

REVIEW OF SOME CALIFORNIA FISHERIES FOR 1984

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Total 1984 landings of fishes, crustaceans, and mollusks declined 13% from 1983 to a level that is 32% below the average for the last seven years.

Landings of pelagic wet fishes dropped for the third straight year; all species except Pacific mackerel exhibited declines (Table 1). Jack mackerel and Pacific herring landings declined by approximately 50%, and market squid were virtually unavailable along the entire California coast for most of the year.

Groundfish, pelagic thresher shark, and Dungeness crab landings remained at about the same level as in 1983. The ocean shrimp fishery off the north coast recovered moderately from the disaster of 1983, but declined dramatically off central California.

The brightest notes of 1984 were the record high landings of swordfish by primarily drift gill net vessels and the excellent early summer run of albacore for southern California recreational fishermen.

PACIFIC SARDINE

The moratorium on commercial fishing of Pacific sardines (*Sardinops sagax caeruleus*) remained in effect in 1984 because the spawning biomass was assessed as remaining below the 20,000 tons necessary to initiate a fishery. Good signs of a recovery of

the resource continued to be evident. However, the trend of increasing occurrences of sardines appears to have slowed relative to last year.

Approximately 212 tons of sardines were landed incidentally with mackerel fishing in 1984, a considerable decrease from the high of 388 tons landed the previous year (Table 1). However, fishermen continued to report pure schools of sardines and sets on schools of mackerel with more than the allowable 15% by weight of incidental sardines. Sardines occurred in the southern California mackerel landings in all months of the year except July and December. At Monterey, sardines were landed incidentally to mackerel primarily during the last four months of the year. Sardines occurred in 30% of observed mackerel landings during 1984, about the same as observed for 1983. Preliminary analysis of length frequency and aging indicates that the 1983 year class (1-year-olds) was dominant; however, older fish were commonly sampled.

For the third consecutive year sardines appeared in record high frequency in midwater trawls during the annual California Department of Fish and Game (CDFG) recruitment survey off northern Baja California and southern California. Sardines were caught in

TABLE 1
 Landings of Pelagic Wet Fishes in California in Short Tons from 1964-84

Year	Pacific sardine	Northern anchovy	Pacific mackerel	Jack mackerel	Pacific herring	Market squid	Total
1964	6,569	2,488	13,414	44,846	175	8,217	75,709
1965	962	2,866	3,525	33,333	258	9,310	50,254
1966	439	31,140	2,315	20,431	121	9,512	63,958
1967	74	34,805	583	19,090	136	9,801	64,489
1968	62	15,538	1,567	27,834	179	12,466	57,646
1969	53	67,639	1,179	26,961	85	10,390	105,307
1970	221	96,243	311	23,873	158	12,295	133,101
1971	149	44,853	78	29,941	120	15,756	90,947
1972	186	69,101	54	25,559	63	10,303	104,993
1973	76	132,636	28	10,308	1,410	6,031	150,489
1974	7	82,691	67	12,729	2,630	14,452	112,576
1975	3	158,510	144	18,390	1,217	11,811	190,075
1976	27	124,919	328	22,274	2,410	10,153	160,115
1977	6	111,477	5,975	50,163	5,827	14,122	187,570
1978	5	12,607	12,540	34,456	4,930	19,899	84,437
1979	18	53,874	30,471	18,300	4,681	22,025	129,369
1980	38	47,339	32,645	22,428	8,886	16,957	128,293
1981	31	57,593	42,913	15,673	6,558	25,715	148,483
1982	145	46,364	31,275	29,110	11,322	17,951	136,167
1983	388	4,740	35,882	20,272	8,829	2,001	72,112
1984*	212	3,203	46,482	11,930	4,241	622	66,690

*Preliminary

54% of the tows off southern California and 44% of the tows off Baja California. Although sardines previously (1966-82) were absent or rare in trawl surveys, they have become the second most frequently taken species during the last three years. Young-of-the-year fish in substantial numbers were taken for the second year in a row. Sizes this year ranged from 40 to 230 mm SL, with most fish in the 125-to-200-mm range.

The percent occurrence of sardines in live bait hauls during 1984 remained at about the same level as last year. Recently, logs were revised to allow fishermen to specify a quantitative estimate of sardines landed; however, these logs are submitted on a voluntary (and frequently incomplete) basis. Department observers on sportfishing boats were also estimating the occurrence of sardines in live bait. A preliminary estimate from these sources suggests possible 1984 live bait landings of sardines ranging from 70 to 250 tons. The live bait catch of sardines is considered to be greater in 1984 than 1983, but consists of more large and fewer small (young-of-the-year) fish than were seen in 1983.

Legislation was passed on September 4 that extends, until July 1, 1986 (an additional year), the sunset clauses on statutes regulating incidental catch tolerances for sardines mixed with other fish, and the allowable uses of sardines. This bill also requires CDFG to submit a report to the California legislature by January 1, 1986, on the effect of the regulations concerning the use of incidentally taken sardines. In addition, the bill allows 75 tons per year of sardines to be taken for live bait and requires a revocable permit and submission of logbooks. These provisions add to and continue statutes designed to alleviate and minimize the impacts of a resurgence of sardines on fishermen and dealers.

NORTHERN ANCHOVY

At the beginning of 1984 only 32 tons of northern anchovy, *Engraulis mordax*, had been landed for reduction purposes toward the 1983-84 season quota of 52,000 tons for the southern permit area (south of Point Buchon). The first 1983-84 season northern area landing (76 tons) occurred January 31, and was applied toward the 5,800-ton northern allocation. At that time, most of the northern area seiners were still fishing herring.

After the interseason closure (February-March), interest in anchovies for reduction remained low, with boats targeting primarily on mackerel. In the southern area, only a single landing was reported prior to the June 30 closure. In the northern area, only two seiners participated in the fishery. These boats made consistently good catches during April, May, and early June,

and accounted for approximately 1,700 tons landed for reduction. During this period, the price dropped from \$42 to \$38 per ton. The 1983-84 season closed with preliminary landings of 1,765 tons in the north and 70 tons in the south (Table 2).

The National Marine Fisheries Service (NMFS) estimated a 1984 spawning biomass of 340,608 tons (309,000 MT). The optimum yield for the 1984-85 season was set at 12,346 tons, and the U.S. reduction fishery harvest limit was set at 6,944 tons. Allocations of 694 and 6,250 tons were established for north and south of Point Buchon, respectively. The 1984-85 season opened August 1 in the north and September 15 in the south. Only one landing, 78 tons in the south, occurred before the end of the year, even though a processor in each permit area had issued orders early in the fall. Fishermen in both areas concentrated efforts on mackerel and complained that only small anchovies were available during the fall.

The statewide reduction landings for 1984 were 1,896 tons. Nonreduction landings accounted for an additional 1,307 tons, whereas live bait catches were estimated at 5,726 tons.

JACK MACKEREL

For the sixth consecutive year, jack mackerel (*Trachurus symmetricus*) contributed less than Pacific mackerel (*Scomber japonicus*) to California's mackerel fishery. The 1984 landings of 11,930 tons constituted 20% of total mackerel landings. This ranks as the lowest proportion of jack mackerel in overall landings since this species began supporting a viable fishery in the late 1940s. Jack mackerel dominated landings

TABLE 2
Anchovy Landings for Reduction Seasons in the Southern and Northern Areas from 1966-84, in Short Tons

Season	Southern Area	Northern Area	Total
1966-67	29,589	8,021	37,610
1967-68	852	5,651	6,503
1968-69	25,314	2,736	28,050
1969-70	81,453	2,020	83,473
1970-71	80,095	657	80,752
1971-72	52,052	1,314	53,426
1972-73	73,167	2,352	75,519
1973-74	109,207	11,380	120,587
1974-75	109,918	6,669	116,587
1975-76	135,619	5,291	140,910
1976-77	101,434	5,007	106,441
1977-78	68,476	7,212	75,688
1978-79	52,696	1,174	53,870
1979-80	33,383	2,365	35,748
1980-81	62,161	4,736	66,897
1981-82	45,149	4,953	50,102
1982-83	4,925	1,270	6,195
1983-84*	70	1,765	1,835

*Preliminary

only one month of the year, in March, when interseason restrictions on landing Pacific mackerel were in effect. During most of the year, jack mackerel were largely unavailable off southern California, and made up only 15% of the mackerel catch. Jack mackerel were more available off central California, where they averaged 39% of the mackerel landings.

No explanation is readily apparent for the recent lack of availability of jack mackerel. Jack mackerel may be less abundant under conditions of high Pacific mackerel biomass, as has occurred in recent years. Although it is difficult to assess any impact of the recent El Niño on this species, behavioral patterns that may make jack mackerel unavailable may have been accentuated by this phenomenon, particularly with respect to southern California. In addition, during 1984 fishermen did not fish offshore areas that have traditionally produced large catches of jack mackerel.

A high incidence of young jack mackerel in midwater trawl catches during the 1984 CDFG anchovy recruitment survey suggests a relatively strong 1984 year class.

PACIFIC MACKEREL

The year began with approximately 1,000 tons remaining on the 1983-84 season quota of 22,000 tons. The trend of more northerly catches, which began during the summer of 1983 and persisted through December, continued during the first part of January, with mackerel being caught near Monterey and delivered to southern California by truck and boat. In late January the initial quota was increased to 26,000 tons, primarily on the basis of financial hardships facing the fishermen. Catches improved, with 100% Pacific mackerel available off the Santa Barbara Channel Islands. The season was closed on February 8, when the additional tonnage was landed. Interseason restrictions went into effect, limiting landings to 50% or less by number, or 3 tons of 100% Pacific mackerel. Fishermen were mostly unable to locate schools containing sufficient proportions of jack mackerel to comply with regulations, and this, together with limited cannery interest and poor weather, resulted in low landings during the rest of February and March. At this time fishermen were faced with no prospects of directed take of Pacific mackerel until July 1, poor availability of jack mackerel, squid, and anchovy, and poor market conditions for anchovy.

Urgency legislation (AB 384), which was signed and effective immediately on April 4, provided an additional 1983-84 season take of 7,500 tons, with 2,500 tons allocated for each month (April, May, and June) remaining in the season. In addition, this legislation authorized the California Fish and Game

Commission (CFG) to adjust the determined allowable catch for future seasons between February 1 and June 30. As a result of this legislation, the season was open from April 4-19, and during the first week of both May and June, with interseason restrictions in effect the remainder of the time. Pacific mackerel were more commonly available off southern California during the spring, with catch areas ranging from off Gaviota in April to off San Onofre in June. The season's catch reached 39,000 tons by the end of June—50% more than the adjusted allowable catch of 26,000 tons recommended by the CDFG. This represents an increased seasonal catch at a time when biomass levels appeared to be declining, and Pacific mackerel were entering their spawning season.

The 1984-85 season opened on July 1 with a quota of 16,000 tons based on a biomass estimated to range between 89,000 and 106,000 tons. Fishing got off to a slow start, because most southern California seiners fished for albacore during July. However, landings in August and September were brisk, with Pacific mackerel constituting 95% of the catch; some San Pedro boats fished as far north as Morro Bay. A permit amendment was enacted to limit landings per boat to 125 tons per week, or 375 tons per month, in an effort to distribute the quota more equitably among the fleet and discourage the waste of fish. The season quota was adjusted upwards by 5,000 tons in early October and by another 5,000 tons at the beginning of November, partly as a result of reevaluation of the biomass estimate then considered to range between 107,000 and 139,000 tons. On December 20, the Pacific mackerel fishery was closed when the 26,000-ton quota was reached, and interseason restrictions went into effect. The seasonal catch through December was 28,300 tons.

Landings of Pacific mackerel for the year totaled 46,482 tons. Slightly over 82% of the Pacific mackerel landings occurred in southern California, with Monterey accounting for 18%, or 8,312 tons. This is by far the largest recorded annual take of Pacific mackerel in Monterey since the beginning of the fishery in the 1920s. Landings of Pacific mackerel averaged 85% and 62% of the total mackerel catch in southern and central California, respectively. Jack mackerel continued to be largely unavailable, particularly in southern California.

Although eight year classes (1977-84) contributed to the Pacific mackerel fishery, the 1980 and 1981 year classes accounted for 72% of the tonnage landed in 1984, and fish 3 years of age and older accounted for 96% of the tonnage landed.

The assessment of the 1983 year class suggests that recruitment of these fish will be poor. The 1982

spawning season also produced a weak year class, resulting in two consecutive years of poor recruitment. The very weak presence of the 1982 and 1983 year classes in samples, less than 4% by weight, indicates a crucial need for a strong incoming year class. Preliminary indications suggest the 1984 cohort may be a moderate or even strong year class. Some observations of young-of-the-year fish have been reported, and during November, the 1984 year class contributed a surprisingly high 1% of the total month's tonnage.

MARKET SQUID

Both the central and southern California market squid (*Loligo opalescens*) fisheries fell far short of historical landings during 1984. Only 622 tons were landed statewide, the lowest catch since 1942.

The Monterey fishery produced only 538 tons, despite intense interest and scouting in other than traditional fishing areas. Although this is typically a summer-fall fishery, over half the tonnage, 57%, was landed in May. Prices offered reached record high levels, ranging from \$250 to \$900 per ton, but fishermen most frequently received \$500 per ton.

Only 84 tons were landed in southern California; 87% of this was landed at San Pedro markets. This fishery, which normally has a fall-winter season, also landed over half the tonnage, 60%, in May. Prices paid ranged from \$460 to \$600 per ton.

Fishermen, processors, and some scientists are worried that the method and level of fishing may be affecting the abundance of squid. In Monterey, most lampara boat owners have proposed a prohibition of chains on nets (to reduce the number of egg cases torn from the bottom) and a limit on the number of boats that can fish on the spawning ground adjacent to the Monterey Peninsula. No known proposals have been made for southern California, which is a scoop boat and purse seine fishery.

Some central California fishermen have suggested that the poor availability of the last two years may reflect a coastwide decline in abundance; others feel that squid may be spawning on grounds inaccessible to the fleet. If squid were able to spawn successfully in deeper waters off Monterey or more northerly waters during the past two years of warm water, then they are expected to return to the Monterey Peninsula in abundance during the summer of 1985. However, if they were unable to spawn successfully, they should be in short supply, with recovery delayed or prevented by likely high exploitation rates.

PACIFIC HERRING

The cumulative effect of two consecutive warm-water years from 1982 to early 1984 had a devastating

impact on the 1984 Pacific herring (*Clupea harengus*) fishery. The 1984 annual catch declined to 4,241 tons (Table 1), and the 1983-84 seasonal catch (December-March) was only 3,000 tons, representing a quota shortfall of over 8,000 tons—the poorest season since the fishery began in 1973.

In addition to the reduced catches in the 1983-84 season, herring in the catch exhibited below-normal growth characteristics and consequently were of poor quality. Data gathered from the catch indicated all age groups were 25% below normal weight. The base price for 10% roe recovery was \$600 per ton during the season, but the poor condition of the fish caused the price to fall to \$150 per ton in some cases.

Population estimates derived from surveying spawning grounds in Tomales and San Francisco bays also declined in 1984. In the 1982-83 season, the Tomales Bay population was estimated to be over 11,000 tons, the second highest estimate recorded. In the 1983-84 season, the Tomales Bay population declined to only 1,280 tons. It is believed that this sudden decline was a result of a northerly migration of the population rather than a sharp increase in mortality. The San Francisco population declined 30% from the previous season to approximately 40,000 tons. Most of this decline is attributed to the poor growth exhibited by herring during 1983.

The ocean temperatures off central California returned to normal during 1984, and both Tomales Bay and San Francisco Bay fisheries are expected to improve in the 1984-85 season.

As the 1984-85 season began, December catches were good in San Francisco Bay, but a lower quota, based on the population estimates from the 1983-1984 season, is in effect and will limit the overall season's catch for Tomales and San Francisco bays to about 7,500 tons. At the beginning of the season the base price for 10% roe recovery increased to \$1,000 per ton, and good initial catches give hope for a quick economic recovery for the fishery during the 1984-85 season.

GROUND FISH

California's 1984 commercial groundfish harvest was 40,030 metric tons (MT), with an ex-vessel value of \$22,506,000. The 1984 harvest level represents an increase of 583 MT over 1983 statewide landings (Table 3). California's groundfish catch, which accounted for 20% of West Coast groundfish catches, is typically dominated by the rockfish complex (*Sebastes* spp), Dover sole (*Microstomus pacificus*), and sablefish (*Anoplopoma fimbria*). The majority of the catch (29,087 MT) was landed by trawl vessels. Set net, pot, and hook-and-line vessels accounted for the re-

TABLE 3
California Groundfish Landings (Metric Tons)

Species	1983	1984*	Percent change
Dover sole	8,402	9,744	16%
English sole	1,162	946	-19%
Petrale sole	563	582	3%
Rex sole	626	566	-10%
Thornyheads	1,675	2,105	26%
Widow rockfish	3,455	2,663	-23%
Other rockfish	14,200	14,491	2%
Lingcod	885	935	6%
Sablefish	6,509	4,707	-28%
Pacific whiting	980	2,335	138
Other groundfish	1,041	983	-5%
TOTAL	39,498	40,030	

*Preliminary

mainder. An additional 5,125 MT was estimated to have been captured by the recreational fishery.

First-quarter catches, averaging 1.8 MT per delivery, rebounded strongly from the previous year because of calm ocean conditions and favorable domestic markets. Catch rates declined to 1.4 MT per delivery during the second and third quarters, before rising again to 2.0 MT per delivery in the final quarter of 1984. The high fourth-quarter catch rates occurred despite frequent periods of hazardous ocean conditions, which restricted fishing effort.

Only two species, widow rockfish (*S. entomelas*) and sablefish, were regulated by Pacific Fishery Management Council (PFMC) catch quotas. A coastwide optimum yield of 9,300 MT was established for widow rockfish and enforced by a trip limit and frequency restriction of one landing per week between 3,000 and 50,000 pounds. Trip-frequency limits were not imposed on landings of less than 3,000 pounds. The industry soon adjusted to the new regulations by bringing more vessels into the fishery and extending the length of trips. The rapid pace of landings necessitated a reduction in the coastwide trip limit to 40,000 pounds per trip on May 6, 1984. By September 9, the PFMC was forced to order a cessation of directed fishing, for 9,200 MT of widow rockfish had been captured. An incidental landing limit of 1,000 pounds per trip was imposed on the industry until closure of the widow rockfish fishery at the end of September.

A coastwide acceptable biological catch (ABC) of 13,400 MT of sablefish was established for 1984 to

achieve the OY of 17,400 MT. Harvest restrictions included continuance of the 22-inch size limit and a retention allowance of 5,000 pounds of undersized sablefish per trip. The ABC harvest guideline was not exceeded during the year, and no further restrictions were necessary. California's sablefish catch declined to 4,707 MT from the 1983 level of 6,509 MT. Several factors contributed to this decrease: notably, weak foreign demand, an absence of strong year classes of subadult fish, and the departure of two large trap-processor vessels from California waters.

Dover sole was landed in the greatest quantity of all groundfish species statewide: 9,744 MT. This species is typically harvested most intensively by trawl vessels near northern California ports. Yet in 1984 Morro Bay emerged as an important source of Dover sole: landings for this port increased from 350 MT in 1983 to 1,248 MT in 1984. The dominance in northern California landings of less desirable, deepwater dover sole, which have very soft, watery flesh, and better ocean conditions off Morro Bay are two probable reasons for this expansion. The set net fishery for rockfishes and lingcod continued to expand in central and southern California waters during the year. Conflicts with other user groups increased, as the fleet spread into fishing grounds traditionally exploited by trawl, troll, and sport vessels. Assessment of this important fishery has proved difficult.

In general, domestic demand for groundfish remained robust during the year, but fresh rockfish from British Columbia entered markets historically occupied by California rockfish, depressing wholesale prices. Weak ex-vessel prices and the stabilization of catches despite increased effort have created economic problems for a majority of the trawl fleet. By late 1984, many trawl fishermen were requesting a limitation on fishing effort through limited-entry or other alternative management measures.

DUNGENESS CRAB

California Dungeness crab (*Cancer magister*) landings for the 1983-84 commercial season totaled 5.56 million pounds, slightly higher than 1982-83 seasonal landings of 5.33 million pounds.

December 1, opening day on the north coast, greeted fishermen with reasonable weather, a record opening price of \$1.25 a pound, and low catches. By the end of January, 95% of the season's production was across the docks, and the price had risen to \$1.85. Approval was given to extend the northern California season from July 15 to August 31. However, effort was minimal, and only 28,000 pounds were landed during this period. Fishermen noted that few sublegal crabs were in the traps, a sign that fishing might be

poor for the 1984-85 season. Effort was slightly less than the previous season, when 432 vessels engaged in the fishery. Total landings for Crescent City, Trinidad, Eureka, and Fort Bragg were 3.21, 0.50, 0.79, and 0.20 million pounds, respectively.

San Francisco area Dungeness crab landings for the 1983-84 season were 0.86 million pounds, making it the best season of the past fourteen. The previous season's landings were 0.58 million pounds. Average landings for the past fourteen seasons are 0.50 million pounds. Bodega Bay, San Francisco, and Half Moon Bay landings were 0.25, 0.30, and 0.31 million pounds, respectively. Landings in this area were a little more evenly distributed throughout the 1983-84 season than during the previous season. In 1983-84, 57% of the season's total was landed in the first two months, compared with 76% for the same period in 1982-83.

The 1983-84 season opened November 8 in central California, with an ex-vessel price of \$1.65 a pound. By mid-December, the price had reached \$1.75, climbing to \$2.00 by late January. By May, the price had reached \$2.37, and fishermen expressed interest in extending the season from June 30 through the month of July. By the end of June, the price was \$2.50 a pound, and there were about 20 boats fishing in the San Francisco area; because crab condition was reported to be good, the extension of the season through July was granted. Although many of the Half Moon Bay boats quit before the end of June, San Francisco landings increased, and 26,000 pounds were recorded during the season extension.

PACIFIC OCEAN SHRIMP

California's ocean shrimp (*Pandalus jordani*) fisheries reversed themselves during 1984 as ocean waters cooled to more normal temperatures. While the fishery off the north coast rebounded from record low landings in 1983, landings at the central California port of Morro Bay plummeted to a near-record low.

Shrimp landings from Area A (California-Oregon border to False Cape) totaled 1,107,266 pounds, a great improvement over the 568 pounds landed in 1983 but still well below the 1973-82 average of 4.6 million pounds. Although the season is from April 1 to October 31, no shrimp were landed until the last week in August. A total of 224,550 pounds caught in Oregon waters was landed in Crescent City during the season.

The price received by the fishermen was \$0.45 a pound throughout the season. The number of vessels delivering shrimp to Area A ports was 35 (18 single rigged and 17 double rigged), the lowest number since 1977 (excluding 1983). Single-rigged boats had an

average catch rate of 211.5 pounds per hour; double-rigged vessels averaged 381.6 pounds per hour for the season.

Shrimp landings in Morro Bay and Avila totaled 150,220 pounds, plus 4,113 pounds taken incidentally to spot prawn and ridgeback prawn fishing. This was the worst year since the fishery began off Morro Bay in 1979, with landings declining to only 15% of the nearly one million pounds landed in 1983. An ex-vessel price of only \$0.40 a pound and declining catch per unit effort (CPUE) contributed to the low catch, because fishermen could not make enough money to continue targeting on shrimp. Readily available, low-priced, Norwegian frozen shrimp was a major factor in keeping the price down.

Only 10 vessels (3 single rigged and 7 double rigged) participated in the fishery. Individual vessels made from one to seven trips. Total hours fished fell to 597, down from 3,990 in 1983. Most of the catch came from the Point San Luis to Point Sal area, in water 80 to 120 fathoms deep, but tows were also made from 54 to 140 fathoms. CPUE started at over 200 pounds per hour for both types of vessels in April, but fell to less than 85 pounds per hour by June. No fishing at all occurred in July and August, because discouraged fishermen turned to other species. In September, two double-rigged boats found a bed of shrimp off Point Sal, and brought in two loads each. The fishery ended in early October with two landings totaling 17,000 pounds. Overall CPUE for double-rigged boats (242 pounds per hour) was higher than for single-rigged boats (141 pounds per hour). Total CPUE for all vessels was 201 pounds per hour. Most of the catch was transported to northern California for processing.

Average counts-per-pound ranged from 59 in April to 48 in October, and averaged 53 for the season. This was considerably lower than the 79 per pound in 1983, indicating the presence of older and larger shrimp in 1984. Two-year-olds constituted 66.2% of all shrimp sampled. Whereas transitionals were most abundant during 1983, females dominated the sex composition in 1984. If recruitment is poor, 1985 landings should be predominately 3-year-old females.

PELAGIC SHARK AND SWORDFISH

During 1984, 258 permits were issued to harpoon fishermen to take swordfish (*Xiphias gladius*), and 225 drift gill net permits were issued for taking pelagic sharks and swordfish. In addition, a special category of drift gill net swordfish permits, authorizing fishing north of Point Arguello only, was established by the California legislature. Of a possible 35 such permits, 30 were issued.

Harpoon fishermen met with moderate success in 1984, reporting 1,068 swordfish on logbooks. In October, an eight-year ban on the use of spotter aircraft as an aid to harpooning was repealed by the CFGC. That decision came too late to improve the 1984 season, but could add significantly to the harpoon success rate in subsequent years.

For the second consecutive season, drift gillnetters set a new record for reported catches of swordfish. Logbook submittals indicated 25,367 fish caught for the 1984-85 season (May through January). The previous record, set during the 1983-84 season, amounted to a reported 21,000 fish. The California-based drift gill net swordfish fleet continued to expand its area of operation during 1984. Waters adjacent to the escarpment, which borders the Southern California Bight, proved to be very productive fishing grounds. Other productive areas included the offshore Rodriguez and San Juan seamounts.

Preliminary 1984 annual landings of swordfish also established a new high. The estimated 4.4 million pounds with an ex-vessel value of \$11.6 million easily eclipsed the previous highs of 2.6 million pounds in 1978 and 1983.

Common thresher shark (*Alopias vulpinus*) landings declined for the second consecutive year, with just over 1.5 million pounds having been taken. The final landings figures for 1983 indicated a total catch of 1.7 million pounds. Analysis of trends in the length composition, and continued declines in CPUE indicate that common thresher stocks may not be able to sustain current levels of harvest. Discussions are currently underway with representatives of the gill net industry concerning the need for reducing fishing effort. The main topic of discussion centers around the springtime fishery. This is the period when common thresher sharks are most available and swordfish are least available.

CALIFORNIA SPINY LOBSTER

Daily log returns from the 1983-84 commercial California spiny lobster (*Panulirus interruptus*) fishery documented the largest effort in the 11-year history of logbook submittal. The 221-boat fleet made almost 540,000 trap hauls, an increase of 9% over the previous season.

Log returns estimated that traps retained 486,000 sublegals ("shorts")—a 0.9 catch-per-trap (CPT) rate, which is the highest since sublegal escape ports were added to traps beginning in the 1976-77 season. This continuation of an 8-year trend of increased CPT on sublegals, even in the face of mounting effort, may reflect improved juvenile survivorship enhanced by the escape port addition.

A total of almost 324,000 legal-sized lobster were reported on logs during the season (first Wednesday in October to first Wednesday after March 15), with an estimated weight of 511,500 pounds and an estimated ex-vessel value of \$1.9 million. This represents a catch almost double that reported for the 1973-74 season, when logs were first implemented. Still, total landing estimates for 1983-84 were only half that of the postwar bonanza of the early 1950s, which was the peak of historical annual landings dating back to 1916.

Comparing the 1983-84 legal CPT rates with the 11-year logbook record, the season could be considered average at 0.6 legals (0.956 pounds) per trap hauled.

As usual, fishermen expended most of their effort in the early season, with 37% of the season's trap-hauls made in October, 24% in November, and 15% in December. Effort continued to decline linearly thereafter, with only 4% of trap-hauls occurring in the closing month of March.

Catch success, averaging 1.7 pounds per hundred trap hours for the season, repeated a typical seasonal trend. Whereas nearly 3 pounds per hundred trap hours were recorded during the opening month, catch rates declined rapidly to 1.0 pounds in December, and then recovered well during the last half of the season, increasing to 1.8 pounds per hundred trap hours by March.

The southern California fishery was most concentrated along the mainland. Approximately 54% of the catch was taken by 68% of the effort (trap-hauls) in coastal waters south of Santa Monica Bay. Increased catch success occurred farther from port; fishermen at Channel Islands and Cortez Bank reported taking 34% of the catch with only 23% of the effort. Low trapping densities occurred in coastal waters from Malibu Point to Point Arguello, where fishermen trapped 12% of the catch with 8% of the effort.

Record effort levels in recent years have brought about increased friction, especially among the participants in the high trapping densities of crowded, productive, local fishing grounds. Veteran year-round lobster fishermen voiced increasing resentment over part-time "opportunists" who fish briefly at the season opening, when high catchability and availability of first-season recruits (brought on by summer molting) maximizes catch rates. Marginal operations, beset by the downward fluctuations of the fishery (initial log summaries indicate fall 1984 catches are 20% below average) have increased vocalization of this resentment. Limited entry and limitations on the number of traps per fisherman are management schemes often suggested by fishermen. Since preliminary evaluation of log returns gives no evidence of a persistent

downward trend in CPUE, such management measures may not be biologically justifiable at this time.

Contributors:

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Terri Dickerson, Pacific mackerel, market squid

Allen Grover, northern anchovy

James Hardwick, northern anchovy, market squid

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Sandra Owen, Pacific ocean shrimp

Jerome Spratt, Pacific herring

Ronald Warner, Dungeness crab

Patricia Wolf, Pacific sardine, jack mackerel

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