Pacific Coast Groundfish Fisheries

Unit 15

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INTRODUCTION

The groundfish fishery off Washington, Oregon, and California is conducted across a diverse range of habitats and involves tens of species and several fishing gears. Domestic landings averaged about 30,000 metric tons (t) per year prior to the early 1970's (PFMC, 1997). A foreign fishery began in the early 1960's for Pacific ocean perch and Pacific whiting. The long-lived Pacific ocean perch stock is still recovering from the excessive foreign harvest that occurred during the 1960's, but the fishery for the more productive Pacific whiting stock evolved into a healthy joint venture, then to a wholly domestic fishery in 1991.

By 1977, when work by the Pacific Fishery Management Council on the Groundfish Fishery Management Plan began, domestic landings of all groundfish had increased to 60,000 t, and by 1982, when the fishery management plan was implemented, landings peaked at 116,000 t (PFMC, 1997). The recent yield of groundfish (other than Pacific whiting) has returned to an average of about 56,000 t.[1] Present yields may be sustainable for some species involved, but several of the stocks are depressed. Many stock assessments do not have sufficient data to be precise, and substantial natural fluctuations occur in some species.

Several assemblages of fish contributed to the $98,500,000 groundfish fishery in 1997 (Figure 15-1). The midwater trawl fishery for Pacific whiting dominated the tonnage (Table 15-1), but Pacific whiting and sablefish contributed equally high values in 1997 (Figure 15-1). A deep-water trawl fishery for sablefish, thornyheads, and Dover sole now operates out to near 1,500 m depths. This trawl fishery and a longline and pot fishery for sablefish was worth $43,500,000 in 1997, with sablefish and thornyheads contributing about 63% of this total.

On the continental shelf and extending into the nearshore reef habitat is a trawl and hook-and-line fishery for tens of rockfish (*Sebastes*) species that was worth $16,800,000 in 1997. Widow rockfish contributed 27% and yellowtail rockfish contributed 10% of this total value. An associated species is lingcod with landings worth $1,700,000 in 1997 (PFMC, 1997). In addition, lingcod and some species of rockfish have substantial recreational harvests in some areas.

Catch of nearshore flatfish (Petrale sole, English sole, sanddab, sand sole, and starry flounder) was worth $6,100,000 in 1997, with 64% coming from Petrale sole. Fishing and processing participants in the groundfish fishery also commonly engage in fisheries for shrimp, halibut, Dungeness crab, salmon, and albacore tuna. In 1997, the groundfish fishery contributed 38% of the total $206,000,000 for these named fisheries (PFMC, 1997).

Management Situation

Recommendations for management of the Pacific Coast groundfish fisheries are developed by the Pacific Fishery Management Council. The Groundfish Fishery Management Plan calls for es-

[1]Landings and value data since 1981 are available from the PacFIN data base, Seattle office of the Pacific States Marine Fisheries Commission, 7600 Sand Point Way, NE, Seattle, WA, 98115.

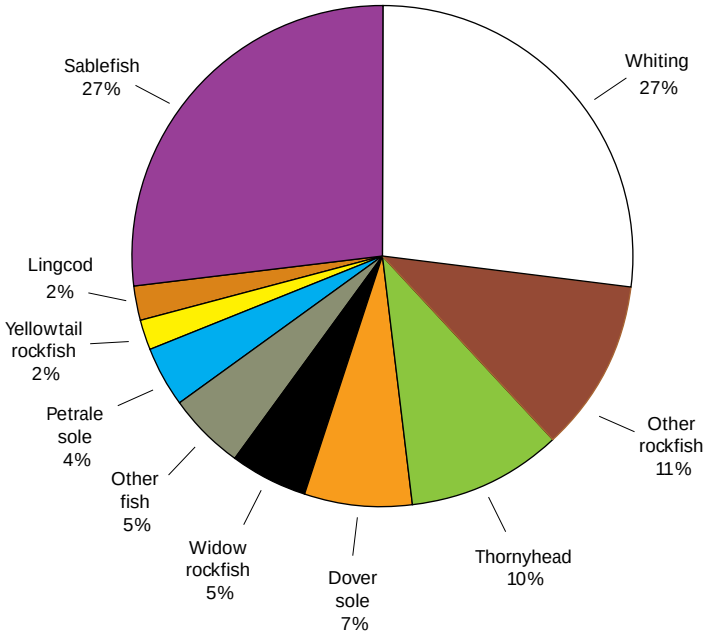

Figure 15–1
Relative components of Pacific Coast groundfish total value in 1997.

tablishment of an annual acceptable biological catch and harvest guideline for major groundfish species (PFMC, 1997). Although brief, derby-style fisheries of a few weeks or days duration have been used for a portion of the Pacific whiting and fixed gear sablefish harvests, most elements of the fishery have a goal of year-round operations.

Achievement of a year-round fishing opportunity in the face of excessive fishing effort has been achieved by imposition of limits on individual vessels. These limits have evolved from trip limits for widow rockfish beginning in 1983, to monthly cumulative limits for each vessel for each of several species today. Inseason adjustment of these limits has been mostly successful in keeping the annual catch close to the harvest guideline while allowing year-round fishing opportunities. However, some abrupt changes to the limits have been disruptive to the industry, and the restrictive nature of these limits causes discard of excessive catches.

In an attempt to reduce discarding, fishermen are presently allowed to bring in up to 10% over their monthly limit and have the excess deducted from the other month in designated 2-month periods (PFMC, 1998). The expected level of discard is taken into account when setting the annual harvest guideline below the acceptable biological catch. Development of observer programs to estimate the amount of discard, biological studies to understand the mortality rate of discarded fish, and study of co-occurrence patterns among species is needed.

In 1994, a limited entry program was implemented for the groundfish fishery (PFMC, 1997). The transferable limited entry permits have endorsements for vessel size and primary gear in order to maintain the existing fleet composition. A formula for combining of permits from smaller vessels into a single permit for a larger vessel has allowed several large (>200 ft) catcher-processors to buy permits and participate in the Pacific whiting fishery. Implementation of the limited entry system has been beneficial in creating a well-defined set of participants, but it has not decreased the number of participants sufficiently to allow for increases in the monthly vessel limits. Nonpermitted vessels may participate in a small-scale, open access fishery.

Other major restrictions on the groundfish fishery include a minimum mesh size on trawls to allow escapement of undersized fish, and area/season restrictions on the whiting fishery to decrease bycatch of salmon.

Species and Status

The Pacific coast groundfish fisheries are generally managed with a constant proportional rate of harvest such that the expected level of egg production (or spawning biomass) per recruit will be 35 or 40% (for rockfish) of the unfished level. The exception is Pacific whiting, which has a more conservative and varying harvest rate in recognition of the extreme natural fluctuations in recruitment.

Because many groundfish species have longevity in the 40–100 year range, the annual exploitation rates that achieve the spawning biomass per recruit goal are often as low as 5–10%. Thus, it has taken many years for these low exploitation rates to reduce the stock abundance from the lightly exploited levels of the 1960's to the fully exploited levels of today (Figure 15-2). Reductions in recommended annual harvest amounts over the past decade for sablefish, widow rockfish, and some other species has been a direct result of this "fishing down" of the surplus biomass. In no case has the fishing down been smoothly along a constant

Table 15–1
Productivity in metric tons and status of Pacific Coast groundfish.

Species and Area	Recent average yield (RAY)[1]	Current potential yield (CPY)[2]	Long-term potential yield (LTPY)	Fishery utilization level	Stock level relative to LTPY[3]
Pacific whiting[4,5]	291,067	290,000	336,000	Full	Below
Pacific whiting (U.S.)	207,971	232,000	268,000		
Sablefish	8,022	5,625	9,800	Full	Below
Lingcod[5,6]	2,890	1,532	3,100	Over	Below
Lingcod (U.S.)	1,966	960	1,943		
Pacific cod	515	3,200	Unknown	Under	Unknown
Flatfishes:					
Arrowtooth flounder	2,257	5,800	Unknown	Under	Unknown
Dover sole	10,930	9,426	16,300	Full	Near
English sole	1,263	3,100	3,100	Under	Above
Petrale sole	1,810	2,700	2,700	Full	Near
Other flatfish[7]	2,278	7,700	Unknown	Unknown	Unknown
Rockfishes:					
Bocaccio	863	654	~1,800	Full	Below
Canary rockfish	1,054	1,130	~1,250	Full	Below
Chilipepper rockfish	1,846	3,400	<4,000	Under	Near
Pacific ocean perch	800	2	1,100	Over	Below
Shortbelly rockfish	38	23,500	23,500	Under	Above
Thornyheads	6,514	4,103	6,600	Full	Near
Yellowtail rockfish[5]	5,232	4,886	<6,700	Full	Below
Yellowtail rockfish (U.S.)	4,073	3,539	4,853		
Widow rockfish	6,426	5,750	6,700	Full	Below
Other rockfish[6]	7,766	8,750	Unknown	Full	Unknown
Other groundfish	1,693	14,700	Unknown	Unknown	Unknown
Total (U.S.)	268,085	336,039	391,796		
Total (U.S.+Canada)	353,264	395,958	462,800		

[1]RAY is the average 1995–97 landed commercial catch as reported to the Pacific Fisheries Information Network (PacFIN) (Pacific States Marine Fisheries Commission, 45 SE 82nd Drive, Suite 100, Gladstone, OR 97027).
[2]CPY is taken from the Pacific Fisheries Management Council's Acceptable Biological Catch for 1998 (PFMC, 1997).
[3]Stock status compared to the stock size that would produce LTPY.
[4]Includes tribal catch.
[5]Stock as defined crosses Canadian border. Estimates of Canadian catch are from Martin Dorn (personal communication, NMFS, AFSC, RACE, 7600, Sand Point Way, Seattle, WA 98115) for Pacific whiting, Jack Tagart (personal communication, Wash. Dept. Fish & Wildl., Fish Management Program, Marine Resources Division, 600 Captial Way N., Olympia, WA 98501), for yellowtail, and the 1997 lingcod stock assessment (PFMC, 1997). Canadian catch in 1997 is assumed equal to 1996.
[6]Recreational catch estimates were added to the commercial catch estimates: 438 t lingcod, 200 t bocaccio, and 1,980 t other rockfish including 600 t black rockfish.
[7]Does not include halibut.

rate of exploitation. Rather, imprecise stock assessments, insufficient staff to revise assessments frequently, and natural fluctuations in abundance contribute to changes in recommended harvest levels.

The groundfish stocks are generally fully utilized, although a few species such as shortbelly rockfish remain essentially underutilized because of a lack of market. Pacific whiting is fully utilized, but its abundance has been on a decline because of a lack of strong recruitment since the 1984 year class.

The four species in the deep-water fishery are near full utilization. Within this set, sablefish abundance may be below the level needed to produce the long-term potential yield, due in part to a recent series of weak year classes. Dover sole abundance is slightly increasing as a result of an estimated above-average 1990 year class and reduced catch levels in 1994–96. The abundance of shortspine thornyheads appears to be below its target level, and the deeper living, smaller bodied longspine thornyhead has not yet been fished down to its target level. However, the assessments for all

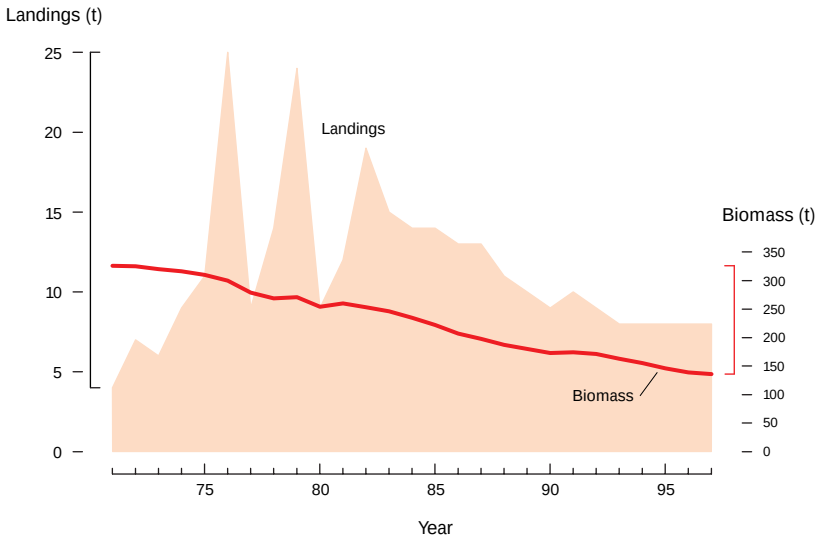

Figure 15–2
Total landings and estimated stock biomass (fish over 2 years of age) in metric tons (t) of sablefish off the U.S. Pacific Coast.

four of these species have considerable uncertainty, and the sablefish and shortspine thornyhead assessments have been subject to a high level of scrutiny and criticism from the fishing industry.

Within the set of rockfish, widow rockfish is estimated to be below the target level of abundance, based on estimates of low recent recruitments to the fishery. Off California, the chilipepper rockfish stock is declining with the passing of the extremely large 1984 year class, while bocaccio is at a low stock level with reduced recruitment levels since the 1977 year class (PFMC, 1997). Off Oregon and Washington, the canary rockfish is estimated to be below or close to the level needed to produce the long-term potential yield, based on an estimated downward trend in recruitments during 1987–95.

In that same area, yellowtail rockfish stock biomass also apparently continues to decline, but there is substantial uncertainty in the recent stock estimates. Pacific ocean perch appears to be only slowly rebounding from overharvest that occurred in the 1960's. The current level of catch, intended as bycatch in other groundfish fisheries, is close to the overfishing level. Black rockfish, an important recreational species off Oregon and Washington, appears fully utilized and probably is near its target level of abundance.

An assessment of eight additional rockfish species indicated that some species have catches much greater than their current potential yield, while others may be underutilized due to market restrictions. However, the precision of all these rockfish assessments appears low, given the amount of available information. For other species of rockfish, no estimates of abundance and exploitation rates are available.

A recent lingcod assessment in the northern area indicated that harvest over the past decade has equaled or exceeded the overfishing level since 1990. The stock has continued to decline due to the high exploitation rates and steadily declining recruitment since 1980. Among the other flatfish species, English sole appears to be at a high level of abundance due to large recent recruitments, and Petrale sole is near its target level of abundance and yield.

Recreational Fisheries

The non-salmon recreational fishery harvests a diverse collection of nearshore fishes, including many species of groundfish managed by the Pacific Fishery Management Council. Coastwide sampling of the recreational fishery resumed in 1993 after a 3-year break. Valuation of the recreational fishery for groundfish is important, but more difficult than estimating the magnitude of the catch. In some cases, proxy values from the recreational fishery for salmon have been used in estimating the economic impact of changing regulations for the recreational groundfish fishery.

Among the groundfish species, the recreational component is particularly important for lingcod and some species of rockfish. In 1995, the recreational catch of rockfish off California was estimated at 2,800,000 fish[2]. This may represent approximately 1,400 t, so it was an important component of the estimated 8,400 t of rockfish (excluding thornyheads and widow rockfish) harvested in California in 1995.

Off Washington and Oregon, the charter boat fishery has relied on black rockfish to offset declining opportunities to fish for salmon. In recent years, the recreational catch of black rockfish has been about 300 t in each of these states. Com-

[2]Marine Recreational Fisheries Statistics Survey data, NMFS Office of Science and Technology, Fisheries Statistics and Economics Division, Silver Spring, MD 20910.

mercial catch of black rockfish has been less than one-third of that amount. The Pacific Fishery Management Council has supported initiatives to provide long-term protection for this recreational fishing opportunity by recommending spatial segregation between recreational and commercial fisheries for black rockfish, and by imposing restrictive trip limits and bag limits on the commercial and recreational fisheries, respectively.

Landings

The landed catch of most species is well-monitored through a system of state fish landing receipts and collation of computerized copies of these receipts into the centralized Pacific Fisheries Information Network (PacFIN) database. Unfortunately, funding for biological sampling of the landings is inadequate, so the species composition of mixed rockfish landings is not well known, and size and age composition data are not adequate for many species.

The combined U.S.-Canada harvest of Pacific whiting reached a record level of 358,900 t in 1994 (of which 252,700 t were caught in U.S. waters). The increase in 1994 was due to a new stock assessment based on an expanded and improved survey. However, the stock's spawning biomass continued to decline due to reduced recruitment, resulting in lower available total yields in 1995–97 (Table 15-1).

The landed catch of non-whiting groundfish has generally declined since 1989, reaching approximately 54,000 t in 1997. Several major stocks such as Dover sole, sablefish, and widow rockfish contributed to this decline (Figure 15-3) as the stocks were fished down and year classes entering the fisheries were estimated to be at low levels (PFMC, 1997). Table 15-1 documents the recent average yield (1995–97) for those species that contributed substantially to the landings, or were identified with a specific landings target (acceptable biological catch and/or harvest guideline) by the PFMC.

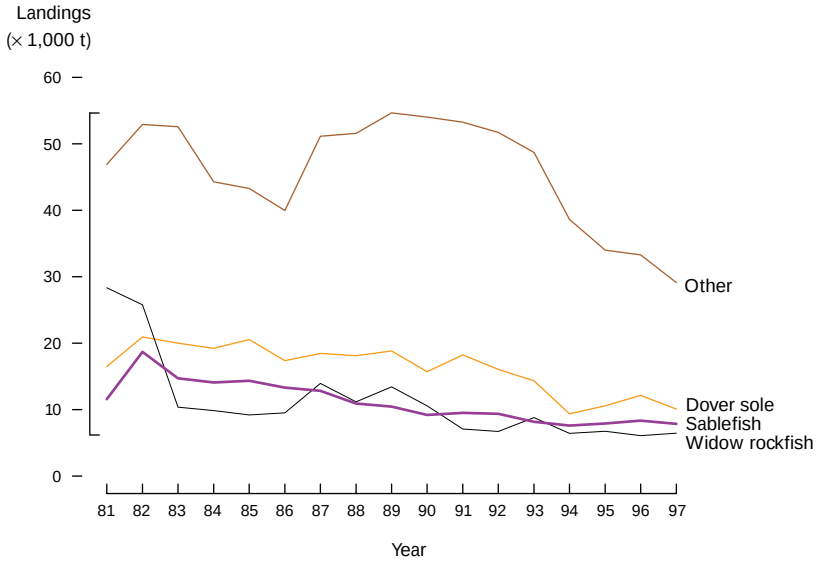

Figure 15–3
Pacific Coast commercial groundfish landings in metric tons (t), excluding Pacific whiting.

ISSUES AND PROGRESS

Balancing Between Competing Users

Management of the Pacific coast groundfish fisheries involves old and new allocation issues. The Pacific whiting available yield is allocated first between the United States and Canada and then between shoreside and at-sea deliveries within the United States. The two countries have not come to full agreement on any allocation scheme. Thus, the United States now sets its harvest guideline at 80% of the overall acceptable biological catch, and Canada sets its harvest guideline such that it will be 30% of the combined harvest guidelines. This resulting overharvest has contributed to the stock's decline in recent years.

The sablefish harvest guideline is allocated between a Native American fishery, an open access fishery, limited entry trawl, and limited entry fixed gear. The allocation between limited entry and open access is by a fixed percentage for each species as established in the fishery management plan, but the level of allocation to open access has the potential to become more contentious for lingcod and some rockfish. Direct allocation between recreational and commercial fisheries has not occurred; however, management actions on black rockfish have been designed to preserve recreational fishing opportunities for this species. Re-

cent lingcod management has reduced both the commercial and recreational catches to achieve the increasingly lower total harvest allowed.

Indirect allocation between high capacity and low capacity participants affects many management issues. For Pacific whiting, the direct allocation between a brief at-sea fishery and a protracted fishery for shoreside deliveries is partly a consequence of this issue. For fixed-gear sablefish, the debate in recent years has been between an ever-shortening derby-style fishery, movement to an individual transferable quota fishery (which could favor high capacity participants), or movement to a protracted trip-limit fishery (which could favor low capacity participants). For trawlers, the decline in trip limits over the past decade has had the greatest impact on the vessels that already invested in advanced harvesting capability, yet did not greatly deter other vessels from increasing their capability.

Bycatch considerations have not much entered into allocation arguments, partly because the lack of a comprehensive at-sea observer program has hindered collection of data on the magnitude of bycatch. For example, past arguments over trawl versus fixed gear allocation of sablefish hinged on intractable questions regarding whether sablefish was a target fishery for trawlers or an unavoidable bycatch as they targeted other species. More recently, an estimate of Pacific halibut bycatch in the groundfish trawl fishery has increased the potential for this to become a new allocation issue. Both of these issues need better estimates of the amount of discards and the survival rate of discarded fish.

Ecosystem Considerations

Accurate, long-term predictions of potential yield will require a substantial increase in our knowledge about competitive and predatory interactions in the biological system that includes Pacific Coast groundfish, and about climate effects on this community. The target exploitation rate for most groundfish species is designed to achieve a large fraction of maximum potential yield, while reducing the abundance of spawners by about two-thirds, in expectation that this will not reduce the mean recruitment level. However, we have been monitoring some of these stocks for not much more than the span of just one of their generations. Only decades of monitoring the stock's performance will ascertain the long-term feasibility of these targets, and the degree of natural fluctuation that will occur while maintaining these targets. Unfortunately, there is little historical data, and the current level of stock assessment data is not adequate to precisely track changes in abundance for more than a few species. In addition, only a low level of effort is directed towards food habits studies that may help predict how the interactions among species may change as the abundance of several major species is reduced below unfished levels.

Models of long-term potential yield depend on assumptions of constant average environmental conditions or an ability to predict changing conditions. There is evidence of a decline in zooplankton abundance within the California Cooperative Oceanic Fisheries Investigations' 40-year time series (McGowan et al., 1998), as well as of an ocean warming during the late 1970's (Francis and Hare, 1997). Dover sole in southern areas and bocaccio rockfish and lingcod exhibit declines in mean recruitment during this same period. Better understanding of potential linkages between fish recruitment and long-term changes in the ocean climate are key to improved 5- to 10-year forecasts of fishery potential yield.

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