HISTORY OF THE COMMERCIAL CALIFORNIA HALIBUT FISHERY

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ABSTRACT

The commercial fishery for California halibut, Paralichthys californicus, is concentrated in varying degrees from the Bodega Bay area to San Diego and on into Mexican waters. The California fishery has shifted northward from the Baja California-Los Angeles area and is now centered off the Santa Barbara region. Otter trawls and set gill and trammel nets are the commercial fishing gears most commonly used to harvest halibut. The dominant gears in southern California are now set gill and trammel nets. The gear types and regulations governing commercial harvest are reviewed. Trends in commercial landing figures are discussed and suggest that the natural population peaks every 20 years.

INTRODUCTION

The California halibut, Paralichthys californicus, has been a sport and commercial species for more than a century. Its geographic range is from the Quillayute River, Washington to Magdalena Bay, Baja California (Miller and Lea 1972). The commercial fishery is concentrated in varying degrees from the Bodega Bay area to San Diego and on into Mexican waters. Commercial fishing gears most commonly used to harvest halibut are otter trawls and set gill and trammel nets. This paper provides an overview of trends in the commercial landings since the early 1920s, and changes in gear and geographic extent of this fishery.

HALIBUT FISHING GEAR

Trawl Nets

The original type of trawl or drag net used in California, the paranzella, was towed by two vessels. It was introduced in San Francisco in 1876, and was the standard in California for the next 50 years (Clark 1935). In the late 1930s and early 1940s, California fishermen started using the otter trawl. In this method "otter boards" or "doors" are attached at the mouth of the net to keep it open, eliminating the necessity of a second boat (Scofield 1948).

Entangling Nets

Entangling nets, which are set or anchored at both ends, have been used continuously since the 1880s to catch halibut and shark (Ueber 1988). Originally entangling nets were made of cotton or hemp. A traditional halibut

entangling net is the trammel net, which consists of three walls of multifilament webbing attached to common cork and lead lines (Clark 1931; Herrick and Hanan 1988; Ueber 1988).

The set gill net is the other type of entangling net used today in the halibut fishery. The single panel of monofilament webbing is designed to catch fish when they attempt to swim through it. Halibut are generally wedged in the net—held by a mesh at the widest part of their bodies (Philip Beguhl, gill net fisherman, pers. comm.).

When a line or "suspender" is used on a gill net and causes the webbing of the net to bag or hang slack, the net is designated a trammel net under California law (Herrick and Hanan 1988; Ueber 1988). Today multipanel trammel nets are being replaced by monofilament, single-panel suspendered nets.

Historically, most California halibut landed were taken by trammel nets or trawl. Set gill nets in southern California have replaced the trawl as a dominant gear in the fishery.

Hook and Line

A small amount of the total commercial landings have traditionally been taken by hook and line. In 1988, 8% (89,700 lb) of the landings were made by hook and line.

CHANGES IN THE FISHERY

Set entangling nets are the dominant gear in southern California (Point Conception to the Mexican border) for the halibut fishery (Herrick and Hanan 1988). Trammel nets have been the gear used exclusively by the San Diego and San Pedro halibut fleet (Clark 1931) since legislation in the early 1900s prohibited the use of trawl nets off Los Angeles and San Diego Counties.

In the Santa Barbara area prior to 1969, the trawl fishery produced the greatest catch. By the 1970s the majority of the halibut caught in the area was by set gill and trammel nets (Karpov 1981; Methot 1983). Since then, entangling nets have continued to be the dominant gear in the Santa Barbara area. Several factors may have accounted for this shift. First, new regulations were placed on the commercial trawl fishery early in the 1970s (area and season closures). Second, trawling is an expensive method of fishing when compared to the efficiency and effectiveness of fishing entangling nets from small vessels (Karpov 1981; Methot 1983).

The geographic center of the halibut fishery has changed. Historically the fishery was centered off southern and Baja California. When collection of fish statistics began (1916), large catches of halibut were made by the San Pedro fleet in local waters from January to June. From June to December the fleet fished Mexican waters and made large catches, most of which were landed in San Diego (Clark 1931). North of Ventura County, the fishery was much smaller.

In recent years, the center of the fishery has shifted north (Roedel and Frey 1968; Frey 1971; MBC 1987). For the past decade, the greatest landings have been made in Ventura and Santa Barbara Counties. The exception was in 1983, the second year of an El Niño event, when the greatest landings were made in the San Francisco area (Appendix I).

REGULATIONS AND MANAGEMENT

The halibut fishery is managed by the California Department of Fish and Game in state waters (0–3 naut mi). In federal waters, the Fishery Conservation Zone (3–200 naut mi), no restrictions exist on the halibut fishery except the minimum mesh size requirement for trawl nets. Presently bottom trawls must have a minimum mesh size of 4.5 inches (114 mm).

Trawl nets were prohibited in Monterey Bay and state waters off Ventura, Los Angeles, Orange, and San Diego Counties in 1913. In 1915 this legislation was amended to prohibit trawling anywhere in state waters. Legislation in 1925 legalized trawling off the coast of Santa Barbara County inside the 3-naut-mi limit, but 1953 legislation prohibited it. Once again, the entire coast of California was closed to trawling within the 3-naut-mi limit.

In 1968 the use of trawl nets was authorized between Point Sur and Cape San Martin in waters not less than 1 naut mi from the mainland. Trawl use was also permitted between Point Arguello and El Capitan Point (Santa Barbara County), in waters not less than 25 fm or 1 naut mi from shore. Since much of the nearshore coastal area in the northern portion of Santa Barbara County is rocky bottom (precluding the use of trawl gear) this allowance had little effect on the fishery.

The low catch in the late 1960s prompted the California Legislature to designate an area not less than 1 naut mi from the mainland shore, between a line running due west from Point Arguello and a line running due south from Point Mugu, in waters not more than 25 fm deep as "California halibut trawl grounds" (Figure 1), effective 1971 (Fish and Game Code, sec. 8495). This expansion of the traditional trawl grounds was accompanied by additional regulations. A 4-month closure on the trawl grounds from February through May was made to protect spawning adults. In 1973 this closure was shifted from 15 March to 15 June to encompass the peak of the season and provide a window when halibut spawning could occur without interference from trawl fishing activities. Also in 1972 a 7.5-inch (190 mm) mesh trawl cod end was required on the trawl grounds to allow for the escape of undersize halibut. Schott's (1975) evaluation of this regulation was that it was effective, and that most fishermen were pleased that a large number of undersize halibut and "junk" fish were escaping through the trawl cod end. In 1988 the definition of the trawl grounds was amended and the 25 fm clause was removed, effective 1 January 1989. Trawling is now allowed between Point Arguello and Point Mugu in waters farther than 1 naut mi from the mainland.

The use of trammel nets was prohibited in state waters in 1911. In 1913 trammel nets were again permitted, but were required to be pulled within 6 h. As early as 1917, some of the state's fishing districts required 8-inch (203 mm) mesh in any trammel net used. In a 1985 legislative bill, the mesh size was increased to 8.5 inches (216 mm) between Point Dume (Los Angeles County) and Ragged Point (San Luis Obispo County). In 1989 the 8.5-inch mesh size provision was adopted coastwide. Presently gill and trammel nets are prohibited in Santa Monica Bay. Gill and trammel nets are also subject to various depth, area, and season closures throughout the state that are too numerous to list (however, see e.g. Wild 1990).

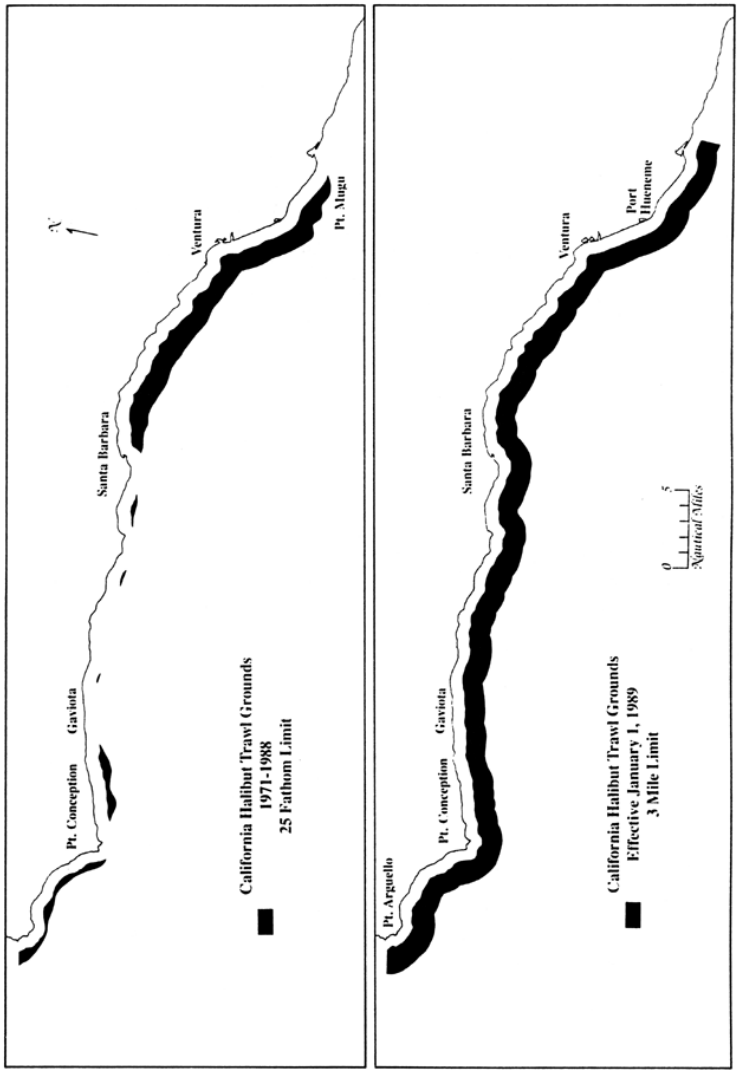

FIGURE 1. Map of the California Halibut Trawl Grounds as originally established, and after amendment effective 1 January 1989. Maps done by Deborah Morrisset.

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In 1915 a regulation was passed that halibut less than 4 lb (1.8 kg) in the round (whole) could not be bought or sold. In 1931 it was further specified that halibut less than 3.5 lb (1.6 kg) dressed with the head on, or 3 lb (1.4 kg) dressed with the head off were not to be taken. However, up to 30 lb (13.5 kg) of halibut under the specified weights could be possessed for personal use but not for sale. In 1979 a law went into effect prohibiting the take, possession, or sale of halibut under 22 inches (559 mm) in total length. A 1985 law reduced the number of halibut that could be retained for personal use to four (about 12 lb [5.4 kg]).

COMMERCIAL CATCH

The halibut fishery is year-round in southern California, but is most active during the winter and spring. off the central California coast most of the catch is taken in the summer (Herrick and Hanan 1988). Halibut are generally delivered to the buyers intact with only the viscera removed. However, in the Monterey Bay area, most halibut are delivered in the round.

California halibut has always had to compete with Pacific halibut, Hippoglossus stenolepis, in the market place. Demand for California halibut in southern California usually exceeds supply, so prices are consistently high except when California's markets are flooded with Pacific halibut from Alaska at the opening of that season. In 1989 California halibut imported from Mexico depressed the market price and demand for local halibut. This may become a trend as Mexico increases its fishing efforts. Presently, the average price per pound to southern California fishermen for California halibut is $2.25.

California's statistical records on fish landings began in 1916. Prior to 1936, market receipts were simply made out as halibut, whether the species was California halibut or Pacific halibut. The two species overlapped in the San Francisco Bay area. Department field surveys in the 1930s determined a ratio of Pacific to California halibut of 9:1 at various times in this port. The early landing figures were corrected using this ratio (Holmberg 1949). Presently, Pacific halibut show up infrequently in catches in the San Francisco Bay area.

In this discussion, "total landings" include halibut caught in state waters and those caught in Mexican waters and landed in California. "California landings" exclude the catch from Mexican waters. In 1937 the Bureau of Commercial Fisheries (the fisheries branch of the Division of Fish and Game) reported that on average, 35% of the landings made in Los Angeles and San Diego were from Mexico, although they fluctuated greatly. After 1966 Mexican-caught fish were no longer a significant component of the total landings of halibut. This was due to financial and logistical considerations (Tony West, California Gillnetters Association, pers. comm.). A fishing trip to Mexico was no guarantee of large profits. When Mexican fishermen increased their fishing effort via small "cooperativas" (cooperatives), competition for the localized fishing areas in Mexico next to the kelp beds increased. The response of California fishermen was to extend their season by going to the Channel Islands and farther north rather than fishing in Mexican waters.

Total landings and California landings tend to mirror each other (Figure 2). Due to this and a lack of documentation of the fishery in Mexican waters, the landing trend discussion has been confined to California landings. California's landing figures are also presented in tabular form (Appendix II).

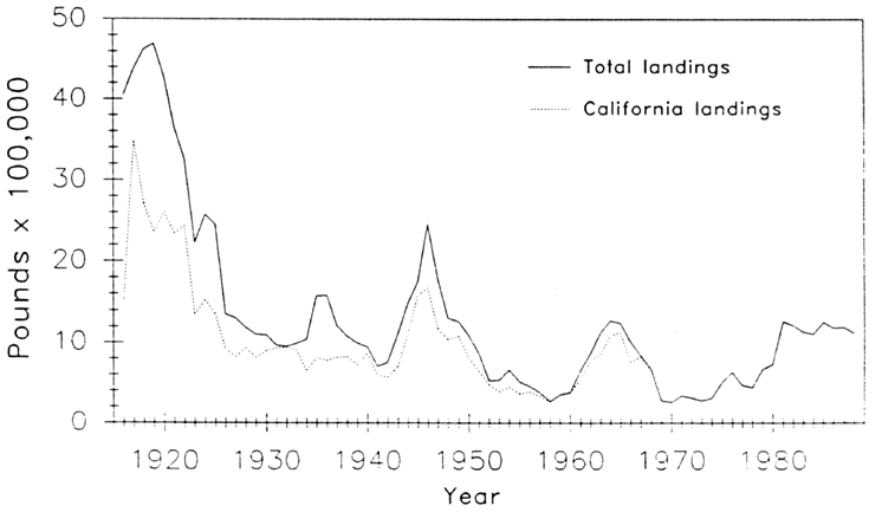

FIGURE 2. Commercial California halibut landings. The upper curve is total landings which includes fish caught in Mexican waters and landed in California. The lower curve is California landings, only fish caught in state waters.

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Commercial catches of halibut have fluctuated over the years. The overall trend was thought to be one of decline (Frey 1971; Karpov 1981). However, landings peaked in 1981 and have exceeded 1 million pounds for the eighth straight year. Moser and Watson (1990) found that halibut larval abundance and the commercial landings mirror each other, with natural population peaks every 20 years. Without catch-per-unit-of-effort data, stock abundance cannot be accurately assessed. Catch data does allow one to observe trends and make reasonable first approximations of what has been happening, especially if it is correlated with human activities and notable oceanic events.

The record landing of halibut was 3.5 million pounds in 1917 which was followed by an 11-year decline. World War I contributed to this decline by reducing the number of fishermen, significantly limiting supplies for civilian use, and restricting boat activity. It is also possible that the Department's monitoring of fish landings was initiated just as this fishery had finished its growth phase (Gulland 1983).

When this country entered World War II, security regulations went into effect prohibiting noncitizens from fishing off the California coast. Since many California fishermen were Italian citizens, the halibut fishery was severely affected. From 1941 through 1943, landings were the lowest recorded since 1916.

After the war, California experienced a tremendous growth in population. The initial wartime fishing restraints probably allowed the halibut stocks to increase, and the postwar population growth fueled a large demand for fish resulting in sizable landings in the latter half of the decade. The rapid decline of the catch in the 1950s was probably an effect of this exploitation. Concurrently, there were nine consecutive years of subnormal temperatures, followed by a notable

El Niño (1957–59) that resulted in abnormally warm ocean temperatures (Radovich 1961). In 1958, only 256,000 lb of halibut were landed, the lowest ever recorded. The warm water of an El Niño event is often associated with an increase in juvenile recruitment of halibut and a decrease in landings of adults, as the population ranges farther north with the warm waters. However, since each El Niño event is unique, the effects are variable.

The next peak in the fishery was in 1965, the year after a major El Niño event. In 1969 another El Niño event occurred, and the halibut landings were very low in 1969 and 1970. The landings remained depressed throughout the 1970s. Two El Niño events occurred in this decade—in 1972–73 and 1976–77. The landings peaked again in 1981, and in 1988 exceeded 1 million pounds for the eighth straight year.

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APPENDIX I

Year	San Francisco	Monterey	Santa Barbara	Los Angeles	San Diego
1930	31,078	24,412	312,247	431,381	298,601
1931	7,267	16,221	354,663	464,466	127,156
1932	19,734	46,881	311,705	492,620	78,762
1933	24,262	21,615	322,017	459,019	162,736
1934	30,844	34,561	221,004	412,650	339,297
1935	18,462	41,892	239,964	604,998	670,547
1936	12,356	44,351	263,590	367,547	95,315
1937	8,945	18,936	311,319	340,636	132,245
1938	14,533	39,586	366,730	239,748	174,866
1939	25,261	28,887	330,333	310,808	49,495
1940	61,687	20,655	398,921	301,701	132,742
1941	22,400	15,366	212,538	256,404	106,097
1942	6,140	12,226	275,688	216,383	64,349
1943	10,869	15,511	352,263	297,096	35,155
1944	7,739	17,497	607,736	421,420	64,136
1945	62,415	34,176	926,451	470,935	144,160
1946	49,973	209,665	497,793	757,457	203,509
1947	5,842	135,378	488,835	371,589	171,024
1948	8,346	80,976	527,745	326,219	97,838
1949	9,021	97,820	492,188	351,712	128,760
1950	11,771	79,610	320,045	259,570	135,283
1951	6,515	64,416	214,458	271,309	86,581
1952	19,659	23,074	191,481	195,611	43,795

APPENDIX I—*(continued)*

Year	San Francisco	Monterey	Santa Barbara	Los Angeles	San Diego
1953	5,838	29,079	156,775	118,035	78,012
1954	2,782	41,346	193,116	138,670	68,629
1955	41,754	31,147	136,337	84,933	69,663
1956	15,801	14,615	143,505	116,140	91,770
1957	14,310	19,981	118,328	47,808	132,157
1958	10,253	12,663	109,611	63,836	59,681
1959	34,282	9,218	178,886	60,807	62,093
1960	21,981	3,926	206,875	85,722	47,604
1961	50,050	9,957	191,674	127,695	165,880
1962	74,016	47,181	149,070	313,239	192,571
1963	125,801	62,361	278,040	268,424	120,101
1964	183,690	42,919	371,218	350,897	142,952
1965	162,517	94,065	396,291	355,408	119,777
1966	234,026	92,656	285,596	87,515	49,647
1967	264,960	100,622	304,967	110,411	43,959
1968	191,003	79,340	231,718	129,958	27,256
1969	90,238	24,149	51,582	70,183	36,121
1970	81,598	10,430	77,396	70,508	16,747
1971	63,664	47,812	134,198	78,454	12,217
1972	107,162	49,556	89,054	40,164	23,027
1973	34,522	52,046	137,609	19,749	28,490
1974	51,472	25,522	113,513	75,378	36,300
1975	53,613	22,684	185,919	138,672	102,855
1976	38,132	36,812	406,171	102,208	44,121
1977	40,517	14,913	296,072	74,566	41,501
1978	46,483	30,726	227,029	102,121	35,081
1979	89,637	30,569	371,663	124,540	48,751
1980	129,402	69,505	349,270	92,434	86,105
1981	317,965	40,709	680,175	173,316	49,008
1982	423,948	39,042	546,338	163,197	40,001
1983	551,806	22,510	372,584	131,331	51,965
1984	307,386	37,574	487,802	174,286	100,074
1985	236,195	73,207	499,820	315,121	131,363
1986	202,773	68,916	600,635	221,456	89,241
1987	97,769	94,362	607,945	307,911	79,555
1988	136,302	79,275	583,655	235,718	78,005

APPENDIX II

Year	Total	California	Mexico
1916	4,052,173	ca 1,500,000	ca 2,500,000
1917	4,379,312	ca 3,500,000	ca 800,000
1918	4,624,218	2,708,514	1,915,704
1919	4,698,123	2,362,520	2,335,603
1920	4,279,582	2,602,043	1,677,539
1921	3,653,861	2,340,428	1,313,433
1922	3,254,505	2,437,966	816,539
1923	2,229,381	1,347,243	882,138
1924	2,576,882	1,528,399	1,048,483
1925	2,452,551	1,352,248	1,100,303
1926	1,349,031	916,794	432,237
1927	1,303,559	818,517	485,042
1928	1,187,651	932,289	255,362
1929	1,102,573	811,427	291,146
1930	1,097,760	896,062	201,698
1931	969,773	929,306	40,467
1932	949,702	939,001	10,701
1933	989,649	904,829	84,820
1934	1,037,008	648,516	388,492
1935	1,575,863	810,291	765,572
1936	1,582,907	776,634	806,273
1937	1,207,235	812,365	394,870
1938	1,078,229	822,447	255,782
1939	991,621	722,084	269,537
1940	948,457	861,908	86,549
1941	706,650	592,911	113,739
1942	750,539	569,245	181,294
1943	1,111,998	701,219	410,779
1944	1,485,463	1,111,880	373,583
1945	1,748,821	1,582,150	166,671
1946	2,457,187	1,675,280	781,907
1947	1,787,901	1,172,638	615,263
1948	1,306,613	1,041,124	265,489
1949	1,262,514	1,079,501	183,013
1950	1,092,745	806,279	286,466
1951	865,933	643,279	222,654
1952	525,311	473,620	51,691
1953	530,315	387,739	142,576
1954	661,331	444,543	216,788

APPENDIX II—*(continued)*

Year	Total	California	Mexico
1955	509,802	363,834	145,968
1956	455,799	382,006	73,793
1957	376,815	332,584	44,231
1958	267,446	256,075	11,371
1959	354,242	345,286	8,956
1960	376,263	366,191	10,072
1961	654,554	545,472	109,082
1962	863,086	776,077	87,009
1963	1,120,369	855,092	265,277
1964	1,276,105	1,092,068	184,037
1965	1,243,718	1,128,348	115,370
1966	1,011,412	749,555	261,857
1967	838,058	824,919	13,139
1968	671,654	659,425	12,229
1969	274,277	272,331	1,946
1970	257,444	256,898	546
1971	336,871	336,416	455
1972	309,245	309,003	242
1973	273,526	272,466	1,060
1974	306,479	306,290	189
1975	508,913	507,785	1,128
1976	628,370	627,574	796
1977	467,862	463,760	4,102
1978	441,440	432,884	8,244
1979	665,546	658,892	6,399
1980	726,852	724,590	2,120
1981	1,262,265	1,259,029	3,236
1982	1,214,375	1,211,232	1,324
1983	1,130,581	1,130,543	38
1984	1,107,332	1,107,332	0
1985	1,256,375	1,255,913	204
1986	1,184,090	1,183,110	205
1987	1,188,881	1,186,272	2,609
1988	1,114,559	1,114,559	0