

**P r o c e e d i n g s o f
t h e C o n f e r e n c e o n**

**Fisheries Management:
Issues and Options**

**November 13-16, 1984
Anchorage, Alaska**

**University of Alaska
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Proceedings of the Conference on Fisheries Management: Issues and Options

November 13-16
Anchorage, Alaska

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Welcome

James O. Campbell Chairman, North Pacific Fishery Management Council

Welcome to a very cold Anchorage this morning, the site of the North Pacific Fisheries Management Council. Why was the council located in Anchorage? When you think of fish you certainly don't think of Anchorage, but it goes back to the first council, it goes back to Elmer Rasmusen and Clem Tillion, who thought that it should be located here because Anchorage is the transportation center for the state. It's the communications center for the state. It has the professional services, doctors, lawyers, retail service centers, hotels (which I understand many of you think we don't have enough of), and food service.

The conference that starts this morning on Fisheries Management: Issues and Options, is intended to be more than an exchange of information among those of us in the fisheries management business. You'll note that the program includes participants from all sectors of the fisheries--fishermen, processors, government, academia, and even lawyers.

Our intention today is to first see if we can identify problems in fisheries management and then address the methods we may have available to resolve these problems. I have been critical in the past of the processors and their lack of attendance at the North Pacific Fisheries Council meetings. But let me tell you: now Rick Lauber can relax a little bit, because he's got John Peterson on our council, who will help us with input from that group. In addition, I would like to acknowledge Henry Mitchell, another new member of the council, who brings us an in-depth understanding of western Alaska.

There are problems, I'm sure you'll agree. Fishing industries around the world are in trouble. Ours is no less so than those on the East Coast, in Europe, or for that matter almost any place you

may care to guess. There is no question that the resource we are dealing with in the United States is large, it's productive and it should be bringing a good return on our investment. The fact is, it's not returning nearly as much as it should be. We have every reason to suspect that it may be because of the way we manage it.

We have the most productive and the most resourceful group of fishermen. Man for man, they are as productive as anyone in the world. I think this could be pointed out by the recent catch of sail fish or black cod; the Atka mackerel now and eventually the Pacific Ocean perch. Our industry has proven over and over again, it can be responsive and supply a good product at competitive prices. Why then do we see so many problems in both the processing and harvesting sections of our industry?

Alaska and the North Pacific Fisheries Management Council are particularly concerned with finding ways to resolve these problems. The fishing industry in Alaska has some marvelous opportunities in the next few years, as they move into the rich groundfish resources off of Alaska. We will see the last of directed fisheries by other nations off our coast in the very near future. How we manage this resource--2.5 million tons of fish--and the fishery is going to determine what benefits will accrue to this industry and to this country.

While we have an expanding groundfish fishery, other fisheries have expanded beyond their reasonable limits and are increasingly difficult to manage. I hope that we can get some direction on these problems before we are done this week.

You'll note in the conference program, it's been sponsored by a number of different organizations. We certainly want to acknowledge them: six of America's Sea Grant Programs; three of the regional fishery management councils, several government and industrial organizations, and one fisherman, Barry Fisher.

I again want to welcome you. We are deeply honored to have you here in Anchorage with us today. I hope you enjoy our city and that we learn and take home something from this conference. Thank you.

Acknowledgements

Thanks to all who participated in this conference, attendees, panelists and speakers, for providing the Alaska fishing industry the opportunity for this information exchange.

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Introduction

Harold E. Lokken
Director, Pacific Fisheries Foundation

Good morning, Mr. Chairman, Ladies and Gentlemen. It is generally customary for an introduction to a conference such as this to be upbeat, to express optimism, and confidence and to indicate that we have the tools and the collective will to solve the major problems of fisheries management. I wish this were true. But, I am afraid it is not, unless we evidence much greater concern for our fisheries resources in the long term. Making this observation, I fault no one in particular. The blame for this state of affairs belongs to all of us. I include myself as well.

To quote a bit of popular wisdom, "We have met the enemy, and it is us." There have been many conferences over the years on fisheries management. These have served a useful purpose because fisheries are dynamic. Change is the order of the day. Past management is not necessarily the best for today's fisheries and conditions. Management must be under constant scrutiny to make certain it keeps pace with the changes occurring in our fisheries.

The most recent management conference, of which this may be said to be a successor, was held in Denver in 1978. It, however, was confined primarily to the management option of limited entry. In the debate that followed the Denver conference, other options were offered as substitutes for limited entry. Consequently, the planners of this conference broadened its scope to cover all issues and options concerned with fisheries management. The conference speakers represent a wide range of experts from all parts of the United States and elsewhere, including participants indirectly as well as those directly involved with fisheries.

The difficulties of fishery management stem from the requirement that good management must of necessity involve restrictions. One most appropriate comment on management in general was made on a TV

program by a national commentator, George Will. He said, "Good management is the ability to inflict pain." It is also true that bad management causes pain, as many of those in the fishing industry can confirm by personal experience. Management also requires the allocation of fisheries privileges, and therein lies more difficulty. Inevitably, some gain while others lose. In our system of government, the prospective losers in any proposed management decision can easily convert a biological problem into a political one. Biological solutions, then become virtually impossible to obtain. The end result is loss for everyone.

The unpopularity of management is caused not only by the need to allocate among groups of individuals, but also by the need to allocate over time. Even if a particular fishery is restricted to a set number of participants, it is still necessary to restrict a season's harvest to provide for harvests in future seasons. The economic needs of the harvesters and processors however, are such that the needs of the resources over the long pull are often given secondary consideration. There are also those looking for a fast killing in fisheries, hoping to get out with a bundle before the inevitable collapse occurs. All of this adds to the burden of management.

In the search for solutions to management problems, there are probably as many suggestions as there are gear, vessel and geographical groups. Unfortunately, there is no agreement on a workable definition of good management. I use the word "workable" because I suspect most would agree that good management is a regime that produces enough fish for everyone on a sustained basis. In place of this impossibility, the views differ widely.

Good management as perceived by some is considered bad management by others. Each definition is based upon the perception of the beholder, motivated by his economic needs. Good management to many is regulation of the other guy only. If a limit is involved, the limit is the capacity of the vessel owned by the proposer. If a season is involved, the season desired is the one that does not interfere with the activities of the proponent. If closures are necessary, one's backyard should remain open.

Perhaps, it is too much to expect those regulated to give much help to the regulators. If this is the case, one option might be to set up an ad hoc commission to research the overall problem and offer solutions, somewhat like the Pierce Commission in Canada. The idea has some merit in that it shifts the burden and responsibility away from those directly affected. While any solutions offered have to run the gauntlet of our political process, the rationale developed for justifying a solution should ease the burden of securing their acceptance.

One suggestion for a management improvement seems to have universal appeal. It is a need for better understanding among all of the elements in the fishing industry. This is the core of this conference, as I see it. It involves an exchange of experience and ideas among harvesters, processors, managers, academicians, and others having an interest in fisheries management. It is to be hoped that the conference will create a dialogue among these diverse interests that will result in the eventual formulation of sound ideas in

fisheries management, the need for which will be understood, if not necessarily endorsed by all.

One perverse ray of hope is that conditions have deteriorated in some of our fisheries to such an extent that this alone will force improvement. It should be obvious to all that past methods will not work in many of today's fisheries. Solutions, then, depend upon new concepts. With such a diverse group of participants here, I feel sure that many innovative ideas will be advanced. This is certainly to be encouraged.

While it is not a new idea, limited entry will certainly be high on the list of solutions offered. This raises some fundamental concerns. If limited entry is a viable solution to many of our problems, is it possible for the fishing industry to isolate itself from other industries and individuals in the country? Can we set up a closed-shop regime in a common property resource such as fisheries, where no one except those selected can seek to make a livelihood? From the opposite standpoint, is it fair for the unemployed from other industries to swell the ranks of fishermen, and drag down the standards of living for those who have spent a lifetime in their occupations? These are basic questions that also need to be considered in devising new concepts for fisheries management.

In any discussion of the problems of fisheries, it might be useful to consider the problems in other industries. Are we alone as an industry with our troubles? I think not, for the papers are full of the woes of airlines, agriculture, steel, autos, forest products, housing, and even banking to name a few. Ours is different, however, due to the common property nature of most of our fisheries. Other industries have an opportunity to return to former levels of health. But not in fisheries. Once the fish are depleted, the return to health is virtually impossible.

We in fisheries are different in another way. We are users of a public resource. Our use could be questioned in the future. Have we managed properly? Have we given adequate consideration to the generations that will follow ours? Have the owners of our fisheries, the American taxpayers, received an adequate "bang for the bucks" that they have invested in fisheries and fisheries management? Will they still be willing to finance fisheries management in face of the decline of many of our important fishery species? These are questions I hope will be addressed in the four days of this conference.

There are other questions also. No discussion of management would be complete without mentioning the council system of management. Is the system doing the job intended for it? The councils are eight years old. As you might expect, they have both supporters and detractors. When the system was devised in 1976, one objective was to bring management closer to those managed. This has happened only in part. Blame for the partial failure must be shared. The system's overseers, as well as many of the councils' constituents, have been reluctant to accept the judgements of the councils. And the councils have been unwilling to make the tough and painful decisions necessary for good management. No one should simplify the difficulties of the councils in addressing problems such as allocations between mobile and fixed gear, protection of a depleted species in a

multi-species fishery, and avoiding incidental, unwanted, and at times prohibited species, when fishing for a target species.

These are only a few examples of a longer list. On balance, the system generally has been worthwhile. It certainly has given fisheries resource users greater participation in fisheries' decisions. Not as much as they would like, but like Rome, a perfect system is not built in a day. Improvements are bound to occur. You will no doubt hear many suggestions for betterment as this conference proceeds.

As one who has been involved in fisheries for a long time in many capacities, I wish to pay tribute to managers of fisheries elsewhere, everywhere. My hat's off to them! They have an exceedingly tough job translating inadequate data on the strength, movement and fluctuations of fish populations into meaningful regulations, affecting thousands of vocal individuals. It is easy to be a critic without responsibility. I have, at times, been a critic and at other times a part of management. I can testify that it is a whole of a lot more fun being a critic.

This conference represents a serious attempt to improve management and arrest the decline in many of our fisheries. All should participate fully for it is only through greater communication among all of the diverse interests in fisheries that we have any chance of getting agreement on the many controversial issues that face us in fisheries management.

Before closing, I should comment on the student scholarship award that was to have been a part of this program. Three papers were submitted by students. The subjects covered were an estimator of total catch weight, fish estimation from length, and United States sablefish management. The judges deemed the three papers to be good, but too limited in scope to fit into the program of the conference. The papers are recommended to any of you who have a specific interest in the subjects involved. The award which was to have been given will be used at a later date in some form of fisheries education.

In closing, I hope that all of you will find this conference a rewarding first step leading to more rational management and use of our nation's fisheries resources. Thank you.

Executive Summary

William F. Royce, Fisheries Consultant

Summarizing this conference is an awesome task after the attendance of some of the world's best fishery scientists, and a large proportion of industry specialists and people knowledgeable about fishery affairs. I have no intention of trying to go through any great amount of detail. But there are two or three matters of perspective that I think are worth using as a wind-up.

This meeting has been extraordinarily useful, because of the size of our resource potential, the size of our management and development problems, and their complexities. I would like to say a few words a bit later on about the people who are not really represented here, the people who are paying the bills for what we do with the fisheries: the public. I would also like to mention some of the goals that are ahead of us on this present course.

I know that a lot of you are impatient with the specialists from academia and government agencies, but these specialists have dedicated their lives to understanding a narrow part of the problems that face us. I have referred to some of my academic colleagues, as having "insect eyes." You know, the kind of compound eyes where each person is seen going off in a different direction. In order to get the rounded camera image, we come to people like you, people in the industry. I have never heard a better overall description of industry problems than Bart gave us at the outset of this session. But specialists are a little like the people you employ on a larger vessel: a specialist in navigation, one in engineering, a net specialist, and so on. You don't expect each of them to do the job of the captain and you don't expect each to look at the whole picture. You use them for their particular, very specialized, knowledge.

This conference is aimed at a very important goal because Alaska's fisheries are among the largest in the world. If Alaska were a country, harvesting its fishery resources fully, its production would rank about fifth in the world. I recall a report to the governor of Alaska about 1979 suggesting that, in the long run, Alaska's fisheries are more socially and financially important than Alaska's oil.

Let's now try to look at the breadth of our task and how fisheries management has changed. It's always had a primary goal of conservation. Many of you have recognized that. It has been approached by learning about the resources, determining allowable catch, and then dividing that catch among the people who want to fish. This management systems works well in the recreational fisheries, where one fisherman can be happy catching one fish, while a commercial fisherman might need a thousand to make a day's pay. We can even ask that recreational fisherman to release his catch alive, in some fisheries. Another feature of recreational fisheries is that they are largely paid for, as far as the special services to them are concerned, by earmarked license fees and by special taxes on equipment. I want to come back to that with regard to commercial fisheries a bit later.

Commercial fisheries management is moving away from just conservation into development. In fact, the Magnuson Act was aimed at fishery development in this new economic zone around our country. This greatly enlarges the complexity of our management. But let me compare two of the fishery management operations that have established themselves and in which almost everyone has great confidence.

The halibut commission and the Pacific Salmon Commission regulating the Fraser River Salmon Fisheries both went through a decade-long political hassle in their formative periods about 50 years ago. Both of them localized the big decision-making out in the field where fisherman could be advisors, where fishermen knew what was going on, and where, and in consequence, fishermen developed a confidence in what was being done. Maybe some of that has eroded with the changes in the fishery in the case of halibut, but I believe it still largely applies. They almost developed a political constituency of their own. I recall a barroom conversation between a couple of individuals about 20 years ago. They were complaining because they felt the halibut commission was supposed to be responsible to our two governments and we didn't control it. I think there was something significant there because, with local arrangements, the commission was developing the trust and confidence of the people being managed by it.

I would like to emphasize particularly the people paying the bills for commercial fisheries. I reviewed the commercial fishery policy in the western states some 15 years ago and asked about money raised by special catch taxes and by license fees and so on, and the cost of the special services to the commercial fisheries. At that time, the ratio was something like seven to one. In other words, the public costs were somewhere around \$7 for each dollar of special earmarked tax from the commercial fisheries.

The real problem of the fisheries on limited stocks, which is where we are getting to with all of the world's fisheries, is over-investment. It isn't a theory. It is a fact, all over the world. I recently reviewed the country experience papers collected by FAO in Rome for about 40 countries. Every one of those countries identified over-investment as a major problem as well as the resulting subsidies to the fisheries in the interest of maintaining coastal communities. This problem is not new--it's been known for centuries. It was described in great detail for the North Sea fisheries by a British scientist 50 years ago who called it "the great law of fishing." If we allow unlimited entry on limited stock, the fishery becomes unprofitable. Some of you have said, "Ok, let the poor fisherman drop out." But whole communities get in trouble. It isn't just the fisherman: it's the processor; it's all of the people who work taking care of the fish. The government bails them out.

This starts with the nature of the resource. The fishery doesn't show impact immediately. In 10 or 15 years the full effect of the fishery is felt on the resource. So there is a failure. Well, fisheries fluctuate anyway. There's always the hope that this is natural fluctuation. So government gives a little help to keep things going. There may be some slight gains, then there is a further drop.

This cycle is so inevitable, that I think you people must find a way to get participants out of it as fairly as is possible. The major reason is the public costs involved. We had information from Jake Dykstra, I believe, on the private views of the Canadian scientist who felt that the cost of subsidizing the eastern Canadian fisheries were higher than the total value of the catch. There is a remarkable parallel between their situation and Alaska's. They have the same kind of similar cod-like fishes, rockfishes, herring, flounders, trawl fisheries: they kicked out all the foreigners with great hopes, just as Alaska has, for what they were going to get out of this resource. What has been their result? They have roughly twice as much gear, in the view of Canadian economist, as they should have in that fishery, and major problems in the coastal communities of Nova Scotia and Newfoundland. Now the same thing is happening in the European countries. I can't give you all the details here, but Norway's fishery is, again, an old fishery. Many of you may well be related to some Norwegian fisherman. Their fishery is subsidized by about \$150 million annually, simply because of their over-investment problems and as a consequence of this inevitable cycle.

If Alaska is to repeat the experience of eastern Canada, all Alaskans should look very carefully at the ultimate cost of subsidy programs unless there is enough information at the outset to plan this, as economists say, more rationally. I recognize that the word has many implications for you, but it is also a pervasive problem. Almost all of the world's fisheries are now approaching the limit of their productive capacity. Hence, almost all of the world's fleets are moving into trouble.

Now a very brief word about the council process. I have been a federal bureaucrat, and I know that the federal system is beset by a multitude of people's ideas and deeds at the Washington level.

Sending problems that you can solve locally back to Washington is a little like anchoring your boat and letting it accumulate barnacles. Everything will get fouled up as it gets involved with other people's interests from all over the country. It seems to me, that we must use this council process, this framework system, and make it work.

**Session I: Overview
Presentations**

Donald H. Rosenberg,
Chairman

U.S. Fisheries Policy Evolution

Dayton L. (Lee) Alverson
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INTRODUCTION

National and state fishery policy are generally perceived to be nonexistent or at best a collage of ephemeral short-term goals supported by the political regime in power. For the most part, members of the commercial and recreational fishing industries are quick to point out that problems confronting their constituents flow from the lack of a recognizable national fishery policy. Academicians have generally echoed these sentiments, but some writers point out that a national fishery policy does exist, that it emerges from an array of legislation and is implicit in the discussions and actions of government and Congress. This author supports the latter perception, that national fishery policy, although confusing and at times conflicting, can be unraveled from the historical behavior of government.

It is also this author's view that since the nation's founding, the U.S. fishing industry has played a significant role in shaping national fishery policies. These policies have, in turn, helped to mold the socioeconomic, legal and political environment within which the U.S. industry functions. Government has historically been confronted with conflicts between fishermen employing different harvesting techniques, between sport and commercial fishermen, and between fishermen of different nations. New policies, developed through political channels, have frequently been required to resolve the problems.

In recent history, passage of the Fishery Conservation and Management Act (FCMA) constituted a significant national declaration of fishery policy. The act consummated efforts by major elements of the U.S. harvesting sector, processors, and recreational fishermen, to secure greater control over the resources in waters adjacent to the U.S. The FCMA has undoubtedly improved the competitive position of the U.S. fisheries--perhaps more so for fishermen than processors--and has

sharply altered the legal basis for managing fishery resources within the 3 to 200 mile zone. Nevertheless, fishery policies and procedures emerging from the original act can be expected to be dynamic, and the concerns and disappointments of different industry sectors and other users will result in new or modified policies. This paper will explore the historical evolution of national fishery policies and the basis of current and future policy functions.

THE BUILDING OF NATIONAL FISHERY POLICY

Rothchild (1972), in a paper entitled "The Need for Analysis in Development of a United States Fishing Policy," states that the commonly held view that the U.S. federal fisheries agencies function without a fishery policy is not correct, and that the U.S. does have a fishery policy. "This policy," he notes, "is reflected in a consolidation of the decisions that are made in the various branches of government at the different hierarchical levels." He further states that "the policy is a conglomeration of decisions that would have been made on more or less an *ad hoc* basis, whereas it would be much more desirable to have a decision that arises from fundamentally sound policy." Before we continue down this path too far and cast too many stones at the "establishment," it might be constructive to examine more closely the historical character of federal fisheries policy and its origin.

The federal government became involved in fishery policy early in U.S. history, when international fishing disputes erupted among cod fishermen in the New England area. A federal agency dealing specifically with fisheries issues was not created until 1871, however, when the Fish Commission was established. The commission gave way to the Bureau of Fisheries in 1903 and to the Fish and Wildlife Service in 1936. These federal bodies were created largely in response to declining production of Atlantic salmon, the need to develop fish culture techniques and by a legislative mandate to rehabilitate depleted fish runs. Collection of scientific and statistical information by the federal fishing entities soon became an integral part of their operations. Involvement in management, however, was for the most part limited to international situations or to areas under U.S. territorial jurisdiction.

In 1956, Congress passed a reorganization act that split the U.S. Fish and Wildlife Service into a Bureau of Commercial Fisheries and a Bureau of Sport Fisheries and Wildlife. Reorganization followed strong industry pressure to recognize and identify the commercial fishing interests within the U.S. The act also explicitly defined the responsibilities of the agency, incorporating such areas as fishery product technology, fishing gear research and exploratory fishing, and expanded its service areas to include loans and grants and market information.

Government policy guidance was also provided in a mandate to maintain a healthy U.S. commercial fishing industry. This mandate was a difficult task for the fishery sector of government. The post-World War II era spawned policies in other sectors of government contrary to protecting U.S. markets from foreign imports. There is even stronger evidence that the U.S. marketplace was opened in an effort to balance trade inequities and promote economic recovery in Europe and Asia.

Although processors and harvesters attempted to secure or maintain protective duties, this ran against the grain of a growing national commitment to promote free trade. In the decade following World War II the international financial structure struggled under a severe and continuing surplus of exports over imports in the U.S. balance of payments. It is apparent that in setting priorities for product protection, fish was not in the same league as steel and textiles. Hence, there was much pressure to encourage imports in order to facilitate recovery in the economics of allies, former enemies, and lesser-developed countries.

It seems evident that despite a legislative mandate to the contrary, implementation of fishery policy was thwarted by conflicting policy goals. Non-fishery policies were clearly held to be of greater importance to the nation than fisheries, although it is doubtful that this decision has been explicitly raised in the policy process. For better or worse, the actions of government through much of the 1960s and 1970s demonstrated an implicit policy of limited support to the U.S. fishing industry, non-intervention in the U.S. market to protect domestic fishermen from foreign competition, and freedom for U.S. processors to purchase fishery products from either domestic or foreign sources and thus provide consumers with lower cost and, as frequently described, "better quality products."

Federal government involvement in fishery management expanded in the post-World War II period responding to conflicts between U.S. and foreign vessels fishing adjacent to the U.S., and problems encountered by U.S. vessels fishing off foreign coasts. Distant-water fishing activities in the late 1950s and 1960s generated a variety of problems including overfishing, gear loss, economic dislocation in areas adjacent to the U.S., and seizures of U.S. vessels off foreign coasts. The gamut of distant-water fleet problems presented an internal industry conflict: coastal fishermen saw extended jurisdiction as a solution to their economic and conservation problems while the distant-water tuna and shrimp fleets sought to preserve their options to fish off the coasts of other countries.

Extended jurisdiction was considered a dangerous precedent by those responsible for national security, bringing yet another political element into the dispute. Government responded as might be expected, supporting its internal political weight and favoring the national security interest. Fishing was not a major policy issue and the division within the fishery ranks further weakened the political thrust of extended jurisdiction advocates.

The evolution of national policy concerned with extended jurisdiction is briefly described in the book Wildlife and America as follows:

The United States took a major step in promoting the rights of nations to exploit the fishery resources off their coasts when it established the abstention principle (1954), which stated that if a country was fully utilizing the MSY of a species and the fishery was under management and scientific investigation, other countries should refrain from its harvest. The principle formed the major binding ingredient of the International North Pacific Fisheries Commission (INPFC). The concept was not, however, embraced by the world community as a formula for resolving fishery disputes. To the contrary, it was often referred to as

an arrangement consummated by the United States and Canada during a period when Japan was at a disadvantage, following the conclusion of World War II.

The United States subsequently abandoned the abstention concept and looked instead to multilateral conventions (commissions) to resolve conservation issues while promoting the principle of full exploitation of resources on the basis of their MSY. Unfortunately, these commissions failed to deal with underlying social and economic differences. Furthermore, their procedures fostered delays in providing management, and they lacked the ability to monitor regulations to ensure compliance. To overcome the ineptness of the commissions, the U.S. government moved to resolve fishery conflicts through bilateral negotiations.

Although one cannot deny that commissions and the bilateral agreements provided a degree of protection to the U.S. fishermen, they failed to stave off the growing demand for an extended fisheries jurisdiction zone. Despite executive branch opposition, sport and commercial fishing interests allied with conservationists, and marshalled enough support in Congress to extend the U.S. fishery zone to 12 miles in 1966. This extension was considered inadequate by U.S. coastal fishermen and support for a 200-mile fishing zone mounted.

At the opening of the Third United Nations Conference on the Law of the Sea, the United States supported the 12-mile fisheries zone, but with increased coastal nation preference over locally exploited resources. The position, which had little support within the U.S. industry and less among the developing countries of the world, was abandoned within hours after it was presented. In its place emerged the "three species" approach that authorized a coastal nation to manage the species primarily inhabiting the continental shelf and slope and those species that spawned in and migrated out of the coastal rivers and streams into ocean regions beyond 200 miles. Highly migratory oceanic species, such as tunas, were to be managed by international bodies.

Although the government eventually endorsed a 200-mile fishery zone, it was never actively promoted by U.S. officials. Proposed by industry, the United States supported it because it was an acceptable alternative that the majority of nations at the conference might endorse.

Passage of domestic legislation extending jurisdiction to 200 miles illustrates how the political process was used to establish policy. Throughout its evolution key government departments opposed unilateral extension, claiming that such an act was illegal under international law and that national policy dictated working within the U.N. framework to find a solution to managing ocean fisheries. The Executive Branch's failure to persuade Congress to resolve the issue through an international forum can be traced to industry's disillusionment with progress made in a series of preparatory and substantive sessions of the Law of the Sea Conference, a problem aggravated by the Department of State's persistently optimistic view following each session of the conference that "a solution is imminent."

Ironically, the extended jurisdiction legislation (P.L. 94-265) incorporates many features embodied in the abstention concept

established in 1953. U.S. policy had come almost full circle: from establishing the concept of preferential rights to fully used resources (1954-1956); to promoting a policy of resolving fisheries issues through multilateral organizations and bilateral arrangements (1957-1970); to re-establishing the concept of preferential rights (1970-1975); and, finally, to re-endorsing the basic concepts associated with abstention under a zonal format (1975). The policy cycle, largely driven by forces outside of government, conflicted with executive policy. But the collective external forces ultimately regenerated a fishery policy, part of which the government itself had advocated and subsequently discarded some 25 years before. As one former NOAA director put it, "the U.S. was driven remorselessly to a position it should have been taking all the time."

The history of extended jurisdiction and formation of the principles embodied in the U.S. FCZ is a classic example of the hurdles confronting fishery policy development. Problems brought about by extended jurisdiction were largely resolved within the framework of the special interest concerns of the fishing groups. Government responded first to the development of Japanese high seas fishing in the Pacific, and later to Soviet and Korean activities. The INPFC and its protocol were created in response to northwest salmon industry concerns, and its solutions generally met the self interest of that industry. Timing of the treaty most likely tilted its results in favor of the U.S. interest.

The abstention principle embodied in the protocol of the INPFC, however, soon became a danger signal to elements of the U.S. fleet involved in distant-water fishing off foreign coasts. Splintered industry interests diminished the thrust for preferential coastal status. Growing military concerns over the consequences of extended jurisdiction generated a backwash that temporarily sidetracked the movement for greater coastal state control. Fishery disputes on both U.S. coasts were dealt with either through existing international commissions or through bilateral agreements. Ultimately, extended jurisdiction was consummated by a concerted effort of a consortium of Pacific Northwest, New England and mid-Atlantic fishery groups. Their cause gained momentum when an ad hoc industry group put together the "three-species approach group" that minimized internal conflicts within the fishing industry.

Whether good or bad, the key elements of the FCMA and its management structures were engineered from outside government. In the end, fishing groups were supported by sports fishermen, environmentalists and coastal state fishery agencies. The effort was also assisted by segments of the academic community that, at the onset of the movement, was largely opposed to extended jurisdiction. Adoption of the FCMA was finally achieved by a coalition of strong Congressional personalities. The coalition, no longer buying the military argument, was concerned about the consequences of growing national fisheries conflicts, resource depletion and the lack of U.S. control of fisheries in its adjacent waters.

THE FISHERIES FAMILY¹ AND POLICY DEVELOPMENT

This example of policy development outside of the federal government is not unique to fisheries but occurs in other natural resource areas, such as water, minerals, and oil. History will show that fishery policies and goals have been largely molded by sectors of the fishing industry and/or state fishery agencies working with Congress.

Different segments of the fishing industry have periodically taken the leadership in promoting policy change. During the pre-World War II era, the salmon and tuna industries were instrumental in securing protective duties on canned fish. In the post-World War II period, salmon processors took the lead in promoting the abstention principle.

The expanded financial role of the Bureau of Commercial Fisheries was suggested by both processors and harvesters. During the 1960s and 1970s better-organized fishermen's groups pushed extended jurisdiction, the FCMA, and many of its modifications.

State fish and game agencies have traditionally played an important role in promoting fisheries research funding and mitigation and conservation programs. They, of course, frequently receive federal funds allocated for these purposes. In addition, state agencies have guarded state's rights with respect to natural resources control. In this role, they have successfully engineered prominent membership on federal bodies and international commissions concerned with fishery management. Their current dominance of FCMA fishery councils is a testimony to their success in this arena.

The federal government's role in fishery policy development has largely been in response to political pressure groups, including Congress. It appears to have had a stronger internal role in promoting and adopting the conceptual and technical basis for fishery management. In this sense, federal government may have been responsible for adopting management to achieve the "maximum sustainable yield" and promoting "full use of the surplus provided by nature." It should be noted the technical basis of MSY was formulated by scientific effort outside of government, but adopting the objective of securing MSY must be credited in part to key officials serving in the Bureau of Commercial Fisheries.

Outside of the fishing industry and government bodies, academic groups and conservationists have also played important roles in fishery policy debates. Processors, fishermen, conservationists and academicians have not always seen eye-to-eye. Their goals and interests differ. The ability to effect major fishery policy changes, however, has depended on building strong support among these influential members of the fisheries family. Minor policy changes and goal setting can be achieved without significant support of the major

¹ The family comprises processors, including their sales and distribution elements; converters; commercial fishermen; recreational fishermen; conservationists; environmentalists; academicians; scholars and state fishery agencies.

advocacy groups as long as the proposed change is not antagonistic to other members of the family.

Federal fishery policy is most easily revamped or changed when the policy goal does not infringe on policies important to any member of the family or other interest groups. The long and frustrating struggle for extended jurisdiction is an example of policy that developed despite divergent views among user groups.

In its early development, extended jurisdiction found only modest support among the fishing community. Recreational and consumer groups were only mildly interested. The academic community, for the most part, opposed the idea. At the onset of the Law of the Sea (LOS) meetings in the early 1970s, a large section of the commercial and recreational fishing community began to consolidate efforts to achieve extended jurisdiction. At the same time, the academic faction began to splinter. National security interests, however, remained a formidable obstacle to successful attainment of extended jurisdiction.

The conflict between the fishing groups and the national security faction was largely resolved by policy development at the international level. That is, the acceptance of the concept of the 200-mile Exclusive Economic Zone (EEZ) by a majority of the world family of nations. The Caracas Declaration, supporting the 200-mile EEZ, was a trade-off of U.S. objections to the EEZ in exchange for supporting freedom of movement through straits. Thus, objection to the EEZ was dropped in order to secure more important national goals, particularly maintenance of a reasonably narrow territorial sea.

In the late stages of national fishery policy evolution concerned with extended jurisdiction the fishery family, in concert with an international movement toward extended jurisdiction, persuaded Congress of the validity of their arguments. Simply stated, preservation of fishery resources and people dependent upon them required more timely action than could be expected from the tedious debates of the LOS forum. The fishery family found several strong and willing spokesmen in the Congress. Extended coastal state jurisdiction was portrayed as consonant with the interest of most of the world family of nations. In light of the direction taken by the fishery interests at the LOS conference, U.S. national security arguments were less convincing. Congress acted in 1976 to create significant new U.S. fishery policy.

This scenario leads to the conclusion that the fishing family is capable of molding significant new policy. Successful policy development, however, is contingent on getting agreement, or at least not having significant objection to the policy goals from 1) the fisheries family 2) other national interests, such as national security, trade, agriculture, oil, shipping and banking; and 3) U.S. international and global community interests.

Frequently, fishery policies have not extended beyond the family. This was particularly true prior to World War II when the responsibilities of the government fishery entity were confined largely to science, fish culture and information dissemination. The expansion of its fisheries role in the post-war period included financial support of industry, international trade, fishery development. An increase in international disputes further broadened the number of groups

interested in fishery policy. As a result, policy development has become more complicated, the number of ocean-oriented interests has grown, and the environmental and conservation movements are better organized, increasing the probability of multiple-use conflicts.

GOVERNMENT ATTEMPTS AT POLICY DEVELOPMENT

Although the program elements associated with natural resource use and conservation changed over time, the policy thrust in this area has remained largely intact. There remains a national commitment to ensure that the fishery resources are used in a manner that minimizes waste and that use of the resource does not destroy the options available to future generations.

Socioeconomic policies concerned with the well-being of users have, by contrast, undergone considerable change. There has been a significant post-World War II increase in government services associated with the fishing industry. The FCMA and its incorporation of optimum yield (OY) goals codified the legal right and obligation to consider socioeconomic as well as ecological aspects of resource management. It brought into full focus issues concerned with allocation including multiple-use conflicts between recreational, commercial, and marine mammal interests and conflicts between fishermen and industrial developers.

It is interesting to note that the currently established National Marine Fisheries Service (NMFS) mission outlined in the agency's "Strategy Plan" is to "achieve a continued optimum utilization of living resources for the benefit of the Nation." This goal translates pragmatically as management and development. Optimum utilization includes protecting not only fish but also marine mammals, endangered species and the habitats that foster these resources. In addition, the NMFS mission states that assuring continued resource productivity through conservation and management will yield substantial benefits to the nation. These benefits include jobs, profits, export earnings, subsistence, recreation, a better-fed population and a healthy ecosystem. The mission includes creating a business climate conducive to more economic benefits and the guardianship of resources and amity.

This statement of mission is rather broad and lacks guidance on specific goals and objectives. Nevertheless, the commitment to conservation and fishery development is apparent. The stated mission is not, however, a clear enunciation of U.S. fishery policy but of agency goals that will allow it to respond to what it perceives as legislative and administrative policy. The commitment to the stated mission must be gauged against specific administrative programs designed to implement and secure policy goals. In the past, such goals have frequently been subjugated to more powerful conflicting policies evolved in other sectors of government or to parochial interests.

In our view, Rothchild is quite right that implicit and explicit fishery policy exists in the form of legislative commitment and the record of administrative actions. Some elements of fishery policy have remained consistent over a long time-frame while others have been dynamic, changing with party politics or expanding government commitments within the fishery arena. The criticism that government has no clear fishery policy to guide resource use and development is

in part true. However, government has attempted to surface a broad set of policy goals in regard to fisheries or the oceans in general.

Over the past three decades both the administration and Congress have commissioned and requested certain entities to develop national strategy and policy concerned with fisheries and the oceans. The President's Scientists Advisory Committee (PSAC) panel on ocean groups was formed in 1965 to evaluate our nation's effort to explore, understand and develop the oceans. Among the panel's principle objectives was to "draft a statement of goals for a national program to serve the marine interest of the U.S. and to define the federal role in pursuit of these goals." In its findings and recommendations, the panel proposed that the ultimate objective of the national ocean program be "effective use of the sea by man for all the purposes currently considered for the terrestrial environment: commerce, industry, recreation and settlement, as well as for knowledge and understanding." PSAC left it to government to enunciate national policies concerned with marine interests.

In 1969 the Stratton Commission delivered its findings in a document entitled "Our Nation and the Sea." The commission was established by Congress in 1966 and is officially known as the Commission on Marine Science and Engineering. The commission was to formulate a comprehensive, long-term, national program for marine affairs designed to meet present and future national needs in the most effective ways possible. The commission report recommended broad policy as well as specific program goals. Twenty-four recommendations specifically associated with fisheries were formulated by the commission (Appendix 1).

Another attempt to promote a national ocean policy was undertaken by the National Academy of Engineering (1976) which produced a document entitled "Toward Fulfillment of a National Ocean Commitment." The Academy made 13 fisheries recommendations (Appendix 2) that were also fairly broad.

The above-mentioned planning documents and reports constitute some of the more notable efforts from the late 1950s to 1970s to promote and influence a national ocean policy including fisheries. They were preceded by several similar efforts in the early 1950's. Most were the products of university scholars, government scientists and a sprinkling of industry advisors.

Many of the various recommendations were made obsolete by subsequent changes in jurisdiction and technological developments. Others failed the test of political acceptability. Some are a component of current government policies and programs. The energetic planning efforts and proposals of the 1960s and 1970s gave way to new political concepts and changing national priorities. Failure to understand the political process that leads to successful policy formation, however, also took its toll on recommendations. The academic attempts to influence policy employed many of the nations leading scientists, engineers and scholars involved in ocean affairs. The process did not however, include significant input from a broad segment of the recreational and commercial fishing industries. These groups alone formed a sufficient political force to scuttle unpopular recommendations, particularly if they required significant government funding.

Politically, the most effective planning effort was the Eastland Report (1977), developed in close harmony with the fishing industry. This effort was more pragmatic and resembled a national wish list, but was a casualty of the congressional attitude regarding spending and changing administration goals.

In addition to these broad approaches to ocean policy evolution, NMFS and its predecessor, the Bureau of Commercial Fisheries (BCF), also tried to define the government role in fisheries. At least five significant in-house documents were developed between 1960 and 1983, periodically with the help of numerous key fisheries personnel. They have, however, seldom been publically exposed; most were quickly retired in favor of new planning efforts and/or were swept aside or scuttled by new administrations or the Office of Management and Budget (OMB).

The inability of NMFS/BCF to produce a desirable national fishery policy may reflect the government planners' tendency to protect their turf and promote solutions in consonance with their particular areas or specialties, or to live within well-defined administrative guidelines. This is not unique to government officials but perhaps more aggressively pursued by them because of a greater need to protect self interest. In addition, government planners' lack of political awareness has been a major stumbling block to successful policy development. The continued criticism, by industry and academicians, that government lacks a well-articulated national fishery policy, however, may be misdirected. Congress and the administration have both made attempts along these lines.

GOVERNMENT'S CONTEMPORARY STATED POLICY

In a 1979 NMFS planning document, the general character of federal activity in fisheries was discussed. The author(s) drew heavily on Peter Steiner, professor of economics and law at the University of Michigan, in commenting on this matter. Two criteria, economic and political, were used to evaluate the appropriate role of government:

- . The economic criteria states that 'the opportunity cost of public sector resource allocation must not exceed the value of goods produced to satisfy the public sector demand. That is, a greater return should not have been possible in an alternative investment in the public or private sector.
- . The political criteria hold that any federal activity is appropriate if a large enough interest group can bring sufficient weight and legislative mandate to bear in implementing the activity.

This suggests that "all" is possible. Depending on the political force generated, it is probably true if the policy or goal is not contrary to the Constitution. The extensive list of federal services to fisheries, as listed in a 1979 task force report, illustrates the broad involvement of government in the fisheries area (see Appendix 3). This list, which only involves the development sector of the current federal fishery mandate, demonstrates the extent to which government has responded to users and projected itself into the business end of fisheries.

Current fishery policy is, thus, a mixture of many approaches embodying the interest of diverse groups. In U.S. Ocean Policy in the 1970s: Status and Issues, the Department of Commerce reports that current fishery policy is "an amalgam of many approaches, both old and new, aimed at dealing with the complexities of declining fishery resources, a fragmented industry, growing consumption, growing imports, increased pressure from foreign fleets, and increased competition from recreational fishing. Federal fisheries policy is in a state of transition and is likely to remain so for a number of years. The enactment in 1976 of the Magnuson Fishery Conservation Act, more commonly called the 200-mile law, has contributed further to the complex situation. Though a major aim of the legislation was to curb foreign fishing off U.S. coasts, the Act's management controls apply equally to domestic fishing."

The report notes that:

Implementation of the Fishery Conservation and Management Act of 1976 is the dominant factor in U.S. marine fisheries policy at this time. Because the Act is relatively new, many policy adjustments represent the normal 'fine tuning' associated with carrying out any major new law. Many more fundamental policy revisions may be needed as experience is gained with the new law and its full effects become clear. Thus, the United States can be described as entering a 'new era' in fisheries policy in the late 1970's.

Federal fisheries policy now consists of three major components: fisheries research and information; fishery management and conservation; and development of fishery resources and the fishing industry.

Since enactment of the 200-mile law, the primary goal of Federal fisheries research and information policy has been to ensure that adequate scientific data are made available for conservation and management purposes. Basic biological and ecological research pertaining to fisheries, however, has been a mainstay of Federal fisheries programs for many years. While much of this work is now being applied to fisheries management problems, other basic research and information programs are being conducted to:

- . gain knowledge about particular species of fish, their environment, and their sensitivity to environmental change,
- . protect marine mammals and endangered marine species,
- . resolve problems related to fish culture and husbandry, and
- . improve harvesting and processing technology.

In all, nine federal departments and agencies administer marine fisheries research and information programs, including the Departments of Commerce, Interior, Army (Corps of Engineers), Energy, Navy and Agriculture; the Environmental Protection Agency; the National Science

Foundation; and the National Aeronautics and Space Administration. The Federal Government's principal marine fisheries programs are administered by the National Marine Fisheries Service (NMFS), a part of the Department of Commerce's National Oceanic and Atmospheric Administration. NMFS is responsible for monitoring and assessing the composition, distribution, abundance, and availability of living marine resources, including threatened and endangered marine species and marine mammals. The data and information resulting from this program are used for various purposes, but their primary value is in implementing Federal fishery and conservation and management measures. The work is carried out at seven regional centers and 17 associated laboratories, and involves numerous at-sea surveys by research vessels.

Although the above policies may seem in the fishing industry's interest, national fisheries policy has not always seemed helpful or supportive to U.S. harvesting and processing interests. These industry sectors see government as a cumbersome, inept body interfering in their affairs. On the other hand, both frequently look to government for financial aid, information, and assistance to resolve economic problems and international conflicts.

The lesson to be learned is that 1) the government administration is unlikely to play a prominent role in fishery policy development, 2) key elements of past and current policy were produced by outside groups, working with Congress; 3) party political views frequently temper policy; 4) despite its size, the fishing family has frequently generated policy that has had major influence on the viability of U.S. fisheries; and 5) if the implicit and explicit fishing policies of this nation seem internally inconsistent and chaotic, it probably reflects a) fragmentation in the multi-faceted industry it serves, b) internal conflicts and conflicting regional policies of congressional blocs concerned with fishery matters and c) policy conflict with other sectors of our economy.

This conclusion hints at the futility of policy development, but the more pragmatic conclusion is that we have been looking to the wrong practitioner. If commercial recreation fishing interests believe that a national fishery policy proclaimed from a high level of government would play an important role in guiding fishery management and development, then the fishing family is the best forum in which to draft, surface and submit such a policy to government. A starting point could be internal planning by a coalition of harvesters, processors and recreational interests.

Policy evolution at the regional council level is much the same as described for the national scene. The arena is certainly smaller and possible actions are limited by the legislative bounds of the FCMA and administrative guidelines. Nevertheless, policy formation within the council structure is a political process testing the limits of the sometimes vague and confusing legal membrane of the FCMA. Special interest groups work fervently to gain whatever advantages are possible to support their cause. These interests may vary between fisheries, and coalitions within the council family may differ from issue to issue. As on the national scene, the seemingly conflicting management policies emerge between fishery plans over time, reflecting

the pliability of the council system (within the limits of law) toward its constituency. Political constituents can be both the force behind policy evolution and the custodians of the FCMA's purpose.

CONCLUSIONS

The thesis of this paper has been that a national fishery policy does exist and that it has evolved largely in response to personal needs of individuals and the requirements of the resources. Many of the present inadequacies, inconsistencies and/or inappropriate aspects of national fishery policy reflect the multi-faceted character of the fishery family, and/or conflicts arising between fishery interests and other sectors of our nation.

The FCMA is a significant legislative component of national policy. The act not only makes a commitment to conserving and managing the marine resources adjacent to the U.S., it is an explicit declaration of United States intent to develop its underused or unused fishery resources. The findings of the act and its purposes both make this commitment clear. The act's findings state: "A national program for the development of fisheries which are underutilized or not utilized by the United States fishing industry, including groundfish off Alaska, is necessary to assure that our citizens benefit from employment, food supply and revenue which could be generated thereby." The findings are translated into action under the purposes of the act which states that Congress' intent was to "encourage the development by the United States fishermen of fisheries which are currently underutilized or not utilized by United States fishermen, including groundfish off Alaska, and to that end to ensure that optimum yield determinations provide such development."

For U.S. industry sectors seeking to develop and promote viable U.S. fisheries, these paragraphs generated enthusiasm--a promise for the future. Realizing the potential however, has been painfully slow to some. To others, the legislative rhetoric has seemed hollow.

The feelings of discouragement have been felt especially by Pacific Northwest and Alaskan processors and elements of the New England industry. They watched the rapid growth of joint ventures involving U.S. fishermen delivering to foreign processors. Many processors feel these developments are contrary to their interests. This concern ultimately led to a joint NFI and PSPA proposal to phase-out foreign fishing and processing, including over-the-side joint venture deliveries in the FCZ. No specific alternative marketing opportunities have been proposed, so this proposal has concerned many U.S. fishermen.

Much of this concern may reflect a lack of understanding regarding the legal constraints under which the industry must function. These constraints prevent industry involvement in joint planning concerned with purchasing, processing and marketing the resource. They do not, however, constrain the development of such plans at a corporate level. The manner in which U.S. fishermen and processors face issues confronting the councils, the proposed Exclusive Economic Zone, phase-out and a variety of other matters, will have a direct bearing on how successful they are in securing the development opportunities offered by the FCMA.

In the past year, Northwest and Alaskan processors and fishermen have formed the Alaska Pacific Seafood Industry Coalition (APSIC). United, this group is a powerful political force that can help mold regional and national fishery policy. Admittedly it does not embrace all elements of the fishery family as described in this paper. However, it does bring together a significant component of the region's harvesting, processing and labor force and can provide leadership.

The coalition strongly advocates "Americanization" of the FCZ, a concept promoting full use of the fishery resources within 200 miles of the U.S. by U.S. fishermen, processors and labor. Actions and correspondence by key elements of Congress and departments of government make it apparent that this goal is strongly endorsed and is to be fostered to the extent possible. "To the extent possible" may be the caveat that limits the possibilities of Americanization and sets the scene for future intra-family conflict.

Hope for U.S. processing sector development rides on the crest of strong U.S. control over fishery resources of vital interest to Asian and some European countries. Processors and fishermen have banked on entering the large national whitefish market by harvesting the highly abundant pollock and other groundfish resources in the Gulf of Alaska and Bering Sea. High catch rates, the productivity of U.S. fishermen, and advanced technology appeared to provide the potential for supplying U.S. markets with high-quality competitively-priced fillets. Similarly, the possibilities of supplying pollock to a rapidly expanding U.S. surimi/product market has also been seen as a lucrative possibility. But the aspirations are largely based on a U.S. commitment to allocate TALFF and/or joint ventures to nations that would assist U.S. fishery growth and not generate further problems resulting when fish caught by foreigners in the U.S. FCZ are exported into U.S. markets.

At this stage, conflicting U.S. interests and intra-fishery family disputes are likely to test coalition unity and the implied national commitment. A growing number of joint ventures are with nations that are expanding their exports to the U.S. of pollock and cod products caught in the U.S. FCZ, and rapidly dimming U.S. processor interest in expanded domestic activities. Failure to implement a strict and carefully controlled set of criteria related to allocation of TALFF and/or joint ventures may quickly scuttle the short-term goals of Americanizing the FCZ. Attaining this strict control, however, seems to be at odds with other fishery and national interests as indicated by recent arrangement with Poland, expanding contacts with Korea and potential developments with China.

The question requiring congressional and administration attention is whether Americanization is feasible in light of 1) conflicting national goals, 2) different user-group interests, and 3) the range of economic factors impacting the U.S. processing sector. It is apparent that U.S. fishermen and processors cannot expect government protection on the U.S. market in the form of tariffs. If allocation of TALFF and authorized joint ventures are not strictly controlled to achieve this goal, then the U.S. industry should not be left dangling, expecting that government can or should provide such control to achieve rapid Americanization of the FCZ. It may be a hard pill to swallow, but the councils and users will be better off knowing the government's intentions or limitations.

This policy is not likely to be shaped by the fishery family alone but by a variety of national interests. It is better, however, that the policy be shaped now rather than after significant fishery investment that may ultimately go down the drain. If conflicting national goals make it unlikely that allocations and joint venture developments will be used selectively to achieve full use of the fishery resources by American processors, then both fishermen and processors have alternative options that can and should be explored in order to optimize benefits to U.S. interests.

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APPENDIX 1. Stratton Commission Fisheries Policy Recommendations

STRATTON COMMISSION FISHERIES POLICY RECOMMENDATIONS

1. The Commission recommends that the United States continue its own research programs aimed at improving stock and yield estimates, cooperate with other nations in programs for this purpose, and explore new techniques for preliminary assessment of stock size and potential yield where new fisheries are contemplated.
2. The Commission recommends that fisheries management have as a major objective production of the largest net economic return consistent with the biological capabilities of the exploited stocks.
3. The Commission recommends that voluntary steps be taken and, if necessary, Government action to reduce excess fishing effort in order to make it possible for fishermen to improve their net economic return and thereby to rehabilitate the harvesting segment of the U.S. fishing industry.
4. The Commission recommends that the National Oceanic and Atmospheric Agency (BCF) establish national priorities and policies for the development and utilization of migratory marine species for commercial and recreational purposes in cooperation with other Federal agencies, States, and interstate agencies.
5. The Commission recommends that the National Oceanic and Atmospheric Agency (BCF) be given statutory authority to assume regulatory jurisdiction of endangered fisheries when it can be demonstrated that:

A particular stock of marine or anadromous fish migrates between the waters of one state and those of another, or between territorial waters and the contiguous zone or high seas, and the catch enters into interstate or international commerce, and

Sound biological evidence demonstrates that the stock has been significantly reduced or endangered by acts of man, and

The State or States within whose waters these conditions exist have not taken effective remedial action.

6. The Commission recommends that legislation be enacted to remove the present legal restrictions on the use of foreign-built vessels by U.S. fishermen in the U.S. domestic fisheries.
7. The Commission recommends that the National Oceanic and Atmospheric Agency (BCF) analyze each major fishery and develop integrated programs designed to exploit those fisheries where opportunities for expansion exist.
8. The Commission recommends that the National Oceanic and Atmospheric Agency (BCF):

Develop means for rapid assessment of fish stocks

Conduct surveys and exploratory fishing programs to identify and establish the dimensions of latent fisheries off the U.S. coast

Continue to support basic studies relating to fish habitats, population dynamics, and the effects of environmental conditions

Give priority attention to development of improved statistical data and analytic techniques.

9. The Commission recommends that the National Oceanic and Atmospheric Agency (BCF) establish an expanded program to develop fishing technology by improving the efficiency of conventional gear and developing new concepts of search, detection, harvesting, transporting, and processing.
10. The Commission recommends that fisheries extension services, analagous to the Agricultural Extension Service, be established in order to facilitate transfer of technically useful information to fishermen at the local level.
11. The Commission recommends expanded support for the National Oceanic and Atmospheric Agency (BCF) program to develop fish protein concentrate technology.
12. The Commission recommends that the United States seek agreement in ICNAF to collaborate with NEAFC in fixing a single annual overall catch limit for the cod and haddock fisheries of the North Atlantic, including the whole ICNAF area and Region 1 of the NEAFC area (East Greenland, Iceland, and the Northeast Arctic). This single annual overall catch limit should be designed to maintain the maximum sustainable yield of the fishery and, in turn, should be divided into annual national catch quotas. The overall catch limit should be adjusted regularly to take account of such factors as year class fluctuations of the stocks, recovery of the stocks due to conservation measures, and errors in setting prior limits.

Every participating nation should be authorized to transfer all or part of its quota to any other nation.
13. The Commission recommends that the United States take advantage of the opportunity presented by a quota system to rationalize its fishing effort in the North Atlantic.
14. The Commission recommends that early consideration be given to instituting national catch quotas for the high seas fisheries of the North Pacific.
15. The Commission recommends that until the existing disagreements with the Latin American countries are resolved, the policy of indemnification embodied in the Fishermen's Protective Act be continued. However, the Commission also recommends repeal of the Act's requirement that the amount of aid a country is scheduled to receive from the United States must be cut by the total of unpaid U.S. claims against it for seizing U.S. fishing vessels.

16. The Commission recommends that an attempt be made to reach international agreement on the maximum breadth of the territorial sea along with arrangements that would protect the right to pass through and fly over international straits.
17. The Commission recommends that the geographical area subject to international fisheries management be large enough to permit regulation on the basis of ecological units rather than of species and, when necessary, include the territorial seas. Fisheries commissions should be authorized to manage ecological units whenever they conclude that the additional gains from such management are likely to outweigh the increased costs of undertaking it.
18. The Commission recommends that an appropriate existing international organization be entrusted with the tasks of evaluating the operations of existing fisheries conventions, suggesting measures to improve and coordinate their activities, and recommending the establishment of new conventions. The establishment of new conventions should not await the threatened depletion of particular fish stocks.

The commissions created by these conventions should recommend measures to maximize the utilization of fish stocks, consistent with their conservation, and aid the developing countries.

19. The Commission recommends that renewed diplomatic efforts be made to persuade all important fishing nations of the world to adhere to the Convention on Fishing and Conservation of the Living Resources of the High Seas.
20. The Commission recommends that international fisheries commissions, particularly in those areas where some member nations lack the personnel or the resources to employ them, should be adequately financed by the member nations so that they can employ full-time, competent staffs to provide the scientific, technical, and economic data and analyses needed to accomplish the objectives of the conventions.
21. The Commission recommends that enforcement of the provisions of international fisheries conventions and implementation of regulations of the fisheries commissions be strengthened.
22. The Commission recommends that the United States ratify the Optional Protocol Concerning the Compulsory Settlement of Disputes and support compulsory arbitration of disputes arising under fisheries conventions when that seems preferable to settlement by the International Court of Justice.
23. The Commission recommends that:

The National Oceanic and Atmospheric Agency (NOAA) be given the explicit mission to advance aquaculture

NOAA (NOAA) assist and encourage States through the Coastal Zone Authorities to remove the legal and institutional barriers that may exist in individual States and that inhibit aquaculture

NOAA (BCF and Sea Grant) support more research on all aspects of aquaculture, economic and social as well as technical.

24. The Commission recommends establishment of a National Institute of Marine Medicine and Pharmacology in the National Institutes of Health to effect a methodical evaluation of the sea as a source of new and useful active substances. The new Institute should: "inventory presently known bioactive substances and examine those factors which relate to the ecology of marine organisms and their pharmacology."

APPENDIX 2. Toward Fulfillment of a National Ocean Commitment
13 Recommendations Regarding Fisheries

TOWARD FULFILLMENT OF A NATIONAL OCEAN COMMITMENT
13 RECOMMENDATIONS REGARDING FISHERIES

1. The United States Government should assume jurisdiction over all interstate fisheries.
2. Broad policies should be established within which interstate fisheries can be properly managed by an agency on a sound technical basis.
3. Comprehensive investigation of institutional restraints affecting the fishing industry should be initiated. Particular attention should be given to the present inequities (primarily in state regulations) and to a basis for developing a rational system of regulations designed to obtain the maximum benefits from fishery resources, with due consideration of all our national requirements. Government and industry must face up to the difficult task of devising an equitable method for limiting entry into those fisheries that have a limited productive capacity.
4. An objective analysis should be undertaken of the interests of all users of marine living resources. The principal considerations to govern allocation of the resources are preservation, recreation, and commercial utilization.
5. A complete revision should be made of the present fishing vessel subsidy program. Subsidies should be discontinued. Where it is in the public interest to encourage new methods of fishing or new gear, the government should have the new types of vessels constructed for demonstrated purposes. These vessels should be sold in the open market to United States fishermen when the demonstration programs are complete.
6. To stimulate the construction of new commercial fishing vessels and also to provide modern equipment and gear for the existing fleet, loan and mortgage insurance programs should be expanded. Direct loans at low interest--sufficient guarantees to private institutions in order to attract their capital into the industry--would bring about considerable additional investment. Tax relief by allowing rapid depreciation of investments in fishing vessels and their equipment should be used as an incentive to attract capital to the industry.
7. The industry should encourage a general increase in quality of fishery products as a basis for expanding its markets.
8. The government should expand its exploration service to locate and delineate new, unused fishery resources.
9. The government should initiate a program of preliminary and exploratory long-range engineering development in fishery research to provide information for better management of fishery resources.
10. A program to train technicians and paraprofessionals for improved operation of the fishery industry should be initiated.

11. The agency responsible for managing the fishery resources and carrying out the required basic research, exploration services, and development should establish a consulting board of engineering experts of sufficient scope to advise it on engineering aspects of its problems in all of the fields involved.
12. The development of fish protein concentrate (FPC) should continue, with U.S. Government involvement in selected aspects (see discussion and amplification on p. 86).
13. The Food and Drug Administration should reconsider its ruling prohibiting the sale of FPC as an ingredient in processed food and limiting its sale to the final consumer to one-pound-packages.

Discussion

GUTTING: As a long-time observer of the fisheries' political scene, what's your assessment of our ability to work together to form the kind of coalition and consensus that you say are needed to change national policy? What's your view? Are we making progress now? Are we doing better? Or doing worse? Where do we stand from your perspective?

ANSWER: Well, I think you are aware, Dick, that in the Pacific Northwest, we've formed a coalition called the Alaska Pacific Seafood Industry Coalition (APSIC). It's a coalition of processors and fishermen that meet periodically. It's not institutionalized, there's no basic structure to it. There are two "monitors," myself and Bob Morgan. When that group comes together, it looks at policy issues to see if we can resolve differences between processors and fishermen. It's been in existence about eighteen months. I think it's made some very large gains, but nevertheless, it's walking on eggshells.

You know, there is a long history of suspicion between the two groups. There's a long history that each group is out to undercut the other group. I am surprised that APSIC has done as well as it has. It's had about twelve meetings of one form or the other. It's surprising that if the meeting runs its course and the two sides talk, we have generally managed to come out with some consolidated positions on a number of issues.

In the past the problem has been first, a tendency not to communicate with one another, and second, the other guy wears a black hat, and we oughten talk to him because he's the guy that's going to undo us. So there is a lot of suspicion, and I'm hoping that this thing is going to make some progress.

This group started because one fisherman and one processor were in my office as clients, both seeking different types of advice. While they were waiting, they literally almost got in a fist fight in the waiting room. Thank God we had a desk between them and managed to get them calmed down. We talked to each other and said, you know, maybe it's time that processors, fishermen, and labor groups get together to improve communication. APSIC has been dealing largely with the U.S.-Japan industry-to-industry discussions and has done fairly well. Now it is beginning to broaden; to look at some generic issues that deal with the behavior of the council or establishing more definitive criteria for the allocation process.

I am encouraged, but I'd be the first to admit that it's still a very delicate process to keep ourselves together and mold the group into something larger. We have had some preliminary talks with the people in California. Our hope was to first bring that area in, then New England and gradually down the south and build a national coalition.

We are very strong on keeping this relatively unstructured, because we're concerned that when you structure the organization, people run off and start speaking for the group without reflecting a lot of its elements. To this point, every decision made by the coalition has been signed off by every member. To get consensus agreement of that sort is pretty difficult, but we've done it. I think it can be done in larger forms, but only time will tell if we can formulate a broader-based approach of that sort.

McKERN: Is government responsive when fishermen are coalesced behind a particular stand on policy?

ANSWER: I think Congress has been overly responsive. Regionally, Congressional groups have been so responsive, that we end up with a collage of fisheries policies that are at times difficult to respond to. On the other hand, many groups work closely with various Congressional groups trying to move policy and most of it is evolved in that way.

At the Department of State, I would say, it depends who's there. Different individuals have made a big difference. Most of us have felt in the last few years, at least the groups I've dealt with, that the Department of State has been fairly responsive.

The National Marine Fisheries Service, I think, you can put in the same mold. Certain directors have tried to work with elements of industry. They may have been more pro one group than the other, but they tend to be responsive, because they are basically an interpretive and responsive group. They try to interpret national needs from the various signals and stimuli they get, formulate them and put them into some response. What they read in terms of signals, what they tune in and what they tune out depends on who's listening. Some of them have been very helpful and, I think at times certainly there have been things we hoped we could roll over the top of.

ANDERSON: Are we too optimistic to think fishermen will rally around a policy choice, particularly something different from FCMA? What can we do about the fact that we build policy by groups?

ANSWER: If you have a rallying cause, a strong cause, such as FCMA, obviously, it's easier to generate the type of support and enthusiasm you need to mold a strong position and to move policy. If you have an issue that tramples into many different family areas or crosses lines, it becomes very difficult. If the issue doesn't generate interest in a broad sector of the country, it'll make a lot of difference.

You're quite right, it becomes very, very difficult if it gets down to particulars--should we have financial aid or shouldn't we have financial aid. The guys down the gulf want it; somebody else doesn't. Those types of things become very difficult to do. I am proposing that there is a better way to do it, although it still may not work.

The next time government decides to put an ocean policy group together, there needs to be a better blending of people. At least use sharp, intelligent academicians, understand clearly the perception of the user group, its reaction to policy, and whether or not the group can educate the people to a decision.

I was just down at a Law of the Sea Conference in San Francisco, and I heard some very interesting comments. People were patting themselves on the back over the excellent quality of some of the papers on limited entry that have come out over recent times. And I said, You know, if you look around the room, there isn't a single fisherman. We've done one hell of a job of convincing ourselves that limited entry is the salvation of the world. The problem is that we haven't convinced the guys controlling the policy, the guys that control the votes.

I think we can do a better job, because, you know, I think there is a story to be told. I think that there is an educational process. It seems to me, when we put those groups together we have to get a better blend of people who understand where the fishing industry's coming from. We also need an educational form that shows why these different policies are better in the long term, and try to sell them.

Fisheries Management Problems: An International Perspective

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SUMMARY

This paper examines the biological considerations that need to be taken into account when choosing the tools to manage fisheries. The ultimate objective of management must be to increase the benefits man gets from the resource (higher catches, greater income to fishermen, cheaper fish, and so forth). However, the immediate effect of most management measures is to modify the impact of human activities on the resource. Hence, the main role of the biologist is to determine what these changes in impact will be, and how they will affect the catches that will be taken, particularly in the long-term. The harmful impacts are chiefly catching the fish before they reach a good size ("growth overfishing"), and reducing the adult stock below the level that ensures adequate reproduction ("recruitment overfishing"). In addition, attention needs to be given to the interactions between fisheries on different species, and to the variability that occurs in most natural systems.

Management tools are briefly discussed. So far as their impact on the stock is concerned, they can be divided into measures that control the total amount of fishing (catch quotas, limited entry, some aspects of closed seasons or gear controls), and those that control the type of fish caught, especially the sizes (mesh regulations, minimum fish sizes, other aspects of closed seasons or gear controls).

Well-established models are used to estimate the effects of these different management tools. In general they have proved sound. The major practical problem is the lack of adequate basic information, especially statistics from the commercial fishery. There is a world-wide downward trend in statistical data quality, sometimes as a direct result of management measures. Certainly there is little sign

of improved, more precise data necessary in many fisheries to match the growing demands for improved biological advice to managers.

The main theoretical problem in current models is that inadequate account is taken of variability and of species interactions. Some improvements can be made by simple expansion of the models, improving the documentation of what species are caught by which fisheries for example, but there remain major scientific uncertainties: the links between the fluctuations of sardine and anchovy stocks and major climatic changes, the effects of fishing, or the quantitative interactions between predators and prey. Even with the best models and the best data, there will be some uncertainty in biological assessments. This must be recognized by the manager and by the biologist. One implication is that there should be better communications between them.

INTRODUCTION

The program for this session looks at management tools, and divides the session into three parts: biological, socio-economic, and legal tools. If this division is strictly interpreted, the first part should be very short. The fishery manager has very limited opportunity to intervene directly to improve the natural fish stocks, and the fishermen has not the farmer's concerns of when and how to apply fertilizer or pesticides--he has other things to worry about. The manager affects the abundance and productivity of the resources indirectly by controlling what is removed by fishermen. The tools to do this are almost entirely either legal or economic.

The aims of management are almost entirely economic. Only in the case of marine mammals has the protection of the resource itself become a high priority for managers. For this reason, the prominence of biologists in fishery management discussions is sometimes felt to be surprising. However, the biological characteristics of the resources--their limited extent, and their vulnerability to over-exploitation--are among the main factors that make management necessary. Some of their other characteristics--the problems of observing or controlling the resources--are among the main factors that make management difficult.

No apology is therefore needed for a discussion of management tools from the biological viewpoint, even though this discussion will deal principally with economic and legal tools. It will be divided into three main sections: the biological impacts on the resource caused by the tools, the range of tools used to achieve these impacts, and determining which tools are to be used in a particular case. This final section will concentrate on evaluating the biological impact of different tools, recognizing that a healthy and productive resource is a necessary, but not sufficient, condition for a well-managed fishery.

IMPACTS OF MAN OTHER THAN FISHING

On the open oceans man has little opportunity to affect the fish resources, other than by fishing. Pollution and similar factors are usually diluted to a negligible level by the time they reach the open sea. Some pollutants can be harmful even at the extremely low concentrations likely to occur; but in that case their concentrations

in coastal waters are likely to be high enough to bring such serious results that some effective form of control will be introduced. The most likely immediate change in high seas resources will be in the rather special case of those species, notably salmon, where positive intervention (stocking, hatcheries) to increase the resource by raising young fish can be practical.

This paper is not concerned with the question of stocking or hatcheries, except to the extent that they influence management policies. So far, the number of additional fish produced has been small and these fish have not changed the pattern of fishing on natural stocks. If the number of hatchery fish is sufficient however, they could affect, perhaps harmfully, management policies and the natural stocks. Increased numbers of fish can increase the fishing effort in areas where they are common because of uncontrolled response of fishermen to increased stock, or because managers relax controls to allow full exploitation of hatchery fish. This can lead to over-exploitation of natural stocks in the same area.

In the above example, efforts to improve the fishery by stocking and by management (in the narrow sense) tend to work at cross-purposes. This need not always be the case. Studies at the University of British Columbia have shown in a more elegant form than the preceding paragraph) that for some depleted Canadian salmon stocks, isolated efforts to improve matters by stocking may not be successful, and might require the fishery to be maintained more or less permanently by expensive hatchery operations. Isolated efforts to restore the stocks by allowing greatly increased escapement, though biologically satisfactory, would involve such severe short-term drops in catch as to be equally unacceptable in practice. A combination of both approaches might be much better. A large, but short-term hatchery program could produce such a good run composed of natural and hatchery fish that the normal catch (in numbers) could be maintained, while still allowing enough increased escapement of natural stocks to rebuild them over a few years. During this period, less than optimal catches might be taken from the hatchery fish, but this would only be for a few years. Afterward the fishery could be self-sustaining at a higher level on the natural stock.

This matter will not be pursued further here. The point is that traditional management measures are difficult to introduce. They often require short-term sacrifices by the fishermen in order to rebuild the stock before the long-term benefits can be enjoyed. In some circumstances this short-term gap can be bridged by special kinds of intervention directed towards the resource itself.

In coastal waters man has more opportunity outside of fishing to influence the resources. Not infrequently these opportunities are taken, usually damaging the resource. Again, it is not intended to discuss here all coastal problems and their impacts on fisheries, but only the extent to which these problems can affect management. The first point is obvious. If the stock's existence is threatened by, for example, the destruction of nursery areas, then the fishery manager will have to give high priority to protecting these areas. This might mean neglecting, until the continued existence of the stock is ensured, more typical management measures.

The two activities are not wholly independent. The way the resource is managed can affect fishery manager's ability to prevent pollution or other damage. Controlling pollution and other coastal problems nearly always requires a political solution, deciding between the interests of those who want, for example, to discharge waste from a pulp mill, or to "reclaim" coastal zones for building, and those who wish to see the environment undisturbed.

To some extent fishery interests can ride on the back of the environmental movement. The chances of the environmental arguments winning will be increased if they can be supported by concrete figures of potential damage to a valuable economic activity. This depends on how well the fisheries are managed. If the fishery concerned is subject to difficult political argument over its management and is a substantial net drain on the government for research, administration and enforcement of management measures, then the higher levels of government are not likely to oppose something that could threaten its existence. If a fishery is being successfully managed in economic terms, but the benefits are enjoyed by only a small group of fishermen, political opposition to an environmental threat will be less than if the benefits are more evenly spread through the community. These considerations mean that the manager should consider possible environmental damage to the fishery and the methods, including the political methods, of countering those threats, if they are significant, when considering possible management measures.

THE IMPACT OF FISHING

SIMPLE APPROACHES

At a meeting held in Alaska it is reasonable to point out the two distinct approaches to what should be considered a well-behaved fishery, and its supporting resource. The approaches are based on the salmon and the flatfish. In a proper salmon fishery, catches take place instantaneously just before the fish spawn. Growth and natural mortality are not important, since they occur in some black box out in the ocean before the fish reach the fishery. The interesting scientific problem is the relation between the spawning stock (escapement) and the subsequent recruitment (run). The manager has essentially only one element that he can control: the catch.

In a proper flatfish fishery, (The North Sea plaice fishery of some 50 or 60 years ago is the best example) catching, natural mortality, and growth take place continuously. For easier computation, spawning and recruitment are usually assumed to occur instantaneously at the appropriate dates, though it would be possible and more aesthetically pleasing to a mathematician, to treat these as continuous also. Fishing mortality is not only treated as continuous, but also as constant above some specific age; (the age at first capture), that can be varied by changing suitable characteristics of the fishery.

In the simplest form it is assumed that over the ranges of stock sizes likely to be found even at fairly high fishing levels, the average recruitment will be the same. The scientific problem is that of "growth overfishing": of adjusting the sizes of fish caught and the intensity of fishing so that most fish reach a good size before they are caught, and not many die of old age. This is a two-dimensional problem, with the fishery manager able to adjust both the

size at first capture, by changing the mesh size used; or the amount of fishing (fishing effort or fishing mortality), by applying an overall catch quota. Changes in mesh size or similar measures may be implemented with little direct impact on the fishing operations. Fishing costs will, other things being equal, be proportional to the fishing effort so that reductions in fishing effort give the opportunity of proportional reductions in total costs.

No actual fishery matches either of these sketches nor are the models currently used by biologists usually quite so simple, although the picture of the biological events in the minds of non-specialists often comes close to one or other of these caricatures. They are presented here as reminders that any model of a fish stock is a simplification of the real situation. The manager and his advisers must always consider whether anything important has been lost in simplification. Even these extreme simplifications bring out many of the important biological points relevant to management.

The first is a distinction between two types of overfishing. "Growth overfishing" is controlled to make the best use of fish once they have reached a fishable size. "Recruitment overfishing" is controlled to ensure that there is a sufficiently large, in some cases not too large, spawning stock to produce adequate future recruitment. A fishery may suffer from both types of overfishing, but problems faced at any particular time usually fall into one category or the other. This is fortunate because the measures that have to be taken to prevent each are quite different--in both the scientific and practical respects.

In growth overfishing, the analysis should take account of changes in the value of the fish with season, size, and so forth, as well as the simple increase in weight. It is relatively easy to determine by analyzing the growth and mortality rates. Remedial action does not require very drastic measures, usually, no more than an increase in mesh size, or closure of areas where small fish are abundant. Recruitment overfishing, even though its effects can be catastrophic, is more difficult to demonstrate, and may require detailed examination of the early life stages of the fish. When it occurs, its correction may demand very drastic action, including complete closure of the fishery for a period of years, as has been done for some herring fisheries in the Northeast Atlantic.

Another important distinction is to be made among the types of measures that can be taken. There are those that may have important biological effects, but which allow fishing operations to go on more or less as usual. This would include changes in mesh sizes. The other type substantially affects fishing operations, sometimes favorably, by allowing the costs to be greatly reduced. Controlling fishing effort would be an example of this.

Significantly, there is not a unique relation between costs and the biological and other impacts. For example, many measures can be used to reduce the fishing effort (or fishing mortality) to some specified level. They will have the same effect on the stocks, but can have very different effects on the economic or social characteristics of the fishery.

The final important point to emerge from these simple models is that the biological controls that can be imposed on fishing patterns are multi-dimensional. Even for salmon, the picture is not as simple as presented. A salmon can be removed at any one of many points along its migration route from spawning to feeding grounds. The point at which they are removed can significantly affect biological yield.

The typical demersal fishery is even more complex. Fishing mortality is not constant above a certain age. Detailed studies, particularly from cohort analysis or VPA, show that there can be considerable variations with age or size, even over the ranges of sizes, for which the gear has no obvious mechanical or geometrical forms of selection. These variations come mostly from uneven distribution of various size-groups in space and time. Concentrating fishing on certain grounds or depth zones at times of year when the young fish are first becoming vulnerable to the fishing gear can result in much higher fishing mortalities, albeit for a short period, than are suggested by looking at annual data.

If this concentration occurs at a time when the fish are growing quickly--or more precisely, when the growth rate greatly exceeds the natural mortality rate--then the impact of fishing, and the benefits from suitable management measures, can be high. Around Cyprus the trawl fleet concentrates on the young of the year at the beginning of the traditional open season in early autumn. Postponing the season opening for a month led to dramatically increased catches. The catches in 1982/83, the first season after the introduction of the regulation, were up some 70 percent, and the early returns for the 1983/84 season suggest a doubling of the pre-regulation catches (Demetropoulos and Garcia 1984).

In the same part of the world, comparison studies between the size of hake caught in a trawl survey off Morocco covering all depth zones and the hake commercial landings indicates fishing mortality on a few of the smallest size groups is extremely high. This might even be as much as one order of magnitude greater than natural mortality. For larger fish, this figure declines to more reasonable levels usually associated with heavily fished stocks, about the same as natural mortality. Although the practical test has not been made, these results suggest that if the smaller fish are protected dramatic catch increases, such as those experienced off Cyprus, could result.

These may be extreme examples of the magnitude, actual or potential, of benefits from the right kind of management. They are probably not extreme in showing the degree of variation in fishing mortality with age (or size) of fish, and many fisheries have much more complicated mortality patterns. A large stock may be exploited by several different fishing fleets, often with different gears (trawls, gill-nets, seines of various types), each with its own pattern of distribution in space and time, and hence there will be great variety in fishing mortality with age.

The possible number of exploitation patterns is therefore enormous, but can be arranged in terms of three major dimensions: the total amount of fishing; how this total is shared between the different component fisheries; and possible variations in the 'selection pattern' of each fishery. "Selection" is taken to include any factor that could affect the way in which fishing mortality varies with age

(or size), and not solely mesh selection or similar mechanical affects.

Conceptually this is not greatly different from the simple flatfish model where the exploitation pattern is determined by the two parameters of fishing mortality (the same for all ages) and the age at first capture. The volume of calculations involved in the necessary scientific assessments is increased, as is the model's range of possible management options, but the procedures are not fundamentally different from the simple situation.

Two complexities of the real biological world not apparent in either of the simple models are the existence of several interesting species, and the fact that natural conditions and the abundance and productivity of fish stocks are not necessarily constant even in the absence of fishing.

MULTISPECIES QUESTIONS

The problem of multi-species is one that is raised at most present-day discussions on management (May et al. 1979; Mercer 1982; FAO 1978). The problems can be divided into two classes: those caused by technological interactions between fisheries, and the biological interactions between species. Technological interaction refers to the fact that few, if any, fisheries catch only one species of fish. Most fisheries catch a single target species and a number of other species (perhaps only in small numbers) that may be the target species of other fisheries. The trawl fisheries on Georges Bank, particularly during the heyday of foreign fishing, provided a good example. There were directed groundfish fisheries for each of cod, haddock, flounder and silver hake. Each of these directed fisheries caught the other species in appreciable quantities. In addition, some of the fisheries on pelagic species (herring and mackerel) caught significant numbers of groundfish.

The biological study of technological interactions is not difficult, provided that the study deals with all the species, and includes all the catches. The actual impact on the haddock stock of a given size of catch, distributed among different ages (or sizes) of fish, is the same whether the catches are all taken by fisheries directed at haddock, or taken in fisheries directed at cod or silver hake. The difficulties come when devising measures that will maintain the haddock stock at some productive level, assuring benefits for those fisheries directed toward haddock; while not unduly interfering with the fisheries directed toward other species, and remembering that the same individuals and vessels may be engaged at different times both in both the fisheries. This emphasizes that biologists are generally concerned with stocks, and managers with fisheries. Especially when many species are involved, there is not a neat one-to-one relation between stocks and fisheries.

Biological interactions offer more challenging scientific problems. It is obvious that if heavy fishing on one species reduces its abundance, then the species that eat it, or are eaten by it, or compete with it for living space or for food, and so forth, can be affected in one way or another. Sometimes the direction of the affect also seems clear: since cod eat a lot of herring, fewer cod would be expected to reduce the natural mortality of herring, and

fewer herring to reduce the growth rate of cod. Matters may not be as simple as that. As Ursin (1982) has pointed out, there can be a triangle of species. Cod eat whiting and herring while whiting eat herring. Fewer cod could mean more whiting, therefore more herring may be eaten altogether. Sometimes the same species can form two corners of the triangle since many are cannibalistic at different ages. A similar complication has been suggested in the Alaska pollock fishery as it relates to the food supply of fur seals in the Bering Sea (Swartzman and Haar 1983). Fishing has undoubtedly reduced the abundance of large pollock. Large pollock feed on younger pollock, so fishing could actually have increased the number of small and medium fish, those preferred by seals.

The possible complications, and the variety of possible interactions are even wider than this. They may occur at any time in the life cycle of the fish. A small species of adult fish can thus prey upon the eggs, or larvae, of a much larger species. With the great range of possible interactions and the uncertainties about the magnitude of any given effect it is not at all easy to say, in quantitative terms, fishery on species A will be affected by a change in a fishery on species B. A massive coordinated research program was required in the North Sea to determine with moderate precision what quantities of other fish are eaten by the main commercial species. This makes it even less easy for the administrator charged with managing the fisheries as a whole to formulate measures to control fishery A for the sake of some ill-defined benefits in fishery B.

These problems, which lie at the heart of attempting ecosystem management, are of less concern for this paper. So far as the manager is concerned his objectives may be complex, and agreement on the measures may be difficult to reach. But the type of measures he has to choose from--his biological tools--are the same as those used to control the fishery on A purely for the benefit of those concerned in the fishery for A. He can control the overall amount of fishing, or how fishing effort is distributed among different sizes/ ages of fish.

VARIABILITY

As series of data become available for an increasing number of fish stocks it is clear that variability is a natural feature of most. Those that exhibit little natural variability, such as the North Sea plaice, are exceptions. There are different variability patterns, and these will affect how the fishery manager approaches his task (Caddy and Gulland 1983).

In the extreme, variability may require the manager to modify his entire strategy. The upwelling systems of eastern boundary currents seem particularly susceptible to large-scale variation (Csirke and Sharp 1984). In these systems, attempts to sustain a high-volume fishery on single species (Californian sardine, Peruvian anchoveta) may be doomed. The best strategy may be to maintain high flexibility in the fishery, minimize the economic and social distress of a sudden collapse, and allow the fishery to switch easily to another species, if, as often happens, collapse of the target species is paralleled by the rise of some related species.

The problems of managing large marine ecosystems that combine the problems of variability and species interaction, such as the Californian or Peruvian upwelling systems, were recently discussed at the AAAS meeting in New York, and do not need repeating here. At this point, note how variability in the natural system can affect the way the biological tools operate.

If the main problem in a given species is growth overfishing, natural variability mainly affects the implementation of measures, rather than the scientific analysis. The most striking examples of variation have been in recruitment, rather than in growth or natural mortality. (However, direct estimates of natural mortality are few, and direct estimates of changes in natural mortality almost non-existent.) The optimal pattern of fishing (the fishing mortality, and its distribution between ages of fish), taking into account economic and social factors, will therefore be the same. Recruitment variability will merely affect the catch taken with that optimum fishing pattern. If management tools are such that the fishing mortality and its pattern are fixed as-is, approximately true for fishing effort controls in demersal trawl fisheries, then variability affects the manager little. On the other hand, some other controls, such as catch quotas, will need yearly adjustment.

If the basic problem is actual or potential recruitment overfishing, then natural variation can greatly complicate basic scientific analyses. Even a little variation can make it difficult to determine the relation between the abundance of adults and subsequent recruitment. The affects of variability can be of at least three types. First, the parameters of a basic relation, for example that of Ricker (1954) or Beverton and Holt (1957), between stock and recruitment can remain unchanged; the natural, non-fishery effects can result in a random distribution about this relation. Second, recruitment can be essentially random and independent of adult stock, until stock falls below some critical value; at this time the probability of poor recruitment sharply increases. Third, the parameters of the basic relation may vary. For example in Ricker's model, the stock size at which the greatest recruitment occurs will vary, perhaps larger in years of favorable environment.

These differences have implications for the manager. In the first case the desirable size of adult stock will not be changed from that determined without variability. In the second, the principle aim will presumably be to keep the stock above the critical level. In the third, it would be desirable if the information were available, to modify the adult stock size in accordance with expected environmental conditions.

THE MECHANICS OF CONTROL

GENERAL OBSERVATIONS

The fishery manager has a range of mechanisms that modify fishing impact on the stock. As shown earlier, it is useful to divide the nature of the impact into two categories: the overall amount of fishing (fishing effort, fishing mortality) and how this fishing is distributed among the different ages or sizes of fish. This division will also be used here. The same measure can be used for both purposes. A closed season has been one of the first methods used to

control the overall amount of fishing. When conditions are favorable it is also a very convenient method for switching fishing away from the smallest sizes of fish. The different aspects of the same measure will be discussed separately.

CONTROLS OF THE TOTAL AMOUNT OF FISHING

These are in many ways the more interesting and important types of controls. They greatly affect not only the impact on the stock, but also the economic performance of the fishery. On the positive side, an economically successful measure can reduce the costs of fishing giving significant benefits even when the biological benefits, in terms of increased total catch, are not significant. On the negative side, an economically unsuccessful measure can dissipate the benefits from a biological successful control because the cost of fishing has been increased.

There is a rich literature on the interaction between biological and economic aspects of management. See Clark (1976) for the theoretical and mathematical aspects, and Beddington and Rettig (1984) for a discussion of some of the more practical aspects. Other papers at this conference will discuss the non-biological aspects. Controlling the biological impact of fishing on the stock is necessary, but is not sufficient for managing the fishery as a whole. Noting this, we will limit our discussion to whether a measure will in fact control the impact on the stock in the way expected.

Regulations controlling the total amount of fishing involve two questions: the units used to measure the amount of fishing (essentially either in output or, nominal fishing effort), and the procedures used to ensure that fishing effort remains within the prescribed limits (for example, whether the catch quota is allocated or not, or how the holders of a limited number of vessel licenses are chosen). The latter aspects are vital to the economic and social outcome of the management decisions, but are relatively unimportant in determining the biological impact. It matters little to the stock whether a 10,000 ton catch is taken in a wild scramble by a large number of boats operating under an unallocated quota, or whether it is taken by 50 vessels, each allocated a 200 ton share in the catch.

The units of measurement are more critical to biological impact. Neither the weight caught nor the amount of fishing effort will precisely reflect the true fishing mortality. The fishing mortality caused by a given catch (setting aside the question of the sizes or ages caught, which is discussed later) will only be consistent if the stock abundance is constant. Otherwise the catch limit has to be adjusted probably each year, in accordance with increases or decreases in stock abundance. Since these adjustments should be made at the beginning of each season, they can put quite a data collection and analysis burden on the scientists' ability to predict stock abundance up to 12 months ahead.

The situation is slightly different for the salmon fisheries. For these fisheries the objective is best expressed as some target escapement, for example, run less numbers caught. Again the run must be known in order for the proper target catch to be established.

Measuring the amount of fishing in terms of fishing effort raises other problems. The nominal fishing effort, f , is related to the actual fishing mortality, F , by the equation $F = qf$, where q is the catchability coefficient. A given fishing effort will exert a fixed fishing mortality only if q is constant, or if corrections are made to the amount of effort to correct for changes in the catchability coefficient. In practice, some types of variation in q are random, and tend to average out over a period. This includes variations due to weather, tide, and so forth, as well as the differences in fishermen's skills. Two sources cannot be ignored: those related to stock abundance, and those caused by gear or vessel improvement.

For fish distributed fairly evenly over the grounds it is reasonable to expect that a given fishing effort will take a fixed proportion of the fish present. In simple terms, the area covered in a single trawl haul may be one ten-thousandth of the total area inhabited by the stock, so a thousand hauls will take ten percent of the stock. In other fisheries, for example, purse-seining for herring, the fish are clumped. The fewer fish, the more likely that in a given amount of fishing, a fisherman will encounter and catch a given fish: the catchability coefficient increases as the stock decreases.

This can lead to a very dangerous situation if attempts are made to control the fishing mortality on a stock declining through over-fishing. Managers can reduce the nominal fishing effort in an attempt to reverse the decline in stock abundance, but the reduction may be more than balanced by an increased catchability coefficient. The real fishing mortality may therefore increase, accelerating the stock's decline. The same principle holds true for controlling catch. The reduction in catch quota has to be more than the reduction in stock if it is to do any good. The problem is more obvious, and it is easier for the manager to see what needs to be done (a big reduction in catches) and to persuade the fishermen that it should be done.

The situation is reversed when the stock is increasing, perhaps as a result of management measures. Fishing mortality will decrease when it should be kept constant, or even be allowed to increase slightly. This is not a serious matter, and can probably be adjusted over the years with no great losses.

How improvements in the fishing gear affect the stock depends on how the measure of fishing effort is defined. Say the regulations merely specify how many vessels may operate, and licenses are issued to that number of vessels. The immediate reaction of any go-ahead fisherman is to operate the largest and most powerful vessel possible in order to maximize his share of the catch. The fishing mortality therefore increases well beyond the desired level.

In principle, this problem can be resolved by defining the measure of fishing effort in sufficient detail, that it will bear a constant relation to the actual fishing mortality. Thus many fishing effort regulations limit the tonnage or horsepower of vessels, the length of trawl headline, or the number of pots that can be used. After an initial period when many fishermen adjust the size or power of their vessels or gear upward to the allowed limit, these controls are fairly successful in keeping actual fishing mortality growth within bounds.

They are rarely completely successful. The ingenuity of fishermen is greater than that of the regulation-setter. The prize is increasing his share of the catch. So the fisherman finds ways of increasing the effectiveness of a standard unit of effort by increasing the horsepower of the vessel within a fixed tonnage, designing more efficient trawls within a fixed headline length, using bigger pots, and so forth. If the increased effectiveness does not increase costs proportionally, these developments are not, in themselves, objectionable. Because they might improve the economic efficiency of the fishery, they are probably to be welcomed. In any case they are inevitable. If the biological conditions are to be met, if the fishing mortality is to be maintained at or around the desired level, there must be provisions to reduce the nominal fishing effort (how ever this is measured) in accordance with the increase in catchability coefficients. If in 1984 the desired fishing mortality is achieved by licensing 40 vessels of some standard specification, the manager will probably have to reduce this to perhaps 35 in 1990 to maintain the same fishing mortality.

CONTROL OF SELECTIVITY

The variety of tools available to control the fishing mortality distribution among different sizes or ages of fish, "selectivity" in a broad sense, is wide. The manager can exercise his ingenuity in finding a tool, or a combination of tools that will create the desired affect on the stock, while also serving his economic or social objectives.

The most direct method is, of course, to specify what types of fish the fisherman is not allowed to catch. This is almost impossible to enforce. The best the manager can do in most cases is to specify what the fisherman may or may not land, which is not the same thing. Any fish that are caught but cannot legally be landed, and that are returned to the sea dead may satisfy the enforcement officer, but the impact on the stock is the same as if they were brought ashore and sold at the best market price. By themselves, size limits or similar controls are of little direct value unless illegal fish are sufficiently tough to survive being caught and left on deck until the crew has handled the more immediately valuable fish, or unless the fisherman can avoid catching them. Otherwise, the main value of size limits is indirect, an incentive for the fisherman to change his fishing strategy. In this sense they can be a valuable back-up to other regulations.

The other direct method of controlling what sizes of fish are caught is through gear specification. Setting maximum mesh sizes used in trawl cod-ends is probably the best known form. In principle this results in: a selection pattern (little or no fishing up to a certain size), and then the full fishing mortality on all larger sizes, corresponding to the original simple model of the North Sea plaice dynamics. Roughly similar patterns can be obtained with some other gears, for example, the use of escape gaps in lobster or crab pots. Gill nets have a more complicated selection pattern, with fishing mortality reaching a peak at some size of fish determined by the mesh size used, but falling off for smaller and bigger fish.

Mesh regulations and similar controls can fail to have the biological impact expected because the sorting is never exact. Some fish bigger than the mean selection size will escape, while some smaller fish will be retained. Where the animals concerned are well-equipped with spines or other appendages to tangle in the net, as is the case with shrimp, the spread in selection can be very large. Since opposition to mesh regulations will be increased by every large fish that the fisherman sees escape, and the impact will be reduced by every small fish that is retained, this spread in selection can greatly reduce the value of mesh controls.

Its potential value is also limited in the case of multi-species fisheries, and most trawl fisheries are effectively multi-species fisheries. The optimum mesh size is different for each species, depending on its shape, and its growth and mortality rates. It is possible to find a mesh size that results in the optimum impact on the catch as a whole, but this is likely to be sub-optimum for most individual species, especially for the larger species.

On first sight the enforcement problems for mesh size (or similar regulations) and for minimum size regulations, are slight. A simple check can tell if the gear is correct, or if there are any undersized fish in the catch. To some extent this impression is true. Certainly in some international fisheries these types of regulations have been enforced between countries with a fair degree of reliability. Several international commissions have given power for enforcement vessels of one country to stop fishing vessels of others to inspect their gear and catches and establish the degree of compliance. Even though resulting legal proceedings were left to the flag state of the fishing vessel, this did allow a fair degree of check on the degree of compliance. On closer examination, methods of reducing the real selectivity of a net and other complications mean that it is a far from straightforward matter to enforce the full effectiveness of these measures.

Closed areas and seasons have recently been the forgotten class of methods. They were popular in the early days of fishery management, being simple and direct in their application. It was clear to all concerned when and where fishing was allowed, and enforcement was therefore relatively simple. As management became, in theory if not in practice, more sophisticated, the popularity of these types of measures decreased. Although they can be used to control both the total amount of fishing and its selectivity, they have disadvantages in respect of both objectives.

Closed seasons, and to a lesser extent closed areas, will reduce the fishing mortality, depending on the length of the closure. But they offer only limited opportunities for proportional decreases in the costs of fishing. With growing emphasis on the economic objectives of management, less attention was paid to the potential biological role of closed seasons or areas in reducing fishing mortality. The role in controlling selectivity has fewer practical objectives, but attention has tended to be concentrated on the more direct methods, especially mesh regulations. One of the biologist's attractions to the latter method is that once the stock assessment calculations have been made to show, for example, that the optimum size of fish capture for cod off Labrador is 54 cm, it is possible to calculate a mesh size with mean selection length equal to that target size at first

capture. In contrast, the range of possibilities using closed areas or seasons is much less. The manager has to take the limited opportunities to close fishing at times and places where fish below the target size are particularly abundant. It is not possible, for example, to determine immediately what pattern of closed areas or seasons would give an effective size of first capture of 54 cm.

The practical problems of implementing and enforcing management measures, have made the advantages in the simplicity of closed areas or seasons better appreciated, and the theoretical disadvantages appear less important. Fisheries are much less homogeneous than suggested by the simple models but suitable choice of closed area or season is not infrequent.

A major advantage of a closed season, as pointed out by my colleague Serge Garcia, is that it provides the opportunity to break out of chronic over-fishing. In fisheries such as the Cyprus trawl fishery, the stock has been reduced to a low density of very small fish: mostly those just recruited to the fishery. A combination of a larger mesh size and reduced fishing along the lines of the standard yield-per-recruit trawl models would undoubtedly increase the total yield substantially, especially when allowance is made for the very high fishing intensity on the small fish during the first few weeks after they recruit to the fishery. In the short run, such measures are unacceptable because the fishermen need to fish hard with a small mesh in order to catch enough to make a living. A closed season, imposed when the fish are just recruiting and would be exposed to a high fishing mortality, can shock the system and allow it to target larger fish. This happened in Cyprus in 1982 and 1983. Not only were the catches greatly increased after the closed season, but the fishermen are considering other measures, such as using larger mesh, practical propositions.

BIOLOGICAL ASSESSMENTS

NEEDS AND PROBLEMS

The first two sections of this paper describe why managing fisheries by altering the biological impact on the stocks can result in benefits, and the kinds of measures that should achieve the desired biological impact. This section touches briefly how determining changes in the fishing pattern affect fish stocks and hence on the fisheries.

Everyone can agree that the fishing mortality on heavily-fished stocks should be reduced, that small fish should be protected, and that such measures can, in the long term, benefit everyone concerned. Nevertheless, when the fishery manager proposes specific measures plenty of fishermen and others will argue that the particular stock is not that heavily fished, or that the measures proposed are far too drastic and will cause severe immediate losses without reasonable prospects of equivalent long-term gains.

Fishery management must therefore be based on a sound understanding of the immediate and long-term effect of the proposed measures. This is no place to go into the details of stock assessment. These are adequately described in standard texts, such as those of Ricker (1965) or Gulland (1969, 1983a), and in a number of FAO manuals. 1

have also attempted (Gulland 1983b) to describe for the non-specialist some of the basic approaches of stock assessment. Here I will concentrate on the aspects of stock assessment, particularly its problems and shortcomings, that are significant for the manager. Whatever the stock assessment scientist's ambitions, and the fishery manager's hopes, the assessments for a given fishery at a given time are almost always less precise and less detailed than either wishes. If scientific advice is to be used sensibly, the manager needs to understand the likely errors in the quantitative estimates given, as well as the less quantifiable ways in which the advice may not give a complete or fair picture of the situation. The scientist must explain to his paymasters (who directly or indirectly, will usually include the fishery manager) how the advice would be improved by a better supply of data, where substantive improvements will be achieved only by new research, recognizing the results of original research cannot be predicted.

DATA REQUIREMENTS

Reliable assessments need reliable data. Taking world fisheries as a whole however, the supply of data needed for stock assessment is poor and becoming worse. There will be difficulties even if data supply is perfect, but improvement in data is the easiest and most immediate way of improving assessments and the resulting scientific advice.

One main source of data is the commercial fisheries, especially the statistics of catch and nominal fishing effort. Few people question the need to collect these statistics. However, there is concern for what is often a continuing increase in the level of detail and precision demanded by the users, and for the common failure to provide manpower and money to collect data even of a modest standard. There is also growing concern about how management measures can decrease the quality of statistics available.

In principle it should be possible to make a quantitative balance between the costs of improving statistical information and the benefits, in terms of better management, that would be obtained if the improvements were achieved. In practice this has seldom been done and, with some noticeable exceptions such as the meeting organized in 1982 (Doubleday and Rivard 1982) which looked at the commercial landing sampling program on the Canadian east coast, the question has only infrequently been addressed.

One reason for this is that the quantitative link is often not clear: for example, the link between obtaining catch and effort records by weeks with the position given to the nearest ten miles rather than in one degree squares; and the reduction that could be achieved by the variance of the estimate of the catch quota needed for the next year to achieve some policy objective. Still less clear is the link between the dollars required to collect the more detailed data and the dollars gained by more accurate catch quotas.

The statistical work required to calculate generate the "better advice" expected from improved basic data is far from straightforward. Many factors other than the sampling variation or shortage detailed basic data the affect variation of final estimates. Equally, it is not easy to put a value on improved precision. A judgement on the costs and benefits of improving data collection in any

specific fishery is therefore likely to be subjective. A judgement on the situation in fisheries as a whole, whether national or global, must be even more subjective. With that provision, it nevertheless seems probable that only very few fisheries do the marginal benefits of improving data not exceed the marginal costs. In many fisheries, improved data would be the most cost-effective road to better management advice. Data collection is not a glamorous subject, and is likely to be neglected by scientists pursuing new scientific ideas or models, and by administrators looking for ways of cutting expense. Only where calls (and action) to improve statistics have been used, perhaps unconsciously, as diversions from failures in the science or in taking action, is it likely that enough, or more than enough data, are being collected.

Despite this clear need for a general improvement in data supply, the current trends are for it to get worse. Ironically, this is somewhat a side-effect of management progress. When little was done to implement controls, there was little incentive to mis-report data. This is no longer true. At the worst, evading controls such as catch quotas may mean that the actual total catch is greatly in excess of the official statistics. Even when there is no such gross and deliberate misreporting, fishermen may be unwilling to provide accurate information on such things as the location of fishing grounds, detailed fishing effort (number of hauls, and so forth) if they feel the figures will be used to justify unpopular measures data can often be obtained only with the willing collaboration of fishermen.

Paradoxically, the decrease data supply seems to have resulted from the reduction in longer-range vessel fishing off foreign coasts. Following the introduction of 200 mile EEZs or similar zones, there was no great drop in the amount of foreign fishery except in some areas, such as the Northwest Atlantic where most of the stocks were heavily overfished. Continuation of this non-local fishery was only possible if the coastal state agreed. This agreement has usually included requirements on providing data. The fishing license could usually be withdrawn if adequate data were not provided, so foreign fishermen had strong incentives to supply data. As foreign fishing is phased out and replaced with local vessels the requirements to supply data can be continued. However, it becomes more difficult for the authorities to apply penalties, especially with drawing a fishing license, if adequate data are not supplied.

MODELS

Once data has been made available, it has to be incorporated into some model in order to provide advice on the affects of different management actions. Two questions then arise--how adequately do available models stocks behavior, and how possible is it to apply a suitable model to the information concerning a given stock.

All models are simplifications of the true situation, omitting large portions of the complete picture. Pictures of the idealized salmon or plaice fisheries omit large elements of the life history of each species, treating the pre-recruit phase of plaice, or the open-ocean phase of salmon as "black boxes." This in itself is irrelevant to the question of whether these models are acceptable. Including elements that deal with these phases would raise questions of other

aspects that are omitted, such as the differences in growth rates between individuals. The relevant question is whether or not omitting certain features of the real population from the model will affect the advice, and the decision made on that advice. The adequacy of a model is therefore not an absolute, but depends what use is made of it.

The need to expand a simple model may be obvious. If a high-seas fishery for salmon develops, then the very simple salmon model has to be modified to treat the oceanic phase as more than just a black box. At other times, the fact that the model is over-simplified for a situation only becomes clear when it fails to produce reliable results. Such a failure after the event is less desirable than an earlier recognition of the need for modification, so a distinction can be made between applying a simple model to a specific situation, and the wider-ranging research that can show whether or not such a simple model will give reliable results for the purposes at hand.

Within the scope of the factors that they attempt to describe explicitly, the simple models have proved useful and reliable. The main weaknesses of these models lie in what is left out, specifically, the natural variability in most fish stocks and the interaction between species.

To some extent a failure of a model to look at natural variations is not important to the fishery manager. To choose between actions he needs to compare their outcomes, rather than the absolute value. If he is considering increasing the legal mesh size from, say, 100 mm to 120 mm, he needs to know what difference it will make in yield per recruit. This will be true regardless of the actual recruitment. (I ignore here the possibility that there may be some density-dependent effects that can alter the yield-per-recruit function. There are likely to be minor second-order effects). It does not matter that the actual catch with the larger mesh in some future year may, because of poor year-classes, be below the average already experienced with the small mesh. If that mesh were used in the future, catches would have been even less.

It will therefore often be satisfactory to base the advice to managers on models that ignore variations and deal solely with the mean value of the various parameters. This is not always true. Because of the non-linearity of many of the relations the mean value of, say, the annual catches when parameters vary, may not be the same as the annual catch experienced when these parameters are constant, equal to their mean values.

A more important exception arises when deviations from the average are of interest to the fishing industry, and so to the manager. The magnitude and duration of significant negative deviations are likely to be the most important. While any fisherman must expect days or even weeks of poor catches, he may have difficulty with longer periods. Thus the manager will probably have to take into account that heavy fishing will reduce the number of year-classes present in a fishery, and therefore increase the probability that a single bad year-class, or two successively poor year-classes, will result in catches significantly below average in one year.

The longer periods of decades or more, are of particular interest to the strategic planners. Biologically it may be meaningful to determine that over a century, the Californian sardine stock can provide average annual catches of 50,000 tons. But this figure is meaningless to the fishing industry if it arises from a period of 25 years of 200,000 ton catches, and 75 years of virtually nothing.

In some cases the variation can, where necessary, be added to the model without difficulty. For example, an important variation often appears as year-to-year changes in one or two parameters, such as the strength of the incoming year-class; and the variation appears to be essentially random, with little serial correlation. In this case the simple analytic (Beverton and Holt or Ricker) models can be readily extended through Monte Carlo simulation models. In these, the fishery is followed through for, say, the next twenty or thirty years, choosing each annual recruitment (or other variable parameter) from a set of random numbers with appropriate distribution. Repeated runs will then determine the characteristics of interest, for example, the mean and variance of the annual catch or the probability that the catch in a given year will fall below some critical level.

The other shortcoming commonly noted in the usual biological models is that they consider single species in isolation, whereas in the real world many species live, and are harvested, together. Any model that fails to deal with this multi-species dimension must be to that extent incomplete. Whether this incompleteness is important is another matter, and depends on whether the interaction between species is significant, and also whether the manager is able and willing to take account of the interaction when making decisions.

The second condition may well not hold, even when the interactions may be large. The most striking events in the North Sea fisheries in the last twenty years have been the collapse of the pelagic stocks (herring and mackerel) and the outburst of strong year-classes among most of the demersal species such as cod, haddock, and plaice. (See many of the papers in the ICES Symposium, Hempel 1978.) It would be a bold man who would assert that there was no connection between these two events, though no definite causal mechanism can be demonstrated. (A number can be imagined, such as predation of adult pelagic fish on the eggs or young larvae of the demersal species, but the quantitative evidence is lacking). Other interactions, for example, the effect of predation by cod on small fish, are better demonstrated, even though the effects may be less dramatic.

Nevertheless the current management policies in the North Sea such as the target levels of fishing mortality, and the corresponding values of the annual TACs (total allowable catches), are largely determined on the basis of single-species analysis. This ignores that, for example, limiting the rebuilding of the North Sea herring stock as is (which now seems to be taking place in a satisfactory manner) to an abundance perhaps a half or one-third of the level that would be optimum for herring alone might significantly increase the recruitment to, and yield from, the demersal stocks without much loss in the value of the herring catch (because the higher-valued consumer market for herring is limited, and above a moderate level of catch most of the excess would go to the low-valued fish meal market).

Equally, the cod management policy is based wholly on what will happen to the cod stock as a result of alternative management measures. The cod fishery ignores the likelihood that measures resulting in lower cod abundance levels will mean reduced predation on, and therefore the opportunity for increased catches from, the stocks of smaller species.

One reason for this is undoubtedly that without satisfactory multi-species models, the manager's scientific advisers can give quantitative assessments of how much the recruitment of, say, haddock would be reduced on the average by a given decrease in the abundance of herring, or how much the yield of whiting would be increased by a given decrease in the abundance of cod. However, the answer to the second question is, with models such as those of Andersen and Ursin 1977, much closer to being satisfactorily answered than the first.

A more convincing reason is probably that managers have no satisfactory mechanism for achieving the necessary trade-offs among different interests even if they have convincing quantitative biological advice. Different groups of fishermen are interested in different species. It is not easy to see, to continue to use the convenient North Sea example, how managers could persuade Danish fishermen that optimum herring management requires that Danes have a small herring catch so that the Scottish fishermen can get more haddock, and the English fishermen more cod or plaice. Nor would it be any easier to persuade the English fishermen that the cod stocks should be deliberately depleted in order to reduce predation on, and yield from, the stocks of small species caught in the Danish fish meal fishery.

Development of current fishery models to provide a better understanding of the biological interactions between different species is undoubtedly one of the major scientific challenges in fisheries today. If successfully met, these will have important long-term implications for practical management. However, I would suggest that in the context of today's practical problems, the lack of such models is not the critical obstacle to effective "multi-species" or "ecosystem" management. In the really difficult situation, where different fisheries are targeting different, but interacting, species, the biggest obstacle is lack of effective mechanisms for achieving the necessary trade-offs among the different fisheries.

There are simpler 'multi-species' situations where action can be taken, and for which present models are adequate. One is where the interaction is a technological one: the gears used by one group of fishermen to catch species A also catch species B, the prime target species of another group of fishermen. Regulating incidental catches or "by-catch," can be difficult both in setting, for example the amount (by weight or percentage) of the incidental catch permitted, and in implementing and enforcing these regulations. But the scientific aspect is relatively simple. It is generally a matter of ensuring that adequate accounting procedures are used when applying the single-species models to each individual species: that all catches of species B are included in the assessments and projections of future allowable catches, whether taken in the directed fishery or as by-catch.

The other "multi-species" situation that can be handled with existing models occurs, somewhat paradoxically, in some fisheries with a very

large number of species, such as the tropical demersal fisheries. In these the fishermen do not, or cannot, target on any individual species, but catch as many fish as they can. The dynamics of these fisheries seem to be adequately represented to a first approximation by relating the catch, or catch-per-unit effort, of all species to the amount of fishing using the Schaefer or production model approach.

APPLICATION OF MODELS

Models are only useful to the extent that the relevant data can be obtained to apply the models and estimate their parameters. Data supply is therefore critical. Many of the problems concerning this, especially the manner in which some management measures (such as catch quotas) can inhibit the supply of reliable data, have already been discussed. Of interest here is to note how difficulties in obtaining needed data can modify the models, the methods of analysis, or even overall management policy.

In the extreme, data collection problems can render theoretical models virtually useless. This is true of many of the more complicated multi-species models, such as that of Andersen and Ursin (1977). These involve a large number of unknown parameters, (the exact amount eaten annually of each size of each main prey species by each size of each main predator species) that can, even with a large sampling effort, only be estimated. Uncertainties in the resulting analysis are likely to be so large that they are of little value in giving specific advice. These models can be of some strategic value by showing how, stocks could interact and therefore supporting possible policies on joint management of the two stocks.

The simpler, and more widely used models (the Schaefer, or Ricker-Beverton and Holt type) meet relatively few data problems in temperate areas, where the research effort is higher. Serious data problems are met in many tropical areas for two reasons. With more species and fewer scientists it is not possible to put much effort into studying any one species, and the lower annual range in temperature, productivity, and so forth means that the fish do not usually carry convenient birth certificates on their scales or otoliths.

Attention is therefore now being given, particularly by Pauly and his colleagues at ICLARM and by FAO, to ways of adapting the present models to tropical conditions. The difficulty of aging is being surmounted by using length as the basic measure of time. This has a disadvantage compared with age because it is not linearly related to chronological time. However, it is more directly related to the size and value of the individual fish. A number of techniques now exist for estimating the basic population parameters (growth and mortality) from length data, as well as using some of the other standard techniques, such as virtual population analysis (VPA) (Pauly 1980a; Jones 1981).

Because the time scale is no longer simple, these techniques generally involve adding some algebraic complexity to the original models. But computer-based techniques such as Pauly's ELEFAN family of program (Pauly 1982) have made it easier to use length-based methods of analysis. However, the basic hypothesis about how fish stocks behave are unchanged, and no special allowance is made for tropical

conditions. Indeed the methods are more applicable to temperate than to tropical conditions to the extent that they help to interpret and analyze length data if the stock concentrates its spawning into a short period, rather than spreading it fairly uniformly through the year.

The problem of a large number of species is also being tackled by using comparisons among species, especially among taxonomic groups. These comparisons are based on a few observations and are used to obtain estimates of the hard-to-assess parameters, like natural mortality, for the less well-studied species. These parameters include maximum size and water temperatures (Pauly 1980b).

The most widespread difficulty in using the models for management advice occurs when the amount of fishing has not varied much over the period for which observations are available. Most advice concerns predicting the effects of changes in the amount of fishery (restrictions, in the case of management in the narrow sense; expansion, in the case of most development planning). Such predictions are obviously easier if the effects of past changes in the amount of fishing can be observed as changes in characteristics of the stock, such as total mortality rate (in the case of analytic models) or abundance or catch per unit effort (in the case of production).

The typical analyses on fishing effort such as regression of total mortality, or catch per unit effort, can become somewhat indeterminate, resulting in estimates with wide confidence limits, unless there is a wide range of values of the independent variable (fishing effort). This underlines that data collection should have priority during the early years of a fishery, when effort is likely to be comparatively small. It is also the basis for the arguments put forward, especially by Walters and his colleagues in Vancouver, in favor of experimental management: management policies that encourage changes in the amount of fishing, and hence generate observations that are likely to improve the precision of existing assessments (Walters and Hilborn 1978).

IMPLICATIONS FOR MANAGERS

The preceding sections on methods of analysis, and their strengths and weaknesses, have a number of implications for the manager.

The first is definitely positive. In most cases fishery biologists have the tools, in the form of existing models and techniques of analysis, to give sound advice provided they get reasonable support and access to the necessary information. They can predict with fair reliability the likely outcome of alternative management strategies. The major exceptions are some pelagic stocks, especially in upwelling areas, that seem to be highly unstable. For these stocks, the biologist can at present give general warnings that major changes in stock abundance are likely, and that collapses may be triggered by excessive exploitation. They cannot give more specific warnings of when a collapse will occur, or of exactly how much fishing is "excessive".

The second implication is a mirror image of the first. However good the methods and the information used to apply them, there will always be some residual uncertainty in any advice given. This uncertainty

should not worry the manager much. He is used to uncertainty in most things from next year's price of fish, to the political complexities of the administration after the next election.

Nevertheless there seems to be an impression that biological advice could, and should, be certain. Some biologists may have encouraged this impression, fearing that admission of possible error would threaten their credibility and thus their future funding. Equally, some managers might encourage uncertainty because this could remove one otherwise fixed point in the inevitable arguments about future management measures.

The first point is weak. An implied infallibility can strengthen one's status only until the first prediction falls wide of its mark. One of the best arguments for more funding is that it is necessary to make advice more precise. The second point has much more validity. Especially in the age of international negotiations over annual quotas and their allocations, recognition that the scientist's estimate of the next year's quota was not the unalterable truth, almost always has the same result. The negotiators found that the way around the problem of, say, dividing the 130,000 tons into four shares of 40,000 tons, was to shift the total up to 160,000 tons. Undoubtedly in such cases separating the allocation negotiations from agreement on the total will prevent "convenient" allocation decisions from resulting in measures that will not prevent over-exploitation.

As this experience shows, taking account of uncertainty can be dangerous if it means only taking the more optimistic view within the possible range (for example, the higher values of catch quotas). Clearly, the manager should also consider the more conservative, or pessimistic, alternatives. Since the situation is not likely to be symmetrical, managers should pay more attention to the possibility of the assessments being too optimistic. For example, if the stocks are in better condition than thought when setting an annual quota, most losses can be regained by fishing harder in the following year; but if they are in a worse state than thought, it may take several years to rectify matters.

The inevitable degree of uncertainty in biological advice also implies that the manager does not need to wait until scientists can come up with some perfect answer. In some cases, completion of a specific study will mean significant improvement in the resulting advice that is worth waiting for. More often, bearing in mind that early management action is likely to be less disruptive to the industry and less difficult for the administrator, incompleteness of biological studies should not be an excuse for delay.

If the manager is to both account for possible uncertainties in biological studies and to act sooner, even on the basis of incomplete studies, there must be better understanding between scientists and administrators, so that each understands the other's problems.

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Discussion

TILLION: Just one thing, John, if I may. Please, look up what the scientific population of whales are. The grey whale that we call endangered is at a higher level than it was at the beginning of the early whaling; the minke whale is at an all-time world high. The great surge to save the whale has been successful and we're now overshooting the mark by millions of animals.

ANSWER: I couldn't agree more, at least on those species. There are unfortunately, a number of stocks that are at the low level. One of the dispiriting things about working in whale management is the unwillingness of some environmental groups to accept that there are differences between stocks, between stocks that we know are endangered, stocks that we know very little about, and these stocks that you have mentioned, which are now in extremely good health. I couldn't agree more.

LOKKEN: What do we do if we have a surplus in the whale population? Are we going to be able, politically, to handle them and avoid problems for fisheries on which whales subsist?

ANSWER: There are schools of thought that you can't have too many whales. If you can walk from here to Japan on the backs of sperm whales and minke whales, that's great. But to be serious, this is a real problem, not only for whales, but also for seals. What is the balance between these marine mammals and fisheries? How do the different interests weigh in fishing, in watching whales, in just feeling good because there are more whales about than there used to be? How are you going to achieve a balance? Secondly, if you accept that you may have to keep the population of some species of whales down, or some species of seals down because of the damage they do to fishing nets or competition for fish, how are you going to do this in a fairly humane manner?

I don't think there is a easy answer. It is something that the managers, particularly in the North Pacific and in Canada, will have to face. The best one can do is to start educating people that there are a large number of these animals about; just as there was the need to educate people, including the whaling industry, when whaling stocks were going down in a very serious fashion in many parts of the world. The other message is that minke whales in the Antarctic are common, that several other species of whales, several other species of seals are common. And certainly, if there is a threat to anything, the threat is going to come to the livelihood of the fishermen.

Equally these threats have sometimes been exaggerated. The suggestion that the interests of fishermen need to be matched against the interests of seals and those who like seals or whales has been damaged by exaggerations on both sides. In Scotland there has been a great argument about the interaction between the local grey seals and the fisheries around there, particularly, but not exclusively, for salmon. There is no doubt that if you are using fixed nets and are kind enough to give free food for seals, the grey seal is not so stupid to pass it up and will get to your net quicker than you can. There is very little evidence that grey seals are any good at catching salmon in the wild, and that the figures quoted on the damage to salmon fishing caused by grey seals just didn't stand up to close examination. There is a great need to get the sums right, to be clear what the effect of different seal populations or different whale population is on the fishery. This isn't a straightforward question, it's not just a question of how much fish does a seal population or a whale population eat, but what will be the effect of different consumptions on the different fisheries? Does that answer your question?

LOKKEN: Are there examples in the North Sea or elsewhere where high volume, relatively short-lived species have been impacted by commercial effort such that that effort should have been regulated?

ANSWER: The obvious example of a short-lived species where the impact has been clear is the tropical shrimps, which are basically a one-year animal. Most of the shrimp stocks around the world have been clearly impacted by fishing, not usually to the extent of their recruitment being cut down, although there is more and more evidence that this can be the case. The fishing effort has been so high that even the one-year-old animals have not had time to grow to a decent size. You would catch a lot more in weight, by letting them have a better chance to grow.

LOKKEN: Are there any examples of fin fish?

ANSWER: I think you'll find that most of the commercial stocks, say in the Gulf of Thailand, where there have been some good studies, there are a lot of these short-lived fin fish, but still you can see the catch rates going down. In terms of multi-species models, this Gulf of Thailand fishery is very interesting. They've had the search surveys going now for, I think, getting on twenty years. During this period, the fishing fleet has steadily increased, the total catch rates in the surveys have steadily gone down. The proportion of small fish has gone up. For many of the individual species, the bigger they are, the longer they live, the more they've

gone down. This shows, as you might expect, that the longer-lived, the better chance of fishing having an effect, the worse the species' chance of standing up.

There have been some examples, notably of squid, of the abundance going up as the competition or predation from the other species goes down. Basically, provided you can get enough boats to bear on the stock, being small and being short-lived it won't let you escape the impact of fishing.

ALVERSON: The issue has come up that stocks that might not need or require management. I want to ask you to comment, elaborate a little on a point that you brought up. You talked about the natural variability in some stocks. Quite frequently in various management discussion papers and various documents of state and federal agencies, you see the issue of managing for the stability of the resource. If one looks in the Alaska region and just plots the history, one finds that there has been very little stability in the resource. Will we ever get to a position where we can effectively forecast the consequences of nature? Also, we should perhaps be looking at the stability of the industries, their capacity to respond, and assume that natural variability is an inherent part of the resources that we are dealing with.

ANSWER: First there is a need to distinguish between stability and constancy. I am always being told by people in the airline business that when you look out the window and see the end of the wings flapping in severe turbulence, this is a good sign. It shows it's not going to fall off and it's flapping to absorb the disturbance. I think stability has to be thought of in that sense.

The stability of a fish stock or a fishery must be its ability to absorb. If you're talking about the fish stock it must absorb a year or two's unsuitable natural conditions, plus the impact of fishing. I think, a lot of the problem in the pelagic areas and the upwelling areas of the world has been that some of these stocks like the anchovy, can withstand heavy fishing in good years. They can withstand bad environmental conditions if there's not much fishing, but not both. You have to manage stocks so that your fishing impact is such that the stock can withstand fishing and a few bad years of poor "environment." Equally, you've got to manage your fishery in such a way that the industry can withstand the bad years as far as possible from its own resources and live on its fat. I think, if you look at stability in that sense, then clearly stability is important. If you look at stability just in terms of keeping everything constant, you're trying to do the impossible.

Conflicting Conceptual Tools and Faulty Similies

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ABSTRACT

Contemporary fisheries management suffers from a lack of direction because there is no overriding philosophy or a public consensus against which national fisheries policy can be measured. The fundamental fisheries question that has never been answered is whether management is meant merely to provide opportunity, or to guarantee a return to the various constituencies comprising the fishing industry. With no clear mandate, and a proclivity for yielding to political pressure, contemporary management in effect seeks to guarantee returns by institutionalizing inefficiency.

INTRODUCTION

View From the Bridge

The difficulty lies not in new ideas, but in escaping from the old ones.

John Maynard Keynes

The Koran says, "If you don't know where you want to go, any road will get you there." Having no goals may be the ideal circumstance for a spiritual quest, but it is a very expensive foundation for fisheries management. And yet, current fisheries management on the North Pacific is largely without goals. Within the context of contemporary fisheries policy, virtually any road will do. Today's management apparatus will consider virtually any option as a possible alternative as long as it services political expediency, even without an overriding goal or goals that might lend cohesion to the process.

The costs are high: high for the taxpayer who subsidizes the confusion; high for the fisherman who must re-tool his operation every time the political winds blow; high for the processor whose merchandising suffers from erratic supply and artificial prices; high for the consumer whose table is supplied by an inefficient industry; and high for the communities and support businesses that depend upon fishing.

The cost to our seafood resources may be highest. Nature knows where she is going even if we don't, and just any road won't do if we are to relate to the natural order in harmony rather than in conflict.

The shortcomings are by no means solely those of management. The edifice of regulatory confusion that governs our fisheries was built by various segments of the user community pushing policies they viewed as crucial in the near term. But appropriate, long-term management must do more than strive to please its various constituents. Management must provide consistency and direction, if not wisdom. In this respect our present system falls far short of the ideal.

LESS THAN THE SUM

We must first recognize, of course, that the harvestable portion of our marine resource complex is far less than the sum of its parts. We will quickly exhaust the biological whole by striving for maximum use on a species-by-species or fishery-by-fishery basis. We can't manage "crab" or "cod" or "salmon" without considering the entire ecosystem. Yet we fish on mixed stocks with mixed gear, while a multitude of constituents clamor for "their" rights, so that there is considerable reason to doubt that we can adequately manage our resources at all. Can a capitalistic and democratic society cope with the pain of allocation that management in a commons entails, or is tragedy the inevitable result? It is too soon to conclude that we have failed the test, but the jury is still out.

Present-day management is hardly a fount of leadership; rather it's a coping mechanism, an oddsmaker that shoves the prospect of success from one constituency to another depending on whose agenda is politically ascendant. For fishing businessmen whose livelihood depends upon picking a route through the regulatory obstacle course, the winds of change are as harsh as a Bering Sea williwaw. Politically-induced change that has nothing to do with the principles of business or biology is especially pernicious at the state level. Matters are somewhat better at the federal level only because federal decision-making moves at glacial speed.

Interminably slow federal action is usually the source of outrage because someone's agenda has been derailed by policies promulgated after the train has not only left the station, but is out of sight. In a very real sense, however, (at least regarding domestic allocations rather than conservation) federal ponderousness is a positive phenomenon. It limits the amount of damage the bureaucracy can inflict. There simply isn't time to wreak as much havoc as would otherwise be possible if managers could yield to every blandishment.

Unfortunately, because it is harder to count fish than votes, the federal management apparatus moves even more slowly on conservation

issues than it does on allocations. The biological repercussions can be severe.

Uncertainty is the nemesis of a capital-intensive production industry where business choices, such as what kind of boat to build or what style of operation to adopt, have long-term, very expensive consequences. And yet, uncertainty is rife in the fishing industry for at least three reasons. First, there is the cyclical nature of most fish stocks, coupled with the logistical problems of doing business in harsh and distant realms like the Bering Sea. Second, there are the limitations of marine biology: the innumerable gaps in our understanding and our proclivity for attempting to reduce the universe into ones and zeros to make it compatible with the computer age. Third, there is no philosophical base to guide and stabilize our regulatory efforts.

For some fishing businessmen the managerial debate over means and ends is largely irrelevant, except where conservation is legitimately at issue. From his point of view, it makes little difference which regulations are chosen as long as they are consistent over the long term. The superior fishing businessman will prevail in a consistent regulatory environment even if management limits the fleet to rubber boats.

From the same business point of view, of course, the best management is the least management. Efficiency and output would be maximized if management did nothing but protect resources and leave allocation issues alone. But contemporary management is designed to ensure that no one gets too efficient, too successful.

Fisheries management today is founded on politics, not biology or business. However as the managers, the "bio-politicians", characterize their actions, the real mission of the contemporary management apparatus is to equalize returns, to make sure each constituency gets a slice of pie. This aspect of management is something of an undeclared war on efficiency. Managers institutionalize inefficiency through gear restrictions, area registration or some other means. Their unspoken purpose is to guarantee that free competition doesn't eliminate any of their political constituencies from the game. They want to ensure that everyone gets a return.

OPPORTUNITIES OR RETURNS?

Should our management system guarantee opportunities or guarantee returns? This is a question that has never been answered clearly and publically. Without a definitive statement of managerial purpose this is one of the principal problems plaguing the fishing industry. Guaranteeing opportunities would be the free enterprise choice. To guarantee returns, as has been done in other industries, is a much more expensive proposition: witness farm supports of \$18.9 billion in 1983, a year when net farm income amounted to \$17 billion.

That management has never answered this question satisfactorily also reflects divisions within the fishing industry. The aggressive entrepreneur prefers that guaranteed opportunity be the mission of management, but there are others who prefer a guaranteed return instead. Ultimately, for the superior businessman, the choice of one road or the other is irrelevant because operations can be structured

to produce profits in either environment. What is unacceptable is the no answer option, and that is where we are today.

If management guarantees opportunity, and lets the economic chips fall where they may, the fleet will respond in one fashion. If, however, management chooses guaranteed returns, the industry's response will be far different. It is important for management to appreciate how the industry will respond to its policies. If equalizing allocations is to be our managerial credo, then let's do it up front, by the most effective means possible. Let's have a public pie-cutting and be done with it, instead of the current system of attempting to guarantee returns to subsets of the fleet by devices like area registration and gear limitation. While each restriction may have a short-term, narrow-focus rationale, the result is a regulatory jungle that raises costs and promotes inefficiency for the fleet as a whole.

Without a public consensus on the question of guaranteed opportunities or guaranteed returns, the fishing industry is dedicated less to producing seafood than to adapting to the administrative maze created by a directionless bureaucracy.

Our managerial system lacks candor in other respects. The ocean was "fully utilized" in terms of biological interdependence before the first fishing boat set sail, but we create the notion of "surpluses" in order to turn fish into profits. We must be honest enough at the outset to acknowledge that every fish we catch represents a disruptive impact, and yet political pressures always nudge the commercial harvest toward the high end of biological possibility.

MANAGEMENT OPTIONS

If in the beginning there was a natural balance, we have long since presumed to stir nature's soup whenever it suits us. In this age of technological mastery over the physical realm, our management options run the gamut from catching virtually every fish to the blanket protection now afforded marine mammals.

History tells us what our options are likely to produce. We have witnessed the tragedy of the commons and the stagnation of the collective. We know that certain options produce the most fish, while others produce the most jobs and still others the highest profits. Within the constraints of culture and society, we could maximize the "yield" from the Pacific Ocean in any number of respects. But without a clear sense of direction, we lack the political will to fully exploit our opportunities.

We have no broad understanding that enables industry and management to view each other with tolerance, much less respect. We haven't even agreed on a definition of progress. Is it a linear increase in poundage in five percent installments annually? That would satisfy an economist, but doesn't reflect the cyclical character of marine resources. Is it steadily expanding participation or profit? Neither the politicians nor the entrepreneurs will ever be so lucky. Is it an ocean that behaves according to computer models? That would be the biologist's dream.

Without consensus, without definitions, without goals, industry and management are engaged in an endless game of quid pro quo in which each new election, each new appointment, each emerging constituency re-invents the wheel and rewrites the agenda. The process is always adversarial, always short-term. There is no higher plane, no consideration of the long term, no direction. The mere fact that conflicting user groups negotiate to a "middle ground" has no bearing on whether their compromise is the proper one. Yet the management agencies will always embrace the negotiated solution for expediency. The result is a powerful undercurrent of chaos in an industry that cries for consistency.

END OF THE FRONTIER

The "frontier era" of Alaskan fishing has been replaced by the "allocation era", creating even more political turmoil. Giving away fish had no cost in the frontier era. Increasingly, every allocation of Alaskan fish now comes at the expense of some domestic constituency. With no creed other than expediency, management in such a context may deteriorate into a shrill clamor of competing interests.

Witness salmon "limited entry" in Alaska, which yielded to politics and boosted the amount of effort in the fishery and the cost of participation. Limited entry is a term that cries for definition. A scheme of entry limitation backed by political will may be reasonable, but the Alaskan salmon version falls short. It hasn't reduced effort, yet it places a dollar value on the access to the fishery and creates a second, highly inflationary economy in licenses without contributing to fish production. In this instance management promulgated a potentially viable remedy for the problem of salmon allocation, then caved in to the political outcry that greeted the action. It is a scenario that may well be repeated.

Under a scheme of limited entry, it seems management-imposed inefficiencies would no longer be necessary. With the number of participants in the fishery controlled, logic suggests that their operations should be unfettered. If past experience holds true, however, management will continue to be driven by the political system to promote inefficiency even after entry has been limited.

The first step toward meaningful advancements in fisheries management is the development of a long-range management philosophy. It must stabilize allocation and effort during periods of political transition, but be flexible enough to respond to biological fluctuations. Such a statement would represent for fisheries management what the Constitution represents for the country: not just an exercise in lofty rhetoric but a vital measuring stick for evaluating current policies; a practical means of balancing immediate needs against the long-term health of the resource, the commercial fishing industry and society.

There must be leadership in the open political system, not simply retreat to a middle ground. Someone has to bear the bad news and make the tough choices. This is increasingly difficult in a litigious society where a constituency whose interests are denied can paralyze decision-making even if its position is frivolous. In such an era, a fisheries philosophy becomes an even more critical crux of leadership. It could become the glue that binds an industry

preoccupied with efficiency, and a management bureaucracy preoccupied with equality: two entities with no other common ground.

THE FISHERY CONSERVATION MANAGEMENT ACT

The document that has established the current system of federal fisheries management within the 3- to 200-mile Fishery Conservation Zone (FCZ), the Magnuson Fishery Conservation and Management Act (FCMA), may appear to provide long-term guidance. Those of us who have served at the nominally preeminent regional council level know from day-to-day experience that this legislation cannot curb the excesses of political expediency.

Indeed, it seems that the politicians who drafted the FCMA were only secondarily concerned with the philosophy of fisheries management. The guiding principal that has evolved from their efforts, optimum yield (OY) works against consistent, long-range decision making. Rather, it encourages the opportunistic character of the fishing industry, something it is ostensibly meant to alleviate.

Without a national fisheries management philosophy, however, the FCMA does provide us with opportunities at the regional level if we aggressively pursue regional goals. The alternative, a vacuum at the regional level, would give control over our fisheries policy to interests in Washington, D.C. that have no first-hand understanding of fish or the fishing industry.

What should our long-term philosophy be? The answer to that question lies far beyond the scope of this paper, but some of the considerations that must be addressed are clear. The most important, most politically intractable and most far-reaching question is the one already stated: Should the goal of fisheries management be to guarantee opportunity, or to guarantee returns?

This question is key to everything the regional management councils are trying to achieve. It is a loaded question, and not one unique to the fishing industry. As a matter of fact, it is central to many aspects of current socio-economic policy. When we bail out the Chrysler Corporation, we answer it one way. When we refuse disaster relief to fishermen, we answer it in another.

It is a big question, but not so big that it can't be addressed and given the political will, answered conclusively with respect to fisheries management. Guaranteeing opportunity is the relatively simple way the marketplace distinguishes winner from loser. There are successes and failures, but, as Clem Tillion would say, "Bankruptcy is the epsom salts of the free enterprise system."

POLITICAL ARENA

Guaranteeing returns is far more difficult, far more complex and far more expensive. It thrusts fisheries management directly and deeply into the political arena. The solution may become more expensive than the problem. A few will go broke under the system of guaranteed opportunity. But an entire, bloated, inefficient industry may teeter on the brink of collapse under the system of guaranteed returns. The managers may find they have equalized the industry around non-competitiveness and failure, and that they now must become procurers of

subsidies, price supports, tariffs and other forms of artificial vitality. Suddenly the lawyers and lobbyists become more important than the fishermen, administrative costs reach staggering levels and the fishing industry becomes dedicated to its own perpetuation, not to producing food. Again, witness the disarray and the costs associated with contemporary farm policy.

For the businessman whose concern is efficiency rather than equality, guaranteed opportunity is the preferred management philosophy. It is disturbingly apparent that without a clear and public consensus on the question of what management is meant to achieve, managers have embarked on an undeclared program of guaranteed returns.

They have not done so entirely on their own. Our management system responds and copes, it doesn't lead. Every regulation has been sought by someone, and it is interesting over time to watch various factions flip-flop as they seek to cover their sterns in response to different circumstances. Management isn't leading us to ruin. Lacking both direction and political will, it isn't leading us anywhere.

We need goals, we need a philosophy of fisheries management, we also need to examine the problem of "management by equation". What we have now is alphabet soup: MSY modified by the political "wiggle factor" equals OY. It looks very convincing on paper, equation management is creating a dangerous illusion about our ability to manage fisheries resources. It presupposes we have more precise abilities to monitor resource levels and trends, and to control or anticipate fishing effort, than we actually have.

In this age of the divine computer printout, we have reams of data and a growing club of biological oddsmakers who handicap marine resources like bookies at the Superbowl. Just as the NFL point spread is often overturned, the biological predictions may have little to do with reality. Yet the predictions are the basis for much of the managerial and financial decision-making that infuses a fishery.

A fisherman probes a fishing ground for a lifetime, and his efforts are called prospecting. A biologist observes the same locale for a month and his are called research. They both have valid insights. Equation management, as it is presently construed, accepts primarily the input of the biologist. His research is massaged sufficiently to ensure that it fits a computer-shaped hole, then becomes the basis for predictions. In turn, those predictions may create thoroughly unrealistic expectations for resource managers and financiers about the collective impacts of the fleet, or the prospects of particular fishing operations. The managers set quotas anticipating a certain level of success, and the financiers capitalize a fleet with the power to realize their figures. The marketplace greets the biological astrology by juggling inventories and adjusting prices, before the fleet goes out to see what's really there.

MILLIONS OF CRAB

When I first joined the North Pacific Fishery Management Council as a fisherman-representative, the slickest computer print-out of the day described "hundreds of millions" of tanner crabs at large in the

Bering Sea, and postulated a bonanza that extended far into the future. Armed with my own insights and those of others who had spent their working lives on the fishing grounds, I contended that the trend was downward. Typically, the fleet's input was discounted. The observations, and more importantly the intuitions, of the fishermen didn't fit the computer model. Intuition is one of the businessman's foremost tools, but it is a term that doesn't exist in computer language and doesn't figure in equation management.

The quota system works when the biological seers happen to be right, but the resources regularly confound them in all directions. A low estimate and consequent overescapement brings wails of outrage about "wasted" opportunities. Inflated predictions place inflationary pressures on the industry. To an increasing extent, equation management and the all-important quota have destabilized the industry, causing cycles of overcapitalization and subsequent failure; along with speculation in the means of production, the plants and boats.

The biological realities are that no species of animal can long exceed the carrying capacity of its environment, but the genetic urge is to try. Marine resources frequently build to unsustainable peaks, then collapse and begin the process again. The problem with prognostication is that we never know where we are on the abundance curve. We may find ourselves capitalized for the resource cycle's peak because of false promises of equation management, coupled with the activities of speculative players in the fishing game armed with linear minds and pro formas based upon the predictions.

The speculators and their banking partners may understand little about marine resources, but they certainly understand formulas like this one: 300 pots times 30 crabs per pot times X lifts times Y vessels equals Z million dollars. That kind of thinking spurred the tremendous growth in the crab fleet and the extent of the collapse. It was aided and abetted by equation management, by the computer print-outs that looked so impressive on the banker's desks, and by the FCMA requirement that the domestic industry capitalize for full exploitation even if the resource was at a peak, in order to win its competition with the foreigners.

It is not only the banks but government incentive programs like the Capital Construction Fund (CCF) that accept computer print-outs and bio-political projections as the linear gospel. When all these speculative forces gather momentum, career fishermen who understand the peak and valley fortunes of their industry are forced to play along or quit. It is revealing that the most successful fishermen tend to be those who know when to sell their boats.

KING CRAB EXPERIENCE

It has happened most visibly in the king crab fishery. Crabbing was once managed on the basis of size, sex and season, and conducted by relatively small boats that survived by scratching out crabs month in, month out. That stable foundation was changed radically by quota management and the arrival of speculators armed with policies like CCF. These twin pressures caused an evolution toward big boats that harvested crab intensively in seasons that came to be measured first in weeks, then in days.

Equation management and the incentive programs that permitted the pyramiding of money, promoting high debt with funds available at less than the rate of inflation, made it almost impossible not to build a bigger boat. Suddenly, with the quota in effect, time became the enemy. The path to success was to get the most the fastest. Instead of delivering five 100,000 lb loads, you had to build a bigger boat and deliver five 200,000 lb loads. The fleet built to fit the regulations, it didn't happen by accident. In this respect, as in others, management had goaded the industry in a certain direction.

If the quota-induced intensity favored bigger boats, the catcher-processor was even better. Here was a boat that could remain on the grounds throughout the fishery and maximize production during a short season. Since the market would accept crab smaller than the regulatory size limit; and since there was enforcement only at shoreside plants, not on the grounds, the catcher-processor had a larger resource to work with. That catcher-processors took undersized crab wasn't a moral problem--no more than the fox in the henhouse is a moral problem--it was an enforcement problem. In this case, what management didn't do goaded the fleet toward a certain style of operation. It is important to note that the problem of enforcing size limits is a constant under any management system, whether it is based upon a quota or upon size, sex and season.

If this managerial shortcoming has spurred the growth of catcher-processors, it has also helped destroy the trust upon which good management is founded. Operators of shoreside plants or floaters are now reluctant to let a biologist on their premises because they know the size limits aren't being enforced on the catcher-processors. The opportunity for a cooperative approach is being lost because of the sense of discrimination experienced by a segment of the industry.

In the king crab fishery, inflated expectations were one consequence of quota management. Steadily intensifying financial pressures were another. The breakdown of trust was a third. The "roadmap" phenomenon was a fourth. There was a time when successful Bering Sea fishermen had one thing in common: years of experience on the grounds and a black book of hot spots that took years to compile. Then came the pre-season trawl surveys that ostensibly measured the future, provided the basis for the quota, and made the locations of major crab concentrations part of the public record. The biologists helpfully provided loran coordinates for the stocks they discovered. The experience of the professional was largely nullified, much to the delight of the speculators.

The fishery grew at a fantastic pace, both in terms of production and fishing power. In the tanner crab fleet, it was the result of another form of managerial goading: the domestic fishermen had to create a fleet capable of using the entire resource before foreigners could be ousted from the fishery. When the resource collapsed in 1981, we had a magnificent fleet of shiny steel dinosaurs built for a peak that may never reoccur.

The big boats were a consequence of management. No one was more stunned by the crash than the managerial-financial establishment that had really believed computers could see beneath the waves. The equations produced expectations for a certain level of success that

radically changed the industry. The system had inadvertently promised returns, and the level of failure was far greater as a result.

Management tried to mitigate the peaks and valleys in the resource cycle with quotas meant to produce a "carry over" of crab from one year to the next, and the attempt was an abject failure. Size, sex and season management would have protected the resource as well without the same emphasis on big boats and intensive operations. Now there is no return. The fleet that has adapted to equation management and the quota would have a devastating impact on the resource under a size, sex and season regime.

The unfortunate requirement that all harvestable resources in the 200-mile zone be caught, either by U.S. citizens or foreign fleets, overrides the economics of supply and demand. By guaranteeing that the foreigners will get whatever domestic fishermen cannot use, the system undercuts prices for the emerging domestic industry, and gives the nations that carry out the bulk of the harvest inordinate control over the markets for our resources.

This same system of management, in conjunction with current foreign fishing policy in the Fishery Conservation Zone (FCZ), is already promoting overcapitalization in the domestic groundfish fleet. It requires that U.S. producers have the capacity to harvest and use the entire groundfish resource before the foreigners can be displaced, and another collapse of king crab proportions is by no means inconceivable.

There is nothing wrong with letting fish go free any more than there is in letting a field lie fallow. There is nothing abhorrent about shutting down a fishery and sending the foreigners home if it suits our economic interests; certainly nothing that contradicts standard U.S. behavior. This nation has no moral scruples attached to its food policies. After all, farmers are paid billions of dollars not to farm while the children starve in Ethiopia. The world runs on a dollar economy, and food flows toward the people who can pay for it.

The idea that our ocean resources have to be fully used, either by us or by someone else, contradicts economics and has nothing to do with morality. It is a political choice. The U.S. State Department finds it relatively painless to give away the nation's fish in the interest of promoting larger strategic and economic concerns, when only a few fishermen rail against the inequity. The fact that we don't use fish as a more effective economic weapon simply reflects the fishing industry's lack of clout. If there are doubters, consider the fact that fish, the superb protein, is only now being proposed as a "food" in the national lexicon, while the tobacco from Senator Jesse Helms' North Carolina is not only officially a "food" but a highly subsidized one.

SUMMARY

These are examples of a politicized management system, one in which expediency often undermines both business and biology. The current system, rife with inefficiencies and confusion, wastes the full potential of an industry that could provide far greater benefits to society, however those benefits are ultimately defined. Once we agree on what we mean by "progress", management must tread a delicate

balance: it must provide stability in its development policies, even while it gives the industry the flexibility to respond to changing conditions on the ocean.

The first step is to establish a guiding philosophy so that our management policies, now largely backward-looking and intended to redress past inequities, point to a stable future. This managerial creed could provide the consistency now lacking in much of what our management system undertakes, and consistency is crucial to business. Not that there hasn't been progress. The decision of the North Pacific Fishery Management Council to establish a policy on joint ventures, for example, is a giant step in the right direction.

We must decide whether opportunities or returns are to be our principal goal, and management must be candid in representing its ability to further either objective. Management can guarantee returns to some extent, it can eliminate a degree of risk from the business of fishing, but only at the cost of efficiency, and of reduced adaptability. And, as every professional fisherman understands, adaptability is the key to success in a changing ocean environment.

Discussion

MCKENZIE: The previous speaker seemed to focus almost all of his remarks about management and what needed to be done on amending the FCMA or some other law. It seemed, except in the financial arena, you were talking more about attitudes. Would you comment on whether what you see needs to be done is more attitudinal or more legislative? We've already amended the FCMA any number of times and certainly we can amend it again. But will that really contribute in any meaningful way to resolving the problems that are confronting the industry, in many cases the same problems that were confronting us in 1976?

ANSWER: What I tried to bring here is my perceptions. Most people that go out fishing, they get a copy of the rule book. They want to know when can I fish? Where can I fish? How much can I fish? When can I stop? When can I get back? They like that as simple as possible. One license. Now, we have to have a state license, a federal license, a tank inspection, and area licenses. That's basically, I think, the problem of decisions out here. If we're going to make this council system work, I think that is very important that we stick with it. If you lose, you lose and you don't go running back to Washington D.C. I think it reflects badly on everybody.

My real expertise on this, isn't the bureaucratic "how you get things done", "how you don't get things done." That's why I usually run to the hill. I say this is what I see wrong...You guys fix it.

DYSON: In the last thirty-five years that I've been involved in the fishing, I sensed that we've perhaps gone too far in managing people and have stopped managing fish and the resource--biologically and scientifically. And also the development of our markets. What do you have to say about that?

ANSWER: Well, I think you're right. But that's what politics is all about, managing people. I've said the same thing. Many times the fishermen and the industry can detect these biological glitches long before management. They'll say, hey, we can see that the crab stocks are going down here. We've got a new fleet building.

I can remember one time when the size limit for crab in Adak was seven inches. There was a big effort in Kodiak to get it dropped to six-and-a-half, so they'd have another couple years of that half-inch out there to keep the boats from coming in. Kodiak was made an area registration. When the people that made it their area of registration got the ability to get a floater to go to the Bering Sea, they wanted an area of registration taken off. Sometimes, I think management can respond too fast, this is where it's very open to the political manipulation. One constituency comes in; management responds. The other one doesn't even find out about it till the next year. They get up in arms, jump on a plane, and come to the meeting because they've been impacted. They try and change it back and forth.

This is a delicate matter. I don't know how fast you should respond, but I think you have to be aware of what you are responding to, and so much of it is politics and managing people. Every reaction that the Board of Fish and Game has, somebody's asked for it. React this way. Protect me. Give me area registration. Make him inefficient. Remember the guy that came in and testified he wanted a 36 pot limit? Gave a half-hour speech. It was great. Sounded good. I asked, "Why 36? Why not 37, 38, or 35." He said, "Well, 36 is all I can carry." So, I really think we are managing people, but people have requested us to manage people.

The Divergent Results of Political and Biological Considerations in the Management of Fisheries Resources

William Hingston
Processor
Seattle, Washington

Since 1947 I have been continuously involved in nearly all of the fisheries in the Kodiak area, as well as salmon fisheries throughout the coastal districts, and herring fisheries from Prince William Sound to Togiak and Goodnews Bay. In addition, I have been closely involved with the development of the Alaskan scallop fishery, the development of the Kodiak dungeness fishery, and the Kodiak shrimp fishery.

Throughout this period, the Kodiak salmon fishery has been the one stable fishery reasonably well-forecasted and managed by the ruling agencies. Prior to statehood, this fishery was managed by the Bureau of Commercial Fisheries from Washington D.C. This was quite likely political management at its very worst. Seasons were set without regard to tides, biological swings, or mother nature's capricious whims. There was one underlying consideration: 50 percent of the run was for harvest and 50 percent was for escapement, provided the fish arrived during the season set the previous winter by an unknown bureaucrat in Washington D.C. It literally took an Act of Congress to get an extension, and an earlier opening was impossible.

The State of Alaska manages on a different basis than the Bureau of Commercial Fisheries did, using local advisory boards to represent the interests of each sub-district. These advisory boards submit their "wish list" to the state for discussion before the governor's appointed Board of Fisheries.

This board holds public hearings long before the specific seasons start, but they meet during the year if some pressing decision must be made. With so many personal interest groups throughout the state, it is hard to imagine a more political process. In spite of its cumbersome nature; in spite of the cost in time, money, and human resources; in spite of the nitpicking and a vested "looking out for

number one" approach; this system has, in the broad term, worked very well.

Timing for even-year salmon runs in Kodiak is normally earlier than for the odd-year runs. Under the federal management system the season rarely changed, closing either the 6th of August or the 13th of August, depending on what the regulations said when published in the Federal Register in the spring. As a result, some late runs such as those in the Dakovak area were really never harvested. When the late runs were strong or abnormally late, there was really no way to extend the season or to reopen it once it was closed.

For several years in the late 40s and early 50s, in an effort to seed the heart of the run, a closure of two weeks from July 15th to August 1st was instigated. In 1949 or 1950, this resulted in huge schools of pink salmon on every beach from Wide Bay to Cape Douglas. When the season reopened on August 1st, over 1,000,000 pinks were caught by the fleet fishing the Village Beach grounds. This beach is less than 7 miles long and from the air there was no visible dent in the fish population. On August 1st, these fish were still bright. But by the time the season closed, many of the other areas were too dark to harvest.

This mid-season closure was a mistake and a resource that should have been harvested was lost. My primary job from 1947 through 1950 was fish spotting. No amount of pleading with or showing the resource to the local management could reduce that closed period. These instances were strong arguments for less political and more biological considerations on fishery stocks.

In 1967 the Kodiak area had a very low forecast from ADF&G and most plants and fleets were prepared for the failures that did, in fact, occur. The total pack was 52,000 cases on a 48/1# tall basis, and a lot of those were chums.

However, from that minimal escapement, the large 1969 run returned. By July 30th the plant I was managing, Kodiak King Crab, had packed 10,000 cases. For the next five weeks all operating plants were operating at capacity. Kodiak King Crab ended the season with 126,000 cases. Because of local management flexibility and good cooperation from Juneau, it was possible to harvest a run that was abnormally late as well as exceptionally strong. The Wide Bay run was again very large and very under-harvested. Mr. Larry Freeburn and I actually waded through the schools to make sure they were too dark to harvest. Incidentally, I do not think there has been a run approaching this magnitude in Wide Bay since 1969.

In recent years, it has been possible to harvest most salmon surplus to escapement requirements by spot opening on specific stocks when the rest of the district stocks did not justify further exploitation. I used to be the only fish spotter in the air. There are now many spotter planes keeping track of salmon build-ups. Most of these planes report any build-ups to local management.

The sole consideration for these openings has been the ability of the resource--to allow harvest of fish surplus in excess of escapement requirements. Since statehood, Kodiak has been blessed with a series of good managers. Certainly we, as processors, have not always

agreed with them, but the salmon management for biological purposes has been very satisfactory. Incidentally, the primary tools for adult stock management are aerial surveys of both streams and estuaries.

One of the major problems, if not the major problem, facing most North Pacific participants in the fishing industry is over-capitalization. While I am sure this will not be a popular position, recent history strongly indicates that cheap and easy Alaska state loans along with the Federal Capital Construction Fund have created a monster that threatens to destroy the very people it was designed to help. State money financed many fishermen for permit and vessel loans with such leverage that the slightest decrease in harvest poundage, volume or unit value meant that they could not be re-paid. While there are also many conventional mortgages in trouble, it is the political "help" that has done the most damage.

Fishermen that were doing well with a modest conventional salmon boat diversified into other fisheries such as crab or shrimp. When those fisheries failed, salmon alone could not and still can not make the mortgage payments.

The same rationale has overtaken the plant owners, where plants have been financed without sufficient thought about whether the resource can make that plant pay. Plants that were built to process crab or shrimp now process salmon, halibut or bottomfish in an effort to survive until their primary resource returns or until some new resource is developed. In the meantime, the salmon plants are also in trouble. Their margins are so thin that no amount of volume can generate a profit, and losses are the norm instead of the exception.

The Capital Construction Fund has done a similar disservice to the North Pacific fishery. By allowing vessel owners to delay taxes by continuing to build more and/or bigger and better vessels, the problems of over-capitalization were intensified and compounded. When the crab and shrimp resources were depleted, the wholly-owned boats were in as much trouble as the mortgaged new boats because the owned boats had been used as security to build the new ones.

Whether the current depleted resource condition is due to overfishing or to natural causes is immaterial. The effect is the same. There are not enough fish being harvested to support the infrastructure and everyone is suffering. What appeared to be good political intentions, in the long run devastated many owners and investors that have vessels with high mortgages exceeding current market values. This condition still exists. Many vessels now being sold are bringing about 30 percent of the mortgage value.

Which brings us to the management problem. How do the resource managers cope with a depressed stock when the pressure from the fishermen, the processor, and probably the most difficult to handle, the politician, is fully applied. When the Bering Sea crab stock showed unmistakable signs of a decrease in biomass, much pressure was applied to take younger stock, in order to maintain the gross earnings required to pay the bills.

Unfortunately, as soon as a risk-taker pioneers a new fishery that shows promise of paying the bills, it is soon saturated with effort. During the 50s a resource developer could count on at least a year of

minimum competition in which to recover his risk capital. With the number of underused vessels and plants today, this is no longer possible. Reaction time is much faster than it used to be and lead time is reduced to weeks rather than years.

Let's look at a bit of history and examine some of the past and current fisheries practices.

In the 1950s when king crab was first being harvested and prices were as low as 7 cents per pound, a few Kodiak fishermen such as Lloyd Cannon, Oscar Dyson, Dave Murphy and Louie Wick were fishing crab on a year-round basis. The only limiting factor on production was the soft-shell period when the crab were molting, or the plant shut-down to process salmon during the summer. At that time the fishery was working on about 12 year-classes with a strong population of large older crab; some as old as 20 years. Trips were small and most boats were either dry or were using lawn sprinklers and were small and most boats were either dry or were using lawn sprinklers and salt water pumps to keep the crab wet and alive.

As more and more boats, both bigger and better, entered the fishery, the average weight of the crab decreased and today nearly all of the catch is recruit crab. In the early years of the fishery, there could be a failure of two or three years in survival and it would not be too evident. Today when a year-class fails, the entire fishery fails.

The 1983-84 Kodiak king crab season had no fishery and the industry is reeling. Plants, vessels and fishermen are all experiencing difficult times. Plants and vessels are changing hands at distressed prices sometimes as low as 30 cents on the dollar.

Even in retrospect it is hard to see what approach, other than a major reduction in catching and processing effort with a corresponding decrease in harvest, could have prevented the fishery collapse we are now experiencing. Use of larger vessels caused industry pressure to increase the pot limits. Management problems multiplied as the number of pots increased and the numbers of crab available decreased. Fishermen and processors were exerting strong political pressure for longer seasons and smaller size limits; while the resource managers were shortening the seasons, reducing the quotas and fighting hard to save some seed stock. In this fishery it appears everyone lost when political pressure won over resource management resistance.

The shrimp fishery in Kodiak during the 50s and 60s was very strong with some 60 peelers operating in Kodiak at one time. Some plants were operating around-the-clock. Pressure to generate income now rather than later led again to harvesting smaller and smaller shrimp, including large quantities of two-year shrimp, really not much larger than pinheads. The last year that shrimp were available on the Marmot edge, the February fishing produced tows of 25,000 pounds of large shrimp, primarily four and five year olds, with double riggers having 25,000 pounds on each side. When the season reopened in May there were no shrimp in that area nor could they be found anywhere in the surrounding area. To the best of my knowledge shrimp have still not returned in harvestable numbers to the Marmot district.

In this particular area it does not appear that overfishing was the cause of the fishery failure. It appears to have collapsed from natural causes. I personally felt that the fishery on two year olds should not have been allowed and a minimum size count should have been established, but it is doubtful that any change in management strategy would have prevented collapse of the stock. However, there was continuous pressure on the department by nearly all of the fleet to open the closed areas. When the collapse came it was quick and total, again a combination of too much processing capacity and too much political pressure for a fragile fishery to survive.

These two fisheries involved resources that cannot be observed or counted. Both have collapsed, for reasons not fully explained or understood. On the other hand, the salmon and herring resources can be observed and counted, and except for normal cyclical variation are continuing to produce well. Management, at least in Kodiak with which I am most familiar, has done a good job of securing escapements and at the same time has allowed near-maximum harvest of both salmon and herring.

During the early 70s Kodiak had several years of uniformly adequate salmon escapements and uniformly poor returns caused by cold winters and poor survival conditions. In the mid-70s, those severe winters moderated and have been moderate ever since. As a result pink and chum runs were strong until 1983, when a disappointingly small run materialized. Unfortunately, the fleet's capability and capitalization had increased at the same time the market values of all salmon declined. Even with good runs, many individual gross stocks are not sufficient to service the debt and to support the owner.

Here is a case where resource management has been excellent and still the industry continues to struggle from crisis to crisis. Make no mistake, the entire industry, processors as well as fishermen, is fighting to survive. While there are probably ten plants that have failed in Alaska for every one still operating, there has never been a time in my working life when conditions were as difficult as they are now.

The Togiak herring fishery, on the other hand, appears to be responding to current management. The resource can be counted or estimated before the first fish is captured. This is the ultimate in management protection of the stock. It is counted, checked for age group, and the roe checked for both quality and quantity before a fishery is allowed. In the future there may be a series of spawning failures that will reduce or close this fishery, just as has occurred in the crab and shrimp fishery, but for now the resource is very strong with good six- and seven-year-old stocks.

The Togiak and Norton Sound herring fishery probably is subject to more political pressure than any other fishery in Alaska. The gillnetters and seiners each do what they can to control the other's percentage of the harvest and both want more total catch. As the gillnetters become more proficient in harvesting quality fish, their political pressure is bound to increase. Prior to 1984, the mesh size used by most gillnetters was 2- 1/4 inches which proved too small to harvest the older fish of good quality. In 1984 the mesh size increased for many vessels to 2-5/8 and 2-3/4 inches and the average roe percentage increased from 6 to 8.2 percent. The dominant

ing factor in this successful fishery has been the ability of the resource manager to stand up to fishermen and processors, pressuring for more tonnage. While I do believe the resource to be seriously under-harvested, the fishery is healthy thanks to a lot of backbone in a few resource management people.

The Togiak fishery consists of both seine and gillnet gear. In 1984 there were 196 seiners, 300 gillnetters, 25 processing companies and five roe-on-kelp buyers. The tidal current is strong and reasonably constant. Seine sets that are not promptly pumped out drift with the tide and more than occasionally snag up on the bottom, which results in tearing of the seine or hanging up on a rock and losing the set. When it storms, gill-netters can not service their gear and it is either lost or continues to fish indiscriminately. Most of the consistently high-tonnage fishermen sample their catch before drying up the set. The sooner they can turn loose a low roe set, the better chance they have of getting a good school. With one- and two-hour-openings there is little chance to correct any mistakes.

The gill-netters, on the other hand, have not perfected the technique of sampling to a significant degree. As a result they have earned the reputation of catching and selling fish with poor roe recovery. This poor quality literally destroyed the market for gillnet fish in the Togiak area and led to bringing in the Japanese longline fleet to process low roe-percentage herring for food fish on a co-op basis.

The domestic processor cannot recover his costs on this quality of herring. I believe this change of mesh size will provide gill-netters with the means to increase roe percentage to the point that domestic processors will be courting the gillnet fleet in preference to the seine fleet. Perhaps specialized processing vessels will be set up to handle the gillnet production.

Political pressure applied by the gill-netters to assure themselves a fixed percentage of the total herring catch is strong, consistent, and well organized and orchestrated. This pressure is primarily applied at the board meeting. Once the season is underway, all effort is directed to catching herring. The increase in numbers of gillnetters comes mainly from the residents between and including Bristol Bay and Norton Sound. To date some areas, namely the Nunivak and Nelson Island, have not wanted to participate in the fishery although biological resources appear sufficient to support a commercial as well as a subsistence fishery. Political pressure from the local residents keeps these areas closed. In the future, I expect this political pressure to stop, the fishery to be opened and new pressure applied to severely restrict the amount and kind of gear that could fish in this area.

There is also political and managerial pressure from one group to harvest food fish herring from the same stocks on the wintering grounds. The inshore fishery and management group is applying an equal amount of pressure to prevent this offshore fishery. Who is to say that the sustainable harvest is taken during the inshore fishery and none should be taken on the high seas? We do not know for sure the size of the resource. Estimates by various acknowledged experts differ even when evaluating the same stocks at the same time.

There is good reason to believe that stocks are generally underestimated on the grounds. But there is really no way to precisely calculate the total stocks, because of continual change of stock within the inshore fishery. Spawning fish move offshore, new fish move inshore, and only stocks on hand at any given time are included in biomass estimates.

The big crab boat owners facing a declining resource along with declining gross stocks can and do exert considerable political pressure to gain access to this fishery. It is not known just what inshore stocks comprise the offshore wintering stocks and this complicates the management problem. Foreign fleets also want access to fat herring on the fall and winter grounds for their high-seas fleet. This issue will be a hot one in 1984-85.

When the scallop fishery was being researched, an East Coast vessel, Viking Queen, was brought through the canal to Alaska to prospect. There was little factual knowledge about the resource. As the fishery developed, the Kodiak-based crab boats feared that the drags would destroy the pre-recruit crab stocks and also did not want anyone else to harvest the resource, denied by local pressure the City of Kodiak as an operating base.

While fishing out of Seward, the scallop fleet did find scallops on prime crab grounds. Promptly political pressure was applied to keep the scallopers off of those grounds. At that time the extent of the scallop resource was not known and there were really no studies to support or to deny that pressure to exclude scallopers. Today the fishery is not very intensive and scallop fishing is an accepted means of making a living for the one or two boats involved.

In Alaska there are older salmon fisheries that have fished the capes and passed on so-called "intercept fisheries." These fisheries are primarily in southeast Alaska, Kodiak, Shumigan Islands and False Pass and existed long before research-tagging indicated the destination of fish passing any given geographic point. As destinations became known, political pressure was exerted, as it is now, to modify fishing times, eliminate those fisheries, reduce the catch, or modify the catch composition in those intercept fisheries. In most cases resource management has attempted to satisfy all parties by allocating a percentage of the forecast, as at False Pass where a weekly quota is allocated based on the predicted run into the Bristol Bay watershed. Or they might allocate a percentage of the actual run, such as at Chignik where fixed percentages of the catch are allocated to the Cape Ikvak area in the Kodiak district and to the Shumigan Island area of the South Peninsula district. In these instances resource management and political pressures have reached if not agreement, at least accommodation on allocations between interception on the various capes and the catch in what would be considered home waters.

This past February (1984) at the ADF&G meeting in Anchorage, the question of chum interception at False Pass was raised by the Kuskokwim and Yukon River system fishermen. Even though False Pass has a long commercial fishery history, there is new political pressure to reduce the historical fishery. This despite the lack of research data to prove that the bulk of the chums in the False Pass fishery are bound for either the Kuskokwim or Yukon River systems.

The little research data available indicates that these chums are not bound for these areas. I am not trying to fault the interior fishermen for trying to increase their catch by even a few fish. But I am trying to point out that political pressure that changes from fishery to fishery at any given time can be in direct opposition to an established biological management program that has successfully managed an intercept fishery for many years.

In the past few years there has been substantial development of joint venture fishing for codfish and pollock in the Kodiak and western areas, using large-sized crab boats. These boats have converted to very sophisticated mid-water trawls. To this fleet, a small group of catcher-processor vessels has been added now approaching ten vessels. The season is now open for continuous fishing in one area or the other. The only restraint is tonnage allocations to domestic fishermen and to the foreign direct-fishing effort. Foreign governments are exerting considerable pressure, at a much different level than domestic fishermen, to increase or at least maintain their directed fishing quotas.

There is a good deal of speculation that the saturation point of the cod resource is near. Many fishermen say this isn't so, but this vested interest group made the same statements about crab and shrimp, and I would not give much credibility to their opinion. At this time all parties in the domestic cod fishery appear to be in relative harmony. There is, of course, continual political pressure from foreign governments to increase the directed fishery catch. It is highly possible that this directed fishery on cod will soon be terminated, and that the domestic processors and catchers will then exert their own political pressure to tailor the fishery to their needs.

There is not a great deal of firm evidence to establish the history, the present condition or the future of this resource. Sure, we know that it once supported a major salt cod fishery and that the fishery endured years of surplus and years of failure. But we do not know the current biomass, nor whether a year-class recruitment failure will affect local stocks only or, thru migration, affect entire regions.

Because of this void in knowledge, the cod management will likely be done on a conservative optimum yield basis. This approach will surely trigger a flood of political pressure exerted by fishermen and processors to place few, if any, restrictions on the codfish catch. The rationale is "let's fish it past the point of optimum yield and then cut back."

I suspect that one catcher-processor takes more cod in a year than all the sailing schooner operations did in a similar period of time. Nevertheless failures still occurred when no pressures were being applied from either the fishing companies or the regulating agencies.

The pollock fishery is certain to become the state's largest poundage fishery. But it has not prompted any management pressures because the resource is just too large for special interest groups to find any issue to rally behind.

One graphic example of the results of political pressure is the salmon industry in areas south of Alaska. I have not been involved with the fisheries in Washington state for the past ten years, but it does not take more than a cursory examination to realize how far downhill that industry has gone. Everyone agrees that there are not enough salmon to support the industry in the style to which it has become accustomed. At the same time, each fishing group seems determined to catch the last fish.

Here is a resource that is only a minor piece of its former self. Yet Alaska continues, rightly or wrongly, to block an overall West Coast salmon management plan. Washington, British Columbia and Alaska each claim their neighbor catches more migrating fish than their share of the production warrants. Sportsmen, too, have a hand in the stock decline and most catch reductions have been made at the expense of someone other than the sportsman.

The Alaska sportfishing industry, through political pressure, has twice thwarted the governor's appointments to the fisheries side of the Fish and Game Board. While the board itself is political by nature, its members generally have been able to take a broad outlook on the resource and do what was necessary for its continued renewal. As an outsider looking in, and that is better than being an insider looking out, I can not see any result of political pressure on the board other than the destruction of the board concept of management. This destruction will be caused by politicians more concerned with personal power and votes than with the preservation of an industry through judicious management.

The halibut fishery used to a long-term fishery with effort spread over many many months and many different stocks. Today it is a short-term fishery with the bulk of production being taken in a couple of very short, three or four day, openings. Everyone involved agrees this is a poor program and not in the best interest of fishermen, processors, consumers or the resource. Grassroot political pressure has delayed a limited entry program. Now that option has gone by the boards.

Which brings me to the final section of this paper. I have many questions and few answers. How should the resources be managed and apportioned? Who is to say which groups can catch a given stock and which groups are to be denied access? Who is to say if an established fishery such as king crab should be protected at the expense of a newly-developing fishery such as bottomfish? In this reference bottomfish includes all mid-water species as well as bottomfish. How do we assure good management without having to make every decision with a weather eye cocked at the political impact and ramifications of an unpopular decision? Assuming that ways can be found to curtail, limit, or eliminate political pressure, how do we remove a poor manager when civil service seniority insulates him from removal?

We need not be concerned with processor management pressure because processors are individualists and do not work well together. Their numbers are too few to have any real clout. Oh they can holler loudly but they have very little impact and, except when operating thru a trade association, are pretty much bluster and not much substance.

It is not too difficult to identify many problems with past, current and future management of fishery resources. The solutions to those problems are not so easily determined, or once determined, put into practice. I hope I have identified some of the needs, and that through free exchange of ideas we may collectively offer some improvement of the regulatory process. For without a strong management capability, the political process will succeed in destroying our fishery resources species by species.

Discussion

HERRNSTEEN: I feel that in Kodiak there has always been a resistance even when certain biologists would say you're silly to have a seven-inch size limit. You should go six-and-a-half. There has been a strong pressure from processors and fishermen in Kodiak over the years to keep the seven-inch size limits and to keep the quota system. Were you feeling that it's always this way, or do you feel it was a little bit different in Kodiak at different times with different crab stocks?

ANSWER: Kodiak just used more pots. Certainly no blanket statement ever applies to every fishery. I do think there was a lot of pressure in Kodiak. I sat in on a lot of meetings that were held to get at smaller crab because there weren't enough of the big ones to get around. If the six-and-a-half inch king crab is capable of reproduction, let's harvest six-and-a-half inch crabs. Do we have to give him an extra year or two to get to seven, or can we take him early?

HERRNSTEEN - Comment: I think it's best to go through the local advisory board, and by the positions of the advisory board, even though there will always be a few processors and a few fishermen who would push for the lower size limits and the larger quotas. There's always been a conservationist bent in Kodiak and support for going through the Board of Fish. This conference is on fisheries management issues and I think it's a mistake, since you're possibly the last industry person connected with the Alaska fisheries to speak here, to assume that the fisherman wants to get the last crab, or the last fish.

ANSWER: I don't mean to imply you're trying to get the last crab or the last fish. I'm just saying that many of the operators, in order to support the debt burden on the vessel, are going to do whatever

is necessary to come up with the dollar volume and keep from going bankrupt. I think that's the basic underlying premise. I grew up in an era when people bought a \$20,000 boat and took twenty years to pay for it. When the king crab fishery came into being you bought a \$2 million boat and paid for it in a year or two. I think we're getting back to the old program, where it's going to take a long time to pay for a boat.

This consulting business that I'm in is really illuminating. I'm exposed to a whole new element that I never knew was out there, namely, people that are sitting on boats that have got a problem. I know a good 120 foot power scow, which probably cost a million and three-quarters to build, that has just been foreclosed at a million and a quarter. And if you've got \$500,000 cash that boat's available.

The resources that we're working with, other than bottomfish resources, just do not generate enough dollar volume to pay off the cost of these vessels. When you take, for example, a Kodiak seine boat, a bare vessel capable of fishing salmon that cost \$30,000 to \$50,000, and go down and look at the 44 and 49 foot glass boats with the promoscopes and the two radars and all the gear that costs \$250,000 or \$300,000, add to that a salmon permit that somebody bought two years ago for \$80,000, and put him out there catching \$50,000 gross stock of salmon, he's in deep trouble. There's just no way he's going to get away with it. Because he's in deep trouble, he's going to ask to catch a little more than he ought to catch. It's just the nature of the human being.

COMMENT: I'd just like to make one point on what you just said. That that boat is in deep trouble, but it's under a limited entry system.

ANSWER: I agree with you. It's under a limited entry system. And I'm not advocating limited entry. I don't know what the solution is to that halibut fishery, but I do know the solution is not to make that halibut fishery a two-or three-day-a-year fishery. It just isn't the way for the fisherman to get top dollar for his product. It's not the way for the processor to handle quality. It's not the way for the consumer to get an acceptable product. It just is not the right way to go.

Should the Federal Role in MFCMA Management be Played "Back There" or "Out Here"?

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As Bert Larkins said in his abstract under the title "Should the Federal Role in MFCMA Management Be Played 'Back There' or 'Out Here'?", both law and logic require a federal involvement in the FCMA fishery management process. No one can argue that the current law requires it, and I doubt that many would argue the logic of federal involvement for those species that are predominantly in the FCZ and extend beyond more than one state's boundaries.

The issue that does need further thought and discussion is the extent of that federal involvement and the process by which such involvement takes place. After almost eight years of experience under the Magnuson Act, it is time to evaluate our progress, or lack of it, and map out our strategy for overcoming the problems that have plagued us.

THE PROBLEM

One of the most serious problems impeding an efficient fisheries management system is the federal process that has evolved for reviewing, approving, and implementing FMPs and amendments, and for promulgating annual and in-season regulations under those FMPs.

You may recall the process worked out during the first year or two of council operations was called the "horseblanket". It required about 300 days from the time the council submitted an FMP or amendment until implementation of federal regulations. This one-year time frame was probably about average. Some plans were hurried through under certain waivers and were implemented by emergency regulations in less than a year. The Pacific Fishery Management Council's (PFMC) ocean salmon FMP and amendments are a good example. On the other hand, others took far more than one year. The best (worst) example is probably the Gulf of Mexico Reef Fish Plan which was submitted for

secretarial review in October 1980, approved in June 1983, and implemented in November 1984, four years and one month after submission.

This process was lengthy in part because both the councils and the federal agencies were learning how to prepare, review and approve the plans. Part of it no doubt was due to a certain amount of sloppiness on the part of the councils, who hurried things through that did not stand up under close scrutiny. Part of it was overkill by the federal bureaucracy, that had created too many levels of review and was being overly cautious about compliance not only with the Magnuson Act, but also with many related laws and executive directives which in my judgment, duplicate requirements of the Magnuson Act. These include the National Environmental Policy Act, the Regulatory Flexibility Act, the Paperwork Reduction Act, and Executive Order 12291.

Reviewing each of the FMPs or amendments for compliance with these laws and directives required a different set of reviewers and in many cases additional documents. It also resulted in higher and higher levels of the federal government being involved in review and approval of FMPs and amendments. Finally, the Office of Management and Budget, the president's primary management group, became involved because it was not willing to delegate responsibilities for complying with Executive Order No. 12291 nor with the Paperwork Reduction Act.

Congress, at the urging of the councils, the users and others affected by this lengthy process, attempted to improve the situation by amending the Magnuson Act in early 1983 (P.L. 97-453). This amendment set a maximum of 95 days for the Secretary of Commerce to review an FMP or amendment and to advise the council of intent to disapprove or partially disapprove the plan or amendment. Otherwise, the plan takes effect, and regulations implementing it must be promulgated, within 110 days after the plan is received for review.

While the 1983 Magnuson Act amendment shortened the review and approval process somewhat, it also had an adverse impact. It lengthened the process leading up to "day one" of the 110-day review period. All documents must be submitted and be determined "structurally complete," whatever that means, prior to "day one." In cases where problems with an FMP have been obvious, "day one" was delayed to resolve these problems so that the FMP would not have to be disapproved.

This amendment, therefore, does not seem to have greatly shortened the overall time required for developing, reviewing and implementing FMPs or amendments. Nor has it cut down on the number of layers of federal reviewers. NMFS, NOAA, the Department of Commerce and the Office of Management and Budget, are all still involved in the process.

NMFS also made a widely-discussed and publicized effort to streamline and reduce the time required for review and approval of plans by initiating a policy of "regionalization." This effort was intended to reduce the involvement of Washington, D.C. personnel in the review and approval process and to delegate decision making to regional directors.

I question the effectiveness of this effort. Some decisions have been delegated to regional directors. More of the review and paperwork associated with the approval and implementation process currently are being done at the regional level. However, the Washington office is still involved in the process about as much as before. The ultimate approval of proposed and final regulations implementing an FMP or amendment is still at the highest levels of NOAA, the Department of Commerce and the Office of Management and Budget.

The problem discussed so far has been limited to the time required to develop, review and implement FMPs and amendments. Let me expand the discussion to include the time required for the feds to complete pre-season (between-season) and in-season actions authorized by a framework FMP.

Most framework plans establish a decision process whereby the regional director, after consulting with the chairman of the council or the council itself and the state directors, or upon receiving a recommendation from the council, is authorized to implement certain actions. Such actions are limited in scope and are either done by formula or based upon criteria or factors specified in the approved framework plan and regulations. In other words, the amount of judgment involved in the decision is minimal. In-season actions are handled this way because they almost always need to be made effective on very short notice.

It is almost outside the realm of reason that even the most automatic of these actions, such as closing a season when a quota is reached, must be cleared not only by the head of NMFS, but also by NOAA, and the Department of Commerce. As Bert Larkins states in his abstract, "that unarguably is absurd." To make matters worse, the regional director cannot anticipate NOAA and DOC clearance so that he can alert the fishermen and processors that the decision is pending and will become effective on a certain date. To do so would take away the prerogative of NOAA and DOC to make the decision. Rather, he must wait for clearance, which usually doesn't come until the eleventh hour (or sometimes the twelfth!), and only then can he announce the effective date.

The states sometime bail out the feds by taking action to change landing regulations and protect the resource until the federal government can go through its ridiculously cumbersome and inefficient process. This occurred in 1982 when fish were unusually available and quotas were nearly taken. If the states had not closed the salmon season, the catch would probably have exceeded the quotas by 100 percent at the expense of spawning escapement.

There is one other aspect of the problem I need to discuss before suggesting possible solutions. That is, we must recognize the controversial nature of fishery management and how politics may bear on this problem. All of us recognize that our political system operates best on consensus and does not handle controversy well. In fishery management, as well as other governmental matters, it is important to hear everyone out and to consider all information before rendering a decision. The council system has strengthened public involvement in fishery management decision making. However, public participation lengthens the time required both for development of the FMPs and amendments, as well as for review and implementation.

I think several tenets can be offered about the impact of the political element on the plan review and implementation problem. First, the more controversial a decision, the longer it takes the feds to reach it. Also, the more controversial the issue, the higher it goes in the system before the decision is reached. Some user groups believe that the present system is acceptable because they believe their opportunity for achieving a management decision favorable to them is better in Washington, D.C. where elected officials or political appointees can influence the decision.

One other tenet may be worthy of consideration. I believe the more a solution has been influenced by politicians, the greater may be the immediate benefits to some involved pressure groups, but also the greater will be the long-run costs in terms of overfishing, diminishing our resource base, and worsening the problems we will have to deal with in future years.

SOME POSSIBLE SOLUTIONS

Having discussed the problem, how do we bring about resolution? I submit that is a political process.

First, I believe that we need to convince the powers that be that their role in fisheries management is in establishing the laws, setting the policies, and auditing the actions of those charged with carrying out the laws and policies. I am pleased to note that at least one member of Congress agrees with me. At a fisheries law and policy conference in Cancun, Mexico a few months ago, Congressman John Breaux, Chairman of the House Subcommittee on Fisheries and Wildlife Conservation and the Environment, said:

"...As many of us have become painfully aware, too many council management decisions are heavily influenced by, or are frustrated by, political pressures in the region itself or in Washington, D.C. ...It is, therefore, our responsibility in the federal government, in Congress, to develop a means to insulate council management decisions from inappropriate political influences."

As Bert Larkins says in his abstract, the involvement of the Secretary of Commerce, the White House, and members of the Senate or House of Representatives in setting local fishery regulations is counterproductive and is contrary to the principles of efficient government. While such decisions may benefit one pressure group in the short run, other resource users will pay a short-term price, and all resource users will pay the price in the long run.

I also agree that the appropriate level of political influence should be played out during the council process and during review and approval at the regional level. These regional entities are the ones closest to and most familiar with the resources and the needs of the fisheries. They are best able to assess the impacts of political decisions. They also are the most capable of working out reasonable and timely solutions that have the greatest overall benefit.

Perhaps the best example of how political intervention in the nation's Capitol interferes with regional fishery management was the 1982 West Coast ocean salmon regulations. The secretary, bowing to

Congressional pressure, disapproved the portion of the plan relating to the California and southern Oregon troll chinook seasons. A secretarial amendment was substituted that a U.S. District Court only recently found to be "arbitrary and capricious" and "without reasoned basis." The court chastised the Secretary for turning down the council's plan for its alleged "failure to provide a significant increase in (Klamath River) spawning escapement over 1981", and then substituting regulations "which were less restrictive than the council's proposal."

The NMFS, NOAA, and the Department of Commerce must have the political courage to resist self-serving, special-interest group influence and pressure tactics and serve instead the longer-range resource needs that will benefit all citizens. If the powers that be hear this from enough interested parties, they may get the message. I do not know if there is enough agreement on this issue to effect change. Your guess is as good as mine.

Secondly, there must be a strong effort to convince the present administration that while eliminating some management activities, such as deregulation of the airlines, may be good management of common property resources is essential for the long-term welfare of the resource and resource users and must be done by someone. Without management, there soon will be no resource. Bureaucratic impediments and roadblocks to an unneeded management process may be appropriate, but they should be minimized in those cases where management clearly benefits society.

The Environmental Protection Agency, the Small Business Administration, the Office of Management and Budget, the Department of Commerce and NOAA Headquarters need to be shown that management of common property fisheries resources is necessary and desirable and that the process should be made as efficient as possible. They must be convinced that if we adhere to the strict requirements of the Magnuson Act and delegate the responsibility for doing so to regional officials, it will mean compliance with the spirit and to some extent even the letter of the National Environmental Policy Act, the Regulatory Flexibility Act, the Paperwork Reduction Act and Executive Order 12291 and do so without all the high-level bureaucratic involvement and impediments. Compliance with the management principles they espouse could be ensured further by periodic reports and audits, if necessary.

We must somehow convince the administration and the Congress that forcing separate review and scrutiny by these agencies at the Washington, D.C. level is counter-productive and will surely result in the eventual destruction of the regional council system of fisheries management. While some people would welcome the demise of the council system and favor return of management to the states, I for one, think that is a short-sighted view, and that regional management is essential. I am convinced that this second recommendation is absolutely necessary and must be pursued. Achieving this would greatly reduce the burden of both development, by eliminating duplicative documents; and review, by reducing the layers of clearance, and by delegating decisions to the field where they belong.

A third recommendation is to find a better way, a regionally-oriented way, of satisfying the legal requirement of publication of management

notices by some means other than publication in the Federal Register. At present the federal system requires that regulations and notices, including a notice that a council meeting will be held, must be published in the Federal Register. This is done to assure the legal notice and so forth has been given. (The fact that almost no one reads the Federal Register is apparently not important.) Publication in the Federal Register is a terribly stilted, bureaucratic, cumbersome process that is absolutely guaranteed to involve the Washington bureaucracy in what might otherwise be a simple process.

The best solution to this problem would be to eliminate any involvement with the Federal Register. However the federal legal establishment being what it is, this solution is unlikely. The next best solution, and one that may be possible, would be to eliminate the requirement of Federal Register publication for everything except rulemaking.

Let me explain the difference between "rulemaking" and "notices". Rulemaking is publishing regulations in the Federal Register. Usually regulations are published as proposed rules, and public review and comments are requested. Later, after all comments are considered, the final regulations are published as rulemaking. We probably will be unable to eliminate publication of rulemaking in the Federal Register. Rulemaking, or regulations, establish the procedure and criteria for such things as closing a season when a quota is reached and other more or less automatic management actions.

A notice is that item that is published in the Federal Register, in accordance with the approved regulations, when a quota is reached and a season closed. A notice usually involves action that is time critical and, it is too time consuming to publish in the Federal Register because of Washington, D.C. bureaucracy involvement. These actions should be regional management. Elimination of the requirements for publishing such notices in the Federal Register would be a major procedural improvement.

By now, I am sure some of you are viewing what I have suggested here as heresy. It may be, but I firmly believe that these are necessary changes to bring about effective fishery management and to preserve the council system.

Discussion

ROSENBERG: Do you see a fundamental change, any possibility in taking the FCMA and turning it around, trying to pull on it the other direction? Put things into place at the regional level. They go into place and they're effective and they're working unless they're recalled. Then they're only recalled for just and sufficient reasons.

ANSWER: My view is that the only basis for a reversal of a plan ought to be if it's clearly defiant of the national standards that the Congress of the United States established. The burden of proof ought not to be on the councils, it ought to be on the reviewer in Washington, D.C. to establish that the plan flies in the face of that particular standard.

I think you could build the trap by establishing a presumption that the councils and the regional managers are operating consistently with the law. The process ought then to be a review, whether that is some sort of administrative process or some process like we have now. There ought to be a burden also on the guy who disagrees. We need to review how the process is triggered, once the so-called "recall provisions" are in place.

There are a lot of examples. Under the National Environmental Policy Act (NEPA) there's a fairly complicated process when one first reviews the state's laws and then when one suggests that the state's no longer doing its job. That's not a simple process of the feds just coming in and a yanking the chains, so to speak.

ALVERSON: Congress obviously has a responsibility to its constituents to respond to the appropriate government implementing bodies, if their constituents are writing to them about a policy that is inconsistent with national standards or another aspect of the law.

That's the only thing in your entire presentation that I was a little concerned about.

I think there's an absolute need for a federal overview that relates to one issue: Is this plan consistent with national standards or other aspects of the law? If it is, you know, get off of all this review about the scientific and technical information and the character of the regulations and let them do the job. And if the plan isn't consistent, respond in a timely fashion. But I'd be the last guy that'd want to give up the fact that there's a higher order or body that takes that final review out of the regional process.

ANSWER: I agree with you completely, Congress is not going to assume a ministerial role. I was addressing things like the paper-work burden act, and the Small Business Administration, and even OMB, in terms of their ministerial review.

With respect to what you have suggested in terms of the review, you and I are saying the same thing. What we're saying in essence is to assure that what is reviewed in D.C. is reviewed on the basis of some intelligent insight that there's somebody out there operating against the national standards. If you're going to conduct such a review about the plan, open up that process, and do it publicly, whether it's in D.C. or out in the regions. Get input from all sides openly, so that people like us who work on the plan for two years, have an honest opportunity to explain why on God's green earth we came to the conclusion we did. Okay? That's easy with respect to the broader plan. I don't see any reason why that can't be done.

With respect to in-season management decisions, when a legislator calls me, I explain the decision. Basically, and I don't say this as directly as I'll say it to you, but I say if you don't like my overall management scheme, responsibility for which has delegated to me by you and the governor, then get rid of me. Okay? The same is true of regional directors; the same is true of the council. If you don't like the way that council is going then bring some new blood into it; bring a new regional director into the process, whatever is needed to take care of that manpower problem.

HERRNSTEEN: The state systems are a lot simpler than the federal system as you described it. What would you think of allowing the states to manage those fisheries? As I understand it states manage those fisheries which lie primarily within three miles. Just change that to those fisheries which lie offshore. They're state plans so long as they don't interfere with those fisheries of other states and so long as they conform to the national standards. What would you think of using the carrot/hammer technique to that degree?

ANSWER: I personally don't have much trouble as long as the fisheries management plan that the state establishes has gone through or has been through the kind of process that any FMP outside of three miles would go through. My own view is that states could be trusted to implement the plan. But if they deviate, then you take their authority away from them. But the council process, in terms of developing the original plan, seems appropriate. If the state and the councils go through that process and develop a plan that clearly meets the review standards, then I personally don't

have any trouble with the state taking on the burden of implementing that plan. Then the review would be as an auditor, determining if the state is conforming to the plan adopted pursuant to those national standards. I am not for just turning it over to the states to develop their own plan by their own process and then maybe not send it back for federal review. I think that it would need to follow the kind of approach that we've gone through to date. But once that plan's in place, I think you could delegate a lot of implementation to the states, especially if you provided money.

STOKES: Every speaker so far, and I suspect the rest of them here, is going to talk about the need for a system where the working manager is able to make a decision and essentially stop the buck, rather than a system of endless change in the face of political pressure. Everyone talks about various means of getting to that point. What about using the process of selecting the managers? I address that question to you, because I suspect that as Governor Spellman's man, you've had some hand in this over the years. Do you have some observations on that? How do we go about altering the way we choose council members and other essentially political decision-makers in a way that can enhance the management process?

ANSWER: Well, I've got a lot of ideas on it. The trend that I've seen indicates that there ought to be some qualifications developed. For example, an individual sitting on the council ought to have some background, other than perhaps dabbling a line in the water, in fisheries management. You could develop some intelligent criteria with respect to the council positions.

With respect to the regional manager - regional director I think the system has appointed good people into those positions for the most part. I have dealt with several regional directors fairly extensively over the last four or five years. I think they have all been excellent, quality people. They have developed a tough scrutiny system. But at the council level in recent years, somebody in the men's clothing business could be appointed to a fisheries management position. That just isn't right.

At the state level, I'm the first guy in my position in Washington since, I believe, 1955 not to have legislative background. It's been essentially a "political position." I am sure that most people in the room would say that it's no less political under me than it was before. Again, I think that the governors should require some background not just in the fisheries management politics, but, perhaps, in fisheries management itself. You could deal with that through criteria. But, governors and presidents are going to make personnel decisions that may deviate from those criteria. That doesn't mean we shouldn't at least seek to establish those criteria.

ANDERSON: The title of this conference is "Issues and Options." What are your ideas on options? I think that asking Sen. Hatfield not to respond to his constituents is not a viable option. That's going to go on forever. If we are going to do something about it, that chance may come: with sunset review of the FCMA next year. My question is, do you have any specific suggestions on changing the institutional structure to eliminate or reduce these problems? If so, do you have any chance of getting such a suggestion passed? The same institutional structure may prevent such things from getting passed.

ANSWER: Well, I don't think that you could ever persuade Sen. Hatfield not to write letters or provide his input. But I think you could set up a system in Washington, D.C. that says during a review process, these are the types of issues that will be reviewed. Is the plan consistent with the national standards? That's basically our question. Anybody who challenges the plan needs to present his case to show why it does not.

Second thing is, that the D.C. process could be open. Part of the process could be that if the federal government wants to reverse a plan, or has concerns about its conformity with national standards, then it would hold a hearing, either out in the region or in Washington, D.C., to hear the wide variety of inputs and to express its concerns directly in an open forum just as we did for six months in developing the plan. Let the process be open once it leaves the region. I think that the regional process is the best that I have seen--ten times as good as ours in state government in terms of an open administrative way to reach a decision. But, once it goes to D.C. it gets cloudy. You put an incredible amount of pressure on the people in D.C.. So, I would suggest you open that part of the process up while at the same time being aware of time constraints.

TILLION: First off, who do believe actually owns the resource that we are talking about managing?

ANSWER: I don't think that I make that decision, Clem. I think that the Congress of the United States and the state legislature make that decision. It's common property resource and our job is to implement their decision.

TILLION - Comment: I come back to the qualifications of who sits on the council. I am basically here to defend the system. I say that if the resource belongs to the general public, then appointing a consumer, a hardware man, or anybody else should be within the governor's prerogative. If you want to insulate your system from the political system, you're insulating it from the voter. If you like the way the Post Office runs now, that's an outfit that was insulated from the voter. The system of appointees isn't bad. Your points-of-view on how the system works, I agree with. There should be a deadline and if you don't have your complaints in by that time, it is too late to move them. This is the same as we have to do with our biologists and the data: we say this is when we vote on the plan, we'll take the best data available as of this date. If you have some new data tomorrow, bring it in for next year's revision. Always approach with caution removing anything from the political arena.

ANSWER: Just a quick comment to that. It gets down to the question is the executive branch to operate more like a legislative body (citizen representation), or is the executive branch an implementing body, which I perceive that we are. Then, does it take some background in the field to be an implementor? Believe me, I am a better manager today than I was four years ago or seven years ago, simply because of my increased background. I would just suggest a separation of principles. I'm not convinced that the council, even though it's organized somewhat like a legislative body, is anything but an executive entity. It is an executive entity of people who are there to implement the national standards and the FMPs.

FISHER - Comment: Most of what you have said is very appropriate to the first part of the Congressional mandate on the FCMA which is to conserve and manage the nation's renewable marine resources. There's another mandate laid down though -- to get development going in the underused and unused species. I look at the current make-up of the councils and I listen to your description of the kind of managers you need and I agree until I start to think about what their qualifications are for development. The Congress was talking about economic development. They were talking about freeing the entrepreneur. I don't think we'd have much room to argue that many of the people who currently sit on the council, and more importantly the people in the plan development teams, are very ill-equipped to talk about how you fulfill this second mandate: how you allow entrepreneurs to go into the underutilized species. For example, I'm one of those dirty birds that went back to Washington. We got the council overturned four or five times. The nation now has, this year, \$100,000,000.00 in export products that it did not have then. The cost was using that political influence, being branded as a bastard and a communist and everything else and getting the council overturned. I'd like a few comments on that.

ANSWER: Well, I think you raised an excellent point. In terms of my personal qualifications I'm not qualified to do that part of the job. In the last four years, I've probably focussed less than one percent of my time on that aspect. I am a rubber stamp on the foreign fishing portions of the act. I suspect that a good number of my colleagues are. One approach is that among the selection criteria, require that some members of the council have qualifications that are directed toward that portion of the act. Other members should have skills directed towards the management portion. Another possibility is to accept the fact that the council is kind of a rubber stamp on these issues, and delegate a hell of a lot more of that responsibility to an expert or series of experts within the federal structure. Recognize that the council just isn't going to have the time or doesn't have the people to deal with that question.

There isn't an economic development specialist, other than Jim Crutchfield, on our council. Joe Easley and Jim probably have the best qualifications in a sense, and yet I don't think that they are spending a lot of time focussing on that element during their time on the Pacific council.

FISHER - Comment: With all due respect to Dr. Crutchfield, and I admire him greatly, he TEACHES economic development and we DO it.

ANSWER: Right, I understand. So, I think that's a weakness. It's a weakness inherent in Bill Wilkerson's representation on the council. I suspect that if we had an honest polling, you'd be down to 12 to 2 or 11 to 1, in terms of that aspect. There are ways to resolve it. You know the subcommittee approach within legislatures works very well. You have a natural resources committee and there is a sub-committee that deals primarily with fisheries and a sub-committee that deals primarily with timber. Very frankly, each sub-committee chairman carries the ball on one issue through the whole legislative process. You can do that within the council framework, and we do with unwritten rules a lot of the time. But, the lack of a foreign fishing strategy and expertise is a very real problem at least on the Pacific Coast.

FINCH - Comment: I don't disagree with you about the timing of the process. I think your idea of trying to get various members of Congress not to lean on the federal government when processing a plan presents a delightful dream world. There will always be, I believe, conservation of some degree of authority in Washington. I don't realistically think it can be any other way.

So what's the solution? We've been trying the framework solution. You put a thing like the salmon framework plan in place. It is on schedule and being approved, by the way. Then you've got the management. I know it doesn't get down to the one-day turnaround that you'd like, but it is on average a four-day or less turnaround. We processed around sixty actions last year within four days. Think of how far the councils have come, from taking two, three and four years to develop plans. Think of how far the National Marine Fisheries Service and all those entities have come, from taking longer than a year to process down to the current 130-day process. Also, there is also the public review of regulations in the middle of that process. (Essentially, you asked why take that time to review?) I think we've come a long way. I think we could do better. And I'd certainly support any good recommendations for doing that.

ANSWER: I hope that I'm coming across strongly for opening up the process in D.C and cutting the time lines down. I didn't speak so much to the pull-backs at the regional level, or the five years to develop a particular plan because some plans are worth five years. I really believe that. They're incredibly complicated plans to develop. Establishing the constituency for such a plan is an incredibly difficult job. Some are six month jobs and some are, quite frankly, five year jobs, or maybe twelve year jobs. I hope that my remarks were taken to emphasize the need to tighten the time lines and get the ball rolling back there, but more importantly, open that process within the D.C. confines.

Session II: Fisheries Management Problems Panel Discussion

**Donald E. Bevan, University of Washington,
Moderator**

Daniel D. Huppert, National Marine Fisheries Service
William Wilkerson, Washington Department of
Fisheries

Douglas G. Marshall, New England Fishery
Management Council

Michael P. Sissenwine, National Marine Fisheries
Service

E. C. Fullerton, National Marine Fisheries Service

Fisheries Management Problems

Panel Discussion

BEVAN: Harold Lokken proposed a hypothesis yesterday that I think we ought to test, that we ought to discuss. It was that government is unwilling to let the councils function. That's a serious charge. I'd like to ask each one of our panel members to consider the validity of that hypothesis. I think I believe it. But, I certainly find it out-of-character for an administration that's attempting to take things from government and return them to states and smaller divisions of government. That this administration would consider turning regional management of fisheries over to fisheries experts in such unusual places as the Office of Management and Budget or the Small Business Administration, simply seems out of character to me. And, perhaps, there's some explanation as to whether that's the case and why.

Lee Alverson's thesis yesterday was that we do have a fishery policy. There is a mechanism for developing new fishery policy and I quite agree. The rub is, and Lee mentioned it but we need to emphasize it, that fishery policies will only be implemented if it does not stand in the way of other people's views on where our country should be going in such issues as trade and development in other industries. We're not going to be able to develop that fishery policy--I'm not suggesting that Lee said this--within our own fisheries family and expect it to fly unless there's some pretty good spade work going with other industries that have other interests.

I'd like to answer Harold Lokken's question with regard to whales a little bit differently. He asked, what's going to happen when the oceans are full of whales? What are we going to do? Well, I'd like to suggest that that question of the size of the whale population is not relevant to the decision. Nobody really cares. The International Whaling Commission, and I am going to allow John to rebut me

if he wishes, started out as a political organization controlled by the people who killed whales. We didn't listen to our scientists and we drove our stocks of whales down through unwise management. Then the pendulum swung towards people who weren't interested in killing whales. I think there was a window from maybe the mid-sixties until the early eighties when science could take a stand, could develop some rational management of whale harvests. That management was put into place, but we really didn't wait to see the answers. The commission people who don't want to kill whales are not any more interested in the scientific numbers, or how we might rationally manage these populations than the people on the killing side who controlled the early days of the commission. So, I think here we have a perfect example of how not to manage a resource. There is no real essence of scientific information that forms the basis for management decisions. The decision's a simple one now, it's the politics of whether you want to kill whales or whether you don't want to kill whales. The number of them is rather immaterial.

I'd like to pick up on another analogy that I thought was very good. John Gulland said that when we look out the windows of the airplane and see the wings going up and down that's natural absorption of air disturbance, and that similarly we ought to look very closely at the variability in fishery population. John, I'd like to describe what we do a lot of the time in our fisheries here. We've got the

passengers out there on the wings trying to hold them up. And we're not much worried about the flaps that go up, but we're worried about the flaps that go down and we accomplish just about as much as if the passengers went out and tried to do that.

We are probably going to have some discussion. I wish we could have the breakfast discussion of this panel in front of you: these questions of the economics of the fish business, what it means to be able to get back in without the high costs of large mortgages when someone or someone and his bank have gone broke and that vessel comes back into the fishery at a reasonable cost and is therefore more efficient. I hope we'll be able to get some discussions along those lines.

Bart Eaton asked about where was he going to be with regard to surimi or fillets. I think Bart needs to take John Gulland's example of learning from history. It's pretty clear we have, as John said, fishermen with black hats and white hats. We're regulating the black hats, something we do a good part of the time up here in the North Pacific council. The black hats are the foreigners. We might get away with under-harvesting a stock to allow large sizes. But, I think history will show us that when we start to manage all the white hats, there's first going to be a struggle over who really wears the white hat. You know, is pot fishing really permissible? Do we need all longlines? Should we ban trawls? When you look at the history of managing the groundfish fishery, and we're dealing entirely with domestic fisheries, we have not been able to control the fishing effort on most domestic stocks to maintain their reasonable levels, let alone something extra that will allow us to have large fish in the catch. So, Bart, I suggest that you gear up for surimi and you better see that we keep sufficient stock so you'll have a constant supply.

Our plan is to have a short presentation by each of the panel members, then some discussion among the panel. Then we'll throw it open to the floor for questions.

SISSEWINE: I have noted that the meeting on bankruptcy held yesterday in the room next door to ours is relevant. I'm sure a number of you noted that as well. We've heard a lot about the role of bankruptcies in the fishing industry. Today, the session next door concerns assertive management. And it does seem that there's a hell of a lot of assertiveness here. The question is how assertive is the management and that ought to be a topic for discussion.

Anyway, to comment on the actual session yesterday. I thought we had five very good presentations. I enjoyed them. I thought they were stimulating. And I think that I learned from them. There was a good cross section of people involved. Yesterday seemed to be the day for jokes about lawyers. We got a little bit into joking about economists today. Both of those things make me feel good, because I recall not too long ago being a biologist in New England was not the most popular thing. One would walk up to a group of council members in a restaurant and sit down for dinner and everybody would leave. And it wasn't only because they wanted to stick you with the check.

Things have changed quite a bit. The situation in New England, I think, has improved tremendously. During that period five or six years ago when biologists were having some very serious difficulties in communicating with council members and the fishing industry, we felt very paranoid. We thought that it was only our problem. I was interested to note that there are those problems here, too. In fact, there are a lot of similarities between the situations. There is a lot to be learned by observing what happened in New England a few years ago. And probably a lot to be learned by observing what is happening now as well, because I think progress is being made.

As one would expect, there was probably more identification of issues than there was evaluation of options in yesterday's talks that seems appropriate since they were overview presentations. But, with respect to the issues, there seemed to be a fairly central theme associated with policy. All of the papers clearly related to the perception of what policy is, the procedures for formulating it and for implementing it. We traced the long history of fisheries policy development in this country. But, we also noted that where we are now is regional policies, and many policies that are quite general. We noted that the really strong example of a specific national policy occurred when we had a coalescing of public opinion--a coalescing by those people with white hats against those others with black hats. And the black hats were the distant water fishing fleets. That, I think, is an important point. It made me recall one of the remarks in the introductory presentations, "we have met the enemy and it is us." Lee's perception that policy requires a coalescing of opinion and a clear identification of white hats and black hats and, at the same time, the recognition that we ourselves are the enemy, leads one to be concerned about how we go on with policy development that will lead us to specific points rather than general statement.

One other comment I have about policy development, black hats and white hats, and strong coalescing of opinion relates to the

discussion following John Gulland's presentation concerning marine mammals. That may be another case where we have a coalescing of opinion to develop strong policy. It's clear that this country has developed a strong policy that says protect marine mammals. The lesson there is that strong policy may not always be, and I won't make the judgement whether it is or not, but it may not always be the right one. There's obviously a fair amount of opinion in this room that in that case it's not.

It is clear that there is a general fisheries policy. One might describe it as "motherhood" in nature. It is a policy for both conservation and development of fisheries. It's clearly stated in any number of places, whether it be the Magnuson FCMA, or National Marine Fisheries Service documents, or various other places. That sort of policy however, has sometimes led to actions by governments and other groups that tend to be contradictory--working for conserving stocks at the same time another is working for increased development. At least in some cases, it's clear that those dual forces have led to the overcapitalization discussed by a number of people in their presentations. This is not a problem caused by a lack of policy, but rather by lack of a coordinated attempt to apply that policy. And I think that's an important lesson. It's not

unique to fisheries. I think similar problems developed in other areas of the public sector, such as the dual charge of the Atomic Energy Commission to develop and regulate nuclear power. Segments of that agency worked out of touch with each other, and eventually collided. We may have some similar situations here.

It is worth reiterating another point brought out yesterday about policy development in the fisheries business: the people that are much involved in policy are often very fickle when it comes to applying it. A specific reference was made to legislators who would support a particular policy but when it came to applying it, when various constituency groups were hurt, they were not particularly strong in supporting it. This was noted as a general problem to fisheries managers. I don't have a solution for it, but I think it's a point worth reiterating.

Some papers yesterday were case studies. One discussed some "success" stories in fisheries management and some other situations that were unsuccessful. In successful cases, the author specifically noted that the stock could be seen, whether it was salmon or herring. There was a good understanding of how many fish were there. That seemed to be an important point in his perception of why the process had been successful. I think that means there was consensus not only among scientists, but among industry people. Those being managed had a real grasp of what was happening and therefore it was easier to get agreement on how to handle those resources. I think that's an important point. I don't think we have to be able to see the resource to achieve that consensus, but consensus is clearly important to viable management.

A related issue is how do we manage? How robust are our management methods with respect to being able to monitor fish stocks. One of the points that needs discussion is this interrelationship between the precision of the information that is available, whether it be biological or economic, and the actual mechanism used to manage the

stocks. There's got to be interplay. That precision is pertinent to how the strategy one has in mind is accomplished.

I guess the last thing that I'd like to comment on about yesterday's talks was a very important discussion about how council members are selected. I'd be hard-pressed to figure out a more representative make-up for our own council than the one we got with the present process. Furthermore, I don't have any trouble when the industry or a major segment of the industry lobbies people in the National Marine Fisheries Service or lobbies their congressional representatives if they don't like a council action or a management plan. In some cases, I don't think it's productive, but like a lot of other things, you give up something in order to get something else. I'm convinced that this kind of "political safety net" may actually help keep the councils on a somewhat steadier path than they might get onto if they felt they were free to do as they pleased without anybody doing anything about it.

I enjoyed Bart Eaton's presentation. He said two or three very important things. One was his thought that management by equation, as I think he phrased it, is not necessarily a way likely to yield the kind of success some people seek in the management of fisheries.

I also agree with him that we have not spent enough time or paid enough attention to the questions, the issues of enforcement. Our own council in New England has become concerned over the past six or so months about the question of enforcement and we are beginning to do something about it. I am convinced that whatever kind of regulations you have, if you don't have some reasonable enforcement, you'll never have much compliance. It isn't because everybody out there is a bad actor. If some people are clearly getting away with violating all the rules, then it becomes very hard to expect the rest of the people to behave like good citizens. There's also a great economic disadvantage to them if they do so.

Finally, I think Mr. Eaton touched on something that is fundamental to all of the discussions at this session and others like it. That is the question of our goal in this whole business. What are we trying to do? What is our real purpose in managing fisheries? Are we trying to manage for returns and to insure that everybody in the business makes a living? Are we trying to manage so people have opportunities along with whatever risks may be entailed?

In listening to debates and discussions on this question it strikes me that people come with their own built-in set of assumptions, including why we are managing the fisheries. They probably have read the Magnuson Act and the section that deals with the purposes and so on. Most of us are aware, whether we say it outright or not, that the real reason for the Magnuson Act was to get rid of foreign fishing. We haven't quite succeeded, but we've made a lot of progress. Sooner or later, I think we'll be a little more outspoken about it than we have been in the past. There are some caveats. I don't think anybody would deny that in certain circumstances it may very desirable to have foreign participation in the fisheries, whether its in directed fisheries or whether it's in joint venture operations. I do believe that you can't take everything in the Magnuson Act pertaining to why the law was passed in the first place and assume that those reasons reflect everybody's sentiments as to

what we are trying to do. If those of use who are involved were sometimes more explicit about where we are starting from, we'd find that the dialogues we have would be more meaningful.

BEVAN: Thank you, Doug. Wilkerson isn't here so I want to jump in a little bit to his defense. I didn't hear him say that he wanted to cut the halls of Congress off to people who have problems, who want to go there to get policy issues straightened out. If he did say that, I'm sure he didn't mean it. Bill's so effective at doing that himself, that I'm sure he wouldn't want to close those doors. What I think he meant was that, if we go to Congress to decide if we catch a 22 inch black cod or a 24 inch, or if we use a four and a half inch mesh or a five inch mesh, or do we open the season on the 22nd or the 26th, this whole system is going to be in deep trouble. Some of that that has gone on and that's what I understood he was addressing as a problem.

FULLERTON: After listening to the papers yesterday, I was a little bit disappointed. Bill Wilkerson stimulated a lot of thought. Bart did a great job. But, generally, everybody talked about the past. Not many talked about what we're going to do to solve the problems. Bill skirted on it a little bit. Bart skirted. But not many other speakers. They talked about all their past problems. I'd like to put the past aside as history. It's a great thing to look at so we don't make the same mistake twice, but we should be thinking more about what can we do to change what's going on or to improve some of the current problems that the industry has.

Commenting a little bit on Bill's statements about congressmen, I would hate to have the avenue to Congress shut off or we wouldn't have the NMFS council budgets we have today. Congress is used to a great extent to get back the funds that are generally cut by the administration. I'd hate to shut that power off. I do think that sometimes congressmen get into the everyday work too deeply. Somebody mentioned earlier that determining whether we catch a 22 inch cod or a 25 inch salmon shouldn't be the congressman's role. They should tell us what they want done and let us do it.

Everybody seems to be speaking about the council's role in passing regulations. The council is only recommending regulations. The responsibility set by the act is that the Secretary will sign those regulations. I think that Bill Gordon would be irresponsible if he didn't have some type of review before he sent his boss a completed staff work. So there has to be some time in Washington D.C. for that review. On the other hand, I think they get some nit-pickers back there that worry about the biology and that shouldn't happen. It should be reviewed back there only to see that it meets policy and meets the criteria of the act. People out here, after the public review process, should have answered most of the other questions.

We've talked a lot about management. In my own opinion, we overmanage. I think we overmanage to a great degree. When we overmanage, we get more and more regulations. As we get more and more regulations, we make the fishing industry less efficient. Too many times we talk about stabilizing a fishery. You can't stabilize a fishery. Mother Nature's not going to stabilize a fishery. It's going to go up and down, and it's going to go in cycles. The only thing we have

to talk about is stabilizing the market. And that makes a difference to the fisherman. We could stabilize all the fisheries in the world. If you can't stabilize the market, the fisherman's in trouble.

Too many times, our economists work on trying to stabilize the fishery and stabilize the income. They should be trying to work on the market and how we can market better, so we can stabilize the market and keep a continuing industry income. Let Mother Nature take care of the fish. Don't get me wrong, I think we have a great responsibility to determine the best we can how much fish is out there so the industry will know what's available and can plan and stabilize their markets. We have a difficult time doing that. We don't have enough money to do it, but, we do the best we can. But there's where I think we should get out of the business. I mean the councils and the government. Let the industry work on its markets. This doesn't mean we shouldn't help the industry establish foreign markets for their products. But, we shouldn't be telling them how to market their product, and when to market, or try to stabilize it for them. That's their business.

I think we over-emphasize the species management. Until we back off from species management, and start managing fisheries as a whole, I think we're going to be in trouble. There are going to be some species we can't keep at the optimum population size. When we have multi-species fisheries, I think we have to look more to gear to take care of the species.

I think, too, that we're going to see smaller vessels. I think we overcapitalize on the size of vessels. This came about by bigger being better. We've found out we can't afford the P&I insurance. We can't afford the fuel. We can't afford a lot of things that come with big vessels. As a result, economics will force us back into smaller vessels, and I think that will probably stabilize. This has happened in the automobile market. In the United States, we went into great big cars. Now we're back down to little ones and we find out we're getting around just as much and just as well in the little four cylinder Toyota as we did in the big Cadillac. Maybe we don't feel as good, as comfortable, but we're getting there.

As far as enforcement, the more we try to manage the little species, and the little things, the more enforcement problems we'll get that we can't control. As Bart said yesterday, as those things happen, there's less and less respect for the law. Everybody says, well, Joe's cheating a little, I'll cheat, too. And we can't afford that kind of cheating. We can't afford that attitude in the industry. It's self-defeating. But, the government and the councils create this a lot of the time by making the damndest enforcement regulations and the damndest nit-picking things you ever saw. We've got to get away from that and have less regulation. I think we can do this if we'll back off from species management and take a look at more gear regulation. Maybe its area closures we need or something else. Until we do that, we'll be plagued by enforcement that's not only costing the government a lot of money but, I think, arresting a lot of fishermen that should not have been arrested for nit-picking things. It's not doing much good for the fishery, or the industry. It's making a little money for the government, but I'm sure that's not what we're interested in.

BEVAN: Thank you, Charlie. I want to go back and comment on an exchange yesterday. I think it was Dave Herrnsteen that said that the fishermen deserved some credit for a conservation ethic when it came to crab management. I think that's true. But, I also think that at the time that was happening, it really didn't count. The conservation ethic is going to be needed now, when our crab stocks are very low and we need to be conservative. We should have taken our chances, I suspect, even in a larger way when the crab stocks were at very, very high levels. In the Bering Sea, for example, we probably never removed more than 10 percent of the total mature population, which means maybe we went as high as 15 percent of the males. As it was, those tremendous populations did not return anything. And that's our situation at the present time. So, there's no indication that conservation in those days would have changed the scene. There probably is good evidence we could have removed a few hundred million dollars more of crab and come to the same result. If the fishermen have that conservation ethic, and I think they demonstrated it, now is the time that it's important, not back in those days when stocks were higher.

HUPPERT: I enjoyed many of the papers given yesterday. I noticed in Lee Alverson's talk, that he broadened the perspective a lot from what I expected a conference on fisheries management to include. He told us how federal fisheries policy is formed, and how the various actors get their views and their desires into the policy process. While I was listening to it, I was wondering what the connection is between these overall federal roles, and policies in fisheries and other industries. How does that connection relate to what we normally think of as fisheries management?

In fact, I think there are some federal roles that weren't even mentioned yesterday. We heard about the capital construction fund, the fishing vessel obligation guarantee program, and tax policies and how those affect the investment incentives of fishermen. But, the federal government is doing other things that we might keep in mind, for example, Coast Guard inspections and safety programs, Corps of Engineers port construction and dredging and so forth. This is a federal role in the ocean that affects fisheries. We have Saltonstall-Kennedy money, that resulted in the fishery development foundations. These help, or are supposed to help, develop under-utilized fisheries. Something that wasn't mentioned at all yesterday was the Dingle-Johnson Program and Aid-to-States-Recreational Fisheries Programs. I've noticed very little mention of recreational fisheries in this conference so far. Maybe that's because we're in Alaska. In California, we would hear a lot more about it. But at any rate, there's a fairly broad area for discussion if we're going to talk about the federal role and how it affects fisheries.

I would prefer to stick to a more narrow focus, for example, John Gulland and his talk. One of his statements that I wrote down was his view that the main focus of fisheries management was the impact of fishing on fish stocks. I think this is a traditional view that is at the heart of what's been written about fisheries management, especially by biologists. I don't think it's true, however. The action in fisheries management isn't largely to do with how fishing affects fish stocks, although that's an important aspect. It's really a much broader policy question: how do our fishing regulations affect fishermen? How do those effects on fishermen filter

through the processing industry and into the markets? I think what we really need is a general policy towards the industry, rather than a policy that focuses on the fish stocks.

Finally, I picked a question out of Bart Eaton's paper which he thinks is of central focus: Should the goal of fisheries management be to guarantee opportunity or to guarantee returns? The federal government generally doesn't guarantee returns except possibly with public utilities commissions guaranteeing an eight percent return or a ten percent return or whatever on equity. But, the point's well taken. What is our objective here? How do we evaluate? This is going to affect how we evaluate successes of fisheries management programs.

In particular, I noticed that in yesterday's discussion there seemed to be some misconceptions. These regulations, in particular limited access programs, cannot eliminate variations in the resource, they can't eliminate variations in ocean conditions that result in changing stocks and catches. They aren't intended to stop shifts in markets between various countries. They don't stop technological innovations that cause the emphasis in fisheries to shift from one area to another. They don't stop things like the development of pen-raised salmon in Norway. They don't stabilize the economic or the biological environment. They don't eliminate business risk. Fishing conditions, skills, luck, and financial mistakes determine the plight of individual fishermen. Eliminating access simply, if it works, improves the typical opportunity available to fishermen in the long term. It certainly doesn't guarantee anyone a higher return on any particular year. It doesn't stop individual fishermen from going under.

I would answer Bart Eaton's question that way. If we do anything, we should improve the opportunity to make a decent economic return. Certainly, there are no guarantees.

MILLIKEN: What I would like to focus on are some opportunities that I see. We've all talked about the problems we have, and believe me they're problems. Through my role in Oregon, Washington and California groundfish management, I see we're constantly fighting problems. Too much effort is a big, big problem down there; it's a big problem around the world. Decreasing resources are a big, big problem. There's no doubt about that. Where are we going?

I was looking for a common theme, something that I could focus on, and suddenly it dawned on me. It was opportunity left to the fishing community here, least on the west coast. I wouldn't be surprised in other areas of the world, too. There still are some under-exploited resources, under-exploited in the domestic sense. In Oregon, Washington, and California we have Pacific whiting that are under-exploited. They have been exploited by foreigners, are increasingly exploited by joint venture vessels, and I think ultimately by U.S. vessels landing to domestic processors. Perhaps arrow-tooth flounder is another fish that's under-exploited. Up here we're talking about the big pollock resources that were exploited by foreigners in the past, but maybe we'll have a transfer of harvest to domestic processors. We have an opportunity and I was thinking about the policies involved.

Perhaps now is the time to develop a policy for exploiting under-used resources. One of my concerns has been how we incorporate economics into the management process. From my perspective as a manager, we're usually dealing with a crisis of over-exploitation and how to keep a resource from collapsing. What we see, typically, is an under-exploited resource exploited very rapidly, far above annual surplus production and then a subsequent collapse. We've had a number of classic examples even in our area. A few years ago, we had a widow rock fish resource and no fishery. In a period of three years, it went from zero to about 26,000 tons taken and then subsequently, it collapsed. We saw with Pacific Ocean perch.

So how do we keep that from happening? I don't have the answer. But an issue that we ought to discuss today is development; to focus on this as an issue. We do have opportunities. It's not all doom and gloom here on the west coast, or around the world. There are opportunities, but how do we make the best of them? We have the opportunity to bring fishermen into the process, we have the opportunity to bring economists into the process, to bring the sociologist into the process, before we're back to the standard procedure of reacting rather than acting.

Getting back to this black hat-white hat business, I've always enjoyed a comment that Don Bevan made a number of years ago: he walked up in front of the council and said, "Yes, I'm wearing many hats, but I hope I'm not wearing the one that covers my eyes and ears and just leaves my mouth exposed." I think that's what the managers have perhaps been doing, and I accept my share of that responsibility. But I contend, now, to you, that it's time to pull the hat off, expose our eyes and our ears, as well as our mouth, and together with Dr. Alverson's fishing family develop a policy that will prevent some of the pain which was another common management theme that we heard yesterday.

BEVAN: Thank you. I'd like to now turn to some interaction among panel members. Let me start with what I think I heard Lee Alverson say yesterday. He described government as some black hole that sucks up ideas and doesn't seem to contribute very much to the procedures in terms of developing public policy. Can we have a little discussion on that question? Is there any reason to look to government to develop fishery policy or is Lee right, that the fishing community, or fishery family as he described it, is where to look for leadership. Dan?

HUPPERT: I think of it as a mirror. It may be a warped mirror, but what you see there is what's put in. What our legislatures give us, I thought Lee Alverson was telling us, is a lot like what we ask them to give us. The problem is, who's we? What comes out of the legislation and regulation, can't be balanced perfectly with respect to all interests. It's going to be more influenced by some than others. That's the political process. But, still, I don't see the government as being a black hole that sucks up ideas and doesn't provide any. It reflects ideas to a large extent. Whether there are bureaucratic entrepreneurs, so to speak, who can go further and come up with new ideas and sell them is a good question. I certainly think there's a role for that. It's probably also incumbent upon management agencies like ours to do a little more interacting with the people who are being regulated so that as regulations are

developed, they reflect more the realities of the fisheries that they're aimed at.

BEVAN: Jim?

CAMPBELL: I thought I heard Lee say that, really, it had to start at the fisherman's level or the industry level and I believe that. Usually it starts from a current practice and it has to go up. But I don't think government's a black hole in that case, because unless you get it adopted by the Congress or government, you're never going to get it implemented across the board. It's going to stay a tradition or a practice. If it's going to be a policy, it has to go through that procedure, including financing and how to carry it out over a long period of time. I don't think the government is a black hole. It's a necessary process we have to go through if we're going to have worthwhile policy. But it does have to start at the ground level.

BEVAN: Well, let me turn to another subject. John Gulland raised the question of multi-species management. It's on the minds of a lot of people but, and I don't think I'm wrong in making a pretty flat statement, they say "that's fine, we ought to be looking at it, but at the moment we don't know how to do it." We're going to be forced into doing it. What are we going to face when we do that? What's going to happen in a groundfish fishery in which nets are only semi-selective for the various species that we have to deal with.

CAMPBELL: Well, I spoke a little bit to that, and I feel rather strongly that we can't go to individual species management in multi-species fishery. We have to watch those individual species, but we can't manage all the other species on the one or the fishery will be very inefficient. Things like aquaculture are going to take us over. I don't see aquaculture playing a big part in the groundfishery, but I'll use it as an example in the salmon fishery. If we keep playing around try to manage on a single-species of salmon, Norway's going to have the total market here. It's surprising to come to the Captain Cook Hotel in Anchorage, Alaska, and see Norwegian steelhead on the menu as a specialty. I think they can take the market because they can deliver fish every day - 50,000 pounds any place you want it, at any size you want it. They're going to take over our market unless we do something to gain back that control.

We're going the wrong direction when we try management by single-species. We've got to realize that some species will never come up to their total capabilities. They have to be fished in the lower levels, to keep from over-fishing the abundant species that can be fished and with which we can gain control of the markets with.

MARSHALL: Every now and then when I feel low and want a good laugh, I'll pull out some old papers from my council files. When I went to work for the council in 1979, it had adopted a series of targets or goals for development of plans. We had on the drawing board separate plans for pollock; a single plan for cod, and haddock and yellow tail; a plan for hakes; and another plan for red fish. We were thinking about a plan for flounder. We had envisioned a series of management plans to cover each of these various species. The

thing that always gives me such a giggle is that we'd set out a timetable which would have completed all of those plans by 1981. As it turns out, we didn't quite make 1981.

The point is, the council discovered that in a mixed-troll species, people may go out to target on a particular species, but if they don't find that, or don't find enough of it, they finish their trip on something else. They fish essentially with the same gear, although they might change the cod end if they get into an area where they want to catch red fish as opposed to cod, or something like that.

The fact is, that you can't have seven or eight different management plans to run that fishery. We have reached the conclusion that I think the Pacific and the North Pacific councils will be forced to reach sooner or later: You have to manage on the basis of the entire fishery and not species-by-species. I don't think there's any way you can optimize or maximize the harvest of each individual species. What the fishermen target will be influenced by relative abundances, it will be influenced particularly by prices, and by maybe some other things that I don't even know about. It simply will never work to set a particular level of harvest for each species based on what we think we know about their relative abundances in the total fishery, and expect the industry to run around and fish on this one this week, another one a different day. What you will do is encourage a lot of people to discard and waste the resource and to evade the rules and regulations.

BEVAN: I wouldn't disagree with any of that. You have to make clear however, that in a multi-species fishery, you cannot fish the primary and most accessible species at the same rates that you would if you could isolate them. We'll simply have to underfish some parts of that complex in order to successfully have a multi-species fishery. I'm not sure that that's sunk home along the way.

CAMPBELL: I think on the other hand you're going to have to overfish some of them, too. I think we've got to look more at gear and less at the individual species.

HUPPERT: Unless John Gulland is right, that we've got so much natural fluctuation it overrides the effect of fishing, you're going to continually overfish a number of species in that group. The result is still single-species management, because that's what's left.

MARSHALL: Let me say, Dan, in term of over-fishing, I'm not talking about fishing it down to where you don't have the reproduction. But you're not going to be able to have the optimum population at all times. You're going fish it at much lower populations, and I think that's the only way. I'm sure we can design gear that will protect the species so it won't be done away with, but we just can't fish on individual species.

HUPPERT: I've dealt with this multi-species question, to some extent. I don't think that it's particularly different for groundfish than for salmon. Although we don't talk about it that way when we're dealing with our salmon fisheries on the West Coast, we do have several stocks that mix in the ocean and the fishermen can't

discriminate among when they're fishing. Yet we seem to deal with that problem by openings and closing and levels of catch in various areas to reach some kind of compromise escapement level on several runs at once. We all realize this isn't perfect. I have never heard that discussed as a multi-species problem, but it's really the same thing we're talking about on groundfish. Everyone agrees you can't go in and manage each individual species in an optimum level. On the East Coast, I've heard the suggestion that we should have bio-mass management. At this point, I don't know that anyone's willing to accept no discrimination among species, because we know that the higher-priced species would be fished way down right off and we'd be left with a lot of low-priced species.

To break through all that, I'll make a proposal that people can shoot at. We have to reach some kind of compromise between individual species and total biomass. Why don't we pick some categories that already exist and which the industry finds. I think in California, when we land groundfish, I'm thinking of rock fish in this case, the fish tickets have categories like deep-water reds, small reds, chili pepper, browns, and there's a couple other groups. Those particular market categories are useful for the industry because they mean certain kind of product can be produced. A fillet of a certain size or quality can be sold at a uniform price, as I understand it, and I could be wrong about that. It might be worth looking at the possibility of managing for these categories. They are already defined and documented in landing statistics and the fisherman already knows how to identify them. Presumably, that would ease some of the enforcement problems, if we require sampling of all species.

SISSEWINE: I'm not sure why we're debating whether we should be looking at multi-species management or not. Reality management is multi-species. There's no avoiding that. We're dealing with fishing vessels involved in multiple-species fisheries, with industries and markets that are multi-species in nature and with ecosystems. Every decision we make has a multi-species impact. Even the decisions to protect marine mammals have an impact on an ecosystem. The issue is how, in fact, do we develop a strategy that deals with the reality of biological interactions? John Gulland noted there are many biologists, well-dressed biologists, he noted, that have their own bag of models to deal with that. Probably of more practical importance are the technological interactions, the by-catch problems, because those are more quantifiable and visible. There is some value in looking at history and at New England in this particular case, because these are issues that became very apparent to people, even before FCMA or MFCMA in New England.

I believe Bart made the comment yesterday, that he suspected that you couldn't fish all of the species to their potential simultaneously. Well, that's an important observation. About 1973, the International Commission for Northwest Atlantic Fisheries, ICNAF, did an analysis which indicated that the potential productivity of the entire finfish community was about 40 percent less than the sum of the estimated potential of each individual species. I presume that situation probably applies everywhere. That is, you can't maximize things all at once.

There's a clear history of documentation of those observations about ten years ago in the northwestern Atlantic. What did ICNAF do in that case? They developed what might be called a biomass quota, called a "second tier" quota. It was a quota on the whole that was less than the quotas for the individual parts. That quota took into account the details of the by-catch rates between species, for example if one wanted to catch 100,000 tons of cod and for conservation reasons, only wanted to catch 5,000 tons of haddock. There was a known rate of by-catch of haddock in the cod fishery. There were specific ways to adjust the catch quotas on those two species so you didn't violate constraints on one or the other. Those procedures are on the shelf. There's nothing difficult about them from a scientific point of view.

I don't necessarily recommend they be applied in this case or any other case because there are a lot of ancillary considerations. I also don't think that the concepts and approaches are very difficult. They were worked out ten years ago. They were ignored or overlooked in the initial stage of management under MFCMA in New England. And that was one of the major problems. It was very clear that the 1977 exploitation rates that were applied by the first groundfish management plan were incompatible for two important species - cod and haddock. That led to some of the early problems. It wasn't surprising that the management plan was developed in haste and with a lot of people involved that were not experienced. The problem was very severe because we did not look at history. My point is: we are involved in multi-species management. We better face that more directly, and think about the problems in a much greater multi-species context or we're just going to make mistakes.

BEVAN: I hesitate to extend that multi-species into the incidental catch question that John Gulland raised yesterday. In some respects, we don't worry about that in the North Pacific. We just call them prohibited species. As long as you don't keep them, we don't worry about them. We don't take them into account. We're now getting incidental catches reaching levels where we're going to have to do something about them. One of the alternatives is to simply call them a prohibited species and as long as people throw them away, we won't worry about them.

And I'll start with Clem Tillion.

TILLION: I just wanted to address one thing, Don. It's rather ancillary, and that's why there are not so many sportsman here. The reason is that the United States and the state systems of managing sport fish are very good. The purpose is to maximize the resource and maximize the opportunity of the ordinary citizen to participate. If that system is carried into the commercial fishery, it is a blueprint for disaster. It's like taking the farms that are so productive and dividing them among each generation, until they finally reach a size that is no longer productive. The reason you don't have the sportsmen is that their fight is, "you shouldn't let the commercial take the king salmon." And that's done at the very basic level. But the absolute management of the sport fishery by the United States and the individual states is very good. There's no basic reason to change that management, when you're talking about food. The reason we've been able to carry that further is we've had the "black hats" as you call them, the foreigners, that we could

push out while still using for a short period of time the sport fish management. If we continue to do it, it's a blueprint for disaster. I hope, we would take a look at the fact that commercial means the production of food and we'd better address that system which delivers the best product to the consumer at the best price or the United States will remain in the position of importing 70 percent of the fish that the American citizen eats.

BEVAN: I hate to quote Clem Tillion in responding to that, but I think Mr. Tillion laid out Alaska's priorities very succinctly a few years ago, when he said we don't really have any problem with our priorities: "First, we eat them, if there's any left over we sell them, and if we still got some left over, we play with them." I think that describes maybe why we don't have too many sportsmen here. We were simply afraid to let them in the halls.

ALVERSON: I just want to correct the record. I did not imply that the government was some black hole. I think that Dan and others corrected that. I look at it as a response-sensing mechanism. It responds to what it senses in terms of the public and policy evolution and is, as Dan says, reflective in character. That's largely the way it's supposed to be.

In response to your question about policy evolution. Yes, I do think that industry and the fisheries family as I described it could make efforts to communicate more effectively with one another, including the recreational and academic components. There is a point in time, however, when government becomes essential. That's when you begin to project that policy into the government. Then again, it is a sensor and it is going to sense what you think everybody else thinks. If you've done your job well, you've quieted down the noise.

I want to comment on the multi-species issue, because I think Michael said it very well. We are in the multi-species management arena. I accept the concepts evolved over the last decade or so regarding the inability of the complex to produce what the added-value of the species might be, what the quantitative value might be. The problem is the one that Charlie mentioned. We tend to be in a multi-species management process with a lot of people thinking single-species solutions. That's where the difficulty lies.

EATON: I'd like to make a comment to Dr. Bevan on the loss of the crab we didn't take. Just because we didn't catch crab may not mean that we lost money. Sometimes taking less, you can make more. The only thing that I know about economics and the fish business is the more you sell, the more you make. That doesn't mean the more you sell, the more you make. I can remember one year management closed the season to carry crabs over to the next year and we were getting a \$1.35 when they closed the season. The yen changed or something happened. They saved the crabs. We took 'em the next year. We only got \$.85. So there can be some losses when you get into that kind of manipulation.

On Mr. Fullerton's comments about stabilizing markets, you really can't stabilize markets unless you've got some stabilized product, because the fish fills the market. I think that's why we're seeing

the analog products. That's a strategy to get a constant supply of fish into the market.

And a comment on overregulating the fishermen. I think part of the problem is that management isn't always strong enough to turn away the pleas from different individual groups to create this over-management. It's still an open question as to whether it's returns or opportunities management is to guarantee, especially the way limited entry is being sold. If somebody comes in, not the windfall, but the second guy comes in and buys a license for \$200 or \$300 thousand and if something goes wrong in management, he is going to petition government for help, just like the farmers. An \$18.9 billion farm subsidy is attempting to guarantee returns. And a lot of that is because of what government has promised through controls. If you have a \$3 million boat that's built with a government subsidy, and something goes wrong, you're going to return to government and say, "Hey, you're a partner, you got to do something to help me." I think government will be called on to guarantee results.

LOKKEN: I could spend the rest of the day asking questions of this panel, because many astounding statements were made. But, I'd like to comment first on one that Charlie Fullerton made regarding over-managing. You have to define what you mean by over-management. In my experience, over-management is what you do to me, and you're under-managing the other guy. And, there are two examples, I would like to make in the form of questions to Charlie. The first is, would not removing much of the management, let us say on the Pacific coast, Washington, Oregon, and California reduce the fishery there to a fishery on hake? Because if you allow that to bloom without concern for the other species that you're taking, and I think Mr. Huppert mentioned this, you're going to get rid of all the high-priced species, and wind up with the low-priced species. That's going to add large fisheries on that one species only and the small-boat fleet will disappear. The same thing is true in Alaska. If you apply that theory to Alaska, you're going to wind up with a fishery on pollock, because that's the largest bio-mass out there. Now, how would you avoid such a situation in Washington, Oregon and California on hake and in Alaska on pollock?

FULLERTON: Harold, we're probably miscommunicating again, but we have done that quite often over the years. I think we have to manage the fishery. Over-management is like when we get down to single-species management. Suddenly, we adopt a whole mess of regulations that I feel are not necessary. They don't do any good as far as returns to the fishermen or to the industry. They cause a lot of public and Congressional concern. They cause unnecessary arrests. That's the type of overmanagement I'm talking about. We do have to manage the fisheries to make sure they're not overfished, to assure we have fish out there. But, I think, many times we go too far and put on regulations that are not necessary. I hear people talk about limited entry here. The biggest mess you can get into is regulations on limited entry. You've got to take serious looks at that to make sure you don't adopt something that puts on an over-abundance of regulations that make an inefficient fishery.

BEVAN: I'd like to add to Charlie's response. Particularly, after listening to his second addition, I don't disagree with Charlie. I think we're over-managing. At the same time, we're under-managing.

We're under-managing in the sense that I can't look around the country in a domestic groundfish fishery and see how the effort and the supplies are matching up. And, we're addressing that problem through a whole lot of inefficiencies. So, it's a combination of over-managing and under-managing, at the same time.

FULLERTON: Over-managing now causes a tremendous waste of fish that could be put on the market. Dumping and sorting at sea is causing all that. I'm saying there must be a better way. There's going to be some of that, no matter what happens, if we're going to really manage the fisheries. But I think when we get too many regulations, we cause this tremendous waste of fish. And that should not be going on.

COMMENT FROM AUDIENCE: You're talking about better regulations, rather than eliminating them.

FULLERTON: That's right. You gotta have some regulations, even though as Bart put it, the minute the regulation's passed, the first thing the fisherman starts to figure is, "how can I get around it?" I think Churchill said, if you have a problem you can't solve, you manage it. Well, I think that's what the fisherman does with the regulations. I think that we ought to look at that, but I don't think we should make inefficiencies through regulations.

HERRNSTEEN: I'd like to touch on several subjects. Will there be conservation in the king crab fishery now that the stocks are down and fishery's been closed for two years in Kodiak? The fishermen haven't objected to that. They did some extra surveys, the fishermen and the department together, and saw the stocks were down. It's very frustrating because we don't have the multi-species management you were speaking of earlier. A lot of people feel the halibut stocks are being allowed to build up to too high a level and we're not fishing enough of them. We fish them on the same grounds where the king crab are normally taken and where they're being eaten. We also have problems with sea otter cleaning out crab in some of the bays. Yet there's no harvest on sea otters. This multi-species thing makes it frustrating when we're trying to build up the king crab stocks, but there's no question that fisherman are conservation-minded.

One of the other things I wanted to comment on is the makeup of the council. Should the council be made up of a cross-section of the community or should they be knowledgeable industry people? I feel it's very important to have as many knowledgeable industry people on the councils as possible. As well-meaning and dedicated as the average non-industry kind of person, the general representative, may be, he doesn't have the background to take a critical look at the numbers and have a feel for the industry.

I think the Board of Fisheries in Alaska has been very successful in managing the salmon fisheries. One reason it's been so successful, is that the Board of Fisheries is all fishermen. It works equally with the commissioner and the Department of Fish and Game. It takes a lot to override a commissioner's decision, because the biological decisions are ultimate. But you have give and take. The fishermen on the board analyze, cross-examine and critique the management.

It's a two-way street of working together. If you have a council made up of a cross-section, with maybe two out of fifteen of them fishermen, I don't feel you will have that same review.

Another problem is limited partnerships and syndications. It relates to what one gentleman said yesterday. Well, it's a simple bank economist who keeps making loans on king crab boats, thinking if one made it, ten'll make it. In talking to one of the bankers here yesterday, he said, "I personally, don't loan on boats, I loan on men. I only loan to men who have boats." If you look at over-capitalization in the king crab fishery you'll find that many of the last boats to be financed were bought through government guarantee loans, through syndication, and through misuse of federal development incentive programs. The two different boxes of government aren't coordinating themselves as far as development is concerned. There's always someone asking for another loan or another bail-out or another tax shelter, or this or that. Pressure to re-examine this has to come through industry to Congress, but I certainly feel it should also come from the councils and from management bodies. Congress should take a critical look at economic development programs like CCFs and fishing vessel loan guarantees. Bill Hingston said, I think, one of these new catcher-processors for cod could harvest as much as a whole sailing schooner fleet did many years ago. These are being built apparently, from what Bart said, with speculative money from doctors, and lawyers, and movie stars, and other people who are looking for tax write-offs. And, they're hurting us. They're hurting us bad. As far as Alaska and our coastal communities go, it's gonna be death to them, if they're not controlled. That's all I care to say now. Thank you.

FULLERTON: I'd like to say a little bit in defense of the government and this loan program. I'm involved in that quite heavily. If you read the Congressional Record in the last year, you'll recall that: the fishermen and the fishing industry went to the Congress and the Congress gave us hell, because we weren't giving out enough of those loans and we weren't distributing enough of that money. In many cases, they should have never been loans put on them. So, let's take a look at the fishing industry, too. We react to your pressure on Congress.

CHAPMAN: Just a brief comment. We have been looking, as a lot of people have, at the capital construction fund, the fishing vessel obligation guarantee program, and the fisheries loan fund, and so on. There is probably an argument that programs of that type have, in fact, added to the current levels of effort. A lot of people think those levels are too high, industry's over-capitalized. But, I also agree with something Charlie Fullerton said earlier today. Whatever you think of those programs, the even bigger problem is the general tax system in the United States. Tax incentive programs and things of that sort probably do far more to encourage investment in large vessels, particularly, than the capital construction fund and those things. So, I think we're gonna have to look at more than just those programs when we talk about reducing the incentives or the attractiveness of investing in fishing vessels. Talk to some of our congressmen and senators and see if we can't persuade them they ought to do something about the fundamental tax system of the country.

HERRNSTEEN: I agree with you. I've always believed that the purest form of limited entry is tax. I've advocated, at times, that the taxes would be put to good uses, either to the communities or to the fisheries. That's the problem. The fishermen are just chasing dollars, we're not chasing fish as Bart and others have pointed out. If you want to really take the economic rent from the fishery, or decrease the number of votes, the purest and the simplest way to do it is just to tax. We're doing the opposite. We're subsidizing. Instead of taking, we're subsidizing them and then saying, oh, we gotta have limited entry, too. I agree with you on the tax.

BEVAN: I'd just like to raise the question of fishery development, and go back to something Barry Fisher said yesterday. He left us with something I don't think he intended to mean. He's looking to the councils to go into the second step of Americanizing and developing the underutilized resources. Barry may have said that, but I don't think he means it. I think the best that he can expect out of the councils is that they stay out of his way. What's going to Americanize the pollock fishery are such things as imports, tariffs, the value of the dollar, interest rates, fuel, and a whole lot of other things that, quite frankly, I don't think most of us want the council trying to mess around with. Barry's shaking his head so I guess he agrees with me.

JAEGER: My name is Sig Jaeger and I used to be a fisherman. Don, many years ago, you used to talk about the leaky bucket approach. Now, there isn't an industry person sitting on the panel there, but I thought that I might hear from some of the fishermen here about what management costs them in terms of let's say, unharvested fish, or resources and expendables used for runs from grounds that are dictated by management. Your leaky bucket approach, as I understand it, was basically that. I know that we had regulations in the Bering Sea that required running back and forth, and at \$1 to \$1.10 per gallon, it was really expensive. What you were basically doing was increasing the cost of acquisition to the fisherman through regulations. I think that's basically the gist of your leaky bucket approach.

BEVAN: Sig, I guess I would look askance at your term "dictated by management." I have been involved in this management process for a long time. I can't ever recall where anything was dictated. Fishermen and processors and the whole group had a very large say in how this thing was put together. I agree that quite often the horse put together by that committee looked more like a camel when we got through. But it wasn't because of a lack of information or input we concluded that we can't limit effort directly, that we're going to find ways as painless as possible to make that effort inefficient so we can reduce it. I don't have any problem with people who dislike limited entry and the fact that I happen to like it. I admit, I've never been successful in selling it to certain groups of fishermen. I think we do have to recognize that if we're not going to limit effort directly, when we run out of time and space to control, we have to rely on inefficiencies. I see no way around that problem.

JAEGER: I didn't mean to infer that it was dictated, Don. The industry has had opportunity to make comments, but sometimes the industry doesn't recognize what the economic costs are.

FISHER: At the risk of being tiresome, I'd just like to clarify what I intended yesterday with that statement. I wanted only to point out to the council that as I read it, there is double mandate laid upon the councils. One is to conserve and manage renewable marine resources. The second is to develop the under- and un-used species. I did not expect that the council would engage in economic development. What I said was that the majority of the people on the council have never done anything in the field of economic development. I want the councils to examine this mandate, to be conscious of it, to clearly recognize that they can't do it. In turn, they should work out some inner guidelines and agreements among themselves to encourage and to facilitate economic development.

In the area of joint ventures, for example, I was given two extremely opposite reactions to the request to go fishing on joint ventures. One was continued recommendations and decisions against what we wanted in the whiting fishery in the Pacific Management Council. When we came to Alaska, the attitude was the opposite. We were, in some senses, protected. We were assured that we would have the chance to go fishing. In other words, this council saw that as part of their duty. At the same time, they put some caveats on us in terms of prohibited species catch, getting along with other fisheries and so forth. With those instances of completely different treatment by two councils, the only thing I was trying to get across was that the councils should be aware that there is a second mandate. Further, they should get some kind of internal guidelines going on how to encourage the economic development that will get you into the second mandate. I hope that clarifies it.

TILLION: I'd like to comment on the economics that Bart Eaton covered of how the government encourages you to go in debt. I think that the failure is illustrated by Rowan Drilling's annual report. They said this was the best year they have ever had and they're now six months from bankruptcy. Two of their most important competitors have government loans. If the government forecloses, they are safe and will continue to make a profit. If the government does not foreclose, their competitors will be able to operate at a price Rowan cannot operate on because they have paid their bills and their competitors have not. That is the danger of government loans.

I always thought that bankruptcy was the epsom salts of the free enterprise system. I don't happen to think that these people losing their boats, and another fisherman picking one up at a quarter of the price, is bad. Now I'm in the charter boat business, so the king crab thing was hurt. It means there are people desperate to keep their boat payments paid and they're bidding prices in that I can't compete with because my gear is paid for. Now, if they are under-bidding me because the government won't foreclose on the loan, and they are in effect getting a feebie vessel, I'm being badly hurt. If they've gone through bankruptcy and somebody has picked up a boat at a quarter of a price, that's how I got mine. That's legitimate.

The fear I have of government assistance, is reflected in what's happened to our farmer. If you go to the bank, and you don't make your payments, they take your farm. Government can't take it, and therefore, government loans and government assistance are far deadlier than any other. The whole thing comes back to the fact that

the government should foreclose and the loan should be handled like it would be from a private lending institution. If they encourage you to go in with capital investment funds, which is damned foolishness, and you go in a direction that you shouldn't have gone, that's your tough luck. But they should take your house and your boat and your automobile, just like a bank would.

EATON: I think a lot of what Clem said. I agree with him and my grandpa agreed, too. His advice to me was, you just can't stop a foolish man from doing his foolishness.

I'd like to continue discussing regulation. As I view it, and when I watched it on the council, every regulation has a cost. Then the question becomes who's going to bear the cost? Many times the managers will pass a regulation and turn it over to the fish hawks, but they don't give them any money. Then, the fish hawks come back and say we can't enforce it. So, the only other place to get the money is to put that cost on the fleet; or you don't enforce it, which creates all these other problems. The main point I want to make is if you're going to have a regulation, you have to know the cost and who's going to bear it. If the fisherman bears it, it's an inefficiency. If the fish hawks bear it, then that comes from public revenue and that creates problems. Regulations made just to get you out of the meeting, and to keep the constituency that happens to want it today happy, can have a lot of financial impact. I think maybe we don't realize what the real costs are.

DIANOTTO: After listening to Bart's comments I think I'd like to make an observation on discussion of over-management and an observation of how a management entity, in trying to respond to the users, can dig itself into a hole. I'd like to use the Pacific council and the Pacific council's attempt to manage the groundfish fishery off Washington, Oregon, California. The Pacific council is responding to the industry as their advisory panel is represents it. The industry wants a year-long fishery for groundfish. They need the fishery to maintain the market. They can't use time and area closures, because time and area closures unfairly affect certain shore-based processors and fishermen based out of certain ports. So, time and area closures are out.

They don't want to look at the question of total effort limitation. This is controversial. The concept then, to meet the objective of the year-long fishery, was to impose trip limits. This is what the industry was suggesting. This is what came back to the council. The trip limit was favorable to most of the industry because at the outset, the trip limits were high enough that they affected a relatively limited part of the commercial fleet, the larger trawlers. Most of the investment in the fishery was safe under the initial trip limits.

Well, the resource is not substantial enough to allow, basically, the full fleet to fish year-long. As the trip limits became increasingly severe, they affected more and more of the fleet. Then we got to trip frequencies. Not only were trip limits inadequate, we had to combine them with trip frequencies. The whole package has gotten complicated and severe enough that it has affected the whole spectrum of the industry. The package is now basically unacceptable. It has resulted in increasing wastage. It has resulted in a

winnowing-out of the fleet. But that was the proposal, you see, that industry brought to the council. When the council saw a industry task force recommendation that was solidified, they responded by passing the motion 13 to nothing for trip limits.

What Bart was saying yesterday is that in defense of the fisherman, the management entities need to look at these ramifications. This objective can be reached by other approaches. You could have a year-long fishery off Washington, Oregon, and California probably by a mesh size. Now the mesh size would be very large and you would be underutilizing some species. You'd be reducing the total potential, but that is an option to reach the industry goal of a year-long fishery.

The point I am making is that sometimes the management entities do need to look at and present a spectrum of options that clearly present the trade-offs in terms of production, in terms of cost. Only in that way can you get around this criticism of over-management and over-regulation that usually results in the management entity trying to respond to the industry's need for a little more tonnage here, a few salmon more here. In trying to respond, you develop this complexity of regulation and all the associated problems of enforcement and wastage that go with it.

HUPPERT: I think there's a real connection between what Gene has said and what Bart and Sig Jaeger have said. In terms of taking into consideration the costs of regulations, that is, the cost borne by the fishermen, and processors, or the industry as a whole. As an economist that worked with the council, I have to plead guilty; we haven't done a whole lot of work on estimating what these costs are and reporting them to the councils and the Department of Commerce so they can take those into consideration.

On the other hand, if we look at the economic theories regarding how fisheries operate under regulation with open access, we see that as a general principle, the imposition of the various forms of regulations we currently have (trip limits, size limits, mesh sizes, the closed areas, the quotas, the closed seasons) all of these work to increase the costs of fishing. They do it in two ways. One, the individual fisherman finds himself having to tie up when he wouldn't otherwise. So, fixed costs of owning and operating a vessel have to be amortized over a smaller period of time. They have to travel to zones or areas to fish where they wouldn't have otherwise. They have to use gear types that are not the most efficient for catching that species. They'll have to throw out a lot of fish. This is one of the things that keeps coming up here. So, if you tow and catch 50,000 pounds of fish and only keep 30,000 pounds of it, then it's costing you more per pound of fish landed. All these things increase the fishing cost per ton of fish landed.

In the economic analysis of fisheries that Professor Crutchfield and Lee Anderson, who's here today, have documented very well, this is a necessary part of that kind of management. If it's an open access system, and we're going to control fishing through these kinds of regulations, the cost of fishing is going to rise until it prevents any additional profits from being earned in that fishery. The only way out that I know of is to move in the direction of limited access. We all know the problems we run into when we're talking

about limited access. There's no quick and easy answer here. I have to fall on the same side of the line as Don Bevan does. I prefer at this point to consider limited access, in those fisheries where there's a substantial amount of over-capacity, as a way to control costs.

BEVAN: I'd like to follow-up that statement. That can only be done if you have approval of the fishermen and the other groups involved. I don't think you impose that on anyone. I'd like to comment on something Barry Fisher said, that no one's been involved in this development process. I'd like to report that some of my colleagues and I, on a hobby basis, have been involved in the development of an under-exploited industry in the state of Washington: the wine industry. That's gone along very well. And I can just start to think of the problems we'd have run into if the government had planted the grapes and we had open season on when you picked grapes with a quota and free access. I don't think we'd be where we are at the present time, in developing a very fine industry under the private property and the free enterprise concepts. Again, I don't think you impose that on anyone. As Bart suggested yesterday, both sides have to open up their minds a little bit, look at that question, and see under what circumstances might it be permissible, and if we can go that direction at all.

DYSON: Don, I think I'd like to say a few things on that over-regulation statement that I made yesterday. I was on the Board of Fish and Game for several years. Finally, we got to the point that most of our time was spent managing people's problems. We need to start managing and developing our fisheries, domesticating our fisheries, and our efforts. And then, I think we'll be doing a better job. As a processor, I know we have many dollars on the line. We wonder when you talk about limited entry, just why are you doing it? Who are you gonna hurt? Who are you gonna kick out of the fishery? And how is it going to help in the long term? I think those questions have to be answered before we ever go seriously into that. Limited entry, as we know it today on salmon, has not been a total success. I think a study should be made to find out whether we should adopt that same system or change it, if we find out where the problems are. After you've done that and have given it a trial or a test, then maybe you take it a step further. There are so many problems in the fishing business and after I've been in it for 35 years, I haven't got the answers, so maybe some of you people have.

BEVAN: I guess, we've come to the end of the time that we have available. I want to thank my panel members for their contribution.

**Session III: Fisheries
Management
Tools
Presentations and
Panel Discussions**
Rod Moore, Chairman

The Economics of Management and Allocation: Experience from Outside U.S. Fisheries Management

Robert Stokes
University of Washington
Seattle, Washington

INTRODUCTION

The U.S. Pacific Coast groundfish catch (Alaska to California) is growing at a surprisingly rapid pace. In a sense, the fisheries development problem of 1976 has been solved. Profitable U.S. fisheries for Pacific groundfish have developed along two routes.

The first has targeted higher-value species such as rockfish and flatfish (for West Coast fresh fish markets), and Alaskan sablefish and Pacific cod. In these fisheries, prevailing prices are high enough to yield profits for both U.S. fishermen and processors. As a result, the domestic catch is growing toward, and in some cases beyond, overall resource constraints.

The other route has been joint venture (JV) processing of low-value but high-volume species such as Pacific whiting and Alaskan pollock. For these species, wholesale prices do not cover the combined costs of U.S. harvesting and processing. To overcome this obstacle, U.S. fishermen make at-sea deliveries to foreign processors. Lower cost foreign labor and an abundance of idle foreign processing ships have made this approach mutually profitable to both U.S. fishermen and foreign processors. Again, the result has been growth in the domestic catch, in some cases to levels that approach resource constraints.

The shift from foreign to domestic production creates, as one would expect, a host of new management problems: some biological, some economic, and some institutional/political. The focus of this paper is on the economic dimension. But I believe the crux of the groundfish management problem is neither economic nor biological. Rather, it is institutional and political. By this I mean that most

of the major biological and economic uncertainties can be resolved with "normal" research effort.

Biologists can and do ascertain the status of stocks and recommend harvest quotas. The research underpinning these quota recommendations is subject to the familiar limitations of data inadequacy, unrecognized inter-species relationships, and so on. Mainly it provides an adequate basis for informed decision-making. Similarly, familiar techniques of economic analysis can identify policies that will lead toward improvements in the industry's profit position and its contribution to national economic well-being.

But, what does not come out of any specialists' theory is a solution to the institutional/political question of distribution: who gets what share of the economic pie and by what means shall those shares be determined? We can avoid the distribution question altogether, by letting fishermen divide the catch among themselves in free-for-all seasons, and by "economic" regulation consisting primarily of ad hoc responses to organized political pressure. Both approaches however risk losing a significant share of the Pacific groundfish fisheries' potential economic value.

Avoiding that outcome requires coordinated efforts by all participants in the fisheries management process: industry, senior policy makers, working managers, and researchers from several disciplines. The economist can contribute to this effort a conception of what the economic stakes are and how the greatest aggregate economic value can be obtained from the fishery. This paper argues for the following general approaches to obtain the greatest economic value for the U.S. from Pacific coast groundfish resources.

1. In the JV fishery, the bargaining position of U.S. interests should be strengthened to guarantee them the greatest possible share of overall JV profits.
2. U.S. policies affecting the investment or operating climate of foreign JV participants should be tempered by a recognition that foreign profits are, or can be, U.S. profits. Favorable treatment of foreign JV processors increases overall JV profits, some share of which will accrue to U.S. fishermen if they hold a strong bargaining position.
3. It is essential to control effort in all U.S. fisheries, including JVs. Otherwise, much of the fisheries profit and contribution to national income will eventually be converted into excess fishing costs. Technical conditions and the current state of economic and institutional development favor effort control caused by strengthening those features of management and industry practice that allocate catch among individual fishermen. The worst outcome would be allocation by the kinds of free-for-all open seasons that we now see in many other U.S. fisheries.
4. Finally, no significant conflict exists between maximizing U.S. national income and maximizing aggregate industry profit. However, excessive emphasis on accommodating

individual regions, gear groups and industry sectors can greatly reduce the fisheries' overall economic performance. Industry and government leaders need to develop new understandings and institutions that prevent "fisheries politics" from driving yet another fishery toward its lowest rather than highest attainable level of economic performance.

ECONOMIC CONCEPTS AND GOALS

The term "economic performance" has a variety of meanings to different participants in the fishery. To the U.S. fisherman or processor the economic value of the groundfish fishery is the net income or profit he earns, in economic terms his "producer surplus". That producer surplus is gross revenues, less the sum of out-of-pocket expenditures and "opportunity costs". Opportunity costs refer to the value an individual places on the contributions of labor and capital he makes to the fishery. Ordinarily, opportunity cost is the individual's assessment of what that labor and capital could earn in its next best alternative employment. In short, the U.S. groundfish fisheries' economic value to U.S. producers (producer surplus) is the sum of how much better off all producers feel they are by participating, rather than by earning their living elsewhere.

The domestic groundfish fishery's value to U.S. consumers is measured by the extent that its existence allows them to get more from their food dollar than they would without it. The term "consumer surplus" measures this gain, and is analogous to the fishermen's and processors' producer surplus. In money terms, consumer surplus is the maximum the consumer would be willing to pay for groundfish products, less what he must actually pay. What this money measure of consumer surplus reflects is the added satisfaction (value) a consumer obtains by buying U.S. produced groundfish, rather than other products such as imported groundfish, other fish products, or other foods such as beef, pork and poultry.

Development of the U.S. groundfish fishery will also affect the economic well-being of Americans who have no direct involvement in the fishery. Public revenues from the domestic groundfish fishery will reduce other taxes and/or increase other government expenditures. In both cases the economic effect will be to increase producer and consumer surpluses elsewhere in the economy. Public expenditures on the groundfish fishery will do the reverse.

Changes in private expenditures resulting from groundfish development will also affect non-fisheries economic interests. Examples of such interests include the shipbuilding/repair industry, and the Alaskan and lower 48 communities where groundfish fishermen buy supplies and spend their earnings. Other examples include industries and communities that process imported groundfish, and those producing the export goods foreigners buy with dollars earned from groundfish sales to the U.S. Each of these and other indirectly related groups will gain or lose producer or consumer surpluses as a result of policies associated with the U.S. groundfish industry development.

The overall economic value of the domestic groundfish fishery to the U.S. is the sum of all consumer and producer surpluses that it generates for U.S. citizens. Policies which increase that economic

value do so by adding more to the producer and consumer surpluses of some citizens than they subtract from those of others. Policies that do the reverse diminish the fisheries' economic value.

Benefit-cost analysis of fisheries policy is the art of identifying and estimating those consumer and producer surpluses. In the conventional terminology of benefit-cost analysis a policy is efficient (increasing national income) if it has a positive net effect on consumer and producer surpluses. The policy is inefficient (decreasing national income) if the reverse is true.

More broadly-defined policy analysis identifies other policy consequences and trades them off against national income impacts. One of the principle "other" considerations is the distribution of national income among individuals and groups. The following section applies the above efficiency or aggregate national income approach to the economic evaluation of specific groundfish policies. Discussion then returns to the question of distribution.

ANALYSIS OF GROUND FISH POLICIES

For now let us return to the earlier assertion that we can advance toward achieving the greatest national economic value from the domestic groundfish fishery (sum of producer and consumer surplus) by: enhancing the U.S. fisherman's bargaining position within joint ventures, maintaining a favorable investment climate for foreign JV processors, and controlling the size of the domestic groundfish fleet.

IMPROVING THE AMERICAN FISHERMAN'S BARGAINING POSITION IN JOINT VENTURES

The JV sector of the Pacific groundfish fishery has grown faster than the all U.S. harvest and processing sector. For several reasons we should expect this trend to continue.

At the harvest level both the U.S. and foreign processing sectors can be considered economically equivalent. They both employ the larger trawl-capable multipurpose vessels that were originally built to harvest other species, principally king and tanner crab. The owners of these vessels can be counted on to supply either U.S. or foreign processors as long as expected revenues exceed the sum of out-of-pocket expenditures and opportunity costs. Opportunity cost, in this case, means only the value of alternatives found in such economically distressed fisheries as king and tanner crab. Hence these vessels are available to both U.S. and foreign processors at modes, though comparable, cost.

When we look at processing costs, the balance shifts substantially in favor of JVs. Foreign JV processors, like U.S. fishermen, can contribute low opportunity cost vessels that have been squeezed out of other fisheries, and which today have few viable alternatives. The U.S. processor, on the other hand, must make substantial new capital investments; whether he equips a shore plant with bottomfish filleting equipment, refits an existing vessel for processing, or builds a new factory processor. The opportunity costs of such investments are the earnings that liquid capital could achieve elsewhere in the economy. Typically these earnings will be higher than

the profits obtainable by using existing vessels and equipment in some other manner.

Additionally, foreign processors benefit from lower wages, government subsidies and the absence of costly U.S. social and environmental legislation. Finally, at least for the present, foreign nations have responded to the Magnuson Fishery Conservation Management Act's (FCMA) linkage of allocations with support for the U.S. industry (fish-and-chips diplomacy) by forming JVs rather than by purchasing finished groundfish products from the U.S. processing sector.

Stripped of its formal organization, a JV is a bargain between one, or at most a very few, foreign processing firms, and a larger number of independent U.S. fishermen. Economic theory and the history of fisherman/processor relations on the Pacific coast would indicate that this relatively greater concentration of buyer/processors will leave the more numerous U.S. fishermen at a disadvantage. Whatever the total JV profit might be, a greater share will go to the foreign participant than would be the case if the fishing and processing sectors were equally concentrated, or if U.S. fishermen had access to some mechanism for coordinated bargaining.

To see the economic basis for this assertion, imagine two extreme situations. In the first, a single foreign processor deals individually with each of several independent U.S. fisherman. He could under such circumstances obtain their services for little more than the sum of their out-of-pocket expenditures and opportunity costs. That is, he would only have to pay a bit more than the U.S. fishermen and vessels could earn in their next best alternatives. All of the producer surplus or profit from the JV would accrue to the foreign processor.

Alternatively, one U.S. fishing enterprise could hire individual foreign processors. The fishing entity would have to pay only slightly more than the foreign processor's opportunity cost, thus capturing all producer surplus for the U.S.

Obviously, neither of these extremes represents a real world possibility. However, measures to coordinate and strengthen the bargaining position of U.S. fishermen should, other things equal, increase their bargaining power and therefore shift the division of profits toward the U.S.

Some coordinated bargaining has been done on behalf of U.S. groundfish fishermen. But usually the issue has been the quantity of JV purchases rather than prices to be paid. U.S. "fish-and-chips" policy, codified in recent amendments to the FCMA, has been used to link JV purchases to foreign allocations. There was also a recent U.S.-Japanese industry-to-industry bargaining effort that led to guarantees of Japanese JV purchases.

But, at least to my knowledge, no one has pursued the idea of concerted price bargaining by, or on behalf of, U.S. fishermen. Who in government or industry should do this, and how they should go about it, is beyond the scope of this paper. What does seem clear, though, is that the current benefits to U.S. fishermen could be substantial, and that these benefits could grow in the future.

One reason a stronger U.S. bargaining position will pay off even more in the future is growth in JV fisheries. Today, the JV fishery is not only the domestic fisheries' largest component, but also the one that can economically harvest species with the greatest domestic industry growth potential: Alaskan pollock, whiting, yellowfin sole, and so forth.

Another reason is the clouded future of alternative U.S. fisheries, particularly king and tanner crab. Recall that opportunity cost (the value of alternative employment) is all that must be paid to hire a truly powerless individual fisherman. Until and unless the crab fishery rebounds, independently negotiating U.S. crabber/trawlers will remain in a weak bargaining position. Not only will they lack a coordinated mechanism for extracting JV profits, but they, and the JV operators, will realize that they have few attractive alternatives to JV participation.

Achieving the greatest U.S. gain from other economically rational policies may also depend on a stronger bargaining position with JVs. This applies specifically to the observations made below about reducing costs by accommodating foreign processors and by limiting U.S. fleet growth. If the U.S. bargaining position is weak, foreigners will simply keep whatever profits they gain from favorable U.S. policies, and will respond to reductions in U.S. fishing costs by adjusting their prices downward. The same foreign response could be expected to a variety of existing policies. We may, for example, be permitting foreign processors to capture at least some of the economic value of subsidies provided by current fishing vessel loan guarantee and tax deferral programs.

A FAVORABLE INVESTMENT AND OPERATING CLIMATE FOR FOREIGN JOINT VENTURE PARTICIPANTS

If U.S. fishermen are in a bargaining position which permits them to capture a significant share of JV profits, then U.S. policies that increase the magnitude of JV profits should rebound, in part, to the advantage of U.S. fishermen. Conversely policies that reduce JV profits will hurt participating U.S. fishermen.

In particular U.S. policies that increase foreign industry costs will reduce the profits available for division between U.S. and foreign JV participants. Examples of such policies include measures that restrict foreign operations, or promise to do so in the future. To the extent that such policies are enacted, or expected, foreigners will downgrade the economic value of JVs, and hence their willingness to pay American fishermen for their participation. Where existing vessels are involved, the foreign operator may continue to buy from Americans, as he has few alternatives for his vessel. However, other things equal, he will pay less than he would in the absence of such policies.

In the longer term, when foreigners must build new processors to participate in JVs, restrictive U.S. policies may not only diminish U.S. earnings, but may also eliminate some JV markets entirely. Money, unlike vessels, can be invested anywhere. The money will only be committed to the construction of new JV processors if foreign investors expect a return from JV operations that exceeds what they can earn by investing elsewhere in the fishing industry, in other

economic sectors, or by simply holding the money in liquid form at prevailing financial interest rates. Policies that threaten the long run viability of JVs will cause foreigners to adjust their opportunity costs of capital upward by shortening capital pay out periods, applying risk premiums to ordinary interest rates, or both. The result will always be a reduced willingness to pay U.S. fishermen and, in the extreme, may result in some foreign withdrawals from JVs.

In the world of tradeoffs and political reality there are numerous reasons why such policies will be made, or discussed, even though their discussion can adversely affect the foreigners' perception of the long run investment climate. Measures to protect species such as salmon, crab and halibut from JV incidental harvest are one class of such policies. Another are policies that prevent direct competition between the all-U.S. and JV sectors. Economic analysis directed toward maximum national income and aggregate industry profit might or might not support such restrictions on JVs. The economic test would be whether or not the foregone American share of JV profits exceeded or fell short of U.S. profits generated in the protected sectors. Needless to say, legal and political reality dictates a quite different calculus, a subject to which we will return in the next section.

A final class of restrictive policies are proposals for the phase-out of foreign fishing, specifically foreign JV processors. As with policies to limit incidental catches and protect U.S. processors, such proposals may or may not be in the overall interest of the U.S. economy and fishing industry. Given earlier observations about the importance of strengthening the U.S. fisherman's bargaining position, there may be good strategic reasons for keeping the club of "phase-out" partially visible. But, as with other JV restricting policies, there is also a potential cost.

Realistic foreign investors are not likely to expect unqualified preference for their interests over all competing U.S. interests. However, they can be expected to discount the attractiveness of investments in countries where foreigner's interests always come last. To the extent that the U.S. conveys that impression, its JV fishermen will become suppliers of last resort, to be relied upon only when more secure alternatives are unavailable, and to be paid accordingly.

CONTROLLING U.S. FISHING EFFORT

Limited entry and fleet rationalization have been extensively discussed elsewhere, including in other papers and panels of this conference. Hence I will only briefly summarize the economic argument for such measures. That argument holds that the maximum sustained yield of a fishery (or any other desired quantity) can be harvested at minimum opportunity cost, and, therefore, maximum economic value, under these conditions:

1. The fleet must operate year-round, or throughout the natural season. The natural season is dictated by weather, flesh condition of the catch, the degree of fish aggregation, and other biological, technical and market factors. Legal seasons to protect juveniles or prevent physical wastage might also be considered part of the definition of

natural season. However, seasons intended primarily to reduce total mortality are not.

2. The fleet must use the best available technology. Again, biological, technical and market factors determine what this best technology is, and how it should evolve over time. Gear restrictions that protect juveniles and eliminate wasteful practice might also be included in the definition, but not if their primary intent is to reduce total mortality.

Such an efficient harvest pattern is not likely to prevail in a fishery where allocation is accomplished by competitive fishing during the traditional open-access season. Instead, economic theory, confirmed in countless real-world fisheries, indicates that opportunity costs will rise toward total revenue. The primary cause of this rise is the need to progressively shorten seasons to prevent the growing fleet from exceeding conservation-determined quotas. To do better, one must control the fleet's size rather than its fishing time or operating efficiency.

The literature of limited entry also includes detailed discussions of the major alternatives for controlling fleet size. Essentially, these alternatives are input controls (vessel license programs such as prevail in Pacific salmon fisheries), severe regulatory taxes or fees (as were recently proposed for Canada's salmon fishery) and transferrable individual quotas (as were recently proposed for Alaska's halibut fishery).

The point about limited entry that I would like to emphasize here is that we have an extremely attractive, though time sensitive, opportunity to control fleet size to efficient levels without confronting many of the obstacles that have frustrated such efforts in other U.S. fisheries. From a technical standpoint, aggregate U.S. groundfish harvest capacity is still less than that required to harvest the entire Pacific coast groundfish resource. Some fisheries are over-capitalized, such as the Washington, Oregon and California fresh market trawl fishery. Others soon will be, such as Alaskan sablefish and Pacific cod. However, given the ability of at least the larger trawlers to shift between regions and fisheries, we are still some years away from a situation where there is any economically rational reason to remove groundfish effort entirely.

Thus, by acting in time, we can limit our task to the more economically advantageous and politically tractable business of preventing new entry. That is, we can achieve substantial economic (opportunity cost) savings by deflecting new liquid capital into other equally attractive investment alternatives that exist within or beyond the fisheries sector. Similarly, we can deflect potential fishermen toward other professions early in their careers while they can still easily adapt to a broad range of employment opportunities. From a political standpoint, we can also be spared the unpleasant and usually untractable task of deciding who must leave the fishery and how to get them out.

From an economic, institutional and political standpoint there may also be greater hope for individual vessel allocation systems than is found in other fisheries. In brief, such share or quota systems

achieve economic efficiency by allocating the catch prior to the fishing period. With fixed quotas in hand, fishermen have no reason to increase costs just to increase their individual shares. Instead they maximize profits on their initially assigned shares by minimizing costs. With assigned individual quotas, neither seasons nor gear restrictions are required to keep total mortality within bounds. Finally, trade among operators can adjust harvest shares in response to changing personal or general economic conditions, much as trade in land and buildings adjusts for the retirement of individual farmers, the expansion of land holdings to utilize new technology, and so on.

This argument for private property rights in marine fisheries is theoretical on only one point: can you enforce them? If you can, and that remains to be seen, then the rest of the argument for individual harvest rights is more experience-tested than any current fisheries regulatory system. It is simply the way that most of the world runs today, and has run for centuries. Hence, the reader who wishes to critically evaluate the individual allocation or quota approach does not have to understand or accept the tenants of economic theory. All he needs to do is compare the economic performance of common property fisheries with the performance of other natural resource industries where individual harvest allocation prevails, either in the form of private property rights or government granted leases.

Enforcing individual property rights would seem easier in the groundfish fishery than in many other traditional U.S. fisheries. In those traditional fisheries the catch is typically high in unit value but low in volume, and often requires minimum shoreside processing. Such catches could be covertly marketed through a variety of hard-to-monitor channels. By comparison, groundfish are a low value, high volume product that requires intensive processing. Furthermore, groundfish vessels and processing facilities are large, highly visible investments that will always be few. Hence, they should be easier to monitor, and their operators less willing to risk their investments by flagrant violation of reporting requirements.

Initially, implementing an individual quota system should be easier in the groundfish fishery than it will be elsewhere. This is because the manager will for some time be spared the really difficult problem of deciding which established fishermen shall or shall not have property rights. For some years there will be major opportunities for domestic industry expansion through either the joint venture or U.S. processing routes. Thus, one option is to assign quotas that equal (or even exceed) the fisherman's historic catch. In affect we can give U.S. fishermen the right to homestead: that is, lay claim to resources at no current cost, but with the bonus of a permanent and transferrable right to the resources they develop.

Interestingly, the rudiments of individual allocation already exist. In what may be a telling comment on the future, they came into being with little discussion of property rights, individual shares or limited entry.

The most formalized system is the Pacific Fisheries Management Council trip-limit/trip-interval program. This program was adapted from the earlier trip limits that processors imposed to divide the limited West Coast fresh fish markets among fishermen. The council

adopted essentially the same system to allocate harvestable surpluses of several groundfish species. Individual vessel trip limits were chosen rather than season closures in order to maintain year-round supplies to the West Coast market. Without such continuity of supply, it was feared that Canadian and other imports would make even more severe inroads than they do at present.

Under that program, each groundfish trawler is permitted to land no more than a specified quantity per trip of each controlled species. He is also limited to a specified number of trips per time period. For regulatory purposes the year is divided into trimester periods. Once a trimester's quota has been reached, the season closes until the beginning of the next trimester. The intent, though, is to set trip limits and intervals that prevent such closures. Thus, each vessel has, in effect, an annual individual quota: the product of the trip limit times the number of trips permitted in a year.

All that differentiates this system from a full-blown transferrable individual quota system is the lack of any control on the entry of new vessels, and any provision for the adjustment of vessel quotas by market transfer. Without such provisions the existing program accomplishes little in the way of cost reduction. However, it does maintain year-round supplies, at least to a greater degree than would be possible with a single free-for-all season.

The joint venture fisheries also operate under the rudiments of an individual vessel allocation system. When joint venture companies make their annual applications to the relevant regional councils, they indicate the amounts of groundfish they intend to harvest. These quantities are aggregated to determine joint venture production (JVP) for each fishery. Once the federal approval process has been completed, authorized joint ventures are permitted to operate until aggregate JVP has been taken, at which time they must all quit. Within individual joint venture companies, allocations are also made to individual fishermen. These allocations take the form of delivery schedules intended to facilitate orderly production and to give each participating fisherman a fair share of the joint ventures' overall production target.

Because the total resource volumes are large relative to joint venture requests, the joint ventures are typically allowed to take as much as they can harvest during the natural season. In fact, if a joint venture decides mid-season to harvest more than its initially requested quantity, it can do this as well. Typical practice is for the joint venture operator to inform U.S. authorities as early as possible of the additional amount requested. In the past, all such requests have ordinarily been granted.

Neither the trip limit/trip interval system nor the JV allocation system can be counted on to maintain long term harvest costs at their technological minimums; that is, to keep fleets operating throughout the natural season and insure the continued employment of best available technology. The trip/interval limitation program fails to do so primarily because entry remains open. It also fails because it provides no transfer mechanism through which vessel quotas can be divided or consolidated as required to fully use trawlers throughout the natural season, or to adjust to technological and economic changes. Because the Pacific groundfish fishery is already severely

overcapitalized, such transfer provisions are essential to let the market adjust the fleet toward its economically optimal size.

When there are no resource constraints, the joint venture allocation system is, at the government-to-joint-venture-company level, so informal as to be almost voluntary. At the next level, joint-venture-company-to-individual-vessel, it carries a bit more weight, having the effect of limiting each JV fleet to its operator's conception of the technologically minimum required number of vessels. However, in the presence of resource scarcity, there is always the danger that the system will revert automatically to a free-for-all season in which JV companies abandon their current cost-minimizing strategy in order to preserve or expand their shares of total JVP.

However, each of these systems performs an important precedent-setting function. Because they exist, many groundfish managers and fishermen are now familiar with, and presumably accept, day-to-day practice associated with allocation. Managers are dividing fish among fishermen, and fishermen are filling assigned quotas at minimum cost rather than maximizing catch in free-for-all competition with each other. Imposition of a firm, transferrable quota system would result in only modest changes in these day-to-day practices. For that matter, firming-up existing allocation systems may be seen as more supportive of established practices and interests rather than would be reversion to free-for-all competitive seasons.

The U.S. groundfish industry's tenuous position in the highly competitive world groundfish market depends heavily on the low costs and continuity of supply afforded by current arrangements. Of equal importance, today's groundfish fishermen are learning to live in a professional world that rewards (economically and socially) consistent cost-effective achievement of production quotas, rather than "getting ahead of the hoarders". As they turn their attention to the policy problems raised by emerging resource scarcity, their recent experience may also make them tolerant of management measures that involve the allocation of catch among individual fishermen.

DISTRIBUTION

To this point I have followed the custom of most economists by deemphasizing the question of distribution: who gets the benefits and bears the costs of policies designed to increase aggregate industry and national economic well-being? Experienced students of fisheries management know that this is the real sticking point. Yet none of them, trained economists or not, have very constructive suggestions about how to "solve" the distribution problem.

My favorite example of the power of distributional issues is the U.S.-Canadian salmon treaty. Most recommendations for economic reform, including those suggested here, can be criticized on their aggregate merits. That is, will they really contribute what their proponents suggest to the national economy or the fishing industry? Not the salmon treaty!

To my knowledge no one argues the biological, economic or other merits of having such a treaty. Yet we still don't have it because we can't agree on dividing the gains and losses between nations and between user groups within each nation. Income distribution isn't

just one of many considerations concerning treaty negotiators and reviewers. Rather it seems to be the consideration, dominating all the other factors that call for prompt consumation of a treaty.

In considering more ambiguous policies for the economic rationalization of groundfish I suggest that we not lose sight of the lesson provided by the U.S.-Canadian treaty. The lesson is that we don't have to worry about ignoring distribution. What we have to worry about is that distribution will swallow everything else.

Does economic analysis have anything to offer the fisheries manager who must wrestle with distribution questions? I suspect more than has been contributed so far. To that end I offer some tentative observations about the economic nature of the distribution problem presented by the West Coast groundfish fishery.

The first observation is that there is no serious conflict between the economic interests of the fishing industry in aggregate and those of the nation at large. We are not dealing with a situation like environmental policy, where industry bears economic costs to benefit the public; or agricultural and maritime policy, where the tax paying public bears costs to assist the industry. To see the basis for this rather strong assertion, let us look at the three "other," (non-fishing) groups that have an economic stake in groundfish policies: consumers, taxpayers and those who are affected by changes in private expenditure patterns.

The U.S. consumer will, if anything, benefit from policies that enhance domestic groundfish industry profits. He can't, in any event be hurt very much, even if that were the intent. This is because a vigorously competitive world groundfish market will continue to provide U.S. consumers with groundfish products at current prices, regardless of what happens within the domestic industry. Even if an effort were made to restrict imports, the consumer would be minimally affected, and the industry minimally helped. Competition from domestically produced protein substitutes, beef, pork and poultry, will maintain present price levels as much as foreign groundfish imports. Also, policies that increase industry profits by reducing costs release labor, capital and other resources into the economy for the production of other goods and services, presumably to the benefit of the consumer.

Taxpayers and beneficiaries of non-fisheries public programs gain from fisheries policies that cause the fishing industry to make net contributions to the public treasury, for example paying increased taxes that exceed new expenditures on fisheries subsidies, management or other functions.

The bulk of conservation and management-related expenditures are largely unrelated to economic policy toward the fishery. Roughly the same research and management effort will be required whether the fishery is efficient, inefficient, foreign, or domestic. Where industry cost reducing/profit increasing policies do affect management expenditures, these are likely to be favorable. For example, smaller fleets that harvest throughout natural seasons are usually easier to manage than large fleets competing frantically within short, free-for-all seasons.

Fishermen and processors also pay general taxes and receive a variety of subsidies and transfer payments. Payments to fishermen range from the vessel loan guarantee program to unemployment and public assistance payments. If we can say anything in general about this pattern of revenues and expenditures, it is that increasing a group's net income will increase their tax payments and reduce their claims on the public treasury.

Obvious qualifiers to this conclusion would be new programs which subsidize the fishing industry or extract economic rent from it. At present, neither seem to be seriously contemplated, nor would there appear to be any overwhelming economic reasons for proposing them. Stimulating an industry into existence by subsidy diminishes overall national income, has never worked very well, and doesn't seem to be seriously advocated by anyone in today's fisheries management community.

Extracting economic rent from fishermen on behalf of the "public" is a popular argument among some economists, but not this one. The fisherman, after all, is part of the public, too. What he gains, the public gains by definition. One can argue that something is accomplished by transferring some of the fisherman's gain to the non-fishing public through taxes or fees. But to support such a proposal the proponent must explain why the non-fishing public is more deserving than those who happen to be fishermen.

Policies that affect the economic performance of the fishing industry also affect seemingly unrelated individuals as a result of changes in private expenditure patterns. For example, increased U.S. fisheries production will increase the demand for U.S.-built vessels. But when that production reduces fisheries imports it diminishes demands for the services of those who process imports. Such import substitution also diminishes the dollar earnings of foreign countries and thus, eventually their expenditures in the United States, to the disadvantage of U.S. export-oriented industries. Policies that reduce fishing costs reduce expenditures in fisheries-related communities and industries, but they release resources into other industries, where the resulting growth also stimulates demand for supporting services.

Over the entire nation it is difficult to tell whether the net affect of these and other secondary economic impacts is positive or negative. Hence, the accepted approach in nationally-oriented benefit-cost analysis is to regard them as having a zero net national income effect. This is not to say, of course, that there won't be clear and identifiable impacts on those industries and communities that directly support the fishing industry. But here, as with intra-industry economic affects, we have an issue of income distribution, rather than net national economic impact.

Before turning to that distribution problem, though, consider the advantages that a positive (or at least non-negative) correlation between fishing industry profit and national income provides to fisheries economists and policy makers. The fisheries economist can concentrate his efforts on assessing industry's revenues, costs and profits. These are subjects that he is familiar with and for which the data is, if not perfect, better than it is for the assessment of

diffuse consumer, taxpayer and related community affects. If the above argument holds, then he can limit his analysis to direct industry impacts with some conviction that his results represent, (or are at least positively correlated with), the national income benefits emphasized in benefit cost analysis. In other words, determining that a policy will increase industry profits means (in most cases) that it will increase net national income by at least that amount, and possibly more.

The fisheries administrator can also find comfort in the assertion that policies that improve industry profits will ordinarily result in equal or greater increases in national income. Within the prevailing political structure, success in fisheries administration requires that industry economic interests be accommodated. But fisheries administrators are increasingly pressured to justify their policies in terms of overall national economic impact. This "pressure" comes from reviewing authorities in the Department of Commerce, from some members of Congress, and particularly from the Office of Management and Budget.

When considering policies that increase industry profits, the fisheries administrator can have it both ways. When dealing with his industry constituents he can gain support by pointing to their expected increase in profits. When dealing with reviewing authorities, he can, unless special circumstances indicate otherwise, represent those profits as the lower bound of net improvements in national income. Therefore, if consensus merely meant agreement between "national" and "industry" economic interest, it would seem attainable for a broad range of policies beneficial to the Pacific groundfish fishery. Unfortunately there is more to consensus-building than that.

When we look inside the bundle of economic consequences that we have called "aggregate industry profits" we find conflicts of all sorts. Many of these have surfaced in the last few years of debate over groundfish policy. In most cases the partisan advocates have a rational economic basis for their positions; at least from the standpoint of individual group and regional incomes. Alaskans are skeptical about joint ventures, because the participating U.S. fishermen consist primarily of large vessel operators from the lower 48 states. Processors are similarly skeptical. One basis for processor skepticism is that products bought from joint ventures need not be purchased from others, including the U.S. processing industry. Also, fishermen who can sell to joint ventures will be less inclined to sell to U.S. processors, particularly if the U.S. processors' prices are less attractive.

Programs to limit entry and allocate catch also cut different groups in different ways. Fishermen with well-established production records might favor such programs, if only to "lock themselves in" against future competitors. Those who hope to enter may oppose limited entry and allocation for the same reason. If factors other than historic catch are considered in allocation, fishermen will see yet another basis for division among themselves. Some fishermen may justifiably conclude that they can do better competing on the fishing grounds than in the political arena. Hence they may have a perfectly rational reason for advocating free-for-all seasons, even if they are

fully aware of the long-run negative effects on aggregate industry profits and national income.

For better or worse, fisheries policy making in the United States is the business of consensus building, not only between the nation and the industry, but also between and among gear groups and regions. Rarely has a major change in fisheries policy been implemented without the acquiescence of all significant user groups, and the enthusiastic support of at least some. But, if all profit-improving policies will hurt someone, is there hope for any of them? More constructively, can we reorient our thinking in a direction that points us toward possible solutions to the dilemma of distribution?

That dilemma suggests the question I would pass on to other conference participants. How do we change the rules of fisheries politics so that the first task is to obtain the greatest possible economic value from groundfish resources, and the second task is to divide that economic value among regions and groups without diminishing its magnitude? The current rules of fisheries politics almost guarantee that we will do it the other way around. That is, we will simply refuse to consider any measure that might hurt or offend any group, and then just accept what, if any, economic gains are possible within those limitations.

Discussion

CASEY: My name's Tom Casey from Seattle, Washington. I'd just like you to know, I listened patiently to what you had to say. I think those ideas are warmed-over Robert Ryke. They were adopted by the presidential candidate who lost in 49 states of the union four or five days ago. All your ideas were rejected by a majority of Americans. I think you should devote yourself to the grape industry. They may fit better.

BEVAN: I'd like to turn to the question of analogies. Maybe I'm the wrong one to get up here and dispute the use of them, but I do think we have to be careful with them. They're like computer models. Someone, I should remember his name, once observed that they're a set of lies that help us explain the truth. We have to recognize they don't fit. Sure, the grape analogy doesn't fit. The grapes don't move around and you can go from there and find a lot of other inconsistencies. I sort of like your poker analogy in some respects. But, yet, I guess, I want to warn against it. I'm a member of a group that holds a probability seminar about once a month in Seattle. It's a group of quantitatively-trained people, all of whom know the laws of probability, have done a little work in advanced mathematics. I don't think that helps them a damned bit, whether they're going to win or lose in a particular night. You're dealing in a group where none of them are stupid enough to draw to that inside straight, all evening long you hoped they would. Occasionally they do. Whether they hit it or not is going to have a lot more influence on your winning or losing. We're a little bit like that in fishery management.

Sure, you can lay out the technicalities. You can lay out the probability curves. But, you don't know whether somewhere along the process, somebody is trying to run a four card flush on you. John Gulland said that we had some concerns about good data. In some

respects, we come out better with bad data. Let me give you an example. In the sixties and seventies, we had the records of catch for foreign fishermen off Alaska. We used those records to try to understand what the impacts of those removals were on the stocks. Well, those removals were under-reported. We inputted then, a greater affect to the fishery than those removals would bring about. When we started to regulate the foreigners in the 70s and 80s, we got a much better response than we would have if they'd given us the right numbers. So I guess, just a little warning to fishermen, that if you're going to under-report, that might lead to successes for the day in not meeting a quota, but it leads to more rigorous fishery regulations. So don't over-report on me. That's really going to get me in trouble.

With poker the rules don't work very well if you deal with more than about seven people. I think we could run any fishery if all we had was about seven people. We could get them together and decide what the rules of the game were. My problem with Tom Casey is, you know, what is wrong with free enterprise and private property and trying to apply that to this. I want to come through with the observation that none of this is ever going to apply to a group of people who don't want it. If they want to avoid discussing the issue, and pointing out where the pitfalls are and why this Alaska scheme of limited entry, which I have often referred to as "unsophisticated crowd control", is a bad example, I'll agree with them. But, let's bring the issue out and let's discuss it, because it's not going to go away.

ANDERSON: I'd like to comment on your problem with the enforcement of limited access. I think it may not be as bad of a thing as your discussion indicated. I just returned from New Zealand, where they have a transferrable individual quota program and enterprise system. The way they've handled it indicates that, although you want to be concerned with enforcement, it may not be that big of a problem. I think the two areas of enforcement would be the amount of catch and transferrability of the quotas between firms.

It's a smaller country there, but they can handle enforcement of catch amounts through a very cheap means of bookkeeping analysis, in the same way that we know how many gallons of beer the Olympia Brewery puts out: by having a little meter so we can tax them appropriately. They seem to have worked out systems where they can monitor the process in a similar fashion.

Transferability works very nicely, too. In fact, I saw it happen right at the conference with two fishermen there that had quotas. One of their boats hit a school of a particular type of fish for which he did not have an individual quota. He radioed in. The company sent a runner to the conference who found the owner. The owner went over to another owner at the conference who had a quota. They agreed on a price and shook hands. The word went back out to the boat. The other boat started fishing. Both of the presidents or owners of the boats sent a telex to the fisheries agency indicating that they had agreed to this trade. It was all processed through to the bookkeeping analogy. I think we do have evidence that it can work in certain instances. I'm not trying to poo-poo your whole idea. It may not be as big an issue as you think. And in fact, it may be cheaper than other types of regulation.

STOKES: A couple of extensions on enforcement. You know, we don't know whether it's going to work in all fisheries, but we can rank fisheries in terms of enforceability. I suppose the worst possible enforcement situation would be something like a troll salmon fishery: many individual operators making landings everywhere, delivering a high-value product that doesn't require a whole lot of processing. Whatever the monitoring system, there's got to be a cheap and easy way of evading it. One of the best situations, from the enforcement standpoint, would be a large-scale groundfish fishery. You're always going to be dealing with a few operations. These are large, capital intensive and fairly visible sorts of operations that a few enforcement officers can keep track of.

Of course, you don't have to have perfect enforcement. We don't have perfect enforcement of any of the fishery management systems now. Within bounds you do have to know about where you are. If your catch reporting is 10 to 15 percent off because of the incentive to cheat, then a policy decision can be made whether or not to live with it. You probably can't live with figures 120 percent off because of misreporting. You probably can't live with a situation where you really don't know how wrong the figures are. You also can't manage very effectively for either the economic or biological purpose. The subject needs more thought and a lot more experimentation and experience.

HERRNSTEEN: You suggest keeping out the 19-year-olds, you want to give joint ventures vested rights, as I understand it, and the share quota would concentrate fishing rights in fewer and fewer hands. If your plan goes through, I wonder what effect the share quota systems and the other types of things you were presenting or indicating here today would affect Alaska's coastal communities or industries.

STOKES: Well, I suppose, I don't know. To some extent, I'd like those questions to be on a different side of the ledger. What I'm interested in and what I think we need to focus our attention on is the aggregate effect over the entire U.S. economy, initially ignoring the question of how particular groups, and particular individuals, and particular regions come out. I think we need to answer that question, or at least we need to first think seriously about that question, without attacking the question you've posed.

Secondly, and maybe equally importantly, we need to attack those questions. But, we need to attack them from the standpoint of who gets what, by a means that I wouldn't have a clue to. I don't know how to go about it. The question you pose is the "who gets what" question. We need to attack that in some as yet undiscovered way. But, it's different from the aggregate question. And, that's essentially my answer.

HERRNSTEEN: Okay, let's go into the aggregate question. I keep hearing the problem is that costs will increase until there are no profits. I think that's part of many industry problems. Clem Tillion pointed out it's also true in the oil industry, Rowan Drilling, I mean. I had talks with them a year ago. They explained to me, gee, we've got the same problems. We have the same problems in our airlines. Here we have a resource, the air space, we have airports. The plane I came over from yesterday on Kodiak had six passengers on it. It was a 737. And the plane that left ten

minutes earlier, had only four. The oldest airline in Alaska's going bankrupt right now. Maybe we should auction off the right for planes to fly from Anchorage to Seattle or Seattle to L.A. Have two airlines allowed to have flights from here to there and every year auction the right to do that. You can do that in other things. Yet, I don't feel the system overall works.

When you do it for fisheries management, that's a different story than when you need to do it because you feel some economic efficiency. There's no question in my mind what the effects of the schemes that you've proposed will be on our communities. Obviously, to say you don't know is the problem I had 12 years ago when Alaska was writing the state's limited entry law. I could see everything was theoretical, but how does it work in Alaska? I called Dr. Crutchfield and I could tell obviously, from talking to him on the phone, he wasn't concerned about the Alaskan situation. Transferrability of permits has very definitely changed our social and economic structure. There will be very definite changes to Alaskan social and economic structures as these plans effect the state's number one industry in terms of people. We worked hard, a lot of people did in Alaska, to get the 200-mile limit bill through and to get the management regimes. But I don't think anyone meant to give joint venture boats vested rights, to turn to fish auctions, and these things. I feel that any time something is presented to a regional council, particularly in Alaska, there ought to be a corollary presentation on how it will economically affect such a major segment of the state's industry.

STOKES: Let me address that. That is not the problem now. Nobody's going to ignore that. Nobody's going to ignore that in this game. The problem now is that the kind of consideration you mention is going to swallow everything else. What I see when I go to meetings and participate in fisheries discussions, is precisely that. If you're in Alaska, it's "how's this going to affect Kodiak and Petersburg?" When you're down in Washington, it's "how is this going to affect Westport?" "How's it going to affect the association of the left-handed trollers from thirty miles north of La Push," or what ever it might be? You get continual emphasis on the interest of each and every group represented as if that was essentially the only relevant consideration. And somehow, whoever makes management decisions has to worry about it; in many cases, with no other perspective, no other information. All in the world I'm suggesting is that another perspective be applied to these problems, one other than how each individual group and region comes out. That needs to be very much a part of the process. That question needs to be asked and to some extent answered without being dominated, as most of the rest of the discussion is, by questions of how each group comes out. You know the political system as well as I do. There's no shortage of opportunity for you to raise the issue of how is this and how is that community going to come out.

HERRNSTEEN: The concern is always the number of boats and you feel sorry for the ones going broke. Well, it's always true in the fisheries. It was proven a dozen years ago that the top 5 percent of the fishermen catch 25 percent of the fish. The top 25 catch 75 percent. So you know the statistics. What's the problem with allowing open entry and having a few more boats, but allowing attrition to choose who's up there?

STOKES: Maybe, we can continue later. Are there other questions? Comments?

????: One suggestion. Maybe you wouldn't use terms, economic terms, like 'sunk investments', when talking to fishermen. And number two, when I get into a poker game, the first thing I want to know is what's the ante? And the second thing I want to know is what is the house going to take? Economic rent?

STOKES: I'd like to take a shot at that, the last one in particular. Yeah, poor choice, I grant you, a "sunk cost" is a real poor choice of words to use in a fisheries group. Another poor choice may be "economic rent". And that may create a lot of confusion. "Economic rent" is simply what I'm calling profit. At least as I use the term anywhere in my talk, that's what I meant. People also use it in another sense. They mean the amount of money extracted from the fishermen or any other producer on behalf of something called "the public," which is to say, everybody else. Petroleum and forestry are good examples of where it's a clear policy to extract a good share of that economic rent, maybe all of it if we can, on behalf of everybody else. I'm sorry to toss aspersions around, but I think it's an approximately accurate generalization of the measures that Canadian economists are big fans of: extracting economic rent from the fishery for the benefit of everyone else.

In the U.S. legal or political system I don't find any evidence that that sort of a policy is likely to occur here in the future. In the first place, FCMA, as I read the act, prohibits such activity. The political system that we live in does not lend itself to extracting economic rent from fishermen by any means. From an economic standpoint, you have to puzzle about why that's such a big issue. The fisherman, after all, is part of the public. When the fisherman earns a profit, society has accrued an economic rent. Whether you want to transfer some of that from the fisherman to someone else, that's an entirely different matter. That's different from how thus-and-so-community comes out on all of this. That's a question of allocation and distribution. It's not a question of achieving the greatest economic value. Leave that value wherever you want.

LOKKEN: I'm concerned about your reference to the 19-year-old. Now, I've been around a long time. I'm studying the limited entry problem, and have for years and years. I'm still on the fence as to whether or not it's desirable. But, with your reference to a 19-year-old, that he should be kept, let us say, out of the fishing industry and he should have opportunity somewhere else. The assumption is there's a lot of opportunity elsewhere, and there isn't. If we move to another industry, they've got their problems. Automobiles, agriculture, forestry, they're all in trouble. What are we going to do when we run out of places to send these people that are not going to go into the fishing industry? Are we going to have a body of unemployed, maybe 20 to 30 percent of the population? What's going to happen when this takes place? You all have noted here in the last few days the Catholic Church has come up with a moralistic criticism of the U.S. economy because it isn't taking care of the poor people. And we're just going to push people out somewhere else. How do you handle that situation?

STOKES: I wasn't suggesting that you want to keep all 19-year-olds out. In the first place, you need a fair number of them to develop the fisheries. I was suggesting that where you do need to keep some people out of the fisheries, when you have an adequate level of effort, it's better to keep the 19-year-old out than the 57-year-old out. Other things equal, the 19-year-old is at the point in his life where he has more options open to him than he ever will have, whatever they may be, they may be good or bad. Later on, you train yourself, you gain experience in a particular profession, you necessarily close off other options. The situation that we want to avoid is removing people who have already closed their other options behind them. Maybe we don't want to remove or keep all the 19-year-olds out either, but we certainly we would want to move in the direction of keeping the younger people out rather than excluding those further down the line.

LOKKEN: Well, you don't have an answer to the problem as a whole. The fishing industry isn't an isolated part of the economy. It's part of the economy. The troubles of other industries come to the fishing industry and vice-versa. This is a broad-scale problem rather than an individual one involving the fishing industry alone.

STOKES: Yes, but then 10 percent unemployment means 90 percent of the people are employed. And it means there is a range of alternatives out there for a fair number of people.

LOKKEN: But under our form of government, the 10 percent can raise a lot of noise. They can control things better than the 90 percent in a lot of cases. I don't have an answer. And I hope somebody else has.

STOKES: Does anybody?

GRANT: I'm not sure I've got the answer, but somebody said here today that limited entry precludes that option. It doesn't preclude that option necessarily. We've got systems in Australia that allow 19-year-olds into a fishery, 57-year-olds out of a fishery. The 19-year-olds buy in, the 57-year-olds go out. The 19-year-old buys in with a loan from the bank, and the 57-year-old takes the money that the 19-year-old passes over to him. It all works. It can be done. Later on this afternoon, I'll be on the panel. I think, if I'm asked some specific questions, I can answer them. But I don't think that the answer is that limited entry precludes that happening.

Legal Tools and Restrictions Affecting Fisheries Management

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INTRODUCTION

The question of what fishery management tools are legally available to fishery managers is a logical one at a conference such as this. A preliminary inquiry, however, may leave one feeling that most fundamental debates over management issues are not legal battles but policy ones.

For the purposes of this paper a fishery "management tool" shall be considered a technique used by fishery managers in an attempt to accomplish a legitimate fishery management objective. Most fishery managers have as much legal leeway in implementing various management measures as they could possibly need to conserve and manage a resource. The "tools" available include seasonal restrictions, catch size restrictions, gear restrictions, fishing area restrictions, by-catch restrictions, vessel size, propulsion and capacity restrictions, and limited entry restrictions. Management tools designed to differentiate between individuals' access to the resource or that have economic allocations as their objective are legally challenged more often than those used to conserve the resource.

Limited entry has generated more controversy than any other management tool because it excludes interested persons from participating in a fishery. Much has been written on the legality of limited entry as a management tool.¹ This paper will not deal with that issue other than to state that recent court decisions and a proper reading of constitutional law have firmly established limited entry as a legitimate method of fishery management.

This preface may leave one thinking that fishery managers are free to do whatever they wish. That is not the case. Part two of this paper will outline some of the restraints on fishery managers' authority.

Most management tools, however, are well-established and understood. Three tools that have generated some of the most significant recent confusion will be discussed in more detail in parts three, four and five of the paper. Part three will discuss "buy-back" programs--"buy-back" meaning when the government purchases the vessel, gear and license of a fishermen in order to reduce harvesting effort in a particular fishery. Part four will discuss the use of, and possible changes to, the "fish and chips" allocation policy of the federal government. This policy is intended to stimulate the full use of all United States fishery resources by U.S., rather than foreign, harvesting and processing industries. Part five will discuss the use of observers aboard fishing vessels as a management/enforcement tool.

RESTRICTIONS ON AUTHORITY

JURISDICTIONAL RESTRICTIONS

An initial question is whether a management agency has jurisdiction over a particular fishery. This is usually not a significant question when the federal government is the fishery manager. The Magnuson Fishery Conservation and Management Act (referred to here as the Magnuson Act) gives the federal government management authority over the 197 mile federal fishery conservation zone (FCZ)--over 2.2 million square nautical miles--and the authority to preempt state management inside territorial waters under certain circumstances.²

The federal authority granted in the Magnuson Act provides for the eight regional fishery management councils and the Secretary of Commerce to prepare and implement plans that will achieve and maintain an "optimum yield" in accordance with a specific set of national standards. It also provides for the Secretary of State, in coordination with the Secretary of Commerce, to allocate any surplus fish not used by the U.S. fishing industry to interested foreign fishing industries according a set of national standards designed to promote the development of the U.S. fishing industry and other interests. This allocation policy is commonly called "fish and chips." It is subject to more scrutiny at the present time in Washington, D.C. than any other fishery management tool and will be discussed in detail in part four.

The fishery management authority of the states after enactment of the Magnuson Act has never been precisely defined. This is due to the imprecise language of the act, and because since 1977 the federal government has been less inclined to establish fishery management systems and has more often deferred to state authority. This has been particularly true in the North Pacific where Alaska is the only adjacent state.

The Magnuson Act states: "No state may directly or indirectly regulate any fishing which is engaged in by any fishing vessel outside its boundaries, unless such vessel is registered under the laws of such State."³ Unfortunately "registered" is a word that has no well-defined meaning or legislative history. This vagueness, combined with several state court decisions upholding state extraterritorial management in the absence of a federal management scheme, has produced a somewhat uneasy status quo that allows states greater management authority than one would first believe existed from a literal reading of the Magnuson Act. (This issue is discussed in greater length by

other legal commentators.)⁴ It is sufficient for present purposes to note that, in the absence of federal regulation, states have been allowed to manage fisheries in the fishery conservation zone when:

1. The state has a major interest in the fishery.
2. There is no foreign vessel participation in the fishery.
3. The federal government has acquiesced in such management.
4. The state management regime is consistent with federal law.
5. There is some sort of valid state vessel "registration"
and
6. The state management regime does not discriminate against vessels from other states, constitute an undue burden on interstate commerce, or violate other federal rights or authority.

Recently, the most active "jurisdictional" issue has involved inconsistent state and federal fishery management systems. In the salmon fishery adjacent to the Pacific Coast, Oregon and California established salmon management seasons that conflicted with the federal salmon management plan. The Secretary of Commerce has thus been faced with the issue of whether to preempt the state systems. This authority is clearly provided to the Secretary by Section 306 of the Magnuson Act.⁵ This preemption question is very similar to the one presented in May 1982 when the Secretary of Commerce preempted Oregon, preventing it from opening its territorial waters to recreational salmon fishing, in order to preserve the effectiveness of a federal closure of those waters. One lesson was apparently not enough, however, and on September 21, 1984, the Secretary again had to preempt Oregon's decision, closing its waters to salmon fishing because the Oregon season conflicted with the federal salmon management plan established by the Pacific Fishery Management Council.⁶

Earlier in 1984, a direct confrontation between Alaska and the federal government over tanner crab management was resolved against the state in federal district court. In that case, the Alaska established tanner crab regulations attempting to regulate fishing in federal waters in a manner that was different from and inconsistent with existing federal tanner crab regulations. In this needlessly confrontational challenge, federal supremacy was upheld. This demonstrated that, while there is room for states to regulate fishing activities in the FCZ under certain circumstances, there is no room for states to establish fishery management regulations that conflict with valid federal management systems.

IMPERMISSIBLE DISCRIMINATION

The U.S. Constitution imposes several limitations on fishery management authority, including 1) prohibiting states from unduly burdening interstate commerce, and 2) prohibiting undue discrimination against non-citizens. The combination of deference to state fishery management and increased competition for sometimes diminishing resources often produces tensions making it attractive for state fishery managers to somehow give preferential treatment to their state's

fishermen. Not only is this contrary to the stated interest and specific terms of the Magnuson Act,⁷ such action is also quite likely to be unconstitutional.

Interstate Commerce

The classic case demonstrating the impermissibility of burdening interstate commerce with parochial fishery regulations is Toomer v. Witzell.⁸ In that case, South Carolina tried to require all boats licensed to harvest shrimp in South Carolina waters to land their catch in South Carolina before transporting the product to another state. The clear intent of the provision was to promote economic growth in South Carolina. The U.S. Supreme Court ruled that the law, which artificially directed industry employment and increased costs, was an impermissible burden on interstate commerce and violated the commerce clause of the U.S. Constitution.⁹ The principle in Toomer is just as valid today as it was in 1948.

A state cannot control or allocate the use of natural resources in a manner that needlessly discriminates against harvesters, buyers, processors or consumers solely because of their out-of-state status. Economic localism is not viewed favorably by the Constitution and needs to be avoided in fishery management.

"Privileges and Immunities" and "Equal Protection"

The privileges and immunities clause¹⁰ and the equal protection clause¹¹ of the U.S. Constitution bar fishery management schemes that discriminate against non-residents and non-citizens. The privileges and immunities clause basically provides that a resident of one state has a right to conduct a business in another state on terms substantially equal to those applied to the citizens of that state. Thus, for example, in the Toomer case, a South Carolina fishing license fee that was one hundred times greater for non-citizens than for citizens was held to be invalid because it violated the privileges and immunities clause.

The Fourteenth Amendment to the Constitution provides that "No state shall make or enforce any law which shall...deny to any person within its jurisdiction the equal protection of the laws." By its terms, the Constitution applies the equal protection requirement only to the states. It is settled, however, that the Fifth Amendment's due process clause, applicable to the federal government and thus to the regional councils and the Secretary of Commerce, incorporates equal protection principles identical to those applied to the states.¹²

The Supreme Court continues to adhere to a two-tiered equal protection standard under which a governmental classification is subjected to "strict scrutiny" if "fundamental rights" or "suspect classifications" are involved, and to a minimum rationality test in most other circumstances. Classifications used in fishery management decision making are remote from the type of classifications that the Court has previously held to be suspect,¹³ and the right to pursue a particular vocation has never been held a "fundamental" right. Furthermore, the Supreme Court has shown no inclination in recent years to expand the existing list of suspect classifications or fundamental rights.

The applicable standard for equal protection analysis of limited entry schemes is the "rational basis" test, which:

...admits of the exercise of a wide scope of discretion in (the power to classify), and avoids what is done only when it is without any reasonable basis and therefore is purely arbitrary... A classification having some reasonable basis does not offend (the equal protection) clause merely because it is not made with mathematical nicety or because in practice it results in some inequality.¹⁴

Thus, as long as a fishery classification is rationally related to the statutory purposes of fishery management and treats all parties within the class alike, it should comply with equal protection criteria. Furthermore, any challenge to such a classification faces a strong judicial presumption that the classification is valid, and a strong judicial tendency to accept any state of facts that can be reasonably conceived to justify the classification.¹⁵

Furthermore, courts have a general policy of nonintervention in the rational-basis equal protection analysis of economic legislation. For example, the Supreme Court has observed:¹⁶

In the area of economics and social welfare, a State does not violate the Equal Protection Clause merely because the classifications made by its laws are imperfect. If the classification has some reasonable basis, it does not offend the Constitution simply because the classification...in practice...results in some inequality.

In short, fishery management systems will be evaluated under a lenient, minimum rationality standard. However, it should always be stressed that the easier the management agency makes it for a court to see the rational relationship between the means chosen to achieve an objective and that objective, the greater the likelihood that the court will ask no more.

ADDITIONAL STATE LEGAL CONSTRAINTS

Each of the 50 states has its own constitution and set of laws, and each of those constitutions may have requirements that restrain that state's legal authority to manage fisheries differently from the restraints in federal law. It is beyond the scope of this paper to catalogue the various state legal systems governing fishery management. Suffice it to say that with a few exceptions--such as the legal battle over Alaska's limited entry system where the Alaska Constitution was the major obstacle rather than the federal constitutional restraints--state constitutional restrictions are generally not more onerous or restrictive than federal requirements.

PROCEDURAL REQUIREMENTS

The 1980 amendments to the Magnuson Act changed the procedures for establishing an operating fishery management plan (FMP). These amendments resulted from frustration with the great amounts of time needed to get management plans into place. The revised system, while an improvement, still has shortcomings as a model for swift fishery management decision making.

The time used to develop fishery management plans or amendments is discretionary with the councils, but once a plan or amendment is submitted to and accepted by the Secretary for review, the deadlines set forth in section 304 of the Magnuson Act apply. Within 30 days after the beginning of Secretarial review, proposed regulations must be published in the Federal Register. The public comment period ends 75 days after review begins. The plan or amendment takes effect unless the Secretary disapproves it before the 95th day, and by day 110 final regulations must be published in the Federal Register.

In addition to the Magnuson Act, the requirements of other applicable law must be met. The Administrative Procedure Act, Executive Order 12291, the Endangered Species Act, the National Environmental Policy Act, the Paperwork Reduction Act and the Regulatory Flexibility Act require various analyses and findings under certain circumstances, but these can generally be carried out within the Magnuson Act's 110-day time frame.

BUY-BACK PROGRAMS

Section 306(b) of the Magnuson Act authorizes the regional councils and the Secretary of Commerce to establish limited access management systems.¹⁷ The procedural requirements for establishing such a system are no different from those required for establishing any other FMP. To date, two federal limited access plans have been developed and implemented--the Atlantic surf clam FMP and the North Pacific troll salmon FMP.¹⁸

One management tool, which has been discussed at various times for different fisheries as a complement to limited access, is "buy-back" programs.

The only federally-funded fishing vessel/gear buy-back program is one established for Washington state's non-Indian commercial salmon industry to offset the tremendous dislocations resulting from the federal Indian fishing rights decisions, commonly known as the Boldt decision. This program is authorized and set forth in considerable detail in the Salmon and Steelhead Conservation and Enhancement Act of 1980.¹⁹

However, buy-back programs have also been discussed as possible management tools in other areas and for other purposes. For example, a buy-back system has been mentioned as a way to cushion any impact from a future U.S.-Canadian salmon interception treaty. Buy-back systems have also been discussed as a way to reduce fishing effort in conjunction with the establishment of a limited access system in fisheries such as halibut. Incredibly, there has even been a suggestion--never taken very seriously--that buy-back programs might be appropriate even in the absence of a limited entry management program for a fishery.

The initial question is whether adequate statutory authority now exists for establishing buy-back programs, or does additional legislation, such as the Salmon and Steelhead Conservation and Enhancement Act, have to be passed by Congress before a fishery can have such a program created for it. The validity of this question was confirmed during the 97th Congress. Legislation was introduced in the House of Representatives²⁰ that, among other things, provided explicit

statutory authorization for the federal regional management councils to establish buy-back programs in FMP. Further, and more notably, this legislation authorized such plans to include mandatory fees to be imposed on fishermen to pay for the program. This legislative proposal was passed by the House of Representatives but not the Senate and was never enacted. As a result, the question of what kind of buy-back proposals, if any, could be set up under existing law has been left confused.

THE MAGNUSON ACT

Section 303(b) of the Magnuson Act grants broad discretionary management authority to the councils. It authorizes FMP's to "prohibit, limit, condition, or require the use of specified types and quantities of fishing gear (or) fishing vessels"²¹ and to "prescribe such other measures, requirements, or conditions and restrictions as are determined to be necessary and appropriate for the conservation and management of the fishery."²² A liberal interpretation of this language could authorize the establishment of a buy-back program, although this has never been done.

Such an interpretation and result would be troubling. It would stretch the literal legislative language beyond the bounds of reason, but more importantly the legislation and the legislative history is devoid of intent to create such a management tool or any guidance on questions fundamental to any rational buy-back plan. For example, such a blanket authorization leaves unanswered basic questions such as:

1. Must entry be restricted before a buy-back system can be established?
2. Must vessels be sold with all accompanying licenses?
3. Can the vessels be repurchased and used in the same fishery?
4. What valuation system would be used for vessels, licenses and gear?
5. Would bonuses exist for early vessel retirement or for vessel productivity?
6. Must vessels or licensees have operated in the fishery for a minimum amount of time to be eligible for the buy-back?
7. What sort of mechanism is to be established for handling funds in the administration of such a program?

Each of these questions was answered by Congress when it enacted the salmon buy-back program for some Washington commercial fishermen in 1980. It is certainly true that none of the questions, let alone their answers, even were dreamed of by the members of Congress when they passed section 303 in 1976. While Congress might want to address such questions in a similar manner for other fisheries, the 1980 act was not intended to address other situations and cannot be construed to provide any guidance for them.

Congress acknowledged the lack of clear authority for regional councils to establish "buy-back" programs under the existing terms of the Magnuson Act when it considered H.R. 5002 during the 97th Congress.²³ That bill proposed amending that act to authorize FMP's to establish "a limited access system (which system may include a vessel "buy-back" or equivalent program...may provide for the funding of any such program through a fee schedule and may be administered by the States concerned)."²⁴

The bill went on to propose a new section 304(e) to the act:²⁵

(e) Vessel "Buy-Back" Programs.--(1) If a vessel "buy-back" or equivalent program established pursuant to subsection (b) (6) is funded through fees, the Council shall establish the level of such fees. All fees collected pursuant to any such program shall be deposited into the vessel "Buy-Back" Fund established under paragraph (2).

(2) (A) There is established in the Treasury of the United States a revolving fund known as the Vessel "Buy-Back" Fund (hereinafter in this paragraph referred to as the "Fund"). Each vessel "Buy-Back" or equivalent program established under subsection (b) (6) shall have a separate account in the Fund and the fees collected under the program that are deposited into the Fund shall be credited to that account.

(B) The Secretary shall withdraw funds credited to any account at such times and in such amounts as may be necessary for the administration of the vessel "buy-back" or equivalent program concerned.

Even this explicit authority leaves almost all difficult and necessary questions about structuring such a program unanswered. The Senate refused to approve this new statutory authority, and it was eliminated from the final version of the bill.

THE FISH AND WILDLIFE ACT OF 1956

The Fish and Wildlife Act²⁶ is a sweeping statute whose general terms could be and have been liberally interpreted to authorize a very wide array of fishery activities by the government.

In 1980, at the request of Senator Warren Magnuson, the general counsel of the National Oceanic and Atmospheric Administration (NOAA) analyzed this statute and concluded that it could be interpreted to authorize a direct Congressional appropriation of funds for the Washington salmon vessel buy-back program. The analysis did note, however, that the act's authority is "not explicit," and that Congress would need to appropriate funds "for that specific purpose," and that "it would be desirable to avoid any dispute...for there to be a Congressional statement accompanying the appropriations bill acknowledging the Agency's authority..."²⁷

This opinion was of interest in establishing the Washington program, but it is important to note that the Salmon and Steelhead Conservation and Enhancement Act's specific authorization of that program was enacted the year Congress began appropriating funds, and this very liberal interpretation of the Fish and Wildlife Act was never used.

It is also important that the authority described in the general counsel's opinion, even if it does exist, is confined to the Secretary of Commerce and does not include the regional councils established under the Magnuson Act, and requires Congress to appropriate money for such a program and specifically earmark it for a particular "buy-back" purpose. Thus, the possible authority to establish a "buy-back" program under the Fish and Wildlife Act has never been tested.

FEES AND FUNDING

Although some observers dispute it,²⁸ the generally accepted interpretation of the Magnuson Act's provisions governing limited entry and fees is that fees imposed upon fishermen under an FMP--including an FMP with a limited access system in it--cannot exceed the "administrative costs incurred in issuing the permits."²⁹

Thus, even assuming that one were to accept a very liberal reading of the act that would authorize buy-back programs to be established, the problem remains that the act provides no mechanism by which such a program could be funded. Fees could not be imposed on fishermen to support the program, and the act's general authorization of appropriations clearly was never intended to be used for such a management mechanism. It was for these very reasons that the ill-fated provisions of H.R. 5002 in the 97th Congress specifically provided the authority to impose fees on fishermen to support potential buy-back systems.

FINAL ANALYSIS

This discussion illustrates that, while creative interpretations of existing laws can be used to argue that buy-back programs may be established under existing fishery management laws, such interpretations obviously strain the limits of both practicality and credibility.

Under the Magnuson Act, any such program would have no guidance from the terms or legislative history of the act and no mechanism to fund itself. As a result, and particularly in light of Congress' refusal to give specific authority as proposed in H.R. 5002, a management council would be taking a highly questionable gamble by developing a plan on the assumption that the Department of Commerce would approve it, that the Congress would fund it, and that it could withstand a legal challenge.

FOREIGN FISHERY ALLOCATIONS AS A MANAGEMENT TOOL

This nation's "fish and chips" policy toward allocations of fish not used by the U.S. fishing industry has existed since 1978. The term refers to the general proposition that we should not give the benefit of allocations of unused fish to a foreign nation unless that nation provides the United States fishing industry with something in return--that is, a concomitant benefit to our fishing industry, such as buying fish from U.S. fishermen in "joint venture" operations or buying processed product from the U.S. processing industry. In short, foreign fisheries in U.S. waters are to be managed to maximize economic and development prospects for the U.S. fishing industry.

This policy has produced significant benefits to U.S. harvesters by providing at-sea markets for fish that traditionally have not been used by the U.S. processing industry. To date, however, the policy has not produced the "Americanization" of these fisheries that many hoped for. Foreign vessels still harvest very large tonnages of pollock and lesser species, and U.S. firms have not been able to process or market any appreciable percentage of the vast North Pacific groundfish resource, either domestically or in foreign markets.

As a legal matter, the criteria in the Magnuson Act governing allocations are broad enough that the Secretary of State can withhold allocations until satisfied that U.S. fishermen and processors are getting the maximum obtainable benefits from foreign nations wanting access to U.S. fishery resources. These criteria are:³⁰

- (i) whether, and to what extent, such nation imposes tariff barriers or nontariff barriers on the importation or otherwise restricts the market access, of United States fish or fishery products;
- (ii) whether, and to what extent, such nation is cooperating with the United States in the advancement of existing and new opportunities for fisheries trade, particularly through the purchase of fish or fishery products from United States processors or from United States fishermen;
- (iii) whether, and to what extent, such nation and the fishing fleets of such nation have cooperated with the United States in the enforcement of United States fishing regulations;
- (iv) whether, and to what extent, such nation requires the fish harvested from the fishery conservation zone for its domestic consumption;
- (v) whether, and to what extent, such nation otherwise contributes to, or fosters the growth of, a sound and economic United States fishing industry, including minimizing gear conflicts with fishing operations of United States fishermen, and transferring harvesting or processing technology which will benefit the United States fishing industry;
- (vi) whether, and to what extent, the fishing vessels of such nation have traditionally engaged in fishing in such fishery;
- (vii) whether, and to what extent, such nation is cooperating with the United States in, and making substantial contributions to, fishery research and the identification of fishery resources; and
- (viii) such other matters as the Secretary of State, in cooperation with the Secretary, deems appropriate.

As a practical matter, the slower than hoped for progress in the Americanization of U.S. fishery resources--especially by the processing sector--has led to efforts in the 98th Congress to alter and clarify the legal criteria governing allocations.

The most dramatic proposal was S.750,³¹ introduced by Senator Ted Stevens of Alaska, which would prohibit all foreign fishing and processing vessels from operation in the U.S. 200-mile exclusive economic zone after 1987. The premise of this legislation appears to be that it will foster very rapid growth in the U.S. fishing industry by eliminating foreign competition on the grounds and denying foreign nations access to North Pacific groundfish unless they purchase those resources in product form from the U.S. industry. No action was taken on this proposal in the 98th Congress.

Another proposal, S. 2523,³² introduced by Senator Slade Gorton of Washington and Bob Packwood of Oregon, is a less ambitious "fine-tuning" of the allocation criteria. This bill would make three changes in the Magnuson Act's allocation provisions. First, it clarifies the fact that the Magnuson Act does not require allocation of surplus fish in our zone. Allocations are discretionary and made only when the federal government is satisfied that benefits received from our "fish and chips" policy warrant allocations in the amount granted. Second, the bill clarifies the allocation criteria, emphasizing that purchases of U.S. processed fishery products and not just fish are intended. Finally, it narrows the examination of what fishery benefits a nation is offering the U.S. in return for an allocation. Presently all fishery purchases are considered; the bill would narrow the focus to fishery purchases of the species for which an allocation is being sought. Thus, a nation would not be given pollock allocations simply because that nation purchases other types of fish from the United States. Instead, that nation would be expected to provide benefits to those segments of the U.S. industry interested in harvesting and processing pollock.

The changes proposed in S. 2523 have been approved by both the Senate and the House of Representatives as part of S. 1102, and became law during October 1984.

The "legal tool" of allocations is probably as vivid an example as any of the distinction between having a tool legally available and using it in a manner that satisfies those people interested in seeing it used.

The policy debate over how best to gain maximum advantage from allocations is intense. The debate involves questions such as: How tough should the United States be? How does one weigh the fact that allocations may result in that fish coming back to the United States in product form?³³ Should joint venture purchases from U.S. fishermen be put at risk by demanding greater concessions to U.S. processors? What factors aside from fishery issues would be considered in making allocations? How many nations should the U.S. allow in the 200-mile zone? These policy debates are at present the most meaningful because the legal tool is already established and available. It is now implementation that will determine the extent to which allocation decisions foster American fishing industry development.

OBSERVERS AS AN ENFORCEMENT TOOL

Another tool used by fishery managers that has come under close scrutiny is the placement of observers aboard fishing vessels. The critical question in the use of observers is whether they constitute an unreasonable search in violation of the fourth amendment to the U.S. Constitution. The U.S. tuna industry last year lost its argument in court that placing observers aboard fishing vessels to gather information that could be used against the vessel and its crew in civil and criminal proceedings was an unconstitutional search.³⁴

That case--*Balelo v. Baldrige*--involved National Marine Fisheries Service observers enforcing the fishery management restrictions imposed on the tuna fleet under the authority of the Marine Mammal Protection Act. The Ninth Circuit Court of Appeals found that the use of observers did constitute warrantless searches aboard such vessels.

The court ruled, however, that a warrant was not required, because the tuna industry is a "closely regulated industry," and as such falls within one of the exemptions from the requirement that there be a warrant before a search is conducted.³⁶ The Balelo decision then went on to find that the "search," i.e. the observations made by the observers, were reasonable because the NMFS regulations governing the observer program provided adequate certainty and regularity of its application.³⁷

The Magnuson Act's provisions on enforcement certainly are as broad as the Marine Mammal Protection Act's. As to foreign vessels, section 201(i) of the act calls for observers aboard all foreign fishing vessels in our 200-mile zone.³⁸ As to domestic vessels, the councils and the secretary of commerce, while not given explicit authority to put observers on board, have very wide discretion under both sections 303(b)³⁹ and section 311.⁴⁰ In fact, the grant of authority is every bit as broad, if not broader, than the Marine Mammal Protection Act.

One could argue that onboard observers are needed for effective marine mammal protection enforcement on tuna vessels to a greater landing. That argument would not likely be of major importance, however, if a council and the secretary were confronted with an enforcement problem so vexing that it required the placement of observers aboard U.S. vessels.

In short, it is certain that the use of observers as an enforcement tool are valid as they are applied to foreign fleets industry. Their use has also been upheld in the Puget Sound salmon fishery,⁴¹ and while legal challenges are always possible, their use in other domestic fisheries is very likely to be upheld if proper implementation of an FMP required using observers and their deployment was pursuant to a predictable, nondiscriminatory system.

Presently there are two fishery management plans containing observer requirements--Western Pacific spiny lobster and Gulf and South Atlantic mackerel. Observers will soon be placed on some Atlantic swordfish vessels under a pre-FMP data collection program. In each instance the placement of these observers has been for the purpose of gathering additional scientific information, rather than for enforcement purposes, and as such has resulted in less controversy.

THE TOOLS AND POLICY BOUILLABAISSE OF AMERICAN FISHERIES LAW

Obviously there are limitations on the legal authority of any fishery management entity's ability to manage fishing effort. Discussions of such limitations tend to delight fishery lawyers and to confuse, frustrate and alienate everyone else interested in fisheries management.

If one steps back, however, and tries to look rationally at the range of authorities and programs the federal government has established to manage and promote the U.S. fishing industry, one will not see a set of tight restrictions. Instead, one will see a startling array of overlapping, expansive and often inconsistent programs and policies. The real confusion, to the extent there is confusion, usually lies not with any legal impediments that stand in the way of rational fishery management. It lies in the fact that Congress has splattered the landscape with such a wide array of tools, programs and authorities

that federal policy on the subject is often directionless or inconsistent.

Examples are not difficult to find. We encourage new vessel construction with title XI loan guarantees⁴² and tax-deferred capital construction fund accounts,⁴³ yet bemoan over-capacity in those same fisheries and discuss whether we shouldn't encourage buy-back programs to be instituted. We reportedly have enough fishing vessel capacity to harvest the entire available catch in our U.S. fishery conservation zone, yet we do not question continuing these incentives for more vessel construction.

We institute a salmon buy-back program for the Washington non-Indian commercial salmon fishermen, and simultaneously provide SBA disaster loans to keep such fishermen in business. Such ironies are not confined to the Northwest. We subsidized entrants into the Gulf shrimp industry with federal loan guarantees and then establish additional loan programs designed specifically to keep them going even when they can't satisfy traditional economic viability tests.

We give regional councils the explicit authority to adjust optimum yield figures downward for economic purposes with the intent to phase out foreign fishing, yet we don't see that authority used.

We strive to ensure "fish and chips" allocation criteria can be used vigorously to pressure foreign nations to open their markets to U.S. fish products, but quibble over using this tool for fear that the pressured foreign country may respond by pressuring U.S. fishermen in their joint ventures, reducing existing fish product purchases, or because such pressure may impact other non-fishery interests.

The federal governmental institutes and funds numerous expensive programs to promote salmon production on the Columbia River and elsewhere in the Northwest, yet fails to conclude a salmon interception agreement with Canada to protect that investment.

We bemoan the fact that foreign fishing fleets can operate more cheaply than our own, yet we require U.S. fishing vessels to be built in U.S. yards, manned with U.S. labor, and operate with equipment and nets the cost of which is inflated because of U.S. tariffs.

Every individual restriction, law, program or policy has a rationale and a logic behind it. The trouble is that we have amalgamated more tools and policies than could ever be internally consistent.

The conclusion of this discussion and this paper is that fishery managers have available to them all the tools they are likely to need to manage any fishery in the United States. The difficulty lies in sorting through these tools and choosing, on the basis of long-term planning, the ones that can most effectively be used to promote whatever management objectives have been decided upon.

FOOTNOTES

- 1 See, e.g. Koch, A Constitutional Analysis of Limited Entry, in Limited Entry as a Fishery Management Tool, (Rettig and Ginter eds.) (University of Washington Press 1978).
- 2 16 U.S.C. 1801 et seq.
- 3 16 U.S.C. 1856(a).
- 4 Greenberg and Shapiro, Federalism in the Fishery Conservation Zone: A New Role For the States in An Era of Federal Regulatory Reform, 55 S. Calif. L. Rev. 641 (1982).
- 5 16 U.S.C. 1856.
- 6 50 C.F.R. 661.
- 7 16 U.S.C. 1851(a)(4).
- 8 334 U.S. 385 (1948).
- 9 See also, Foster Fountain Packing Co. v. Haydel, 278 U.S. 1 (1942).
- 10 U.S. Const., Article IV, § 2.
- 11 U.S. Const., Amend. XIV, § 1.
- 12 See Buckley v. Valeo, 424 U.S. 1, 93 (1976).
- 13 Suspect classifications include: alienage (Graham v. Richardson, 403 U.S. 365 (1971)), race (Loving v. Virginia, 388 U.S. 1 (1967)), and national origin (Oyama v. California, 332 U.S. 633 (1948)).
- 14 Lindsley v. Natural Carbonic Gas Co., 220 U.S. 61 (1911). See also Dandridge v. Williams, 397 U.S. 471 (1970).
- 15 See, e.g., Lindsley v. Natural Carbonic Gas Co., 220 U.S. 61 (1911); Metropolitan Casualty Insurance Co. v. Brownell, 294 U.S. 580 (1935); McGowen v. Maryland.
- 16 Dandridge v. Williams, 397 U.S. 471, 484-85 (1970).
- 17 16 U.S.C. 1856(b).
- 18 The North Pacific Council developed a moratorium on new entrants for the North Pacific halibut fishery, however, that proposal was disapproved by the Secretary of Commerce. It should be noted, however, that the proposal was developed and disapproved under the terms of the North Pacific Halibut Act, not the Magnuson Act.
- 19 Public Law No. 96-561, 16 U.S.C. § 3301 et seq.
- 20 H.R. 5002, 97th Congress, introduced on 11/17/81.
- 21 16 U.S.C. 1853(b)(4).

- 22 16 U.S.C. 1853 (b)(8).
- 23 H. Rept. No. 97-549, 97th Congress, 2d Session 27 (1982).
- 24 H.R. 5002, § 7.
- 25 Id.
- 26 16 U.S.C. 742a et seq.
- 27 The complete opinion of the NOAA General Counsel is attached at the end of this paper as Appendix A.
- 28 See Burke, Recapture of Economic Act Under the FCMA, 52 Wash. L. Rev. 681 (1977).
- 29 16 U.S.C. 1854(d).
- 30 16 U.S.C. 1821(e).
- 31 S. 750, 98th Cong., 1st Session, introduced on 3/10/83.
- 32 S. 2523, 98th Cong., 2d Session, introduced on 4/2/84. This bill is attached as Appendix B.
- 33 See letter from Ambassador Ed Wolfe to Senator Slade Gorton, June 22, 1984, attached as Appendix C.
- 34 Balelo v. Baldrige, 724 F.2d 753 (9th Cir. 1984).
- 35 See, e.g., Colonnade Catering Corp. v. United States, 397 U.S. 72 (1970).
- 36 See United States v. Kaiyo Maru No. 53, 699 F.2d (9th Cir. 1983) (foreign fishing); United States v. Baker, 641 F.2d 1311 (9th Cir. 1981) (Puget Sound salmon fishing), and United States v. Raub, 637 F.2d 1205 (9th Cir. 1980) (Puget Sound salmon fishing).
- 37 This revolved around the fact that NMFS observer standards (1) established "a predictable and guided federal presence and limit the scope of the data collection," and (2) gave vessel owners advance notice of the stationing of an observer. 724 F.2d 753, 760.
- 38 16 U.S.C. 1821(i). A number of exceptions are permitted under this section.
- 39 16 U.S.C. 1853(b). Any FMP may "require the use of...devices which may be required to facilitate enforcement of...this Act" (para. 4). It may also "prescribe such other measures, requirements, or conditions and restrictions as are determined to be necessary and appropriate for the conservation and management of the fishery." (para. 8).
- 40 16 U.S.C. 1861(b).
- 41 United States v. Baker, 641 F.2d 1311 (9th Cir. 1981), and United States v. Raub, 637 F.2d 1205 (9th Cir. 1980).

⁴² 46 U.S.C. 1271 et seq.

⁴³ 46 U.S.C. 607.

APPENDIX A



National Oceanic and Atmospheric Administration
Washington, D.C. 20230
OFFICE OF THE ADMINISTRATOR

September 23, 1980

TO : THE RECORD

FROM : GC - Eldon V.C. Greenberg *EVCG*

SUBJECT: Authority to Retire Commercial Fishing Vessels,
Gear and Licenses

This memorandum outlines NOAA's authority under existing law to engage in a vessel/license retirement scheme similar to that proposed in S. 2163. It concludes that the Fish and Wildlife Act of 1956, 16 U.S.C. 742a (the "Act"), provides NOAA with broad authority to address fishery-related matters consistent with sound conservation and development of the Nation's commercial fishing industry. A cooperative program with the State of Washington to buy salmon vessels and licenses would be in furtherance of the Act's policies and grant of authority.

BACKGROUND:

The salmon fishery is one of the most significant fisheries in the United States. It has been the object of Federal and State legislation and almost continuous litigation since the 1950's. Because of its lucrative nature, it has been a target fishery in the Northwest since the beginning of that area's development.

In recent years the number of vessels in the fishery has increased substantially, causing a decrease in vessel efficiency and creating a potential for conflict between various user groups in the fishery. Legislation (S. 2163) has been introduced in Congress to reduce these conflicts and increase the efficiency of the fleet. S. 2163 is designed to reduce economic dislocation arising from Washington v. Washington State Commercial Passenger Fishing Vessel Ass'n., 443 U.S. 658 (1979), and to improve the distribution of fishing power between treaty and nontreaty fisheries. Title IV of the proposed legislation authorizes the Secretary of Commerce to distribute funds to the State of Washington to purchase commercial fishing and charter vessels and licenses. The purchase and sale of all vessels and licenses must be consistent with the standards, conditions and restrictions set forth in the bill. These limitations are in effect contract limitations which would be imposed on the State by a cooperative agreement.



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Should the bill not pass, the question remains whether NOAA has the authority under the Act to conduct such a program in cooperation with the State of Washington provided specific appropriations are made for that purpose. It is this issue which this memorandum addresses.

DISCUSSION

Although not explicit, the Act contains authority for a broad program of fishery-related activities. This authority, originally vested in the Bureau of Commercial Fisheries of the Department of the Interior, was transferred to NOAA by Reorganization Plan No. 4 of 1970.

The Act generally provides that its purpose is to "accomplish the objective of proper resource management" and that it should be administered

with the intent of maintaining and increasing the public opportunities for recreational use of our fish and wildlife resources, and stimulating the development of a strong, prosperous, and thriving fishery and fish processing industry.
16 U.S.C. 742a.

It authorizes "assistance [to the fishing industry] consistent with that provided by the Government for industry generally . . .," 16 U.S.C. 742a, without limiting the type of assistance available. More specifically, the Act states, inter alia:

The Secretary of the Interior, with such advice and assistance as he may require from the Assistant Secretary for Fish and Wildlife, shall consider and determine the policies and procedures that are necessary and desirable in carrying out efficiently and in the public interest the laws relating to fish and wildlife. The Secretary, with the assistance of the departmental staff herein authorized, shall

(1) develop and recommend measures which are appropriate to assure the maximum sustainable production of fish and fishery products and to prevent unnecessary and excessive fluctuations in such production . . . ;

(4) take such steps as may be required for the development, advancement, management, conservation, and protection of the fisheries resources; and

(5) take such steps as may be required for the development, management, advancement, conservation, and

protection of wildlife resources through research, acquisition of refuge lands, development of existing facilities, and other means. 16 U.S.C. 742f.

While it is possible to read Section 742f as limited to calling for the establishment of "policies and procedures" and as only operative in connection with the implementation of other laws ^{1/}, it can also be properly read as a grant of independent authority. Indeed, the second sentence of Section 742f, which mandates the Secretary to take certain actions to advance the industry, makes little sense if the operative authority in subsections 4 and 5 can only be of a procedural nature and must be related to existing law.

The provisions of Section 742f appear on their face to be comprehensive enough to encompass the cooperative program envisioned in S. 2163. The prefatory language of subsections 4 and 5 "take any steps as may be required" is without limitation on the type of program to fulfill these responsibilities. There is no suggestion in the language of the Act that a cooperative vessel/license retirement program is outside the bounds the grant of legislative authority. Rather, the Secretary has discretion to choose a program best suited to achieve particular fisheries' "development, advancement, management, conservation and protection" objectives.

This flexible approach to program implementation is confirmed by the Act's legislative history. The House Merchant Marine and Fisheries Committee viewed the bill as a broad, if not totally comprehensive, approach to fishery problems:

While the committee is aware that there can be no cure-all for the many differing ills of the industry, it believes that this bill is likely to prove more beneficial to more segments of the industry than any of the many solutions proposed in the course of its lengthy attempts to find the correct answer to the problem. H.R. Rep. No. 7519, 84th Cong., 2d Sess. (1956).

^{1/} In fact, under other laws, such as the Anadromous Fish Conservation Act, 16 U.S.C. 755 et seq., and the Fishery Conservation and Management Act of 1976, 16 U.S.C. 1801 et seq., NOAA is charged with a variety of responsibilities relating to the development, conservation and management of the salmon resource. Therefore, even if the Act's authority is limited in scope, it may be utilized for the purposes under consideration here.

Congress, in 1956, recognized that a wide range of problems faced the U.S. fishing industry and that a wide range of programs was necessary to combat them. As the House Merchant Marine and Fisheries Committee stated:

The need for aid by the commercial fishing industry can best be set forth by a recital of some of the problems confronting it. These include depletion of the resource, either from overfishing or natural causes not fully understood, due to the absence of further research. The New England groundfish, California sardine and salmon are examples of this. Increased costs of operation, inability to secure adequate financing to upgrade vessels and equipment to keep pace with new developments in technique, increasing competition with other nations for the domestic market and the possibility of insufficient representation in negotiations with other countries are other problems facing the industry. H.R. Rep. No. 2519, 84th Cong., 2d Sess. (1956).

The range of problems addressed by Congress in 1956 are of a similar kind to those which confront the Pacific Northwest salmon industry today and which could be alleviated by a cooperative vessel/license retirement scheme. Such a scheme would reduce the number of vessels in the salmon fishery which would increase the efficiency of the remaining vessels and make a contribution toward the effective conservation of salmon resources. The potential sale of salmon vessels into underutilized fisheries would promote the development of those fisheries as well.

In sum, implementation of a cooperative vessel/license retirement program is consistent with the broad purposes and authorities embodied in the Act, provided that funds are made available for that specific purpose. Nonetheless, because the Act's authority is broad and not explicit, were Congress to appropriate funds for such a program, it would be desirable to avoid any dispute over its proper implementation for there to be a Congressional statement accompanying the appropriations bill acknowledging the Agency's authority and specifying that the funds are for the purpose of conducting a cooperative license/vessel retirement program with the State of Washington.



APPENDIX B

98TH CONGRESS
2D SESSION

S. 2523

To amend the Magnuson Fishery Conservation and Management Act regarding allocation of allowable levels of foreign fishing.

IN THE SENATE OF THE UNITED STATES

APRIL 2 (legislative day, MARCH 26), 1984

Mr. GORTON (for himself and Mr. PACKWOOD) introduced the following bill; which was read twice and referred to the Committee on Commerce, Science, and Transportation

A BILL

To amend the Magnuson Fishery Conservation and Management Act regarding allocation of allowable levels of foreign fishing.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

3 That (a) section 201(e)(1)(E)(i) of the Magnuson Fishery Con-
4 servation and Management Act (16 U.S.C. 1821(e)(1)(E)(i))
5 is amended—

6 (1) by inserting “both” immediately before
7 “United States”;

8 (2) by striking “or fishery” and inserting in lieu
9 thereof “and fishery”; and

1 (3) by inserting the following immediately before
2 the semicolon at the end thereof: ", particularly fish
3 and fishery products for which the foreign nation has
4 requested an allocation".

5 (b) Section 201(e)(1)(E)(ii) of the Magnuson Fishery
6 Conservation and Management Act (16 U.S.C.
7 1821(e)(1)(E)(ii) is amended to read as follows:

8 "(ii) whether, and to what extent, such nation is
9 cooperating with the United States in both the ad-
10 vancement of existing and new opportunities for fisher-
11 ies exports from the United States through the pur-
12 chase of fishery products from United States proces-
13 sors, and the advancement of fisheries trade through
14 the purchase of fish and fishery products from United
15 States fishermen, particularly fish and fishery products
16 for which the foreign nation has requested an alloca-
17 tion;"

18 SEC. 2. (a) Section 201(d)(4) of the Magnuson Fishery
19 Conservation and Management Act (16 U.S.C. 1821(d)(4)) is
20 amended by striking "shall" the first time it appears and in-
21 serting in lieu thereof "may".

22 (b) Section 201(e)(1)(A) of the Magnuson Fishery Con-
23 servation and Management Act (16 U.S.C. 1821(e)(1)(A)) is
24 amended by striking "shall determine the allocation among

1 foreign nations of" and inserting in lieu thereof "may make
2 allocations to foreign nations from".

3 (c) Section 301(a)(1) of the Magnuson Fishery Conser-
4 vation and Management Act (16 U.S.C. 1851(a)(1)) is
5 amended by inserting "for the United States fishing indus-
6 try" immediately before the period at the end thereof.

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APPENDIX C



1984 JUN 25 PM 3 25

United States Department of State

Washington, D.C. 20520

BUREAU OF OCEANS AND INTERNATIONAL
ENVIRONMENTAL AND SCIENTIFIC AFFAIRS

June 22, 1984

Honorable Slade Gorton
United States Senate
Washington, D.C. 20510

Dear Senator Gorton:

I have recently learned of your concern regarding the ultimate disposition of fish allocated to Poland under the governing international fishery agreement. Among other factors, Section 201(e) of the Magnuson Fishery Conservation and Management Act of 1976, as amended, requires that the Secretary of State take into account whether and to what extent fish harvested in the U.S. exclusive economic zone is needed by the foreign nation for its domestic consumption. I wish to assure you that this factor has and will continue to be evaluated by the Department of State in reaching decisions on the level of allocations to be made available to specific nations.

If such fish is not needed by the foreign nation for its domestic consumption, a nation's performance based on the other factors contained in Section 201(e) must be sufficiently compelling to justify the level of allocations requested by or contemplated for that nation. In addition, whether and to what extent fish harvested under that nation's allocations will demonstrably compete in the U.S. marketplace with fish harvested or processed by U.S. fishermen and processors will also be considered.

I trust that this clarification is responsive to the concern you have raised.

Sincerely,

Edward E. Wolfe, Jr.
per. mjf

Edward E. Wolfe, Jr.
Deputy Assistant Secretary
for Oceans and Fisheries
Affairs

Discussion

????: You mentioned the fees and then the observer program. There was a discussion yesterday about the problem of the catcher-processors. Could the regional councils, if they so wished, require observers and have a special fee to cover the administrative costs of having the observer on the catcher-processor? For a crab boat, for instance, in order to enforce the size limits? Does the council have that authority?

ANSWER: In terms of placing an observer on board, it would be my opinion that, yes, they could do so. In terms of the fees, I don't know, I'd have to take a closer look at it. I don't know, maybe. The language of the statute, if I remember correctly, says fees can cover the administrative costs in issuing the permit. Whether the observers could be considered part of the cost of issuing the permit, you could construct an argument on either side. That might be stretching it a tad. I don't know.

STOKES: The Congress does a lot of things other than make laws. They intervene in various ways, if you want to call it that, in the administrative process by taking a constituent's request and passing it on in one form or another to the responsible administrator. That's been referred to in this context as "end-running." You've, of course, been in the Congressional game for some time. How do you handle that situation when it comes to you, as a Congressional staffer? How do you think it might better be handled, if you want to try that one?

ANSWER: That's an easy one. The best answer for that would be that if no senator and no congressman did it. What, unfortunately, tends to happen is a senator with one set of interests will try to intervene in the process and you feel you have to cover your constituent's rear end, and do the same thing. It ends up being no more

than simply fighting out the battle that was already fought out at the council level. That goes on, and probably will continue to go on. It's something that should be resisted by everybody, and I think we'd be better off if it were resisted.

In terms of how its handled, each office handles it differently. Some people feel very little inhibition about intervening in that kind of process. Other people think that should be done only in very serious circumstances, where a council or a management entity has done something that is subject to question. There's no magic answer as to how that one's handled. It's always case-by-case. To answer your question, it seems to me that the management process would be better served if everybody realized at the start of the game that the battle was going to be at the local level. In the two days I have been here, I've been approached by a number of different people anticipating bad outcomes at the council level and saying, "get ready, because we're coming to Washington." You know that's going to happen, but it's not the way to deal with the problem. As I said earlier, the reason Congress set up the councils was so all those things could be handled in the regions. The most serious situations are where the council tries to do something that in fact raises the question of whether it's legal or not. Then you would forward concerns of constituents to the agency, and the agency is going to be looking at that anyhow.

GUTTING: Chris, you mentioned that the Congress has passed and the president has just signed a change in the way the "fish-and-chips" policy is implemented. One of the keys to that was the shift from the mandatory "shall" to the discretionary "may". And I know Congress always likes to pass laws and then let the administration figure out how to implement them. I don't want to put you on the spot. But if you were in the administration right now, looking at this new statute, faced with the allocations that have to be made next year, how would you implement it? What changes would you make in the allocation process? What were you trying to get at with this amendment? Would you set up larger reserves? Would you change the process? What would you do differently?

ANSWER: Part of the way that change is implemented really lies with the abilities of people in this room. Too often, almost always in terms of allocation decisions, the administration has been faced with the situation of fishermen vs. processors, with the phase-out people vs. the joint venture people. Now, the administration no longer has the excuse, "we've got to allocate all this stuff, so we're going to do it and wing it." They can always use the excuse, "it's the best we could get."

What this amendment really does is provide an opportunity for the fishing industry to sit down and decide what it is they want out of fish-and-chips. If we return to the situation we had before, with the processing industry and the fishing industry arguing and unable to come to any reasonable middle ground, we'll probably see the law implemented no differently than we've seen in the past. The administration is a very poor body to take sides in that battle. As a practical matter, it is very unlikely to take sides in that battle. The industry up here, and I think it would be appropriate for the councils to really set up policy-making time for this, needs to decide how they want to go about doing it. They can decide how they

want fish-and-chips to be implemented, agree on it at the council level, and make it explicit so that the Department of Commerce and the Department of State has that as a policy from the region. It makes it very easy at that point to mobilize a greater force to shape the policy, to actually withhold allocations if the fishing industry's not satisfied with what they are getting from foreign nations.

I don't have a crystal ball and I really don't know how to answer that question. Again, Congress has provided the tool, it has clarified the tool in this case and it has strengthened the industry's hand. But so much of decision-making in D.C. tends to boil down the lowest common denominator. And if there is a significant fight going on within the industry, I can guarantee the State Department isn't going to solve it for you.

????: I like what you said, but how do you square the fact that the councils tend to feel we're not setting policy? We get the impression from Commerce that in these areas and other areas, we truly don't set policy. We make our thoughts known; they take our recommendations under consideration. So, are we looking at a change to the law that would clearly once and for all say that the councils do set policy, and do manage?

ANSWER: The way the law is set up, the secretary really has the authority under that statute to disapprove a plan only if it is inconsistent with the national standards. A council really has to be sloppy if it sends a plan back that isn't consistent with those standards.

????: I was thinking more along the lines of what Dick Gutting said about allocations.

ANSWER: Allocation is a much more difficult problem. The problem really stems from the fact that at the State Department tries to avoid confrontations with foreign governments whenever they can. Fish-and-chips is inherently confrontational.

The second problem we have is because of the basket clause and because of whaling, we do get a lot of extraneous junk thrown in for consideration. There's no way to get over that problem. You're always going to have it. I guess that the only thing I could say is that the councils could, in fact, be specific. They could adopt policies that would make it much easier, for example, for Congressional people to line up behind the councils to see if they can get those policies through.

????: What about potential changes on the act to take Commerce out of the loop and have the councils directly under the authority of their plans and all the other figures and make their recommendations directly to State Department?

ANSWER: I haven't heard the proposal.

WALSH: Chris, I have a question. It looks to me like the next ten years will be the time in which this industry will begin to develop. You opened the political issue. What about taxes? Clearly, for the fishing vessels, big fishing vessels syndication, investment tax

credit, and things of that sort are important. Have you heard anything about what's going to happen with tax loopholes, particularly those that might affect this industry, vessels, and investments in plants?

ANSWER: There are going to be two issues regarding taxes in the next Congress as far as I can tell. One would be the proposal for a tax reform, whether this is a flat tax or the Bradley-Gebhardt graduated flat tax-type proposal. That initiative, if it ever gets off the ground, will basically be revenue-neutral, in the sense that the overall revenues coming into the government shouldn't be changed in that proposal. However, the premise of the proposal is basically to lower the highest tax rates down to a figure of, depending on whose proposal, roughly 30 percent. That would be the maximum tax rate and in return probably 95 to 98 percent of all deductions, credits, and exemptions would be eliminated from the tax code. The affects vary from industry to industry. Because everybody has an investment in the existing tax structure, it's somewhat questionable whether that kind of proposal will, in fact, pass. The fishing industry has one advantage because some of its tax preferences are in places other than the Internal Revenue Code. It is likely that this effort would be confined to that code rather than the Merchant Marine Act. So things like CCF, for example, would probably get through this without being directly observed, although I don't know that that would be the case.

The other question is about generally raising revenues. It's probably going to happen if they're going to deal with the deficit. They can't deal with it just by cutting spending; they can't deal with it just by raising taxes. It'll have to be a combination of the two. Whether that will come down is exceedingly unclear right now. Although, it would be my guess, if I had to guess, there will be action in that vein.

The political prospect back there for a reform movement is made easier if they go through a sweeping change like this, where they get rid of 99 percent of all the deductions and credits, rather than trying to target a few. You don't have the "why me?" aspect of it. As my boss likes to point out, a tax loophole is what you use and a vital tax incentive is what I use. That situation is one that generates nothing but controversy in terms of reform, because we've vested so many interests in these various provisions in the code. Whether or not that's going to change, I don't know. But if it does change, it would be a sweeping change and probably affect everybody equally. The toughest part of that is transition rules. How would you get people who have made investments on existing tax systems into a system where you have done away with all this? That's probably the most difficult part of that whole assignment.

WALSH: I understand there's a lot of talk about getting rid of the tax-loss kind of financing syndication. As I understand it, most of the large vessels in the Pacific Northwest have been syndicated. They are being syndicated in areas where movie stars and professional basketball players don't care about getting a dollar back. They'll get half of that back in tax losses. It sounds like that's the kind of thing they're going to go after the earliest and quickest and that's going to affect some of these big new boats that

want to develop offshore surimi capability. I assume you've heard the same?

FISHER: Chris, I don't even know how I'm going to phrase this question. I was going to try and editorialize it tomorrow from the vantage point of chairing a panel. I get uneasy as hell to hear you lecture us, and that was a little bit of a lecture with all due respect, that processors and fishermen should quit fighting on this allocation question. You brushed very lightly over the real territorial fights and territorial imperatives involved between Commerce and State on questions of allocation. I would like to hear your thoughts and comments on one other part of this equation on who interferes with the allocation process. Namely, the all-pervasive attitude that I sense coming out of Washington, a defeatist attitude here in the industry, that fisheries is still negotiable, that you people are going to somehow or another be considered secondary to the big picture. I'm 56 years old. I've been hearing this bullshit from government representatives for thirty-five years. If you don't understand the big picture, it's namely this: What do we do to overcome this image of having a negotiable industry? These two things I just mentioned are symptomatic of it. Worst, the elected political officials somehow or another feel it's safe for them to get into the allocation game to serve other agendas-Packwood with the whales; Reagan and the Poles. You know as many instances as I do. What do we do as an industry or a group to counteract this attitude that fish and fisheries are negotiable, and secondly, to enforce some discipline on all of us?

I liked what the Governor said about when we replace the foreigners, you guys are going to have to start anteing up and spending some money. That's okay, that's reasonable. When you get into the area of those who are going to make investments, and particularly investments in these large syndicated freezer-trawlers with expensive units-of-effort, it's an uneasy situation when only the industry is accused of fighting by government representatives, but State and Commerce fighting, and now the elected officials. How do we end this? You can't go with what both councils want on joint ventures, for example a ton for a ton. This was the message given to the foreigners. What do the Poles get? And the Poles have been bad boys for the American Fisheries.

ANSWER: I understand the problem. I don't have an answer for it. I will go back and reiterate one point that I still think is valid and that is there is a strong perception in Washington, D.C. that processors and fishermen fight over this issue. It has put the people who want to use allocations for other reasons in a stronger position. As long as the industry is divided, it's easier to conquer, and you can trade it away for other things. I'll go back and say again, if the industry can agree on how to do it, it makes it easier for those who want to help the industry in that regard. As to your fundamental question, which is how do you keep the extraneous things out of it, I don't know. There have been a number of people fighting on that behalf in the Congress. Senator Gorton, this year, was able to get an amendment all the way through the Senate that would have changed the basket clause, so only fishery matters could be considered. Through no fault of friends on the House side, that provision simply died out. It was not passed. If it had come to the floor, I can predict why it wouldn't have passed.

People who want to keep those issues involved would have been more powerful. I don't have an answer to your question. There's a lot of us who are sympathetic. We're trying as hard as we can to help on it. And we haven't won the war. But any time you can come up with a stronger, more united case, it makes it easier for us, on a case-by-case basis, to get that position across.

Fisheries Management Tools

Panel Discussion

**Richard Marasco, National Marine Fisheries Service,
Moderator**

Keith Brander, British Ministry of Fisheries, Food and
Agriculture

Parzival Copes, Simon Fraser University

Edward D. Evans, Diamond E. Fisheries, Inc.

Richard P. Gale, University of Oregon

Colin Grant, Australian Department of Primary
Industry

John Gulland, Fisheries Consultant

Christopher L. Koch, aide to Senator Slade Gorton

Robert Stokes, University of Washington

MARASCO: To begin our discussion, I'd like to make a couple of points. First, and I think extremely important, is that the focus of this particular session is on the exchange of information and ideas. The intent isn't to formulate policy recommendations. Secondly, we are discussing management tools that can be used to address fisheries problems and issues. The important question then is, what are the key issues? What are the key questions? Yesterday and today a number of issues have been identified. And I'm going to mention several of them.

We've heard people talk about conflicting policy. We've also heard about operational difficulties associated with plan or amendment implementation. A third, and I think most important, is the resource allocation question.

Of the issues that I just mentioned, the one that we want to focus our attention on is, of course, resource allocation. Perhaps the most important politically, it is one of the most volatile of the three. We want to focus our attention on tools that we can use to address the resource allocation issue.

I'm going to begin by turning to the panelists that have experiences in other parts of the world and ask them to summarize, to brief us, on how others approach this whole question of resource allocation. After we've heard comments from these people, I will turn to our other panelists for comments or questions. And then, finally, in recognition that resource allocation is the heart of the issue and one of the reasons why all of us are here, ask our panelists to address the question of what are desirable properties that we might associate with a resource allocation mechanics, system, or, if you will, institution. So I'm going to begin by turning the floor over

to Colin Grant. And he can then describe for us some of his experience in Australia.

GRANT: We've heard a lot about democracy today. And I think it's indicative of the fact that I kick off. I'm the only Australian on the panel and as far as I know the only Australian in the room. And a decision was made that I should go first.

If you were to take an American, blindfold him, take him to Australia, drop him down, turn him round three times, take off the blindfold, and ask him where he was, he probably wouldn't realize for a few minutes that he was anywhere else but in America. He'd turn around. He'd see Kentucky Fried Chicken. He'd see Pizza Hut. See MacDonald's. And he wouldn't really know he was outside America until somebody came up and said, "Good day, how are you doing?"

In a sense that's very similar to the fisheries situations that I've had experience with. I've been here eight months. I've been going around the country looking at the American fisheries situations and comparing them with what we've got in Australia. We've got a lot of similarities and there are some differences.

Let me go through some of the similarities to tell you where we're coming from. Firstly, we're a large federal country. We've got three mile lines. We've got state's rights issues. We've got common ancestral heritage in the sense that we stem from Europe. We've got remote fisheries situations such as you see in Alaska. We have a place called the Northern Territory. We have vessel building subsidies. We even have fuel subsidies. We have dolphin issues and conservation issues associated with dolphins. We have indigenous people issues. We have foreign fisheries, joint ventures, directed fisheries. We've even sent the Poles and the Russians home like you did. We've got doctors and lawyers who have set up fisheries schemes for tax minimization purposes. In other words, we've got a lot of very, very similar situations.

On the other side, we've got some differences. We've got a small population within our country. We've got some differences in stocks. Basically, we've got some similarities as well. We've got trap fish stocks. We've got prawn fisheries. We've got tuna fisheries. We've got scallops, etc. Our resource size, however, is very, very much smaller than yours. We have no capital gains tax in Australia. I thought I'd throw that in early. The basic difference, however, as to what we have in Australia and to what I've seen here is that we have limited entry.

What is limited entry? Well, in going around the country, I've come across a lot of confusion, which I believe is born of a misunderstanding of just what limited entry is or can be. And I've heard, for example, that it's anti-free enterprise. I've also been told that it's a fixed formula that you apply to fisheries. And the answer is it doesn't need to be either of those. It doesn't need to be anything like that at all.

I'll throw in something a little controversial here. I'm sure it's not going to be anything unusual. But Australia is largely a socialistic country. We've got a socialistic government in power at the moment and yet fisheries management in Australia and fisheries

practice is largely free enterprise. The U.S.A.'s philosophy is free enterprise. And, yet, what I see in many fisheries in America, is a social welfare situation. And I think that's an interesting point.

Limited entry, which is something that I've come across as being a nasty word--it's anathema to people, can be whatever you want it to be. There is not fixed system. But, you must know before you go into limited entry where you are going and what you want to achieve.

This morning, Dan Huppert asked what do want to achieve? Do we want opportunity for people? Do we want income guarantee? Do we want efficiency? They can all be achieved within limited entry. Some of them can be achieved outside.

I think you've got to adapt to the existing situations. And through adaption, be innovative as well. As I said, we have limited entry in Australia. What have we decided to do through limited entry was to promote economic efficiency. Bob Stokes was talking about what that means. Is that total efficiency? Is that national efficiency? Is it individual economic efficiency, that is, return for capital investment? All of those things it can be, but, it doesn't necessarily have to be a guarantee for an income.

The other thing that we attempt to do in Australia besides promoting economic efficient fisheries, is to promote orderly fishing. Those are our two basic overriding objectives, after, of course, conservation of the resource.

We've got almost every form of limited entry that you could have, I think. Let me say some of these systems have been in place for twenty years, and others have only recently been put in place. We've got at least twenty years experience in some fisheries with limited entry. We've got vessel limits. We've got vessel and pot limits in pot or trap fisheries. We've got individual quota limits. That's one that's recently been implemented, and we're going through the exercise of how to enforce those sorts of situations. We've got individual diver limitations for diving fisheries.

In all of our fisheries, almost all of our fisheries, I should say, the transferrability of the limited entry is part of the system. We have a non-transferrability of some entitlements to fish. Particularly, in abalone fishing. So, the entitlement to fish or whatever the limitation on activity is a freely tradeable commodity in the Australian context.

We have also gone through a degree of aging of fisheries. Through a degree of aging in the investment of capital, you end up with an over-capitalized system even within limited entry. We've had to implement buy-back schemes. The implementation of the buy-back scheme at the moment, the one that commences on January 1st next year in Australia, is industry funded. Industry sought it. Industry agreed to fund it.

Limited entry in Australia, has, to best of my knowledge, never been imposed as an administrative fiat on the people. It's been done in cooperation with the people who are to be limited, namely fishermen. It's been done at their behest.

Finally, we've got forms of limited entry that allow flexibility of movement between fisheries, which are all limited entry.

This morning, somebody said that you can be over-managed. And I think you probably can be over-managed. If I can generalize, and it's a dangerous thing to do, I would say that in Australia at the moment, we've got less over-management than I see in the United States. We have limited entry and some other attendant controls such as gear controls and seasonal area controls. But, in the main, we don't have year quotas, quarterly quotas, trip limits, nominated fishing days, prohibited species and the like. So, limited entry doesn't have to be a plethora of controls that, as I've heard somebody say today, restrict your opportunities. I don't believe it does.

As I said, we started out in limited entry some 21 or 22 years ago, now. It's rather interesting to observe that in Chris Koch's paper, he makes the point that there was an attempt in the 97th Congress to introduce a buy-back scheme that died in the Senate consideration of the issue. The whole intent was to have an industry funded buy-back. We've done that. We've put all the legislation in place that's needed and it will commence on January 1st.

The interesting thing, I think, is that we started into 200-mile fishery management in 1979, fully three years after you did. And yet, five years down the road, we've got buy-back schemes, we've got limited entry, which we had, of course, before. The point I'd like to make is that you can talk about it for a long time, but you've got to start doing something about it. You might not want to go into limited entry. I'm not rowing that boat. I'm telling you how we do it.

One thing, I would like to suggest is that you don't need to reinvent the wheel. It has been invented outside America on a number of occasions and inside the U.S. in some fisheries in terms of limited entry. It exists in Canada, it exists in Australia, it exists in New Zealand, for example. What, I think, you probably do need to do is to go and see how the wheel is being used in those countries and what you think you might use it here.

I'm here on an exchange. I think it's a credit to Bill Gordon and the National Marine Fisheries Service to have been far-sighted enough to, in conjunction with my boss, initiate this exchange. Right now, over in Australia, there's a National Marine Fisheries Service officer from the Juneau office. He is working on an individual fisherman quota in the tuna fishery, learning how we're learning to implement them, what it means, the enforcement aspects of it and so forth. I think he's going to be in a very good position to advise you as to how to adopt those systems in America. I can't tell you simply because I don't know your political system well enough.

I'd like to just close by saying this. I went to the bathroom earlier and on the way back, I stepped into a room along this corridor and I heard people talking about management. They were saying you need to be innovative. You need to be open to ideas. You need to be decisive. To be informed. To be responsible. And I thought to myself, "Gee, have I been gone a long time or what's

happening?" And, in fact, I looked around me and I didn't see any faces I recognized. So, I went outside and I looked at the notice board and it said "Assertive Management Discussions." And I came next door where it says "Fisheries Management: Issues and Options" and I knew I was back home.

What I hope happens by the end of this conference is that we are in a position, you are in a position, to be more assertive about your management. I think with that I'll leave it there. And later on field any questions or abuse that come my way.

COPEs: I'd like to hang my remarks on a plea to insert more realism in our application of management objectives, of management tools. We had three presentations today on management tools and I thought they were all quite good. I know some members of the audience didn't share my approval for some of the remarks this morning. I must say that I'm conscious of being the first economist to speak after Bob Stokes. And I feel a bit like the second fellow sticking his head up out of the foxhole. Just wondering whether the enemy has shot off all of its ammunition already or whether they've just refined their aim. We'll find out later.

I'd like to start off by taking a critical look at the role of economists in devising management schemes and coming up with management policy. What may please some members of the audience is that I'm going to be critical of my fellow economists and implicitly of myself too, because I have also been involved in the process. I'd also like to mention that I happen to be a former commercial fisherman and I've seen regulations from the other end as well.

Economists, I think, have a very important role in fisheries management. We, have been trained, and been given analytical tools to look at the big picture--how the various economic forces that are at work within the fishing industry all fit together. People who are at the cod-end of the net, see things close-up and sometimes they cannot see the forest for the trees.

The disadvantage of working from the big picture is that we look at fisheries problems as theoretical. We draw up our theoretical models. We know about the common property characteristics of the fishery and we're very happy to tell everybody else about it. They don't understand us all the time. When it comes to working out practical schemes for fisheries management, we do it the way economists do. We put a model together, we develop a few theories that we apply to this model. The problem is that not everything in the real world fits into our model. We leave bits and pieces out, because we cannot quantify them, we can't fit them into the model, because they're nasty little bits that don't fit in with our conclusions or perhaps, they're just things we don't know about because we haven't been down at the other end of the problem. We haven't seen all of the details of the problem on the ground.

The result is that when fisheries economists get a chance to write policy, to help bring in fisheries management schemes, sometimes these schemes don't work too well. In my own country, there are some good examples of that. We have the brave new world when we decided to bring in a salmon management scheme in British Columbia with a buy-back program that was the first major attempt in that

direction. We though we really were going to show the rest of the world how to do it. But I'm from British Columbia, and I can tell you that the salmon limited entry scheme and the accompanying buy-back program, by-and-large has been a pretty miserable failure. So we're starting all over again, now, trying to do it right.

The problem is not always that we, the economists, don't know what to do. Sometimes, it is that the government doesn't listen to us. We don't get every part of our scheme in. Sometimes, they're listening to the wrong economists. At the same time, I've got to admit that economists as a group are often not sufficiently realistic about the implications of our schemes at the working end of the fishery. As a result, our schemes are simply not practical; they cannot be applied.

Perhaps I can illustrate what I'm concerned about in this connection with some practical schemes in fisheries management. One of the problems of the economists is that once in a while they come up with another application of their analysis in the fishing industry and think they've really got the solution now. We started off with limited entry and buy-back and they didn't work too well in many instances. The latest thing is the individual transferrable quota.

I don't want to dump on these schemes altogether because there are places where any one of them work well. Colin Grant has given some examples of workable management schemes in Australia. I've worked on fisheries in Australia and I know there are some very good examples of workable limited entry programs. One of the advantages in Australia is they came late to developing their fisheries and they could bring in limited entry before they had too much effort in the industry. It's the mature fishing industry that really gives you a problem. My country has got a terrific fisheries problem, largely because we've already got four times as many fishermen as we need. And if you try and correct that situation, well, you've got real problems on your hands. So, some of these schemes can work in the right circumstances if they're applied the right way.

I'd like to issue some cautions on what I think is the latest enthusiasm of economists, to solve it all with the individual transferrable quota. I don't want to say that the individual transferrable quota is not going to work because there are already some places where it is working reasonably well. On the East Coast of Canada, the enterprise quota is reasonably effective. Lee Anderson mentioned the New Zealand situation where they have a trawl fishery with a transferrable quota that works reasonably well.

I think it works in both of those instances because you're dealing with fisheries where you can monitor what's going on very easily. If you have a large trawl fishery with a few plants where you load fish a trawler-load at a time, there's nobody who can sell it out the back door. The controls, the enforcement, the monitoring is pretty complete under those circumstances. If you have a small boat fishery with 5,000 boats, as you have in the salmon fishery in British Columbia, you have 5,000 boats and you have 5,000 landing places and you do what you please with all the salmon that's landed. There's no way that you could control individual quotas under these circumstances. This shows that you have to look realistically at what kind of controls you're going to put in what kind of fishery.

You can't draw general conclusions that will apply to all fisheries. It depends very much on the individual fishery you are dealing with, whether you can have a workable scheme or not.

As has been mentioned, I refer both to comments by John Gulland and Bob Stokes, the biggest problem with individual quotas is the enforcement. It can mess up our fisheries management in all kinds of ways. John Gulland says the quality of the landings data that we are getting has greatly deteriorated, in some cases because you have individual transferrable quotas and the incentives for the fishermen to underreport and cheat are enormous. If you supplement that, as we tried to do in British Columbia, with a landings tax, you get a double incentive to cheat. You want to avoid the landings tax. You don't want them to know how much you're landing. You find ways of getting rid of your catch without them knowing it. We don't know what's going on in the fishery any more, and the scheme can become quite unworkable. Even the workable scheme that we have on the East Coast of Canada for the trawler fishery there has the problems that are by-products of the transferrable quota scheme. One of those is that you give fishermen an incentive if they have a quota. You give them an incentive to high-grade the catch. If you have fish of various sizes and so on, you don't want to come in with a load of less-valuable small fish, you want to have the biggest fish, so you dump the smaller fish. Of course, that's just waste, because you want to fill up your quota with the most valuable fish.

There are other problems. One thing that you have to take into account when you're dealing with the fisheries is that you are dealing with a pool resource. It is all right to say, well, if we hand out individual quotas to fishermen, they'll have an incentive to take that quota in the most efficient way. They won't just rush out and try to beat every other fisherman to the fishing grounds, because they have the whole year in which to take their catch. But the problem is, in the case of the fishing industry, you're dealing with a pool resource. You're all dipping into the same pool. If you had a quota system in the case of forestry, or oil, or something like that, you might wait until your best time of the year to take what you want to take. But in the case of the fishery, where you're dealing with a pool resource, you want to get out on the fishing grounds when the stocks are the densest because that's where you can get the most fish for the least effort. You still race other fishermen to the fishing ground--individual quota or no--to get in on the best part of the fishery. You'll still go for the highest density stocks. You'll go for the best time of the year. It does not eliminate all of the problems of racing for the fish and overcapitalization in certain corners of the industry.

You may reduce those problems. It is true that you are able to take your quota any time of the year. You can land it in a season when the price is high. You can spread out fishing through the year. So, there are advantages. But, I think sometimes we overstate those advantages and we overlook all kinds of problems that are going to arise in the fishery.

There simply is no substitute for trying to think through all of the possible problems that can arise in the fishing industry. This is where we have to come back to cooperation in the fishing industry. All kinds of groups can contribute to effective management. We need

the biologists, because they are the only ones that can really tell us what the dynamics of fisheries exploitation are all about: how the stocks react to various kinds of fishing pressure, what we will do to the fish stocks if we don't stop certain practices. We need the economists because they are trained to look at the overall picture, and to see what damage we can do to each other by ineffective, inefficient fisheries regulations, by inefficient systems of fishing. We need the lawyers to tell us what we can do and what we can't do by the law. We need the politicians to tell us what is practical to get through Congress and what you simply cannot get through. We need the anthropologists and sociologists to tell us what various kinds of fisheries regulations and new developments in the fishing industry will do to fishing communities and people. We've got to take all of that into account.

In the end, I suppose, what my plea is is for a process that we use to educate each other on what we know about the fishing industry. A conference like this is part of that educational process. Let me conclude by defending my fellow economists. I think that we have an extremely important role to play in fisheries management, one that is not fully appreciated. You've got to keep a check on us and not let us get too enthusiastic about our new schemes. We have to look critically at what might be wrong with them. But don't throw the baby out with the bathwater. Don't say economists cannot come up with good schemes and everything has gone wrong in the fishery since we've had the economists messing around in there. There was a lot wrong with the fishing industry long before economists ever got at it. It's been a problem industry for at least a century. We've come in largely because we are fascinated by doing something about the problem. We didn't make the problem. We can help to solve the problem. But, we've got to be realistic about what we can do, what we can't do, and what we have to learn from others. Thank you.

BRANDER: The first comment that I would like to make is a reiteration of what we just heard. The thing that has impressed me particularly about this meeting is the scope of participation, the number of academics, lawyers, economists, and politicians and so on, who take an informed interest, obviously, on fisheries issues here. In Europe, at the moment, I think one of our problems is that a meeting like this would simply be impossible. You might have about ten or fifteen people there. There is a real vacuum at the moment in fisheries management. It seems to me that whatever problems you are facing, at least you have vigorous institutions for coping with them. To that extent, you're a great deal further ahead than what we see in Europe at the moment. It's really rather difficult to sit up here and try to bring things to your attention from the European experience that may allow you to learn from us. People say that you learn from mistakes, and there are certainly a lot of mistakes being made in Europe at the moment. It seems to me that these are mistakes that you probably passed through many years ago.

What I'd like to do first is address the allocation question that was raised by Bob Stokes, and to point out how this has bedeviled attempts at fisheries management in Europe in the last ten or fifteen years. The point that he was making at the end of his paper was how do we change the rules of fisheries politics so that the first task is to obtain the greatest possible economic value from

groundfish resources and the second task is to divide that economic value among regions and groups without diminishing its magnitude.

In Europe, the main control over fisheries is exerted by the European Economic Community through the European Commission. There you have a group of nine countries that have decided to pool their fishery resources. Those resources are managed by the central body through a common fisheries policy.

In order to achieve the common fisheries policy, it was felt the first thing to be done was to reach agreement on how the resources should be allocated. Over a period of many years, there were arguments essentially about who should get how many tons of fish and where. This eventually resolved itself into an agreed percentage allocation of annual TAC's. This forms the cornerstone of the common fisheries policy. In other words, there was a big argument about allocation.

There were a number of casualties in that debate. The first major casualty was Norway, which was applying for entry to the European Community at the time and decided not to join. The main reason for that was disagreement over the allocation of fisheries rights. Norway is not a member of the European Community for the simple reason that it didn't like the allocation of fish it was offered.

At the present time, we have two international disputes revolving around this same issue. Greenland left the European Community a few months back, and the main issue was the allocation of fisheries resources. At the moment, Spain and Portugal are applying for membership to the European Community and the main sticking point, in the case of Spain, is the allocation of fish. So it's a major international issue. Because the allocation issue has assumed such importance, now that we want to go on to look at the more important issues about how we manage the fisheries, we're working within a straight jacket. Nobody can question the present allocation or quite a lot of the present management process, because that has been the cornerstone of the policy achieved so far. So we've put, I think, the cart before the horse, and we are having to live with the resultant difficulties.

I'd like to finish up by just mentioning a subject that I know a little about anyway. I'm not sure there's very much I can contribute to this meeting otherwise. That is, the tools that are used, the biological tools in fisheries management. I'm going to cheat slightly by regarding models in themselves as tools that are used in fisheries management. It seems that this is a valid thing to do, because we're using the biological models to forecast what will happen if you use this or that form of fisheries management.

There's quite a lot we can learn from our partners in Europe. The French have an education system developed during the time of Napoleon. The apex of the higher education system is their colleges of engineering. I think Napoleon set up two main colleges of engineering: the College of Mining and the College of Bridges. Within the school of bridge-building, there are the theoretical bridge-builders and the practical bridge-builders. The practical bridge-builders can build bridges that don't fall down, but they don't really quite know why. The theoreticians build bridges that

do fall down, but they know why they fall. Now, it seems to me, that biological models occupy rather the position of the theoretical bridge-builders. There is a good reason why this is not such a bad thing. Obviously when you're building bridges, then it's very important that they should stand up. If we contrast a practical approach to fisheries management, where you learn by experience with a more theoretical approach, practical approaches are fine if you have time to learn and if the situation is staying relatively constant. In fisheries management, the background is changing all the time. We simply haven't got time to learn how to do things by practical means. We've got to model. We've got to say well, we can't do this as an experimental piece of fisheries management. We've got to try model it and answer the question, what would happen if we did such and such, if we did so and so.

John Gulland said this morning that biologists, on the whole, know what they're doing and the answers which they give are reliable. I hope he had his fingers crossed when he said that because I wouldn't like to be so sure. We know that there are problems within our models because we don't understand the processes of stock and recruitment. We know there are problems that arise because we don't know what causes long-term variability in fish stocks. We know that there are problems which arise due to multi-species affects. I find it very hard myself to be confident that these models are right. But I don't think this is in itself fatal, because I don't regard those models as being means of setting objectives. They are simply tools. What we can say of them, at any point in time, is that provided everyone is doing their best, they will give answers that are the best guide we can have at the moment for how to proceed.

The problem is how to incorporate into the management decisions our knowledge about the uncertainties that are involved. In the traditional approach, the biologists say well, the TAC should maybe be a thousand tons or maybe it should be two thousand. Everyone says, okay, two thousand sounds a nice number and we'll try that. Now, that's a perfectly valid thing to do. I think that the people who make those sorts of decisions have to be aware of the risks they're running in doing this. It seems to me that in the U.S. you have institutions that can incorporate all sorts of uncertainties within the management decision-making procedure. I wish we had the same thing ourselves.

MARASCO: I think at this point, what I'd like to do is just summarize a couple of key items from the presentations that we just had. Then we'll move on to comments from Richard Gale and Ted Evans.

The charge that I hear is that first of all that we've got to be practical in developing management measures for fisheries. In being practical, they are really charging us to be aware of the limitations of models, models being used in a general sense. Secondly, I think Colin Grant, Keith, and Professor Copes are all saying, that communication between academics, communication between academics and managers, communication between all of the above and the fishing community is extremely important if we're ever really going to have practical, functional, useful management measures.

GALE: I want to frame my comments as a reaction to two of the three papers, those of Stokes and Koch, although I found plenty interest-

ing in Gulland's as well. When we speculate about ways to improve the U.S. fisheries bargaining position with regard to joint ventures and foreign processors, we can think about changes in organization, changes in finance and changes in the flow of fish. What I would like to do for a minute is think about possible organizational options.

The problem, obviously, is when individual fisherman sell to the joint venture or foreign processors, they are at clear disadvantage. In other cases, fishermen have banded together in cooperatives or marketing associations and obtained better prices and otherwise influenced their markets. Other organizational forms might be something we want to consider. We might want to borrow an idea, for example, from the Canadians and their Canadian Salt Fish Corporation. To create, for example, a U.S. rockfish marketing corporation.

Predictably, fisherman complained loudly last year when Bill Gordon and others supported creation of a national fisheries corporation which would do some of the things that National Marine Fisheries Service now does, but stop very much short of a Canadian corporation counterpart. But, nearly any governmental assistance in marketing might seem likely to treat fishermen better than the current variant that we have of laissez-faire.

Federal government is not the only organizational or governmental entity that might become involved. For example, port authorities have broad financial and management authority. Would a Dutch Port Fleet Project of the port of Dutch Harbor be an alternative? Should Alaska port districts or municipalities build freezer and processing facilities? Private organizations, as well, might provide vehicles for increasing fishermen's bargaining power as a group, although perhaps not individually. I'm thinking, for example, of the involvement of large corporations such as Weyerhaeuser, which has gone far beyond their original natural resource base in timber, and gotten into a full range of natural resource activities including, of course, salmon ranching. What bargaining power would Weyerhaeuser's salmon fleet have in joint ventures? Would the Trans-america Trollers, Inc. stand better as a unit, although, obviously, very different with regard to the activity of individual fishermen?

We need to think creatively of organizational alternatives, even though some of these may violate our hopes for the survival of the independent fishermen.

Stokes' individual quota proposal for the U.S. groundfish fleet clearly suggests that the common property regime we currently have is likely to undergo some dramatic change. As this change occurs, then, we can consider options that have been used in other resource management regimes. Obviously, my experience has been in forestry.

Most natural resource-related discussions of distributional values, including worries about social values, really focus on four key dimensions. We could probably define those and then line up along the wall in terms of where we would stand. These dimensions are concentration of harvesting and processing capability, income concentration, the distribution of occupational and participatory rights and activities, and geographic and community targeting. Each

of us has our own preferences on these four dimensions. I certainly have mine. I would like to comment on where my preferences might take us.

First, should we worry about the concentration of harvesting or processing capability by establishing small boat set-aside allocations following the U.S. Forest Service example? Adapting Forest Service small business set-asides in marine fisheries might reserve some portions of the allowable catch for designated vessel capacity or by type of ownership.

Secondly, should income concentration be addressed by exploring taxation systems that would limit financial speculation by those not directly participating in marine fisheries? For example, what limits on the transferrability of quotas might be acceptable? Do we want to assure that profits accruing from marine fisheries in the fat periods are not quickly transferred to other non-resource dependent activities by the same corporation? For example, it is inappropriate to me that recent release of timber companies from Forest Service timber sale contracts benefited corporations, some of whom no longer had any major interest in timber processing. In Washington state, for example, the company had also gone into retailing auto parts.

Third, what pattern of occupational and other access rights should predominate in marine fisheries? Does trip interval, when coordinated with effective marketing, offer some opportunity for nearly professional, full-time fisheries, some career for these 19-year-olds? What percentage of the fleet is in the weekender or part-timer category?

Finally, do we need sustained yield fishing communities? In 1944, Congress passed legislation allowing designation of National Forest Areas. These areas would be available through non-competitive allocation to mills in small timber-dependent communities. Although few such areas have been established (Lake View, Oregon and Shelton, Washington, are examples), resource allocation that considers community economic need is not a new idea. It has been a major justification for the increasingly controversial long-tenure timber sale contract system in British Columbia. Some of the Alaska timber sales have had some similar goals.

I'll make a couple of comments on Koch's paper. Bill Wilkerson's comment that's frequently made in Washington was that "good law has yet to produce its first fish." I wonder as I read through his paper, what portion of the FCMA is, in fact, unconstitutional? The heart of his paper is the Constitutional limits that restrict fisheries management. As a believer in economic and social, but not necessarily managerial localism, it disturbs me that states find it almost impossible to direct benefits from natural resource development to their own communities. Whether it's Alaska pipeline jobs for Alaskans, or processing requirements for timber exported from state lands including Alaska, states are relatively powerless to channel resource exploitation opportunities and benefits to their resource-dependent localities and occupations. In a sense, the more we develop management tools that effectively target resource opportunities to specific groups, the more likely it is that these tools will constitute "impermissible discrimination," to use a legal phrase.

How then can we begin to think about these Constitutional restrictions? The only practical way is probably to push the rational basis test as far as possible and to broaden the umbrella of actions that are "rationally related" to the statutory purposes of fisheries management. Those actions are less likely to be declared unconstitutional.

A second, and perhaps futile approach, is to consider whether the interstate commerce protections of the Constitution are generally helping or hindering economic conditions within these fifty states. People have talked about the nine nations of North America. These nine nations are clusters of states playing increasingly diverse national economic roles. States like Oregon, Washington, and Alaska to some extent are often rich in natural resources, and find their economic power rapidly eroding. While state's rights proposals typically do not appeal to liberal social scientists, the powerlessness of sociologically viable entities such as communities and occupations to project their economic well-being is most disturbing.

These comments only touch on many of the issues that are raised in the three papers. Koch talks about a substantial management leeway in what he calls a bouillbaisse bay. I see instead that responsible fishery management requires a very long beat through very heavy seas.

EVANS: I'd like to thank the organizers of this conference for inviting me and my colleagues. I think it's a good opportunity for an exchange of views. I'm a processor. In my former life, I was a regulator. I am now a regulated. I'll tell you, my views have changed quite a bit over the past few years. I have the good fortune to participate in a fishery free of many of the problems that you find in FMCA fisheries. Our cannery is in Bristol Bay and our fishery is regulated by Alaska. It's presently at an all-time high in abundance and the user conflicts are relatively miniscule. There's always that potential for conflicts, but presently it's a relatively simple fishery in which to participate.

Listening to the talks yesterday, I heard some veiled references to the reconstituting FCMA. That led me to structure my comments on my impressions of the FCMA since its enactment.

I was the attorney for the Pacific council in 1976 through, I guess, 1979, when it was embarking on the fairly ambitious program to institute fishery management plans. The council instituted the second fishery management plan that dealt with Pacific salmon and shortly thereafter, the third fishery management plan which dealt with anchovy. One of the primary purposes of each plan was to allocate the fisheries species with which it dealt.

It's my impression from assisting the councils in structuring these management plans and later defending the management plans in legal challenges, that the FCMA does indeed provide broad authority and a wide variety of management tools for managing fisheries. Because the FCMA is a national law that deals with the various regional fisheries, it presents a drafting problem. The problem was handled very well by Congress delegating authority to the councils to essentially write the fisheries laws of the United States.

The OY standard allows the councils to consider almost any aspect in formulating its allocation and conservation goals and requirements. If you look at the various plans implemented by the councils, you'll note that the management tools, the goals, and facts of the fishery are widely disparate. In fact, these plans have considered all of the aspects and have largely dealt handily with the situation they faced.

The price of making the law more specific is that ultimately you would run into an illogical application of the law to a certain set of facts. The reward of the Fishery Conservation and Management Act is that it allows flexibility. The councils can hear from processors, fishermen, the consumer and everybody else who is impacted by a plan, then structure the management scheme to deal with that particular set of circumstances.

OY and the fishery management council system institutionalizes fisheries politics at the council level. As attorney for the Pacific Council, and having spent the three years previous to that as attorney for NOAA and an executive agency, I was aghast at the obvious politicizing during implementation of various fishery management plans. I feared I would have to defend as an executive action an act that was purely political. But, in further thinking about the structure of the FCMA and how it is operating, my conclusion is that if a "political act" complies with the national standards and is Constitutional in other respects, it is consistent with our fishery laws under this regime.

The safeguards that the people of the United States, processors, and fishermen have in view of this flexibility, of this discretion granted to the executive branch and to the councils, is that if standards built into the act are violated, the law itself is illegal. The opportunity to go to the courts or go to the secretary or your congressman and point out the illegalities of the management plan is there. It can be judged against national standards. It can be, obviously, judged against the Constitution and other laws of the United States with which it must comply.

During my years with the government, a hue and cry was raised about the length of time that it takes to process a fishery management regulation. I believe the Pacific Council tried to localize decision-making, to have it be done on a more streamlined basis. In fact, I think in the Pacific Council's groundfish plan includes mechanisms that allow this. Tools that end up as regulations must be enforceable and must be accepted by the impacted public. This, again, is quite an advantage of the FCMA over the previous system that we had.

My feeling is that as cumbersome as this act is, we should to some degree accept its shortcomings and try to streamline the process. From what I've seen in the United States and in some of my work outside the United States, this law is the one that offers the public to implement policy and it allows the fisheries managers to receive the input that's necessary to make the required decisions.

I was a bit surprised, after a three or four year hiatus from working with fishery management plans, to see that the decision-

making process is still apparently in D.C. and it takes a significant effort to take a plan through the D.C. system.

At the time I left the government, there was talk of regionalizing the process. That goal has significant merit. My recommendation is that it ought to be tried on one or two plans to see how it works. I think I'll cut off my comments now.

MARASCO: At this point I'd like to address a question to the panelists and the authors of the papers. If you were to design a Utopian-type model to address the question of resource allocation, what sorts of characteristics or properties would that system have? And I guess we'll start with Bob Stokes.

STOKES: As I listened to the various commentators I was thinking about a paper that I read a long time ago by Peter Larkin. It addresses several of the points about theory and practicality and gives some idea what one of these criteria might be. It's something like the right balance between emphasis on experience and emphasis on learning: experience on the one hand a willingness to innovate and simplify on the other. Now, Rich, I'll leave you with the task of finding some comprehensible label for that.

Let's go back to what is sort of the beginning of fisheries management, to a day when people who are now considered the deans of fisheries management were the zealots. This is the way that, I believe Peter Larkin describes them. And they took a very complex natural world in which all marine species were related to all others and to their surrounding environment and they boiled it down into a system in which all species of fish lived in vacuums unrelated to either each other or the environment that surrounded them. Fish behaved according to certain models, from which one could derive maximum yield. Maximum sustained yield they arrived at conclusions about what catch quotas should be. They pressed these figures on decision-makers around the world. In the process, they made a host of mistakes that we now talk about endlessly.

In the process, they also established the important principle that you must control total fishing mortality if you're to have a long-term fishing industry of any sort. They pressed that idea through an inherently resistant social and political system. For that reason, we have many of the major fishery resources that we have today. Absent that kind of a commitment, we simply would not have had them, at least not to the extent that they're used now.

You can jump up several decades to the point where fisheries economists, whom people like myself regard as more or less the deans of our particular field, pressed an equally simple-minded notion forward: that fishermen are all alike. Fishermen fish for one species and one species alone. They do nothing else for a living. There is nothing on earth that the fisherman can do to change the nature of his fishing operation, except either go out and fish or stay home. A boat is a boat. A fisherman is a fisherman. They passed over important features of the system; they made a whole lot of mistakes. But they also pressed home, again, to a very resistant world and community, the notion that the fishing industry is not like the laundry and dry cleaning business. To this point they had convinced, I would say,

the overwhelming majority of participants in the fisheries management community on this point. The fishing industry is not like the laundry and dry cleaning business. Competition in the fishing industry has a very different and a generally pernicious effect when it occurs out in the fishing grounds. Something has to be done about it. Of course, we saw the evolution of license limitation programs that are now the template for some sort of reform, of the type that has been adopted, and usefully so, in some fisheries.

The great simplified idea today is the so called "share system", the enterprise quota system, or whatever else you might want to call it. In the simplest form, you imagine that with a stroke of the pen you can convert the fishery into something like the dairy industry or the forest products industry. You can't do that, and we shouldn't assume that you can do that, even though the analogy's indeed a very good and a very informative one. We already talked enough about enforcement to know however that it is not the case.

At each stage along the way, we have learned a great deal through simplification and through pressing forward very simple, but indeed very important ideas. Along the way, we've made mistakes. The important characteristic of the system, of course, is that one can receive those ideas, weigh and evaluate them, and at the same time test them carefully to catch the mistakes as early as possible and take corrective actions.

EVANS: I don't have any scientific response to this. I guess I'm kind of a romantic. The thought of making the fisheries economically efficient to the point of altering the structure of our coastal fishing towns and villages I find somewhat disturbing. On the other hand, I'm living with a limited entry system in Bristol Bay that in some respects seems to be working, although some of you would disagree. Its goal is to limit the number of boats in the fishery, which it is doing. I'm not sure that it's limiting the effort in the fishery. If you're going to get into such allocation schemes, first and foremost you want to make sure that whatever you are going to do is fair. You want to make sure that the people who are affected participate in policy formation from day one. And you want to be sure to recognize the social impact of measures.

I was involved with the Pacific Council, chairing the council's Salmon License Moratorium Task Force. That was a council effort to place a moratorium on the number of licenses in the three west coast states. Washington already had one, but Oregon and California did not. That process took, oh, my, it must have taken a year-and-a-half to develop guidelines that the council finally adopted and submitted to the states. The states ended up adopting their own moratoria somewhat in conformance with those guidelines. My experience tells me that it's just a long arduous process. It's the tool with which the manager is most severely impacting the individual rights of participants. It has to be used with great care.

GRANT: Just to re-phrase the question, I think you asked what would you do if you were designing a Utopian fishery management plan or management for a fishery? That's in a sense, exactly what I don't think you can do. I don't think I can sit here and say, "all fishery management plans should have the following characteristics." Each plan has got to be tailor-made for the fishery that you're

dealing with. So I don't think there's a panacea that you can use by plugging in the relevant numbers, the relevant people, the relevant issues and come out with "the Utopian fishery management plan."

Whatever is developed has to be developed from industry's desire to change what they've got for the better. I believe it has to be done with as little disruption to the existing practice in the fishery as possible. Therefore, it is an adaption, in a sense, of an existing practice. That's the easiest thing to live with. If the industry developed their own forms of management, then they would find it easier to be regulated because they, in fact, will be self-regulators. It's in their own self-interest to do that.

I believe, however, that this is easier through ownership of the property that you're managing. I think people tend not to look after rented apartments that they take on as well as they might look after them if they owned them. I believe, in general, that you try to develop the system from the industry and by the industry. You do it with as little disruption as possible. That, I believe, leads to self-regulation in the best interests of those people who are involved in the industry.

There is one thing I think industry has to recognize. Any management practice imposed upon them or decided by them has a cost. They have to recognize from the outset that there are costs. Since they are the beneficiaries of the management practice that they put in place, they should be prepared to pay for it.

BRANDER: I deal mostly with highly-mixed fisheries, and the thought of individual vessel allocations when dealing with a large number of species fills me with horror. Whatever system one did implement would have to allow as much flexibility as possible, allowing transfer and so on. But that gets very complicated if you're dealing with a large number of species. I think I would agree with Colin, that it depends very much on the circumstances.

A couple of weeks ago we met with the industry to ask how they wished one of the very few directed fisheries to be managed--the sole fishery in the English Channel. They were offered the choice of unallocated quotas or single vessel quotas, or something between the two that we called "sectoral quotas." In these, producer organizations or cooperatives would be given a chunk of the quota to manage themselves. To a man they chose to go for the unregulated quota. Some of the people there recognized that if they were given a fixed share for the year, guaranteed, they would probably be better off. They would be protected from mobile fleets coming in and taking their share. And yet, for some reason, not one of them asked to have an individual quota. I'm not sure why this is. I think it may be because they preferred the possibility of perhaps being able to catch a bit more than they would be allocated over the risk, the certainty of a fixed amount. I don't know. Obviously, the perception there was, to me, unexpected.

KOCH: I'm not going to add very much to Colin's initial statement, which was I'm not sure you can develop a Utopian system for fish managing. You're dealing with tough issues and you're dealing with people. The mixed fishery management problems implementing Indian

treaty rights, dealing with prohibited species by-catch, all those are tough things, and I don't think you can impose a Utopian system. In terms of people, there's always going to be somebody disgruntled. No matter what management system you set up, it's going to affect people in different ways, whether it's bureaucrats in D.C. who don't want the regions to be making the decision or locals trying to put people from outside that region at an artificial disadvantage. Those things are always going to be there.

My suggestion would be that it's the wrong question. Instead of asking what would be the Utopian system, a question that I don't think has an answer, ask how we can make the existing system better. I think the existing structure tries to set up something that is very broad, provides a great deal of flexibility and a great deal of discretion. I'm not sure that I know of a way to improve that system.

GULLAND: I have to agree with many of the things that were already said, particularly, that there isn't a magic formula. One thing that strikes me is the importance of communications. The success of this meeting is in getting a whole bunch of people together, not just the variety of experts that we often get elsewhere when we have a fishery management meeting. We get the biologists, we get economists, some lawyers, if we're unlucky, and then occasionally, we get one fisherman. He sits in the back of the room and he walks out after a half an hour saying, "what the hell are these guys talking about?" Here we are getting the fishermen, the processors, and everyone who's actually in the game.

Even so, I've heard this a few times, there seems to be lack of communication. The expert in commerce knows what he means, but when his words reach the end of the room, a very different message comes across. This is particularly the case with some of the magic formulas, such as limited entry. Well, that's terrible, we say. We know it's terrible. So we'll go for transferrable individual quotas, which to me, finishes up with very much the same sort of thing. It allows some people to go fishing, and other people don't have access, don't have entry, or don't have a quota. If we listened a little bit more to what's really being said about different methods, I think there might be a better chance of getting them across. Whatever approaches you're following, it is important that there be a dialogue and communication among the different groups, really understanding the consequences, both immediate and long-term, of different approaches.

Another thing about being at the end of the table is that one has a chance of defending oneself against misquotation. I think Keith was, in fact, quoting me fairly correctly, and also quoting correctly when he mentioned that I did say I think the biological models work quite well. I think I had my fingers crossed, I certainly said, "on the whole." What I meant is that we haven't had too many nasty surprises. Things have gone more or less as we expected and I think models are useful for making decisions. There must be uncertainty. There is a point emerging from this, and that is the question of experimentation and how do you know you are going the right thing. I think some of the people in UBC in Vancouver are concerned about this. If you don't allow a bit of experimentation in your management approaches, you may go sitting in the same spot thinking you're

about right and you may be well away from the best position. Equally, there are dangers when experimenting with other people's livelihoods. One has to accept that we don't know quite what is the right thing to do, either in biologic terms or in economic terms. There must be some degree of trial and error, as long as we can keep the degree of error from being too great.

COPEs: Well, like the previous speakers, I have no magic formula for allocation. But, I'd like to touch on some of the principles that may be difficult to implement, or to refine, or to define in precise terms. Any allocation system, any management system must meet two tests: efficiency and fairness. Unfortunately, the two don't always work in the same direction. It's like we have in economics, where the government is supposed to see that we have full employment and more stable prices. Well, most of the things we do to get full employment will raise inflation. Most things we do to keep inflation down will increase unemployment.

We have the same problem to some extent in the fishing industry if we want better management. We want to have both a bigger cake and a fair share of that cake. Let me say, that I have no doubt that we can bake a much bigger cake for the fishing industry. There's no secret about it, there are fairly easy ways of getting far more net income out of the fishing industry than we do. Unfortunately, every scheme that we come up with affects different groups in the fishing industry in different ways. Everybody is running for cover and wants to make sure they don't lose out in the process. It's a question of education and working together to find ways of getting that bigger cake, than making sure that the shares that come out of it are reasonably fair.

Unfortunately, the question of efficiency, of getting the bigger cake, are subject to a good deal of scientific precision. We can show how you can get bigger incomes and we can do that in fairly accurate ways. But, when it comes to deciding what the fair share is, you're dealing with value judgements. What you think is a fair share, I might not think is a fair share. You have to take into account where you start from, who you think has been unfairly dealt with in the past, who's going to lose out, or who's going to have to be moved out if the fishing industry because we've got too much effort in there. To some extent, one answer is as good as any other for determining the fair shares. You have to get some kind of consensus on what fair shares are, and that holds up the process very often. Again, there is nothing like more communication within the fishing industry to come to some agreement on fair shares.

We have the problem of the salmon interception between Canada and the United States. We know what damage is being done to the salmon fishing industry because we haven't got an agreement yet. It's in everybody's interest to get an agreement. It's deciding on the shares, who can intercept how much, that has held up everything. We'll have to get an agreement. We're losing too much by not having one. I suspect, that within a year we will have one. But, it means knocking heads together and getting people to agree on what is a fair share of what can be a much bigger pie to divide.

I would emphasize one other thing. Establishing management measures, you do have to look at every fishery situation separately.

Within the fishing industry, each fisheries situation is different from another one, because of the nature of the stocks, because of the industry structure or whatever. Let me just give one simple example. We talk about handing out quotas in the fishing industry. Biological differences in different fishery situations dictate that you can do some things in one case and not in another case.

So much depends on whether the fish catch is predetermined by management or whether it is residual. For instance the key to a prosperous salmon fishery is to get the right escapement. Once you've got the escapement you say, "boys, mop up the rest." Are you then going to hand out quotas and say, "you get so many pounds, and you get so many pounds." I mean, the fishery's only open for one day, and you take what you can at that time. It would be nonsense to do that by quota. On the other hand, if you have a groundfish situation, with large stocks that are distributed over thousands of square miles, you're not concerned about counting fish and getting so much escapement. You monitor the stocks, and you say, "this stock can stand a total allowable catch of so many tons in one year. Then you can say, "yeah, we can divide that up into pieces and everybody can have so much of that total allowable catch."

You've got to look at the total fishery situation if you are going to make sense of particular management devices. They vary according to the situation. If you have small boat fishery, there's no way you can impose quotas. With large trawlers and just one man at the plant, you know what they're landing.

I think we have to make progress through cooperation, exchange of information, and through education. But let us not expect that we will have an ideal situation at any time. It's tough. We have to make trade-offs. We've got to make trade-offs between efficiency and fairness. That's one of the big problems in the fishing industry.

GALE: I think it's interesting to speculate on the differences between fisheries management and the environmental movement. I'd like to elaborate on the possibility of fisheries riding the back of the environmental movement, and where that galloping horse might lead you. I think that there may be some opportunities with regard to linkages with the environmental movement. You don't face the same kind of built-in antagonism that the timber industry does, for example. It may be easier to incorporate marine habitat issues into fisheries management plans than to deal with an environmental movement-generated new marine mammal protection service. That is one pulling it completely outside of National Marine Fisheries Service. You may find that the environmental movement is interested in resource-dependent communities and occupations. There is an opportunity there. Certainly, the surprise cancellation of the joint venture meeting in Seattle last Friday over the whaling issue speaks to me, at least, of the gulf between fisheries and environmentalists.

Finally, I think the council system is special. Other natural resource management systems on the federal level have no similar examples. The Bureau of Land Management's Grazing Advisory Board is one perhaps, but not many others. Certainly, we don't sit around and debate the regional allowable cut for the Forest Service. Some

people would argue that they should. It would be a very exciting meeting. But, the network composed of the National Marine Fisheries Service, the SSC's, the advisory panels, and the council is a very special one. I saw the evidence very clearly the barroom discussion last night. Among you people, it was very, very different. I've sat around a lot of Forest Service conferences at Ramada Inns and everywhere. Mostly they talk about who got transferred where. There's very little discussion of constituencies, very little discussion of real issues. This is partly because the agency does not have the council system, the kind of public penetration in management that is characteristic of marine fisheries. Last night I heard a mix of people from different agencies discussing issues, and that was great.

MARASCO: Thanks, Dick. We'll open to questions from the floor at this point.

FISHER: This is a generalized question and I'm going to ask for comment. Each and every speaker elaborated on management of people. Very little said by anybody about management of the resource. This particular set of panelists talked about tools and techniques. Your comments are based upon what seems to be a common assumption: the stock we are talking about dividing up, or allocating, or getting economic rent from, is constantly given: they're assumed. I was most grateful for John's remarks this morning about the stocks. I sit here now and worry.

The first year that I ran a little trawler, the amount of silver salmon that I would get in a scratch day (in fisherman parlance, that means an average day) was the entire season's quota for the trawlers on the west coast this year. I bought a little trawler in 1975. I averaged 9,400 pounds a day. An equivalent vessel on that coast will catch 3,000 pounds, and that includes species that I couldn't sell. By contrast, we were told years ago by the biologists up here, "Don't worry about the tanners. They're there in multitudes. You're not going to impact them. And we can manage them."

I tell you this desperately: we are not paying attention in this conference or in management to the following questions, all of which should have priority over what you're talking about, because what you are talking about is dependent upon those stocks. Our stock assessment, categorically, is at best inadequate, at worst, abominable. We are paying no attention in a scientific sense to the impact of the ocean environment upon stock recruitment. We're paying almost no attention to population dynamics, and I'm talking about real-world attention. I am not talking about models. And worse, we're paying no attention to fish behavior.

I expected that somewhere in this conference, we'd examine the biological tools and techniques. All of what is being talked about is dependent upon stocks. At the national level, we are not prioritizing these issues. On a council level, we're not prioritizing these issues. I'd simply like some comments on how we can focus attention back toward figuring out what the hell we've got in the store--what's contained within our two-hundred-mile zone.

COPESE: I don't know how adequate my comments will be, but I'd like to point out some parts of the problem. The speaker says what we've been talking about is managing people instead of managing stocks. You can not manage stocks without managing people and vice versa. They are all tied up together. It's interdependent.

The question is "How effective a management scheme can you get?" I'd like to point out that, while theoretical economists and theoretical biologists are involved in the management process, many are involved at a very practical level. But some of the best advice is ignored because of the pressures from the fishing industry. In British Columbia, where we've been trying to save the salmon stock by closing the fishery, you should hear the howls of protest. The politicians and the managers give in. The sad state of the stock is in part because of pressure from the industry which can only see this year's catch and the need to pay off on their boats. It becomes a political process. And the best advice from biologists and economists is being ignored much of the time.

STOKES: I'll wander into this with great trepidation. I've talked about much the same problem with any number of fisheries biologists, the people who do the sort of work, Barry, that you're talking about needing to get done. From them, I pick up a strange frustration about the deflection and diversion of their efforts away from the more sophisticated, deeper, and better understanding of the fisheries resources interactions. Their time and energy goes increasingly toward building up the biological basis for management necessary to defend management actions against the attacks they expect from every sector of the industry that feels aggrieved. Thus decreasing quantities of their time and energy is available for doing what their particular scientific perspective tells them should be done. Again, it's not only that scientific advice gets ignored in the political process, but something feeds back into the scientific establishment itself. It's not necessarily to the best advantage of either the evolving science or of the industry that depends on it.

MARASCO: Let me take a crack at both of those questions that Barry raised. Speaking, at least for the Northeast Fisheries Center, we are very aware of the need for stock assessment activities. At the same time, we are extremely aware of the importance of looking at the impact of fisheries on a stock or a group of stocks. We're constantly trying to improve upon what we do. We devote a large quantity of resources to these two efforts in our ability to provide the council with the best possible information. At the same time, we are very aware that there is always room for improvement. We can always do better. We're very committed to improving our capabilities in both those areas.

ARON: I feel compelled to comment on my role in the Northeast Center. I'm a little bit taken aback by Bob Stokes' comments. Within the center, we feel that the stock assessment and associated programs are the single most important thing we do. During the past three years when the center has been faced with significant budget cuts, the divisions responsible for stock assessment activities were fully protected. All of the proposed cuts were outside of the stock assessment activities.

In recent years, we have pulled together what we call an ecosystem working group. This year, and I think Barry should try to remember it, we are moving forward with a program in Shelikof Strait where physical oceanographers and biologists will work side-by-side in a coordinated survey that will bring together ecosystem factors and environmental factors that affect recruitment. We are going to try to improve our predictive capacities through understanding the total ecosystems and the multi-species complexes, but most particularly, through the relationship of this to the changing environment.

To the best of my knowledge, our staff's scientific pursuits have not been diverted to defend management decisions. In fact, through the councils and through our regional directors we try to provide the best scientific advice and a set of options and consequences for different management regimes. We have tried very hard to stay out of the final decision-making and away from taking a view on which management regime should or should not be implemented. I'm happy in many respects with Barry's remarks, because they support the work of the center. I do think the resource comes first. We will have people to manage unless we protect that resource. The activities of the center are absolutely essential to protecting that resource.

MARASCO: Thank you, Bill. Jim.

WILSON: Barry may take me to task for this, but I don't think any of you really answered the question that he put to you. He asked about the models that are used in our theories, and pointed out that they are predicated on a very deterministic view of the world. We tend to view that world in an equilibrium setting and a stable setting. The ideas of setting shares and quotas, predictability and so on flow from that perception of an equilibrium, stable world. He's pointing to the fact that there's a tremendous variability out there. We're not building the intuitive knowledge we have of the biological phenomena into our social and economic policies. I think the question that Barry was asking you is, "Why don't we start to do that?"

GRANT: I'll try to comment on that. I can't speak for anything that's going on in North America, because I'm not familiar with it, but the Fisheries Act in Australia has two basic objectives. The first is conservation of the resource and the second is optimum utilization of the resource. Over just the last few months we have implemented an individual, transferrable quota system into a fishery where there never was such a quota, where there never was limited entry. We had to do that very rapidly because we got advice from the scientists that the stocks were declining dramatically. We had a virgin biomass some twenty years ago of about 650,000 tons standing stock. We now are down to 150,000 tons.

The point that has risen out of this is that the whistle was blown only two years ago, and management has responded by implementing a quota scheme. In other words, we are starting to manipulate people directly as a response to a biological conservation issue. We've implemented a quota system. The quota is about 60 percent of last year's total catch and that has been split up amongst the participants in the fishery. In other words, last year's catch in the fishery was 20,000-odd tons, this year's catch has been set at 14,000 tons. Last year's catch was not a limit. This year we've

divided the 14,000 tons by the participants in the fishery. Barry was saying that we haven't been talking about management of the resources, we've been talking about management of the people. I would contend, as somebody else has said here, that you do manage people in order to conserve the resource. That's exactly what we've attempted to do in this particular fishery over a particularly delicate conservation issue that's developed in Australia.

BRANDER: I can respond to why we don't incorporate the variability that we know of in the real world--stock recruitment, the problems of multi-species--into our models that we use for management. Part of the answer is that it is very, very difficult. It's also very difficult to get biologists to agree on what kind of multi-species models one could use as a guide to management. That's the first thing you need. One can make some comments about how biological variability can be handled in management policies. But there was a comment sometime earlier today, I can't remember who made it, that you couldn't control the variability in fish yields by means of management policies. In fact, that's not true. I think we had the answer to it earlier on. If you're prepared to accept a management policy of fishing at a very low level indeed, then you will, by that process, iron out some of the fluctuations that you get, due to recruitment variability, for example. There again, I think you can see there are trade-offs between variability and level of catch. You can allow for variability in the environment, but only at a cost of fishing, perhaps, in a very light way.

????: There are examples of fish management models around. They're not that numerous, they do exist. That's not saying they're used in the management world, I think that's partially because there's still room for a significant amount of improvement. One example that comes to mind is a fisheries management model that was developed for the Pacific hake fishery. Progress is being made in that direction. We're not where we'd like to be, but things are happening.

ALVERSON: Oh, I think about enough has been said in terms of the various comments. I would add just a few and then go on to another related issue. There's no doubt that the people who are dealing with the models and the people that are doing the day-to-day management recognize that at times there's a difference between the theoretical model and their application to changes that are perceived or detected from survey data and other information. I'm a little surprised some of the people in the center didn't point out that, although you have very extensive modeling activity, the day-to-day management process does adjust to variabilities we are frequently unable to predict by adjusting the yields up and down from year-to-year as we perceive the stocks change. This doesn't get at the issue of stability. I'm not talking about that issue. This is more one of looking at the biomass and attempting to adjust yields in accordance with changes that are occurring in the biomass. Enough said on that.

I think one of the key things that Barry has said is much more important. Some of the real difficulties confronting the industry and generating the economic problems is our own inability to forecast those changes with any real lead time so that appropriate adjustments can be made.

Having said that, I'd like to go back a little bit, Rich, to your question. I'm not going to refer to it as a Utopian situation, but I would like to comment as a person that's now interfacing with industry as a consultant. What properties should an allocation process have? First, people would fully understand the goal of the management entity. I mean, they would know the criteria for setting the allocation and what the process was attempting to achieve.

Over the last thirty years, all sorts of management was brought in under the guise of conservation, with all sorts of purposes that went way beyond conservation: trying to help one group, or building a certain-limit boat to keep out another group. Let's be very clear what those goals are and be sure the user groups fully understand the purpose of that allocation system. Second, from the standpoint of the investor, particularly in this area we are looking at, it should include opportunities to develop an extensive resource that's now used by foreigners. Such a system must also have some degree of permanence. It can't be jumping around from this position this year, three months later to another position, responding again to another allocation problem. That destroys the willingness of the banking community, of the processors and the fishermen to invest. If we're looking at how to design a better system, we can't tell them to be more efficient and three months later, have a regulation that's designed to decrease efficiency. So permanency and a full understanding of the allocation process are at least two major properties I'd like to see it have.

BEVAN: Quick comment on Barry Fisher. It's pleasant, when I am getting ready to get out of this business, to remember coming into it about 30 years ago and being called a bug hunter. My fishermen friends wanted to know why I was measuring fish, counting scales, and looking at age and growth and why didn't I get on to something that was important to put more fish in their nets. I would like to remind Barry that we're training some pretty good people in some of these areas. But in basic fisheries research, maybe the real word is "long-term research", there isn't very much support in this country today. Those good people we trained are fortunate that fishermen and others around here are drinking enough booze to get them good jobs as bartenders for two or three years before they can find a teaching job somewhere. We don't have a National Science Foundation scheme for fisheries research as we do in zoology or biology, and some of the other more basic sciences. If you want to look at the background of the information that's going into this, there probably is a gap in where we are putting our money.

I'd like to warn again about this business of considering carefully variability in the stochastic process in the model. Models, not too many years ago, were in big machines and nobody could get at them except the modeler. He knew what his limitations were and could build rather grand and elegant structures to consider variability. But now we can put these models in little computers and put them on a desk. Barry Fisher can come up and play with them and put his own inputs into them. You're telling me to put in some statistic variations, so every time Barry runs that model he gets a different answer? I don't think the fishery management world is ready for that just yet. I think we've got to use our deterministic models for a little while longer.

But a real question to Colin Grant. I know I'm not talking now to an Australian fisherman, but are there some specific answers to some of the questions that were raised here on limited entry? How are the Australian nineteen-year-olds faring? What are the impacts on the coastal communities? Is there a sense on the waterfront that there are some winners and some losers? How do the people in the system feel? How do the people outside the system feel? I realize that's a lot of different questions, and I'm not asking for another hour lecture, but some rather specific instances of those situations.

GRANT: To generalize, we got into limited entry in Australia before there was a problem. We haven't always done that, but in the main we have. We let everybody in and then there are no complaints by the people who are left out. That, I think takes care of the first one.

After you've let people in and the system's off and running, the people who got in for nothing have a tradeable commodity. In Australia we have a system whereby we try to keep hands-off the situation and let market forces take their affect. In the northern prawn fishery, our biggest fishery in Australia generating \$100 million a year or thereabouts, there are 300 entitlements and it's been closed for ten years. Some of the people operating in that fishery are the original people who got into it for nothing. I wouldn't like to hazard a guess as to what proportion have bought in since, but it must be close to 50 percent. They bought entitlements from those that got them for nothing. We've got young people in that fishery. We've got old people in that fishery. A person can go along to the bank, seek a loan to buy an entitlement from another person in that fishery. The banks often ring us up ask "How are things going in the fishery?" We say, "Not bad. You know, last year's return on average was such and such." We can only give them these sorts of figures. You can't tell them what an individual vessel caught, because it's not important. You are now about to change the ownership and therefore the operating practices of that individual vessel. The banks then take the mortgage on the entitlement to fish against the loan. The people who get the pay-out leave the industry, new ones go in. The system seems to work. I don't know what more I can say.

We have an interesting situation in Australia's coastal communities and this is where you tailor-make the solutions to suit your problems. Everybody lives in a coastal community in Australia, except the federal government, and they live 200 miles inland. I live there, and that's one of the beefs of the industry. We live 200 miles from the water, so what do we know about it? Australia's got 15 million people and 14.7 million live in coastal communities. There are, shall we say, six coastal communities. They're the big cities, one in each state. Obviously there are smaller ones. In fact, fishing industry in Australia accounts for GNP revenues of about 3 percent. But, the whole reason for coastal communities' existence in Australia, particularly some of the little ones with populations of 5,000 or 10,000, is the fishing industry. Without fishing industries there's nothing else there, except for maybe a little bit of tourism. So, we've got a somewhat unique situation. I would say that the situation is that the fishing industry is the *raison d'etre* of coastal community survival. Survival is, in a

sense, not impeded, and may even be enhanced by the limited entry system we have.

SISSEWINE: Like Lee Alverson and Don Bevan, I think we've said enough about Barry Fisher's comment, but I can't resist saying a little more about it anyway. I was beginning to think that the paper I will present tomorrow was *passee*, and now I know that it is a little more relevant. I'd have to reiterate Bill Aron's comments on behalf of the Northeast Fisheries Center. It's very clear that in the Northeast Fisheries Center the biological programs relevant to the type of question that Barry asked maintain the highest priority. Nevertheless, I think it is worthwhile to reflect on the comment that John Gulland made in his paper. I hope that I'm not misquoting him, but the essence of it was if there are increasing demands on the resource, the biologists that are doing this science have to deal with the year-to-year-catch quotas. That's a problem that exists world-wide, I think. It is a serious problem because it deflects resources in a big way from dealing with the more fundamental biological problems, and we have to look at that balance. How much do we use to deal with next year's TAC versus dealing with fundamental issues like the biology of the resources?

Having said that, I'd like to say something related to the sort of characteristics one would want in an allocation scheme. I'll generalize that to what characteristics are important in any sort of regulation that you put on a fishery.

Very often we lose sight of the fact that we are talking about very complex systems. They're ecosystems, but they are also systems in a more general way. They are not only biological, they're economic, social, they're political, and everything else. Systems that persist have feedbacks in them, what we call negative feedback. And those properties are very important. If we want to regulate them, we'd better understand those properties. We'd better very much make sure that our regulations are compatible with them and build on them. Build on the natural controls in the system and avoid building on some of those natural destabilizing factors. We overlook that quite often and, in fact, some of the regulations and things we're doing in fisheries quite clearly have done the opposite. For example, the natural process of bankruptcy as a stabilizing system in a fishery is, in fact, undermined quite often by the things we do. I won't go into the details, but the application of catch quotas in some cases can, in fact, work in this negative way as well. I think we need to think very much more about the natural regulatory processes in our systems and learn from them. My observation is that negotiations and compromises proceed one step at a time and from settling on principles prior to settling on specifics. Unfortunately, there seems to be a tremendous difficulty in the fisheries world in actually doing that.

Now why does it happen at one place and not in another? I don't have an answer to that, but something that we refer to in other aspects of life and politics and so forth, is the statesman or the stateswoman. What are the characteristics of that person? To a large degree that person has to be non-threatening and has to be observed to be or perceived as objective. And I'm not sure how often we have key people in the fisheries game that give off that perception. That is also a problem with actually making progress.

DYKSTRA: I'd like to talk a little bit about economists, where I think they seem to be coming from and why I have trouble with them. To start, I was exposed to biologists for many years. I can remember John Gulland fighting bulls in the ring up in the hills above Madrid a good many years ago. That was a long time ago, John. I've been with Mike Sissenwine, I think, ever since he started in the business and the chap next to him, there I don't know how long.

Anyway, we were exposed to these people for years but we never really had any incentive to find out the nuts and bolts of what they did. We were going to let them do their foolish thing over there and we'll do our thing, and as long as they didn't crucify us, we'd let them go ahead and play around.

When we got the councils, and I was there in the beginning, we had some real problems. We got into a crunch and there was blood all over the floor and we really got pretty upset with each other. Then we started trying to understand each other. We had a lot of sessions and I think that Mike will agree with me that a number of us in the management game got to respect what they did, got to know enough about it so that we could follow it through. And we did. We sometimes spent days doing it. Frankly, I haven't had similar experience with most of the economists.

Almost all of the economists that I run into are pushing limited entry. Today, I've heard about the costs of various "old-fashioned," you might say, management measures--mesh size and fish size and so on. And I think he said, well we don't have a lot of information to base this on. Then he went on to say that for reasons both economic and social, we really have to go to limited entry. In my experience economists all say that without limited entry we have excess capital, excess labor, costs of the management and so on, and in order to get away from those, we go to limited entry. But nobody puts any numbers on it. At least, I don't see the kind of numbers that the biologists use. Economists say, okay, our purposes are social and economic. There may be some biological fall-out, and, of course, the political thing is always there, but mostly our purposes are social and economic. But they don't seem to be able to separate these two very well.

No one has shown me anything that convinces me limited entry schemes with their costs, and some of them are pretty large, are more efficient than what preceded them. It seems to me, that these people are saying "trust me." Take it as an article of faith that limited entry is more efficient and that there's more economic return to society. You say, well, can you quantify it? They don't seem quite to be able to. They say, well, there are a lot of social benefits, too.

I guess my question is, can you really separate these things and put some numbers on them, so that those of us who are fishing and who are in the management business can say, look, these numbers show us that there is really a lot of economic waste. Can you give us something that we can go by, so that we don't have to accept some of these things just on faith?

COPEES OR STOKES: Let me try. I think a number of fisheries with limited entry schemes have generated some very convincing data. I think Australia provides some examples of that. Of course, one of the limitations of making comparisons is that economics and other social sciences are not experimental. You can't run it over again in the laboratory. You can't run it this way and then run it that way, and compare the two results. You run without a limited entry scheme for a period of time, then you run with a limited entry scheme for a period of time, and then you compare those two situations. But, there may be other factors that influence why one case is successful and another case is less successful. It may be that the fish stocks have disappeared. So it's not strictly comparable. This is to some extent why you have taken our predictions on faith. But, I think frequently enough we do put figures on it. I have been involved in advice on limited entry schemes, too, and I've provided figures. They are speculative to a certain extent because the world is far from certain and a lot of things can happen before you ever get a chance to implement a scheme.

As far as the social questions are concerned, perhaps, the shoe is really on the other foot. And that is, economists can come up with calculations that don't have to take social problems into account. We can come up with calculations on how much extra income you can generate. But, here we get back into the distribution or the fair shares business. We can say, oh, we got a fishery here. There are 5,000 fishermen. Now, if we only had 2,000 fishermen instead of 5,000 fishermen with the number of boats that goes with it, we'd save so much. And the income would be so much. So you can look at the extra income you get. Now, who is to get that extra income? That's the big problem. Which fishermen are going to stay in? Who are the ones that are going to be kicked out? And that's an entirely different ball game and really where a lot of the advice for bringing in new schemes fails because we have not attached to it an acceptable scheme for moving from here to there. And how do you get an acceptable scheme of handing out fair shares to everybody? That's where the difficulty comes in.

LUNDSTEN: Mark Lundsten, with the Deep Sea Fishermens Union. I'm a halibut and black cod fisherman. I don't really have a question. I have mostly a couple of remarks that I'll try to keep short. There is one thing that has not been brought up and that I think is a major problem in using any of these tools you've been discussing. The main reason no one likes to talk about it is that this is kind of a fisheries management club. Most of you are involved in government, or with government directly and very few fishermen who notice this problem are present. That problem is the jealousy and the inertia of various agencies. The lack of communication between them. I fish basically just in the FCZ of Alaska and from the Javelain Strait. If possible I fish off the coast of Washington. I deal with the IPHC with operates under an international convention. I deal with North Pacific council, and NMFS which are ruled by a federal law. I deal with the Alaska Department of Fish and Game, and the Washington Department of Fisheries, governed by states. And I'm a specialized fisherman, in terms of the broad spectrum of Alaska. I don't deal with the Board of Fish. There are guys in Kodiak who fish not just two or three species, like I do, but fish six. They really have to keep on top of it.

My point is that I hear a concentration on problems and models and so on. I hear very little about lessons we've learned and very little about what's worked. Why did the joint ventures happen? What prompted that? What made it work, you know? Why are the halibut stocks now? That's a fishery that's been up and down, but basically stable for decades. I've found that estimates for OY and so forth are disputed from one agency to another.

An example of what I'm talking about is that there is no one from the International Pacific Halibut Commission here. I don't know why. Maybe they think they are not part of the club, I don't know. I just noticed it today and it's been eating at me. For one thing, I've heard that their idea of what the halibut biomass is and other agencies estimates are at variance. Of course, the incidental catch of halibut is also a major issue right now, one which is being worked out mostly by fishermen. Halibut is also one of the pressing limited entry questions. This kind of jealousy makes everything more prone to political pressure. What hurts the fisherman more than anything is government's inability to manage on a biological and conservation basis and allow fishermen the opportunity to exploit that resource in a sensible way. That's what the fishermen want. That's, I think, what everyone would like to see. I don't really have a solution to that problem, except, perhaps, to encourage communication between the agencies and perhaps find ways to streamline them.

In sum, one thing that I really haven't heard too much about except in Bart's presentation, and this is central to the allocation issue, is just what makes people want to fish, and what makes them successful and what makes them stick within the law. That is something that economists, biologists, and managers in general, must keep in mind.

EATON: Yeah, I'd like to address how limited entry distorts fleet action. I'd like to address this to Colin Grant. He can maybe give some advice on how Australians do this. The example I'd use is the St. Matthews crab season this year where the stocks were down, the price was down, and the insurance was up. I don't want to say I was constructing a model, but that's really what I was kinda doing. It wasn't a scientific one. I wanted to make my decision about whether to go up there. One of my other calculations was how many other guys are going to be there? That's because we're on a quota. About 30 percent of the guys that I talked to, and I talked to most of them that were going, said "Well, I don't really want to go. I probably can't make any money, but I think I'm gonna go up there and get a sale on the fish ticket, because I don't know what's going to happen." They know that the stocks are down, but they're going to come up again, that's the way of the sea. The price was down, but the Yen is gonna change and the dollar is gonna get weaker and they don't want to lose their position plus the windfall. My basic question is how do you mitigate that kind of stress that really aggravates the problem that we're dealing with. It puts managers under more stress to get something done, so we're probably gonna do it too soon or too fast without too much thought.

GRANT: Basically, I think the answer comes down to this. The parliamentary system which exists in Australia, Canada, Britain, and Japan is different from the U.S.A. system of politics. The system

you have here is up-front, open-ended discussion. When you say you think you're going to have limited entry, everybody heads for the fishery that you're thinking about limiting to make sure that, as you say, they've got a catch on their fish ticket and they've hedged their bets. Then you talk about it for years. Meanwhile, more people go into the fishery and the opportunity to achieve your objective, namely limiting the number of people that go into that fishery, is largely lost. You've now got more people and you still haven't got limited entry.

The British parliamentary system on which Canada, Australia, New Zealand and Japan run, is based on the German Bundestag. They have essentially a "benevolent dictator." I use that term because the other day, I was asked to give a talk at a meeting. People were saying what we need in management is a benevolent dictator. I said basically that's what a minister of government is under a parliamentary system.

How we get into limited entry? Okay, I'll tell you how we do it. What happens is, that there's an obvious problem in a fishery. I mean so obvious that the newspapers are writing about it, people are bitching about it. Vessels are tied up at the wharf. You know, it's starting to get to be a bit of a problem. Industry leaders are saying to government, you've got to do something. What we do then, is we sit down with, it depends on jurisdiction, the Federal government minister and/or his state counterpart minister. They'll sit down with a few advisors, people like myself and ask, "what do we do?" They agree among themselves that limited entry is going to be the way. It's got to be solved. Now this is the thing I don't think you're going to like, but this is the way it's done. What'll happen is that tomorrow morning in the press, out of the news release we send out after the meeting, a statement along the lines of the following will appear: "The Minister for Primary Industry and his state colleagues, the fisheries in Victoria and New South Wales, noticing the problems in such-and-such a fishery and noting the defaulting on bank loans and so forth, announced today that anybody entering X-Y-Z fishery as of today's date has no guarantee of future access to that fishery should it go under limited entry." In other words, a warning has been made as of today's date.

For last-minute scramblers, their run's too late in a sense. We then develop three criteria for entry. One, an operational history. Anybody that's got an operational history in that fishery over some specified period of time, we usually say over the last twelve or eighteen months, is largely in. Two, if you're not in but were about to go in, have you got evidence to prove it? I mean, have you taken out a bank loan recently? Were you going to negotiate tomorrow morning? Have you written to the bank manager and so forth? In other words, the onus of proof is on the operator to prove that he was about to enter that fishery. That's the second category. And the third category is those people who haven't been operating in the last twelve to eighteen months. Have you taken a holiday from the fishery, was it your intent to go back, and can you prove that to us? If the answer is yes, you are in the fishery.

Most people who get into the fishery on the basis of those three criteria are those already fishing and those who have realistically been attempting to get into that fishery. Anybody that is excluded

can place their case on appeal against being excluded, if there is such a case of exclusion.

What the system is all about is that the minister's responsible for fisheries. Our fisheries act says "the minister in discharge of his duties shall have regard to", and his duty is to manage the fishery. He takes the responsibility, bites the bullet, and takes all the flack when the flack comes. There is a benevolent dictator out there attempting to manage the fisheries for the best benefit of the people in the fishery and the resource. Our minister's responsibility statement says "shall have regard to the conservation of the resource and optimum utilization of the resource." We interpret that to be economic efficiency, social equality, and so forth.

The difference is that you talk about what you want to do up front, and then people enter the fishery hedging their bets. We are close to the industry. We know what they are thinking and what they want because they tell us through various mechanisms. But the decision as to when it is put into place is largely a secret. Well, it's not largely a secret; it's an absolute secret. The point is it's done tomorrow morning. If you think you were going out there next month, but you really hadn't done anything about, you're in a hard position to prove to us that's the case. Now, you may not like that, but that's the way it's done.

MARASCO: Tomorrow we are going to get into options and consequences, and people will have another chance to hammer on the same kinds of issues. I've got four questions lined up. I'm not going to take any more.

HERRNSTEEN: There was talk at the beginning of the session that there was abuse given. I certainly didn't mean to give any abuse to Mr. Stokes. I mean Clem and I, for instance, have disagreed for years, but we're friends. And it's nothing personal. There is a difference in a way in Alaska and in me. This hotel and this city, you could place in Australia, or any place else. But, it's in Alaska. For those of you who aren't from the United States, Alaska is quite different. We've only been a state twenty-five years. We were a territory and the main reason that we became a state was because of absentee ownership of our fish stocks through the fish traps and federal management of our fisheries. When we see threats of something similar, it strikes close to home.

Among the fishermen of Alaska, there are people of all backgrounds: doctors, lawyers, engineers, professors, economists, all kinds of people have turned to the fishing industry. Mr. Copes said he was fisherman before he was an economist. I have a degree in economics from Stanford University, but I've been making my living as a fisherman. I haven't written a paper on limited entry or anything. I spent five months in Juneau while Clem was there, though I was just on my own while he was in office, when the state's limited entry bill was passed. I read the literature and I believed in the system when it started. Of course my views changed, but my concern is free transferability.

I see what it has done to our town and to other towns in Alaska. I'm not saying limited entry is all bad, but I'm saying the social good that's supposed to come out of the economic rent, or the

efficiency, or the capital, really hasn't taken place in Alaska. It's caused some great inequalities, some pockets of really high income and some pockets of low income. In Alaska, with our diverse populations and our diverse towns, it's caused a real problem. I had the honor of being mayor of our island for two years and I think there's a responsibility not only to your own self interest, whether you get a permit or not, but to how things look over the industry.

I always believed economics is not an exact science. I mean Stanford had a different school of economics than the University of Chicago. It's a social science. It's theory. Even fisheries management isn't an exact science. We're still guessing. As Mark said, different agencies are debating over what the actual stock, the basis of the stock is. When you get down to economics and theory, it's even more inexact. I can understand and respect, those of you who are economists, your desire to create more efficient systems. From my perspective of both living with them and seeing the results of them, I feel I have the right to disagree, too. We have about a billion dollars a year in the fisheries. The governor said that the bottomfish represent another potential billion dollars. How those billions of dollars are divided up is a very real thing to this state. Already the salmon permits that were given out are worth \$800,000,000. And that's a large windfall for those who gain on the appreciation side. But, they go up and down. We have lived with a system that you may think, as an economist, is highly irrational: jumping from fishery to fishery. In western Alaska, there's a variety of fish. We have been jumping fishery-to-fishery for 15 years. I mean, we would take our shrimp gear off the boat in one day and the king crab season would open two days later. We'd fish king crab for a month or two months or whatever it was, put the shrimp gear back on, or whatever fish it was--herring, salmon. We've lived that way. You may think, well, that's quick pulse. How irrational is it, how dangerous is it? What if the weather's bad? All these other inefficiencies are the way of life that a lot of us have learned to love. Exhilaration comes out of it at times. These are very real factors that need to be taken into account.

DYSON: There is something that bothers us in the industry, me in particular with all my thirty years of effort in the fishing business tied up in a processing plant in a fish bowl. We've been asked by the economists and by the panels that support limited entry to bear with it and accept it because that's the way to go. We know that some are going to be cut out of the fishery and we may be among them. I've been out a couple of times, I don't think I'd like the third whack at it. A question that I would like to leave you with, not with any bad feelings or anything else, but so that we can all think about it as we go home is how many of the economists and how many of the panelists supporting it, if their job and all of their holdings and all of their savings was put on the line, would be that strong for a limited entry system that really hasn't proven itself.

FULLERTON: I have been involved in four limited entries for four different reasons. Each time, the industry took those systems to the legislature and got them implemented and put them into effect. I would say two were very successful for the reasons that they were implemented, and two were worthless. I wanted to say that these had different quirks in them that I haven't heard here today. The California Legislature, which I was working for at the time, said

the permit cannot have any value, the permit belongs to the state, it shall be returned to the state when the fellow leaves the fishery with one exception: if the fisherman has any sibling working on the boat with him, he could transfer it to that sibling. But the permit could never have any value. They did this, of course, to leave the fishery open. The way to get into a fishery is to qualify yourself on the different criteria set for each limited entry system. After you qualify, you go into the lottery. As openings come up, you can be drawn out and become a fisherman in that fishery with one of the limited entry licenses. Believe it or not, there is a 12 to 15 percent turn-over per year in those permits, but they didn't put any value on them, so it changes the reasons for rushing into a fishery. If you are really not interested in let's say sword gill net fishing or the herring fishery, or the salmon fishery, you don't rush into it. You are either really interested in it or you are not going to get there. Everyone here puts a value on the permit and the guy's got an insurance policy when he goes out. The limited entry fisheries I have been involved in had no insurance policy. The permit went out to another person who didn't need to buy it, he just had to show that he had an interest in a fishery, and be lucky in the lottery.

TILLION: Rich, I wanted to say that when I entered the legislature in 1962, I fished five species on a year-round basis. I was not a part-timer. I quit in '73, shortly after limited entry, because my son and my son-in-law had not gotten a permit and I turned it over to them. Still, Alaska's system was not wrong. It is not something that you should use again, because too much of the population has learned where the loopholes are. But I studied much of Australia's system when they were struggling with rock lobster. We copied a good many of their ideas. I can only say in answer to Dave Herrnsteen, who says, "Leave it open, let everybody come in," that he sounds like a farmer talking to the young agricultural agent that's trying to get him to contour plow because, although the farmer has found it easier to plow down hill, he is losing all his top soil. The farmer says, "I'm not going to take anything from you, you young punk. I have worn out five farms already, I know how to do it." And, as far as Herrnsteen saying he wasn't against limited entry, I can't remember that. He was against it from the first day. What I am saying is that it took years under our system. It had to go through the courts to be proven constitutional. Judges didn't like it, and then it had to go to the Supreme Court. It withstood the challenges and has been a success in about 80 percent of Alaska. It's in trouble in places that had too much gear when it went in. But when it came up for referendum vote after the pressure from the Kodiak district, which was about the only one that was opposed to it, the repeal lost 5 to 1 statewide.

Now, there are two groups of people who want limited entry right now: those who have rushed to get in it from the state's system because they know of every wrinkle of it now and want only that system so they can rip-off and run; and those that don't want it at all, because they don't qualify. I'm saying that limited entry is a very good management tool. But our state system should never be used again. It works well only on a species that comes in over a short period of time, in a basically terminal fishery, where you can divide just the right to fish. If you want stability year-round in the market place, then you have to go to a quota system of some type

so that once a fisherman has his quota, he doesn't have to worry about what month he takes it. The tough ones take it when the weather is tough and the price is high, and the other ones take it when it is easy to take. I'm saying Alaska's system is a success. You only hear those that complain about it, but I tell you I see fisherman building hatcheries that produced, last year, some eight million salmon. If you really want to take the conservation ethic out of it, and that's what I would like to address to Charlie, you just leave the permit with no value, so that a fellow can use up the resource before he gets out. If you want an incentive to take care of the resource, then make the permit worth something, so if it's value is up when he gets out, a fisherman can sell it for his retirement. You will build a conservation ethic in your fisherman that you will never build if it's great benevolent uncle that owns it.

**Session IV: Options and
Consequences
Presentations and
Panel Discussions**

Barry Fisher, Chairman

East Coast Groundfish Experience: Industry Perspective

Jacob J. Dykstra
Commercial Fisherman
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and
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INTRODUCTION

This paper addresses, first, a very brief history of our experience managing the New England groundfishery; second, the lessons that we think we've learned as a result of that experience and, finally, the implications of all this for groundfish management.

REGULATORY HISTORY

We began the regulatory process under the FCMA in 1977 faced with seriously depleted stocks and a very depressed industry. From the outset our objectives were to rebuild the stocks (especially the commercially important cod, haddock and yellow tail stocks) with the eventual hope of stabilizing populations at levels that would sustain yields of the sort we had grown used to before the arrival of the foreign fleets in the 60s.

The regulatory instruments we used were quotas (for constraining catch and accelerating stock rebuilding) and allocation of the quotas by vessel class size (to parcel out in some reasonably equitable way the limited available catch).

In 1978, relatively strong year-classes of cod and haddock entered the fishery. As might be expected a dispute, certainly not the first, arose over the appropriate response to this unexpected abundance. One side favored continuation of low quotas so that the young fish could grow, arguing that this would produce two significant benefits. First, when caught later the fish would be much larger and would bring a better economic return to fishermen. Second, by allowing the fish to remain in the water and spawn, stock rebuilding would occur faster than otherwise with corresponding economic benefits to the industry. The other side favored increased catches, not necessarily in

proportion to the increased size of the stocks, in order to relieve the immediate economic problems of the industry. This argument in effect suggested taking some of the possible future benefits in order to support the industry in the short run.

It is not exactly fair to suggest that these arguments were ever resolved in a rational decision-making process within the council. Instead, the weaknesses of the quota and allocation approach began to determine the future course of the fishery. The economic incentives for evasion of the quotas and allocations were so strong that the regulatory system simply collapsed. Landings were under-reported or misreported. Cod (subject to the quota) became pollock (not subject to the quota). Remote and little-used ports where no agents were present suddenly began to land a lot of fish. In the larger ports large volumes of fish were off-loaded in the night and early morning when port agents were off-duty, and so on.

The practical inappropriateness of the quota system became so strongly apparent that the credibility of the council and National Marine Fisheries Service was seriously threatened. In addition, reporting system abuse became so thorough that no one really knew the magnitude of the problem. Landings data, which is probably the most important for understanding what is going on in the fishery, could no longer be trusted - it had always been biased but now no one knew the extent or nature of the bias.

During this period there was a very intense debate within the council about alternative regulatory approaches. Some of the council staff and some of the academic advisors on the Scientific and Statistical Committee strongly favored a system of limited entry. There were proposals for toughening the quota and allocation system, for relaxing it and for abandoning it. In the end, the council chose to move to something we called the "interim plan". This is basically a very simple regulatory system that depends upon closed areas, an increased mesh size and a minimum landed size. This plan was interim to something that has yet to happen - the Atlantic Demersal Finfish Plan. The council is in the process of finishing the ADF right now and it looks very much like the interim plan.

WHAT HAVE WE LEARNED?

It may be presumptuous to use the plural 'we' here, but there are certain lessons from this experience that are shared fairly widely in the council and the New England industry.

Among our more obvious lessons, we learned that we can't hope to operate with a regulatory system that threatens the economic health of a large part of the industry. This is especially true in situations where the outcome is not certain. There is probably nothing that threatens the credibility of the management process more than the council or some experts loudly and with great certainty proclaiming what's best for the industry when simple honesty demands a more modest approach. Plans have to observe economic reality and, even if a situation arises as it did for us in '78 and '79 when it might appear wise to forego immediate harvests, this can't be done by denying the industry all immediate benefits. The kinds of enforcement, data and overall credibility problems we encountered are bound to arise.

It is fair to say that the council learned it is extremely difficult and not very productive to make allocative choices among different groups of fishermen. Putting the council in the position of saying that Joe deserves this more than Jack is bound to lead, sooner or later, to the creation of privileged classes, an extreme and very unproductive politicization of the council process and the perpetuation of inefficient sectors in the fishery.

Less obvious, but much more important, questions concern what has been learned about the fishery itself: how both fish and fishermen behave and the extent to which management is able to influence that behavior in a beneficial way. There is a huge gap between what the models and textbooks propose as logical and even necessary management, and what is practical and socially beneficial management. When we began this process, most of us were making an honest effort to understand the lessons about maximum economic yield, rents, stability and a lot of other things that the economists and biologists threw at us. Implicit in what the biologists and economists were saying, and in what most of us believed to a greater or lesser extent, was the fundamental idea that we could control the long-term viability of a particular stock by being very careful about the amount of fish we took out of the water today. After all, more mommies should mean more babies.

The idea may not be all wrong but it was very misleading. Specifically it conveyed the sense that you could fine tune the fishery, that if you only made the right choice about the amount of fishing today you could effectively make sure that there would be good fishing tomorrow. Or from a slightly different perspective, if you made the wrong choice today you would certainly be harming fishing prospects tomorrow. In the language of the scientists' models, the idea assumed that there was a strong relationship between the size of the current stock and recruitment.

One very important lesson we have learned is that we can't depend upon that kind of relationship between current stock and future recruitment. In short, we have very little influence over the long-term status of the fishery except in a certain limited way. The reason, and Mike Sissenwine and the other scientists familiar with the New England fishery will confirm this for you, is that the spawning behavior of the fish is very different from what we had assumed. Briefly, for all the important stocks the size of any recruiting year-class is highly variable and unrelated to the size of the current stock, with one important exception. If the current stock size is driven to very low levels as happened, for example, when the foreign fleets vacuumed our coast, then the possibilities of good recruitment are seriously reduced.

This means that the only beneficial control management can exercise with regard to the long-term health of the fishery, is to make sure that the current stock is not driven to a size so small that good recruitment is threatened. The idea that management can stabilize the stock or "optimize the level of fishing effort in order to obtain maximum economic rents" is just not operational when management has so little practical control over long-term events (i.e., recruitment). The idea that a marginally larger stock today will yield a larger stock tomorrow becomes equally inappropriate. Fine tuning the fishery is out of the question from a practical point of view.

A kind of negative lesson that flows from this primary lesson, is that attempts to carefully control the fishery when in fact control is not possible, inevitably lead to the expenditure of a great deal of regulatory and enforcement effort that yields no public benefits. Equally inevitable is the council's loss of credibility. After all, when the fishery is managed with a fundamentally wrong idea about how that fishery works, when it operates on a casual relationship that doesn't exist, the error is bound to be found out sooner or later. Opposition to its plans, the skeptics in the industry, may not be terribly articulate and may not offer constructive alternatives, but they and not management may be right.

One of the things that did happen in New England was that fishermen's opposition to the original management procedures was taken to be simply a bull-headed, ideological opposition to any kind of regulation whatsoever. In fact, a lot of the opposition was based upon the very practical feeling that these initial management efforts just would not work. Fishermen did not want to pay for fine tuning the fishery when they were skeptical about the basic approach working at all.

An aspect of this fine tuning question that deserves mention has to do with the role of modeling in this whole management business. I may be a little naive about scientific procedure but I was always, and still am, under the impression that scientific theories were meant to be verified before they were applied to practical problems. This seems to be a rather reasonable requirement that screens out a lot of harebrained ideas (and scientists) that are potentially disastrous.

In New England, and undoubtedly on the West Coast too, we were bombarded with all sorts of expensive, complicated and unrealistic models whose authors were always willing to tell us how to manage the fishery. The expense and complication of these models is not an issue if they work. Businesses make a lot of money using expensive, complicated models to predict the size of their market and other very useful things. But before these businesses begin to rely upon a model they make damn sure it works.

The problem in New England was that we had a lot of models peddled to us, but the guys who made them up didn't seem to care if they worked or not. As far as I could tell what they were peddling more than anything else, especially the economists, was a peculiar textbook ideology. And when it comes to supporting their ideology, economists do not have to take a backseat to bull-headed fishermen. This is a serious problem for management. We are not imposing anything like a scientific process upon our scientists and economists. It is very difficult to model fisheries; but management should not accept as "the best science available" science that doesn't at the very least subject itself to verification.

Another lesson we believe we've learned is that management can't treat the groundfishery as if it were simply a collection of single-species fisheries. This lesson is related to what we learned about our control of spawning and recruitment. The point is simply this: New England fishermen have always been very opportunistic about what species they go after. This willingness to switch from species to species according to market prices and the availability or abundance of species is an aspect of the groundfishery that tends to diminish,

but not eliminate, the overall management problem. To put it very simply, as the abundance of a species declines (toward the level where reproductive capacity might be threatened) the costs of finding the fish begins to lower the economic return to that species. Fishermen begin to have strong incentives to switch to other, more abundant, species. What can off-set this tendency, is market prices that more than cover the increased costs of fishing for scarce species. The other side of this point, is that the more the willing the market is to substitute one species for another, the less likely the tendency to drive a species into a threatened position and the less likely the overall need to be concerned with the active management of fishing effort by species. What is important is to assure that fishermen are free to switch when they want to. Also implied is the importance of not having one or two species that will have a strong demand in the market no matter what the price. If consumers will take pollock instead of cod, or grey sole instead of yellow tail, there will be less of a management problem.

This may be an important consideration here on the West Coast where, to the best of my knowledge, your groundfishery does not have a strong market dependence on one or just a few species. As long as you can maintain this kind of situation, you may have much less of a management problem than you think, provided of course you don't lock your fishermen into little fisheries boxes from which they can't switch.

An interesting example of the kind of problem that can occur if you do lock up fishermen in species-specific fisheries with limited entry licensing or whatever, happened in the Canadian scallop fishery on the Peak of Georges Bank during the sixties and seventies. The Georges Bank scallop fishery had been exploited since the thirties by a U.S. fleet that was continually in and out of the fishery depending upon the abundance of the scallops. During the forties and fifties, the U.S. fleet consistently landed between 8 and 12,000 mt of meats from Georges Bank. The Canadians entered the fishery in the late fifties and early sixties. Under this increased pressure the Georges fishery declined dramatically. In 1965 the U.S. fleet essentially abandoned the bank for new beds in the Mid-atlantic and the groundfish fishery. Except for an occasional boat the U.S. fleet stayed off the Peak until 1977-78.

The Canadian fleet remained on Georges through the late sixties and on into the seventies, basically because a limited entry program restricted switching out. An almost constant level of Canadian effort kept pounding away at a very diminished resource and never gave it a chance to recover.

According to Canadian government reports, there were times when the fleet was harvesting 120 meats to the pound. (The average U.S. ratio during the 40s and 50s was 20 to 30.) Over the ten-year period from 1966-76 average Canadian harvests from Georges were less than 65 percent of the average harvests of the U.S. fleet from the same area in the 1950s. During both decades the number of boats working the resource were roughly comparable. The only important difference between the two decades was that during the U.S. tenure in the fishery, fishermen were able to switch to other fisheries in those years when the fishery was down.

In short, when the resource is highly variable, management programs that tie the fisherman to a single species almost assure that that species will be driven down to a stock level that threatens its reproductive capacity. What we have learned is that one of the best protections management can provide for the resource is giving fishermen the freedom to enter and leave fisheries in response to economic incentives. Barriers to entry in one fishery invariably are barriers to exit and threats to the viability of another.

Summarizing this perspective: the groundfishery is by its very nature highly variable from year to year. Management cannot control that variability and for all practical purposes it cannot predict and plan a response to that variability. The best management can do is to make sure that fishermen are free to adapt to that variability as much as possible.

IMPLICATIONS FOR FUTURE MANAGEMENT

What does all this imply for the future management of the New England groundfishery? Someone who is wedded to the notion that fisheries have to be very tightly controlled to avoid a depletion of the resource, having listened this far, would undoubtedly conclude that everything to this point is simply a preamble to the conclusion "let 'er rip". That is not exactly what I'm going to say. As I mentioned before beneficial management control is not completely absent. Our experience certainly seems to suggest that you can drive spawning stocks to such low levels that the probability of good recruitment is seriously reduced. There is not doubt that this is very harmful to the fishery, fishermen and society as a whole. In New England we feel there are reasonably simple steps that can be taken to minimize the possibility of driving a stock toward to below the point where its reproductive capacity is threatened.

The management recipe we would offer for this is as follows:

1. Encourage fishermen to switch from species to species in response to changes in relative abundance. Above all, don't lock fishermen into a single species or into a single geographic area. To the extent that you restrict the adaptability of the fisherman (that is, his ability to switch into and, especially, out of the fishery) you increase the probability of overfishing. In this respect, I see limited entry as a socially counterproductive conservation strategy. Limited entry not only limits entry and creates privileged classes, it also creates strong incentives against leaving the fishery. It is getting-out of the fishery in response to the entirely normal and uncontrollable periods of low abundance that is of crucial importance to the long-term health of the fishery. What management ought to be talking about is 'accelerated exit' or 'accelerated switching' instead of 'limited entry'.
2. Implement only those controls that will encourage fishermen to switch away from a species as it begins to decline toward its minimum safe reproductive level. In New England we've decided that the most appropriate controls of this sort are mesh size restrictions (reinforced with minimum landed sizes) and area closures. These controls are not perfect

and, in fact, we've had problems getting NMFS to enforce the minimum size rule especially. In addition, the council has difficulty establishing the appropriate time and area windows for large and small mesh. In spite of these problems we are still of the opinion that given the minimal amount of control over the stocks actually available to us, these rules are likely to be the most effective we might implement.

It is difficult to give up on the idea that you can manipulate Mother Nature. One question that comes up repeatedly about the New England interim plan is "what if in spite of these controls a species gets driven down to or close to its minimum safe reproductive level? Shouldn't there be some sort of 'trigger mechanism' that would institute more thorough control over catch?"

That's a reasonable question to ask, but the problem is to find a management approach that will actually accomplish that end. Usually quotas are offered as the appropriate control; but there is certainly nothing in our experience or that of our Canadian neighbors that suggests that quotas will accomplish a rebuilding. Ultimately, it seems our safest course is to rely upon fishermen 'switching away' from a species before it becomes endangered. That is a natural response of the fishermen and it is a response that management ought to work toward encouraging.

In summary, what I think we've learned and believe we're tending toward is simply this: we started out managing the fisheries as if we could mold both fish and fishermen to fit our preconceptions of an efficient, productive fishery. We thought of the stocks as if we could pull a few strings and get them to dance to our tune. We found we couldn't do this because we failed to understand the nature of the variability in the stocks themselves, and certainly did not understand the conservation effects of fishermen's normal switching behavior.

What we have come to in New England is a much more modest idea of what we can do with management. We now feel the most positive steps we can take are those that encourage fishermen to respond as quickly as possible to their own perception of changes in the relative abundance of stocks. We think this is best accomplished by a very simple set of regulatory rules that reinforce switching. There are problems with what we have devised in New England, but overall we feel this approach conforms much better with the natural variability of the fishery and the behavior of fishermen. It is based on scientific reality and is more likely to achieve the goals of an efficient and productive fishery than are either quota or limited entry management approaches.

Discussion

GALE: I'd be interested in your speculations on the social or community or occupational assumptions that would fit into your model. You detail the biological and economic, but I'm waiting for that third category. I'm interested in your reflections. But let me ask a question in case you don't choose to reflect. Why would the tragedy-of-the-commons situation not operate? Is the multi-species operation really a multi-commons? Why, under your fairly free management model, wouldn't stocks be easily driven below the sustainable level?

WILSON: Regarding your first question, social impacts are a fairly complicated question. The philosophical approach we are talking about is one that puts decision-making about who is fishing for what and when, at a very low level in the system. It decentralizes it. Though I haven't thought this through at all, if there were economic advantages to a small community to exploit a part of that system with peculiar characteristics that were advantageous to them, it would allow those kinds of niches. I think those niches could sustain themselves as long as they were economically viable. It is clearly a system though that would make those small communities vulnerable to economics. If they could not survive and compete in that kind of a fishery, they would perhaps become more vulnerable.

BEVAN: What happens if this new plan of the New England Council doesn't work? What are your next alternatives? Do we change? I think that you pointed out it's not quite clear what you do to get some of these sub-components down to low levels. Do you change mesh size? I quite agree with your first observation, that of employing the second rule of fisheries management: if you don't know what you are doing, don't just sit on your ass; go do something. Then, at least you would

get some new information. The information that you've got is that it's unacceptable to have a lot of fisherman on the beach all of the time, and you can't throw away a lot of fish at sea. You and some of the others knew that before you started. A lot of us had to learn that before we went some other direction. Now, you have got a plan that may work. Where do we go if it doesn't?

DYKSTRA: The council plans to increase use of the measures that they already have: close the areas, change mesh size, fish size, or whatever. I said that I personally have the same trouble you do if we reach the so-called "minimum abundance level." I think we all do. I don't think anybody knows any more. If they do, I wish they would tell me. Some people think that you then go back to the single-species approach, which I don't think is a very good solution.

I'm also heretical about minimum stock size or keeping our stocks in a certain abundance. At the risk of being run out on a rail, I don't go along with what I have heard in this conference about how the stocks will be destroyed. They told us that with the Canadian treaty too. They told us that all along. Stocks were driven to a very low level when the foreigners were there. The scientists told us, and I agree with them, that if you drive the stocks down to those levels, good year-classes will not be as frequent, but that doesn't mean that they are gone. Sometimes, they embarrass you like they embarrassed us. We thought, Christ, we will have to wait years. All of a sudden we had fish up the ying-yang and we didn't know what to do with them. The fishermen gave us a hard time and it was a bigger problem than we had before. So you can't really say that by driving them down to those levels you are destroying the stock, unless you are talking about endangered species and the mommas can't find the papas. What you are talking about is money. When you are talking about a real commercial fishery, I want someone to show me where the bucks are. Unless you drive it until the mommas can't find the papas, there's just more bucks in doing it this way than that way. I don't do a whole hell of a lot of worrying about minimum abundance levels or devastation of the stocks and one thing or another people talk about. That may be very heretical, but that's where I come from.

COPES: I cannot resist the temptation to challenge Jim Wilson on his account of the scallop fishery in Nova Scotia. I think, it's an entirely erroneous account. First, of all, he gives the impression that they were there because they had subsidized vessels. Subsidization of vessels was done to keep the shipbuilding industry in Nova Scotia alive. In Canada, we have larger vessels. There is no import duty. As a result, larger vessels were being imported and in order to keep the shipbuilding industry alive, it had to be given a subsidy to be competitive with foreign vessels. They were barely competitive, because Canada continued to import some of the larger vessels, free of duty. As far as smaller vessels were concerned, there was an import duty but this meant that the Canadian fisherman was paying more for his boat than the fair international market value. To offset that, the subsidy was brought in to make the prices of Canadian shipyards competitive with foreign prices. The fisherman was not subsidized in terms of the boat he got. He just got it at the fair international market value.

Concerning the suggestion that the poor scallop fisherman in Canada were locked into a fishery they wanted to get out of, no scallop

fisherman in his right mind wants to get out of that fishery. With the limited entry scheme and only 70 vessels there, it is by far the most profitable fishery in all of Nova Scotia, and in fact of Atlantic Canada. There is no scallop fisherman who'd want to get out. The problem of declining stocks came only when the American fisherman came back to Georges Bank and started competing with the Canadians. We kept a limited entry scheme of 70 vessels, but with the flood of American vessels, yes, the stocks were very hard hit and started to go down. But even then, the scallop fishery in Nova Scotia was relatively profitable by comparison with most, well ahead of all other sectors in the fishing industry. Today, even though it is not as good as it has been, it is still one of the better sectors in the Nova Scotia industries. Moreover, they weren't locked-in, because at the time, 1978, when the pressure on the stocks increased with the Americans returning to Georges Bank, there was still free entry into the groundfish fishery. No one was locked into the scallop fishery at that time.

LOKKEN: I'm somewhat confused on the multi-species problem that you raised. Supposing that you have ten species in this multi-species fishery. You take species number one, you run that down, then you move to two or to five and you move around. The assumption is that you continue to move to a species that is not depleted. But if that is a successful operation for a few boats, additional boats are going to come in. Eventually all of the species are run down, until you just pass poverty around among all of the participants in the fishery. I don't see how moving from one to the other is an answer at all. Now do I misunderstand something that you said?

WILSON: I'm throwing out an idea that I don't think many of you have encountered. We were lectured yesterday on the value of pushing simple ideas. I thought I might try that. I think, though, that we can get into much more sophisticated, realistic discussions about how a system like this would operate. In fact, we have a lot of historical examples from this coast, the East Coast, and probably the North Sea and all around the world of fishermen always operating this way. You move from one species to another. As shellfish come up from the system, you go after them. When they go down, you go after this fin fish, or that fin fish. That has historically been the nature of fishing. In a way, what I'm talking about is putting together management systems which reinforce those and make those historical processes function.

LOKKEN: Jim, I don't want to take up too much of your time here. I'm still confused. I would like to talk to you outside sometime, when you have an opportunity.

WILSON: Don't think of it as going to this species, being there, and then going to the next species, and being there. I wrote down here, the trip I took out Sunday morning had significant quantities of squid, skunk, monk fish, butter fish, whiting, yellow tail and fluke. During that trip, I've emphasized one and then I emphasized the other, according to what happened during the trip and from one trip to another or from one month or one year to another. I emphasized all these species while having significant quantities of each, shifting back and forth on all of them.

The Pendulum Swings: A Public Choice Historical Perspective of East Coast Groundfisheries Management

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SUMMARY

After reviewing the basis for fisheries management in an independent fishery, the justification is restated for the complex New England groundfishery. Although it may be one of the most difficult fisheries to manage, the basic principle from the simple model applies: If the open-access operation can be improved at a cost commensurate with expected benefits, then regulation can be justified. Moreover, the particular regulation program chosen should be the one which maximizes net benefits.

The proposed plan for New England groundfish focuses exclusively on biological aspects, ignoring the open-access problem. Given the interdependence complexities, the information uncertainties, and the high costs associated with more direct management in such cases, this may be the best possible plan. However, the simplicity of the plan may be an overreaction to confusion caused by the original groundfish plan, and perhaps a better scheme can be found somewhere between the two extremes.

INTRODUCTION

When I was asked to present this paper, the suggested title was "Perspective of an Academic on the East Coast Groundfisheries." Although the title has changed, my comments are in fact a perspective in the sense that I will evaluate the New England groundfishery emphasizing the component parts according to my own proportions. I offer some discussion that I hope will be stimulating and of benefit for evaluating management of groundfish specifically, but also for fisheries management in general.

While I consider myself a fisheries management scientist, I come to my work from the study of fisheries economics, which has affected my perception of the relative importance of various fisheries management problems. Also, my perspective of the New England fishery is that of a relative outsider. I have studied management of the fishery since the inception of the MFCMA. While I have had access to the basic documents and minutes of some planning meetings, I have not had an active role in the management process. In one sense this will help me. I should be fairly open-minded compared to one who has been more involved. On the other hand, the fishery is very complex and unless one works with it on a day-to-day basis, it is very difficult to get a complete grasp of the biological, economic, industrial, and management problems involved. Therefore, my perspective may be limited by a lack of information.

The specific purpose of the paper is to evaluate New England groundfishery management over the past seven years. As the title indicates, there have been drastic changes in both stated philosophy and type of regulation over this period. One of the main points is that current management (and what will most probably continue with the adoption of the Atlantic Demersal Finfish Plan) is the result of early management efforts and the structure of the council form of management. Depending on how the problem is perceived, however, the present management plan may well be the best that can be expected, although there are several important caveats to this conclusion.

The first section presents a brief review of the basis for fisheries management and the second, restates the argument in terms of the complexities of the New England groundfishery. The next section describes the Atlantic Demersal Finfish Plan. This is followed by a discussion of the plan and how it was generated. The lessons for the Alaska groundfishery are presented in a concluding section.

THE BASIS FOR FISHERIES MANAGEMENT

The purpose of this section is to state my perception of the basis for fisheries management in terms of a single species, single fleet fishery. In the next section, the analysis will be expanded to include operations of the complex New England groundfishery.

Reduced to the barest minimum, the basis for fisheries management is: given the unowned nature of fish stocks, there is reason to believe that individuals who use them will do so independently and will not, on their own, arrange for optimal joint use. Therefore, gains can be made by reorganizing fishery exploitation from the patterns developed by unrestricted independent operators. Further, if these gains are greater than the regulation costs, there is a basis for government intervention.

This can be explained in more detail in terms of the standard revenue and cost curve diagram for a simple independent fishery (Gordon 1964; Anderson 1977). See Figure 1a. Individual fishermen are motivated by vessel profits and will enter the fishery as long as revenues are greater than costs such that boats are earning profits. Therefore, the open-access equilibrium will occur at level E_2 .

While E_2 will be the equilibrium achieved by the independent actions of unconstrained individuals, it involves certain problems. For one

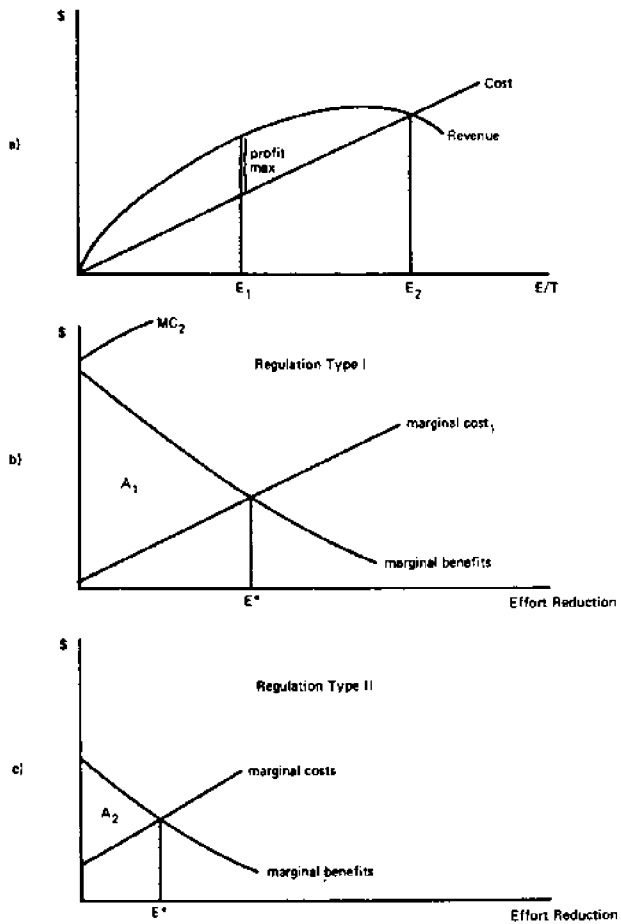


FIGURE 1

thing, depending upon the level of effort at which revenue and cost are equal, fishing pressure can be high enough to place serious strain on the fish stock. This may reduce the chances of adequate recruitment and decrease the stocks' resistance to environmental perturbations. In addition to these biological repercussions, the industry can suffer because even slight downturns in biological productivity can cause a loss of profits. Finally, the open-access equilibrium involves a waste of resources. Beyond E_1 , the level of effort that has been called the maximum economic yield, an increase in effort will increase costs more than it will increase the value of the catch. The resources used to produce this effort are wasted, because they will produce higher values in other economic activities.

In very simplistic terms, fisheries management programs that reduce effort below the open-access level will produce the benefits of future biological productivity, industry stability, and increased economic efficiency. However, in even this simple case it is not this straightforward because the costs of management must be considered. There are many different types of regulation (closed areas, closed seasons, quotas, limited entry, etc.), each of which will directly or indirectly reduce effort, although at some cost for implementation and enforcement activities, or inefficiencies in the production of effort.

The basis for determining an optimal fisheries management scheme is to select that management technique that will yield the highest net benefits. Each particular management technique will generate different types of biological, industrial, and economic efficiency benefits for given reductions in effort. For example, a gear restriction regulation increases the cost of effort thereby forcing the industry to contract. Although this will generate some biological advantage, the economic advantages will be lower than if regulatory measures that did not cause economic inefficiencies were used.

Two hypothetical examples of marginal management benefit curves are displayed in Figures 1b and 1c where reductions in effort are measured on the horizontal axis. For the same level of effort reduction, regulation type 1 generates higher benefits than does regulation type 2. Similarly, different types of regulations have different costs associated with them. Regulation is not free. Rather, it involves both implementation and operational expenses to get it started and functioning and then enforcement expenses to gain adherence from the industry. Hypothetical marginal regulation cost curves are drawn on Figures 1b and 1c as well. Given the marginal benefit and marginal cost curves for the two cases, the optimal effort reduction for each is E^* . The net gain from management at these points is the difference between the curves out to E^* , as indicated by areas A_1 and A_2 for regulation types 1 and 2, respectively. Therefore, regulation type 1 has the highest potential for net gains if effort is reduced appropriately.

Note that it is the relative size of marginal benefits and marginal costs of regulation that are important. The control that gives the highest marginal benefits may not generate highest net benefits if its marginal cost of enforcement is high. Also, note that if the marginal cost of regulation is as high as MC_2 in Figure 1b, then the optimal amount of effort reduction is zero. Even though there may be some benefits from effort reduction, the costs are higher than the

benefits accrued and the optimal thing to do is to leave the fishery in the open-access situation.

In summary, the basis for fisheries management is that individual fishermen likely will not make optimal biological or economic use of a fishery. There are potential gains from reducing effort, but the size of the gain will depend upon which regulation type is chosen. The optimal regulation program will be that which, when used at its most efficient point, will generate the largest net benefits.

FISHERIES MANAGEMENT IN THE CONTEXT OF THE ATLANTIC GROUND FISHERY

The basic points made in the previous section hold for any fisheries management problem, they must be put in the context of an actual fishery in order to be properly applied. The Atlantic groundfishery is one of the most complex fisheries in the world. There are many different fleets (from different ports in different states) using different types of gear, each harvesting from stocks of biologically interrelated species. While some of the fleets may direct effort at particular species, at least during certain times of the year, their catch will contain individuals from many species. To make things more complex there is also a significant amount of recreational fishing. Finally, there is a great deal of uncertainty concerning the reproductive processes of the stocks both individually and as an ecosystem. The size of various stocks fluctuates over time depending on harvesting pressure and a number of physical and biological parameters that are independent of harvest levels.

In addition to these problems, management of this complex fishery is made more difficult by institutional constraints. Regulation authority is spread among fisheries management councils, state governments, some county and municipality governments, as well as between the federal governments of the United States and Canada.

Ignoring institutional arrangements for a moment, the open-access operation of the New England groundfishery can be viewed in terms of the schematic diagram in Figure 2. Nothing so simple as the graph in Figure 1 will suffice. The large box at the top of the diagram represents the ocean and its biological and chemical properties that control the growth, reproduction, and relative size of the various species. The box is empty, emphasizing that both managers and fishermen really know very little about what goes on below the ocean's surface. The rectangles on the right-hand side represent various commercial fleets that harvest the fish. Each fleet has specific markets and harvest technologies that determine their revenues and costs. As a result, each fleet, or perhaps even each individual vessel within the fleet, views the fishery through their own particular "lens" determining their particular view or perception of the nature of the stocks. The lenses are not necessarily the same. While each fleet may be looking at the same information, they may have a different perception of the stocks based on their experience, market structure, costs, or other relative items.

At the left, below the biological box, is another set of rectangles representing various recreational interests. Each has its own idea of relative benefits and costs of directing effort at various species, and as such they also perceive the ocean and the stocks through their own particular lens.

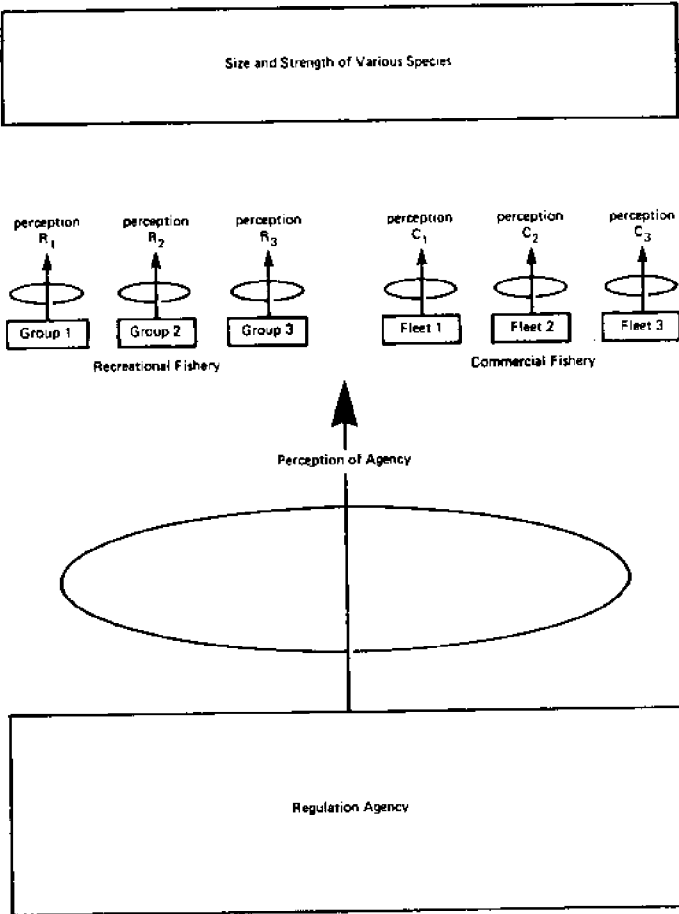


FIGURE 2

Figure 3 is a schematic drawing of what each of the fleets and recreational interests perceive through their particular lens. In one sense, what they see is an evaluation of various stocks in the fishery, according to the relative benefit potential to them. For the commercial fishery, the ranking is in dollars per unit of effort--a function of relative abundance, ease of capture, costs, and market prices. The recreational fishermen rank the stocks in terms of satisfaction per unit of effort--a function of abundance, the nature of the fish, and the anglers' respective tastes.

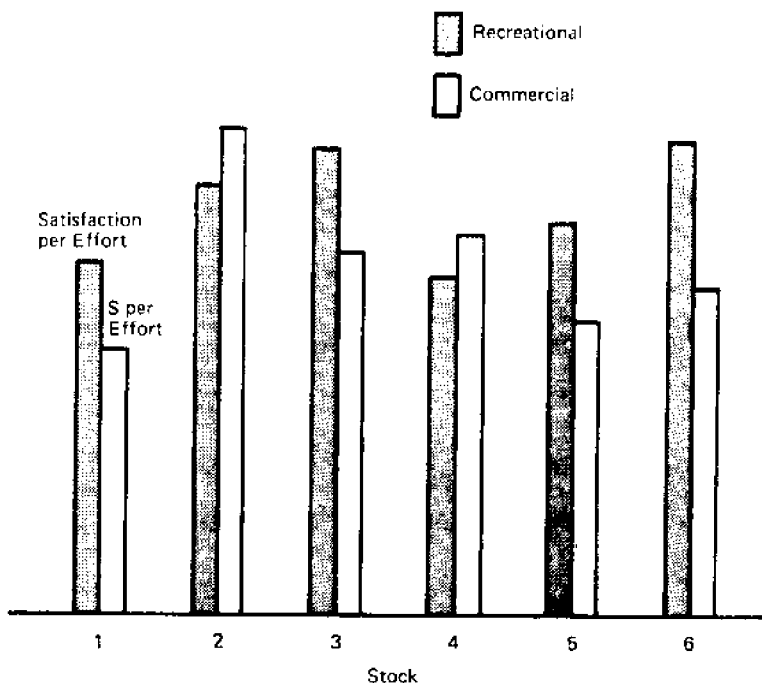


FIGURE 3

Given the perceptions of relative net revenue per unit of effort or satisfaction per unit of effort, each commercial fleet and each recreational sector plans and executes a harvest schedule reflecting time, place, and type of harvest based on the net benefits from attacking each particular species. Presumably they will plan their harvesting activities to maximize profits or satisfaction, respectively.

These plans result in an aggregate effort vector, again defined in terms of types of effort at different times and places throughout the year. This vector defines open-access operation of the fishery. This effort vector will have an associated specific cost in terms of resources used to produce the effort, and a return in terms of harvest value or contribution to the recreational fishing experience. The difference between these costs and benefits will be the net return at open access.

The open-access operation points cannot be defined in terms of a specific level of effort, but there is a multi-dimension operation locus that produces some benefits and some costs. The main difference between the simple model and this analysis is the complexity of the stocks and fleets and the uncertainty of the latter about the nature of the former. The same problems that exist in the simple fishery are likely to occur at this open-access locus, but in a more complex way. Effort could cause biological strain on some or all of the stocks; there could be stability problems for some of the fleets, especially those which focus on few specific stocks; and there might be problems of fleet overcapitalization.

The relevant management questions are: "Can this open-access situation be improved through management so that gains can be obtained net of regulation costs? If so, which management program will produce the greatest net benefits?"

In order to get a proper perspective of regulation in this context, it is also necessary to understand its complexity and uncertainty. Refer back for a moment to Figure 2. While the various commercial fleets and recreational sectors analyze the fish stocks and make their fishing plans accordingly, the regulation agency must analyze this behavior and the stock's biological information. Therefore, regulators must study the whole harvesting picture, but they do so through a lens shaped by available information, past experience, governing laws, institutional structures, and operational budget constraints.

Given the statistics from the fishery as well as from fishery-independent surveys, the regulatory agency has some perception of the stock sizes and perhaps the directions of change. In addition, they have some perception of how the industry operates. In particular, how its operational level will change to reflect changes in relative size of various stocks, prices and costs. Finally, they must have some knowledge of how the fishery will react to regulations. Given these perceptions, and other constraints affecting or directing their behavior, they select the management regime that maximizes benefits.

THE ATLANTIC DEMERSAL FINFISH PLAN

In terms of the above analysis, current New England groundfishery management as implemented under the Interim Groundfish Plan, and what appears to be the likely result of the Atlantic Demersal Finfish Plan (ADFP), can be described as follows. For each stock in the management unit, the council will identify a minimum abundance level based

on an unacceptable risk of recruitment failure¹. That is, they will select an abundance level below which the prospect for successful recruitment is so low it is a serious threat to the continued existence of the stock. Management for any stock will be defined by this level.

Reduced to the minimum, this is how the plan will work. Stocks safely above their minimum level will not be managed. Those that are above the minimum level but show a danger of decreasing, will be regulated so that fishing mortality will be "controlled" to reduce the risk that those stocks will reach their minimum abundance level. Finally, for those stocks determined to be below their minimum abundance level, regulation will "reduce" fishing mortality to allow the stock to grow above the minimum level. The distinction between controlling rising mortality to reduce the risk of further stock reductions and reducing fishing mortality to allow stocks to grow is explicit in the management framework. In reality it may be difficult to design specific programs to accomplish one or the other. In both instances, the reduction in fishing mortality will be aimed at juveniles.

Judging from the interim plan and preliminary documents for the ADF plan, fishing mortality will be regulated by size restrictions (principally by mesh size), spawning area closures and perhaps nursery ground closures, although area closures have recently been considered. In all cases, the decision on the exact type of control will be made considering the biological and technological interdependence of the various species and how different control types effect that interdependence.

The council's perception of its management task may be described as follows. They will get the best information they can on the size, cohort composition, and growth rate of the various stocks and this will become their exclusive focus. When the stocks get too low in either of the two ways described above, management action is taken. No attention is focused on the actions of the fleet per se, unless there is a danger of one or more stocks reaching its minimum abundance level. No attention is focused on other possible negative aspects of the open-access fishing such as industry stability or economic efficiency.

Although this is a very brief sketch of the interim and the ADF plans, it does lead to the following question: "If these other types of problems are ignored can this really be the best way to manage the fishery?" If it is not, one might well ask "Why was it chosen?" To get a proper perspective on management of the Atlantic groundfishery it may prove worthwhile to answer the second question first.

¹ During final preparation of this paper for the conference preprints, the council abandoned the idea of minimum abundance levels in favor of spawning potential per recruit as the operational guideline for determining what type of management to use. However, the other parts of the management procedure remain the same. These and any subsequent changes in the plan will be discussed during the conference presentation.

GENERATION OF THE ADF PLAN

Understanding how groundfish have been managed since the inception of the FCMA may well shed some light on development of the interim plan and preliminary versions of the ADF plan. One explanation is that they are a reaction to earlier management schemes, or more precisely, a reaction to the pressures put on the council as a result of these schemes.

The initial groundfish plan was only for cod, haddock, and yellow-tail. Initiated in 1977, it established a quota for each of the stocks of fish, including independent stocks of the same species. Fishing licenses were required, but they were easily available and there was no moratorium on entry. Soon it was obvious that with the existing fleet and many new entrants, the annual quota would be harvested very early in the year. This infuriated fishermen. In the following year, the quota was met early in the period. Because absolute closure of the fishery would cause industry hardships, the council adopted a policy that started the fishing year and quota over again, although the quota was broken into quarterly allotments to spread fishing over the whole year.

Eventually the quarterly quotas were further subdivided by vessel size, and other stipulations were introduced which limited catch per boat trip. These limits were particularly wasteful since boats had to return to port before they would normally have done so, wasting fuel and other resources. These allocation methods did not subdue the loud voices heard at most council meetings concerning perceived inequities of the plan. Owners of larger, newer boats needed substantial catches in order to pay their mortgages; skippers of smaller boats felt unable to get a fair share of the quota since they could not fish in stormy weather. The quarterly quota allocation by vessel size did not solve either of these problems. If the smallest boats and fixed-gear vessels did not harvest their allocation, it was given to the larger boat categories rather than reserved for the following quarter. Trip limits based on the number of crew members were then instituted, presumably to allow the larger boats to catch more. The effect of doing so was predictable. Many boats increased the size of their crews in order to increase their allowable catch.

The system continued to deteriorate. Toward the end of a quarter, small boats could be forbidden to fish for yellowtail flounder west of the 69° meridian, but could fish yellowtail east of that line. At the same time, medium boats still have met their quota for flounder on either side of the line while big boats could still fish anywhere for flounder. The rules for cod and haddock, which are caught in the same nets, could be different. Vessels were subject to different rules if they fished in state waters before or after fishing beyond the three-mile line. Since it is impossible to tell where a fish is caught, enforcement was all but impossible. Finally, complaints led to changes in both total quotas and the rules to enforce them. Neither fisherman nor regulator knew what was going on.

By late 1980 and early 1981 complaints concerning the groundfish management plan were so loud that something had to be done. As a result, an interim fishery management plan for the Atlantic Groundfishery was developed. This plan was to put something in place while a more complete and improved management plan was developed. The

hoped-for plan is the Atlantic Demersal Finfish Plan, at this writing near completion. As already indicated, there is little difference between it and the interim plan.

When one considers the drastic change in regulations from the original groundfish plan to the interim plan, the term "overcompensation" comes to mind. An analogy might be made to a reformed drunkard who becomes a member of the temperance union and spends his evenings breaking up taverns. The pendulum has indeed swung in New England fisheries management. Previously, almost every aspect of harvesting was controlled, but now there are few restrictions. The question, of course, is: "Has the pendulum swung too far?"

The following quotes from the interim plan give the council's reaction to the original management plan and their feelings for why something else was necessary. (Interim Fishery Management Plan for Atlantic Groundfish, 1981, p. 53 ff).

The current system of trip allocations and quota guidelines by species, area, vessel class and season force a very complex fishery into overly simple and artificial boxes. Dividing the groundfish fishery into segments and believing that the parts will make sense when pulled together creates the impression of addressing variations in the fishery but actually fails to take account of the variety within the industry. There is, therefore, a need for a management program that is simpler, less restrictive and that allows the fishery to operate in response to its own internal forces rather than in response to a complex and confusing regulation.

This plan does not contain an economic objective reflecting the judgment that for the time being the optimal distribution of benefits within this fishery is achieved by natural economic forces operating within the industry.

It is important at this time to let the fishery proceed with as little restriction as possible so that it may be better understood as the council prepares a long term comprehensive management program.

A major difficulty of the original Atlantic groundfish plan was that it had not stated objectives although it was apparently based on the implied objective of restoration of depleted stocks. The implied objective evolved into less perceptible objectives which were more concerned with economic or sociocultural problems. The resulting difficulties were partly the consequences of original failure to identify, define and adhere to reasonable, practical, and obtainable objectives.

This interim plan does not seek to obtain any objectives other than those stated. It recognizes that at this time credible management depends upon setting limited but relevant obtainable objectives which are readily understood and accepted by large segments of the fishing industry.

The objectives of the interim plan are to: 1) enhance spawning activities; 2) reduce the risk of recruitment of overfishing for cod, haddock, and yellowtail flounder; and 3) acquire reliable data in support of the development of the Atlantic Demersal Finfish Plan on normal fishing patterns of the industry and the biological attributes of stock as indicated by fishing.

As already indicated, there was considerable pressure from the industry under the original management plan. It would not be exaggerating to say that the industry had a healthy amount of disgust for the council and the way it operated. The original plan was changed constantly in response to recognized weakness and industry pressure, but the changes were only slight modifications directed at a specific problem. The correction of one problem usually resulted in several that also had to be addressed. As a result of these changes, the plan evolved into an almost incomprehensible myriad of rules, some of which seemed to contradict others. Indeed, someone looking at it for the first time would have a hard time understanding how such a plan could be adopted. As the changes continued, the only acceptable thing to the industry was to start over with a management program that provided very few specific controls.

The above quotes from the interim plan describe the weakness of the original plan, but it does not take too much of a cynic to read through the words and hear an industry shouting in unison, "Leave us alone." Of course there is such a thing as over-management, so a movement to deregulate may be healthy. But the specific intention to ignore all open-access problems except recruitment failure is troublesome.

EVALUATION OF THE ADF PLAN

There are many explanations of why the interim plan and the preliminary versions of the ADF plan look as they do, including the previous discussion. Regardless of how the plan was derived, let's turn to the question of "Is the ADF plan the best possible plan, given the basis for fisheries management and the nature of the fishery under consideration?"

Institutionally speaking, the answer may well be "yes". The Atlantic groundfishery is well established. The various harvesting and processing components of the industry have a natural dislike for any policy that they perceive will restrict their access to the fishery. Also, because of the bad memories of the original plan, the ADF plan might be the only plan with any hope of council acceptance. The council and the National Marine Fisheries Service, which must approve the plan submitted by the council, respond to industry pressure. The industry will accept regulation policies that are generally favorable to the fishery as a whole, but no one sector is willing to bear the brunt of effort reductions. The regulators are aware of these political realities and will not implement plans that will meet strong industry opposition. More specifically, there are many industry segments that have conflicting interests in regulation, and the council looks for plans that offend as few as possible.

Is the ADF Plan the best from a strict fisheries management science point of view, ignoring these institutional aspects? To be honest,

the answer is possibly yes. In a recent paper, James Wilson (1982) described the economic problems of managing a complex fishery, such as the New England groundfishery. He concluded that because of the complexity of the interrelationships between the stocks and the fleet and the uncertainty facing harvestors and managers, a plan that focuses on critical abundance levels might be appropriate.

While such a plan will not address all of the potential problems of open-access fishing, it will achieve some benefits. At the same time its cost will be relatively low. Thus, net benefits may be higher than if other possible regulation schemes are used. According to Wilson, other plans that attempt to address all the issues will likely produce less net benefit. To overcome the complexities and obtain the information necessary for more detailed management schemes, vast amounts must be spent on research, implementation, and enforcement. The extra benefits might be less than the costs. It is interesting to note, however, that the New England Council did not use such an argument when proposing the interim plan. They appear to be arguing for simplicity for its own sake.

On the other hand, it might be that the ADF plan is not the best. The plan does not address the fundamental problem of fisheries management: open-access to the stocks. The only control measures are size and perhaps area restrictions. However, a vast literature has shown that these do not directly influence the overcapitalization problem, and as a result might not be biologically effective and could even increase the cost of effort. For example, the noted biologist, John A. Gulland, has recently stated (Gulland 1983):

Setting the minimum size that can be used in trawl or other nets has never been considered as offering more than a partial solution to part of the problem. These measures can allow small fish to grow to a better size, but cannot prevent overcapacity or ensure that the spawning stock is maintained at or above the optimum level.

Fortunately the fisheries manager has other tools at his disposal. Closed areas and closed seasons can help, particularly in supplementing the protection given to small fish by mesh regulation and minimum size of fish. Reduction of overcapacity can be tackled directly by various forms of effort control, limited entry and licensing, or indirectly by financial measures.

Further, Wilson himself (1975) in an earlier article has stated.

Biological controls have given no evidence of leading to efficient (and for that matter, equitable) common property resource exploitation regimes. Limited entry is certainly not the ultimate policy tool for fisheries. It cannot displace, but it can supplement, biological regulations. A realistic reading of our present management ability certainly suggests that limited entry can create a more efficient and equitable situation than the one which currently exists in our fisheries.

While the New England Council has chosen to supplement mesh sizes with closures, they make no attempt to affect capacity. But successful fisheries management, ought to at least address this basic problem. Wilson's biological argument is theoretically valid, but it is not a biological general prescription to use plans similar to the ADF, mainly because it ignores the thrust of his earlier economic arguments. Only comparative empirical analysis of other properly-developed plans that address the open-access problem can show if the benefits of increasing management complexity will be worth it. Thus far, the New England Council has not seriously considered such a plan and therefore the pendulum may have swung too far, from "too much" to "too little." Something in between could very well be better.

LESSONS FOR THE ALASKA GROUND FISHERY

There are at least two specific lessons that may apply to management of Alaskan fisheries. The first is the importance of getting it right the first time. Postponing regulation can be better than instituting programs without careful study. Such programs might work, but they can cause general adverse industry reaction to regulation in general, making it more difficult to get properly-developed management schemes through the public hearing process intact.

The second lesson also has to do with timing: when to start managing. One of the main differences between the groundfisheries on the two coasts is that Alaska's is relatively underdeveloped. From the domestic fleet's point of view, large parts of the stock are untapped. Further, much of the current use is by foreigners. Therefore, there is considerable room for domestic expansion. This, however, is not justification for postponing management action. One of the reasons New England had difficulties coming up with a management plan that faced the open-access problem was political opposition from the existing fleet. The Alaska fishery, however, is in a different situation. The existing fleet is small relative to the resource potential, so effective management developed now will not involve fleet reduction and hence will not meet with as much industry opposition. It is much easier to restrict unnecessary growth than it is to reduce overcapitalization.

In this regard, there is a lesson to be learned from the New Zealand experience. They too have a groundfishery, composed of many interdependent species, that until fairly recently was underdeveloped. Management was incorporated into their development plans when a program of transferable individual quotas was instituted. These are flexibly defined to consider joint harvest problems. (See Duncan 1983.) Essentially everyone interested in fishing these new stocks was given the chance to do so. The program is successful thus far. The stocks are protected, harvest and processing is proceeding in an apparently efficient manner, and employment is balanced with the estimated productivities of the stocks. The same sort of program may be appropriate for Alaska. If so, it is essential to begin work now, during the developmental stage. It may not be possible to implement such a plan later.

ACKNOWLEDGMENTS

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Discussion

HERRNSTEEN: It seems to me in the tragedy-of-the-commons and the too many nice guys argument, there are assumptions that no longer apply. The tragedy-of-the-commons assumes, as I understand it, that there is no management of the fish. I think the New England guys are putting levels of management on the fish. In Alaska, we've become quite sophisticated in managing the sex, size in season, quota, regulating season time and area closures and, those things are acceptable. But, if you assume that you can't manage the fish, then everyone will fish them down to nothing and you have the tragedy of the commons. But with too many nice guys, we don't do well, and assume that all the fish are out there doing equally. The fact is that your highliners are catching most of the fish. Now maybe my problem is that I'm a nice guy. I like to see a good crew man of mine go off on his own and compete. He puts the pressure on me to do better and I'm putting the pressure on someone else. Still, every year, it's the same way. A small handful of fishermen catch most of the fish. In other words, there are too many nice guys and the good fishermen are able to succeed. But I understand why too many nice guys cause the tragedy.

ANSWER: Not only the "too many nice guys" and your crew member who gets a boat putting pressure on you, but the total fleet is putting pressure on the stock. I haven't got all of the graphs on the board, but the stock is going to be overexploited in the sense that there will be economic waste. There can be the problems put forth with much vigor and voracity by Jake and Jim, that you can have recruitment problems, you're going to have biological problems. So that's the tragedy. The tragedy is new people starving to death and everything else. But again, there are potential benefits to the fishery, to the industry, to the stock, from reducing the pressure and that's what I'm talking about when I say "too many nice guys."

HERRNSTEEN: Let's assume that we are managing the stock, like halibut today. We have a certain quota, whether we catch it in six days or six months. The stocks are the number one priority behind it, and I assume that because I believe in the stocks first. Let a fisherman go broke before he compromises the stocks. Take that assumption.

ANSWER: My problem with the ADF plan is that I don't think there is enough in there to really solve the "too many nice guys" problem. There is too much room for slippage. Now, if you have a total quota, and the total quota can be enforced, then, in one instance, the "too many nice guy" problem is solved with respect to pressure. But then you have the issues of efficiency of harvest, and efficiency of processing, where there can still be potential gains from handling.

HERRNSTEEN: Ok, then we are narrowing it down. We are into the economics of efficiency.

EATON: I want to make some remarks, especially on the previous speaker, Mr. Wilson. Now what he said tasted so good, I really wanted it. I wish it was that way. I think if I just thought about it, I could make myself believe that's the way it is because it sounds so good. But I think that some of his fleet movement assumptions are distorted, at least in Alaska. The fact is, the plan may work if everyone moves, and if you always have someplace to go. But everybody doesn't move. As some move, the CPUE may raise everybody's cost, prices may change, and some people may just wait for the next cycle. The structures left behind, the towns, and the plants and the people that don't want to move, they will construct barriers so that fleet that has moved can't come back. It's very interesting, especially in Alaska where the industry is going through maturity, how some people are playing to win the game, and then all of a sudden start playing not to lose the game. That is what constructs all these barriers.

I also disagree with the statement that stocks can't be pushed down too far, especially in Alaska, where massive marine mammal populations are fishing for food and we're fishing for dollars. But, they keep on fishing. If we can push them down so far they will never come back, I think I have seen it on some pollock stocks up around the Pribilof Islands where the marine mammals have to forage for 15 days instead of for eight days. So while I really liked what he said, it's not going to work that way.

ANSWER: Let me just jump in on that again. You brought up this flexibility issue, and I agree with what you said. My comments, with respect to the ADF plan, have to be interpreted in the context that Jim Wilson is right when he says flexibility is important. You want to shift. I would like to see them give some thought to controlling the "too many nice guys" problem by looking directly at the flexibility issues. I think it may be possible to do that.

ALVERSON: There's one point that the chairman brought up that I would like to elaborate on very slightly at this point: communications. I think that Barry is very right, and I think that Dr. Bevan tried to address it in one instance. We have heard the term "model" today. We have heard it a number of times and you sort of sense this resentment on one side of the aisle to the concept of models. Somebody brings up limited entry and that suddenly arouses a certain amount of fear. That's really a communication problem. Don is exactly right in terms

of the model. The first two years of my career I spent on troll boats, one after the other. I started asking the skipper, "Why are you going to this grounds in the morning?" "Well," he says, "early in the morning, the fish are going to be setting at this particular position and in the evening, they are going to set back down on the bottom. I'm going into 60 fathoms in the winter off of Destruction because the English sole always concentrate." He has modeled this thing and he's modeled extremely well.

People have to understand there is a difference when one starts making models and then wants to use them to make management decisions. At that point, the model has to have a degree of reliability and saleability, both in terms of the user, and in terms of what he perceives is going to happen. In most instances, in the conservation area, we have not done a good job of this. People understand why it's important to have adequate spawning stock and get the recruitment. It's more difficult in terms of this boundary we begin to cross in terms of limited entry. I would just urge that people don't get bound up in the terminology, but rather get bound up in trying to understand what limited entry may provide; what its options are. There is a lack of knowledge about that and the same thing is true of models. If there is anything that this conference can do, it is to result in a convergence. We need to work very hard at communication. This communication gap is extremely strong and we had better pay a little attention to it.

COPESE: I must jump to my own defense as an economist. I'm not opposed to limited entry as was suggested either for troll fisheries or for non-troll fisheries. What I would like to point out is that we must be realistic about our choice of tools in fisheries management. Some tools cannot be used in some circumstances. The circumstance I mentioned was trying to apply an individual quota in a small-boat salmon fishery where you've got half a day to mop up a large stock. If you start handing out quotas and trading at that time, I think the fish will be gone before you get a crack at them. So, far from being an opponent of any type of management, provided that it is applicable in the circumstance, I simply want to urge that we apply some realism in our choice of tools and techniques. My criticism is that some of my colleagues are not very realistic in their enthusiasm for new tools that they will think will cure everything. The point I'd like to make is to be realistic in your choice of tools. That is entirely in concert with the main point that we are trying to make. Far from being an example of the opposite, I think that my views are entirely in concert with that.

STOKES: Jim Wilson has put forward what is a really radical reformulation of the conventional bio-economical model. The policy implication is that size selectivity is enough to achieve both conservation and economic efficiency, if I'm hearing him right. I'm close to believing that he is right in the sense that you can protect the value of the product under some realistic circumstances. I don't, as yet, understand how he has come to the conclusion that you can also control fishing costs that way. He says you can, and you that you can't. I want to press the two of you to debate a little bit for the group. On the cost side, how does the Wilson plan, and the emphasis on the size selection only, control or not control costs?

ALVERSON: I do not agree that Jim has made a radical formulation of the theory. I think that he has made a significant improvement on the

way we look at things and is forcing us to look at the variability. He has made a radical departure in his conclusions, which I personally don't think follow necessarily from his extension of the model, although they may. If it's okay with the chairman, let Jim take three minutes and answer that.

WILSON: Before I get to that, let me make a quick response to what Bart was saying. The very simple model that I sketched out wasn't intended to represent reality but rather to represent a management goal that we could work toward. We talked about the sole owner model that is usually put up and then becomes a goal that we work toward in traditional theory through limited entry. There are a lot of steps to go through before you get there. It sets a management agenda for you. It's not descriptive of reality.

On the cost question, I can't say that I have strong theoretical or empirical evidence that the kind of system I'm talking about will eliminate all costs associated with common property exploitation. You will find in the systems things that are similar to peak load problems in utility management that lead to larger capital requirements than you would have with a stable system. By that, I mean that because of variability in the system, there is a normal requirement for greater capitalization than what you would otherwise see. Consequently, what we see is the free entry cost level. The difference in the kind of system I'm talking about is in a stable system. These information mechanisms I was talking about that lead to exiting also become very selective in terms of who is in what kind of gear, and so, and contribute to reduction of cost. The system has a great deal of uncertainty, leading to a lot of discounting of investment and less investment than you find without that uncertainty. The question is the magnitude of the difference between what an economist might call the optimal level of capitalization in a highly variable system and what you would find with this free entry. I don't think it's going to be that large of a difference.

MARASCO: I guess I have to disagree with Bob Stokes that what Jim's proposing is a radical departure from natural resource theory. There's a large body of theory that goes into the discussion of critical zones and safe minimum standards. Critical zones are where, if you continue to exploit the stock beyond that level, you can cause the whole system to reverse itself, given the current economic situation. When Jim sat down and did his social calculus to look at what the potential gains and benefits are, are those associated with potential management measures that might be applied? I think he may have concluded that the costs far exceed the benefits and maybe the best that we can do is manage via the safe minimum standard of avoiding the critical zones. I can support him if, in fact, he arrived at the position that way. Now if they haven't gone through that social calculus to arrive at that point, then I'd really question what they are doing.

????: If I can answer for Jim because I'm at the mic, I think that he has gone through that calculus implicitly by asking for a comparison of benefits and costs. But, as he says, we have no numbers. It's a viable option, let's compare it. He would tend to say, yes, it would, and I would tend to say no, it wouldn't. Let's get the answer on it and find out for sure.

New England Groundfish Management: A Scientific Perspective on Theory and Reality

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INTRODUCTION

The stated objective of the conference "Fisheries Management: Issues and Options" is to provide fisheries harvesters, processors, managers, scientists, and researchers an opportunity to relate and debate their experiences with fisheries management. In order for the dialogue to be beneficial, the participants must have some common ground. This paper is intended to contribute to the commonality.

The groundfish fishery off the northeast coast of the United States, or the Atlantic demersal finfish fishery (ADF), as it is referred to by the New England Fishery Management Council (NEFMC), is an appropriate case study. It is a valuable fishery (ex-vessel value of about 190 million dollars in 1982) that is the mainstay of the New England fishing industry. It is a multi-species fishery (haddock, Melanogrammus aeglefinus; cod, Gadus morhua; pollock, Pollachius virens; redfish, Sebastes marinus; silver hake, Merluccius bilinearis; yellow-tail flounder, Limanda ferruginea; and other species) with a long history. In part, overfishing of certain species of ADF stimulated Congress to extend U.S. jurisdiction to 200 miles. One of the first fisheries management plans (FMP) implemented as a result of the Magnuson Fishery Conservation and Management Act (FCMA), or the 200-mile limit, applied to the three most important ADF species. There is much to be learned by studying the Atlantic demersal finfish fishery and its controversial management history.

This paper is divided into five sections. Following the introduction, some theory of renewable resource management that is pertinent to

¹ Opinions expressed in this paper are those of the authors and do not necessarily reflect the position of their employers.

Atlantic demersal finfish is reviewed. The next section describes ADF, with emphasis on its recent history and management. Then, the theory is reassessed in light of the experience of ADF management. The final section describes the current approach to developing a new ADF FMP.

THEORY

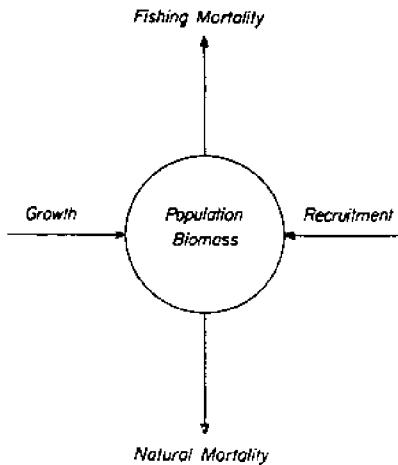


Figure 1. Conceptual model of exploited fish population After Russell (1931).

Russell (1931) described a simple input-output model of exploited fish population biomass (Figure 1).

The biomass is increased by growth of individuals within the population and by recruitment, which is the result of successful reproduction and survival of young (preexploited or pre-recruit) fish. Fishing mortality and natural mortality (all deaths not resulting directly from fishing) decrease the biomass.

A priori, recruitment is related to the amount of spawning (number or biomass of parents), lagged by the time necessary for an egg to hatch and grow to the size or age at recruitment. Several models of the relationship have been proposed, most notably by Ricker (1958) and Beverton and

Holt (1957). Ricker hypothesized that young fish mortality increases in proportion to the number of spawners, due to cannibalism. Cannibalism leads to dome-shaped spawner-recruit curves. Beverton and Holt hypothesized that young fish mortality increases in proportion to their own number, due to competition for food that retards their growth and makes them more vulnerable to predation. This mechanism leads to asymptotic spawner-recruit curves.

Except in the tropics, the fish that recruit each year are usually from a cohort produced by spawning some specific number of years earlier, depending on age at recruitment. Each cohort is referred to as a year-class. The yield derived from a recruiting year-class depends on the harvesting strategy applied to it as well as the number of recruits. There are several methods (Beverton and Holt 1957) of calculating yield normalized for recruitment [yield-per-recruit analysis (YPR)]. These methods are based on the net production of a year-class; that is, the difference between the sum of the weight gained by individuals and the sum of the weight lost by mortality. Figure 2 gives an example of the time history of a year-class.

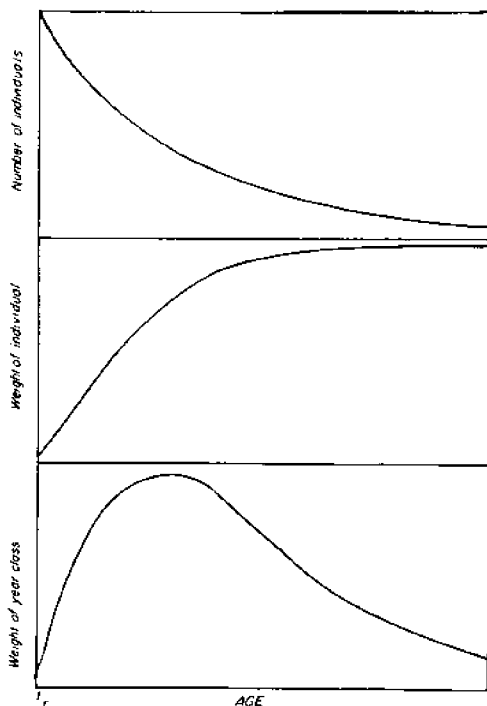


Figure 2. Time history of a hypothetical unexploited year class.

If we ignore fishing, the net production is initially positive and the total weight of the year-class increases. The peak of the total-weight curve corresponds to the age at which growth gains balance mortality losses. To obtain the maximum possible yield, harvesting should be delayed until total weight peaks. Then the entire biomass should be harvested before it is reduced by negative production (when losses to mortality exceed growth gains).

This particular strategy is not feasible or even desirable for a variety of reasons. Other combinations of exploitation rate (u), proportion of the population caught per unit time, and age at which exploitation begins (t_c) are therefore required. It is sometimes impractical to manipulate t_c . Thus, only a univariate (exploitation rate) analysis is possible.^c Figure 3 is an example of the results of yield-per-recruit analysis.

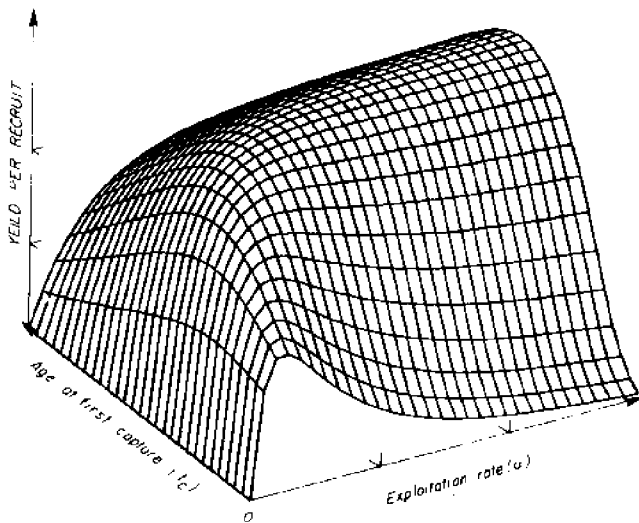


Figure 3. Yield per recruit as a function of age at first capture (t_c) and exploitation rate (u).

The harvesting strategy not only affects the yield-per-recruit, but it also affects the spawning potential of a year-class. Figure 4 gives an example of the time history of the year-class, but in this case the affects of two different harvesting strategies [(1) when fishing mortality is applied immediately upon recruitment, and (2) when there is no fishing mortality at first, but the same rate of exploitation as in strategy 1 is applied from age t_c onward] are compared to the situation when there is no fishing. The spawning biomass at each age is the product of the number of fish, their mean weight and the proportion mature. The lifetime spawning biomass of the year class equals the area under the curves in Figure 4c.

It should be clear that the spawning biomass of the year-class is reduced by fishing. The greater the exploitation rate, and the earlier the age at which it is first applied, the greater the reduction in spawning biomass. The affect of fishing on the lifetime

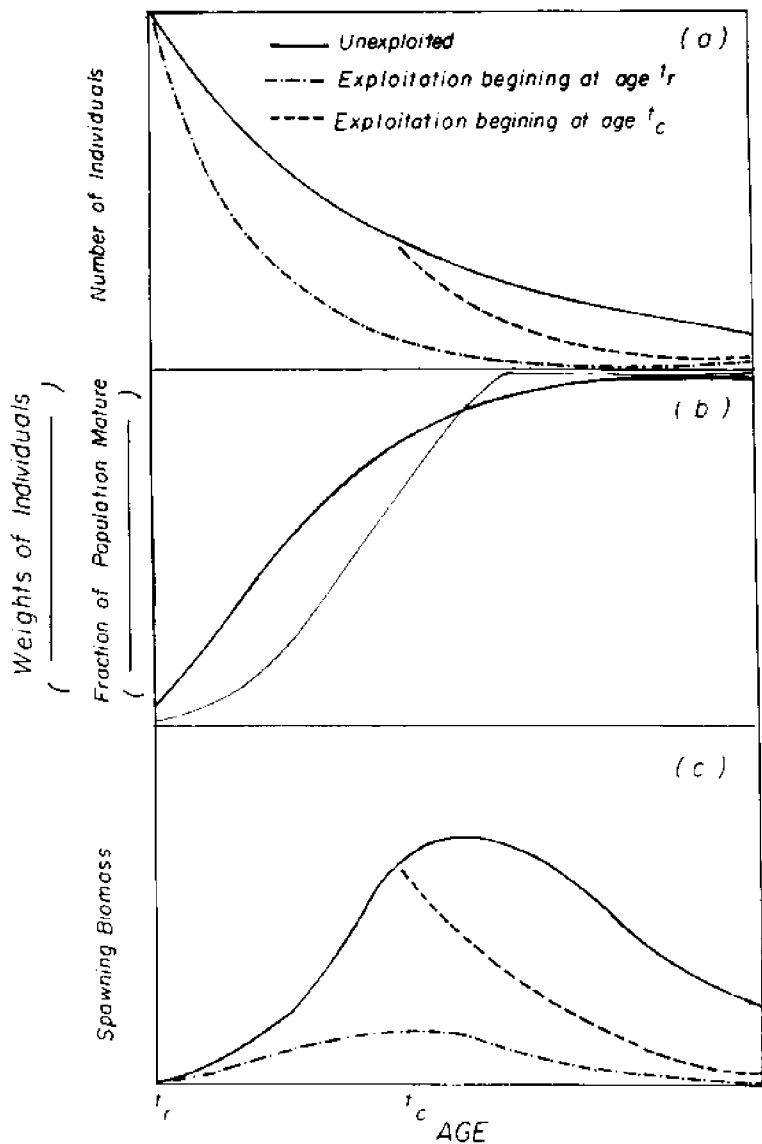


Figure 4. The history of a hypothetical year-class (1) unexploited, (2) exploitation beginning at age t_r and (3) the same exploitation rate beginning at age t_c .

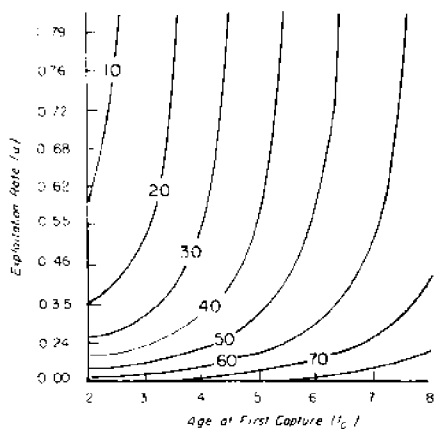


Figure 5. Spawning biomass per recruit, in percent of unexploited level, as function of exploitation rate (u) and age at first capture (t_c) for Georges Bank haddock.

spawning biomass of a year-class is usually reported as a percent of the spawning biomass without fishing on a per-recruit basis (Figure 5).

How does spawning biomass-per-recruit analysis and yield-per-recruit analysis relate to spawner-recruit models? As indicated above, each harvesting strategy (combination of exploitation rate and age at first capture) results in a specific amount of spawning biomass per recruit (S/R). A straight line through the origin (zero recruits and zero spawning) with a slope equal to the inverse of S/R superimposed on a spawner-recruit curve is referred to as a replacement line (Figure 6). The intersection of the replacement line with a spawner-recruit curve is a stable equilibrium point. This means that if a harvesting strategy that corresponds to a specific replacement line is applied, the spawning biomass and recruitment will change and become progressively closer to the stable equilibrium point.

The equilibrium yield (or sustainable yield) is calculated by multiplying the equilibrium recruitment by the yield-per-recruit that corresponds to the harvesting strategy. An equilibrium yield function is derived by calculating equilibrium yield for a variety of harvesting strategies. An example of the approach is given by Sissenwine, Overholtz and Clark (1984). The approach is described in greater detail by Shepherd (1982).

We have now reviewed several of the concepts underlying the theory of fish population dynamics. According to the theory, yield and population response to fishing is determined by the exploitation rate and the age at first capture. The theory is easily generalized to show how yield and population response relate to an age-specific exploitation rate vector, but this additional complexity does not serve the purpose of this paper.

The objective of renewable resource management is to achieve benefits. These are in part determined by yield, while conserving the resource. It should now be clear that fisheries management depends on the affects of regulations on exploitation rate and age at first capture. Certainly, the most commonly considered methods of fisheries management relate to u and/or t_c .

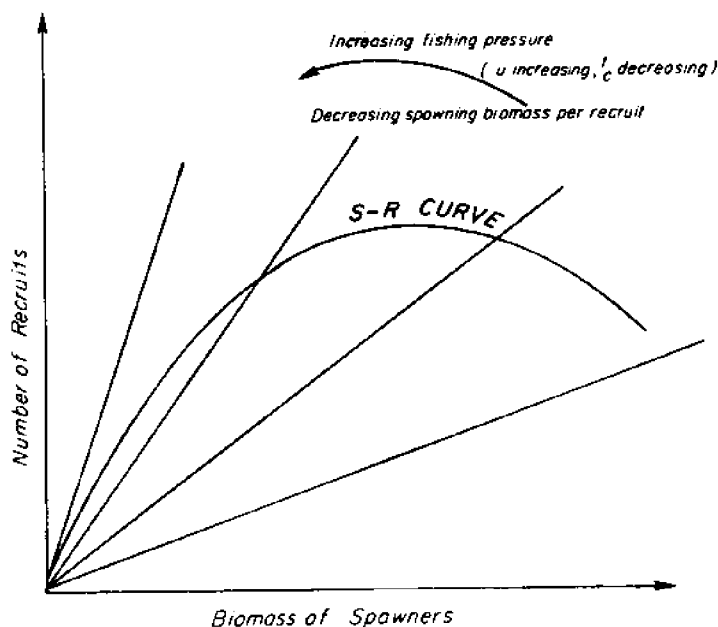


Figure 6. Hypothetical spawner-recruit curve with replacement lines corresponding to various exploitation rates and age at first capture. Intersections of curve and replacement lines are stable equilibrium points.

Sissenwine and Kirkley (1982) review practical aspects and limitations of fisheries management methods. Fisheries management usually regulates harvesters. The most common forms of fisheries management restrict: (1) catch, (2) fishing effort, (3) gear type (mesh regulations), (4) spatial and temporal distribution of fishing activity (closed areas or closed seasons), and (5) the nature of the catch (for example, minimum size regulations).

There are numerous examples of fisheries management by restricting the amount of catch. The amount of catch (C) is directly related to the exploitation rate (u), $C = uP$, where P is the population size. Therefore, at least in theory, u can be manipulated by regulating catch if P is known.

One of the most commonly applied methods for determining population size is sequential analysis of catch-at-age data (Ricker 1975). There are numerous versions of sequential analysis, but virtual population

analysis (VPA) (Murphy 1966, Gulland 1965) is applied most frequently. Virtual population analysis is difficult to describe precisely, but Sissenwine (1981) gives an example that illustrates the method to the nontechnical reader.

Unfortunately, virtual population analysis is only useful for estimating historic population size. In order to estimate the current population size, VPA must be supplemented with additional information, such as a relative abundance index based on either research surveys or catch-per-standard-unit of fishing effort. Presumably, changes in the relative abundance are proportional to changes in actual population size. Unfortunately, indices of relative abundance are subject to numerous sources of error (see Bryne *et al.* 1981).

The exploitation rate can also be manipulated by restricting fishing effort. Fishing effort is defined in terms of the amount of time a specific method of fishing or type of gear is employed. The greater the amount of fishing effort, the higher the exploitation rate. The scientific problem is to determine the specific relationship between exploitation rate and fishing effort (what proportion of the population is caught during each unit of time spent fishing?). The problem is complicated because the answer depends on the method of fishing, the type of gear employed, the time and place of fishing, and the skill of the harvester. Frequently, multiple gear types and methods of fishing are employed. When this happens, it is necessary to estimate the relative efficiency or "fishing power" of the various methods and gear types.

Gear restrictions can be used to either manipulate the age at first capture (t_c) or to affect exploitation rate. Minimum mesh size regulations reduce the number of small fish that are caught by allowing them to pass through the mesh of a fishing net. The appropriate size mesh is determined by conducting experiments that compare the size of fish caught with the mesh size used.

Gear may also be restricted in order to reduce the efficiency of fishing effort and reduce the exploitation rate. Regulations could be established to restrict the size of fishing gear or fishing vessels, to ban fish-finding equipment, or to regulate the means of propelling fishing vessels.

As is the case with gear restrictions, spatial and temporal restrictions on fishing can effect either t_c or u . Areas or seasons may be closed to fishing in order to protect nursery grounds. Spatial and temporal closures may be imposed to prevent fishing on unusually high concentrations (spawning). In effect these closures reduce the efficiency of fishing effort and reduce the exploitation rate generated by a unit of fishing effort.

A direct approach to manipulating the age at first capture (t_c) is to restrict catching or possession of fish smaller than the minimum desired age (restrictions on the nature of the catch). Restrictions of this type may be used in conjunction with mesh regulations and spatial and temporal closures.

Now that some of the theory of fish population dynamics and fisheries management has been reviewed, it is time to return to reality. The next section focuses on the Atlantic demersal finfish fishery.

REALITY: A REVIEW OF THE ATLANTIC DEMERSAL FINFISH FISHERY FROM COLONIAL TIMES THROUGH THE INTERIM PLAN

An excellent review of fisheries conservation and management history for New England (including the Atlantic demersal finfish) is provided by Hennemuth and Rockwell (in press). In addition, Marchesseault, Ruais and Wang (1980), and Pearce (1983) review management of Atlantic demersal finfish during the era of the Magnuson Fishery Conservation and Management Act (since 1977). The review presented here is based on these reports as well as the authors' firsthand experiences.

The fishing industry has been important to New England since colonial times. Fishing began near local shores and expanded northward off the coast of Nova Scotia and Newfoundland. The offshore waters of Georges Bank began to be fished in the mid-1700s. The earliest fisheries were for cod and mackerel. In fact, fisheries management of the resources off the North American coast began with a 1670 prohibition of early mackerel fishing (before the first of July annually). By 1850 the halibut fishery had already begun a slow decline from which it has never recovered. The halibut resource is of minor consequence today. The cod fishery proved more stable and is still a mainstay of the industry.

In 1871, Congress created the U.S. Fish Commission, responding to a perceived decline in abundance of food fish. The first report of the commissioner established that an alarming decline in catch and abundance of fish had occurred. The principal causes of the decline were given as a decrease in food for commercial fishes, change in the location of fish, epidemics or harsh environmental conditions, predation by other fish, pollution, and overfishing.

Haddock has been caught along with cod on Georges Bank since the early days of the fishery. Initially, it was not a desirable species because it did not salt well. During the 20th century it became the most important Atlantic demersal finfish species: economically, politically and scientifically.

Haddock landings surpassed cod landings in the early 1900s. There are several reasons: increased demand for fresh fish, the introduction of steam-driven trawlers, the otter trawl, and hydroacoustics.

Introduction of the otter trawl was an important event. Harvesting efficiency increased markedly. Furthermore, the otter trawl is much less selective than the hook-and-line gear that had predominated. The otter trawl catches smaller fish and a wide variety of species. Much of the catch is discarded at sea.

Haddock landings peaked at more than 110,000 tons in 1929, but decreased sharply after that. It is likely that this peak reflects exceptional recruitment during a brief period. This encouraged greater expansion of the fishing fleet than could be supported in the long run. The phenomenon is not unique to haddock (Peruvian anchovy fishery of the late 1960s and early 1970s).

In 1921, the U.S., Canada, Newfoundland, and France formed the North Atlantic Council on Fisheries Investigations. When the haddock fishery collapsed in the 1930s, the U.S. Congress appropriated funds to expand these studies. The investigations focused on the problem of

catching, and sometimes discarding, too many small fish. Growth studies showed that these young fish would produce up to twice the yield in weight if harvesting was postponed by one or two years. Mesh selectivity studies were initiated in order to point the way to a reduction in the catch of small fish.

It was not until 1953 that a minimum mesh size regulation of 4.5 in. for the Georges Bank otter trawl haddock fishery was implemented. The regulation did not apply if the haddock catch per trip was less than 5,000 lb or 10 percent of the total. The mesh regulation was extended to cod in 1955. This was the first high seas regulation of the New England fishing industry. The haddock mesh regulation was approved by the International Commission for Northwest Atlantic Fisheries (ICNAF), and ratified by the U.S. and Canada. ICNAF was established in 1949 and held its first meeting in 1951. The original members were the U.S., Canada, Iceland, and the United Kingdom. By 1976, 18 countries belonged.

The effects of mesh regulation were controversial. The industry was apprehensive because some marketable fish passed through the larger mesh. On the other hand, meshes sometimes became clogged, particularly when there were large catches, and small fish were retained. Another problem was the by-catch of the small haddock (and cod) in fisheries directed at other species. Enforcement was a concern. A standard gauge for measuring mesh size was developed. Even so, enforcement needed to take account of some inherent measurement error.

In 1960, minimum mesh size regulations for haddock and cod were still the only management of Atlantic demersal finfish, except for some state regulations that only applied within three miles of the coast. In 1961, distant-water fishing vessels arrived on Georges Bank to fish primarily for herring.

Haddock spawning in 1963 produced an outstanding year-class, the largest ever observed. The first evidence came from U.S. research vessel bottom-trawl surveys conducted in the autumn of 1963 and 1964. In 1965, the U.S.S.R. directed its fishing fleet to take advantage of the haddock bonanza. They caught 82,000 tons. The total haddock catch, by all countries, in 1965 and 1966 was 150,000 and 121,000 tons, respectively. During the previous 30 years the annual average had been less than 50,000 tons. The fishery collapsed within a few years and has never entirely recovered.

The pattern of pulse fishing outstanding year-classes continued through the 1960s and early 1970s. Yellowtail flounder, cod, and silver hake, as well as pelagic species (herring and mackerel), were particularly affected. Since non-selective fishing gear was used (otter trawls) the abundance of virtually all species declined. Clark and Brown (1977) reported that the total biomass of finfish and squid off the northeast coast of the U.S. was reduced by about one-half during a decade of fishing by distant-water fleets.

By 1968, the desperate condition of the fishery resource, particularly haddock, became apparent. U.S. scientists indicated that the fishing would have to cease entirely if the stock was to have a chance of recovering during the next five years. In 1970, ICNAF imposed an annual total allowable catch (TAC) limit on haddock of 12,000 tons. The stock continued to decline. In 1972, the directed fishery for

haddock was closed, but 6,000 tons was allowed as incidental catch in other fisheries.

In the next several years, TACs for other species (yellowtail flounder, silver hake, cod, pollock) proliferated. However, these TACs did not control exploitation rate. In some cases, TACs were too high because of uncertainty in estimates of population size. There was a tendency to err on the side of overfishing. In other cases, by-catches caused catches to exceed TACs. There was also evidence that the total level of fishing effort was excessive relative to production of finfish and squid (Brown et al. 1976).

In 1973, the U.S. proposed that ICNAF limit total fishing effort. The proposal was rejected, primarily for social and economic reasons. As an alternative, the U.S. then proposed a limit on the total catch of finfish and squid lower than the sum of the individual TACs. This approach was accepted and implemented in 1974. In addition, the individual species TACs were adjusted downward to take by-catch into account. The approach successfully reduced the exploitation rate in subsequent years, but the damage to the fishery resources (including ADF) had already been done.

The Magnuson Fishery Conservation and Management Act (FCMA) was passed by Congress in 1976 and implemented in early 1977. Overfishing of Atlantic demersal finfish, in particular haddock, was certainly an important impetus for the act.

The U.S. withdrew from ICNAF at literally the eleventh hour, December 31, 1976. There was immediate concern for Atlantic demersal finfish if they were left unregulated. Therefore, in January 1977, a draft fisheries management plan (FMP) for groundfish (cod, haddock, and yellowtail flounder) was published in the Federal Register. The plan was to manage "seriously depleted New England stocks of groundfish" following the March 1, 1977 implementation of the FCMA. The plan perpetuated regulations that would have been adopted by ICNAF had the U.S. remained a member. The plan was immediately in difficulty.

The first groundfish FMP placed annual catch quotas on cod, haddock, and yellowtail flounder; imposed spatial and seasonal closures to protect spawning haddock; included minimum mesh size and minimum fish size restrictions for haddock and cod; and placed trip limits (the amount that could be landed in a single fishing trip) on yellowtail flounder. It was not long before trip limits were applied to cod and haddock as well. Catch quotas for haddock and southern New England yellowtail flounder applied to unintentional by-catch. Directed fishing was prohibited. The catch quotas were intended to stabilize abundance at the current low levels or to allow recovery of the populations when recruitment improved. In some cases, this meant a significant reduction in the exploitation rate, either immediately (Gulf of Maine cod, southern New England yellowtail flounder) or when recruitment improved (haddock). The implication, although it was not stated explicitly, was a reduction in fishing effort and/or closures of the fishery when quotas were filled.

Problems developed by the summer of 1977. Approximately 80 percent of the quotas for cod and southern New England yellowtail flounder were taken in the first half of the year. The projected annual catch for cod greatly exceeded the annual quota. Therefore, the directed fisheries were closed. Limits on the amount of by-catch were imposed.

During the September 1977 meeting of the New England Fisheries Management Council (NEFMC), modifications to the groundfish FMP were submitted. It was recommended that cod by-catch limits for the remainder of 1977 be established according to vessel tonnage classes. Discarding cod was prohibited. This meant that when a vessel achieved its by-catch limit, it had to either stop fishing or illegally discard cod. It couldn't land the fish, nor could it legally discard them. The NEFMC also decided that the cod catch quota for 1978 would be established to prevent cod from declining and would take into account the excessive 1977 catch.

One reaction of the fishing industry to this unprecedented battery of regulations was to question the accuracy of fish abundance assessments. The restrictive quotas were interpreted to mean that scientists believed there were very few fish. This belief was reinforced by the recent assessments that described the dismal condition of the fish populations. Yet, fish harvesters knew that fish were more abundant than they had been in recent years, and their catch rate reflected this.

The problem was one of communication. Fortuitously, the 1975 year-classes of both cod and haddock were large. In fact, the 1975 haddock year-class was the largest since the 1963 year-class that had stimulated the disastrous period of Soviet pulse fishing. The 1975 year-classes recruited to the fishery during the summer of 1977. While assessments of the resource's condition and year-class sizes were uncertain, scientists were not surprised by the improved condition of the fish populations. Resource surveys taken during the autumns of 1975 and 1976 had detected the good year-classes. This was the good fortune that scientists had indicated was necessary in order for the population to recover, but the recovery could only occur if fishing was controlled.

During autumn of 1977, another problem with the groundfish FMP became apparent. Catch quotas were the primary conservation measure of the plan. In order for the council to recommend the appropriate quotas for 1978 (to allow the stocks to recover without being so conservative that the fishery would be closed for extended periods of time) it needed precise and timely estimates of population size. In general, scientists could not be that precise far enough in advance to both satisfy the council and fulfill the legal review requirements. As a result, recommendations to change quotas were frequent (essentially as each new bit of scientific information became available or as catch quotas were exceeded). Because of the lengthy review process, the fishery was often subjected to regulations that the council had already abandoned.

During the summer of 1978, the council recommended that the fishing year be restarted with the "Council's Plan" in place as a complete package. This increased the allowable catch during calendar year 1978. Unfortunately, the situation remained much the same. Trip limits had to be reduced and closures were frequent. Many council members pointed to inadequate enforcement and loopholes in the regulations as the problem. In particular, trip limits could be exceeded by claiming that cod, haddock, and/or yellowtail flounder were caught within the territorial waters of states. Gradually, the states adopted regulations complimentary to the FMP, thus closing the loopholes.

In March 1979, the council recommended a substantial increase in the catch quotas of cod and haddock. The increases were based, in part, on accumulating scientific evidence that the condition of the populations had improved. There was evidence of other strong year-classes (most notably 1978 for haddock). The catch quota increases were also based on a change in perceived objectives. Instead of managing in order to rebuild the stocks, the council now proposed acceptable biological catches that could be sustained in the short term. These recommendations were adopted by the National Marine Fisheries Service on an emergency basis during July 1979.

At its August 1979 meeting, the council faced yet another decision concerning catch quotas. The current fishing year would expire on September 30, 1979. The council requested that the existing management measures be implemented on an emergency basis for the 1979-1980 fishing year. Actual implementation was not completed until August 1981.

By August 1979, some council members wanted to abandon the existing plan. A motion was made to eliminate the system of catch quotas, vessel class allocations, trip limits, and seasonal allocations as soon as possible. The existing plan was to be replaced by closing appropriate species' spawning areas and mesh regulations, as determined with scientific and industry advice. The proposal had numerous shortcomings, but it had one very important attribute. It was perceived as a way out of the dilemma of the existing FMP.

The proposal became known as the "Interim Plan." It was intended to relieve the council of the constant pressure caused by the existing FMP so it could turn its attention to a long-term solution to the fishery's problems. Work began on the interim plan in September 1979.

While the interim plan was being prepared, ADF management remained chaotic. There were more closures, changes in trip limits, and debates concerning the condition of the fishery resources. In particular, the status of the yellowtail flounder population of the southern New England area was controversial. A special survey of the southern New England yellowtail flounder population was conducted cooperatively by the Pt. Judith Fishermen's Cooperative, the New Bedford Seafood Council, the State of Rhode Island, and the Northeast Fisheries Center, during February 1980. The survey indicated a substantial increase in abundance. Recommendations to revise catch quotas (of haddock as well as yellowtail flounder) soon followed.

The interim plan for managing the ADF was not implemented until March 31, 1982. What was intended to be a quick interim solution to a dilemma took nearly three years to implement. The plan relied on mesh regulations, minimum fish size regulations and spawning area and season closures. There was a great deal of concern about whether these regulations would be sufficient to conserve the fishery resources. Nevertheless, the duration of the plan was limited to three years. When the plan was implemented, haddock, cod, and yellowtail flounder resources were in their best condition in a decade or more. Since implementation however, abundance has declined sharply (most notably for Georges Bank haddock; Resource Assessment Division 1984). In fact, the condition of the fish populations is remarkably similar to the situation at the beginning of the FCMA era, except that the outlook for recruitment is not nearly as good.

WHAT HAPPENED

Numerous lessons are illustrated by the Atlantic demersal finfish fishery. First, it is apparent that conservation is necessary. At least one valuable fishery resource was fished to near economic extinction as early as the 1800s (halibut). Haddock and yellowtail flounder populations have been fished down to very low levels on several occasions, most recently during the early 1980s. The current redfish abundance is low, and recruitment prospects are poor. Of course, fluctuation in fish population abundance would have occurred naturally, but heavy fishing exacerbates the problem because of an increasing dependence on annual recruitment.

Where reality departs most glaringly from the theory is in the lack of relationship between recruitment and spawning population size: spawner-recruit models do not work. Georges Bank haddock data (Figure 7) illustrated the point, although the situation applies to most fish populations (see Sissenwine, Overholtz and Clark 1984). Of course, this realization isn't new. It is no wonder that some harvesters, managers, and scientists question the importance of spawning population size, although it is apparent that average recruitment of Georges Bank haddock is significantly lower when spawning biomass declines below approximately 75,000 tons. A significant decline in average recruitment that accompanies a decline in spawning biomass is referred to as a situation of "recruitment overfishing" (Gulland 1980).

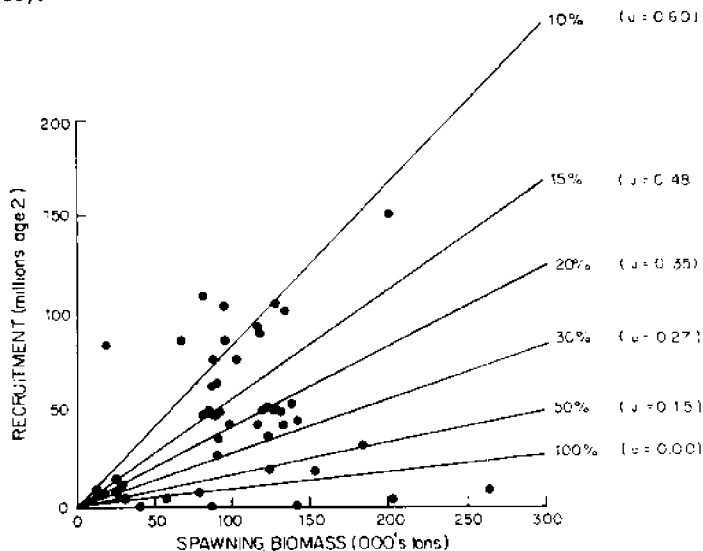


Figure 7. Spawner-recruit data for Georges Bank haddock with replacement lines for various values of spawning biomass per recruit as percent of unexploited level and the corresponding exploitation rate of $t = 2.0$ years. The outstanding 1963 year class (369 million recruits) is excluded.

Recruitment variability makes it difficult to predict the abundance of a fish population very far in advance. This is particularly true when the population is heavily fished and its future abundance depends on annual recruitment. Inherent uncertainty in estimates of current population size adds to the problem. As indicated earlier, virtual population analysis tells nothing about current population size. Estimates of current population size depend on relative abundance indices (research vessel survey or catch-per-unit-effort data). These sources of information are imprecise relative to conserving Atlantic demersal finfish, and minimize the short-term economic hardship on the industry (a few percent of the yield or closures of a few weeks per year are important to the industry, but estimates of population size are an order of magnitude less precise).

The problem of estimating population size and predicting it in advance is closely related to the problem of catch quota management. Part of the frustration that the New England Fishery Management Council experienced with catch quota management of ADF was caused by poor communications and unclear objectives. In general, the participants were inadequately prepared in the early stages of FCMA management. Nevertheless, part of the problem experienced with catch quota management is related to the burden that this method places on scientists to provide accurate and precise advance predictions of abundance.

Another important aspect of the ADF fisheries management is related to the multi-species nature of the fishery. There are biological interactions between the populations (see Sissenwine, Cohen and Grosslein 1984), but this is not the practical aspect of the problem that became apparent during attempts to manage ADF. The fisheries management problem is associated with the non-selective principal fishing gear used in the fishery, (otter trawls). As a result, it is difficult to apply mesh regulations because several species are fished in essentially the same location using the same gear (sometimes during the same fishing trip). Thus, if the appropriate mesh regulation is applied to one species, the regulation limits options to harvest other species. To date, attempts to apply mesh regulations that do not preclude options to fish for alternative species have complicated enforcement.

The second aspect of the multi-species problem is associated with by-catch. Catch quotas for each species must account for the by-catch that will occur in fisheries directed at other species. This problem became apparent to ICNAF during the early 1970s. Unfortunately, it was overlooked in the early FCMA attempts to manage ADF.

It is an understatement to say that renewable resource management theory is imperfect. Nevertheless, there is much useful about it. The theory encapsulates the relationship between fishing strategies (exploitation rate and age at first capture) and yield and spawning potential, on a per-recruit basis. The long-term effects of fishing are less certain because of recruitment variability.

The next section describes a method of adapting the theory to reality in order to evaluate the long-term average effect of exploitation strategies.

CURRENT APPROACH

The interim plan accomplished one of its primary objectives: to take the immediate pressure off the New England Fisheries Management Council, allowing time to carefully develop a plan for long-term conservation and management of ADF. It is too early to judge whether or not the opportunity has been well-used. The new plan will not be implemented until spring of 1985 at the earliest.

During the first year and a half following implementation of the interim plan, the NEFMC discussed, examined, and debated ADF. During August 1983 it adopted the following policy statement:

Major Policy

1. The Council shall attempt to provide an environment in which the multispecies fishery can operate and evolve with a minimum of regulatory intervention or restriction of fishery options. Initial management measures shall be designed to prevent stocks from reaching minimum abundance levels of individual species within species groups included in the management plan with due consideration for the overall multispecies fishery.
2. Initial management measures will be designed on the basis of biological, social, and economic factors operating at the time, and may be modified only if significant changes in these factors are demonstrated.
3. Minimum abundance level is defined as that level of abundance below which there is an unacceptably high risk of recruitment failure (stock collapse). The Council, in establishing minimum abundance levels, shall not consider economic criteria.
4. Minimum regulatory intervention is defined as the use of measures which are only intended to limit the risk of reaching minimum abundance levels.

Other Considerations

1. The Council will seek the best possible data upon which to base its management decisions in fulfillment of this policy.
2. The Council shall place an emphasis on freedom of choice for fishermen participating in the various species fisheries so long as those species remain above their minimum abundance levels.
3. Consideration will be given to species not explicitly included in an FMP subject to this policy only if the required measures impact a fishery for those species.
4. If a species within a major species group falls below its minimum abundance level, the impact on the fishery for other species within that species group, as well as on other species groups, will be considered in efforts to restore the species to an appropriate abundance level.
5. The Council shall attempt to avoid or minimize abrupt economic dislocations in implementing this policy; however, in no event

shall continued access by individual fleet sectors, net economic impacts on individual fishermen, or impacts on the quality of life be considered in framing management measures developed consistent with this policy.

Implications

Initial measures would be modified in response to major changes in the biological, social, or economic factors operating within a fishery where those changes were judged to be contributory to abundance declining toward minimum abundance levels.

Initial freedom in the fishery might be restricted by adjustments in management measures dictated by a stock decline to the minimum abundance level.

The policy statement can be summarized as two major concerns of the council. The draft Northeast Multispecies Fisheries Management Plan, as it existed on August 1, 1984, indicated that the council is concerned: (1) for the long-term viability of valuable, individual fish stocks, with particular reference to recruitment overfishing and associated prospects for recruitment failure; and (2) that the management program work in concert with the multi-species fishery, providing the opportunity for fishermen to continue to choose among fishing options in response to shifts in species price and availability. In short, the council's goal is conservation while minimizing restrictions.

One of the problems the New England Fisheries Management Council has to overcome in applying its policy to the Atlantic demersal finfish fishery is the vagueness of the term "recruitment overfishing." Recruitment overfishing is generally understood to result in a precipitous decline in recruitment at low levels of abundance. Presumably, the "minimum abundance levels" referred to in the ADF policy statement are abundance levels associated with recruitment overfishing.

The definition of recruitment overfishing and the policy statement focus on the low levels of abundance that result from overfishing, not the act of fishing itself. The situation is analogous to focusing on being overweight instead of on overeating. There is much subjectivity in determining at what point a person is overweight or at what abundance level a population has been overfished. The problem for fish populations is exacerbated by recruitment variability and the imprecise nature of estimates of population size. In addition, if management focuses on minimum abundance levels, there will be a tendency to react after the fact (after abundance has declined) instead of applying a management regime that will prevent the problem. The policy statement indicates that the council intended the latter. Therefore, the definition of recruitment overfishing needs to be recast in terms of the act of fishing.

In order for a population to persist, successive generations must replace one another, on average, through spawning and recruitment. The points of intersection between replacement lines and the spawner-recruit curve in Figure 6 define abundance levels that will persist for the harvesting strategy that corresponds to each line. The slope of the replacement line increases as u increases or t_c decreases. Eventually, the replacement lines become so steep that they only

intercept the spawner-recruit curve at the origin. That is, the only equilibrium point occurs when the population is extinct. Clearly, such harvesting strategies constitute recruitment overfishing.

Unfortunately, a definition of recruitment overfishing based on the illustration of Figure 6, is of little practical value since spawner-recruit curves are so poorly defined by actual data. But the approach can be adapted to reality.

In Figure 7, replacement lines are superimposed on the actual spawner-recruit data for Georges Bank haddock. The position of each data point, relative to a replacement line, determines whether or not recruitment was adequate to replace spawners. If the point is above the replacement line, then the lifetime spawning biomass of the recruiting year-class (the sum of the biomass that spawns at each age) was more than enough to replace the spawning biomass of its parents. Conversely, if the point is below the replacement line, then the year-class was too small to replace the spawning biomass of its parents. In order for a population to persist, points below the replacement line must be balanced by points above. Therefore, a useful definition of recruitment overfishing is an exploitation rate and associated age at first capture such that the lifetime spawning biomass of recruiting classes is insufficient to replace the spawning biomass of their parents on average. The data in Figure 7 indicates that recruitment overfishing occurs for any combination of u and t_c that reduces spawning biomass per recruit to less than approximately 20 to 30 percent of the unexploited level for Georges Bank haddock.

The approach is not without limitations and pitfalls. As described above, spawner-recruit data are required, but unavailable for many important ADF species. In such cases, the level of spawning biomass per recruit (as determined by historic values of u and t_c), which corresponded to a period of relatively stable abundance, might be selected as a reference level.

The approach, as described, ignores temporal patterns in the ratio of recruitment to spawning biomass (survival of pre-recruits). If there is a trend, it is appropriate to place greater emphasis on the most recent data. In addition, the survival of pre-recruits may decrease at low levels of spawning biomass. In such cases, biological reference points of spawning biomass per recruit should be selected conservatively.

The New England Fisheries Management Council has considered the approach described above in developing its objective (according to the draft ADF FMP as it existed on August 1, 1984):

"To control fishing mortality on juveniles (primarily) and on adults (secondarily) of selected finfish stocks within the management unit for the purpose of maintaining sufficient spawning potential so that year classes replace themselves in the stock on a long-term average basis; and to similarly reduce fishing mortality for the purpose of rebuilding those stocks where it has been demonstrated that spawning potential of the stock is insufficient to maintain a viable fishery resource..."

The NEFMC has selected reference levels of spawning biomass per recruit that presumably will reduce the probability of populations being reduced to minimum abundance levels (which are in actuality undefined). It has considered a variety of management measures that are intended to control u and t_c in order to achieve these reference levels. It has emphasized minimum fish size and minimum mesh size regulations, and closed seasons and areas. There has been little consideration given to catch quotas, not surprising in light of the council's past experience with this method.

The future of ADF depends on the specific regulations that are eventually adopted. The problem is that there is more fishing effort than is necessary to achieve the council's objective. The number of vessels in the New England otter trawl fleet has nearly doubled during the FCMA era (Figure 8).

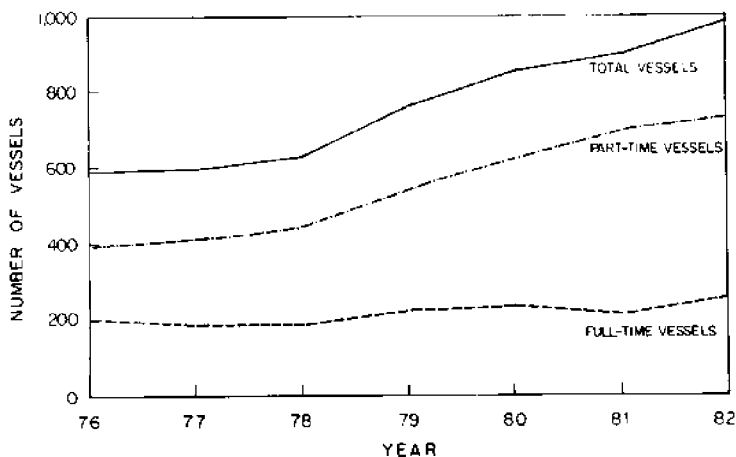


Figure 8. Otter trawl vessels fishing New England

Ultimately, fisheries management regulations must be enforceable and/or acceptable to the industry. These are major hurdles.

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Discussion

BRANDER: Mike, could I just ask what the rationale is behind closure of spawning areas? There are a number of reasons why in many circumstances it's not a good idea. For example, if the stock that you see on the spawning area is actually the large fish and therefore from an exploitation point of view this may be a good way to harvest them. Also, very often, if they are concentrated there, then the harvesting costs are low.

ANSWER: Well, the rationale is probably related to your observation that the harvesting costs are low or the inverse of that. Actually, these closed spawning areas were created under ICNAF and I couldn't speak to the specifics of how they were established. I suspect that, to a large degree, it's a regulation that's intuitively appealing to those people being regulated. We all understand that you need mothers in order to have offspring, so it's acceptable in that regard. In terms of its impact right now, it's more related to your observation of when you can catch a lot of fish. The application of regulation right now is in essence reducing the efficiency of some of the fishing effort. Closed spawning areas are actually being expanded to other places explicitly for that purpose, to cut down the catch rate.

MATHISEN: Let me address or attach a little rejoinder to the stability problem or the converse, which is a natural variability that has been discussed today, yesterday, and the day before. I fail to see that this conference has isolated or stressed the variability induced by the fishing operations. For understanding structure of the populations, you know they are in geographic isolation and temporal isolation, but I think genetic tagging is showing us very intricate structures within a very short period, within the same physical area, and same time span of spawning. The point is that it is difficult to understand why nature

created all this deviance, but unless you operate your fisheries to allow your spawning escapement including all these elements, you are going to increase your variability and, of course, enhance your risk in your fishing operations.

LOKKEN: The world court ceded part of Georges Bank to the Canadians a short while ago. Is that going to stress the areas to the south and require the movement of some of the United States vessels away from the upper end of Georges, and is that going to exacerbate the problem?

ANSWER: It's certainly going to exacerbate the problem in the broadest sense. I mean, just the problem of Georges Bank. In terms of the biological impacts, I don't think we're in a position to say. I mean, there are pluses and minuses. For example, the scallop fishery, of course, is very important on Georges Bank and a substantial amount of the U.S. catch in recent years came from the Canadian side of the line. That's well-known. Less well-publicized is that there is a substantial part of the Canadian catch that came from what is now the U.S. line. There are these trade-offs. The real concern, of course, is that you have uncontrolled competition for the resource. For example, haddock concentrate in a spawning area that has been closed by both countries, an area largely in the Canadian zone. If the two countries, in essence, compete for their share of that resource as opposed to maintaining some conservation regime on a rational basis, there's certainly a danger to those resources--the cod, haddock, scallops and some other things.

West Coast Groundfish Management: An Industry View

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SUMMARY

This paper gives a historical synopsis of the groundfish trawl fisheries, the fishery's management and the science on which its management is based.

The paper ends by giving the principal government management points that, in the author's view, the industry will have to contend with in the next five to twenty years. The points are: (1) the council's philosophical base for managing a multi-species fishery; (2) the lack of facts to support the scientific theory on which management is based; (3) the establishment of a new social order (the EEZ); (4) the continued effort by some to adopt a form of limited entry in the industry; and (5) the Marine Mammal Protection Act.

The recorded history of the West Coast groundfish industry is relatively short. Management, in anything but a very relaxed fashion, has a short history indeed. Before the Magnuson Fishery Conservation and Management Act (FCMA) was adopted in 1976, and before the preliminary management plans of 1977, there was very little active management.

Trawling, which produces most of the groundfish, began on the Pacific Coast in 1876. The paranzella net, a trawl towed by two vessels, was introduced in San Francisco Bay. It was towed by lateen-rigged sailing vessels. In the 1880s, steam-powered vessels replaced the sailing vessels. In 1884, a small schooner began fishing with a beam trawl. It appears that the otter trawl was not used on a regular basis until 1926, when two vessels began fishing with it in Puget Sound.

Trawling grew rapidly during World War II, providing both food and shark livers for vitamin A. After the war, the domestic trawl industry grew slowly. In many cases, if you didn't have access to a market for animal feed, you didn't have a market.

The next big change came in the 1960s when a large foreign trawl fleet began fishing for groundfish off the West Coast of the United States. To many people, this apparent pulse fishing was intolerable. Had it been us instead of foreign nations there would probably not have been near as much hue and cry.

Passage of the FCMA was assured in the 1970s and the domestic trawl fleet began to grow again. When the act was passed, new vessels were built and many others converted for the trawl fisheries. But in recent years, the collapse of shellfish stocks has had the most impact in the Northeast Pacific. This collapse, in my opinion, happened because of oceanographic conditions and not over-fishing. It made many shrimpers and crabbers convert to groundfish trawling. A report done for the West Coast Fisheries Development Foundation in August 1981 pegged the number of trawl groundfish vessels on the West Coast at 448, but I believe somewhere around 600 vessels are engaged in groundfish trawling at least part of the year.

The first management action I know of was closing San Francisco Bay to the paranzella fleet in 1906. Until the FCMA, there was very little active groundfish management except in halibut, which has long been a prohibited species for the domestic trawler. Washington, Oregon, and California also had log book programs and mesh laws. California further had a trawling closure inside three miles.

When the foreign fleets appeared, bilateral fisheries agreements were negotiated with some of the countries fishing off our coast. Generally they were impossible, or next to impossible, to enforce. It seems to me the most successfully enforced bilaterals were the time restrictions. The foreign trawl fleet came under active management in 1977 with the FCMA and PMPs. Observers were put on some of the vessels, and vessel and gear inspections could be carried out by the Coast Guard and National Marine Fisheries Service any time.

In 1978, joint ventures began when two vessels transferred their catches to Soviet processors off Oregon. Marine Resources, headquartered in Seattle, arranged this effort and has been active in joint ventures ever since. The joint ventures started under the same management rules as the foreign fishery. This included keeping the processors outside 12 miles. The mileage restriction for foreign processors in joint ventures was relaxed to nine miles, then six miles, and ended up at three miles.

The joint ventures off Washington, Oregon, and California have been scrutinized as much as any fishery that I know of in which local domestic fishermen have participated. The foreign processors have had virtually 100 percent observer coverage. The incidental catch, the catch of prohibited species, the total catch, and when and where the joint ventures fish have all been observed. This segment of the groundfish fishery has been intensely managed every since it started. Most of the parties have appeared to do well; however, there has always been a surplus of stock above the allocation asked for. There

will be some management crunch in the future when nothing is left for foreign allocation and the division is made between domestic on-shore processing and joint ventures.

Domestic groundfish management, as we know it now, (quotas, harvest guidelines, and areas) did not really start until 1983. The Secretary of Commerce approved the groundfish management plan by September 1982. The council did very little in 1982, except to warn the industry that more restrictive management was coming. The rockfish catch, in particular, fell dramatically in 1983 and 1984. Widow rockfish landings were 26,690 mt in 1982. In 1983 the landings were about 10,000 mt. The optimum yield (OY) for widow rockfish in 1984, is 9,300 mt and is a quota. The groundfish plan has five species managed by quota: widow rockfish, Pacific Ocean perch, Pacific whiting, sablefish, and shortbelly rockfish. In 1983, the Sebastes complex, one of two major groupings of stocks under the plan, had landings of about 18,000 mt. The harvest guideline for this complex is 10,100 mt in 1984. This being written in August, I am not sure, but I don't believe this guideline will be exceeded in 1984. In two years, industry rockfish landings have been reduced by 26,000 mt.

The timing was unfortunate for the industry, to say the least, since shrimp, salmon, albacore, and crab fisheries also collapsed. Much of the industry, vessels, and processors had nowhere else to go. Groundfish resource management, in conjunction with events in the rest of the industry, is likely to have far-reaching economic effects for years along the coasts of Washington, Oregon and California.

The saddest part is that groundfish management lacks a good scientific base. Much of the survey work done on rockfish is worthless at this point. The numbers are so variable that only rarely can stock size be established with an accuracy that exceeds plus or minus 50 percent. The scientists have fallen back on "rules of thumb" or computer models based on simplistic assumptions. Two such models are "Virtual Population Analysis" and "Stock Reduction Analysis". The fact is we are managing some stocks for which we don't have a life history.

Managers and scientists now debate how rigid management should be. Some favor a very rigid posture with very little compromise on the numbers generated. Some favor a more relaxed attitude, believing that some pulse fishing is acceptable. Likewise the two groups, it seems to me, can be divided into pessimists and optimists. Using the pessimists' approach, at the present progress rate we may develop enough scientific information in thirty to fifty years to settle the debate. Using the optimists' approach, we would have some answers in a much shorter time frame when the fishery stressed the stocks. I don't know who will win this debate, but it may be a moot point.

Since 1976, we have had a change in weather patterns established over the previous thirty years. Meteorologists are busy trying to come up with a "norm" for what they think is a new period in the earth's weather. They could be wrong and this might be a new extreme. Oceanographic conditions have changed in the same period. Dependable fish stocks have collapsed. We have also seen some very large year-classes of whiting, cod, and pollock. There may be strong year-classes of other species composing the groundfish complex.

However, we don't know because it is still too early for them to have entered the fishery. Unfortunately, it is also too early to tell if we are faced with a new norm for the earth's weather and oceanographic conditions, or if this is an extreme that will return to something more like the old norm. Whether it is a new norm or we return to the old, there is a tremendous amount of fisheries oceanography to be done.

With the establishment of the EEZ, oil and mineral industries can now own areas out to 200 miles. We could lose whole segments of fisheries just because we don't know. There no doubt will be other uses of the ocean and ocean floor.

There are other areas that have had a bearing on the groundfish industry such as foreign trade, the price of oil, the strength of the dollar, subsidies in other countries, technology, and so forth. I won't comment about any of them at this time, but I would like to make a comment or two on effort limitation whatever you would like to call it: limited entry, optimization of capital, or the latest one I've heard, "rationalize the fleet."

Every time the amount to be taken or landed is regulated or gear is restricted, management is practicing effort limitation. It has been going on in various forms for a very long time, under the name of fisheries management. Limited entry, as practiced, has never gotten rid of effort limitation. Effort limitation has led however to limited entry by not leaving enough to make the fishery economical for some vessels. Limited entry has led, in most cases, to ownership of the right to fish not ownership of resource. One suggested quota system would assign shares of a quota to an individual or company. These shares could be bought, sold, and leased. Other schemes include bidding for shares of the resource. There are also some moratoriums that limit new entrants. Most of these use what I call the "zero option" where nobody is forced out. The purpose of effort limitation is to reduce or contain the landings. When you get past effort limitation, some social scheme becomes involved, usually under the guise of economics.

In fact, the limited entry schemes I have looked at have not reached the objectives used to justify limited entry. Administrative costs have been higher to both government and the fisheries than was supposed. Our national government's policy on limited entry, in most of the industries similarly regulated, has been to deregulate.

It seems to me that limited entry does not offer near the solutions that its advocates think it does. As practiced, it has exchanged one set of problems for another.

The standard economic theory of fisheries, and common property in general, presents a rather myopic policy perspective consisting of only two institutional alternatives: establishing sole-owner resource property rights, or simulating the market outcomes of sole-owner resource property rights through taxes and subsidies or quasi-property rights (limited licenses, resource shares, and so forth). These policy suggestions ignore the crucial economic question: the choice of the most economical set of rules. (James A. Wilson 1982).

Summing up the history of the fishery or the management, is relatively fast. However, we seem determined to repeat everyone's mistakes in multi-species fisheries. We seem bound and determined to impose a rigid set of rules on a highly variable environment over which we have little or no control. Fisheries oceanography is moving at such a slow pace it will take many years to develop a preponderance of evidence on the multi-species groundfish complex. We could lose it because of a new social order (the EEZ) and not ever know why. I expect this would be blamed on over-fishing. Lastly, we may end up with a limited entry scheme that will most likely exchange some old problems for new ones, leave many old ones, and cost us in regulations and money.

There is one other thing that seems to me to be a time bomb waiting to go off. I refer to the Marine Mammal Protection Act and the protectionist groups who tend to be completely one-way.

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Fisheries Research and Its Application to West Coast Groundfish Management

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INTRODUCTION

I would like to present my personal view of two major problems in fisheries biology currently confronting west coast groundfish managers:

1. Groundfish species currently requiring management attention along the west coast have life history patterns that encourage overexploitation. These resources have such low rates of production and (relatively) high unexploited standing stocks that fisheries can develop and mature relying almost entirely on the standing stock (as opposed to new or surplus production) for their sustenance. These resources are ultimately harvested down to levels at which their fisheries productive capacities are destroyed.
2. What appears to be an important tenet of multi-species fisheries management (multiple stocks exploited by a common fishery) is that the more general or diverse the target of management (for example the number of species, gears, areas) is, the more biologically conservative the management policy must be in order to maintain long-term production of the resource base. Is this actually true and, if so, how might it affect the management of west coast groundfish?

THE NATURE OF WEST COAST GROUND FISH PRODUCTION

Basic differences in the nature of the U.S. west coast groundfish fishery, as opposed to that of Alaska, are immediately apparent in Table 1.

Table 1. Total and domestic groundfish catch (1000 t) and species breakdown of domestic catch in selected years in U.S. west coast (WC) and Alaska (AK) regions

Year	Area	Total	Domestic Landings	% Rock	% Flat	% Round
1976	WC	307.7	65.0	34	39	27
1981	WC	218.8	110.8	58	25	16
1983	WC	169.8	97.7	49	30	21
	AK	1678.1	44.4	1	1	98

Along the U.S. west coast (Washington, Oregon, California) domestic landings have risen from 21 percent of the total catch in 1976 to over 50 percent of the total in 1983. These domestic landings are becoming more and more heavily oriented towards rockfish such as widow (*Sebastes entomelas*), yellowtail (*S. flavidus*), and canary (*S. pinniger*). Good descriptions of recent developments in the fishery are given by Huppert (1984) and PFMC (1984). The recent groundfish catch in the Alaska region, on the other hand, is dominated by foreign and joint venture catches of species such as walleye pollock (*Theragra chalcogramma*) and yellowfin sole (*Limanda aspera*). Domestic landings, which make up a minor portion of the total groundfish yield from the region, are dominated by Pacific cod (*Gadus macrocephalus*) and sablefish (*Anoplopoma fimbria*).

One has only to look as far as the history of Pacific Fisheries Management Council (PFMC) management/regulation actions since the implementation of the Groundfish Management Plan (GMP) in 1982, to see where the emphasis of west coast groundfish management has recently been (PFMC 1984). The rockfishes in particular have demanded special attention by fisheries managers. Whereas rockfish compose about 50 percent of the domestic groundfish catch along the U.S. west coast, since implementation of the GMP, 26 of 32 (82 percent) of the council's groundfish management actions were taken on rockfish, and the balance on sablefish. What is it about the fisheries for these species that commands so much attention from management agencies?

The history of rockfish and sablefish exploitation in the North Pacific and eastern Bering Sea clearly demonstrates the problem. Fisheries on these species developed rapidly and then catches markedly declined as the standing stocks were depleted. The process more closely resembles mining than renewable resource exploitation. The 1960s was the decade of the decimation of the Pacific ocean perch (POP) stocks of the North Pacific. The Japanese and Soviet fisheries started in the east Bering Sea in the early 1960s and worked their way through the Aleutians, Gulf of Alaska, and west coast areas as far south (Oregon) as the resource would allow.

Figure 1 gives estimates of POP catch rate per unit of habitat, where habitat is defined as the shelf or slope area between 200m and 1000m. This comparative fishery production index was originally computed for sablefish by Stauffer and McDevitt (in prep.) and used by the PFMC

Groundfish Management Team to modify estimates of sablefish optimum yield. I decided to use it in this paper because it gives a rough idea of comparative rates of production of the various fisheries regions. At any rate, one can certainly observe the "boom-and-bust" response of the POP stocks of the North Pacific to the heavy exploitation of the 1960s. Table 2 gives the average annual POP catch in the 1960s by region, as well as estimates of unexploited biomass (Ito 1982; Archibald, Fournier and Leaman 1983; Gunderson unpubl. manusc.) and the ratio of mean annual catch to unexploited biomass.

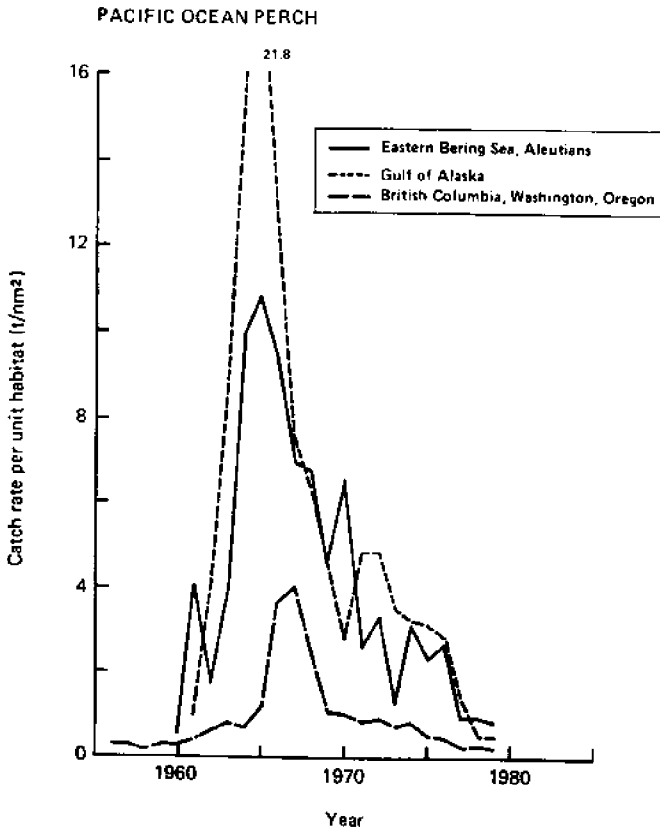


Figure 1. Pacific ocean perch catch rate per unit habitat (t/nm²).

Table 2. Average annual 1960-69 POP catch (1000 t) and estimates of unexploited biomass by region

	Avg Annual Catch (1000 t)	Unexploited Biomass (1000 t)	Avg Annual % Unexp. Biomass Harvested
East Bering Sea	22.3	132	16.9
Aleutians	45.9	373	12.3
Gulf of Alaska	130.3	1107	11.8
BC/Wash/Ore	21.1	154	13.7
Total	219.6	1766	12.4

As will be discussed later, the average annual catch of POP during this decade was close to an order of magnitude greater than the maximum sustainable production of the resource.

Figure 2 gives a time series of catches in the INPFC Vancouver and Columbia areas (Washington, Oregon coast) of POP, widow, yellowtail, and canary rockfish. It is clear that widow rockfish have exhibited a "boom-and-bust" pattern similar to POP. With the rapid decline of the widow rockfish fishery, emphasis has shifted to the less desirable (or available) yellowtail and canary rockfish resources. Yellowtail presently seems to be following the pattern of demise exhibited by POP and widow, albeit at a slower rate. Will canary be next?

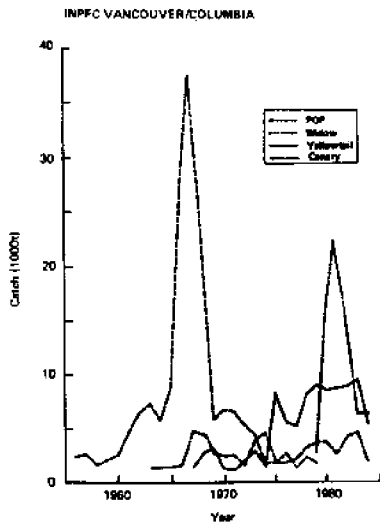


Figure 2. INPFC Vancouver/Columbia area catch (1000 t) of Pacific ocean perch, widow rockfish, yellowtail rockfish, and canary rockfish.

Figures 3 and 4 give indices of fishery production (catch rate per unit of habitat) for sablefish in the Alaska region (Stauffer and McDevitt, in prep.) similar to those presented in Figure 1 for POP. Again, one observes the effect of the foreign fisheries sweeping their way through the resources of the east Bering Sea in the 1960s and Gulf of Alaska in the late 1960s and 1970s. Figure 4 shows what appears to be a similar trend for the U.S. west coast (INPFC Monterey-Columbia) during the 1970s and early 1980s as well as a rather constant fishery off the west coast of Canada (INPFC Vancouver, Charlotte). It is interesting to note that the most detailed and direct estimate of coastal sablefish production (McFarlane and Beamish 1983) is for the British Columbia coast where the resource has been most conservatively and successfully managed for a number of years.

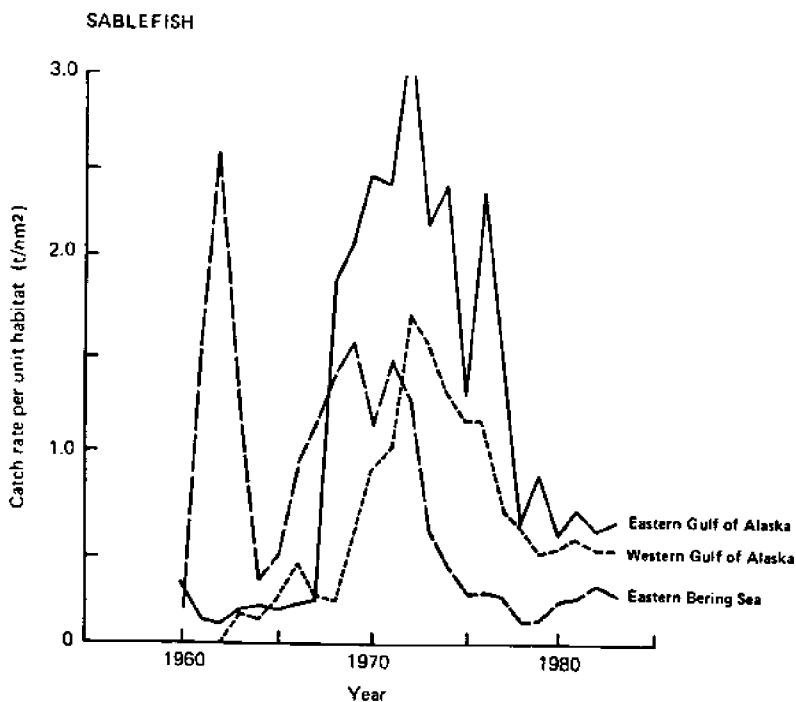


Figure 3. Sablefish catch rate per unit habitat (t/nm²).

The biological problems associated with exploitation of species such as rockfishes and sablefish may be illuminated by a comparison of their fishery dynamics with those of other North Pacific fishes. In order to do this comparison, I have performed a series of computer simulations of the estimated fishery dynamics of these species using a simple age-structured population model constructed along the lines of Walters (1969). For a sense of relative production of these species or species groups, I have standardized each population to have an unexploited biomass of 100 (units). Then, by employing the best estimates of growth, natural mortality, and relative age-specific availability of the resource to the existing fishery (relative catchability), as well as estimates of recruitments that give our desired unexploited biomass, I can simulate an abstraction of the fishery dynamics under a variety of different conditions. Perhaps the most important of these conditions is the way in which recruitment to the fishery manifests itself. For this exercise, I have used two scenarios: first, constant recruitment over all stock levels (CR), and second, density-dependent recruitment (DDR) of the form discussed by Kimura, Balsiger and Ito (1984), in this case with $r=0.6$ (Figure 5).

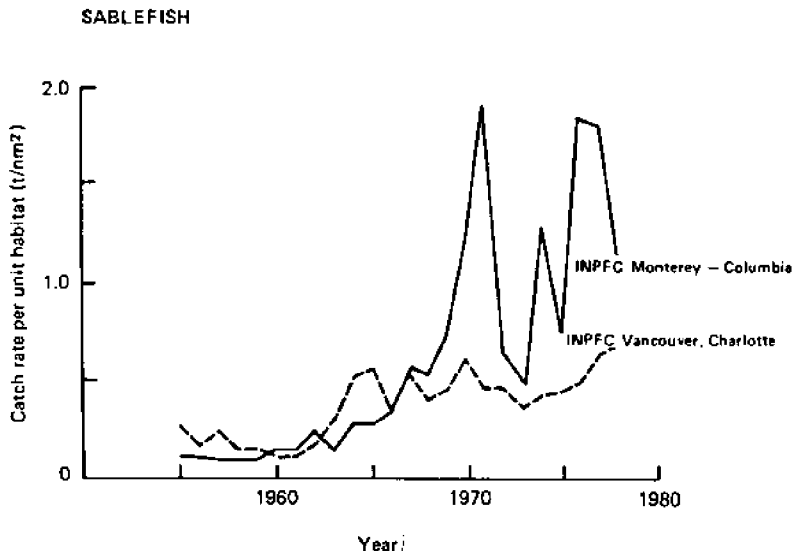


Figure 4. Sablefish catch rate per unit habitat (t/cm^2).

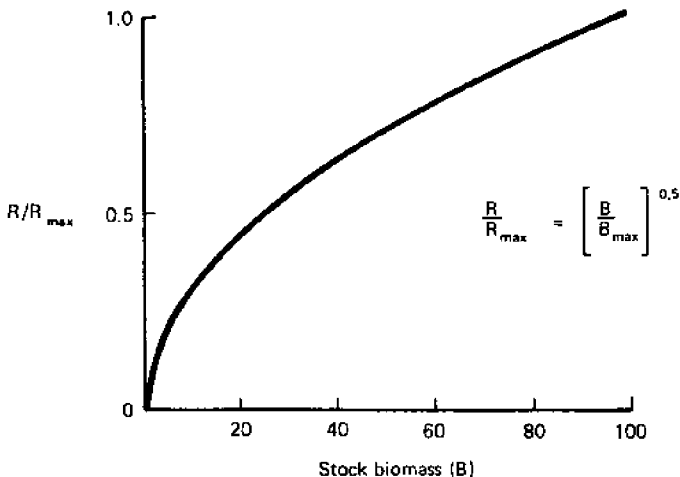


Figure 5. Stock-recruitment relationship used in density-dependent simulations.

The species chosen along with the sources of their parameter estimates are: Pacific hake (*Merluccius productus*, (Francis 1983)), yellowtail rockfish (Tagart 1984), walleye pollock of the east Bering Sea (Bakkala et al. 1981, Smith 1981), Pacific ocean perch off the west coast of Canada (Archibald, Fournier and Leaman 1983) and yellowfin tuna (*Thunnus albacares* of the east tropical Pacific (Francis 1977)). Yellowtail rockfish and POP are typical of the species that seem to present us with our greatest management problems. They are slow-growing, long-lived (30 to 80 years) animals, typical of what Adams (1980) and Gunderson (1980) refer to as "K-selective" species. As will become evident, the most notable feature of their life history is their very low production to biomass ratio (sometimes referred to as "turnover"). Pacific hake and walleye pollock, the dominant groundfish species in their respective ranges of the North Pacific, are rather fast-growing and short-lived (10 to 15 years). Yellowfin tuna would be referred to by Adams (1980) and Gunderson (1980) as "r-selective", very fast-growing (tripling of weight in one year) with a short life span (5 to 8 years).

The biological nature of fisheries production of these five species was compared by running three sets of simulations. In order to look at long-term production, simulations of equilibrium yield versus relative fishing mortality (effort) were made. In Figures 5 and 7, a range of equilibrium yield curves for each species, one for constant

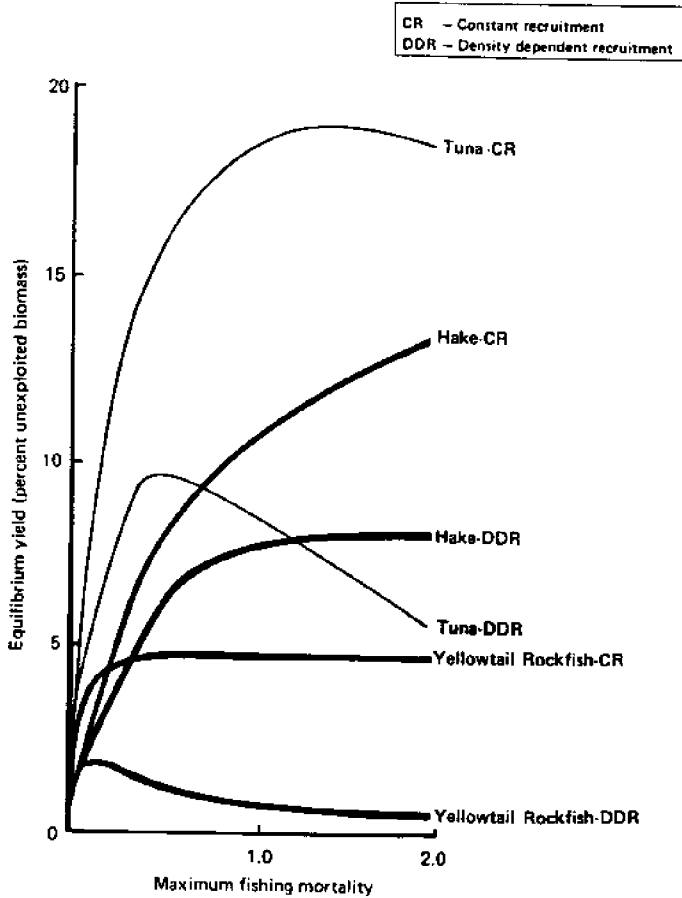


Figure 6. Equilibrium yield of yellowtail rockfish, hake, and yellowfin tuna as percent of unexploited biomass.

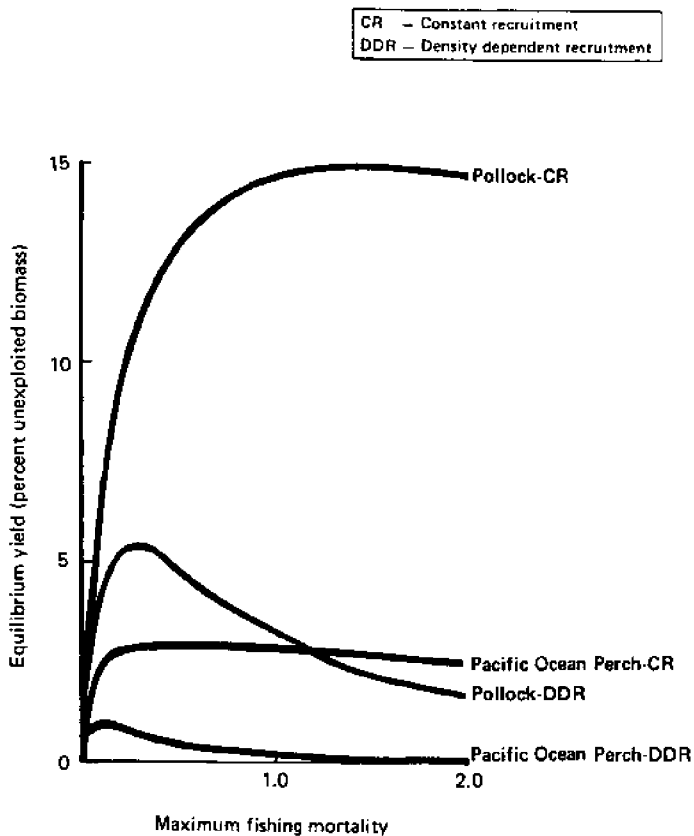


Figure 7. Equilibrium yield of Pacific ocean perch and pollock as percent of unexploited biomass.

recruitment (CR) and one for density dependent-recruitment (DDR), are presented. Equilibrium yield is given as a fraction of unexploited biomass, and effort is scaled to the fishing mortality on the fully-recruited segment of the stock. Some model parameters are given in Table 3.

Table 3. Some simulation model parameters

	Hake	YT	Pollock	POP	YF
Annual Inst. M	Variable	.088	.4	.05	.8
Age @ 1st recruit.	3	5	2	6	1
Age @ 100% recruit.	10	14	5	15	5

Perhaps the most interesting result indicated by these simulations is that a rockfish stock such as yellowtail or POP has a maximum surplus fishery production of from 1 percent to 5 percent of their unexploited biomass, hake and pollock from 5 percent to 15 percent of their unexploited biomass, and yellowfin tuna from 10 percent to 20 percent of its unexploited biomass. Looking back at Table 2, one can see how much in excess of sustainable production (1 percent to 2 percent of unexploited biomass, or approximately 20,000 to 40,000 t per year), the POP catch of the 1960s was (approximately 220,000 t per year). It is also quite apparent that, in order for rockfish stocks to realize their maximum sustained fishery production, fishing mortality on the fully-recruited stock must be kept at a much lower rate than in the case of hake or pollock.

Figure 8 illustrates the responses of these stocks to the fishing-up process. The ratio of catch in the first five years of exploitation of a virgin stock to estimated maximum sustainable yield (MSY) is given on the vertical axis and maximum age-specific fishing mortality is again given on the horizontal axis. These runs were made with density-dependent stock-recruit relationships only due to the fact that, in most cases, recruitment is delayed enough so that the effect of five years fishing on recruitment will not be felt during that five-year time period. This figure clearly points out that the two rockfish stocks are capable of producing ten to twenty times MSY while being fished-up, and at effort levels not much in excess of MSY effort, whereas the gadoid stocks (hake, pollock) are capable of producing only two to four times MSY, and then only at relatively high levels of effort. One can certainly see evidence of this in the fishery catch history for POP and selected west coast rockfish of Figures 1 and 2.

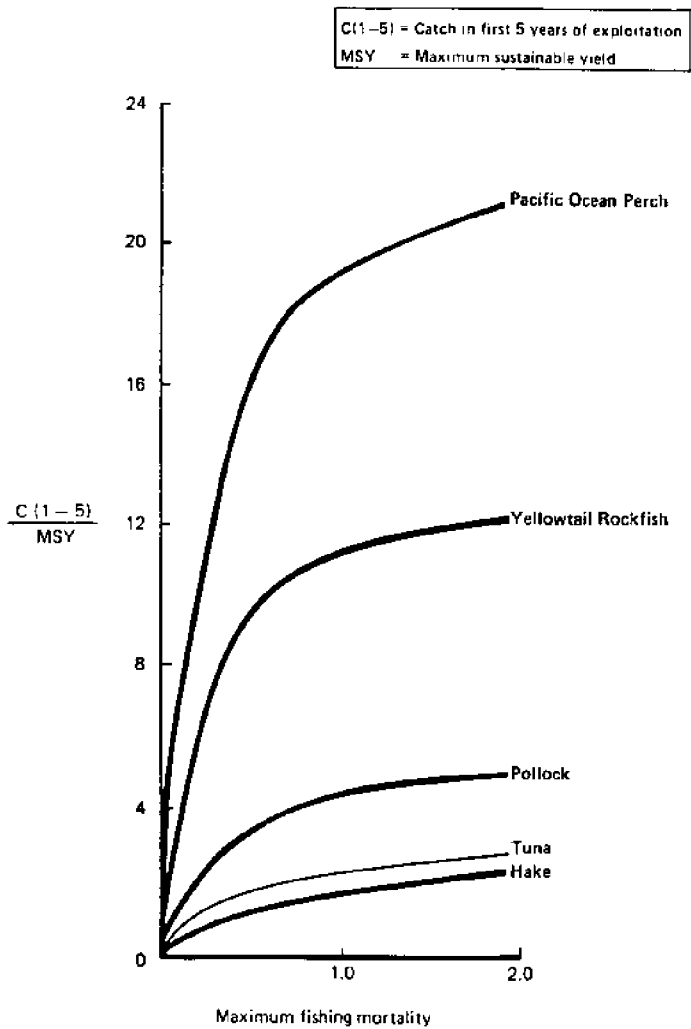


Figure 8. Mean catch in first five years of exploitation as fraction of maximum sustainable yield (MSY).

Figures 9 and 10 illustrate the responses of these stocks to overfishing in terms of their expected recovery times. The vertical axis of Figure 9 gives the average number of years each of these stocks would be expected to take to recover from an equilibrium biomass of 50 percent that would support MSY ($B_{0.5}$) to 95 percent of $B_{0.5}$ under density-dependent recruitment. Recovery times are computed at three levels of effort: no effort, 50 percent of effort estimated to produce MSY, and MSY effort. Along the lines of Gulland (1983), define $f_{0.1}$ as the fishing effort producing an equilibrium yield at which the marginal equilibrium yield from an additional unit of effort is one-tenth the marginal equilibrium yield at very low levels of fishing (a point beyond which there is little reward in increasing fishing under a constant recruitment scenario). If we define $B_{0.1}$ as the equilibrium biomass that produces that yield, then Figure 10 gives the average number of years each of these stocks would be expected to take to recover from an equilibrium biomass of 50 percent $B_{0.1}$ to 95 percent of $B_{0.1}$ under constant recruitment. Again, recovery times are computed at three levels of effort: no effort, 50 percent of $f_{0.1}$, and $f_{0.1}$.

There is no question that recovery rates for rockfish are much slower than those for hake and pollock. What is most alarming, however, is the projected slow rate of recovery from overfishing of rockfish (yellowtail, POP) when that recovery is allowed to occur at an effort level equal to that which produces MSY. That is presently the way both widow and yellowtail rockfish are being managed in PFMC.

Finally, there is a vast difference in expected recovery rates between the density-dependent (Figure 9) and constant (Figure 10) recruitment scenarios. One major problem confronting fisheries biologists is whether or not to assume density-dependent recruitment when making these types of projections. The ages at 50 percent recruitment are estimated to be 9 and 10 years for yellowtail rockfish and POP respectively. Therefore this is the average amount of time one would expect for the affects of fishing on recruitment to be felt by these stocks. Looking at the catch histories of Figures 1 and 2, one would guess that some of these rockfish standing stocks are so available to modern fishing gear that they can be drastically depleted before any such relationship can be tested. In any case, it is clear that once a rockfish stock is fished down to a level where subsequent recruitment is affected, one can expect the stock to take a long time (even without a fishery) to recover to a level that can sustain production of as little as one-tenth to one-twentieth of the yield it produced in the fishing-up process.

What does all of this mean in terms of west coast fisheries management? Most simply stated, I believe it means that fisheries that develop while fishing-up long-lived, low-production stocks such as rockfish and sablefish attain a harvesting potential that vastly exceeds the long-term productive capacity of the resource. This does not seem to be the case for more productive stocks such as hake and pollock. Unquestionably this has already happened along the west coast of the U.S. In the past when fisheries became overdeveloped and eventually depleted resources to the point of economic extinction, they simply moved on to other, generally less desirable, stocks. What this presently portends is a significant exodus of the most mobile (and sophisticated) domestic groundfish effort from the U.S. west coast to the Gulf of Alaska, east Bering Sea, and Aleu-

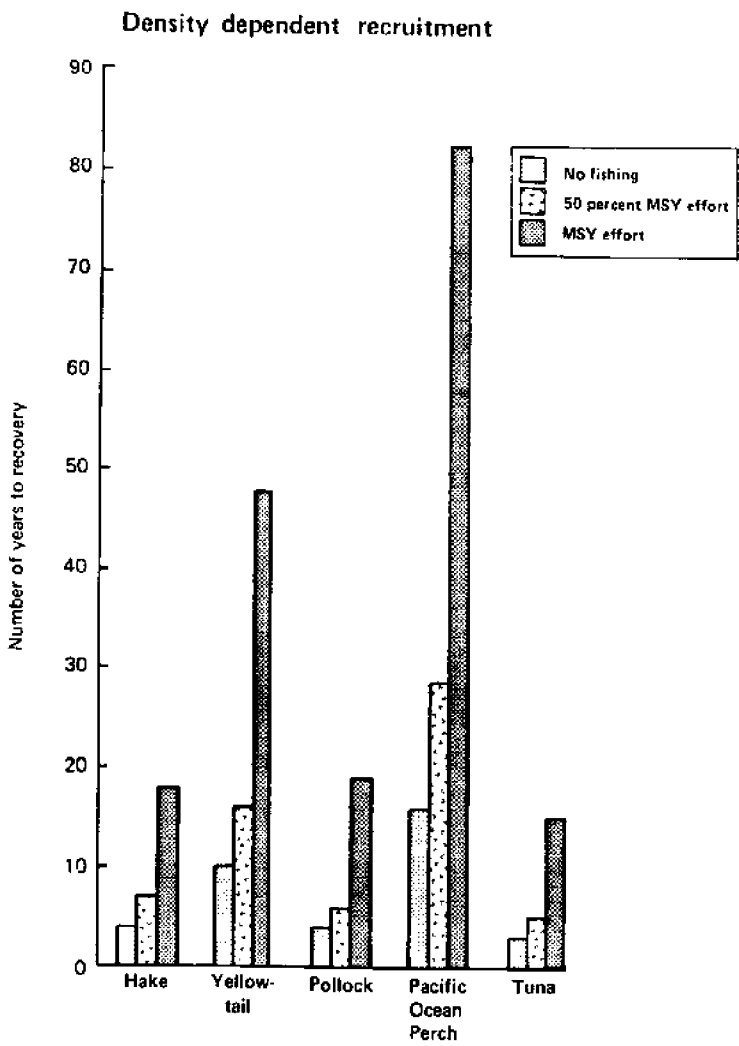


Figure 9. Number of years needed to recover from $0.5B_{MSY}$ to $0.95B_{MSY}$ under density dependent recruitment.

Constant recruitment

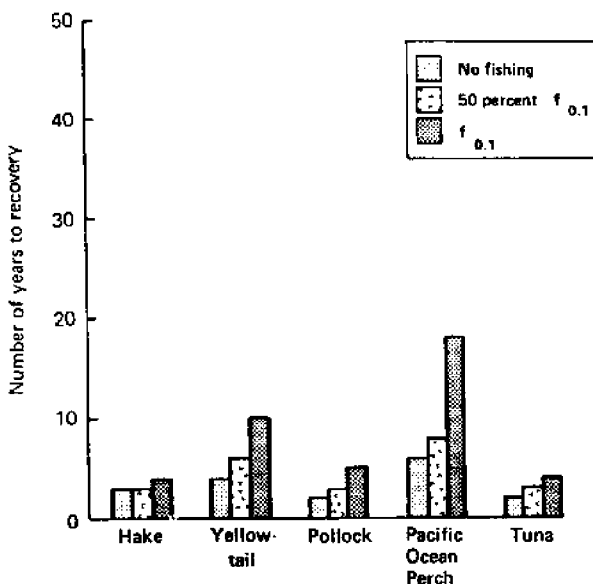


Figure 10. Number of years needed to recover from $0.5B_{0.1}$ to $0.95B_{0.1}$ under constant recruitment.

tians. This effort will not only inject itself into the developing joint venture fisheries for pollock and yellowfin sole, but into efficient and hasty exploitation of the coastal rockfish communities of the region as soon as marketing channels are established. Unless this fishing-up process is controlled, the same thing will happen in the Alaska region that is presently happening along the U.S. west coast.

At the same time, I believe that west coast fisheries will continue at a subsistence level, however keeping enough pressure on these slow-growing stocks to preclude their recovery to levels of peak sustained production. Although this has been said many times, it seems the only possible way to protect the productive capacity of fish resources such as rockfish and sablefish is to control development and capitalization of the fishery at the outset. The biological nature of these species seems to preclude their recovery from overfishing while still maintaining any semblance of a viable and productive fishery. The U.S. west coast domestic rockfish fisheries, particularly off the Washington and Oregon coasts, are, in my opinion, most likely beyond hope. Therefore, it is of paramount

importance for fisheries biologists and managers of the Alaska region to develop a plan for orderly and conservative development of their domestic rockfish and sablefish fisheries. If POP and sablefish are any indication, the resources are certainly as significant as those already heavily exploited farther to the south off the U.S. west coast. A first step would be thorough examination of NMFS resource surveys of the three regions (U.S. west coast, Gulf of Alaska, east Bering Sea, Aleutians) to get a rough idea of the comparative fishery production potential of these types of groundfish resources in the three regions. This might then serve as a basis for attempts to control the rate of domestic groundfish fishery development in the Alaska region to avoid the negative experiences realized elsewhere.

MULTI-SPECIES FISHERIES MANAGEMENT

In recent years, much rhetoric has been devoted to the concept of multi-species fisheries management. At the present time, rockfish (*Sebastes* spp.) along the U.S. west coast are managed in four categories: coastwide widow rockfish, INPFC Vancouver Area POP, INPFC Columbia Area POP, and INPFC Vancouver/Columbia (Van/Col) Area *Sebastes* Complex (all *Sebastes* species other than widow, shortbelly, POP, and thornyheads). In 1983, the INPFC Van/Col Area *Sebastes* Complex accounted for 20 percent of the total domestic groundfish landings and, as was reported earlier, with widow rockfish, has recently been the management unit that received the major groundfish management attention of PFMC. There is presently a push from some segments of the fishing industry to manage all *Sebastes* species as a coastwide unit. If that were to happen, Table 1 reveals that about 50 percent of the total domestic groundfish landings would be contained in one management unit. What does this push to simplify west coast rockfish management portend for total fishery production?

This question may best be answered by careful study of the current PFMC Groundfish Management Team (GMT) recommendations for management of the Van/Col *Sebastes* fishery in 1985 (PFMC 1984). At the present time the Van/Col *Sebastes* catch is made up of three distinct components: yellowtail rockfish, canary rockfish, and remaining rockfish. Table 4 gives some indication of the current status of these three components of the fishery.

Table 4. Recent estimates of allowable catch and stock production for INPFC Vancouver/Columbia *Sebastes* Complex

	MSY	1984		1985
		ABC	Catch	ABC
Yellowtail	2900	2900	5221	2700
Canary	-	2100	1940	2900
Remaining RF	-	<u>4200</u>	<u>3691</u>	<u>4500</u>
Total		9200	10852	10100

The current stock assessment for yellowtail rockfish (Tagart 1984) indicates that the stock biomass is significantly below that which

will produce MSY. Consequently, the GMT has set the yellowtail Allowable Biological Catch (ABC) below MSY in the hope that the stock will be allowed to recover to MSY levels. The stock assessment for canary rockfish (Golden and Demory 1984) is inconclusive in terms of making direct estimates of fishery production. However, there are indications that the stock is not presently being overfished, and that the current ABC (set based on historical catches) is fairly close to MSY. At present there are no biological data available to assess the status of the remaining rockfish category in the INPFC Van/Col area. The 1984 and 1985 ABCs were set based on average landings over three year periods.

The GMT made its recommendations for management of the 1985 Van/Col *Sebastes* fishery in light of management goals set by PFMC in 1984; to maintain a constant catch of the complex throughout the year while providing conservation for yellowtail and canary rockfish. Unfortunately, it appears that whereas the catch of the complex will not greatly exceed its ABC in 1984, the catch of yellowtail rockfish will exceed its ABC by a multiple of 1.8 (Table 3). The GMT therefore looked at several options for management of this complex in 1985, and has tried to predict what the 1985 catch would look like under each of them, based on extrapolation of historical catch records. The likely impacts of three of these options are given below in Table 5.

Table 5. Expected catches (t) from three 1985 Van/Col *Sebastes* management options

	<u>ABC</u>	<u>Status Quo</u>	<u>Area Mgt.</u>	<u>Weakest Link</u>
Yellowtail	2700	4848	2700	2700
Canary	2900	1808	3279	986
Remaining RF	<u>4500</u>	<u>3444</u>	<u>4121</u>	<u>1444</u>
Total	10100	10100	10100	5130

In the first option, Status Quo, the quota for the complex is set at the sum of the individual component ABCs (10100 t) and the fishery is allowed to proceed, as in past years, until that quota is attained. The GMT projects, however, that under this option yellowtail will again be significantly overharvested. In the second option, Area Mgt., the INPFC Columbia area is divided into two at Cape Falcon (Figure 11, Buchanan 1984), and separate quotas are set on the complex in two resultant subareas (INPFC Van/Col north and south of Cape Falcon). Figure 11 shows that, historically, a major portion of the yellowtail catch has been taken north of Cape Falcon and a major portion of the canary catch south of Cape Falcon. If this holds true in 1985, the GMT feels that by reapportioning the *Sebastes* catch between the two subareas, yellowtail rockfish could be protected while, at the same time maintaining total Van/Col *Sebastes* production at or near the combined component ABCs. The major problem with this approach is that it shifts the expected balance in the fishery from the historical 65/35 north/south ratio to the projected 24/76

north/south ratio. In the final option, Weakest Link, the quota is set for the entire Van/Col Sebastes Complex such that the fishery is allowed to proceed as in the past but that the ABC for yellowtail rockfish is not exceeded. Of course, the major problem with this approach is that in order to protect yellowtail and maintain the simplest possible management of the Van/Col Sebastes Complex, both canary and remaining rockfish would have to be significantly underharvested.

The GMT thus feels that if the Van/Col Sebastes Complex is to be managed as a single unit with a single quota and under the guidelines set by PFMC, the total yield from the fishery will have to be reduced to around half what the combined stocks are capable of producing. The only way the GMT can see to increase production of this resource to levels close to the sum of the individual ABCs is for management to become more detailed, either in terms of subarea management or separate component species management. This process of setting the 1985 ABCs for this multi-species complex has led me to hypothesize that the more general or diverse the target of management is, the more biologically conservative the management policy must be in order to maintain the long-term productive capacity of the resource base. This point was made years ago by Paulik, Horton, and Larkin (1967) in their analytic discussion of the problem of exploitation of multiple salmon stocks by a common fishery. These scientists came to the basic conclusion that it is very unlikely that a single fishery exploiting a multitude of stocks, each with different rates of production, can harvest all stocks simultaneously at their maximum rates of fishery production.

In light of the above discourse, it is interesting to speculate on the impact of consolidating all Sebastes species into one management unit on coastwide fishery production. As with the Van/Col Sebastes Complex, my guess is that in order not to allow any component stock to fall below its maximum production level, consolidation might require reducing the overall coastside Sebastes catch by as much as 50 percent. Along this line, the West Coast Research/Management Task Force at the Northwest and Alaska Fisheries Center is presently conducting research on likely impacts of various levels of resolution (or simplicity) of Sebastes management along the U.S. west coast.

SUMMARY

The major points of this paper can be summarized as follows:

1. Fisheries that develop while fishing-up long-lived low-production stocks such as rockfish (Sebastes spp.) and sablefish attain a harvesting potential that vastly exceeds the long-term productive capacity of the resource. The most effective, and perhaps only, way to manage these types of fish stocks for sustained production is to control development and capitalization of the fishery at the outset. The biological nature of these species seem to preclude their recovery from overfishing while still maintaining any semblance of a viable and productive fishery.
2. The more general or diverse the target of multi-species management is, the more biologically conservative the management policy must be to maintain the long-term production of the resource.

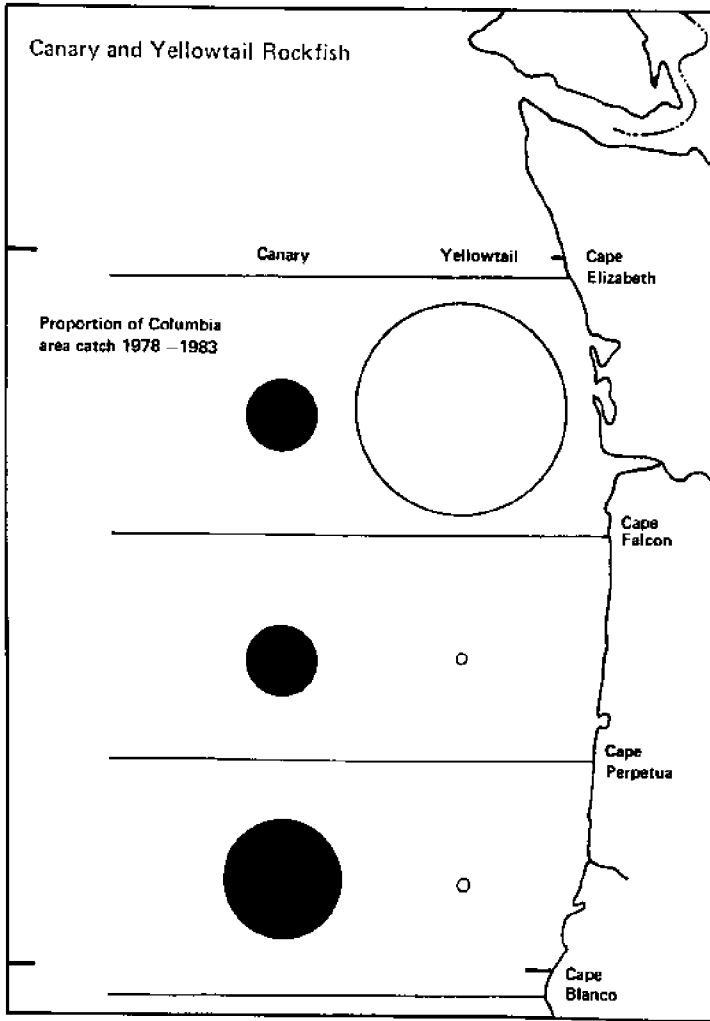


Figure 11. INPFC Columbia area trawl landings of canary and yellowtail rockfish, 1978-83 average (from Buchanan 1984).

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Discussion

HUPPERT: One of the last things you said struck me as being diametrically opposed to what Jim Wilson told us earlier in regard to fishing on multiple stocks. I was speculating about why two intelligent observers of the same sort of situation would come to opposite conclusions. My guess is that, in looking at the simultaneous harvest of several species, you assumed that all species are always harvested in proportion to their abundance in the water. Jim Wilson assumed that once the abundance on a particular species is reduced far enough, all fishing effort will be directed off that species and it will be allowed to rebalance. Is this a fair thing to say about your assumption regarding that statement?

FRANCIS: I think that you are right. Basically the difference between what we've done and what Jim has done is that we did ours on the back of an envelope, and he may have done his in a computer. When you look at the history of the fishery for Sebastes in the Vancouver-Columbia area off the Washington/Oregon coast, you find that as these harvest guidelines have been established certain species have been greatly over-harvested relative to the amount that we would like to see taken, and other species are under-harvested. In order to avoid that problem, the groundfish team feels that one of two things has to happen. One is that the total yield from the complex has to be reduced. Then you are harvesting by the weakest link approach. You are going to harvest your weakest link, perhaps your most productive species too, at the level that you'd like to, and the rest are going to fall by the wayside. Secondly, you are going to make your management policy more complex. For example, you may want to manage by areas, you may want to manage by species. In other words, when the harvest guidelines for a species are exceeded, then you remove it from the catch. What I'm saying is, if you want to manage in a very general way, then you are going to have to

be biologically very conservative. The more conservative, and the more specific your management becomes, the less conservative you're going to have to be.

FISHER: Jim Wilson said something else that is pertinent, and it's the point that strikes home closest to me, the fisherman, in terms of what's going to be caught. He did mention price entering this equation. I'll tell you this, those species that are going to be hit are the species that yield me the greatest bottomline, so that high prices are not always the determinate. As far as we are concerned, and I think the other guys will back me up, it's what is going to yield the greatest buck. That's independent of species availability, it's independent of price. It is bounded upon what's going to put the greatest number of bucks in my pocket. As Bart says, "We're fishing for dollars."

FRANCIS: I think that you are absolutely right. In order for *Sebastes* to yield the highest dollar and to sustain production, those two things are contradictory. The stock level of *Sebastes* that has to be maintained to produce maximum surplus production is high enough that you could support a significant, economically viable fishery, fishing it down for some time. If uncontrolled, the immediate response of the fishery, even when the population is at the sustained level, is to go out and harvest the same way that they did with Pacific Ocean perch. Rather than harvesting them at 20 times the MSY, maybe they will harvest them five times the MSY. But you can still have a large standing stock and have a lot of available fish in order to maintain sustained production. So, I think that the two things are in real conflict relative to *Sebastes*, probably not so much relative to pollock. Keep that in mind when we are developing management policies for these two types of animals, that biologically they are very different.

ARON: The stock assessment strategy we use at the center is to take into account the economic value of the fishery, Barry Fisher's bottomline. Indeed, one could get improved forecasts, improved stock assessments of rockfish, but that would cost a great deal. On a fixed budget, it means giving up stock assessment work in areas that produce a better economic profit for the fisherman. That's the trade-off that we have had to make to study rockfish. To improve our assessments would be very expensive, costing us in the stock assessments for species that provide a greater profit for the fisherman. If we want better stock assessments of any stock on a fixed budget, we will have to give up work elsewhere. If you don't want to give up work elsewhere, it means putting more resources into the system. It might mean getting cooperation from the fleet in terms of gathering data which could then be used. It may not mean that federal government would have to generate the income; it may mean that the fleet would have to work with us, and that means more than just providing us with log books. It may mean setting out a fishing strategy that allows data to be gathered in a scientific way.

FISHER: I'd like to make a couple of comments on that last point. Dr. Aron, I'd add dollars to that. In 1978, we started the joint venture. I went to Oregon Department of Fish and Wildlife and said, "You aren't going to get the assessments off of this fish that we're catching. Traditionally, we've paid assessments for all the groundfish that we land. You're not going to get it on these joint ventures the way they are structured." To that point in time, it was experimental. They

said, "No, we don't have any machinery, any procedures whereby we can take in this assessment money." This year, if all ventures reach their targets, we're exporting \$100 million worth of fish to help correct the negative balance of payments. I would submit and I risk becoming a pariah among my peers, that you management people should really get us to pay assessments. You're talking about economic rent. That gives us troubles. Assessments don't give us any trouble. And, I, for one, would volunteer. Keep the assessments reasonable, so that you don't screw the fishery down.

The second point is regarding data on perch. Bob, you're saying you don't know what happened up here on rockfish and perch. It's already happened. We set up a little perch fishery out in the Aleutians this fall, and we found fish. There are catch records of that little adventure on an American floater with American boats that were targeting on perch. The pack was such that we had the fish divided into nine different grades, according to size. I'd submit that the ADF&G and the Northwest Fisheries Center should grab some of that data from the company and use it. We ran into some very interesting things on age and frequency. We think that frequency and sex seem to go along with a really good bell-shaped curve, much as you'd expect perhaps even in a virgin population. Interesting thing is that almost all of those fish were taken inside the 12 miles. Whenever we went outside 12 miles, we couldn't find much. In the areas where the foreigners haven't been permitted to go, there were some fish. How do we know that there hasn't been any effort there? The trolls came up laden with pieces of coral and bottom debris of the type that tells you that that bottom hasn't been trolled much for a long time. I'd submit that this is a good source of data.

I would also repeat: don't let us get away with catching 500 and 600 and 700 thousand tons. I applaud Governor Sheffield's statements yesterday about how, when the foreigners get out, the income is going to go down. You really should be getting some income from us in the way of assessments.

Pacific Coast Groundfish Management: Evolution and Prospects

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SUMMARY

Although federal management of Pacific coast groundfish strongly resembles previous state and international management programs, the current fishery management plan (FMP) contains important new elements as well. The groundfish FMP adopts state fishing gear regulations, but seeks more coastwide uniformity. As in previous international agreements, foreign fishing is limited to Pacific whiting and jack mackerel (with minimum incidental catch of other groundfish), and is prohibited in areas sensitive to U.S. interests. Development of major domestic rockfish and joint venture fishing has changed the fishery and has challenged the management system to devise approaches to new problems.

Annual harvest quotas or "guidelines" were established for several commercial species. These are based on "optimum yield" estimates derived from biological stock assessments. A major advance in the FMP is its flexible procedure for modifying the annual harvest guidelines in response to new information and changing fishery conditions. Individual vessel trip catch and frequency limits, designed to extend the rockfish fishery over the year, represent another important innovation. These regulations affect not only the pace and volume of catch, but also the distribution of catch among size-classes of vessels. In addition, the individual vessel trip limit reduces the economic incentive for greater vessel catching capacity.

Further progress could be made in setting optimum yield objectives and in addressing economic objectives of management. The FMP's optimum yield discussion ignores ecological interactions among species, and it treats aggregate yield from a mix of rockfish species as the sum of the yields from individual stocks. This is because there are no quantitative ecological models. Research suggests that optimum yields

for individual species should not be independent of the quantity and mix of other species being fished. Further, even if each species is ecologically independent, in multi-species harvesting some species are fished at greater or lesser rates than they would be in a single species harvest. Development of multi-species optimum yields should be high on the research agenda.

To generate greater net economic benefits, access must be limited either with license limitation or with individual fisherman quotas. License limitation provides minimal control over the excess vessel investment. Licenses do not replace the various harvest quotas, however, since the multi-species fleet would still over-fish individual species.

To forestall excessive capital investment among licensees, some meaningful control over up-grading fishing technology and vessel replacement is needed. "Individual fisherman quotas" eliminate the need for these controls by designating the quantity of fish to be caught by each fisherman. Despite the possible additional administrative and enforcement costs of individual quotas, this approach should be seriously considered for Pacific coast groundfish.

INTRODUCTION

During four years development, the Pacific Fishery Management Council (PFMC) worked out an innovative and ambitious plan for Pacific coast groundfish. The final plan covers a broad variety of fish species taken by the whole gamut of fishing methods (trawls, pots, lines and gill nets). It addresses fish stocks in all stages of development and depletion. It establishes harvest guidelines for the more heavily exploited fish stocks, and includes a variety of regulatory methods to assure that these guidelines are met. Finally, and possibly most important, the groundfish fisheries management plan (FMP) provides flexible procedures for altering harvest guidelines and associated regulations in response to new information.

Both the FMP and the periodic reports compiled by the Groundfish Management Team (hereafter called "the team") provide comprehensive documentation of the fish harvests, fishing fleet, and management alternatives considered. Therefore, I provide only a brief background summary on the fishery and plan in this paper. Beyond that summary, I describe the underlying management policy and anticipate modifications that might be necessary to meet reasonable biological and economic objectives.

In reviewing and evaluating the management effort I focus on two particular aspects: setting "optimum yields" and the possible introduction of limited access to the groundfish fishery. These are two prevalent and controversial topics in fisheries management. Consideration of these demands intense scrutiny of basic assumptions and objectives and comprehensive analysis of economic and ecological systems. Further development of a coherent policy for Pacific coast groundfish management requires careful examination of these issues. My objective here is not to present detailed proposals for changing groundfish management. Rather, I will suggest some approaches for further consideration, and contribute to public discussion of these issues--a discussion that must precede any effective consensus in support of revised management strategies.

SCOPE OF THE GROUNDFISH PLAN

The groundfish FMP covers commercial and recreational fishing in the three to 200 mile zone of five International North Pacific Fisheries Commission (INPFC) statistical areas on the Pacific Coast (Figure 1). Only one significant area of the groundfish fishery -- Puget Sound-- is not covered by the plan. Total shoreside and joint venture harvests increased from 57,000 mt in 1976 to 187,000 mt in 1982, and then declined slightly to 170,000 mt in 1983 (Table 1). The recent decline was primarily due to the decreased catch of widow rockfish.

Gross ex-vessel value of shoreside landings grew rapidly from 1976 through 1982 caused both by rising prices and increasing catch. Nominal ex-vessel price-per-ton for domestic groundfish peaked at \$532/mt in 1979, dropped about 23 percent from 1979 to 1980, and then climbed back almost to the 1979 level by 1983. After adjustment for inflation, however, the 1983 average ex-vessel price is 24 percent below the 1979 price, and lower than the average 1976 price. These changes in gross value of landings are caused both by fluctuations in the market for fish and by changing species composition in the catch. Higher-priced species, like sablefish and the soles, account for an decreasing proportion of the total harvest, while lower-priced species, like rockfish, account for an increasing share.

During the same time span, from 1976 to 1983, foreign catch off of Washington, Oregon and California fell from 225,000 mt to nothing. During 1984, both Polish and Soviet fishing fleets are gaining renewed access to the Pacific coast whiting fishery. Preliminary indications are that around 30,000 mt will be released for foreign fishing this year. Joint venture fishing, arranged primarily through one firm (Marine Resources Company) grew rapidly after 1978. Current projections indicate that the 1984 catch may reach 100,000 mt, for the first time exceeding shoreside landings.

Eighty-four species are currently listed in the groundfish management unit. For practical purposes these can be roughly divided into five categories: rockfish, Pacific whiting, sablefish, other roundfish, and flatfish. Table 2a presents the distribution of catch by species groups and among the INPFC statistical areas, while Table 2b displays the catch by gear type. Of the \$70.4 million in 1982 ex-vessel revenue, 82 percent was earned by trawl vessels, 6.7 percent by fishermen using fish pots and traps, and the remainder by vessels using longline and other gears. About 15 percent of the dollar value of trawl vessel sales were from over-the-side deliveries for joint venture fishing companies operating foreign-owned processing ships.

Pacific whiting, which accounts for the largest harvested tonnage, is caught primarily by domestic fishing vessels in joint venture operations. Rockfish, the second leading species group, includes Pacific Ocean perch, shortbelly rockfish, widow rockfish and the so-called *Sebastes* complex. The *Sebastes* complex is dominated by yellowtail and canary rockfish in the INPFC Vancouver and Columbia areas and by chilipepper and bocaccio rockfish in the Monterey and Conception areas. The principal species in the flatfish group are Dover sole, English sole and petrale sole. Sablefish, accounting for the fourth largest tonnage, is caught by a large number of fish pot fishermen as well as by trawl gear. Pacific cod and lingcod dominate the "other roundfish" category. Other miscellaneous fish in the FMP

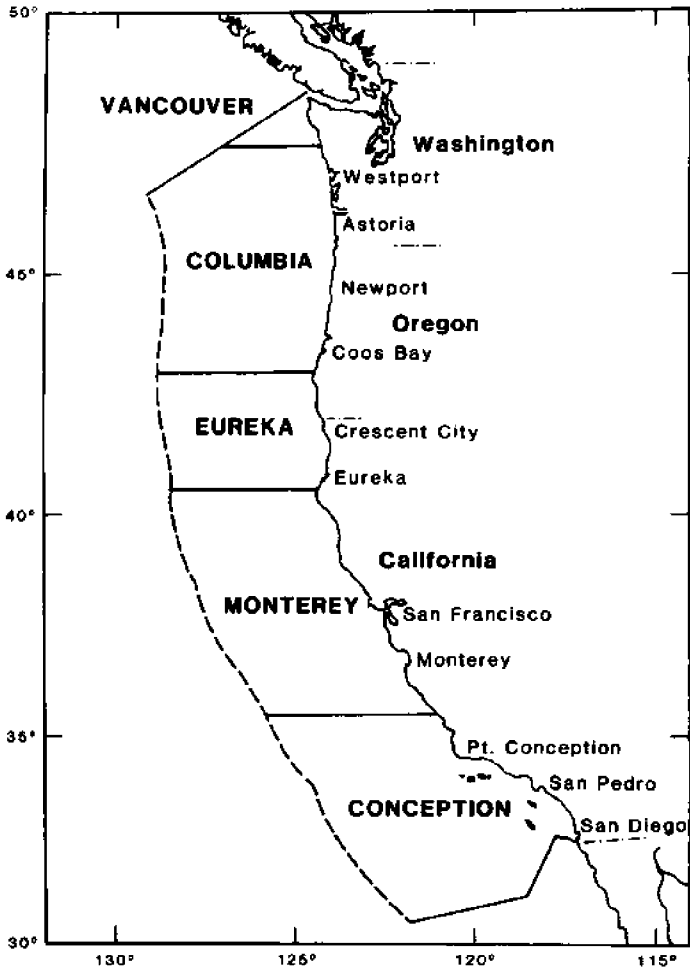


Figure 1. Pacific Coast groundfish management areas.

Table 1. 1975-1983 Pacific Coast groundfish harvest, quantity and ex-vessel value

Year	Domestic Harvests				Foreign ¹	
	Shoreside 1,000 mt	\$ mil.	Joint Venture 1,000 mt	\$ mil.	1,000 mt	\$ mil.
1976	57.0	19.4	-	-	255.0	unk.
1977	59.8	20.7	-	-	118.0	unk.
1978	71.6	34.5	0.9	0.1	98.0	13.3
1979	90.0	47.9	8.8	1.2	117.0	15.9
1980	87.9	37.1	26.8	3.3	44.6	5.5
1981	103.9	46.8	43.8	6.3	70.9	10.2
1982	119.0	60.0	67.7	10.4	7.3	1.1
1983	97.7	52.2	72.1	10.2	-	-

¹ Foreign fishery value calculated on assumption that price is equal to joint venture average price per metric ton.

Sources: 1976 data from Pacific Coast Groundfish FMP, p. 8-3.
1977-1980 data from C. Korson, Economic status of the Washington, Oregon, and California groundfish fishery in 1981. NMFS, Southwest Regional Office, Terminal Island, CA.

1981-1983 harvest quantities from PACFIN Report No. 002.

1981-1983 ex-vessel values from PACFIN Report No. 022.

Table 2a. 1982 Pacific Coast commercial groundfish harvests by INPFC area by species group (metric tons)

Species Group	Vancouver	Columbia	Eureka	Monterey	Conception
Rockfish	6693	27336	8170	14996	4466
Sablefish	2422	6348	3791	5083	946
Pacific whiting	30646	36410	8407	115	tr
Other roundfish	1361	1986	559	848	163
Flatfish	3860	14157	7411	6643	563
Others	107	109	99	143	111
Total	45089	86346	28437	27828	6222

Source: PACFIN Report No. 001. Includes joint venture catch.

Table 2b. 1982 Pacific Coast commercial groundfish harvests by gear type and species group (metric tons)

Species Group	Groundfish Trawls	Pots & Traps	Shrimp Trawl	Gill-Nets	Hook & Line
Rockfish	55646	30	1091	1639	3247
Sablefish	10159	6494	79	144	1657
Pacific whiting	75577	-	-	-	1
Other roundfish	4264	5	95	180	353
Flatfish	32419	1	128	45	11
Others	374	1	2	145	38
Total	178,439	6531	1396	2153	5307

Source: PACFIN Report No. 009.

are the various sharks, skates, rays, rattails, and jack mackerel taken north of 39° N. latitude.

The number of domestic fishing vessels active in the groundfish fishery changed rapidly from 1976 to 1983 (Table 3). Of particular

Table 3. Groundfish fleet size, 1976-1982

Year	Number of Vessels with Specified Gear:		
	Otter Trawl	Pot/Trap	Longline
1976	269	36	N/A
1977	286	60	N/A
1978	351	119	N/A
1979	472	207	N/A
1980	458	116	205
1981	409	66	191
1982	443	82	208

Sources: 1981 and 1982 Status Reports on the Pacific Coast groundfish fishery, compiled by C. Korson, NMFS, Southwest Regional Office; and PACFIN Report No. 022, PFMC Source Report: Commercial Groundfish Estimated Dollar Values of Landed Catch.

significance is the trawler fleet, which increased by 174 vessels. Most of the new vessels entering the fleet were larger, more powerful vessels with improved navigation, high-speed winches, stern ramps and mid-water trawling capability. These vessels tend to focus on the high-output, but lower-unit-value fisheries such as widow rockfish and Pacific whiting. Some of these vessels also participated in joint venture catches. Because of the ex-vessel prices and very high costs of borrowing capital, many of these newer vessels encountered financial difficulties.

SYNOPSIS OF FMP CONTENT

The Pacific coast groundfish FMP provides a lengthy discussion of alternatives to and implementation procedures for those measures chosen by the Pacific Fishery Management Council. I find the following five elements to be the most essential features of the plan.

BIOLOGICAL YIELDS

For each important groundfish stock, the team established a level of "maximum sustainable yield" (MSY), defined as the "average over a reasonable length of time of the largest catch which can be taken

Table 4. Pacific Coast groundfish harvests, estimated maximum sustainable yields and allowable biological catch (ABC) (metric tons)

Species	Annual Harvest			Estimated MSY	1984 ABC
	1976	1982	1983		
Pacific Ocean perch	2,336	893	1,659	5,300	1,550
Widow rockfish	-	25,445	9,904	10,714	9,300
Shortbelly rockfish	-	3	1	44,250	10,000
" <u>Sebastes</u> complex"	20,051	35,515	35,919	33,000	28,000
Boccaccio	unk	unk	unk	6,100	6,100
Canary	unk	4,296	3,654	5,900	2,700
Chilipepper	unk	unk	unk	2,300	2,300
Yellowtail	unk	8,715	8,887	5,000	3,200
Remaining rockfish	unk	unk	unk	unk	13,700
Sablefish	7,028	18,592	14,533	13,400	13,400
Pacific whiting					
Shoreside	trace	1,023	1,051		
"Joint Venture"	0	67,465	72,100	175,500	175,500
Foreign Catch	231,000	7,089	0		
Pacific cod	2,165	910	597	unk	3,100
Lingcod	2,542	3,809	4,146	7,000	7,000
Other roundfish	5,187	4,918	4,762	10,100	10,100
Dover sole	13,179	20,916	19,819	19,000	19,000
English sole	4,488	2,771	2,336	4,500	4,500
Petrale sole	2,816	2,619	2,193	3,200	3,200
Other flatfish	4,690	11,691	9,581	15,400	15,400
Totals	295,482	193,550	169,329	341,664	300,050

Sources: 1976 harvests from Groundfish FMP, Table 8. 1982 and 1983 harvests from PACFIN Report No. 002. MSY estimates from the FMP, Table 13 and various reports of the Groundfish Team. ABC's and OY's from the 1984 regulations (Federal Register, Vol. 49, No. 5; January 9, 1984 pp. 1060-1061).

Notes: * "Sebastes complex" is all rockfish except Pacific Ocean perch, widow and shortbelly rockfish, and Sebastes sp.
 unk = unknown harvest level.

continuously from a stock" (FMP p.2-5). Due to variations in recruitment, ocean conditions and other uncontrolled factors, however, it may not be desirable to catch the MSY each year. Accordingly, the FMP defines "acceptable biological catch" (ABC) as the "seasonally determined catch that may differ from MSY for biological reasons". ABC may be lower than MSY for depleted stocks, like Pacific Ocean perch, and it may be higher than MSY for newly exploited stocks, like widow rockfish.

The FMP lists estimated MSY and ABC for sixteen principal species and species groups in each of the INPFC areas of the Pacific Coast groundfish fishery (Table 4). These estimates rely upon analyses ranging from detailed, long-term assessments to "first approximations". For Pacific whiting, for example, there are extensive studies by Soviet and U.S. scientists that support the estimated MSY of 175,000 mt. Ichthyoplankton and hydroacoustic/trawl survey information permitted the team to estimate the proportions of the total MSY occurring in each INPFC area. At the other extreme, only rudimentary stock assessments are available for lingcod, Pacific cod, "other flatfish", "remaining rockfish" or sablefish. Estimated ABCs are sometimes set as a proportion of recent annual harvest rates, where the proportion chosen is based upon collective judgement of the team as to the impact of recent harvest levels on the stock. Evidence used in this judgement includes anecdotal accounts from fishermen, estimated catch-per-efforts, changes in length or age composition in landings, and how long catch levels have been sustained.

OPTIMUM YIELD

For all but five groundfish species, "optimum yield" is defined as the amount taken with "legal gear". In other words, the optimum amount is the quantity harvested during a year by fishermen using gear that meets specifications in the plan. This approach to OY is applied to most of the rockfish species, all the flatfish, Pacific cod, lingcod and miscellaneous species. Gear restrictions are expected to protect juvenile fish and to maximize the yield-per-recruit for most of the species. Bag limits on recreational catch are three lingcod per day and 15 rockfish per day.

The FMP lists three main reasons for adopting the non-numerical OY approach. First, the fish stocks covered were not thought to be significantly depleted by commercial fishing at the time the FMP was developed. Second, this multi-species fishery naturally experiences simultaneous harvest of more than one target species and occasional large by-catches of non-target species. Grouping many species under a non-numerical OY "allows the flexibility to manage for maximum yield from the group as a whole rather than the maximum yield from each species". Third, management without using numerical quotas was expected to allow the existing fishery to continue with least impact on "fishermen's freedom".

A variety of special circumstances are cited by the groundfish plan as reasons to assign numerical OYs to some species. For Pacific whiting, widow rockfish, and shortbelly rockfish, the reason is that "they can be caught with mid-water trawls with minimal by-catches". Pacific Ocean perch is "severely depleted and requires special management consideration". For sablefish: "much of the catch is by directed effort with stationary gear", and "harvests in the Monterey Bay area

deserve special attention". Optimum yields for these five in 1984 are equal to the ABCs listed in Table 4, except for sablefish. The sablefish OY is 17,400 mt, 30 percent greater than the ABC.

The PFMC selected a 20-year re-building schedule for Pacific Ocean perch, requiring a low catch level barely exceeding expected incidental catches. For widow rockfish the OY significantly exceeded the MSY during the 1982 and 1983. Presumably, the extent to which OY exceeds MSY determines the rate at which a virgin fish stock is fished down to MSY or some other desirable equilibrium level. As shown in Table 4, the 1984 ABC for widow rockfish is slightly below MSY. This reflects apparent biological over-fishing in some management areas.

BIOLOGICAL ASSESSMENT AND "POINTS OF CONCERN"

Because many of the stock assessments in the groundfish FMP were first-cut, preliminary estimates, and because the non-numerical OY procedure cannot completely protect all important fish stocks from over-fishing, the plan establishes a "groundfish management team" to continually monitor the status of each species and species group. This team is to look for "signs of biological stress", and to report to the council regarding appropriate management measures when a "point of concern" is reached. Specific conditions triggering the point of concern include: biomass falling below the level producing MSY, recruitment falling substantially below replacement level, fishing mortality exceeding that required to take the acceptable biological catch, catch for the year exceeding the acceptable biological catch, and other abnormalities occurring in the biological characteristics of the stock.

After considering the team's report and evaluating comments received during a subsequent public hearing, the council may recommend new management measures to the Northwest Regional Director of the National Marine Fisheries Service. If concurring, the Regional Director will publish proposed regulations, and allow adequate time for public comment before implementing the new regulations. This procedure permits significant flexibility in formulating regulations to achieve the biological conservation of fish stocks consistent with the optimum yields and allowable biological catches established by the council in the plan. Regulations can be changed without going through the full FMP amendment process.

FLEXIBILITY IN SETTING HARVEST GUIDELINES

The "Points of Concern" mechanism allows fast response to biological conservation problems, but does not allow for increases in OY or ABC. The FMP has other procedures, however, for in-season and between-season upward adjustments in OYs and ABCs. If the groundfish management team concludes that increasing catch of a species will not "stress" that or any other species, the team may recommend that the council increase OY or ABC. As with the point of concern, the FMP lists a series of criteria for triggering the upward adjustment in harvest guideline. These criteria include biological factors such as: low fishing mortality rate relative to MSY, large recruitment, large biomass relative to MSY, and any other pertinent factor.

Upward adjustments in numerical OYs are limited to 30 percent during any given year, while reductions under the points of concern procedure

are not limited. Upward adjustments of more than 30 percent in a year must be implemented through a full FMP amendment process, which can take 250 to 300 days. The council may recommend more than one upward adjustment in a year, so long as the sum of all increases does not exceed 30 percent of the original optimum yield. Acceptable biological yields may be changed by any amount. Consequently, the PFMC/NMFS regulations have much greater flexibility in regulating the harvest of non-numerical OY species.

REGULATIONS TO ACHIEVE OPTIMUM YIELD

The optimum yields and acceptable biological catch levels in the FMP represent the maximum recommended catches. A numerical OY is a legal quota, and the fishery regulations must assure that this level of catch is not exceeded during a given calendar year. Although ABC is not a legal quota, it may be taken as a "harvest guideline" for non-numerical OY species. The PMFC has formulated specific regulations to assure that catches do not exceed harvest guidelines for the Sebastes complex, a non-numerical OY species group.

As noted, most species are not assigned numerical OYs. Harvests of these species are regulated only by restrictions on legal gear, area closures, and recreational bag limits. "Legal gear" is defined by extensive and specific requirements regarding: the construction and mesh size in trawl net cod ends (specific to type of trawl operation and region), size and use of chafing gear, size of rollers or bobbins on groundfish trawls, locations for set nets (trammel and gill nets), and escape panels in fish traps. In addition, both traps and longlines must be attended at least once every seven days, and both must also be marked at the surface at each terminal end of the groundline with a pole and flag, light, radar reflector and a buoy displaying clear identification of the owner.

For species having numerical OYs, or for which there is a "point of concern", the "legal gear" requirements are supplemented by additional fishing regulations. The generic form of regulation is prohibiting additional landings once the OY or ABC is attained (for example, a fishing season closure). Because of the in-season flexibility built into the groundfish plan, however, the council may decide that increasing OY is more justifiable than closing the fishery. The FMP also seeks to prevent wasting fish by allowing minimal incidental catches occurring after the harvest guideline is reached. For example, fishing vessels are limited to a "trip limit" of 5,000 lb of sablefish whenever 95 percent of the OY is reached in a management area. The 1982 trip limit for Pacific Ocean perch, which is managed as a strictly incidental catch, was 10,000 lb or 10 percent of the total fish landed.

In 1979, well before the FMP was officially implemented, the domestic trawl catches exceeded established ABCs for Pacific Ocean perch and Dover sole in the Vancouver area, Pacific Ocean perch, canary rockfish, yellowtail rockfish and Dover sole in the Columbia area, and sablefish coastwide. Also, widow rockfish catches substantially exceeded the original ABC estimate in 1981. Warnings of "biological stress" provoked varied responses from the PFMC/NMFS management authorities.

No additional regulations were developed to manage the flatfish species even though the Dover sole harvest continued to slightly exceed the coastwide ABC in 1982 and 1983. The "legal gear" measures protected small flatfish, and the amount by which catch exceeded ABC was trivial in view of the low precision of the biological assessment. This presumably justifies the council's lack of action on flatfish.

When sablefish catch was projected to substantially exceed the team's initial OY estimate in 1982, the council imposed a trip limit of 3,000 lb for the last three months of the year. The OY was raised from 13,400 mt to 17,400 mt (by 30 percent). The 1982 catch total was even greater than this new OY. The sablefish regulations were augmented in 1983 by a 22 in. minimum size limit in all areas north of Point Conception (excluding Monterey Bay). The incidental catch allowance for undersize fish has varied, but is currently 5,000 lb per fishing trip. The council's intention is to close the fishery after the OY is reached. But the market for sablefish in 1984 seems to have declined to the point that the fishery is unlikely to take the ABC.

The council has modified regulations on Pacific Ocean perch harvests to keep that stock on its 20-year rebuilding schedule. In some INPFC areas the annual catch was projected to exceed the area's ABC. In November, 1983 the Columbia area was closed to Pacific Ocean perch fishing, but the 5,000 lb or 10 percent by weight trip limit was retained in other areas. The 1983 harvest reached 1,659 mt, 7 percent greater than the coastwide ABC. In July 1984 the council further recommended that the Pacific Ocean perch trip limit be changed to 5,000 lb or 20 percent by weight, whichever is less. This last variant of the incidental trip limit regulation was designed to prevent smaller trawl vessels from making daily fishing trips specifically targeting on the 5,000 lb of perch.

Much recent council management activity has involved widow rockfish and the Sebastes complex. Harvest guidelines for these are implemented mainly through trip catch limits, trip frequency limits, incidental catch allowances, and season closures. Following the groundfish management team's recommendations, Sebastes complex ABCs are established in two geographic areas separated by 43° N. latitude (later changed to 42° 50'). The area north of this line roughly corresponds to the Vancouver and Columbia INPFC areas, while the southern range includes Eureka, Monterey and Conception. In each area the trip limits are calculated to allow the fleet to fish all year, assuming usual seasonal patterns of fishing, without exceeding the OY. If the OY is reached, then the fishery is closed.

Annual widow rockfish harvests grew from 4,293 mt in 1979 to almost 28,000 mt in 1981, dropped to about 25,000 mt in 1982, and fell to 9,900 mt in 1983. During 1980-1982 the PFMC temporarily permitted the OY to substantially exceed the estimated MSY of about 11,000 mt. The widow rockfish fishery was exploiting a virgin biomass of relatively old fish. The temporarily high annual fishing rates were expected to reduce the standing biomass, presumably to levels that might sustain a near-MSY harvest.

Maximum use of the FMP provisions for in-season flexibility is evident in the history of rockfish regulations. A coastwide trip limit of 75,000 lb, was imposed on widow rockfish from mid-October, 1982 through February of 1983. The trip limit was reduced to 30,000 lb in

March of 1983 and further reduced to 1,000 lb in September. In 1984, the widow rockfish trip limit started out at 50,000 lb, but was reduced to 40,000 lb in May. Trip frequency for widow rockfish was limited to one per week beginning in January, 1984. Each of these regulatory actions was preceded by reports and recommendations from the groundfish management team, industry advisors and scientific and statistical committee.

The fisheries for other rockfish species developed close on the heels of that for widow rockfish. A 40,000 lb trip limit for the Sebastes complex with maximum frequency of one per week was established in the Vancouver/Columbia area starting in March of 1983. In mid-September the trip limit for the Vancouver/Columbia area was reduced to 3,000 lb, while a limit of 40,000 lb per trip with no maximum frequency was specified for south of 43° N. The trip limit in the northern area was reduced to 15,000 lb once per week, or 30,000 lb once per two weeks (at the option of the vessel operator) in May of 1984. Although none of these trip limits could be expected to precisely attain the OY over an entire year, they do represent an innovative attempt to simultaneously satisfy both the OY and year-around fishery objectives.

EVOLUTION OF MANAGEMENT REGULATIONS UNDER THE FMP

Commercial fishing regulations evolved fairly rapidly during the first two years of the plan's operation, largely because stock assessments found increasing evidence of over-exploitation as the fishery expanded. An additional impetus for regulatory change was the PPMC's decision to extend fishing seasons over as much of the year as possible. The objective of this is to avoid disrupting the flow of fresh groundfish fillets in domestic markets supplied by the Pacific Coast fishery. To do this and keep the annual catch within harvest guidelines requires that the rate, not just the annual amount, of catch be regulated. Individual vessel trip limits and trip frequency limits were selected as the mechanism for retarding the harvest rate. This is a significant and important change from the traditional "fishing season" regulation wherein participating fishermen are unrestricted regarding catch on individual fishing trips.

Catch and frequency limits on fishing trips have two main effects: they re-allocate economic returns among the various size-classes of vessels, and they improve opportunities for private firms to reduce costs of fishing. When trip limits are low enough to lengthen the fishing season, smaller vessels should take a larger share of the annual catch than they would otherwise, and their profitability should improve relative to that of new, larger vessels. Recognizing the higher minimum per-trip harvest requirements of large trawlers, the groundfish regulations allow fishermen to catch twice the per-trip limit of Sebastes, if they make such trips fortnightly rather than weekly. This somewhat lessens the re-allocation effect. But it cannot compensate larger vessels entirely, since the higher fixed costs of owning and operating a large vessel need to be spread over a greater annual revenue. In sum, the new, more powerful vessels are designed to take advantage of profit opportunities related to large harvest volumes that the trip catch and frequency limits preclude. To maintain year-around fishing and greater trip limits, the number of fishing vessels must be reduced.

A trip limit approach also causes a qualitative change in the traditional form of competition for fish. With free access to the "common property" fish stock, a vessel's ability to harvest more rapidly usually translates into a larger share of the total harvest. With both catch per trip and trip frequency limited, increased fishing vessel capacity is no longer rewarded immediately with a larger share of the catch. Under trip limits, a vessel's expected annual harvest depends upon the annual harvest guideline and the number of participating vessels. This assumes, of course, that the trip limit is smaller than the typical catch-per-trip taken before the limit was imposed. When the council first established a widow rockfish trip limit in 1982, the level chosen (75,000 lb) was not a significant constraint, even on larger vessels.

The 1984 widow rockfish management regulations include an aggregate catch quota of 9,300 mt, a trip limit of 40,000 lb (18.14 mt), and a trip frequency of one per week. Subtracting 100 mt reserved for incidental catch after the widow rockfish season closure, these regulations create 507 weekly vessel quotas. If there are 70 vessels participating in the fishery, they can fish an average 7.25 weeks each on widow rockfish, and each vessel has the opportunity to harvest about 133 mt of fish. This 133 mt is not specifically assigned to individual vessels. So there is still competition among vessels; but the competition will be different from before. A given vessel operator can take 18.14 mt as fast as possible each week, or he can fish at a slower (and possibly less costly) pace, or he can intersperse widow rockfish fishing with other forms of fishing during a given week. Overall, I would expect the widow rockfish harvest to generate a greater net economic return than before, due to somewhat lower fishing costs. Also, the rockfish fillets may bring a greater net return because they are produced at a more even pace, over a longer season.

Similar qualitative change in competition among commercial fishermen may be encouraged by the Sebastes complex trip limit and trip frequency regulations, and to a lesser extent the Pacific Ocean perch and sablefish incidental catch trip limits. The potential increased economic value from these trip limits is small, and this does not represent a shift toward economic efficiency objectives in groundfish management. It does represent a perceptible movement away from annual harvest quotas that encourage irrational and costly harvest methods.

OPTIMUM YIELD CONSIDERATIONS

As I noted in the introduction, further development of coherent groundfish management requires that optimum yield receive attention. Two aspects need to be discussed: the nature and function of optimum yield in the management regime, and the criteria for setting OY in a multi-species fishery. I will provide some insight into these issues, indicating why I think they are important and how the existing management framework deals with them.

NATURE AND FUNCTION OF "OPTIMUM YIELD"

The Magnuson Fishery Conservation and Management Act (FMCA) followed the International Law of the Sea in designating optimum yield as a central management objective. Since much has already been written about the optimum yield concept, it is unnecessary to belabor that discussion here. The American Fisheries Society Symposium on Optimum

Sustainable Yield (Roedel 1975) and the NMFS-sponsored National Workshop on the Concept of Optimum Yield (Orbach 1977) provide extensive guidance. Optimum yield, as a management objective, is largely an elaboration of the more narrowly defined concept of maximum sustainable yield. It is supposed to encompass economic, ecological and social factors, but development of practical techniques for determining OY in specific instances has been slow. As lamented by P.A. Larkin (1977), even a concerted attempt to explain optimum yield tends to become an "eclectic mishmash that was all things to all people".

To avoid this "mishmash", a specific and explicit presentation is needed. Since economic factors have been most extensively considered in commercial fisheries, the prospects seem brightest for introduction of economics into optimum yield. Quantitative economic models for fishery management are available, many developed specifically for fishery management plans (for example Anderson 1981). Given proper information regarding market prices, fishing costs, and a biological yield model, standard analytical methods are used to determine maximum sustained level of economic yield.

Economic efficiency, in its broadest sense, is the focus of this approach. In principle, economic efficiency requires a proper balance of greater fish production and greater production of a variety of other things that could be produced instead of fish. In the words of James Crutchfield (1977), "optimal utilization of fishery resources, like optimal utilization of any other natural resource, cannot be divorced from optimal utilization of all inputs--natural resources, capital, labor, and technological knowledge--in meeting the multitude of competing demands for all goods and services".

The groundfish FMP does incorporate some economic factors in setting OYs, but it does so clumsily and inexplicitly. With its great reliance on MSYs and ABCs as optimum yields, the Pacific coast groundfish FMP appears to seek maximized physical yield. But the management record belies this simple interpretation. No remedial action was taken by the council or NMFS when shortbelly rockfish and Pacific whiting harvests fell far short of the stated optimum yield. These shortfalls were not alarming, in my interpretation, because the nominal OYs are not intended to represent optimal catch levels. Both the PFMC and the industry advisors implicitly understand that optimum yield of shortbelly rockfish is far less than the stated 10,000 mt, and that the OY for Pacific whiting was substantially below the nominal 175,000 mt.

These numerical OYs are better understood as maximum, biologically safe levels of fish harvest. From an economic standpoint, harvest levels are desirable only if the price equals or exceeds the fishing cost: if there is a "market" for the fish. Since the domestic fishery could not profitably exploit these fish stocks, the real optimum is some undefined amount less than the stated OY. The substitution of "biologically safe" for "optimum", however, confuses the concept of an optimum catch level with the process of regulation. The maximum safe level may logically function as an upper limit, or harvest quota. Whether quotas and optimum yields need be the same is debatable.

Without involving economic and other factors in setting optimum yields, moreover, "biological factors" are often stretched and twisted to accommodate all kinds of management concern. Caution in the face of resource uncertainty, avoiding foreign fishing allocations, and political division of the catch among competing groups are some of the management motives hidden under the guise of "biological" conservation. To those who understand the role of biological research and stock assessment, the management process appears to be ad hoc. One rationalization is that "optimum yield is whatever the council decides it is". This may be procedurally correct, but it fails to meet the need for well-informed, understandable management criteria.

For non-sustained harvest levels, development of an economic rationale for optimum yield is even more essential. The FMP's discussion of widow rockfish and Pacific Ocean perch management provides no convincing biological reasons for choosing particular rates of growth or decline in the underlying fish stocks. Yet the rate of stock reduction, or "dis-investment", was chosen when widow rockfish OYs were set during 1980-1982. Similarly, the 20-year rebuilding schedule for Pacific Ocean perch implies an investment rate that pays off in future economic returns. If explicit criteria for these non-equilibrium harvest strategies were developed, management policy would be more transparent to reviewers, and the council less subject to misunderstanding and criticism (see Gunderson 1983).

MULTI-SPECIES ASPECTS OF OPTIMUM YIELD

Since ecological interactions are important in determining sustainable yields from a species complex, fishery managers have long struggled with the need for acceptable criteria in managing multi-species assemblages. Whole workshops have been devoted to investigating multi-species approaches to fisheries management (Mercer 1982; Hobson and Lenarz 1977). Prominent fisheries scientists warn against the errors caused by artificially compartmentalizing the fishery by managing individual species (Silvert and Dickie 1982). Collecting and analyzing appropriate data to make practical use of eco-systems models, however, has proved too difficult for most fishery research efforts. The groundfish FMP does not explicitly consider the ecological interactions among species. It seems to assume that each species stock is biologically independent. This is implicit in establishing ABCs for each species in each management area.

For various species that are linked by technological and economic factors, however, the FMP does make provisions for multi-species harvesting. The groundfish plan introduces the notion of species "targeting". A species is a "target" if it can be caught predominantly in pure loads. A trawl net, for example, will usually encounter more than one groundfish species in a given area, depth or mode of operation. By appropriate manipulation of the time of day, area, speed, depth and other operational factors, however, a fishing vessel skipper can often "target" on one or two species.

Disagreement undoubtedly exists as to when, and under what conditions fishermen can accurately target on some species. But, as a general rule, the mid-water schooling species, such as widow or shortbelly rockfish and Pacific whiting, can be caught in nearly pure tows. Similarly, the Sebastes complex can usually be caught without serious

incidental catch of other species; but there is less agreement on the extent to which trawl vessels can target a particular species in the complex. In contrast, important members of the flatfish group tend to be caught in mixes with several commercial species (Adams and Lenarz, unpublished manuscript). This technological interdependence is addressed in the FMP by lumping some species into groups. Species that can apparently be "targeted" are given separate optimum yields.

As a provisional approach to multi-species optimum yield, this raises some further questions. First, how can the optimum yield for a species group, like the Sebastes complex, be derived from the "acceptable biological catches" of the constituent species? If there are ecological interactions among the species, or if the different species stocks are optimally exploited at different fishing rates, this may be quite difficult. Second, what is the best way to prevent the wastage of incidentally-caught fish of a prohibited species, or of a species whose quota has already been filled? Assuming that targeting is imperfect, some incidental catch of a numerical OY species may be taken while fishing for other species.

To date, the harvest guidelines from grouped species are constructed from the sum of ABCs for the species. This is a questionable practice. If two species are harvested simultaneously (the same fishing effort applies to both stocks), the optimum level of aggregate catch (or effort) for the mixed harvest would equal the sum of the individual species optima only by extraordinary coincidence. Only if exactly the same level of fishing effort achieves the optimum yield for each species would there be a simultaneous optimum. In any other case, the optimum multi-species harvest must be less than the summed optima for the individual species, considered separately. Full use of more abundant species would likely require that less abundant and less productive species stocks be fished to less than the MSY level. Thus grouping several species to establish harvest guidelines requires adoption of a "second best" approach that cannot achieve the maximum total yield from the group. By this reasoning, the optimum yield for the Sebastes complex must be lower than the sum of the MSYs for yellowtail, canary, bocaccio, chilipepper and other rockfish. The groundfish FMP recognizes this fact, but does nothing about it.

Another problem for multi-species fisheries is that of incidental catch regulations. Species with individual quotas cannot always be caught in pure loads. Consequently, some widow rockfish or Sebastes complex species, for example, will be caught by vessels targeting other fish. This inadvertent incidental catch will occur even after a quota is reached and target fishing stops. Mortality due to handling the fish is very high, so discarded fish are generally not returned to the stock for later harvest, but are wasted. The manager's dilemma is how to enforce a harvest quota, and prevent the wastage of discards, while not unduly burdening the fishermen with gear and other restrictions on efficient harvest practices.

In their examination of alternative incidental catch controls, Marasco and Terry (1982) adopt an approach that minimizes the economic cost of incidental catch. The direct "cost" of discards is approximately measured by the ex-vessel value of discarded catch. Regulations to prevent incidental catch, however, involve two other costs: those incurred by management authorities in surveillance and enforcement, and costs borne by fishermen if they are forced to fish in less

productive fishing areas or times, or with gear that provides lower gross earnings. It is not necessarily desirable to eliminate incidental catch, even though this would minimize the direct cost of discards, because the administrative costs incurred by management authorities and fishermen might exceed the value of the fish saved.

Minimizing costs in incidental catch regulation would be part of a coherent multi-species harvest policy with two main affects. First, incidental catch would be considered in setting OYs and size limits of fully-used fish stocks. If the cost of avoiding small sablefish in the Dover sole fishery exceeds the value of sablefish saved, for instance, the incidental catch limit on small sablefish should be raised. Second, this would affect the design of an operational quota system. When a known percentage incidental catch is not worth avoiding, that catch can be subtracted from the directed fishery quota and reserved specifically for incidental catch.

Current groundfish management regulations seem to have adopted an approach quite close to this for *Sebastes* and sablefish, and I would not focus on this as a major problem. It may become a problem however, if the domestic fisheries for Pacific whiting and shortbelly rockfish develop to their potential. When low rates of incidental catch are applied to very large harvest volumes, the incidental catch of some depleted species, like Pacific Ocean perch, may equal or exceed the designated harvest guideline. Managers need to be prepared to decide when to relinquish particular objectives relating to species, like Pacific Ocean perch. Although this species is high-priced and has great prominence in the history of the fishery, a time may come when the costs of avoiding incidental catch and waste of discarded fish exceed the economic value of the fishery for that species. It might be useful to have some agreed criteria for deciding when and if a species should be re-assigned to a multi-species aggregate or non-numerical OY group.

LIMITED ACCESS PROSPECTS

Limiting access to commercial fisheries has become increasingly acceptable to managers and industry. A variety of industry and scientific groups have urged the Pacific council to consider limited access in the groundfish fishery. Over the past two decades this interest has been attributable to several motives: increased economic efficiency in the commercial fisheries, increased income for successful vessels, easing pressures on management caused by over-built fleets, and in some cases improved conservation of stocks. Current high interest in groundfish limited access can also be attributed to the increased experience in the Canadian, Australian, Alaskan and Pacific coast fisheries, as well as the poor financial performance of many recently-built trawl vessels.

Adopting such a significant change in the groundfish regulatory approach would require long and careful deliberation of limited access concepts and options. The generic options are thoroughly reviewed in the recent reports of Meyer (1983), Pearse (1982), Sturgess and Meany (1982), Stokes (1979), and Rettig and Ginter (1978). While I do not intend to make any specific proposals in this paper, I think it is useful to review the principles involved and to consider how limited access might apply to Pacific coast groundfish.

RATIONALE FOR LIMITED ACCESS

The general case for limiting fishery access builds upon the well-known deficiencies of open competition for "common property" fish stocks. Without regulations, competitive commercial fishing fleets tend to economically and biologically over-fish. The principal reason for stock depletion with open access competition is that individual fishermen cannot control aggregate harvest rates. When many firms catch fish in competition with others, no individual act of conservation is likely to pay-off for that individual. With common property fish stocks, economic rationality on the part of individual fishermen does not favor fish stock conservation. This lack of opportunity to invest in fish stocks, not lack of knowledge and inclination, explains the lack of private conservation action.

To determine appropriate yields for important commercial fish stocks, fishery scientists devise quantitative concepts expressing the biological potential, such as MSY. Applying annual catch quotas to the open-access fishery may adequately insure biological conservation. But the basic economic incentives of the individual fishermen are largely unchanged. Instead of competing for dwindling stocks, the open competition is for a conserved stock. Individual incentive for conservation action remains weak, and economic rewards go to those fishermen who find ways to increase their individual catches, so long as their increased fishing costs do not exceed increased ex-vessel revenues. As ex-vessel prices rise, increased potential fishing profits attract additional investments in fishing capacity by both new and continuing participants.

Obviously, the degree to which the over-built fishing fleet becomes a real concern depends upon the potential net difference between costs and revenues. Pacific salmon provides the extreme example of very high ex-vessel prices teamed with potentially miniscule harvest costs. To prevent rapid stock depletion management strategy has forced the harvesters into technically inefficient operations. Even with severe restrictions on catch, fishing seasons, and harvest technology salmon fleets tend to be unreasonably large. Consequently, it is not surprising that limited entry was introduced first, and has been used most extensively, in salmon fisheries on the Pacific Coast.

Like the harvest quota, however, limiting the number of participants in a competitive fishery does not change the economic incentives of individual fisherman. Although the number of competitors is limited, fishermen still find it profitable to increase fishing capacity as long as the cost of such increase falls below the potential increase in revenue. Soon after the salmon limited entry program was introduced in British Columbia, managers had to impose various sorts of capacity limits on fishing operations. Economic studies showed that increased investment in capacity of the limited fleet was a substantial threat to economic returns from the fishery (Fraser 1979; Pearse and Wilen 1979).

Similarly, license limitation programs in Australian fisheries have been forced to include stringent fishing vessel capacity controls. In the northern prawn fishery, for example, fishing licenses can be transferred and even consolidated, so long as the new vessel has no more capacity than previous license holder's (Colin Grant, personal communication). To maintain a significant level of "economic rent",

the regulators may have to continually anticipate and forestall technical innovations that, while increasing an individual's harvest capacity, simply raise the total cost of taking a fixed harvest. The economic evaluation of license limitation systems is not complete, but the debate has now turned to whether any substantial economic benefit will accrue from the program in the long run. Simply limiting the number of licensed fishermen does not assure improved economic performance of fisheries.

In recent years, economists have focused on forms of limited access that more directly address the underlying common property problem. The key is to establish a set of institutions that lessen individual incentives to compete for increased catch through expanded fishing capacity. "Racing for fish" needs to be replaced by incentives for low-cost production of available yield. There are two basic alternatives. First, quantitative rights to harvest fish (also called "individual fisherman quotas") could be established to allocate optimum yield. These rights can mimic conventional property rights established for other natural resources. Second, landings fees or royalties could be set to discourage excessive fishing capacity and effort. In a Canadian fisheries context, Pearce (1982) is a well known proponent of individual fisherman quotas; and Stokes (1983) developed this approach during discussions of north Pacific halibut license limitation.

The main advantage of the individual fisherman's quota is that it eliminates the basic economic incentive leading to overcapitalization of the fishing fleet. With a known, quantitative share of the allowable harvest, a commercial fisherman will no longer be strongly encouraged by the profit incentive to competitively increase his fishing power. Instead, the fisherman is encouraged to adopt fishing vessels and fishing methods that permit taking the licensed catch at the lowest cost. The individual fisherman's profit incentive is made consistent with overall cost minimization. Further, permitting transfer of quantitative rights in private market transactions would encourage broader economic efficiency by facilitating the redistribution of harvest rights to those fishermen most able and/or willing to harvest at low cost. Market prices of individual quota certificates would be expected to reflect the potential profits from fishing. Like prices for other natural resource commodities, the price for a harvest quota would represent a cost of doing business to the purchaser and a source of income to the seller.

Royalties on fish harvests could be an alternative to quantitative harvest rights, or they could be used in conjunction with quantitative rights as suggested by Pearce (1982; p. 94-95). As a direct cost of fishing the royalty would discourage excessive investment in fishing power. If the royalty rate is roughly equivalent to the hypothetical market price for a quantitative harvest right, the same incentive for cost minimization would occur under the two alternative approaches.

Two primary elements distinguish royalties from quantitative rights. First, government administrators, rather than private markets, would set the value paid per unit harvested. Second, with royalties the net economic value of harvesting fish would accrue to the public treasury rather than appearing as net income earned by private fishing businesses. To establish royalty rates with correct cost minimizing incentives, public administrators will have to collect and evaluate

cost and revenue data from fishing operations. Interpretation of such data can be technically difficult because of the variety of crew share arrangements, non-cash transactions, bonus payments, and variability in harvest rates among vessels and over time. Fishermen opposed to a royalty system would not be inclined to provide the more accurate information.

To avoid this estimation problem, management agencies might dispose of quantitative fishing rights in a public auction. Again, this substitutes the competitive market for administrative computation. This is the way the U.S. Forest Service and the U.S. Minerals Management Service dispose of timber harvesting and mining rights on public land. But there are essential differences between these rights and any prospective fish harvesting rights. Mineral and timber sales confer exclusive rights to sever the minerals or timber from the land, while any prospective fishing rights would retain certain characteristics of the "commons". A right to harvest, say 10,000 mt of Pacific whiting, could be established as a salable right, but the harvest of fish is still from a common pool.

Another practical problem with royalties is that they are distinctly political. Like taxes, they are established and modified through legislative action. Royalties would not be viewed as a permanent feature of the fishery, but as a point for continual negotiation, lobbying, and tinkering.

In contrast, once quantitative rights are established, the competition for fish that now fuels political tinkering would no longer be a continual source of instability. Competition for fish among gear types, regions, and cultural groups would no longer fuel political debate and be a constant source of instability for the fishery. Through time and custom, such rights might assume the legitimacy of private property. As noted by Anthony Scott (1984) the community would then be expected to uphold the validity of fishing rights, help protect them from trespass, and support their exchange and subdivision by standard property right mechanisms.

Further, once the rights are established, their holders will have an interest in the long-term health of the fishery. They will be more willing to make the short-term sacrifices often required to conserve fishery resources. Therefore, the beneficial affects of establishing property rights and the corresponding conservation responsibilities are most evident with the individual harvest rights approach.

PROSPECTS FOR APPLICATION TO THE GROUND FISH FISHERY

License limitation tends to follow conventional fishery regulation, focusing on fish stocks rather than fishing fleets (Stokes 1979). Licensing programs for Pacific coast salmon, herring and abalone, and for Australian prawns and rock lobsters exhibit this characteristic. If fishing capacity is specific to a species, a stock, or a coherent group of stocks, the "fishery" may be identified by a fish stock or stocks for management purposes. In this case, one can determine how the number of licenses issued is likely to effect fishing capacity, economic yield, and estimated optimum fleet size. When several distinct gear groups and many varieties of multi-purpose fishing vessels are involved, as in Pacific coast groundfish, it is not so simple.

First there is the problem of usefully defining the groundfish fleet. The fleet currently includes many part-time vessels that are used for a number of fisheries. They shift at seasonal or longer intervals among shrimp, rockfish, bottom-trawling, and joint venture fishing. If the crab catch rate is high, some vessels shift from groundfish into Dungeness crab for the winter season. Also, salmon trollers and crab pot fishermen can catch groundfish incidentally. The line between included and excluded vessels, required for licensing, must be carefully drawn. If the definition is too all-inclusive, neither the fleet nor capacity is limited. To limit capacity and still allow great variety in commercial fishing strategies, separate licenses could be issued for distinctive segments of the fishery. Southern California gill nets, Monterey Bay fish traps, sablefish/halibut longliners, mid-water trawlers, and shrimp/bottomfish trawlers are some likely categories. Each category has a characteristic locale, harvests a characteristic mix of species, and uses a distinctive gear. But there will necessarily be a significant overlap in species and stocks exploited by license categories.

Beyond the problem of fleet definition, a license limitation approach is not particularly well-adapted to the flexibility normally exercised in multi-purpose fishing operations. As noted in Huppert (1979), the ability to shift among substitute fishing modes may be essential to the long-run economic survival of these kinds of vessels. Trawlers move between shrimp and groundfish as the fish stocks and market conditions affect revenue-per-day-fished. To license a vessel just for shrimp, or to deny groundfish licenses to vessels that have recently fished only shrimp, could be disastrous to those vessels and economically inefficient. Flexibility in license transfer, division and consolidation among vessels might address this need for shifting among fishing activities. Whether or not this could be accomplished without a cumbersome and costly administrative apparatus remains to be seen.

The other side of this coin is that limiting licenses to fish cannot effectively control the amount of fishing for any given fish stock so long as multi-species fishing remains significant. For example, no reasonable limit to the mid-water trawl fleet alone could produce appropriate harvest levels for Pacific Ocean perch. If fishing rates are uncontrolled by license limitation, conservation of fish stocks must still be sought through direct harvest limits, such as annual quotas. Imposing licensing on top of traditional harvest controls could only reduce the potential for fishing fleet over-capitalization. Finally, to be successful, this approach to economic efficiency in commercial fishing would require either strict limits on technological upgrading of fishing vessels and gear, or a license buy-back or vessel retirement plan to cancel the expanding harvest capacity.

In sum, license limitation has three principal drawbacks as an economic regulation for Pacific groundfish. First, it requires substantial supplementary regulation to assure fish stock conservation. Controlling aggregate multi-species fishing capacity does not prevent significant over-fishing of more economically profitable fish stocks. Second, additional controls, besides licenses, must be placed on fishing capacity. License limitation does not eliminate economic incentives for individual fishermen to increase investments in fishing capacity that are superfluous in the aggregate. Finally, licensing programs would tend to restrict license-holders to specific fish

stocks or other sub-units of the fishery and may unreasonably restrict the use of more flexible, multi-purpose vessels. On a positive note, license limitation is one attempt to limit the cost of "inputs" to the fishery. There may be sub-units of the fishery (mid-water trawlers, or sablefish traps?) that could be economically regulated by license limitation.

Properly controlled and enforced, individual fisherman quotas could overcome many drawbacks of the license limitation approach. Since quotas would be issued for individual species, the quota system would automatically incorporate biological conservation as well as economic efficiency objectives. Assuming marketability of quota rights, vessel operators can choose to fish a mix of species or operate in the combination of fisheries that most suits them. A vessel owner with quantitative rights in widow rockfish, for example, could sell these rights and move into a nearshore fishery or to an Alaskan fishery. Similarly, fluctuations in the shrimp fishery may cause a flow of vessels between the shrimp and groundfish trawl fisheries. With quantitative rights, this flux can be accommodated by an exchange of individual quotas; no vessel need be eliminated completely from either fishery. In this respect, the individual quota system is much more flexible, while the license system essentially assigns a certain number of vessels to each fishery.

Individual quotas have two major benefits: fishing vessels have greater operational flexibility and there is increased potential for harvesting industry efficiency. Such quotas may, however, be expensive to enforce. Under-reporting and mis-reporting of species will directly affect the quota system's credibility. For this reason, enforcement will have to be on an individual vessel basis, catch sampling will have to be quite refined, and sample timing carefully guarded. If biological yields are defined on sub-areas of the fisheries, the individual quotas will have to follow suit. Whether enforcement becomes a major problem depends largely on whether the system creates conservation-minded fishermen who police themselves.

Enforcement is a problem, but the groundfish fishery would seem more likely candidate for quantitative rights than, say, the salmon fishery, simply because detection of serious transgressions would be easier. Unloading tons of fish from a trawl vessel is difficult to conceal. This, and the relatively small number of locations where unloading occurs, should make enforcement manageable.

The individual quota approach could be introduced on a partial basis. Without causing any serious dislocation in the trawl fleet, individual quotas could be assigned for Pacific Ocean perch, widow rockfish, Pacific whiting or any other species for which there is a firm optimum yield estimate. Reservations on the part of fishermen and managers could be tested in this way without converting the entire management system at once. License limitation, in contrast, tends to be a once-and-for-all, all-inclusive event. By testing the approach on a particular fish stock, preferably one that is fully used and subject to "target" fishing, both managers and fishermen could learn what specific adaptations to make in the system.

CONCLUSION

Groundfish management on the Pacific Coast has evolved a detailed set of administrative procedures and regulations, based substantially upon the preceding state and international regulations, and keyed to the biological conservation needs of the principal commercial fish stocks. The Pacific Fishery Management Council pioneered development of "framework" management plans, incorporating specific rules for modifying the optimum yield, acceptable biological catch levels and harvest regulations both within and between fishing seasons. In this, and in its breadth of coverage, the Pacific Coast groundfish FMP can be judged a substantial, state-of-the-art management document.

There is room for further improvement in two aspects: incorporating multi-species considerations and non-biological objectives in setting levels of optimum yield, and restructuring the fishing rights by limiting access to achieve a greater degree of economic efficiency. Since multi-species fishing, and multi-purpose fishing vessels are common in the Pacific coast fishery, it seems clear that more attention should focus on determining ecological implications of fishing for the stocks that are heavily exploited by the commercial fishery. For example, Pacific whiting may be a major predator of shrimp, juvenile fish or other stocks. This could have a major bearing on optimum yield for whiting fishery. Also, the problem of aggregating several optimum yields from jointly fished species (such as in the Sebastes complex) needs further consideration. Simple models of multi-species fisheries suggest that the optimum for the mixed stock should not, as suggested in the FMP, equal the sum of the maximum yields for the individual constituent stocks. These problems of biological optimum yield are on the leading edge of fishery management practice.

While the FMP contains various sections and references to non-biological criteria for optimum yield, close scrutiny of the management regime reveals very little explicit consideration of economic and social fishery objectives. In regard to the non-equilibrium optimum yield policies for Pacific Ocean perch and widow rockfish, this has left the managers with no rigorous foundation for fishing strategies chosen. Application of well-known economic principles to the choice of re-building and stock liquidation strategies could help to bolster the council choices. This would require more systematic information regarding the economic effects of deliberately altering the fish stock size over time--an aspect of management policy currently not well-expressed by the static, biological MSY and ABC guidelines.

Besides improving the substance and appearance of procedures under the existing management system, it would be useful to consider adopting limited access. Based upon a review of the two most likely alternatives, license limitation and individual fisherman quotas, it appears that both would have strengths and weaknesses in the Pacific coast groundfish context. License limitation has generic weaknesses, requiring supplementary restrictions on annual harvests and on technological upgrading of fishing capacity among licensed vessels. Besides improving the substance and appearance of procedures under the existing management system, it would be useful to consider limiting access. Based upon a review of the two most likely alternatives, license limitation and individual fisherman quotas, it appears that both would have strengths and weaknesses in the Pacific coast

groundfish context. License limitation has the generic weakness that it leaves unaltered the individual fisherman's economic incentive to compete for shares of the harvest through costly expansion of fishing power. Consequently, annual harvest quotas for the fishery are still needed. Further, to achieve a reasonable degree of cost minimization with a licensing program requires supplementary restrictions on technological upgrading of fishing capacity. Individual fisherman quotas could avoid some of these difficulties. Given a known share of an annual allowable harvest, fisherman are encouraged to seek lower fishing costs in order to improve profits. Still, license limitation is now widely understood and relatively easy to enforce. As a first step in limiting access to the fishery, limiting licenses for groundfish would probably provide some useful control over further increases in fleet overcapitalization.

The logic of individual quotas seems strong, but there is no substantial experience to back it up. Consequently, the drawbacks and weaknesses may not be properly anticipated. Aside from the difficulty in achieving acceptance of a new approach, one problem might be enforcing individual quotas. Whether this and other problems would militate against individual fisherman quotas is not known. Fortunately, the approach could be introduced one step at a time, so that discovering and correcting errors could be part of the system.

In summary, groundfish management on the Pacific coast has come a long way in the past four years. A most ambitious and innovative management plan has been implemented, and the success of biological conservation objectives seems assured. Fine-tuning the optimum yield concepts to incorporate multi-species interactions is a logical next step for the research program. Serious consideration of alternative forms of limited access should begin immediately so that future decisions on this can proceed swiftly and with a reasonable chance of success.

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Discussion

HERRNSTEEN: Very briefly, just to answer your question as to why, it's not just that fishermen are necessarily nice guys, there's also greed in there. In a lot of diversified fisheries, we just feel that being locked into different fisheries and the cost of the system is greater than the benefit in dollars and cents. It is a dollar-and-cents decision to not want it in some areas.

ANSWER: Could I respond a little bit? Are you saying that the cost of administering the limited entry program is what you are afraid of or are you thinking of something else?

HERRNSTEEN: Not the cost of administering it. It's the cost to you, if you are locked into a box. Ten years ago, we used to say, "Just give us the permit to fish. Don't put us in all these little categories." Nobody has come up with a system where we maintain our flexibilities, so the cost of being left out is the important thing.

????: I asked this question of Colin Grant, because he has had so much experience with these sorts of things in Australia. One of the things that they have been able to do is to put an authorization on a license for several different fisheries. Maybe that would help address that kind of question. We would have to think about it kind of carefully because if all the people are licensed for all of the fisheries, there's no limit on the overall effort.

????: I'd like to just briefly comment on the idea of targeting and multi-species and fisheries management. It reflects back on a point that John Gulland made a couple of days ago. If I understood him correctly, I think he said that the real problems in multi-species management are not in the tropical-type fisheries where you can't target, but in the temperate fisheries that deal with species you can target. The problem I was mentioning relative to biological conserva-

tism in multi-species management is directly related to the fact that fishermen can target in that complex. Therefore, the pressure is not removed from those species that are in danger. Then you get a sequential exploitation of one species after another until the whole complex is reduced to such a low level that it can't recover unless the whole fishing process is stopped.

FISHER: First, let me make one comment on this business of the fishermen now discussing limited entry. I'm one of the Board of Directors of Fisherman's Marketing Association in Eureka. At our last three meetings, we spent about seven or eight hours on limited entry. We went through every single variable that all of you have talked about and six or seven variables that will become important that nobody has mentioned here today. The principle reason these guys are now prepared to talk about this is that the highliners are the ones that are forcing it because the situation has gotten to the point where they simply can't make money any more. It's the highliners that you have got to convert, then the fleet will follow. I'm also reminded of something that Dick Allen said at the Fish Expo banquet in Boston this year, when he was getting his Highliner Award. He said, "It's good that you all want to help us, but, please, come and talk to us before you help us. And don't help us too much."

Options and Consequences

Panel Discussion

**Edward L. Miles; University of Washington,
Carl Mundt; Mundt, Huppel, Falconer, Zulauf &
Hall**

Moderators

Robert Alverson, Fishing Vessel Owners Association

Terry Baker, Arctic Alaska Seafoods, Inc.

Loh-Lee Low, National Marine Fisheries Service

Steve Pennoyer, Alaska Department of Fish and
Game

John Peterson, Ocean Beauty Seafoods, Inc.

Jeff Stephan, United Fishermen's Marketing
Association

James A. Wilson, University of Maine

MUNDT: We would like to start this afternoon by giving you a little idea of how we plan to run the panel. We've selected three topics to focus on. We picked these topics from the papers we heard today, as well as from those of speakers heard earlier in the week, and from some of the comments that we heard from the floor. The panel members will talk about each topic in discussion format rather than in prepared presentations. As we finish each of the topics, we will open it to questions and comments from the floor.

Each of us will now take a minute and summarize our backgrounds. I'll start with myself, and then we'll go to the other co-chairman, Ed Miles.

I have practiced law in Seattle for the last ten or 12 years. My entire practice has been maritime fisheries-related with the exception of two years, 1974 and 1976, when I took a break from law and went to the University of Washington's College of Fisheries, and enrolled in a two-year graduate program. Lee Alverson was the chairman of my thesis committee. I wrote about salmon management. Between 1976 and 1980, my practice was oriented toward management issues. I went to a lot of council meetings and represented parties before the council. I was on the SCC for the Pacific council. Since 1980, my practice has tended to be fisheries business-oriented. I've essentially been helping people put together fisheries business deals.

MILES: I serve as a director of the Institute of Marine Studies at the University of Washington. I work on a variety of international ocean use regulatory problems. I spent quite a bit of time in fisheries. I served six years on the SCC for the North Pacific council from December of 1976 to December of 1982. During that time, I also served on the

Micronesia Maritime Authority, where I helped to manage Micronesia tuna fisheries.

ALVERSON: My name is Bob Alverson. I am currently manager of the Fishing Vessel Owners Association in Seattle representing primarily halibut, longline and black cod interests. I'm also manager of the Alaska Marketing Association that negotiates king crab and tanner crab prices out of Dutch Harbor. I graduated from the University of Washington in economics, at a time when the billboards in Seattle said "Last person out of town, please turn off the lights." I took a job with Trans-America Corporation repossessing television sets. I know a little bit about the bottom side of economics, and from there, I went to working for the halibut interests in Seattle.

STEPHAN: My name is Jeff Stephan from Kodiak, manager of the United Fisherman's Marketing Association there. We negotiate prices and represent our fishermen in political matters. We have salmon fishermen, herring fishermen, longliners, trollers, seiners, and pot fishermen in our association. I have been on the job there for six years, been a member for two-and-half-years of the North Pacific Fishery Management Council. For three years prior to that, I was on the advisory panel. I graduated in 1968 from the State University of New York with a B.A. in economics. I got interested in the fishing industry after moving to Oregon, and came up to Alaska in 1973, and have engaged in the commercial fishery, myself, throughout Alaska.

PENNOYER: My name is Steve Pennoyer. I'm deputy commissioner of fisheries for the Alaska Department of Fish and Game. I have been with the department for 25 years, primarily in biological-management-research and administrative roles. My background is primarily in the shellfish fisheries. The position I hold now requires dealing with recreational fisheries as well as commercial fisheries, aquaculture, and hatchery projects. I've been associated with the Board of Fisheries, which is in the middle of a six or seven day marathon process dealing with allocation, one of the topics that you are facing today. I was on the SSC and chairman of the SSC for North Pacific Fishery Management Council. I have engaged in various international negotiating forums, U.S.-Canada and INPFC, Japan. Currently, I'm located in Juneau.

PETERSON: I'm John Peterson, and about 95 percent retired from business activities. I graduated from the School of Fisheries of the University of Washington in 1940. For the last 44+ years, I have been engaged in industry. The reason that I went into industry and didn't become a biologist is that I was unable to fill out the government forms. I still am unable to fill them out and they're so much more complicated now. But during that 44+ years, I think that I have been involved in almost every phase of the industry. I'm proud to say that I'm a survivor and there are not too many of us around. I have been involved in association activities, been president of National Fisheries Institute and the Pacific Seafood Processors Association. I've been engaged in many advisory commissions for California and the U.S. government. Most recently, I was appointed to the North Pacific Management Council and with three months of experience, I'm an instant expert. Just ask me.

BAKER: My name is Terry Baker. I'm the president of Arctic Alaska Seafoods. We operate what we think is the largest trollers fleet in Alaska for bottomfish and catcher-processors for both king and snow crab. I'm also acting director for a new group, the Alaska Factory Trollers Association. My duties in Arctic Alaska Seafoods in the last three years have been in the bottomfish business, and finding markets for our product.

LOW: My name is Loh-Lee Low. I'm a biologist in the Northwest and Alaska Fisheries Center in the fisheries management division. My main role has been as a staff biologist, drafting fishery management plans for the Bering Sea groundfish region. Formerly, I was involved a little bit with drafting fishery management plans for the Gulf of Alaska groundfish as well. I'm also involved with INPFC activities as one of the scientists discussing status of stocks with Japanese and Canadian scientists. I served as a technical advisor on the International Pacific Halibut Commission. My main role here today is to provide some views on Alaska groundfish management, especially in the Bering Sea.

WILSON: I'm Jim Wilson, from the University of Maine, economist, and currently a chairman of the SSC for the New England council. Among other things, I have worked on multiple-species fisheries. Some of you may have heard about the new European-style display auction that is going on in Portland, Maine. We've been working on this project for about seven years, and recently, just finished up rather intensive work on the economics of the U.S. case at the World Court concerning the Canadian-U.S. boundary.

MILES: As you will have noted, we are missing one of our fellow panelists, Walter Pereyra, who has a crisis this week and could not leave Seattle. However, I'm authorized to become Wally Pereyra for two minutes, and to speak to you with eloquence and obscurity, or at least sufficient obscurity, to leave him room to wiggle out of whatever I say. Let me tell you a bit about the organization of the panel before we actually begin the substantive discussion.

Our charge from the conference organizers was to identify options and evaluate consequences. We decided at the same time we couldn't identify options without linking those to some issues. We had to derive issues that would cut across the detail and specificity of a fairly large number of papers. We have, therefore, chosen three issues to concentrate on in the time available to us. The first issue is title to fisheries resources, or who owns the fish? The second issue is management authority, or who is in charge? And the third issue is management of multiple-species fisheries. We have people on the panel from the East Coast and West Coast management agencies and the West Coast groundfish industry. We define the groundfish industry on the West Coast to consist of line fishermen, crabber-trollers, catcher-processors, shore-based processors and at-sea joint ventures. Without Walter, we don't have the strong point of view he would bring from the at-sea-joint-venture people, and you should keep that in mind.

The first issue we will turn to is title to fisheries resources, about which much has been said.

MUNDT: I said as I introduced myself, my practice in the last few years has represented people making investments in the fishing busi-

ness. It's really those people that drive our whole industry. They're the ones that are making the business go. I've rubbed elbows with all different types of investors: sophisticated, unsophisticated, those from the United States, from foreign countries, Kodiak fishermen, Los Angeles basketball players, Seattle lawyers. Some of the investors know nothing about the business, some investors know a whole lot about the business.

I don't tell them whether to invest or not, that's for them to decide. But, I do have some observations about all of these people. They come to the fishery for exactly the same reason. They see an opportunity to get some money, whether it is the foreign fisherman who wants to get involved in our fishery, the guy from Kodiak, or the L.A. basketball player. They all have the same motivation. Word gets out that there are some profits to be had in a particular fishery for whatever reason, and the investor sees an opportunity to make some money. He puts his money down, buys a boat and some gear. If he already has a boat, he puts some money into it and gets ready to go fishing.

He can do that because there are no restrictions on his entering any particular fishery. This is because no one owns the fish. He's free to go out and try to catch fish just like everyone else. Nobody owns the fish because that's the law. We have used a lot of terms in the last week about this, it's been called common property. That's what I call a legal point. All 50 states say nobody has title to free-swimming fish until after they're in someone's net. Consequently, if any investor wants to get involved in a particular fishery, he just sends his boat out and he starts fishing.

This is very, very different from the investor who wants to get into the forestry business or the mining business or the ranching or the oil and gas business. In those businesses, the investors have to buy the tools, but they also have to go buy the resource because someone owns the oil or the trees. They can't simply go around cutting down trees. They've got to buy the trees before they can harvest them. That is a fundamental distinction between the fish business and all the other natural resource extraction industries. One guy gets in and starts making some money and soon there's going to be more and more boats in the king crab business or the joint venture pollock business or the cod business or whatever it is.

The manager realizes that as more boats come in, and they are all taking more fish, he's got to do something because he's trying to conserve the stock. So, we see one or more of a whole variety of management techniques causing pain to the various fishermen: shortened seasons, limits on the size of the boat, size of the net, trip limits, all of these techniques that restrict the catch. Ultimately, in some of the fisheries, the manager actually puts on a fixed quota. All these techniques have one purpose: to cut the catch so that not too many fish will be taken.

The fisherman's response is what you would expect in a situation where nobody actually owns the fish until they're caught. The fisherman tries to catch as many fish as he possibly can as fast as he can. If he doesn't catch a fish, one of the other fishermen is going to catch the fish. It isn't going to be there the next time he goes fishing. There's absolutely no benefit to the individual fisherman to wait until later in the year to catch a fish, or wait until the fish gets bigger,

or wait until the fish gets fuller, or wait until the price goes up, or wait until it's easier to catch. Because he can't exclude the other fishermen from the resource, he's got no choice but to go out and catch the fish as fast as he possibly can.

The next manager's response is sometimes to impose a system of limited entry. The manager figures to himself that, by cutting back the number of boats in the fleet, restrictions can be eased and the boats that are in the business can make a little money. So he puts in a limited entry system. If there's one point that I can add to the conference, it's that a limited entry system does not give title to the fish themselves. Under the limited entry system, or a limited entry program, there may be fewer fishermen, but you haven't given the fishermen left in the program anything approaching title to the fish. There are fewer fishermen who don't have it. The world at large can't simply buy a boat and get into the fish business, but the fishermen in the limited entry system don't have title to the fishery resources. Their motivation is still to get out and try to catch the fish as fast as they possibly can.

I want to point out three options, and then I'll shut up and let other people talk. The first is the same we are doing now. Let anybody in that wants to come in if they've got the money to buy the boat and they think that there is some profit to be had. The managers will impose season limits, quotas, or whatever, and fishermen will just do the best they can.

The second option would be to add-on limited entry and try to get the number of boats down and see if that had any impact, increased profits, or made fishing a little easier.

The last option is even more controversial, and I almost hesitate to mention it given the reaction to some of the other ideas that have been passed around here. It is to give title to the fish while they're in the water so the fisherman can treat them just as he would treat any trees that he has on his property or any oil that he has under his own land. Then, the fisherman would plan to take his fish according to some more reasonable parameters. He'd wait until the market was good or until it was easy to catch them or until they'd gotten big.

Now there are a lot of ways to give title to the fish while they are in the water. None of them have actually been tried, at least, I haven't ever heard of it being done before. You can give a fisherman a guaranteed catch quota where he gets a share of the catch or a share of the annual resource. You can give him a right to fish in a particular area of the ocean where nobody else gets to fish so every fish that he can take in that part of the ocean is his. Or, and this is the ultimate place where this whole theory goes, you can transfer an entire fishery to somebody, or to some consortium of fishermen or consortium of investors. For example, take the whole St. Matthew crab fishery and just transfer it to somebody and say it is your fishery and nobody else can go fishing unless you let them.

The last point I want to raise is how do you decide who is going to get into these fisheries? You can essentially give them away to people or you can establish the same type of criteria that you would for limited entry permits. How long have you been in the fishery? How much investment have you got? What's your history? You can just lease them

or sell them outright just the way we do the off-shore oil and gas leases. Now, having said all that, I think that I'll fall back and ask for some comments and help from the panel.

PETERSON: Maybe I look at this from a different point of view. One of my most significant activities was as president and chief executive officer Ocean Beauty Seafoods. You may recognize it better as Kodiak King Crab, St. Elias Ocean Products, Juneau Cold Storage, Washington Fish and Oyster and so on. There were about 25 subsidiaries under my jurisdiction in that company.

It seems to me there has been a lot of fantasizing going on at this meeting. So I would like to have the privilege of fantasizing a little bit. My fantasy takes me five years into the future after a system of quota shares has been put in place in some fishery. A few things come to mind. The first one is monopoly. It is defined as exclusive control of a commodity in a given market, allowing price fixing and the elimination of free competition. That may not prevail, contrary to what Carl said. I think ownership of that resource does become private once this occurs. It is no longer a common property resource. It is privately held. Does the anti-trust law change? Does the Department of Justice become interested? From my perspective in the processing business, I wouldn't touch it with a ten-foot pole. Now fishermen have certain immunities. Maybe those immunities still hold, I don't know. This should certainly be investigated.

Another aspect of it is, from a businessman's point of view, that we would have another agency. We don't need another agency. I think we have enough. I don't see that any of the current regulations would be eliminated. If you could get into a trading situation, ok, you could do this, but you will eliminate that maybe. You would have something that would be useful. But I don't think that regulations go away very easily. I'm not sure it would change the patterns of fishermen, as you suggested, Carl. I don't think so because in order for that to occur, the fisherman must have complete confidence in the quotas that are established. If you say there's going to be 100 million pounds caught, there damn well better be 100 million pounds caught. The fishermen are going to be out there to catch them first, so I'd doubt there would be any change in the fishing pattern. Certainly in a bloated fishery like halibut, you have another problem. By the time you allocate the quota to the individual fisherman you might put each one of them where he cannot make a profit by catching his quota. It might be too small. Who knows? I don't think anybody knows that one.

There is another ingredient that is hard to define. It's been touched on. I think I would call it the highliner ingredient. I think Lee Anderson talked earlier about the good guys, all fishermen are good guys. They are all created equally, but they don't fish equally. What is a good fisherman? A good fisherman is always ready to fish, he's got good equipment and he takes damn good care of it. He has a good boat. He hardly ever has break downs because he knows what he's doing. He brings in high volumes of fish. He brings in good quality fish. He has good fish sense. He knows where fish are. He is a good hunter. Jim mentioned that word and it is a good word. Good fishermen are good hunters. But above all, they're competitive as hell. They want to win. Now, it would seem to me that any limited entry system any share quota system litigates against that characteristic of the industry. I think it's an important characteristic.

ALVERSON: If I could take up where Mr. Peterson has left off. I have picked up several different concepts of limited entry at this table and at the conference. One concept might be bidding on quotas, such as 10,000 pound or 10,000 ton increments of the resource, depending on the resource. I see a problem on the bidding arrangement, the guild system, or a share system. I take an analogy from the timber industry. When they went to leasing stumpage rights, you might have had 100 different independents and companies bidding on those stumpage rights. Maybe 60 of them were successful. Those rights were good for maybe five years, then there was a rebidding. During those five years, the company set up sales, purchasing and processing, infrastructure. The 40 people who were unsuccessful bidders are really unrealistic competition now, five years down the road. They sold their equipment probably 20 cents on the dollar to people that were successful bidders and are probably employed by them. As the scenario rolls on 25 years down the road, you end up with 80 percent of the resource in the hands of a Weyerhaeuser or Georgia Pacific. The little guy is really not an effective competitor anymore.

The bidding system will have a significant impact on the small processor and the small communities within Alaska. In a share system, where a fisherman might be given certain percentage of the resource, people retire, people pass away, and their shares are put up for sale. The processor is going to have to worry about where his guaranteed product is, where his product will come from. The people that are going to bid or offer prices to those individual fishermen are not necessarily going to be other fishermen. They are going to be the Moonies, the Con-Agras, the Star Kists, using fishermen as a mouthpiece to bid for their share of the resource. This, again, has significant impact on the small processor and the small communities from Washington to Alaska.

The share system and those other systems would set the fishermen back 40 years to the point where they will be working for the company store. We were in that place 30 years, 40 years ago and we worked our way out. This is just another way to put ourselves back in there, as far as I am concerned. Share systems have been sold to the fishermen in the last three years. Hey, wouldn't it be great if you had a 100,000 pounds, and you could take it anytime you wanted, and you could take it with any part of any resource that you're fishing at the time? That's the short-term benefit. But, as the gentleman from British Columbia said, we should look at what some of these regulations will cause five years down the road. How many new oil companies have come into the offshore leasing business in the last ten years? It's the same companies, the same process as bidding for timber. Looking at the history of other natural resource industries such as those two, why wouldn't it happen in fisheries?

I think that there is a need for limited access though. The current Alaska license program is a viable alternative. It addresses the needs of the resource, in my opinion. It may not address the economic needs of the fisherman, but I think people would be hard-pressed to say that limited entry has not been successful in terms of the needs of the resource. I think it would be successful in the halibut and some of the groundfisheries off the coast of Washington, Oregon, and California. No one fisherman is going to be guaranteed something and no processor is going to want to finance a fisherman that doesn't have a guarantee. So, you mitigate or minimize the problem of different processors pooling fishing rights. The processor knows that all

fishermen are fair game. No one has his soul mortgaged to a particular processor. All the processor has to do is put the right price out on the dock and that gentleman's going to come into his dock.

These are two issues that Mr. Peterson mentioned: that the share system and some of these other systems lack competition and I agree with him. I think that long-range implications of shares and bidding process are detrimental to the fishing industry. It would rob the soul of the fishing industry as we know it today.

BAKER: Bob, just regarding your points on limited entry or limited access, as you call it. A company such as ours would love to see a limited entry or limited access for Pacific cod or king crab. As we progress in the bottomfish business, we make investments in capital and equipment. If limited entry were to be enforced in bottomfish, we wouldn't have any options if the resource were to dry up for whatever reason. Because of that, we feel that we need options. That's why limited entry to us is just not an acceptable means of controlling the resource. I think the resource can be managed effectively without limited entry as with it. We need regulation but not in the form of limited entry.

QUESTION: If the resource dried up under an open entry system, what would your options be?

BAKER: I don't know. We didn't know three years ago when king crab dried up, but we did successfully convert one of our crabbers to a factory trawler, not that it's as successful as a trawler, but we're still paying the bills.

QUESTION: Wouldn't you do that anyway under a closed system? Move to your next alternative?

BAKER: Not if Pacific cod or pollock was a limited entry situation. We couldn't go into that fishery so I don't know where we would go. Maybe we would have to go to a foreign country.

PENNOYER: This is not the easiest topic to discuss. In the state system, we divide functions between different forms of management. Our agencies usually don't manage or decide on the management for economic purposes or for entry. It doesn't mean it's not part of our management process, and it doesn't mean we don't manage for it, but we take guidelines from others, usually derived from some public forum process. They set the objectives then give us the guidelines around which to manage, aside from the conservation part of it.

But I'd like to comment on what Carl said about why managers do all these various gear limitations. I think that was probably more true before we started counting total escapements, before we knew what run sizes were. It may still be true in some of our developing industries for which we have limited data. At that time, managers feared that they didn't have the information to regulate. We tried to slow the fishery down as a part of the process. We did impose obvious length restrictions in gear, type of gear, and so forth. That's still true to some extent today. Some of those regulations have been imposed in different areas by groups like the Board of Fisheries to divide the resource up among different groups so they can't get some particular share or larger share. The next guy accepts it, because they can use

the same general type of gear. Bristol Bay 32-foot boatline is a good example. The Board of Fisheries talked about getting rid of it and even put a moratorium on it a few years back. The general public sentiment in the bay was that they were concerned not with conservation, but about somebody coming in with a bigger investment or a new boat and taking a larger share of the resource. I think that can work both ways.

In Alaska, we do have an entry commission that deals with limited entry. It makes decisions based on input from us as to whether limited entry is needed biologically, or if the general public and fishermen feel they need it for an economic advantage. Bob said nobody can argue that the needs of the resource have been met by limited entry. When we originally envisioned limited entry in Alaska salmon, everybody was going to fish seven days a week, it would be a nice slow fishery and the effort levels would go way down. That was the concept some people were talking about. It hasn't actually worked that way. I know what the alternative is with unlimited amounts of gear. I think it has given individual fishermen a feeling of responsibility and ownership toward that resource. But in many cases, not all, but many cases, we have more gear now than we had before limited entry. I'm not saying we might not have more yet, but most of the regulations are based on run assessment and time and area closures.

The only other thing I was going to discuss a little bit was how you arrive at a management system. People talk about how this type of system won't work and that type of system won't work. I haven't heard a lot of discussion on what the overall objectives are going to be, who decides those objectives, and then who derives the system to meet them. For example, one objective brought up in Alaska has been to benefit or to protect the economy of coastal communities. Now that goes one step further than perhaps just some type of economic benefit. I think there is a need to spend more time talking about the objectives, talking about whether the share system meets them or, if our particular limited entry meets them.

LOW: Well, Carl, I don't want you to feel we are all ganging up on you, but I think you've brought up an interesting topic. Who has title to the resource? It's a common property resource, as you have said. I wanted to make an observation on option number three, which essentially leads into a monopoly situation. Last week, I attended a seminar where Dr. Colin Clark, a mathematician from the University of British Columbia, gave a talk entitled: "Catch Quotas: Theory and practice." He provided a mathematical equation that says if you give a share quota to one large enterprise, like your monopoly situation, you have the same situation as a fishery with a single fisherman who is very efficient. What I would like to say is that we don't always manage fisheries to maximize yield. We maximize yield sure, but we've always kept in the back of our mind that we're also trying to maximize future optional use of the resource. We don't want to deplete one resource, we don't want to deplete one year-class of something else, because we want to preserve future options. And as we discuss the limited entry systems, bidding systems or a monopoly situation, I think we all have in mind that we don't want our future options precluded. The moment you grant title to somebody, it becomes vested in him forever, and other people's options are forever precluded.

PETERSON: Even though I blasted off against any limited entry program, I can't help but observe that the one fishery that seems to be making a lot of money now, the joint venture fishery, is in effect a limited entry fishery. The quotas are given to the foreign companies, who then hire the vessels to fish for them. They are very selective about how many vessels they take, and the fishermen themselves don't want too many. So here you have a contrast where the successful fishery is, in effect, under a limited entry system.

STEPHAN: I want to strike off in a little bit different direction. What we're talking about is title to fishery resources. We list the options as number one, status quo; number two, limited entry; number three, title. I just wanted to read the last sentence here that you have in a very short synopsis regarding option three, title. You're talking about conveying title and that this solves the underlying common property problem. It is bound to be extremely controversial and difficult to implement because it is a fundamental and significant change in the way fisheries have historically been managed. It presumes a sophistication in management that is presently lacking. It is about that presumption of sophistication in management that I would like to say a few words, if you don't mind. Bear with me here for seven or eight minutes. John, I'm also going to fantasize here for a little bit. I'm going to fantasize that I'm an economist and maybe even that I went to the University of Washington.

In the context of this particular panel, I'd like to illustrate some of the concerns I have about the issue of whether or not we collectively choose to adopt a policy of managing to a greater extent than we do now, the economics and economies of the seafood industry. Do we want to continue to develop conceptual systems and implement laws and regulations that attempt to, for example: "Insure for us in the industry a reasonable economic return in our investment." Or in still other terms, "Get us the greatest economic value from our fishery resources."

I am not in favor of this type of fisheries management. I see this option as social engineering. Its consequences are very dangerous. This is not to say that the purveyors of these designs all have bad intentions. On the contrary, I believe that many of the promoters of these systems are trying to solve the ever-evolving conflicts and problems that we face as fisheries managers and industry participants. Some, however, are attempting to develop only new and exciting techniques or systems for managing the people and economies of our industry. In this vein, we are told often that traditional management tools or combinations and variations of them will no longer work. I'm speaking of what seems these last few days to be a very strong attempt to sell some form of limited access or share allocation as the only tools left for managing our industry and addressing our contemporary challenges.

These access and effort limitations schemes are being billed as a new dispensation that will rescue us from ingrained and harmful habits allegedly inherent in the system which drives our fishing industry. We are led to believe this Utopian system will protect us from the inexorable twists of the business cycle and fine-tune natural economic laws. Much of the justification for effort limitation comes in one form or another from economic principles and theory. In large part I do not

agree with the theoretical relationships and conclusions I have heard these last few days.

As an academic exercise, I would put forth a few economic theories to which I adhere that lead me to disagree that access and effort limitation systems are feasible tools for managing our fishery resources. They also lead me to see these systems as exercises that bring us too far into social and economic engineering. The desire to develop and implement these systems, in my opinion, can be given the label of "constructivism." "Constructivism" is a label developed by the economist Friedrich von Hayek. He did not attend the University of Washington. Nevertheless, he did receive a Nobel Prize in 1974. He is British, and from the Austrian school of economics. He taught at the London School of Economics and later at the University of Chicago. His constructivists believed that man is the measure of all things, that man is smart enough to design his own future and can design a plan to achieve it. Constructivists ignore human and historical values in their haste, sometimes their arrogant haste, to remake the system. Hayek, on the other hand, believes in a deep respect for complexity, the values of the past, and humility. He coins another phrase to define constructivism. He calls it the "illusion of human omnipotence," the type of illusion that leads to legislation like the Humphrey-Hawkins bill which makes joblessness illegal. It leads to rent control, it leads to illusions that we can design a system that somehow promises that, "In the aggregate, we, in fishing, will derive the greatest economic return from our investment." Or, as another example, will lead us to the belief that we can, "design a system that will get us as far as we can go into getting the greatest economic value from our fishing industry through fleet rationalization programs."

I like the term "fleet rationalization" because it connects in my mind with the thinking of the French rationalists who had theories much the same as constructivism. David Hume wrote in opposition to the French rationalists that successful societies are "all the result of human action, not of human design." The option of fleet rationalization and its portrayed results is an illusion. It is an attempt at social and economic engineering that is doomed to failure, not because of political influence or sabotage, but because of the flaws in the principles upon which it is built.

What bothers me about rationalization programs is that the weight of failure will fall on the industry. It always does. I do not condemn the promoters of these programs because their intentions are mostly well-meaning. In their attempt to remake mankind, they are suffering from what Hayek calls a pretense of knowledge: that they can quantitatively measure in the aggregate an essentially complex economic system. Hayek also calls this scientism.

Economics has been labeled the dismal science. One of my favorite definitions of an economist is one who has predicted 12 out of the last two recessions. I am not trying to pick on economists' attempts to design a system based upon simple equations. Establishing a simple relationship between measured quantities of certain parts of the economic system is not feasible. We cannot let ourselves think totally in terms of simple functional relationships between aggregate groundfish harvesting capacity, aggregate value to the U.S. economy, aggregate inputs and aggregate outputs. The consequence of this approach is

that you have, in Hayek's words, "An ever-increasing backlog of mis-applied resources because the price system has not been allowed to operate as the guide as to where these resources should be used."

The comments made yesterday about poker and the seafood industry caused me to reflect upon how an analogy can be made between fleet rationalization programs and poker. It can't be made. The seafood industry's poker game depends on luck and skill. Fleet rationalization is by definition finely planned. Its outcome, we are told, is basically preordained; more like a crossword puzzle than poker. Rigged planning and preordained results do not mix with luck and skill. There is no body of economic thought of which I know that supports this type of experimentation with social engineering in an industry as complex and dynamic as ours.

Going back to those aggregate quantitative formulas and measurements that we hear so much about, where do we plug in the real world? We can't. We cannot predict the complex interrelationship between factors that affect not only the biology of the resource, but also the business cycle as it affects fisheries. If I'm told that the rules of the game are changing to fit into a crossword puzzle Utopia, I'm going to first ask what the value of the Yen and the Pound will be in the next five years, since these currencies have a profound effect on the decision of where to allocate capital in the fishing industry. What about interest rates and insurance rates? We direct our financial and capital resources in response to these factors. How much pollock is going to go to surimi versus fillets? If we know, are we going to rationalize separately the surimi trawler fleet from the factory ship fillet fleet? How much additional demand is going to be cracked in our industry by the government through capital construction fund, fisheries obligation guarantees, the three-phase bailout provision of the Brough bill a few years ago, low interest loans, state loans programs, and so on.

Let me say something about the government programs. Through these stimulation programs, the government directed productive effort to a level that could not continue unless fishery stocks continually accelerated. The government knew that stocks would not continually accelerate. In fact, they would decline. We all know that it is the nature of the business. In the meantime, we've created a level of instability in the relative price structure and a flow of investment in the industry. Are we to rely on this type of performance, when we talk about planning efforts for fleet rationalization? We cannot predict which variable will affect us in the future, or how those variables will react. Even if we can, we cannot control them.

We make too many assumptions about the few variables we consider. This pretense of knowledge, that we can predict and control economic variables, is a major flaw in these fleet rationalization social experiments. In my mind, we must remove ourselves from this illusion of human omnipotence in fisheries management.

MILES: I think our management problems could be eliminated and our fisheries could be made an attractive area for a long-term investment and growth if we would only bite the bullet and institute some form of resource allocation. If we don't do this, the future is fairly clear: it's over-capitalization and a dissipation of the gains that we have recently made. Decisions on how, when, and where fisheries resources have to be harvested, or put back into the hands of those who do the

harvesting, must be made before controlling entry into fisheries as a means of optimizing of effort. By allocating resource shares directly among the participants, resource shareholders could individually or collectively decide on what strategies they want to follow to take their share of the resource. They would be in a much stronger position to negotiate long-term supply contracts with interested buyers. This would create a competitive and qualitative climate for resource development in a more stable management environment. This would in turn facilitate conservation. There are a number of ways in which such allocation of rights could take place. The simplest would be to allocate through a lottery or an auction system with consideration for the rights of existing harvestors and potential new entrants. A resource share under this approach could be valid either indefinitely or for some limited time with expired shares reverting to some central resource agency for re-allocation. But, I would want to emphasize that there's real urgency here, if we are to maintain the gains that we have recently made.

WILSON: Going back to something Bob Alverson said, he asked, "Would you mind limited entry if the alternative choice was not having a resource? Wouldn't it be a better world than the one in which the resource was lost because of open access problems?" I think that point is well taken. But, it brings up a crucial question about limited entry. Economists have implicitly buried in the theory about limited entry that if it's the only way you can save the resource, then it's a good way to go. The implication is that if you can control effort, you will, in fact, sustain the resource and have one that wouldn't have been there otherwise. Bob pointed to the salmon fishery as an example of one where there were good conservation effects. That may be. From what I know, in the salmon fishery it is possible to, in fact, have some control over inter-generational recruitment effects. You can expect such benefits in that kind of fishery, because you have that control. When you go on to the halibut fishery, I really wonder if we have that kind of control. If you go to the kinds of population dynamics that Mike Sissenwine was talking about, essentially he said that from the biological point of view, you don't have that control. If that's the case, then the proposition of limited entry or no resource is false because controlling effort is not necessarily going to control or preserve that resource.

FISHER: John Peterson, this is really directed at you. You made the comment that, in the joint ventures, you've got limited access. Or I think you implied that. Is that correct?

PETERSON: I didn't imply that. I stated that.

FISHER: Ok, good. I don't think that's true at all. I think that what the joint ventures did is to take some of the economic conditions that prevail between the plant and the fleet, and rationalize them quite a bit better. Now, I fished under both systems, and sure there are a limited number of boats. Just as if I'm a good fisherman and I fish for your plant. Any smart plant manager knows that he shouldn't overload his plant with boats, because the share that those boats can get will go down to the point where the good fishermen take off. You're no longer a good market for them. We spent a lot of time thinking about the economics, because there were some new variables when we planned the joint ventures.

We noted first that the fishing platform had now become a fishing platform 24 hours a day. It was not a freighter and a warehouse, not generating revenue when it wasn't fishing. Secondly, we knew we were after full utilization of the plant, the plant here being the processor. So we tried to strike a balance between the appropriate number of catching units and the needs of the processor, recognizing that we would have to factor in such things as break-downs in the catching fleet, and try and strike a balance with what income is needed per boat per day to hold him in the fishery, to sustain him and to motivate him. What does the processor need in order to achieve his full production, so that your unit cost of production reached an all-time low? Third, we looked hard at something that I think most processors and most fishermen forget. What are the relative capital intensities required in both plant and boats? If you look at the average West Coast traditional plant, you discover that the aggregation of capital fishing for that plant is far greater than the cost of the plant per se. I suggest that the elements were similar between plants and boats in the traditional match, but we thought them through with a great deal more finesse than is typically done between the plant and the fleet. In this instance, the economic dividends are apparent. Realize that in the joint ventures, the degree of economic planning is far more sophisticated than is currently used between the processor and boat.

PETERSON: May I comment on that, Barry, because I agree with you 100 percent. A fisherman who does not have an arrangement with a joint venture doesn't have a market. It's the market that is important. I'm saying that the market is controlled by the processor in that particular instance. We in the industry have certainly recognized what you're saying. Then or 15 years ago, we had systems whereby bonuses were paid to the top ten fishermen. It always seemed to me that was wrong. The guy that didn't catch much is the guy ought to have got the bonus because he really needed it. But not so economically. You give the bonus to the top ten or whatever number you want, because they're the guys that bring in the product that you need. They are the highliners. I'm not sure that system is still in effect, but it recognized the point you're making.

ALVERSON: I have one last comment to Mr. Wilson on the halibut thing he mentioned. The halibut industry went through a period when they were catching 60 or 70 million pounds in a 20- to 30-day period. This was back in the 1940s or 1950s. Harold Lokken could probably give the exact year. And the fleet was fairly stable at that time. There simply wasn't a lot of entry into it. The fleet did several things on its own. One, it established poundage limits per crew. You could only bring in so many pounds per so many crewmen. It also split the fleet. You had a stable fleet and it split the fleet, say into several different categories, to spread landings and to apply consistency to the processors in the market. These things, I think, can be done under Alaska's state limited license program as you have in salmon, only adapting it, maybe it's only good for gear-specific fisheries that are pot-oriented or longline-oriented or something like that. Maybe it doesn't work for a multi-species troll fishery, but I think it might be adaptable. I think you can address many of the issues, or that one issue you mentioned awhile back that you didn't think it would be adaptable to the halibut fishery and still accommodate the needs of the resources.

WILSON: I meant that when you look at a limited entry program in terms of success, there's a tendency to look at whether people in the program are making a lot of bucks. There are two reasons that a lot of bucks can be made. One is because you're sustaining the resource. That's the reason most economists think that effort limitation is a good thing, socially. The other reason is because you've given people a monopoly privilege. Not a complete one, but you have restricted the competition and excess profits result from that. The point I wanted to make is that, from the social point of view, are you really going to be able to sustain the resource with that kind of limited entry program? Are you simply going to create a privileged class of people who have a special access to this resource denied to other people?

ANDERSON: I want to correct something I understood Carl to say. You said no individual transferable quotas exist. They are prevalent in New Zealand and Australia, and on the East Coast of Canada. I'm glad they're there, because after hearing the comments from the panel, I would otherwise think that industry would have no use for them. That gives me courage to go on and do a little more discussion.

The points that have been raised here this afternoon are interesting. They're the types of things that are often raised in discussions of these types: problems of monopolies, problems of hurting the high-liner, social engineering topics of one form or another are brought up. I think we should be very careful with the use of monopoly. For one thing, individual transferable quotas do not, as a logical conclusion, go on to monopoly. They become monopolies if the individual transferable quotas are centered in too few hands. I think that should be a distinction. Creating a property right does not necessarily create monopoly. A farmer owns his land, but he does not have a monopoly on food. He certainly owns his land and he can use it the way he wishes, but there are other people who own land. You get a monopoly when someone owns all of the farm land. I think that distinction should be clear. Another point is that if, in fact, you think monopoly is going to be a problem, I would certainly suggest that the anti-trust legislation be applied. I think, not just in terms of fishing in this regard, but when we start introducing property rights, let's compare the fishing industry with other industries for the criteria. If you're going to have monopoly problems here, let's have anti-trust come in and handle it in exactly the same way that it's handled in other industries, no less, no more.

MUNDT: Lee, can I just interrupt you a second? I don't see much chance of having a monopoly situation in our business, because it's such a global business. The supply of fish is certainly not controlled by us, it's essentially a world market. Even if we were to give one company every single cod fish in the whole United States, it couldn't raise the price one bit, because it faces the prices from other suppliers.

ANDERSON: Well, if everyone will believe you, we won't talk about the monopoly problem anymore. I think it would clarify things. Another issue has to do with the highliners. They can no longer compete. Another thing I have found confusing is the idea that, by giving an ownership to individuals, we are tying them to the "company store." That's a pretty grievous jump in logic that I don't think I can agree with at all. The highliners are certainly still going to be able to compete. Because they are the ones that can catch the fish as cheaply

as possible, they're going to be able to compete and when the shares are transferable, they are the ones that are going to be buying them. You're not going to buy a transferable quota away from a highliner, simply because you're not going to be able to afford to. If he is the best there is, you can't pay him enough to get away from him. It's not worth it to you to buy it from him if you're not as good as he is. There's just not the profit margin there. The highliner can still compete, he just has to buy his property right in the same way that you buy it in any other industry.

This social engineering issue is interesting, but I think we have to bear all of this on an even keel. For one thing, I don't think it's any more a social engineering program than what was described by Dan Huppert. That's the same sort of thing as telling the fisherman where to go. But, I would like to attack it on another basis. I'm certainly not advocating control of the fishing industry, certainly not looking at the industry any more than I would at other industries. My exact point is that we are not trying anything new on the fishery. What we are trying to say is "let's let the fishery be like every other industry in our capitalist economy." We're going to create property rights. That's all, that's it. No social engineering. We're going to tell them how to invest, what interest rates should be. We're going to get him on the same footing as other industries, and let him go.

GUIMOND: One point that really kind of irritates me as a manager, and I see it happening in all of the councils, is that there's a menu of management tools that are available to us: to limit access, limit effort, how you want to define it. It includes in-seasons, mesh, fish sizes, quotas, all of these other elements. Yet, in another menu there is one item under column B, and is limited entry. Managers have got to stop looking limited entry as one card in a deck. It is not the ace, it is not a straight flush, it is one card. Its value is yet to be determined.

We're going through a multitude of gyrations back in the east, and limited entry, because of its complexity, is just not going to get into effect. We always fall back as managers to, if all else fails, limited entry will work. We in the outside who've been representing certain interests over the last half-a-dozen years, have suggested to managers on the panel and in the audience that they take a look at any fishery in their area, in a historical context, and apply limited entry at any point and see the results that you will get based on your perception of limited entry. You'll find it really doesn't change things all that much. I don't think that we are supposed to manage a resource to make sure that a harvester or a processor is successful. Success and failure is going to be their own making.

But the councils are driven by the fact that we're supposed to be enforcing or managing the FCMA, not protecting the processors, or protecting the shore-side, or protecting the boats. We do a little bit of all these. I get really tongue-tied trying to come up with a scheme that's going to make someone successful. You don't want managers involved in your business to make the decision. At the same time, you are looking to us managers for the guarantees. Yes, we will support management regimes as long as we feel that we're going to come out ok. The time one wants to consider the possibility of limited entry, in my opinion, is not when the resource is in the toilet. Just the opposite. More importantly, show me a limited entry scheme that has resulted in

an increase of the resource, strictly because of limited entry. You do, and I'll stand corrected. As I understand it, you have a somewhat limited entry in salmon. But landings, as I understand, have increased not because of limited entry, but because you have stopped certain interceptions in the high seas and other types of practices. Anyone who thinks limited entry is the answer should look at it as you conceive it in your own mind. Apply it to any fishery you want to and see what the results were. You can daydream all you want. Theorize, do anything, wave the magic wand, but apply any conditions you want during any tenure and you're going to see the management results aren't that different. So, let us not try to devise a system that is going to guarantee success.

I, for one, look at limited entry as no more important than a minimum fish size, depending on what you're trying to do. Limited entry is viewed as a successful type of situation. With due regards to all of them in our audience, I haven't found too many economists that invest the fishing business. If they're really interested, there are several people here that would be willing to talk to you. However, I was handed a magazine called "United" and it says, "You cannot run a business or anything else on a theory." So remember, theory's fine, but when it comes time for making money, it's business sense on the fisherman's and the processor's part. Don't make limited entry the fallback position because I don't believe it's going to answer the question. What you want to achieve should be your consideration, not what you think is going to be achieved because you're closing out everybody else. I don't own that resource, you don't own that resource. That's my personal opinion, my other council members think differently, but let me be successful or fail on my own volition, not because you've kept inefficiency profitable.

ALVERSON: Some of us are trying to move from theory to practice. As Barry Fisher indicated, a lot of the highliners on the West Coast think there's a problem, whether it's in the groundfish fishery off Washington, Oregon or California, or the halibut fishery up north. There is a problem. There are too damn many boats. There are too many processors. Now something has got to give. The resource is paramount. If you don't over-harvest the resource, as more boats enter, the managers under the traditional management systems have only one alternative and that's to reduce your limits, your trip limits, increase your trip frequencies of landing so that you don't exceed and cause undue stress on the resource. On the West Coast, the Pacific council, I think has a very poor record of fisheries management. There again, you have the industry starting to say, "Hey, we've got a problem." I think they're going to solve that problem. To come in continually, as fishermen or people associated with other councils do, and say quit playing with your theories when their own backyard is about that deep, I don't think it's really proper.

HERRNSTEEN: I wanted to go back to the share quota for one more minute. You are talking about it going to monopoly or oligopoly. I don't know alot about it but there are farm programs where only certain people are allowed to sell. I've been told there's only a handful of hops. You can't go grow hops and sell to a brewery. I've seen the pictures on "60 Minutes" of a football field of oranges going rotten so farmers can hold the price up. I've heard the similar things about how they hoard the almonds. Almonds are expensive because of controls on the market. There has been alot of thought among fishermen about how,

under the share quota system, you could jack the price of the fish up by similar control. It's not a bad deal. The consumer would get alot of fresh fish, maybe cheap in-season. I don't think we have to assume a year-round fresh fish market for every species.

I'd like to go back to grapes for a minute, then ask Carl Mundt a question. My understanding of the problems in vineyards and orchards is all the tax incentives that encourage people to shelter their money in those items. Five years along the line, whenever the orchards and trees grow up, there's a surplus of products. That's why avacados are really cheap right now. Someone told me last night that 25 percent of the grapes in California weren't harvested, weren't put into wine this year because of the surplus. I don't know alot about these things, but I want to ask you something, Carl, since you are into the investments end. Jake Dykstra said if there are laws to be changed, there are ways to change them. From your experience, what are the various investment vehicles through the tax laws that encourage the basketball players, the movie stars and everyone to invest in our industry? I feel absentee owners generally promote inefficiencies, in the fishing industry. What are the various laws that would have to be changed to put everybody on equal footing?

MUNDT: From my experience, the tax laws that apply to the fishing industry are exactly the same as the tax laws that apply to every industry, with one exception. That's the capital construction fund program. If you make an investment in a boat or gear, you get investment tax credit the same way the farmer gets investment tax credit when he invests in a tractor or something like that. When you buy an asset like a boat, you get to depreciate it over a certain period of years. Exactly the way the farmer gets to depreciate his tractor. The depreciation gets recaptured if you sell the boat, just the way Weyerhaeuser has to recapture the depreciation on all equipment it buys. The only difference that I know of is the capital construction fund program, and that is a tax deferral program. If you have profits, you can deposit them into some kind of bank account and you can deduct the profit from your federal income tax return. You don't pay taxes on it until you take it out of the bank account. Then you put it into some other boat or, if you put it into your pocket, then you pay tax on it. The only program that really relates to the fishing business that's in any way special is the capital construction fund program and that's really not the motivating factor for these basketball players because it only takes effect after there's profit. They're not sure there's going to be profits and they're not sure they're going to want to put their profits into a capital construction fund. They might prefer to have the profits for their own spending. To summarize, there does not appear to me to be any difference whatsoever in the tax laws that apply to the fishing business as opposed to the wine business or the farming business or the oil and gas business, or whatever business you want to mention.

MILES: The second issue is one of management and authority. It relates to issues that were discussed on the first day by Lee Alverson, Bart Eaton, Bill Wilkerson and a number of people. This has to do with the question of who is in charge. Let me try to summarize the problem as the moderators see it in the following way, which some of you will find provocative and that's just great. The Magnuson Act solved only the external dimensions of the management problem. The authority to manage internally has not been solved. It is not at all clear who is

in charge, in an operational sense. As a result of this, the quality of fisheries management in the United States is severely constrained and potential national benefits to be derived from fisheries are dissipated.

Why do I say the internal problem has not been solved? Because at the heart of the Magnuson Act lies a very uneasy compromise over historic problems of federal/state jurisdictional conflict. Regional councils have been interposed as a new bureaucratic layer between the two antagonists. Theoretically, the Secretary of Commerce is in charge. Although a major role is provided by the Secretary of State on issues involving foreign allocations. Actually, a great deal of confusion prevails. Conflicts between states, the federal government, and regional council jurisdiction abound and they have to be negotiated continuously. In the North Pacific council, I can only use as examples the king crab and herring plans are the most graphic examples of this problem, and these continuing negotiations often lead to no clear resolution. The management system on the whole, and a number of people have referred to this, is too porous, with regard to special interests who have access to all levels and who seek either to overturn the decisions which they do not like or who continue to lobby for alternative policies which may have been rejected at lower levels. The process, therefore is continuously turbulent.

These difficulties are further exacerbated by the fact that even though the system is highly sensitive to external pressures from special interests, the various sections of the regional fisheries constituencies, Lee Alverson's fisheries family, are seriously divided among themselves. No clear sense of direction can be derived from the pulling and falling of contending forces. The system as a whole lacks the capacity to define clear operational policy objectives. It also appears to be incapable of solving the growing allocation problems between different gear types, within the U.S. fleet, and between harvestors and processors. As if that weren't enough, the management process is extremely complex, cumbersome, time consuming, and expensive for participants. Required reviews at the federal level, as we have heard, are unnecessarily lengthy and duplicative. This results in management actions that are not timely, not efficient and not effective.

So what options are available to us to remedy these deficiencies? We can identify only four. We present these to you for your reaction. You can choose to continue to use the present system, but seek at least to get improvements in the timeliness of management response. If you do so, that does not solve the "who is in charge?" problem and it doesn't solve the problem of internal division, meaning we cannot produce clear, specific operational objectives that are accepted by the players. It doesn't have anything to do with the incapacity to resolve internal allocation problems within the U.S. fleet, and between the fleet and the processors. You can choose to give management authority to the states inside of the 200 miles. This, of course, raises severe Constitutional questions, that will swallow us up interminably. It won't solve allocation problems. It won't solve the problem of conflicting objectives in a nondiscriminatory way and it doesn't solve conflicts over interstate fisheries. You can also choose to institutionalize the notion that the federal government owns all the living resources beyond three miles, as in the case of Canada, or Australia; that it is the sole management authority for those resources; and that

the federal government should assume jurisdiction over all interstate fisheries. Then you can seek to create a management structure within the federal government that would flow from that, which would receive the required funding in order to assume the responsibilities that would evolve. The problem with this approach is that it, too, would raise all kinds of interminable conflict on Constitutional and other issues and would be regarded as too radical a move. Finally, you can choose to give ultimate authority to the regional councils. That too, raises some Constitutional questions with regard to both states and the federal government. But, as we look at these options, no single one seems to do the job that needs to be done. No single one of these options will remedy the inefficiencies that have been identified. Therefore, we pose to you the question, "What should we do?"

PENNOYER: I thought I'd go back for a couple of seconds and talk about state/federal conflicts and how we got where we are in Alaska. The system is cumbersome, time consuming and expensive for all participants. Federal actions are not timely, efficient or effective. During statehood debates, some of the main problems identified were those you just mentioned: the inability to get things done on-the-spot when the fisheries are taking place, the general public feeling that they were excluded from the final discussions when the decisions were made. These are part of the reason the state adopted its board system, which, until 1976, regulated offshore domestic fisheries.

With the FCMA, we started stumbling on some of these systems that were already being managed. The state already had a management infrastructure. It already had research programs, a large management staff, offices throughout the state dealing with crab and other shellfish fisheries. The questions that came up under the FCMA were dealt with in different fashions, and it's been kind of progressive. This is why I was offering a different solution that I don't think has been adequately tried yet. It's true that we ended up with two forms of fishermen, and that's not the way to do it, obviously. We did end up with people going to the council meeting and then to the board meetings and testifying differently depending on the audience, and that causes conflicts. We ended up with a tanner crab plan that had regulations contrary to the federal system. Even if we had agreed on what this should be, the rules didn't change fast enough to publish in the regulation book that went out to the fleet. There were always discrepancies.

We decided one of the ways to do it so the federal government could use the state's system research and management was to try a frame working of the king crab plan. We still don't know if this is going to work. When it was sent forth to the secretary the last time, the state commented that we saw some problems with conflicting regulations and the inability to change the process in time for the two systems to agree during the season. In essence, the proposal says that the state, through existing management and research, will actually regulate the fishery as long as we stay within precepts of the FCMA which are principally the national standards. I have no way of telling how it is all going to work or in whose perception it must stay within those boundaries, but it does keep the system closer to home.

Boards meet for six or seven days each fall and talk about allocation. I generally know why the boards made their decision, and the input that they received. In our state processes, except perhaps for legislative

action, the decision is there and you know how it got there. Now that has certain benefits, I'm not saying it's going to solve all of the problems, I'm not saying that all users that come to the state are going to feel equally represented. But, we are trying the frame work plan in king crab. Rather than choose one of your options of throwing everything out or starting over again or going to ownership concepts, I presume that where infrastructure for management and research exists, we should try to use them.

BAKER: Barry Fisher said earlier that, as an industry, we would consider using assessments to fund federal management of the groundfish fishery in particular. We have numerous problems with the State of Alaska trying to administer the king crab plan. I understand it's to be extended up to a 200-mile limit. But we think that federal control is probably the safest since we are outsiders from Seattle. If it taxes financial resources to be objective in the fishery management, then maybe that's something that we should pay. We have fought on this issue for the last several years. I think you acknowledged last year on the tanner crab issue that, with the exclusive area situation that we got into, federal control wasn't that bad when compared to what we have faced in the last few years with king crab and tanner crab. Federal management to us is something that is not workable. Sure, the council is cumbersome, it's awkward, maybe expensive, but it's a democratic process. We go through those hoops and we get our chance to talk, and it's lengthy, but maybe that's just the cost of being democratic. The other alternative is a "fishing Czar." I don't know if that's a good option, so the democratic process is one that I vote for.

STEPHAN: Terry, not to put you on the spot, but what problems did you have with the state king crab management?

BAKER: I don't know if we have time to list the problems that we as outsiders have with king crab regulations in Alaska. One example is last year's super-exclusive areas for tanner crab. I don't know the legal outcome of that right now, but we tried to plan a fishery three or four months in advance, which is future planning in the fish business as you know, and it changed within 30 days of the fishery. So, those are the kinds of things that we fought in the crab business in the last few years.

LOW: I'd like to offer a few comments on this question of who is in charge. Let's begin with biologists, who think they are in charge. We come up with the OY numbers and then you start from there. The economists say, "We multiply by \$1.99 and I got this number, and it's very important." The fishermen comment, the council members pass on it, and then Washington, D.C. gets to comment on it. I think this is a very healthy process. There are a lot of checks and balances and I like to see us look at it as a positive process. In the case of the Bering Sea and Gulf of Alaska, we have made substantial progress in the case of the few fisheries plans that I'm associated with. I'm sure that there are lots of people in the room who can point to other examples of plans that may have failed, but I'm not sure whether they have failed because of the cumbersome process or whether they've failed because fisheries by nature are so complex. Even if you have a benevolent czar, you may not have that good of a solution.

PETERS: When you are running a fish processing business, you plan ahead. I remember when our company was sold to some other owners, and

they wanted a five-year plan. You can't put together a five-year plan. Our plan is damn good if we can go one year at a time. I can put together a five-year plan on the back of an envelope, there's no problem, but it doesn't mean anything. We're in an industry that moves fast. When you think about it, fish spoils fast so you damn well better move fast. Our industry is capable of moving fast. We are capable of making decisions rapidly. I have been frustrated in the last three months with the cumbersome system that exists for this decision-making process, originating with the biologists, going through this full democratic system. Somewhere, somehow, that system has to be shortened and made more efficient so that decisions can be arrived at much faster than they currently are. Management systems have to work so two years later it can be changed to suit industry changes; supplies of fish are volatile, they change, markets change, decisions change, and these are factors that we live with in the industry. We've got to have some method of speeding up this management system. The councils and the council system are the only game in town. Perhaps they simply need to be improved.

ALVERSON: It's real nice to listen to this old debate on who has authority: the state or the feds. But no one ever wants to talk about the fact that, with management authority goes accountability. And as of this date, I don't think the NMFS central office has a procedure to keep tabs on accountability of their councils. The councils make projections on fish stocks and propose harvest rations, and those stocks continue to decline, as they have off Washington, Oregon, and California. The original status of stocks report listed only Pacific Ocean perch as a concerned resource back in 1977. Today, probably half to two-thirds, according to the October 31st status of stocks report of this year, have major problems. National fisheries central office in Washington, D.C., Bill Gordon's shop, has a responsibility to monitor its councils. If they want management authority, they need to be held accountable for what's going on in the regions, both in the terms of their projections, and the status of the stocks that they want authority over. The same is true with the state: if the state is going to manage it, the state has to be accountable. If they're not, the central office has the responsibility to move in and make sure something is done. Accountability goes right down to the AP members and the SSC members and the councils themselves.

MILES: Why don't we open it up to the floor then, if anyone has a question.

FISHER: I'd like Steve Pennoyer and Terry Baker to comment on this. You both asked who's in control, the state or feds? I'm an admirer of the way the State of Alaska does certain things through the board of fish, and also, the way certain things are carried out under federal control. Those of us in the groundfishery are still fishing under federal management permits. It seems to me that with the feds in control, you've essentially got a highly capitalistic system of economic determinism. The fish are there, here's your permit, go scramble after it. Whatever kind of economic or industrial approach you've got for extracting that resource; be it joint venture, be it floaters, be it shore-based plants, or whatever, get out there and do it. By contrast, the board of fish is highly democratic. You get to the people, you listen to the people, and you make decisions. The State of Alaska fisherman is fraught with all sorts of economic inefficiencies. The 57-foot limit seiner, the 32-foot gillnetter, and so

forth and so on. Now here comes the bombshell. Dr. Alverson did a study a little while ago, demonstrating that at least up through 1982, roughly 80 percent of the product that was being harvested off of Alaska was being harvested by out-of-state boats. Now comment on this.

PENNOYER: I don't know how to comment on the 80 percent, Barry. I think that's obviously including groundfish. I'm not saying that the frame work plan system I was proposing is going to work in every instance. The state's got no track record on groundfish, never has had, and doesn't have the biological expertise or the infrastructure in place. I think we've got a role in the groundfish fisheries because there are obviously interactions with state fisheries. There are obviously interactions between fleets and their roles in collecting data and helping with the analysis. In terms of economic inefficiencies, we talked earlier about what limited entry did for conservation and what various ways of limiting access are. Most of those have been up for removal at one time or another, but the public outcry has been "No, keep them, we want them. We don't want somebody else taking advantage of us."

There have been some cases where unpopular things have been done. Generally some group convinced the board it was the best for everybody and maybe it turned out that way. But the 32-foot boat limit is a case in point. The board actually put a moratorium on it about four years ago and put a two-year moratorium on it and they even went out to popular vote. In fact, they sent out yes and no sheets, with every entry permit application in the spring. The response was overwhelmingly, "No, let's keep it." It wasn't any one class of people or any one group. It was throughout the group that they wanted to keep it. A lot of those inefficiencies started earlier for conservation reasons. Mesh sizes were put in Bristol Bay because controlling efficiency of the gear was generally the manager's answer, having poor data to manage by. It's not anybody's fault, that's just how we progressed in terms of money spent for research.

That's not the case anymore. I don't think anybody in the department ever said you had to have a 32-foot boat limit in Bristol Bay to manage the fishery. It's opened or closed. If it's open, about 90 percent to 95 percent of the fish in the district are harvested, they are not going up the river. If it's closed, they are going up the river. Bigger boats don't raise you much from 95 percent, maybe up to 99 percent, I don't know. So, when you say "fraught with inefficiencies", I guess each fishery has different characteristics. In long-term salmon fishery that's reached certain levels of relative stability, people have chosen how they want to divide that resource. They've chosen how much they are willing to let somebody else come in and take advantage of in a system that's in place. I don't know if that's a castigation of the system, I think it's something that's evolved from public participation. I'm not sure you're not going to put a 32-foot limit on the groundfish fishery. It doesn't make sense. Different fisheries will react in different manners.

BAKER: Just one comment on Barry's point, from Dr. Alverson's report that 80 percent of the production caught by outside boats, foreigners as we're called being from Seattle, was from traditional species. That goes back to the groundfish fisheries in a new fishery. I don't know how far back that study went, I imagine five years, so it includes crab and salmon and those particular species. My point is that we don't

think we're getting a fair shake when we harvest 80 percent of the production and the rules are going to be made in Alaska. We just don't feel that that represents our group.

EATON: I'll bring up a different subject, maybe everyone will forget that one. I'd like to address it to John Peterson, before I get too far from his last statement. You brought up the factor of planning in the business climate. I know this may not sound logical, but sometimes I feel that the management operates, responds too fast, especially when different user groups perceive some biological glitches out there and they want to get the odds in their favor. I'm always interested that the many people who oppose the limited entry quota, use limited entry on a yearly basis. Area registrations will have quotas, they'll have gear limits. Many times this changes so fast that the pro-formas many of us construct, we may be able to amortize over 15 years. Every time we have a meeting, there are a whole new set of regulations shifting the balance around through a broad definition of different limited entry programs on a yearly basis. I'd like to have your comments on that.

PETERSON: Well, I certainly agree with you. I agree there is very little stability in this industry because of their high variation in supplies of fish. There should be stability in regulations, however. How in the world can you put together a business plan, if the rules under which you operate are going to be changed? I agree with you. I still feel that a year-and-a-half or two years is too long to put any change in regulation into place. The system seems very democratic, everybody has a shot at it, everybody has to approve it and that's highly desirable. But somewhere, I think, somehow that can be done more efficiently.

BEVAN: I'm a little bit surprised that Barry Fisher doesn't recognize some of these things he just talked about as being Alaska's social engineering. I feel a little bit like Winston Churchill did about the council government: It's the worst thing in the world, except all the others. Terry, you probably weren't around here when we did have federal regulation in Alaska. It certainly wasn't very good. It wasn't as bad as some of the youngsters on the panel feel that it was. If it was, we wouldn't have 32-foot limits which the feds started. We wouldn't have exclusive registration which Don started as a federal manager; a lot of things have stayed over from that period that are still worthwhile holding onto. There is a long history around the country of the states not being able to manage interstate fisheries very well. Whether Alaska can meet the needs of the Seattle-based fisherman really isn't the question. It's whether the Seattle-based fishermen feel that they do. I agree with John Peterson. I think we've got a system that's probably the best we can make. We do need to improve it, and we ought to get on with that job and not look for some substitute that's either federal or state.

ALVERSON: I should clarify the statistics in the distant-water study because maybe there's some confusion. I don't want the Alaskans to run me out of town on a rail without clarifying it. One, the study was not undertaken to relate to the jurisdictional issue between the State of Alaska and the council or the feds. Basically, it was to demonstrate to the State of Washington that its fisheries were extremely important and they could not look just at the domestic landings in Washington, that their residents were very strongly involved in the harvest of fish

in the Gulf of Alaska and the Bering Sea. As to the numbers, it was 80-some percent of the weight of fish taken in the FCZ. Now, don't forget, the Alaska salmon catch is all taken inside of the FCZ. If there's a portion of the tanner crab catch and the king crab catch and good share of the shrimp catch, and a lot of stocks outside of those numbers, just to get a proper balance. However, I understand what Terry is saying, and what Barry is saying. There are two major harvestors of the resources in the FCZ off Alaska that have their origin largely from Oregon and Washington. Any plan that emerges within the council obviously has to acknowledge and be considerate of the social and economic impacts not just in Alaska, but in other regions. That's the main message people are perceiving from that particular study, and I think it's a legitimate concern.

LOKKEN: You asked the question "Who's in charge?" As far as I'm concerned, based on my experience, the state through the board, the council, the feds and the court system is in charge in the FMCA and this is exactly as it should be. I think I agree with Bevan. That's the system we're stuck with and there isn't any way that we can change it through the political system. We might as well realize that and try to improve the system. And there are many ways that can be done.

I am opposed to the council having complete autonomy. I want to be able to appeal to somebody else in the event that the members of the council make a decision that I think is unfair and discriminatory, and they're capable of doing that. I sat on the council for eight years and I know the pressures. We in the council attend maybe six meetings a year, two or three days to a meeting. The rest of the time, we are doing something else, and we can't keep up as much as we should in the work of council. So, I want to be able to appeal to someone else.

Council members should be selected through the political system because the Senate of the United States is selected that way, the president and the congressmen are too, and why we should be exempt in a system that is, you might say, 100 percent political.

Approval of council recommendations just takes too long. That time period has to be shortened and that has to be done through the frame working that's going on. It should be even more efficient than it is now. The framework should cover everything, such as should the season close at a certain time, based upon conditions that you can only determine during the course of the fishing season. You can't determine at the beginning of the year in many of our fisheries that the season should end September 15th, or September 10th, or July 10th. That has to be decided in the field. That decision should be made by the council or the Board of Fisheries, in so far as the fisheries inside of the state are concerned, and not have to go back to Washington, D.C. and get approval that might take a month or two or three or four or five. That's complete nonsense. The Board of Fisheries and the council ought to work together very closely. During the time I was on the board, we were making progress in bringing these two groups together. After I left, further progress was made. I don't think enough progress has been made in getting those two groups to work in concert so when a regulation comes up, they both can agree upon it in the same meeting room. If you do that, you are not going to have the friction that there has been in the past between the board and the council. In time, that's going to improve. So the framework problem is the one that needs to be met. The people back in Washington, D.C. have got to

let some of their prerogatives go to the councils in the regions. If they do that, the system we have is just as good as any system that you can get.

HERRNSTEEN: The Alaska Department of Fish and Game in my mind has been the premiere fish and game department in the nation. A lot of management tools were developed in Alaska. There have been more fishermen involved in the management system. There are seven fishermen over there right now across the street spending six or seven days of their time, not one bureaucrat on that council. Now certainly, there were some proposals throughout the years that were mistakes that we learned from.

The North Pacific council is right now proposing area registration in the halibut fishery. Certainly, there have been parochial issues, but Seattle fishermen have made more fortunes than anyone else. They can't say they haven't done well under the system. Anyone who got involved in king crab in the Bering Sea, can't cry sour grapes now. There's more responsiveness in the Alaska system.

MILES: We want to shift the focus now, back to the very excellent papers and a variety of issues that I raised concerning management approaches. As we looked at this aspect of the problem, the major difficulty seems to be that we must deal with complex multiple-species fisheries, but the information and analytical base is not comprehensive, adequate, or credible to fishermen. No one has any clear, effective answers to offer yet, and we don't have any either. Therefore, we wish to continue asking questions and we want to pose a couple of questions and let a couple of people respond.

The first question is, "What are appropriate mixes of biological, economic and social objectives for the management of multiple-species fisheries?" When we look at the Atlantic demersal finfish plan, at least with respect to biological objectives, the approach seems to be to do nothing unless the risk of recruitment failure is unacceptably high. When action is taken, seek only to control fishing mortality for the purpose of facilitating growth. In each case, the target of regulation seems to be the juveniles. Management action is restricted to a mix of gear and size restrictions plus area and/or time closures. We pose the question "Is this enough?" Since this does nothing to regulate effort and increase efficiency, we would tend to argue, no. But is it enough biologically? Are there lessons here for the Pacific Northwest?

Alternatively, we look at the Pacific Council approach. Is it really useful to try to specify MSY for stock complexes and to modify these on the basis of crude quantitative and non-quantitative information into AVC's plus the monitoring of points of concern, as the Pacific council has chosen to do in its groundfish FMP? Is, in fact, the former, that is the Atlantic Demersal Finfish Plan, too simple, and the latter too complex and arbitrary to provide effective real-time management? Does the absence of comprehensive effort controls produce potentially fatal flaws in both approaches?

It seems to us that two of the questions Huppert raised really do require explicit answers. The first to quote him was, "How can OY species group be derived from ABC's of constituent species?" And secondly, "How do we most effectively reduce the waste of incidentally-caught fish of a prohibited species or a species whose quota is already

filled?" So, that constitutes one major question and the commentary on it. What are the appropriate mixes of objectives?

The second major question we would like to pose with commentary is, "How should we approach the basic analytical problems of managing multiple species fisheries?" We are agreed that we don't know enough and we can't really do it yet. What do we need to know and how should we do it? What are the major information needs and how do we acquire what we need? Let me suggest the following. We know that it is practically impossible to maximize the physical yield of an entire stock complex simultaneously because the species composition of catches will vary with increased fishing effort, and therefore the responses of the constituent stocks vary. We know, also, that the relation of stock size to yield for given levels of fishing effort and the shape of the recruitment curve may differ between the types of demersal and pelagic stocks. Moreover, increased fishing effort will significantly affect the net worth of predator-prey and competitive relationships within a stock complex. But formulating what we know in that very general way doesn't provide any clues to fruitful operational formulations giving adequate guidance to biological management on a real-time basis. Since we are still far away from that, is it worthwhile in the short run, to give primacy to maximizing net economic yield in the management of multiple-species fisheries? These are the questions we offer to get the discussions started on management approaches.

LOW: Regarding the first set of questions you ask, Mr. Chairman, what are appropriate mixes of biological, economic, and social objectives for the multi-species fisheries and then you went into some other questions particularly raised by Huppert. I really am not very familiar with the Northeast or Atlantic Demersal Finfish Plan and a little more familiar with the West Coast plan. In the case of Alaska, our level of complexity is lower. I would say that the Northeast plan has a more complex set of problems, followed by the West Coast, Gulf of Alaska, and the Bering Sea. What I would like to do, of course, for the sake of people who are not as familiar with the Bering Sea groundfish plan, is to explain a little bit about our plan. I believe the staff biologists like myself have developed a system that is flexible enough for our managers to make many of their decisions while staying within the framework of law and staying within signs of what we know about those fisheries resources.

Over the last few days, I've heard about how the management process is cumbersome; that plans take time to be developed, and that it may take as much time to have it approved up and down the system. We were very much aware of that necessary administrative process and had to come up with a system that could perhaps stay within that framework or rather try to beat the system, so to speak. I was very fortunate to have Bert Larkins leading some of these concepts. He came up with a very ingenious plan. He was going to have Bering Sea groundfish resources managed as a complex. I think it's a good idea. We saw graphs today provided by Sissenwine showing that if you look at the total groundfish complex, there is a certain degree of stability to it. We know the same thing in the Bering Sea as well. So there is good empirical reason to believe that we can, in fact, manage that resource as a complex, and that in the foreseeable future, we have reasonable confidence that the yield will stay within a certain range. That was a good basis on which to set the optimum yield according to the law, according to a certain range. We believed at that time that range in the fore-

seeable future is between 1.4 and 2 million tons. It's just between x and y. The number is not so important. The important thing is that the council wisely adopted that range, which turns out to be working quite well. Within this complex, we realize that there are species, TACs that have to be allocated. The plan, as it stands, allows the TACs to be adjusted from year to year without going through an amendment process. All it requires is that a biological assessment of the stocks be provided to the councils sometime in July, set up for a public review, and so forth. At the December meeting, decisions could be made about what TACs for individual species ought to be so that the total comes up to be an optimum level adopted by the councils, such as 2 million tons or 1.4 million tons.

I would like to submit to you that this system provides managers with a number of options. Number one, it allows them to set the optimum yield each year between 1.4 and 2 million tons without having to have it amended. I think that's a plus. Two, it allows the TAC to be set from year to year consistent with the latest source of information on those resources. Third, and best of all, once that's set it need not be cast in concrete. During the next fishing year, as the fishery progresses, and the dynamic of the stock changes from time to time, there may be need to change that TAC in a fishing year. The system allows it. It requires assessments on stock conditions to be made, and recommendations brought before the council or to the regional director for changes to be made, in a sense, very quickly.

At this conference, we're talking about options and consequences. In the case of the Bering Sea, I have not, as you have noted, addressed anything about allocations or other means of dividing resources between constituent groups for constituent needs. This system just sets the optimum yield for the year, the allowable catch for that year. That is, I believe, slightly better than some of the plans that need to have optimum use set from year to year and any changes often have to be made through amendment processes. On top of that problem, they have the allocation problem. I would like to say that, in the case of the Bering Sea, we are not over the hurdle yet, basically having set the first stage of TAC. As the domestic fisheries expand their operations, we will obviously have to face those allocation problems like all other plans do. This system may not solve it. So, I'm listening, and I'm sure all my fellow biologists on the team are listening, to the examples from the other regions for a better allocation system.

I want to get into Huppert's questions. How can QY for a species group be derived from ABC of constituent species? We looked at it the other way around. We're not trying to add the ABCs of constituent species. We look at the complex first, then break them down into constituent species, at least, in the Bering Sea. There was a question earlier from Dr. Huppert on whether exploitation is proportionate to the biomass. No, in this case, exploitation is proportionate to the productivity of the stock. Dr. Francis mentioned and showed some examples of long-lived species like Pacific Ocean perch where you will necessarily have to exploit them at a much lower rate than another species like pollock, which has shorter life span, higher growth rates, and so forth. In the case of the Bering Sea, we're looking at it the other way proportionate to productivity of resource. That's not the full answer, obviously, because it's a very simplistic way of looking at it. I don't want to pretend that we know any more than you do, but that's how we are doing it.

The next question is, "How to we reduce wastes?" Historically, you will note that, in the case of Alaska anyway, certain species have been declared prohibited. Just this Monday, our groundfish team for the Bering Sea met to discuss what to do about these issues. What about those species that are low in abundance and are desired by domestic fleet? They could use up all the available quota, in fact they may be able to shut out, say, a joint venture fishery, or a foreign fishery. The problem is that there's no good answer. We all talk about being able to keep those fish caught incidentally, set a quota and allow retention, maybe have fees charged for the catching of fish and put those fees to some worthy cause. Then there are people that feel that it ought to be declared private, just as salmon and crabs and so forth are, because they cannot see why some of these lower-value groundfish species all of a sudden are elevated above the status of king crabs, tanner crabs, and so forth. It is easy to argue some of these points and the decision is yet to be made. I believe that many people would like to see the fish that are caught incidentally retained, and put on the market somehow, rather than declared prohibited.

PENNOYER: I can't argue with Dr. Low on groundfish biology in the Bering Sea. I wouldn't stand much of a chance, and I don't disagree with him anyway. I could ask a couple of questions though. I guess, in relating our plan to the East Coast experience, we offer the council some of the same parameters. We offer the council OYs that are some sort of "threshold level" as well as OYs. We give the council the ability to make those choices as biological part of the management. You gave the council a range of choices of either holding the stock stable or doing other things with it, rates, rebuilding, and that sort of thing.

LOW: That's why I don't think we're offering our council less choices than the Northeast Council. Those choices are really offered in the existing plan. What I don't know, of course, is whether in their case, those choices have to go to an amendment process. In the Bering Sea case, so long as the optimum use stays, the optimum yield for the complex stays within 2 million tons, those decisions don't have to go for amendment. I am not afraid that the council would abuse this system in the sense that you would not necessarily want to allocate all the two million tons to sablefish, no more than you would want to give all two million tons to pollock. There is a biological rationale in the plan stipulating those criteria.

Regarding the appropriate mixes of biological, economic, and social objectives, the plan has in a very generic way spelled out those objectives. Among them is development of the domestic groundfish fisheries, the protection of halibut and other prohibited species, and utilization of the total groundfish complex. It is sufficiently flexible for the council to make a wide variety of decisions. It is necessary simply because the system itself is cumbersome enough. If the staff biologists like myself do not come up with more flexible systems, I think we are in jeopardy.

????: I have a couple of comments or questions. One for you, Loh, and a general one that has to do with cod. You asked for the question on cod, so, I'll ask it. And the question is, "I have some considerable difficulty with the OYs and TACs that have been developed on cod. As I understand it, these are based primarily on a very successful 1977 year-class. It seems to me there's a recommendation for a very intense

fishery on cod. With maybe one exception, the Gulf has had very weak year-classes subsequent to 1977. Seems to me that troll fishing is not selective. That the fishing would not be able to select only that year-class of 1977. The intense fishery then would be focussing on those weak year-classes later. I don't disagree with your figures. I have some difficulty with the logic that leads to these yields. From a business point of view, it would make more sense to me to be concerned with having a continuing yield down the road two or three years, rather than an intense harvest one year, perhaps a collapse the following. That's the question for you. And after you finish answering that, I've got another one.

LOW: My first inclination is to say, "I would like to look at my ouija board before I answer your question." But, more seriously, I would like to answer this question in the context of the purpose of this conference: issues and options. At the December meeting, if the biologists cannot convince you, as a council member, and other council members that cod should be exploited at the rate that was recommended, then the council can make a decision that is different from what the team comes up with. This is the option that you're getting. You can make that decision and next year, January 1st, it'll be implemented. Now, I have skirted the problem of answering that question and I deliberately wanted to do so. First, I don't know the answer. Second, perhaps this is not the appropriate form to approach that question.

????: Let's talk about cod because this is the one that concerns me. Here the council gets into the business of making allocations of cod to joint venture operations and perhaps even some TALFF this year, I don't know what the fallout will be on that. Why don't we make allocations to Terry's company? Or to other U.S. cod processors? Why don't we put them in the position where the quota is allocated to the company? It's a question and I don't know whether anyone on the panel would like to comment on it.

ALVERSON: In terms of economic and social objectives we need to consider in multi-species fisheries, the different types of groundfish that we are targeting on and specifically the older-age rockfishes and perches, hake or whiting and pollock. One of these species is very numerous and the others are not, but they represent very substantial parts of the overall economic picture for the West Coast drag fleet and the pot and longline fleet. In looking at the older-age rockfishes, these fish generally have a characteristic flesh quality that allows them to be caught and processed shoreside, generally with a wet fish operation. Suppose in the whole scenario someone says, "Well, if you get rid of this species, and whiting or pollock will fit the niche, and it's a white fish and roe, that's okay as long as whitefish fillet replaces it." There's a whole different marketing strategy that takes place if you begin to lose some of these rockfish species. Many of the vessels and the shore-based plants become obsolete if you lose some of these species. These are the gold flecks in the coal mine, as Clem Tillion puts it. The high-volume pollock and the hake are something we can grind on, but you're really going to make the profit off of those other species in the long run. I think it's very important to protect and it's very difficult, obviously, to protect a multi-species fishery. There is going to be a need to look at and take into consideration the importance of these two types of species: short-lived vs. the long-lived species.

LOW: We try to manage a fishery so that future optional use of that mix of resources is not precluded. I firmly believe in that. I firmly believe that we need to maintain a certain mix of species. Now, I don't know what that mix ought to be, that changes in time, in history, and so forth. I'm not sure if it's better for me to try to rebuild the Pacific Ocean perch resource or another resource, for example. But I do know that if you want to assure future optional use of that resource, you'd better not fish that one species down. So I'd like to see a good mix of species out there, and a good mix of age groups of fish out there. We're dealing with the probability of over-exploitation, the probability of the resource taking advantage of good environmental or other conditions that may lead to strong year-classes and the probability that what we decide as management objectives right now may not be the ones we want ten years from now.

PETERSON: I'd just like to address the point of how do we most effectively use the incidentally caught, prohibited species? There's been a lot of talk about funding of certain agencies. Our factory trawlers catch prohibited species, salmon, halibut, or whatever, and we throw them overboard. It kills every crew member on each of those boats to do that, but we tell the people when we get to Seattle, we'd be glad to get them halibut or salmon if that's what they want. But you know, it is a waste. Maybe that's a vehicle to fund some of the things that we need to manage the fisheries. Maybe those fish that are caught incidentally should be packed and put into a pool that the packer doesn't receive any money for, with the revenue going into a pool for different management. The same could be true for joint venture fisheries. Instead of being dumped back to the sea dead, those fish could be packaged and sold for that pool. Maybe that's a use for that wasted fish.

I was intrigued with the papers that Jake Dykstra and Jim Wilson presented, because that fishery is being managed quite differently. It strikes me that the fishery is being driven by the forces of the market. Contrast that, if you will, with our traditional fisheries here that are driven by the forces of regulation. When a season opens, everybody goes fishing. The East Coast system is different. It depends upon the market. That's a significant difference and to me, it was very appealing. It continued to be intriguing until I read further into their paper. I came across such things as safe reproductive levels, minimum abundance levels, unacceptable risk of recruitment failure. Dr. Huppert's paper has some of the same phrases, points of concern, signs of biological stress. These phrases really concerned me. It is almost a management based on brinksmanship. I wonder if with the precision, or the lack thereof, in the biological assessment and conditions of these species, whether that isn't pushing a dangerous situation to the limit. Might you not start a species down that slippery slope from which there may not be any recovery? It would seem to me that there should be a safety margin in that system of management. Do you want some comment on that?

WILSON: What you're saying about the New England approach has a lot of truth in it. One of the things I was trying to say today is that we are starting off on a new path. We are not completely certain about its workability, its feasibility. We can clearly see problems with the approach that we've taken. You've brought them all out just now. When I mentioned a management agenda, I meant that we looked at the fishery in a different way and a different list of options come out for us that

may help to alleviate these problems. One that jumps out at me right away is this question of market structure. What will push a species down the slippery slope faster than anything else is rising prices for that species in the market. If a market structure with good substitutability can be developed, then you've minimized that problem. I won't say that we have that kind of market structure now. I think we're a lot closer to it than the Pacific coast is. The relevant management problem ahead of us is how can we attempt to build that kind of situation in the market? Are there reasonable approaches to developing market structure that we can implement that will minimize our management problem, minimize the chance that we go down that slippery slope? I think that the kinds of things that we're doing in Portland, the display auction approach where we're trying to increase marketability of species are one step toward that. We have to pay attention to the market because a lot of what is going on in the market makes our management problems worse. If we can solve some of those market problems, we can minimize our management problems.

PETERSON: I have been sitting here listening for the better part of two days. I've only heard one mention of food, and that was by Clem Tillion. We're in the food business. I don't think we should ever lose sight of that. Fish goes through the channels of distribution and it finally ends up on somebody's table and they have to eat it. Keep that in mind, because that's what I'm going to talk about: how we achieve that in the best possible form. Is fishing the common property resource a right or is it a privilege? Presently, it seems to me that any itinerant cotton picker can get a license and go fishing. I just wonder if that's the right way to do it. As part of management, what if, before he can be licensed, a fisherman must show that he has been trained to handle fish aboard a vessel, in seamanship, safety, and all these things that are needed, so that experienced, trained, professional people become fishermen. Recognize that it's a high-class occupation.

Further, I think the vessels should be subject to tough sanitary inspections to see that they are designed to take care of fish in the best possible manner. Again, perhaps a management tool. There should also be stiff license fees to get into the fishery--for both vessels and for fishermen. I don't think this would both professional fishermen at all. The tire kickers, yes. I think it would keep them out. The high risk of this business should be emphasized somehow so new entrants know how risky it is. And along with that, wouldn't it be nice to prevail on all of the government agencies so that if a fisherman goes broke for whatever reason, there's no bail-out to make sure this elite, professional group of fishermen are just that. Now that's a management option that's been overlooked. I'm sure biologists and economists have not even thought of that. Within the business, you do think of it. Our products are competing with other protein foods. In the United States, we are competing against poultry and beef and just think of the inspections that those products go through before they hit the marketplace. On all of them, there is an anti-mortem inspection. Can't have that in the fish business. But we've got to pay attention to our products because it's food.

HERRNSTEEN: Your ideas are very interesting, John, and I agree with most of them. I think you need to take them one step further. A fisherman can have a clean boat, a safe boat, and everything else and still deliver a bad product if someone will buy it. You need to take

that a level higher. I'm not afraid to have my boat inspected, or to go through a safety test, although I think it would involve a cumbersome bureaucracy. Instead of trying to get all the quality assurance right there, from that 10,000 or however many fishermen, make sure that bad fish aren't being bought by having a similar kind of quality assurance at the processing level.

PETERSON: You're absolutely right, but that gets into the business end of it. I'm thinking of creating barriers to entering the fishery that do not detract from the efficiency of the fishery.

HERRNSTEEN: You're speaking of the sanctity of the food that we handle and I agree with you. It's really frustrating when 80 percent of the fishermen bring in a good product, and 80 percent of the processors only buy a good product, but you've got that other small percentage who are bringing in crap, and someone's buying crap, and someone's eating crap and giving all the rest of the fish a bad name.

ALVERSON: I'd like to respond to something Terry made a comment on, and that's allowing the incidental species, or the prohibited species to be delivered for financing some agency's activities. In the case of halibut, Natural Resource Consultants recently did a study on troll activities. There was considerable discussion in regard to the actual mortality rate of discarded halibut onboard a catcher-processor. In fact, some of the conclusions were that they were quite high, exceeding 50 percent possibly with sorting. If you have a survival rate of that magnitude, by then requiring incidental catches to be retained and delivered shoreside, it would seem to me that you would begin to maximize your incidental catch and the mortality of that incidental catch. In regard to retention, I think it can create some undue enforcement problems, as well as additional strains on resource management. It's a very ticklish subject. There is wastage. There's wastage in the current troll fleets the line fisheries and pot fisheries on the targeted species. Probably 30 percent of what goes aboard many of the draggers is shoveled overboard because it's juvenile or not the species they want. That goes overboard and is not counted against any quota. And I think it's about time the scientists stop pretending that doesn't exist. It is of significant magnitude off Washington, Oregon, California and to a lesser extent up here. I don't know if the answer is mesh sizes or what, but the issue is not an easy one to settle. The needs of the resource are number one in each case whether it's crab, salmon, halibut or herring.

PETERSON: My point is don't tempt us with any financial reward for keeping those prohibited species. We just don't want the waste. Put that product into a pool. Whatever funds are generated from that, I don't particularly care where they go. But if there's any financial gain from keeping those prohibited species for a factory trawler or a joint venture operation, there's going to be abuse. We don't want financial gain, we just want to eliminate the waste.

ARON: I would like to ally myself with the comments made by John Peterson. I did spend two years of my life as a food inspector. During that time, I went to meat packing plants, dairy facilities, and kitchen facilities. I spent a lot of time on the waterfront, in fish processing facilities, and looking at fishing boats. We did inspect the fishing boat, we did inspect the fish plant, we did inspect the product. And we are dealing with food. I am a wild optimist in terms

of the potential of the fishing business. At the present time, the United States has a per capita consumption on the order of 12 pounds per year. That consumption is very low in comparison to other countries around the world. It's low because the American consumer has not perceived fish as a good product to eat. I know it's good because I've eaten some of Oscar Dyson's fish, I've eaten some of Conrad Urie's fish, and I know we can produce a high-quality fish. The consumer demands quality and he demands consistency. But, there's something else that fish can offer which makes me very excited. At the present time, it offers food product that is genuinely good for your health. The data is very clear. People who eat fish at least three times a week have a significantly reduced chance of cardiovascular disease. You can eat one hell of a lot of fish and not have too much in the way of calories. I can't help but feel that, if we can control quality and consistency, that product will ultimately sell itself. It will sell itself to the benefit of every single person in this room, regardless what part of the industry or academic community or government community he or she may be.

????: I'd like to ask Mr. Baker a question on retention of incidental species and that's prohibited species. Your boats have a limited freezer space. You can only get a profit by filling that space up. Number one, would your crew be willing to process those fish for free? Number two, would you take up space in your freezer for something you don't get paid for in place of putting something in you can get paid for?

BAKER: First of all, 50 percent of fish handling is done when the cod end comes up the stern ramp. I believe our people would process the fish without compensation rather than see it wasted. Secondly, we would tie up our freezer space because the incidental amount is insignificant compared to the total tonnage. In our normal course of discharging product, whether at sea or transferring into Seattle, I don't think it would cause lost production or fishing time.

????: One very quick comment for Jim Wilson. In this multi-species fishery, you have a good opportunity to look at it and study it with your auction process. Someone said earlier that we had to rely on theory or greed. It's quite clear in a multi-species fishery that we don't have any theory, so we'll probably have to fall back on greed. In these multi-species fisheries, we've got a pretty good idea of the relative success of these stocks and where they might be. Our problem is trying to put some differential fishing mortality on them. In your auction, what's the possibility of taking species one, which is depressed, and putting a 5 cent tax on it per pound and then give that 5 cents to the fellow that's bringing in species seven, which is top on the list. Have you given any thought to that kind of process?

WILSON: Not with regard to the auction. Jake proposed a tax a few years back that was very much like that. It was to be interpreted as a tax scheme on scarce species and a subsidy scheme on underutilized species. With regard to doing it in the auction, the answer is simply no. A very deliberate decision was made to make no effort whatsoever to require fishermen to move through the auction as a safeguard against the possible fixing of the auction processes. So, if you were to do that, the fish would simply bypass the auction.

Session V: Policy Evolution and Implementation Panel Discussion

Elmer E. Rasmuson,
Chairman

**Jim H. Branson, North Pacific Fishery Management
Council, Moderator**

Dayton L. (Lee) Alverson, Natural Resource
Consultants

James O. Campbell, North Pacific Fishery
Management Council

Don W. Collinsworth, Alaska Department of Fish and
Game

William G. Gordon, National Marine Fisheries
Service

Ronald Jensen, Sea-Alaska Products Incorporated

Elmer E. Rasmuson, National Bank of Alaska

Clement V. Tillion, International North Pacific
Fisheries Commission

Policy Evolution and Implementation Panel Discussion

BRANSON: For this discussion on policy evolution and implementation, the panelists will give you their ideas on how this conference has illuminated the subject of fisheries policy, how it might evolve, and how it can be implemented in those fisheries where change is needed. My impression, from the discussions we've heard in the last four days, is that changes are needed in a number of fisheries, if not all.

I would like to start by introducing the panel members. I have biographies for most of the panel members, but I really don't think we need lengthy introductions. I would like to say a word about all of them though, as I seldom get the chance to. I would like to start with Elmer. Not only is he the leading banker in Alaska, but he is also the top fisheries leader in Alaska, and has years of service as a commissioner and chairman on the International North Pacific Fisheries Commission. He just retired from that post. He, of course, was the chairman of that commission for the first year of its existence. In my opinion, he is largely responsible for the success of this council. He set it on the right course and built a solid foundation for it. I had a very interesting year working for you, Elmer. I can remember many of the things that you told me, but one was particular apropos. You told me early on that a good executive went around with a worried look on his assistant's face. By that standard, and many others, you certainly are a good executive.

Next to him is Lee Alverson. He has already been introduced once at this conference: a successful researcher, a successful administrator, and now a successful consultant. In my opinion he has a rare ability to put thoughts into words that all of us can understand.

Next to him is Jim Campbell, chairman of the North Pacific Fishery Management Council. He is in his second year in that role, but has been on the council since 1978. He succeeded Elmer Rasmuson in that seat, as a matter of fact. Jim was not in the fishing business originally, although he has been associated with it for years. He comes from Gig Harbor on Puget Sound, and he has a lot of interest in fishing. He sells two-by-fours as president of Spenard Builders Supply, the largest lumber firm in Alaska. He recently took on the job of running the Alaska Railroad as chairman of the railroad commission. I'm sure most of you know that the state recently bought the Alaska Railroad from the federal government. I don't know how he finds time to do all of this, although one of the first things he gave me when he became chairman was a little book called The One Minute Manager, and he seems to make it work very well indeed.

On my other side is Don Collinsworth, the commissioner of the Alaska Department of Fish and Game. Don is an economist by training, and I find the background quite useful. Don has been with the department for what must be at least ten years now. When I first met him he was head of their extended jurisdiction section, the division set up to handle expansion of U.S. authority under the 200 mile zone, to work closely with the council as it got into that area, and to serve as a liaison with the state fisheries department. He has gone from there to commissioner under Governor Sheffield, and in my opinion, is doing an outstanding job in that difficult position.

Next is Bill Gordon, NOAA assistant administrator for fisheries. He runs NMFS. Bill is a fish-crat. He is a good one. In fact he is very good. He has been in fisheries in a formal way all of his life. He was regional director in the northeast region. He is very familiar with the New England fisheries, and the fisheries of the world for that matter. He has been the assistant administrator and the head of NMFS for the last four years.

Next to Bill is Ron Jensen. I'm sure all of you know Ron. He is not only a leader in the industry. Ron has devoted enormous amounts of time to industry associations, including a stint as chairman of the board and president of the National Fisheries Institute, the largest industry organization in the United States. He is also president/chief operating officer of Sea Alaska Products, which is a ConAgra company; a director of the Seafood Processing Association; and a trustee of the Northwest Research Lab, the National Food Processors Association.

At the end of the table is Clem Tillion, another ex-chairman of the North Pacific Fishery Management Council. If you don't know Clem, you haven't been in the Alaska fisheries business, ever. I've known Clem for years. He came to Alaska right after the war as a skinny, red-headed kid. When I first met him, about 1951 or 1952, I thought he was the most obnoxious guy I ever saw. Of course I was the local game warden. And frankly, at the time, I think I was right. He has changed! I want you to know that Clem has gone straight, and he has been doing it for quite a while. Clem is no longer on the council, because of some changes in the political regime. He is a commissioner on the International North Pacific Fisheries Commission, and still active in fishery affairs.

With that, I would like to make a few remarks. Then each panel member will give a presentation. Following that, we will go into a round table discussion that will include the audience. Questions to the panel and stimulating discussion will allow us to put a cap on what we have been doing for the last several days.

We heard at the very beginning of the conference from Lee Alverson that fisheries policy in the United States is not a new thing, that it began back in the eighteenth century. It has continued since, and policy in the fisheries industry is probably as complete now as it is for most other U.S. industries of this nature. He pointed out that policy comes from the industry and its participants; that the government is usually a receptor, not an initiator of policy.

Dr. Gulland, in one of the keynote papers, pointed out that the common state of world fisheries is over-capitalization. He suggested that the ideal fishing industry would be able to adapt to resource changes, and not be excessive in size. But he held out little hope, because every fishery is apparently condemned to repeat the mistakes of all previous fisheries since management is generally applied after problems arise.

Bill Wilkerson espoused the regional council system as the best alternative to purely state or purely federal management. He also pointed out that the system is complicated, and that a great deal of time is wasted in redundant reviews by numerous federal agencies after an already slow development process has been followed within the councils. He believes that the best managers were those that recognize their roles as regulators, but pointed out that regulation should be developed through discussion by everybody involved, and that compromise is essential.

Bart Eaton expressed doubts that any system would work over the longer term, and that the system we now use causes many of its own problems. The definition of terms such as "progress" and "successful" vary from group-to-group and person-to-person. Until we agree on definitions of words like that, it's difficult to establish a dialogue among the many members of the fisheries family. He questioned whether management should aim for opportunities for everyone or for guaranteeing results for everyone. He votes for opportunities. He also pointed out that one of the tests of any regulation is how well it can be enforced, and that lack of enforcement breeds distrust from all participants in the fishery. He cited the many factors that determine how a fisherman conducts his business, including such influential ones such as tax policy. He warned that, just because two or more industry groups agree on a course of action, it doesn't mean it is the correct solution. Compromise can sometimes be a target for disaster.

Bill Hingston pointed out that much of the over-capitalization in the industry is due to government loans and subsidies, such as the Capital Construction Fund and state loans for permits and boats. Frequently, these do long-term disservice to the industry. Bill also pointed out that risk-takers who pioneer new fisheries, new techniques, or new fishing grounds, seldom get a chance for a return on their investment or on the risk-taking. The reaction time of the fishing fleet is so fast, that they simply never have the chance.

Don Bevan's panel, on fishing management problems, pointed out that we tend to over-regulate and to over-emphasize individual species management, and that more interaction is needed among management and the industry.

We've heard so much in the last few days from so many thoughtful people, that I won't attempt to elaborate any further. It is useful to point out that we've heard virtually all sides of every argument. Some think we don't regulate enough, others think we regulate too much. Some believe limited entry is a useful tool in the manager's kit, others think it will cure virtually all problems, while still others believe it is no answer at all and in fact, an evil by itself.

Colin Grant, from Australia has told of their experiences and pointed out that different fisheries need different measures. He also mentioned the paradox that socialist Australia has a free enterprise fishery system, while free enterprise America has a socialist fishery system. In fact he called it a "welfare fishery system."

It's been generally concluded by the speakers that managers have sufficient tools in their kits to do almost anything necessary, but without the consent of the fisheries family, they can't do very much.

Before we call on Lee Alverson to begin the presentations this morning, I would like to make one remark of my own. What we are hearing here is that managers, one way or another, are going to limit effort. We really have been talking about how that effort is going to be limited. Is it to be done the way it has been in the past, and as we are still doing it in most fisheries, by decreasing the efficiency of the individual participant: by limiting the amount of gear, the kind of gear, the size of the boat, and keeping him out of the best fishing spots? Are we going to limit participation directly and change that? Whether those other methods are desirable is still an open question with many of the participants at this conference.

ALVERSON: I felt that I said enough in my opening address regarding policy evolution, and I just want to review very quickly some of the findings. I told you that there was a whole basket of different policies, sometimes conflicting, sometimes inconsistent. Certainly some of those that evolved because of, and dealt with, conservation, have been consistent over a number of years.

In my concluding remarks, I said all of the above policies may seem logical in terms of the fishing industry's interest. National fisheries policy has not always seemed helpful or supportive of U.S. harvesting and processing interests. Both of these frequently see government as a cumbersome, inept body interfering in their affairs. On the other hand, both frequently look to government for financial aid, information, and assistance in solving economic problems or an international conflict. It's that divergence that generates those policies we've been talking about.

I've also said that the administrative component of government is unlikely to play a major role in fisheries policy development. Key

elements of past and current policy have largely been the product of outside groups working in concert with Congress. All policy is frequently tempered by party politics. Despite its size, the fishing family has frequently and successfully generated new policy that has had a major influence on the viability of the U.S. fisheries. Finally, if the implicit and explicit fishing policy of this nation seems internally inconsistent and chaotic, it reflects the fragmented structure of the multi-faceted industry that it attempts to serve: its internal conflicts, regional policy orientation of congressional blocks concerned with fisheries matters, and policy conflicts with other sectors of our economy. I told you that the stark reality of this conclusion may hit at the futility of attempting policy development. The pragmatic conclusion is that we have been looking at the wrong practitioner. The commercial and recreational fishing interests believe that the proclamation of a national policy from a high level of government would play an important role in guiding fisheries management and development. If so, the fisheries family should draft, surface and submit such a policy to government and subsequently interface with government. A starting point obviously would be an internal planning effort by a coalition of harvesters, processors, recreational people, and other elements of the fishery family that are going to be part of the final policy.

I also pointed out that policy evolution at the council level involves much the same process as that described for the national scene. The ring is certainly smaller and the possible actions are limited by the FCMA and administrative guidelines. Nevertheless, policy formation within the council structure is a political process, testing limits of the sometimes vague and confusing legal membrane of the FCMA. Special interest groups, most at the national level, work feverishly to gain every advantage possible to support their particular point of view. These interests may vary between fisheries, among different groups within the council family, and may differ from issue to issue. As on the national scene, the emergence of seemingly conflicting management policies between fisheries plans over time probably reflects the pliability of the council system. The political constituent therefore can be both the force behind policy evolution and the custodian of the act.

FCMA is probably the most important single new element of policy. It is the one that is now going through a evolution. When we talk about it, we frequently talk about management responsibilities. I would like to underline something that I believe Barry Fisher said, that another strong key emphasis is on developing the United States fishing industry, garnering the economic resources within its FCZ. From my standpoint, it's the manner in which the fisherman and processors face issues confronting the councils, such as proposed exclusive economic zones, phase-out, and other matters, that will have a direct bearing how the U.S. industry secures development opportunities offered by the FCMA.

I end by reiterating that policy evolution comes from the constituency. We can put ourselves together in some sort of coalition where we have appropriate dialogue between the key elements of the industry, bring together the long disparate differences, and move toward a more cohesive policy. We can push that through. We can have a development concept and a management concept that will essentially protect the resources and also allow evolution of a viable fishery,

responding to market opportunities. If we persist in looking out for our self-interest and continue to fight with each other, that may not happen. It requires some give on all fronts: people in Seattle, people in Alaska, the trawlers, the long liners, pot fishermen, and the other types of fisheries. It requires give on the part of the general fishing community with the interest of the native fishing community. It requires an ability to look at what is in the best interest of our industry and develop a policy that can be responsive. I think that it can and will happen. If it does not, and you're satisfied with the existing conflict in policy, then we'll go on pretty much as we have.

BRANSON: Thank you, Lee. Jim Campbell, will you follow please?

CAMPBELL: If it's possible in this room, let's forget about fish for a moment and just think about management. Perhaps I'm in a better position to do this than many of you. I'm not involved in a direct way in the fish business. But I have had 30 years in management. I don't own a fishing vessel, and being used to making a profit, I don't want to be in the processing business. Obviously, I'm not with the U.S. government.

When I first went on the council, many of you wondered what a lumber dealer was doing in the fish business. Shortly after, I was wondering the same thing. With words like *opilio* and *bairdi* and POP and NS. I bet very few of you know what NS means. That is a designation of nonsignificance. I hope I've dispelled now the fear of having a lumber dealer amongst what I consider a great fraternity of people. Just recently, as chairman of the newly-formed Alaska Railroad Corporation, we began a search for the new CEO and president. Before doing that, I asked the present management, what do you want in your manager? Almost to a person, they said they didn't need anyone that knew anything about railroads, they knew how to do that. What they wanted was a decision-maker, organizer, and someone who could implement. Let me suggest, that in the fish business we do a pretty good job of forming policy. We know where we should be, but we fail miserably when it comes to implementation.

Oddly enough, some of the largest corporations in the United States are now waking up to the danger of being over-gunned in planning and short on doing. Implementation! Let me quote from "Business-week:" "Perhaps the most telling sign of change is that the famed Boston consulting group, which is widely considered the parent of strategic planning, this group now is abandoning planners buzzwords in favor of new emphasis on implementation." Says general chairman of General Motors Smith, "We've got these great plans together. We put them on the shelf, and we marched off to do what we would be doing anyway."

Sound familiar? Unlike private business, our job in fisheries management is further complicated because once we've made a decision, and perhaps even before we do, we have to go out and sell the idea. Unlike private business, we cannot just make a decision and force it until it works. Nor am I suggesting that should be the case. In some instances, things happen in spite of us. As I commented in my opening remarks the other day, we're finally able to see in the not-too-distant future there will be no directed

foreign fisheries in our FCZ. I suggest that recent discoveries of attempts by the Japanese to circumvent observer and enforcement coverage has done more to speed up this process than anything we could have done. I mention this to point out how difficult it is to track and stay on a plan when there are so many players and the ground rules keep changing. The council makes a decision to allocate to a foreign nation, some senator gets unhappy because that nation is taking whales, and to hell with what management is doing. These are the outside influences that Lee Alverson talked about in his opening remarks.

Remember, I said we have to sell ourselves and our plan for action. Let me cite an example: You are all aware of the council's action to implement a halibut moratorium to provide time for us to study various methods of management. Notice I didn't say limited entry. I'm selling. In this case, we did not do a good job of selling. Not only did we not do a good job of selling our program to the fishing industry, we did a poor job of selling it to our partners back in Washington. It is dangerous for the council to think that, after having spent numerous hours on an issue in briefings, holding public hearings, debating and coming to a final conclusion, that their mandate will fly once it gets back to Washington. In this case, the very same special interest group that had an opportunity to take part in the decision-making process here on the local level went to Washington and was heard all over again. Where was the council? Back home thinking we had done our job. I'm not saying there is anything wrong with the system but only that as managers, we cannot afford to relax. Unless we are prepared to defend and sell our programs, they may never be implemented.

In closing, let me comment that I believe the council system is working. The pluses far outweigh the minuses. We have to understand, however, that by design, it is slow. The real question, in my opinion, is as managers under the present system, can we implement changes fast enough to keep pace with the industry? For the last nine years we have dealt primarily with foreign fishing interests who are more patient with the system and certainly are in no position to be critical of it. This will not be the case, Barry, as we develop our domestic fishery. I suggest that we are headed down a dangerous path if we believe that the current management system can keep pace with the change we will see in our fishery over the next three years. As we take a look at the council system next year, let's please do so with one thought in mind: to provide managers with proper tools so they can be innovators and not just reactors.

Having made this suggestion, I feel obligated to make four suggestions: Certainly the council needs additional funding. Isn't it terrible that we sit in budget sessions, cutting back on our hearings, cutting back on our meetings, because we don't have funds? If we cut back two meetings, we save enough to get through the year. I think it's criminal that the Northwest center was the only NMFS center in the United States that didn't get an add-on this year in their budget, when fisheries as important as those in Oregon, Washington, and Alaska are involved.

As I stated before, unless we can do something about the response time between us and Washington D.C., we are not going to be

prepared to get into this fishery. The intent of the act was more responsibility on the local level! Almost since the day I've been in Alaska I've been involved, unfortunately, on the local level. I found out that is the worst place to be. City Council, Borough Assembly, those things, that is where the action is. That is where you can get ripped off more, too, right on the local level. But that is where people can get to you. I would have been far better off, Clem, to have gone to Juneau or back to Washington. But I think that is where the action gets done, and I think that is where it should be.

And finally, I would like to see a partnership, rather than an advisory position with Washington.

BRANSON: Thank you, Jim. I would like to call on Don Collinsworth for his thoughts on the subject.

COLLINSWORTH: I had the misfortune not to be able to attend the first few days of this session and therefore had to make do with reading some of the abstracts and papers. I particularly took time with Dr. Alverson's paper because it was on the subject of this panel: the evolution of policy and implementation.

My brief presentation this morning is going to change focus just a little bit and essentially get into a case example of how a policy is developed in Alaska. It is a real pleasure this morning to join my fellow panelists to discuss this concept of policy, its evolution and implementation. I believe this panel has been well-chosen. Each of these gentlemen has helped to shape and influence contemporary fisheries policy.

When looking at the invitation to join this panel and its subject matter, I thought that it should be a relatively easy chore because everyone knows what policy is and how it is implemented. But the more I considered the subject, I realized just how complex fisheries issues are with regard to the evolution and development of policy. Following, I guess, Bart Eaton's question about putting definitions on words, I insured that my definition was consistent with what the dictionary had to say with regard to policy. I referred to Webster and found out what he had to say about the noun, "policy." According to Webster, it means: 1) cunning and wisdom. I'm not really sure if it was an editorial comment or a empirical observation, but with regard to political wisdom and cunning, Webster now knows that it is rare. 2) Webster notes that it is the wise and expedient and prudent conduct of management. 3) A principal plan or course of action as pursued by government organization or individual. I then set the dictionary aside, satisfied that Webster and I were now in agreement. Policy is a plan or course of action as pursued by government organization or individual.

But why are policies important to us? Why are they important to fisheries management? Well, policies can save time and make us more efficient in dictating a course of action when dealing with repetitive issues. Policy can promote consistency in dealing with a constituency. I think the constituency is concerned about that and, at the state level, is also the concern of the state ombudsman and Department of Law. We must deal in a very consistent way with our public.

Policies also signal to the public what kind of response they may expect with regard to issues covered with a policy. In fisheries, policies usually come about when someone says: "We need one," either as a result of having to deal multiple times with a certain kind of issue or when faced with a brand new problem. There are at least two kinds of policies. I wrote this before I had the opportunity to read Dr. Alverson's paper, but I came up with the same conclusions. There are the formal policies and the informal policies, one explicit and one implicit. Formal policies are generally written, precise, and adopted under some administrative procedure. They're established in statute or law, by regulation or executive order, and most often are developed with public participation and review.

Informal policies are more difficult to deal with. They can be extrapolated from a review of how management organizations, such as the North Pacific Fishery Management Council or the Alaska Board of Fisheries, deals with like issues over time. For example: The Alaska Board of Fisheries does not have a formal policy with regard to authorizing new fisherman for, or new gear types into a commercial fishery that is already being fully used. Nevertheless, the actions of the board are consistent in dealing with that issue and you can infer from that consistency of action that there is an informal but very real policy not to re-allocate to new gear types when a fishery is already fully used.

Let me turn to a specific example of how a formal policy was developed recently in Alaska under the Sheffield administration. Early in his administration, Governor Sheffield appointed a fisheries policy task force comprising commercial fisherman, who were appointed either to represent geographical areas or gear types, and other industry persons who were appointed to represent processing, aquaculture, sport fishing, developing fisheries and labor. The governor addressed the first meeting of the task force and instructed them as to their charge, which included a relatively long list of specific issues and the following areas of general concern: 1) how to make fishing a viable industry, 2) how to make it more profitable, 3) how to create more employment in the industry, 4) consideration of long-term, regional, and statewide goals and problems.

In June 1983, the fisheries policy task force delivered a 200-page report to the governor. The report analyzed several key issues and recommendations for policy development. It specifically recommended that the governor establish a fisheries mini-cabinet.

The governor did establish a fisheries cabinet comprising the commissioners of the Department of Fish and Game, the Department of Environment Conservation, the Department of Commerce and Economic Development, and two associate members: the director of the Alaska Seafood Marketing Institute, and the chairman of the Commercial Fisheries Entry Commission. Governor Sheffield charged the members of the mini-fisheries cabinet with the responsibility to provide continuing budget analysis, review fishery-related programs and insure that those programs were coordinated, and further the development of policy and strategic recommendations over a wide range of fisheries issues.

The governor also identified some specific issues requiring immediate attention. One of those was development of an internal waters joint venture policy, and a strategic recommendation that would actively promote development of all sectors of the Alaska seafood industry. As you may recall, the Magnuson Act was amended in 1981, granting authority to state governors to permit foreign fishing processing in internal waters under certain conditions. As I said earlier, policies usually come about when somebody says "we need one". In this case it resulted when the fisheries policy task force identified an issue that needed a policy. That issue was articulated to the mini-fisheries cabinet by the governor with a mandate to develop a policy. Recommendations were made to the governor and the governor has adopted a policy defining the conditions under which internal waters joint venture permits will be issued.

In the process of developing those recommendations, the fisheries-mini cabinet worked with the fisheries task force and other members of the public. This is in a sense Alaska's "fish-and-chips" policy. It identifies specific activities that must be incorporated within the permit, including those promoting a fully-integrated U.S. seafood industry. They include, but are not limited to, the following: A) purchase of finished or partially-finished products from U.S. processors, B) cooperative marketing with joint venture products using the U.S. marketing and sales firm with constructive U.S. equity ownership, C) use of U.S. labor, D) transfer of pertinent technology, E) transfer of capital, F) investment in infrastructure, G) meaningful relaxation of stated and unstated trade barriers to products produced in joint venture operations, H) U.S. secondary or re-processing of joint venture products and I) applying timely and accurate marketing and biological information.

Once developed, this joint venture policy had to be implemented in some way. Regulations to implement the policy were drafted and sent through the state's administrative procedures for the adoption of regulations, including public review and comment. There was a great deal of public interest in those regulations. Those regulations are now codified and found in 5AAC 39198, of the state administrative code, where it is noted that "except as provided for in this chapter, a foreign fishing vessel is prohibited in engaging in fish processing in internal waters of Alaska", and goes on to define the conditions under which foreign processing will be allowed. These regulations became effective in October 1984.

I think the chronology that I have just gone through describes how a real piece of policy was recently developed. It closely fits the description of developing formal policy mentioned by Dr. Alverson. The fisheries mini-cabinet is now working on a range of other policies. We are engaged in intensive study and research to develop a policy on aquaculture. This policy will be applied across the state, as it supports hatcheries and other kinds of aquaculture programs.

Again I look forward to serving on this panel and to discussion.

GORDON: Fisheries management in the United States is really by consent of the governed. It always has been and I hope always is!

But management implies, and at least anticipates, a favorable outcome. I'm not sure that is really what we're getting.

Fisheries management is an active political process. Probably more so here in the United States than any other country. There are a lot of dictators in some of those other countries, some not always benevolent. Fisheries regulation, as it evolves in other countries sometimes is very abrupt and long-lasting. In the United States, because of constitutional and traditional concerns that everyone's rights be protected, I think we have a very good, well-balanced political process. In most instances, a very high-participatory process results. While it protects individual rights, it has all the weakness of management by committee. We sometimes end up with the lowest common denominator, and sometimes an unfavorable outcome.

In the last decade, roughly, Congress has erected some very elaborate protections and built these into law through regulatory reform. They are being considered for strengthening by Congress. This was not always the case. In my not-too-recent past as regional director, I thought we had one of the best possible worlds in terms of fisheries management. When I was asked to leave my regional director's job to take over Magnuson Act implementation, I had already dealt with quotas, mesh size, closed seasons, closed spawning grounds, vessel imitations, and quarterly allocations through a country commitment with ICNAF. That was in a regime where American fisherman on the East Coast could fish anywhere they chose, up off Canada. Now we have a boundary line that extends seaward and the areas are becoming more restrictive. I sometimes question whether we gained a great deal under the Magnuson Act, and I will elaborate a little bit further on that.

Much has been said about the "regional-versus-central office" issue: headquarters versus the field office. Differences are common in any organization I know of, both in government and industry, although the extent varies. The fact is that departments responsible for administering federal law are often under conflicting political pressures, and can never totally delegate authority when policy issues arise. In fisheries however, we have moved toward a sound, practical compromise. Councils have to do their homework, of course. We have pushed aggressively for framework plans that give clear directions from the councils as to how the secretary, as emulated by our regional director, is to implement annual and "in-season" changes. Unfortunately, those framework plans have to be accompanied by a seemingly endless evaluation of alternatives that allow the governed to gain a reasonable understanding of the plan's impacts as well as satisfy the legal requirements. In our democracy, that is the price we pay under federal law and executive direction. But I think the framework plan process is leading to routine applications, which now take four days on average to process through the Washington office and file with the Federal Register. We have made 57 four-day changes already this year. Last year we did 60. I wish we didn't have to publish in the Federal Register before regulations are effective, but that's the law of the land.

To be safer and easier, we may have to apply and perpetuate the past practices, especially in fully-developed fisheries. That is,

we maintain the historical quotas and allocations, but the nation's needs are changing. We can no longer afford to be provincial. We have to look at it from a national perspective. For example, fishing off the gulf coast, particularly off Florida, Texas and Louisiana, is becoming more recreational. That trend is evident elsewhere in the nation. Texas recently closed state waters for taking red fish and sea trout, and that is limited entry. The commercial interest is out. This trend, I think will continue. But the technology used for both commercial and recreational fishing is rapidly becoming more sophisticated and available to everybody. Markets for fish are changing. The fact remains that on a world scale fish is very competitive with other protein foods.

How can we offer new opportunities while preserving traditional rights? Can we, or should we do that? How do we phase-out foreign fishing and still gain the advantages of access to foreign markets, reduction of trade barriers, import quotas, and the like? How do we introduce new ideas into established fisheries without disruption? Interpretation of the Magnuson Act has changed. It was originally conservation-oriented. It has moved toward industry development, to allocations, joint ventures, OY limitations, and the so called "fish-and-chips" policy. It has been used aggressively to affect trade barriers. Timing is critical and it differs from fishery to fishery, yet the process of change remains burdensome within our body of laws.

The Magnuson Act is on trial. At its worst, it has produced non-plans that do not help depleted resources and in some instances, marginal fishing operations, leading people who participate in those fisheries to ask Congress for more money for fisheries development, more money for financial assistance, and more protection. At its best, it can be bold and increase stocks, yields and profits. It is too soon to evaluate its success in many areas.

There is also a larger trial in the federal process that will be ongoing in 1985 and beyond, as the president and the Congress seek to reduce the budget deficits. I agree with Jim Campbell. It's a pity that the Northwest fishery center didn't get an add-on. But if the president's proposed budget for fiscal year 1985 had passed, the agency that I head would have a budget of less than \$90 million, and the councils would have budgets of \$3.3 million, not \$6.8 million. That budget was recommended to Congress for passage by the executive branch. I work for that executive branch, but in spite of the fact that we define the president's budget, we ended up with roughly \$170 million. That may sound like we are fat and happy, but we're not. Much of our problem is because of the add-ons and self-serving interests we're not able to manipulate. Some of the add-ons were helpful to the agency, but others are not because they are untouchable. We cannot re-program that money for other purposes.

We use a computer to model our budget and look at what we should be getting. Ideally, our budget should be around \$220 million. With that we could have more data for fisheries management and development: more science on stock assessment, which in my view, result in less regulation; more enforcement; and much less fishery

development money. We don't have that budget and we probably won't, unless society asks for it and supports it.

I would like to point out that one major objective of the act is well on its way to achievement. Foreign catches in our zone have decreased from 2 million mt in 1971 to 1.3 million mt in 1983. Joint ventures have grown from almost none to approximately 430 in 1980, and 435,000 mt this past season. The U.S. fleet has also grown. But has it overgrown? Are too many vessels chasing too few fish in some fisheries? As a result, are fewer profiting?

I urge each council to consider how their actions impact the quality of fish. John, you made a good comment on that. Are we forcing the fisherman, because of our regulations, to not properly care for the fish at sea? As a result, do we impact the market quality unfavorably? Is the consumer's reaction then not to eat fish? What are our impacts on safety and insurance costs? These things are uppermost in people's minds.

I'd like to end by pointing out that Alaska is extremely gifted. Adjacent to its shores are some of the richest fishing grounds in the world. A lot of people want to share in that gift, in the Lower 48, and in the rest of the world. But if we are to develop those, it strikes me, that we must do a much better job of communication. Call it what you wish, salesmanship or whatever, but we have to achieve the level of understanding that Lee and Jim talked about, or we are not going to achieve development in the near future.

JENSEN: We have come along way, I don't think that we should forget that, but we have a hell of a long way to go. I would like to make some cryptic points for you to think about, and maybe discuss during our session. I think everybody is here to listen and also to get their points across.

It is important that we should all come away from here with something to tell Bill Gordon: we have got to direct more funds toward assessment and the ecosystem. We have got to press that case. He basically pleaded with you here, in essence, to support him in his budget process. But I also think that we have to put on all the pressure possible to look at this resource, because we don't know that much about it. We really don't. Not enough to intelligently make the decisions that we have to make.

The second thing, is on council appointments. I run a company. A lot of you do. If you do something wrong, you can get fired. If you do something right, you get rewarded, sooner or later. If the Department of Commerce receives a list of nominees for council positions that includes unqualified people, they must turn the list back and say, "these are not acceptable. Please submit another list." It's tough, but they have got to do it if we are going to have good councils to manage the system. Pressure should be put on the state governors to appoint people with vested interests in those fisheries, past or present, so they really understand them. That doesn't mean that people not involved with fisheries should never be appointed, but we should lean towards people with vested interests. We've got a limited resource and it's divided among many, foreigners and domestic. We don't trust the system. That is

terrible. If you have lack of trust in the system, it never works. Everybody fights it. Even if the majority is for it, with enough lack of trust, the system is destroyed. We've really got to build that trust.

We need a federal overview. The suggestion made in the early part of the discussions, that we don't have a federal overview, is totally wrong. But the federal overview should relate to the national standards. It shouldn't be made behind closed doors. If the council is going to be overturned, it should be an open process. But we need some overview. We need access to The Hill. The only way we have gotten the things we have really wanted was by going to The Hill. It's terrible, and I wish it was more at the grassroots level, and we've got it at the councils, we've got it at the states, but any major legislation, we went to The Hill to get, and it has been very effective.

Harold Lokken made a point. He said that the government won't let the councils function. Now that is a very strong statement. Why won't the government let the councils function? Is it lack of trust? Is it conflict at the council or state level with some basic things in national policies and goals? We must create the best climate for success, and I don't think that so far we have. I'm not knocking that we have come along way, but we still don't have the best climate for success.

Management and development go hand-in-hand. Sometimes I think that we forget that. People say, "let's manage the resources and forget about development." We have a very large development issue, especially in Alaska, because of foreign competition and foreign fishing. So, management policies have to be centered around development, especially if Americanization is a goal. That has to be kept in mind in all decision-making processes.

We are also at a point where some of our fisheries, and maybe most of them, are on a single year-class system. Boy, I'll tell you, if that year-class system fails we are in deep trouble. We had the luxury of being on a many year-class system, so if there was interruption, it didn't bother us too much. But most of our fisheries now are on a single year-class system, and that is dangerous. Fisheries oceanography is moving at such a slow pace that it will take many years to develop a predominance of evidence on the multi-species groundfish complex. Going back to my point on pushing funds for assessment and ecosystem studies, we have got to move in that direction fast, or it's going to be too late.

Do we really have a national fish policy? I don't think we do. If we had a national fish policy that we were focussing on, the councils could function better. But we have a lot of policies. Some of them are very conflicting. We have got to have a national policy. Where does it start? It starts at the bottom, not at the top. It starts with the fisherman, the processors, the people who are interested in the business. They get together and say, "Hey, what should we be doing? What should we be doing for the next ten to 20 years? How are we going to develop it?" I think that can come about. Basically, management decisions have got to be made from the bottom up, not from the top down. If you don't get the

support from the bottom up, you have a system where the management decisions will not be supported.

We all started back in the old days under bilaterals. We all shot at them because we were not part of the process. As you know, back in the 60s and early 70s, fishermen and processors got to be part of the process. We were invited as advisors. In the earlier years, I think we were scared of advisors. We didn't want to say too much because it was really a government-to-government negotiation and we were there to "give some advice." Some were listened to and some weren't. In the 70s we were frustrated because of the king crab situation after 1966. Finally, we said to hell with it. We're going to take a strong stand and we are not going to move until we get those foreign fishermen off that resource. We're tired of hearing that we can't catch it. We made asses out of ourselves. We made points. We argued. We inspired some dramatic events, as Bart is well aware since he was one that made a dramatic event.

What happened? The Japanese said, look, we have to save some face so we need a quota. We will sign a little side letter that says we won't fish for it. We said fine, that is great! We got what we wanted and that developed the king crab fishery for the U.S. They used the same old arguments: "Well, we aren't going to buy it from you; we can't afford it; you can't really fish it; you're making a terrible mistake." Well, that didn't happen. The same thing happened with tanner crab. We are all familiar with that situation. "We won't buy it from you; you can't catch it; you can't process it for the Japanese market." That went away right away. They are saying the same thing now about groundfish. That is bullshit. You know it, I know it, they know it. But they have a national interest. They are participating in that fishery and they don't want to be thrown out. I'd use every trick in the book, too. I'd lie, I'd cheat, I would do everything I could to stay in that fishery, because that is my livelihood. That is what they are doing. But we have got to get past that.

Now, how do you get past it? Well, we decided a couple of years ago that we could make better headway, on a industry-to-industry basis. So we proposed it. The Japanese said "Well, this might be a good idea. Maybe industry will be a little easier to deal with than government. Let's sit down." So we sat down. Our industry group was a loose coalition of people; we had no formality. We got together and decided I would be the spokesman. We picked a negotiating team that included harvesters from Alaska, and both Alaskan processors and Washington processors with operations in Alaska. This negotiating team would be our "cheerleaders," as the Japanese say. Well, we don't look at them as cheerleaders, the Japanese do. We look at them as being there to tell us what to do. That is different.

So, we had this meeting. We made an agreement beforehand. The agreement was that in over-the-side joint ventures, they could take 120,000 mt from July 1982 to July 1983, and they would take 200,000 mt from 83 to June 84. At that time, the Japanese claimed our fisherman couldn't catch it. I mean, they pounded on that issue. When you're not catching it, and you're not doing it, you can say, "Yes we can", but you've got no proof. We knew we could. It

wasn't an issue in our minds, but it was in theirs. Well, it's not an issue anymore. They have agreed that it will never be brought up again.

Now the issue is that we can't process it. We sat down in November 83 and said, "We want more than just over-the-side joint ventures. We want some movement on technology, purchasing product from American processors, and catching other species in areas other than Shelikof and Bering Sea." They said, "Wait, we have an agreement that expires June 84 that says 200,000 mt. We have already caught 120,000 mt, so we really have only 80,000 mt to go. Maybe we should discuss it in June." We said, "No, we are going to discuss it yearly, beginning January 1 to December 31." At that conference they agreed to 330,000 mt for the period from January 1, 1984 to December 31, 1984. They had already taken 80,000 mt toward that 200,000 mt commitment that went to June. In essence, we got them up to an additional 262,000 mt for the last six months of this year. What have they taken? They took 342,000 mt. So that part of the agreement was fulfilled.

They didn't fulfill some other parts of the agreement. They had only purchased 3,967 mt, as of two weeks ago, towards the 50,000 mt goal of American-processed bottomfish products. But, it was a step in the right direction. They feel great because the year before they only did 650,000 ton. They didn't go into other areas that we hoped around the Aleutian Chain and the Alaska peninsula, but I think maybe that will open up to us next year. We had scheduled another meeting. As you know, that was called off because of the whale issue. Now the proposal is to reschedule it for December 8th through the 12th. We should hear back from them today whether that is on.

Let me end with something that is important. One of the issues that we have been forcing is if we let foreign nations fish in our zones, why can't we ship product of that same fish species to their countries. I asked their negotiator, Mr. Imanaga, if today, I produced one pound of surimi, could I ship it to Japan? And the answer was, "No, there is no quota for that." "Could there be one?" I asked. "Well, yes, if the U.S. industry will consider discussing multiple-year agreements." We asked what they meant by that, because that scared us. They gave us an example: "Right now in essence, we participate in 1.5 million mt. That relates to 0Y percentage-wise, and we realize that, maybe that number comes down, but we still want it. Then we want to sit with you the industry and discuss who gets what of that 1.5 million mt. How much for the over-the-side? How much for U.S. processors? How much for directed-fishery? And we want to look at that ahead." Well, how far do you mean? Ten years. Well, we really don't mean ten years, we mean, two." OK! Well, it went from ten to two over one drink. So they're willing to make some moves. I think we have some possibilities here. So I asked Mr. Imanaga, "What is the biggest problem in giving us a modest IQ?" He said, "Well, the fisherman and the shore-side processors don't want it because it will bring more product into Japan." "But", I said, "it won't bring in one pound more. It's a matter of who is catching it and who is processing it. The total stays the same." He said, "I understand the total stays the same, but they don't understand that."

Well, they do understand that. Here's the key question that was asked, and this is of record: "Mr. Imanaga, do they fear that surimi can be produced cheaper through joint venture activities, either through over-the-side, or true joint ventures, than in a directed fishery? Answer: "It's one of the reasons behind their position. However, because joint ventures have expanded, shore-side processors are trying to upgrade their product through capital investment. However, we are trying to tell them that the U.S. product will not compete with theirs."

Now I think that is a key. They realize that over-the-side joint ventures or a true joint venture in the American zone will be competitively priced with theirs, and they're scared to death. I think you've got the opening. Now it's a matter for the family to resolve where it wants to go, in what steps, and that it might mean some sacrifices from either the harvesters or the processors.

RASMUSON: I've captioned my remarks here "The Four Pillars of Fishery Management Wisdom." In the Magnuson Act of 1976, the Congress established comprehensive fishery policy for the United States. It set forth goals and objectives and provided a mechanism for achievement. It was also interestingly enough, a mandate for development of underutilized stocks. Those familiar with the history of this act are aware that the concept of extended jurisdiction did not have administrative support. Rather it was achieved by an outside government combination of what Dr. Lee Alverson has aptly named, the "fisheries family." It's quite a practical document, as might be presumed from its origin. It assumes cooperation between the state and the fisheries council, and it recognizes foreign fishery participation. Management is implemented. The fishery management plan for each fishery stock is developed first through the scientific findings as to the maximum sustainable yield. However, this finding is required to be modified by, quote, "any relevant economic, social or ecological factor to arrive at the optimum yield."

The assumption is frequently made that the biological approach, that assumes preservation and enhancement of species, is firmly established as the foundation block in building fishery management. Like most articles of faith, it requires continuous reaffirmation. It has been my observation that there has been significant disagreement between fishery scientists from different countries as to basic biological facts. It is only when the government officials operate on those facts that the disagreements arise.

In the International North Pacific Fisheries Commission, after a very early and rocky nationalist division, the preservation of stocks has been accepted. The fact that the scientific advisors, organized by national sections, can achieve substantial agreement is a tribute to the emergence of the scientific principle. If we believe in the general acceptability of scientific findings, the solution for international cooperation appears to be in the following scenario. Since all the sovereign nations claim extended jurisdiction, let each country manage a migratory stock while it is within its boundaries. However, to insure a practical degree of necessary coordination, let each nation, by written agreement, state that it will implement no decision without prior consultation with the others, and all decisions will be in accord with the

latest scientific data. Therefore, by applying a loose reign, a coordination in practice may be achieved. This was the basis for the successful reorganization of the halibut commission. It is still unique in Pacific Ocean management by having its own scientific staff. By excluding the reciprocal fishing privileges of both nations, the right to set area quotas is retained.

A further case in point is Alaska's rejection of the proposed U.S.-Canadian salmon treaty. The biological findings of the scientists from Canada and the three states involved were not that far apart. It was fear of possible bias in quotas set by an international commission that made Alaskans reluctant to give up local management.

Much has been written and said about the difficulty of determining the optimum yield because of the lack of objective standards. In my judgement, it was a stroke of genius to emphasize the optimum yield as a catch-all for varying interests, known and unknown. Absent this concept, the council system could never have survived because too many interests would have felt left out. Remembering that the Magnuson Act was written with contributions from the entire fisheries family, the criteria for successful management are basically practical.

The first step is positive. Everyone should be heard and have input in developing a fishery plan. It is not a guarantee of satisfaction by all interests, but usually violent dissatisfaction is avoided by knowing that a viewpoint was recognized.

The second step is negative. Under no circumstances should any subjective value or preference be afforded to any fishing interest on the grounds that it is ethically superior. People reject that kind of moralizing. Any of our management decisions under the OY concept, as well as other sections of the Magnuson Act, involve preferences for fisherman, harvest locations, gear, different species, and so forth. These decisions are not always based on biological grounds, nor any logic. Sometimes they are based on historical use. People have grown accustomed to a practice and accept it until tremendous changes in conditions force a reassessment of the practice. I call historical use the first pillar of management wisdom, and it should have strong consideration before other options are considered. Examples are: Indian treaties, ocean trolling for salmon, interceptions of migratory fish at caps and passes. These practices make the biological sorting of fish near spawning grounds more difficult, but the practice has been accepted. Since an accepted practice develops capital investments and vested interests, it is extremely important to make timely decisions that will avoid subsequent complications. Examples are the preference of longlining cod over pots, where the latter have not been used. In southeastern Alaska, where domestic trolling for bottomfish has been strongly developed, much trouble will be saved if preference is maintained for longliners who fish for halibut and black cod, namely, the established fisheries.

My second pillar of fishery management wisdom is importance of use. This is especially easy to administer in favoring domestic over foreign harvesters. Fishing use and benefits, like charity, begin at home. A practical application of this pillar of wisdom is to

favor the user who has few other options for physical or monetary support. This prefers subsistence over monetary use. There may be a gray area where subsistence is merely a life style, rather than the only available food. Still, this preference, although probably not a subsistence problem in the harvest of the sea, avoids potentially great political conflicts and polarization. Certain areas, by history and available alternatives, must harvest the sea. A good example is the AYK area of western Alaska. The area's preferential rights have even been recognized internally, since Japan, through voluntary domestic measures, made certain significant reductions in their interception of chinooks and chums. Another example is the registration of certain areas for shellfish harvesting in order to avoid unsocial, and uneconomical exploitation by itinerant vessels.

My third pillar of management wisdom is the greatest good for the greatest number. This is especially applicable in reconciling the commercial fishing interests with expanding recreational desires. In 1981, which was the last year for which I have statistics, 36,000 people were employed within the Alaska commercial fisheries and an 134,000 resident sport fishing licenses were taken out. In addition, 87,000 non-resident fishing licenses were purchased. Incidentally, the number of resident licenses issued was substantially in excess of the number of people who voted in Alaska that year.

Before attempting a management decision, it is useful to analyze the problem. Fortunately in the Pacific coast states, we have a tradition of separating licenses and we know the number of commercial and sport fisherman. However, from a management standpoint, the distinctions become somewhat blurred. I think there are two kinds of recreational fishermen. The first has his own gear and vessel and is limited in catch, which is not for sale. This is not particularly intensive in use, and probably could co-exist with commercial fishermen without special limitations, except in spawning areas. An example is the Deska River of Cook Inlet. The other kind of recreational fisherman is the same as the first, except he fishes from vessels owned by commercial charter boats. These may be off a skiff based at certain land or central sea facilities, or off large vessels. These fishermen are expanding in number every year and the enterprise is essentially commercial, although the fish are not offered for sale and catch limits for sport fishermen are applicable. Since the target of most sport fishermen are the more scarce chinook and silver salmon, this type of recreational fishery does have, and can have great affect on biological stocks. Obviously, since there is an expanding charter fleet, there must be recognition of an allocation of stocks for the interest of sport fishing, the charter fleet, and traditional commercial fishing. It is my understanding that in both Washington and Oregon the division of available salmon has been worked out on the basis of historical catches. This is an example of the application of the third pillar of fishery management.

My fourth pillar of management wisdom is no man is an island entirely of himself. There are two kinds of additional interests that do not harvest fish but must be accommodated in fishery management. The first are environmental concerns. No one seriously argues against reasonable standards on pollution or health

risks. A more philosophical problem arises with respect to concern for sea mammals and sea birds. Accommodation can usually be achieved if the different view points don't neglect to get the facts. Maintain dialogue with the environmentalists and strive for solution. Thus the numerically stronger moderates are not lumped with the difficult extremist.

The second kind of interests are those that compete for the use of the water itself. Examples are building sites, loading areas, transportation and defense corridors, hydro projects, and disposal of mining waste. Here again, the resolution is usually obtainable on a particular basis, provided each side recognizes the overall benefits in achieving accommodation.

To summarize, once the biological basis has been established, the resolution of most fishery management problems depends on practical, factual information and good will.

TILLION: Elmer hit one point that I think is very good. The administration did not support the FCMA and has been doing everything it can to sabotage it since it was passed. It doesn't change from administration to administration, because these are civil service employees very deep within the system who think they should be the management. You will have their sabotage for a long time. They will not cooperate and will do everything to hamstring it because they think that they have been anointed by the Lord, and disagree with the United States Congress who felt differently. It will take a tedious body of court cases and law to tell them otherwise. We had a judicial decision this year in California that was very significant. The secretary had overridden the Pacific council. The council went to court, and the judge turned to the federal government and said, "What do you think you are doing, overriding them? The law says that you may only override them for legal reasons, and you don't have a legal reason." And she disciplined the secretary. In time, I think this will happen, but there is going to be some confusion in between.

I thought of Mr. Wilkerson's remark that managing is inflicting pain. As my family for many years ran to mercenary soldiers, I have a saying from my grandfather which is "never inflict pain without profit." I wish our managers would think of that. Grandpa wasn't that gentle--he would have taken somebody apart one piece at a time, but he wouldn't do it for the fun of it. Having that bent, I read Clausewitz, whom some of you might know. He said war was part of the intercourse of the human race, an extension of politics that is separate from normal business merely by the shedding of blood. And that is a fact. If you don't think that politics are a step very little separated from war, you haven't ever watched the political process. Of course there are other sayings, such as: "There are two things the general public should never watch being made, one is sausage, and the other is law."

There is a point that I would make, and I'm in slight disagreement with Ron Jensen on this. He seems to feel that once you kick all the foreigners out and break the import quota, we will have no problems. I think that is utterly ridiculous, though I certainly support him in getting rid of the foreigners and fighting the import quotas. We will be in just as much trouble when our

competition is another United States citizen as we are today, unless we solve the basic problems of management: harvesting it; getting it to the market; and differentiating between our sports fishery, which is our life style fishery, and our commercial fishery, which should be simply the production of food for the world.

We seem to forget that we don't go out to fish for the way the fisherman feels when he is on the high seas. Yes, that might be a feeling to him, but that is not the purpose for supporting commercial fishing. The fisherman is out there to bring back something for somebody else to eat. He might like his work, but the bottom line should be: have you produced something for the world to eat at a price that they can afford to pay? Therefore I'm not one of those that is greatly supportive of tariffs to stop foreign imports. I am a foe of foreign tariffs to keep our products out. But I think in time, we can break that down. I would also hope that we can see the day that American fishermen produce food, at a truly competitive price, as is his ability. I don't have any doubt whatsoever that we can produce it cheaper than anybody else if we don't have a regulatory system that raises the expense of doing it. Therefore, I'm always sorry to see the fall-back position where you have to reduce the length of the boat, reduce the amount of gear, or something like that to increase the price of the product, making it less competitive worldwide.

Another thing that I would like to ask is "Why do we have to be consistent?" I would hope that we would consistently provide a quality product to the consumer at a reasonable price, but I don't see why New England should have the same management system that Alaska has. I don't see that the Pacific council should have to manage the same way the North Pacific council does. Within the basic guidelines, yes. But I personally hope that we have a number of different management systems in action at the same time in different places in the country, or within the same areas, so one can readily see where the failures lie. If you pick one system and don't let anybody deviate from it, you don't have a way to compare what is going on. I think that you can be consistent in your goal while allowing great variability in the way harvests are conducted in the various areas. In our own, we don't have to have the same system for crab that we have for groundfish. I don't think that there is any need to be that consistent. In fact, I think that in some cases, it is biologically quite detrimental to be consistent. In a real mixed-stock fishery you want to protect certain species more than others, but you have a huge biomass. That management should be entirely different than say for crab, where you are taking just one sex of over a certain size after it has already had time to breed.

This is something that I'm afraid the Washington bureaucracy will have great difficulty with, because they want everything to fit in their little column. They want crab to look just like salmon to look just like halibut to look just like pollock, and any fisherman can tell them they don't. I would hope that if we put anything out to the rest of the United States, we also put out a feeling that we might have to go back to Congress many times. Congress has written a very good FCMA. If the executive branch had followed the intent of Congress, I think we would have had very little trouble. The

executive branch does understand the importance of fishery in relationship to other interests in the United States very accurately. After all, they proposed \$90 million for fisheries management and \$136 million for military bands. That is in part because 70 percent of the fish that the American eats is imported. If you build an industry that pushes off to sea and carves a big chunk out of the world market, I don't think that you will be seeing that kind of action.

BRANSON: Before we open the discussion, I would like to note that a great number of people have come from all over the world to attend this conference, and we are very, very pleased that they did. We have participants here from Peru, Ecuador, Canada, Australia, of course Dr. Gulland from England, and many others. I didn't want to let that go without mentioning it. We are very pleased to have this kind of attendance from so wide a range, of countries and interests.

With that, we will open the discussion to questions from the floor to the panel members on a subject of your choosing or a subject that they talked about. I think that they can field almost anything you want to give them.

JACOBS: I'll start things out. Most of my questions and comments are directed to Mr. Campbell, but I have to say something to Mr. Tillion first. If you are going to advocate getting the most fish at the least price to the general American public, I think we should take it a step further and look at eliminating salmon fishermen completely. Eliminate the 30,000 jobs that the industry provides, go back to fish traps, and only employ a couple of thousand people in Alaska to harvest that fish efficiently. You can do the same with each of these other fisheries. If you want to produce them in the most efficient way, you are going to eliminate a lot of people that live off them. Their livelihoods are based on catching and processing those fish.

Anyway, for Mr. Campbell. A couple of quotes that I wrote down. You say that we know where we should be. Well, there have been a lot of comments in the last few days about where we should be, where we are, methods we need to use, if we need limited entry, and I don't think we know where we should be. I think we are working on it and I think we have made some advances by talking. I think the economists understand the fisherman better. I think the fishermen understand the managers better and it's a start, but it's not your role as a manager to say you know where you're at because you don't want to show any weakness. Maybe that is what a manager is supposed to do. I feel we get things shoved down our throat because of it.

CAMPBELL: I think that I was talking about the council's direction and goals, not the fishing industry in total. The council has established and worked on a program of goals and if you had been at the meetings, you would be aware of that.

JACOBS: Well the system has to be somewhat flexible. A couple of people have spoken out against fishermen and industry people going over your heads to Washington D.C., "running to The Hill" and stopping things that you have proposed after putting a lot of time

into them. I see history in a little bit different way. It seems that Kodiak would be the place in Alaska most affected by a halibut moratorium or limited entry, or whatever. Yeah, you did have hearings. But the hearings were interpreted to reflect Kodiak as being moderately opposed to the moratorium 95 people spoke out against it, and the community was very unified in not wanting it. Things like that made us go back to Washington D.C. We don't go for nothing. It costs us a lot of money and we'd just as soon be fishing and staying in our little isolated community. But when a decision affects our life styles that much, yes, we'll run to Washington D.C. and I like to have the right to go over somebody's head when something is directly affecting me that much.

CAMPBELL: In my remarks, I didn't object to that. You know, I have a lumber yard in Kodiak. We get substantial income from there, from people who make a living from the fisheries. I have as much invested interest in your fishing as you do. I'm simply saying that we can't, once we have made a decision, let it go. We have to go back and sell our program. It may be something you agree with, and you want it sold back in D.C. I don't like going back to D.C. either, but we have the responsibility of going back there and selling our programs. That is simply what I'm saying.

TILLION: The first part was directed to me. The United States fisherman catches 30 percent of the fish consumed by United States citizens. If we produced as we should produce, it's more jobs, not less jobs. More on the sea, not less on the sea. What I'm advocating is that the United States work out a system where we not only displace that which is now imported, but actually produce and sell elsewhere in the world. That is going to take some changes.

GORDON: I would just like to comment on the lady's point about going to Washington. I hear a lot of complaints from the field back in Washington, and I don't discourage them. I think the point we're trying to get across here is for more autonomy in the regions, because that is where more intelligent decisions can be made. We work, to the degree that we can within the law, to get regional decisions because that's where the people are. If you circumvent that system and go to Washington sooner or later someone, perhaps above me, is going to say, "The councils aren't doing their job, why are we getting this noise in Washington?", and it's self-defeating. The point I would make is that every American citizen has the right of appeal. Thank God, for that. I think that folks who don't like a particular decision of the council ought to re-visit the council and ask them to reopen that issue. And the council members have to listen. That is their job, to listen. If, in their collective wisdom, the decision stands, then we can not allow that to be overwhelmed by some fishcrat or bureaucrat ingrained in Washington, or the council system has broken down. If we want our cake, then let's keep it intact. Otherwise, we run the risk of losing it.

RASMUSON: When I became mayor of Anchorage the city council meetings went on for hours. I suggested that we first refer business to advisory councils, then deal with their presentations. They agreed to that. I think that in the three years I was mayor, we never ran past midnight more than twice. The worst problem, as always, was planning and zoning. We would never get anyone to

comment on the budgetary process, not a single citizen would come. For dog controls or something like that they were hanging from the rafters, because it was something of great interest to them. Well, as a result of that, we got more participation at the original level and the city council didn't have to review everything. I think you can ask people that lived in Anchorage at that time whether that was a pretty satisfactory way to run the government, and I think they will agree that it is.

See, here's the problem with not using the council adequately. Nobody seriously doubts that you should have the right of appeal, including going to your senators and your congressman. We all do that. If we have to do it, it shows that something is serious and we need that appeal.

But it's like a lawsuit. One of the problems of the law system in Alaska is that nobody pays any attention to the original court decision. Nobody does! They all go to appeal. Why? I've never added it up, but I'm in litigation all the time. The reason is that the Alaska Supreme Court overturns as many decisions as they support. So why shouldn't you appeal? What I'm driving at is this. Unless you use your local and regional means of developing policy, you're really not using the great opportunity. Nobody has said this in all of this group.

Establishment of the council system is the first time in the history of the United States that the federal government ever gave management authority to a lay group on a regional level. The first time! Now I will remind you of what happened before that time. Do you want to lose what we've gained? I don't think you do. All right, make it work. The way to get it working is to be involved. I point this out as an example of a practical use of regional means of developing your conclusion.

TILLION: I will make this very short. I don't think we need to change the law. We need to find some way for Congress to assure that it can be enforced. For instance, the 90-day cooling-off period. When Congress said that the NPFMS must act within 90 days of receiving it, the NPFMS immediately set up a system for checking it for conformity that doesn't begin the 90 days. I'm saying that the law doesn't need to be changed, it need to be enforced on the bureaucracy. It's a good law!

FISHER: I'm not going to dwell too much on philosophy. The title of this thing is Fisheries Management: Issues and Options. I've got Gordon, Collinsworth, Branson, Campbell, all sitting together, pegged down in one place. The issue is that the council does not have enough money to operate. We are worried about that resource base. We are worried about the magnitude of work we can afford. The money isn't there. The council doesn't have it. That is an issue.

Also, and Governor Sheffield said it very well when he said: "The fees will wind down as the foreigners are displaced and there isn't anything to take their place." I propose an option. Get an assessment out of those of us in joint ventures. We should pay somewhat for the fish we take and we would like to see the money go

to research. We've got a problem. The problem is, you can't have dedicated funds.

I'd like to propose that we sit together and come up with a possible assessment. Since politics is the art of the possible, we then make a deal with Mr. Gordon and the Department of Commerce. First, NMFS and NOAA will recognize that the Pacific council and the North Pacific council areas have the greatest potential for growth in the United States. The JV's have proved that, you are getting a \$100 million of exports this year. The deal will be, that much of that assessment money will then come back to the regions to get on with the job that Ron, Bart, and several of us have talked about. That is an issue and a option.

Another option. You don't have much pre-recruit king crab information. We sit up there every year in the pot sanctuary and in other places, dragging away. We only drag about ten or 12 hours a day. You've got NMFS observers aboard those processors. Why can't we get some kind of a deal going while we are laying idle? Put on a small cut-in with a fine mesh liner and make a little spot tow, then pass what's caught in it over to the processor to be analyzed. Is there any information, valuable information that can be gleaned from that, in pre-recruit king crab surveys?

We ran a little perch fishery down in the Aleutians this fall. Now the data we got won't exactly meet the needs of the resident manager, but there is some of it that is valuable simply because of the way we put up the pack. I think there were eight size gradations in the pack. That gives you some beautiful distribution curves. It gives you some data about perch that hasn't been taken in that way for a long time. The issue is: we really don't know where we are going on perch assessment. The perch is a holy cow to the biologist. We might glean some valuable information out of this.

I think we should pay our own way. I think we should be involved in where the funds are going to come from. How are they going to come? Above all, how are those funds going to be spent?

GORDON: It's not unusual to have contributions, and they can be dedicated contributions. The only other point I would make, is if it is a tax in a sense made possible by an act of the council, God forbid we would charge American fisherman for that fee. We don't even charge for the licenses and registrations issued, but you know it's appropriate within the law to do that. Personally Barry, I think very quickly the Office of Management and Budget in Washington would say, "Oh, that is becoming a normal part of the tax structure of this country. The money should go into general revenues, and then you ask the Congress to appropriate it back to us." We already have some. I'll be very critical of the almost ludicrous restriction on the foreign fishing observer fees. We can collect them. The foreigner pays them. But Congress must appropriate the money back to us before we can spend it. There are a number of those things on the books that make it very difficult for us to do our job.

BRANSON: Those were interesting proposals, and I think that we ought to think seriously about all three of them. I would like to

call on Dave Woodruff for the last question. You know, I've heard comments from the first day that this conference was too long, that everybody was going to lose interest and they weren't going to hang in there. I think now we could run it another four days with the interest that is visible right now. Please go ahead Dave, I don't mean to take your time.

WOODRUFF: To elaborate a little further on what Barry said, there is another source of revenue that we are overlooking, that is all the prohibited species that are being thrown away. I think it should be mandatory that they are frozen, processed and brought to the beach. However you sell them, the money should be put back in for research, running the meetings, and so forth. It's criminal to be throwing away the halibut and cod and all of the prohibited species.

I'm looking at over 200 years of practical experience on this panel, and my 30 years in Alaska seem very insignificant. We have an entire industry in Kodiak for which no scheme is being generated. We have processing workers and a community that is stagnating. When are we going to see steam start coming from that plant again? We have been told that we are displacing the foreigners. I'm here to protect my own rear end, to protect the processors and the fishermen that fish for me, and to protect the community that I represent. Kodiak, one of the largest fish-producing towns in Alaska, is sitting idle. We need to get out of neutral, and get back to work. When do you propose that is going to happen?

ALVERSON: Dave mentioned the prohibited species issue. I have been an advocate of generating some funds from there. I think we should be careful how we do it. My own view is that the initial step should be confined to taking prohibited species that are transferred in joint ventures because the mortality is known to be extremely high. I'm not convinced that we should apply it to the factory trawlers and the other boats processing their catch on-board, because the survival may be reasonably high and there may be a fairly good transfer of revenue to the line fisheries. Certainly in the joint venture transfers where you have 100 percent mortality, where you have observers on the boat, and can count the number of prohibited species coming in, then put them up for sale without revenues going to the boats, except, perhaps a handling fee; you could generate \$5 to \$6 million for research, if you did it effectively. People have to look at their prejudices and decide. Everybody says this is opening the door. All we are doing right now is closing the door. We are admitting the fish are dead and then throwing them over and we can account for at least this portion. I would be careful of instituting this before we understand survival, because you might get some good revenue to the line fisheries.

With regard to Kodiak, in my personal view, timing is always extremely important in the evolution of any development process. In my view, it's on hand. But it is not we, at this front table that have to take advantage of the opportunity, it's you. You have to put yourself together and look at the opportunities that are available. There will be a great deal of change, in my view, as a result of what is happening to the Hooten fishery? They are landing some very high-valued species in the Japan market and

somebody is going to have to replace that market. Everybody is going to be out competing for it and I can't guarantee Kodiak's going to get it. There are guys in Seattle and all over Alaska scrambling. But, there is an opportunity there and I think in the next three years you're going to see some big changes. You've got to put your act together, cause you're the investor, you're the entrepreneur. We can help you with information and contacts. But from then on, it's your game.

TILLION: Some of this waste has taken place because we don't want someone to legally have prohibited species in their cold storage unless we have somebody aboard that knows they are truly incidental. In the past, I'm talking about in the foreign fisheries, you would have boats that said, "Oh, those are fish that we were going to turn in", when they were going to take them home. Now that we have enough enforcement to watch it, and know that it's going to come into our ports, I think your ideas are very good.

Special Addresses

Governor's Address

Bill Sheffield, Governor of Alaska

Good afternoon. It is a pleasure to be among this group of distinguished businessmen and scientists and administrators, not only from Alaska, but from other states across the United States as well.

I got to switch gears here, now, just a moment. I just got through speaking, giving the keynote address to the Municipal League on capital budgets and reform of spending. And now I've got to get fish back in my head.

The seafood industry represents one of the most important segments of Alaska's economy. Right now, it's worth more than \$1 billion a year, at first wholesale. Fishing is the most labor-intensive industry in Alaska, employing on average 15,000 people. During the peak season, that soars to 45,000 people. In addition to that, each 100 full-time jobs in seafood processing results in 28 jobs in other sectors of the economy. And so, a 10 percent increase in the Alaska seafood catch will create some 900 additional, direct and indirect, jobs.

Now our economists say that if we're able to harvest, process, and market the pollock resources in the Gulf of Alaska, Bering Sea and the Aleutian Islands, some 6,400 direct and indirect jobs in the harvesting and processing sectors would be started. We will soon face declining oil revenues in Alaska, so looking at other options is very, very important to us. Here in Alaska, we have unique opportunities. We have a tremendously productive seafood resource and seafood base. And there is no doubt, combined with our modern transportation system and our ability to use technology, Alaska will continue to play an important role in the world seafood arena. Clearly, the way our fisheries resources are managed is of tremendous significance to Alaska and its residents.

We'd like to increase our efforts in three areas. First, by adding value to those products already produced in our traditional fisheries; second, by developing those so-called domestically underutilized fisheries, especially the groundfish; third, by developing aquaculture and mariculture opportunities, such as raising scallops and oysters.

Since statehood Alaska has, of course, developed a great deal of experience with management of its fisheries. We've made substantial investments in facilities, and vessels, and information systems. We have a large number of experienced personnel who can research and monitor what's happening with our resources. Our management, planning and regulation process, which uses a public participation system, is one of the best in the nation. Programs for the domestic conservation of salmon, herring and shellfish are well-funded and extensive.

We consider the North Pacific Fishery Management Council to be a leader, an innovator, among the nation's eight regional councils. This is due in large part to the state's well-developed management and conservation program, which was in place to manage off-shore domestic fishing when the Magnuson Act was passed in 1976. That's allowed the council more time to concentrate on developing the domestically underutilized groundfish. Because of Alaska's experience, we are fully aware of the complexity of the management decisions you, as managers, will face in the very near future. Particularly in development of our groundfish resources.

Today, I'd like to focus on groundfish development and some of the issues that will face managers very soon. The Magnuson fishery Conservation and Management Act (FCMA) placed responsibility for management of fisheries resources in the hands of the regional councils and the U.S. Department of Commerce. That process has been in place nearly nine years. While some of the mechanics need to be improved, the councils can be applauded for their work on behalf of the resource and the industry. The next decade, however, will greatly tax the existing system. We, as a state, are looking to you to work with us in addressing tomorrow's issues, today.

One of our goals is to replace foreign harvesting and processing with our own. But that can be a mixed blessing since we'll also be transferring a whole new set of complex and difficult problems from foreign governments and industries to ourselves. The way we deal with these problems will be the true measure of the success of the Magnuson Act and the regional council process.

Currently, for example, foreign governments must deal with the issue of encouraging an environment that stimulates orderly private and public investments, while minimizing the problem of overcapitalization. We've seen this problem in Alaska before. Government has a key role here as it is often the source of funding for fisheries growth. State and federal loan programs, for example, should be carefully reviewed to be certain they are not, in the long run, counterproductive. Another possibility will be to spend more time and more money figuring out the economic and social impacts of management decisions. Protecting a healthy resource base will always be our top priority. But we can't forget that management decisions affect people and their businesses.

I am particularly concerned that managers work in such a way that coastal communities receive the maximum benefits. And we must promote the economic growth of these communities, but the impact of any management decision must be thoroughly assessed on a regular basis.

We are also finding that a major issue in developing groundfish fisheries is the catch of incidental species. This issue is a thorny one. It affects both allocation and conservation and could polarize the industry. As the U.S. fishery grows, managers must resolve this divisive issue which will become more, not less, complex with time. An important part of the solution is collecting data to measure the actual impact of the groundfish fisheries on incidental species. Only with adequate information can we reach a solution that's fair for all user groups.

This leads me to another concern. The departure of foreign fishermen will also mean a reduction in the fisheries revenue, research and data currently supplied by foreign nations. The added responsibilities of dealing with a wholly domestic industry will require more dollars, not less. And over the long term, neither the state nor the federal government can fund these efforts independently. For the state's part, we're trying to plan for a future revenue decline. The government and private industry must decide soon how future fisheries research and management will be funded.

So in summary, the seafood industry is an undeniable cornerstone of Alaska's economy. We recognize the tremendous potential of the groundfish resource off our coast and that the way they are managed is particularly important to us. Our experience with the wise use of fishery resources leads us to ask you, as the leaders in the industry, to help us tackle some of the issues I've raised this afternoon. If we can accomplish that, we will be on our way to a bright future that will benefit not only Alaska, but the entire nation.

Keynote Speech

Clement V. Tillion, International North Pacific Fisheries Commission

I am pleased not only to be here but to see all of you here meeting on the subject of fisheries management options. I must warn those who do not know me that I have a touch of missionary feeling toward the fishing industry of my state and nation.

I'm not going to stand here and plead the case of the humble fisher folk because I don't believe they need an advocate. In my years as a fisherman plus years of political office I've always come to that Carolina-backwoods saying, "When a man's self interests are at stake, his morals are somewhat less noble than those of a fox in a henhouse." So, to expect that those involved in any given fishery will take a position not beneficial to their own interests is a ridiculous notion.

It's my position that in our management processes we often listen only to fishermen to the exclusion of the other user groups, especially the largest user group, the consumer. And yet, when you ask anyone, "Who owns the living fish in the open sea?" the answer usually comes up, "The general public, of course." If that's true, why do we take a course that results in a management system so against the best interests of our own nation? We import 70 percent of the fish consumed by the citizens of our country for a net deficit of over \$4 billion, making fish imports our third or fourth (according to product division) largest deficit item. Why do we take a course that in some instances makes our consumers pay more for storage and interest than they do for the fish? Is this because we don't have the resources needed within our coastal areas? Hardly! Twenty percent of the total fishery resource of the northern hemisphere lies within our jurisdiction. It is our archaic form of management that keeps our fishing industry in the Dark Ages. It is the failure to make the tough decisions or, when those decisions are made in the regions, it is the practice of those in Washington overturning those decisions because of personal biases or political pressure that holds us back.

The management of our recreational fisheries, for the most part, has been efficient. It is simply, "Protect the resource and let everyone have an equal-access opportunity while keeping traditional and political considerations in mind." The failure is to carry this system over to the commercial fishing industry where the goal, I hope, would be to not only protect the resource but also provide a good food product to the U.S. consumer at a reasonable cost. The purpose of a commercial fishery should be to produce food not a life experience for those wishing to fish.

What is the reason for this failure? It's a management system left over from another era--one from the days of the open range and perceived inexhaustibility of resources. In all fairness, though, the tools to make our fishing industry strong like our agricultural and oil industries were not always there. As a nation, we have not always been willing to claim authority over the resources off our coasts.

The first extension of a territorial jurisdiction over the waters seaward of a coastal state was a result not of fishery concerns but of a delicate instrument called the cannon. If you could land a cannonball on a ship it was obviously in your territory and so, the cannon range at that time being approximately three miles, the world got a three-mile limit. I'll spare you a tedious description of the policy evolution from then to now, but once this three-mile limit was changed things progressed at a relatively fast pace. The Truman doctrine touched off unilateral extensions by Peru, Ecuador and Chile. Our own Magnuson Fishery Conservation and Management Act and, finally, the Reagan proclamation of an Exclusive Economic Zone are benchmarks in this swift evolution.

If, however, we maintain 18th century fishery management philosophies despite the existence of 20th century management tools, we deserve to be a fifth-rate fishing nation. The concept of the commons is hard to change, so the "tragedy" is perpetuated. But don't look to the cowboy for a change in the system of open range. As one who has great faith in both the free enterprise capitalist system and the people of our nation, I feel we will solve this problem. But why do we delay? Listening to and reading the papers presented at this conference I'm encouraged that at least a few others also see the problem and are intent on resolving it.

If you feel I lean to limited access, you're right. There was a day when crude oil production was open to entry. But the wildcat operators of East Texas who were lucky enough to have brought in a gusher pumped as fast as possible as others rushed to tap into the pool. As a result of this open-access approach not only did the cost of producing oil equal the selling price for the product, but more oil was lost in the ground due to wasteful production practices than ever reached the consumer.

Sound like fish? It should. The open-to-all system of management fails because it not only is based upon the concept of common property, a resource not owned by anyone, it relies upon a pervasive bureaucratic management regime that institutionalizes inefficiency. As I've often said, we use the same system to manage our fish that the Soviets use to manage their farms and we also get the same results.

The private ownership of land made our agricultural system second to none. The actions of the Texas Railroad Commission did much to make our oil industry what it is--one that for years not only paid the public well for oil lease rights but was always competitive on the open market. The Taylor Grazing Act ended the open ranges our old-time cowboy loved even though he did so much to destroy that very range. I say again, now is the time to make our fishing industry competitive with the goal to not only produce quality fishery products for the U.S., but also for the rest of the world.

As I come to a close this evening, I'd like to turn my focus homeward to Alaska. Alaska's limited entry system for salmon appears to be working. But to make this judgement, one must ask what would the salmon fishery look like if individuals did not have some form of property ownership. Now when I say salmon limited entry, while far from perfect, is a success, I'm not advocating that particular management system for other fisheries. It works on a species that comes to a fixed location for a short period and then dies. For species like halibut or sablefish, the salmon system would be little better than the halibut derbys that we have now when the majority of the catch is delivered within one week. This is the wrong approach to take in managing a species that is best inventoried alive and swimming instead of all dumped on the dock at one time and held in cold storage for a year running up storage charges plus interest on the debt for a steadily deteriorating product. For species like halibut and sablefish I advocate a share-quota system, one that gives a fisherman a fixed percentage of the total allowable catch for a particular species or, better yet, several species. That allows fishermen to buy and sell as you would a coal, oil or timber lease and then lets the free market bid the price and schedule of landings so you can get the bureaucracy out of this part of fisheries management.

To close, I say again: a quality fishery product to the consumer at a competitive price. This will not only give the owner of the resource, the public, a fair deal but also will build a strong, self-supporting fishing industry for the production of food. This is only possible through the creation of private rights in the resource.

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