

11 Spiny Dogfish, *Squalus acanthias*



Spiny dogfish, *Squalus acanthias*. Photo credit: David A. Ebert.

History of the Fishery

The spiny dogfish, *Squalus acanthias*, known also as the piked dogfish, has long been targeted by recreational and commercial fishers in California. Over the past 90 years, there has been great fluctuation in the demand, use, gear used and annual landings of this shark species in California.

Compared to most other shark species, commercial landings and trade of spiny dogfish is well documented due to its long history of utilization in California. At the beginning of the 20th century, sharks comprised a minor meat fishery in California; very few Californians wanted to eat shark. Spiny dogfish have small fins and were not routinely caught for their fins. A small number were harvested for their hides, although this was a labor intensive process. As a common bycatch species, spiny dogfish fetched \$5 per ton in reduction fisheries to make fertilizer. Many commercial trawlers despise this species for feeding on their targeted fish and ruining their nets—spiny dogfish roll into circles, thrash about, and have rough skin and spined dorsal fins that make them very difficult to remove from trawl nets. In effect, they were harvested just to remove them from the ocean so as not to destroy any more nets. When it was used, spiny dogfish meat was widely passed off as other, more lucrative species such as California halibut and white seabass. According to California Department of Fish and Game (Department) landings data the annual commercial shark harvest during the years 1930 through 1936 averaged 588,373 pounds (267 metric tons).

A brief but intense commercial fishery for spiny dogfish occurred in the late 1930s, secondarily to the soupfin shark fishery. A new market for sharks suddenly developed with the discovery that livers of soupfin shark, and to a lesser extent, spiny dogfish, have unusually high levels of vitamin A. At the time, vitamin A could not be synthesized and a shark liver gold rush ensued. By 1939, 600 vessels were fishing for sharks along the California coast using gill nets, otter trawls or any means necessary. Starting at around \$40 per ton of livers, shark liver dramatically rose in value to \$2000 per ton in 1941. This is the equivalent of one shark being worth about \$50 today. Not surprisingly, total shark landings increased over eight times between 1937 and 1938, but in 1942 fell to less than half the total landed in 1941. These changes are so great

that even data gaps and inaccuracies cannot conceal the events that took place in the fishery. A great increase in landings happened—the annual shark harvest during the years 1937 through 1941 averaged 6.6 million pounds (3000 metric tons) although the actual proportion of spiny dogfish is unknown due to non-specific shark sorting (see below). In the years following 1941, a decrease in total landings occurred in spite of increased fishing effort encouraged by high liver prices. Hence, this latter change may reflect a decrease in abundance of spiny dogfish and soupfin shark. The annual shark harvest during the years 1942 through 1950 averaged 2.4 million pounds (1074 metric tons). The shark liver bonanza halted with the advent of synthetic vitamins and the onset of World War II, and shark landings fell to pre-bonanza levels by 1950.

Commercial sorting of sharks by species was not required by law until relatively recently. The spiny dogfish was known as “grayfish” in the 1930s, and was granted a market code in 1931, but landings were not effectively sorted until the late 1960s. No distinction was made between shark species in the landings before 1937, and only soupfin shark data became available in 1941. From 1941 through 1950, soupfin shark made up 53 percent of the total shark landings by weight, and spiny dogfish probably accounted for a large part of the remainder. Inaccuracies in the landings data arose due to the variations in the marketing practices of the fishers. In the earlier years, sharks were cleaned at sea and only the carcasses were delivered to the markets as “unidentified shark”. Then later, many livers were landed without a corresponding carcass. For instance, in 1948, 100,000 pounds (45 metric tons) of shark livers were landed, the corresponding species unknown.

According to commercial data from Department, spiny dogfish landings have varied greatly since active sorting began in 1969 (Figure 11-1). From 1969 to 1976, landings were relatively low at a yearly average of 6749 pounds (3 metric tons); however many spiny dogfish were probably not sorted into their specific market category and were instead landed as “unidentified shark”. Landings were the highest from 1977 through 1979, and peaked in 1978 at 439,991 pounds (159 metric tons). Between 1989 and 1997, commercial landings were quite low, but slowly increased to 98,261 pounds (45 metric tons) in 2008. Although many factors can affect total landings, probable influences are regulatory changes in other commercial fisheries such as groundfish and salmon, sorting requirements and the demand in foreign markets.

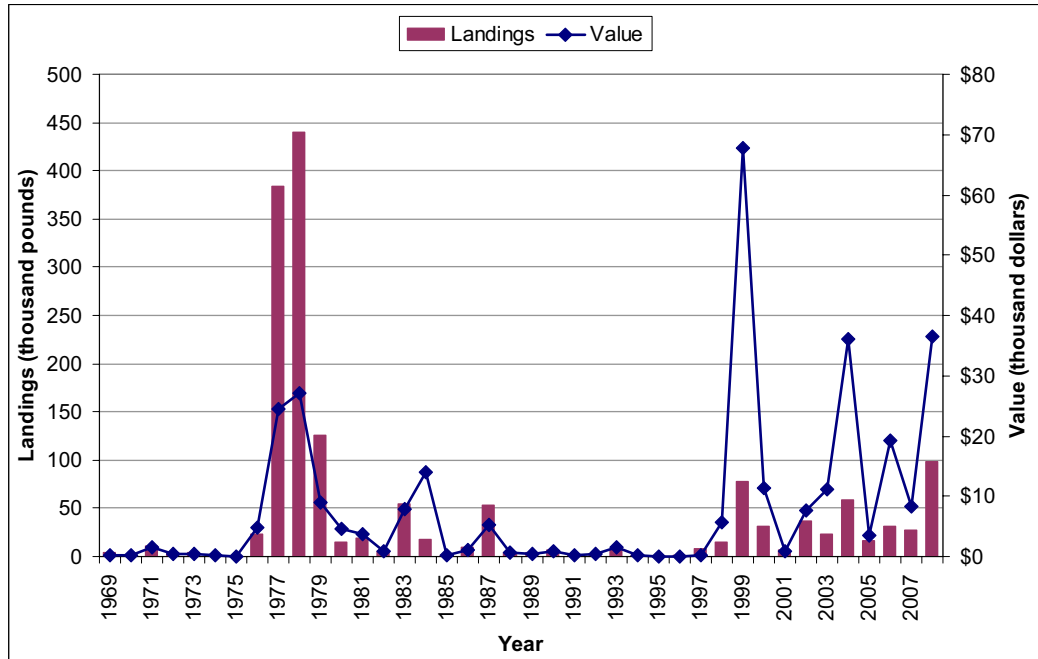


Figure 11-1. Spiny dogfish commercial landings and value, 1969-2008. Data source: CFIS data, all gear types combined. Data not available prior to 1969.

The spiny dogfish in the eastern north Pacific is currently harvested for exportation to Europe, Australia, South America and Japan where the meat is consumed by humans or made into fishmeal for aquaculture. The gear types used to land spiny dogfish are trawl, gill net, and hook and line (e.g. long line). Commercial fishery catch-per-unit-effort (CPUE, in pounds per trip) show that trawl gears have the highest success, followed closely by gill net, with hook and line gear being the least successful (Figures 11-2 and 11-3). Markets favor mature females due to their large size. Fins may be utilized in China, but are of relatively low value because of their small size. Some spiny dogfish are embalmed and processed for science education.

In recent years, the commercial market price for spiny dogfish has been low, between \$0.25 and \$0.40 per pound (\$0.55 to \$0.88 per kilogram), with only a modest increase from 1970s prices of \$0.10 to \$0.20 per pound (\$0.22 to \$0.44 per kilogram). Currently, the commercial sector lands a majority of the spiny dogfish total catch at 17,905 pounds (8 metric tons) in 2007 and 98,261 pounds (45 metric tons) in 2008, compared to the recreational sector at 11,423 pounds (5 metric tons) in 2007 and 6428 pounds (3 metric tons) in 2008. The 2008 commercial ex-vessel value of spiny dogfish is estimated at \$36,423 (Figure 11-1).

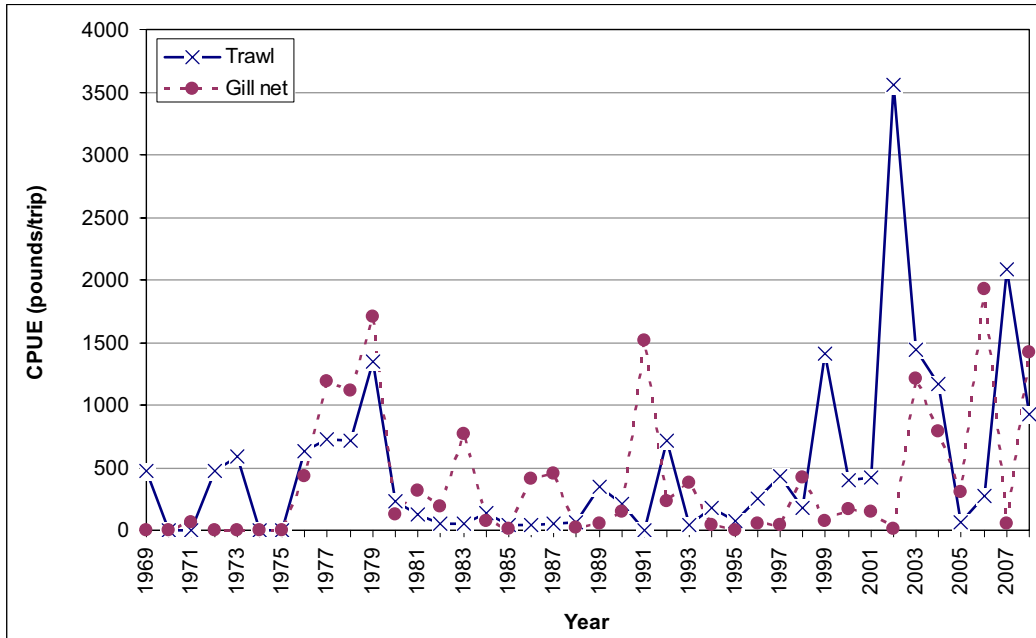


Figure 11-2. Spiny dogfish trawl and gill net catch-per-unit-effort (CPUE), 1969-2008. Data source: CFIS data. Data not available prior to 1969.

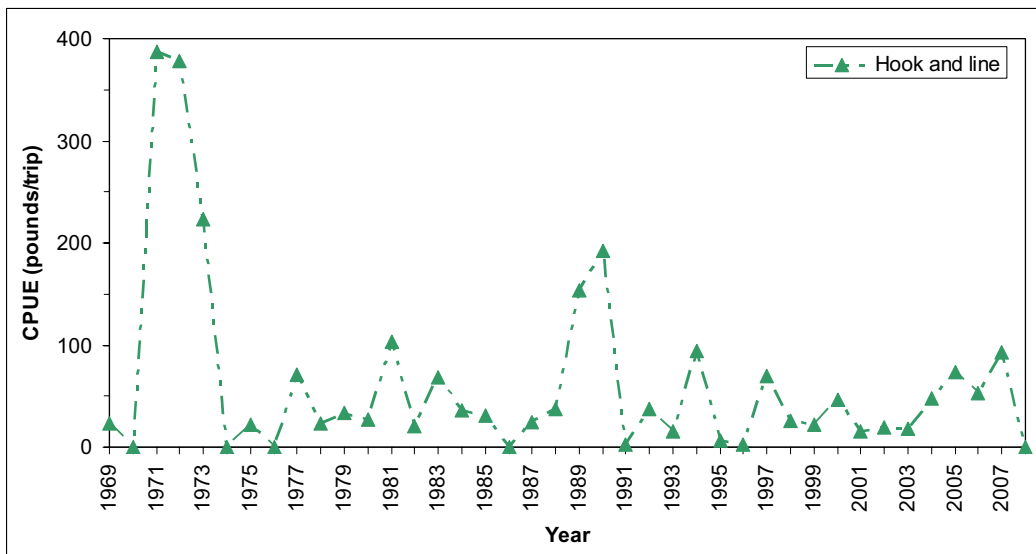


Figure 11-3. Spiny dogfish commercial hook and line catch-per-unit-effort (CPUE), 1969-2008. Data source: CFIS data. Data not available prior to 1969.

Generally, recreational anglers in California do not target the spiny dogfish; however, due to its voracious feeding nature, it is frequently caught incidentally and considered a nuisance by many recreational anglers. Nevertheless, spiny dogfish make up a significant portion of the recreational fishery catch in southern California and in the San Francisco Bay area. In the recreational fishery, it is taken primarily by hook and line gear and has been landed in the following fishing modes: private/rental boats,

commercial passenger fishing vessels (CPFVs), and man-made structures. Beaches and banks tend to be too shallow, thereby minimizing catch for this fishing mode.

There are two different recreational sampling programs: the Marine Recreational Fisheries Statistical Survey (MRFSS) which sampled from 1980 to 2003 and the California Recreational Fisheries Survey (CRFS) which was initiated by the Department in 2004. Due to changes in the sampling protocol and how the data are used to estimate catch these two surveys are not comparable. A review of the MRFSS data show the average annual catch of spiny dogfish from the period of 1980-1989 was 25,331 fish (Figure 11-4) and the average weight during this period was 4.2 pounds (1.9 kilograms). The average annual catch declined by 80 percent to 5065 fish from the period of 1993-2003 (note: no data available for the years 1990-1992) but the average weight during this period was quite a bit larger, at 6.8 pounds (3.1 kilograms). Catch peaked in 1980 at just fewer than 58,000 fish; the worst year for recreational spiny dogfish harvest was 1997 at 1517 fish. From 1980 through 2003, for the years where data are available, a majority (71 percent) of spiny dogfish were landed in southern California. The spiny dogfish is quite a common species encountered on southern California CPFVs. From 1986 through 1989, spiny dogfish ranked tenth in total number of fish caught onboard CPFVs at Bolsa Chica Artificial Reef.

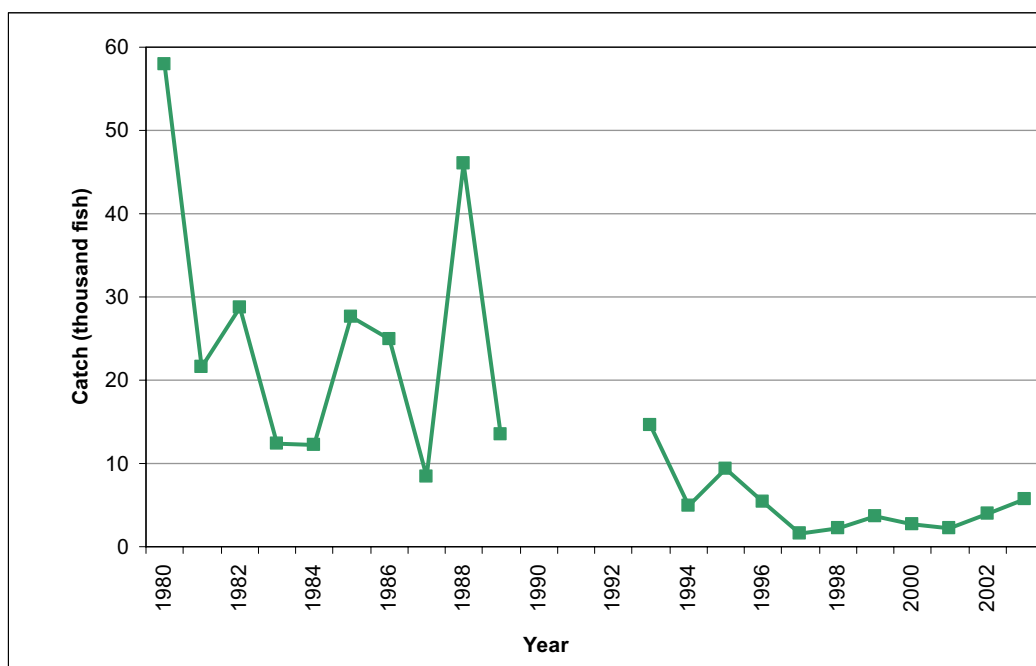


Figure 11-4. Spiny dogfish recreational catch, 1980-2003. Data source: MRFSS data, all fishing modes and gear types combined. Data not available for 1990 through 1992. CPFV data not available for central and northern California for 1993-1995.

The California Recreational Fisheries Survey (CRFS) data show spiny dogfish Catch has fluctuated between 825 and 1998 fish per year since 2004 (Figure 11-5). The average weight per shark since 2004 was 6.4 pounds (2.9 kilograms); and a majority of the catch came from private/rental boats (50 percent), followed by man-made structures (29 percent), and CPFVs (20 percent). CRFS data (2004-2008) show

spiny dogfish ranked 53rd statewide as the most commonly caught species from all boat modes (private/rental and CPFV combined). A majority of the 2004-2008 spiny dogfish recreational catch (76 percent) was landed in the port complexes of San Francisco, Los Angeles, and San Diego; very few fish were landed north of Point Arena (Mendocino County).

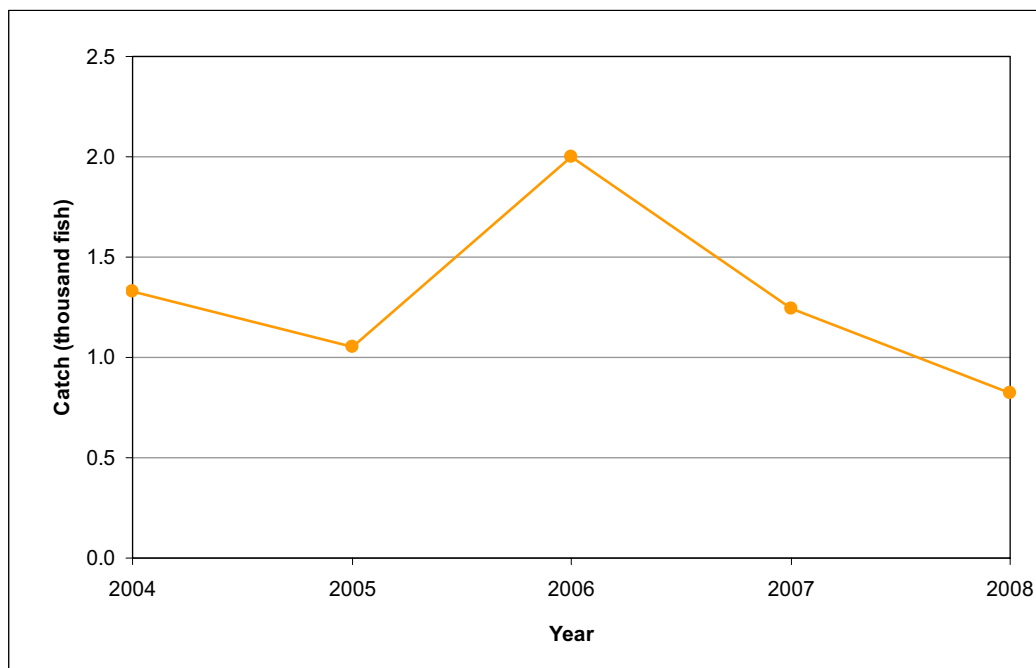


Figure 11-5. Spiny dogfish recreational catch, 2004-2008. Data source: CRFS data, all fishing modes and gear types combined.

Recreational fishery CPUE, an indicator of fish abundance based on MRFSS and CRFS sample data, has varied greatly since 1980, with the 2008 figure (in amount of fish caught per 100 angler hours) similar to the early 1980s (Figure 11-6).

According to CPFV logbook data available from 1948 to present, CPFV spiny dogfish catch varied greatly from over 1500 fish in 1975 and 1980 to 15 fish in 2008 (Figure 11-7). Since the spiny dogfish is a schooling species, catch is highly dependent on whether the vessel drifts into a school. According to the CPFV logbook data, the 1940s was not a time for catching spiny dogfish onboard CPFVs. Either the species was still recovering from the shark liver boom, or perhaps anglers were not interested in keeping these fish (released fish were not recorded until 1994). Relative to the 1980s and early 1990s, there has been a notable decline in fish landed and CPUE of spiny dogfish in the late 1990s and 2000s (Figure 11-8). From 1981 through 1993, the average number of spiny dogfish landed was 430 fish, with an average CPUE of 0.31 fish/100 angler-hours. From 1994 through 2008, the average number of spiny dogfish landed was 141 fish, with a CPUE of 0.08 fish/100 angler hours. This decline for CPFV CPUE could be due to changes in overall recreational fishing regulations since 1998.

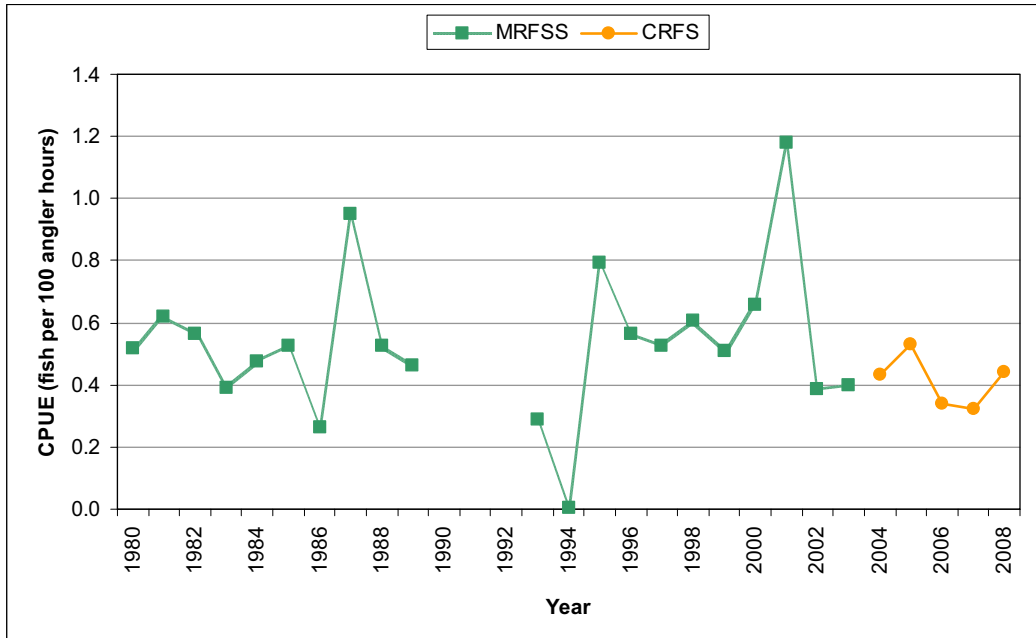


Figure 11-6. Spiny dogfish recreational catch-per-unit-effort (CPUE) for boat modes (private/rental and CPFV), 1980-2008. Data source: MRFSS (1980-2003) and CRFS (2004-2008). Data not available for 1990 through 1992. CPFV data not available for central and northern California for 1993-1995.

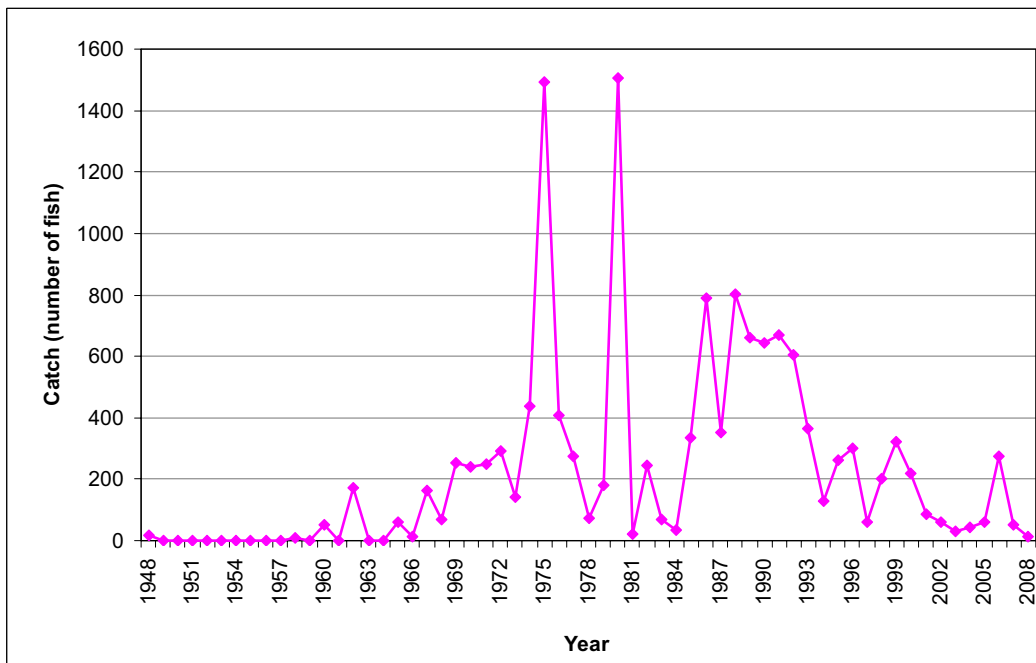


Figure 11-7. Spiny dogfish commercial passenger fishing vessel (CPFV) catch, 1948-2008. Data source: CPFV logbook data. Data not available prior to 1948.

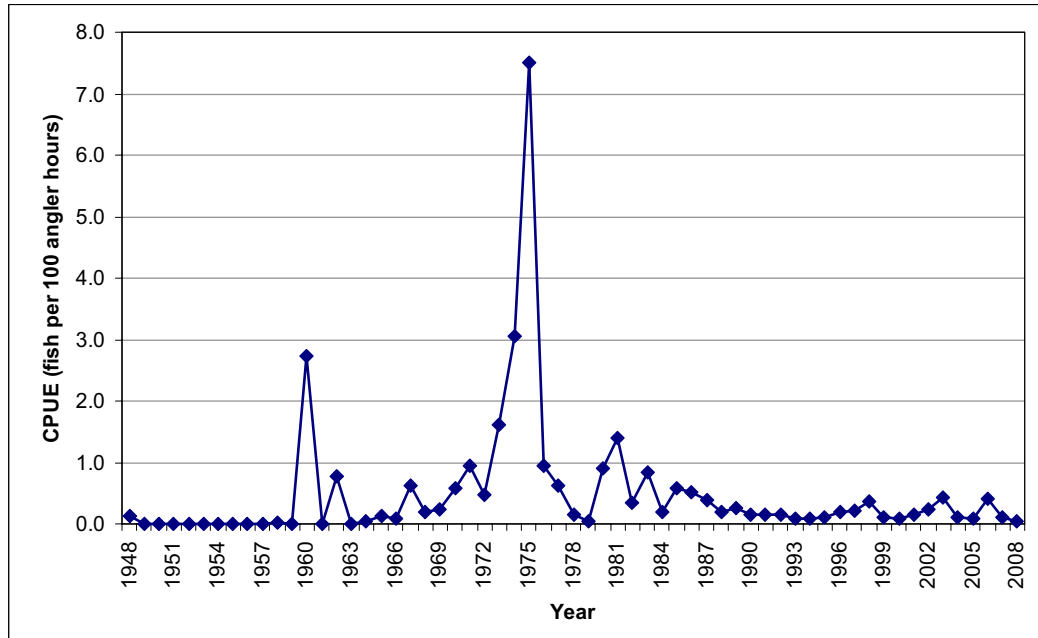


Figure 11-8. Spiny dogfish commercial passenger fishing vessel (CPFV) catch-per-unit-effort (CPUE), 1948-2008. Data source: CPFV logbook data. Data not available prior to 1948.

Status of Biological Knowledge

The spiny dogfish occurs worldwide on the continental shelf, from the intertidal to the shelf-slope boundary, in temperate and boreal waters. In the eastern North Pacific, the geographical range of the spiny dogfish extends from the Gulf of Alaska southward to San Martin Island (southern Baja California, Mexico). This species is extremely abundant in waters off British Columbia, Canada and Washington state, but declines in abundance southward along the Oregon and California coasts. Spiny dogfish prefer colder waters (45-59°F; 7-15°C), often making migrations to follow this optimal temperature gradient. Spiny dogfish have been observed from the surface down to a depth of 4055 feet (1236 meters), but fishery data as well as National Marine Fisheries Service (NMFS) fishery-independent shelf surveys show that the highest catch rates occur in 180-600 feet (55-183 meters).

Although frequently observed as a solitary species, this gregarious shark forms large localized schools of hundreds if not thousands of individuals of uniform size and sex. Spiny dogfish can travel long distances. An extensive tagging project found that spiny dogfish tagged off the west coast of Canada migrate as far as the coasts of Japan and Mexico.

The spiny dogfish is a moderately large species of squaloid shark, reaching a maximum size of 51 inches (130 centimeters) in the eastern Pacific. It reaches maturity between 14-35 years of age; males reach maturity at a younger age, but females live longer and grow larger than males. The maximum age estimated for this species is at least 30-40 years but potentially up to 100 years. This species is extremely slow

growing, at about 0.6-1.4 inches (1.5-3.6 centimeters) per year. It displays one of the lowest population growth rates calculated for any shark species: 2.3 percent annual rate of population increase from maximum sustainable yield in the eastern North Pacific.

Reproduction in the spiny dogfish is well documented. This species displays aplacental viviparity (i.e. ovoviviparity; live young without a yolk sac placenta) and no parental care. The breeding season is between September and January. The gestation period of the spiny dogfish is the longest documented in any vertebrate, 18-24 months. Mature females give birth every two years and large schools of pregnant females have been documented. Birth occurs in the midwater zone in depths of 541-1178 feet (165-359 meters). Pup size at birth is between 8.7 and 13.0 inches (22-33 centimeters). Litters average between 2 and 12 pups with larger females having larger litters. The young tend to occupy a pelagic habitat, but as they mature, they shift to a more demersal lifestyle.

The spiny dogfish is a top level predator and it is a highly active, voracious, opportunistic feeder that preys upon squids, crabs, shrimps, sea cucumbers, jellyfish and combjellies, and bony fish such as herring, smelt, rockfishes, sardines, and almost any fish smaller than itself. Fish become a more important part of their diet as the spiny dogfish grow larger. Most of the diet of juveniles consists of small invertebrates, whereas the adults prey largely on benthic organisms. They are preyed upon by a variety of shark species, including sixgill, sevengill, leopard, and white sharks, and by some marine mammals. This shark is not dangerous to humans other than the occasional injury to anglers by their sharp teeth and mildly toxic dorsal fin spines.

In California, the highest levels of contaminants in marine fishes usually occur in coastal southern California and San Francisco Bay. In a 1975-1981 comparison of fish contamination in southern California coastal areas, the highest values of dichlorodiphenyl trichloroethane (DDT) and its isomers and metabolites in muscle tissue were in the spiny dogfish (200 parts per million). Polychlorinated biphenyls (PCBs) in muscle and liver tissue were also the highest in the spiny dogfish (14.8 parts per million). Since inputs of contaminants from all sources have decreased in recent years, concentrations of contaminants in water, sediments, and marine organisms have also decreased.

Status of the Population

Currently, there is no fishery stock assessment approved for management purposes on the west coast. Washington is the only west coast state with a directed spiny dogfish fishery, mostly in Puget Sound, where, in 1955 the spiny dogfish population was considered to be nearly fully utilized. The Washington Department of Fish and Wildlife (WDFW) was scheduled to lead a 2009 assessment, however the majority of studies conducted thus far are for the waters of Puget Sound, Washington or Vancouver, Canada. There is a lack of west coast spiny dogfish biological data, specifically, age and size composition data. In late 2008, the Pacific Fishery Management Council (PFMC) discussed the issue and decided to postpone the assessment until 2011 to allow WDFW time to collect more data.

Some stock assessment scientists believe that the Puget Sound sub-stock has been overfished, and some indicators (e.g. CPUE) support this with catches at historic lows. Fishery and population trend data indicate that populations in the North Pacific qualify the spiny dogfish for inclusion in the International Union for the Conservation of Nature (IUCN) Red List of threatened species. The spiny dogfish has already been declared as overfished on the east coast. At the global level, the spiny dogfish is categorized in the IUCN Red List as “near threatened”. Since foreign markets are, in most cases, the driving economic force behind spiny dogfish fisheries around the world, unregulated international trade is the main threat to the species.

It is unknown how the population off California fares today. The spiny dogfish was most likely overfished by the end of the 1940s, but the population has had many years to recover from the shark liver fishery boom of the 1930s and 1940s.

Management Considerations

The spiny dogfish became a federally designated groundfish in 1982 when the PFMC adopted the Pacific Coast Groundfish Fishery Management Plan. Since then it has been managed under the joint jurisdiction of the state and the federal government. Prior to 1982, this species was managed by Department through regulations adopted by the state legislature and the California Fish and Game Commission.

There is no directed commercial fishery for spiny dogfish in California. Federally, it is included in the Other Fish category in Pacific coast groundfish management. Since 2006, the spiny dogfish has been managed with separate trip limits but there is no set allocation or optimum yield (OY), as no stock assessment has been completed. Although the U.S. and Canada conduct cooperative surveys for northeast Pacific spiny dogfish, there is no coordinated, international management for the stock.

Even in the absence of a formal assessment, life history information indicates the spiny dogfish is easily overfished. The spiny dogfish is long lived, slow growing and late maturing, with a very slow metabolic rate, limited reproductive capacity and a low population growth rate. Furthermore, fishers preferentially target the large, often pregnant, females whose aggregating habit and predictable migration patterns make it relatively easy to obtain high catches.

In late 2005, the PFMC raised concern that existing measures are inadequate for effectively managing spiny dogfish. Future management measures may include removing spiny dogfish from the Other Fish category and setting an acceptable biological catch and OY. There is also concern over the amount of spiny dogfish harvested as bycatch in other directed fisheries. Because it occurs in many areas where gill nets, long lines, and trawls are used, these gears catch spiny dogfish incidentally. Gears with small mesh size may take immature individuals. The U.S. Northeast Regional Stock Assessment Review Committee assessed the relative importance of spiny dogfish bycatch for the period 1968-2002 and estimated that average discards were more than double the average catch. Fortunately, spiny dogfish

are rather tenacious and post release survival tends to be high from trawls, hook and line gear, and handling stress.

Before the PFMC considers moving forward with management measures for spiny dogfish on the west coast, additional information is necessary, including an assessment of the status of the stock. The WDFW is prepared to lead the 2011 stock assessment and is in contact with representatives from academia and state and federal agencies to share and review spiny dogfish biological and fishery data. Any genetic stock differences are unknown at this time, so a successful assessment needs to take into account the trans-boundary nature of the spiny dogfish stock. At this time, it is unknown how a west coast stock assessment will affect spiny dogfish management in California.

The PFMC and the Department continue to coordinate efforts to manage spiny dogfish. The Department uses area closures (e.g. marine protected areas) and the general bag limit of no more than 10 fish (Title 14, CCR, §28.51) to regulate the recreational fishery. For the commercial fishery, license and permit regulations, gear restrictions, area closures, depth restrictions and trip limits are used for management purposes. Depending on a future stock assessment outcome, management recommendations for spiny dogfish may include minimum size restrictions and a smaller daily bag limit for the recreational fishery, and more conservative trip limits and bycatch quotas for the commercial fishery.

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Further Reading

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Spiny dogfish commercial landings, 1969-2008.								
Year	Pounds	Value	Year	Pounds	Value	Year	Pounds	Value
1969	3,554	\$213	1983	54,704	\$7,906	1997	8,405	\$157
1970	1,466	\$287	1984	17,181	\$14,040	1998	14,996	\$5,598
1971	10,262	\$1,577	1985	1,000	\$165	1999	77,752	\$67,657
1972	4,345	\$466	1986	9,558	\$1,175	2000	31,584	\$11,299
1973	4,672	\$360	1987	53,935	\$5,207	2001	6,574	\$978
1974	879	\$307	1988	3,773	\$611	2002	36,259	\$7,626
1975	179	\$59	1989	3,430	\$452	2003	23,749	\$11,242
1976	22,697	\$4,765	1990	6,873	\$896	2004	58,122	\$36,136
1977	384,177	\$24,505	1991	1,523	\$228	2005	16,871	\$3,391
1978	439,991	\$27,026	1992	3,350	\$392	2006	31,737	\$19,180
1979	125,489	\$8,890	1993	6,230	\$1,583	2007	27,905	\$8,227
1980	15,280	\$4,537	1994	1,221	\$173	2008	98,261	\$36,423
1981	19,250	\$3,817	1995	232	\$52			
1982	5,744	\$909	1996	1,320	\$101			

Data source: CFIS data, all gear types combined. Data not available prior to 1969.

Spiny dogfish commercial CPUE (pounds/trip), 1969-2008.							
Year	Trawl	Gill net	Hook and line	Year	Trawl	Gill net	Hook and line
1969	471	0	23	1989	352	56	153
1970	0	0	0	1990	214	148	192
1971	0	60	388	1991	0	1516	2
1972	474	0	378	1992	714	233	37

Spiny dogfish commercial CPUE (pounds/trip), 1969-2008.							
Year	Trawl	Gill net	Hook and line	Year	Trawl	Gill net	Hook and line
1973	585	0	224	1993	44	380	16
1974	0	0	0	1994	180	41	95
1975	0	0	22	1995	69	0	7
1976	631	436	0	1996	253	49	3
1977	724	1189	70	1997	435	47	70
1978	719	1115	23	1998	176	423	25
1979	1344	1709	34	1999	1410	72	23
1980	232	126	27	2000	399	167	47
1981	126	313	104	2001	421	142	16
1982	56	194	20	2002	3553	13	19
1983	51	769	69	2003	1444	1208	18
1984	135	75	36	2004	1168	790	48
1985	40	16	31	2005	63	310	74
1986	47	415	0	2006	273	1928	53
1987	52	455	25	2007	2081	50	93
1988	59	23	37	2008	925	1418	0

Data source: CFIS data. Data not available prior to 1969.

Spiny dogfish recreational catch, 1980-2003.							
Year	Number of fish	Year	Number of fish	Year	Number of fish	Year	Number of fish
1980	57,988	1986	24,955	1992	---	1998	2,247
1981	21,565	1987	8,455	1993	14,536	1999	3,728
1982	28,764	1988	45,992	1994	4,881	2000	2,680
1983	12,326	1989	13,505	1995	9,434	2001	2,258
1984	12,183	1990	---	1996	5,402	2002	3,971
1985	27,575	1991	---	1997	1,517	2003	5,638

Data source: MRFSS data, all fishing modes and gear types combined. Data not available for 1990-1992. CPFV data not available for central and northern California for 1993-1995.

Spiny dogfish recreational catch, 2004-2008.	
Year	Number of fish
2004	1,329
2005	1,051
2006	1,998
2007	1,241
2008	825

Data source: CRFS data, all fishing modes and gear types combined.

Spiny dogfish commercial passenger fishing vessel (CPFV) catch, 1940-2008.							
Year	Number of fish	Year	Number of fish	Year	Number of fish	Year	Number of fish
1948	19	1964	1	1980	1506	1996	302
1949	0	1965	61	1981	23	1997	61
1950	0	1966	12	1982	246	1998	202
1951	0	1967	161	1983	69	1999	323
1952	0	1968	67	1984	35	2000	219
1953	0	1969	252	1985	333	2001	85
1954	0	1970	241	1986	788	2002	62
1955	0	1971	248	1987	353	2003	29
1956	0	1972	293	1988	803	2004	44
1957	0	1973	141	1989	660	2005	58
1958	10	1974	436	1990	643	2006	273
1959	0	1975	1494	1991	671	2007	53
1960	50	1976	408	1992	604	2008	15
1961	0	1977	274	1993	366		
1962	172	1978	74	1994	129		
1963	0	1979	181	1995	261		

Data source: CPFV logbook data. Data not available prior to 1948.

Spiny dogfish recreational boat mode (private/rental and CPFV) CPUE (fish/100 angler hours), 1980-2008.							
Year	CPUE	Year	CPUE	Year	CPUE	Year	CPUE
1980	0.52	1988	0.53	1996	0.56	2004	0.43
1981	0.62	1989	0.46	1997	0.53	2005	0.53
1982	0.57	1990	---	1998	0.61	2006	0.34
1983	0.39	1991	---	1999	0.51	2007	0.32
1984	0.48	1992	---	2000	0.66	2008	0.44
1985	0.53	1993	0.29	2001	1.18		
1986	0.26	1994	0.01	2002	0.38		
1987	0.95	1995	0.79	2003	0.40		

Data source: MRFS (1980-2003) and CRFS (2004-2008) data, all gear types combined. Data not available for 1990-1992. CPFV data not available for central and northern California for 1993-1995.

Spiny dogfish CPFV CPUE (fish/100 angler hours), 1948-2008.							
Year	CPUE	Year	CPUE	Year	CPUE	Year	CPUE
1948	0.1	1964	0.0	1980	0.9	1996	0.2
1949	0.0	1965	0.1	1981	1.4	1997	0.2
1950	0.0	1966	0.1	1982	0.3	1998	0.4
1951	0.0	1967	0.6	1983	0.8	1999	0.1
1952	0.0	1968	0.2	1984	0.2	2000	0.1
1953	0.0	1969	0.2	1985	0.6	2001	0.1
1954	0.0	1970	0.6	1986	0.5	2002	0.2
1955	0.0	1971	1.0	1987	0.4	2003	0.4
1956	0.0	1972	0.5	1988	0.2	2004	0.1
1957	0.0	1973	1.6	1989	0.3	2005	0.1
1958	0.0	1974	3.1	1990	0.2	2006	0.4
1959	0.0	1975	7.5	1991	0.1	2007	0.1
1960	2.7	1976	0.9	1992	0.2	2008	0.1
1961	0.0	1977	0.6	1993	0.1		
1962	0.8	1978	0.1	1994	0.1		
1963	0.0	1979	0.1	1995	0.1		

Data source: CPFV logbook data. Data not available prior to 1948.