

OVERVIEW OF THE GROUND FISH FISHERIES OF THE WEST COAST OF THE UNITED STATES OF AMERICA

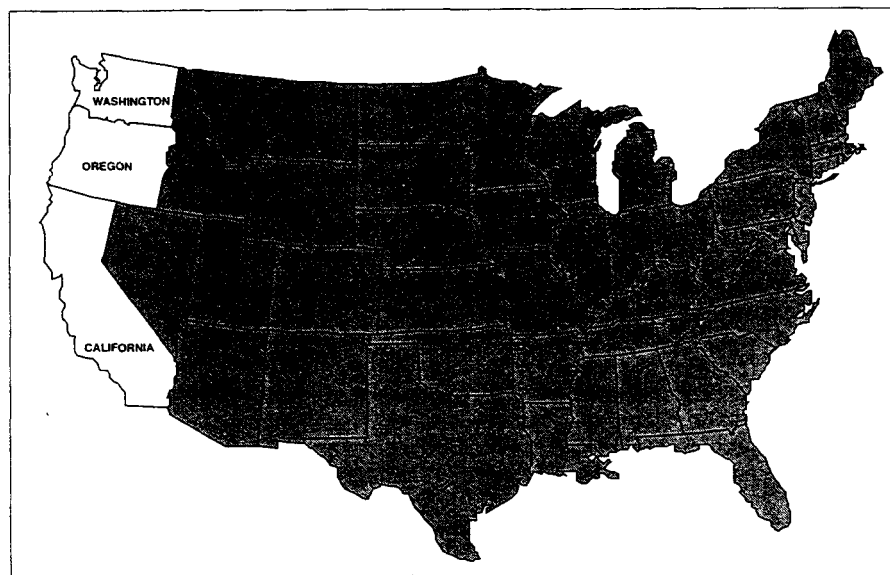
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In this paper I present an overview of the groundfish (demersal) fisheries of the West coast of the United States of America. This area includes the waters within 200 miles of the coasts of the states of Washington, Oregon and California, Figure 1. While the continental shelf is narrow, the area is productive because of the California Current and upwelling that occurs during spring and summer.

The fisheries are diverse. More than 50 species of groundfish are captured by hundreds of commercial vessels. Vessel types include gillnetters, hook and line vessels, small bottom trawlers and large trawlers that use both bottom and midwater trawls. In addition there are more than 2 million recreational fishermen and, while not all of these fishermen fish for groundfish, recreational landings of groundfish exceed 15 million fish.

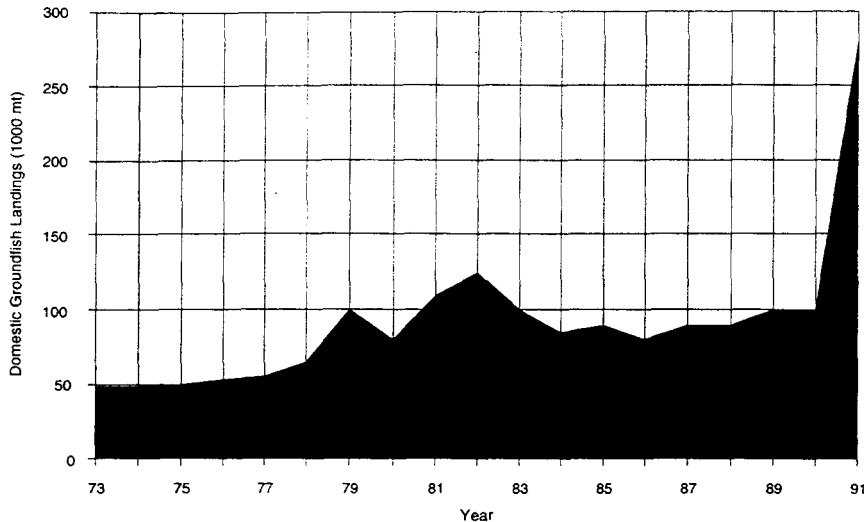
The fisheries have also changed considerably over the years. Domestic landings ranged from less than 50,000 mt in 1973 to almost 300,000 mt in 1991, Figure 2. Many stocks were lightly exploited in 1973. A combination of improved markets, expansion of the economic zone to 200 miles in 1977, and improved fishing techniques resulted in rapid increases in landings. By 1982 it was obvious that many stocks should not be fished down to lower levels. It was necessary to place annual landing limits on several important stocks in 1983. Since I am involved in making management

FIGURE 1 Map of United States of America, exclusive of Alaska and Hawaii, emphasizing the states of California, Oregon and Washington.



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FIGURE 2 Domestic landings of groundfish off the west coast of the U.S., 1973-1991.



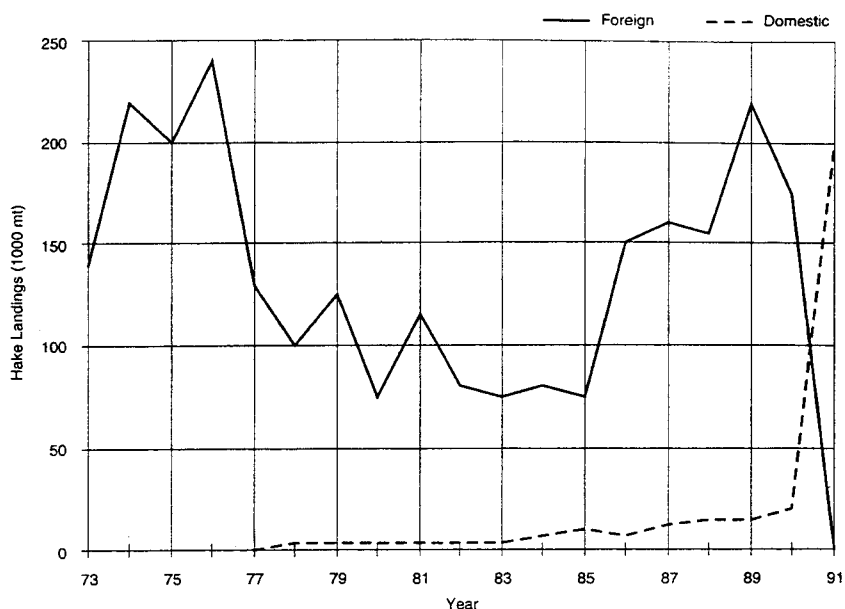
recommendations, I would like to be able to say that the large increase in 1991 landings is directly the result of our excellent management decisions.

In actuality several factors were involved in the increase. Combined foreign and domestic landings did not show the rapid increase. The increase in domestic landings was at the cost of a similar decrease in landings delivered to foreign processors of a very important species, Pacific hake (Family Merlucciidae; *Merluccius productus*). Until 1991 most Pacific hake were processed by foreign vessels and sometimes captured by foreign fishermen, figure 3. There has been a national policy to convert both the catching and processing of all fish from U.S. waters to domestic concerns. However until recently there was little domestic interest in processing Pacific hake, because a parasite causes difficulties in producing a high quality product. These problems were solved and large domestic factory trawlers and processor vessels began moving into the area from Alaskan waters in late 1990 and the fishery became completely domestic in 1991. The land based processing industry is also increasing rapidly. Our management people now have the difficult task of allocating the catch between factory trawlers, smaller trawlers delivering catches to processing vessels, and other trawlers delivering catches to land based processors.

The large increase in domestic landings of hake is also partly the result of good management policies and reliable stock assessments. Since 1977, catch restrictions have been based on assessments using data from hydro-acoustic surveys and catch samples. A healthy stock was maintained and was available when it became economically feasible for domestic processors to utilize hake.

The fisheries for other types of groundfish have also changed, Figure 4. Landings of the rockfish group (Family Scorpaenidae) show the greatest changes since 1973. Sixty species of rockfish (*Sebastes* spp.) and two species of thornyheads (*Sebastolobus* spp.) occur off our coast. These species range from the robust, sedentary and usually solitary gopher rockfish (*S. carnatus*) to the streamlined, semi-pelagic and very

FIGURE 3 Domestic and foreign landings of Pacific hake off the west coast of the U.S., 1973-1991.



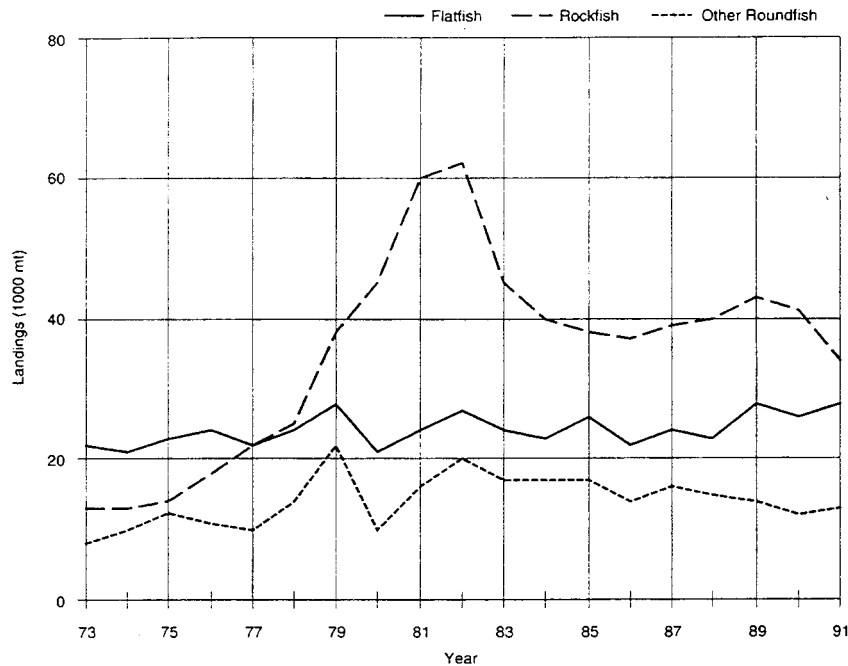
abundant shortbelly rockfish (*S. jordanii*). While numerous rockfish species occur off our coast the landings are dominated by eight species.

The rapid increase in landings of rockfish through 1982 is the result of increased markets and improved fishing techniques. Landings of widow rockfish (*S. entomelas*) had the greatest change. They increased from about 1000 mt in 1978 to about 26,000 mt in 1982, and were reduced to 10,000 mt in 1983 when it became necessary to protect the stock from depletion. The increase in landings between 1986 and 1989 was the result of an improved market for thornyheads. It also proved necessary to restrict landings of thornyheads in order to protect the stocks.

The landings of other roundfish have also varied considerably. Much of the variation between 1973 and 1982 is due to changing market conditions for sablefish (Family Anoplopomatidae; *Anoplopoma fimbria*). Sablefish is another species that needs protection from overfishing and landings have been constrained by regulations since 1983. Sablefish are very valuable and division of the catch between trawl, and nontrawl gears (longline and traps) has been a difficult management issue. Very recently there has been increased interest in Pacific grenadier (Family Macrouridae; *Coryphaenoides acrolepis*) and I expect that they will become more important in the landings.

The landings of flatfish are not as dynamic as the other groups. The increased landings in recent years are mostly the result of an improved market for arrowtooth flounder (Family Pleuronectidae; *Atheresthes stomias*). However, more than 50% of the flatfish landings are comprised of Dover sole (Family Pleuronectidae; *Microstomus pacificus*) and most of the earlier fluctuations are due to changing market conditions for this species.

FIGURE 4 Landings of flatfish, rockfish and other roundfish off the west coast of the U.S., 1973-1991.



Research on groundfish is as diverse and has changed as much as the fisheries. The amount of research increased considerably as the fishery expanded. Prior to 1977 biological composition sampling of landings of many species was minimal and sporadic. We now have a satisfactory sampling program for most of the important species. Economists monitor the industry with a combination of required reporting and special studies. Coastwide trawl surveys have been conducted on a tri-annual basis for upper slope and shelf species since 1977. A hydro-acoustic survey for Pacific hake also is conducted on a tri-annual basis. Trawl surveys have been conducted along most of the coast for deepwater species such as Dover sole and sablefish. Submersibles and remotely operated vehicles have been used to calibrate the deep water trawl surveys. Coastwide trap surveys are conducted for sablefish.

It has proven very difficult to estimate the abundance of rockfish from standard trawl or hydro-acoustic surveys because their behavior. We are conducting an annual young-of-the-year midwater trawl survey off California to estimate recruitment strength of important rockfish species. We are attempting to use larval surveys to extend the egg production method of estimating spawning biomass to live bearers such as rockfish. Oceanographic sampling is a part of these studies and oceanographers are working closely with us to relate fish distributions and reproductive success to oceanographic features. We are also closely following the efforts of researchers in Alaska to develop hydro-acoustic and other methods to estimate rockfish abundance. Fieldwork for a large study on mesh size that included many trips on commercial fishing vessels was recently completed to provide data to evaluate proposed changes in mesh size regulations.

Results of the field work are utilized by scientists at several laboratories to estimate the condition of stocks and make recommendations for managing the fishery. The stock synthesis model is used for catch at age analyses that form the basis for most of our assessments. Economists estimate the impact of proposed regulations with a variety of formal and informal analyses. We also develop computer simulation models to evaluate and further develop assessment and management techniques.

The Pacific Fishery Management Council considers recommendations from the scientists, fishing industry, legal advisors, enforcement agencies, and general public to formulate its management recommendations. The Council's recommendations are then subject to approval by the U.S. Department of Commerce. Usually recommendations by the scientists are followed by the Council and recommendations by the Council are approved by the Department of Commerce. The management regulations are then implemented by federal and state enforcement agencies.

Since many of our species are long lived, 50 to 100 years, the stocks can not support heavy fishing rates. It has not been an easy task to maintain both a healthy fishing industry and healthy stocks of fish. Beside gear restrictions and annual quotas it has been necessary to impose restrictions on the size and frequency of individual landings in order to insure the long open fishing seasons that our fresh fish markets desire. The landing limits cause discards of fish from catches that are unintentionally above the landing limits. As the fishing power of the fleet has increased, it has become very difficult to balance the risk of increased discards caused by restrictive landing limits against the early closure of fishing seasons that result when landing limits are not sufficiently restrictive.

Many people in the fishing industry and management believe that the number of vessels participating in the fishery should be restricted to present levels or reduced. While most of the fish stocks are healthy, almost all are already fully fished, and there is much more fishing power than is needed to take the allowable catch. The Council is in the final stages of preparing a recommended program to prevent the entry of new vessels in to most components of the fishery and hopes to implement the system by 1994. The Council has also begun to develop proposals for an Individual Transferable Quota system.

It has been fascinating to observe the changes in the fishery and particularly to witness limited access to the groundfish fishery change from being a subject that wasn't discussed in polite company to being a popular option for management of the fishery. While this management option is still controversial within the fishing industry, it has many supporters including some of the largest fishermen organizations. I think that events in this fishery during the next decade also will also be very interesting to follow.