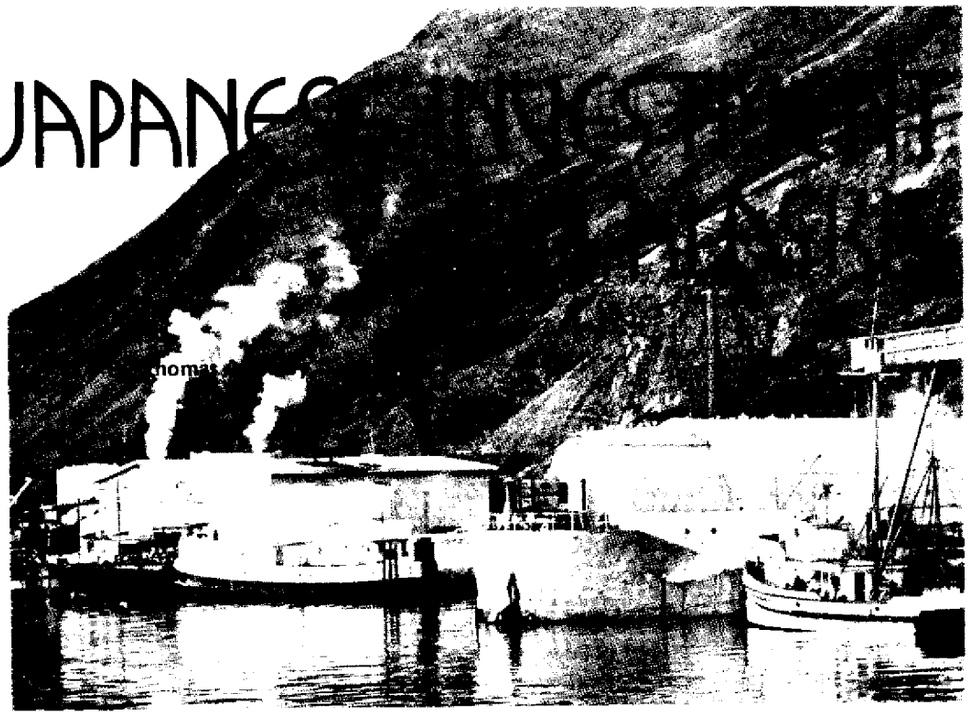
Frequently, however, a better price or contractual arrangement can be obtained from a smaller Japanese company, an association of processors, or a department store or supermarket not represented in the United States. These companies often have a special interest in some product such as sea urchin roe, live abalone or clams, or a special pack, or a small but dependable source of supply. These companies should be contacted during the exploratory stage of marketing.

After watching a number of successful and disastrous attempts to sell fish in Japan the safest approach seems to be through one of the Japanese fishing or trading companies with offices in Alaska or the Pacific Northwest. As pointed out previously, the prices offered for various products will differ considerably from company to company, depending on interests and specialties, current needs, and the desire of a company to expand their source of supply or to enter a new area. It is very important that the seller solicits offers from as many companies as possible to assure the best price for his product.

For those who want to "go it alone" there are a few Japanese companies that have handled fish products on consignment. Arrangements such as these are generally difficult because of Japanese monetary regulations governing imports. If you feel that you can obtain a better price at auction in the Tokyo Fish Market, then arrangements can be made with a company to ship your fish, clear it through customs, and deliver it for auction per your instructions. When the fish is sold, the Japanese company provides a statement itemizing the various charges plus a commission and a check for the balance due.

June 1976

JAPANE



The United States' 200-mile limit bill, which will be signed into law this month, comes as no surprise to the Japanese. For over seven years Japanese fishing and trading companies have invested in Alaska fish processing plants, anticipating the day when U.S. law would restrict fishing in the Gulf of Alaska and the eastern Bering Sea.

Japanese capital now dominates the seafood processing industry in the United States' most valuable coastal fishing port, Kodiak, Alaska. A profile of Japanese capital investment in Alaska's seafood industry, which was published in March 1975 by the American Embassy in Tokyo, designates the following percentages of Japanese ownership in Kodiak fish plants:

Alaska Pacific Seafoods	100.0%	Marubeni Ida
B & B Fisheries	90.0%	Taiyo Gyogyo
Kodiak King Crab, Inc.	49.9%	Marubeni Ida
New Northern Processors	50.0%	C. Itoh, Hokuyo Suisan
North Pacific Processors	50.0%	Marubeni Ida
Whitney-Fidalgo	97.9%	Kyokuyo

This list does not include the processors in Dutch Harbor, some of whom are owned by Japanese investors, nor does it contain the names of all Alaska fish processors who have depended heavily upon Japanese financing for capital improvements and fish purchasing reserves. It is not uncommon for a Japanese fishing or trading company to install custom-processing equipment in American-owned fish plants at little or no cost to the plant owners. Likewise, Japanese "financing" of an American processor's pack of crab, salmon, or salmon roe has occurred more than once in Alaska.

The Partnership

Japanese investors apparently supply their American partners with management expertise, marketing channels, and financing in exchange for guaranteed access to Alaska's abundant fish supply. Japanese seafood marketing channels now lead directly from dockside in Kodiak to supermarket shelves in Tokyo, often without the merchandise ever leaving Japanese hands.

Marubeni, for instance, can custom process snow crab in Kodiak, ship it to its own brokerage in Japan, and market that crab through Japan's largest supermarket chain, Daiei. At each marketing level, Marubeni can derive business profits. C. Itoh can duplicate the process exactly. Such a streamlined, high volume marketing

system has probably never existed before in Alaska seafood history.

The relationship between Japanese investors and American seafood processors is a convenient one. Processors have often had difficulty attracting American capital into the high-risk fish business, and the Japanese food supply would be severely endangered if the one million metric tons or more of fish from Alaska were suddenly cut off.

At first glance such a system would appear advantageous to Alaska's fishermen. Japanese elimination of expensive marketing intermediaries should enhance their earning power and product control. This should make it easier for the Japanese companies to implement a well-planned, marketing strategy which accents Alaska seafood's purity, nutritional value, good taste, and visual appeal. The ex-vessel price paid to Alaska fishermen under these circumstances should reflect market demand and quality requirements.

It has not. In the spring of 1975 Alaska snow crab sections sold on the Japanese wholesale market for more than $1.90 per pound. Japanese processors in Alaska paid fishermen only 14c per pound for the raw product, down six cents per pound from the previous season. Currency exchange rates during this time, as compared to the previous November, made all American products 6.6c per dollar cheaper for the Japanese to buy.

At this point the American-Japanese partnership in Alaska fisheries is one-sided. The Japanese advantage lies in their high seas mothership fleets.

Nippon Suisan which owns shore plants in Cordova and Dutch Harbor has four bottomfish factory ships and 75 draggers operating in the Bering Sea and the Gulf of Alaska. They also have a crab factory ship and 16 catcher vessels harvesting tanner crab in the Pribilof Island area. Taiyo Fisheries, owners of one of Kodiak's most productive plants, has two factory ships and 48 bottomfish draggers plus a crab factory ship and 16 catcher vessels. Hokuyo Suisan has a factory ship and 27 draggers operating in the eastern Bering Sea which have severely depleted the Alaska pollack, yellowfin sole, Pacific cod, and Pacific halibut stocks in that area.

The combination of high seas fleet and shore plant ownership in Alaska gives the Japanese strong economic power. Japanese impact on ex-vessel prices to American fishermen, as well as FOB prices to American exporters, is enormous. Alternate sources of supply for snow crab, for instance, allow the Japanese to fill their market orders from either the Japanese tanner fleet now fishing around the Pribilof Islands or the shore plants in Dutch Harbor or Kodiak. Pricing of the processed crab need not be identical from both sources. Already we have seen that tanner crab sections from the mothership fleet are priced higher than sections processed in the same manner at Alaska fish plants.

The 200-mile limit law may change this picture dramatically. The management provisions of the law require that 11 Americans on the North Pacific Regional Fisheries Management Council advise the Secretary of Commerce on an allowable level of annual foreign fishing. The Regional Council composed of six Alaskans, three Washingtonians, one Oregonian, and the Regional Director of National Marine Fisheries Service will develop a management plan for all fisheries occurring outside state waters. Once the council determines the safe biological level of harvest, the maximum sustainable yield (MSY), it shall modify that MSY by relevant social, economic, and environmental factors to arrive at the optimum sustainable yield (OSY).

American fishermen will receive first crack at harvesting the OSY. If Americans can harvest and utilize the entire OSY, there will be no foreign fishing for that species. If American fishermen cannot deliver a certain species for processing although they are capable of catching it, the OSY can be diminished to represent the desire of American fishermen to catch and utilize that species. This would reduce the allowable level of foreign fishing and force the foreigners to rely more heavily upon American fishermen for supply. This preferential right mechanism, if agressively promoted by Alaskan fishermen, members of the North Pacific Regional Council, and Alaska's Senators and Congressman, could force the Japanese high seas fleet off the Gulf of Alaska and the Bering Sea and pave the way for American domination of Alaska's fisheries.

April 1976

JAPANESE INVESTMENT IN ALASKA'S FISHING INDUSTRY

The rich fisheries of the Bering Sea and the Gulf of Alaska have historically attracted large foreign fleets. As of August, 1977, the National Marine Fisheries Service reported 356 foreign fishing vessels in the U.S. 200-mile zone off Alaska. By country these break down to: Japanese – 337; South Korean – 10; Soviet – 7; and Nationalist Chinese – 2.

The dominance of the Japanese fleet is obvious. Japanese efforts to acquire seafood products, however, are not limited to the catch of this high seas fleet. In this first portion of a two-part feature article, Per O. Heggelund examines the second element of Japan's quest for high quality seafood: investment in shore-based U.S. seafood processing plants prior to the 200-mile limit.

By Per O. Heggelund
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With no significant natural resources other than her 110 million people, Japan has had to import both food and the raw materials needed to sustain a modern economy. Indeed, 90 percent of her food is imported, making overseas procurement a vital aspect of her economic development.

CHANGES IN JAPAN'S SEAFOOD CONSUMPTION

Marine products have remained a staple in the Japanese diet for centuries. Since 1960, however, there has been a steady decline in the dietary proportion of seafood. This decline primarily reflects the change in the living standards of the Japanese people. They now rely more on meat products for their animal protein needs. There has also been a gradual growth in the preference for higher-value or specialty marine products which Japan has imported at an increasing rate.

In order to accommodate this increased demand for specialty seafoods, import controls on most of these fishery products were lifted in the early 60s. These events coincided with Japanese businessmen initiating the purchasing of Northeast Pacific (NEP) salmon roe.

MAGNITUDE OF THE INVESTMENT

Foreign investment in the U.S. fishing industry totaled $129 million by the end of 1974. The investment was spread among 47 firms reporting foreign ownership of ten percent or more of the voting stock. These companies reported a total sale of $570 million of which $235 million were sales by fisheries processing firms and $292 million by wholesaling firms. The U.S. market share of these affiliates was eight percent and six percent, respectively.

Although foreign investments comprise only a minor part of the entire U.S. commercial fishing industry, the investment has almost doubled since 1970. During 1974 alone, direct investment rose some 30 percent. These foreign investments have been made predominantly through debt items (for example, bonds and notes) representing 66 percent of total claims against assets. Moreover, the foreign investors have tended to concentrate their establishment in the Northeast Pacific. Approximately one-third of the establishments are located in Alaska.

INVESTMENT PATTERNS IN ALASKA

Foreign investments in Alaskan and NEP fisheries enterprises have been dominated by the large Japanese general trading companies (Sogoshosha) and fishing firms: C. Itoh, Marubeni, Mitsubishi, Mitsui, Hokayo, Kyokuyo, Nichiro Gyogyo, and Taiyo Gyogyo. These Japanese companies have applied a foreign investment strategy in this area which differs significantly from the general trend observed in the fishing industry across the nation.

→

First, the Japanese have tended to concentrate their investment in equity items (stocks — 66 percent) rather than debt items. Second, the trading and fishing companies initiate their investments by means of consortiums.

CONSORTIUMS

Although this latter investment strategy is not commonly observed among other foreign investors in the U.S. fishing industry, it has formed an important part of the Japanese multi-national strategy. During the latter part of the 60s, the Japanese fishing firms and trading companies changed their product procurement strategy in the NEP from straight purchasing to equity participation in the local seafood processing establishments.

Taiyo Fishery Co., Ltd. (Taiyo Gyogyo Kabushiki, Ltd.), as the leading fishing concern in Japan with an annual sale of $2.5 billion in 1974, led the way in equity investments in the NEP. In 1965, Taiyo bought 49 percent of Pacific Alaska Fisheries in partnership with Peter Pan Seafoods. Two years later, the same Japanese fishing company incorporated Western Alaska Enterprises as a subsidiary of Taiyo California.

Western Alaska Enterprises, originally established as a holding company with marginal involvement in direct seafood production, only represents the parent company with on-site management and production supervision in plants throughout the NEP. In view of this strategy, Taiyo formed B & B Fisheries in 1967 by signing 70 percent of the stocks to Western Alaska Enterprises and the remaining portion to a local Kodiak processor. This strategy of local participation, however, changed in the mid-70s as Taiyo acquired all the outstanding shares of B & B.

SPECIALTY PRODUCTS

The aggressive investment strategy of Taiyo followed a growing interest by Japanese concerns in a variety of specialty products or underutilized products by domestic standards. Tanner crab, for example, faced an uncertain market in the U.S. Then in the early 70s Japanese interests began purchasing large quantities of tanner crab sections (a semi-processed product) thereby providing the industry with a necessary growth stimulus. This increased demand caused the fishery to expand from 13 million pounds in 1971 to 61 million pounds in 1973.

The growing demand for specialty products prompted other Japanese fishing and trading companies to invest in the NEP. During the late 60s the first Japanese consortium obtained equity participation in one processing establishment. In 1966 Nichiro Gyogyo Kaisha, Ltd. (Japan's third largest fishery company) and Mitsubishi Shojiku (Japan's largest general trading company) in partnership with New England Fish Company, formed Orca Pacific Packing Company in Cordova. Except for Nichiro establishing a U.S. subsidiary, Nichiro Pacific, Ltd., this investment was the last reported Japanese equity participation in the Northeast Pacific during the 60s.

INVESTMENT RATE

The rather slow investment rate was maintained despite the Fisheries Agency of the Japanese Ministry of Agriculture and Forestry's estimate that after 1965 a gradual domestic seafood deficit would become apparent. The Ministry projected that by 1971 one-half million metric tons had to be imported to meet the growing demand. Since fishery products would not represent any major portion of total imports, the Japanese government did not seem concerned with the prevailing trade imbalance. In fact, the value of seafood imports did not exceed exports until 1972.

The widening trade imbalance of seafoods may in part have caused the Japanese investors' renewed interest in the NEP fishing industry. In 1972 and 1973 alone, 14 reported investments were initiated. This investment surge represented a threefold increase over the accumulated investment level since 1965.

The explosive growth in Japanese investment in the NEP fishing industry coincided with a general surge in Japanese foreign ventures. This accelerated investment rate resulted from Japan's economic strategy in dealing with her mounting foreign exchange reserves in the late 60s and early 70s.

First, the government removed most restrictions on overseas investment in order to stimulate capital outflow.

Second, in 1972, the previous administrative policy had not significantly reduced the foreign exchange surplus. The yen was effectively revalued 17 percent in relation to the U.S. dollar, thereby equivalently discounting United States assets.

Third, in 1973 the Japanese government in cooperation with the fishing companies, specifically began promoting overseas investments in fisheries by forming the Overseas Fisheries Cooperation Foundation. The primary function of this organization was to provide credit for companies engaging in off-shore economic and technical cooperation.

The Japanese government's economic incentives toward overseas investments, particularly in fisheries, resulted in the formation of partnerships in the NEP by the new investors. In 1973, the Nippon Suisan Kaisha, Ltd.-Mitsui and Company, Ltd. consortium (Japan's second largest fishery and trading companies respectively) purchased 37.6 percent in Morpac, Inc., which was formed in 1968 by a group of Cordova residents. The same consortium bought controlling interests of the firm in 1976, thus increasing its total capital commitment in the NEP at par with both Taiyo and the Nichiro-Mitsubishi consortium. This strengthening of Nippon-Suisan's consortium strategy appeared despite their formation of three partnerships outside the consortium in the mid-70s.

The strategic position of the consortium in the NEP began deteriorating during the 1972-1973 investment surge. The fishery companies probably possessed some degree of managerial and technical advantage over the trading companies, as the former consortium partners were able to form local partnerships without the aid of the trading companies. These inherent advantages of the fishery firms, however, were abruptly challenged with the aggressive investment policy of Marubeni.

Marubeni-Iida Co., Ltd., the third largest Japanese trading company and the largest marine product importer, committed $1 million among three different NEP establishments in June 1972. The following year this company invested in the firm additional processors, making it the most diversified Japanese investor in the NEP.

Meanwhile Kyokuyo, as with the other Japanese investors in the NEP, committed its capital in seafood processing rather than direct fishing operations. The reasons for this apparent corporate strategy may be found in the inherent structure of the Northeast Pacific fishing industry, Japanese foreign investment regulation, and U.S federal marine regulations.

PERSPECTIVE

The U.S. federal merchant marine laws limit the operation and ownership of

vessels documented for coastwide trade to United States citizens. In the Kyokuyo-Whitney case, for example, Whitney prior to Japanese takeover, was both an operator and preferred ship mortgage holder of vessels in U.S. coastwide trade. Therefore, prior to Kyokuyo's acquisition, Whitney was required to divest its assets and liabilities in U.S. vessels.

These U.S. federal regulations that tend to direct foreign ownership toward seafood processing rather than domestic fishing operations differ significantly from the Japanese regulations pertaining to this issue. Presently, the Japanese Ministry of International Trade and Industry and the Ministry of Finance will not grant foreign investment approval for foreign investments in fisheries governed by international fishing treaties. Therefore, since most NEP fisheries actually are governed by bilateral treaties with Japan, this regulation may have hampered Japanese investors in directing their efforts toward NEP fishing operations. Instead they concentrated on land-based processing establishments.

The NEP seafood processors, at least during the 60s, were also the natural investment target for the Japanese fishery and trading companies. During this period the Japanese investors were interested in specialty products, which were primarily by-products from the processing line rather than raw products from the fishermen. However, as the Japanese demand for fishery products increases, vertical integration, particularly by the major fishery companies, may become a reality. One company is committing some $40 million over the next five years in strengthening their operations in the NEP.

If the Japanese are to intensify their investments in the NEP, this may severely alter their low political profile in the region. The fairly tranquil period of the past may soon expire as the Japanese investments reach the similar "peril point" experienced in a number of Far Eastern countries. According to Dr. Ichimura, Director of the Southeast Asia Research Center in Japan, the "peril point," with subsequent anti-Japanese sentiments, arises in the host country when Japanese investors exceed one-third financial ownership of the local industry.

The "peril point" in the entire NEP seafood processing industry may still be far in the future. However, certain point concentrations, such as Kodiak, the largest fishing port in the NEP, have already caused some negative sentiments toward foreign investments. In fact, the National Marine Fisheries Service published a report this year concerned with the potential Japanese control of the tanner crab market. Although the report concluded that the Japanese did not control that specific market, a concern over the effect of Japanese investment has nevertheless surfaced.

In the next issue of **Alaska Seas and Coasts** *the author examines foreign investment in the Alaskan fishing industry since the advent of the 200-mile limit.*

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JAPANESE INVESTMENT IN THE NORTHEAST PACIFIC (NEP)

JAPANESE INVESTORS	U. S. SUBSIDIARIES	DATE OF INVESTMENT	EQUITY (CAPITAL STOCK)	
			PERCENT	$1,000 (U.S.)
Taiyo	Pacific Alaska Fisheries	12/65	49	50
	B & B Fisheries	-/67	70	305
	Western Alaska Enterp.	11/67	100	550
	B & B Fisheries	-/74	30	131
	NEP TOTAL			1036
Nichiro	Orca Pacific	6/66	50	1000
Mitsubishi	Hilton Seafood	7/73	50	81
	Sand Point Packing	------	50	
Nichiro	Nichiro Pacific	8/67	100	300
	Adak Aleutian Proc.	6/73	30	33
	NEP TOTAL			333
Marubeni	North Pacific Proc.	6/72	50	250
	Marubeni Alaska Seaf.	6/72	100	600
	Bering Sea Fisheries	6/72	25	135
	Juneau Cold Storage	4/73	25	25
	King Crab, Inc.	4/73	49.9	1500
	Kodiak Fishing Co.	4/73	25	130
	Ward Cove Pack.	11/73		
	Juneau Fishing Co.	11/73		
	Alaska Ice & Storage		100	
	Alaska Pacific Seaf.		100	100
	Columbia-Ward Fish.		25	
	Cordova Bay Fisheries		50	
	New Eng.-Marub. Export			
	New Eng.-Marub. Seaf.			
	Point Chehalis Packers			
	St. Elias Ocean Products			
	Togiak Fisheries		49.9	256
Nippon-Suisan	Morpac	6/73	37.6	405
Mitsui	Morpac	-/76	60	646
	NEP TOTAL			1051
Nippon-Suisan	Universal Seafood	6/74	49.9	
	Intersea Fisheries	3/75	40	
	Dutch Harbor Seafood		25	
	Nippon Suisan (USA)		100	300
Kyokuyo	Kyokuyo (USA)	-/73	100	300
	Whitney Fidalgo	10/73	97.9	11,000
	Mokuhana Fisheries (M/V)			
	Nefco-Fidalgo Packing		50	
C.Itoh Hokuyo	New Northern Proc.	3/74	50	500
C. Itoh	Roy Furfjord			
Iwakiri Fisheries	Alaska Marine Prod.	-/74		
Ak. Pulp Co.	Harbor Seafoods		100	
Alaska Shokai	JAD Alaska Shoji			
Kyodo Kumiai	JCT Alaska	6/73	100	10
Kenai Fisheries	R. Lee Seafoods		20	
Kamai Fisheries	William Sound Fisheries			

Oct. 1977

Japan's Crab Take Cut

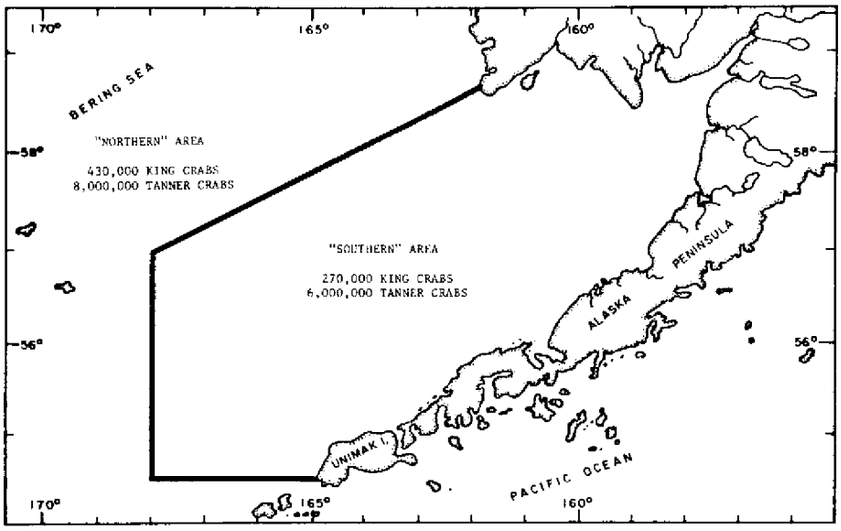
U.S., Japan Sign Fish Treaty

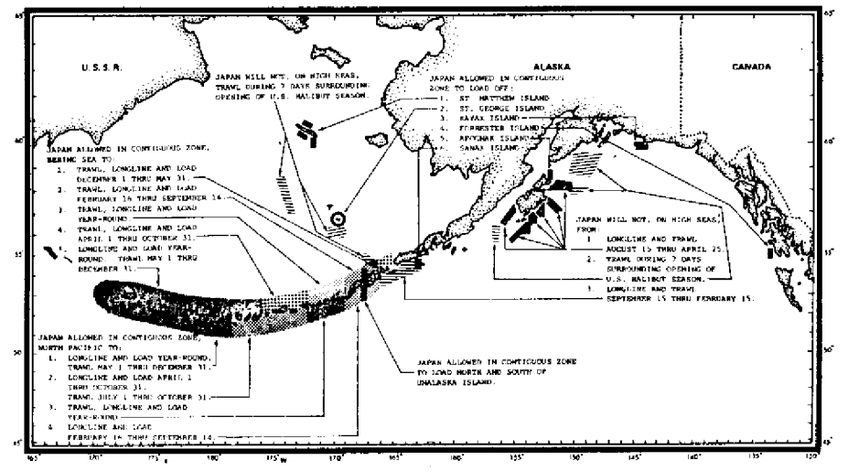
A new, two-year North Pacific fishery agreement between the United States and Japan is expected to reduce Japanese crab fishing operations in the southeastern Bering Sea by 70 percent on both King and Tanner crab.

Renegotiations on two pacts dealing primarily with fishing in the northeastern Pacific Ocean and Bering Sea were completed last November in Washington, D.C. by representatives of the two countries.

Announcement of the new agreements by the State Department said Japan will be permitted to continue its crab fishing operations north and west of the Pribilof Islands in an area not frequented by the U. S. fishing fleet. The new agreement will give U. S. fishermen greater control of crab resources of the southeastern Bering Sea.

The second agreement provided that Japan may continue to fish in certain selected areas of the Aleutian Islands within the nine-mile fishery zone contiguous to the three-mile territorial limits. In return for this privilege, the Japanese agreed to refrain from fishing in "certain areas of the high seas of Alaska during certain periods of the year in order to avoid conflicts with American fishermen arising out of differences in types of fishing gear." (See charts below.)





The charts above, prepared in December of 1972 by the National Marine Fisheries Service, illustrate new U.S./Japan fisheries agreements concerning the Japan eastern Bering Sea crab quotas for 1973 and 1974 (top), and the U. S. contiguous fishery zone off Alaska (bottom).

Feb. 1973

Japanese Bilaterals

Twas the night before Christmas when last year's U. S.-Japanese bilateral agreement on fishing policies in the eastern Bering Sea and the northeast Pacific was finally signed. The agreement outlines U. S. restrictions on the Japanese catch and methods of operation, and provides for enforcement procedures. The agreement will be effective for 1975 and 1976.

According to Clint Atkinson, former fisheries attache to the U. S. embassy and advisor at the bilateral negotiations this year, the negotiations were tough because of the depressed economic status of the Japanese fishing industry, but the agreement is a good one. "We went in asking for the sky and came out with big patches of blue," Atkinson explains.

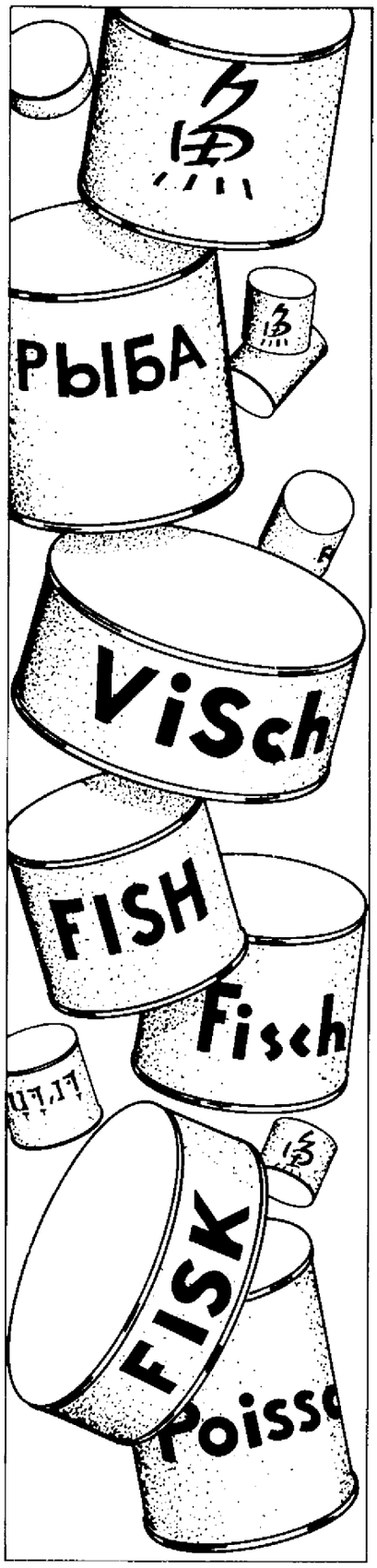
As a result of the agreement, the Japanese king crab quota was cut to 300,000 crab. Because of this extremely low quota many sources believe the Japanese fleet will not fish king crab at all this year.

The final agreement on tanner crab allowed the Japanese a total of 13½ million crab — 11 million from the northern district of the Bering Sea and 2½ million from the southern district. Although the quota for tanner was higher than expected, many feel that the stricter enforcement procedures agreed upon will adequately protect the crab by limiting the incidental catch. The incidental catch of tanner crab by the Japanese fleet has been estimated to be at least 80 million crab annually.

Enforcement provisions of the agreement provide for two trained U. S. observers to be aboard every crab factory ship throughout the entire fishing season. Last year U. S. observers only covered approximately 60 percent of the total fishing time. Teams of observers will provide partial coverage for finfish factory ships and stern trawlers.

In addition to the crab quotas and the enforcement procedures, U. S. negotiators were successful for the first time in establishing quotas for all species of finfish taken by the Japanese off the U. S. coast. For any species where overharvesting seemed possible, the quota reached was either lower or similar to past quotas. Quotas were generally below past catch records. Most significant was the pollock quota of 1.1 million pounds which compares to past catches of 1.5 and 1.7 million pounds.

Feb. 1975



U.S. – FOREIGN JOINT VENTURES in the Northeast Pacific

by Per O. Heggelund
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The pattern of foreign investment in the Alaskan fishing industry has changed since the passing of the 200-mile limit. As discussed in an article by Mr. Heggelund in our October 1977 issue, the Japanese dominated investments made by foreign companies prior to 1977.

In this, a continuation of that article, the author discusses those changes, and outlines details from the controversial proposals for joint ventures between U.S. companies and foreign companies with high seas processing ships. He also presents the arguments of the proponents and opponents of those schemes.

– Ed.

The enactment of the Fishery Conservation and Management Act has catalyzed a new and different surge in foreign investment in the Northeast Pacific (NEP) fishing industry.

Technically, the act with its preferential fishing rights to U.S. fishermen does not prohibit domestically caught fish to be sold to foreign processing vessels within the 200-mile fishery conservation zone.* This fact has promoted proposals of international joint ventures which differ from the foreign investments that the NEP industry experienced prior to the 200-mile legislation. The investment target has shifted from shore-based facilities to off-shore floating processors (Table 1).

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* *It should be noted that processing vessels which already hold valid permits, and are fishing in conformity with U.S. regulations, are not presently prohibited from receiving and processing fish obtained from U.S. fishing vessels operating in the same fishery. Under proposed rulemaking to amend Section 611.3, such permits could be modified by the Director, if the arguments presented here, and at other hearings, warrant final adoption of the rulemaking as proposed.*

National Marine Fisheries Service, **Paper for Use in Joint Venture (J/V) Hearings** (Portland: NMFS Field Hearing, 21 July 1977) pp. 2-4.

Moreover, foreign partners of the proposed joint ventures now include citizens of the Republic of Korea and the USSR, thereby potentially threatening the previous Japanese investment domination in the area.

The Japanese, however, are likely to continue their leadership as equity investors in the NEP shore-based processing establishments, since these have not yet proven to be the investment target of other nations. The Japanese, nevertheless, may change their strategy from shore-based processing facilities to high seas fishing operations, in order to counter the oncoming threat. The proposals for offshore joint ventures listed in Table 1 provide one indication of this change.

Another sign is the intention of one of Japan's largest fishing companies operating in the United States to integrate its subsidiaries to enable it to pursue high seas fishing operations in U.S. offshore waters. This particular firm plans to register vessels in the United States and to invest more than $40 million by 1980.

Although this aggressive investment strategy may not apply to all Japanese companies in the NEP, the recent revaluation of yen should cause still another increase in Japan's overseas investment. During the latter part of last year, the yen soared to 240 yen per U.S. dollar, an exchange rate 12 percent higher than the rate of 1972 which partly caused the investment surge of 1972-73. Whether the Japanese government, particularly the Fishery Agency of Japan, will approve the required foreign investment licenses is uncertain. Nevertheless, should the Japanese fishing and trading companies decide to expand, their involvement in bottomfish, the greatest resource of the the region, is the most likely target.

BOTTOMFISH

Bottomfish importation to Japan, however, is strictly regulated through import quotas. A relaxation of these quotas, therefore, will be necessary if the product is to be marketed in Japan. In order to deal with this situation, the major fishing and trading firms, on the one hand,

have informally proposed liberalization of trade on import-quota items to the Japanese Ministry of International Trade and Industry. On the other hand, the Fisheries Agency of Japan, maintaining a strong stance against this relaxation, "supports the wishes of the small- and medium-sized fisheries companies and associations to restrict fish imports, and it considers the relaxation of restrictions untimely." Therefore, in the interim before the Japanese government relaxes the import-quota, other nations can aggressively pursue their investments in the NEP with reduced competition from the Japanese.

REPUBLIC OF KOREA

The Republic of Korea (ROK), for one, is in a very different situation than Japan. Prior to U.S. extended jurisdiction, Korea did not operate any joint ventures in the Northeast Pacific. The 200-mile fishing zones of both the U.S. and the Soviet Union also severely reduced future resource potential to the Republic of Korea. The U.S. refrained from increasing the Korean total allowable catch above the 1974 level.

Table 1

PROPOSED INTERNATIONAL FISHERY JOINT VENTURES IN THE NORTHEAST PACIFIC OCEAN

NATIONALITY OF FOREIGN PARTNER	FOREIGN PARTNER	U. S. PARTNER	JOINT VENTURE CLASSIFICATION	TARGET SPECIE	VENTURE DESCRIPTION
Republic of Korea (ROK)	Korean Marine Industry Development Corporation (KMIDC)	R.A. Davenny (Anchorage, Alaska)	Contractual	Pollock	• Davenny to contract purchase of 30,000 - 130,000 MT pollock from U.S. fishermen • Catch to be processed on 3 ROK factory ships • Venture disapproved by NPFMC
ROK	Unidentified	Unidentified (Togiak, AK)	Contractual	Herring	• 2 ROK vessels engaged in transporting herring to Korea • Product transfer within 3 miles in compliance with U.S. Custom law • Venture approved by NPFMC
Japan & ROK	Unidentified	Unidentified (Bering Sea)	Contractual	Herring	• One Japanese and one ROK vessel • Product transfer within 3 miles in compliance with U.S. Custom law • Venture approved by NPFMC
Japan	Unidentified	Unidentified (Native fishermen, Angoon, S.E. AK)	Contractual	Salmon	• Japanese processing vessel • Salmon dressed at U.S. shore plant • Product frozen and stored on-board processor for future sale in U. S. market
Japan	North Pacific Longline-Gillnet Association of Japan	Unidentified	Contractual	Black cod	• Potential delivery of U.S.-caught black cod to Japanese vessels at sea
U.S.S.R.	Sovrybflot	Marine Resources Co., Inc. (50% Bellingham Cold Storage, WA)	Equity and contractual	Pacific hake Pollock	• MRC to purchase catch from fleet of 10-15 U.S. boats • Catch to be custom processed aboard Soviet factory vessel SULAK • MRC to market products internationally • Venture disapproved by PMFC

Source: National Marine Fisheries Service, *Paper for Use in Joint Venture (J/V) Hearings* (Portland: NMFS Field Hearing, 21 July 1977) pp. 2-4.

Since the USSR fails to recognize ROK diplomatically, they were completely excluded from Soviet waters. As a result of this latter action, the Koreans lost 80 percent of their previous catch.

In order to deal with the situation, the government of the Republic of Korea granted that country's leading deep sea fishing firm, Korea Marine Industry Development Corporation (KMIDC), the sole right to (1) negotiate joint ventures in the U.S.; and (2) to import pollock in the round for Korean domestic consumption. In return for this privilege, the Korean government constrained that company by demanding that the operation must not cause any drain on the nation's foreign exchange. The revenues from selling fish blocks, fish meal, and oil on the international market will have to generate enough cash to pay for the corporation's total purchase of fish from U.S. fishermen.

The venture became operational when KMIDC signed a contract with R.A. Davenny and Associates, Inc. on 11 April 1977 for 130,000 metric tons of pollock per year. The contract set the exvessel price at five cents per pound with an additional bonus of one cent per pound so that: (1) one-half cent per pound will be paid to fishermen who fulfill their yearly contract; and (2) one-half cent per pound will be paid to fishermen who participate for the duration of the whole five-year contract.

In addition to the bonus based on time participation, the exvessel price is to be pegged to the final market price of the product. The fishermen will be paid 10 percent of the difference between the U.S. market price (published by the U.S. Department of Commerce) for pollock fillets and a 55-cent base price.

The contract also included a revolving letter of credit of $3 million to be opened by KMIDC in an Anchorage bank. The bank in turn would pay the fishermen within two weeks of the presentation of the fish ticket issued by the KMIDC processor when the catch was delivered to the three processing ships in Northeast Pacific waters. The Koreans had hoped these processors would handle 60,000 to 80,000 metric tons of pollock in 1977 and 130,000 metric tons per year for the remaining contract period. The start up of the venture, however, was postponed until 1978 after the North Pacific Fishery Management Council (NPFMC) disapproved the application for a permit to purchase pollock from U.S. fishermen within the 200-mile zone.

SOVIET

The Pacific Fishery Management Council similarly rejected another international fishery joint venture for Pacific hake proposed by the U.S.-USSR Marine Resources Co., Inc.

Marine Resources was incorporated 19 July 1976 in the State of Washington. The capital stock is divided equally between Bellingham Cold Storage Co. and Sovrybflot, the Soviet Government Agency specifically established to enter into international fishery joint ventures. The formation of the Soviet joint venture in the Northeast Pacific was the culmination of more than two years of negotiations. These negotiations were initiated by the U.S. partner in May 1973 through a letter to the Soviet Minister of Fisheries, Alexander Ishkov. Upon concluding the negotiations, Marine Resources opened offices in Seattle and Bellingham. In addition, the company also recently established an office in Nakhodka, the principal Soviet fishing port on the Siberian Pacific Coast.

The branch office in Nakhodka would enable Marine Resources to service U.S. fleets if they should begin fishing within the USSR 200-mile extended economic zone in accordance with the reciprocity of the Fishery Conservation and Management Act. The main objective of the U.S.-USSR joint venture, however, is to supply the Soviet fleet and initially to purchase, process, and market Pacific hake and later Alaska pollock caught by U.S. fishermen. The catch would be custom processed according to international quality standards on board the Soviet factory ship, *Sulac.*

This recently renovated Soviet mothership is capable of processing 250-300 metric tons of raw fish per day for direct sale in the U.S. and the international market. Thus, in order to continuously operate the *Sulac,* assuming expected catching rates of the U.S. vessels and the total allowable catch, some 10 to 15 trawlers would be employed. Despite the definite economic benefit that both this and the Korean joint venture would give some U.S. fishermen, at least in the short term, both operations have caused a great deal of controversy in the NEP fishing industry.

GOVERNMENT AND INDUSTRY OPPOSITION

Two camps of opinion have emerged from the issue of U. S. fishermen delivering their catch to offshore processors operated by international joint venture (Table 2).

The proponents consist primarily of representatives from Marine Resources Co. and R. A. Davenny and Associates. They argue that the NEP fishing industry is faced with a problem of matching technological and financial capabilities with the potential of the raw material resource within the 200-mile zone. This group believes that in order to speed up the transition period and replace foreign fishing effort in accordance with the law, international cooperation in the form of joint ventures are needed. This view is, however not predominant in the Northeast Pacific fishing industry.

The two Pacific Fishery Management Councils recommended that the U. S. Department of Commerce disapprove both the Korean and the Soviet applications. They may "appear simple and isolated on the surface but are fraught with substantive and unreckoned consequences for the future" (E. Rasmuson, Chairman NPFMC). The final policy decision, however, will not be announced until the data gathered from various public hearings have been reviewed. In the meantime, strong opposition to the international joint ventures persists both on Capitol Hill and within the fishing industry.

The opponents state that the foreign proposals will nullify the intention of the 200-mile limit if U. S. fishermen are allowed to deliver bottomfish to foreign processing ships. The foreign partner, the opponents believe, potentially will receive a "double dip." In other words, if there is a stock surplus within a particular fishery, a foreign citizen might apply for and receive a quota allocation from the U.S. The North Pacific Ocean Protein Coalition (NPOPC) argues that in addition to this allocation, international joint ventures with U.S. flag vessels may also provide the foreign partner with a share of the U.S. quota.

NPOPC

The North Pacific Ocean Protein Coalition was founded in Kodiak last April. NPOPC was co-founded by the United Fishermen's Marketing Association, representing Kodiak-based crab and salmon fishermen, and New England Fish Company. The fact that both processors and fishermen have joined forces in one group has made this coalition unique in the history of the Northeast Pacific fishing industry. The success of the organization has prompted national organizations of fishermen and

Table 2

ARGUMENTS FOR AND AGAINST INTERNATIONAL JOINT VENTURES USING FLOATING PROCESSORS IN THE NORTHEAST PACIFIC (NEP)

PROPONENTS VIEW

- Provide immediate market for U.S. caught bottomfish
  - Reduce foreign quota hence: (1) higher bottomfish prices on the international market (2) Japan eliminate present import quota, (3) result in the price competitiveness of U.S. processed bottomfish
- Provide capital, technical assistance, and employment
  - Increase employment and income to U.S. fishermen in addition to federal and state tax revenues
  - U.S. fishermen will improve techniques, thus reducing investment risk for future onshore processors
- Provide U.S. fishing industry with floating processor
  - Bottomfish deteriorate rapidly. Processors should follow catching fleet to insure minimal on-board storage of the fish prior to processing
  - Onshore processing facilities could obtain dependable supply of whole or semi-processed fish
  - Gross boat share 3.2 times greater for vessels delivering to floating operation than shore plants

OPPONENTS VIEW

- Hamper development of onshore U.S. bottomfish industry
  - U.S. economic jurisdiction does not extend beyond 12-mile, giving floating processors economic advantages. The U.S. unable to enforce minimum wages; OSHA, EPA, FDA standards; tax laws
  - Foreign processors government subsidized
  - Floating processors outbid U.S. processed fish products
- Create serious conservation and management problem
  - Optimum yield for Gulf of Alaska pollock in 1977 set at 150,000 mt with a domestic allocation of 1,000 mt. Proposed domestic purchases by foreign processors exceed the U.S. allocation by 129,000 mt.
  - Difficulties regulating valuable secondary catch
  - Induce "fish wars" among foreign nations competing for joint venture arrangements. Regulators not prepared to manage the potentially complex situation
- Create a captive fleet of U.S. fishing vessels which may enter into the traditional (other than bottomfish) fisheries of the NEP
  - International joint ventures may finance U.S. boats or re-register boats previously built in the U.S.
- Joint ownership of bottomfish processing by international joint ventures might lead to price controls

processors to support the Coalition's statement of concern.

Two basic concerns unify the group. First is the concern that the Republic of Korea proposal is based on harvesting pollock in Alaska waters in excess of the domestic quota. Secondly, the group believes that the Fishery Conservation and Management Act (FCMA) should be amended to protect Americans, both onshore and offshore, from foreign investment domination. Such domination, the group believes, could be prevented if foreign investment in American processors and fishing vessels was limited to 25 percent of the equity capital. This investment limitation, specifically in U.S. fishing vessels, has also found support in the U.S. Congress.

In January of this year, Congressmen Les AuCoin (Oregon) and Gerry Studds (Mass.) introduced HR 2564 to limit foreign investment in U.S. fishing vessels to 25 percent. The bill's sponsors asserted that if foreign investment was not restricted in the fishing industry, this would repudiate the 200-mile law. The Congressmen felt that foreign investment in U.S. fishing vessels would constitute a loophole and could be used to circumvent the FCMA because:

- Fees collected from foreign fleets could be reduced.
- The American need for fish as a protein source would be disregarded on the assumption that fish caught by foreign-controlled U.S. flag vessels would be exported.
- American-owned U.S. flag vessels would be displaced by new foreign-owned U.S. flag boats limiting the economic potential of American fishermen.

The potential weakness of the 200-mile legislation should not come as any surprise to the legislators. Prior to passing the law, Congress deliberately excluded the definition of terms for international joint ventures and foreign investments due to the controversy of the issue.

ALTERNATIVE TO OFFSHORE PROCESSORS

One major objection to the foreign proposals has been their greater economic competitiveness, relative to NEP shore-based fish processing plants. The cost advantage of foreign processors is achieved by operating outside the U.S. 12-mile limit, which exempts them from U.S. state and federal regulation (Table 2). In order to lessen the economic controversy of this issue, but at the same time take advantage of the utility of floating processors, two NEP fishing companies have proposed situating floaters in direct connection with land facilities in Alaska.

World Seafoods, Inc. and New England Fish Company recently proposed purchasing or leasing European-built processing vessels. New England Fish Company plans to lease the 250-foot *Hause* from British United Trawlers and moor it close to shore at Sand Point. Although the floating processor will remain under British flag, it will be manned entirely by a crew of 35 Americans.

World Seafoods' plan differs from the New England Fish Company plan in that this company proposes to purchase three Norwegian-built processing vessels. The

vessels will be documented in the U.S. and located near shore in Peterson Bay. The World Seafoods' vessels, similar to the *Hause,* will not engage in coast-wide trade and will not be moved except to be placed in other fixed locations. In this way the venture will comply with the Jones Act.

Moreover, a preliminary view expressed by the National Oceanic and Atmospheric Administration (NOAA) legal staff states that foreign-built processing ships can legally be documented for non-fishing purposes as U.S. vessels by a U.S. corporation. The vessels may be tied up at shore to receive and process fish harvested by U.S. fishermen. The vessels, however, cannot process fish obtained from foreign flag vessels fishing in the U.S. fishery conservation zone.

The NOAA legal staff furthermore predicts that "certain U.S. shipbuilding interests, and other interests, might have objections to the proposed arrangements." The status of all the international joint ventures in the Northeast Pacific, however, should be clarified shortly when the U.S. Department of Commerce publishes its final policy statement on the issue.

Feb. 1978

ELMER RASMUSON

BULLISH ON FISH

By Mark I. Hutton
Assistant Director
NPFMC

Alaska Seas and Coasts *is especially pleased to present the following interview, in which Mark Hutton, Assistant Executive Director of the North Pacific Fishery Management Council, discusses Alaskan fisheries of today and the future with Elmer Rasmuson.*

Mr. Rasmuson speaks from his perspective as past Chairman of the North Pacific Fishery Management Council and the International North Pacific Fisheries Convention, as well as from the perspective of an officer in one of the leading financial institutions in the state.

The overview he presents may be of considerable value to those whose future depends on the health of the fishing industry. In addition, the interrelationships between our industry and the national and international fisheries politics are particularly enlightening.

We would like to express our sincere thanks to both Mr. Rasmuson and Mr. Hutton for consenting to this interview for **Alaska Seas and Coasts.**

Elmer Rasmuson, from his perspective as past Chairman of the North Pacific Fishery Management Council and of the International North Pacific Fisheries Convention, is optimistic about the future of Alaska's commercial fishing industry.

(Photo by Mark Hutton)

Hutton: Do you consider yourself bullish on fish?

Rasmuson: Very much so.

Hutton: Because of living in Alaska and your familiarity with the resource?

Rasmuson: Well, I suppose if I hadn't lived in Alaska I wouldn't be so close to it. I'm confident that currently in Alaska fishing is the industry that employs the most people (it always has). The demand for its product and its supply is such that it gives the greatest opportunity for more people to not only make a living from it, but make such an adequate living that they can build up the community and their homes, schools, and general living in our state.

Hutton: What role would you see fisheries taking in the Alaskan economy in the next 10 to 100 years?

Rasmuson: As I say, I think there have always been many people involved in fisheries. As I see it, there will continue to be more people directly and indirectly involved in fisheries than any other industry. In contrast, the mineral industry, particularly oil and gas, is quite intensive during the construction stage with respect to utilization of people and labor. However, once the construction is completed, modern automation makes it unnecessary to have many people employed.

Fisheries, a renewable resource, is going to touch the lives of more and more people. It can, with proper management, (which I think we have the mechanism for) continue to be an industry of undiminished supply.

Hutton: Recently, I heard a radio announcement that the prime interest rate at the Chase Manhatten Bank was 11.75 percent. Do you think this and President Carter's open fight against inflation are

going to hamper investments in Alaskan fisheries?

Rasmuson: Naturally as interest rates go up, there is an inhibiting influence on long-term investments. I don't think that these peak interest rates (and the peak may still be yet to come) are going to be permanent. In my judgement, part of the rise in interest rates has to do with people's reaction to inflation. They feel that they must have a higher rate of interest to compensate for the fact that the dollars will be diminishing in the future. On the other hand, that encourages those who are making investments in boats and processing plants to pay the necessary interest rates because the price of the product, as we've seen, has gone up and the retirement of the debt is usually in cheaper dollars.

Hutton: Would you consider financing to be the single limiting factor in fisheries expansion as we're looking towards the development of the North Pacific and Bering Sea resources?

Rasmuson: On the contrary, I see no problem in financing at all. I don't know of any proper deals that haven't been financed, and from the banking standpoint I am personally aware not only of what our bank is doing, but others as well. People have no real idea of the tremendous amount of investments and financing that is coming from both the state and private sources for boats and processing plants. In addition, you have heavy equity capabilities of many of the processors that are involved.

Hutton: Do you think the Jones Act has been a deterrent to the development of the fisheries off Alaska, or perhaps is the Jones Act in a broader context in the best interest of the overall U.S. economy?

Rasmuson: Well, I'll have to ask in what way you think the Jones Act is impeding the fishery industry? I'm familiar of course with the restriction of coastal transportation with foreign-built hulls.

Hutton: The Jones Act prohibits fishing with a foreign hull. It does not prohibit processing with a foreign hull, but it does prohibit fishing. It seemed that with a lot of countries being phased out of the fisheries in Alaska there would be a surplus of large modern trawler vessels available at a much cheaper price than could be built at today's prices. This is currently prohibited by the Jones Act and I wondered if you had any comments.

Rasmuson: Well, I think that any restrictions on trade or investment are expensive to the economy, and generally I'm not in favor of them. However, once you've built up an economic social structure that is based on certain rules and laws (and I'll relate that specifically to fishing), the dislocations when you modify them become pretty strong.

There have been many fishermen and processors who in good faith have made their investments in Alaska, the North Pacific, and elsewhere in the United States. If they should now be subject to competitive factors of production, such as more boats and processing plants that are dumped on the market because of over-capacity elsewhere, I think that would be a dislocation that would probably be very costly to these individuals who made the investments.

I think that the problem of transportation is possibly a more serious problem than the impact of the Jones Act. I don't think there is any shortage of fishing boats.

Hutton: Clem Tillion, who is Chairman of the North Pacific Fishery Management Council, told the Japanese in Tokyo last month that they should become more deeply involved in financing and supporting onshore joint ventures with the United States. With all the criticism concerning onshore foreign controlled processing, do you agree?

Rasmuson: I don't have the figures in my mind, but it's well known that the investment by the Japanese in onshore plants is very, very substantial. I think they are getting into it wherever there is an opportunity for them to make the investment. I am sure that there are going to be other nations, or companies of other countries, that are going to similarly make the investment. These expansions that we have been talking about in the fishing industry have to come step by step so that the production, the processing, and the marketing will more or less "lock-step." If one of them gets out of phase with the other there is an economic dislocation.

Hutton: Do you think then that the magnitude of foreign involvement we have in our shore based plants is hurting us in developing under-utilized fisheries?

Rasmuson: On the contrary, I think it has given a better price to the fishermen by having this additional competition. I think the capability of processing has been stimulated by having investment, whether it be national or international, and I think that we have gained by having an internationalization of our fishing industry.

Certainly there is no question but that the demand for our fishery products, as reflected in the higher prices, has been in great degree due to the foreign demand.

Hutton: Do you have any comments in general about high seas joint ventures?

Rasmuson: As with many controversial questions, it is dangerous to oversimplify. I certainly don't think that my opinions concerning North Pacific and Alaskan joint ventures are necessarily applicable everywhere in the coastal areas of the United States. So far, I have not seen any joint ventures proposed in the North Pacific (that affect our Alaskan products) that are advantageous to the Alaskan economy as a whole. The serious questions that I raised (as you know) in a letter that I wrote to Secretary of Commerce Juanita Kreps a year and a half ago are still valid, in my opinion.

Hutton: You've done a great many things in Alaska. You've been Mayor of Anchorage, a member of the University Board of Regents, Chairman of the North Pacific Council, Chairman of the International North Pacific Fisheries Convention, President and Chairman of the Board at National Bank of Alaska, and confidant of every Governor and major politician. With this background, do you feel that enough is being done at the University level, the Governor's office, with city planners and at the Federal level to encourage and assist the development of a major Alaskan fishing industry? Is there any place where you think progress is not being made that could help?

Rasmuson: Really, I give very high marks to the State, the Federal government, and to the University, in their support of the fishing industry. I don't have any earth-shaking recommendations, other than perfection of some of the apparatus and some of the concepts. For example, I feel that there should be a better coordination in the scientific research by both the Federal and the State agencies (and in this I mean a quite important role could be played by the University of Alaska). We have a great deal of information on applied research on fishery matters.

Salmon is a good example. We know a great deal about their migratory pattern. We know a great deal about the diseases. But we do not know enough about what happens to them on the high seas to adequately predict the run. And yet we have a great fund of scientific knowledge in the fields of marine biology and oceanography and meteorology that I think ought to be coordinated.

It is my hope (and I think I see signs that there is movement towards correlating all of these cross disciplines) to better improve our forecasting of the time and extent of the salmon runs. I don't think that our knowledge has progressed to the point where we can materially affect the survival in the sea. But if we more precisely forecast when, and to what degree those fish would be coming back to Alaska (and I don't mean just to Bristol Bay), I think it would be of immense value to the fishermen, the processors, and in the market. I think that we can do more in utilizing our existing information.

I think that we have had good support from all of these agencies. The State of Alaska on the whole has done a very good job in the management of the fishery resources, and when I am urging that they do other things, I am just asking for improvements.

One of the projects which I had hoped to have some influence on (but I guess time has gone by) was to get more coordination between the State of Alaska and Canada in the development of salmon runs, particularly in Southeastern Alaska. With many of the streams originating in Canada it is difficult to get British Columbia and the Dominion to spend money when they do not get any benefit from harvesting the fish. It is equally difficult, if not politically impossible for the State and the Federal government to develop the fishery runs in those waters. We don't have any jurisdiction there and we can't enhance somebody else's streams.

I think combined effort, taking the Frasier River as a pattern, could be a great benefit to both Alaska (the United States), and Canada. I feel that it was a step backward last year when we seemed to lose the spirit of cooperation between Canada and the United States on developing the fishery stocks that both countries are interested in.

Hutton: If you were a crewman on a Bering Sea king crab boat and you had the money from two or three good seasons, how would you invest it, and would you invest it in fisheries?

Rasmuson: When you say a crewman do you mean an owner or one who must work for a share? *(Hutton:* A share, with aspirations of having a boat.) *Rasmuson:* Of course, an individual who wants to become owner of a boat must have the desire and capabilities of running that boat. It's a business that just happens to be fishing. It also depends a lot upon the individual. I think that I have already answered the basic question of whether there is this opportunity.

As a crewman, I would look around and very carefully analyze the supply of competitive vessels, and the scientific data to find out the species I could best fish for, taking into account the fact that they fluctuate between years. Certainly if I was going to be in the fishing business I would sooner or later want to get into that ownership category, because I think time is on your side. Inflation is in favor of owning that vessel and I believe you now have a greater versatility to fish for different species, and in different times and areas.

Hutton. Do you miss your involvement with the North Pacific Council?

Rasmuson: Oh, I miss very much being on the Council. It was with great and mixed emotions that I retired from it, but I still keep aware of what is going on. I always will, and I appreciate my friends keeping me appraised of what is being done.

Incidentally, I recommend to anyone who is seriously interested in the fishing business on the broader scale to subscribe to a publication that comes out from Washington, I believe on a monthly basis, having to do with worldwide fishery matters. It is *The Latest Developments in World Fisheries.** We read it very carefully in the bank because you have to know what is going on in Africa, South America, the South Pacific, and elsewhere in order to appreciate what is taking place with joint ventures, what is taking place under extended jurisdiction, and what the prices are going to be on the different products. It shows that fisheries has now become a matter of global concern and we're all tied together. As has been said, no man is an island, and I don't think any man (or country) has a specific fishing ground that they can harvest exclusively.

Hutton: I agree. Do you have any New Year's Resolutions that you'd care to share?

Rasmuson: Oh, I can say that I have projects that I am working on that I don't think are in the stage where I can identify them. I will always be interested in both business and in the development of Alaska – not just in the economic terms.

Some of my projects may be a little bit out of context here, but I consider the D-2 land problem an important phase in the general misunderstanding by the lower 48 states of the significance of Alaskan development to the whole nation. I'm going to do anything that I can to try to remove the polarization that I believe exists today and get a better concensus of opinion of the image of Alaska to the school children, environmentalists, the public and the Congress. They must appreciate that Alaska's development is in the interest of the whole United States, and everything that we do up here should be thought of in those terms.

Hutton: Thank you for the interview and I'd like to say that you are a man who is admired by many and respected by all and we wish you continued good health, smooth sailing, and good fortune in 1979.

Editor's Note:* **The Latest Developments in World Fisheries *can be obtained by writing to:*

John K. Bishop, Editor
Fishery Market News
1700 Westlake Avenue, N.
Room 732
Seattle, Washington 98109

Feb. 1979

Section three

ALASKA Seas and Coasts

A Newsletter for the Alaska Commercial Fishing Industry

Resource Management

Section three: Resource Management

Historically, fish are considered common property: they belong to everyone. Often, this idea has led to overfishing and severe depletion of a particular species. Management is one solution to the dwindling food yield and total fishing income caused by overfishing. That management may include limiting the number of fishing boats, type of gear, or seasons to prevent overharvesting.

The United States has seen some significant changes in fisheries management in the past several years. The 200-mile limit and a national fisheries plan are at the forefront of major national legislation. That legislation is also responsible for setting up regional councils in charge of administering the national plan.

Alaska has also set up a plan for management, to offset dangerous depletion of traditional fisheries in state waters. Governor Egan's limited entry plan is perhaps the most dramatic example of these steps, discussed at length in the following section.

Finally, marine mammals in Alaska have been tossed from one management program to another, with control switching from state to federal hands a number of times. The federal Marine Mammal Protection Act and the subsistence use of these animals in Alaska have been in conflict for years as have fishing activities and the marine mammal life cycle. All these are topics in Alaska Seas and Coasts.

Section Three

RESOURCE MANAGEMENT

Here it is . . . *Alaska Seas&Coasts* Bicentennial effort — a history of salmon regulation in Alaska by James Owers.

1878 First salmon canneries begin operation in Southeast Alaska.

1889 Congress enacts law making it illegal to construct barricades across salmon streams.

1892 Funds to enforce the 1889 law are authorized, one inspector and an assistant are hired.
Artificial propagation is first proposed as an alternative to regulation by U.S. Fish Commission.

1896 Restriction on fishing in salmon streams with weekly closed periods is proposed. Final law does not apply to the three most important salmon producing areas, Bristol Bay, Cook Inlet and Prince William Sound.

1900 Congress passes legislation requiring canneries to establish fish hatcheries.

1903 U.S. Fish Commission Report shows only one cannery has made a serious attempt at establishing a hatchery program.

1904 Stanford University biologist David Starr Jordan investigates Alaska's fisheries. Recommends that controlling number of canneries would be desirable, more powers on open and closed periods necessary.

1906 Legislation is proposed which would give Secretary of Commerce power to establish weekly closures in all areas and prohibit certain types of gear. Bill would apply to all waters under U.S. jurisdiction (3 miles). Bill is strongly opposed by industry. 1906 Act ultimately allows Secretary to regulate fisheries only within 500 yards of salmon streams. Fisheries outside these areas remain unregulated.

1912 Organic Act prohibits Territory of Alaska from regulating its own fisheries—only situation where Federal government has retained this authority.

1919 Drastic price reductions following World War I; canneries wish to curtail production, begin to talk of "conservation."

1920 Gilbert and O'Malley state in report that salmon resource cannot be protected without considering basic economic motivation. Recommend a policy of reservations.

1922 Reservation policy started by executive order. Each reservation gives a cannery the rights to a certain fishing area. Stipulations are made as to the size of the pack that may be produced, the number of vessels that may be used, etc.

1923 Alaska Congressman denounces reservation policy as giving away resource to outside interests.

1924 Attempt to get reservation policy enacted into law fails, the White Act passes and becomes basis for regulation until Statehood. White Act provides for no "exclusive right of fishery." Expands scope and power of regulation.

1932 FDR becomes President, employment in Alaska's fisheries becomes a policy objective. Number of traps reduced.

1936 Eight and one-half million cases of salmon packed. Peak year of Alaska salmon production. Great increase in number of mobile gear units without proper regulation to compensate.

1941 Proposals within the Federal government to limit the amount of gear receive consideration. Such proposals continue through the 40's and 50's.

1950 Rapid decline in salmon harvest from 1936 continues, hit 29 year low.

1956 Constitutional convention in Alaska provides for no "exclusive right of fishery" in effort to get rid of fish traps.
Area licensing begins as an alternative method of controlling gear concentrations.

1958 Secretary of Interior abolishes fish traps.

1959 Statehood.

1960 Authority for commercial fisheries transferred to State, January 1, 1960. Program of field announcement begins.

1967 Runs take drastic decline to 67 year low.

1968 Limited entry proposal for Bristol Bay adopted for 1968 season by Board of Fish and Game.
Legislature passes law to apply limited entry concept statewide. Law is successfully challenged in federal court as creating an exclusive right of fishery and a closed class. U.S. Supreme Court vacates appeal on jurisdictional grounds.

1970 Gear licensing reaches 175% of 1960 level.

1971 1968 limited entry law is declared unconstitutional in State Superior Court.

1972 Referendum amending Alaska constitution to allow for limited entry passes by large majority.

1973 Limited entry law based on free transfer of permits and grandfather rights is enacted.

1974 Runs decline to 74 year low.

1975 1973 limited entry law is challenged in Juneau Superior Court and upheld. Appeal is made to State Supreme Court.

1976 Signatures collected to place limited entry repeal initiative on ballot.
Case is filed in Juneau Superior Court challenging the use of the initiative process to repeal an act of the legislature.
State Supreme Court strikes down the portion of the limited entry law that restricts the applicant pool to those that held gear licenses prior to January 1, 1973. Rest of law is upheld.

NMFS to Seek Input from Alaskans

NATIONAL FISHERIES PLAN

By WALTER G. JONES
Chief, Fisheries Development and Marketing Services
National Marine Fisheries Service
Juneau, Alaska

The National Marine Fisheries Service in NOAA has been assigned to lead development of a National Fisheries Plan (NFP) in close cooperation with the States, the commercial fishing industry, recreational fisheries interests, and consumer groups. Such a plan will summarize the present condition of U. S. fisheries, their trends, major barriers to full use of the fisheries for recreation and food, effects of foreign fisheries off U. S. coasts, extended jurisdiction, action programs needed to assure optimum use of the fishery resources and the appropriate roles of State and Federal governments, the industry and other involved entities in carrying out required action programs. The NFP will be updated and revised periodically to assure that it provides a dynamic, rational basis for future U. S. actions concerning the fisheries.

Broad goals outlined for the NFP are:

- Restore and maintain fisheries stocks of interest to the United States.
- Develop and maintain healthy commercial and recreational fishing industries.
- Improve the contribution of marine resources to recreation and other social benefits.
- Increase the supply of wholesome, competitively priced fishery products to the consumer.

A "draft outline" of a plan has been completed by an NMFS task force and will be used to review the needs of the fisheries with interested persons in and out of government. The outline describes the present problems facing U. S. fisheries and discusses a series of major issues which are of primary concern in any effort to meet our national purposes if the fisheries are to provide employment, food and recreation. The outline also reviews how the issues involved can be applied in formulating a viable National Plan.

The objective is not merely a Federal fisheries plan, since by itself the Federal Government can fill only a part of the need. The plan is intended to indicate what action is required by all concerned with our fisheries. For this reason, the full plan cannot be developed without information, opinions, and ideas from fishermen, vessel owners, processors, State fisheries managers, marine recreational fishermen, conservationists, scientific organizations, trade groups, consumers and others. Using the "draft outline" as a base on which to build, input will be sought between now and January 1975 in many fishing communities along the U. S. coasts. The meetings will be arranged with the cooperation of Atlantic States Marine Fisheries Commission, the Gulf States Marine Fisheries Commission, the Pacific Marine Fisheries Commission and the five NMFS Regional Directors.

Suggestions and comments presented at these meetings will then be used to develop the ideas in the draft outline into a broad National Plan which will discuss general legislative needs and make recommendations. This will assist in developing our fisheries resources to meet the growing demand for food and recreation, while ensuring that these valuable resources are restored and maintained for future generations of Americans.

Alaska fishermen, processors, recreational fishing associations, local businessmen, civic groups and other interested persons will have an opportunity to learn more about the National Fisheries Plan and to help formulate it by providing their own ideas, opinions, and information, according to Harry L. Rietze, Director of the Alaska Region, National Marine Fisheries Service. Local meetings to obtain this input will be held in Alaska communities in October and November 1974 and January of 1975. Staffs of NMFS and the Alaska Sea Grant Office, both of which are components of NOAA in the U. S. Department of Commerce, will schedule and conduct the meetings in cooperation with local Alaska Department of Fish and Game staff, community colleges and concerned organizations. The schedule of these meetings to be held in Ketchikan, Petersburg, Sitka, Juneau, Cordova, Anchorage, Homer and Kodiak will be announced through local news media and bulletins.

Alaska Comments on the National Fisheries Plan

Faced with increased consumption of seafood by Americans, a decrease in the productivity of U. S. fleets, and a consequent increase in imported seafood products (70%), the President's National Advisory Committee on Oceans and Atmosphere recommended in the fall of 1974 the preparation of a national fisheries plan. This plan will establish national policy for fisheries resources, the fishing industry, and the supply of recreation and food they provide. Basically, it will lay out an overall strategy for the future of U. S. fisheries.

The National Marine Fisheries Service was assigned to prepare the plan, and they established four goals. 1)Restore and maintain fisheries resources. 2)Develop and maintain healthy commercial and recreational fishing industries. 3)Improve the contribution of marine resources to recreation and other social benefits. 4)Increase the supply of wholesome, competitively priced fishery products to the consumer. Meetings to obtain the information, opinions, and ideas of fishermen, vessel owners, processors, State fisheries managers, marine recreational fishermen, conservationists, scientific organizations, trade groups, consumers, and others were held in fishing communities throughout the country.

In Alaska, town hall meetings were held in Petersburg, Ketchikan, Sitka, Cordova, Seward, Homer, and Kodiak. Regional conferences to summarize the local meetings were held in Juneau and Anchorage. Participants in the regional conferences hammered out an Alaskan position on the national fisheries plan under the guidelines of NMFS. Generally, the reports from Anchorage and Juneau are very similar; highlights from both conferences follow.

International Relations

Alaska supports the U. S. Law of the Sea position.

Country of origin ownership and jurisdiction over all anadromous fishery stocks.

Coastal fisheries should be the property of the host nation.

The host nation should execute research and management responsibilities with other users sharing the costs.

Highly migratory stocks should be managed by international bodies.

The full utilization principle applies to U. S. distant-water fisheries as well as foreign fleets fishing here.

Foreign fishing should be phased out.

Trade-offs in fisheries negotiations should consider the value of other resources, U. S. foreign aid, or other tools of negotiations besides underutilized stocks.

The State should have full and direct involvement in international negotiations – Anchorage.

Alaska should participate to the fullest possible extent in management and enforcement of regulations in the extended fishery zone, while recognizing that the federal government has the ultimate authority to negotiate with other nations and to enforce foreign compliance with U. S. regulations. The federal government must quickly develop the capability to enforce fishing regulations in the contiguous zone – Juneau.

Domestic Fisheries Management

A joint effort between the State and federal government is the best method of domestic management.

Stocks presently managed by the State should continue to be managed by the State. Federal preemption should be considered only when the States have failed in economic, biological, social or ecosystem management.

Because of Alaska's unique geographic characteristics, extensive coastline, broad continental shelf, and physical separation from other States, Alaska should be considered a separate region for fisheries management purposes with local authority for action.

Alaska should have extended fisheries management beyond its present boundaries.

Stock assessment of species should receive high research priority to provide data for management.

Increasing the Productivity of U. S. Fisheries

Top priority should be given to developing markets for underutilized fishery resources available to U. S. fishermen. The federal government should provide financial assistance in research, development and marketing.

Priorities for the development of underutilized species are resource stock assessments, research to estimate the maximum sustainable yield, market analysis and development, development of production techniques, financial assistance, and gear development.

Tax credits should be given to help companies develop underutilized fishery resources.

Commercial fishermen should receive fuel allocations and cost advantages as accorded to agricultural enterprises.

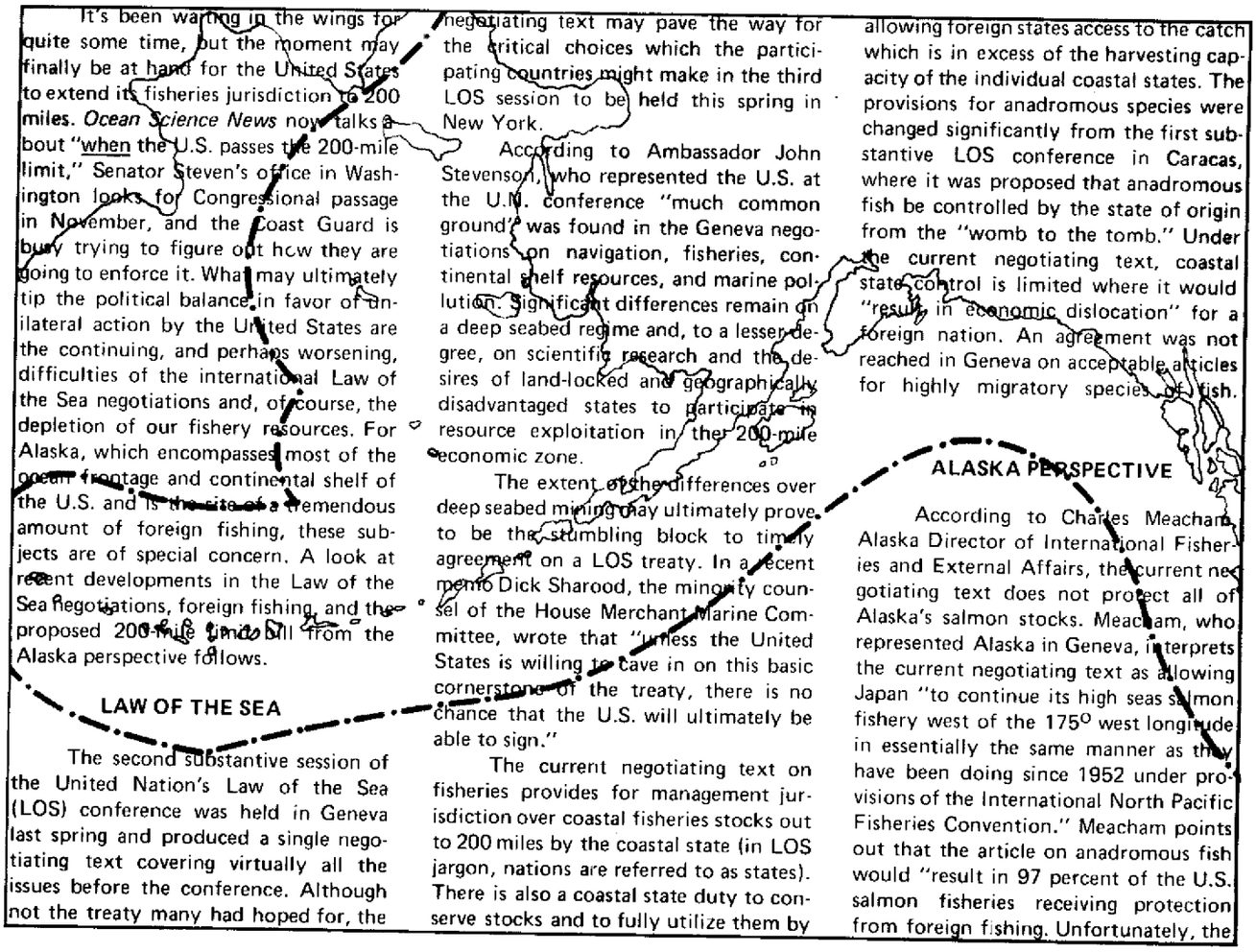
Aquaculture is an important means of supplementing the natural production of fish and shellfish in Alaska.

Better management is the key to improved production.

Feb. 1975

ALASKA and the 200-Mile Limit

By Nancy Munro
Arctic Environmental Information & Data Center



It's been waiting in the wings for quite some time, but the moment may finally be at hand for the United States to extend its fisheries jurisdiction to 200 miles. *Ocean Science News* now talks about "when the U.S. passes the 200-mile limit," Senator Steven's office in Washington looks for Congressional passage in November, and the Coast Guard is busy trying to figure out how they are going to enforce it. What may ultimately tip the political balance in favor of unilateral action by the United States are the continuing, and perhaps worsening, difficulties of the international Law of the Sea negotiations and, of course, the depletion of our fishery resources. For Alaska, which encompasses most of the ocean frontage and continental shelf of the U.S. and is the site of a tremendous amount of foreign fishing, these subjects are of special concern. A look at recent developments in the Law of the Sea negotiations, foreign fishing, and the proposed 200-mile limit bill from the Alaska perspective follows.

LAW OF THE SEA

The second substantive session of the United Nation's Law of the Sea (LOS) conference was held in Geneva last spring and produced a single negotiating text covering virtually all the issues before the conference. Although not the treaty many had hoped for, the negotiating text may pave the way for the critical choices which the participating countries might make in the third LOS session to be held this spring in New York.

According to Ambassador John Stevenson, who represented the U.S. at the U.N. conference "much common ground" was found in the Geneva negotiations on navigation, fisheries, continental shelf resources, and marine pollution. Significant differences remain on a deep seabed regime and, to a lesser degree, on scientific research and the desires of land-locked and geographically disadvantaged states to participate in resource exploitation in the 200-mile economic zone.

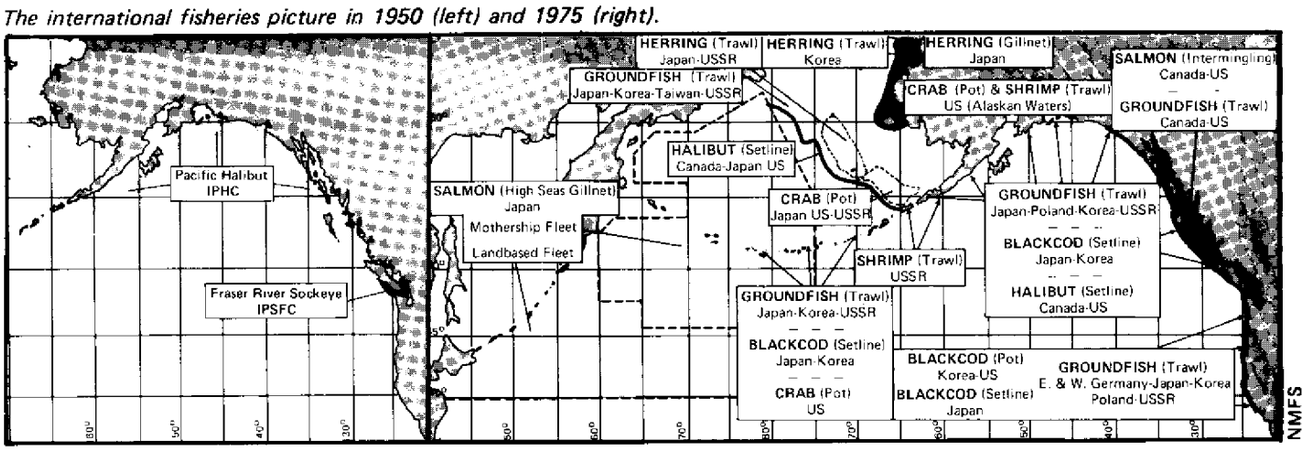
The extent of the differences over deep seabed mining may ultimately prove to be the stumbling block to timely agreement on a LOS treaty. In a recent memo Dick Sharood, the minority counsel of the House Merchant Marine Committee, wrote that "unless the United States is willing to cave in on this basic cornerstone of the treaty, there is no chance that the U.S. will ultimately be able to sign."

The current negotiating text on fisheries provides for management jurisdiction over coastal fisheries stocks out to 200 miles by the coastal state (in LOS jargon, nations are referred to as states). There is also a coastal state duty to conserve stocks and to fully utilize them by allowing foreign states access to the catch which is in excess of the harvesting capacity of the individual coastal states. The provisions for anadromous species were changed significantly from the first substantive LOS conference in Caracas, where it was proposed that anadromous fish be controlled by the state of origin from the "womb to the tomb." Under the current negotiating text, coastal state control is limited where it would "result in economic dislocation" for a foreign nation. An agreement was not reached in Geneva on acceptable articles for highly migratory species of fish.

ALASKA PERSPECTIVE

According to Charles Meacham, Alaska Director of International Fisheries and External Affairs, the current negotiating text does not protect all of Alaska's salmon stocks. Meacham, who represented Alaska in Geneva, interprets the current negotiating text as allowing Japan "to continue its high seas salmon fishery west of the 175° west longitude in essentially the same manner as they have been doing since 1952 under provisions of the International North Pacific Fisheries Convention." Meacham points out that the article on anadromous fish would "result in 97 percent of the U.S. salmon fisheries receiving protection from foreign fishing. Unfortunately, the

The international fisheries picture in 1950 (left) and 1975 (right).



remaining three percent, or approximately four million salmon annually, are entirely from Western Alaskan stocks, primarily from the Yukon and Kuskokwim Rivers and from Bristol Bay. This means Alaska is paying the bill for protection from high seas salmon fishing for the entire Pacific Coast." It is worth noting that these salmon stocks provide for the large subsistence fishery in that area.

Perhaps in reaction to this, the seeming defunct Alaska Commission on the LOS, (which was originated by the Alaska Sea Grant program to provide a public forum on LOS issues) was reactivated this summer to discuss Alaska's interests in, and formalize an official Alaska position on the LOS. Members of the current commission are: Bob Thorstensen, Petersburg fish processor and commissioner for the International North Pacific Fisheries Commission; Phil Daniels, Juneau gill net fisherman and executive secretary of the United Fishermen of Alaska; Robert Hartig, Anchorage attorney and former legislator; Chancy Croft, Anchorage attorney and President of the Alaska Senate; Ed Naughton, manager of the Kodiak Shrimp Trawlers Association and State representative; Tom Casey, manager of the United Fishermen's Marketing Association in Kodiak. Chairman of the group is Charles Meacham, Director of International Fisheries and External Affairs in the Office of the Governor.

The Alaska position is scheduled to be unveiled at the U.S. State Department's LOS advisory committee meeting on October 20 in Washington, D.C. One can expect to call for:

– "exclusive" rather than preferential rights and management jurisdiction over the living resources within the 200-mile economic zone. (This means that foreign fishing becomes a privilege rather than a right.)

– "exclusive" rights and management control over anadromous species by the country of origin, and prohibition of fishing for anadromous species beyond 12 miles (trolling would probably be excepted).

– a management goal based on the optimum sustainable yield rather than the "maximum sustainable yield" or "full utilization" principles. OSY takes into account social, economic and biological factors.

– no special access right for developing, landlocked, or otherwise geographically disadvantaged states.

UNILATERAL ACTION

Late this summer the Alaska LOS commission also announced their support of unilateral action by the U.S. to extend fisheries jurisdiction to 200 miles. The commission pointed out that the 200-mile bills presently before Congress (which, they noted, need changing from an Alaskan viewpoint), are not intended to undermine the international negotiations. "They are interim measures designed to provide only for management and conservation of offshore fisheries pending the establishment of fisheries management provisions in a law of the sea treaty." The commission is certainly not alone. The rapid growth of the foreign fisheries and subsequent depletion of stocks off Alaska have extinguished most Alaskans' patience with the painfully slow LOS negotiations.

The depletion of pollock, Pacific Ocean perch, pacific cod, black cod, rockfish, flounder, yellowfin sole, king crab and halibut stocks off Alaska has been well documented, and the charts depicting the international fisheries picture for 1950 and 1975 give some idea of how rapidly this has occurred. Just last year Poland and Taiwan joined the Russian, Japanese, and South Korean boats fishing off Alaska, and rumor has it that a West German trawler may be on its way up from the Washington-Oregon coast. To add fuel to the fire Alaska saw a rash of violations this summer as a Japanese longliner and a Japanese sterntrawler were caught fishing within the three-mile state waters, and a South Korean sterntrawler and a Taiwanese longliner (not yet convicted) were caught fishing within 12-mile territorial waters.

Because of the foreign fishing situation, most Alaskan fishermen; Governor Hammond, Senator Stevens and Congressman Don Young support U. S. unilateral action. Most see the 200-mile limit as a necessary interim measure to protect the fish while an international LOS treaty is designed, ratified and implemented.

Congress

Many members of Congress seem to agree. Senator Warren Magnuson (D-Wash.) is again pushing a 200-mile limit through Senate Bill 961, which adds management provisions to his Senate Bill 1988 which passed the Senate last December. Simultaneously the House is considering a similar bill, HR 200.

Both bills propose to conserve U.S. fisheries resources by extending jurisdiction to 200 miles and wherever anadromous species may roam. Both recognize traditional foreign fishing rights but direct the Secretary of State to negotiate with foreign nations to effectuate the act and to protect U.S. traditional fishing rights. In perhaps their most controversial aspect, both bills establish regional councils to prepare management plans for their respective geographic areas. (For a critique of HR 200 from an Alaskan perspective see the accompanying article by Tom Casey.) At

this point the major difference between the two bills seems to be detail. HR 200 is painstakingly specific about the bureaucratic network for carrying out the provisions of the bill, while S 961 leaves the procedural matters in generalities.

Specific or general, however, any 200-mile limit bill will face heavy opposition from those who feel that U.S. unilateral action will detract from the LOS negotiations. These opponents include the State Department, the President, Alaska Senator Mike Gravel, tuna and shrimp fishing interests and seabed mining interests. In a speech this summer before the American Bar Association Secretary of State Kissinger remarked that the United States had "consistently resisted the unilateral claims of other nations" and warned that the "others will almost certainly resist ours." He added that unilateral legislation by the United States would "surely prompt" extreme claims by others and could jeopardize the LOS negotations.

Gravel Disagrees

This summer Senator Mike Gravel announced his disapproval of unilateral action "until all other options have been exhausted." Gravel, a Senate adviser to the U.S. LOS delegation, feels that a LOS treaty could be "wrapped up and initialed" at a summer meeting in 1976 after the spring session in New York. In a letter to the *Cordova Times* Gravel stated that "with a unilateral 200-mile declaration, salmon and other species would go unprotected. He suggested that an international LOS treaty would "afford far better protections for Alaska's fish" and would give Alaska more time to develop its own management program. Gravel also pointed out that speedy action on a 200-mile limit bill would "require that the U.S. negotiate bilateral agreements with nations to honor that 200-mile zone and would also require immediate enforcement." He concluded "what appears to be the long route to accomplish this goal – through the LOS conference – may in fact be the shortest route of achieving international recognition of a 200-mile limit."

Perhaps, although it is extremely difficult to foretell when 147 nations will resolve their special interests or the complex economic implications of a deep seabed regime and agree on an all-encompassing LOS treaty. At this time, however, there is a clear concensus among the participating nations favoring 200-mile economic zones. In that light Charles Meacham's rather depressing prognosis for the future may well prove true.

At the end of the Geneva LOS conference Meacham predicted, "it will be several years before a Law of the Sea is finally adopted. Before that time all of North and South America and a number of other nations will have taken unilateral action to establish a 200-mile economic zone which will include fisheries. Unilateral action creating the fisheries zone will not, however, directly solve our high seas salmon fisheries problem, because the salmon migrate much further. Since there would then be no international agreement regulating catch beyond that limit, our salmon stock would be seriously depleted. Hope for Alaska's salmon will rest with the State Department negotiating foreign interests off the salmon beyond 200 miles by licensing these fleets to fish within the economic zone for resources not utilized by American fishermen."

Oct. 1975

HR 200 - something fishy?

By Thomas A. Casey
Manager, United Fishermen's Marketing Association

HR 200, the U.S. House of Representative's 200-mile limit bill, was introduced by Congressman Jerry Studds, (D-Mass.) early this year. Reaction to the bill has been, to say the very least, mixed. Fishermen across the country have criticized the management provisions of the bill, and this summer the United Fisherman's Marketing Association in Kodiak announced its opposition to HR 200 in its current form. In the following article Tom A. Casey, manager of the UFMA, outlines his organization's objections to and amendments for the bill. Mr. Casey is a member of the Alaska Law of the Sea Commission and was sent by that organization to Washington, D.C. late in September to express his views at the HR 200 hearings.

Shrimp, crab and salmon are the "bread and butter" fisheries of Alaska. The incomes, mortgages and futures of Alaska fishermen depend on the continued health of these stocks. Currently, our crab are protected from foreign fleets by the 1958 Geneva Convention on the Continental Shelf. Likewise, most of our shrimp are protected by their location inside U.S. 12-mile waters. The Alaska Department of Fish and Game (ADF&G) manages these fisheries, and thus our money fish are protected and within our State's control. If fishermen disagree with ADF&G policy or if they favor new management proposals, they need only fly to Juneau or Anchorage for a forum with the Alaska Board of Fisheries. The management committee is always close and convenient.

Not so under the present form of HR 200. With this bill the management body for our fisheries would be the Alaska Regional Fisheries Management Council (ARFMC) which would represent the interests of Alaska, Washington, and Oregon. Membership on the ARFMC would consist of: (1) the executive director of the Pacific Marine Fisheries Commission, 2) three members appointed by the Governor of Alaska, 3) the regional director of the National Marine Fisheries Service, 4) the regional director of the U.S. Fish and Wildlife Service, 5) six members (other than government employees) with knowledge and experience in commercial or recreational fishing who represent different geographic areas in the region, to be appointed by the Secretary of Commerce from a list of nominees suggested by the members in 1-4, and 6) two members (other than government employees) who shall represent the public interest to be appointed by the Secretary of Commerce from a list of nominations by the members in 1-4.

As the present draft of HR 200 is written, Alaska could well become a minority on the council, and meetings need not even be held in Alaska. In fact, there are enough designated out-of-state members of the ARFMC that meetings could very well be held in Seattle or Washington, D.C. Since the council's authority would supercede that of the ADF&G our local management control would be lost.

To remedy this rather repugnant situation, the United Fisherman's Marketing Association recommends the following amendments to HR 200.

–1. Alaska shall be guaranteed a majority on its own Regional Fisheries Management Council. To accomplish this: a) the Governor of Alaska must be granted three more primary appointments, b) Oregon must be removed from the ARFMC, c) the Alaska member of the Pacific Marine Fisheries Commission must be designated instead of the regional director in Portland, e) at least two of the primary appointments by the Governor of Alaska must be designated as Alaska commercial fishermen.

–2. All meetings of the ARFMC shall be held in Alaska.

–3. ADF&G must retain management control of shellfish and salmon in the 200-mile economic zone. ADF&G shall continue to set methods, quotas, and seasons for harvesting shellfish and salmon. ADF&G now has the power to issue emergency orders which it uses to manage fisheries on a day-to-day basis. The timetable for management decision-making under the present version of HR 200 is much too bureaucratic and drawn-out to respond effectively to the fast pace of fisheries management. The chain of command between the Secretary of Commerce and the Regional Fisheries Management Council could not match the speed and decisiveness of ADF&G.

–4. The ARFMC shall select its last eight members by majority vote.

–5. The ARFMC shall have the power to promulgate conservation policies and fishing regulations independent of the Secretary of Commerce.

–6. The ARFMC shall have direct management responsibility for the Alaska cod, black cod, pollack, Pacific Ocean perch, and sole stocks in the 200-mile zone.

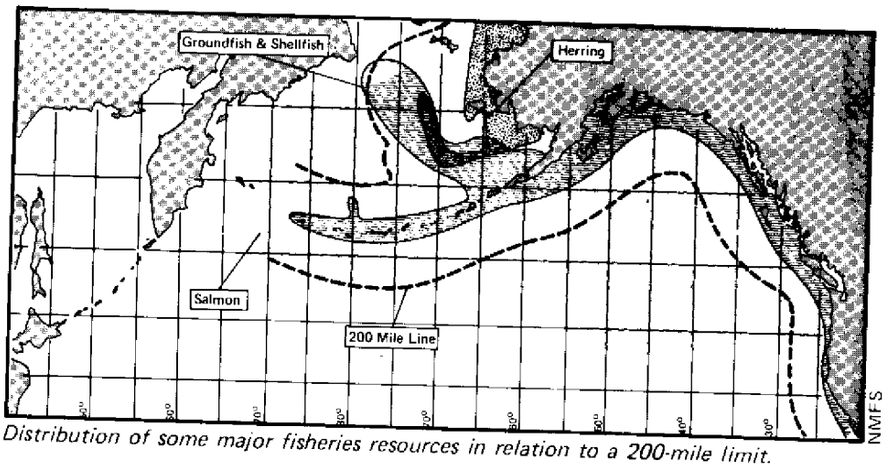
–7. Any limited entry program promulgated within the jurisdiction of the ARFMC shall be mandated by the Alaska state legislature.

–8. ARFMC shall have the power to forbid any foreign fishing within the 12-mile zone.

–9. The ARFMC shall have the authority to develop and implement a timetable by which foreign salmon fishing in the 200-mile zone shall be eliminated.

In addition, HR 200 should be generally amended to aid development of an Alaska bottomfish industry. Unlike the East Coast and the West Coast, Alaska has never had a well-developed, domestic bottomfish industry. In New England waters, New Bedford and Boston trawlers compete head-on with Russian and Japanese draggers for haddock, cod and whiting that are valuable in Boston and New York markets. Likewise, West Coast trawlers from Eureka, Coos Bay, and Seattle drag side-by-side with foreign trawlers for marketable sole, perch, cod and hake. HR 200 could reduce the foreign competition to American trawlers in these areas and thereby increase the annual catch for American fishermen. The processing plants and marketing channels are already functioning in those areas.

Not so in Alaska. There are no substantial bottomfish processing plants in Alaska. Marketing channels have not been established here. Nor is there any indication that Alaska seafood processors are planning to develop bottomfish processing capability as long as foreign fleets are trawling off Alaska's coast and exporting their catch to America. In 1974, Japan, USSR, Poland, Taiwan,



Distribution of some major fisheries resources in relation to a 200-mile limit.

and South Korea took over 4.4 billion pounds of bottomfish from Alaskan waters. That's ten times greater than the 450 million pounds of salmon, shellfish, and halibut caught by Alaskan fishermen last year.

At 10c per pound, the 1974 foreign bottomfish catch from Alaskan waters was worth $440 million. American consumers paid more than $250 million for foreign imported bottomfish blocks, slabs, and fillets that same year. The total, then, of lost income for American fishermen and the increased U.S. trade deficit was over $690 million.

These are the stakes that Alaska fishermen could compete for if HR 200 is amended properly.

Japanese control of the Alaska seafood processing industry is a fact. The same Japanese companies that own Alaska shore plants, also own high seas bottomfish fleets. Any investment that the Japanese make in shore-based, bottomfish processing equipment directly jeopardizes their high seas trawlers and motherships operating in the Gulf of Alaska and the Bering Sea. The huge investment that the Japanese have in their bottomfish fleets and the great value of the bottomfish they take from Alaskan waters will certainly be guarded closely by them. No bottomfish processing "pilot-programs" are likely to be started in Japanese-owned, Alaska shore plants.

Obviously, Alaskan fishermen will need alternative ways to begin harvesting and processing bottomfish before HR 200 stands to benefit them nearly as much as it can benefit East Coast, Gulf Coast, and West Coast fishermen. Such a program will require a combination of federal construction subsidies, marketing assistance, price supports, and a concerted effort to impose protective tariffs and quotas on fish imports. The Capital Construction Program, the Farmers' Cooperative Service, and the National Marine Fisheries Service would be invaluable elements of such a program. It is critical to Alaska fishermen that HR 200 contain a well-planned strategy for developing bottomfish processing plants in Alaska. Otherwise, the bill will not increase our catch or our earnings.

If the U.S. House of Representatives can improve HR 200 to grant to Alaska fishermen the same benefits the bill provides for American fishermen on the East and West Coast, we Kodiak fishermen will endorse it enthusiastically.

Oct. 1975

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200 Miles

Sex, groundfish, and extended jurisdiction have been the three most talked about subjects in Alaska over the past year.

Harry Rietze,
Director of National Marine Fisheries Service for Alaska

Mr. Rietze sums it up pretty well. Six months ago the 200-mile limit was one of the most hotly debated issues in Alaska. Governor Hammond called the limit a "giant step forward," Senator Stevens deemed it "essential," Congressman Don Young saw "no logical reason to hesitate," and Senator Mike Gravel felt declaration of a 200-mile limit "would not protect Alaska's salmon but hamper and possibly destroy chances of an international treaty."

Today the 200-mile limit is a reality. The Congress conferred extensively over the past two months and agreed on a final form for the Fishery Conservation and Management Act of 1976 which President Ford signed in April.

The law establishes a "fishery conservation zone" out to 200 miles in which the United States exercises exclusive management authority over all fish. The U.S. also claims authority over anadromous species throughout their migratory range and all continental shelf fishery resources. The effective date is March 1, 1977.

After February 28, 1977 foreign fishing will not be allowed in the zone without a permit. The level of foreign fishing allowed, if any, will be that portion of the optimum sustainable yield which would not be harvested by vessels of the United States. The optimum sustainable yield (OSY) will be determined by modifying the biologically maximum sustainable yield with social, economic, and environmental factors. The Secretary of State and the Secretary of Commerce will allot the allowable foreign catch among nations by traditional fishing effort and cooperation in fishery research and conservation.

The bill establishes eight regional fishery management councils. Alaska has its own council, the North Pacific, which has authority over the Arctic Ocean, Bering Sea, and Pacific Ocean seaward of Alaska. Because of extensive and successful lobbying efforts, Alaskans will be a majority on the council. Members will be chosen within the next 120 days and will consist of six Alaskans, three Washingtonians, one Oregonian, and the regional director of National Marine Fisheries Service.

The regional council will be responsible for preparing a management plan for each fishery within its authority. This plan would include the present condition of the fishery, maximum sustainable yield, optimum sustainable yield, and the portion of the OSY which will not be harvested by fishing vessels of the United States.

April 1976

200 Miles

Congress has voted to extend U.S. fishery management authority to 200 miles. On January 28, 1976 the Senate overwhelmingly (77-19) passed a 200-mile limit bill similar to the measure passed by the House in October.

The bill now goes to conference where the differences between the House and Senate versions will be ironed out. One major difference will be the enforcement date. As it stands now, the House bill would be enforced beginning July 1, 1976, while the Senate bill's date is July 1, 1977. President Ford has said that if enforcement on a 200-mile limit bill were put off until 1977 he "would probably not veto" it. The main points of the Senate 200-mile limit bill follow.

—Exclusive U.S. fishery jurisdiction to 200 nautical miles offshore.
—The U.S. claims jurisdiction over anadromous fish spawned in U.S. waters wherever they swim.
—Foreign fishermen will be allowed into the 200-mile zone only when U.S. fishermen cannot or will not take the permissible amount of fish.
—The measure encourages development of domestic fisheries for under-used species such as Alaska bottomfish.
—The U.S. will renegotiate any treaties to which it is a party, to bring them into conformance with the bill.
—Seven regional management councils are created to develop fishery management plans for their areas. Five Alaskans will sit on the nine-member North Pacific Council and Alaska will have three members on the 16-member Pacific council.
—A seven-member, presidentially appointed Fishery Management Review Board is established to hear appeals from persons adversely affected by final management regulations.
—Where practicable and consistent with national standards, the regional councils will incorporate in their management regulations the management measures of the coastal state nearest the fishery involved.

Feb. 1976

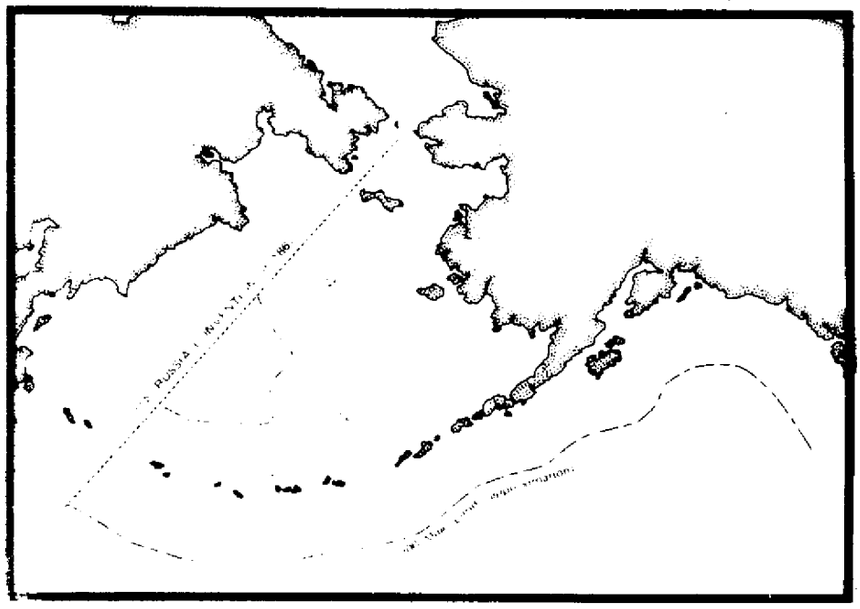
NEW DIMENSIONS FOR ALASKAN FISHERIES
THE 200-MILE LIMIT

By Hank Pennington

Often referred to as the 200-mile limit law or extended jurisdiction (EJ) law, the Fishery Management and Conservation Act of 1976 (PL 94-265) may come to be regarded as the tide of change for Alaska's fishing industry. It will lead to dynamic changes in many of our offshore fisheries and could, over the long term, result in increased opportunity for Alaskan fishermen. To realize these opportunities, however, the fishermen of Alaska will have to participate actively in the processes outlined in the Act, and develop fluid communications with the North Pacific Regional Management Council, the Council responsible for the management of Alaskan waters.

The management of Alaska's rich and diverse fisheries has progressed through a significant series of changes in the last century. From 1867, when Alaska was purchased from Russia, until the turn of the century, fishing was unregulated and there was no effort to manage the fisheries. In the early 1900's the Bureau of Fisheries (later to become the Fish and Wildlife Service) was created and given management responsibility for Alaska's fisheries.

Until 1960, when the Alaska Department of Fish and Game took over, the Bureau, and later its successor, attempted to manage the fisheries, though they were often shortchanged in terms of management personnel and enforcement dollars. This, in combination with rapidly expanding fishing effort, resulted in the serious over- exploitation of some fisheries. With statehood and the transfer of responsibility, however, a new system of management was initiated and with few exceptions the fisheries began the long process of recovery.



In most instances the state was able to closely regulate its own fishermen through quotas, gear restrictions and seasons, and to progress toward revival of the stocks. The offshore fisheries, however, were still vulnerable to over-fishing by the fleets of foreign nations. Once again the fishermen and the state had to turn to the federal government, this time for assistance in controlling the foreign fishing fleets.

Since the United States had no real management authority outside the recognized 12-mile limit, the only controls available on foreign fishing were those that could be negotiated through international treaties and agreements. As a result, in too many instances the State Department was unable to negotiate a treaty until such time as the stocks were so badly over-fished that they were no longer of real interest to the foreign fleets. Examples in the Pacific Ocean and the Bering Sea are the Pacific ocean perch and the yellowfin sole, both of which were so badly over-harvested that their survival is threatened.

Against this background a drive grew rapidly for extending our management authority out to 200 miles offshore, the approximate limit of our continental shelf. This sentiment, however, was not shared by all fishermen in the U.S.

Because of the precedent set by our claim to a 200-mile economic zone, the tuna fleet of Southern California and the shrimp fleet of the Gulf Coast fought actively in Congress against the concept and related legislation. These fishermen regularly fish within 200 miles of foreign shores, and the tuna fishermen in particular have for years fought a running legal battle with several Latin countries over the recognition of those countries' claim to a 200-mile economic zone.

Finally on April 13, 1976, after a long series of debates, revisions and compromises in Congress, the Fishery Management and Conservation Act of 1976 was signed by President Ford. While some parts are vague and will require legal interpretation in the future, the Act lays out an entirely new management scheme and will lead to significant changes in our offshore fisheries. *It must be remembered, however, that the Act is only an interim measure to serve until the United Nations Conference on the Law of the Sea can develop a treaty for the management of high seas resources.* The Act contains provisions for amendments to make it conform to a Law of the Sea treaty, should one be forthcoming.

Highlights of the Act

Under the conditions set forth in the Act, most of the offshore fisheries presently managed by the Alaska Department of Fish and Game will become the responsibility of the National Marine Fisheries Service (NMFS).

The authority of individual states to manage fisheries within three miles of shore is preserved in the Act, if their managment plans do not conflict with those for the fisheries of the entire 200-mile zone. All species that primarily inhabit and are harvested in the waters beyond the three-mile Territorial Sea will be managed by NMFS.

Exceptions are highly migratory species such as tuna, which migrate and spawn over broad ranges in the open ocean; salmon from the Stikine, Taku, and Alsek rivers in southeastern Alaska, where they migrate through the U.S. and into Canada to spawn; Bristol Bay red salmon; and the salmon of the Arctic-Yukon-Kuskokwim (AYK) region. The Act sets a precedent by

NORTH PACIFIC REGIONAL MANAGEMENT COUNCIL MEMBERS

With the recent passage of PL 94-265, the Fishery Management and Conservation Act of 1976, eight regional management councils were formed. Waters off Alaska fall under the jurisdiction of the North Pacific Council, which has eleven voting members. Listed by decreasing length of appointed term, the Council members are:

THREE-YEAR TERMS

Douglas B. (Bart) Eaton: Crab fisherman; Vice President, Pacific Pearl Seafoods; advisor, International North Pacific Fisheries Commission; Full Delegate, United Nations Conference on the Law of the Sea; long-time relationship with fishermen's associations.

Donald McKernan: Director, Institute for Marine Studies, University of Washington; former Ambassador of Fisheries, U.S. State Department; Regional Director, U.S. Bureau of Commercial Fisheries for Alaska in the years immediately prior to statehood.

Elmer Rasmuson : Chairman, Executive Committee, National Bank of Alaska; Chairman, U.S. Section, International North Pacific Fisheries Commission; member, Marine Fisheries Advisory Committee, U.S. Department of Commerce; life-long Alaskan with long financial ties to the Alaskan fishing industry.

TWO-YEAR TERMS

Harold Lokken : Manager, Halibut Fishing Vessel Owners Association for fifty-two years; served as special advisor to International North Pacific Halibut Commission and International North Pacific Fisheries Commission; member, National Advisory Committee on Oceans and Atmosphere and Marine Fisheries Advisory Council.

Charles Meacham Director, International Fisheries and External Affairs, Office of the Governor, State of Alaska; former Commissioner, U.S. Fish and Wildlife Service; Commercial Fisheries Management Biologist in Bristol Bay; advisor, International North Pacific Fisheries Commission.

ONE-YEAR TERMS

Henry Eaton (no relation to Bart Eaton): Salmon fisherman; Director for Economic Development, Koniag, Inc.; former Director, Kodiak Fishermen's Union; Board Member, Alaska Federation of Natives; Chairman, Alaska Native Fisheries Council.

Senator Clem Tillion: State Senator; fisherman; advisor, International North Pacific Fisheries Commission; former member, National Council on Oceans and Atmosphere, U.S. Department of Commerce.

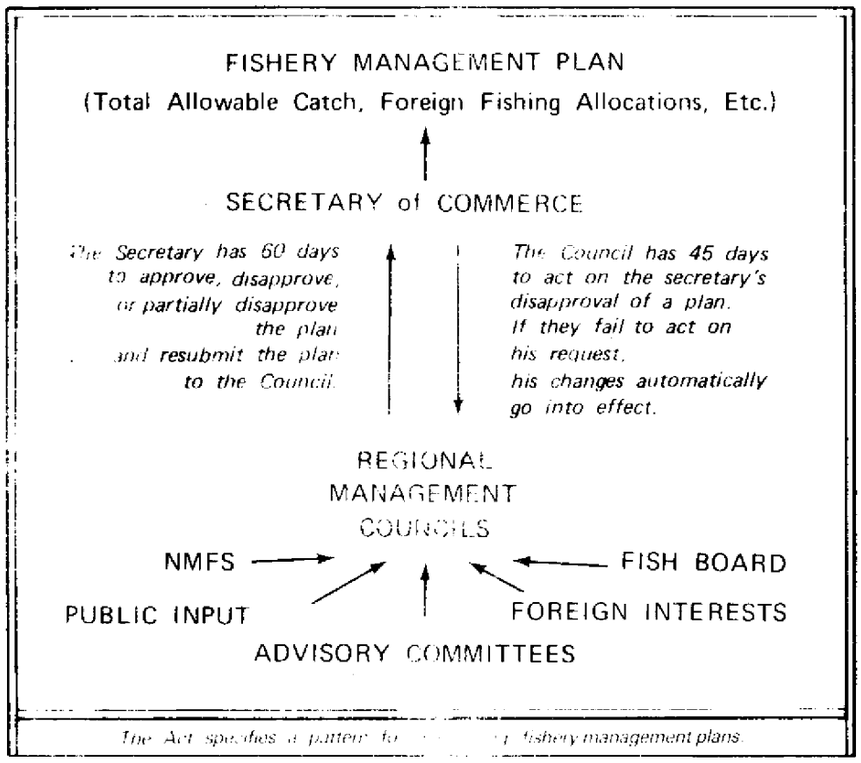
VOTING STATE AND FEDERAL OFFICIALS

James W. Brooks: Commissioner, Alaska Department of Fish and Game; marine mammal specialist; involved with resource management in Alaska since territorial days.

claiming exclusive U.S. management rights to all anadromous fish originating in our rivers *throughout their migratory range.* It also emphasizes a "...national program for the development of fisheries which are under utilized or not utilized by United States Fishermen, including bottomfish off Alaska."

To develop the plans for the management of our fisheries, including the determination of the total allowable catch for foreign vessels, the Act creates eight regional management councils, and provides a set of standards and guidelines for the councils' preparation and implementation of the plans.

The councils do not, however, have unlimited powers in the formation of the management plans. Outlined in the Act is a system by which the management plans have to meet the approval of the Secretary of Commerce, and, therefore, align themselves with the National Standards of the United States (See chart).



The Act specifies a pattern for ... fishery management plans.

Alaska's council, the North Pacific Council, consists of eleven voting members: five appointed from Alaska; two appointed from Washington; the heads of the fishery departments of Alaska, Washington, and Oregon; and the regional director of the NMFS. Also serving on the council are non-voting members including the regional director for the U.S. Fish and Wildlife Service, the commander of the Coast Guard district, the executive director of the Marine Fisheries Commission, and one representative of the State Department. (See related story on page 2.)

A significant element of the Act is the inclusion of the concept of optimum sustained yield (OSY), defined as: "...the amount of fish...which will provide the greatest overall benefit to the Nation, with particular reference to food production and recreational opportunities; and...which is prescribed as such on the basis of the optimum sustainable yield from such fishery, as modified by any relevant economic, social, or ecological factor." In determining the allowable foreign catch the fishery management plans must consider "...the capacity and the extent to which fishing vessels of the United States, on an annual basis, will harvest the optimum yield." Together these provisions insure that U.S. fishermen will receive preferential treatment when the total allowable catch is divided between the various fishing fleets, and that the offshore fish stocks will finally be managed on the basis of a continuous high yield.

A country whose vessels fish within 200 miles of our shore will be required to obtain a permit, as specified in the Act, and to submit to U.S. authority to board and inspect their vessels. The Act also calls for reciprocity, or the extension of similar fishing rights to U.S. vessels in that country's waters in exchange for permission to fish in U.S. waters. As added pressure on foreign countries fishing off our shores, legal authority is provided in the Act for the Secretary of Treasury to impose an embargo on the fish and fish products of any country not adhering to the terms of the Act.

ENFORCEMENT

Enforcement of the provisions of the Act falls on the Coast Guard and NMFS, with civil penalties and forfeiture, criminal sanctions and stringent enforcement procedures outlined. This partnership of the two agencies has in the past resulted in very high quality enforcement of our

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Donald W. Moos: Director, Washington Department of Fisheries; interest in fisheries and natural resources.

John R. Donaldson: Director, Oregon Fish and Wildlife Department; former Associate Professor of Fisheries, Oregon State University; past-president, private aquaculture firm; renowed fishery biologist.

Harry L. Reitze: Regional Director of National Marine Fisheries Service since 1959; professional fisheries biologist.

NON-VOTING MEMBERS

Jan E. Riffe: Assistant Area Director, U.S. Fish and Wildlife Service.

Rear Admiral J.B. Hayes: Commander, Seventeenth Coast Guard District.

Dr. John P. Harville: Executive Director, Pacific Marine Fisheries Commission.

Larry Nakatsu: Office of Deputy Assistant, Secretary for Ocean and Fishery Affairs, U.S. State Department.

(Continued from page 3)

12-mile limit, in spite of the vastness of Alaska's coastline and our inclement weather conditions.

With the many-fold increase in the geographic area to be patrolled, the personnel and equipment requirements will significantly increase. To help offset the tremendous cost of the enforcement and management of our 200-mile zone the Act also provides for the levying of permit fees on foreign vessels fishing within the zone.

For Alaska, these are the more significant highlights of the Fishery Conservation and Management Act of 1976. The remainder of its 59 pages includes legal definitions, a complex series of procedures for carrying out its provisions, directives and technical formats for the Regional Management Councils, and a host of provisions for insuring the coherency of the Act with existing treaties and agreements dealing with marine resources.

LIVING WITH THE 200-MILE LIMIT

The Act goes into effect March 1, 1977, and the first year, at least, will probably be extremely difficult for all concerned. As previously mentioned, parts of the Act are vague and will require legal definition, but the translation of such a dynamic and far-reaching law into practical reality in our day-to-day lives can be painful.

The idea of managing salmon stocks throughout their migratory range has great merit, but in practical terms even the identification of our own salmon when they mix with stocks from other countries on the high seas, much less their management, will be a major effort.

The role of Alaska's Board of Fisheries, the critical link in Alaska's excellent record of flexible and responsive fishery management and regulation, will be greatly reduced. The relationship between U.S. fishermen in Alaskan waters and the federal enforcement personnel who will regulate them will undoubtedly have some rough moments. In some fisheries, the Alaska Department of Fish and Game has developed management expertise and methods that could suffer in the transfer of management responsibility.

The greatest difficulties, however, will probably be encountered by the individual regional management council members. Not only will they have to examine masses of data and from it develop fishery management plans, but also they will face the task of building from scratch a functional regulatory body complete with technical advisory panels, and all the necessary facilities to house their operations.

Oct. 1976

North Pacific Fishery Management Council

Supplement to ALASKA Seas and Coasts, Volume 5, Number 3, June 1977

The NPFMC, shown in session, has authority over the fisheries in the Arctic Ocean, Bering Sea, and Pacific Ocean seaward of Alaska. The Council members shown above, seated at the table left to right are: Rear Admiral J. B. Hayes, Donald McKernan (back to the camera), Chalres Meacham, James Brooks, Harold Lokken, Elmer Rasmuson, Chairman, Jim Branson, Bart Eaton, Henry Wendler (designee for Frank Haw), Harry Rietze, Senator Clem Tillion, and James Barry (designee for Jan Riffe). Members not shown are John R. Donaldson, Hank Eaton, John P. Harville, and Carl Price. (Photo by Hank Pennington)

A New Concept in Fishing Management

by Jim Branson, Executive Director
North Pacific
Fishery Management Council

The North Pacific Fishery Management Council (NPFMC) is one of eight regional management councils organized under the Fishery Conservation and Management Act of 1976. This Council consists of the states of Alaska, Oregon, and Washington. NPFMC differs from the other seven councils because it manages fishery resources of only one state, Alaska, while the other councils work with the resources of three or more states. The North Pacific Council has authority over the fisheries in the Arctic Ocean, Bering Sea, and the Pacific Ocean from three to 200 miles seaward of Alaska. This area contains some of the richest fishing grounds in the world and currently supports over 80 percent of the foreign fishing effort found off the coast of the United States.

SELECTION OF MEMBERS

The North Pacific Council has 11 voting members. Seven are appointed by the Secretary of Commerce – five from Alaska and two from Washington. These council members are selected from a slate of nominees submitted by the governors of the states. The governors recommend at least three candidates for each vacancy to the Secretary. The other four voting members are the Directors of the Departments of Fisheries in Alaska, Oregon, and Washington and the Regional Director for the National Marine Fisheries Service.

LENGTH OF TERMS

Appointees serve for a period of three years, although the initial appointments were split between one-, two-, and three-year terms to provide for overlapping terms and better continuity in the future. All of the other Council members serve for as long

ALASKA Seas and Coasts

EDITOR'S NOTE:

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Alaska Seas and Coasts is pleased to give the NPFMC the opportunity to communicate directly with its readers through this supplement. Comments on the 200-mile limit and the NPFMC were prepared by Jim Branson, Executive Director of the NPFMC; Jim Brooks, Commissioner of Fish and Game for the State of Alaska; Commander Ralph Giffin, U.S. Coast Guard; and Bob McVey of the National Marine Fisheries Service.

This supplement also features a list of members of the Advisory Panel and Scientific and Statistical Committee of the Council, along with articles on a tagging study of high seas salmon and research support for the Council.

as they remain in their respective state or federal positions.

The anniversary date for appointments is August 11; two appointments to the North Pacific Council expire on August 10, 1977. These appointments are currently held by Senator Clem Tillion and Henry (Hank) Eaton. Council members can be reappointed.

COUNCIL STAFF

The North Pacific Council held its first formal meeting in Juneau. At that time the Council elected Elmer Rasmuson as chairman and selected Anchorage as its permanent headquarters. Jim Branson, who had been serving as extended jurisdiction coordinator for the National Marine Fisheries Service, Alaska Region, was appointed the acting executive director at the first Council meeting in October and was confirmed as a permanent Council employee in that position at the January meeting in Anchorage. Offices were opened in Anchorage on January 17 in the Post Office Mall Building. The Council currently has a permanent staff of six: an executive director, assistant executive director, executive secretary, administrative officer, and two clerk-secretaries.

COORDINATING BODY

At its regular monthly meetings the Council sets policy and goals for Council work. The permanent staff carries out the Council mandates and coordinates the work of the various scientific and management groups in the development of management plans. The North Pacific Council, unlike the other seven councils throughout the country, does not expect to hire or maintain its own scientific or technical staff. Rather, it will serve as a coordinating body for the various management and scientific groups working on fishery and ocean management problems in the North Pacific. Using already existing and functioning expertise, the Council will develop management plans for all of the fishery resources within the conservation zone off Alaska. (See Management Plan Development Teams, page 5.)

FISHERY UNITS

Ten fishery units have been identified and will need management plans in the near future. The fisheries are: (1) groundfish, including herring and black cod, of the Bering Sea and Aleutian Islands, (2) groundfish, including black cod, of the Gulf of Alaska, (3) tanner crab, (4) king crab, (5) ocean troll salmon, (6) high seas salmon, (7) Bering Sea clam, (8) shrimp, (9) dungeness crab, and (10) scallop (an inshore species).

It will probably take two or more years to develop all these management plans. Once adopted they will be closely monitored and undergo frequent revision as information is added or management needs change.

COUNCIL'S ROLE

The regional council's role is a completely new concept in fishery management that holds great promise. Acting as a single coordinating body the council will be in a position to pull together the various disciplines, management policies, and concepts in fishery management heretofore divided among state, federal, university, and even foreign institutions.

Although funded by the federal government and reporting to the Secretary of Commerce, the North Pacific Council is funded through a grant and is, therefore, outside the regular federal system for both personnel and procurement. This arrangement allows considerably more freedom to innovate and interact with other groups than would a similar body under other federal or state programs.

COMMENTS ON THE NPFMC
. . . from the National Marine Fisheries Service

by Bob McVey
Deputy Director
Alaska Region, NMFS

For National Marine Fisheries Service (NMFS) operations in Alaska, the major feature of doing business under the Fishery Conservation and Management Act is interaction with the North Pacific Fisheries Management Council. This interaction relates to the preparation of fishery management plans and environmental impact statements, and, with the help of the Coast Guard, assures that fishing is done in compliance with the management plans. These activities are considered so important that many NMFS programs have been reoriented and redirected to focus more clearly on Council needs and actions, as well as to carry out the new functions assigned to NMFS in the Act.

NMFS, state, and university personnel working in teams are now preparing drafts for top priority Council management plans. NMFS input for the drafting process will include research results such as status of the stocks and predictions of future stock abundance as well as information on the pattern, intensity, and performance of foreign fisheries. Before presentation to the Council for consideration, the draft plans will be closely measured against the National Standards in the Act by the Council's Scientific and Statistical Committee.

During Council deliberations on the draft plans and alternative management measures, NMFS will be prepared to offer further technical information based on research, and on observations of the fisheries during joint Coast Guard-NMFS aerial and ship patrols. Throughout the entire process, administrative advice and assistance will be available for Council and staff needs, and the NOAA Office of General Counsel will be available for legal assistance through the Alaska Regional Counsel.

For the future, after a management plan is completed by the Council and has been approved, the Secretary of Commerce, NOAA and NMFS will promulgate the necessary regulations and proceed with implementing the plan as required by the Act. For the duration of the plan, NMFS will continue to monitor the foreign fisheries and the abundance of the fish stocks so the Council can be aware at all times of how the plan is working and whether management measures should be revised in subsequent plans. NMFS welcomes the opportunity to work with and support the Council as this new era in marine fisheries management gets underway.

. . . from the U.S. Coast Guard

by Commander Ralph Giffin
U. S. Coast Guard
Juneau

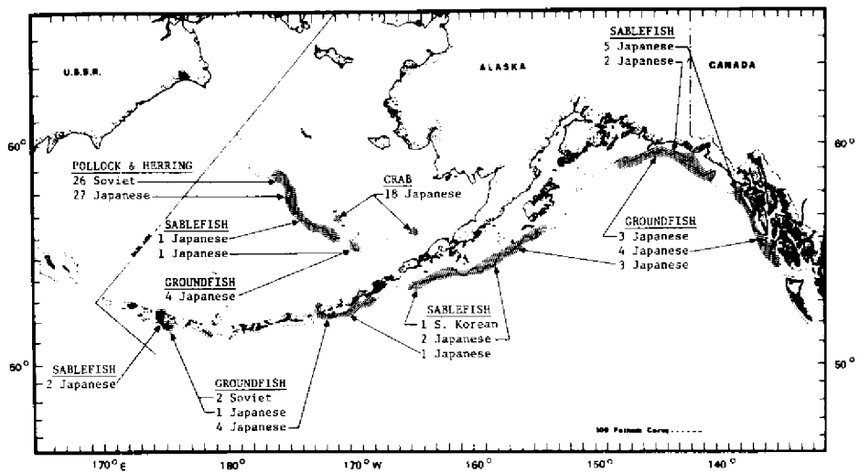
With two months experience under the new Fishery Conservation and Management Act, the Coast Guard has had few problems with the foreign boats fishing near Alaska's shores. In almost every case the Japanese, Russian, and South Korean fishermen are trying to live within the regulations.

Coast Guard patrols with agents of the National Marine Fisheries Service on board have sighted over 75 percent and boarded about half of these fishing boats. Although 15 violations of the regulations were detected by the end of April, all evidence indicates that the infractions were unintentional or that they resulted from actions of relatively low-ranking crewmen. There was no indication that masters of the fishing vessels were responsible for the violations or that they were testing the resolve of the Coast Guard to enforce the new law.

One of the most serious violations was detected during the routine boarding of the Japanese trawler *Eikyu Maru No. 2* in mid-April. Inspection of the logs revealed an intrusion into a closed area in the far Aleutians a few weeks before. Because the violation appeared unintentional and relatively minor, the *Eikyu Maru No. 2* was not seized. Instead, the vessel was charged with a civil offense which will be adjudicated by the National Marine Fisheries Service. The maximum penalty for this civil offense is $50,000.

The handling of this case illustrates one of the many advantages of the 200-mile fishing law. Under the old Bartlett Act a violator was either seized for a major offense or excused for minor ones – there were no other options. But now several alternatives are available.

Particularly important in the enforcement arsenal is the report of civil violation which was used against *Eikyu Maru No. 2*. For the first time the Coast Guard and National Marine Fisheries Service have an enforcement response suitable for moderately serious fishing violations.



Foreign fishing off Alaska, April 1-22, 1977 by country, number of vessels, principle fishing grounds and species fished.

. . . from the Alaska Department of Fish and Game

by James W. Brooks, Commissioner
Alaska Department of Fish and Game

The Alaska fishing community is focusing keen interest on the manner in which the Board of Fisheries and the Alaska Department of Fish and Game (ADF&G) relate to the North Pacific Regional Fishery Management Council. In what ways will fishery management, traditionally a state responsibility, change under the prescriptions of the Fishery Conservation and Management Act (FCMA) of 1976? Answers to many questions were quick in coming, although the longer term character of the state agency-regional council relationship is somewhat unsettled and may always be so.

The drafters of the FCMA carefully considered those provisions that best facilitate the introduction of a new regulatory authority. The authority would variously augment, dislocate, replace, or otherwise affect existing state regulatory authorities. The situation in the North Pacific region was among the simpler ones to deal with because only a single state regulatory body was involved. Here the key arrangement provided in the FCMA was appointment of Alaskans to a majority of the voting seats on the Council. This procedure allowed for certain individuals to have formal roles in both state agencies and on the Regional Council or its official extensions.

Thus, the Commissioner or executive head of the Department of Fish and Game is a voting Council member. The Director of International Fisheries and External Affairs in the Governor's office is also a voting Council member. The Alaska Department of Fish and Game, the Director of Commercial Fisheries and his two senior staff members serve on the Council's Scientific and Statistical Committee, two members of the Board of Fisheries serve on the Council's Advisory Panel and several of the Department's fishery scientists and managers serve the Council as members of fishery management plan drafting teams. Such integration assures a high level of communication and cooperation. It is further enhanced by periodic joint meetings of the Regional Council and the Board of Fisheries.

The question of which Alaska fisheries would fall under the purview of the regional council was resolved quickly and harmoniously in accordance with the provisions and standards set forth in the FCMA. Essentially all shellfish, except a few discrete inshore stocks, and all of the fishery resources

harvested in the fishery conservation zone fall under the authority of the regional council with respect to developing management plans. Regulatory and management authority over Alaska's inshore fisheries, including salmon and herring, will remain the responsibility of the state. Aside from foreign fisheries, which are already managed under federal regulations based on preliminary management plans developed by the Secretary of Commerce, all of the fisheries will continue to be regulated and managed by the State of Alaska until such time as regional council's management plans have been developed and approved. Then federal regulations will apply. At this point many will wonder how the Regional Council will interact with the Board of Fisheries and the Department of Fish and Game in the transition from state regulations to federal regulations.

TRANSITION

It is logical that the existing state fishery management programs, as expressed through regulations of the Board of Fisheries, will form the basis of the Regional Council's management plans. These plans are being developed by personnel of the Department of Fish and Game and the National Marine Fisheries Service as designated by the Scientific and Statistical Committee. This committee also assigns lead agency responsibility to either ADF&G or NMFS for plan development depending upon the agency's former and existing responsibilities with particular fisheries.

The State of Alaska has never managed offshore domestic finfish resources beyond regulations to encourage exploratory effort. The National Marine Fisheries Service has had a substantial experience in exploratory fishing, stock evaluation, and monitoring of foreign fisheries. Therefore, NMFS has been given principal responsibility for preparation of management plans to govern such fisheries.

The Alaska Department of Fish and Game, on the other hand, has successfully managed Alaska's shellfish resources for many years. It has been assigned the lead role in developing management plans for them. In the ADF&G situation, the plans will probably appear much like the existing state management regimes modified as necessary to meet the standards of the FCMA and, of course, updated to reflect the latest biological information and assessments.

It is conceivable that the Council management plan for shellfish will propose federal regulations that make direct reference to state regulations; in other words, state regulations will be adopted by reference as federal regulations.

Such a procedure, if implemented, would have the merit of utilizing the existing institutional arrangements of the state. These are the Board of Fisheries, its advisory committees, and the hearing processes required by the Alaska Administrative Procedures Act. In addition, it would perpetuate the extremely useful emergency order process authorized by state law to amend fishery regulations in season on very short notice. This is vital to proper management of some of our intensive shellfish fisheries.

As mentioned earlier, however, it is yet uncertain how the rather complex legal and interagency relationships will finally be resolved. It appears at this point, that all the principals share a determination to do whatever is necessary to assure the conservation of the fishery resources and improve the domestic industry of the North Pacific region.

Research Support for the Council

Research projects currently underway in direct support of the NPFMC include: short and long-term tanner crab and marketing studies, consideration of data requirements for shellfish and groundfish plans, a review of limited entry in Alaska and Canadian fisheries, the development of a fisheries management system, and a salmon tag recovery program.

The short-term tanner crab study was completed and presented to the Council in May. The purpose of the study was to obtain estimates of harvesting and processing capacity and utilization and to summarize marketing information. The study report, *The Bering Sea Tanner Crab Resource – U.S. Production Capacity and Marketing* (Sea Grant Report 77-5), is available from the Alaska Sea Grant Program, University of Alaska, Fairbanks, Alaska 99701.

Another crab study will begin in June. This project will provide demand estimates of the tanner crab industry's five markets – ex-vessel, wholesale, retail, import, and export – for 1976 and 1977. It will cover as many of the market sectors as obtainable data will allow. The project is proposed for funding through the Alaska Sea Grant Program and is scheduled for completion in October 1978.

The most current of the projects is a coded-wire salmon tag recovery program off southeast Alaska.

The Alaska Department of Fish and Game (ADF&G) received the funds through the National Marine Fisheries Service/Northwest and Alaska Fisheries Center and began work on May 1. This project began originally in 1973. Current ADF&G work is a continuation of that project. It is expected to run about three more years.

ADF&G will use recovered tags to compile information on salmon stock identification and migration, with major emphasis on chinook salmon.

The presence off southeast Alaska of salmon stocks originating in Oregon, Washington, and British Columbia streams requires close contact between the North Pacific Council's ocean salmon management plan development team, the Pacific Council's corresponding team, and the government of British Columbia.

Currently at least two nations, three states, and numerous management and research entities are involved in salmon tag recovery programs. These include the United States, Canada, the states of Washington, Oregon, and Alaska, National Marine Fisheries Service, U.S. Fish and Wildlife, and the University of Washington.

The main project objectives as outlined by ADF&G are to: (1) determine the incidence of occurrence of marked chinook salmon released from the Columbia River hatcheries; (2) determine incidence of occurrence of

marked chinook salmon released from coastal streams of Washington and Oregon; (3) determine incidence of occurrence of chinook and coho salmon released from coastal streams and hatcheries in southeast Alaska; (4) compile catch information by fishing district for the Alaska troll fishery; and (5) provide NMFS with all southeast Alaska troll catch data by two-week period, fishing district, and number of landings.

The procedure for gathering data is to sample chinook and coho salmon landed by the coastal troll fishery and the inshore gill net fishery at appropriate cold storages and canneries. ADF&G estimates they can examine 80 percent of coastal-caught chinook salmon and 60 percent of the coastal-caught cohos.

Samplings are proposed for: Pelican Cold Storage, May 1-September 20; Craig Cold Storage, May 1-September 20; Sitka Sound Seafoods, May 15-September 20; Petersburg Cold Storage, June 15-September 20; Juneau Cold Storage, May 15-September 20; and Ketchikan Cold Storage, June 1-September 20.

Membership of NPFMC and Support Groups

NPFMC MEMBERS

Listed by decreasing length of appointed term, the Council members are:

Three-Year Terms

Douglas B. (Bart) Eaton: Crab fisherman; Vice President, Pacific Pearl Seafoods; advisor, International North Pacific Fisheries Commission; Full Delegate, United Nations Conference on the Law of the Sea; long-time relationship with fishermen's associations.

Donald McKernan: Director, Institute for Marine Studies, University of Washington; former Ambassador of Fisheries, U.S. State Department; Regional Director, U.S. Bureau of Commercial Fisheries for Alaska in the years immediately prior to statehood.

Elmer Rasmuson: Chairman, Executive Committee, National Bank of Alaska; Chairman, U.S. Section, International North Pacific Fisheries Commission; member, Marine Fisheries Advisory Committee, U.S. Department of Commerce; life-long Alaskan with long financial ties to the Alaskan fishing industry.

Two-Year Terms

Harold Lokken: Manager, Halibut Fishing Vessel Owners Association for fifty-two years; served as special advisor to International North Pacific Halibut Commission and International North Pacific Fisheries Commission; member, National Advisory Committee on Oceans and Atmosphere and Marine Fisheries Advisory Council.

Charles Meacham: Director, International Fisheries and External Affairs, Office of the Governor, State of Alaska; former Commissioner, U.S. Fish and Wildlife Service; Commercial Fisheries Management Biologist in Bristol Bay; advisor, International North Pacific Fisheries Commission.

One-Year Terms

Henry Eaton (no relation to Bart Eaton): Salmon fisherman; Director for Economic Development, Koniag, Inc.; former Director, Kodiak Fishermen's Union; Board Member, Alaska Federation of Natives; Chairman, Alaska Native Fisheries Council.

Senator Clem Tillion: State Senator; fisherman; advisor, International North Pacific Fisheries Commission; former member, National Council on Oceans and Atmosphere, U.S. Department of Commerce.

Voting State and Federal Officials

James W. Brooks: Commissioner, Alaska Department of Fish and Game; marine mammal specialist; involved with resource management in Alaska since territorial days.

Frank Haw: Acting Director, Washington Department of Fisheries; interest in fisheries and natural resources.

John R. Donaldson: Director, Oregon Fish and Wildlife Department; former Associate Professor of Fisheries, Oregon State University; past-president, private aquaculture firm; renowned fishery biologist.

Harry L. Rietze: Regional Director of National Marine Fisheries Service since 1959; professional fisheries biologist.

Non-Voting Members

Gordon Watson: Area Director, U.S. Fish and Wildlife Service (replaces Jan Riffe).

Rear Admiral J. B. Hayes: Commander, Seventeenth Coast Guard District.

John P. Harville: Executive Director, Pacific Marine Fisheries Commission.

Carl Price: Office of Deputy Assistant, Secretary for Ocean and Fishery Affairs, U.S. State Department.

COUNCIL STAFF

North Pacific Fishery Management Council staff: Executive Director, Jim H. Branson; Assistant Executive Director, Mark I. Hutton; Executive Secretary, Florence M. Mynarski; Administrative Officer, Judy Willoughby; Clerk-typist, Irma Nelson; and Clerk-typist, Janet Murray.

COUNCIL SUPPORT GROUPS

The North Pacific Council receives input from many agencies and individuals to assist them in decision-making processes. Primary among them are the Council's two advisory bodies, the Scientific and Statistical Committee and the Advisory Panel. The 10-member Scientific and Statistical Committee is comprised chiefly of biological and social scientists; the 25-member Advisory Panel is made up of individuals of varying backgrounds knowledgeable in fishery matters.

ADVISORY PANEL (AP)

1 Year Terms

Keith Specking (Chairman), Special Counsel to the Governor, Guide, Hope;

Nick Szabo (Vice Chairman), Commercial fisherman, Alaska Board of Fisheries, Kodiak;

Robert Alverson, Manager, Fishing Vessel Owners' Association, Seattle;

James E. Beaton, Commercial fisherman, Juneau;

Oral Burch, Commercial fisherman, Kodiak;

A.W. (Bud) Boddy, President, Territorial Sportsmen, Juneau;

William Burke, Professor of Law and Marine Studies, University of Washington, Seattle;

Jack Cotant, Commercial fisherman, Assistant Director, Sea-Ed Vocational Program, Ketchikan High School, Ketchikan;

Truman Emberg, Commercial fisherman, Manager, Western Alaska Cooperative Marketing Association, Dillingham;

Jay Gage, President, Peter Pan Seafoods, Seattle;

Paul Guy, Commercial fisherman, Napaskiak;

Sidney Huntington, Owner, Huntington Ventures, Guide, Galena;

Sigfreyd Jaeger, Manager, North Pacific Fishing Vessel Owners' Association, Seattle;

Charles Jensen, Central Operations Manager, Pacific Pearl Seafoods, Kodiak;

Knute Johnson, Commercial fisherman, Cordova;

Joseph A. Kurtz, Commercial fisherman, Seldovia;

Richard B. Lauber, Representative to Association of Pacific Fisheries, Juneau;

Raymond P. Lewis, Manager, Fisheries Relations, Alaska Packers Association, Inc., Bellevue;

Robert Moss, Commercial fisherman, Homer;

Daniel J. O'Hara, Commercial fisherman, Naknek;

Ken Olsen, Secretary-Treasurer, Alaska Fishermen's Union, Seattle;

Al Otness, Administrative Assistant, Petersburg Fisheries, Petersburg;

Robert Starck, Commercial fisherman, Unalaska;

Carleen M. Welfelt, Bureau of Land Management, Anchorage (replaces Judith Ayres);

Harry Wilde, Sr., Commercial fisherman, Mt. Village.

SCIENTIFIC AND STATISTICAL COMMITTEE (SSC)

Dr. Dayton L. Alverson (Chairman), Northwest and Alaska Fisheries Center, NMFS;

Steven Pennoyer (Vice Chairman), Alaska Department of Fish and Game, Juneau;

Dr. Donald Bevan, Fisheries and Marine Studies, University of Washington, Seattle;

Don Collinsworth, Alaska Department of Fish and Game, Juneau;

Dr. Edward Miles, Institute for Marine Studies, University of Washington, Seattle;

Jack Robinson, Oregon Department of Fish and Wildlife, Portland;

Dr. George Rogers, Institute of Social and Economic Research, University of Alaska, Juneau;

Donald H. Rosenberg, Alaska Sea Grant Program, University of Alaska, Fairbanks;

Carl Rosier, Alaska Department of Fish and Game, Juneau;

Dr. Charles Woelke, Washington Department of Fisheries, Olympia.

Plan-Development Teams

To develop the fishery management plans for the North Pacific, the Council has formed six plan-development teams. These teams are presently working to complete the plans by the assigned completion dates. The teams, their members, and their respective time schedules are:

Salmon Troll: The lead agency for the development of the plan is the Alaska Department of Fish and Game (ADF&G). Team members are Gary Gunstrom, Paul Kissner, Jr., Larry Edfelt, Guy Thornberg, Don Collinsworth, and Alan R. Davis. Mike Fredin of NMFS is being replaced on the team by Bill Heard with NMFS at Auke Bay. Alan Otness and Jack Cotant of the Council Advisory Panel are advisors and consultants for the team.

The draft of the plan is expected to be completed by June 9. April 15, 1978 is the scheduled effective date for the plan.

Tanner Crab: ADF&G has been given the lead role in the development of the tanner crab plan. Serving on the team are Allen Davis, Paul Kissner, Jr., Larry Edfelt, Guy Thornberg, Don Collinsworth, William Donaldson, Al Kimker, Rod Kaiser, and Tim Koeneman of ADF&G. Chuck Jensen and Sig Jaeger are representing the Advisory Panel. Jerry Reeves, Jim Olson, and Murray Hayes are representing NMFS. The plan is expected to be in effect January 1, 1978.

King Crab: The lead role for the development of the king crab plan has been assigned to ADF&G. The team is composed of ADF&G employees Al Kimker, Allen Davis, Tim Koeneman, Larry Edfelt, Guy Thornberg, Don Collinsworth, Jack Lechner, and Guy Powell. Final plans submitted by the team probably will not differ from the preliminary plan. That plan did not allow a foreign catch. The plan is expected to be completed and implemented by spring of 1978.

High Seas Salmon: NMFS has been assigned to lead the development of the management plan for high seas salmon. Bud Burgner of the University of Washington Fisheries Research Institute; Mike Fredin of NMFS; Steve Pennoyer, Ron Regnart and James Parker of ADF&G are members of the team. Advisory Panel members Truman Emberg, Paul Guy and A.W. Boddy consult with the team. The plan will form Council policy for the renegotiation of the INPFC.

Gulf of Alaska Trawl Fishery: NMFS has been designated as lead agency for the development of this plan. The team is composed of Miles Alton of NMFS, Burt Larkin and Richard Bakkala of NMFS and the Northwest and Alaska Fisheries Center; Robert Stokes of the University of Washington; Ron Regnart, Phil Rigby, and Warren D. Blankenbeckler of ADF&G; and Steve Hoag of the International Pacific Halibut Commission. Bob Alverson and Oral Burch from the Advisory Panel consult with the team. This plan should be implemented by mid-January of 1978.

Bering Sea and Aleutian Island Trawl Fishery: The lead agency for the development of this plan is also NMFS. The same team and Advisory Panel representatives are working to develop this plan. Implementation of the plan is expected to succeed the Gulf of Alaska Trawl Fishery plan.

Management Plans and Public Hearings

by NPFMC Staff

Some clarification seems to be in order on the difference between a preliminary management plan and a management plan – the plans used to regulate fishing activity within the U.S. fishery conservation zone.

Preliminary management plans (PMP's) were developed by NMFS and promulgated by the Secretary of Commerce, and are the current guidelines used to regulate foreign fishing activity within the 200-mile fishery conservation zone. The plans estimate the U.S. catch capacity and establish total allowable levels of foreign catches by species and area. Under the PMP's the state maintains management authority over U.S. fishermen as in the past.

When regional council management plans become law, they replace the PMP's. The council-developed plans will regulate both U.S. and foreign fishing activity outside the state three-mile jurisdiction.

The two accompanying charts show (1) the time sequence and steps involved in implementing a management plan, and (2) foreign fishing allocation off Alaska by country, the total foreign allocation, estimated U.S. capacity, and total allowable catch for fish caught off Alaska as set by the PMP's for 1977 (page 7).

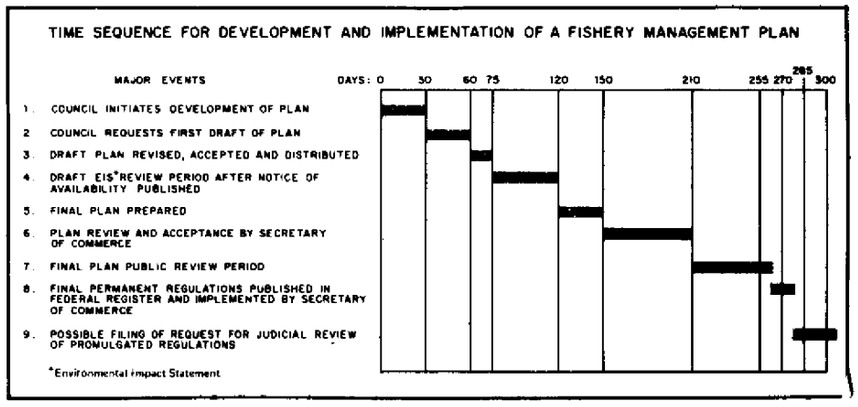
The Fishery Conservation and Management Act requires that each regional council hold public hearings as a part of management plan development (Number 4 in the time sequence chart below). The Act states that each council shall "...conduct public hearings, at appropriate times and in appropriate locations in the geographical area concerned, so as to allow all interested persons an opportunity to be heard in the development of fishery management plans and amendments to such plans, and with respect to the administration and implementation of the provisions of the Act..."

After public hearings, the plans are revised if necessary, submitted for review to the Council, and then submitted to the Secretary of Commerce for a 60-day review period.

The North Pacific Council to date is on schedule in the development of its priority management plans – tanner crab, the trawl fishery for the Gulf of Alaska, and ocean salmon troll plan. Public hearings on these plans are tentatively scheduled for August 1-25. These dates will be made final at the June Council meeting. Tentative locations for the hearings are Anchorage, Cordova, Dutch Harbor, Kodiak, Petersburg, Sandpoint, Sitka, and Seattle.

Hearings on the ocean salmon troll plan are tentatively scheduled for late October in the following communities: Ketchikan, Sitka, Juneau, Pelican/Craig, and Petersburg.

Copies of the plans to be reviewed and notices of actual dates and locations will be mailed in July to all interested agencies and individuals. Both written and oral testimony will be solicited prior to the final revision of the plans and submission to the Secretary of Commerce.



FOREIGN FISHING ALLOCATION OFF ALASKA BY COUNTRY

(1,000's metric tons)

1977

SPECIES/AREA	JAPAN	USSR	ROK	TAIWAN	POLAND	TOTAL ASSIGNED	UNASSIGNED	TOTAL FOREIGN ALLOCATION	U.S. CAPACITY	TAC
POLLOCK:										
Bering Sea/Aleutians	792.3	112.7	40.0	5.0	0	950.0	0	950.0	0	950.0
Gulf of Alaska	44.1	63.1	35.8	0	6.0	149.0	0	149.0	1.0	150.0
SABLEFISH:										
Bering Sea	3.6*	0.6†	0.4*	0.2†	0	4.8	0.2	5.0	0	5.0
Aleutians	2.0*	0.2+	0.2*	0	0	2.4	0	2.4	0	2.4
Gulf-Southeast**	3.75	0	0	0	0	3.75**	0	3.75**	2.2	
Gulf-Central & Western**	10.15	0	1.6	0	0	11.75**	0	11.75**	0.3	22.0††
PACIFIC COD:										
Bering Sea/Aleutians	38.1	17.2	0	0	0	55.3	2.7	58.0	0	58.0
Gulf of Alaska	1.6	0.6	0	0	0.1	2.3	0	2.3	4.0	6.3
YELLOWFIN SOLE:										
Bering Sea/Aleutians	62.1	40.8	0	0	0	102.9	3.1	106.0	0	106.0
OTHER FLOUNDERS:										
Bering Sea/Aleutians	61.5	40.4	0	0	0	101.9	3.1	105.0	0	105.0
FLOUNDERS:										
Gulf of Alaska	18.7	1.8	0	0	0	20.5	0	20.5	3.0	23.5
HERRING:										
Bering Sea/Aleutians	5.8	13.6	0	0	0	19.4	0.6	20.0	1.0	21.0
PACIFIC OCEAN PERCH:										
Bering Sea	2.8	3.5	0	0	0	6.3	0.2	6.5	0	6.5
Aleutians	6.5	8.1	0	0	0	14.6	0.4	15.0	0	15.0
Gulf of Alaska	19.8	8.7	0.5	0	0	29.0	0	29.0	1.0	30.0
OTHER ROCKFISH:										
Gulf of Alaska	2.7	1.2	0.1	0	0	4.0	0	4.0	1.0	5.0
SQUID:										
Bering Sea/Aleutians	10.0	0	0	0	0	10.0	0	10.0	0	10.0
ATKA MACKEREL:										
Gulf of Alaska	0	21.0	0	0	1.0	22.0	0	22.0	0	22.0
OTHER GROUNDFISH:										
Bering Sea	40.4	17.4	1.6	0.2	0	59.6	0	59.6	0	59.6
Aleutians	23.1	9.9	0.89	0.11	0	34.0	0	34.0	0	34.0
Gulf of Alaska	4.2	11.8	0.1	0	0.1	16.2	0	16.2	0	16.2
TANNER CRAB:										
Bering Sea	12.5	0	0	0	0	12.5	0	12.5	22.7	35.2
SNAILS:										
Bering Sea/Aleutians	2.7	0	0	0	0	2.7	0.3	3.0	0	3.0
TOTALS:										
Bering Sea/Aleutians	1,063.4	264.4	43.09	5.51	0	1,376.4	10.6	1,387.0	23.7	1,410.7
Gulf of Alaska	105.0	108.2	38.1	0	7.2	258.5	0	258.5	12.5	275.0
Grand Total	1,168.4	372.6	81.19	5.51	7.2	1,634.9	10.6	1,645.5**	36.2	1,685.7††

* Includes incidental trawal catch

† Incidental catch only

** Does not include 4,000 metric ton allowable incidental trawl sablefish catch in Gulf of Alaska

†† Includes 4,000 metric ton allowable incidental trawl sablefish catch in Gulf of Alaska

Prepared by NMFS, Alaska Region, March 3, 1977

NPFMC

In its Tenth Plenary Session, September 22-24, the North Pacific Fishery Management Council met concurrently with its Scientific and Statistical Committee (SSC) and Advisory Panel (AP). In addition the SSC and AP met prior to the regular Council meeting. On September 22 the meeting included a public hearing. A closed session was held on September 23. In summary, highlights of the meeting were:

The Council approved the Tanner Crab Management Plan for the fishery off Alaska with the following specifications:

- Size limits for *Chionoecetes bairdi* were set at 5.5 inches (140mm) for the Bering Sea and the remainder of Alaska except for Prince William Sound, where a size limit of 5.3 inches (135mm) will continue. The Bering Sea area south of 58 degrees North latitude, and east of 164 degrees West longitude was closed to foreign crab fishing.
- The domestic annual harvest for the Bering Sea south of 58 degrees N and 164 degrees W will not exceed the allowable biological catch currently estimated at 78 million pounds.
- The present state regulations setting Cook Inlet and Prince William Sound as exclusive registration areas, and setting pot limits now in effect in southeastern Alaska areas were recommended for adoption as federal regulations.
- Recommended a foreign allowable catch (FAC) north of 58 degrees N latitude of 15,000 metric tons (33 million pounds).
- Specified procedures so the Regional Director of the National Marine Fisheries Service can open seasons based on specific parameters.

The Council approved the Gulf of Alaska Groundfish Fishery Plan with these specifications:

- A management regime was selected which allows protection of the halibut resource and rebuilding of stocks.
- The domestic groundfishery is encouraged to develop as rapidly as possible consistent with halibut protection.
- A method of monitoring the domestic groundifsh fishery has been developed whereby observers will determine if halibut comprise more than one percent of the catch in a month in any given statistical area. Should the catch of halibut exceed one percent in any area, that area will be closed to fishing.
- The question of trawl mesh size was deferred for one year.
- Joint venture activity was disapproved until July 1, 1978, at which time there will be a reevaluation of joint venture proposals and the state of development of the domestic groundfish fishery effort.
- Optimum yield (OY) for blackcod was set at 10,000 metric tons.
- The area east of 141 degrees W longitude was closed to foreign long lining.
- Foreign longlining will be allowed west of 157 degrees W inshore of the 500 meter isobath for true cod.
- Groundfish catches are to be apportioned by statistical areas in the Gulf of Alaska for both the U.S. and foreign fisheries.

The Council recommended that a 30 percent reserve of the OY be withheld for all species; the reserve to be reapportioned in mid year.

The Council directed that there be no foreign trawling in three sanctuary areas off the coast of Southeastern Alaska.

A report of the Halibut Working Group was accepted as an official Council document. A committee of five members was named to develop an official Council position on halibut.

The Council formally received the Draft Fishery Management Plan for the Commercial Troll Fisheries off the Coast of Alaska and ordered it forwarded for public comment and review. A series of public hearings is tentatively scheduled in December for Ketchikan, Sitka and Juneau, with the possibility of an additional hearing in Petersburg.

The Council heard a report on clam fishing in the Bering Sea and determined a controlled fishery is feasible. A production fishery based on previous experimental work may develop in 1978.

The Council's staff was directed to review foreign applications for permits to fish in the Fisheries Conservation Zone per guidelines to be developed by a Council sub-committee.

The Council approved the appointments of Don Rawlinson and John Jacobson as new members of the AP. A letter was directed to Hank Eaton and James Brooks commending them for service on the Council.

Harold Lokken (Seattle) was elected chairman for the coming year effective October 6. Clem Tillion (Alaska) was elected vice chairman.

The next meeting of the Council will be a combined November-December meeting to be held December 1-2 in the State Court Bldg., 3rd and K Streets, Anchorage.

June 1977

NPFMC Management Terms Spelled Out

By Craig Wiese
Marine Advisory Program
University of Alaska
Cordova, Alaska

Maximum Sustainable Yield (MSY), Equilibrium Yield (EQY), Acceptable Biological Catch (ABC), Optimum Yield (OY), Domestic Annual Harvest (DAH).

If you have tried to keep up with the management of any of Alaska's commercial fisheries, chances are you've run into some of these terms and probably several others. If you're not a fisheries biologist or involved in fisheries management, there is also a good chance that you're part of the crowd that is still a little foggy on what some of this vocabulary means.

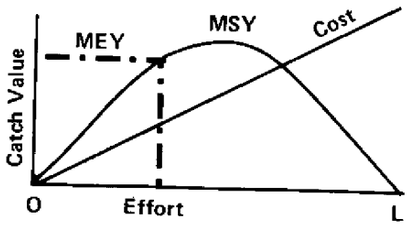
Fortunately, the North Pacific Fishery Management Council has included definitions of these terms in its fisheries management plans. To help clear up the confusion for the many Alaskans who do not have a management plan to fall back on, the definitions are listed below. In some cases the definitions are further explained. There are also terms included which are not listed in the management plans.

MANAGEMENT PLAN TERMS

Maximum Sustainable Yield (MSY) is an average, over a reasonable length of time, of the largest catch which can be taken continuously from a stock under current environmental conditions. It should normally be presented with a range of values around its point estimate.

When a population of fish is harvested beyond the MSY, the remaining fish cannot produce enough offspring to bring the size of the population back up to the MSY level, given the same future fishing pressure and environmental conditions.

Maximum Economic Yield (MEY) occurs where the difference between the value of the catch and the cost of fishing is at a maximum — where profit margin is greatest. It takes place at a lower fishing effort and consequently larger fish population than does the MSY. In other words, there are more fish for fewer fishermen.



Equilibrium Yield (EY) is the annual or seasonal harvest which maintains the resource at approximately the same level of abundance (apart from the effects of environmental variation) in succeeding seasons or years. It is different from MSY in that the sustained level of abundance does not have to be the maximum sustained level.

Acceptable Biological Catch (ABC) is a seasonally determined catch that may differ from MSY for biological reasons. It may be lower or higher than MSY in some years for species with fluctuating recruitment. It may be set lower than MSY in order to rebuild overfished stocks.

Optimum Yield (OY) may be obtained by a plus or minus deviation from ABC for purposes of promoting economic, social or ecological objectives as established by law and public participation processes.

Optimum yield is further defined in the Fishery Conservation Management Act of 1976 (the 200-mile limit legislation) as the yield which (a) will provide the greatest overall benefit to the nation, with particular reference to food production and recreational fisheries; and (b) is based upon the maximum sustainable yield for a given fishery, modified by relevant economic, social, or biological factors.

Because the domestic and foreign catch allocations come directly from the estimate of OY, and because the OY level is in part determined on a judgmental basis, it deserves a few more words of explanation.

Picking an optimum yield that simultaneously promotes economic, social, and ecological objectives conjures up a myriad of conflicts. The definition of OY prescribes that the benefits of the fishery resources be allocated among all of the people affected by the fishery. These include commercial fishermen, processors, foreign fishermen, sports fishermen, distributors, consumers, governments and a host of manufacturing and service industries. These groups usually have different, and often conflicting ideas about the best use of the resources.

Optimum yield then involves judgmental trade-offs that must be made by fisheries councils based upon the best information they can obtain. It is obvious then, that those groups that stand to gain or lose most by the outcome of an OY decision must make their positions perfectly clear to the councils or submit to getting lost in the shuffle.

Examples of optimum yield type decisions are given below to help illustrate the concept.

a. The OY for tanner crabs was set well below the MSY or ABC. The two principal reasons for this action related to economics of the tanner crab industry. Although *Chionoecetes bairdi* (the larger of Alaska's commercial tanner crab species) is found all over the Bering Sea, there are only a few areas where their density permits an economical harvest for American boats. The MSY for these areas is less than the MSY for the entire Bering Sea. The foreign fleet can fish economically at a lower catch per unit effort (CPUE) than the American fleet.

However, they were virtually eliminated from the *C. bairdi* fishery, and allowed to take only a small percentage of the MSY for the desirable *C. opilio* (Alaska's smaller sized tanner crab). This move protects U.S. domestic and export tanner markets and boosts investment in the U.S. tanner crab industry.

b. Pacific ocean perch stocks are severely depressed. In order to build the stocks up to a maximum sustained yield (MSY) the catch must be held below the current EY. (Recall that the equilibrium

yield will maintain the stocks at the same level.)

As a compromise between eliminating the fishery entirely (domestic fishing economics and foreign fishing politics involved) and maintaining the EY (no growth in the stocks), the OY was set midway between the two extremes.

c. Halibut and several species of flounders have overlapping distributions. As most people in the fishing industry are aware, halibut stocks are in a depressed state. Flounder stocks by comparison are in good shape. However, market prices for halibut are approximately ten times greater than flounder prices. Since halibut are economically a much more important species than flounder, the OY for flounder was cut below the ABC in order to reduce incidental catches of halibut. This, however, still left room for growth in the slowly developing flounder fishery.

d. In California there has been a conflict brewing for many years over the allocation of northern anchovy stocks. California sports fishermen, party boat owners, and baitfish fishermen prize the smaller sized anchovy as prime bait for sportfishing. The commercial reduction industry wishes to gain a larger share of the stocks than they are presently allocated. They operate under strict quota limitations which are felt to be unnecessarily low.

Complicating factors are: the greater numbers and louder voices of the sportfishing interests, although their requirements are low compared to the size of the stock; the memories of dramatic growth in the sardine reduction fishery during the 1930s and 1940s, and the subsequent crash of sardine stocks (which may or may not have been entirely due to the reduction fishery); and the size of the anchovy population compared to the combined harvest for both sport and reduction purposes.

If the Pacific Management Council has not yet had to tackle the anchovy question, it is one that they can anticipate will be controversial and require the judgemental trade-offs that characterize most management council decisions.

Domestic Annual Fishing Capacity (DAC) is the total potential physical capacity of the fleets modified by logistic factors. The components of the concept are:

a. An inventory of total potential physical capacity defined in terms of appropriate vessel and gear characteristics (for example, size, horsepower, hold capacity, gear design, etc.).

b. Logistic factors determining total annual fishing capacity (for example, variations in vessel and gear performance, trip length between fishing locations and landing points, weather constraints, etc.).

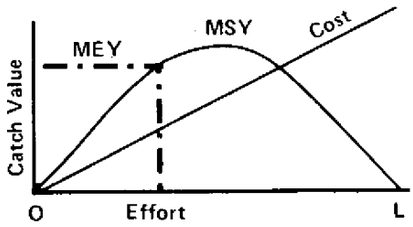
Expected Domestic Annual Fishing Harvest (DAH) is the domestic annual fishing capacity modified by other factors which will determine estimates of what the fleets will harvest (for example, how fishermen will respond to price changes in the subject species and other species). The DAH cannot exceed the optimum yield.

Foreign Allowable Catch (FAC) is determined by deducting the domestic annual expected harvest from the optimum yield (OY – DAH + FAC).

April 1978

Letter to The Editor

There is an error in Mr. Wiese's article on explanation of fishery terms in the April issue of *Alaska Seas and Coasts*. The definition of Maximum Economic Yield is correct. Maximum Economic Yield occurs where the difference between the value of the catch and the cost of fishing is at a maximum. It is also true that "It (MEY) takes place at a lower fishing effort and consequently larger fish population than does the MSY." But that statement is somewhat irrelevant because it does not mean ". . . more fish for fewer fishermen." There are fewer fish taken in the catch at MEY than at MSY.



From "N.P.F.M.C. Management Terms Spelled Out," by Craig Wiese in the April 1978 issue of **Alaska Seas and Coasts.**

As correctly shown on the graph, the cost has been reduced even more than the number of fish, so that net income is increased. It is important to point out that we are talking about effort and a reduction in effort may or may not mean fewer fishermen. It could mean that the total profits to a fishery are greater if we reduce the effort and the costs through means other than reducing directly the number of fishermen.

Donald E. Bevan
Associate Dean
College of Fisheries
University of Washington

June 1978

Bottomfish Development

Regional Committees Being Formed

On December 3, 1977, the National Marine Fisheries Service advised the fishing industry that approximately $2.5 million is available from the Saltonstall-Kennedy fund to assist in the development of Alaskan bottomfish fisheries. At that meeting three regional committees were set up to draft proposals for ways to use those funds statewide.

Convening in Anchorage on January 24, these committees compiled their recommendations into a single proposal for bottomfish development statewide. From the varied interests represented came recommendations for both high seas trawling operations and nearshore, small boat fisheries for bottomfish.

Following the example set in other regions of the U.S., the committees recommended that a statewide nonprofit corporation be set up to administer the funds. That company, Alaska Fisheries Development Corporation, will also seek money from other sources to sponsor fisheries development projects around the state.

In order to best represent the broad interests of the fishing industry, it was decided that the nonprofit corporation should be run by a board of directors drawn from both fishermen and processors. The members of that board will be selected from the membership of five regional advisory committees to be appointed in the near future. The regions represented by those committees are: Chignik and areas to the west, including the Bering Sea; Kodiak and surrounding areas; Cook Inlet and Prince William Sound; ports from Yakutat south through Sitka; and ports from Petersburg southward.

In the interim before formal establishment of the corporation, a short term incorporating board has been set up. That board is seeking nominees for the regional committees.

If you are interested in serving on the regional advisory committees, or if you have suggestions for appointees, please submit your nominations to the head of the incorporating board, Sara Hemphill, at 5341 Ballard Avenue N.W., Seattle, WA 98107. In submitting your nominees, remember that the board of directors for the Alaska Fisheries Development Corporation will be drawn from the membership of the regional advisory committees.

Feb. 1978

Bottomfish Development Needs

Reprinted here is a section from the address given by Jim Edenso, Bottomfish Coordinator in the Office of the Governor, at the opening of the 29th Alaska Science Conference, August 15, 1978. The entire paper, "Alaska and Its Future in Fisheries," will be published in the forthcoming proceedings of the conference.

By Jim Edenso
Bottomfish Coordinator
Office of the Governor

The passage of the Fishery Conservation and Management Act of 1976 encourages the adoption of the assumption that the potential for a healthy, viable fishing industry exists in Alaska and for Alaskan residents.

The state has been adopting policies and programs which are designed to increase the overall fishing effort by Alaska fishermen. Programs which provide loan capital to fishermen for the purchase of vessels, gear and equipment, and permits have been expanded to increase the amount of money per loan. This loan program will help the fishermen purchase larger vessels. The Commercial Fishing Loan Program, the Commercial Fishing and Agriculture Development Bank, and the Alaska Renewable Resource Development Fund are examples of programs designed to increase the fishing effort.

Correspondingly, the state is taking steps to assist the coastal communities in responding to the impacts created by the increased fishing effort. Coastal communities are at a disadvantage because they are usually small and lack funds and personnel to adequately respond to the impact resulting from the increased fishing effort. It is imperative that we begin to plan to assist the communities in responding to the accelerated fishing effort.

If the state adopts policies and programs designed to increase the total fishing effort, it should go one step further and adopt policies and programs designed to assist the impacted communities in responding to the effects of those policies.

For example, existing harbor facilities were designed for fewer and, generally, smaller vessels. State programs are now encouraging more and larger vessels. Serious community and port industrial development planning has to be undertaken jointly by the state, local government and industry representatives. Comprehensive plans should include harbor development, transportation, communication, utilities, state land policies, local government land policies, etc.

It is only with this kind of program that Alaska will insure the development of a healthy and permanent bottomfish industry. Planning efforts have already been initiated in these areas.

Presently, the State of Alaska's shore-based bottomfish landing and processing facilities are in an embryonic stage of development for maximum participation of the domestic groundfish resource. It is necessary to examine the components needed for efficient and competitive industrial participation.

Historically, the Alaskan fisheries industry has relied on a seasonal, local, and transient labor force based in communities that have barely provided the amenities of life. Such conditions as bunkhouse living, poor or marginal working conditions, and lack of recreational outlets are a few of the common problems of this labor force. These conditions are not consistent with an efficient groundfish industry and the development of a non-seasonal effort.

Adequate housing for single and family groups, school and health care facilities, dependable transportation, abundant water supply, proper waste disposal systems, reasonably priced and reliable utility services, port and harbor facilities and recreational facilities are only a few of the components needed in many of the coastal communities that have locations with a potential for entry into the bottomfish industry.

The planning and development required to bring these communities to a standard that allows for efficient industrial operations must be accomplished with sound policies and programs developed jointly by state and local government and private industry involvement.

Historically, Alaska has depended on what is commonly known as the "goldrush" approach to industrial growth. This has precipitated immediate adverse impact and little local long-range stability and benefits.

If we look to growth models developed by the countries of Norway and Denmark for their fisheries resources, we see communities that have grown and prospered within the framework of local geography, a permanent labor force, and a rich community infrastructure developed primarily with regard to community priorities and community values. Alaska coastal communities are similarly unique and demand consideration of their special values if a healthier growth and minimal impact are to be a priority of the state. The importance of a permanent long-term growth of the industry cannot be overemphasized. It is only with this kind of development planning that Alaska's fishing industry will grow and prosper.

Oct. 1978

Egan Proposes Limited Entry Bill

Protection of Alaska's salmon fishery and the relief of economic distress among the state's professional fishermen are the administration's top priorities in the current legislative session, Gov. William A. Egan told the Eighth Alaska Legislature in his Affairs of State address Jan. 10 in Juneau.

The governor introduced a bill to limit entry into Alaska's salmon fishery, and said he would seek support for a "bold scientific venture" to create expertise in managing proposed landlocked Bristol Bay fisheries.

Alaskans last year approved a state constitutional amendment allowing the state to limit entry to the fishery for conservation purposes and to protect the economic welfare of fishermen.

In a transmittal letter accompanying his limited entry bill, the governor said that his proposal is aimed primarily at eliminating part-time fishermen from the salmon fisheries in order to establish a level of fishing pressure that allows improved management and the development of a professional fishery. The letter contains figures indicating that the total number of commercial licenses used in the state's salmon fishery grew from 15,697 in 1961 to 20,564 in 1971. Of the 1971 total, 14,276 licenses were issued to Alaska residents, and the remainder (approximately 30 percent), to nonresidents. The governor's program would hit hardest those who are least dependent on commercial fishing, those with the shortest history in the harvest and fishermen who have failed to file state income tax returns.

And, Egan says, the alternative to his limited entry proposal—continuation of the traditional free access of Alaska's salmon fishing grounds—would result in "the economic destitution of a much larger number of fishermen."

Egan's plan calls for establishment of a three-man Alaska Commercial Fisheries Entry Commission composed of a commercial fisherman, a fisheries management specialist and an attorney. Commissioners would be given broad powers to limit entry to the salmon fishery on the basis of protection of stocks and the economic well-being of the fishing community.

The commission would establish administrative areas, determine the maximum amount of gear permissible in each unit and issue entry permits for specific types of gear in each unit. The commission would be required to balance the following four factors: (1) the amount of gear necessary to fully harvest the allowable catch; (2) the amount of income that would result in an average level of income to fishermen adequate to sustain a professional fishery; (3) the amount of gear manageable without risk of impairing sustained yield, and (4) the number of gear units "commensurate with the traditions and history of the particular fishery."

Entry permits, which would cost $50 each, would be issued under a priority system, with each potential fisherman evaluated on his degree of economic dependence on the fishery, the extent of his past participation and his ability and intent to continue fishing.

Entry permits could not be used by anyone other than their owners, but they could be transferred to qualified fishermen. In addition, the bill does not require permit holders to work every year, but specifies that permits lapse back into state control after failure to fish for five consecutive years.

In his transmittal letter, Egan said his limited entry program would meet constitutional constraints against complete closure of a fishery to all but those in a certain class and against discrimination excluding nonresidents. Controlled sale and transfer of entry permits, he said, would make new entry possible, while economic and historic standards for permit awards would disqualify many nonresident fishermen.

Egan said that four alternative limited entry proposals, including a freeze on the number of licenses issued with attrition slowly diminishing fishermen's numbers; sliding gear scales; a distressed fishery plan, and preference for state residents, would not meet legal or management requirements.

Commenting on Egan's limited entry proposal, Philip Daniel, secretary-treasurer of United Fishermen of Alaska, gave it the following plus marks: "The bill appears sound legally, since the commission would stand in relationship to the fisherman just as a liquor control board stands in relation to the holder of a liquor license. The commission would be given plenty of authority to reduce and limit the number of fishermen involved in the salmon harvest. Under the bill, very large numbers of fishermen could be excluded from the fishery."

Unfavorable aspects of the governor's proposal, according to Daniel, are: "The bill is too broad in scope. No individual fisherman can look at the bill and tell how he will be affected. This is simply left up to the commission. By analogy, this is like turning the Bill of Rights over to three men and hoping they are rational. The bill is too drastic," Daniel added. "In order to be politically acceptable, the bill will probably not be able to cut out nearly as many units of gear as are indicated. It should be made very clear that additional approaches to limited entry will be considered," he said.

Following a Special Senate Fisheries Committee hearing on the proposed limited entry plan Jan. 24 in Juneau, committee chairman Sen. W. I. (Bob) Palmer of Ninilchik said that the bill must be made to compensate commercial fishermen ousted from the salmon harvest. Palmer remarked that in his opinion it would be an injustice to tell a fisherman who might have a substantial investment in the industry that he can no longer fish without providing him with some form of compensation. **Feb. 1973**

Alaska's Limited Entry Law

A Summary: What It Means to You

Alaska's commercial fisheries——a story in recent years of too many fishermen, too much gear and not enough fish. Salmon stocks have dropped to one-half of their historic levels. Gear licenses have increased 78 percent during the past 13 years, while fishing vessels have increased 58 percent. In Bristol Bay each fisherman's traditional 150 fathoms of gillnet was cut to 25 fathoms this year. In Cook Inlet the 135-hour fishing week of a few years ago has been reduced to 24 hours each week.

These factors have combined to reduce the profitability of fishing to marginal levels for professional fishermen who depend upon fishing for a major share of their livelihood; make sound biological management of certain fisheries extremely difficult, if not impossible, and jeopardize the very existence of certain fish stocks. These problems pervade commercial fisheries from Oregon to Texas to Florida to Maine. Alaska has taken the lead in attempting to implement a program to control the problem of over-participation in its commercial fishing industry.

Last fall Alaska's voters approved, by a four to one margin, a constitutional amendment enabling Gov. William A. Egan and the state legislature to enact the most significant and far-reaching fisheries legislation ever attempted by the state——LIMITED ENTRY. The basic objective of the legislature, the Governor and his task force on limited entry was to develop a program that would stop gear expansion; allow for new entry, avoid paralyzing the normal, necessary transitions between gear types and between areas; pass the tests of the courts, and place as small a hardship as possible on all fishermen. Finally, it had to be politically acceptable.

The limited entry bill originally submitted to the legislature by the governor was limited to the state's commercial salmon fisheries. The legislature, recognizing the symptoms of over-participation and excess gear in other fisheries, chose to expand the scope of the governor's original bill to encompass all of the state's commercial fisheries.

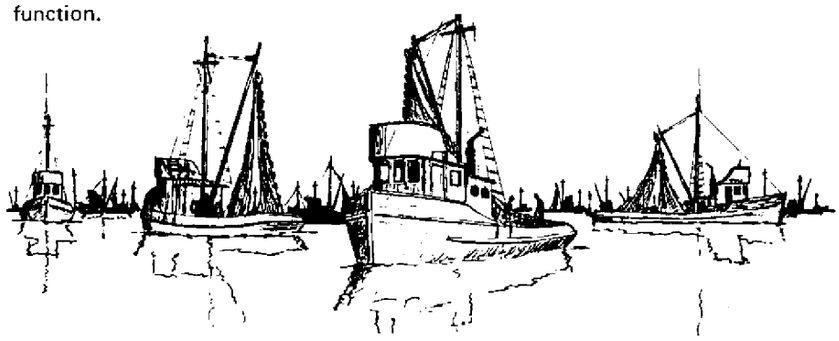
The majority of Alaska's commercial fishermen appear to favor some form of limited entry legislation; the governor has indicated that without the support of the United Fishermen of Alaska, a fisheries organization composed of 19 member groups, and other independent fisheries organizations and individuals, the bill probably wouldn't have passed this year. However, there are indications that the new law has not met with the full approval of all members of the commercial fishing industry. The constitutionality of the bill will probably be challenged in the courts.

Following are detailed descriptions of the several major components of the legislation providing for regulation of entry into Alaska's commercial fisheries and an explanation of how the law will function.

Entry Commission

The bill establishes an Alaska Commercial Fisheries Entry Commission with three members to be appointed by the governor and confirmed by the legislature. The commission members will possess a "broad range of professional expertise" but none shall have any direct or indirect interest in the commercial fishing, fish processing or fish marketing industries. Their primary function will be to regulate entry into all commercial fisheries of the state by issuing interim-use permits or entry permits to qualified individuals.

To fairly, effectively and efficiently regulate entry and control participation in the state's commercial fisheries, the commission is charged with the following responsibilities and duties: (1) Establish priorities based on which fisheries are in most urgent need of application of the limited entry provisions; (2) establish administrative fishing areas for regulating and controlling entry; (3) establish for all types of gear the maximum number of entry permits for each area and then an optimum number of entry permits for each area; (4) designate species for which separate permits will be issued; (5) establish qualifications for entry permits; (6) administer the buy-back program; (7) provide for transfer and reissuance of entry permits, and (8) administer the collection of annual fees.



Limited Entry Law

Permits

The limited entry legislation stipulates two distinct types of permits——**interim-use** and **entry** permits. After **Jan. 1, 1974,** no person will be allowed to operate gear in an Alaskan commercial fishery without a valid interim-use or entry permit. **A permit is not required of a crewman** as long as the holder of the permit for that particular gear is present, and actively engaged in the operation of the gear at all times.

A person may hold more than one interim-use or entry permit only to fish more than one type of gear; fish in more than one administrative area, and harvest particular species for which separate permits are issued.

Before the commission establishes the maximum number of entry permits for each fishery and prior to the issuance of entry permits, it will issue interim-use permits to **all** applicants who can establish their present "ability to actively participate" in the fishery for which they are applying, **except for drift gillnet fisheries in the Bristol Bay, Cook Inlet and Prince William Sound registration areas.** These three fisheries were considered to be in the most severe need of immediate assistance in stabilizing the amount of gear currently fished, because the units of gear far exceed the estimated optimum number needed to adequately harvest the resource.

In these three fisheries, therefore, an interim-use permit will be issued for 1974 only to an applicant who has fished commercially in that area while holding a gear license prior to Jan. 1, 1973.

The phrase, "ability to actively participate," is defined in the law as "the person applying for the permit being physically able to harvest fish in the fishery and has reasonable access to commercial fishing gear of the type utilized in that fishery."

An interim-use permit will expire when the commission makes the final determination of the holder's eligibility for an entry permit, which will take place only after it has established the maximum number of entry permits for that fishery. An interim-use permit does not confer any special claim to a permanent entry permit nor does it amount to a "grandfather" right to participate in that fishery. The commission will adopt regulations specifying the dates and places of application and renewal for interim-use permits.

Eligibility for Permits

When the maximum number of entry permits for a particular fishery has been determined, the commission will decide who will be granted an entry permit on the basis of these two standards, each of which will be weighed equally:

1. An applicant's **degree of economic dependence on the fishery.** This is defined as "including, but not limited to, percentage of income derived from the fishery, reliance on alternative occupations, availability of alternative occupations and investment in vessels and gear."
2. The extent of an applicant's **past participation in the fishery.** This is defined as "including, but not limited to, the number of years participation in the fishery and consistency of participation during each year."

After ranking all applicants for entry permits into priority classifications (high priority, low priority, etc.) based on the above criteria, the commission will then divide the priority classifications into these two groups: Those applicants who would suffer **significant economic hardship** by exclusion from the fishery; and those applicants who would suffer only **minor economic hardship** by exclusion from the fishery.

Maximum Number of Permits

To understand how the commission will determine the maximum number of entry permits for each fishery, a closer inspection of the status of the Alaskan commercial fisheries is necessary.

In certain commercial fisheries, the units of gear currently being fished exceed the estimated optimum units of gear necessary to adequately harvest the resource. These include many of the state's salmon fisheries, including the Bristol Bay, Cook Inlet and Prince William Sound drift gillnet fisheries mentioned earlier. In contrast, there are certain fisheries in which the number of units of gear currently being fished is less than the estimated optimum; for example, the drag fishery for bottomfish.

Distressed Fisheries: The limited entry legislation states that the commission will designate as distressed fisheries those in which the estimated **optimum** number of entry permits will be less than the highest number of units of gear fished during any one of the four years immediately preceding Jan. 1, 1973. The maximum number of entry permits which will be issued for any distressed fishery **will be the highest number of units of gear fished in that fishery during any one of the four years immediately preceding January 1, 1973.**

Other Fisheries: In any fishery which is not designated as distressed by the commission, the maximum number of entry permits **will be set at the time the amount of gear in that fishery reaches a level the commission estimates to be optimum.**

Issuance of Permits

In the process of setting priorities for which fisheries should be dealt with first in limiting entry, the commission will undoubtedly select the fisheries which are the most overcrowded.

For those fisheries which can stand no further increase in gear and for which the commission establishes, prior to January 1, 1975, the maximum number of permits to be issued for that fishery, the commission will accept applications for entry permits only from applicants who have fished commercially with a gear license in that fishery prior to Jan. 1, 1973.

Other than the obviously overcrowded Bristol Bay, Cook Inlet and Prince William Sound drift gillnet fisheries, it is impossible to predetermine which other fisheries will be included in this category. However, it is reasonable to assume that any fishery which, prior to January 1, 1975, the commission designates as distressed will be included. This means that in the fisheries which the commission determines can stand no further increase in gear, holding a gear license and fishing for the first time during the 1973 season **will not count in any way** toward getting a permit to fish in future years. Only fishermen who have held gear licenses and fished in these fisheries prior to 1973 will be able to qualify for entry permits. Most of those who have fished seriously in the past should have no trouble qualifying.

Entry permits for a distressed fishery will be issued to all qualified applicants in descending order of priority classifications (for instance, those in high priority classifications will be the first to receive permits; those in low priority classifications will be the last), until the number of permits issued equals the highest number of units of gear fished in that fishery in any one of the four years preceding Jan. 1, 1973. However, no person who has a high priority classification, such as a fisherman who would suffer significant hardship by exclusion from the fishery, will be denied a permit.

After Jan. 1, 1975, whenever the commission establishes the maximum number of entry permits for a fishery during a given year, an applicant for an entry permit will be assigned to a priority classification based entirely upon his qualifications as of Jan. 1 of that year. For example, if the commission established the maximum number of entry permits in the drag fishery for bottomfish in a certain administrative area on June 1, **1980,** a fisherman applying for an entry permit for the fishery would be considered for a permit based on his experience in that fishery through 1979.

Terms and Conditions

Terms and conditions for entry permits are as follows: (1) Each entry permit authorizes the holder to operate a unit of gear within a specified administrative area; (2) the holder of an entry permit will have the permit in his possession while operating the gear for which it was issued; (3) each entry permit is issued for a term of one year and must be renewed annually. Failure to renew an entry permit for two years will result in the forfeiture of the permit to the commission, except as waived by the commission for good cause; (4) an entry permit constitutes a use privilege which may be revoked or modified by the legislature without compensation, and (5) an entry permit will survive the death of the holder.

Fees for Permits

The annual fee for an entry permit will range from $10 to $100, depending on the fishery. The fee will be greater for a fishery of high economic return, less for a fishery of low economic return. A permit holder with a net family income below Federal Social Security Administration guidelines, adjusted to reflect cost-of-living differentials, will pay a maximum annual fee of $5.

Transfer of Permits

All entry permit transfers must be administered through and approved by the commission. The holder of an entry permit may transfer his permit to another person or to the commission only after providing the commission with **six months notice** of intent to transfer. The entry permit holder may transfer his permit no sooner than six months nor later than 18 months from the date of the notice.

If the person to whom the permit is to be transferred can establish his present ability to actively participate in the fishery, the commission will approve the transfer and reissue the permit to that individual. An applicant who is eligible for an entry permit may choose to receive a permit subject to a five-year prohibition on any transfer (except for an emergency transfer).

If the number of outstanding entry permits for a fishery is greater than the optimum number as established by the commission, a person who received his permit when ranked in a low priority classification (such as one who would suffer only minor economic hardship if excluded from the fishery) can transfer his permit **only** back to the commission. If he desires to transfer his permit, the commission will pay him fair market value under provisions of the buy-back fund.

The commission will adopt regulations providing for temporary emergency transfer of a permit when sickness, injury or other unavoidable hardship prevents the permit holder from fishing.

Buy-Back Fund

As indicated previously, there are certain fisheries in the state for which the **maximum number** of permits issued initially by the commission will be greater than the amount which the commission considers to be the **optimum** for that fishery. When this situation occurs, the commission will establish and administer a buy-back fund for that fishery

for the purpose of reducing the number of entry permits to the optimum number over no longer than a 10-year period at a rate to be established by the commission.

Each buy-back fund will be financed through an annual assessment on all fishermen in the fishery for which the fund was established. This assessment will not be more than seven percent (7%) of the gross value of the total annual catch attributed to a holder's entry permit. A permit holder who made no commercial landings in a given year will be assessed the average assessed all other holders of the same type of permit in that year.

The commission will adopt regulations enabling it to purchase entry permits, vessels and gear when offered to the commission for sale. These will be purchased at fair market value using money accumulated in the buy-back fund for each fishery. The buy-back program for a fishery will terminate when the number of entry permits is reduced to the optimum and the buy-back fund has been reimbursed.

Optimum Number of Permits

The commission will establish the optimum number of entry permits for each fishery based upon a reasonable balance of the following general standards:

(1) The number of entry permits sufficient to maintain an economically healthy fishery that will result in a reasonable average rate of economic return to the fishermen, considering the time fished and necessary investments in vessels and gear;

(2) The number of entry permits necessary to harvest the allowable commercial take of the fishery resource during all years in an orderly and efficient manner, and consistent with sound fishery management techniques, and

(3) The number of entry permits sufficient to avoid serious economic hardship to those currently engaged in the fishery considering other economic opportunities reasonably available to them.

Some Common Misconceptions

1. Limited entry does not mean that all part-time fishermen will be excluded. In many important fishing areas of the state, nearly all fishermen must work at other jobs during the off-season. The law requires only that if some people must be denied entry permits, it will be those who have participated least and are least dependent for their livelihood upon a particular fishery.

2. Limited entry does not mean that all nonresidents of Alaska will be excluded. Past attempts at limiting entry by excluding nonresidents have failed in the courts. The United States Constitution simply will not permit discrimination against nonresidents.

3. Limited entry does not mean that all future entry into Alaska's fisheries will be closed. The entry of new fishermen into the commercial fishing ranks is absolutely essential. However, if limited entry is going to work for those fisheries which must have a limit on the total amount of gear fished, for every new fisherman entering the fishery, there must be another fisherman leaving it. This will happen when the new fisherman buys out someone presently in the fishery, and when entry permits are passed on from father to son. In addition, there will be no restrictions on the new developing fisheries in Alaska, which are presently underfished.

Summary

The limited entry program is basically a number of separate programs administered by the Alaska Commercial Fisheries Entry Commission. Each program will deal with commercial fishing for a specific fishery resource in a specific area of Alaska with a specific type of gear.

The new law allows the commission to limit entry into all of Alaska's commercial fisheries, including salmon, shellfish, bottomfish and fresh-water fish. However, the commission will have to set priorities on which of the fisheries are in the greatest need for limited entry. They will no doubt deal first with those fisheries which are most overcrowded.

The basic ground rules for limited entry are the same throughout the state, but the particular regulations for each fishery will take into account the great diversities among Alaska's many fisheries.

The goal of limited entry is a stable level of fishing effort in each of Alaska's fisheries, allowing for better management of each fishery and an improved livelihood for those who participate in it.

June 1973

Limited Entry.... In the Courts


Rena Arent

Debates are running hot and heavy across the State over Alaska's limited entry law for commercial fisheries. Under the two year old law entry permits are being issued to fishermen according to economic dependence on the fishery and past participation in the industry.

Whether limited entry will stay on the books is another question. A suit challenging its constitutionality was filed by eleven fishermen from Juneau, Hoonah, Cordova, and Seattle in late January. In early March Superior Court Judge Thomas Stewart denied a preliminary injunction which would have stopped limited entry until the constitutionality suit was settled, but commented that the fishermen "do indeed raise questions on the merits that are serious, substantial, difficult and fair ground for litigation." A final decision on the suit is expected sometime this summer.

Naughton Pushes Repeal

Meanwhile, in the legislature Representative Ed Naughton, D-Kodiak, filed a bill to repeal the limited entry law. As **Seas&Coasts** went to press Naughton's bill was in committee and it was unclear whether the motion would come to the floor. At the same time Representative Nels Anderson, Jr., D-Dillingham, chairman of the House Natural Resources Committee, was holding hearings in fishing communities throughout the State to determine whether he would introduce legislation which would place a one-year moratorium on limited entry. What Anderson's committee heard was a sharply divided range of opinions which seemed to be biased by geographical area.

The Committee's largest hearing (95-100 people) was held in Kodiak where testimony unanimously favored repeal of the present limited entry law. Fishermen at the Kodiak hearing felt that the law and its implementation by the present Limited Entry Commission was discriminatory and injust, eliminated the traditional flexibility of Kodiak fishermen, and basically was an incompetent replacement for the free enterprise system. By contrast, at the Committe's hearing in Homer (44-45 people) testimony was, with one exception, in favor of the present law. The consensus in Homer was that the constitutionality of the law should be decided in the courts before any amendments or a move to repeal the law introduced. In Cordova and Anchorage testimony was split right down the middle over the present law.

Fishermen are divided over whether the law will save Alaska's declining fishery resources or whether the law is as Kodiak fisherman Dave Herrnsteen suggests, "an impossible dream turned into a nightmare."

The United Fishermen of Alaska have supported limited entry from the beginning. Members of this statewide organization point to dwindling salmon runs (one-third of the former catch), the tremendous growth of the fleet (78% increase in the 12 years prior to passage of the limited entry law), and the reduction of fishing time (from a 137-hour week to two 12-hour periods per week in Cook Inlet) as strong arguments for limited entry. Members believe that the law offers a viable means for protecting salmon stocks and making the life of a full-time fisherman economically feasible. Although the UFA recognize the disadvantages imposed by limited entry, they believe it necessary and fear a massive influx of Washington boats in the wake of the Judge Boldt decision, should the law be taken off the books. (Last year Judge Boldt ruled that 14 "treaty" Indian tribes must be allowed to take 50 percent of the harvestable salmon returning to State waters in the Puget Sound area.) As UFA president Phil Daniel states, "the greatest disservice we could do to the fishery and to the young people is to let it go down the tubes."

Opponents of limited entry feel the law might send fishermen down the tubes. Robert Emerson, spokesman for Limited Entry Opposition (LEO, the group of fishermen who filed suit against the law) explains that "fishermen want their freedom. The most dangerous thing about limited entry is that it attempts to solve the problem by limiting individual freedom."

The major criticisms of the present law are 1) the discriminatory nature of the point system, 2) the free transferability of permits, and 3) the lack of flexibility for fishermen under the system. Many fishermen agree that the concept of limiting entry to protect the resource is a good one, but feel that the present law will only cut down the number of fishermen and not the gear or harvest levels. Many believe that the free enterprise system, particularly without present governmental tax breaks and the capital construction fund, is the most effective way to protect the fishery resources and the fisherman. Opponents of the limited entry law suggest that Alaska's dwindling salmon runs are due to recent bad winters and poor management as much as an overabundance of boats. They claim that the tremendous growth in the fishing fleet during the last decade has been limited to the gill-net and troll fisheries, and not the big money seine fishery.

Perhaps the greatest argument against the present limited entry law is that it provides no way for young people to enter the fishery, except through purchasing what could become a very expensive permit. Steve Horn from Kodiak and Morry Peterson from Chignik are perhaps typical of young men who have decided they want to be fishermen. Both have crewed on boats since they were very young (8 years old for Steve, and 4 years old for Morry) and now own, or are in the process of buying, a boat of their own. Neither qualify for a limited entry permit. Morry went shopping for a permit in Seattle, but after three months came home empty-handed – the cheapest one he could find was $25,000. Both hope to eventually obtain permits, possibly through a now-dead uncle who qualifies or with help from a cannery, but their frustration at the system is understandable.

At this point the law stands. Because of uncertainty over the application procedures, particularly in light of the lawsuit, the limited entry commission announced a one-month extension of the application deadline (to April 18) provided fishermen could show "good cause why they did not make the deadline."

April 1975

Report from the Legislature

As usual, things are bizarre and busy in Juneau.

For fishermen and others with marine interests possibly the most significant piece of legislation in Juneau this year is Senate Bill 175, the coastal zone management act. This act was introduced at the request of the governor and is currently being extensively reviewed by the legislature.

Senate Bill 175 establishes the Alaska Coastal Zone Management Planning Council to prepare and implement a coastal zone management plan based on the following goals and objectives.

1. the maintenance, restoration and enhancement of the overall quality of the coastal zone environment;

2. the development of industrial and commercial enterprises dependent upon the coastal zone for siting and which are consistent with the social, economic and environmental interests of the state;

3. the orderly, balanced utilization and preservation of all living and nonliving coastal resources consistent with sound conservation and sustained yield principles;

4. the consideration of optimum desirable population densities within the coastal zone;

5. the protection and enhancement of significant historic, cultural, natural and aesthetic values, and natural systems or processes within the coastal zone;

6. the prevention of damage to or degradation of state or federal lands, reserved for recreation, wilderness, scenic or species protection purposes, as a result of inconsistent land or water usages adjacent to those lands;

7. the recognition of the need for a continuing supply of direct and indirect energy sources to fill the needs of the state and to contribute the state's just and equitable share in meeting national energy needs; and

8. the full and fair evaluation of all demands on the land, including environmental, economic and social demands.

The Alaska Coastal Zone Planning Council would be chaired by the Director of Policy Development and Planning of the Governor's Office and would consist of the commissioners of Environmental Conservation, Natural Resources, Fish and Game, Highways, Community and Regional Affairs, Public Works and three public appointees from the Federal-State Land Use Planning Commission. In addition to the usual powers of a commission, the Planning Council would have the power to "acquire on behalf of a state agency by any means, including the exercise of eminent domain, any interest in land the council considers necessary to effectuate the purposes of this chapter." This unusual power is required of state coastal zone authorities by the federal coastal zone management act. The council is required to hold at least 12 public meetings across the state.

At this point the main criticism of SB 175 centers on the paucity of local government and resident participation in the preparation of such a far-reaching management plan.

April 1975

Limited Entry

The first year of limited entry in Alaska. To fish legally this summer in Alaska's power troll and salmon net fisheries, except in the Arctic, Yukon and Kuskokwim areas, fishermen needed a permit.

By mid-September 6,210 salmon fishermen had permits out of 9,129 applicants. The maximum number of permits which will eventually be issued is 7,446, but as of last month the Limited Entry Commission reported they had only denied those applicants who had "never fished with a gear license."

However, the difficulty of obtaining a permit varied from area to area. According to Jim Owers of the Limited Entry Commission permits were "very tight" in southeast Alaska where the amount of fishing gear doubled last summer. Most newcomers who have only fished one year will probably not get permits.

Owers reports that permits were "no problem" in Yakutat, and "not too bad" in Prince William Sound. The drift net fishery in Cook Inlet was "a little tight," the purse seine fishery "not too bad," and everyone who applied for a set net permit in Cook Inlet received one.

As *Seas & Coasts* went to press the permit situation was unclear in Kodiak and on the Peninsula, but permits for the profitable salmon fishery in Chignik looked "quite tight." All those who applied in the Bristol Bay set net fishery received permits.

If the limited entry law stays on the books (it is currently under appeal) the Limited Entry Commission will spend the winter considering gear reduction in Prince William Sound and Cook Inlet, methods of issuing permits for salmon fishing in the Arctic, Yukon and Kuskokwim areas, and the gear and economics of the Alaska crab fishery. In regard to permits for crabbing Owers reports that the Commission is "completely open" at this time, so permits for the next crab season seem unlikely.

Oct. 1975

Coastal Zone Management

Design or Device ?

In the last issue of Seas&Coasts, Governor Hammond's top-priority coastal zone management (czm) bill, Senate Bill 175, was reviewed as "possibly the most significant piece of legislation in Juneau this year" for fishermen and others with marine interests. This bill would have established a central council to prepare and implement a plan for Alaska's coastal areas. Native corporations, local governments, and private landowners sharply criticized the lack of public participation in such a far-reaching plan. The Hammond administration subsequently amended the bill turning planning over to local governments or, in the case of unorganized boroughs, regional planning advisory councils. The Senate Resources Committee passed over this sponsor substitute and came out with their own version (Committee Substitute 175), but as Seas&Coasts went to press it seemed unlikely that any czm bill would pass the legislature this session.

It was obvious, however, that the debate over czm for Alaska had just begun. In mid-March Governor Hammond appointed Dr. Rick Wright as coordinator of coastal management programs for the State. Wright's office will begin collecting and analyzing background information for Alaska's eventual czm plan this summer. In the following interview, Wright, who describes himself as a refugee from New Jersey who does not want to see unplanned, uncoordinated development in Alaska, responds to some of the basic questions posed by czm.

What are the advantages of a coastal zone management (czm) plan for the people of Alaska?

Specifically, the power to direct where coastal development will take place. The most important things are being able to concentrate development into particular areas and to select what type of development is most appropriate. The intention is not to tell a local resident where he can build a boathouse, but to direct industrial development.

What are the disadvantages?

The law vests zoning authority in a central board, and this means, as in all situations where zoning occurs, that to a certain degree citizens will not be able to do with their land completely as they please. Clearly, this restriction will tend to alter coastal property values. In the short run this may well lower values; in the long run controlled, directed development should enhance property values.

What are the advantages of a czm plan for commercial fishermen?

Probably the most important element of a czm plan in this respect would be to help avoid situations like the Kachemak Bay controversy. The federal Coastal Zone Management Act of 1972 (CZMA) directs us to identify and protect critical habitats which are essential to the renewable resources of an area.

What are the disadvantages?

I don't see any. As with any permitting system there will be a certain amount of bureaucratic hassle in obtaining development permits, but since subsistence, commercial and sport fishing are generally desirable uses of the coastal zone it should be relatively simple to obtain permits for development related to these activities.

Would a plan be warranted if OCS development was not in the offing?

Yes . . . but the Administration would not have pushed so hard for a bill so fast. OCS made the Administration move now, rather than after a couple of years of public discussion.

What is the role of your office, as representing the Administration, in the creation and implementation of a czm plan?

My office is specifically responsible for administering the federal funding made available to states in preparing czm programs by the CZMA. These funds are specifically designated for the organization of pertinent physical, biological and geological data and to encourage public participation at all stages in the development of a coastal management plan. Once we have a bill to work with, a prime responsibility of my office will be to provide staff for both regional advisory groups and the central planning council.

What is the role of the legislature?

The legislature must define both the goals and the mechanisms for a coastal management plan.

What is the role of local governments?

In the original Senate Bill 175, local governments were not active participants in the planning process. As a result of the hearings on this bill, local governments are now being encouraged to develop their own coastal management plans.

What is the role of the public?

Public participation, particularly in the identification of both desired and undesired developments, is essential. Local knowledge and understanding of biological resources and the local physical environment will be required to pinpoint sites for development or nondevelopment.

With OCS leasing already underway, can a State czm plan really affect development? How?

If Alaska had a plan accepted under the CZMA, all federal activities in our coastal zone would be required to be consistent with the State's plan. In the proposed state legislation, special permits would be required for any petroleum-related coastal development.

Specifically, what types of onshore development could be controlled by a czm plan?

Essentially, any coastal development—harbor construction, residential development, industrial construction, etc., would be controlled by the statewide plan.

How strong are those controls?

This will depend entirely upon the bill adopted by the legislature, however, the CZMA requires that on developments of statewide or national importance the central council would have the power to override local decisions.

You have stated previously that you would prefer to concentrate rather than broadcast development. Considering the areas already indicated by the Interior Department for leasing, can you suggest specific locations or examples where onshore development might be best concentrated?

In the Gulf area scheduled for leasing in November 1975 the logical site for exploration-related development is Yakutat. If Yakutat is the site of development, I would prefer to see it concentrated in Monti Bay rather than opening new, relatively temporary facilities in the neighborhood. If significant reserves were discovered in this area of the Gulf, Cape Yakataga would be a much more strategic location for production and transportation-related development. This site would require construction of a completely artificial harbor.

Leasing in the Albatross Bank area off Kodiak is scheduled for December 1976. There, the obvious base for exploration is the city of Kodiak. I would like to see the obsolete navy base at Woman's Bay rebuilt as a support facility rather than building an entirely new development. As for production off Kodiak, there are numerous moderately good harbors on the southeast side of the island although any of these would require extensive construction.

In the St. George area of the southeast Bering Sea the logical support base would be on the Pribilofs. Personally, I would prefer that the Dutch Harbor facilities be restored rather than opening a new place. This location would also be good for production development although the question here would be the seasonal sea ice of the Bering Sea. A sensible means of petroleum transportation in this area might be a pipeline across the Alaska Peninsula to a shipping site like Cold Bay, or another completely ice-free site.

For the rest of the proposed state lease areas—the north Bering, Chukchi and Beaufort Seas, there are no existing facilities suitable for exploration support, to say nothing of development and production support. Any bases in these areas would have to be built from scratch.

Several amendments to the Coastal Zone Management Act and the Outer Continental Shelf Act are currently being debated in Congress. How would these amendments affect coastal zone management and outer continental shelf development in Alaska?

There are several important features to these bills which could affect the federal government's OCS leasing policies and a coastal state's influence on those policies. One concern of ours is if and how financial assistance would be given to states impacted by energy development. We believe that the State of Alaska would get more realistic support to cope with impact from OCS development through a fixed percentage of the petroleum revenues gleaned from Alaska's shores rather than from appropriations through a national coastal impact fund.

Under the CZMA the State can select distinctive areas as sanctuaries devoted primarily to scientific research. Please elaborate on the difference between a "sanctuary," a "particular area of concern" and a "critical habitat area" as designated by the State.

At this point the distinction between these three classifications has not been defined for Alaska. The CZMA, which provides for sanctuaries, was written with the overdeveloped shorelines of the lower 48 states in mind. In our situation very few coastal areas are as yet significantly impacted by urban or industrial development and sanctuaries are not our top priority. The difference between the federal government's "particular area of concern" and Alaska's "critical habitat area" may be only in word choice.

Would commercial fishing be allowed in the sanctuaries?

It is difficult to say positively at this time. In two current sanctuary proposals outside Alaska—one in Chesapeake Bay and one in the North Carolina lagoons—I believe commercial fishing will be allowed.

How will the planning studies conducted by the State for the czm plan be funded?

During fiscal year 1975 the State received $600,000 from the federal government for coastal zone planning and matched that with $300,000 of our own. In fiscal year 1976 we may receive as much as $900,000 from the federal government and must match it with $450,000 of state monies. There is a proviso on the federal funds which stipulates that if we don't profitably spend our funds within a given fiscal year, our funding for the succeeding year will be reduced in proportion to the unexpended amount.

Additional large-scale, short-term funding to assist in planning for energy-related development may come from the OCS, CZM bills currently being debated in Congress.

June 1975

The Emerging Law of the Sea

By HOWARD W. POLLOCK
Deputy Administrator, National Oceanic and Atmospheric Administration

Howard W. Pollock, a former Congressman for Alaska, is the only living American to serve in a Territorial legislature, a State legislature, and the United States Congress. He is currently serving under appointment by the President as the Deputy Administrator of NOAA, the agency in charge of the National Marine Fisheries Service, the National Weather Service, the National Ocean Survey, the National Environmental Research Laboratories, the National Environmental Data Center, the National Environmental Satellite Service, the National Data Buoy Program, the Manned Undersea Science & Technology Program, and the Sea Grant Program.

Howard, who still calls Alaska home, is on the U.S. Delegation to the UN Seabed Committee and the Law of the Sea Conference, and is Chairman of the Department of Commerce Law of the Sea Committee. He is the former president and chairman of Alaskan Seafoods.

Preparations for the Third United Nations Law of the Sea Conference next summer are generating fast-moving events, some of which may overtake the material in the following article, which was written in mid-November.

There is an impending crisis in the oceans. It has been brought forth by technological advances which have led to new and more intensive uses of the oceans, and by an increasing number of unilateral claims to broad jurisdiction over the high seas by coastal states.

Prior to World War II, general navigation and commercial fishing, using relatively simple techniques, were the principal uses of the sea. Today certain distant-water fishing states (in the UN, nations are referred to as states) are using highly mechanized fish factory ships and sophisticated sonar equipment to locate and harvest fish concentrations off the shores of other nations. There is the technology to recover petroleum and gas from the seabed at ever increasing depths. Supertankers are plying the seas. Commercial production of manganese nodules (containing valuable minerals including manganese, copper, cobalt, and nickel) lying on the deep seabed is expected within a very few years.

Accompanying these more intensive uses of the oceans and their resources is the capability to degrade the marine environment and to destroy its natural resource potential. Moreover, conflicts between different uses of ocean space are developing. For instance, pollution may threaten fishing or recreation uses—witness the Torrey Canyon disaster off England or the Santa Barbara channel blowout. Considering all these factors, it has become increasingly apparent that there is a need for widely accepted, equitable, legal rules to modernize the law of the sea.

In the absence of international agreement on the breadth of the territorial sea, on fisheries jurisdictions, and on the outer limit of the continental shelf, some coastal states have been unilaterally asserting the right to marine jurisdiction as far out as 200 miles. In the law of the sea forum, some of these same states are seeking special preference even beyond 200 miles. Expansive claims are not surprising since coastal states do have an understandable interest in fisheries and mineral resources off their coasts, as well as a pressing need to protect their coastal waters and beaches from pollution. With its long coastline, the United States shares such intersts.

However, unilateral claims bring with them the seeds of conflict and discord. The two decades of dispute between the United States and Ecuador concerning tuna fishing within 200 miles of the coast of Ecuador is but one stark example. In this case, Ecuador claims the area offshore out to 200 miles as a territorial sea of sovereign jurisdiction. The United States does not recognize Ecuador's right to unilaterally usurp a portion of the high seas in contravention to the interests of other nations.

The inadequacy of existing international law of the sea to deal with some of the interests of nations has been recognized. Thus the United Nations called for a comprehensive Third United Nations Conference on the Law of the Sea which will commence with an organizational session in New York from December 3-14, 1973. Substantive negotiations will take place in Caracas, Venezuela from June 20 to August 29, 1974.

The UN Committee on the Peaceful Uses of the Sea-Bed and the Ocean Floor Beyond the Limits of National Jurisdiction, commonly referred to as the Seabeds Committee, has been making preparations for the plenipotentiary LOS Conference. Since 1970, the 91-nation Seabeds Committee has conducted six preparatory meetings.

In anticipation of this Conference, President Nixon announced in 1970 a U.S. oceans policy which seeks to accommodate various interests in a general international solution. The main components of the U.S. policy cover fisheries, seabed resources, scientific

research, navigation, and environmental protection. A summary of the U.S. policy follows.

Fisheries

The United States would like to accommodate the differing requirements of its fishermen—who fish for coastal or resident species, for anadromous species such as salmon, or for highly migratory oceanic species such as tuna and the billfishes—while at the same time satisfying the needs of other nations to the extent possible.

It is generally recognized in the negotiations that coastal states must be given fishing jurisdiction beyond 12 miles from the coast. The United States has proposed granting to coastal states regulatory jurisdiction and preferential fishing rights. Preferential rights would be based upon a state's capacity to harvest coastal species of fish, as well as anadromous species, which are born in their rivers, but travel far out into the oceans to grow and spend most of their life cycle before returning to their original streams to spawn. These coastal and anadromous species constitute over three-quarters of all the world's fish catch. Under the U.S. proposal, coastal nation jurisdiction would extend as far offshore as coastal and anadromous species range, regardless of the distance. The preferential rights of the coastal state would be subject to treaty provisions negotiated at the Law of the Sea Conference on historic or traditional fishing rights acquired by distant-water fishermen, such as those of the Soviet Union and Japan who fish heavily off the U.S. coasts.

Highly migratory, pelagic (oceanic) fish, such as tuna, would be subject to international and regional control. It is the U.S. view that no single state can adequately manage these species which range widely through the open oceans.

Coastal Seabed Resources

The United States has proposed a "coastal seabed economic area;" that is, an area of essentially coastal state jurisdiction with certain international elements located beyond the outer edge of the territorial sea (12 miles). The inner and outer limits of the area have not been specified in the U.S. proposal. However, the preponderant view favors an outer limit of 200 miles, with a sizeable number of states preferring an alternative seaward limit which would embrace the full continental margin where it extends beyond 200 miles. Beyond the continental margin would lay the deep seabed or abyssal depths, which would be a fully international area.

Under the U.S. proposal, coastal nations would have the exclusive right to authorize and regulate all seabed exploration and exploitation of the mineral resources, especially oil and gas, as well as the construction, operation, and use of offshore installations, such as offshore ports and airports, in the continental margin area. Coastal states would have to conform to international standards to prevent pollution and to prevent unjustifiable interference with other uses of the seas, such as navigation. Investment agreements would have to be observed strictly, and just compensation would be given in the event property was expropriated. Some revenue sharing from mineral exploitation of the area, and the important concept of compulsory settlement of disputes were also proposed.

In lieu of this proposal, many developing coastal states, and certain developed states, are urging the adoption of a 200-mile exclusive resource zone. Under these proposals, the coastal state would have complete and exclusive jurisdiction over both the fisheries and the mineral resources of the seabed, although freedom of navigation would not be affected.

Deep Seabed Resources

In the fully international area, the United States has proposed that a new international organization called the International Seabed Resources Authority (ISRA) be created to license and regulate exploration and exploitation of deep seabed minerals. This Authority would collect revenues from such activities to cover costs of administration and to assist the world community of nations, especially developing states. There is general support for such an authority; however, there are divergent views as to its powers and functions. A number of countries, especially the developing ones, have proposed that the authority should have exclusive, or at least concurrent, authority to engage directly in the exploitation of the mineral resources of the deep seabeds. A number of developing countries have also urged that the agency have the authority to regulate prices and production of the mineral resources. This is an enormous and dangerous economic power, and is vigorously opposed by the United States and certain other developed nations.

Scientific Research

Scientific research in the oceans is and should be beneficial to all, but it is viewed with grave suspicion by the developing nations. These nations feel that knowledge is power, and that the capacity for gleaning knowledge from research off their shores is reserved to the wealthy, developed nations who will use new knowledge to increase their own wealth and power. To meet these objections, the United States has proposed a set of obligations for governments of the scientists in the conduct of research beyond, but adjacent to, the territorial sea; that is, in areas where the coastal state will exercise jurisdiction over seabed resources and coastal fisheries. The obligation or conditions would require advance notification of the research to be conducted, coastal state participation, sharing of data and samples, assistance in interpreting the results, and compliance with international environmental standards. This obligation would be in lieu of the need for advance coastal state consent, advocated by most developing and many developed coastal states.

Navigation

The United States has proposed a move from our present position of a three-mile territorial sea to a universally adopted 12-mile territorial sea, coupled with freedom of transit through and over straits used for international navigation.

The basis for the United States' insistence on free transit is that with the move from a three- to a 12-mile territorial sea, some 116 international straits between six and 24 miles wide (for example, Gilbralter, Dover) would become overlapped by territorial seas. It would be most unsatisfactory for foreign shipping in important straits to be subjected to "innocent passage," where subjective determinations could be made by the coastal state on the right of a vessel to pass. These subjective judgments could relate to the flag of the vessel, its cargo, its size or destination, propulsion system (for instance, nuclear powered), or for other arbitrary reasons. Also, under the 1958 Convention on the Territorial Sea, and under customary law, "innocent passage" does not permit submerged transit by submarines, or military overflight of territorial seas by aircraft.

The United States has stressed that it is seeking a limited right solely for the purpose of unimpeded transit through straits, and will seek to accommodate the concerns of coastal states with

respect to navigational safety and pollution. The United States' objective has been supported by other maritime states and by a limited number of developing countries. However, Spain and some other states bordering on straits have strongly opposed the U.S. position.

There has been a growing consensus in support of a 12-mile territorial sea, conditioned upon various other factors. Several developing countries stipulate the proviso that they obtain adequate control of the resources off their shore beyond 12 miles, in the form of a 200-mile exclusive economic zone. Incidentally, at the present time, of the 119 coastal states, over 70 claim territorial seas of 12 miles or greater (including more than 15 claiming up to 200 miles).

Another navigational problem, yet unsolved, is the archipelago-island-nation issue. This doctrine is intended to enclose traditional high seas waters between islands as inland waters or territorial seas or "archipelagic waters." If this happened, navigation through these waters could be severely impaired or restricted by subjecting foreign-flag vessels to "innocent passage" or perhaps to another even more burdensome regime.

Environmental Protection

Individual state jurisdiction over marine pollution emanating from land-based sources is clear. It seems generally understood, however, that coastal state economic jurisdiction over seabed resources will include controls over pollution from exploration and exploitation of seabed resources. The controversy lies in the extent to which such controls should be subject to international standards.

There is particular difficulty in dealing with the question of pollution from vessels. On the one hand, the interest of coastal states in protection from vessel pollution is clear. On the other hand, international interests in freedom of navigation could be seriously compromised by varying coastal state requirements and controls over vessels and their movements.

The United States has proposed that there be international standards for the prevention of vessel-source pollution with an additional right of the port-of-destination state or the flag state of the vessel to prescribe higher standards. It is the U.S. view that the right of enforcement should rest with the flag state or the port state, with only an extraordinary or limited supplemental right to enforce international standards resting with the several and changing coastal states along the route of a transiting vessel. As could be anticipated, many coastal states also seek recognition of broad coastal state enforcement rights, as well as a right to prescribe standards for ships transiting off their shores beyond 12 miles.

Dispute Settlement

A system of peaceful and compulsory settlement of disputes relating to the uses of the seabeds or fisheries, scientific research, protection of the marine environment, or a whole host of other issues has been proposed by the United States. This system is an essential aspect of a comprehensive LOS settlement to ensure, to the maximum extent possible, uniform interpretation and immediate access to dispute settlement machinery in urgent situations. In addition, this system will provide the means for the final resolution of legal questions which will surely arise from time to time.

Conclusion

The United States has submitted draft treaty articles on virtually all major subjects and has delivered both introductory and explanatory speeches on the issues to be considered at the Third Conference on the Law of the Sea. The issues which will be before the Law of the Sea Conference are both complex and interrelated. While preparations for the Conference have not resolved the more difficult political issues, the interests that require accommodation, and the principal alternatives available have now been clearly identified. Hopefully, a spirit of good will and accommodation will lead to a successful conference in this most vital area of international law.

This is unquestionably the most difficult and ambitious international undertaking ever attempted for dealing with the problems of the world marine environment. It is a monumental effort, fraught with many difficulties, but success in this quest for world order in the oceans would be of enormous historic significance.

Fisheries and the Law of the Sea:
Problems in the U.S. Industry

By DAYTON L. ALVERSON
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The following is the fifth in a series of five articles on Fisheries and the Law of the Sea Conference prepared by Dr. Alverson for the Seattle Post-Intelligencer. In his first four articles, Dr. Alverson describes the rapid expansion of man's exploitation and use of the oceans during this century, the role of fish in nutrition and world politics, the growing conflicts between nations for the oceans' resources, and the hopes and purposes of the Law of the Sea Conference. He predicts that some form of coastal state jurisdiction over living and nonliving resources of the sea is on its way to realization.

Acquiring jurisdiction, ownership, etc., over resources of the sea will not guarantee the solution to many U.S. fisheries problems, but it will provide a new opportunity for change. Although it is popular to point to the conservation inadequacies of other nations, we have not done much better. To improve our record will require that the United States adopt and vigorously pursue a national policy emphasizing the importance of ocean resources to the world community and particularly to our country, and that we develop state-federal relationships to allow for efficient utilization and conservation of those resources.

During the past two decades, the United States has not followed the world trend in increased fish production. The failure of the U.S. fishing industry to compete on the high seas has been attributed to a variety of factors. It is often stated that the U.S. fisheries have declined due to technological obsolescence and because young Americans will not go to sea for extended periods. Such statements reflect half-truths and an unfamiliarity with the nature and technological competitiveness of the U.S. fishing industry.

Despite the fact that the world demand for fish has increased steadily, a number of factors have inhibited the ability of the United States to develop its fisheries. The economic dilemma of U.S. fisheries is similar to those which have faced many U.S. industries in recent years. Foreign labor costs have been substantially lower than in the United States. This has made it difficult for domestic producers to compete for the world market.

An array of archaic and sometimes conflicting national and state fishing regulations has perplexed U.S. fishermen. They are frequently told, "Get out and compete," but find that many regulations encourage social and political constraints which result in technological paralysis.

National trade policies also make the U.S. competitive position difficult. Many nations pay considerably higher prices than we do for fisheries products, and use trade barriers to prevent competition. The U.S. free trade policies have resulted in reduced duties on fish products imported into this country. At the same time, our policies have not reduced duties on imported fishing paraphernalia and have prohibited our fishermen from buying vessels at lower prices in foreign countries. Finally, U.S. fishermen often have had to compete with nationals whose fishing activities are entirely government operated or heavily subsidized.

Despite the handicaps, many U.S. fishermen have remained competitive through technological innovations and sheer will; their technology is as good or better than their foreign counterparts. The U.S. tuna fleet is cited as a classic example of advanced fishing technology. The U.S. king crab fleet is composed of modern, efficient vessels as advanced as any in the world. Other technologically efficient operations include portions of the U.S. shrimp fleets working in the Pacific Northwest, Alaska, and the Gulf of Mexico, and the U.S. menhaden fishery in the Atlantic.

We have our share of obsolete vessels, which are often the prime targets of those who point to inefficiency. Such critics are frequently not familiar with the fact that a portion of the Japanese, Russian, English, and Peruvian home fleets are of a similar character. All of the major fishing nations employ small crafts, including dories, skiffs, and a variety of powered vessels under 50 feet in home waters.

Unfortunately, one tends to equate size and newness with efficiency. A large vessel can be important when great distances must be traveled between fishing grounds and home ports. It provides for a greater payload, additional power to tow or handle nets, space to process the catch, at-sea comfort, and endurance. Much of this, however, is unimportant and frequently unnecessary when fishing grounds are close at hand. All of the fishing gear used to detect fish by the modern foreign vessels fishing off our coasts is available to and normally a part of the fishing paraphernalia used by smaller U.S. trawlers. In fact, many technological advancements used in world fisheries have had their origin in the small boat fisheries of the United States and Canada.

The United States, however, has found it difficult to compete for low and medium value species, such as herrings, anchovies, and bottomfish. In some instances, the development of U.S. fisheries for these species have been constrained by state laws; but in others, U.S. fishermen simply cannot land the fish cheaply enough to compete with imported products. The competition for bottomfisheries has been especially keen, and fishermen in the New England area have, in part, suffered.

However, **available foreign technology would not have solved this problem. If the economic environment is appropriate, the technological know-how to become competitive does exist in the U.S., and young men will go to sea.** There are no major problems in recruiting fishermen into the profitable crab, shrimp, tuna, and Pacific Northwest trawl fisheries.

The major contributions that the Law of the Sea Conference can provide U.S. fishermen are greater stability in exploiting species in the rich waters adjacent to the United States, developing an effective management institution for the high seas (tuna) migratory species, and ensuring investors that such fisheries will not quickly errode as a result of increased overexploitation.

Many fishermen are not looking to high tariffs for a solution to their problems. They would, however, like to be assured that the resources are being properly managed, that they have preferential access to those resources they have fished or are capable of fishing off their own coasts, and that state and federal governments recognize the need to make timely and nondiscriminatory decisions. Resolving the national difficulties is perhaps as large a problem as those confronting us in the international arena. The international problem must, however, be resolved as a requisite to achieving national goals.

DEC. 1975

Committees Selected For LOS Conference

By WALTER B. PARKER
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The Third United Nations Law of the Sea Conference will be held this year in Caracas, Venezuela from June 20 through August 29. There will be a second session in Vienna, Austria the following summer, unless the first session reaches a deadlock and no further progress is likely.

The problems faced by the Conference will be primarily those created by the impact of technology on the oceans and by the ever-growing utilization of ocean resources. Attention will be focused on the question of jurisdiction over the territorial sea and the sea bed. Decisions in this area will greatly affect fisheries and the allocation of the catch among nations. The U. S. position on jurisdiction over the territorial sea currently is in a state of flux due to Congressional action on such bills as Senate 1988, which advocates extension of the U. S. contiguous fisheries zone to 200 miles.

H. S. Amerasinghe of Sri Lanka (Ceylon), President of the Conference, previously served as Chairman of the United Nations Sea Bed Committee. The Sea Bed Committee and its personnel have been incorporated into the Third Law of the Sea Conference.

A General Committee selected to conduct the Conference is comprised of 48 seats distributed as follows: African group, 12; Asian, 12; Latin American, nine; Western European group (including the United States), nine; and Eastern European, six.

In addition to the General Committee, there are three Main Committees and a Drafting Committee. Each Main Committee is composed of a Chairman, three Vice-Chairmen, and a Rapporteur. Representation by country is as follows: Chairmen of the three Main Committees are from Cameroon, Venezuela and Bulgaria; the Chairman of the Drafting Committee is from Canada. Vice Chairmen of the Main Committees are from Brazil, East Germany, Japan, Czechoslovakia, Kenya, Turkey, Columbia, Cyprus and West Germany. Rapporteurs are from Australia, Fiji and Sudan.

The most striking feature of the composition of these committees is that the majority of the members would appear to be oriented to problems related to lands, while the primary purpose of the Conference is to deal with the problems of the seas. The working arrangements under which the United Nations function led to the makeup of the committees, but it is hoped that informed working groups will materialize and confront the problems of the ocean rather than those of the continents.

During the Conference, approximately 130 nations will negotiate on a one nation-one vote basis for shares in the wealth of the seas and will seek agreements in the control of navigation, ocean pollution and marine research.

OCT. 1974

Third Law of Sea Conference Ends

No Treaty in Sight

The question of who owns what in the oceans remained unresolved when the Third United Nations' Law of the Sea Conference ended August 29 in Caracas, Venezuela. For 10 weeks representatives of 148 countries stated and restated their positions, but did not begin firm negotiations toward a Law of the Sea treaty.

The most significant achievement at the conference was a general acceptance of the need to extend the territorial sea limits from three to 12 miles with the addition of another 188 miles of water in which coastal states would have economic jurisdiction over living and nonliving resources.

However, the major powers, including the United States and Russia, want guarantees that their commercial and military vessels will enjoy unobstructed passage through straits which fall inside this 188-mile economic zone. Developing nations insist on the right to control such traffic through their zones.

The three committees established for the conference will attempt to achieve consensus on dozens of sensitive issues at the Law of the Sea session scheduled next spring (March 17-May 3) at Geneva, Switzerland.

The First Committee, which is responsible for the seabed regime, will deal with conflicting proposals for rules and regulations to govern seabed mining. At the end of the Caracas session, the major powers were seeking a seabed authority to license companies on a nondiscriminatory basis pursuant to a comprehensive mining code, and the developing countries wanted a monopoly seabed agency, with general guidelines specified in the treaty, empowered to enter into such arrangements as it deemed appropriate for the exploration of manganese nodules.

When the Geneva session opens, a set of alternative treaty texts on all of the critical issues before the **Second Committee** (economic zone, continental shelf, straits passage, preferential fishing rights, etc.) will be available for review by the committee. The basic economic zone issues identified at the Caracas meeting include the following:

1. Some nations want to agree first on the broad concepts of the economic zone, while others (especially the United States) say they want all responsibilities and rights clearly defined before they agree to the concept.

2. Some nations prefer that all rights in the economic zone not specifically granted to coastal countries or to the international community be reserved to the coastal nation. Others (particularly the United States) do not want coastal countries to possess this "residual authority."

3. In regard to fisheries, some nations want outright sovereignty over the zone while others would be satisfied with exclusive rights. In both cases distant water nations would be dependent upon the coastal country for access. Those in favor of preferential rights would oblige the coastal country to admit distant water fishing nations

Law of the Sea

Agreement in Geneva?

Walter B. Parker
Commissioner of Highways

On March 17, 1975 the Third United Nations Law of the Sea Conference opened in Geneva. There is some hope that in that serene and comfortable city, a sense of unity and concord which was largely disrupted in tumultuous Caracas will be regained.

According to last contacts with the State Department, the position of the United States at Geneva at the beginning of the conference was essentially the same as at the end of the Caracas session. The primary points are:

–Territorial Sea – would extend offshore 12 miles with free passage through 112 defined international straits.

–Fisheries – Control by the coastal state to 200 miles with special provisions for pelagic species such as tuna under existing international regimes. Anadromous species, salmon primarily, would most likely require protection under a new treaty provision.

–Continental Shelf – to 200 miles or the toe of the continental slope (the continental margin), whichever is further, would belong to the economic zone of the coastal state.

–Deep Seabed – This position has retreated from that of the Nixon Seabed Draft Treaty of 1970, which favored an international regime, to an ambiguous position which seeks the rights of corporations to exploit the deep seabed minerals, primarily manganese nodules, on a *laissez faire*, free enterprise basis. The licensing authority would probably be some form of international agency with extremely restricted regulatory powers.

–Pollution – This is a complicated position for the United States. Basically, it restricts coastal state control to the territorial sea (12 miles) and wishes to prevent enforcement in the economic zone (200 miles).

–Freedom of Research – The U. S. position is that the high seas (beyond 12 miles) should be open for basic research.

The other positions at Caracas are those of the "territorialists" who advocate a patrimonial sea which would, in essence, extend the territorial sea to 200 miles, taking all regulatory controls to that limit and restricting free passage except beyond 200 miles. This position would effectively eliminate any military, civil or economic freedom of the seas.

Few nations are pushing for an extremely restricted jurisdiction such as the existing three-mile limit. Even Japan is showing signs of accepting a 200-mile fisheries jurisdiction.

There is little or no evidence at this time (March 7, 1975) that consensus on a treaty will be reached at Geneva. There are three possible outcomes to the conference which are listed below in their order of probability:

–No agreement on any treaty.

–Extension of the territorial sea to 200 miles, a convention which few major developed nations, including our own, would sign.

–Some variation of the U. S. position.

The two primary factors which would prevent the United States from signing a convention for a 200-mile territorial sea are defense and energy. The navy could not function under such a regime, and the transportation of oil from the Middle East and Venezuela to the United States would be severely impacted. For the same reasons Western European nations and Japan would not sign. The Soviet Union is in a more flexible position due to its oil surplus situation at the moment.

Alaska

The big question is – What will protect Alaska's fisheries if extended jurisdiction is not achieved at Geneva? The general consensus is that Congress will pass a 200-mile fisheries bill if the Geneva conference fails to reach an agreement acceptable to the United States. The Congressional bill would provide protection to most stocks except the westernmost range of salmon from Bering Sea river systems. A 200-mile limit would also open salmon in the Gulf of Alaska to exploitation if the abstention line was abrogated by Japan, as she can do on one year's notice.

On the other hand, action on the 200-mile limit could enable the U. S. to enforce regulation over all stocks and bring the Soviet Union, Japan, and Canada into a general treaty that would serve as an umbrella for existing bilateral agreements and the base from which to negotiate new agreements. American action in the eastern Bering can only be successful if regulation in the western Bering is sufficient to insure the continued health of the entire Bering biomass. (The fish do not seem to have acquired enough of a sense of nationalism to recognize new boundaries yet.)

We must move quickly. If several displaced Atlantic fleets move into the North Pacific, it will be difficult to achieve any rational regional system. As in the Atlantic, each fleet wants more than its share. Only concerted action by all nations with an interest in the North Pacific can keep out new entries. One nation at a time can do it only by firm military protection of 200 miles.

The threat of these fleets may be the common peril necessary to bring about a North Pacific Fisheries Convention that will insure each nation's coastal fisheries will receive protection. Let us hope it is done while there is still something to protect.

April 1975

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when the allowable catch was not totally absorbed by the coastal nation.

4. Landlocked nations are seeking a share of the living and nonliving resources taken from the economic zones of their regional neighbors.

5. Many nations regard control over scientific research and pollution in the zone as a necessary link of their resource jurisdiction. Others (including the United States) want to apply separate regimes for research and pollution.

The Third Committee completed draft alternative articles on most of the issues involved in pollution control and scientific research at the Caracas meeting. Major technological powers favor free access to the economic zone for research (at least for research unconnected with resource exploitation). Developing coastal nations have presented a variety of mechanisms for control by coastal countries, ranging from a consent system to an exclusive and absolute right of the coastal country to conduct or authorize scientific research in the zone.

OCT. 1974

Marine Mammals in Alaska

By Nancy Munro
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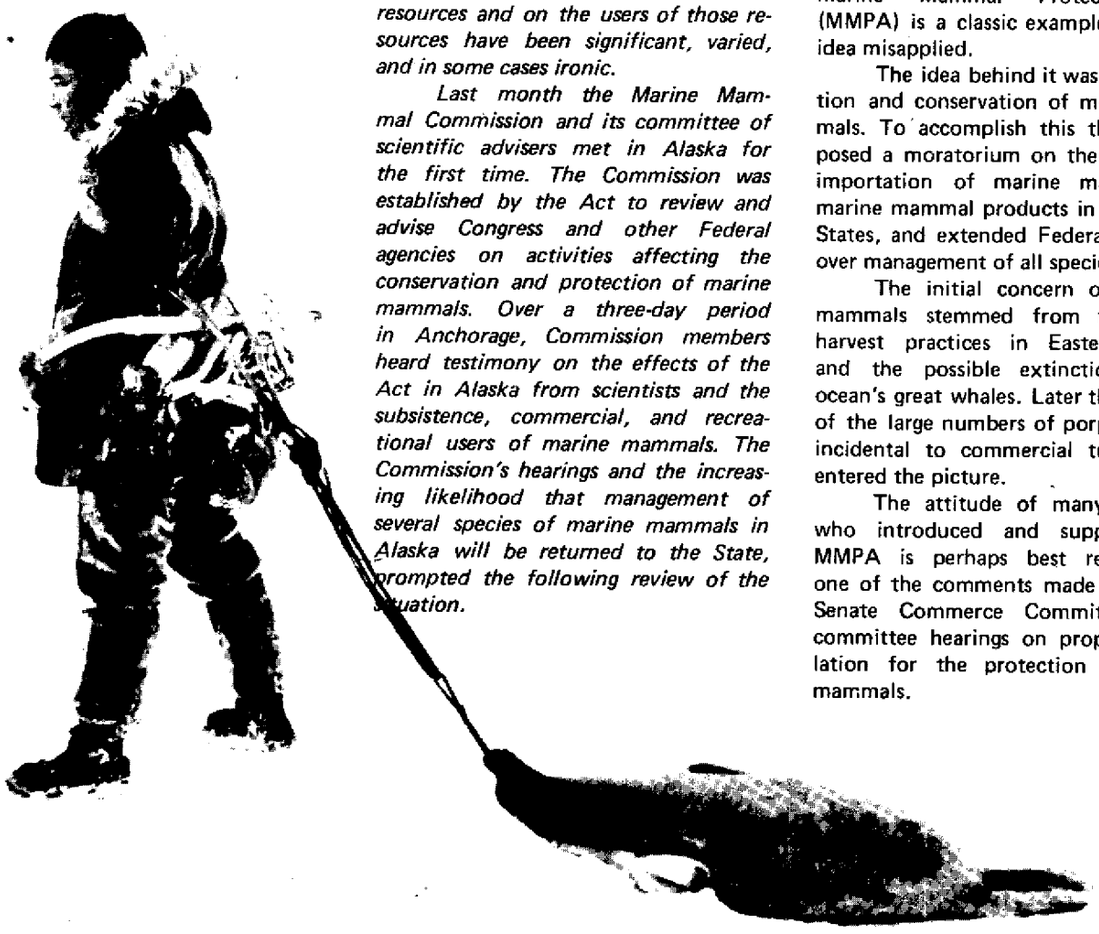


Three years ago the Marine Mammal Protection Act was signed into law. Its effects on Alaska's marine resources and on the users of those resources have been significant, varied, and in some cases ironic.

Last month the Marine Mammal Commission and its committee of scientific advisers met in Alaska for the first time. The Commission was established by the Act to review and advise Congress and other Federal agencies on activities affecting the conservation and protection of marine mammals. Over a three-day period in Anchorage, Commission members heard testimony on the effects of the Act in Alaska from scientists and the subsistence, commercial, and recreational users of marine mammals. The Commission's hearings and the increasing likelihood that management of several species of marine mammals in Alaska will be returned to the State, prompted the following review of the situation.

THE ACT

To many people in Alaska, the Marine Mammal Protection Act (MMPA) is a classic example of a good idea misapplied.

The idea behind it was the protection and conservation of marine mammals. To accomplish this the Act imposed a moratorium on the taking and importation of marine mammals or marine mammal products in the United States, and extended Federal authority over management of all species.

The initial concern over marine mammals stemmed from the sealing harvest practices in Eastern Canada and the possible extinction of the ocean's great whales. Later the question of the large numbers of porpoise taken incidental to commercial tuna fishing entered the picture.

The attitude of many of those who introduced and supported the MMPA is perhaps best reflected in one of the comments made during the Senate Commerce Committee's subcommittee hearings on proposed legislation for the protection of marine mammals.

The large number of people for whom I speak are very clearly and very strongly opposed to management and harvest. We do not regard seals, whales, sea otters, manatees, polar bears, and the other magnificent animals as a resource. They are an independent form of life which should be neither harassed, killed, managed, nor harvested.

—Alice Herrington, Friends of Animals, New York, N.Y.

As is often the case, things were a little different in Alaska.

Traditionally, Alaska's marine mammals had been utilized for their commercial value and by Alaska's Native people for subsistence. In 1972 the populations of fur seals and whales that frequent Alaskan waters were under international agreement and had recovered from a severely depressed condition brought on by intensive commercial harvesting in the 1800s and early 1900s.

For 12 years prior to the MMPA sea lion, sea otter, harbor seal, four species of oceanic hair seal, walrus, and polar bear had been managed by the Alaska Department of Fish and Game (ADF&G). According to Ben Hilliker, deputy commissioner of ADF&G in 1972, none of those stocks was endangered. Alaska obviously did not have a tuna-porpoise problem. Senator Mike Gravel pointed out that baby seals were not even taken during the federally-managed fur seal harvest on the Pribilof Islands and that the photographs of baby seals being clubbed were actually taken in Canada not Alaska.

Perhaps most important, Alaska's cultural heritage and economy was based on the use of natural resources. Generally, people in Alaska considered marine mammals, some of the largest remaining populations of which live in Alaskan waters, as a viable, renewable resource.

Many people outside the state however, were concerned that Alaska's marine mammals were being brutalized and endangered. Those people in a position to observe the marine mammals directly — biologists, fisherman, subsistence hunters, and several Alaska conservation groups — felt the stocks were either rapidly increasing, at maximum, or in some cases over their maximum sustainable population. The frustration of these people within the state is reflected in one of Alaska Senator Ted Stevens' remarks during the subcommittee hearings.

I long for the opportunity for the other side of this issue to be heard by the American public. Certainly the side of what is happening in Alaska in the last 11 years since statehood has not been heard by the American public and you people with your national organizations and your national funds entirely outstrip us and you are being heard a great deal.

Later that year the Marine Mammal Protection Act was signed into law. In the end it included a special exemption from the moratorium on taking for Alaska's Native people. Under the exemption Natives were allowed to hunt for subsistence or handicraft usage, provided it was done in a nonwasteful manner.

PROBLEMS

Since its passage the Marine Mammal Protection Act has had special pertinence and problems in Alaska. One of these is misunderstanding.

In some circles the MMPA is considered one of the great mysteries of the decade. The vagueness of its language has made interpretation, at best, difficult.

What is an optimum sustainable population? Does taking of walrus for ivory constitute "subsistence" hunting? If subsistence hunting is intended to provide basic sustenance, what about the non-Native people who live in rural areas of Alaska? Finally, what constitutes a "substantial portion" of waste? Is hunting a walrus solely for its skin to be used for boat covers wasteful? What about hunting walrus or polar bears only for their meat because their skins are, under terms of the Act, unmarketable?

The confusion surrounding the language and interpretation of the MMPA is compounded in some of Alaska's rural areas by misunderstanding. As Jack Lentfer, one of the scientific advisers for the Marine Mammal Commission, described the situation:

The Act and implementing regulations were drafted in Washington, D.C., and though they were circulated to some coastal villages, there was no concerted effort to inform coastal residents and solicit input before they became effective. Now, after the Act and regulations have gone into effect, the lack of contact with villages continues, and people remain uninformed and confused.

Lack of Management

Even more serious than these misunderstandings is the possibility that the MMPA's actual effects are contrary to its original intent. Passage of the Act left management programs in limbo, and testimony at the Marine Mammal Commission's hearing last month revealed that the Act may actually be encouraging indiscriminate and possibly large-scale hunting.

Jack Lentfer, speaking from his experience in State and Federal wildlife management research outlined the situation:

The moratorium on taking, a central feature of the MMPA, precludes management of marine mammals. The Native exemption to the moratorium does not restrict the number, sex, or age of animals taken or time of year when taken. . . A decision has not yet been made on the State of Alaska's request of nearly three years ago for return of management. In the meantime, the Natives drift further and further from conservation measures of pre-Act management programs.

Lentfer explained that female polar bear and cubs, which were protected even from subsistence hunters under the pre-Act management program, are "particularly vulnerable" to coastal hunting as now practiced. He added that both the females and cubs were especially in need of protection now when the disturbances associated with oil and gas development could lower productivity.

Economic Loss

It would be erroneous to assume however, that Alaska's Natives are making a killing off the MMPA. On the contrary, the MMPA has severely depressed the economy in several Native regions in Alaska. Because the act prohibits the sale of raw skins or ivory to other than Natives, it has seriously limited the monetary base in many Eskimo communities.

Ironically, in addition to causing serious economic hardship for many Native people the Act may also be

encouraging waste. Since raw skins cannot be sold to other than Natives, they are sometimes wasted when seals, walrus, and polar bear are hunted for food.

In his accompanying article Howard Ness, an economist for the NMFS in Alaska further examines some of the economic implications of the MMPA.

Conflicts with Fishermen

In a companion article, Pete Islieb, a commercial fisherman in Alaska, outlines the conflicts between marine mammals and fishermen throughout Alaska. These continuing and evidently increasing problems seem to demonstrate that the uncontrolled growth of marine mammal populations is not compatible with managing a fishery for maximum productivity. Nick Gregory, who has observed the marine mammals in Bristol Bay for the last 60 years, summed up the situation at the Commission hearings last month. "My beef is simple—we have a lot of belukhas around Bristol Bay and they're protected. They eat a lot of fish. The seals out there are getting to be too many, too."

RETURN OF MANAGEMENT

The big question is whether the moratorium will be lifted and management of Alaska's marine mammals returned to the State.

Three years ago when the MMPA extended Federal management authority, it divided jurisdiction over species of marine mammals between the Department of Commerce, (NMFS), for whales, porpoises, seals and sea lions, and the Department of Interior, U.S. Fish & Wildlife Service (FWS), for all others including polar bear, sea otter, and walrus. The Act provided that the moratorium could be waived to allow the taking or importing of any marine mammal, if on the basis of the best scientific evidence available and in consultation with the Marine Mammal Commission, the appropriate secretary determines that to do so would be compatible with the Act. If so, the secretary would then adopt regulations to ensure that the harvest would not disadvantage the species or population stock.

Immediately after the MMPA was signed into law the State of Alaska requested the Secretary of Commerce (NMFS) to waive the moratorium for Steller sea lions, harbor seals, ringed seals, ribbon seals, bearded seals, and beluga whales and to approve the States' laws and regulations relating to management of these species. The State submitted a similar request to the Secretary of Interior (FWS) for polar bears, sea otters, and walruses.

Walrus

For nearly a year very little happened with the State's proposal. Finally, in December 1974 FWS announced its intention to consider walrus as a separate proposal. According to Loren Croxton of the FWS walrus were separated because there was good biological information available, the stocks were in good health, and they were politically the least controversial.

Last spring an administrative law judge listened to testimony in Anchorage and Washington, D.C. on the walrus proposal. The State of Alaska, FWS, and the Marine Mammal Commission advocated waiver of the moratorium and the return of management to the State. Richard Gutting represented the Environmental Defense Fund, the Sierra Club, Monitor, Inc., Friends of Animals, Inc., and the Committee for Humane Legislation in opposition to the transfer.

In July Judge Kennedy rendered his decision. With several stipulations on hunting practices, Kennedy recommended that the moratorium on walrus be waived and their management returned to the State. As *Seas&Coasts* went to press, it was expected that the Director of the FWS would waive the moratorium and return management of walrus to Alaska with certain stipulations.

The Other Eight

Meanwhile, the draft environmental impact statement on the proposal for the eight other species was cleared by the NMFS and the FWS late last month and will be sent to the Council on Environmental Quality for review. Hearings on the proposal will probably be held in mid-March. They will be held before an administrative law judge, probably in Anchorage and Washington, D.C. People who wish to speak at the hearings must notify the judge prior to the hearings. Testimony will be subject to cross-examination.

Outlook

Should the Departments of Interior and Commerce decide in favor of the State's proposal, things would look a little different in Alaska.

First of all, the blanket moratorium on the taking of marine mammals would be waived. The could mean that interstate commerce of marine mammal products would again be legal, and that recreational and subsistence hunting by non-Natives might be resumed.

It would also mean the reinstatement of management for the protection and conservation of the animals. This might include the reinstatement of seasons and bag limits for some species, regulation on hunting methods and means, and some areas closed to hunting.

As things look now, the proposed state management plan will give preference to subsistence users—Native and non-Native alike. As proposed, the extent of a person's use will be regulated by his dependence on the resource, geographical location, and economic status. Under this setup a trophy hunter from New York would obviously be more restricted in his take than a subsistence hunter from Savoonga.

Naturally, some of the conservation efforts of a management plan are not as attractive to Natives as their present advantage of being the sole legal, and relatively unrestricted, harvesters of marine mammals.

Jesse Foster of Quinhagok explained the fears of the people in his area should sports hunting be resumed. "Use for the sports hunter means the fun of the hunt. Use for us means something else. Hunters who might kill all the game in one area can move to another. But it hurts the Native people because they can't move away."

Dick Curtis of Kotzebue underlined the problems of any subsistence hunter in the Arctic. "My living is 90% from the sea. All my life I have hunted seal. This seal hunting is up to the weather. I want to hunt when I want to because that is my way of life. If the state took over and put seasons on seal I would not like that."

Despite these problems a majority of the Native people who testified at the hearings last month favored a waiver of the moratorium and the re-

turn of management because of the significant economic advantages it would mean. Natives and others would regain the ability to sell by-products of marine mammals (hides, ivory), they could engage as guides, the villages would again receive the money from providing services for recreational hunters, and there could be increased sales of handicrafts without a middleman.

Robert Madden, executive director of the nonprofit arm of the Bering Straits Native Association, testified for the people of Shismaref, Wales, Gambel, Savoonga, King Island, Stebbins, St. Michael, and Golovin in support of the State's proposal. Harry Wild represented similar support from 57 villages in the Yukon-Kuskokwim area.

> *We depend on living on the land and the sea, especially on sea mammals. We educate our children to survive by hunting sea mammals. . .Right now a lot of people down on the coast are crying because they can't get a couple of dollars to support their family. They can't sell their seal skins.*

The State seems to recognize both ends of the Native's concern. As Robert Rausch, ADF&G, summarized the State's position at the hearings last month, "The State feels that anything less than management designed to protect the resource, and the people who use the resource, is unacceptable."

Unfortunately, it looks like a final decision on the State's proposal is still a ways off. Many people outside Alaska remain convinced that marine mammal stocks are declining, overutilized, or endangered. Should the Departments of Commerce and Interior decide to waive the moratorium and return management to the State, it is quite possible that decision would be challenged in federal courts.

DEC. 1975

Testimony Favors State Control Of Alaska's Marine Mammals

Management of Alaska's marine mammals should be returned to state control, a variety of witnesses testified Aug. 31 in Anchorage before the Subcommittee on Fisheries and Wildlife Conservation of the U.S. House of Representatives Merchant Marine and Fisheries Committee. Subcommittee members Rep. John Dingell, D-Mich., chairman; Rep. Paul McCloskey, R-Calif., and Rep. George Goodling, R-Pa., conducted the hearing to determine how the Marine Mammal Protection Act of 1972 is being administered in relation to the intent of Congress, and what changes need to be made in statutory language.

The Act preempted state control, placing all marine mammals under federal protection, and banned hunting except for subsistence and traditional handicrafts by Indians, Aleuts and Eskimos who live on the coast of the North Pacific and Arctic Oceans.

Testimony ranging from problems related to lack of implementation of the Act to undue economic hardship created by the legislation were presented by representatives of state and federal agencies and others. The subcommittee heard statements by Rep. Don Young, R-Alaska; a former commercial seal hunter; an owner of a defunct Anchorage business which had once thrived as a sealskin processing firm, and spokesmen for professional sport hunters, Native subsistence hunters, conservationists and professional biologists. State officials and other witnesses endorsed the Alaska Department of Fish and Game as the agency best qualified to manage the state's marine mammals.

Robert Rausch, deputy director of the game division of ADF&G, told the subcommittee that shortcomings in the federal law could be improved through full implementation of the Act and the return of management authority to the state, with adequate federal funding for state enforcement. Rausch, however, raised the question of a possible constitutional conflict if management is given to the state, because state law does not allow a distinction between Natives and non-Natives, while the federal Act does provide for Native exemption.

Rausch also said that total protection for seals and sea lions, which are part of the overall fisheries picture in Alaska, is not consistent with treatment of the state's other fisheries. Problems affecting the commercial fishing industry have arisen, Rausch said, because applications by commercial seal hunters for exemptions to the Act, based on undue economic hardship, have not been acted upon by federal authorities.

Under the Marine Mammal Protection Act, the Department of Commerce controls seals and sea lions, along with whales and porpoise. Federal regulations allow the Secretary of Commerce to grant relief to persons who can demonstrate undue economic hardship by exempting them from the moratorium on the taking of marine mammals until midnight, Oct. 20, 1973.

The National Marine Fisheries Service received applications from 11 hunters in Alaska to harvest 11,100 seals and 13,200 sea lions for commercial sale. Hearings were held on the subject last spring in Kodiak, during which a representative of ADF&G estimated that NMFS could conceivably expect to receive an additional 15 such applications. When it was estimated that requests involving 51,000 animals could be forthcoming, NMFS determined that an Environmental Impact Statement would be required under the National Environmental Policy Act of 1969 prior to action on any exemptions requested. The draft Environmental Impact Statement is reportedly being prepared by NMFS.

State officials pointed out that prior to the Act, the state had prohibited killing any sea otter, outlawed hunting of polar bear sows and cubs, and set limits on the number of female walrus harvested. When state controls were lifted by the federal Act, Native subsistence hunters were permitted to take any marine mammal in any numbers, provided the animals were not taken in a wasteful manner.

Witnesses and the subcommittee panel appeared to agree that provisions of the Act which exempted marine mammals from any control if hunted by Natives for subsistence might have to be revised. No terms of reference for such revisions were offered, however.

Stephen Powell, a representative of the National Oceanic and Atmospheric Administration, said a state plan for management of marine mammals is now under "active review" by federal authorities.

Oct. 1975

Fishermen and Marine Mammals

The following testimony was given by Pete Islieb, a commercial fisherman in Prince William Sound, at the Marine Mammal Commission hearings in November. In his statement Mr. Islieb reflects the views of the Cordova District Fisheries Union and many fishing communities throughout Alaska.

My testimony elaborates on fisheries problems, particularly those problems which are being compounded by the moratorium on the killing of marine mammals imposed by the Marine Mammal Protection Act of 1972.

Most people present at this hearing are aware that Alaskan fishermen have a history of local conflicts with some species of coastal marine mammals. In preparing for my testimony I have found that there is very little hard or soft data available to assess the impacts of marine mammals on these fishing industries and fisheries resources.

I will try to list, however, some of the types of problems presently occurring and escalating, and will attempt to qualify and quantify these problems where possible. Personally, in preparing this testimony I was amazed at what is happening, at least in part, because of the lack of regional management of our marine mammal populations.

Gear Loss

The gear losses incurred by Alaskan fishermen which are directly attributable to harbor seals and Steller's sea lions exceed millions of dollars annually.

Steller's sea lions destroy crab buoy marker bladders and subsequently cause loss of pots in southern Alaska coastal areas. The economic value of this loss is presently unknown but would be substantial.

Steller's sea lions destroy or damage salmon troll gear and drag and trawl gear in southeastern Alaska. This is another substantial but unassessed figure.

While preying on salmon caught in nets, Steller's sea lions and harbor seals damage or destroy drift gill nets, set gill nets and seines. The estimate of gear loss and damage of this type in the Copper River-Prince William Sound area alone exceeds $100,000 annually.

In the 1975 red salmon drift gillnet season off the Copper River Delta, I personally know of one fisherman who departed Cordova with a new net worth about $1,200 on board. After two days of fishing he was forced to return to town and spend two days mending the rips and holes torn in his net by sea lions. Upon returning to the fishing grounds the fisherman noted nearly as many seals and sea lions as fish, and his attempts to catch and retain salmon were nearly futile. After another day the web of his net was in shreds and returning to town the second time he took off the gillnet gear, put on a crab block and went crab fishing.

Those of us fishing offshore, in the surf, or in the bar openings (about 500 fisherman) who were not equipped to change fisheries, were plagued by hundreds of Steller's sea lions and thousands of harbor seals throughout the season.

Economic Loss

In addition to the significant gear loss attributable to marine mammals, there are substantial economic losses incurred by the industry and the public through marine mammal predation on the fisheries resources.

Steller's sea lions prey on fish caught or entrapped by troll, longline, drag and trawl gear. The economic loss from this type of predation is unassessed at present, but substantial.

Harbor seals and Steller's sea lions prey on fish entangled in nets. In the Copper River-Prince William Sound area the dollar loss to fishermen because of predation of this type is at least $100,000 annually. On a statewide basis this figure would annually exceed $1,000,000.

In the Coghill district drift gillnet fishery in Prince William Sound this year, harbor seal predation on salmon (mainly pinks) during mid-July and early August was the worst that I have witnessed. The fishermen in this area reported daylight fish losses up to 40 to 60 percent of their net's catch. Nighttime losses averaged at least 40 to 60 percent and late in the season nearly 100 percent.

During one of my night sets at this location in mid-July I found 146 salmon in the net after a three-hour period. Only 68 of the fish were marketable. The others were ripped in pieces or were merely skeletal remains.

The number of fish totally removed from the net must have been substantial considering the net's poor condition. This $1,200 fine-meshed net had to be retired for repair after being used only one week. During late July and early August many of the fishermen decided not to fish at night because of greater fish losses and gear damage.

Steller's sea lions prey on maturing and migrating anadromous fish in coastal and continental shelf waters.

Belukha whale prey on salmon smolt during spring outmigrations and returning adult salmon during summer runs in estuarine and freshwater areas of Cook Inlet and Bristol Bay.

Harbor seal prey on migrating

and spawning anadromous fish in coastal and continental shelf waters.

It is well known that seals often follow anadromous fish into freshwater systems. The Copper River, a major river on Alaska's southern coast, retains large runs of anadromous fish and is also the summer home for thousands of harbor seals. One of the principal food sources for these seals is a small anadromous smelt locally called "hooligan."

During late summer and autumn the smelt are no longer present in any volume and the seals are somewhat dispersed from their earlier concentrations in the commercial salmon fishery area. Those seals remaining in delta waters wreak havoc with the silver salmon fishery in late August and September, but a large percentage of the Copper River seal populations are spread out in the freshwater tributaries of the delta.

Over 100 seals were reported in the Bering and Martin Lake systems in early September this year, and at least 50 seals were reported in the Eyak Lake system. Residents on Eyak Lake observed seals constantly harassing red salmon trying to spawn in the shallow lake shore gravels.

In 1975 the enlarging harbor seal population and their predation on the salmon fisheries coincided with greatly diminished salmon returns. The diminished returns required a complete closure of the commercial fishery halfway through the season, and even then the escapement levels were only 20 percent of that normally required. If the predation of salmon at their spawning grounds was as it appeared, we can look forward to a dismal future and probable economic dislocation for many fishermen in this area.

Conclusions

Marine mammals and man have been competing for the same fisheries resources in the marine environment for a long time. I am not here to state that all of these conflicts are caused by the moratorium or will cease if the moratorium is waived.

Fishermen and fishing communities have a direct interest in all elements which contribute to the proper functioning of the marine ecosystem. Generally, we agree with the congressional findings and declaration of policy as stated in the Marine Mammal Protection Act.

However, we believe that management should be implemented for those marine mammal species, or regionally distinct populations, which rise well above their optimum sustainable population. This is especially true where enlarged populations are adversely affecting man's attempts to manage or culture other renewable marine resources.

We believe that along the north coast of the Gulf of Alaska harbor seals are well above their optimum sustainable population and that Steller's sea lions have reached their maximum sustainable population. These enlarged populations are altering the balance of the ecosystem adversely, and in some instances causing economic dislocation to portions of the fishing industry.

We concur that species and populations of marine mammals need protectional guidelines. However, it is our view that sound policies of renewable resource management cannot be obtained through the moratorium of the Marine Mammal Protection Act.

We urge the earliest possible waiver of the moratorium in respect to certain coastal marine mammals including harbor seals, Steller's sea lions, sea otters and belukha whales. Finally, we hope that the management of these species will be returned to the State of Alaska to be dealt with on a regional basis.

DEC. 1975

The Economic Implications

By Howard Ness
National Marine Fisheries Service

When the Marine Mammal Protection Act was passed in December 1972, it appeared that the 50,000 Eskimos, Aleuts and Indians in Alaska had received a windfall. The act put a moratorium on all taking of marine mammals but allowed a special exemption for Alaska's Native people to harvest for subsistence and handicraft usage. Ironically, the immediate effect of the Act was to depress the economy in some Native regions, especially those north of Bristol Bay. The Act also created a severe economic stress for some white commercial hunters and traders.

The reason for this was that passage of the Act eliminated the opportunity for Natives and non-Natives to sell raw skins or ivory. Formerly, the European market alone had bought between 8,000 and 10,000 seal skins and 4,000 and 6,000 sea lion hides annually.

Seals are and have been the primary resource base for the subsistence and monetary economy in many Eskimo regions. The meat serves as a food staple, and the hides are sewn into various articles of clothing or are bartered. In some Eskimo villages it is estimated that prior to the Marine Mammal Protection Act the income derived from the sale of raw seal skins constituted as much as 10 to 15 percent of the village's annual earned income. A 1958 study of the Point Hope economy revealed that 20 percent of the annual village gross income was derived from the sale of the products and services associated with marine mammals.

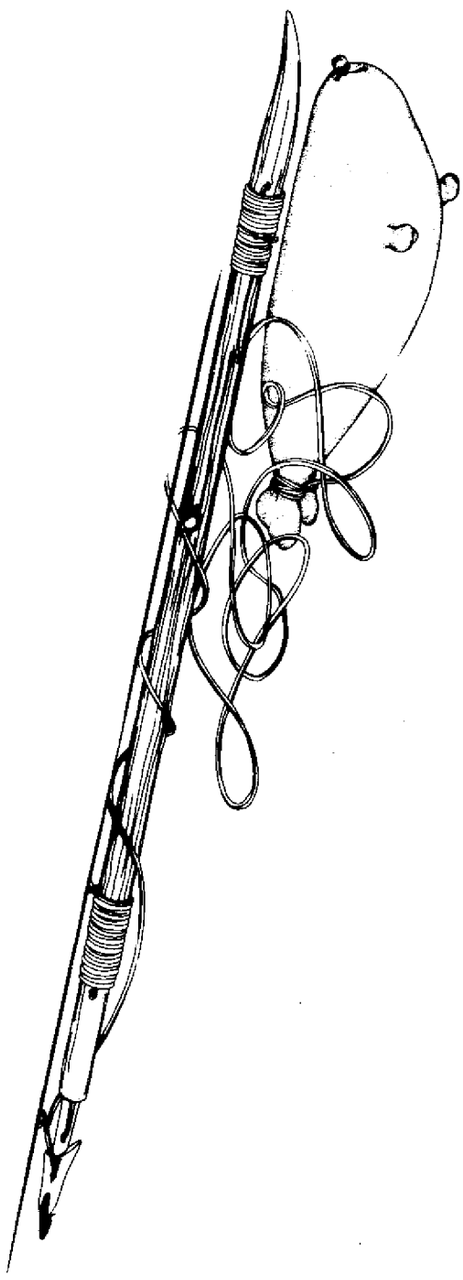
The effect of the ban on selling raw seal skins is shown in the low seal harvests since passage of the Act. In 1973 only 8,500 to 9,000 ice-breeding seals were harvested. This is 36 to 40 percent below the 1968-1972 annual average harvest of 14,300 ice seals. Preliminary information suggests that harvest levels did not exceed this number in 1974-1975.

Seal hide (raw and tanned) prices have fluctuated from $8.00 to $40.00 per pelt over the last five years. If seal hide prices were assigned the average value of $20.00 per adult pelt for all species, a potential income of $110,000 was lost to the Alaska Native population in 1973 and, at least as much in 1974. It is not known at this time what the total cutback in production of Native handicrafts will be for 1974-1975, but the amount is probably significant in the larger communities of Bethel, Kotzebue, Teller and Barrow.

Other sources of cash income have also been reduced since passage of the Marine Mammal Protection Act. Polar bear hunting, for instance, used to contribute significantly to a village's economy for support and guiding services. An estimated 20 to 30 polar bears are annually harvested by Eskimos, and because of current restrictions on sport hunting and the sale of hides, the estimated total annual loss of revenue derived from polar bear hunting is probably above $150,000.

Due to ramifications of the Marine Mammal Protection Act the Alaska Native economy lost more than $500,000 in revenue in 1973-1974. This is a significant loss of income for a coastal population of approximately 50,000 individuals. More than 60 percent of the families residing in the northern Arctic regions exist on an income less than the $3,870 level defining poverty in the "lower 48." A family earning $2,000 to $3,000 annually that loses the opportunity to earn an additional $500 would obviously be severely affected.

In the short-run the Marine Mammal Protection Act has depressed the economy of several Native areas in Alaska. In the long-run the Act may actually be detrimental to the resource and contrary to its original intent. The Act has created an increased demand for handcrafted marine mammal products by banning imported competitive goods. Thus, national attention has turned to Alaska Native handicrafts. The lure of profitable markets may encourage increased harvests of marine mammals, and eventually politics and the profit motive may replace rational state-federal regulation of marine mammal harvests.



Debate About Marine Mammals Continues

By John J. Burns
Marine Mammals Biologist
Alaska Department of Fish and Game

On December 21, 1972 Public Law 92-522, the "Marine Mammal Protection Act of 1972" became effective. The results of this law were immediate, significant to both the marine mammals and users, and in some cases ironically detrimental to both. Several articles about this subject have appeared in **Alaska Seas and Coasts** and one issue (Vol. 3, No. 5, December 1975) covered it in detail. This report is intended as an update covering events since January 1976. Keep in mind that conservation of marine mammals is the real issue. This may sometimes be submerged during the course of complying with legal requirements in an adversary situation. Readers must also excuse me for some biased speculation.

A REVIEW

A brief review of certain facts is necessary.

The Act placed a moratorium on the taking and importation of marine mammals and marine mammal products except in certain cases: such as for scientific research and public display (by permit only); incidental taking associated with commercial fishing operations (such taking was to be "reduced to insignificant levels approaching a zero mortality..."); and in specific instances authorized by the Secretary of Commerce or Interior. A notable exception was that the moratorium did not apply to Indians, Eskimos or Aleuts taking these animals for subsistence purposes or, "...for purposes of creating and selling authentic native articles of handicrafts and clothing."

The situation which resulted in Alaska was that most marine mammal management programs essentially ceased as of the effective date of the Act. The State of Alaska no longer had jurisdictional responsibility for any species, a moratorium was in effect for non-Natives, no consideration was given to the practical relationships between marine mammals and other marine resources and the so-called "Native exemption" allowed continued, essentially unregulated taking by a segment of the public which has frequently had the greatest impact on marine mammals in several regions of the state.

Problems inherent in the bills which eventually evolved into the Act were widely recognized. For the most part testimony in opposition to the bills was disregarded.

STATE MANAGEMENT AUTHORITY

Resumption of a management program, including regulated taking, by a state is provided for in accordance with requirements of the Act. The State of Alaska submitted its request, in January 1973, seeking to waive the moratorium on nine species of marine mammals and to allow the state to resume management.

One species, the Pacific walrus, was specifically singled out for "early" consideration. Management of walrus was returned to the State, effective 5 April 1976. However, the decision returning management of Pacific walruses required that the matter be reconsidered as part of the State's broader request. As of this writing all parties involved are moving, ever so slowly, toward obtaining the required decisions of the Secretaries of Commerce and Interior.

Marine mammals included in Alaska's request are: polar bears, sea otters, walruses, sea lions, harbor seals (including spotted seals), ringed seals, ribbon seals, bearded seals and belukha whales. These represent nine of approximately 28 species which occur in waters adjacent to our shores.

Management authority was requested for these nine because they are the ones which are traditionally of greatest importance to coastal residents of the state; are most directly affected by activities of Alaskans; are significant and important functioning elements of our marine ecosystems and are species with which the Alaska Department of Fish and Game has been involved since statehood. Much of the scientific and management expertise required for these species has been and remains in Alaska. Additionally, ADF&G is the agency with greatest responsibility for considering all aspects of the management of nearshore fish and wildlife species as well as providing for the needs of her residents.

One major step toward a federal decision was accomplished in February. A draft environmental impact statement, prepared by an interagency task group, was published for public review. This was required

before the next step, public hearings, could begin. Public hearings, which are adversary proceedings with an administrative law judge presiding, began in late June in Anchorage. They continued in Nome and Bethel and were reconvened in Anchorage in mid-July. The last part of these hearings will occur in Washington, D.C., beginning on Tuesday, October 19.

After the last series of hearings the presiding administrative law judge, the Honorable Malcolm P. Littlefield, is required to convey a recommendation to the Secretary of Interior (relating to walrus, sea otters and polar bears) and the Secretary of Commerce (concerning the other six species). The respective Secretaries will then eventually render a decision.

PUBLIC RESPONSE

The hearings held in Alaska were both interesting and frustrating. The testimony of Alaskans was divided. Many Native Alaskans are opposed to a return of management to the State as they are well aware that their taking of marine mammals would once again be subject to a management program including regulations. The "Native exemption" in the Act, as currently interpreted, is an exemption from any hunting regulations. The strong and outspoken protectionist groups are also opposed to a return of management as they collectively think it would greatly weaken a strongly protectionist federal law.

In this instance, the opposition consists of strange bedfellows indeed—those organizations dogmatically opposed to any legitimate, regulated use of wildlife resources and those parties seeking to contrive to take marine mammals, unhampered by regulations of any kind!

My personal and obviously biased thoughts are that the bedfellows referred to above will enjoy a very short partnership, if they obtain a favorable decision. The protectionist faction does not wish to see either a harvest or a management program of any sort. A quote from Friends of Animals, which appeared in **Alaska Seas and Coasts** (Vol. 3, No. 5, p. 2) expresses the essence of the philosophy of that organization.

> *The large number of people for whom I speak are very clearly and very strongly opposed to management and harvest. We do not regard seals, whales, sea otters, manatees, polar bears and the other magnificent animals as a resource. They are an independent form of life which should be neither harassed, killed, managed, nor harvested.*
>
> *Alice Herrington*
> *Friends of Animals*
> *New York, N.Y.*

My speculation is that if the protectionist factions and those wishing to continue unregulated exploitation jointly prevail, the former will have won a significant battle and the latter will have gained a short-term victory. The State of Alaska with its management program will be dealt out of the picture. The protectionist groups can then solidify their gains and attempt to dispense with the "problem" of the Native exemption to the moratorium by quietly obtaining more stringent amendments to the Act during the periodic process of congressional oversight hearings.

Returning to fact; the last series of public hearings is soon to begin in Washington, D.C. It will be dominated by organizations opposed to Alaska's request. Whatever your opinion is, you should express it. Comments will be received for at least 30 days after close of the hearings. This can be done by writing to the office of Judge Littlefield, U.S. Department of Interior, Office of Hearings and Appeals, Hearings Division, 4015 Wilson Boulevard, Arlington, Virginia 22203. **Oct. 1976**

ALASKA'S WHALE POPULATIONS

State Control of Alaska Marine Mammals Is Becoming a Vital Issue

By KAREN HULETT
Arctic Environmental Information and Data Center

Alaska's role in the current controversy over the status of the great whales has been largely relegated to that of a bystander. While nations confer on the possibility of a moratorium on whaling, and the U. S. government enacts a nearly total ban on the killing of any marine mammal, the State of Alaska has had to relinquish control of resident and migrant whales alike.

It is difficult to understand why Alaska has lost management responsibilities for whale and other marine mammal species, since their harvest has been of such great historical and current significance to the State and its residents. Eskimos in the Alaskan Arctic have hunted the bowhead for many thousands of years; the whale is an integral part of their culture. During the 1800s Yankee whalers took sperm whales, Pacific right whales and bowhead whales off Alaska's coast. In fact, the Yankee whalers were so efficient that they greatly reduced the bowhead population and endangered the sperm whale species. Fortunately for these great whales, whaling became unprofitable due to several economic factors including the discovery of fuel oil. Since then, the harvest of whales by Alaskans has been limited mainly to traditional Eskimo hunting of the increasing population of bowheads. However, Japan and the Soviet Union have continued to whale, and in 1971 these two nations took 14,879 whales in the North Pacific. (See accompanying table and map.)

The unabated whaling by Japan and Russia has been the subject of much international concern because stocks of some of the great whales appear headed for extinction. In 1946, concern over whale populations led to the International Whaling Convention for the Regulation of Whaling. This convention created the International Whaling Commission (IWC), composed of representatives from the United States, Argentina, Australia, Brazil, Canada, Denmark, France, Iceland, Japan, Mexico, Norway, Panama, the United Kingdom, the Soviet Union and South Africa. The Commission theoretically manages and regulates the harvest of the commercial whales; however, it has no enforcement powers. Furthermore, the Commission cannot make its regulations even theoretically binding unless there are no objections from any member nation. These restrictions have led to 30 years of impracticably high catch limits for some species, with a consequent decimation of humpback and blue whale stocks.

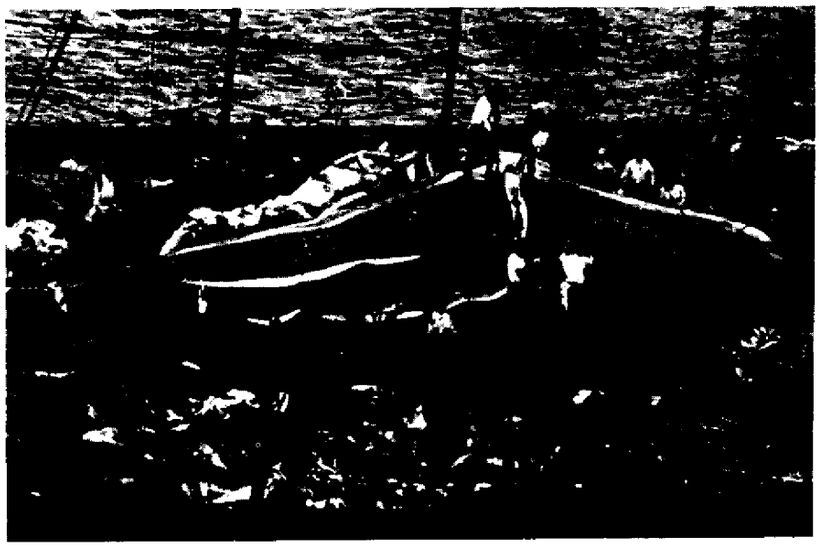
Populations of the big blue whale, the largest animal which ever existed, have been reduced to possibly a few thousand individuals. They are scattered widely throughout the oceans, thus contact and breeding between animals has been reduced and population growth is impaired. The Scientific Committee for the IWC advised that the blue whales should be protected.

By 1970, the U. S. Department of Interior, disillusioned by the ineffectiveness of the IWC, placed eight species of whales on the Endangered Species list. This action prohibited both the importation of any product of the eight designated species, and the killing of these species by a U. S. citizen. In 1972, with the passage of the Marine Mammal Protection Act, the taking or importation of any marine mammal was prohibited, except for traditional subsistence use by Alaskan Indians, Eskimos and Aleuts. In addition, the United States has urged the IWC to adopt a 10-year moratorium on all commercial whaling. At this time, the IWC has passed a resolution to establish a moratorium on selected species which fall below optimum population levels. Japan and the Soviet Union are the only dissenting voters.

These two nations have consistently refused to curtail their whaling efforts. Between them, they account for 85 percent of the world whale kills. Presently, they are taking fin, sei, sperm and minke whales in waters off Alaska. By 1965 Japan and Russia had stopped reporting blue whale kills in the North Pacific.

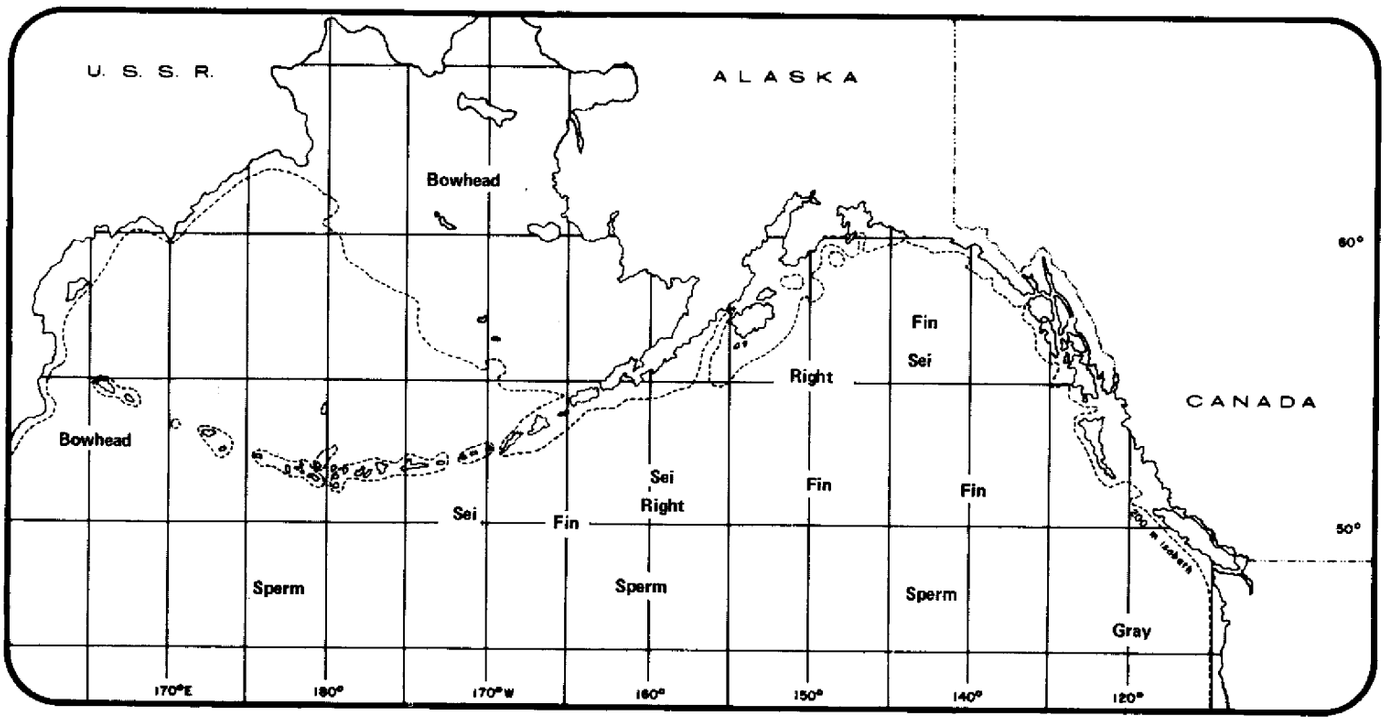
Whale meat constitutes from 3 to 6 percent of the protein consumption of the Japanese people, and all parts of whales taken are completely utilized. Japan has always depended heavily on the oceans to provide most of the protein consumed by her people. The increasing worldwide emphasis on the oceans as a food source has created a situation in which Alaska, with more than half the coastline of the United States and far more marine mammals than any other state in the Union, is insisting that it have greater influence in the regulation of species which inhabit its waters.

The bowhead and the grey whales, which frequent Alaskan waters, are thought by uninformed observers to be headed for extinction; the truth is that these species have steadily increased in population. The beluga whale is common in Alaska. This species is accused of extensive depredations on the State's salmon stocks, especially in Bristol Bay. Other whale species are present in such abundance that they attract foreign whaling fleets. In short, the situation in Alaska is contrary to the grim national and international scene. Control of Alaskan resources by Alaskans, including the services of several internationally respected marine mammal biologists, is becoming a vital State issue.



A sperm whale being butchered aboard a Japanese ship. Photo by National Marine Fisheries Service, NOAA.

Whaling Areas Off Alaska



Total North Pacific Whale Harvest, USSR-Japan, 1959-1971

Year	Blue	Fin	Humpback	Sei	Sperm	Right[1]	Other	Total
1959	92	1,572	74	125	3,360			5,233
1960	70	1,521	57	262	3,028			5,938
1961	72	1,531	333	58	3,686	2		5,655
1962	67	1,604	1,230	563	4,504	2		7,971
1963	404	2,105	2,252	1,469	7,825	2		14,048
1964	119	3,507	242	2,128	7,893	1		13,890
1965	121	2,898	283	2,093	10,656			16,051
1966		2,574		3,718	12,439			18,731
1967		2,127		6,007	15,065		21	23,220
1968		1,846		5,730	16,289	2	171	24,038
1969		1,245		5,148	14,879		89	21,361
1970		1,007		4,501	14,769		139	20,416
1971		798		3,003	10,656		908	14,879

1 – Taken for scientific research
Source: International Whaling Commission

Oct. 1975

Section four

ALASKA Seas and Coasts

A Newsletter for the Alaska Commercial Fishing Industry

Safety

Section four: Safety

Fishermen everywhere face hazards while harvesting the ocean's wealth. Alaska's fishermen perhaps face more than their share. Cold water can be particularly dangerous and Alaska Seas and Coasts has dealt with development and use of cold water survival suits, inflatable life rafts, hypothermia, and cold water drowning--topics of interest to all who go near the water.

Fire aboard ship is one of the most dreaded marine accidents. Improvements in fire fighting gear and supplies are of particular interest to Alaska fishermen. Also discussed is the handling of fuel and other combustable material aboard ship.

Icing is another problem apt to be more severe in Alaska waters. A vessel's superstructure can ice easily, making the vessel top-heavy and likely to capsize. Knowing more about conditions that cause icing has helped crews know when to expect it. The vessel icing chart appearing in this section is an example of some helpful research, allowing fishermen to minimize danger.

The cause of an accident most commonly is human error. That's why safety education has stressed checklists, demonstrations and guidelines to stop accidents where they start. The safety articles and standards deserve careful reading.

Improvements in safety equipment also go a long way to cut accident rates. These include electronic locators, emergency radio broadcasts and engine oil analysis. Some of these are techniques applied from other industries.

Improvements in navigation, charts, and weather service reporting can assure a safer time at sea. At the same time, knowing how to deal with runaway engines, hydraulic leaks and ship's batteries can also play a part in reducing accidents or getting help.

Section Four

SAFETY

FISHING VESSEL SAFETY

— a checklist —

I CAUSES OF PERSONAL INJURY AND LOSS OF LIFE

A. Deck — outside —

1. Alcohol and drugs
2. Fatigue
3. Working too fast; taking short cuts
4. Loose clothing or rain gear
5. Long hair (loose)
6. Lack of adequate training — at deck gear — at anchor winch
7. Man overboard — alone on deck while traveling, at night, or in bad weather — hauled over while setting gear
8. Standing under stressed rigging
9. Standing in bight of line
10. Slick decks
11. Open hatches
12. Loose or swinging rigging
13. Loose lines or gear on deck
14. Fish poisoning
15. Bottom paint poisoning
16. Lack of safety equipment while using power tools
17. Improper use of machinery
18. Overloaded skiffs or dinghies
19. Inadequate hand holds
20. Haste in tying up boat at dock
21. Removing web or line from wheel
22. Bad location of controls and brakes on equipment
23. Bringing heavy gear aboard while fishing — landing skiff — landing pots — landing doors (shrimp) — hauling, tow/bag aboard
24. Leaving machinery controls while operating
25. Cut by fishing gear — trolling line — flying hooks — cleaning knives — parting gear
26. Large halibut
27. Bad practices with skiff when going ashore
28. Not knowing area while hunting ashore
29. Ladders on side of pilot house
30. Inadequate lighting

B. Galley and Quarters

1. Stove burns
2. Stove and stack fires
3. Smoking in bunk
4. Falling through hatch into fo'c's'le or engine room
5. Wet slippery floors — bad housekeeping
6. Inadequate ventilation
7. Excessive noise
8. Bad sanitary practices — old or bad food
9. Inadequate lighting

C. Engine Room and Fo'c's'le

1. Excessive noise
2. Exposed belts, chains, and gears
3. Exposed shaft couplings
4. Exhaust leaks
5. Refrigerant leaks
6. Exhaust burns
7. Inadequate escape routes or hatches
8. Oil leaks, slick decks
9. Poor house cleaning
10. Gas operated equipment — battery chargers and welders
11. Gas welding cylinder storage
12. Exposed AC wiring
13. Heavy objects not tied down
14. Storage of flammable and poisonous liquids
15. Exposed urethane insulation
16. Bad battery placement and insulation
17. Working on equipment while running
18. Using engine room as laundry
19. Working on or around battery with metal tool without disconnect
20. Battery acid burns
21. Inadequate ventilation
22. Inadequate lighting

D. Fish Hold

1. Inadequate lighting
2. Inadequate ladders
3. Slick decks
4. Open shaft alley
5. Carelessness during unloading
6. Inadequate stanchions and pen boards
7. Poor routing of shafts and access to pipes and lines
8. Falling hatches

II VESSEL DAMAGE OR LOSS

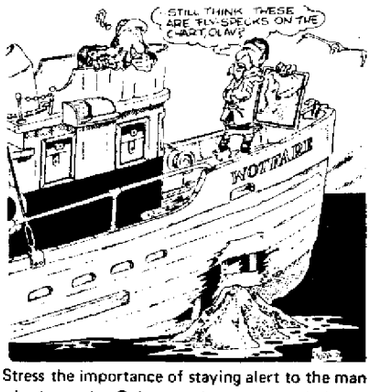
A. Poor anchor gear, ground tackle
B. Poor navigation
C. Fatigue
D. Alcohol and drugs
E. Poor judgment
F. Lack of local knowledge of area
G. Fishing gear in wheel
H. Logs and other drift
I. Loss of steerage
J. Water, dirt or sludge in fuel
K. Inadequate fuel filters or changes
L. Poor thru-hull fittings
M. Inadequate sea-chest valves
N. 3-way or Y system on bilge-sea-chest pump system
O. Instability — inadequate ballast — free surface on deck
P. Poor communications equipment
Q. Fire
R. Inadequate windows
S. Icing
T. Overloading
U. Pen board or stanchion failure in hold
V. Lack of preventive maintenance
W. Electrolysis
X. Inadequate visibility
Y. Inadequate clearing ports
Z. Inadequate alarm systems
AA. Inadequate bulkheads
BB. Inadequate alarms and pumps in voids

Feb. 1978

Alaska Records Highest Water Accident Rate

Alaska has the unenviable distinction of possessing the worst water safety record of any state in recent years, and the commercial fishing industry accounts for a large percentage of the state's boating accidents. During 1966 and 1967 a total of 99 boats out of the Alaskan commercial fishing fleet were lost at sea, and there were nearly 1,800 reported accidents involving injury to Alaskan fishermen. The most tragic statistics, however, are those which list loss of lives; 60 fishermen died in accidents in Alaskan waters during 1966 alone.

The following cartoon and suggestions on how to avoid grounding of fishing vessels are excerpts from the booklet, "Safety Notes for the Alaskan Fisherman," published cooperatively by the National Marine Fisheries Service and the U. S. Coast Guard. A copy of the booklet may be obtained by writing to National Marine Fisheries Service, P. O. Box 1668, Juneau, Alaska 99801.



- Stress the importance of staying alert to the man on wheel watch. Going to sleep on watch has contributed to many accidents.
- Make sure a new crewman knows what he is doing before he stands watches. As a minimum, he should know basic rules of the road, whistle and radio distress signals, standard running lights, how to use the radar and fathometer and when to call the captain.
- Have a deviation table made up and posted, and make sure you know how to apply it.
- Keep a dead-reckoning plot on a chart whenever under way in the fog, even if you have every piece of modern, red-hot electronic gear made.
- Be sure you understand the effects of current on your boat and that you know what the current is for where you are.
- When anchoring for the night, have enough anchor hawser (or chain) out. In good holding ground, use cable at least five times the depth of the water. If you expect some weather, you should let out seven times the depth of the water.
- When anchored at night in bad weather or in a spot where you cannot let out enough scope, maintain an anchor watch to check the boat regularly for dragging.

Feb. 1973

CAUSES OF ACCIDENTS AT SEA

The following summary of commercial fishing vessel accidents in Alaska waters during 1972 was compiled by Walter G. Jones, National Marine Fisheries Service, from reports of the U.S. Coast Guard 17th District Office in Juneau.

Number of licensed commercial fishing vessels	10,791
Number of accidents reported to U.S.C.G.	70
Number of fishermen fatalities	10
Number of fishermen injuries	7
Number of vessels lost	26
Number of vessels damaged and repaired	40

The 53 accidents reported in Southeastern Alaska included five deaths, seven injuries, and 13 vessels lost. Seventeen accidents reported from other Alaska waters included five deaths, no injuries, and 13 vessels lost. The causes of vessel casualties and personal injuries were listed as follows:

Number of Accidents	Causes of Accidents
12	Fires (due to various causes—overheated stoves, gas in bilges, electrical shorts)
11	Poor navigation or poor seamanship
9	Heavy seas and bad weather major contributing cause
8	Equipment failure (faulty welds, engine failure, plugged fuel line)
7	Operator asleep, intoxicated, not in pilot house, or carelessness
5	Vessel age and worn-out equipment
5	Poor equipment maintenance
4	Hit submerged object
4	Clothing or persons caught in equipment or fishing gear
1	Heart attack
1	Battery explosion
1	Vessel frozen in ice
1	To avoid collision
1	Unknown
70	

Thirty-nine of the fishing vessel accidents reported in 1972 were caused by operator negligence, poor maintenance, or carelessness. Some of the other 31 accidents may also have been caused by poor seamanship and poor maintenance, but records are too incomplete for such classification.

Weather and sea conditions for 48 of the 70 accidents were listed as follows: Good, 15; fair, 16; poor, 8; bad, 9. No weather conditions were indicated for 22 of the accidents.

The age, length, type of fishing vessel, construction material, and engine fuel of the 70 vessels involved in accidents are categorized in the following tables:

Age

1 Vessel	61-70 years old
10 Vessels	51-60 years old
4 Vessels	41-50 years old
3 Vessels	31-40 years old
11 Vessels	21-30 years old
11 Vessels	11-20 years old
8 Vessels	1-10 years old
22 Vessels	Not listed

Length

1 Vessel	101-110 feet
2 Vessels	81-90 feet
1 Vessel	71-80 feet
1 Vessel	61-70 feet
5 Vessels	51-60 feet
8 Vessels	41-50 feet
33 Vessels	31-40 feet
2 Vessels	21-30 feet
7 Vessels	Not listed

Type of Fishing Vessel

2 - Trawler	2 - Packers
4 - Crabbers	1 - Longliner
12 - Seiners	5 - Trollers
10 - Gillnetters	1 - Outboard motor

33 - Not listed

Construction Material

55 Vessels	Wood
6 Vessels	Fiberglass
1 Vessel	Steel
1 Vessel	Aluminum
7 Vessels	Not indicated

Type of Motor Fuel

22	Gasoline
39	Diesel
9	Not indicated

Commercial fishing is as safe or as dangerous as you, the vessel operator or crewman, wants to make it. There is, however, always an element of danger in commercial fishing which is accentuated in Alaska waters. This makes it all the more imperative that Alaska fishing vessel operators do not relax their vigilance in inspecting and keeping their vessels in top mechanical and construction condition in observing safety precautions for themselves and their crews.

We will be compiling the 1973 fishing vessel accidents soon, and we hope that you are not listed in those statistics. However, 1973 will soon be history. We will look forward to 1974 as a year when no fishing accidents of significance will be reported. Wishful thinking? Perhaps, but we wish each of you a safe and prosperous fishing year in 1974.

DEC. 1973

Safety Regulations from the Government ?

For the past two years representatives from all segments of the U. S. commercial fishing industry (fishermen, insurance companies, vessel owners, unions, and government employees) have been meeting to discuss marine insurance and safety. On May 29-30, 1975 this group met for the last time to give their recommendations on legislation which, if passed, will affect every vessel owner in the country. Bills governing fishermen's benefits and vessel safety have been drafted by both the Commerce Department and the Coast Guard. Should neither of these bills become law and the need for safety regulations remain, the Occupational Safety and Health Administration (OSHA) is ready to step in as the regulatory agency.

At the Alaskan Fisheries Safety Advisory Council (AFSAC) annual meeting in March the idea of governmental control over safety standards was a major topic of concern. Highlights of both the Commerce Department and the Coast Guard bills and AFSAC's official reaction follow.

Commerce Department Bill

Title I Fishermen's Benefits (Insurance)

- It would apply to every U. S. fishing vessel owner with one or more employees on the vessel regardless of vessel size or fishery.
- Every vessel owner would be liable to his employees for personal injury or death which occurs while the fisherman is on board the vessel or directly engaged in carrying out duties associated with the vessel.
- Every owner would be required to carry insurance or provide proof of his ability to pay the benefits.
- It would limit the vessel owner's liability to the injured fisherman and his dependents in case of death, to the provisions of the bill.
- Neither the Jones Act nor the existing maritime laws would be eliminated by this bill. Therefore, the present authority for legal action would still exist in the event of default by a vessel owner.
- It would provide a predetermined system of benefits for all injured fishermen and dependents of deceased fishermen and would virtually eliminate the need for negotiation and court action in these cases.
- It would provide free medical and hospital care for fishermen in either U. S. Public Health Service or private facilities.
- The system would be administered by the federal government and would require no added cost to the fishery industry.

Title II Fishing Vessel Safety

- It would be a voluntary safety program available to every commercial fishing vessel.
- The Secretary of Commerce would develop and promulgate vessel safety standards for all commercial fishing vessels.
- It would provide for fishing vessel inspection and crew examinations on a voluntary basis. The cost of inspections would be paid by vessel owners.
- It is expected that vessel owners would benefit through reduced insurance costs while fishermen would experience fewer accidents, injuries and deaths.
- The bill would also provide for (1) vessel certification if in compliance with standards; (2) loan guarantees for vessel safety modification; (3) safety training for crew members; and (4) safety advisory committees.

Coast Guard Bill

A proposed draft of the Coast Guard bill is currently being circulated around other governmental departments and is not yet officially available for public comment. We do, however, have some indication of the nature and content of the bill.

- It would apply to all U. S. commercial fishing vessels in U. S. navigable waters that are over 5 net tons in size.
- It would mandate the Coast Guard to draft specific legislation, which would be entered into the Federal Register covering all facets of the U. S. commercial fishing fleet.
- It would contain regulations governing (1) materials of construction, (2) construction of vessel, (3) maintenance of vessel, (4) stability of vessel and loading, (5) lifesaving systems (life rafts, fires, etc.), (6) updated inspections every three years, and (7) examinations and personnel licensing.
- It would provide for the revocation of any license, for negligence, misconduct, inattention to duty and violation of any law or regulation.
- It would provide a timetable of implementation with specific "grandfather" clauses.
- It would solicit industry advisory groups to participate in the documentation or drafting of regulations.

AFSAC Position

It was generally agreed by attendees at the 1975 AFSAC meeting in Kodiak that the threat of federal safety regulations is very real and could come soon. The committee felt Alaska's commercial fishing industry could, and should, adopt their own voluntary safety code by size of boat and type of fishing. AFSAC would represent the industry, advising the Coast Guard or whomever, on issues and areas of primary interest to the commercial fishing fleet.

The voluntary safety code would be used as 1) a standard by which vessels and captains could assess their own level of safety, 2) a basis for securing loans for the improvement of the vessel, 3) a documentation of the best existing safety standards used within the fleet, and 4) a means of introducing and disseminating important new ideas concerning safety.

To document this safety standard three major groups in the Alaska industry would be contacted—commercial fishermen, marine surveyors and major insurance pools handling Alaskan fishing vessels. AFSAC would document the existing safety standards within the fleet by approaching fishermen who have a history of safe operations and are safety oriented. Marine surveyors would indicate what they think makes a vessel safe. Finally, safety standards required by different insurance pools with group policies in Alaska would be compared.

In the event of mandatory safety regulations from the federal government, AFSAC would act as a legal advisory council and present the voluntary code as the viewpoint of the Alaska commercial fishing industry.

Abandon Ship Survival Suit

An abandon ship survival suit designed to supply flotation and protection against frigid waters is demonstrated by John Doyle, Head, Marine Advisory Program, University of Alaska, in these photos. Such suits recently aided in the survival of four Alaskan fishermen when their vessel sank in the Bering Sea. The following account of that incident was written by Sig Jaeger, manager of the North Pacific Vessel Owners Association:

"The survival suits enabled the crew of the **CRYSTAL S.** to survive when their vessel sank early in August in the Bering Sea. As the vessel capsized, the life raft was released but tangled with the rigging and consequently inflated upside down and drifted away. The crew in their survival suits swam to the raft. Unable to right it, they sat on the bottom of the raft in comfort until they were rescued nearly three hours later by the **BERING SEA,** Kristian Poulson, master. The men feel they owe their survival to the suits."

The survival suit is made by Imperial Manufacturing, and comes packed in a vinyl bag for compact storage. It can be donned quickly over regular clothing by anyone up to six feet, eight inches tall. The garment is made of 3/16-inch neoprene foam with a nylon cloth lining bonded to the interior. The hood, gloves and foot coverings are integral parts of the suit. Hood and upper chest areas are International Orange in color.

Entry is from the top. The suit has one large, gusseted zipper up the front and one chin strap, which when closed, leaves only the face exposed.

Extensive tests performed by the U. S. Navy in 35-degree water indicated negligible body heat loss for approximately 13 hours. The suit should greatly increase the survival rate of those forced to abandon ship in the cold waters of the north.

OCT. 1974

Abandon Ship Survival Suits

The routine with survival suits sounds a lot like the pitch you hear on commercial airlines regarding lifejackets: this is what they look like, this is how to put them on and this is how to use them.

Survival suits are fast becoming an accepted part of the progressive fishing vessel safety program. It is important to know what yours looks like if you already own one or what the available models look like if you still need to buy one, and how to become proficient in putting them on and how to use them.

Different models of the approved exposure suits, as they are called, have different features, but basically they are designed to give the wearer considerable protection for the whole body against hypothermia when immersed in cold water. They are made of closed cell neoprene which is coated on the inside and outside with nylon. This material is both waterproof and serves as a good insulating material. While the zippers and other closures are designed to exclude water, the survival suits all will function well even if there is water in the suit.

An optional feature on the latest models of the suits is an additional flotation device in the form of a ring or bladder. This feature is designed to provide additional flotation and comfort in keeping the head above water. The newer models also come with reenforced soles of the feet of the suit, which adds durability.

Since time is vital in emergency situations, every vessel should have a regular drill so each fisherman can become proficient in getting into his survival suit. A practice donning every first trip of the month might give each crewman enough practice to be able to bring individual times from several minutes down to 20 or 30 seconds.

When using a survival suit remember that they are designed to go over working clothes. It is not necessary to undress to get into your suit. The clothes you have on will help make things easier in the life raft or ashore. However, remember that maintaining bodily fluids is nearly as important as keeping warm. So one should guard against becoming so warm that perspiration losses become critical in individual survival. Don't overexert yourself except for short emergency periods.

In recent months a vessel sank in Alaskan waters with two people aboard and only one survival suit. One lived and one died. One suit will serve one at a time.

Feb. 1978

LIFE RAFTS and SURVIVAL PACKS

Life raft demonstrations have been a vital part of the safety education program in Alaska. In the demonstrations, many Alaskan fishermen have seen life rafts correctly deployed and have had an opportunity to pick up additional tips on survival in emergency situations.

Since life rafts are usually deployed in semi-panic conditions, there is no substitute for the visual experience of seeing and taking part in a life raft demonstration. However, there are some things one should hear again and again and some points that a buyer might want to consider when selecting a raft for Alaskan sea conditions.

CERTIFICATION

The first concern deals with certification. Life rafts which have been certified by the U.S. Coast Guard have been built according to specific plans, passed a number of tests on inflation and durability, and contain certain survival equipment and supplies. The lack of this certification does not necessarily signify a substandard raft, but certification does indicate that the raft has met certain minimum requirements.

Experience has shown that Alaskan conditions place special demands upon equipment and people. For this reason, there are optional features that should be considered for our conditions. Inflatable floors and double canopies are features which are essential for the conservation of warmth. One manufacturer is also pioneering work on a new ballasting idea.

SURVIVAL PACK

An item often overlooked in the optional equipment is the survival pack. The minimum required equipment is just that: minimum. Additional equipment can be obtained by specifying either of two other classes of survival pack.

Since survival equipment packed with the life raft is seldom seen, it is a good idea to review the contents of different classes of packs.

There are three classifications of life raft survival packs certified by the U.S. Coast Guard (other rafts may not contain this type of survival pack): Standard (contains the minimum specified items); Limited Service (contains everything included in the Standard pack plus additional items); and the Ocean Service pack (contains the contents of both the Standard and Limited Service packs and some additional, rather valuable items for survival).

STANDARD

- Painter
- Sea anchor
- Towing bridles
- Righting strap
- Life lines
- Heaving line
- Paddles (2)
- Automatic locator light
- Automatic interior light
- Rain water storage bags
- Inflating and bilge pump
- Leak stoppers
- Repair kit
- Floating knife and sheath
- Survival Manual

LIMITED SERVICE

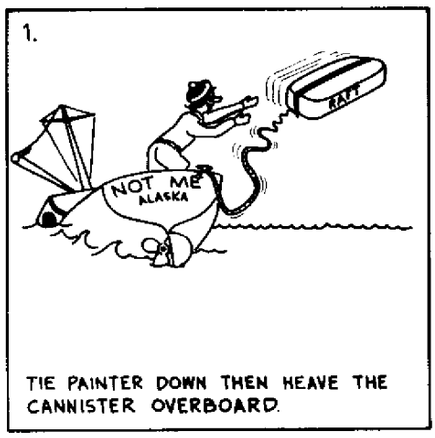
(STANDARD equipment plus:)

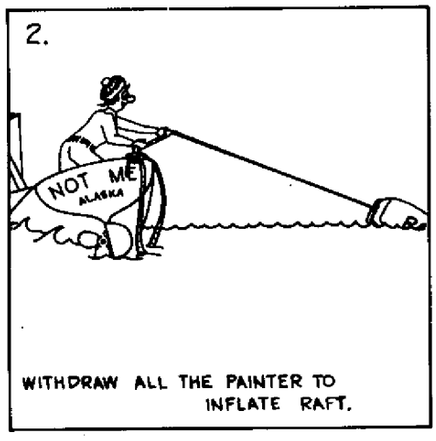
- Flashlight
- Spare flashlight bulbs (2)
- Spare flashlight batteries (3)
- Sponge (1)
- Bailer (1)
- Jackknife
- Parachute distress signal (1)
- Hand smoke flare (2)
- Container for above

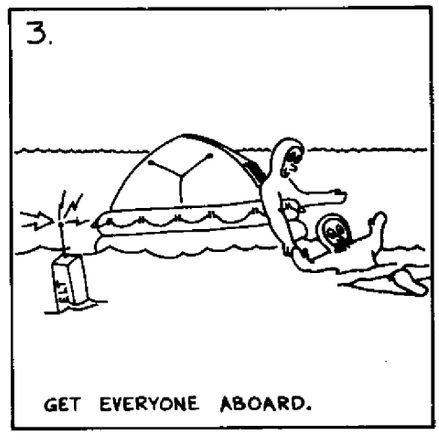
OCEAN STANDARD

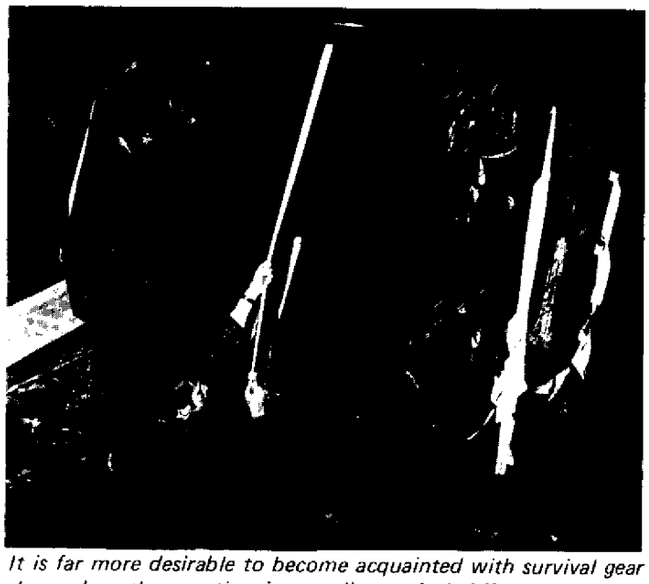
(All STANDARD and LIMITED equipment plus:)

- Graduated drinking vessel
- Signal mirrors
- First aid kit
- 3 cans of water per person
- 1 lb. of ration per person
- Additional bailer
- Additional sponge
- Additional parachute flare
- Red hand flare (6) (SOLAS)
- Additional jackknife (in raft over 12 persons)
- Additional can opener
- Signaling whistle
- Fishing kit
- Anti-seasick pills









It is far more desirable to become acquainted with survival gear in the calm and controlled conditions of hands-on demonstration than when the question is actually survival. Life raft demonstrations will be part of the Safety Fairs scheduled for six Alaska ports in March and Apri.

LIFESAVERS

Demonstrations and films stress the proper way of deploying a liferaft. It is important to remember that the raft will inflate itself and break through the bands that hold the two halves of the cannister together once the inflation mechanism is activated. After securing the painter to the vessel the cannister is simply thrown overboard. Drawing out the full length of the painter activates the inflation mechanism. The raft should inflate itself completely at this point. If not, a pump is provided to inflate parts of the raft which are low.

It also is a good idea to become familiar with the contents of the survival pack at that time and to guard against their loss or damage by water. The sea anchor is designed to keep the raft close to the point of deployment. Be sure it is working so rescuers can find you.

BODY WARMTH AND FLUIDS

Sponging out the inside of the raft to keep it dry will also conserve heat. The floor of the raft should be fully and properly inflated. Another way to avoid the loss of heat and fluids is to avoid exercise, which will cause sweating.

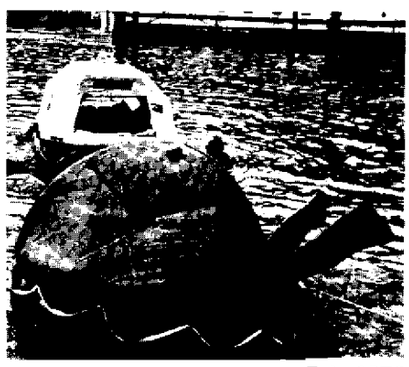
You must remember to pay immediate special attention to maintaining body warmth and fluids. The first thing that can be done after the crew is aboard the raft is to take anti-seasickness pills if they are available (they come with the ocean service pack). Even old salts find the more violent motions of a raft can cause seasickness and a potential loss of warm, vital fluids.

Feb. 1978

There just may be an exception to the old adage you get what you pay for. According to Mark Hutton, safety specialist for the Marine Advisory Program, the new Givens buoy survival raft is an excellent and relatively inexpensive piece of equipment.

The unique feature of the Givens raft is a ballast hemisphere which develops under water as the raft inflates. The underwater portion of the sphere holds 4000 pounds of water ballast which stabilizes and anchors the raft. In the 30 seconds that it takes for the raft to become boardable, the underwater hemisphere has developed at least 10% of its potential ballast, thus preventing extreme drift or blowing. Within three minutes the sphere has attained sufficient ballast to prevent overturning in heavy seas. According to the manufacturer the ballast system prevents flipping in wind or heavy seas, overturning when boarding, and drifting widely from the area of a disaster.

Hutton reports that the raft includes other features which have been recommended for Alaskan waters—an inflatable double floor and canopy, a radar reflector, a standard ocean survival package, and an emergency locator transmitter. The raft comes in only one size which will accomodate four men who weigh approximately 275 pounds each or six men who weight approximately 175 pounds. Price of the raft in Anchorage is $1768. Along with Switlick and RFD, the Givens raft can be repacked in Anchorage.



Feb. 1976

Three Winter Days On a Life Raft

An inflatable life raft is probably the most important single piece of safety equipment on a fishing vessel. Unfortunately, records show that use of the life raft is not always successful. Failures in life raft use are often a result of the crew's lack of knowledge about the raft as a life saving system.

In late November of 1973, Jan Fetterson spent three and one-half days drifting in an inflatable life raft in the Bering Sea. Fetterson and three other crewmen were aboard a fishing vessel which caught fire and had to be abandoned before a distress call could be radioed. A firsthand account of Fetterson's experiences was taped for the Fisheries Department of Kodiak Community College. The following excerpts from this account underscore some of the basic problems of life raft safety.

"I was on the MV Astron out of Unalaska. About 7 p.m. we had an explosion on the boat which created a fire everywhere adjacent to the stack. The fire was burning on top of the flying bridge right adjacent to the life raft cannister so I went up and released the cannister, and it did release very well. I tried to throw the cannister on the deck of the boat so it could inflate on the deck. However, there were several lines from the rigging in the way, and the life raft cannister being somewhat bulky, I had a hard time getting it up over the rail and through the lines. The skipper told me throw it in the water. I threw it in the water and the raft inflated almost immediately, but it inflated upside down. When we realized fighting the fire was useless we went back to the raft. At that time we were 13 miles off North Head Light in the Bering Sea. It was November 22 (1973) . . . there'd been a little bit of ice in the bay in Unalaska that morning so it was pretty chilly, it was probably around 36° and the sea water was probably around 32°.

"After we got in the raft, we proceeded to open a big bag of survival equipment. We were surprised to find there was no fresh water and no food supplied . . . We discovered that we had a flashlight in our survival gear. The main thing wrong with it was, first of all, it was not waterproof. In the second place, it had regular flashlight batteries which weren't waterproof and didn't have a long storage life, evidently, because they didn't last long at all . . . The contents of the survival package were in one big sack which made it very difficult once you took things apart to reassemble them and keep them in any one place without getting a flashlight and looking through it. If we'd had smaller packages where your flares were in one package, your water in another—if you had them separated where they could maybe snap onto some fastening so it wasn't under your feet or your body all the time—it could have been much more organized.

"We were thoroughly wet immediately after getting in the raft since it did inflate upside down. Only one crew member had a coat with him. I was in a T-shirt, deck slippers, wool socks, and no long underwear, so the skipper and I were very poorly equipped for the weather. You don't get any second chances; once you get off a boat you rarely get back on.

"One thing I would suggest for a life raft is some sort of inflatable pillow. On the raft there are only two possible positions—either you can lay prone or sit hugging yourself—and it gets very tiring. An inflatable pillow could help make this more comfortable.

"Another suggestion is to take your shoes off since they cut down the circulation in your feet. I wrang out my socks periodically and massaged my feet and that's what saved them.

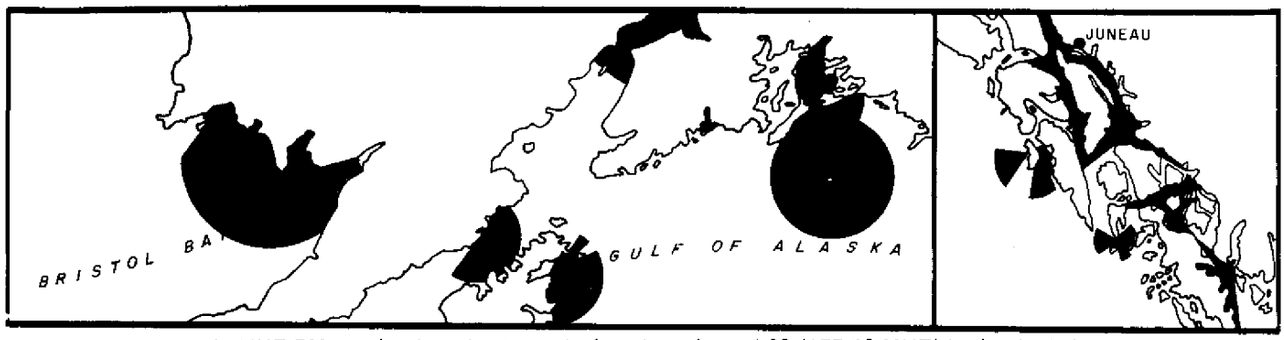
I would also recommend a space blanket. They are highly compact and are really invaluable for keeping warm. It was only well into the night paddling that we got around to inflating the floor of the raft. Without having the bottom inflated in the life raft the sea water takes the heat away from your body very easily. Once you get that inflated, it's far better.

"There wasn't a great surplus of instructions that I could see in any procedure once you got into the raft. That may be all right, but somewhere on the vessel I think there should be information about the life raft posted, more than how it inflates and how it detaches from the frame that secures it. Everybody on board the boat should know about that raft and know exactly what's in it. They should also have talks about what they would take with them, ideally, in an emergency situation if it came upon them suddenly.

"When we were about three miles from the boat, we saw a light of another boat coming past us. We knew it probably had to be the **St. Mark** since they were the only other boat out there at the time. We saw them coming, but by the time we got our parachute flare, and read the instructions to it, and got it put together right to shoot it off . . . by the time we shot the flare the boat was abeam of us . . . but evidently somebody wasn't on watch on the **St. Mark,** because they didn't see us . . . I was very surprised when they didn't see us, very disappointed too. I would definitely recommend more flares with the new flares that you have now, especially parachute flares. They wouldn't take up that much extra space and there's no sense having just one chance. You could have five of those parachute flares easily, it would just increase your chances of getting picked up. We had three handheld flares which are all right, but they don't have anywhere near the visibility and the attention-getting capabilities of parachute flares.

"I would like to reemphasize that it is really hard to find a six-foot life raft in 100 square miles of ocean . . . We were close to boats every night we were out there, but we just couldn't get their attention. I would recommend plenty of flares (at least five parachute flares), a light for the top of the canopy, a pocket strobe and a distress signal.

Editor's Note: The crew members of the MV Astron were picked up on Thanksgiving Day 1973 by a Japanese trawler. Mr. Fetterson's final comments on the tape were "the fact that we were picked up 120 miles away from the point where we stopped paddling, 80 miles off the Alaskan coast in the Bering Sea is something I'll always wonder about." Copies of the entire tape can be obtained for educational purposes by writing Kodiak Community College, Kodiak, Alaska.



Hourly VHF-FM weather broadcasts can be heard on channel 22 (157.10 MHZ) in the shaded areas.

Distress

Distress communications are particularly difficult in Alaska because of immense distances and mountainous terrain. To combat this problem the Coast Guard is increasing its radio communications program.

For high frequency (HF) voice communications the Coast Guard now has the ability to listen and respond on any frequency within ten minutes. If you can make contact on 2182 KHZ, the 24-hour, guarded distress frequency, the Coast Guard can shift and respond on any frequency which might have better reception. Weather broadcasts will continue on 2670 KHZ.

The Coast Guard is increasing use of three single-side-band duplex voice frequencies—the 4, 6, and 8 MHZ bands. These circuits are being established to provide government and nongovernment vessels, particularly those without continuous wave (CW) equipment, a means for transmitting AMVER and METEO reports. The Coast Guard communications station at Kodiak presently maintains a 24-hour guard on the 6 MHZ band, 6208.6 (6207.2) KHZ. Weather reports on 6523.2 (6521.8) are scheduled to begin in the near future, and by July 1, 1976 the 4 and 8 MHZ bands should be operating.

The Coast Guard is also planning implementation of a VHF-FM radio communications system to augment the existing CW and HF systems. The Federal Communications Commission regulations require that all new high frequency (2-3 MHZ) voice radio installations aboard vessels be accompanied by a VHF-FM radio installation. After January 1, 1977 all HF radio-equipped vessels must also be VHF-FM radio equipped. The Coast Guard envisions using the VHF system (157.10 MHZ) for hourly weather broadcasts. Construction of all VHF sites is scheduled to be completed by November 1976.

June 1975

First Aid Notes

For hypothermia and frostbite the current medically accepted treatment **is to warm the body as quickly as possible** with temperatures around **100°F**. Get warm liquid into the person. The old ideas of ice and warming gradually are **not to be used!** It will be painful for the victim but "bathwater temperature" warm water should be used. If you have a survival suit, put the victim in it and fill it with warm water.

Smoke inhalation from a fire can result in lung contamination by undesirable gases and particles. Oxygen is the single most important thing you can give a victim. Out at sea if you have an oxygen/acetylene cutting and welding outfit, make a simple face mask, cut a hose, and give the patient small amounts of oxygen. Industrial oxygen of this type and hospital oxygen are the same!

June 1975

Norway Requires Boats Carry Safety Beacons

Norway is currently the only maritime country in the world which requires all of its merchant ships and offshore fishing vessels to carry emergency radio locator beacons. These beacons transmit on the two frequencies used by civilian and military aircraft. All Norwegian civilian aircraft in regular service are required to listen in on these frequencies when they are air-borne.

The system inadvertently was put to a real test recently. A new locator beacon was delivered to a fishing vessel tied to the dock in a Norwegian port. The weather was bad and the crew was ashore. The beacon, straight from the factory and still in the packing crate, for some reason began sending out its intermittent emergency signals.

Four aircraft picked up the signals, and an air-sea rescue operation was launched. A helicopter headed straight for the signal, landed near the boat, and the pilot went aboard and switched off the beacon.

This prompt response to what was a weak call (from a packed set with rod antennae not extended), provides an indication of the advantage that an emergency locator beacon would offer rescue teams in locating a fishing vessel in distress.

Alaska fishermen interested in equipping their vessels with the most up-to-date emergency equipment might well consider the positive results of the use of emergency locator beacons in the Norwegian fishing fleet.

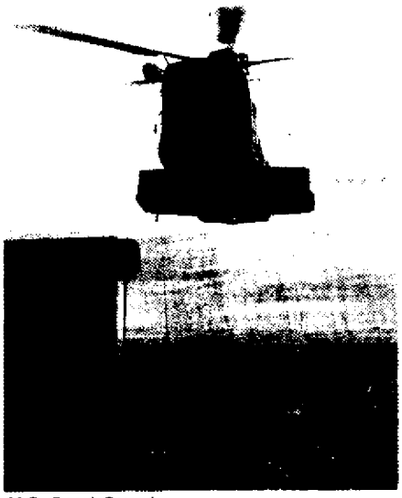
June 1973

Six Rules For Your Liferaft

- Have a Coast Guard-approved raft for Alaskan waters (Switlik, Elliot or RFD). These rafts have excellent insulating qualities, survival gear and back up systems.
- The raft should be inspected once a year. Know what is in your raft.
- The cradle (cannister supporting frame) should be bolted to the deck in an area where the life raft will not entangle with gear if it is automatically inflated.
- Leave the painter attached to the cradle or the ship.
- Release the hydrostatic tie-down and inflate the life raft by throwing the sealed cannister in the water and pulling the painter (rope) out of the cannister. The last pull will inflate the raft automatically. Enter the raft DRY or in a SURVIVAL SUIT if possible. Stay tied to the boat.
- Once inside the life raft, inflate the floor, and proceed according to the instruction/survival booklet.
- Two important pieces of equipment are a survival suit for each person, and an emergency locator transmitter (ELT).

June 1975

HELICOPTER EVACUATION



U.S. Coast Guard

In the above photo, a Coast Guard rescue helicopter from Kodiak lifts an injured Japanese fisherman from the deck of the Coast Guard cutter **STATEN ISLAND.** *The man previously had been transferred to the cutter from the Japanese fishing vessel* **AKEBENO MARU NO. 16.**

If the Coast Guard receives a request for medical evacuation aid from your vessel, you will be informed of the **number** on the Coast Guard helicopter that will be dispatched to your position, and its estimated time of arrival. The Coast Guard requests that you make the following preparations prior to its arrival:

(1) Select and clear the most suitable area for hoisting, preferably on the stern. Secure all loose gear, awnings and antenna wires, trice up running rigging and booms. Do not lower antennas that are used to communicate with the helicopter or shore station.

(2) Adjust course and speed to permit your vessel to ride as easily as possible with the wind on the port bow.

(3) If possible, have the patient moved to or as close to the hoist area as possible if his condition permits. Attach a note to the patient giving his name, age, address, telephone number and any drugs or medication which have been administered.

(4) A litter will be lowered from the helicopter. Allow the litter to touch deck prior to handling to avoid shock from static electricity. Disconnect the cable from the litter and allow to go free. Do not attach the cable to any part of your vessel and do not attempt to move the litter with the cable attached. A trail line may be attached to the litter to assist you in guiding the litter to and from the helicopter. Do not attach this line to any part of your vessel.

(5) Place the patient in the litter. Be sure he is strapped in securely, face up, with the life jacket on if his condition permits. Signal the helicopter when ready to hook up.

(6) The helicopter will lower the cable. Allow it to touch deck, then hook it up to the litter and signal when ready to hoist.

(7) If at night: Light the pickup area as well as possible. Be sure you do not shine any lights on the helicopter and blind the pilot. If there are any obstructions in the vicinity, put a light on them so the pilot can see them.

June 1973

SEARCH AND RESCUE

The Search and Rescue Center at the Coast Guard air station on Kodiak is responsible for assisting vessels in trouble throughout a three million square mile area, including most of Alaska's fishing grounds. Rapid weather changes, extremely low temperatures, tremendous winds and poor communications are typical for this area. Not surprisingly, these physical realities often dictate the chances for recovery of a vessel or life raft at sea. Take, for example, a distress call from a life raft which is able to report its position within 15 miles. After 12 hours adrift in a 12-knot wind, that life raft could be anywhere in an area of 1800 square miles. After 24 hours, the search area would be 3500 square miles or roughly the size of Connecticut. Naturally the chances of recovery decrease the longer the raft is adrift.

To increase your chances of recovery the Coast Guard makes the following recommendations.

- Tell someone if your itinerary changes.
- Listen to the radio.
- Stay on board as long as possible.
- If you must abandon ship to a life raft, remain tethered to the vessel if possible.

Towing

Assuming a lost vessel is found and needs to be towed, you should secure its nets, gear and otter boards or beams on deck. The otter board trawl wires or other wire leads should then be rigged in a bridle and made fast forward of the stem. The rescue ship will pull ahead, and back down on the distressed craft, pass it a hearing line and get the wire bridle shackled into the rescue towing harness. Nonmetal towing bridles should be avoided.

In heavy seas it is difficult to maneuver heavy rescue craft. In these cases the rescue vessel must use a line gun. Take cover when this happens; don't stand up and use yourself as a target for the line gun!

Search and Rescue Area Coverage
(adrift in a liferaft in a 20-knot wind)

Time Lost	Area to Search	Chance of Detection/Rescue	
12 hours	1800 mi^2	70%	good
24 hours	3500 mi^2	60%	fair
48 hours	20,000 mi^2	25%	poor
96 hours	40,000 mi^2	4%	pretty slim

June 1975

We Salute
Rear Admiral John B. Hayes

By Mark Hutton
Assistant Executive Director NPFMC

Mark Hutton

While working with fishing vessel safety for the University of Alaska and now, as Assistant Executive Director to the North Pacific Fishery Management Council, Mark has had long experience with Rear Admiral J. B. Hayes, Commander of the 17th Coast Guard District. We are pleased that they have consented to this interview, as they both have been key figures in Alaska's evolving fisheries. We at **Alaska Seas and Coasts** *join the fishing industry in paying tribute to Rear Admiral Hayes for his service here in Alaska.*

– Ed.

INTRODUCTION

Rear Admiral J. B. Hayes, Commander of the 17th U.S. Coast Guard District (Alaska), has recently been nominated by President Carter to become Commandant of the United States Coast Guard. His rise to the nation's top Coast Guard position began when he graduated from the U.S. Coast Guard Academy in New London, Connecticut, in 1946 – 32 years ago.

In his early career he served as damage control officer of the cutter *Aurora* in Georgia. His sea duty was interrupted when he commanded the Loran Station in Japan in the early '50s. Returning to the sea, Hayes became Commanding Officer of the cutter *Ariadne*. Then he served a short time as Commander of the Coast Guard base in Key West, Florida. He then shipped out as Commanding Officer of the cutter *Sagebrush*.

After completing Naval War College at Newport, Rhode Island, in 1960, Hayes became Chief of the Long Range Planning branch of the Coast Guard's Program Analysis Division. While serving as a member of the special task force to study Coast Guard roles and missions, he received his first major commendation for outstanding accomplishment from the Secretary of the Treasury. Later he served as liaison to the House Appropriation Investigative group.

Hayes was next awarded the Secretary of Treasury's commendation medal for his role in a long range plan for the replacement of aging Coast Guard vessels and for modernizing shore stations. Shortly before leaving Washington for his next assignment as the Resident Inspector in Todd Shipyard in Seattle (1964), Hayes graduated from George Washington University with a Master of Arts degree in International Affairs. At Todd Shipyard he oversaw completion of the 210-foot cutter *Vigilant*, on which he later served as Commanding Officer. He next returned overseas as Fourth Coastal Zone Advisor and Commander of Division 11, Coast Guard Squadron 1, in South Vietnam. Upon returning home he was assigned to Washington and promoted to Captain while serving as Chief of the Shore Facilities Branch of the Search and Rescue Division. As Chief of the Planning and Evaluation staff of the Office of Boating Safety, he was awarded the Coast Guard Commendation Medal.

Hayes was named Commandant of Cadets at the Coast Guard Academy in 1971, and was promoted to Rear Admiral in 1973. Prior to coming to Alaska in 1975, he was the Comptroller of the United States Coast Guard.

Hutton: Your tour here in Alaska has been only a part of your long history with the Coast Guard. How have your experiences here contributed to your career?

Admiral Hayes: I would say that it is the most challenging and exciting job that I have had in the Coast Guard. The things that I have been privileged to be a part of up here will certainly prepare me for some of the problems that I'll encounter as Commandant of the Coast Guard. For example, working with the pipeline terminal in Valdez, we had some interesting discussions with the industry, fishermen, environmentalists, and the State of Alaska. The discussions and the conflicts were healthy. They point out that no matter what one does in this day and age, it is going to be done in an environment of, if not conflict, at least disagreement on what is best.

Rear Admiral J. B. Hayes

Another example is the Fishery Conservation and Management Act of 1976. It is quite clear that the Coast Guard has become even more involved with the fishing industry as a result of it. As you well know, I have had the privilege to be a member of the North Pacific Fishery Management Council here in Alaska. I truly consider that experience to be one of the high points in my involvement with government organizations. We have been plowing new ground, and it has been a fascinating interplay of the different interests, as represented on the Council. It is my candid view that the North Pacific Council has done an outstanding job of carrying out the intent of the law.

Hutton: As Commandant, do you think that some of the issues that you have faced in the past are at a point of change?

Hayes: Yes, I think that you have to say that about almost anything. The Coast Guard, particularly in the last 15 or 20 years, has been in almost a constant state of change. While we have dropped our traditional weather patrol and Bering Sea Patrol, we now have our Alaska Fisheries Patrol. We have maintained our search and rescue responsibility. We have expanded our efforts in environmental protection and marine safety. My real

concern is that we somehow manage to retain a balance between our seagoing forces and our regulatory responsibilities.

Hutton: Weren't the major issues you faced here in Alaska more regulatory than seagoing? I am thinking of the pipeline problem, the North Pacific Council, and the particular enforcement problems of extended jurisdiction.

Hayes: Well, you have to make a distinction between regulations, regulatory responsibilities, and enforcement. Regulatory responsibility is developing the need for certain regulatory action and following the rulemaking process to get regulations. Once you have done that, then it is up to others within our organization to enforce it. Enforcement is the operational side of things. I don't see the Alaska Fisheries Patrol as a regulatory function in this sense, but as an enforcement operation.

Hutton: I think a lot of people have that misconception.

Hayes: Let's look at it in this way: I would classify our regulatory functions as boating safety, commercial vessel or merchant marine safety, ports and waterways safety, and marine environmental protection. Our operational activities include aids to navigation, search and rescue, ice breaking, and law enforcement, including the fisheries patrols. These operational activities require the extensive capital investment in aircraft, ships, etc.

Hutton: Those activities would also include the Loran C navigation changeover efforts, marine safety for recreational and commercial fishing, the Trans-Alaska Pipeline, and the activities on the Council. Were any of these a particular thorn in your side, or more time consuming than anything else?

Hayes: Well, from the summer of 1976 to the summer of 1977 Valdez occupied a disproportionate amount of my time. While the State of Alaska was developing its Tanker Law, we were developing our regulatory action, and entering the final stages of our construction program. This construction program resulted in our three new Loran C stations, the traffic center in Valdez, plus our air station move to Sitka. Since that time, however, fisheries has occupied the greater portion of my personal time. I see fisheries continuing to occupy a substantial portion of the District Commander's time in the immediate future.

Hutton: It almost has to. I would like to note that while the Coast Guard has statutory responsibility on the Council because of its surveillance and enforcement functions, your personal time has gone far beyond those commitments. Everyone is impressed with the personal interest you took in fisheries. I was wondering if you could sum up your feelings on that?

Hayes: Well, first the fisheries are the largest user of Coast Guard resources in Alaska. As I recall, about 40 percent of our dollar expenditures are either directly or indirectly associated with our fisheries operations. That, in itself, dictates a substantial interest and involvement on my part. Secondly, I have to confess to being extremely excited about being a part of what I consider to be a new form of government: a new form of government in which the public and all interest groups can participate in the development of a very complex management machinery. Thirdly, it was obvious from the outset that this was to continue to be a major mission for the Coast Guard. I wanted to be sure that we were strongly represented on the Council and were strong participants in developing those concepts that we were to enforce once they became law.

Hutton: As staff to the Council, it is noteworthy to me that you were continually bringing up points that we had overlooked. These were often high policy or principle problems that reached far beyond strict enforcement and surveillance issues. I know that the Council would strongly commend you for your time and assistance.

Hayes: Looking at that aspect of my involvement with the Council, I have to give a substantial portion of the credit to Commander Ralph Giffin and Lt. Commander Jim Ellis. They have really been imaginative and innovative in approaching the whole business at hand.

Hutton: While on that subject, there are three people in the Coast Guard that the marine industry in Alaska recognize as outstanding contributors to the welfare of the industry. Besides you, the industry has also singled out Commander Bob Nichols and Commander Terry Montonye. I wonder if you can say something about them?

Hayes: Well, you keep talking about the great things that have accomplished, Mark, but I have to make a very strong observation that it has all been possible because of the fine people that I have had working for me.

Commander Nichols was intimately involved with developing the concepts for our vessel traffic system in Valdez. He is one of the most outstanding officers who has ever worked for me. He was nominated for a very special leadership award a year ago, which indicates the sort of person that he is. He has been a strong advocate for the fishermen, while being pretty tough when it comes to enforcement and fairness. I think that is important, because it is all well and good to be a good guy, but at the same time you can be respected for enforcing the law justly and accurately. I think that is something special.

Commander Terry Montonye, skipper of the cutter *Confidence*, has been an extremely aggressive commanding officer. He has become one of the most knowledgeable people in the District concerning the fisheries laws and regulations, as well as the whole broad arena of law enforcement. Terry has been a strong right arm. I would like to recognize Commander Lee Krumm, skipper of the *Storis*, who has done a first-rate job. In addition, the skipper of the air station, Captain Bill Bickford, and the skipper of the support center, Captain Charlie Clark, have performed magnificently over the last two or three years. The list of people goes on and on.

Hutton: This must be a strange time for the Coast Guard in Alaska from the personnel standpoint. About this time every year you lose between 30 and 40 percent of your people to normal rotations and transfers. Few people can recall a time, however, when so many key people were lost at one time.

Hayes: From my experience in the Coast Guard, you don't have to worry too much. We select those people to be put in command very carefully. First, the new District Commander will be someone who wants to come up here. Secondly, I am sure the new Commander will be someone well qualified to step in and do the job. There are arguments for extending the tours of duty, but then you have to be very careful about the impact of those kinds of changes on the families. All facets of the question have to be weighed carefully. I can tell you that the present system seems to be working fairly well. I have had several different sets of skippers in the three years since I have been up here, and yet I can't really distinguish any difference in performance between them. I don't worry too much that quite a few of us are leaving at once

because there are a lot of good people to take our place.

Hutton: We tend to be a little provincial here in Alaska because of our isolation and unique problems. I suppose that we have become self-centered, but a lot of people wonder if your becoming Commandant won't create an awareness, both within the Department of Transportation and the Commandant's Office, of what is needed here in Alaska. I suppose that everyone is secretly hoping that with you as Commandant there might be easier access for Alaskans to both the Department of Transportation and the Commandant's Office to discuss such things as policy decisions that affect Alaska.

Hayes: Sure you are provincial, but so am I, as long as I am an Alaskan. I suspect that may be forever now. I am not likely to create a great deal more financial interest in Alaska than has already occurred. If you really want to look at the facts, in the last four years Alaska has had a very disproportionate share of our construction and improvement money. This is both in terms of shore facilities and in terms of vessels and aircraft dedicated to mission performance.

Any reply that I can make had to be given with that background. We have put more resources into this district than any other district. We are at the point now that we are the second largest district in the Coast Guard behind New York in terms of operating costs. If you added in all the costs of the equipment dedicated to the Alaska fisheries patrol, I would suspect that we are the biggest district in the Coast Guard.

With all that background, now I will answer your question: I don't think that there is any question that you will see me up here a couple of times when I am Commandant. I can assure you of that, but the other districts will also see me. This is a complex piece of real estate up here, and my experience here will help me make decisions about this area a lot more accurately.

You are aware that I am on the Field Coordinating Committee of the Department. That group includes Lyle Brown of the Federal Aviation Administration, Bill Dorsey of the Alaska Railroad, and Gene Hannah and Lou Lybecker of the Federal Highways. We have been working closely to try and make the Department of Transportation aware of Alaska and its special transportation needs. I think to some extent we have been making some inroads. Most certainly I will be able to enhance that effort once I get back there as Commandant.

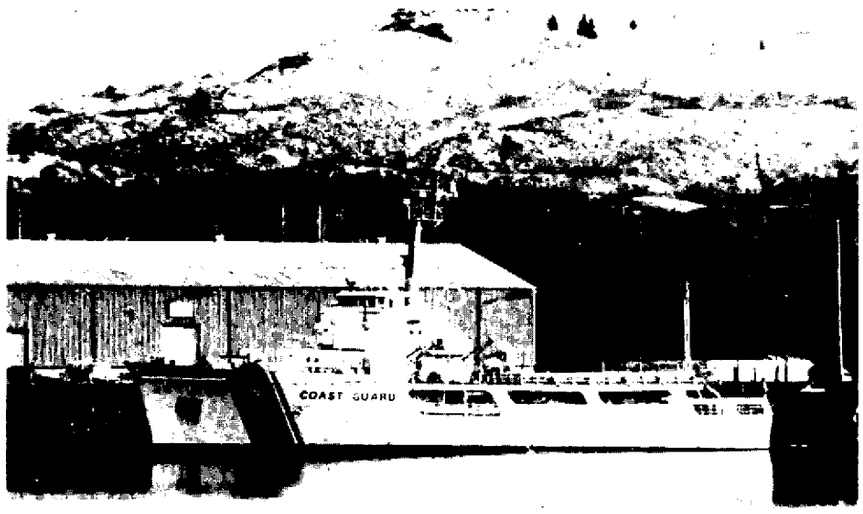
Hutton: Will you miss living in Alaska?

Hayes: You really don't have to ask that question do you, Mark?

Hutton: I just wanted to ask for the record.

Hayes: I'll miss it more than any other place I have ever been. It has a special charm and attraction for my family. ·· ··

April 1978



The U.S. Coast Guard cutter **Confidence** *under Commander Terry Montonye has been a leader in apprehending vessels violating the conditions of our 200-mile limit. It is shown in Woman's Bay on the Coast Guard base at Kodiak after seizing the Japanese stern trawler* **Sachi Maru No. 22** (Photo by Hank Pennington)

The Japanese stern trawler **Sachi Maru No. 22** *has been impounded at the Coast Guard base in Kodiak. It was caught fishing in the Misty Moon halibut nursery grounds in the Bering Sea, an area closed to trawling inside our 200-mile limit.* (Photo by Hank Pennington)

Fire Control — New Developments

The Alaska Fisheries Safety Advisory Council (AFSAC) feels that there have been some recent developments in fire control systems which may have some useful applications in the engine rooms of commercial fishing vessels. These systems, available through fire control firms, are designed with a number of DuPont chemicals in mind. One of these chemicals, HALON 1301, is more suited to engine room fires than the others. The systems outlined briefly below are based upon this particular extinguishing chemical.

HALON 1301

What is HALON 1301, and how do the systems that use it operate? HALON 1301, according to available literature, is a liquid when stored under pressure in cylinders or tanks. It is discharged as a gas which is odorless, colorless, and non-conductive. A system is designed to provide enough HALON 1301 gas to be about four to six percent of the air in the space being protected. At those concentrations, it will put out a fire in seconds.

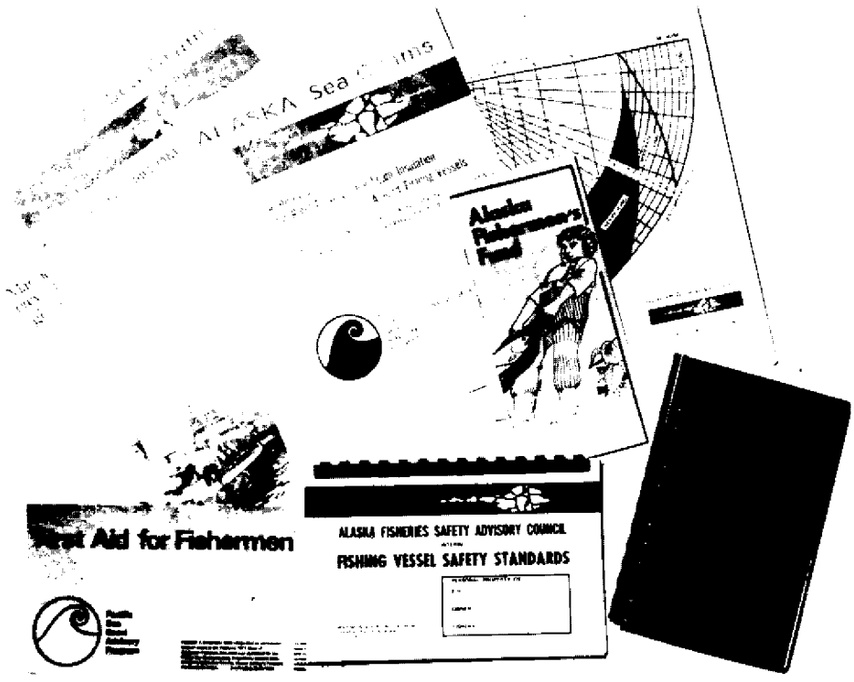
As it puts out the fire by "interrupting" combustion rather than by smothering, there is enough oxygen in the air to breathe and only in the case of a very hot or long fire are there any toxic by-products. HALON 1301 gas does not bother most materials including metals, plastics, rubber and electronic components.

Commercially available fire control systems that use this extinguishing agent have several basic parts. These usually include one or more detectors of several different types: cylinders or tanks, controls, piping, and nozzles. Some systems are very simple and can be installed by the buyer. Others are more complex and require specialized installation by the supplier.

Detectors give a system an automatic feature. A fire control system may also be set up so it can be activated manually from another location on the vessel.

For additional information, contact your nearest fire control business.

Feb. 1978



The following safety publications shown above are available through the Alaska Sea Grant Program, University of Alaska, Fairbanks, Alaska 99701: **Sea-Grams Nos. 3 and 4** *(on the safe use of rigid polyurethane foam insulation);* **Marine Advisory Bulletins No. 3** *(Safety Notes) and* **No. 5** *(Safety Standards);* **Pacific Sea Grant Advisory Program Posters** *(Man in Cold Water or First Aid for Fishermen);* **Alaska Seas and Coasts** *Vol. 4, No. 5 (National Weather Service nomograph for predicting vessel icing). The* **Marine Safety Series** *is available through Oregon State University, Extension Marine Advisory Program, Corvallis, Oregon 97331.* **Alaska Fishermen's Fund** *(state insurance information) is available through the Alaska Department of Labor, P. O. Box 1149, Juneau, Alaska 99811.*

Rigid Polyurethane Foam Insulation & Safety

Another of the recognized safety concerns in the Alaska fishing industry is exposed rigid polyurethane foam insulation. This material possesses superior insulating properties. While it can be used safely, the user must be aware of and take careful precautions against potential fire hazards.

- Avoid applying the foam to any surface where there are temperatures in excess of 250°F.
- Smoke fumes from any burning foam should be considered hazardous.
- All interior applications should be covered with appropriate thermal barriers.

THERMAL BARRIERS

Recognizing the potential fire and safety hazard of exposed rigid polyurethane, the industry, building codes, and the fire-fighting community all stress the requirement for an approved thermal barrier to cover any exposed polyurethane on interior surfaces: The use of a thermal barrier with a 15-minute safety factor on interior walls is the current requirement.

Not all approved coatings (for buildings, walls, etc.) are suitable for commercial fishing vessels. Aboard fishing vessels:

1. A sprayed or troweled coating is more suitable because of the ease of application and conformity to vessel interiors.
2. The coating must withstand moisture.
3. The coating must withstand vibration.

To date there are no coatings that have completed testing to meet the moisture and vibration problem.

The purpose of the thermal barrier is to allow enough time to extinguish a fire or get people away from a potentially dangerous situation. Most qualified applicators of sprayon rigid polyurethane foam will apply thermal coatings. All can supply you with thermal barrier information.

Feb. 1978

Fire and Rigid Foam

By Mark Hutton
Marine Advisory Program

Rigid polyurethane foams are among the best known insulators used today. They are inexpensive and compared to most insulation products are almost twice as effective as the next best commercial insulation material. In fact, a great number of commercial fishing vessels use rigid polyurethane foam insulation in one form or another.

What are the facts about urethane insulation? Will it burn? Is it dangerous?

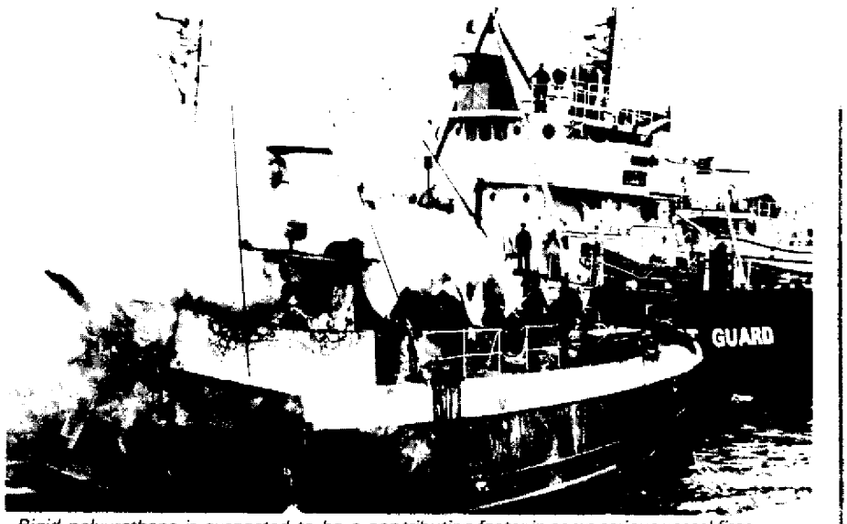
The major fire hazard of unprotected rigid polyurethane foam occurs when exposed foam surfaces remain unprotected in confined spaces with limited air access. This set of circumstances combined with a heat source could present a fire hazard. Any application of rigid polyurethane foam to surfaces that exceed 250°F should be avoided.

Also, recent and varied research and observation reporting has concluded that an ignited, rigid polyurethane foam (with a markedly different chemical structure than any rigid polyurethane foam commercially sold) treated with fire retardants, presented a major health hazard independent of flame contact and carbon monoxide intoxication.

All flame sources should be avoided; i.e., welding and cutting torches, molten metal or slag, electrical sparks, steam pipes, stack heater vents, motors, engines, electrical heaters, or high powered lights.

The Alaskan Fisheries Safety Advisory council (AFSAC) has been promoting the safe and wise use of rigid polyurethane foam insulation and is attempting to educate all urethane users. For more information write for the Marine Advisory Program Bulletin, Sea-Grams No. 2, "RIGID POLYURETHANE FOAM...a guide to safe use!"

OCT. 1976



Rigid polyurethane is suspected to be a contributing factor in some serious vessel fires. Norm Holm

Engine Room Fires

Members of the Kodiak fire department describe engine room fires as "extremely difficult to manage, difficult to fight, and generally extremely difficult all the way around." To prevent this type of fire remember the following.

- Maintain and inspect your electrical circuits.
- Store combustible and solvent liquids (i.e., starting fluid) in metal cabinets, never in the engine room.
- Have appropriate, maintained fire extinguishers on hand.
- Keep a rough sketch of the floor plan of your boat handy for use by any firefighter.
- Make sure your crew knows what to do in case of a fire.

Fire drills should concentrate on extinguishing or suffocating the fire. During the initial stage, when the fire is burning freely, the heat and smoke buildup is only moderate, and there is still plenty of air for breathing, the fire can be extinguished with proper equipment. However, as the heat and smoke intensify and oxygen is being replaced by carbon monoxide or carbon dioxide, the only way to extinguish a fire is to suffocate it. After suffocation the fire must be allowed to cool down. Under **no** circumstance should you open doors or a hatch cover and inject new air into an advanced fire.

June 1975

URETHANE INSULATION

Possibly the most important, and surely the most startling, piece of news which came out of the AFSAC annual meeting was the danger of exposed urethane insulation. This product is probably the best insulation currently available and is used throughout the fishing industry in boats and processing plants.

According to Andre Schalk, the State's Regional Fire Marshal, "Improper uses and placement of polyurethane is suicidal—both as a combustible and as a toxic inhalant." By improper uses and placement Schalk is referring to **any** exposed urethane used on the interior of a boat or building. Schalk calls urethane a time bomb in disguise. Heat, dimensional placement, and an unknown element seem to affect urethane's flammability. According to Schalk, urethane is flammable at all times, burns quickly at an intense heat, and creates a fatal smoke condition.

If you have exposed urethane in your house, boat or processing plant, it should be covered with a fire resistant barrier. A one-half inch layer of cement, plaster, fire-rated gypsum wall board or an approved thermo barrier is recommended. This barrier will give you time to evacuate or fight the fire. Fire retardant paint will not provide adequate protection and seems to retain the toxic gases of the urethane.

Schalk considers inexpensive heat and smoke alarms and appropriate, maintained fire extinguishers to be invaluable. For more information on urethane insulation and its dangers contact Mr. Andre Schalk, Box 6188 — Annex, Anchorage, Alaska 99502.

June 1975

The weight and irregular distribution of accumulated ice greatly affects a vessel's seaworthiness. The most critical effects of icing are: • It greatly raises the vessel's center of gravity, resulting in a loss of stability. • It greatly increases the sail area of a vessel, thus intensifying the heeling due to the wind. • It tends to form most rapidly to windward; thus, its weight may cause a significant list. • It usually develops more rapidly towards the bow, which tends to draw down the head of the vessel. • The added weight reduces the freeboard and buoyancy, cutting the vessel's speed and maneuverability.

VESSEL ICING FORECASTS

Part of Winter Fishing Safety

By John Ball
Marine Advisory Service
University of Alaska

Vessel icing is one of the most dangerous phenomena a fisherman can encounter. As air and water temperatures drop, wind-born spray can freeze and stick to any surface on a fishing vessel. The massive accumulation of frozen spray on the superstructure, rigging and gear of a fishing vessel can cause it to roll over by raising the center of gravity considerably.

Alaska Seas and Coasts *has presented articles discussing vessel icing on three previous occasions (refer to Vol. 1, No. 5, December 1973; Vol. 2, No. 1, February 1974; and Vol. 4, No. 5, December 1976), but the peril of icing cannot be overstressed. This year the National Weather Service is including vessel icing forecasts with their regular weather broadcasts as a service to fishermen, and in an attempt to minimize winter vessel losses in Alaska.*

In the following short article, John Ball, Marine Safety Specialist for the Marine Advisory Program, outlines the new forecasting procedures and includes recommendations for combating icing if it is encountered. For your convenience, the icing nomograph developed by Al Comisky of the National Weather Service and published in our December 1976 issue, is reprinted with the article.

— Editor

When the air temperature goes below freezing, vessel icing becomes a potentially serious problem for some Alaskan mariners. Accumulated frozen spray can affect the stability of the vessel often in a surprisingly short time. Icing forecasts

from the National Weather Service can help the alert skipper avoid serious trouble. There are some tips that can also be followed to fight the buildup of ice should it begin aboard your vessel. This article is designed to give the reader a working knowledge of the factors which contribute to icing and the rules of thumb which can be used to understand the icing forecasts this winter. A few suggestions are also given for combating the build-up of ice should the vessel face this problem.

The accumulation of freezing spray on the superstructure of a vessel depends upon several environmental factors: air temperature, wind speed, and water temperature. Once the air temperature drops below freezing, wind-driven spray can cause ice to form. National Weather Service forecasts for icing are given in four categories:

1. light freezing spray
2. moderate freezing spray
3. heavy freezing spray
4. very heavy freezing spray

The nomograph on this page shows the relationship between the environmental factors and the rate of ice accumulation. To use the nomograph, begin with the predicted air temperature on the left and move across to the estimated wind speed. Then follow the nearest diagonally sloping line down to the area where the water temperature is charted. The intersection of the sloping line and the expected water temperature will establish the icing risk (light to very heavy accumulation) which you can expect to find under those conditions.

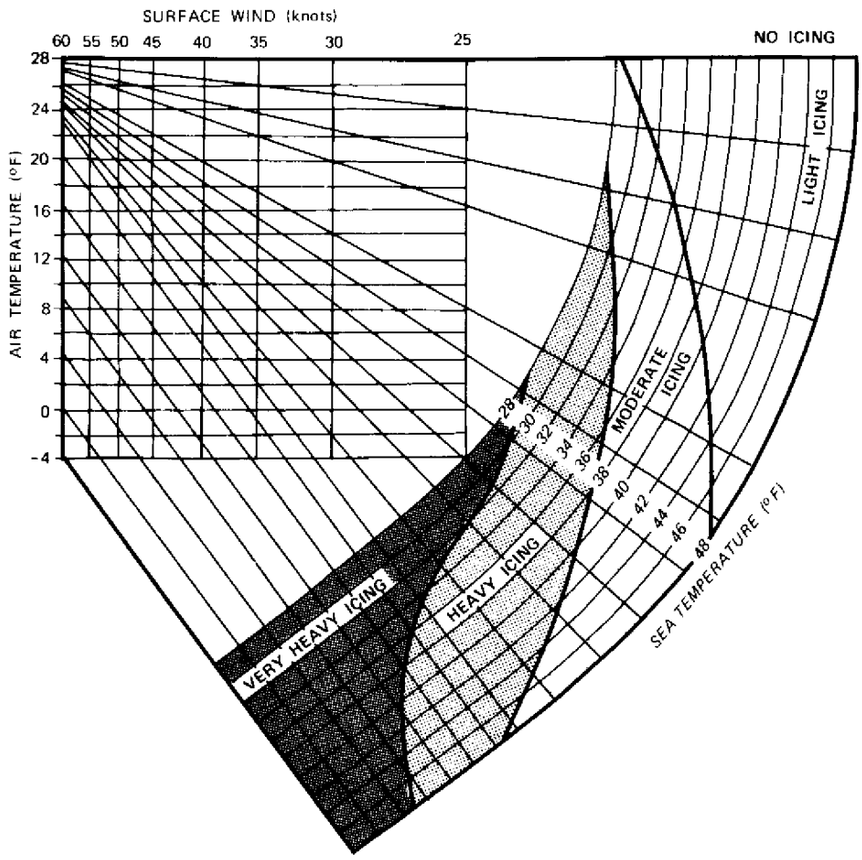
FIGHTING VESSEL ICING

Suggestions for vessels facing an icing problem:

1. Head for warm water (usually away from the Alaska mainland) or protected coastal areas out of the wind.
2. Place all fishing gear, barrels, and deck gear below deck or fasten to the deck as low as possible.
3. Lower and fasten cargo booms.
4. Cover deck machinery and boats.
5. Fasten storm rails.
6. Remove gratings from scuppers, and move all objects that might prevent water drainage from the deck.
7. Make the ship as watertight as possible.
8. If freeboard is high enough, fill all empty bottom tanks containing ballast piping with seawater.
9. Establish reliable two-way radio communication with a shore station or another ship.

For the purposes of the weather forecasts, using only air temperature and wind speed, the National Weather Service has developed these guides:

Icing Conditions	Air Temperature	Wind
Light Freezing Spray	25° to 30° F.	Above 18 knots
Light Freezing Spray	18° to 25° F.	Below 18 knots
Light to Moderate Freezing Spray	18° to 25° F.	Above 18 knots
	Below 18° F.	Below 18 knots
Heavy Freezing Spray	Below 18° F.	18 to 30 knots
Very Heavy Freezing Spray	Below 18° F.	Above 30 knots



INSTRUCTIONS: Say that you estimate that the air temperature is 14°F, wind velocity is 30 knots, and the sea temperature is 32°F. Enter the nomograph on the 14°F line. Follow this line to the 30 knot wind velocity line. From the intersection of the two lines, follow the diagonal line to the appropriate water temperature line. At the intersection read off the icing category — in this case, heavy icing.

ALASKA Seas and Coasts

The icing categories used by the NWS are.

CATEGORY	ACCUMULATION
Light	0.4" to 1.4" in 24 hours
Moderate	1.4" to 2.6" in 24 hours
Heavy	2.6" to 5.7" in 24 h.
Very Heavy	5.7"+ in 24 hours

Icing Poses Threat To Small Vessels

By JOHN P. DOYLE
Marine Advisory Program

Winter fishing in the Arctic and Subarctic is hazardous at best, and the waters around Alaska are no exception. One of the most dangerous conditions is icing—the formation of a crust of ice on a vessel's rigging and superstructure. This usually is caused by the freezing of water droplets from wind-driven spray on any exposed surface, but it may also result from snowfall, freezing rain, or even condensation of sea fog. Icing can be aggravated by water shipped on board and freezing on the deck. Ice develops most rapidly when the vessel is beating directly into the wind and sea, but it also accumulates when the wind is abeam or quartering.

The weight and irregular distribution of accumulated ice greatly affects a vessel's seaworthiness. The most critical effects of icing are:

- It raises your vessel's center of gravity, resulting in a loss of stability; this is most critical in vessels with extra rigging such as trollers, double-rigged shrimp draggers, and boats with deck loads of pots.
- It tremendously increases the sail area of your vessel, thus intensifying the heeling due to the wind.
- It tends to grow most rapidly to windward; thus its weight may cause a significant list.
- It usually develops more rapidly towards the bow, which tends to draw down the head of your vessel.
- The weight of ice will greatly increase the weight of your vessel, reducing the freeboard and buoyancy, and cutting her speed and maneuverability.

The factors controlling the formation of ice on small vessels are very complex, depending upon both meteorologic conditions (temperature, humidity, wind speed, etc.) and characteristics of the individual vessel (freeboard, amount and type of masts and rigging, size and location of deckhouse, etc.). For typical, moderate size Alaskan fishing boats in the 100 to 250 ton range, slow accumulation of ice (less than 1.5 tons per hour) is associated with these conditions:

- Air temperatures between 25-30°F at any wind force.
- Air temperatures below 25°F at wind speeds of less than 18 knots.
- Fog or sea mist coupled with a sudden drop in sea temperature.

Rapid accumulation of ice (more than four tons per hour) will occur at temperatures between 18-25°F with wind speeds of 18-30 knots. At wind speeds greater than 30 knots, extremely rapid build-up of ice can occur, particularly at temperatures below 15°F.

Icing conditions obviously should be avoided whenever possible. However, there are a wide variety of ways to prepare for and to cope with ice, which will be described in the next edition of **ALASKA Seas and Coasts.**

DEC. 1973

Some Solutions:

ICING ON FISHING VESSELS

The causes and effects of vessel icing were described in the December 15, 1973 edition of **ALASKA Seas and Coasts** ("Icing Poses Threat to Small Vessels," page 7). The following article gives suggestions for skippers on how to prepare for, and cope with, icing conditions; and includes recommendations from the Inter-governmental Maritime Consultative Organization (IMCO).

While it may be difficult to avoid icing conditions in a year-round fishery, you can stay aware of such conditions by listening to weather forecasts regularly. If you must take your boat out when icing conditions are likely to occur, you should give consideration to the overall size of your vessel's load, its deck load and the distance of open water you plan to traverse. You should plot your courses to minimize open water travel and to maximize your proximity to harbors.

Crab pots, winches, trawls and almost any kind of deck gear have extensive surface area upon which ice can form. The accumulation of ice on deck could cause your vessel to capsize. Gear should be stowed below, if possible. Equipment which cannot be removed from the deck should be covered with plastic or canvas, thus greatly reducing the exposed surface area. It is easier to remove ice which forms on such covers than it is to pound it off exposed gear.

A double-check of all emergency and life saving equipment, keeping in mind what it might be like to live in a life raft in freezing temperatures, is worthwhile. Be sure that you have tools aboard, such as baseball bats, sledge hammers, ice choppers, scoop shovels, crowbars and machetes, to pound, pry or shovel ice from your vessel. It is a good idea to provide one tool for each crew member; the ice may have to come off in a hurry.

If icing occurs high enough in the rigging to affect booms, the booms probably should be lowered to deck level. However, keep in mind that when booms are on deck, the amount of surface area exposed to icing is substantially increased. Judgment should be exercised at an early stage of icing; it may not be possible to drop the booms after ice accumulates. Ice should first be removed from the upper works of a vessel—standing rigging, mast, life rafts and boats, the deck house, deck machinery, bulwarks and decks. High pressure hoses, using raw sea water, may also help to remove ice, if scuppers with gratings removed are large enough to accommodate ice and water runoff.

If the boat's position in relation to land permits such action, it is possible to prevent or reduce icing by running a boat slowly before the sea, avoiding as much spray as possible. A better alternative, if available, is to run to a nearby harbor.

Feb. 1974

VESSEL ICING
— Know when to expect it.

By Al Comiskey, Chief
Environmental Services Branch
National Weather Service, Alaska Region

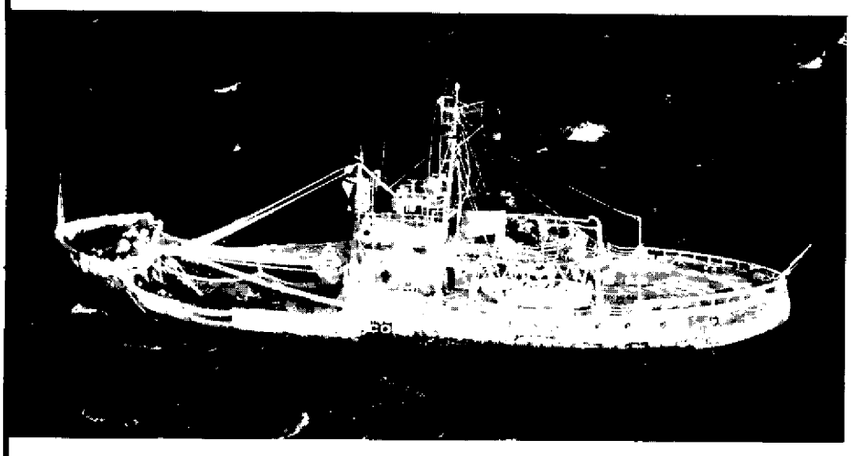
The accumulation of frozen spray on vessels under certain climatic conditions poses a serious threat in many regions of Alaska. The ability to predict icing conditions is a highly significant contribution toward safe vessel operation.

Alaska Seas and Coasts is pleased to present the following article by Mr. Comiskey. The nomograph for predicting icing conditions should find a place in the wheelhouse of every vessel operating in waters with a potential for superstructure icing.

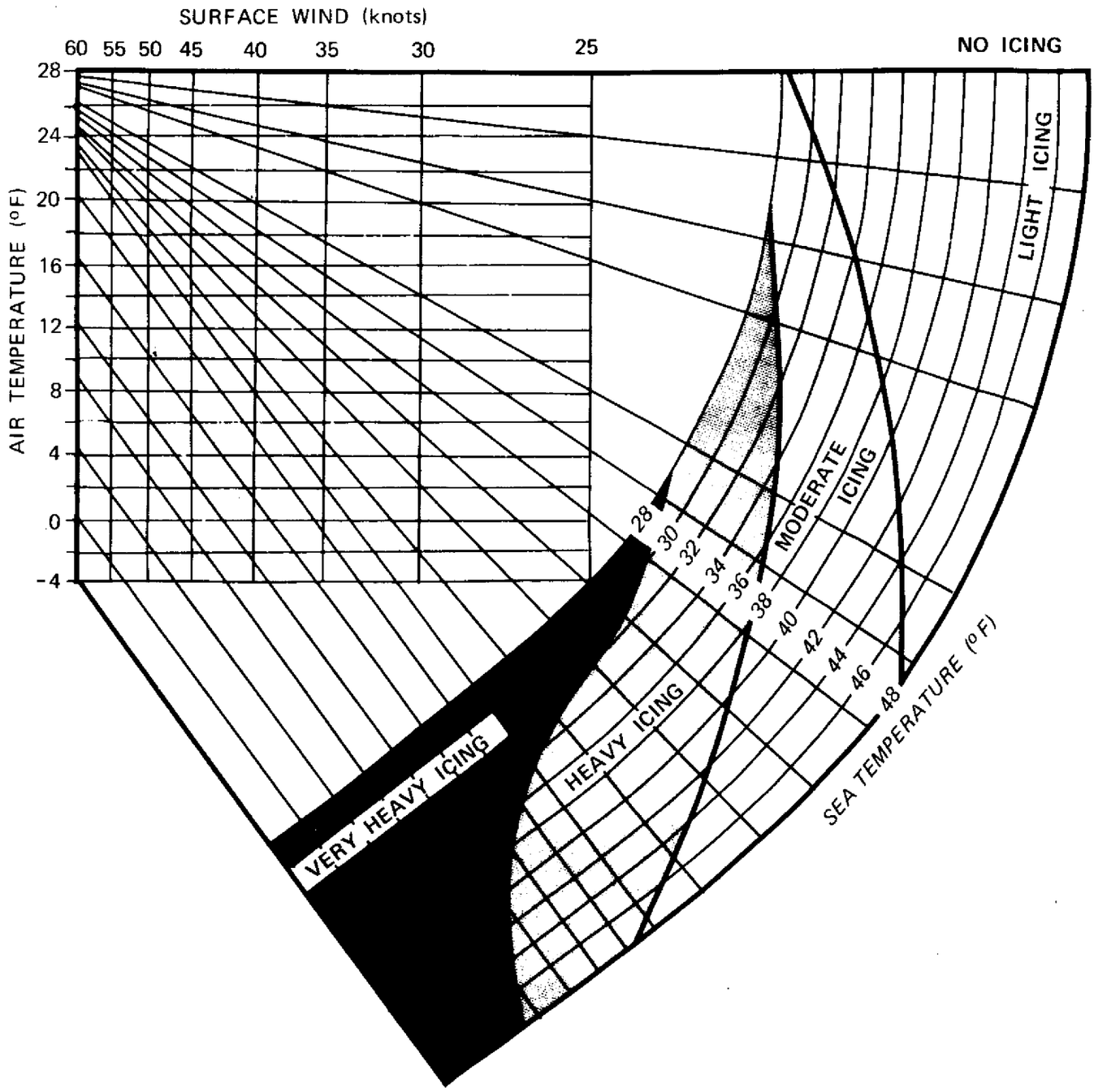
With the coming of winter the National Weather Service (NWS) Alaska Marine Forecast will include a special forecast of freezing spray (superstructure icing) when applicable. Freezing spray conditions are quite common in Alaskan waters, particularly in Kodiak Island, Shelikof Strait, and Alaska Penninsula waters. These areas occasionally have extremely hazardous superstructure icing conditions, which in the past have resulted in loss of lives and vessels. The forecast of icing conditions by the NWS and precautionary measures by vessel operators can minimize future losses.

Last winter the NWS developed an improved technique for forecasting freezing spray. It requires knowledge of sea water temperature, air temperature, and wind velocity. This technique enables the marine forecaster to improve the quality of the icing forecast. Last winter the Kodiak Island fishing fleet and the Coast Guard were particularly helpful in providing sea and weather information to the NWS. Because of this the NWS believes that the accuracy of the freezing spray forecasts has improved to the point that many users consider it to be one of the most important parts of the marine forecasts. Continued cooperation from the vessel operators is needed and appreciated.

For mariners who would like to try making their own short-term icing forecasts, a nomograph from the NWS and instructions for its use appear on page 7. The speed of the vessel and the angle of her course to the wind also influence the rate of icing. Heading into the wind would probably increase icing potential by one category, and traveling with the wind would probably decrease icing potential by one category.



Freezing spray is a hazard to vessels of all sizes operating in northern coastal waters in winter. This U.S. Coast Guard photo was provided by Norm Holm of Kodiak Marine Surveyors.



ALASKA Seas and Coasts

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Very Heavy	5.7" + in 24 hours

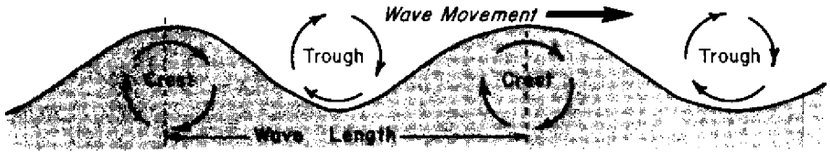
DEC. 1976

Towing In Troubled Waters

By F. F. WRIGHT
Marine Advisory Service

Nearly every seaman finds himself towing another vessel at one time or another. This can be a most trying experience, because vessels under tow have a tendency to move slower or faster or in a different direction from the lead boat. Towing in a rough sea is especially dangerous, because the vessel in tow alternately may charge the tug or snub up short, threatening to tear out the tow bits. This erratic movement is primarily caused by passing waves, and if you understand the wave system, you can avoid most towing problems.

In deep water, the water does not move in the direction that the waves are going. Instead, it moves up and down, as you can see by watching a float bob on the surface. This is because the water particles of the wave are following a circular path, illustrated below:



Notice that the water at the crest of the wave is moving in the same direction as the wave, while the water in the trough is moving in the opposite direction. For towing, the most important consideration is the **length** of the wave, which is the distance between succeeding wave crests. If the towline is the same length as the wave length or a whole number (**not** a fraction) multiple of the wave length, the tug and the tow always will be influenced by the same water movements:

If the tow and the tug are separated by **any other** distance, each vessel will be subject to different water movements. If the tug is on a wave crest and the tow is in the trough, the vessels will tend to be pulled in opposite directions, and towline gear may part:

When the tow is on a crest and the tug is in the trough, the tow will move too fast, causing the towline to slacken, possibly fouling the tug's propeller, or at least leaving slack that will later aggravate the strain:

If waves are short, you can estimate their length by comparison with your own ship or the tow. Large swells are too big to measure directly, but because the length, speed and timing of waves are related, you can calculate the approximate wave length as follows: Count the number of wave crests that pass your ship in one minute, and divide that number into 60 to arrive at the number of seconds per wave (the period). Square the number of seconds per wave (multiply the number times itself). Then multiply that number times five and you'll have an estimate of the wave length in feet. For example, if 15 wave crests pass your vessel in one minute, your calculation would be:

$\frac{60}{15}$ = 4 seconds per wave (the period)

4 x 4 = 16

16 x 5 = 80 (the wave length)

Once you know the length of the wave, adjust the towline to the same length (80 feet in the above example) or multiply the wave length by a whole number (for instance, 2 x 80 feet = 160 feet).

Oct. 1973

DROWNING RESEARCH

ANN ARBOR – People, especially children, who have drowned in cold water aren't necessarily dead. Even if they have been under water for half an hour.

This is the conclusion of a new study by Dr. Martin S. Nemiroff, lung disease and diving medicine specialist from the University of Michigan.

Dr. Nemiroff studied nine drowning victims, who were submerged in cold water (under 70°F.) from four to thirty-eight minutes. They not only survived but suffered no brain damage. Submersion in cold water for longer than four minutes need not produce a human "vegetable."

Nemiroff states, ". . . 'Karen Quinlan syndrome' is not the inevitable consequence of oxygen deprivation – under cold water conditions."

How do these drowning victims survive with no brain damage?

According to Nemiroff, cold water sometimes activates the "mammalian diving reflex" which maintains life even after the victim becomes unconscious. This primitive reflex allows many water mammals (seals, porpoises and the like) to remain under water for long periods of time. The automatic reflex greatly reduces the blood supply to the skin, muscles and gut, tissues which are resistent to oxygen-loss damage. The remaining blood takes oxygen to the brain and, since the brain is cooled by submersion, it requires even less oxygen than normal.

The "mammalian diving reflex" is most likely to occur in children under three and a half years old and works for the victim even though he or she has all the appearances of death: no pulse or heartbeat; cold and blue skin; no breath; and fixed, dilated pupils.

Many factors are important for survival according to Nemiroff. Duration under water, the temperature of the water, the age of the victim and prompt, appropriate resuscitation efforts are all key elements.

Nemiroff is continuing his research with funding from the Michigan Sea Grant Program, a cooperative effort of the University of Michigan and Michigan State University. His most startling story of submersion and survival involves Brian Cunningham, a Jackson, Michigan, college student who was trapped in his car and submerged in an ice-covered pond for 38 minutes.

"The car rolled over after breaking through the ice, eliminating the possibility of an air bubble," Dr. Nemiroff said. "The patient recalled struggling, inhaling water, and losing consciousness."

When he and a companion were brought to the surface, both had no signs of life and were declared dead at the scene. When they were being loaded into an ambulance to be taken to the morgue, Cunningham gave an agonal gasp – a sort of involuntary belch often associated with death – and rescuers began resuscitation on him immediately. After two hours of resuscitation and 13 hours of respiratory support, Cunningham regained consciousness and recognized his mother. Two weeks later he left the hospital to return to college where he is an A- student.

The Cunningham case is spectacular. But the lessons are clear. The "mammalian diving reflex" can save some drowning victims.

Dr. Nemiroff's advice is, "Don't give up," especially if the victim is a child.

This research is of great significance to Alaska. Virtually all the lake, river, and coastal waters of the state are well below the 70°F. classified as "cold" water, according to scientists at the Institute of Water Resources at the University of Alaska. And, drowning is the second leading cause of accidental death in Alaska.

The University of Michigan Sea Grant Program and the U.S. Coast Guard are jointly developing a flyer giving first aid information for rescuers of cold water drowning victims. The flyer can be obtained from:

Communications Office
Michigan Sea Grant Program
2200 Bonisteel Blvd.
Ann Arbor, Maryland 48109

JELLYFISH — Easing the Pain

By John P. Doyle
Marine Advisory Program
University of Alaska

In some areas of Alaska the common jellyfish is a real nuisance. Its sting can be as painful to the skin as a marauding seal can be to the pocketbook of a fisherman. Fortunately, there are a few things that can be done to relieve the pain of the jellyfish sting.

First, a word about the jellyfish. The jellyfish or medusa is the sexual stage of a simple animal with a complex life cycle. The mature medusae spawn, giving rise to larvae which settle to the bottom and become attached animals. This attached stage then gives off the next generation of medusae by an asexual process called budding.

It is the tentacles which contain the stinging cells, or nematocysts (see accompanying drawing). These are the tools the jellyfish uses to catch its food and torment anything that comes in contact with them. When these cells are irritated they discharge a tube stinger into the skin. An acid protein toxin is discharged.

The chemical nature of the toxin is the key to its treatment. Because it is an acid protein it can be neutralized by treating with a base or a protein digester. Basic compounds such as baking soda, household ammonia, antacid tablets or liquid have been found to give relief. Those who use rubber gloves can sprinkle common baking soda in the gloves instead of talcum powder thereby deactivating the nematocysts before they penetrate the skin. (Other mild bases such as stomach antacids can be used to the same advantage.) Another compound that has been found helpful is *unseasoned* meat tenderizer. This is a protein destroying compound that will destroy the toxin. This can be dissolved in sea water and applied directly to the affected area with a wet compress.

Gasoline has been used, but its effects are questionable. Gasoline and ammonia are both skin irritants but can be used as counterirritants when nothing else is available. Be sure to use a dilute solution of ammonia. **June 1978**

AFSAC Insurance Program By Fishermen For Fishermen

by Hank Pennington
Editor

On January 31 the board of directors of AFSAC, the Alaska Fisheries Safety Advisory Council, unanimously accepted an insurance proposal prepared by Reed Shaw Stenhouse, Inc., of Washington. In adopting the proposal the board of directors voted to pursue the creation of a statewide non-profit insurance company to be run by fishermen.

The goals of the company are far reaching and will result in some strong advantages for the fishing industry. As outlined in the proposal, the goals are: (1) encourage vessel owners to raise safety standards through vessel modifications and crew training, (2) provide a stable insurance market for the fishing industry, (3) reduced insurance costs through better loss records, bulk buying power, plus a return of profits to vessel owners based on their loss record with a company, (4) financially assist vessel owners in complying with AFSAC safety standards.

Safety Standards

AFSAC safety standards will be evolved through a series of meetings to be held in March. Twenty high-liners from each of six fisheries will be brought together, and their expertise in the fishery and familiarity with the vessels will be drawn upon to formulate the uniform standards. The fisheries are: crab, shrimp, halibut, troll salmon, gillnet salmon, and seine salmon.

Based on a vessel and skipper's adherence to these standards, plus crew experience and previous loss record, the vessels in each fishery will be separated into fleets for the sake of insurance ratings. Through reduced rates for safe operators in the better fleets, the fishermen will be given an incentive to improve their loss record and operating standard. Based on the same fleet breakdown, the loss records of each fleet will be examined annually. The profits from the company will be distributed among the safer operators in the form of premium rebates or reinsurance credit.

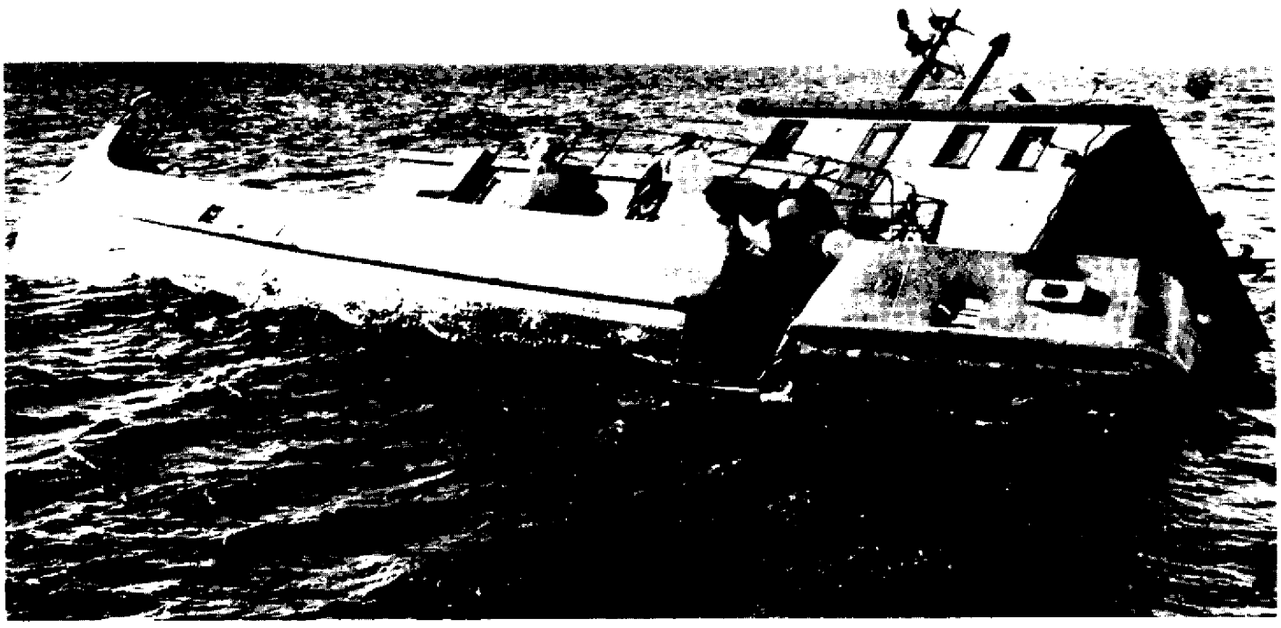
Rates

Assignment of insurance rates will be left to local AFSAC screening committees. These committees will be made up of fishermen who have historically demonstrated high safety standards and a familiarity with the vessels and skippers of the fishery.

The success of such an ambitious project will depend largely on the people maintaining it — the fishermen. It will take honest appraisals of the risk factor to be assigned to each vessel and skippers, coupled with the demonstrable upgrading of the loss record in Alaska.

Rebates

To encourage fishermen to give the AFSAC insurance program a try, the rates of this new insurance company will be approximately ten percent lower than any presently available to fishermen. Through premium rebates resulting from good records, savings will further increase for vessels maintaining a high safety standard. Through the separation of the fisheries into fleets based on their safety records, it will be possible to eliminate the present system by which safe operators are paying for the losses of others through increased premiums. **Feb. 1977**



The crabber and fish packing vessel Beluga founders after a collision at sea. The vessel sustained $250 thousand damage from this accident. Photo by Norm Holm of Kodiak Marine Surveyors.

AFSAC* APPROVED INSURANCE POLICY

Protection and Indemnity Policy

***Alaska Fisheries Safety Advisory Council**

As with doctors and medical malpractice insurance, fishermen have experienced increases in their hull and P. & I. insurance premiums. While a value can be placed on your vessel, and the shipyards can quote costs on repairs, there is no accurate means of predicting how large a settlement might be awarded for a liability claim in a court of law.

James Wells explores the complexities of P. & I. insurance and the little known U.S. Longshoreman's and Harbor Worker's Compensation Act in this article.

Through the impersonal language of the insurance world, one message comes through clearly: If a fisherman isn't adequately covered, he could stand to lose tremendously. Not only can the settlement of a claim exceed the value of an average policy, but the fisherman could stand to lose his vessel and livelihood in the settlement.

By James F. Wells
Account Manager
Reed Shaw Stenhouse, Inc.

It is the common belief that Protection and Indemnity Insurance, (P&I Insurance), is limited to personal injury. The policy does cover personal injury matters, but by no means is limited to them. This article will discuss in some depth the various coverages of the P&I policy.

To begin, it is necessary to point out that the policy is liability insurance. Contrary to most forms of liability insurance, this policy is designed to reimburse the ship owner for whatever amounts he has been held liable. The policy is an indemnity form of insurance.

LOSS OF LIFE PERSONAL INJURY

The first item of coverage – loss of life, injury, and illness – has been combined with the second item – hospital, medical and. other expenses – because they are similar in nature. The policy covers only the liabilities of the assured "as owner" of the vessel. These two coverages protect

the assured from liability to an employee under any compensation act. The principal people involved in loss of life, injury, and illness are the vessel's crew members. However, coverage is not limited to the owner's liability to his crew. In addition to this, the policy will indemnify the assured in liability for hospital, medical, or other expenses necessarily and reasonably incurred in respect of loss of life or personal injury.

REPATRIATION

The second item of coverage addresses the issue when seamen are hurt in a foreign country. It is often necessary for them to be returned to their country of origin: that cost of returning the seaman is commonly known as repatriation expense. In other words, when a seaman becomes ill or has been injured, or in some cases when the vessel has become a wreck, the seaman is entitled to be returned to his place of employment.

COLLISION

The third area of coverage concerns itself with collision liability. Although collision liability is covered by almost all forms of hull insurance, the hull policy may become exhausted because the liability, as a result of a collision with another vessel, may exceed the amount of the hull insurance. The P&I policy provides coverage in excess of the limit of the hull policy in collision-with-another-vessel liability situations. The policy acts as primary insurance in respect to loss or damage to third party property.

SHORE DAMAGE

In addition to the above, the policy covers loss or damage to any other vessel or craft not caused by collision. For example, a trawler navigating in a narrow passage like a canal, river, or channel at high speeds, could create excessive wave wash. This wake could cause yachts or other fish boats to break adrift from their mooring which may result in physical loss or damage to other vessels. The coverage is provided under the P&I policy.*

The fourth basic coverage under the policy covers the assured in liability for damage to any dock, pier, harbor, bridge, jetty, bouy, etc. In the event the assured was held liable for damage to a fixed or movable object, the policy would respond to indemnify the insured vessel owner.

LEGAL COSTS

The fifth area of the P&I policy covers liability for cost, or expenses of or incidental to the removal of the wreck of the vessel when such removal is compulsory by law.

The P&I policy provides liability for fines and penalties that may be assessed against the vessel owner for violation of laws of the United States or any other country. However, coverage is not provided if the ship owner has failed to exercise the highest degree of diligence to prevent a violation.

The policy covers the expense of reclaiming the vessel from a mutinous crew who is holding it for ransom. The policy will also cover the expense of prosecuting those individuals.

Extraordinary expense arising from an outbreak of plague or other contagious diseases which results in the local government impounding the vessel is covered in the P&I policy.

The P&I policy will respond for certain cost, charges and legal expenses for the defense of a case. In the event the final settlement of a case should equal the limit of liability set forth in the policy, no coverage for cost, charges, and legal expense in excess of the limit of the policy will be provided.

COMPANY PREROGATIVE

In the event of a claim, the assured must give prompt notice. The settlement of a liability claim is the prerogative of the insurance company (companies) that cover the risk. The assured should not interfere with the settlement negotiations.

The policy contains a non-payment of premium cancellation provision as well as a return premium clause in the event the insured vessel is sold or requisitioned.

Along with the many coverages provided in a standard P&I policy, the policy excludes a loss, damage, or expense which would be payable under the hull and machinery policy. The policy does not provide coverage for loss, damage or expense resulting from capture, seizure, arrest, breach of charter, bad debts, etc.

In summary, the P&I policy is broad in nature attempting to cover many of the liability features associated with the ship owner's interest. The policy can be adapted and written to the assured's needs and general operation.

U. S. LONGSHOREMAN'S AND HARBOR WORKER'S COMPENSATION ACT

The Longshoreman's and Harbor Worker's Compensation Act, which was enacted by the Senate and House of Representatives of the United States, is an act to provide compensation for disability or death resulting from injury to employees in certain maritime employment, and for other purposes. The act is applicable to any "employee" engaged in maritime employment, including any longshoreman or other person engaged in longshoring operations, and any harbor worker including a ship repairman, shipbuilder and ship-breaker. Such term does not include a master or member of a crew of any vessel, or any person engaged by the master to load or unload or repair any small vessel under 18 tons net.

The act applies to any "employer" whose employees are employed in maritime employment, in whole or in part, upon navigable waters of the United States including any adjoining pier, wharf, dry dock, terminal, building way, marine railway, or other adjoining area customarily used by an employer in loading, unloading, repairing, or building of a vessel.

This compensation act is not usually covered in the basic P&I policy unless specifically endorsed. The reason for this is that the act, as it relates to the P&I policy, has not fully been tested by litigation.

Much of the information and the examples in this article can be found in* **A Visitation Upon and an Acquaintance With the P. & I. Policy *by Don White. This is a Fireman's Fund P. & I. Report, published February 1973. (87 pages)*

April 1977

ENGINE OIL ANALYSIS

Forestall Failure Before Failure Stalls You

by John Ball
Marine Advisory Program
University of Alaska

While there are obvious safety benefits to an oil analysis program, basically it is a management service which allows an interested owner or engineer to understand better the condition of his engines and transmissions. He can then schedule repairs and replacements before problems snowball and component failure comes at a critical time of the trip or season.

TWO TESTS

Two types of tests are used in engine oil analysis. The first is aimed at wear indicators which appear as very small amounts of metals and other elements in the oil. The second type examines the oil and its additive package to determine how well the oil is performing.

As with heavy equipment in the construction industry, it is possible to use a program of regular oil sampling to identify and monitor wear in marine components such as engines and transmissions.

With normal operation, small amounts of metals and elements are worn from working surfaces and enter the oil in a variety of ways. Depending upon the oil change interval and the sort of use being made of the engine component, it is possible to establish normal limits for these indicators. Usually oil samples are analyzed for the level of iron, aluminum, copper, chromium, lead, and silicon.

CLUE TO FAILURE

Most often the oil sample shows that wear is within normal limits. But things do wear out, and as they do, they usually leave a clue in an increased level of metals in the oil. When one or more of these elements exceeds normal limits based upon component types, operating circumstances, lubricating fluids, etc., the laboratory operator is usually able to identify the specific problem and make a recommendation to the owner as to the action which seems appropriate.

In a really serious case, the vessel should not leave port without being repaired or overhauled. Often it is possible to go ahead with normal use until a convenient time for the work to be scheduled. Whatever the case, oil sampling allows you to anticipate failure due to wear and to prevent the failure from compounding the cost of repair, losing fishing time, and placing the vessel in a dangerous situation at sea.

Before going into more detail, it is important to realize that oil sampling won't detect all kinds of failure – it will only detect failure based upon wear or outside contamination such as saltwater and anti-freeze. Failure due to stress is not detectable in oil samples. This sort of failure can occur due to faults in manufacture and/or in unusually heavy strains or use. So while wear failure is possible to monitor and in essence to predict, stress failure is not, and we just have to live with it. Fortunately, failures due to wear and depletion of oil additives are a significant part of all failures, and we can use oil sampling as a way of reducing their overall impact upon the fishing business.

PROGRAM OPERATION

So how does an oil sampling program work? It starts with a decision on the part of the vessel owner, skipper, or engineer to begin and maintain a program of *regular* oil sampling. Depending upon the component, samples will need to be taken every 250 to 500 hours of operation. The samples are then mailed to a commercial lab for processing.

At the lab there are a number of analytical techniques which can be used. One method uses an atomic absorption spectrophotometer to detect wear metals and elements. It is based upon the knowledge that the presence of different levels of a specific metal in a quantity of oil that is sprayed into a controlled flame will absorb a known proportion of a specific frequency of light

Each element has its characteristic wavelength or light frequency. So if the lab operator were analyzing your sample for the level of iron, the equipment would be set up with a special lamp which generated the light that iron will absorb. A small quantity of your oil sample would be sprayed into a flame which is just in front of this lamp. A light meter on the other side of the flame measures the amount of light given off by the lamp and the amount that was able to get through the flame when the oil was being analyzed. The higher the concentration of iron in the sample, the poorer will be the penetration of that element's characteristic light. A computer then converts this information into the parts of iron- per-million particles in the oil sample.

The equipment has to be set up this way for each metal or element being analyzed. Many of the interpretations that go along with specific readings are closely guarded industrial secrets. However, we know that some of the problems that lab operators associate with different elements are often as follows:

Iron – oil pump wear, shaft wear, piston and liner wear;

Aluminum – piston or bearing wear;

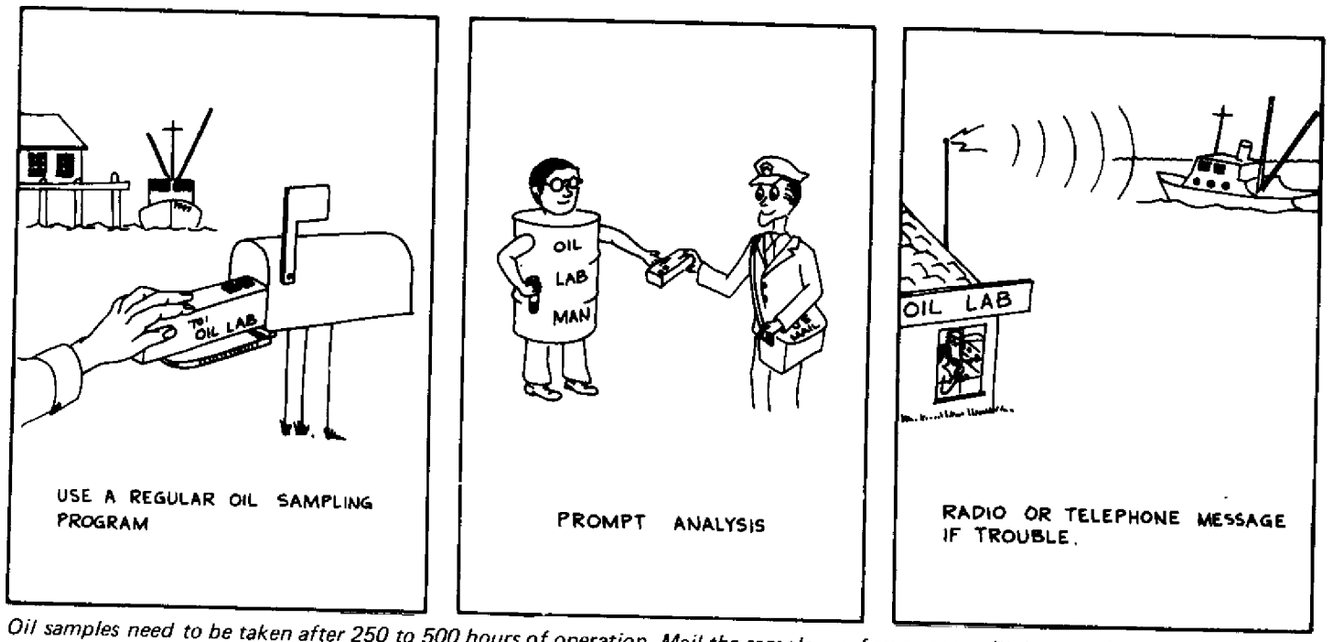
Copper – thrust bearing wear, bearing wear, water entry from coolers;

Chromium – piston ring wear, bearing wear;

Lead – bearing wear;

Silicon – dirt.

→



Oil samples need to be taken after 250 to 500 hours of operation. Mail the sample – a few ounces will do – to the oil lab. If analysis shows evidence of a potential serious problem, the lab will telephone or radio the information to the vessel.

TEST FOR ADDITIVE EFFECTIVENESS

Another sort of analysis can tell how well the additive package is holding up and the frequency with which you should be changing your oil. These tests measure oil oxidation, nitration, and the depletion or level of effectiveness of the oil additives.

If tests show that your oil is holding up in these areas and in tests on soot levels and viscosity, you may be able to stretch your oil change interval and save an oil change or two per year. On the other hand, if these tests pick up excessive values in one or more of these indicators, this may call for more frequent oil changes and/or some repairs to change some condition affecting the engine.

For example, highly oxidized oil is often the result of overheating which breaks down the anti-oxidizing agent in the additive package. The problem may then be traced to an improperly functioning cooling system.

These tests can be performed in Alaska or outside by commercial labs usually associated with heavy equipment dealerships. **Feb. 1978**

New FCC Rules Alter Marine Radio Practice

Are you familiar with the new Federal Communications Commission regulations dealing with marine radio communications and with the timetable for their implementation? Do you understand how the changes will affect you?

The next ten years will span more changes in marine radio practice than any other decade in radio's short history. Despite improvements in equipment, marine telephony has changed little in the last 50 years.

The changes have been necessitated by an increased number of licenses, which has resulted in channel overcrowding and interference, and are necessary in order to implement international rules.

The new regulations involve the use of single sideband (SSB, 2-23 MHz) for long-range communications and very high frequency (VHF 156-162 MHz) for the bulk of transmissions of shorter range.

There naturally has been some confusion along the waterfront about these new regulations. Following are the important dates and changes to remember:

—No new double sideband (DSB, 2 MHz—the present radio for many boats) licenses will be issued as of January 1, 1973.

—If you currently own a licensed DSB, you may continue to renew it as necessary until Jan. 1, 1977. However, if you allow your current license to lapse, you will have to apply for a new license under new FCC regulations.

—You can install VHF and SSB now.

—After Jan. 1, 1974, you can install SSB only if you already have VHF.

—After Jan. 1, 1974, all existing SSB installations must also add VHF.

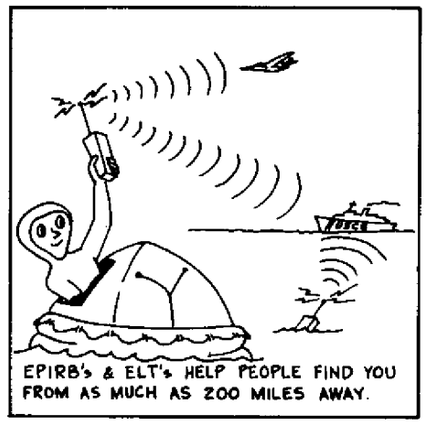
It should be emphasized that the above regulations apply specifically to vessels operating in Alaskan waters. These regulations are somewhat different than those which affect vessels operating in other parts of the country.

Feb. 1973

EMERGENCY BEACONS and TRANSMITTERS

EPIRBs (Emergency Position Indicating Radio Beacons) and ELTs (Emergency Locator Transmitters) transmit emergency radio signals to aid in the location of downed aircraft or marine emergencies. While they are not required for fishing boats, the fact that oceanic aircraft are required to monitor one of the signal's two frequencies make them very useful pieces of survival equipment.

How do they work? They are simply floating tubes with batteries and electronic gadgetry to simultaneously broadcast on two frequencies when activated. They come with an antenna and transmit a signal which can be picked up out to 200 miles (line of sight) while they float in the ocean. That is equivalent to about 125,000 square miles of ocean surface. These units transmit a distinctive signal on the aeronautical emergency frequencies of 121.5/243 MHz. Oceanic aircraft monitor 121.5 MHz.



When civilian aircraft detect the signals they can establish a probable area without altering their course. The location of the transmitter is determined by comparing time and position of the first detection of the signal and final loss of the signal along the aircraft track. This information is reported immediately through aeronautical communications to an oceanic center, which in turn notifies the Coast Guard. Search and Rescue (SAR) aircraft and High Endurance Cutters have direction-finding and homing equipment for these frequencies.

The Alaska Fisheries Safety Advisory Council feels that EPIRBs and ELTs should be considered by our fishing industry.

FEB. 1978

Sink or Send?

Emergency Radio Batteries

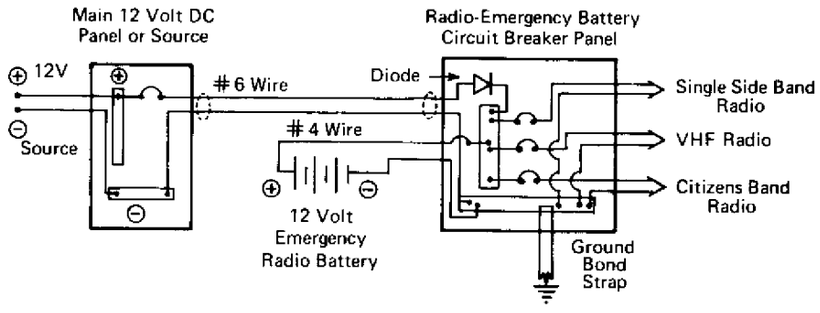
By Don Cunning
Ketchikan Community College

In many emergencies a fisherman has only a few moments to make a radio call. Although the boat may remain afloat for hours, water often short-circuits the batteries in a matter of minutes. An emergency battery that would operate the radio until the wheelhouse goes under, could mean the difference between rescue and loss.

This battery should be installed in a high location—under the aft eve of the main cabin or on top of the wheelhouse in a plastic container—and periodically checked for electrolyte level and specific gravity readings. Only VHF, CB, and AM/SSB radioes should be connected to this battery. All other electronics should be run off the main battery or electrical circuits. The emergency battery would be charged on the same line as the main batteries, but connected by a common four-circuit breaker load center so it could not discharge into the main battery bank.

To wire the emergency battery use stranded wire with a flat copper shield wrap under a plastic outer sheath. At least No. 6 wire should be used for connecting the emergency circuit breaker panel and diode to the main panel. Between the emergency panel and the battery, No. 4 wire should be used. (This is necessary for single side band HF radios).

The diode should be between 15-30 ampheres, with 600 piv (peak inverse voltage), and preferably germanium since it requires less voltage than silicon for forward conduction. The main line circuit breaker at the main panel should have approximately the same amperage rating as the diode. The emergency circuit breaker panel can be a small two- or four-circuit breaker box. A two-breaker box can use a piggyback breaker for the VHF and CB sets.



SCHEMATIC DIAGRAM OF EMERGENCY RADIO BATTERY AS IT WOULD BE WIRED INTO 12 VOLT ELECTRICAL SYSTEM

June 1975

Problems With Radio Calling Frequencies

Single Side Band (SSB) and VHF radios required by the Federal Communications Commission on fishing vessels built after 1972 reportedly have limited output and range capacity when used in an AM compatible mode. Sig Jaeger, manager of the North Pacific Vessel Owners Association, notes that many fishermen who are accustomed to the older, 100/250 watt radios may not be aware of this problem. He would like to call it to the attention of all Alaska fishermen.

According to fishermen's reports to Sig, operating experience with the new radios has indicated that the 2182 AME band for distress and calling frequency has the equivalence of only about 30 watts of output power, seriously shortening the calling range and the ability to reach out when in need of assistance.

It is recommended that fishing vessels in western Alaska waters with the new sets make test calls to Coast Guard units to calibrate and ascertain the limits of their calling range.

The U. S. Coast Guard has instituted a new radio communication program to provide offshore voice communication coverage as indicated in the following bulletin:

HF-SSB Voice Frequencies Opened For Coast Guard Communication

At 0001 GMT on 1 September 1974, both Coast Guard Communication Stations San Francisco (NMC) and Honolulu (NMO) will establish a 24-hour radio guard on three single side band duplex voice frequencies (one each in the 4, 6, and 8 MHz bands). These circuits are being established to provide government and nongovernment vessels (particularly those not CW equipped) with a means for transmitting AMVER and/or METEO reports. The circuits may also be used to coordinate administrative communication matters with these Coast Guard communication facilities. Specific frequencies to be guarded, together with the appropriate ship-transmit frequency, are listed below:

	(Frequencies in kHz)		
Coast Station Transmit (Vessels listen on)	4394.8	6523.2	8762.2
*Ship Station Transmit (Vessels Transmit on)	4096.2	6208.6	8228.2

* Denotes frequencies to be guarded by NMC and NMO.

Vessels are encouraged to utilize this service and address any comments and/or recommendations to Commander, Pacific Area Coast Guard (Potm), 630 Sansome Street, San Francisco, California 94126.

End of bulletin

The Coast Guard points out that the radio frequencies listed above are for emergency, information and other types of reporting as well as for merchant marine and weather reports.

Calling through San Francisco or Honolulu may seem a roundabout way to reach local Coast Guard stations in western Alaska in case of emergency, but rapid reporting between Coast Guard stations makes the system work effectively. The Coast Guard has plans to include Kodiak in the AMVER/METEO Reports calling frequencies in the future. Until then the Coast Guard suggests that fishermen with the capability of transmitting and receiving on the above listed frequencies make test calls to San Francisco and Honolulu to see if the system works for them.

Compiled by Walter G. Jones, National Marine Fisheries Service, Box 1668, Juneau, Alaska 99801. Aug. 1974

Where would you place your alternator's regulator?

By DON CUNNING
Ketchikan Community College

The electrical power on many boats is produced by an alternator. Like a generator, the alternator uses rotating electromagnetic fields to produce an alternating current. With an alternator there is a built-in rectifier to change alternating current (AC) to direct current (DC). Most alternators on boats are models that were originally designed for use in a car or truck. This may cause problems if the vessel operator is unaware of the adjustments which should be made to adapt a car alternator for use on a marine vessel.

In a car the alternator is mounted in line with a fan which blows a continuous blast of cool air across the alternator to cool it. The hot engine room of a vessel does not often simulate this environment, and the performance of the alternator can be affected.

The voltage and current of an alternator are regulated by the regulator. The transistor components of the regulator control the voltage and current of the alternator. These transistor components are subject to "thermal runaway," which means that as they heat up they conduct current more readily. To counteract this tendency there is a temperature compensation system built into the regulator to prevent thermal runaway. If the regulator is placed near heat, the temperature compensation system restricts the amount of current flowing through the transistor components and thereby reduces the current available to the electromagnetic fields of the alternator.

This can be avoided by mounting the regulator in a cool place. Two examples would be the cold water intake line of the heat exchanger or low on the outer skin of the hull. (In either case, the wires between the alternator and the regulator should not be bundled with other wires because it will cause noise in the radio.) Any place where there is a cold blast of air would work, even hot air would cool the regulator if it was blown across the regulator at a fast enough speed. In some instances a fan would be required, this fan could also be used for cooling the batteries.

Editor's note: Don Cunning is a full-time instructor in marine electronics and electrical systems at Ketchikan Community College. A successful businessman, Cunning has become a popular instructor in the past few years with his down-to-earth explanations of marine problems. **June 1974**

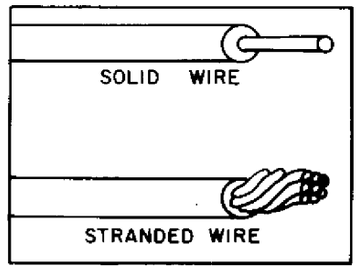
Tips on Wiring Your Fishing Vessel

AWG Gauge	Cir. Mils Area	Amperes Current	OHMS Per 100 feet	Recommended Use
16	2,583	8	0.4	Single lights
14	4,107	12	0.248	Multiple lights
12	6,530	16	0.156	Small Motors, depth sounders
10	10,380	20	0.098	Radiotelephones, less than 100W autopilot, 1/4 H.P. motors
8	16,510	28	0.062	Search lights, 150W radiotelephones
6	26,250	36	0.038	250W radiotelephones, bilge pumps
4	41,740	48	0.024	feeder line to load center anchor winch, minimum size
2	66,370	64	0.015	Alternator feed to ammeter
0	105,500	84	0.010	
00	133,100	96	0.007	
000	167,800	110	0.006	Battery cables to safety disconnect switch
0000	211,600	125	0.005	Battery cables to safety disconnect switch

For the do-it-yourself fisherman, wiring a new vessel, or rewiring an old one, may create some tricky problems. One of the problem areas ordinarily encountered is selecting the right gauge and type of wire for a particular use.

Don Cunning, marine electronics specialist at Ketchikan Community College, recommends that all wire used in marine wiring should be stranded wire rather than solid wire.

Cunning's recommended uses of various wire gauges are listed at left. Wire sizes are listed in both gauge number and circular mils with maximum recommended current loads based on compacting of conductors and the high ambient temperature of engine rooms.



Aug. 1973

Electronic Equipment Failures

Tips on Soldering Connectors

By DON A. CUNNING

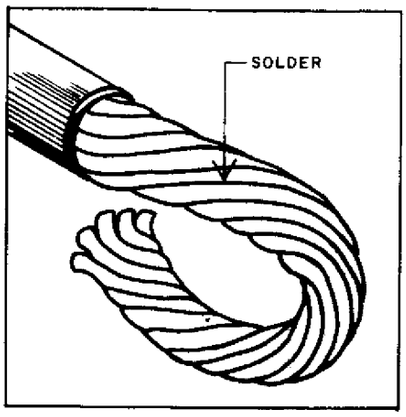
Is your vessel having intermittent electrical troubles? Look for loose electrical connections. Poorly made or loose electrical connections are a cause of many electrical and electronic equipment failures. This type of trouble does not always reveal itself when the equipment is being repaired or replaced, but it results in future equipment failures.

Compression connectors should be soldered, using a noncorrosive, rosin flux with 50/50 or 60/40 solder. Crimp-on connectors will loosen within the crimped area due to both vibration and corrosion. This has been a long-term problem with unsoldered connections.

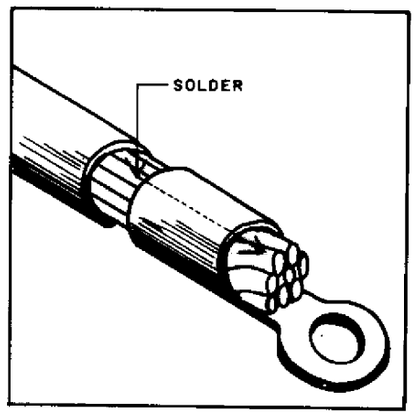
Solder is composed of tin and lead, both of which are highly resistant to corrosion from acids. Tin is used in tin cans as a seal against the acids in canned foods, and lead is used in sulfuric acid batteries with little deterioration. The combination of these two metals in solder forms an effective seal against corrosion in electrical connections.

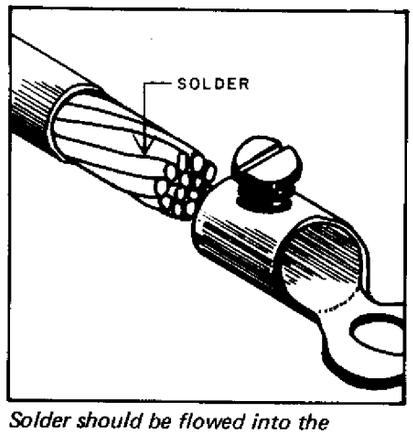
Copper wire exposed to salt air moisture will turn green with corrosion very quickly. Even in a warm engine room the salt air permeates everything. Thus, any connections not soldered will eventually corrode with resultant electrical equipment failure or possible electrical fires caused by arcing within the connections.

Feel the connections one at a time. If they are hot, then correct them as quickly as possible either by replacement or by cleaning and soldering.



Stranded wire should be twisted tightly and formed into a loop as shown above. Then apply solder to seal the wire and help it hold its shape. The loop can then be placed under a screw for a tight connection.





Solder should be flowed into the compression fitting and into the exposed wire (top figure). Stranded wire used in a screw compression connector (bottom figure) should be tinned with solder before it is inserted into the connector.

Keep Your Batteries Cool

By Don Cunning
Ketchikan Community College

Storage batteries are the center of your fishing vessel's electronic system. The temperature at which they are stored and operated strongly affects both their energy output and life span. Everyone in Alaska knows that at low temperatures lead acid batteries do not produce power at the same rate as a warm battery. Less well-known is the fact that batteries do not produce efficiently at high temperatures.

The optimum operating temperature for the lead acid battery is 80° F. Any deviation from this temperature reduces the efficiency of the battery. The normal boat engine room operating temperature is between 110° F and 140° F, much too high for good battery life. In addition, batteries are often placed close to the exhaust manifold which radiates a considerable amount of heat that the black battery case absorbs.

High operating temperatures shorten the life of the battery and are a main cause of battery failure. At temperatures between 130° F and 150° F the plates warp and buckle, breaking the insulation between the positive and negative plates and causing a short circuit. The battery begins to "gas," giving off hydrogen and oxygen at an accelerated rate. This hydrogen and oxygen come from the chemical breakdown of water, which happens at a slower pace any time a battery is either charging or discharging. When enough water is lost to expose the plates, oxidation begins. The lead reacts with oxygen forming lead oxide, and once this takes place it is not reversed. The lead oxide will be sloughed off and the plate gradually destroyed.

Through proper care the normal two- to three-year operational life of a battery could be extended to 10 years. To increase your battery's efficiency and life span place the battery bank in the coolest place possible. With the proper size cable the battery bank can and should be at some distance from the engine and the starter. In the engine room it should be placed so air from the fresh air intake passes over the batteries. Batteries in a bank should not be placed tightly together but spaced so air can pass around each battery. Cool operation and storage temperatures and regular maintenance of the electrolite level will extend battery life and operation efficiency.

Temperature	Battery Efficiency	Effort required to crank engine
110°F	efficiency begins decreasing	120%
100°F	105%	≈ 100%
80°F	100%	100%
32°F	65%	155%
0°F	40%	210%
-20°F	18%	268%

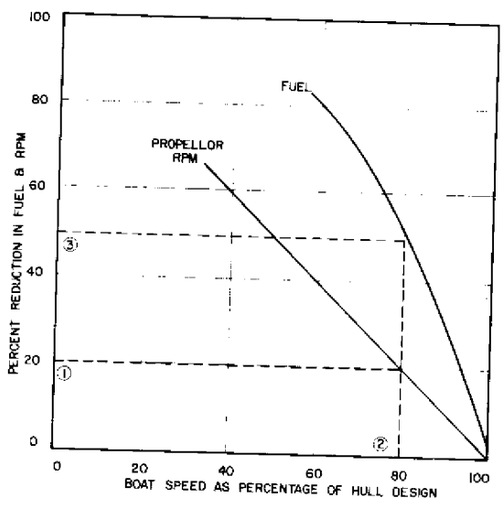
Vessel Fuel Economy

By F. F. WRIGHT
Marine Advisory Service

The energy crisis seems to be having one good effect—it's making Americans much more conscious of our fuel consumption habits. Many of us are finally learning that the faster you run an engine, the more fuel you consume. Most fishing skippers are well aware of this, but—particularly if they have well-designed vessels—they may not realize how much they can save in fuel by cutting back the engine slightly.

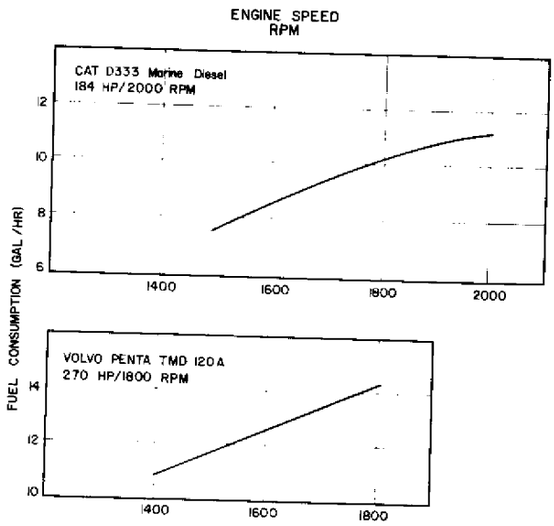
If your boat, like most Alaskan fishing craft, has a full displacement hull (both beamy and fairly deep), it is designed for good handling and efficient operation at relatively low speeds. Approximate hull speed can be calculated from a simple formula: Speed in knots equals 1.34 times the square root of the Water Line Length in feet. A vessel's maximum potential speed is directly related to its length, rather than to the available power in the engine. A typical 36-foot boat, then, would have a hull speed of 1.34 times the square root of 36 (about eight knots). You can put any combination of engine and prop on this boat, but if you try to drive her over eight knots, you'll strain her.

Engineers at the Massachusetts Institute of Technology have plotted a graph to show how an ideal fishing vessel with an appropriate diesel engine and prop can reduce fuel consumption:



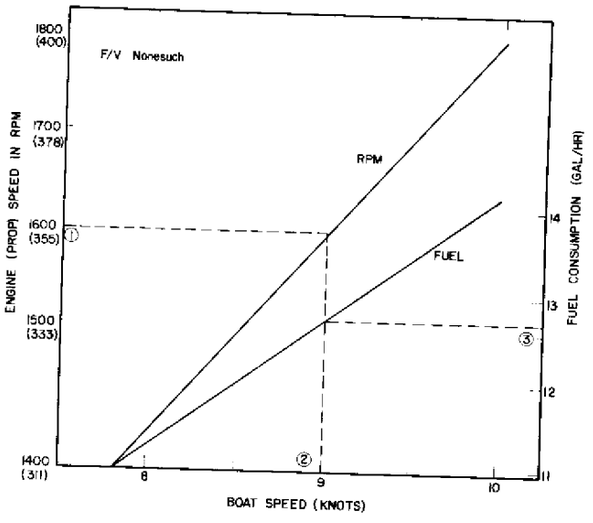
This example shows the fuel saving if you reduce your turns by 20 percent (No. 1). Follow that line across to the RPM curve, drop down to boat speed and you will find a reduction to 80 percent (No. 2). Trace the 80 percent line up to the fuel consumption curve, then move to the left and you will find a 50 percent reduction in fuel consumption (No. 3).

To adapt such a graph for your own vessel, you need to do some homework. Start with the manufacturer's performance graphs for your engine and select the "continuous operation" curves (the range in which the engine can be operated for long periods without interruption or load cycling). There should be a graph showing fuel consumption in gallons per hour against revolutions per minute, but mathematical conversion of units may be necessary. Volvo, for example, gives fuel consumption in units of grams per metric horsepower per hour. (To convert these units to gallons, remember that a gallon of diesel weighs 3,175 grams and one metric HP=0.986 U. S. HP). Fuel consumption curves for two popular marine diesels are shown below, courtesy of Northern Commercial Caterpillar and Alaska Marine and Equipment companies.



Curves such as those above give you fuel vs engine RPM; you still need to convert to percentages to use the MIT graph.

It is really more useful to draw your own graph to fit the operating range of your installation. For example, if your vessel is a 57-footer powered by the Volvo Penta TMD 120A with a reduction ratio of 4.5:1, your graph should look something like this:



This graph shows very clearly how fuel consumption and speed are related in the operating range (1,400-1,800 RPM) of the vessel. In the example shown, if you drop 200 RPM (No. 1), you lose one knot speed (No. 2), and your fuel consumption decreases 1.4 gallons per hour (about 10 percent). Aside from the fuel saving, if you can afford to spare the time, you'll add considerably to the lifetime of your engine by operating at lower speeds.

April 1974

Runaway Engines

Diesel engines run on fuel, air and compression. Most of the diesel engines used in the fishing industry run on an open-air inlet system and a fixed compression ratio with the fuel varying according to speed. Therefore, if you have a runaway engine you have an uncontrolled fuel situation.

WHAT CAUSES A RUNAWAY?

It is possible, particularly in the old gray marine engines that had leather seals, to have a bad enough oil leak that the engine begins to run on its own oil. Good maintenance of an engine can prevent this.

Stopped injectors can also cause a runaway. In this case, the best way to shut down the engine is to shut off the air. If you need to get home with that engine, detach the two fuel lines called "jumper lines," and bypass the stuck injector.

HOW TO STOP IT?

In many engines it is easiest to shut off the fuel. However, with a Detroit diesel engine the fuel should not be shut off since it would run the unit injectors dry and could cause a runaway when the engine started again.

Generally, the best way to stop a runaway is to cut off the air. If you do not have an air door to close, put a board or coat over the air supply. It would be better to throw a coat (not a hand!) in the blower inlet, than to ruin the whole engine.

Alarm systems can alert you to runaways or other dangers and then let you decide whether or not to shut down. These alarm systems monitor water temperature, oil pressure, oil temperature, overspeed, vibration, exhaust temperature, and other factors. If one reaches a dangerous level, the alarm will either ring a bell or flash lights warning the operator of the problem. **June 1975**

Engine Room Swamping

Submersion in salt water does not necessarily mean the end of an engine. Although salt water will immediately corrode lighter metal components, such as aluminum blowers, the main parts of an engine can be saved if steps are taken as soon as the submerged engine is brought to the surface.

WHAT TO DO?

- Tear down the engine.
- Soak it in fresh water, even if you can't work on it right away.
- Steam clean the entire engine and reassemble.
- Drain the crankcase and the gear box; flush with fresh water and put clean oil back in.
- Pour about 3 teaspoons of oil into each cylinder, rotate, put the injectors back in and fire it up.

Electronic Systems

Complete or partial submersion of the electronic system usually implies a total loss of that system. There have been times, however, when electrical systems have been saved. A procedure used and recommended is as follows:

- Take the system completely apart.
- Circulate fresh water around all the component parts.
- Wash each part thoroughly in a soda bath.
- Put them together and bake them in an oven for three or four days at a low temperature.

The important thing to remember is that any parts which have been submerged in salt water should not be exposed to air any longer than necessary. Begin immediately to flush the system with fresh water, following the mentioned procedures. Once the system is in fresh water, cleaning procedures can wait for up to 24 hours. **June 1975**

Pollution

Under the Federal Water Pollution Control Act, any person responsible for discharging harmful amounts of oil in the navigable waters of the United States is subject to a fine of up to $5,000. Under the regulations of this law dumping oil over the side of a commercial fishing vessel as well as dumping oil from a crankcase or fuel strainer in a village is prohibited. If there is oil aboard a boat, that boat must have a fixed or portable means of discharging the oil ashore.

Fines will be assessed against the owner of a vessel or facility which caused the pollution. If a third party caused the pollution and the owner has to pay a fine, the owner can take legal action against the third party to be reimbursed. **June 1975**

Hydraulic Leakage Costly, Hazardous

What may appear to be small, insignificant leaks in a vessel's hydraulic system can be expensive as well as hazardous and unsightly. To establish some idea of outright costs of external hydraulic fluid leakage, a study was made which produced the following results, as reported in **Basic Hydraulics Manual,** published this year by Kem Equipment Co., Seattle, Wash.:

Cost of Hydraulic Oil Leaks
(based on $1.25 per gallon)

	Number of 55-gallon barrels per year	Cost
1 drop every 10 seconds	.72	$ 47.52
1 drop every 5 seconds	1.44	$ 99.00
1 drop every second	7.44	$ 511.50
stream breaks into drops	152.70	$10,498.00

June 1973

New Fire Extinguishers

One of the new equipment discoveries from Fish Expo is FiQuench, a small, lightweight, built-in fire extinguisher.

The FiQuench system consists of a tank of Halon 1301, a control box, a remote push-botton panel and a heat sensor. A system capable of protecting 250 cubic feet of net engine space weighs less than 22 pounds, costs approximately $400, and can usually be installed in less than three hours. The extinguishing tank weighs five pounds and is 20½ inches long and 5¼ inches wide.

A system which could protect 500 cubic feet weighs approximately 33 pounds, and a system for 1,000 cubic feet less than 49 pounds.

Unlike existing extinguishers such as CO_2, water, foam and dry powder which smother or cool a fire, FiQuench uses Halon 1301 which stops combustion chemically.

Halon 1301 (bromotrifluormethane, $CBrF_3$) is a colorless, odorless gas which is nonconductive and noncorrosive. Heavier than air it seems to penetrate in, around, and under engines and all other equipment in the engine space, and flows into bilges or tunnels.

Halon 1301 does not remove oxygen from the air, so humans can be safely exposed to a 7% volume concentration for up to five minutes. Unlike dry powder Halon 1301 leaves no residue, and does not form condensation like CO_2.

On most boats, the Halon 1301 tank would be attached to the forward bulkhead of the engine space. The control box would be in the cockpit, or cabin, just forward of the helm, and the remote push button on the instrument panel. These components are wired to the 12-volt DC source at the helm. An optional remote push button can be installed on the flying bridge. The heat sensor is installed in the engine compartment. A six-conductor shielded cable runs from the control box to the remote button. From the control box to the tank is a pair of wires in protective 3/8" OD aluminum tubing.

The FiQuench system is activated by (1) depressing one of the push buttons; or (2) when the temperature of the tank exceeds 180°F; or (3) when the temperature at the sensor reaches 212°F+5°.

Mark Hutton, chairman of the Alaskan Fisheries Safety Advisory Council, watched the FiQuench system in action at Fish Expo and reports that it is an excellent piece of equipment.

DEC. 1975

NEW COAST GUARD SANITATION REGS

By Craig Wiese
Marine Advisory Program
Cordova, Alaska

Environmental Protection Agency (EPA) regulations governing the discharge of vessel sewage in coastal marine and fresh waters became effective in January of this year. The regulations cover virtually all vessels with toilet facilities installed on board.

Essentially, the regulations require treatment of vessel sewage with a Coast Guard certified treatment unit. The Coast Guard uses the term "marine sanitation device."

The regulations do not apply to vessels with portable equipment (carry on and off), nor do they require the installation of toilet facilities on vessels which do not already have them.

The timetable for compliance with the regulations is different for "new vessels" (keel laid on or before January 30, 1975) and "existing vessels" (keel laid before January 30, 1975). There is also a difference in the level of treatment required. Generally, the longer you put it off, the more sophisticated and expensive the treatment unit will be.

The regulations basically read like this:

A. For "existing" vessels:

1. A vessel owner has until January 30, 1980 to install a treatment unit.
2. However, the EPA has offered an incentive for earlier installation. If a Coast Guard certified treatment unit providing the minimum required treatment (1000 fecal coliform per 100 million parts of water and no "visible floating solids") is installed before January 30, 1978, it will never have to be replaced by a unit providing better treatment as long as it remains operable.
3. A treatment unit installed on or after January 30, 1980 will be required to provide a higher degree of treatment.

B. For "new" vessels:

1. As of January 30, 1977 all vessels constructed on or after January 30, 1975 must have a Coast Guard certified treatment unit installed providing the minimum required treatment. In other words, any vessel constructed between January 1975 and now should have a treatment device installed.
2. Vessels constructed on or after January 30, 1980 will require equipment providing a higher level of treatment.

Most treatment units presently on the market are Coast Guard certified although you should be certain that the label states Coast Guard certification and gives a certification number.

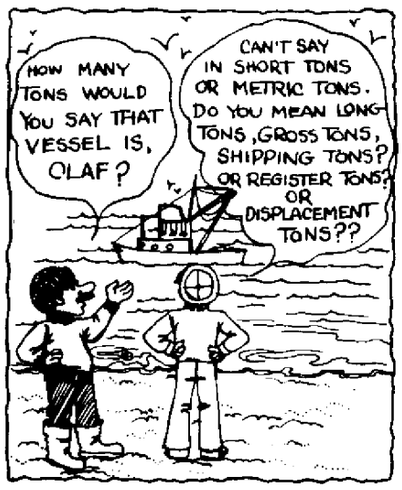
Owners of "existing" vessels that had treatment units installed before 1976 should check with the Coast Guard to learn if the units are certified.

For more details, write to your local Coast Guard center. Ask for publication number CG-485, titled "Federal Marine Sanitation Device Regulations."

OCT. 1977

VESSEL TONNAGE

what it does and doesn't mean



By Craig Wiese
Marine Advisory Program
University of Alaska
Cordova, Alaska

Ever been around a large ship and noticed that somewhere its tonnage was posted? So many "gross tons" or "net tons" or "deadweight tons"? Maybe you saw it on a freighter or passenger vessel, or perhaps a fishing boat or tug. Did you ask yourself if that was the total *weight* of the vessel with cargo? Or without cargo? Or possibly only the cargo? If so, you are in for a surprise.

If you have been around boats enough to know that it is none of the above, read along anyway. The subject has some interesting turns.

Before we get started, a few definitions are a must. There are tons that weigh a ton, and tons that don't weigh anything but are as big as a ton. These are volume tons, and are the tons we will be dealing with the most. But, whether we are talking about weight tons or volume tons, a ton is not a ton is not a ton. This is because there are different weights and different volumes that are each called "a ton."

SHORT TON: This is a weight of 2,000 pounds that is in common use in the United States but hardly anywhere else. It is not used in the maritime industry and so for the purposes of this story can be forgotten from here on out.

METRIC TON: The weight of 1,000 kilograms or 2,204.6 pounds. This is the ton commonly used in many other nations of the world but it is still not a nautical ton.

LONG TON, GROSS TON, SHIPPING TON: These are names given to the weight of 2,240 pounds. *This* is the ton used in the maritime industry where weight is concerned. Notice that it is very similar to the metric ton of 2,204 pounds. The two are easily confused.

REGISTER TON: 100 cubic feet. Here we are. This, strangely enough, is the unit by which most of the world's ships and boats are measured. This is the ton that you might have seen on a freighter, fishing boat, or cruise ship. There are gross register tons and net register tons, but we'll get to them later.

DISPLACEMENT TON: This is a

combination weight and volume measurement. It is officially defined as 35 cubic feet. Thirty-five cubic feet was established because it is the approximate volume of a long ton (or 2,240 pounds) of seawater. The volume of a ship below the water line, measured in 35 cubic foot increments, will tell the actual weight of the vessel in long tons. It is called the displacement tonnage.

There is *Light Displacement Tonnage*, which is the weight of the ship minus cargo, fuel and stores.

There is *Heavy Displacement Tonnage*, which is the weight fully loaded — cargo, fuel, water and stores included.

The difference between the two is called *Deadweight Tonnage*. Deadweight tonnage then is the actual carrying capacity of a vessel in long tons. Bulk liquid carriers, such as oil tankers, are often measured in deadweight tons (dwt) because the cargo is uniform and determining cargo weight is a relatively straightforward matter. But for cargo ships that may carry a mixed load of lumber, cotton and cars, actual weight has much less relevance than actual volume. This leads us to our last ton.

FREIGHT OR MEASUREMENT TON: 40 cubic feet. This is a unit of volume used to measure cargo freight. The price for shipping freight typically is based upon either its actual weight or its volume in 40 cubic foot increments.

So much for terminology. The rest of the story will deal with register tons. Register tons are the units in which most vessels are officially recognized.

Notice I said *officially* recognized. It might have occurred to you to wonder why anyone but the owner or skipper of a vessel should be concerned about its volume. Well, the answer, as intuition has probably intimated, is nothing less than taxes. It's not a recent innovation either.

"Tunnage" or duty was first levied on every "tun" of wine imported or exported from Britain beginning in the 14th Century. Edward IV set the precedent as a means of keeping the royal coffers flush.

Odd as it may seem, the tax was abolished by George III in 1787. Apparently our George neglected to pick up the cue from their George. The third act of the First Congress of the United States was "An Act Imposing Duties on Tonnage." The eleventh act of the same Congress established a system of documentation including a system to determine vessel tonnage. All of this was signed into law by George Washington in 1789. The laws we have today are essentially unchanged from those of 189 years ago.

REGISTER TONNAGE

"Documented" is the term commonly used to mean either licensed, enrolled, or registered. Vessels over five net tons that are engaged in trade or fisheries must be documented. Part of the documentation process includes "admeasuring" the vessel. (Admeasuring is governmentese for measuring.*) The length, breadth, depth of the hull, and the spaces between decks above the hull are measured. These are then cranked through a formula and past a list of deductible spaces to arrive at gross register tonnage.

Remember gross registered tons from our definition of register tons? Gross register tonnage then is the entire cubic capacity of a vessel minus certain spaces, expressed in register tons of 100 cubic feet. If a vessel "admeasured" 1,000 cubic feet after deductions, it would be a 10 gross ton vessel. Gross tonnage is then run past another list of deductible spaces to arrive at net register tonnage or net tonnage. So every vessel's documentation papers include its length, breadth, depth, gross tonnage, net tonnage and deducted spaces.

FOR REGULATORY PURPOSES

Let's take a side trip for a moment to see how tonnage is used for regulatory purposes, then come back to take a closer look at how gross and net tonnage are determined.

To make a long story short, it could be said that most of the shipping regulations vary according to three factors: a vessel's cargo, its means of propulsion, and its size.

For example, there are different *inspection* regulations for tankers, passenger vessels, cargo, and miscellaneous craft, and uninspected vessels (which include fishing boats) depending on whether the vessel is propelled by steam, motor, or sail, or is non-self-propelled (barges). Then, within each power category, there are size limitations — steam vessels under or steam vessels over 65 feet (this is the only exception to the tonnage rule); motor vessels under 15 gross tons and motor vessels over 15 gross tons but under 300 tons; and seagoing motor vessels 300 gross tons and up. There are sailboats under 700 gross tons and sailing ships over 700 tons, then non-self-propelled vessels either under or over 100 tons.

Enough to make you confused? Right! But that's only half the confusion. There are also *manning* regulations that vary with cargo, size, and power. For example, if you are a fishing boat owner, the main requirement to remember is there are *no* manning requirements for fishing vessels under 200 gross tons. But once that 200 ton magic mark is breached, there must be a licensed master, mate, and engineer aboard. Imagine what that could do to your operating overhead.

For passenger and cargo vessels there are different manning requirements at 15, 100, 300 (150 if the vessel is on the Great Lakes), 500, and 1,000 gross tons.

Besides inspection and manning regulations there are construction, load line, and radio equipment standards that are geared to tonnage. And let's not forget the original intent of tonnage measurements, which was to levy taxes or duties.

Today every ship entering a U.S. port from a foreign port is taxed according to its net tonnage. This includes both foreign and U.S. registered vessels. The tax varies, depending upon which part of the world the ship last departed from, but is usually no more than two cents or six cents per gross ton. The U.S. Customs Office in each port collects the charge.

Interestingly, the custom's duty on a ship is levied only the first five times that a ship enters a U.S. port from a given area of the world during a 12-month period. For example, if a ship makes ten trips from Japan to the U.S. in a year, only the first five port calls are taxed.

In addition to tonnage taxes, there are fees for docking, harbor moorage, pilotage, and drydocking that are based on tonnage, although tonnage is not the only criterion used to establish these costs.

TONNAGE DETERMINATION

Suppose you wanted a vessel of certain length, breadth, depth, and general design, but you wanted it to stay below a given gross tonnage to avoid costly regulations or fees.

Let's return to gross and net tonnage determination to find out how this can be done. Remember that gross tonnage is the entire cubic capacity of a vessel except

**By definition, admeasuring is the adding of the measurements of the spaces a vessel may carry cargo for a determination of that vessel's fair share of taxes.*

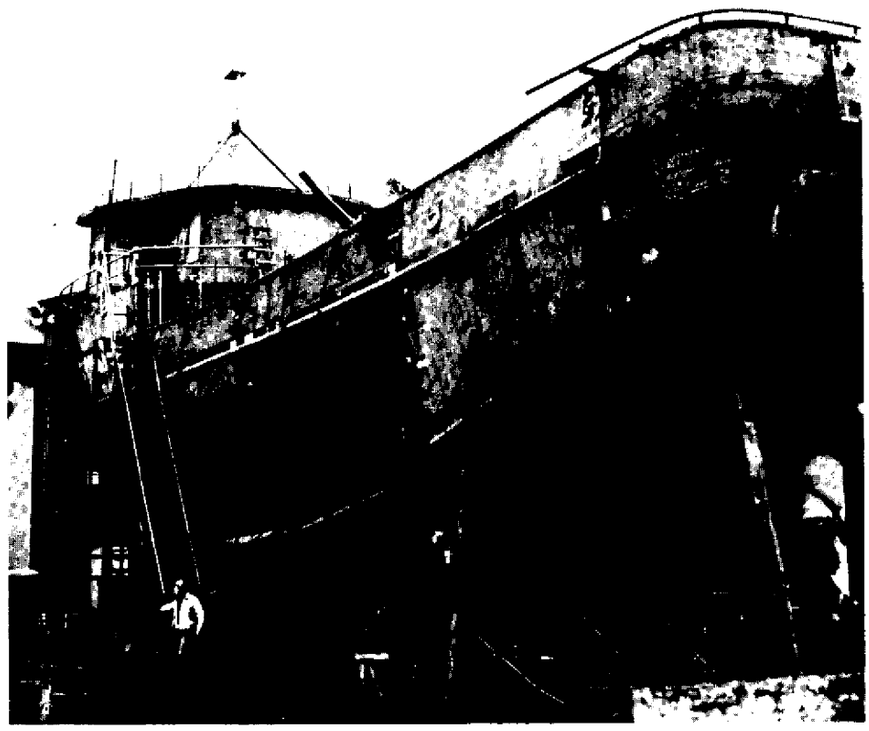
for certain exempt spaces. Likewise, net tonnage begins with gross tonnage, then subtracts other exempt spaces.

The key to arranging the desired combination of linear vessel size and registered tonnage is to make clever use of the various exempt spaces and measurement rules specified in the admeasurement regulations. These can be combined to produce an array of exemptions that, in the end, the correlation between linear vessel size and tonnage turns out to be very loose at best.

For example, there are five net ton boats that are 26 feet long and five net ton boats that are 42 feet in length. There are 199 gross ton vessels anywhere from 70 to 120 feet and 1,000 gross ton ships from 160 to 250 feet. And it isn't just because some vessels are wider or deeper than others. It happens because a builder can choose to either include, eliminate, amplify, reduce, or ignore any or all allowable exempt spaces as he/she sees fit.

Exemptions for gross tonnage include water ballast spaces, certain light and air inlets to the engine room, public bathrooms, the galley, companions, machinery spaces other than the engine room, the wheelhouse, certain passenger cabins, a percentage of the hatchways, and the space between adjacent frames of the hull. That is the space between the outside skin of the hull and an inside skin – whether one exists or not.

Net tonnage can be calculated by subtracting any or all other spaces on the vessel from gross tonnage which are not intended to carry cargo. Ultimately, net tonnage is just the cubic capacity in 100 cubic foot units of the cargo carrying area. But it can be more than just cargo space. Notice I said *any* or all other spaces. There is a fascinating little proviso which states that in order for an allowable space to actually be deducted for net tonnage, the room or space must have a specifically designed nameplate at the entrance, telling what the space is used for. The master's cabin cannot be deducted if there is no sign at the doorway saying "MASTER," nor can the laundry room be deducted without "LAUNDRY," or the mess without "MESS." What a mess! Consequently, a five net ton boat can be 26 feet or 42 feet.



As Alaskan fishing boats become larger and larger, the tonnage question will become more serious. With increasing size, regulations affecting the operation of the vessel become more stringent, and therefore the cost of operation can go up dramatically.

(Photo by Hank Pennington)

TONS ARE NOT ALL BAD

To the commercial vessel owner, this probably makes the register ton look like a bureaucratic pain in the neck. But the bureaucrats provide one saving grace to soothe the pain. Skippers and crew members (including owners if they work on the vessel) of every U.S. documented vessel are entitled to medical care through the U.S. Public Health Service (PHS).

The coverage includes medical, surgical, and dental care and hospitalization furnished by PHS hospitals, out-patient clinics, and contract physicians. There are only a few PHS hospitals, but out-patient clinics and contract physicians are in cities and towns in nearly 40 states, including Alaska.

If a person has worked aboard a documented vessel for at least 60 days, with breaks between service of no more than 60 days, then coverage can extend to *non-job* related medical care. This includes pregnancies, annual medical checkups, broken arms, chronic illnesses, and others. If an on-the-job injury occurs, the crew member is covered even if it is his/her first day at work.

Application for medical care must be made within 90 days following the last day of "sea service."

The extent of coverage seems to vary from one place to the next, so an individual should check with the nearest PHS affiliate to learn exactly what coverage is available locally.

For more information, write:

U.S. Public Health Service
Medical Care for Seamen
1131 14th Avenue South
Box 3145
Seattle, Washington 98114

Anyone who has recently had to face the cost of medical insurance or, much worse, uninsured medical bills, can appreciate the value of this benefit.

So if your commercial vessel is over five net register tons, the benefits of having it documented may very well outweigh the hassles and cost. You see, a ton may not be so bad after all. Even if you are not convinced, it should be clear by now that a ton is not a ton is not a ton.

OCT. 1978

Bow and Beam Bearings

Tips on Inshore Navigation

By F. F. WRIGHT
Marine Advisory Service

There are a lot of little tricks to inshore navigation. When conditions are such that you can see only one reliable landmark, the "Bow and Beam Bearings" method is one of the easiest ways to obtain a good estimate of your position. With this method, you depend on the characteristics of an equilateral triangle—the triangle formed between the landmark and two successive positions of your vessel. All you need is a reliable compass, knowledge of your ship's speed, and the ability to steer a straight course.

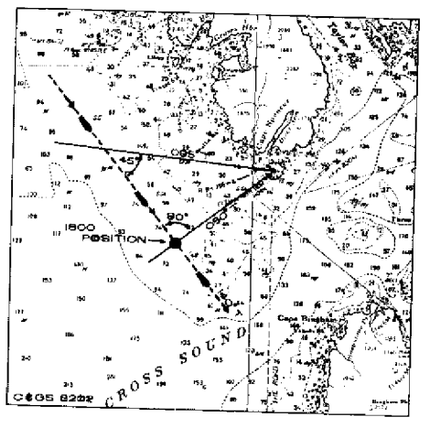
After you make a positive identification of your landmark, hold a steady course and when the landmark is at a 45° angle on your bow, record the time. Proceed along that same heading until the mark is abeam at a 90° angle from your course. Note the time and bearing. From the elapsed time, calculate the distance you covered between the two bearings. Then draw a line on your chart from the landmark in the direction of your beam bearing and scale off the distance. Mark the point of your beam bearing; that is your position.

For example, if you are running on a southeasterly course of 140° True past Cross Sound on your way to Sitka for a big Saturday night, one of your best marks is the light just off Cape Spencer (see the accompanying chart). Imagine that the fog is lying thick in Cross Sound and has just obscured Yakobi Island, but you know you must change course to due south soon, and you need a reliable fix. Your speed is eight knots. Once you have positively identified the light, you calculate that with your course of 140°T, when you read a bearing of 095°T on the light, it will be at 45° on the port bow. Suppose that it is 5:20 p.m. (1720 hours) when you get the bow bearing, and that the light is abeam on a bearing of 050°T at exactly 6:00 p.m. (1800 hours). You can calculate your distance run as follows:

$$\frac{8 \text{ knots}}{60 \text{ min.}} \times 40 \text{ min.} = 5.3 \text{ nautical miles}$$

(1 knot = 1 nautical mile)

This distance is also equal to your distance on a bearing of 230° (the reverse of 050°) from the Cape Spencer light, so you can mark your position as shown on the chart.



When you use this method, remember that it doesn't allow for any course variations caused by factors such as wind, waves, and currents.

DEC. 1973

COMMUNICATIONS

Navigation

Harbors of Refuge

Good news. The National Ocean Survey has commissioned the M/V *Fairweather* to chart specific harbors of refuge on the north side of Shelikof Strait. These harbors are Hallo Bay, Amalik Bay, Geographic Harbor and in the vicinity of Swikshak Lagoon.

Final nautical charts should be printed by summer or fall of 1976. Preliminary navigational information might be obtained directly from the M/V *Fairweather* either during her charting cruise or immediately upon completion. For the latest information check with the Marine Advisory Office in Kodiak or Anchorage. For information on the complete index of boat sheets, contact Commander Leonard Pickens, NOS, Anchorage.

Chart Updating

More good news. The National Ocean Survey is providing an updating service on selected Alaskan nautical charts. This service is available for some charts of the Alaskan Peninsula and areas north of the Peninsula for which chart revision data are seldom received.

A note titled "UPDATING SERVICE," printed on the selected charts, indicates those charts for which the service is available. Through the updating service, a listing of NOTICE TO MARINERS corrections dated after the print date of the chart is available free by writing to:

Director, National Ocean Survey
Roekville, Maryland 20852
Attn: C32

The service is a handy means for updating newly purchased charts but is not intended to replace the timely updating of charts by using the local and weekly NOTICE TO MARINERS.

Loran

The Coast Guard will begin using Loran-C on the west coast on January 1, 1977. Unless a greater overlap period is needed, Loran-A will be phased out by January 1, 1979.

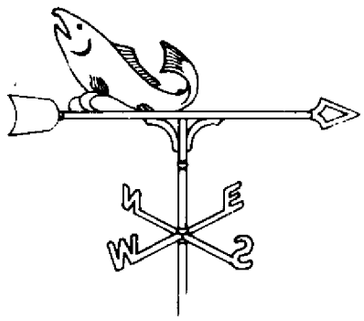
Both of these electronic, long-range navigation systems generate curved lines of position, although Loran-C operates at a lower frequency (100 kHz) than Loran-A (1750-1950 kHz). This lower frequency enables Loran-C to operate for much longer ranges (1200-1500 nautical miles) and will eliminate the many dead spots which now exist on the west coast under Loran-A. Loran-C is expected to provide greater accuracy which will be needed to guide increased tanker traffic.

Loran-C charts are currently being developed by the Coast Guard and the National Ocean Survey. The overlap period from Loran-A to Loran-C will allow readings to be made on both systems and then converted.

Volume production and current electronic technology is expected to decrease the cost of a double tracking Loran-C receiver station from $3,000 to $1,000.

June 1975

Fishermen and the Weather



Fishermen in the Gulf of Alaska can benefit from two experimental weather buoys now being tested in the Gulf. These buoys automatically gather weather data including wind speed and direction, air pressure and temperature, and water temperatures and transmit the information to shore every three hours.

Experimental buoy 03 is anchored approximately 385 miles south of Anchorage and provides weather information on the southwestern Gulf of Alaska. Experimental buoy 33 is anchored about 225 nautical miles west of Juneau (65 miles southwest of Yakutat) and supplies data on the northwestern Gulf.

The environmental information gathered by these two buoys is incorporated into the marine forecasts of the National Weather Service heard on AM radio frequencies 2382 KH_z and 2512 KH_z. (Forecasts are announced on 2182 KH_z.)

If fishermen wish more detailed information or the raw data from the buoys, they should call for a marine briefing at the following numbers.

Kodiak	579-3250
King Salmon	246-3411
Annette	882-3241
Cold Bay	532-2448
Juneau	586-7491
Valdez	835-4505
Yakutat	784-3322
Anchorage	265-4742

The National Weather Service appreciates the help of fishermen in acquiring accurate weather data. If you are at sea, particularly in rough weather, call channel 2182 and let them know about the winds, swells, and icing conditions in your location.

June 1975

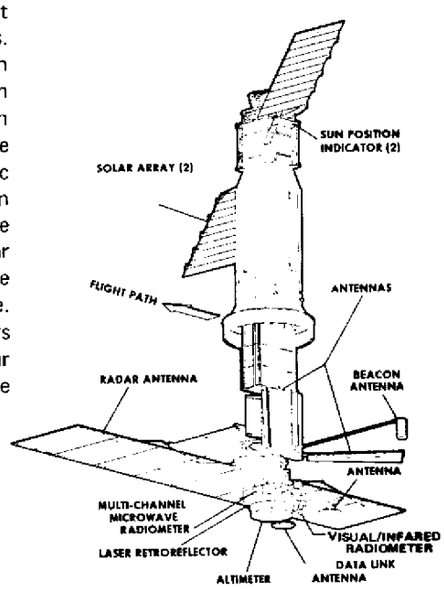
Fishermen's Satellite

by Hank Pennington
Marine Advisory Program

Mariners in the Gulf of Alaska and the Bering Sea can look forward to assistance from an unusual source. May 1978 is the scheduled launch date for SEASAT-A, a satellite designed to study a wide variety of ocean characteristics including ice movement, ocean surface temperature, wind velocity, wave height, and wave frequency regardless of the weather conditions or cloud cover. It will have the capability of helping predict vessel icing conditions, identifying safe harbors of refuge with various wind directions, predicting ice movement in the Bering Sea and Cook Inlet for crab fishermen, and identifying leads in the ice for Bering Sea tug boat operators.

SEASAT-A will be put in a near-polar orbit, passing over Alaskan waters about every 100 minutes and feeding its data to the Gilmore Creek tracking station near Fairbanks.

Don Montgomery from NASA and the Jet Propulsion Laboratory and Celia Drumheller of Econ Incorporated recently travelled to Alaska to meet with fishermen and other mariners. They were soliciting input for the design and maintenance of experiments with SEASAT-A. Because of the crunch on tax dollars it is important that NASA be able to demonstrate the economic utility of the satellite. If SEASAT-A can be proven to have made a positive economic impact, several similar satellites will be launched to provide more complete world-ocean coverage. Fishermen and other vessel operators will probably be contacted in the near future and asked to assist in the experiments.



SEASAT-A will fly five sensors – three active radars and two passive radiometers. It has the potential to yield data needed for achieving the goal of six-day ocean forecasts.

DEC. 1976

Agencies Expand Alaska's Marine Weather Service

Alaskan mariners now have ready access to current, accurate meteorological information along most of the state's coastline, thanks to close coordination of efforts between the National Weather Service and the U.S. Coast Guard.

In early 1969 the Weather Service and the Coast Guard began to initiate action that had been a long-time objective, and by October of 1969 their basic goal had been accomplished: A 24-hour marine forecast position was established in the Anchorage Forecast Office. The frequency of Coast Guard broadcasts was increased at NOJ, Kodiak, from two to six per day. In addition, the Coast Guard began to broadcast from LORAN stations at Biorka, Ocean Cape, Cape Sarichef and Adak. A station was later added at Attu. The Coast Guard has furnished weather information to mariners for many years; however, the broadcast of marine weather data from National Weather Service offices on a marine frequency is a new service, and was innovated in Alaska to meet the needs of boat operators off Alaskan coasts.

To reach a maximum number of AM radio users and to prepare for the change in Federal Communications Commission regulations calling for exclusive use of Single Side Band marine radios on boats by 1977, the Weather Service installed equipment with the capability to transmit and receive in AM or SSB mode. Three marine frequencies are available: 2182 for alerting or emergency use; 2382 for primary weather broadcast and weather collection, and 2512 as an alternate for 2382. Of the seven radios installed, those at Yakutat, Cold Bay and Barrow can operate on 1,000 watts on SSB, 250 watts AM. The others are 100 watt SSB, less on AM.

The installation of radios at National Weather Service stations and the increase in the number of Coast Guard broadcast outlets are part of a continuing effort to improve dissemination of marine weather information. Improvements in the efficiency of the existing installations are being made by both agencies, and other supplemental methods are being developed as funding and facilities can be obtained.

The schedule of marine weather broadcasts which appears at left is in Greenwich Time (GMT), mean solar time of the meridian at Greenwich, England, used as a basis for standard time throughout most of the world. To convert GMT to Alaska Standard Time, subtract 10 hours from GMT; for Alaska Daylight Time, subtract one hour less. For example: 1925 GMT − 10 hrs. = 0925 AST; 1925 GMT −9 hrs. = 1025 ADT.

Comments on marine weather service and request for copies of the marine weather broadcast schedule may be addressed to National Oceanic and Atmospheric Administration, National Weather Service, Alaska Region, 632 Sixth Ave., Anchorage, Ak. 99501.

SCHEDULE OF MARINE WEATHER BROADCASTS

ALL TIMES GMT

WEATHER SERVICE OFFICES

Announcement: 2182 kHz

Broadcast: 2382 kHz AM/SSB Alternate: 2512 kHz AM/SSB

Annette	0400	0600	0800	1500	2100
Juneau	0325	0525	0925	1225	1525
	2125				
Yakutat	0200	0300	0500	1400	1700
	1800			2000	
King Salmon	0215				2015
Cold Bay	0535	0935	1735	2135	
*Nome	0305	0905	1505	2105	
*Barrow	0615	1015	1815	2215	

VHF-FM 162.55 mHz

Seward 1630 - 0600 Anchorage Continuous

*Seasonal or on request

COAST GUARD STATIONS

Announcement: 2182 kHz Broadcast: 2670 kHz

Biorka	0100	0800	1300	2000
Ketchikan	0115	0815	1315	2015
Ocean Cape	0145	0845	1345	2045
Kodiak	0200	0445	0900	1400
	1645		2100	
Sarichef	0515	1215	1715	2315
Adak	0530	1130	1730	2330
Attu	0545	1145	1745	2345

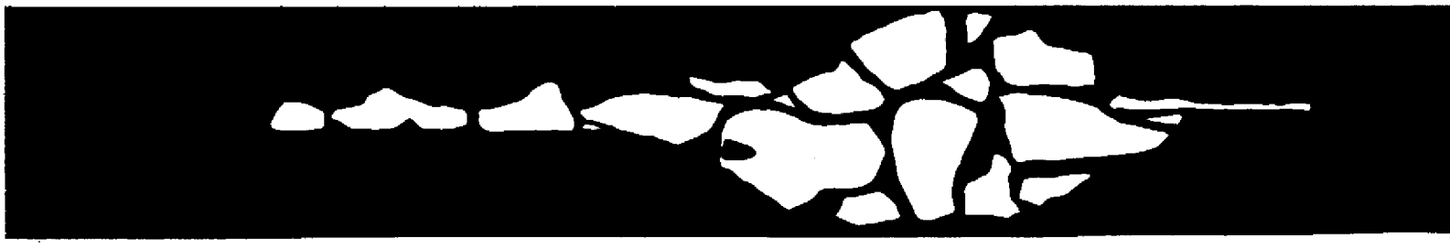
Times may be changed without notice

June 1973

Section five

ALASKA Seas and Coasts

A Newsletter for the Alaska Commercial Fishing Industry



Sea Science

Section five: Sea Science

Sound management of resources depends on understanding the physical and natural relationships that define the biology of a species.

Managing fisheries in Alaska requires a knowledge of man's activities. Shoreline development, pollution and oil activities are particularly important in this state. The biological impact of these activities is only now becoming known.

Each species reacts differently to fishing and environmental pressures. The life cycle of each must be fully understood before management can be effective. The included life cycle charts are one attempt to understand these cycles better.

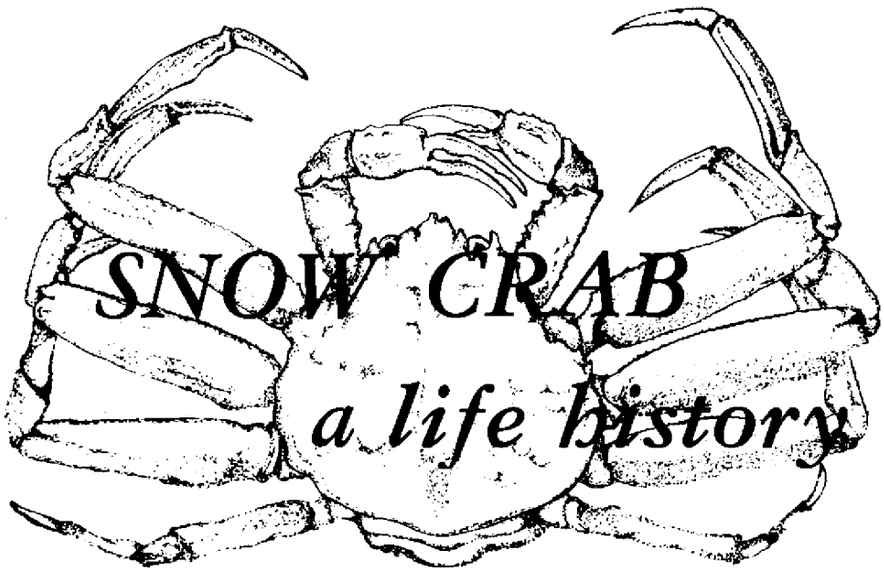
Some species have special needs, such as estuaries. Salmon, for example, are heavily dependant on these near-shore nursery grounds. Other species are sensitive to changes in water temperature or current. Still others react to wind.

Because oil development is likely to occur in many near-shore fishing grounds, this section contains articles that look at the impact of oil development. Coastal residents have also been concerned about the effect of the off-shore industry on their communities.

Other articles of interest include those on the University of Alaska fisheries education program, and a hodge-podge of oceanographic topics.

Section Five

SEA SCIENCE



SNOW CRAB
a life history

by John Hilsinger
Fisheries Biologist
University of Alaska

In the early days of the Alaskan king crab industry the snow – or tanner – crab was considered a nuisance, and was disregarded as a commercial species. It has since evolved into a position of prominence in the fishing industry. With the new 200-mile limit the allocation of the allowable catch of this species between the American and Japanese fishing fleets could become the source of significant international controversy.

In the following article John Hilsinger, fisheries biologist at the Institute of Marine Science, University of Alaska, describes the life history of this important shellfish. Since the management of the fishery is based upon the life history of the crab, he points out some of the complexities that will face our biologists and Regional Management Council as they manage the snow crab on the international scale.

Snow crabs, *Chionocetes bairdi,* are one of Alaska's most valuable shellfish resources. In the first seven years of the fishery, production went from 53.6 metric tons (118,000 pounds) to 29,000 metric tons (64 million pounds). In 1974 snow crab brought 13 million dollars to fishermen from Southeastern Alaska to the Bering Sea. The fishery expanded more rapidly than information could be collected about the crabs.

To insure that over-harvesting is prevented, scientists from the University of Alaska, Alaska Department of Fish and Game and the National Marine Fisheries Service are studying the crabs. They are investigating: (1) age and size at maturity and recruitment (entry into the fishery), (2) number of year classes in the fishery, (3) amount of annual harvest that will be offset by recruitment, and (4) effect of fishing on the reproductive ability of the population. Knowledge collected so far allows us to put together much of the life history of the snow crab and to answer some of these questions.

MOLTING

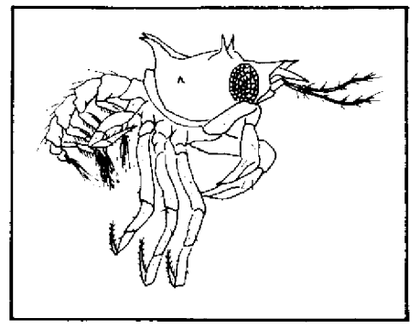
Molting is one of the most significant events in a crab's life. It is the only means by which a crab is able to grow, but it is also a time of real danger for the crab. They may die or lose legs while backing out of the old shell, and before the new shell hardens they cannot move well, which leaves them very susceptible to predators. Because it is the basis for a large part of the following discussion, molting warrants further explanation.

In the process of molting, crabs swell up with water and split the old shell (exoskeleton), exposing a new soft shell which has formed beneath the old one. The crab backs out of the old shell and remains fairly inactive while the new shell swells and hardens enough to support its movement. The amount of growth at each molt depends on the age, sex, and geographic location of the crab.

GROWTH

A young snow crab hatches from its egg in May. Before actually resembling the adult crab in July, it passes through four larval stages. Immediately after hatching the crab is between 3.0 and 3.5 mm (0.118 - 0.113 inches) in carapace width. At this age the snow crab is preyed on by codfish, small tomcod and small halibut. A crab will molt five times during the first year, growing 35 to 40 percent with each molt, until it is 12 to 14 mm (about ½ inch) in diameter.

By the time the carapace width has reached 85 mm (3.3 inches) molt frequency has decreased to once per year, and less frequently as it grows older. Codfish, halibut and sculpin are the major predators during this portion of the crab's life. After 13 molts a male snow crab becomes mature, at about 110 mm (4.5 inches) and 6.3 years of age. At this size the male grows 25 mm (1 inch) per molt and his growth rate decreases.



Immediately after hatching, the crab measures between 3.0 and 3.5 mm (0.118 - 0.113 inches) in carapace width. At this age the snow crab is preyed on by codfish, small tomcod and small halibut. Illus. by Stephen C. Jewett Institute of Marine Science University of Alaska

The crab grows to about 160 mm (6.3 inches) with two additional molts, which is slightly larger than the average size of the Kodiak commercial catch. Most male crabs are captured or die before molting again. They grow to 135 mm (5.3 inches) at 7 to 7.5 years and 168 mm (larger than 90 percent of the Kodiak commercial catch) at 11 years. Living several years after the final molt would make these crabs a maximum of 13 to 14 years old. Most commercially-caught crabs are probably 8 to 12 years old.

Females reach maturity at about age six during their tenth molt. At this time

they first mate and produce an egg clutch. The average size of females at maturity is 85 mm in Kodiak and 80 mm in Prince William Sound. Variation in size at maturity between years may be as great as 10 mm in both areas. This is the final molt for the female.

Adult females average 95 to 100 mm though again this may vary by 10 mm depending on the year. Adult females may be as small as 70 mm or as large as 127 mm. Because they no longer molt after reaching maturity, most females have very old, scratched and pitted shells. Each female lives three to four years after their final molt.

REPRODUCTION

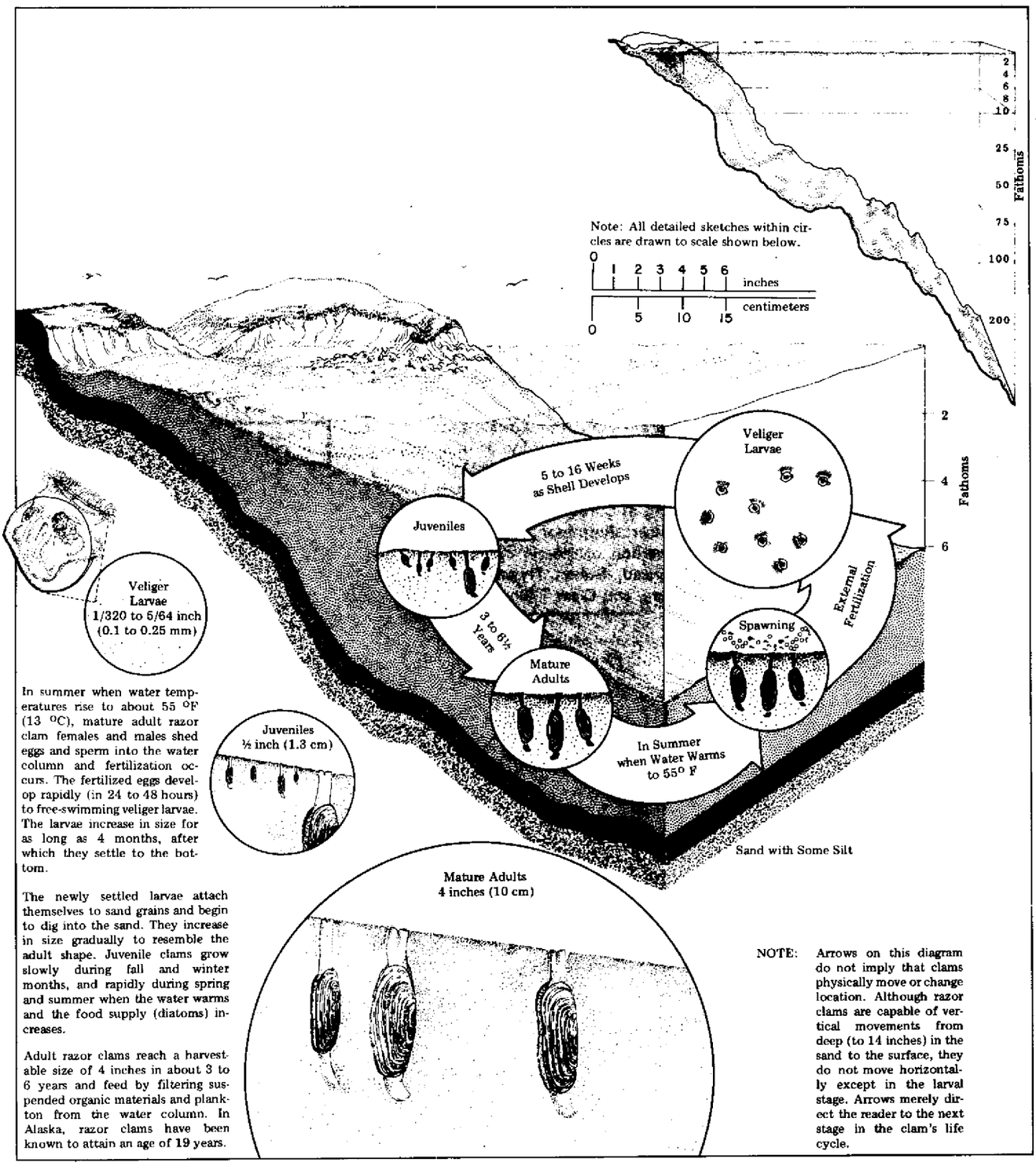
Females produce 100,000 to 300,000 minute (½ mm) eggs per year. The eggs are carried beneath the crab protected by the abdomen. Females from Prince William Sound produce an average of 160,000 bright orange eggs each spring. By the following spring the eggs are dark brown and number about 130,000. During the course of the year many abnormal eggs die and others are eaten by worms and sand fleas that enter the egg clutch. About two percent of the females do not produce an egg clutch in any one year.

During their first mating females are usually grasped by recently-mature males averaging 110 mm in diameter. Subsequent matings take place with older, larger males. Due to the presence of spermathecae, small sacks in which the sperm is stored in the female, fertile egg clutches may be produced by a female even though she has not mated that year.

Continuing studies by ADF&G are aimed at estimating the abundance of sub-legal and legal-sized crabs. This will allow better determination of the size of the allowable harvest for each year. In addition, female crabs are examined to see if removal of males by fishing is decreasing mating successes and causing more barren females. Continuing studies in age and growth will be used to refine knowledge of the life history of snow crabs and allow more accurate estimation of the age of all crabs.

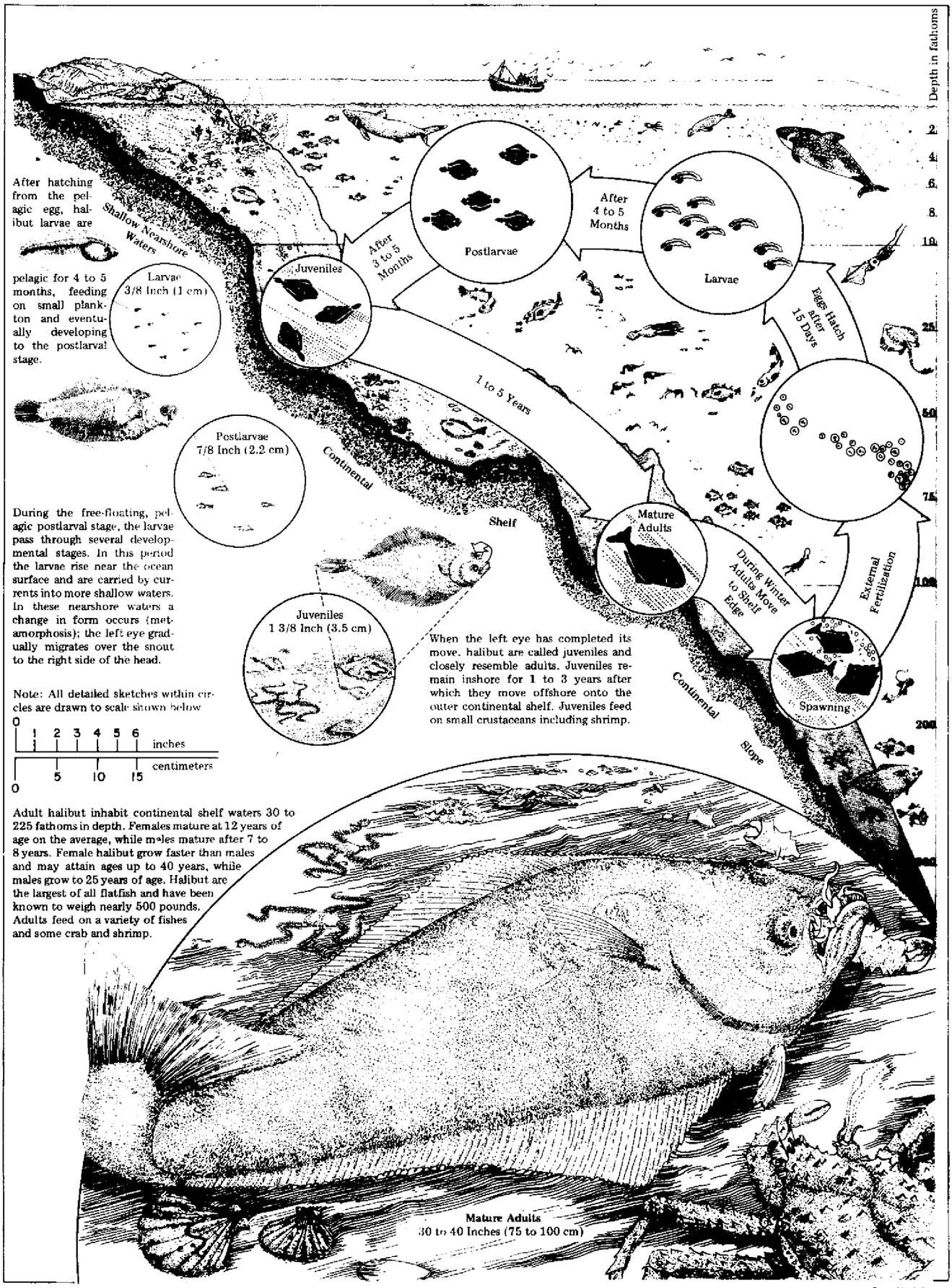
DEC. 1976

Razor clam life cycle



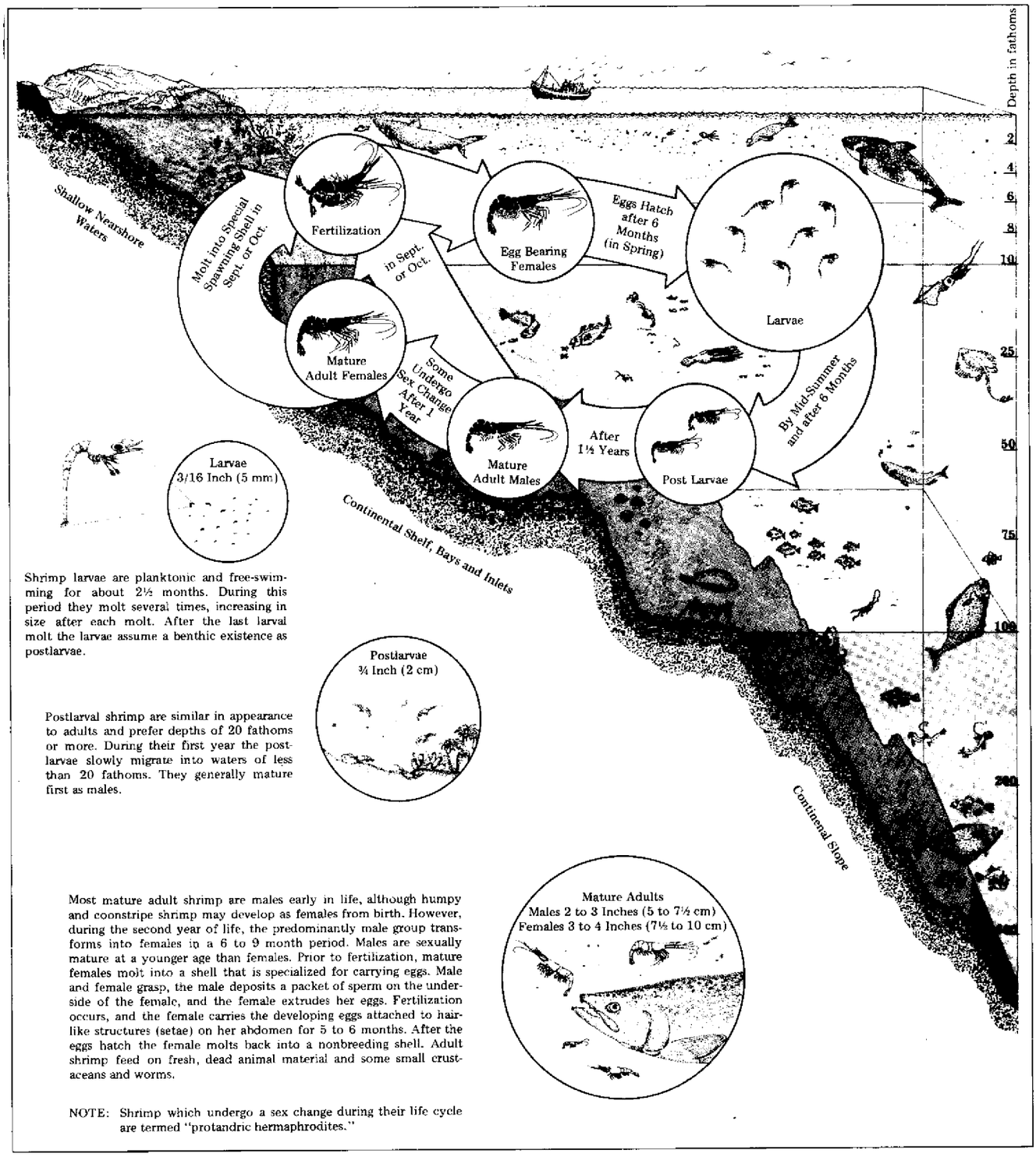
The taste of summer. Razor clams are found on sandy, surf-swept beaches of the open coats and inhabit intertidal waters to several fathoms in depth. They feed on plankton and detritus which they filter from surrounding waters, and reproduce by shedding eggs and sperm into the water where fertilization occurs. The clams spawn during summer when rising water temperatures reach 55 degress F. Developing larvae are mobile for three to 16 weeks, living in and on the sand near where they were spawned. Larvae settle to the bottom when still quite small and spend the remainder of their lives in bottom sediments. From *Kadyak,* an atlas on the environment of the Kodiak Island group and adjacent waters. **June 1976**

Halibut life cycle



April 1976

Pink shrimp life cycle



Shrimp larvae are planktonic and free-swimming for about 2½ months. During this period they molt several times, increasing in size after each molt. After the last larval molt the larvae assume a benthic existence as postlarvae.

Postlarval shrimp are similar in appearance to adults and prefer depths of 20 fathoms or more. During their first year the postlarvae slowly migrate into waters of less than 20 fathoms. They generally mature first as males.

Most mature adult shrimp are males early in life, although humpy and coonstripe shrimp may develop as females from birth. However, during the second year of life, the predominantly male group transforms into females in a 6 to 9 month period. Males are sexually mature at a younger age than females. Prior to fertilization, mature females molt into a shell that is specialized for carrying eggs. Male and female grasp, the male deposits a packet of sperm on the underside of the female, and the female extrudes her eggs. Fertilization occurs, and the female carries the developing eggs attached to hair-like structures (setae) on her abdomen for 5 to 6 months. After the eggs hatch the female molts back into a nonbreeding shell. Adult shrimp feed on fresh, dead animal material and some small crustaceans and worms.

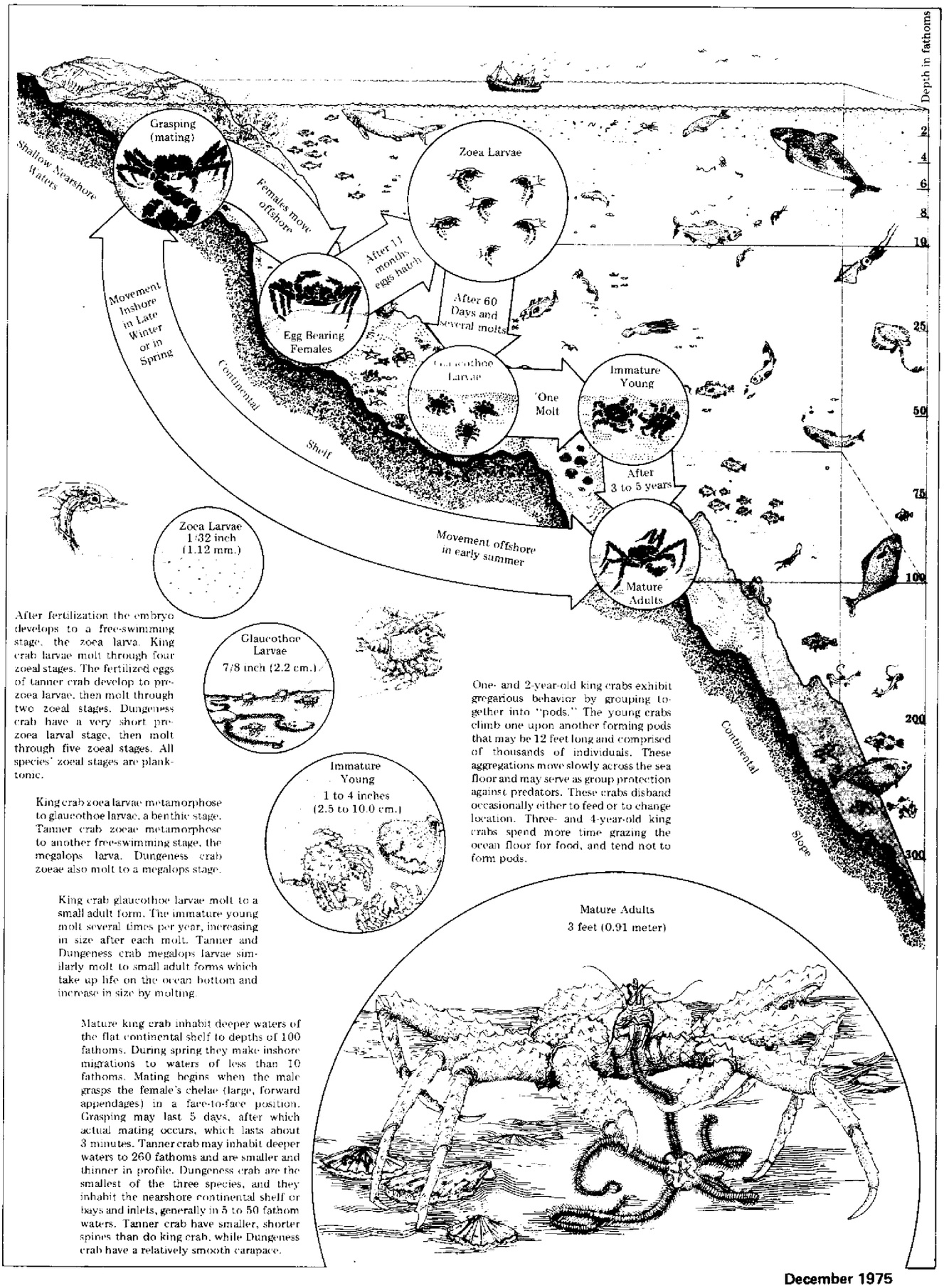
NOTE: Shrimp which undergo a sex change during their life cycle are termed "protandric hermaphrodites."

Kodiak clearly dominates the West Coast shrimp harvest today. The bays and straits around Kodiak Island produce over two-thirds of the total Pacific coast landings. Pink shrimp, as shown above, comprise at least 97 percent of the catch around Kodiak. Larvae of the pink shrimp hatch from February through April or early May. The pink shrimp appear to make a diurnal movement off the bottom at dusk and return to the bottom in early morning. Peak feeding activity seems to occur between nine at night and midnight.

This drawing by Dennis Kuklok is from *Kadyak*, an atlas on the environment of the Kodiak Island Group and adjacent waters. Copies of the atlas are available from the Arctic Environmental Information & Data Center (AEIDC), 707 A Street, Anchorage, AK 99501.

Feb. 1976

King crab life cycle



After fertilization the embryo develops to a free-swimming stage, the zoea larva. King crab larvae molt through four zoeal stages. The fertilized eggs of tanner crab develop to prezoea larvae, then molt through two zoeal stages. Dungeness crab have a very short prezoea larval stage, then molt through five zoeal stages. All species' zoeal stages are planktonic.

King crab zoea larvae metamorphose to glaucothoe larvae, a benthic stage. Tanner crab zoeae metamorphose to another free-swimming stage, the megalops larva. Dungeness crab zoeae also molt to a megalops stage.

King crab glaucothoe larvae molt to a small adult form. The immature young molt several times per year, increasing in size after each molt. Tanner and Dungeness crab megalops larvae similarly molt to small adult forms which take up life on the ocean bottom and increase in size by molting.

Mature king crab inhabit deeper waters of the flat continental shelf to depths of 100 fathoms. During spring they make inshore migrations to waters of less than 10 fathoms. Mating begins when the male grasps the female's chelae (large, forward appendages) in a face-to-face position. Grasping may last 5 days, after which actual mating occurs, which lasts about 3 minutes. Tanner crab may inhabit deeper waters to 260 fathoms and are smaller and thinner in profile. Dungeness crab are the smallest of the three species, and they inhabit the nearshore continental shelf or bays and inlets, generally in 5 to 50 fathom waters. Tanner crab have smaller, shorter spines than do king crab, while Dungeness crab have a relatively smooth carapace.

One- and 2-year-old king crabs exhibit gregarious behavior by grouping together into "pods." The young crabs climb one upon another forming pods that may be 12 feet long and comprised of thousands of individuals. These aggregations move slowly across the sea floor and may serve as group protection against predators. These crabs disband occasionally either to feed or to change location. Three- and 4-year-old king crabs spend more time grazing the ocean floor for food, and tend not to form pods.

Red Tide

A "red tide" hit the coast of Southcentral Alaska this summer, and many beaches were closed to clamming through August and parts of September. The tide appeared almost simultaneously in Prince William Sound, Resurrection Bay, Kachemak Bay and the southern portions of Cook Inlet, Afognak and Kalsin Bays off Kodiak, and on the southern shore of the Alaska Peninsula from Kukak Bay north to Cape Douglas during the early part of August.

Red tides are caused by dinoflagellates — microscopic, single-celled planktonic organisms which serve as food for filter-feeding shellfish. These organisms are probably present in small numbers along the coast year-round, but under favorable conditions increase rapidly and may turn the surrounding water a deep rust color, consequently the "red tide".

The dinoflagellate found in Alaska this summer is an undetermined species of the genus *Gonyaulax*. It is toxic and affects oysters, clams, mussels and other bivalves, but not shrimp or crab. The bivalves concentrate the toxin in their systems, and a small dose of the poison may be fatal to humans.

On September 19 Jim Allen, Regional Supervising Sanitarian for the Alaska Department of Health and Social Services, reported that commercial and other beaches tested for toxicity in Prince William Sound "looked good" and that Kalsin Bay clams seemed to have given up their toxicity. Allen added that, Swikshak Bay was "hotter than a pistol", and that the toxic count in Kachemak Bay had increased.

Lauren Flagg, Alaska Department of Fish & Game habitat biologist in Homer, reported that dead clams, apparently killed by the red tide, were found in Sadie Cove, McDonald Spit and Tutka Bay. Rick Rosenthal and Dennis Lee, marine consultants, reported that the entire flats at the head of Sadie Cove down to a depth of about 40 feet had been affected. The area of heaviest mortality covers an area of approximately 36 acres. A total of 700 thousand cockles, two and a half million clams of the genus Maconna and 300 thousand snails (*Natica*) died in the area. Few butter clams, gaper clams or little neck clams were affected.

Clam fatalities from a red tide are extremely unusual, and the reason why the clams in Kachemak Bay died is, at this point, unknown. Flagg proposed that the species of *Gonyaulux* found in Kachemak Bay this summer is a new species which is toxic to the clams in high concentrations. Flagg also noted that since this was the first recorded *Gonyaulax* in Kachemak Bay it could be that the clams had never developed an immunity to it. It is also possible that the red tide was so thick that it caused an oxygen depletion which smothered the clams and other marine life.

Samples from the area have been collected and will be tested by the Alaska Department of Environmental Health and the University of Alaska's Institute of Marine Science. **Oct. 1975**

Meet 'Walter'

Alaska Black Dolphins

Ever catch a snailfish? The specimen pictured above, "Walter" by name, was brought up from a depth of more than 120 fathoms in a Tanner crab pot last November near Seward by Martin Goresen of Seward. The mottled, black and brown fish is 21 inches long, weighs four and one-half pounds and has finger-shaped pectoral fins. Its most striking features are its orange eyes, a sucker disk under its mouth and a pensive expression.

Walter has been placed on public display at the Alaska Black Dolphins divers office in Anchorage by owner Yvon Van Driessche. Several biologists have tentatively identified the fish as a member of the genus *Liparis*, commonly known as a snailfish, and rarely netted in its rocky, deep-sea habitat. **Feb. 1973**

Disease Traced to Fungus

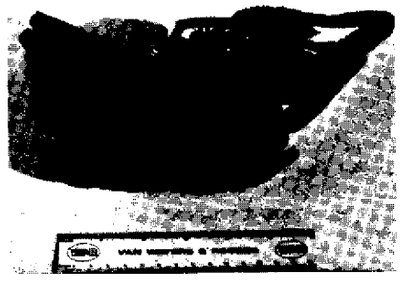
Black Snow Crabs

A black shell encrustation is commonly found on snow crab (tanner crab) taken along the coast of Alaska. The encrustation appears as a mat of black nodules which form a dense, hard, tar-like covering on the shell. It is most common on the rear part of the back and in some cases on the bottom. In bad cases, it is found on the back legs and will sometimes cover the entire shell including the eye stalks and mouth parts. Even in cases of heavy infestations, however, damage to the shell appears to be light. Only when the eye stalks and mouth parts are covered does the disease appear to cause death.

Dr. Jack VanHyning and Mrs. Arla Scarborough found the black crust to be a microfungus, *Phoma fimeti*, which lives by attacking the snow crab shell. This type of fungus is commonly found in decaying wood and other plants. Although this is the first time *Phoma fimeti* has been reported in Alaska, closely related species are often found in Alaskan soils. It is not known how a terrestrial fungus has such an effect on a marine animal.

Even though the fungus may not cause significant damage to the crab, it does cause processing problems. The nodules often come off during shaking, and contaminate the meat. The whole crabs, or sections of badly infected crabs, cannot be sold, because the consumer thinks the encrustation is tar. It is not profitable to process badly infested crab, as too much labor is required to remove the nodules.

Shell diseases are common in other



Infected snow crab.

crustaceans. The "rust disease" in king crab is caused by bacteria. This bacteria attacks the underside of the shell, causing the shell to soften and darken. A bacterial disease is also found on the shells of lobster.

The particular fungus which attacks snow crab appears to be species specific; that is, it attacks only snow crab. Dungeness crab and king crab from areas where snow crabs are heavily infected show no heavy encrustation. The disease may be confined to particular areas. To date, it has not been found in the Atlantic snow crab or on the coast of Japan. Studies of snow crab along the coast of British Columbia and Washington do not mention shell encrustation.

The area between Kodiak and the Shumagin Islands appears to have the highest concentration of infected crab. There the incidence of infestation ranges from seven to 75 percent, with an average of 37 percent. In Prince William Sound, the incidence is about eight percent.

Because the disease is incurable, the only way to cope with it is to avoid fishing the areas of high infection rates, as many skippers already do. **Feb. 1974**

OCEAN RANCHING Of Pink and Chum Salmon

By WILLIAM J. McNEIL
Chief, Anadromous Fishes Investigations
Auke Bay Fisheries Laboratory
National Marine Fisheries Service

Catches of North American pink and chum declined rapidly through the 1940's, and landings remained in a depressed state in the ensuing years. Oregon chum salmon, for example, were decimated in the 1950's, and the fishery was closed south of the Columbia River in 1962. Even in Alaska the once prolific southeastern Alaska pink stocks have suffered about a two-thirds reduction in landings.

Overfishing is strongly implicated as the dominant force which initiated a rapid decline of pink and chum in the 1940's. However, reduced survival of eggs and young in streams and estuaries, which resulted from damaging land and water-use activities, is probably contributing to the present depressed state of stocks in many areas. Provided natural or man-caused imbalances have not reduced the capacity of oceanic feeding grounds, there is a good possibility that numbers of harvestable fish can be increased through strict management of wild stocks and the application of artificial propagation.

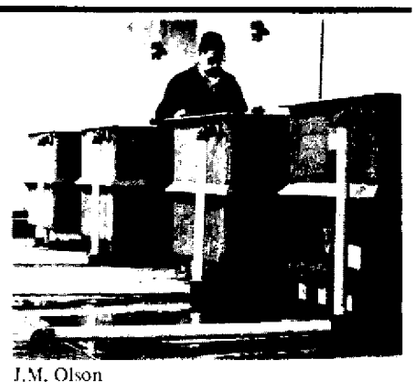
Status of Artificial Propagation

The Japanese began to build chum hatcheries in 1876; and numerous state, local, and private hatcheries now release 400 to 600 million juvenile pink and chum salmon annually to sustain coastal fisheries on Hokkaido and Honshu Islands. Chum is the most important species in Japan, and approximately four million hatchery adults return annually to coastal waters to provide an annual harvest of about 30 million pounds. Furthermore, marking studies indicate that Japanese vessels fishing on the high seas harvest at least an equal quantity.

The Russians were forced into a large-scale hatchery program for pink and chum in the 1960's to compensate for overexploitation of many of their stocks by the Japanese high seas fishery. The Russians presently release more pink and chum salmon from hatcheries than the Japanese; their 21 Sakhalin Island hatcheries alone produce more than 600 million juveniles annually. Although they obtain only about 0.4 percent (2.4 million) return of hatchery chum to their coastal fisheries, the Russians believe that Japanese high seas fleets harvest most of their hatchery fish.

In marked contrast to recent successful hatchery programs in Russia and Japan, attempts to raise pink and chum in public hatcheries in the Pacific Northwest have mostly failed. Although the Washington Department of Fisheries continues to raise a few million chum at two hatcheries, large-scale production of pink and chum came to an end in the late 1930's after consistent failure to establish runs of hatchery fish. Very low marine survival of hatchery pink and chum at Pacific Northwest hatcheries has contributed to the belief which prevails among North American biologists that hatcheries are less efficient than natural reproduction.

In seeking suitable alternatives to hatcheries, biologists began to experiment with spawning and egg incubation channels in the 1950's. Promising results from early tests prompted the International Pacific Salmon Fisheries Commission and the Canada Department of Environment to construct commercial-scale spawning channels in British Columbia. The early indications are that marine survival of



J.M. Olson
Experimental gravel incubator hatchery on Auke Creek near Juneau.

channel fry is much higher than experienced previously in Pacific Northwest hatcheries.

Recent advances in our understanding of the requirements of pink and chum during the larval (alevin) stage have led to development of hatchery incubators which use a gravel substrate. The technique of spreading pink and chum alevins on gravel is widespread in Russian hatcheries, and is used also in some Japanese hatcheries. It affords alevins a more natural environment than conventional trough or tray incubators and produces fry of much higher quality than conventional methods.

Two different designs of gravel incubation hatcheries are being field tested. One type involves burial of newly fertilized or eyed eggs in gravel-filled tanks receiving an upwelling flow of water. In the other type, newly fertilized eggs are placed on screen trays and suspended in a water column with an upwelling flow. After the eggs hatch, the alevins drop through the screens and repose on the surface of a shallow layer of gravel.

The first evaluation of marine survival of pink fry from a gravel incubation hatchery has recently been reported by Canadian fishery scientist, R. A. Bams, who compared 77,000 marked hatchery fry with 75,000 marked wild fry. He estimated nearly

seven percent marine survival of hatchery and wild fry. This is in the upper range of marine survival previously reported for wild pink salmon, and is probably higher than would be observed in repeated experiments of this kind.

Harvest of Stocks

The operation of hatcheries would not relieve the need for continued restriction of harvest of pink and chum salmon in the common property fishery, because the conservation of wild stocks will continue to demand high priority. Even when conditions favor high survival in fresh and salt water, it is unlikely that wild stocks will support more than 75 percent exploitation. Much lower exploitation will be required in most years for conservation purposes. Hatchery stocks, on the other hand, should sustain much higher exploitation, perhaps as high as 95 percent, because of the small numbers of brood fish required to restock hatcheries. In the face of differing requirements for conservation, how do we provide for complete utilization of hatchery fish and avoid overharvesting wild fish on the fishing grounds?

Because it is imperative that the common property fishery be managed to achieve adequate escapements of wild fish to spawning streams, large surpluses of artifically propagated fish will return to successful hatcheries. These surplus hatchery fish would become available for harvest after they segregate themselves from wild fish. Such segregation will occur at the mouth of the hatchery stream in most instances.

State hatcheries in Oregon and Washington began to receive substantial numbers of surplus hatchery coho and Chinook salmon about 10 years ago. In 1970, these public hatcheries placed more than five million pounds of surplus salmon on the commercial market. It is very likely that they also contributed another 20 to 30 million pounds to common property commercial and recreational fisheries from California into southeastern Alaska.

Even though commercial salmon fishermen are dependent upon hatchery fish in the Pacific Northwest, they have been very vocal in criticizing management agencies for allowing too many fish to return to hatcheries. It seems probable, however, that the present high rate of exploitation already threatens wild coho and Chinook stocks in the Northwest, and any further increase in exploitation could be disastrous unless it is selective for hatchery fish.

It is unlikely that wild pink and chum stocks could sustain as high a rate of exploitation as coho and Chinook, because of differences in factors which limit recruitment of young to the ocean. In the case of pink and chum, utilization of spawning habitat limits recruitment of young, and relatively large numbers of spawners are required for maximum production of fry. On the other hand, only relatively small numbers of coho and Chinook spawners are required to provide sufficient fry to stock limited stream nursery areas, which are occupied by young fish for periods of up to three years before they migrate to sea.

Surpluses of fish escaping the common property fishery and returning to a hatchery potentially will be much larger for pink and chum than for coho and Chinook because of the need to hold exploitation below 75 percent most years to conserve wild stocks. Recent information on Japanese hatchery fish indicates that marine survival (catch plus escapement) of chum has averaged 1.5 percent over a 12-year period. It is instructive to use this estimate of marine survival to predict surplus production of chum returning to a hypothetical hatchery:

Number of eggs placed in hatchery	=	50,000,000
Fry production (85 percent of eggs)	=	42,500,000
Adults returning to common property fishery (1.5 percent of fry)	=	637,500
Harvest in common property fishery (60 percent of returning adults)	=	382,500
Adults returning to hatchery	=	255,000
Brood stock (2,700 eggs per female)	=	37,000
Surplus for harvest at hatchery	=	218,000

Many surplus pink and chum escaping the common property fishery and returning to a hatchery will be mature fish which are no longer in prime condition for canning. Nevertheless, these mature fish retain considerable market value for caviar and bait eggs, smoking and drying, animal food and bait. Even the carcasses of artificially spawned fish can be used for animal food and bait, so all adults returning to a hatchery, including brood fish, have potential markets.

Public fishery agencies in the Pacific Northwest are faced with substantial marketing problems which have been created by the sizable surpluses of hatchery coho and Chinook. Common complaints voiced by fishermen include:

"Salmon sold from hatcheries is of poor quality; this hurts our markets."

"A public agency shouldn't be in the fish business."

"Those returned hatchery fish are lowering the price of salmon caught by commercial fishermen."

These problems are symptomatic of a public hatchery program, because any successful hatchery will have a surplus, even with heavy exploitation. To alleviate these problems, serious consideration must be given to institutional arrangements for raising, harvesting and marketing hatchery fish. Ideally, the value of surplus hatchery fish should underwrite the cost of hatcheries without threatening the economic security of fishermen. It seems a paradox that a technology

Dr. William McNeil

Gravel incubator hatchery under construction on Quinault Indian Reservation, Washington.

Dr. William McNeil

Stocking a gravel incubator at Netarts Bay, Oregon, with chum salmon eggs.

which offers the promise of increasing the supply of salmon could also complicate the management of wild stocks and marketing.

One step to insure that surplus fish will underwrite the cost of operating hatcheries is to create a legal basis for private hatcheries. This is being tried on a restricted basis in California, Oregon, and Washington. Except where hatcheries are constructed by Indian tribes on tribal lands, private hatcheries are licensed and regulated by state fishery agencies, but no public tax funds are used for construction and operation. In Oregon, any administrative costs incurred by the state are charged to the private hatchery. Salmon from private hatcheries become public property from the time they are released until the time they are recaptured in trapping facilities operated by the hatchery.

Should "proprietary" fisheries created by private hatcheries prove to be financially successful, a salmon farming industry will most likely emerge over the next several years. Such a proprietary fishery conceivably could attain economic importance in its own right, while at the same time contributing substantial numbers of fish to the common property fishery.

The speculative risk of private salmon hatcheries is undoubtedly high, because we have very little information to pass judgment on economic feasibility at this time. Even if fish returning to a private hatchery do not have sufficient value to cover costs, there is a possibility that fishermen would tax their catches to cover the deficit, provided they are convinced that the added value of hatchery fish in their catch makes the added subsidy worthwhile to them. There may even be circumstances where the operation of hatcheries by fishermen's associations might become practicable, especially where limited entry to the fishery would give the participating fishermen a proprietary interest in any hatchery fish returning to a particular fishing ground.

Even though private pink and chum hatcheries are highly speculative, there is a likelihood for significant economies in costs of constructing and operating gravel incubation hatcheries. If costs of producing 1,000 fry can be held at about $6 (including amortization), then a 1.5 percent return of chum or a three percent return of pink to the common property fishery would be sufficient for a self-supporting hatchery under the following conditions:

	Chum	Pink
Cost of fry	$6/1,000	$6/1,000
Total return/1,000 fry	15 adults	30 adults
Harvested by common property (60% exploitation)	9 adults	18 adults
Return to hatchery	6 adults	12 adults
Required for brood stock	1 adult	1.5 adults
Surplus for proprietary harvest	5 adults	10.5 adults
Value of surplus ($1.30/chum; $.60/pink)	$6.50	$6.30

The above examples provide slim margins for profit. If cost of fry production, market value of surplus fish, or exploitation in the common property fishery should be underestimated, the hatchery would lose money. Money would also be lost if marine survival should be overestimated. The example serves to identify the key elements which require evaluation: (1) Cost of producing fry; (2) marine survival; (3) exploitation in common property fishery, and (4) market value of surplus hatchery fish.

Emergence of a salmon hatchery industry will require intensified support from government in research, development and advisory services. Private hatcheries will require assistance on criteria for design and operation of hatcheries, genetics and selective breeding of stocks, disease control, nutrition where short-term rearing of fry is involved, harvesting, processing, marketing and socio-legal problems. Because state fishery agencies will administer and regulate private hatcheries, it is imperative that they participate in research, development and advisory projects along with National Marine Fisheries Service laboratories and Sea Grant universities.

We may have already entered a period of transition from strictly public artificial propagation of salmon to a partnership between public and private propagation. Many questions need to be resolved by state legislative and administrative bodies before we can convert a "problem" of surplus hatchery fish into an "opportunity" to allow these surplus fish to pay the cost of operating hatcheries and to avoid continued heavy subsidization of public hatcheries. It is prudent for state fishery agencies to proceed with caution as they broaden their salmon management programs to include the assignment of limited proprietary rights to salmon. If properly executed, a partnership between government and private sectors of the economy can greatly broaden the financial base for expansion of salmon resources for the benefit of fishermen, processors and the public.

April 1973

Aquaculture in Alaska

By DR. RICHARD NEVÉ
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The vast fishery resources of Alaskan waters are increasingly endangered by domestic and foreign overharvesting. Policing and managing the food resources of the sea are becoming more difficult. With a stabilized catch of about three million tons live weight annually, the U.S. fishing industry has had to increase its imports each year, and will continue to do so until there is adequate development of aquaculture.

There are serious problems in this development, though. Aquaculture techniques are not well enough developed to encourage large-scale private funding. Aquaculture is a high risk industry requiring large capital investments. It takes time for capital investment to pay off, and time is the important factor here.

It is advisable for the state to get involved in aquaculture now, before exploitation has removed valuable species, or before other uses of the sea and its adjacent coastline have excluded the development of aquaculture sites. The greatest need is for studies which will influence and direct the most potentially efficient marine cultivation systems known to man. There is a need for laboratories which are designed to adapt successful world aquatic practices to Alaskan conditions. There is a need to develop rearing systems for fish and shellfish utilizing a totally controlled environment, such as hatcheries and nurseries; and to develop off-bottom systems for growing and conditioning the molluscan shellfish, such as oysters, clams, mussels and scallops.

The cultivation of these shellfish might be very practical, because much information on their cultivation already has been compiled throughout the world. Oysters, for example, have been a marketable living sea resource for thousands of years. Oyster raising is now conducted profitably in Washington State, Oregon and British Columbia, and participants in those programs are looking forward to a much expanded industry. The Japanese for many years have made oyster farming into one of the most profitable business enterprises in the general area of aquaculture. In spite of these successes, however, there is still a need to develop methods for artificial cultivation and propagation of a variety of fish and shellfish.

There is also a need for the development of feeds for aquaculture. Salt-water rearing of salmon in enclosed areas of estuaries is now practiced commercially in Puget Sound. This process requires a highly nutritious diet for the fish, which is commercially produced by the feed manufacturing industry. Fish wastes combined with foodstuff available in Alaska could lead to production of suitable feeds. Deep nutrient water could be utilized for production of plankton, which in turn could be utilized by fish or shellfish. Fencing with net enclosures in estuarine areas without food enhancement is also a possibility. (The Alaska Department of Fish and Game is conducting pilot studies of enclosures in the Sitka and lower Cook Inlet areas.)

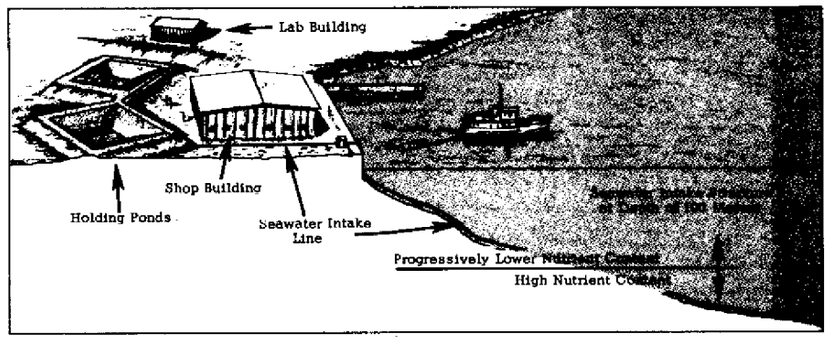
In view of these needs the State of Alaska, the University of Alaska's Institute of Marine Science and Sea Grant Program and the Alaska Department of Fish and Game are developing an aquaculture program in Seward. The specific purpose of this program is to study a method or methods for enhancing biological productivity by simulated upwelling. The high nutrient laden near-shore waters potentially could be tapped by utilizing the natural energy available from the substantial daily tide changes. The pilot study, however, will use electrically driven pumps to simulate these tide changes, and bring the deep nutrient-rich water to the surface in holding ponds. There the nutrients and other factors such as light, temperature and phytoplankton can interact. The goal is to enhance biological productivity, by enhancement of phytoplankton growth.

The growth of plankton, reflecting primary productivity, is analogous to the growth of corn or alfalfa on land. The farm industry raises corn and various grasses, which in turn are utilized to feed sheep, hogs and cattle. Successfully cultivated plankton will provide the same nutritional foundation to higher forms of marine life.

If the pilot study is successful, larger scale operations such as might be found in the damming of a coastal embayment or estuary will be undertaken, and tidal energy used directly.

Two large gravel ponds are under construction at the Seward Marine Station, and will hold approximately 480,000 gallons each. The ponds are to be lined with an inert synthetic liner. A salt water intake system four inches in diameter extending 0.3 mile into Resurrection Bay to a depth of 100 meters is being installed. (See accompanying drawing.) The initial capacity of the pumps will allow a ten percent change in volume of both ponds in a six-hour period. The pumping rate will be controlled electronically for the simulated tide change studies.

The ponds and laboratory will provide an opportunity for pilot scale studies of small production units, intensive management, dense stocking, force feeding and stock selection and management. Research effort and funding will be needed to develop selective breeding and propagation requirements, the diagnosis and control of disease, proper nutrition and the conversion efficiency of raw material into the first and higher levels of the food chain.

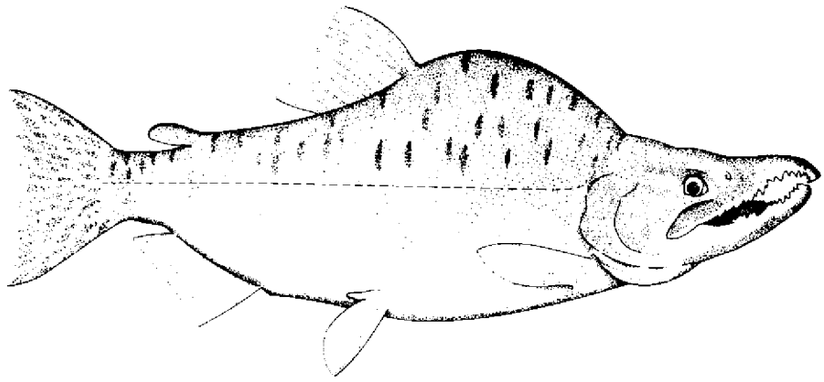


Alaska has the opportunity to take leadership in the field of aquaculture. The program at the Seward laboratory is the first modest step.

April 1973

Salmon Hatcheries-

Moving too Fast?



The February issue of Alaska Seas& Coasts took a look at the private salmon hatchery efforts beginning throughout Alaska under the impetus of Alaska Statute 16.10.400 which authorizes the operation of private, non-profit salmon hatcheries. Included in the article were reports by the National Marine Fisheries Service, the Alaska Department of Fish and Game, and the University of Alaska on recent developments in their aquaculture research projects. In this issue Seas&Coasts presents a position paper from the Genetics Committee of the Alaska District of the American Institute of Fishery Research Biologists, which looks at the current excitement over salmon hatcheries in a new light. This paper was approved by a majority of the membership in March 1975.

GENETIC CONSIDERATIONS IN ARTIFICIAL PROPAGATION OF SALMON

Although knowledge of genetic processes has increased rapidly in the last 20 years, most of this knowledge has been on organisms other than fish. Nevertheless, much of the new information can be applied to fish, and fishery biologists are becoming increasingly aware of the lack of genetic considerations in the management plans for our fishery resources.

The artificial propagation of salmon and trout in hatcheries to supplement our runs of wild fish is currently generating a great deal of interest because of recent advances in technology. However, lack of genetic planning in manipulation of stocks and other applications of this technology could result in unfavorable changes in the genetic composition of some of our wild salmon and trout stocks. [A "stock" is a group of salmon that share a common environment and gene pool. Therefore, one river system could have many stocks, and a run of salmon could comprise many stocks that are in an area at the same time during their migration. Although the problems involved in artificial propagation are more urgent with salmon, the principles discussed in this paper apply also to trout and char.] The Alaska District of the American Institute of Fishery Research Biologists indicates in this statement some of the potential genetic problems associated with artificial propagation and suggests ways of avoiding or alleviating these problems.

HATCHERY HISTORY

Since the beginning of this century, artificial propagation of salmon has been practiced to supplement declining natural stocks. Early attempts at salmon culture in Alaska failed, largely because of lack of knowledge on the biological requirements of the various species. These early hatcheries were abandoned when they did not produce returns of adult salmon.

Much of Alaska has recently had several seasons of very low salmon returns. Recent advances in knowledge of nutrition, disease, incubation substrates, and juvenile life history make artificial propagation of salmon an appealing method for assisting our ailing fishery. Such propagation may hold great promise in some situations, but certain basic genetic concepts must be understood and applied to any propagation effort if we are to avoid exposing natural stocks to genetic deterioration that could result in further declines of the runs.

TRANSPLANTED STOCKS

The recently passed private nonprofit hatchery bill in Alaska (AS 16.10.400) has as much, if not more, potential as limited entry legislation for changing the contributions and course of our commercial and sport fisheries. This bill allows, with approval of the regulatory agency, one hatchery to sell eggs to another if surplus eggs are available. This provision provides a mechanism for transplanting stocks, which would be biologically irresponsible as a routine practice at this time.

The ability of salmon to return to their natal streams for spawning is well documented. This "homing instinct" results in genetic adaptation to the specific environment encountered by each stock. Thus, different stocks display numerous variations in behavior, morphology, and ecological requirements. Characteristics like size and age at maturity, time of spawning, and migratory behavior of juveniles and adults have been shown to be strongly under genetic control and are heritable traits. These and many other heritable features are adaptive to the particular environmental experience of each stock. Thus, every stock is genetically different.

Transplanted stocks may upset the critical genetic characteristics of native stocks. A stock transplanted to another environment would probably not respond well because its genetic makeup would be adaptive for a different environment. Further, if salmon of the same species but of different stocks interbreed, harmonious gene combinations adapted to a given environment could be disrupted and the specific genetic adaptation of each individual stock could be lost. Most of the time this type of hybridization would result in a loss of fitness of the stock. This might be difficult to detect immediately, and the decline of a run could erroneously be attributed to other factors, such as overfishing or severe climatic conditions. Further, transplanted stocks of salmon often tend to exhibit reduced homing abilities and could cause genetic erosion in both their new home stream and nearby streams.

Attempts to enhance existing salmon stocks by transplanting eggs, juveniles or adults from one area to another is hazardous at best and should be avoided until critical evaluations are made to establish the necessary requirements. It is recognized, however, that transplantation is the only option available for special enhancement projects in streams or lakes where a native stock is nonexistent or so depleted that it no longer shows a possibility for recovery. In that case a careful matching of biological characteristics and ecological requirements of donor and recipient stocks should be made. The donor stocks should probably come from nearby watersheds which have physical characteristics similar to the recipient watershed. The homing success of each transplanted stock should be evaluated before permission is obtained to proceed with the techniques.

HATCHERY TECHNIQUES

A high degree of adaptive genetic variability is essential in the gene pool of wild salmon stocks. It is because of this variability that stocks can adapt to extremes or changes in the environment.

A high degree of adaptive genetic variability would also be desirable in a hatchery stock. Some common hatchery practices, however, tend to reduce variability and could change the genetic composition of a stock. Selection and inbreeding, for example, reduce genetic variability. If hatchery incubators are filled, as commonly happens, with eggs from a small segment of a run, the genetic variability will be reduced. For example, if hatcheries are filled with eggs from the early portion of a run, there will be strong selection pressure for early-run fish.

Selection for large size is also frequently practiced by hatchery operators. This selection may be intentional or unintentional—given a choice a hatchery operator will usually choose the larger, plumper fish for spawning because they "look" like better brood stock. It should be remembered that one gene affects more than one characteristic. Therefore, when one selects for size, one is also selecting for other, usually unknown, characteristics.

MAINTAINING GENETIC DIVERSITY

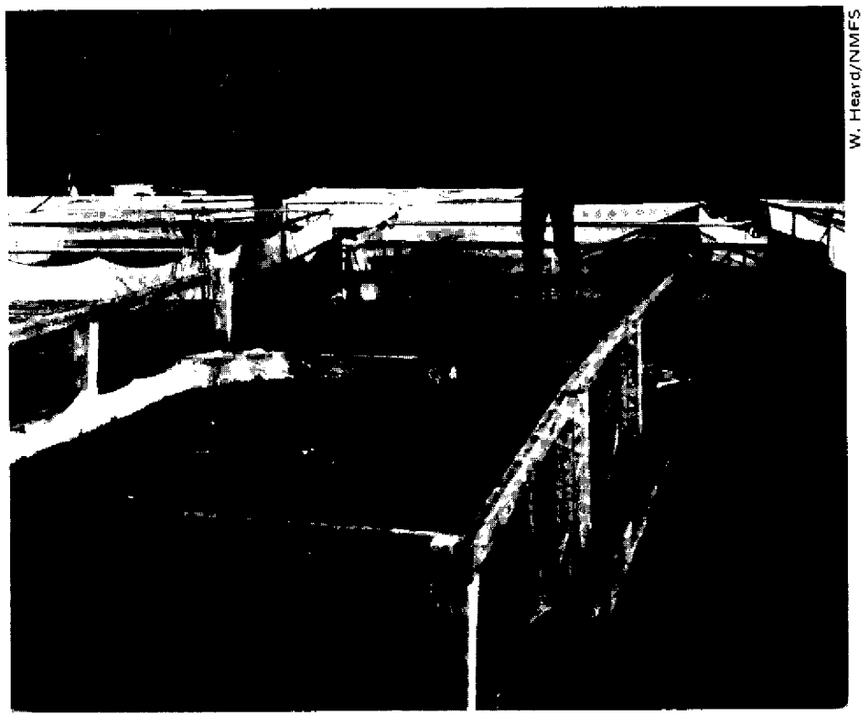
Alaska has a unique opportunity to benefit from both wild and artificially produced salmon runs, but a successful program will require careful planning.

The location of hatcheries is crucial if Alaskans are to succeed in maintaining wild and cultured stocks of salmon. Installations should be located where returning hatchery fish will be least likely to mix with returning wild stocks, both in the fishery and on the spawning grounds.

Wild and hatchery runs also need to be harvested carefully and separately to assure perpetuation of both. If a large run of artificially propagated fish were mixed in a fishery with a small wild run, the former could not be harvested adequately without overfishing the latter. These problems can be minimized through proper planning.

There is evidence that substances responsible for olfactory attraction (pheromones) may attract anadromous species into streams other than their home stream during the spawning migrations. Fish with a weak homing imprint, which may be found in some transplanted stocks, could be particularly susceptible to being decoyed, especially if they had to pass numerous major spawning streams on their return. Pink and chum salmon fisheries are particularly prone to this problem because many spawning streams are commonly involved in an area. In southeastern Alaska, the problem could be reduced by locating hatcheries only on the outside coast where returning adults could enter the hatchery stream directly without passing a gauntlet of other streams. This would allow an easier separation of returning hatchery and wild stocks for harvesting, and would also reduce the chances of interbreeding with the wild stocks returning to streams in the "inside waters." Unfortunately, this ideal isolation of hatcheries, public or private, would frequently be difficult because of logistics and costs.

Another strategy for assuring the coexistence of artificially propagated and wild stocks of salmon and trout would



W. Heard/NMFS

be the establishment of "gene banks." In streams within these preserves, artificial propagation would not be allowed, and special effort would be made to protect the wild runs from overfishing and environmental deterioration. The extent of these reservoirs of genetic variability would depend on the species involved and the location. Preserves of this kind would need to be quite large for pink and chum salmon in southeastern Alaska.

Another strategy for pink salmon would be to allow artificial propagation with only one line (odd- or even-year lines). Pink salmon have a 2-year life cycle with no genetic interchange between the odd- and even-year lines. This scheme would insure the perpetuation of genetic diversity in one line if the hatchery system fails to live up to expectations.

Artificial spawning channels should be considered as another enhancement technique in Alaska. In a spawning channel where natural mating occurs, the potential for unintentional genetic change is less than in a hatchery where matings are made by man. Canadian spawning channels have shown promise for enhancement of pink, sockeye and chum salmon runs.

CONCLUSIONS

Viable wild stocks of salmon and trout contribute annually to the food, income, sport, and esthetic needs of our citizens. They are also of inestimable value as reservoirs of genetic variability. We can insure that wild stocks will persist only if we protect their environment and maintain their numbers and genetic integrity through sound biological management. A great deal of planning needs to be done to insure successful integration of hatchery stocks with effective conservation of wild stocks. We recommend:

1. Enhancement or rehabilitation of the salmon stocks in a stream or lake system should be accomplished using the native stocks already present in the system.

2. In the special situation where transplantation of brood stocks is the only alternative, careful consideration should be given to selection of the donor stock. In addition, an evaluation of the success of the transplant should be mandatory.

3. Hatchery stocks should be separated (in space and time, or both) from wild stocks, both in the fishery and on the spawning ground.

4. If isolation of hatcheries is unacceptable, then certain areas should be designated as gene banks to protect the genetic diversity of the wild stocks. Artificial propagation would not be allowed in these areas, and special consideration would be given to prevent overfishing and environmental degradation.

5. A standing committee with representatives from academic, government and private sectors should be formed to provide planning, evaluation and recommendations concerning strategies for protecting the genetic diversity of wild stocks. This committee should oversee the transplantation of stocks, hatchery techniques and other methods of enhancement. Some members with special training in genetics would be an essential part of this committee. **Aoril 1975**

Aquaculture editorial

Five years ago in Alaska salmon hatcheries were considered a long way off. Today people are talking about the salmon aquaculture "movement," and the State is wrestling with the problems of policy, priorities, and funding.

As Robert Simpson of the National Marine Fisheries Service pointed out recently the upsurge in interest over aquaculture is the result of several interacting circumstances. Alaska's salmon stocks, although substantial, have been declining for the last 40 years. The Alaska Renewable Resources Act of 1974 commits a percentage of petroleum royalties to developing fisheries. A law limiting entry into Alaska's salmon fisheries is now, however precariously, on the books. The Alaska legislature created the Fisheries Rehabilitation, Enhancement, and Development Division (FRED) within the Alaska Department of Fish and Game (ADF&G) to enhance salmon resources through aquaculture. The private, nonprofit salmon hatchery act passed by the legislature two years ago has stimulated nongovernment interest in aquaculture. The Alaska Native Claims Settlement Act has provided native groups and communities with land, funds, a corporate structure, and the initiative to venture into salmon aquaculture projects.

Now that everyone is interested, the multimillion dollar question is what to do about salmon hatcheries in Alaska, who should do it, and who is going to pay for it? Three bills are now being considered by the state legislature which may help chart the future of salmon hatcheries in Alaska.

House Bill 615 is a $44 million bond proposal for state-operated salmon hatcheries. If appropriated, the money would be spent by FRED on some eighteen projects including the construction of six hatcheries. Two of the proposed hatcheries would be located in Southeastern Alaska, two in the Cook Inlet area, one in Kodiak, and one in the Alaska Peninsula area.

The bill was initially referred to the House Resources committee where it has had a chilly reception. Legislative Affairs analyst James Owers submitted a report to the committee which strongly criticized FRED's proposal saying the State's first priority should be to the natural stocks. Owers warned that FRED's enhancement plans may lead to further destruction of the natural stocks through genetic damage. He also questioned the cost/benefit ratio of FRED's proposal for public funds. Citing a 15-20% turnover of salmon fishermen per year, Owers commented that FRED's hatcheries, which would take four to six years to reach full production, are not a solution to the current economic distress of some fishermen.

The committee seemed to agree with Owers' conclusions and as *Seas&Coasts* went to press, they were drafting a committee substitute which will probably chop FRED's funding in half. The committee substitute will then travel to the budget-conscious House Finances committee.

Two other hatchery bills under consideration are Senate Bills 688 and 689. SB 688 is designed to promote the formation of regional associations which would work in conjunction with ADF&G on a regional hatchery plan. SB 689 would provide some $200 million in long-term, low-interest loans for hatchery construction. The bill would provide up to $3 million for regional or

local associations and $300,000 for other groups.

The legislature is now considering the fate of Kachemak Bay. At press time the Alaska Supreme Court was still deliberating over a lawsuit challenging the 1973 State oil and gas sale which sold leases in Kachemak Bay. The six fishermen and a lodge owner in the area who filed the suit claim that the State's oil and gas sale was held without public notice, without review with local planning agencies, and without "reasoned finding" that the sale would best serve the State's interest. As the Supreme Court was deliberating Governor Hammond introduced a measure (SB 626) to buy back the leases and create a marine sanctuary in the bay. Senate President Chancy Croft reported that the legislature may be sympathetic to buying back the leases, but the big question is where the approximately $30 million would come from.

SB 406 has been described as "the toughest piece of oil tanker legislation ever proposed by a state." The bill would require tankers to be accompanied by large tugboats while in Alaska waters unless they were equipped with double bottoms or double hulls, lateral thrusters to increase maneuverability, segregated ballast tanks, back-up propulsion, controllable pitch propellers, and other features to minimize the risk of explosions.

After a week of hearings on the bill Senator Chancy Croft said he was "pleased" with the testimonies from oil companies and marine industries because it supported his contention that the safety features were necessary to protect the environment and would require a small additional investment. One problem, however, may be the availability of tankers which would meet the safety requirements. Mark Singletary of Atlantic Richfield Co. said that his company would not have double-bottom tankers qualified to operate in Alaska under the Jones Act until 1979. Standard Oil Co. of Ohio reported it would have only two tankers with the safety features in operation before mid-1978.

Get ready to do some work on your crab pots. SB 634 and HB 680 would require a biodegradable seam or panel on the vertical wall of the pot, which when continuously immersed in sea water, has a life of six months or less. SB 214 would require "positive identification" of shellfish pots and buoys.

– Nancy Munro April 1976

IMPORTANCE OF ESTUARIES IN SALMON LIFE CYCLE

By Dr. R. Ted Cooney and D. L. Urquhart
Institute of Marine Science
University of Alaska

In 1974 the Alaska Sea Grant Program began work with the development of private nonprofit salmon hatcheries. The Sea Grant studies were undertaken to help the Prince William Sound Aquaculture Corporation (PWSAC) establish a functioning pink and chum salmon hatchery on Evans Island. Initially they evaluated the economics and business management of the proposed operation and made recommendations.

Later, in 1976, a field study was added to describe the ability of the nearshore environment to support the large numbers of hatchery-reared fry planned for release into Prince William Sound. Sea Grant and the Institute of Marine Science at the University of Alaska have now completed the second year of this field program. We feel that a report of our activities may be of particular interest to people involved in the salmon industry of the state.

By establishing coastal hatcheries, Alaska may partially rehabilitate its depressed salmon fishery without asking for excessive self-restraint from its salmon fishermen. New developments in techniques for pink salmon hatcheries have made this species attractive for rearing, particularly since the rapidly maturing pinks return a year after release. Therefore quick returns on capital and effort invested are possible. Until recently, most established pink and chum hatcheries in the Pacific Northwest have worked primarily with egg incubation and fry feeding. Little or no attention has been paid to estuarine fry survival. This approach probably contributed to the failure experienced by many of the pink and chum hatcheries established during the early 1900s in Washington and Oregon.

It is no longer reasonable to disregard the significance of the estuary in the life cycle of the pink and chum salmon. Today it is recognized that the first few weeks spent in the estuaries are critical to the overall survival of each year class. Through careful study of salmon fry feeding, schooling behavior, and interaction with other species, hatcheries may eventually release fry at times that will consistently provide the best conditions for survival. Food availability and populations of potential predators are examples of important information that can be gathered from the local estuary.

In 1975 PWSAC established a hatchery in the old Port San Juan cannery on Evans Island. The first fry were released at the site in the spring of 1976. Concurrently a field party stationed at the hatchery collected basic oceanographic information from adjacent waters. Water temperature, salinity, nutrient concentration, and plankton samples were collected at selected locations. Since the 1976 release was small, little time was spent following the fry or observing their behavior. Instead, the field party concentrated its efforts on the marine environment. They were able to show that fry moved into the estuary from the hatchery at about the time that potential food was most abundant.

In the spring of 1977 PWSAC released more than ten million fry. A field party was again stationed at the hatchery to monitor the estuary during the period of this release. Much of the late spring and early summer was spent examining the behavior and early life history of the hatchery fry nearshore. Information was gathered on the kinds of food eaten and fry growth. Efforts were made to identify areas which seemed to satisfy requirements for food and safety. The kinds and numbers of salmon fry predators were noted as well as species apparently competing with the fry for food.

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SUMMARY OF RESULTS

Fry ready to emerge from the Port San Juan facility this past spring were allowed to enter Sawmill Bay soon after hatching. Once in saltwater they moved rapidly out of the bay into the waters of nearby Elrington Passage. Within a day the fry were congregating in quiet coves among the islands and along the shore at the northern end of the passage. They remained there for several weeks feeding close to the surface on various crustaceans and copepods that had migrated up into the water column.

The fact that both the bottom-dwelling (benthic) copepods and the open-sea crustacean organisms were included in the diet is significant. It means that the pink fry were taking advantage of the energy available from two relatively distinct marine systems.

Sawmill Bay was apparently of little interest to the fry. Their movement could have been caused by undesirable salinity in the bay, or inadequate food. The influence of other factors could be indicated because most fry had large yolk reserves and may not have been ready to begin feeding. Those that did feed were attracted to colorful copepods and barnacle larvae.

Since coves outside the bay supported hundreds of thousands of fry for weeks, these locations were designated as primary nursery areas. Observations suggest that the fry require specific habitats for optimal survival and will actively seek out such areas over less desirable habitat. Tomcod, the most active and numerous predator near the hatchery, were not observed in these nursery areas. Occasionally the juveniles of herring, rockfish, and other fishes schooled with the salmon fry, but never in numbers large enough to indicate they were serious competitors for food.

This coming spring will be the third and final data collection period. In addition to monitoring fry-release at the Port San Juan hatchery, several of the more productive pink salmon streams in other areas of Prince William Sound will be examined.

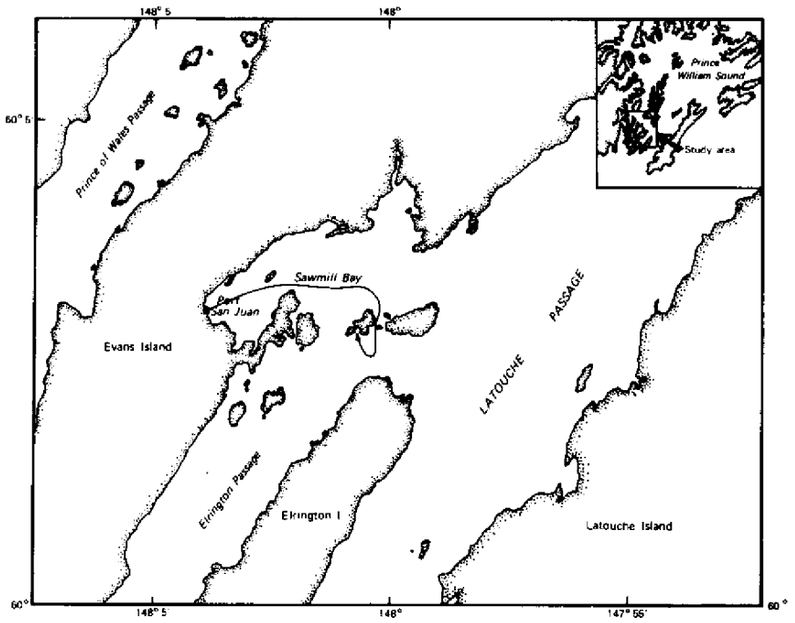
The final study will compare our notions on habitat type and feeding requirements with locations which historically rear large numbers of pink salmon fry. These observations, coupled with the results from Evans Island, will be used to estimate the carrying capacity of all Prince William Sound for pink salmon fry.

Some may question the need for developing a description of carrying capacity. A simpler or less costly scheme would be to flood the estuaries with large numbers of fry and let the environment regulate survival. However, this "blackbox" approach fails to address the very real issue of ecological balance. It opens the door for numerous problems, including competition with wild fry stocks, possible stimulation of predator populations, and increased competition with other species being reared in the same estuaries. We hope that if hatcheries are given guidelines on the upper limits of fry carrying capacity in local waters, they will be able to routinely optimize fry survival. Releases can be coordinated with times of maximum food availability. If necessary, fry can be fed artificially to avoid periods of high predation or an overlap with wild stocks using the same nursery areas.

COOPERATION AND COST EFFECTIVENESS

It is our opinion that in the long run a hatchery designed to operate *with* the nearshore environment, rather than ignoring it, will prove its cost effectiveness. We also hope it will be far less likely to trigger unpredictable biological events that could severely limit the effectiveness of the hatchery program.

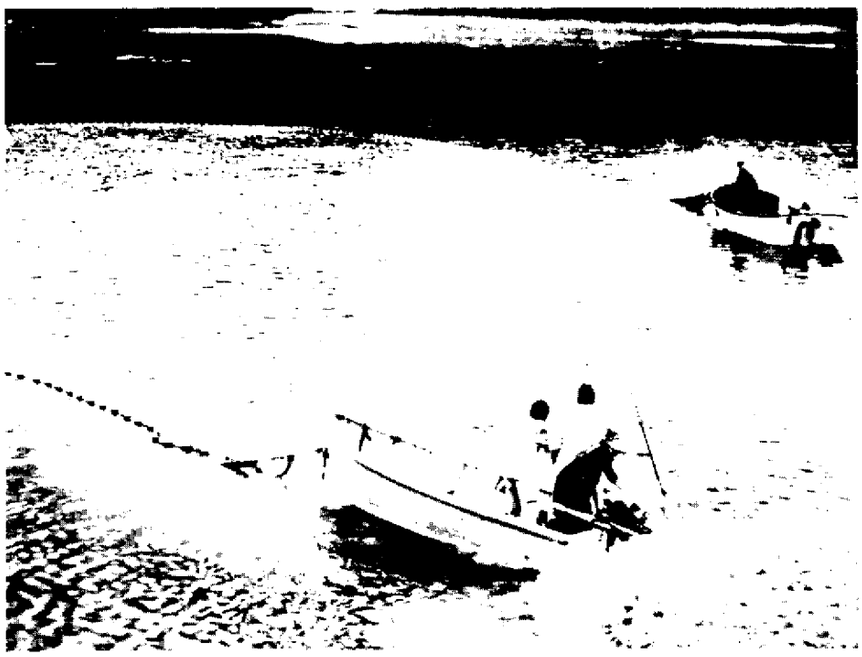
FEB. 1978



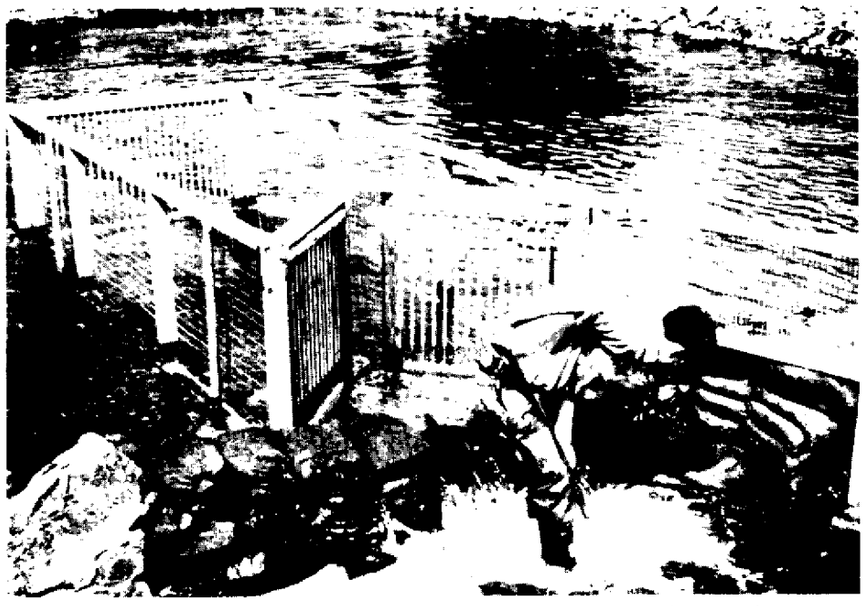
The Prince William Sound Aquaculture Corporation hatchery is located at Port San Juan on Evans Island. Salmon fry leaving the hatchery seem to migrate to the waters near and around Bettles Island. They congregate there in protected coves for about a month before moving down Elrington Passage on the way to the sea.

THE ALASKAN SALMON ENHANCEMENT PROGRAM

Economic Factors That Will Determine Its Success



Aquaculturists gathering adult fish.



Once caught, the adults must be kept in holding pens until they are ripe.

By F. L. Orth and C. L. Kerns
University of Alaska

In concept, the Alaska Salmon Enhancement Program has the strong support of the fishermen and sportsmen of Alaska, but there could be some rocky ground to cover in the future. While the goal of the program is the production of more salmon, within its scope are two vastly different approaches to that goal. Salmon will be produced by both state run hatcheries and the private non-profit hatcheries run by fishermen.

In this article Frank Orth, until very recently fisheries economist of the University of Alaska, and Curt Kerns, aquaculturist for the University of Alaska, examine the relative merits of the two approaches to rearing salmon. While a dictionary might be helpful here and there to deal with some of the economic terms, there is some outstanding information for potential aquaculturists in the state of Alaska.

– Ed.

Testing the female salmon for ripeness.

(Photos on this page by Martha Hoover)

Early Alaskan and long-term Japanese and Canadian experience have shown that salmon enhancement investments can be sound under properly controlled conditions.

In this article we wish to focus attention on the two economic factors – cost efficiency and cost distribution – on which long-run success of salmon enhancement depends. These factors must be confronted in Alaska's policy towards salmon enhancement investments if the potential maximum *net benefits* are to result.

Economic studies of salmon enhancement investments do project a small to moderate margin of net benefits. Therefore, decision makers cannot be unconcerned with the level and distribution of the costs of producing salmon. *Cost efficiency and cost distribution will be the primary determinants of the net benefits derived from enhancement investments – they will determine the degree of success of Alaska's salmon enhancement program.*

Taking milt. (Photo by Martha Hoover)

Due to a general lack of awareness about these determinants of success, however, they are being overlooked in favor of concerns of much lesser long-run significance (such as maximizing federal subsidies). In the process, policymakers are risking the economic failure of Alaska's salmon enhancement program, independent of any biological successes.

With the rapid pace of events, time for policy evaluation is short. Policy decisions should be made to consider the economic incentives facing hatchery managers and employees. Creating institutions with economic incentives conducive to economic performance is important: today's decisions create long-term financial commitments. These commitments may be difficult for user groups to bear if enhancement efforts are not highly cost efficient.

GUIDELINES FOR EVALUATING ECONOMIC SUCCESS

Profitability – relative to other potential uses of investment dollars – can and should be examined for both private and public salmon enhancement investments. Economic success is basically a matter of benefits exceeding costs. Investments should be made so that net benefits are as great as possible. This reasoning is demonstrated through the hypothetical example in Table 1 (See next page).

The results of one year's work – a pink salmon fingerling just before release. (Photo by Judy Wohlfrom)

Owner No. 1 has an economic failure, an unprofitable investment. After allowing for the rate of return that invested funds could earn in other investments of comparable risks (10 percent here) the hatchery benefits are less than the costs.

Owner No. 2 has a profitable investment as the rate of return is greater than 10 percent. But Owner No. 2 cannot be judged an economic success because returns on investments are not what they could be with better management – as with Owner No. 3. Owner No. 3 is clearly the appropriate operator of the facility because he is the *most* profitable operator. Superior management of hatchery production units will be apparent by greater productivity and lower cost, both of which will increase net benefits to user groups.

Because cost efficiency is so important to the long-run success of enhancement, policymakers should attempt to structure the Alaska Salmon Enhancement Program (ASEP) to induce individual hatchery productivity and efficiency. This can be done by placing hatcheries in institutions which are exposed to the discipline imposed by market forces. The failure to adhere to this simple rule exposes society and user groups to significant risks of relatively poor results (like Owner No. 2 rather than Owner No. 3). Even worse, results like those shown for Owner No. 1 are possible in the long-run if hatcheries are insulated from market forces.

The market forces which are relevant in this context are of three sorts: *One, control over hatchery management*

should be in the hands of user groups. When employees' tenure and pay are determined by those who benefit or suffer from the employees' performance, there exists a built-in force towards productive and cost-efficient operations. But if the tenure and pay of employees is essentially unrelated to performance, there is a built-in bias away from productive and cost-efficient operations.

Second, if the user groups are also investors (contributors) the attention paid to management's performance will be significently increased. User groups are much more attentive to performance if their own money and time are invested than if hatcheries are funded and controlled by someone else.

The third relevant market force is that of competition. Competition among hatchery units is a constructive force toward obtaining the greatest possible net benefits from investments. The existence of competitive units allows user groups and others to judge the relative performance of different facility's operations. And, in the struggle to surpass the performance of rivals, competition encourages management to search out cost-saving and productivity-increasing innovations.

THE PRESENT ALASKA SALMON ENHANCEMENT PROGRAM: PROSPECTS FOR ECONOMIC SUCCESS

From an economic perspective, the present Alaska salmon enhancement program has four dominant characteristics: 1) it is a program that allows for public and private nonprofit (PNP) hatcheries; 2) private profit-seeking hatcheries are not allowed; 3) the state's public hatchery unit enjoys organizational, financial and regulatory advantages over that of the private firms; and 4) no formal mechanism exists for ensuring that public dollars spent on the program will be repaid by those benefiting from the expenditures. It is apparent that the economic imperatives of cost efficiency and cost distribution have been given little weight in structuring the program. As a result, the program may eventually fail to even come close to maximizing net benefits.

COST EFFICIENCY

Private Nonprofit Firms. With the present legal barrier to private profit-seeking firms, one way to foster cost efficiency is to encourage the formation of PNP firms whose funds come from user-group assessments and debt obligations. The regional nonprofit association is required by law to represent user groups, who become investors (contributors). The user groups then have a strong self-interest in monitoring and controlling management performance. When there are several independent nonprofit hatchery firms, competition is present in sufficient strength to provide comparison of performance to exert pressure on management for efficiency and innovation. *Conclusion: The incentive structure of PNP hatchery firms is conducive to cost efficiency and productivity.*

State Hatcheries. The Fisheries Rehabilitation and Enhancement Division of the Alaska Department of Fish and Game is financed by bond issues and general fund appropriations. Its employees are public employees. While there is no reason to doubt the dedication of individual FRED employees, it is important to recognize that the incentive structure under which public employees operate is fundamentally different from the private sector's. The first two desirable market forces, user group control over management and the incentive to exercise control derived from financial commitment, are completely absent, and the force of competition within the system is weak, at best. *Conclusion: The absence of a conducive incentive system makes it highly probable that the long-run performance of a public production system will be significantly inferior to that which would be obtained from the private sector.*

TABLE 1

A TWENTY MILLION EGG CAPACITY PINK SALMON HATCHERY

	Owner #1	Owner #2	Owner #3
(1) *Returning adult salmon (fish per year)**	283,400	383,400	493,400
(2) Total revenue/year @ $1.60 per fish** ($)	453,440	613,440	789,440
(3) Useful life of hatchery (years)	20	20	20
(4) Present value of revenue** over hatchery life @ 10% ($)	3,860,390	5,222,561	6,720,948
(5) *Investment costs ($)	2,500,000	2,250,000	2,000,000
(6) *Operation & maintenance (O&M) costs/year ($)	340,000	320,000	300,000
(7) Present value of O&M over hatchery life @ 10% ($)	2,894,612	2,724,340	2,554,069
(8) Present value of total costs ($) (5) + (7)	5,394,612	4,974,340	4,554,069
(9) Net present value ($) (4) – (8)	– 1,534,222	248,221	2,166,879
(10) Absolute economic success	no	yes	yes
(11) Relative economic success	no	no	yes

* *The asterisks are variables (in addition to net present value) which policymakers should also be concerned with.*

***For details of how these calculations were made, see* **The Alaska Salmon Enhancement Program: Imperatives for Economic Success,** *Aquaculture Notes, Alaska Sea Grant Report 78-1.*

COST DISTRIBUTION

A cost distribution system which fails to reflect that nearly all of the benefits accrue to a relatively small, clearly identifiable group is deficient on economic-equity grounds.

Private Nonprofit Hatcheries. PNP hatchery firms are financed primarily by contributors (assessments). This financial commitment is desirable because it

creates an incentive to monitor management's performance, and it is equitable. Fishermen, the primary beneficiary group, are paying the bulk of the costs directly through long-run assessments. Another important benefit of the private sector hatchery approach is that the cost of enhancement will enter the price of salmon products and be borne by consumers.

State Hatcheries. At present there are no specific taxing mechanisms designed to recapture revenue from beneficiaries to cover costs. Public funds going to the state hatcheries violate the equity criterion; the general taxpayer bears the costs with little or no direct benefit, while an identifiable beneficiary group makes no special tax payments.

The injustice of such a cost-distribution system is not likely to remain unnoticed by the political process. *The view that a state hatchery system is a way for fishermen to obtain benefits without having to pay is likely to be naive. Therefore, the relative cost efficiency of a state hatchery system versus a private hatchery system should be of paramount concern to fishermen, processors, and other user groups.*

In the absence of a specific tax on ASEP beneficiaries, a public hatchery system creates an additional injustice – the Alaska taxpayer is required to subsidize consumers of salmon products. General taxes, from which public hatchery costs are covered, do not enter the prices of these products. Only specific taxes or assessments become direct costs to producers and enter the prices of salmon products. It is in this way that the market process ensures that the other major groups benefiting from enhancement, consumers of salmon products, pay a portion of the costs. An enhancement program financed by general taxes does not insure an equitable distribution of costs and leaves the entire financing burden on the general taxpayer. Almost everyone, including most Alaska fishermen, would object to Alaska residents having to subsidize consumers of salmon products, the majority of whom are nonresidents.

RESTRUCTURING THE ALASKA SALMON ENHANCEMENT PROGRAM

There are significant long-run benefits to be gained by assigning almost exclusive responsibility for production facilities to the PNP sector. However, when the private sector is not likely to invest (for basic research facilities, or locations and species with serious bio-technical problems) a public sector investment could be made. *For all other circumstances, production hatcheries should be built and operated by private nonprofit firms.* * (See Table 2). There are three justifications for this division of responsibility: 1) cost control resulting in higher net benefits to fishermen, processors, and other beneficiaries is more likely to be achieved by the private sector; 2) equitable cost distribution is accomplished without compulsory taxation because beneficiaries cover the costs; and 3) for state owned hatcheries there is the potential for serious marketing conflicts with the common-property fishery when fish are sold to generate money to cover costs.

The Board of Fisheries could be assigned the task of determining the species-area roles. Thus the public and aquaculturists would have an opportunity to provide input on each issue.

TABLE 2

ALASKA SALMON ENHANCEMENT PROGRAM
Suggested Institutional Distribution of Functions

Public-Sector Enhancement Functions	Private-Sector Enhancement Functions
Issue hatchery permits to non-profit corporations	Organize regional non-profit firms
Management of natural and hatchery stocks	Arrange self-assessment and loan financing
Construct and operate research hatcheries	Construct and operate production hatcheries
Disseminate research results	Make recommendations on management of hatchery stocks
Construct and operate production hatcheries for exempt species-area combinations	Make policy recommendations on state enhancement programs
Make policy recommendations on state enhancement programs	

While some may argue with the specific division of responsibilities suggested in Table 2, there are no economic bases for questioning a dominant role for the private sector for production hatcheries. If this is correct, Alaskans should reflect closely on requests for additional public bonds for state owned and operated salmon enhancement production units.

SUMMARY

The two economic imperatives which will determine the long-run economic success of the Alaska salmon enhancement program are cost efficiency and equitable cost distribution. The failure to take these economic considerations into account early may irreversibly condemn the program to economic failure. These considerations can be built into the structure of the enhancement program by requiring that production hatchery units are exposed to market forces: user group control over management, incentive to exercise control, and competition. This is accomplished automatically for production units constructed and operated by PNP firms.

In comparison, state production units neither operate within a system that is conducive to cost efficiency, nor do they result in an equitable cost distribution. Policymakers should consider a restructuring of the Alaska Salmon Enhancement Program to strongly favor private nonprofit firms for production units. Such a restructuring would promote cost efficiency and progressiveness, user group participation and control, and an equitable distribution of costs for fishermen and consumers. These benefits, along with the favorable impacts on employment, income, and state-local tax revenues, should remove the need for specific salmon-enhancement taxation. **April 1978**

Greater Knowledge of the Ocean Will Come from the Sky

Seasat-A, an ocean research satellite described briefly in our December issue, may mark the beginning of a new era for the Alaskan fishing industry. The network of ocean-monitoring satellites heralded by this test could provide immeasurable benefits for mariners in Alaskan waters.

We are pleased that Don Montgomery of NASA has prepared this article describing the satellite more completely and outlining new developments in the planned assessment projects. As the purse strings tighten on the popular tax dollars, it is important that such a useful project be able to demonstrate that it is, indeed, providing a needed service.

– Ed.

By Don Montgomery

In May, 1978, the Seasat-A ocean observation satellite will be launched from the Western Test Range in California. It will pass 14 times daily over the Alaskan region, making continuous, all-weather microwave observations of dynamic sea conditions. Sensors on board the spacecraft will measure winds, waves, surface temperatures, tides and current patterns. Ice observations, including build-up, leads, and icebergs will also be charted from measurements by a new synthetic aperture radar system.

Seasat-A is a "proof-of-concept" mission testing the global ocean monitoring capability of its microwave sensors. It will determine the key features required in future operational ocean monitoring systems.

Test of Benefits

A key element of the Seasat-A program is a user demonstration program with selected segments of the commercial ocean community. It is planned to begin six months to one year after the launch of Seasat-A. It is designed to test the benefits and usefulness of Seasat-A data to ocean commerce.

NASA plans to provide data to participating commercial users during the demonstration period. These data will be formed into products best suited to the industry's operational needs and present practices. Cooperating users will incorporate the data into their operations. They will then accumulate and record enough performance information to permit a post-demonstration assessment of the usefulness, if any, of the Seasat-A derived data products.

Included in the demonstration program is an experiment involving the Alaskan crab fishery. A series of continuing discussions with crab industry people has allowed an experiment plan to be developed to test Seasat-A data usefulness within the crab industry during the 1978, 1979, and possibly the 1980 seasons.

Standard forecast products from Seasat-A will be "tailored" to three, possibly four, unique crab fishery data products. These are: a regional map of sea surface temperatures; a regional forecast map of sea state; a regional forecast map of surface winds; and possibly a vessel icing advisory.

It is envisioned that these products would be transmitted on single-sideband radio by facsimile to receivers on the participating crab vessels. It is expected that the vessel operators would then provide two services in addition to their time and vessels. These are: (1) the fisherman would broadcast a daily report of surface observations to aid in the validation of the satellite data, (2) they would keep an accurate log pertaining to operational activities and decisions, to aid in assessing the usefulness of the satellite data.

Background

Earth viewing satellites permit observation of the environment on a global scale over small periods of time. This unique capability permits better understanding of time-varying characteristics of our planet, including the oceans, atmosphere, ice and land, and the influence on life and resources accompanying these dynamics.

With the exception of cloud cover images and infrared-derived surface temperature measurements, relatively little use has been made of such techniques for oceanographic purposes. Observation of the oceans with remote sensors can help overcome the great difficulty and expense of obtaining oceanographic data by traditional means on a global scale.

Seasat, a result of public interest, is part of the overall NASA Earth and Ocean Dynamics Application Program. Public participation ensures that types and quantities of data flowing from the Seasat spacecraft and ground system match their needs.

Orbit

Seasat-A will assume a nearly polar orbit, inclined 108 degrees to the equator. Its 100-minute period will result in about 14-1/3 orbits per day.

Seasat-A will be carried into orbit by an Agena missile. The Agena missiles were first used in 1959 for military space missions. They have been subsequently used in over 300 missions. Special modifications have been made to support the oceanographic mission requirements of Seasat.

Each of the sensors proposed for Seasat-A has had successful predecessors in both aircraft and spacecraft. The sensors aboard Apollo, Skylab, and the currently orbiting Geodetic Earth-Orbiting Satellite provide confidence that the specific hardware for Seasat-A is in a relatively mature state of development.

All Weather Capability

A set of three active radars and two passive radiometers have been included in the instrument complement of Seasat-A. These give the satellite an all-weather ocean observation capability. The sensors include a radar altimeter, a radar scatterometer, a synthetic aperture radar (SAR), a scanning multifrequency microwave radiometer, and a visible and infrared scanning radiometer. These sensors, their basic function and surface

coverage are shown in the illustration on page 7.

The radar altimeter will enable Seasat to identify and "see" such time-varying features as intense currents, tides, wind pile-up, and storm surges. It should also be capable of locating and mapping ocean surface currents and tidal action.

The radar scatterometer makes it possible to measure wind speed and direction. It measures wind speeds from three to 25 meters per second with two meters per second accuracy, and wind direction over 0-360 degrees with an error of ± 20 degrees.

The scanning microwave radiometer serves four functions: (1) it measures surface temperature within 1 degree C; (2) it can measure high wind speed (up to 50 meters per second); (3) it maps ice coverage; and (4) it will provide atmospheric correction data to the active radars.

Clear Weather Data

The visible infrared radiometer will provide clear-weather surface temperature data, cloud coverage patterns, and images of ocean and coastal features. The imaging radar can function through clouds and light rain to provide images of wave patterns near shore and high-resolution pictures of ice, oil spills, current boundaries and patterns, and similar features.

The SAR will sample wave spectra in a 100-kilometer wide swath on one side of Seasat-A over broad patches of ocean. The images will be especially useful for mapping ice leads and open water. It will provide storm wave patterns near potential offshore nuclear power plant sites, deep water oil ports, harbors, and breakwaters along the continental U.S.

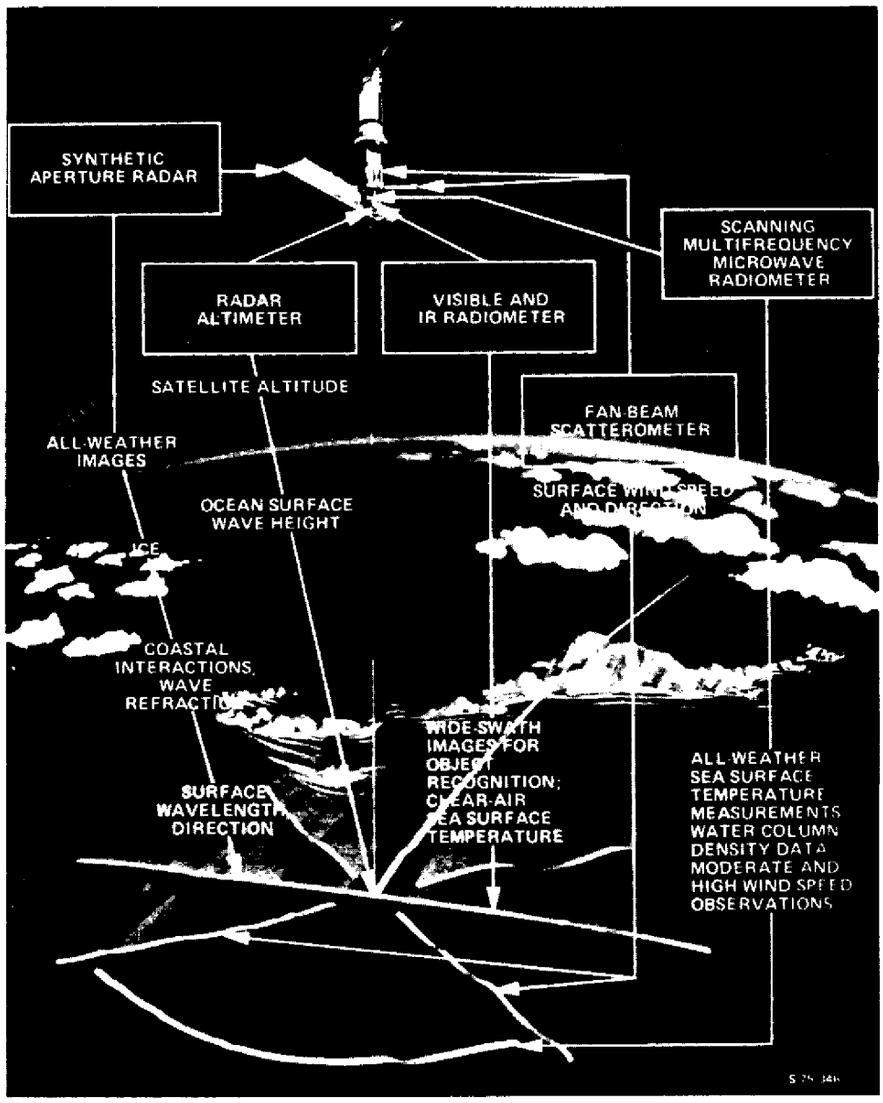
Data Distribution And User Demonstrations

As part of the Seasat-A proof-of-concept mission, NASA plans to provide data to government agencies, academic institutions, and private industry, such as mapping of the global ocean geoid, charting of ice fields and leads, precise measurements of currents and other features of the sea surface topography. The data will also assist global monitoring of wave height and directional spectra, determination of surface wind field magnitudes and directions, all-weather ocean temperature evaluations, and measurement of atmospheric phenomena such as vapor and water content.

The usefulness of this Seasat-A data depends on the use of existing and improved mechanisms for acquiring, transfering, converting and distributing the information. One of the major objectives of Seasat-A is to use these systems to determine the key features of an eventual operational system. This includes demonstrations of both global data gathering and real-time data processing and distribution, including user feedback to provide for improvements in processing and distribution methods.

Considering the remoteness of the regions in which many crab vessels operate and the lack of consistent and dense observations for input into forecast models in these regions, it is expected that Seasat-A derived ocean forecast products may offer benefits to Alaskan crab fishermen. Assuming funding requests are forthcoming, the planned experiments with cooperating crab vessels may well begin to demonstrate some of these benefits.

June 1977



The specialized sensors of Seasat-A are capable of timely monitoring of many ocean features. They will be able to cover a broad swath of ocean surface 14 times daily.

WIND AND WATER

Ocean Currents in the Gulf of Alaska

Fishermen in the Gulf of Alaska don't have to be told how bad the weather is there. They live with it and work in it. Many fishermen are successful today because they developed an instinctive understanding of the dynamics of the Gulf's waters. Today scientists are in the early stages of explaining these phenomena in detail, though they have recognized them for years. In this article, Dr. Thomas Royer, an oceanographer at the University of Alaska, discusses the dynamics of the weather and oceanography of the Gulf of Alaska, and offers an explanation for the seasonal trends that develop.

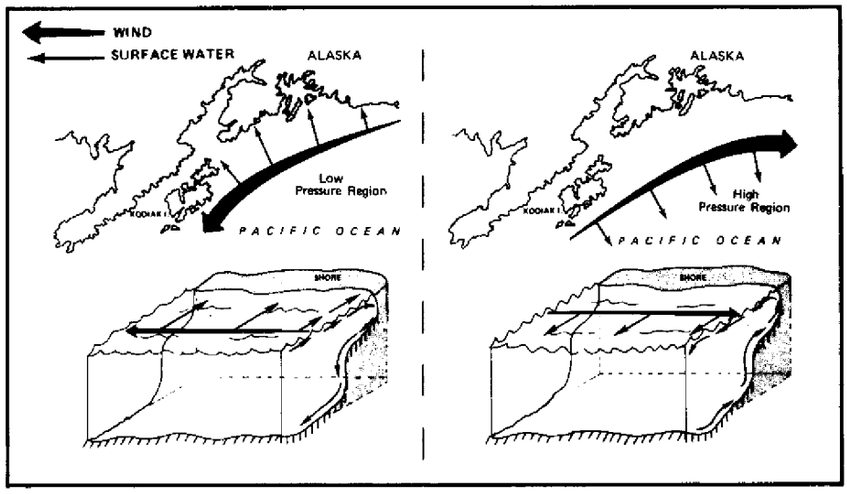
By Thomas C. Royer

Mariners plying the waters of Alaska bear the best testimony to the regions' highly variable weather, and occasionally fall victim to its extremes. An advantage of such extremes for oceanographers and meteorologists is that the changes in conditions are not generally subtle, but are rather large and easily detectable. Of course, under these adverse conditions, their measurement presents difficulties.

Since 1970, the Institute of Marine Science at the University of Alaska has devoted considerable effort to the measurement of oceanographic and meteorological conditions in the Gulf of Alaska at all times of the year. The University's 85-foot vessel, *R/V ACONA*, has been joined in the past two years by the much larger National Oceanic and Atmospheric Administration (NOAA) fleet. The scientists on these ships measure the salinity and temperature of the water column at selected positions on the continental shelf and nearby deep water from Yakutat to Umiak Pass. They moor current meters and sea level gauges, and make meteorological observations. This research is supported by the Bureau of Land Management's Outer Continental Shelf (OCS) study in preparation for the oil leasing and operations. Much of the information, however, is available and useful to others working in the Gulf.

Interaction

Any discussion of the ocean circulation in the Gulf of Alaska must include the interaction of the atmosphere with the ocean. The ocean serves especially in winter as a "source of fuel" in the form of warm water to drive the atmosphere. During extreme winter conditions, greater than 4,000 horsepower over an area equal to the size of a football field is transferred from the ocean to the atmosphere. Storms, which are generally born in the Bering Sea or mid-North Pacific, usually



A typical winter condition in the Gulf of Alaska. The off-shore has counterclockwise winds with surface waters moving shoreward.

A typical summer condition in the Gulf of Alaska. The fair weather has clockwise winds with surface waters moving off-shore.

move eastward into the Gulf of Alaska feeding on the ocean's warm water as they progress. The atmosphere receives this energy as both warmth and moisture. This warming of the atmosphere occurs because of the differences in temperature and humidity between the ocean and air. The differences are largest in winter and account for the greater number of severe storms at that time.

When the air is warmed, it rises, similar to heat rising in a chimney. This causes additional air to move toward the source of heating and to rise. As the air moves together and rises, it is affected by the rotation of the earth, which causes it to be deflected to the right of the wind. A counterclockwise (cyclonic) wind system is formed which is characteristic of a low pressure or storm system. The system may be hundreds of miles in diameter. For these reasons, the winter winds in the northern Gulf are strong and primarily from the east.

In summer a weak high pressure system replaces the strong wintertime low and results in a clockwise rotating wind system. For this reason, the winds on the northern coast of the Gulf of Alaska in summer are light and from the west. Near Kodiak, the direction of strong winds is more variable in winter, depending on the position of the low as it moves from west to east. The passage of these pressure systems is the reason that the atmospheric pressure near Kodiak has the highest variability recorded in the northern hemisphere.

Effects on Water

This seasonal changing of the winds over the Gulf of Alaska has a profound effect on the ocean waters. The general circulation of the Gulf of Alaska shelf waters is counterclockwise with speeds ranging from tenths of knots to several knots, depending on the time of year and location. The winds add to the movement of these waters. As a result of the earth's rotation, the movement of the water is to the right of the wind. Under the low pressure, cyclonic wind field, the surface waters will move outward from the center of the cyclone and toward the coast in the Gulf of Alaska. This accumulation of water at the coast forces a convergence and downward motion or "downwelling," with subsurface offshore movement, as shown in the illustration on the front page. With a high pressure, anticyclonic wind field, there is an offshore surface movement resulting in a divergence, or "upwelling condition" at the coastline. Upwelling regions such as the coasts of Oregon and Peru are highly productive because nutrient-rich water is brought to the surface where high biological productivity occurs.

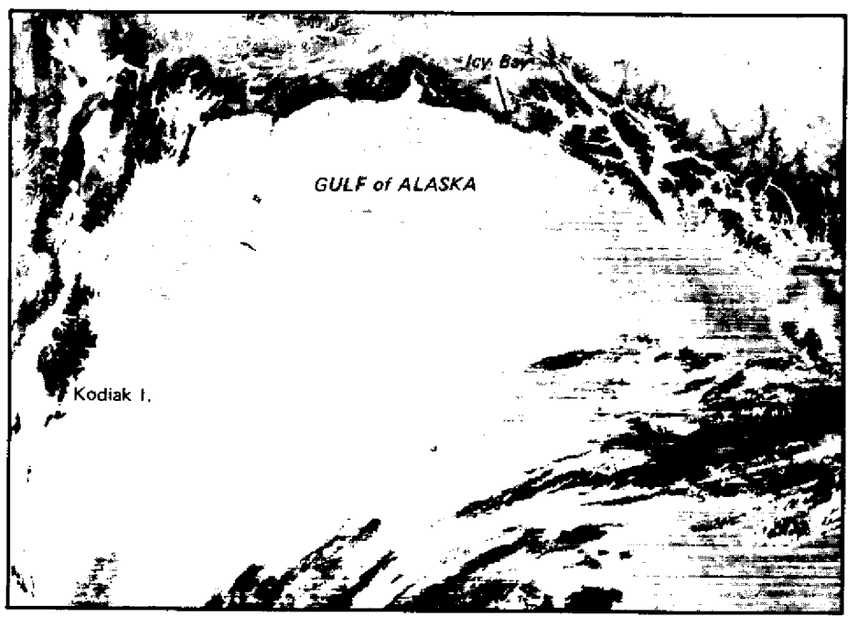
In the Gulf of Alaska winter downwelling is very strong, while summer upwelling is weak. The winter winds flush the shelf, and in summer the weaker winds from the west allow a slight upwelling to occur. However, no biologically valuable nutrients are brought to the surface. Instead, this relaxation of the downwelling allows relatively warm (41°F), high salinity (>33 parts per million) ocean water from a depth of about 500 feet to creep up onto the shelf. The intrusion of warmer, more saline water usually takes place in the late summer, depending on the winds. This water, being more dense than the surrounding shelf water, tends to remain in the isolated pockets and valleys of the continental shelf of the northern Gulf of Alaska. With this knowledge, the Russians have concentrated their bottom fishing efforts on the regions containing this warmer water.

Fresh Water Currents

Another major force driving currents in the Gulf of Alaska is fresh water from river runoff and rain. The light, low salinity water accelerates the circulation in the counterclockwise sense. It usually results in a maximum longshore current in the fall and a minimum in the spring.

An expected response to this description of the Gulf of Alaska circulation is, "But I have seen the currents go in the opposite direction." It is expected that the currents will fluctuate both in speed and direction. Our direct observations with current meters confirm this. Results such as this are not surprising if one makes a comparison between current and wind measurements. An average wind for a month at a particular location does not imply that no other wind speeds or directions were observed. Likewise, an average current for a region does not exclude the possibility of the occurrence of any other currents. Also, nearby locations might have other current speeds and directions.

An advantage that oceanography has over meteorology is that the space and time scales are larger. In other words, currents do not change as rapidly as the winds do. An estimate of the magnitude of the current fluctuations can be made using information gathered with satellites. The photograph on this page is an image obtained from the NOAA satellite on 7 February 1975. Both conventional and infrared photos are available. The infrared data gives a measurement of the sea surface temperature. In an infrared photograph, the variation in the shade of grey of the water is a measure of its temperature. White is 28°F and black is 45°F with variations in greys between these extremes. Temperature changes often



In this infrared satellite photo of the Gulf of Alaska taken February 7, 1975, warm water appears darker.

occur at the boundaries between currents, so that in this example the boundary between the central Gulf of Alaska currents and the shelf circulation is apparent along the shelf break. Irregularities in the sea surface temperature can represent irregularities in the currents. Swirls in the temperature pattern are indications of eddies or meanders in the flow and localized flow reversals.

The satellite photo shows that there is cold water flowing out of Icy Bay even at this time of year. The light area along the coastline indicates colder surface water there. Over the shelf region, the warmer temperatures in winter are a result of vertical mixing. The more homogeneous water column here allows the wind to mix surface water with warmer underlying water and to maintain a more uniform surface temperature throughout the year. The high salinity water beneath the surface in the central Gulf does not allow the wind mixing to penetrate very deeply. This confines the winter cooling to the upper layers only, resulting in colder surface temperatures.

The warm water band found seaward of Kodiak Island is a permanent feature of the region. It is the boundary between shelf- and deep ocean-waters. It is detectable at the surface by both its higher temperature and lower salinity. High current speeds of up to two knots toward the southwest along the shelf break accompany this feature.

Weather Prediction

Since the waters of the Gulf of Alaska supply energy to the atmosphere, changes in the water temperature could result in changes in the weather over not only the Gulf of Alaska but also the entire North American continent. Additional research is required to understand the details of this energy transfer and its consequences. With ocean time scales being much longer than the atmospheric time scales, an ocean disturbance such as a surface warming may remain and affect the atmosphere for months or years. Therefore a knowledge of the changes in water temperature in the Gulf of Alaska might lead to a better prediction of weather over the United States, in addition to the local benefits.

Feb. 1977

Robert Vissar of Shell Oil Co. presents a research grant to David Hickok, director of University Sea Grant Program, and Dr. William Sackinger, project leader of the University Ice Dynamics and Seabed group.

STUDYING THE SEA ICE

University of Alaska researchers are investigating the Arctic coast ice situation from top to bottom in the near-shore vicinity of Barrow.

One phase of the study is coastal sea ice dynamics and properties, which involves observation of the location, boundaries and motion of sea ice and shorefast ice using radar, distance-measuring equipment, satellites and strain gauges.

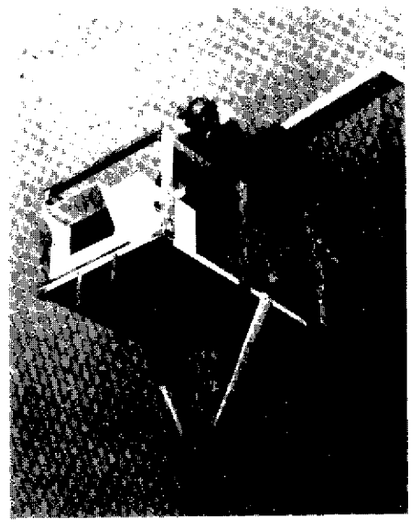
A second part of the project is determining the ocean sub-bottom structure and permafrost distribution off the Arctic coast through a drilling program using a special, portable drilling rig on the shorefast ice.

Data and techniques being developed in this work are needed for the design of structures such as offshore drilling platforms, dock and harbor facilities and transportation systems. For that reason, the Alaska Oil and Gas Association (AOGA) has joined the University of Alaska Sea Grant Program in funding the study.

AOGA representatives presented a check for $32,000 to the Alaska Sea Grant Program April 26 at the U. S. Naval Arctic Research Laboratory in Barrow. The grant supplements $109,150 in support funds for the study under the Alaska Sea Grant Program. AOGA awarded a $23,150 grant to the project in 1973.

Logistic support for the project is provided by the Naval Arctic Research Laboratory.

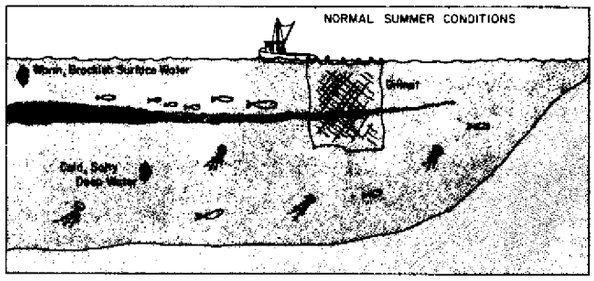
June 1974

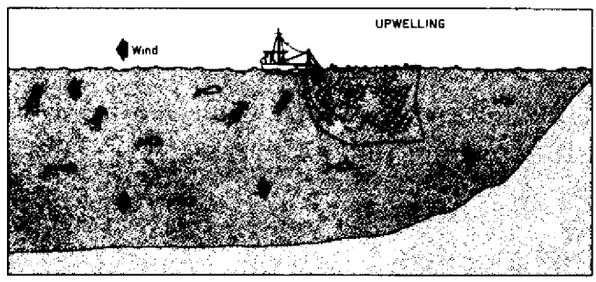


A radar unit which constantly scans the offshore ice near Barrow to record any activity.

Salmon, Jellyfish and the North Wind In Southeastern Alaska

By F. F. WRIGHT
Marine Advisory Service





When the north wind blows during fishing season in Southeastern Alaska, gillnetters learn firsthand, unhappily, about an important oceanic circulation mechanism——upwelling. In the summer the surface waters in Southeastern Alaska usually are a mixture of sea water and fresh water from land, warmer and lighter than normal offshore sea water. This layer, which commonly is from 10 to 50 feet thick, lies over normal sea water. The migrating salmon often congregate in dense schools above or just at the thermocline, which is the boundary between the shallow and deep water masses.

A north wind that persists for a couple of days in Southeastern Alaska tends to physically move the surface waters south along Stevens Passage, Chatham Strait and the other major channels, out to the open ocean. Deep water from the channels moves up to replace the surface water (upwelling), and the thermocline disappears. When this happens, the inshore waters lose their layered structure and the salmon no longer congregate in surface waters. A sure sign of upwelling is the presence of numerous jellyfish at the surface; they are found only in the normal marine waters. Thus the result of upwelling during the fishing season is poor catches of salmon and outstanding hauls of jellyfish.

April 1973

Hitch-Hikers on the Sea Breeze

By F. F. WRIGHT
Marine Advisory Service

If you have ever sailed in the Gulf of Alaska or the Bering Sea, you have probably noticed birds that sweep along on the breeze, hardly moving a feather, just above the surface of a rough sea. They are fulmars, shearwaters and albatross, sea birds specifically adapted to taking advantage of a windy marine environment. Their stiff-winged mode of flight enables them to glide and bank with a minimum of effort over vast areas of water in search of food–small, active fish and squid that come to the surface.

The albatross are the most dramatic of these birds, both in size (Alaskan species may have as much as a seven-foot wingspread), and speed (they can cruise at from 15 to 20 knots indefinitely, and often travel at higher speeds).

The albatross is similar in shape to a modern sail plane; its body is relatively small and rather plump, with a neat, rounded tail. Its wings are very long and slender, forming an excellent airfoil. Such a design provides for a high glide ratio; in still air a modern sail plane with proportions similar to those of the albatross might lose one foot of altitude for every 10 or 15 feet gained horizontally. The wings, tail and feet of an albatross can function in much the same way as the flaps and spoilers of aircraft; however, the bird demonstrates a capability for much more precise control and rapid response than any plane yet engineered.

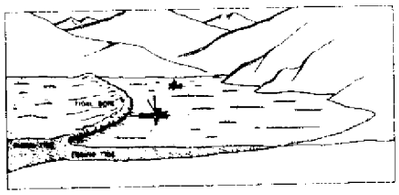
The soaring sea birds use the airflow patterns over the sea's surface just as soaring gliders take advantage of updrafts and thermals to maintain flight. When the wind blows across a rough sea, it tends to create a burble in the lee of each wave crest (see figure). The gliding sea birds simply follow along in the lee of a wave crest, instinctively positioning themselves in the region of the updraft, which balances their tendency to lose altitude.

JUNE 1973

TIDAL BORES

F. F. Wright
Marine Advisory Service

When we use the words, "Tidal Wave," we are usually referring to a tsunami, a tremendous, destructive ocean wave produced by an earthquake or landslide. In Turnagain Arm near Anchorage, however, a genuine and dangerous breaking wave is sometimes produced by the interaction of tide and wind. Such waves, properly called tidal bores, form in shallow, tapering inlets where the tidal range is great.

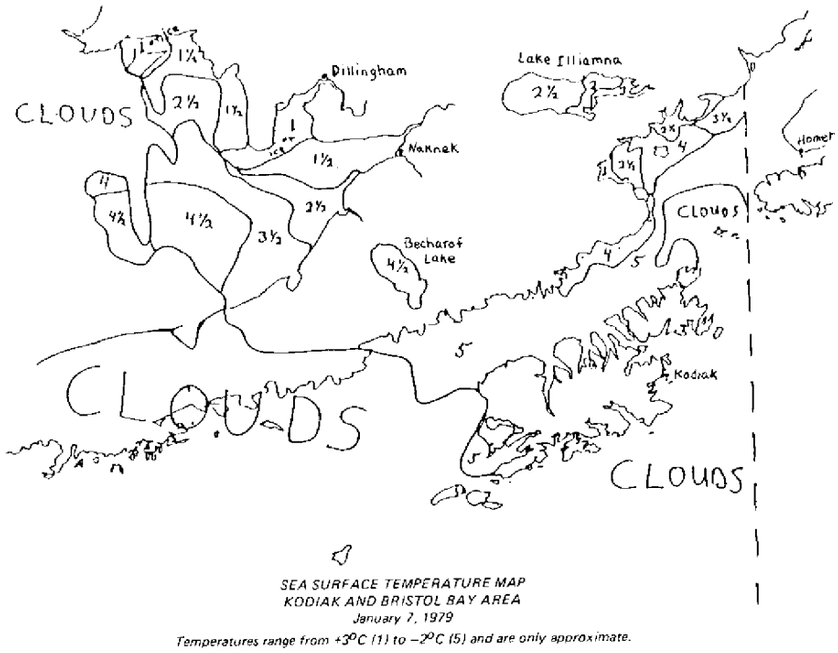


Here is how a tidal bore is formed: The ebbing tide runs so strongly that it temporarily dams back the flood tide; then the rising tide literally bursts into the inlet, advancing as a solitary, breaking wave. Such tidal bores are found in scattered areas all around the world, the most famous being in the Severn Estuary in England and at the mouth of the Chiang Tang Kiang River in China, where on spring tides the bore may form a wall of water 11 feet high, traveling at more than 16 knots.

In Turnagain Arm, conditions for a tidal bore occur at irregular intervals throughout the year. The bore is most likely to develop two or three days before a spring tide, on the flood at about middle of the interval between the low low tide and the high high tide of the day. Apparently, they are more apt to form when the wind is blowing west, out Turnagain Arm toward Cook Inlet. The height of the Turnagain bore is usually three or four feet, but bores of six and nine feet have been reported. Obviously, anyone who is in a small boat in the area should be very cautious, for the bore is similar to a wave breaking on a beach, and can be very difficult to ride through. Outrunning the bore is possible but tricky, for it may be moving at more than five knots, and you would be running directly into waves produced by wind. In addition, shoals in Turnagain Arm often shift, and a grounded boat is very apt to be swamped.

Feb. 1973

SEA SURFACE TEMPERATURE MAPS



SEA SURFACE TEMPERATURE MAP
KODIAK AND BRISTOL BAY AREA
January 7, 1979
Temperatures range from +3°C (1) to −2°C (5) and are only approximate.

This is a sample of the type of map and information you can receive from the Quick-Look Program at the University of Alaska's Geophysical Institute.

By Stephen Barrett
Geophysical Institute
University of Alaska

It has been long known that fish seem to prefer a certain water temperature. Sea surface temperature maps have been used for some time by tuna fishermen and others off the coast of California on a weekly basis as an aid in locating productive fishing grounds. Now the University of Alaska's Geophysical Institute is making sea surface temperature maps available to Alaskan fishermen through their experimental "Quick-Look Program." This program, funded by the State Legislature in 1978 as HB 750, utilizes Air Force satellite imagery (DMSP) to monitor several conditions of the Alaskan environment, including sea surface temperatures.

A typical map is shown for the Kodiak Island-Bristol Bay area. These maps are available whenever one of the Air Force satellites obtains a clear, cloud-free view of the ocean, which may be as often as twice a day or as seldom as once a week. All of the Alaskan coast is covered by these satellites. The temperatures shown on the maps are not exact but can be calibrated using shipboard measurements.

Presently several offices of the Alaska Department of Fish and Game commercial fisheries research divisions are getting these maps, as well as a few fishing organizations for use with their log book programs. These maps are available free to anyone interested. They can be obtained as they become available by sending your name and address to:

Sea Surface Temperature Maps
Attention: Stephen Barrett
Quick-Look Program
Northern Remote Sensing Laboratory
Geophysical Institute, Univ. of Alaska
Fairbanks, Alaska 99701

OIL AND MARINE RESOURCES

NMFS Studies Bioenvironmental Effects of the Proposed Oil Terminal at Port Valdez

By DALE R. EVANS
Chief, Water Resources Division
Alaska Region
National Marine Fisheries Service
Photographs by J. M. Olson, National Marine Fisheries Service

The development of Alaska's petroleum resources will pose a potential for injury to the state's living marine resources. How much damage may be expected and how best to control potential oil pollution hazards are topics of lively debate. Attention currently is focused on the pending trans-Alaska pipeline, which will extend from Prudhoe Bay to a marine oil terminal at Port Valdez in Prince William Sound.

Two million barrels of oil per day are scheduled to flow through this pipeline from the Arctic fields of the North Slope nearly 800 miles to Valdez, where it will be stored and then transferred to giant tankers for shipment to refineries in Puget Sound and California. The volume of oil scheduled to be handled at Port Valdez is 2.5 times greater than the volume handled at Milford-Haven, Wales, which is the largest oil shipping port in the United Kingdom.

Tankers carrying oil from Port Valdez will traverse some of the most productive coastal fishing waters in Alaska. The obvious potential for damage to fishery resources from the marine terminal operation ranges from the possibility of catastrophic oil spills, such as those caused by shipwrecks or equipment failures, to chronic, long-term, low level pollution from normal operations. Gross oil pollution can lead to tainted catches and fouled fishing gear.

Less obvious but potentially more serious are the collective effects on the functions and vital processes of organisms that could be caused by the incorporation and concentration of oil in the marine food web. Perhaps even more critical are the little understood effects of low level, long-term exposure to oil on the productivity of marine ecosystems (systems formed by the interaction of communities of organisms with their environments). Such effects may disrupt the patterns of behavior and responses of organisms.

Patches of weathered oil remain on some beaches in Port Valdez, remnants from storage tanks ruptured at the old town site during the 1964 earthquake and tidal wave.

Investigations to evaluate potential effects of oil pollution that might result from the marine terminal operation in Valdez were launched in 1970 by NOAA's National Marine Fisheries Service Auke Bay Fisheries Laboratory and Division of Water Resource Studies. During our initial study, we identified the most serious gaps in required knowledge of the subject. We developed bioassay capabilities in the Auke Bay Laboratory (which enable us to determine the biological potency of a substance by testing its effect on the survival or physiological responses of an organism), and confirmed that Prudhoe Bay crude oil is highly toxic (poisonous). Biological baseline data of a limited, quantitative nature was compiled on the marine environment of Port Valdez, which is now relatively uncontaminated.

This information was useful in our participation on the federal task force that prepared the final environmental impact statement on the proposed pipeline project, which was completed by the Department of Interior in March of 1972. In addition to the sections of the impact statement dealing with effects on the marine environment, several scientific publications on that topic have been completed by NMFS or are in preparation. Much of our work has been supported by funds transferred from the Department of Interior's Bureau of Sport Fisheries and Wildlife.

We do not yet know the full impact of potential levels of oil pollution that may be associated with the pipeline project. Although we now have a better understanding of these problems than we did when the environmental impact statement was prepared, NMFS still is striving to acquire data necessary to (1) provide a sound, factual basis for specific comments on the several federal

Oil, Marine Resources

permits required for construction and operation of the marine terminal facilities, and (2) assist state agencies with information required to administer their permit systems.

The NMFS Auke Bay Fisheries Laboratory investigations which began in 1970 now cover three major areas:

- Intertidal baseline research on Port Valdez organisms and their environment.
- Toxicity research on effects of Prudhoe Bay crude oil on selected marine organisms.
- Evaluation of present and potential salmon production in Port Valdez and possible effects of project operations. We plan to expand toxicity research to include the effects of Prudhoe Bay crude oil on fresh-water organisms, such as juvenile salmon and their food chain organisms. We also have recommended that planning be initiated for an investigation of effects of oil development on the environment of the Beaufort Sea.

A separate program at the Auke Bay Laboratory is designed to establish a chemical baseline of current oil pollution in Prince William Sound. This study complements the laboratory's current research program in Port Valdez and is sponsored by NOAA's Office of Coastal Environment. The principle objectives of this study are:

- To identify and determine chemical baseline levels of hydrocarbons already present in Prince William Sound, which will aid future assessment of any additional hydrocarbon pollution from petroleum developments.
- To determine how baseline levels of hydrocarbons vary seasonally in selected marine organisms and sediments.
- To determine sampling frequency and intensity required to detect changes in hydrocarbon levels in the marine environment.

Organisms and sediments will be collected from several different locations seasonally in Prince William Sound, and the samples will be analyzed by the National Bureau of Standards Laboratory in Washington, D.C. Sampling began in May of 1973 for this program, which is part of a larger NOAA program now in the planning stage. If all goes well, NOAA will initiate a comprehensive biological and oceanographic investigation for the entire sound in fiscal year 1976.

In general terms, the Auke Bay Laboratory's intertidal biological baseline research in Port Valdez consists of studies to be conducted before the oil shipping terminal goes into operation, followed by comparative studies on a continuing basis after the terminal is in operation.

The abundance and distribution of selected populations of intertidal invertebrates has been determined in different types of habitats. Annual and seasonal variations of these populations have now been measured quantitatively in studies on the Dayville mud flats, at two sites near the mouth of Mineral Creek near Valdez and on a rocky beach on Entrance Island in Valdez Narrows.

Our best information has been collected from the low gradient mud flat near Dayville where the large, uniform population of bentnose clams *Macoma inconspicua*, has enabled the laboratory to establish what may be the only quantitative biological baseline for the entire pipeline project. The laboratory's plans for this aspect of the program in fiscal year 1974 include the following:

- Continue quantitative baseline data collection and analysis.
- Determine which plants and animals in intertidal zones may be used as sensitive indicators of change in the environment.
- Determine the numerical population and distribution of intertidal zone organisms in selected areas which are likely to be affected by oil pollution.
- Determine values of community respiration and oxygen consumption in bottom sediments.
- Collect data suitable for monitoring population changes and for constructing species lists, species diversity indices, and measures of commonness and rarity of species.
- Make collections of the organisms present, and survey the published literature concerning their life histories, so the potential effects of oil pollution can be evaluated in relation to specific organisms.

Toxicity research in the laboratory has been necessary to determine the specific effects of Prudhoe Bay crude oil on Alaskan organisms and their environment. Acute bioassay data have been obtained for herring eggs and larvae, pink salmon eggs and alevins, pink salmon fry in fresh water and seawater and snow crab in pre- and post-molt conditions.

Although the laboratory will continue work on acute bioassays, greater emphasis will be placed on studies of chronic, low level exposures of organisms to oil. The potential for harmful effects on marine resources seems much greater from chronic low level pollution, but, unfortunately, information on this subject is essentially nonexistent.

An egg incubation apparatus which simulates the intertidal spawning environment of pink salmon in Prince William Sound has been tested successfully at Auke Bay. Growth and other basic functions were measured in fry reared in both fresh water and in the simulated intertidal environment. This fall and winter, groups of pink salmon eggs and alevins will be exposed to low levels of Prudhoe Bay crude oil for long periods in fresh water and the simulated intertidal environment. Growth and other basic functions will again be measured and compared with groups which have not been exposed to oil. Depending upon the funds available for our investigations, we also plan to expand our

NMFS biologists use the quantitative sampling methods at the Dayville Road mud flats (top photo) for studying intertidal fauna. In the bottom photo, a researcher adjusts the flow of air into jars of a static bioassay of crude oil at the NMFS Auke Bay Fisheries Laboratory.

work on behavior studies.

Studies of Port Valdez salmon production were conducted in 1971. The characteristics of the migration of pink and chum salmon fry were determined, the adult spawners enumerated, and available spawning areas were measured and spawner capacities determined.

Populations of zooplankton (passively drifting or weakly swimming animals) within Port Valdez were sampled monthly to determine their availability as food for the juvenile salmon. A creel census of the catch of salmon by sport fishermen was completed in 1971 in a cooperative program with the Alaska Department of Fish and Game.

This year the assessment of intertidal spawning habitat in Port Valdez is being completed. In the spring of 1974, if sufficiently large numbers of fry result from this fall's salmon escapement, surveys will be made in Port Valdez to obtain additional information on the migration routes of fry and where they school, the relative densities of fry in these areas, and the time period they remain in Port Valdez. This information, together with the results of laboratory research on Prudhoe Bay crude oil toxicity and the avoidance reactions of fry, will be used to determine the potential impact of oil pollution on Port Valdez salmon stocks.

There is a genuine need to expand research on the effects of oil pollution on Alaska's fishery resources, because Alaska is destined to become one of the world's more significant oil producing areas. The 10 billion barrels of proven reserves in the Prudhoe Bay field constitute the largest discovery ever made on this continent, and it is estimated that oil reserves of the North Slope total several times that amount.

Tentative schedules have been prepared for oil lease sales on the Outer Continental Shelf of the United States, and the Gulf of Alaska alone is estimated to have on tap a potential 40 billion barrels.

With proper planning, research and responsible actions, it should be possible for these developments to proceed without significant damage to the marine environment, permitting the continued utilization and enjoyment of the living marine resources dependent on this environment. This coexistence, however, is highly dependent upon completion of research such as that which NOAA has under way in Port Valdez and Prince William Sound, and the effective application of the knowledge produced by such programs. **Oct. 1973**

FISHERMEN AND OIL

Despite Shell Oil Co. statements that "an oil spill would have to dump more than 30,000 barrels into Cook Inlet for more than 24 hours before impacting fish and shellfish," commercial fishermen are very concerned about petroleum development in Kachemak Bay. Fishermen contend that oil activity infringes upon their crab and shrimp harvests and often trespasses on a large crab sanctuary in Kachemak Bay.

When the State sold 64 oil tracts in Kachemak Bay to oil companies without holding public hearings last December, commercial fishermen began their protest. At a public hearing in February by the State Senate Fisheries Committee, 200 people showed up to indicate their near unanimous support for requiring public hearings before state oil and gas lease sales. On May 7 a draft environmental impact statement was issued, and on May 18 another large group of fishermen turned out to demand a final environmental impact statement before drilling.

At press time the Army Corps of Engineers had not announced whether they would issue a drilling permit to Shell Oil without the final impact statement. The conflicts over use of the Inlet seem unresolved in any case, with Kamishak Bay and Chinitna Bay proposed as future oil lease sites.

June 1974

Fishermen and Oil

As the search for energy in the United States quickens, the possible conflicts between fishermen and oil become more apparent.

As anticipated in the December issue of **Seas&Coasts**, fishermen from Homer have filed a suit against the State over the leasing of lands under Kachemak Bay for petroleum exploration. The plaintiffs claim that adequate public notice was not given for the State's 28th oil and gas lease sale at which the Kachemak Bay lands were leased. The plaintiffs further claim that the State did not analyze, as required by law, whether the leasing of the lands was in the best interest of the State. As **Seas&Coasts** went to press the trial was scheduled to be held during February in Kenai.

Meanwhile, the federal program for accelerated leasing of the outer continental shelf continues. On February 3-4 in Anchorage the Bureau of Land Management of the U. S. Department of Interior scheduled hearings to receive comments from public and private sectors to evaluate the potential effects of outer continental shelf leasing on the "total environment, the domestic supply of mineral resources, aquatic resources, aesthetics, and recreation." Those who spoke at the hearings were to discuss the environmental impact of the proposed leasing, adverse environmental effects, alternatives, the irretrievable commitments of resources involved, and the relationship between short-term and long-term uses of the environment.

Since the Supreme Court agreed to hear the case between the State and the federal government over ownership of lower Cook Inlet, the original schedule for leasing of the lower Inlet has been delayed. A decision by the Supreme Court is not expected until this spring.

With delay over lower Cook Inlet, the Gulf of Alaska becomes the first target for federal outer continental shelf leasing in Alaska. A draft environmental impact statement on the Gulf should be completed in April and public hearings held in May. If the program stays on schedule, the final impact statement would be available in September and the sale held in November.

The Arctic Institute of North America will be sponsoring a symposium on October 16-17, 1975 to discuss the future of research and development in the Gulf of Alaska. The symposium will provide an opportunity to synthesize existing knowledge, review current research, and define the problems presented by development in the Gulf.

Feb. 1975

Offshore Oil

The federal program to lease selected areas of the outer continental shelf (OCS) off Alaska for oil and gas development continues.

Currently, the Interior Department is supporting a major research program (approximately $28 million between May, 1975 and December, 1976) to accumulate baseline data on the environments of the Alaska OCS which are proposed for leasing. Research is under the direction of NOAA's Environmental Research Laboratories in Boulder, Colorado and the Juneau OCS Energy Program office. Dr. Gunther Weller heads the research effort for the Beaufort Sea and Dr. Herb Bruce heads the Gulf of Alaska research. Don Rosenberg, Director of the Alaska Sea Grant Program, is coordinating all of the OCS-related research at the University of Alaska.

The Interior Department is also sponsoring a public conference on November 11-13 at the Anchorage Westward Hotel to determine a research program on the social and economic impacts of OCS development. Organized by the Alaska Sea Grant Program, the conference will examine a draft study plan which was developed by a multidisciplinary group of scientists in September.

Copies of the draft study plan will be available on request after October 20, 1975 at either the Anchorage (707 A Street) or Fairbanks, (Resources Building, Fairbanks Campus) offices of the University of Alaska's Sea Grant Program. Mail requests should be made to Alaska Sea Grant Program, Resources Building, University of Alaska, Fairbanks, Alaska 99701. Telephone requests should be directed to (907) 479-7086.

Meanwhile, a final environmental impact statement for the northern Gulf of Alaska, the first proposed lease area, should be completed by mid-October. According to reliable sources the impact statement is expected to be closely followed by legal action from the State to delay leasing in that area. At this point the Gulf of Alaska sale is scheduled for mid-December, but Royston Hughes, Assistant Secretary of the Interior Department, is "considering" a delay until mid-January, he noted the Department had not changed its stand against future postponements.

A symposium on the science and natural resources in the Gulf of Alaska will be held on October 16-17 at the Anchorage Westward Hotel. Sponsored by the Arctic Institute of North America and the University of Alaska, the symposium will feature papers by distinguished scientists and prominent members of industry on natural and biological systems, energy and mineral technology, transportation and communications in the Gulf of Alaska, particularly as it pertains to outer continental shelf development.

The June decision by the Supreme Court which discounted Alaska's "historic bay" argument and granted the federal government jurisdiction over offshore areas outside the three-mile limit in Cook Inlet, make that area the second target for OCS leasing. Although a rehearing of the case is scheduled, the chances for reversal seem slim, and in late September the Interior Department issued a call for tract nominations. November 17 is the deadline for nominations and comments on a possible sale in the lower Inlet.

On the other side of the coin, Kachemak Bay seems at least momentarily safe from oil development. Reportedly Governor Hammond has received assurances from the oil companies who own state leases in the Bay that they would not conduct exploratory drilling until the lawsuit challenging the validity of the 28th state lease sale is decided. Many believe that if the courts do not block oil development in Kachemak Bay, the Hammond administration may ask the legislature to do so.

Oct. 1975

Offshore Oil

Three areas of Alaska are now scheduled for oil and gas lease sales next year as part of the Interior Department's accelerated OCS development program.

The first sale is scheduled for January, 1976 in the northeastern Gulf of Alaska. Hopes for postponing the sale were squelched in late November when Interior Secretary, Thomas Kleppe, turned down both industry and Congressional requests to delay leasing as "not in the national interest".

The final environmental impact statement on the Gulf sale was released on November 19, and as *Seas&Coasts* went to press State officials were analyzing the statement, deciding whether or not to take the federal government to court over its adequacy.

The second lease sale off Alaska scheduled for 1976 will be in lower Cook Inlet. Nominations of tracts for the lower Inlet lease sale were finished in mid-November and final tract selections are expected to be announced late this month. A draft environmental impact statement is under preparation and should be released sometime this spring.

Oil companies and fishermen are now in the process of nominating tracts for a third possible lease sale. This one is scheduled for December, 1976 in the western Gulf of Alaska around Kodiak Island. Tract nominations are due by December 29, 1975.

In mid-November the people of Kodiak held a community meeting about the potential impacts of leasing off their island. One of the results of this meeting was a fisheries committee which will be entering "negative nominations" to the Interior Department by the December 29 deadline. Following in the footsteps of the Atlantic Offshore Fish & Lobster Association, which successfully convinced the Interior Department to remove some 400,000 acres from an OCS lease sale in the mid-Atlantic, the Kodiak fisheries committee will request the Interior Department to eliminate from the proposed western Gulf lease sale specific tracts which are important fishing areas.

To determine and document the significant fishing areas off Kodiak Hank Pennington, a new Marine Advisory agent and chairman of the fisheries committee, will be organizing information from fisherman's organizations and government agencies. The United Fisherman's Marketing Association and the Kodiak Shrimp Trawlers plan to transcribe their prime fishing areas onto OCS tract maps. The National Marine Fisheries Service is already transcribing onto tract maps the results of their exploratory trawls and important areas of foreign fishing. The Alaska Department of Fish and Game will document the life histories of primary economic species and those species with high economic potential and will be charting significant breeding or rearing grounds, areas of high production, and migratory routes.

Dec. 1975

Offshore Oil

The Interior Department's accelerated schedule for oil and gas lease sales on the outer continental shelf (OCS) of Alaska is lagging.

In late January Interior Secretary Thomas Kleppe announced the postponement of a decision on petroleum leasing in the northeast Gulf of Alaska until at least mid-February 1976. A sale in the Gulf was originally scheduled for November 1975, but the President's Council on Environmental Quality asked Kleppe to consider a delay, or at least restrict the lease area, because of unresolved environmental problems. The Environmental Protection Agency also suggested delaying the sale noting the earthquakes, severe storms, and the slow recovery rate in the harsh climate of the Gulf. Oil companies, on the other hand, rate the Gulf of Alaska as one of their best prospects for finding new oil and gas resources.

Tract selections for the oil and gas lease sale in lower Cook Inlet were still being finalized in late January. Nine separate groups had written comments on the Cook Inlet sale—most delineated tracts they felt should not be included in the sale for environmental reasons or for the protection of other resources. Among those who commented were the U.S. Fish & Wildlife Service, the Alaska Conservation Society, Alaska Department of Environmental Conservation, Alaska Department of Fish & Game, U.S. Coast Guard, Homer Advisory Committee to ADF&G, Kachemak Bay Defense Fund, North Pacific Fisheries Association, Starlight Fisheries, and the National Marine Fisheries Service. According to Connie Wassink of the Alaska OCS office, public hearings on the Cook Inlet sale will probably be held in late May or June in Anchorage. A draft environmental impact statement on the Inlet is scheduled to be released this spring.

Nominations for a lease sale in the western Gulf of Alaska around Kodiak Island were closed in late December. As with the Cook Inlet sale, several groups commented including the Kodiak Shrimp Trawler's Association, Rep. Ed Naughton, William and Jean Schwaab, U.S. Fish & Wildlife Service, Alaska Department of Fish & Game, United Fisherman's Marketing Association, Alaska Department of Environmental Conservation, B&B Fisheries, and National Marine Fisheries Service. Many asked that the sale be delayed until better techniques for the clean-up of oil spills in rough waters could be developed. Several groups delineated tracts critical to shellfish rearing and reproduction and asked that those tracts not be offered for sale in any event. The Kodiak sale was originally scheduled for December 1976, but Wassink reports it will probably not be held until 1977.

Meanwhile it looks like there will be no oil exploration in Kachemak Bay. Although the legality of the state sale which offered leases in the Bay is still in question, Governor Hammond has said he would take action if the court deems the sale legal. Speaking to a joint legislative session this January Hammond remarked, "Whether or not the leases there are deemed legal by the courts, I believe this issue is so crucial as to require. . . us to repossess them for proper compensation." **Feb. 1976**

Offshore Oil

At best, the production of oil and gas in the northern Gulf would provide short-term, critically needed energy and perhaps provide time. . . for the development of long-term alternative energy sources. . .At worst, petroleum development. . . means the irreplaceable loss of Alaskan wilderness—the nation's rapidly dwindling long-term resource.

—From the final environmental impact statement on the northern Gulf of Alaska

On April 13 the Department of Interior is scheduled to go ahead with the controversial oil and gas lease sale in the northeastern Gulf of Alaska. In making the decision to go ahead with the sale Interior Secretary Thomas Kleppe said he had "balanced" the national need for energy against the potential environmental and social damage in Alaska.

Kleppe made his decision over the objections of the President's Council on Environmental Quality, the Environmental Protection Agency, the Marine Mammal Commission, and the State of Alaska. In an "unusually blunt critique" CEQ Chairman Russel Peterson wrote that the decision to proceed with the sale "poses unwarranted risks to the natural resources and environment of the northern Gulf of Alaska and to the communities bordering it."

The State of Alaska felt the same way and in late February filed suit to delay the sale. The State was joined by the City of Yakutat, the Cordova District Fisheries Union, and the United Fishermen of Alaska in the suit.

In April a federal district court judge declined the State's suit saying that the national interest in increasing domestic oil production outweighed any argument the State of Alaska might make against the sale.

The Federal Government expects to reap between $500 million and $1 billion from the sale of over a million acres in the northeastern Gulf.

The Gulf sale is the first in a series of nine offshore oil and gas lease sales which are slated for Alaska's outer continental shelf over the next three years. Connie Wassink of the Alaska OCS office reports that the following dates are "official" although the time schedule seems to be "slipping away."

N. Gulf of Alaska	April, 1976
Lower Cook Inlet	Fall, 1976
W. Gulf of Alaska	Dec., 1976
Bering Sea (St. George)	March, 1977
Beaufort Sea	Sept., 1977
Outer Bristol Basin	Dec., 1977
Bering Sea (Norton)	July, 1978
Gulf of Alaska (Aleutian)	Sept., 1978
Chukchi Sea	Dec., 1978

Officials of the Koniag regional Native Corporation, which represents the native people of Kodiak Island, took many people by surprise in March when they urged Interior Secretary Kleppe not to delay the lease sale scheduled for the Kodiak area. Koniag, Inc. and the village corporations on the island own virtually the entire coastline of Kodiak Island. They made it clear that no petroleum development facilities would be permitted on their lands except at the former Air Force station at Cape Chiniak, which they proposed as an onshore base for offshore exploration. This action may effectively channel the OCS impacts on Kodiak to one area.

In return for the onshore facilities, Koniag Secretary Karl Armstrong has told the oil companies it expects "a piece of the action" in the form of a royalty share of the oil that is handled at any future Kodiak-based port or refinery. Koniag says it will insist on a royalty share for the City and Borough of Kodiak, also.

The controversy over OCS leasing in Alaska is unlikely to subside with portions of the Bering Sea and outer Bristol Bay up for sale next year. Because of the tremendous fisheries and marine mammal populations in the area, State Commissioner of Natural Resources Guy Martin has said that the sales in the Bering Sea and outer Bristol Bay are "the ones we're going to have to get down in the trenches over."

Oil Spills and the Weather

Some Facts about the Climate and How It Could Affect Oil Spills in Prince William Sound and the Gulf of Alaska

By BILL SEARBY
Climatologist
Arctic Environmental Information
And Data Center
University of Alaska

Weather conditions at the time of an oil spill are closely related to the ultimate effects of the spill. Here are some facts about the climate and how it could affect oil spills in the Gulf of Alaska and Prince William Sound. Obviously, the same storms affect both, but not in the same way.

The sound is rimmed by high mountains, contains numerous islands and many bays and narrow passages of water. Precipitation is much heavier there due to the mountains, and this causes a heavy outflow of fresh water from the many streams in the area. Features of the terrain cause winds to be channeled up or down valleys over much of the sound. The channeling creates bands of relatively narrow winds with extremely strong speeds. These winds, called foehn winds, created by pressure gradients, reach speeds upwards of 100 mph for up to two or three weeks at a time. They occur most frequently in winter, only occasionally in summer.

Most of the knowledge that exists about Prince William Sound's climate is based on experience and subjective reasoning. Basic data exists for only a very few locations, and none of it is applicable to more than the immediate vicinity of its source.

The outflow of rivers is superimposed on the tidal currents of ocean waters in the sound. If the strong bands of winds persist, they will cause temporary fluctuations in a current, which would have a significant (but not readily predictable) effect on an oil spill. Knowledge of where the strong winds are the most common can help, and with increased climatological knowledge, their occurrence can be predicted. The situation can satisfactorily be dealt with if a program of data acquisition is carried out. Supertankers will be able to avoid encountering 100 mph winds that are known to occur in the sound.

Weather in the Gulf

In the Gulf of Alaska, the usual weather pattern during winter months is one of low pressure centered somewhere along the Aleutian Island chain, which extends in an east-northeast direction into the gulf. The gulf thus is dominated by wind patterns associated with low pressure areas, which flow counterclockwise. Winds along the eastern side of the gulf blow south to southeast; in the north central gulf they become easterly, and over the western gulf, northeasterly.

Well to the south of the Gulf of Alaska, at about latitude 45 to 50 degrees, there are westerly winds. The ocean currents in the gulf demonstrate this same flow pattern. The theory that ocean currents are wind generated is now widely accepted.

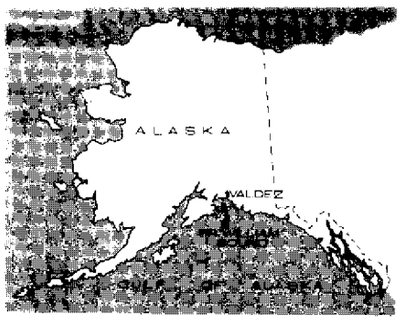
During summer months, a high pressure system that existed farther south during the winter extends into the gulf area, and its wind pattern is such that a west to southwest wind becomes dominant over most of the gulf. The westerly flow of air persists only long enough to cause minor changes in the ocean current pattern, the main one being a northward shift of the circulation center of the currents. Unconfirmed reports indicate that there may be a narrow band of eastward flowing water close to the coast during periods of more persistent westerly winds. Generally, an oil slick will follow the normal current flow, which in the northern portion of the gulf would be east to west.

Basic Data Needed

The lack of data about Alaska's winds and currents makes objective discussion of the topics nearly impossible. The above information is based on long-term averages. What happens when conditions deviate from the average is unknown. If an intense storm develops, with southerly winds of 50 to 75 knots persisting for 24 hours or more, the general pattern will be interrupted temporarily, and a large quantity of water will be carried northward against the beaches.

A statistical study of available wind data could determine the total percentage of time the wind blows from the south and the duration of the storm. With such information, it would be possible to calculate how long it would take an oil slick to move from one point to another under a given set of circumstances. Such data is vital to the effective planning of logistics in order to deal with an oil spill. The climatology of weather elements other than wind is also useful. Average conditions of cloud heights and visibilities under varying conditions will make the scheduling of reconnaissance flights made in connection with oil spills easier.

Information on present as well as past weather conditions is of basic importance in the event of an oil spill. The Council on Environmental Quality is responsible for preparing, publishing and revising a "National Contingency Plan" for the spills of oil and other hazardous substances. Federal agencies with primary responsibility for the plan are the Departments of Defense, Interior and Transportation and the Environmental Protection Agency. Involved as advisory agencies are the Department of Commerce, the Department of Health, Education and Welfare, the Office of Emergency Preparedness and various state agencies. Meteorological input for the program is provided by



NOAA's National Weather Service, Department of Commerce. In the event of an oil spill, the National Weather Service will be responsible for providing weather forecast services for marine and/or flying activities, and---if a spill occurs on an inland river---for hydrologic forecasts.

Nevertheless, despite these delegated responsibilities to government agencies, the government at this moment in time is without the data necessary to deal with either the logistics and clean up requirements of an oil spill in Prince William Sound or the Gulf of Alaska, nor is it prepared to say what biological resources will be the targets of toxicity and damage. **Oct. 1973**

Oil in Kachemak Bay

BY NANCY MUNRO
Arctic Environmental Information and Data Center

Editor's Note

Kachemak Bay is possibly one of the most productive bays in the world, and certainly one of the most beautiful. Last year when the State of Alaska leased portions of the bay for oil and gas exploration it unleashed a controversy which is still raging. Fishermen feel their livelihood would be seriously threatened by oil development, biologists fear the effects of chronic low-level pollution or a possible spill, and many citizens and visitors to Homer dislike the idea of oil platforms in Kachemak Bay or an increased population in the surrounding communities. On the other hand, the Nation requires energy resources and the State desires the revenues derived from oil and gas.

If oil is found under Kachemak Bay, it will be the first example of offshore development in a major fishing area of Alaska. That possibility raises many questions about conflicts, compatibility, and alternatives. With leasing of the outer continental shelf around Alaska already tentatively scheduled, the problems and conflicts raised by the Kachemak Bay affair seem to foreshadow the future. With this in mind **Seas & Coasts** *decided to trace the events of the Kachemak Bay sale, listen to all sides, and present the facts of what has happened, what is happening, and how it might pertain to the future.*

On December 13, 1973 the State of Alaska leased nearly 98,000 acres in the Cook Inlet basin for oil exploration. Profits to the State from the sale (the 28th State Competitive Oil & Gas Lease Sale) were close to $25 million. Since last December controversy over the conduct of the sale and the leasing of offshore lands under one of the State's richest fishing areas has been continuous.

Traditionally, the lands leased in a State sale are selected by the Alaska Department of Natural Resources (DNR) with the input of the Alaska Department of Environmental Conservation (DEC) and the Alaska Department of Fish & Game (ADF&G). According to Pedro Denton of DNR's Division of Lands, selections are based upon the interests of oil companies, income potential to the State, and any special circumstances which may affect leasing (i.e. fishery concerns). As preparations for a particular sale become final, notice of the specific lands to be offered is sent to newspapers, state agencies, legislators, and the oil industry.

Although DNR followed these procedures for the 28th lease sale, their timing and proficiency has been criticized by many people involved.

On April 13 and July 30, 1973 articles in the *Anchorage Daily Times* indicated Kachemak Bay was being considered for the 28th lease sale, but notice that lands under the Bay were definitely included did not appear until November 24. Similar public notice in the Kenai Peninsula newspaper, the *Cheechako News,* did not appear until November 29, and, according to the printer, notice never did appear in the Homer paper.

The ADF&G was asked for its suggestions, information, and requirements regarding the inclusion of Kachemak Bay in the sale. Unfortunately, a "paper management problem" prevented DNR from delivering this request until October 22, 1973; comments were due the first week of November. The ADF&G aquatic habitat biologist in Homer had two days to prepare his analysis and comments.

Oil in Kachemak Bay

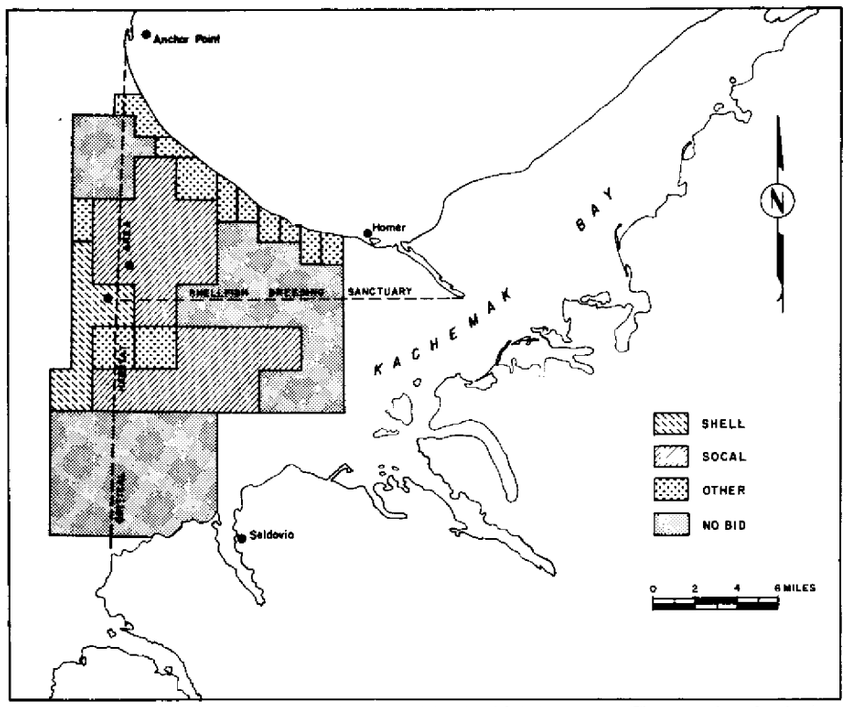
When the citizens of Homer became aware of the proposed leasing of lands under Kachemak Bay, a petition requesting a public hearing prior to the sale was circulated. Between December 1 and December 5, 1973 the petition was signed by over 300 townspeople and sent to the DNR. The DNR declined the citizens' request saying, "we do not interpret your petition as a request for a public hearing on specific problems but basically a request for a forum for the expression of opinion regarding the sale . . . ."

The sale went on as scheduled December 13, 1973. A telegram from citizens in Homer and Seldovia was read at the sale warning that the legality of the sale might "be tested by legal proceedings."

The denial of the request for a hearing and continuing protest by the citizens of Homer and Seldovia led State Senator Bob Palmer to call a hearing on the matter before the Alaska Senate Fisheries Committee. The hearing was held in Homer on February 23, 1974 and was attended by representatives from the oil industry, state agencies, and approximately 200 people from Homer and Seldovia. Testimony was nearly unanimous that because Kachemak Bay was such a rich marine area, studies on the existing renewable resources and the possible impact of oil should be completed before drilling. After the Fisheries Committee reported back to the Senate, Kachemak Bay was declared a "critical habitat area" by legislative action.

In the early months of 1974, Shell Oil Co. and Standard Oil of California applied for exploratory drilling permits for their tracts in Kachemak Bay. Because of continuing public interest DNR and the Army Corps of Engineers, the agency responsible for issuing permits for offshore drilling structures in navigable waters, held a public hearing in Homer on May 18, 1974. Again testimony centered on the lack of information and possible harm to the fisheries. Col. Charles A. Debelius, District Engineer for Alaska, told **Seas & Coasts** that the public concern displayed at the May hearing caused him to revise his opinion on whether or not to issue a permit without an environmental impact statement. Earlier in the year, the Corps felt, as did DNR, that the allowance of a 30- to 90-day exploratory drilling operation from a floating barge did not constitute a "significant federal action" requiring an environmental impact statement. After the hearing the Corps decided to withhold a permit until an environmental impact statement could be completed.

The environmental impact statement was filed on September 25 with the Council on Environmental Quality. After allowing 30 days for comment the statement became final November 4. On November 7 Debelius signed Shell's permit for exploratory drilling provided, among other things: 1) all drilling muds, core drillings, drill cuttings, associated fluids and solid wastes, oil and machinery wastes and untreated washdown residues would be contained and disposed of on land; 2) all sanitary wastes would receive secondary treatment prior to discharge into marine waters; 3) emergency oil containment clean-up equipment and trained personnel would be either on-site or at a suitable nearby location during the drilling operation period; and 4) the applicant would periodically perform in coordination with ADF&G personnel a time series of day and night observations on the occurrence, concentration, and behavior of marine life around the structure and the bottom area of the drilling site. The permit was accompanied by a 20-page environmental assessment which in essence stated that the social, economic, and environmental impacts of exploratory drilling would be minimal except in the unlikely event of a large oil spill. Copies of the environmental assessment are available for those with an "authentic reason" for the request from the Permit Section, Army Corps of Engineers, Box 7002, Anchorage, AK 99510. The assessment emphasized that a permit for exploratory drilling conveyed "no authority whatsoever for establishment of a production well." Shell was expected to begin drilling with the *George F. Ferris,* a jack-up drill barge, for approximately 60 days beginning in early December. A permit for exploratory drilling on Standard Oil's lease, adjacent to Shell's tract, was expected in the near future.



Map showing the areas in Kachemak Bay leased in the 28th lease sale. The two dots in the bay mark the approximate locations where Shell Oil Co. and Standard Oil of California have applied to drill exploratory wells.

As **Seas & Coasts** went to press, Homer townspeople and fishermen opposed to the leases were still fighting what they considered a short-sighted decision which poses danger to the environment and renewable resources of their area. Further legal action seemed likely.

Controversy

At this point in the controversy people involved in the Kachemak Bay issue seem to be asking themselves one of two questions — Why all the fuss? or Why, of all places, Kachemak Bay?

Spokesmen from DNR claim that the public outcry against the sale came as a surprise, and point out that there has been drilling in the area before. Homer Burrell, Director of DNR's Division of Oil & Gas, commented that "we've never had a public hearing for a lease sale" and added that "things could get out of hand" if public hearings were held for each sale. When asked why, with its tremendous renewable resources, DNR chose Kachemak Bay for lease, Burrell indicated that the State actually had very little land to lease with "most of it tied up in d-2 withdrawals or Native claims." Burrell commented that "if we don't have more lease sales, we [the State] will probably be broke before Prudhoe revenues begin arriving in mid-1977."

People who favor oil development generally believe that fears over the possible impact of oil on the fisheries are exaggerated. Burrell challenges "anyone to prove any harm of any kind to any fish in Cook Inlet" from present oil platforms. John Grotefend of Standard Oil of California claims that the waste system in Homer and wash-off from nearby roads created "1,000 times more contamination than an oil platform." Regarding the amount of information one should have before drilling, Bob Weinhold, a fisheries biologist in the environmental section of the Army Corps of Engineers, probably speaks for many when he states that "if you wait until you have all the information, nothing will ever happen." Burrell questions if one can assess all the natural resources of an area and analyze the impact of oil if the presence and size of the oil deposits are in question.

On the other hand, many people, particularly the fishermen of Kachemak Bay, wonder how anyone could even consider gambling with the renewable resources of the Bay. According to Jim Rearden, who was the Alaska Department of Fish & Game's area management biologist for commercial fishing

in Cook Inlet for 11 years, Kachemak Bay is one of the world's most productive bays. With five species of shrimp, three species of crab, five species of salmon, herring, clams, and halibut the annual commercial harvest value of Kachemak Bay to the fishermen is near $13.5 million in a labor-intensive industry. This figure does not take into account the scenic and recreational values of the Bay.

Fishermen feel that their fears over the effects of oil are very well-founded, particularly because many of the oil leases in the 28th lease sale are within a shellfish breeding area. According to National Marine Fisheries Service testimony, there is a large eddy off of Bluff Point where crab and shrimp concentrate for breeding and release of their larvae. Whereas other areas affected by oil pollution might recover by recruiting organisms from surrounding unpolluted areas, Kachemak Bay appears to be the main nursery ground for the entire Cook Inlet and possibly further. According to Loren Flagg, the Alaska Department of Fish and Game habitat biologist based in Homer, Kachemak Bay represents 2.6 percent of the marine waters of the Cook Inlet management area, and produces 62 percent of the shellfish product. Fishermen point out that there are already conflicts over gear and traffic in the Bay and that the addition of another industry will increase the congestion.

Generally, the people who are opposed to oil development in Kachemak Bay feel that with such a rich area no risks should be taken. They argue that the high quality, uncontaminated protein supplies found in Kachemak Bay will become increasingly valuable as the world's nonrenewable resources dwindle, and feel that oil development should take place only if the protection of all resources can be assured. In line with this they feel that water quality standards must be written to provide the best possible protection, and not what might be the best practicable treatment as determined by technology. Many suggest it is not the 30- to 60-day temporary exploratory drilling operation which they object to, but the precedent it might set for oil development in the Bay.

Outcome

Parts of the controversy surrounding oil development in Kachemak Bay are local issues. The near absence of public notice before the 28th lease sale, the minimal amount of time given ADF&G for their comments, and the denial of a public hearing prior to the sale are important local issues connected with this particular incident. At this point it seems evident to most people involved that mistakes were made and that further ramifications of these mistakes will be seen in the future. Meanwhile, continuing public interest in the issue has brought about many changes. The two permits granted so far have the most stringent stipulations ever required anywhere in the world. The State legislature granted the ADF&G a substantial amount of money to study the impacts of oil on the processes of the Bay, and the ADF&G is currently working on protective discharge standards, methods of testing, and an adequate enforcement program. If the following 29th lease sale is any indication, increased cooperation between state agencies prior to a sale seems likely. Ideally, the final land selections for a sale and the stipulations for developing those particular selections will, in the future, be completed prior to any sale.

Parts of the Kachemak Bay controversy have broader implications. In the light of federal oil and gas leasing on the outer continental shelf, the conflicts in Kachemak Bay between petroleum development and the fishing industry mark only a beginning. In the fall of 1975 the U. S. Department of the Interior plans to lease for oil exploration 2.5 million acres in lower Cook Inlet and 3.5 million acres in the Gulf of Alaska directly south of Valdez. A sale for the Kodiak section of the Gulf is tentatively scheduled for December 1976, the St. George's section of the Bering Sea in October 1976, the outer basin of Bristol Bay for October 1977, the Norton basin of the Bering Sea in August 1978, and the Aleutian shelf in September 1978. The social, economic, and environmental impacts of outer continental shelf leasing could be tremendous for the Alaska commercial fishing industry. The Kachemak Bay issue makes it clear that if fishermen want to have input into the selection of lands to be leased, the adequacy of environmental considerations, and the stipulations required for development, they must become involved in the legal procedures of oil development.

State

In the State of Alaska offshore oil and gas leasing is handled primarily by the Department of Natural Resources. There is no formal process for public comment (i.e. public hearings or environmental impact statements), but individuals may make their opinions known by writing the Division of Lands, Department of Natural Resources, 323 - 4th Avenue, Anchorage, Alaska 99501 To find out what may happen before it happens, individuals should request to be put on the oil and gas mailing list.

On November 18, 1974 Charles Herbert, Commissioner of DNR, announced the latest schedule of competitive oil and gas lease sales on State land.

1975	September	Lower Cook Inlet I (Northeast Sector)
1976	March	Beaufort Sea I (Eastern Sector)
	June	North Slope I (Upland, Western Sector)
	November	Lower Cook Inlet II (Southeast Sector)
1977	April	North Slope II (Uplands, Eastern Sector)
	July	Gulf of Alaska (Eastern Sector)
	September	Beaufort Sea II (Eastern Sector including inlying Federal claimed lands)
	November	Lower Cook Inlet III (Northwest Sector)
1978	July	Selawik Basin
	September	Beaufort Sea III (Western Sector)
	November	Lower Cook Inlet IV (Southwest Sector)

Public hearings will be held for any of these sales if valid requests for hearings are submitted 60 days before the proposed sale date.

In addition to state permits, any structure in navigable waters of the United States also requires a permit from the Army Corps of Engineers. In its decisions on permits the Corps takes into account navigation, water quality, aesthetics, economics, fish and wildlife, conservation, recreation, water supply, flood damage prevention, ecosystems, and the general needs and welfare of the people. Upon receipt of a permit application, the Corps must notify the public of the proposed action, and give "a reasonable period of time," normally 30 days but not less than 15 days from date of mailing, for comment. The public can be added to the Corps mailing list to receive notice of permit applications, and may comment on all proposed actions by writing the Army Corps of Engineers, Attention: Permit Section, Box 7002, Anchorage, Alaska 99510.

If oil development does occur, citizens can insure the enforcement of environmental regulations and permit stipulations by informing government agencies or local politicians of possible infractions. Discharge of materials from oil platforms and actions which may cause air or water pollution should be reported to the following agencies.

Alaska Department of Environmental Conservation
338 Denali
Anchorage, Alaska
(Phone: 274-5527)

Army Corps of Engineers
Attention: Permit Section
Box 7002
Anchorage, Alaska 99510
(Phone: 279-5123)

Alaska Department of Fish and Game
333 Raspberry Road
Anchorage, Alaska 99502
(Phone 344-0541)

U.S. Fish & Wildlife Service
813 D Street
Anchorage, Alaska 99501
(Phone 265–4808)

Federal

The federal oil and gas leasing program for the outer continental shelf areas of Alaska will be handled by the Alaska OCS office, 800 A Street, Anchorage 99501 (Phone: 279-4578). A draft environmental impact statement on the nationwide program has been written, and public hearings will be held in early February in Anchorage. The first outer continental shelf area to be leased in Alaska will probably be lower Cook Inlet. Due to the controversy over the ownership of the lower Inlet, the precise timing of the leasing is in question, but a draft environmental impact statement for the lower Inlet is imminent. Thirty days after the draft impact statement has been issued there will be a public hearing where individuals should give their opinions on the areas to be leased, requests for special stipulations (like transportation corridors or subsea completion), etc. Approximately 90 days after the public hearing, the final environmental impact statement will be released. For information on the impact statements and the hearings contact the Alaska OCS office.

DEC. 1974

Kachemak Bay

The saga of oil development in Kachemak Bay may be coming to a close. In late May the legislature passed a bill which empowers the Governor to buy back the oil leases in the bay sold by the State 2½ years ago.

The bill clamps a one year moratorium on oil exploration in the bay, during which time the State can negotiate with the oil industry to buy back the leases, possibly with credits against future payments to the state. If negotiations fail, the State may reacquire the leases by exercising the power of eminent domain and condemning them.

The legislature's move marks a victory for many residents of the Homer area, particularly commercial fishermen, who have fought against oil development in the bay since the leases were sold. Other residents were not so pleased. Rep. Leo Rhode of Homer commented that the legislature's bill was a good example of "banana republic politics.".

In any event Kachemak Bay's affair with the oil industry is sure to be a memorable one. As the legislature voted on the buy-back bill, Homer residents were warily eyeing a jack-up drilling rig named the *George Ferris*.

The *Ferris* has almost become a *cause celebre* since it made its dramatic entrance into the bay last year. Fishermen are still smoldering over the crab pots the *Ferris* snagged as it was dragged into the bay without warning.

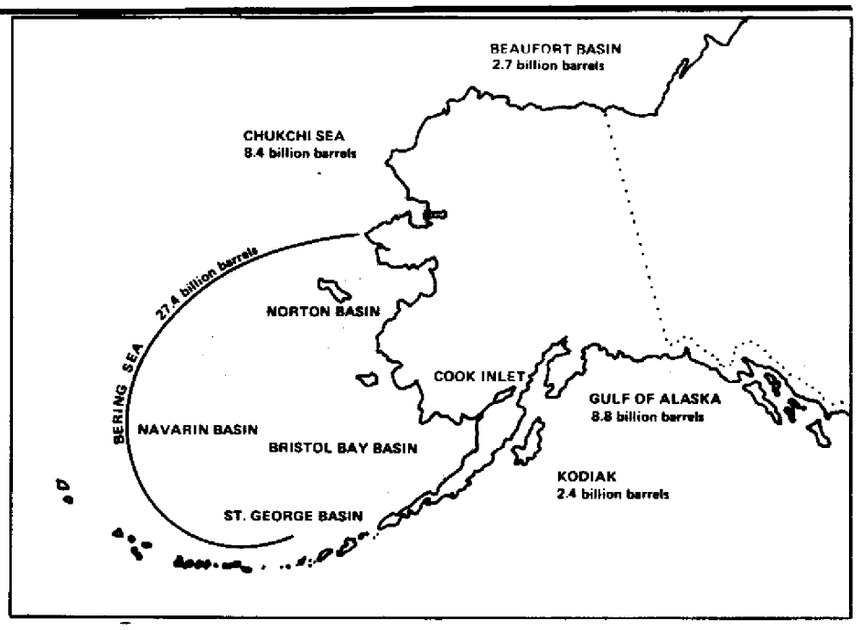
This spring the *Ferris* was to be moved from its perch off Homer Spit for work in the Upper Inlet. Unfortunately, the rig was sitting in 80 feet of mud and when moved the legs of the rig snapped. After much commotion and some oil spilled in the water the *Ferris* is still marooned off the Homer Spit.

As *Seas&Coasts* went to press the owners of the *Ferris* and ADF&G were working on a plan to blast the disabled rig loose from the mud without killing the salmon fry in the area through the explosion's shock waves. Meanwhile, the State is filing charges on the oil spilled during the *Ferris'* impalement.

The *Ferris* incident caused the *Homer Weekly News* to editorialize: *Last year we expressed our reluctance to support oil exploration in the bay for sociological reasons . . . It is no longer just a nice sociological question . . . We no longer believe that the technology exists in Alaska to safely look for oil and gas pockets below. Until we can be persuaded that a way to do so exists which will not endanger the shellfish, we will be opposed to any attempt to drill there.* **June 1976**

Leasing Schedule

Sale Area	Tentative Sale Date
Cook Inlet	Aug. '75
Gulf of Alaska	Nov. '75
Bering Sea-St. Geo.	Oct. '76
Gulf of Ak.-Kodiak	Dec. '76
Beaufort Sea	Sept. '77
Outer Bristol Basin	Oct. '77
Bering Sea-Norton	July '78
Gulf of Ak.-Aleutian	Sept. '78
Chukchi Sea	Dec. '78



OCS Development - What it Means

By Nancy Munro

Extensive oil development off Alaska's coastlines is looking increasingly likely these days.

The nation is alarmed by the prospect of energy shortages, and hungry eyes are turning north to satiate a ravenous appetite for oil. Right now those eyes are riveted on, among other areas, the potential petroleum reserves offshore Alaska on the outer continental shelf (OCS). What the development of these reserves would mean to the fishing industry, towns, and resources of Alaska is difficult to foretell, but the potential impacts are staggering.

Project Independence

The current push to explore and develop petroleum resources on the outer continental shelf stems from the interminable demand for energy in the United States and recent complications with foreign supplies of oil. Last year the United States was faced with the Arab oil embargo and a resulting strain on the national balance of payments due to the quadrupling of world oil prices following the Middle East war of 1973. In response to this, President Nixon initiated a program called Project Independence to alleviate the immediate

impacts of the "energy crisis" and to achieve energy self-sufficiency for the U. S. by 1980. Project Independence included proposals to research alternative sources of energy and to initiate conservation practices, but the major thrust of these proposals was to increase domestic production of oil and gas.

Under the mandate of Project Independence Presidents Nixon and Ford have directed the U. S. Department of the Interior to lease 10 million acres of the outer continental shelf in 1975 for oil and gas exploration. Ten million acres in a single year represent a massive acceleration of the federal OCS program, which in the past 21 years has leased a total of 6.3 million acres. In order to successfully lease 10 million acres in 1975, the Interior Department would have had to offer for lease an incredible amount of the shelf, possibly up to 20 million acres. This is where Alaska entered the picture.

In the past, OCS leases have been limited to the Gulf of Mexico. The accelerated schedule, however, would necessitate leasing off the Alaskan, Atlantic and Pacific coasts – all "frontier" areas with little or no history of oil and gas development. At this time Alaska seems to be holding the lucky number, or the bag, depending on one's viewpoint.

Until recently lands offshore the Atlantic coast were tied up under a lawsuit in which the 12 Atlantic coastal states claimed they inherited, as independent colonies, all the rights previously exercised by the King of England which included sovereignty 100 miles offshore. In March the Supreme Court ruled that the OCS belonged to the federal government. Despite this ruling against the states political pressure will probably slow or limit development off the Atlantic coast.

In the Gulf of Mexico prospects for further leasing look rather dreary. Bids at the latest lease sale were substantially lower than the Interior Department expected, and the consensus of opinion is that the richest areas in the Gulf have already been tapped.

On the Pacific coast strong political and environmental pressure will probably slow development, particularly off California where residents witnessed the Santa Barbara oil spill six years ago.

With its limited population and tremendous potential reserves Alaska seems the most likely prospect to supply the nation's energy demands. The U. S. Geological Survey estimates that the total undiscovered but recoverable oil resources of the U. S. OCS are between 58 and 116 billion barrels. Of this, the Interior Department hopes to glean some 49.7 billion barrels from the OCS off Alaska. At the time of this writing the Department is planning lease sales over the next five years in nearly every major fishing area along the Alaskan coast with the exception of Southeast. OCS lease sales are planned for the Gulf of Alaska, off Kodiak, outer Bristol Bay, the Bering Sea, Norton Sound and Kotzebue Sound. Those areas like the Yukon-Kuskokwim delta where specific lease sales are not planned would likely feel secondary impacts resulting from oil development in surrounding areas.

POTENTIAL IMPACTS

It is impossible at this time to quantify the ultimate impact of offshore oil development on Alaska's commercial fishing industry. We do know that offshore development may affect the fishery resources through spills or continuous low-level pollution, and that social and economic impacts in the coastal towns will probably modify the fisherman's way of life.

Spills

One of the major threats of offshore oil development is the possibility of massive oil spills. If offshore development does occur in Alaska, there is very little doubt in anyone's mind that some spills will occur. The Interior Department unequivocally concludes in its draft environmental impact statement on the OCS program that "sooner or later a major spill will occur wherever there is significant development of offshore exploration and production in potential areas. We are certain that thousands of minor spills will occur."

The actual effects of an oil spill are more difficult to predict. Once the oil enters the water it is transported by the winds, waves and currents, and may eventually come ashore or drift out to sea. As the oil moves in the water three things happen as it "weathers" 1) some immediately dissolves into the water or evaporates, 2) a large portion of the remainder emulsifies or is broken into small particles, and 3) the unemulsified oil sinks. The ultimate impact of an oil spill depends on several variables – the amount of oil spilled, the type of oil, how far the oil is from shore, the weather conditions, biota of the area, time of year, and treatment of the spill.

In the event of a spill fish and shellfish can be killed directly by coating and asphyxiation, poisoning by contact, and poisoning from water soluble fractions of the oil. Shellfish and clams, because of their relatively sedentary existence, and the delicate larval stages of fish and shellfish are particularly vulnerable to this type of impact.

Unfortunately, it seems that the environmental conditions in Alaska will in no way lessen the impacts of any oil spill. Cold water temperatures, not to mention ice conditions, will probably retard the weathering of oil. Analysis of winds and water currents which control spill movement in the Gulf of Alaska indicate that the probability of oil coming ashore is relatively low (5-10 percent in the summer) in the western Gulf, but extremely high (95-100 percent in summer and 40-75 percent in winter) in the eastern Gulf. An oil spill in the proposed St. George's basin lease area in the Bering Sea could probably be transported into Bristol Bay by the Bristol Bay gyre.

Pollution

Pessimistic sources fear that oil from a spill or any other source may introduce carcinogenic hydrocarbons into the aquatic environment which might concentrate in the bodies of commercial fish and shellfish, possibly contaminating them for human consumption. Oil pollution might affect the behavior of different species, conceivably interrupting the chemical communication between marine organisms or the homing patterns of anadromous fish like salmon who would tend to avoid oiled areas. Oil pollution could seriously impair plankton productivity and thus in a local area destroy the primary food source of many marine animals including fish.

The long-term biological impacts of oil pollution are very, very iffy. No one knows for sure what will happen to nearby fishery resources if oil development occurs offshore. Possibly more foreseeable are the potential economic effects of oil pollution. Oil from spills or slicks may foul or damage pots,

floats, and nets as in the Kodiak oil pollution incident of 1970. Oil pollution may reduce the fishing effort if fishermen prefer to remain on shore rather than risk fouling their boat or gear. An oil spill could decrease the marketability of fish both immediately due to fear of contamination and in the long run by detracting from the reputation of the product. Finally, the threat of oil pollution could hamper the development of aquaculture projects. Scientists state that a single large oil spill in Puget Sound could destroy the area's extensive aquaculture industry.

Increased Activity

Even without extensive spills or pollution, offshore development will affect the fishing industry by taking up a substantial amount of land in fishing areas. The OCS draft environmental impact statement figures that "jack-up drilling rigs or permanent production platforms effectively remove two to five acres of fishing area per structure." The semi-submersible drilling rigs used in deeper waters like the Gulf of Alaska would remove approximately 70 acres per rig. For exploratory drilling these rigs would remain in place from 45 days for a single well to around six months for multiple well explorations. Permanent production platforms may remain in place for 10 to over 20 years.

Increased water traffic, tanker or otherwise, will undoubtedly increase congestion in the area of development. Tankers straying from designated lanes could cause collisions and the fouling or loss of fishing gear. Crab pots lost in this manner would continue to fish.

Social and Economic Changes

Probably the most immediately noticeable effect of offshore oil development will be the onshore social and economic changes. Economists from the Alaska OCS office advise that fishing communities along the coast can anticipate sudden population swells, increased competition for labor and harbor facilities, more conflicts over land use, inflated costs for public services, and substantial changes in lifestyle should offshore development occur. Residents may also see better docking and transportation facilities, accelerated local property values, and some new jobs. The Council on Environmental Quality in its assessment of the OCS program predicts that leasing in the Gulf of Alaska would boost the population of the Gulf communities by 16,800 people. Kevin Waring, Director of Community Planning for the Alaska Department of Community and Regional Affairs, has suggested that this population growth in the Gulf "represents a potential onshore public investment of about 600 million dollars" or roughly equaling the State's current annual budget. Looking at the five-year lease schedule Waring has observed that "Alaska must conservatively plan in the next 15 years for population growth far in excess of 100,000 persons, dozens of remote new settlements, thousands of acres of new land uses, and billions of dollars of State and local public expenditures, all directly attributable to federal OCS leases." The potential consequences of this kind of rapid onshore growth to the rural lifestyles, the economy, and the commercial and subsistence resources of the coast are enormous.

Community Impacts in the Gulf of Alaska

	Valdez	Cordova	Seward	Yakutat
Population				
1970	1,100	1,600	1,800	250
1985 base case	9,600	3,800	3,300	400
1985 low development	11,500	5,700	5,200	2,300
1985 high development	13,800	8,000	7,500	4,600
2000 base case	25,800	5,600	4,800	600
2000 low development	28,100	7,900	7,100	2,900
2000 high development	29,200	9,000	8,200	4,000
Employment				
1970	325	475	800	100
1985 base case	2,830	1,190	1,160	160
1985 low development	3,190	1,550	1,520	520
1985 high development	3,880	2,240	2,210	1,210
2000 base case	7,200	1,740	2,200	260
2000 low development	7,500	2,040	2,500	560
2000 high development	8,040	2,580	3,040	1,100

Source: Resource Planning Associates, Inc.

The chart above shows the estimated population increases in the Gulf communities should OCS development occur, as proposed, in the Gulf of Alaska. Communities nearby the other proposed lease areas can expect similar population increases should offshore development occur.

CONTROVERSY

Despite the tremendous impact to a state off which OCS development occurs, the Interior Department began its leasing program this fall with no provision for revenue sharing with the coastal states. This meant that as billions of dollars of oil were taken out of a lease area like the Gulf of Alaska, the federal government would amass a small fortune through leasing fees and taxes, and the coastal state, in this case Alaska, would spend millions of dollars trying to mitigate local impact. Naturally, that plan did not go over very well.

In February, the Interior Department held public hearings with Governors, Congressmen, and other interested citizens from the affected states to get comments on their draft environmental impact statement and to test the political waters facing the accelerated OCS program. Those waters look chilly at best. Criticism of the program came from every direction! Most of it centered around environmental worries about spills and "helter-skelter" onshore development, the lack of revenue sharing with the coastal state, the rapid leasing schedule, and the dependence of the Interior Department on the oil industry for information on leasing areas.

Trade-offs

Alaska has added worries. Severe environmental conditions including devastating earthquakes, ice conditions, high winds, huge waves, and deep waters make it one of the most hazardous places in the world to drill. Its tremendous natural resources other than oil make it one of the worst places to make a mistake.

At the Interior Department's public hearing in Anchorage (February 3-4, 1975), Governor Hammond expressed his concern that the Interior Depart-

ment was not considering other resources carefully enough in its accelerated leasing schedule. Of the Gulf Hammond commented, "The Gulf of Alaska holds promise for oil. But the Gulf is also an energy bank in another sense, for from its womb come fisheries resources so great that they are crucial to both our state and much of the entire north Pacific basin."

Some idea of the value of the fisheries resources in the Gulf of Alaska is suggested by fisherman Bart Eaton, who represented Kodiak at the U. S.-Japanese and U. S.-Soviet bilateral fishery negotiations this winter. Eaton estimates that the 440 million pounds of pollock, rockfish and other groundfish from the Gulf which would have been allotted to Japan and Russia this year (no agreement was reached with Russia) could mean, at a nickel a pound, an additional $22 million for U. S. fishermen. This figure does not include the harvests made by Korean, East German, or Polish vessels in the Gulf, nor untapped resources. According to Eaton the $22 million compares to the roughly $17.9 million Kodiak fishermen will earn from shellfish in the 1974-75 season, estimating 60 million pounds of shrimp at $5.4 million, 30 million pounds of tanner crab at $4.5 million, and 20 million pounds of king crab at $8 million.

The Gulf is by no means the only area where there is concern for the fisheries resources. Governor Hammond has warned that the State will "insist upon most strict analysis of the risks and values involved" for leases in outer Bristol Bay and the Bering Sea. He added that the State may end up opposing any kind of leasing program in the Bering Sea due to its "unique and enormous biological resources which may simply be more important than the oil we might find there."

The wealth of the fishery resources in the Bering Sea is unarguable. The U.S. wholesale value of fishery products from the Bristol Bay and the Bering Sea in 1972 was close to one billion dollars. The value to the fishermen of the 1972 landings was $400,452,573 at U.S. ex-vessel prices. Of that $400 million, the foreign catch was valued at $381 million while landings by U. S. boats were worth just over $19 million.

One billion dollars is certainly nothing to scoff at, particularly when it is considered as a yearly value. Statistics beyond 1972 are incomplete at this time but completed portions and the growing world food shortage indicate that the value of the Bristol Bay-Bering Sea fishery resources is increasing. In 1973 U. S. fishermen landed nearly 4 million pounds less fish in Western Alaska than they did in 1972. What they did catch, however, was worth $38 million at U. S. ex-vessel prices, twice the value of their 1972 landings.

Foreign landings in the Bering Sea have not been tabulated beyond 1972. Taking the 1972 landings, however, and figuring 1974 U.S. ex-vessel prices, the value has increased from $381 million in 1972 to over $440 million in 1974.

To suggest that the threatening of these fishery resources by oil development may prove costly is an understatement.

Hope

There are signs of hope on the horizon. The Interior Department has softened its original commitment to leasing 10 million acres in 1975. The size of the offering in the Gulf has been reduced from 3 million acres to 1.8 million acres, although the leases will still be in the highest risk area of the OCS nationwide and the size of the lease area is still immense on any scale.

The Department has also earmarked a large amount of money to be spent over the next five years for basic environmental research on the proposed Alaskan OCS lease areas. At a Sea Grant sponsored meeting in late February to review the proposed environmental studies, scientists from across the State recommended that the Interior Department fund social and economic research.

The Interior Department is considering the possibility of revenue sharing with the coastal states. President Ford has indicated his support of such a plan, but congressional approval may prove elusive.

Perhaps most heartening has been the State of Alaska's firm commitment to

ESTIMATED CATCH AND VALUE
BRISTOL BAY-BERING SEA, 1972

UNITED STATES	LANDINGS	VALUE (at 1972 U. S. ex-vessel prices)
Salmon	31,483,672 lbs.	$ 6,371,218
Other Fish	100,530 lbs.	$ 16,301
Shellfish	48,958,763 lbs.	$12,692,583
TOTAL	80,542,965 lbs.	$19,080,102

JAPAN	LANDINGS	VALUE (at 1972 U. S. ex-vessel prices)
Herring	29,754,000 lbs.	2¢/pd. = $ 595,080
Pollock-Groundfish	3,680,680,000 lbs.	8¢/pd. = $294,454,400
Sablefish	14,018,000 lbs.	17¢/pd. = $ 2,383,060
Salmon	77,858,000 lbs.	23¢/pd. = $ 17,907,340
King Crab	4,720,734 lbs.	29¢/pd. = $ 1,369,013
Tanner Crab	43,660,652 lbs.	12¢/pd. = $ 5,239,278
TOTAL	3,850,691,386 lbs.	$321,948,171

USSR	LANDINGS	VALUE (at 1972 U. S. ex-vessel prices)
Herring	148,874,000 lbs.	.02¢/pd. = $ 2,977,480
Flounder	88,780,000 lbs.	.05¢/pd. = $ 4,439,000
Groundfish	617,120,000 lbs.	.08¢/pd. = $49,369,600
TOTAL	854,774,000 lbs.	$56,786,080

REPUBLIC OF KOREA	LANDINGS	VALUE (at 1972 U. S. ex-vessel prices)
Groundfish	21,818,000 lbs.	.08¢/pd. = $1,745,440
Perch	6,502,000 lbs.	.12¢/pd. = $ 780,240
Sablefish	662,000 lbs.	.17¢/pd. = $ 112,540
TOTAL	28,982,000 lbs.	$2,638,220

GRAND TOTAL	LANDINGS	VALUE (at 1972 U. S. ex-vessel prices)
	4,814,990,351 lbs.	$400,452,573

insure that any development be done in the best possible manner. Several approaches to a coastal zone management act now under consideration in the State legislature represent efforts in this direction. By influencing onshore development through a coastal zone management plan, the State could have the power to effectively direct the course of offshore development.

April 1975

THE ALASKA OCS - An update

By John Williams

Until recently, John Williams served as a Marine Advisory Program Agent with the University of Alaska. He was involved with seafood processing and coastal resource activities.

Because of the rapid changes in the policies and scheduling of the development of the Alaskan outer continental shelf, and the necessary time lapse between completion of a story and the delivery of **Alaska Seas and Coasts**, *some points contained in this article may have changed. More information will be presented soon in* **Citizen's Handbook – The Alaska OCS.** *The publication will be presented by the Alaska Sea Grant Program with partial funding by the State of Alaska.*

OCS UPDATE

ALASKA – One down – eight to go.

In April of this year, the Department of the Interior leased the first outer continental shelf (OCS) oil development tracts off the coast. The sale, located in the northeast Gulf of Alaska from Icy Bay to Kayak Island, netted over 500 million dollars in bonus bids for the Department of the Interior, which administers the OCS program through the Bureau of Land Management (BLM). This is the first of nine scheduled sales on Alaska's OCS.

Shell Oil Company began exploratory drilling in the Icy Bay region on September 1, with Sedco 706, a semisubmersible drilling rig. In October, ARCO began exploratory drilling operations with the semisubmersible Ocean Ranger, recently transferred from the Bering Sea.

Sedco 706 is 330 feet high with its derrick upright, 245 feet wide, and 295 feet long. It provides living quarters for 96 men, and storage space sufficient to drill for several weeks without resupply. The drilling rig is held in place by anchors connected to computer controlled tension winches, which compensate for wind, waves, and current to keep the rig located over the undersea well.

Next on BLM's agenda is a sale scheduled for lower Cook Inlet, followed by a western Gulf of Alaska (Kodiak) sale. Cook Inlet could go on the auction block early next year, with the Kodiak sale following later in 1977.

OCS IMPACTS

In early 1976, the federal government estimated that OCS leasing would create 90,000 oil jobs in Alaska to be filled by trained personnel and that this would cost state and local governments in excess of $600 million to supply the necessary services and facilities to these new residents. This dollar figure did not consider families of the oilmen or the jobs created in the service industries which accompany the oil business. An additional 1.3 to 1.7 jobs will likely be created in service industries for each new oil job.

The Coastal Zone Management Act of 1972 (CZM) was amended this year to help states in planning and funding coastal energy development activities. The CZM amendments of 1976 created a $1.2 billion national impact fund. Eight hundred million dollars of the fund is in the form of loans for environmental and economic planning, schools, highways, hospitals, guaranteed bonds, etc.

The remaining $400 million is available as grants to be used as a back-up system for the loan fund. Money from this source will be distributed to states based upon a formula considering the number of offshore acres leased, the volume of oil and gas produced, population influx, etc.

The federal government's assistance to states coping with the onshore effects of OCS development is much more limited than for mineral resource development on federal lands contained within state boundaries. In this situation, the federal royalty from the resource is shared with the state from which it was extracted and can be used in any manner that state government chooses. The royalty from OCS petroleum development is not shared by the federal government with adjacent states. In the case of OCS resources, state and local governments must apply for impact monies for specific purposes and be able to prove that it is a reasonable request.

In addition to the burden of proof requirement, states receiving OCS impact monies must already have or be

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making "reasonable progress" toward a coastal management plan as outlined in the CZM Act. Legislative support for development of such a plan for Alaska's coast has been minimal. The Legislature may have another look at coastal management legislation in the upcoming January session.

NEW ADMINISTRATION

Because of Jimmy Carter's election, many people in Alaska are now trying to assess the impact the new administration will make on the OCS lease schedule and procedures. To date, Carter has not been specific on the issue. He has, however, expressed some concern about the accelerated pace of lease sales and its impact on federal revenues from the leases.

With a Democratic congress and president, chances seem better that some changes will be made in the OCS Lands Act, under which the OCS is administered. Senator Jackson (D-Washington) wants new amendments completed and signed by late spring. The amendments reportedly would consider states' interests to a much greater degree, and involve state and local governments in the process.

The State of Alaska has conducted an ongoing battle with the Department of the Interior over the presently proposed lease schedule and procedures. In a letter dated August 4, 1976, Governor Hammond submitted the State's proposal for an OCS lease schedule to Secretary of the Interior Thomas Kleppe. The Secretary had promised to reassess the Alaska OCS sale schedule, which presently calls for nine sales in three years. What actions the lame duck Ford Administration may take on this matter prior to January 20 are uncertain, although at press time negotiations were ongoing to dramatically revamp the present BLM schedule.

Hammond bases his schedule on a number of factors of importance to the people and environment of Alaska. His reasons for slowing down the sale pace include the cumulative effects which would result from the present accelerated lease schedule and the impact on communities and people unprepared for the rapid influx of large development. Hammond also wanted time for further study of the physical hazards and potential environmental risks, especially in the ice covered western and northern waters, and time to prepare the management sectors of state and local government to deal with the many implications of petroleum development on the frontier Alaska OCS.

Hammond's proposal, substantiated by considerable research by state agencies, would extend the schedule to six years, and would not include scheduled sales in the federal areas of the Beaufort Sea, Bristol Bay, or St. George Basin until further research and industrial technology are achieved. The state would agree to hold a joint state/federal lease sale in the shallow, inshore Beaufort Sea area in the fall of 1977 in place of a federal Beaufort Sea sale in the deeper, shear ice zone.

Many of the changes resulted from recommendations by Governor Hammond in his August letter to Interior Secretary Kleppe. The new sale dates reflect a compromise between the rapid schedule and Hammond's proposed delays. The Department of the Interior and the state disagreed on the need to complete environmental studies before scheduling a lease sale.

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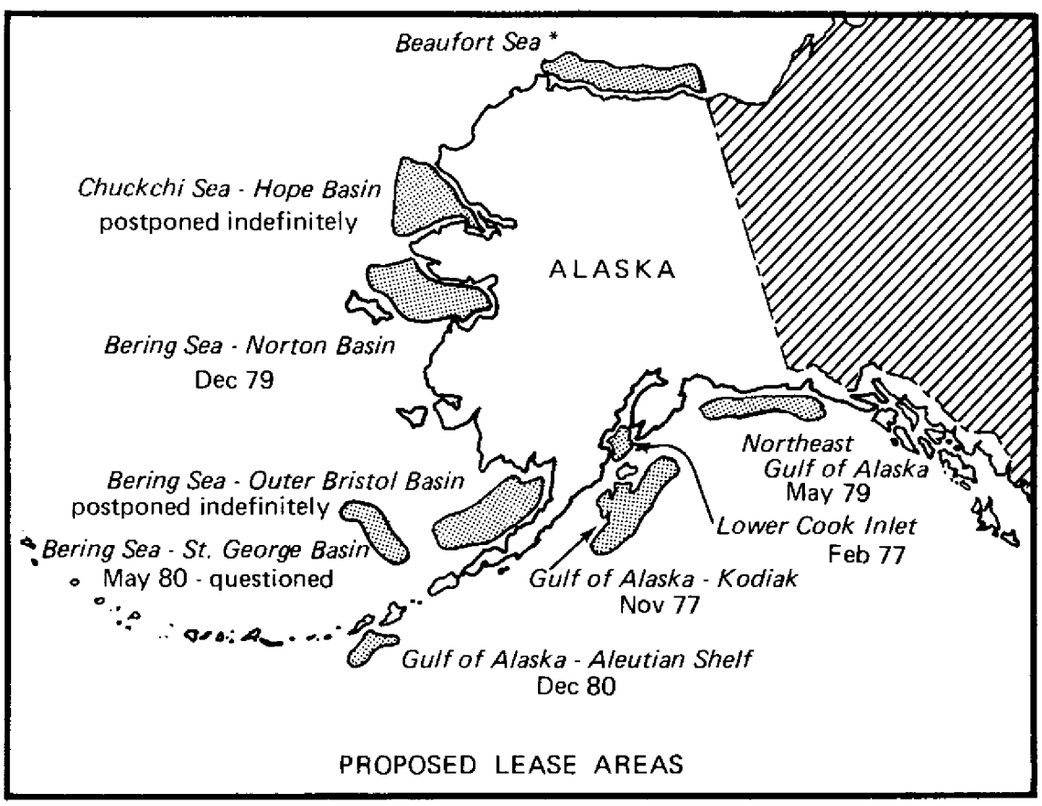

Included in Interior's proposed new OCS lease schedule are changes brought about because of the state's insistence on a slower, more cautious pace in Alaska.

**The Beaufort Sea lease area is subdivided into at least three zones generally characterized by distance from shore, water depth, type of ice and anticipated ice motion. The leases for this area in the current schedule are: near shore, Mar. 78; less than 60 ft. water depth, Feb. 79; greater than 60 ft. water depth, not scheduled.*

Fisheries Education Program

UA Drafts Statewide Plan

Editor's Note: The following description of the University of Alaska Fisheries Education Program is a proposed draft plan which has been submitted by University President Robert W. Hiatt to members of the Board of Regents for their consideration.

To strengthen the role of the University of Alaska in fisheries education, training and research, we propose to expand the technical training program for fishermen, processing plant operators, fisheries business administration and fisheries regulations enforcement. Additionally, the inadequate program for educating fisheries scientists now provided on the Fairbanks campus will be altered by establishing a new, four-year and graduate program for marine and anadromous fisheries scientists, and a program for freshwater fisheries management will be developed in conjunction with the closely related wildlife management program on the Fairbanks campus.

Statewide Effort Planned

Because of the size and varied nature of both the coastline and fisheries of Alaska, we propose to utilize to the greatest extent possible the various units in the UA statewide system; thus no fishery institute, college or school, as such, is envisioned. Rather, existing programs will be expanded and improved to meet the needs of the most important fishery areas, with the entire program coordinated by a statewide officer to insure that each widely separated segment of the program will function in support of the total statewide effort.

In addition to the programs related directly to the fishery resources, the present oceanographic program of the University's Institute of Marine Science will involve more explicitly a fishery oceanography component. The fishery oceanography component will relate itself to investigations of the ocean and inshore marine environment and provide information useful to the University, Department of Fish and Game and National Marine Fisheries Service personnel for a better understanding of the environment so critical to our marine and anadromous fishery resources.

A brief summary of plans developed thus far follows:

Program in Fishery Technology

Location: Kodiak Community College. Location chosen because of Kodiak's extensive activity in fishing and processing, and the availability of personnel from the Coast Guard and from state and federal fisheries agencies to assist in instruction.

Purpose: To provide formal and informal training in modern fishing methods, gear and vessel handling, seafood processing and plant operation, fishing business administration and fisheries enforcement.

Curriculum: Formal two-year programs for Fishing and Seafood Processing require as common core subjects 18 credit hours in writing, speech, fishery mathematics and decision-making.

The program for Fishing includes 24 credit hours in (1) introduction to fishing, (2) vessel maintenance, (3) vessel operation, (4) safety, (5) navigation, (6) regulations and (7) on-the-job training, plus nine credit hours in (1) advanced vessel maintenance on fishing methods, (2) development of new fisheries, (3) fish handling, and (4) fisheries oceanography.

The program for Seafood Processing requires 24 credit hours in (1) Seafood Processing, (2) plant maintenance, (3) quality control, (4) food preservation, (5) regulations, (6) plant safety, and (7) on-the-job training, plus a choice of nine credit hours in (1) advanced plant maintenance or seafood processing, (2) plant management, (3) processing of special products, and (4) quality factors. Courses will also be offered in record keeping, fisheries statistics and fisheries economics.

Additionally, workshops, conferences and demonstration sessions will be held for varying periods of time when fishermen and fish processors are available to attend. Similar programs will be offered throughout the State in other fishery ports utilizing the expertise based at Kodiak.

Degrees Offered: Associate of Applied Science in Fishing or in Seafood Processing. Certificates of completion will be awarded for the brief programs.

Marine and Anadromous Program in Fisheries Science

Location: Southeastern Senior College, Juneau. Location chosen to take advantage of the professional staff at the adjoining major marine fisheries laboratory of the National Marine Fisheries Service and the senior professional staff of the State Department of Fish and Game who have agreed to permit the professional staffs to assist in teaching at both the undergraduate and graduate levels, and to make the facilities of their extensive fisheries libraries, laboratories and other supporting facilities available. The NMFS laboratory's library has 20,000 volumes and 200 periodical subscriptions in fisheries. On-the-job training and summer employment for fishery science students is guaranteed by both ADF&G and NMFS.

Purpose: To provide undergraduate and graduate academic training in fishery science and fishery management of marine and anadromous fisheries.

Curriculum: Four-year program for Bachelor of Science in Fisheries requires nine credit hours in writing and speech; 29 credit hours in biology, physiology, ecology, genetics, botany, bacteriology, pathology of aquatic organisms and plankton ecology; 34 credit hours in introduction to fisheries, biology of aquatic organisms, research methods in fisheries, fishery science, coastal zone management, and on-the-job training; 23 credit hours in mathematics, statistics and data processing; 19 credit hours in chemistry and physics; and 12 credit hours in related courses in oceanography, resource economics and administration management.

Graduate level courses will comprise a series of mini-courses of one- or two-weeks' duration and offering a variety of subjects for the graduate students. Such courses include advanced population dynamics, management of multi-species fisheries, international agreements and negotiations, etc. ADF&G will circulate State fishery scientists into Juneau headquarters in a timely way so that graduate mini-courses may be taken.

Arrangements for graduate study will be made for fishery scientists unable to be in Juneau for extended periods.

Degrees: Bachelor or Master of Science in Fisheries.

Program in Freshwater Fisheries Science

Location: UA Fairbanks, because of importance of freshwater fisheries in Central and Northern Alaska, the presence of an ongoing closely related program in wildlife management, broad-based supporting course offerings and faculty to provide depth for all levels of the curriculum.

Purpose: Provide undergraduate and graduate academic training in freshwater fishery science and management of commercial and recreational fisheries.

Curriculum: Four-year program for Bachelor of Science in Fisheries requires nine credit hours in writing and speech; 32 credit hours in biology, physiology, genetics, ecology, plant form and function, vertebrate anatomy, etc.; 32 credit hours in introduction to fisheries, biology of aquatic organisms, research methods in fisheries, fisheries science, and on-the-job training; 23 credit hours in mathematics, statistics and data processing; 16 credit hours in chemistry and physics; 11 credit hours in ecology and resources management, limnology, water pollution and wildlife biology and management; and seven credit hours in resource economics and administration management.

Graduate programs will be offered to students interested in the development and management of freshwater fisheries in the arctic and subarctic environments.

Degrees: Bachelor, Master of Science and Doctor of Philosophy in freshwater fisheries or in fisheries and wildlife management.

October 1974

New University of Alaska Fisheries Program

By Dr. Willard E. Barber
Assistant Professor
Wildlife and Fisheries Program
University of Alaska, Fairbanks

The fisheries program at the University of Alaska, Fairbanks, is expanding in an effort to keep pace with problems related to rapidly changing patterns in the utilization of Alaska's resources. Intensified mining of fossil fuels and selected metals brings the possibility of pollution and new demands on water use. With the development of forestry and agriculture, large-scale clearing often results in siltation, changes in run-off, and contamination by pesticides. All of these changes will have a profound effect, either directly or indirectly, upon the fishery resources of Alaska.

To help meet the present and future needs of Alaska's changing fishery-related problems, the fisheries science program on the Fairbanks campus offers an integrated curriculum combining formal classroom instruction and research. While formal classroom teaching is the major vehicle for instruction, research also plays a significant part, particularly at the graduate level. Not only does research help keep instructional staff up-to-date, it also helps evolve new concepts, possible solutions to problems, and develops new information to aid in the management of Alaska's natural resources.

For this reason, the fisheries program at the University has been redesigned to educate and train both researchers and managers. Students are offered a Bachelor of Science option in two areas: management and research. The requirements for these options differ basically in the "hard sciences." The research option requires more math, chemistry, biology, physics, and statistics than the management option, which requires courses in such areas as business, education, and administration. The management option, which is new, is designed for those students who might enter fields such as hatchery management, information and education, commercial fisheries administration, law enforcement, teaching, etc.

The fast-growing Fisheries Program on the University of Alaska Fairbanks campus now includes an option in fisheries management, as well as research. Three members of the faculty pictured here (left to right) are Dr. Will Barber, Dr. Mark Osgood, and Dr. Ted Cooney. (Photo by Fran Sweet)

The six faculty members associated with the fisheries program have wide and varied backgrounds and are closely involved, not only in teaching, but in areas of research important to the management and development of Alaska's fishery resources.

For example, Dr. Mark Oswood and I currently are engaged in the development of a stream habitat evaluation system for the Tongass National Forest, under contract with the U.S. Forest Service in Ketchikan. This method will be designed to provide forest managers with objective ratings of the quality of habitat for trout, salmon and char, and the vulnerability of stream habitat to damage from logging. The evaluation system should assist managers in minimizing the impact of

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logging on valuable commercial and sports fisheries.

Dr. Oswood, a freshwater ecologist with main interests in stream insects and how they relate to fish, became part of the program last year. I came to the campus two years ago from Australia after five years of research on Australian estuaries, mostly studying prawns.

Other faculty members associated with the program are engaged in a wide variety of research projects. Dr. Ron Smith, a fish physiologist, presently has a contract with the Environmental Protection Agency to study the effects of oil on young fish. Dr. Howard Feder has conducted a wide variety of research on Alaska's marine invertebrates, notably the clam, mussel and oyster resources, and presently is studying invertebrates in Cook Inlet. Dr. Ted Cooney's primary interest is in zooplankton and how they are related to oceanic fish. He is currently conducting research related to the Prince William Sound Aquaculture Corporation's culture of Pink and Chum salmon at Evans Island. Dr. Tsuneo Nishiyama came to the University from Japan two years ago after a number of years of research on Japan's high seas fishery. He is presently studying oceanographic processes as they relate to distributions of shrimp off Kodiak Island and how these processes might affect the fishery.

The fisheries program recently expanded with the addition of a Cooperative Fishery Unit which involves the U.S. Fish and Wildlife Service, the Alaska Department of Fish and Game, and the University of Alaska. Under the agreement, the Fish and Wildlife Service assigns two fishery scientists to the Fairbanks campus, the Department of Fish and Game provides funds for graduate student research, and the University supplies office space, laboratory facilities, and clerical services.

The primary objective of the unit is to conduct education and research programs on arctic and subarctic ecosystems as they relate to the state's fishery resources. Although Unit personnel will participate in formal classroom instruction, the major vehicle of education for the Unit will be through graduate student research. This research will include impact studies concerning the effects of changing land use patterns and increasing development upon the state's fishery resources.

Although the number of students in the fishery program on the Fairbanks campus has almost doubled over the past three years, it is still small enough to provide close personal instruction. This year, enrollment included five graduate and 28 undergraduate students.

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