Recreational Albacore, *Thunnus alalunga*, Fishery by U.S. West Coast Commercial Passenger Fishing Vessels

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Introduction

The commercial passenger fishing vessel (CPFV) industry along the west coast of the United States is a multimillion dollar business which contributes major economic and social benefits. The vessels include charter boats for hire by individuals or groups as well as partyboats with a first come, open seating policy. Commercial passenger fishing vessel owners and operators from the Mexican border to Puget Sound gross millions of dollars annually providing the fishing enthusiast an opportunity to "get away" and enjoy a recreational fishing experience that would not otherwise be available. Well over 1 million angler trips are logged by these west coast anglers each year. The CPFV albacore, *Thunnus alalunga*, sport catch represents from 1 to 3 percent of the North Pacific commercial albacore catch and a significant portion of the southern California recreational catch.

Background

The albacore is a valuable commercial species with annual North Pacific landings (Table 1) in excess of 75,000 metric tons (t). To the sportsman, albacore is a highly prized, migratory gamefish which contributes significantly to the southern California sport fishing industry during the summer and fall months. In northern California, Washington, and Oregon, where the coastal charter boat fishery focuses on Pacific salmon, *Oncorhynchus* spp., the albacore fishery is much less significant and the catch fluctuates considerably from year to year (Table 2).

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Albacore Movements

Annual transpacific albacore migrations have been described in detail by Clemens (1961), Otsu and Uchida (1963), Clemens and Craig (1965), and Laurs and Lynn (1977). Albacore moving eastward across the North Pacific are exposed to commercial fisheries of several nations which use a variety of fishing gears. Domestic catch records indicate that commercial quantities of albacore first appear off the coast of Baja California, Mexico, and southern California in mid-June and early July. The albacore continue to move into coastal waters and northward in response to the warming of the surface waters and normally reach the offshore waters of Oregon and Washington by the end of July.

Several temperature-related factors play an important role in determining the major times and areas of albacore abundance and availability to a surface fishery along the Pacific coast. Periods of anomalous warm water, such as the El Niño events of 1959, 1972, and 1983, affect the distribution of albacore (Squire, 1983) as do seasonal variations in magnitude of coastal upwelling in the Pacific Northwest (Lane, 1965). The southern California albacore sport catch is greatest when surface waters are from 18.3° to 19.7°C (Squire, 1982); commercial fishing activity peaks along the entire coast from 17.2° to 18.9°C (Majors et al.[1]).

Rapid changes in the thermal structure are also important to the distribution and availability of albacore. Albacore tend to aggregate in the vicinity of ocean fronts. When these fronts are well developed, they may influence migration patterns and increase albacore catch rates in those areas (Laurs and Lynn, 1977). The strength and depth of the thermocline are also important to the availability of albacore. Recent tagging studies using acoustic transmitters indicate albacore swim near the bottom of the mixed layer during the day, but at sunset they begin making frequent vertical excursions near the surface which continue throughout the night (Laurs et al.[2]). Water turbidity and the amount of freshwater discharge flowing south from the Columbia River influence albacore availability off Oregon (Owen, 1968).

The Fleet

The CPFV fleets are located near major coastal metropolitan areas from which their clientele can be drawn. For albacore, they must also be located within a few hours running time of consistently good fishing grounds (Fig. 1). Consequently, the size, speed, and comfort of these vessels are important in attracting customers. Southern California passenger vessels are larger than those in northern California, Oregon, and Washington. These sport boats currently targeting on albacore are from 60 to 117 feet long and average 70 feet in length. There has also been a continuing trend in recent years to larger and more com-

[1]Majors, A. P., A. L. Coan, N. Bartoo, and F. Miller. 1982. Summary of 1981 North Pacific albacore fishery data. NMFS Southwest Fish. Cent., La Jolla, Calif. Admin. Rep. LJ-82-12, 35 p.

[2]Laurs, R. M., R. J. Lynn, R. C. Dotson, R. Nishimoto, K. Bliss, and D. B Holts. 1982. Exploratory albacore longline fishing in the eastern North Pacific during winter 1982. NMFS Southwest Fish. Cent., La Jolla, Calif. Admin. Rep. LJ-82-06, 79 p.

Table 1.—Catches of North Pacific albacore in metric tons, 1952-1983.

	Japan					Taiwan	United States				Canada	
Year	Pole-and-line[1]	Longline[2]	Gillnet	Other gear	Total	Longline	Baitboat	Jibgoat[3,4]	Sport[5]	Total	Jigboat	Grand total[6]
1952	41,386	26,687		237	68,710			23,843	1,373	25,216	71	93,997
1953	32,921	27,777		132	60,830			15,740	171	15,911	5	76,746
1954	28,069	20,958		38	49,065			12,246	147	12,393		61,458
1955	24,236	16,277		136	40,649			13,264	577	13,841		54,490
1956	42,810	14,341		57	57,208			18,751	482	19,233	17	76,458
1957	49,500	21,053		151	70,704			21,165	304	21,469	8	92,181
1958	22,175	18,452		124	40,731			14,855	48	14,903	74	55,708
1959	14,252	15,502		67	30,121			20,990	0	20,990	212	51,323
1960	23,156	17,369		76	42,601			20,100	557	20,657	5	63,263
1961	18,636	17,437		268	36,341		2,837	12,054	1,355	16,246	4	52,591
1962	8,729	15,764		191	24,684		1,085	19,753	1,681	22,519	1	47,204
1963	26,420	13,464		218	40,102		2,432	25,142	1,161	28,735	5	68,812
1964	23,858	15,458		319	39,635	26	3,411	18,389	824	22,624	3	62,283
1965	41,491	13,701		121	55,313	16	417	16,461	731	17,609	15	72,953
1966	22,830	25,050		585	48,465	16	1,600	15,169	588	17,357	44	65,882
1967	30,481	28,869		520	59,870	17	4,113	17,814	707	22,634	161	82,682
1968	16,597	23,961		1,109	41,667	15	4,906	20,441	951	26,298	1,028	69,008
1969	32,107	18,006		1,480	51,593	21	2,996	18,826	358	22,180	1,365	75,157
1970	24,376	15,372		956	40,704	23	4,416	21,039	822	26,277	354	67,358
1971	53,198	11,035		1,262	65,495	24	2,071	22,496	1,175	25,442	1,587	92,548
1972	60,762	12,649	1	921	74,333	25	3,750	23,600	637	27,987	3,558	105,903
1973	69,811	16,059	39	1,883	87,792	35	2,236	15,652	84	17,972	1,270	107,059
1974	73,576	13,053	224	1,065	87,918	40	4,777	20,177	94	25,048	1,207	114,213
1975	52,157	10,060	166	402	62,785	28	3,243	18,926	640	22,809	101	85,723
1976	85,336	15,896	1,070	1,394	103,696	37	2,700	16,314	713	19,724	252	123,712
1977	31,934	15,737	688	1,039	49,398	561	1,497	10,012	537	12,046	53	62,058
1978	59,877	13,061	4,029	3,209	80,176	53	950	15,700	810	17,451	23	97,712
1979	44,662	14,249	2,856	1,280	63,047	81	303	6,253	74	6,630	289	70,049
1980	46,743	14,660	2,986	1,516	65,905		382	7,599	168	8,149	212	74,349
1981[7]	27,426		17,425				784	12,280	195	13,259	200	
1982[7]							425	6,661	257	7,086	1	
1983[7]							607	9,512	87	10,119	115	

[1]Japanese pole-and-line catches include catches by research vessels.
[2]Japanese longline catches for 1952-60 exclude minor amounts taken by vessels under 20 gross tons. Longline catch weights are estimated by multiplying annual number of fish caught by average weight statistics.
[3]U.S. jigboat catches include minor amounts taken by baitboats not submitting logbooks.
[4]Jigboat catches for 1952-60 include baitboat catches.
[5]U.S. sport catch is a minimum estimate based on partial coverage.
[6]Grant totals omit unknown but minor catches by longline and pole-and-line vessels of the Republic of Korea.
[7]Figures for 1981-83 are preliminary.

Table 2.—Recreational albacore partyboat catch for all available data in number of fish and metric tons.

	California[1]		Oregon	Washington[2]		Total			California[1]		Oregon	Washington[2]		Total	
Year	No. fish	t		No. fish	t	No. fish	t	Year	No. fish	t		No. fish	t	No. fish	t
1947	11,445	84				11,445	84	1966	74,680	588				74,680	588
1948	15,414	113				15,414	113	1967	96,497	707				96,497	707
1949	22,692	166				22,692	166	1968	129,710	951				129,710	951
1950	118,087	866				118,087	866	1969	48,887	358				48,887	358
1951	75,924	557				75,924	557	1970	112,106	822				112,106	822
1952	187,267	1,373				187,267	1,373	1971	160,361	1,175				160,361	1,175
1953	23,363	171				23,363	171	1972	86,890	637	—[4]		—[4]	86,890	637
1954	20,098	147				20,098	147	1973	9,858	72	—[4]	1,648	12	11,506	84
1955	78,688	577				78,688	577	1974	12,814	94	—[4]		—[4]	12,814	94
1956	65,814	482				65,814	482	1975	81,562	595	—[4]	5,494	45	87,056	640
1957	41,540	304				41,540	304	1976	84,973	620	—[4]	9,566	93	94,529	713
1958	6,482	48				6,482	48	1977	70,274	513	—[4]	4,275	24	74,549	537
1959	39	—[3]				39	—[3]	1978	92,646	676	—[4]	20,137	134	112,783	810
1960	76,075	557				75,075	557	1979	10,196	74	—[3]		—[3]	10,196	74
1961	184,981	1,355				184,981	1,355	1980	21,309	156	—[3]	1,540	12	22,849	168
1962	229,314	1,681				229,314	1,681	1981	26,648	195	—[3]		—[4]	26,648	195
1963	158,372	1,161				158,372	1,161	1982	36,690	268	—[3]		—[3]	36,743	268
1964	112,358	824				112,358	824	1983	17,161	125	—[3]		—[3]	17,161	125
1965	99,771	731				99,771	731								

[1]DFG landings converted to metric tons using 16.1 pounds average fish weight.
[2]Estimated from landing weights of locally caught commercial fish.
[3]Minimal catch reported less than 5 t.
[4]Sport catch reported but no sampling effort.

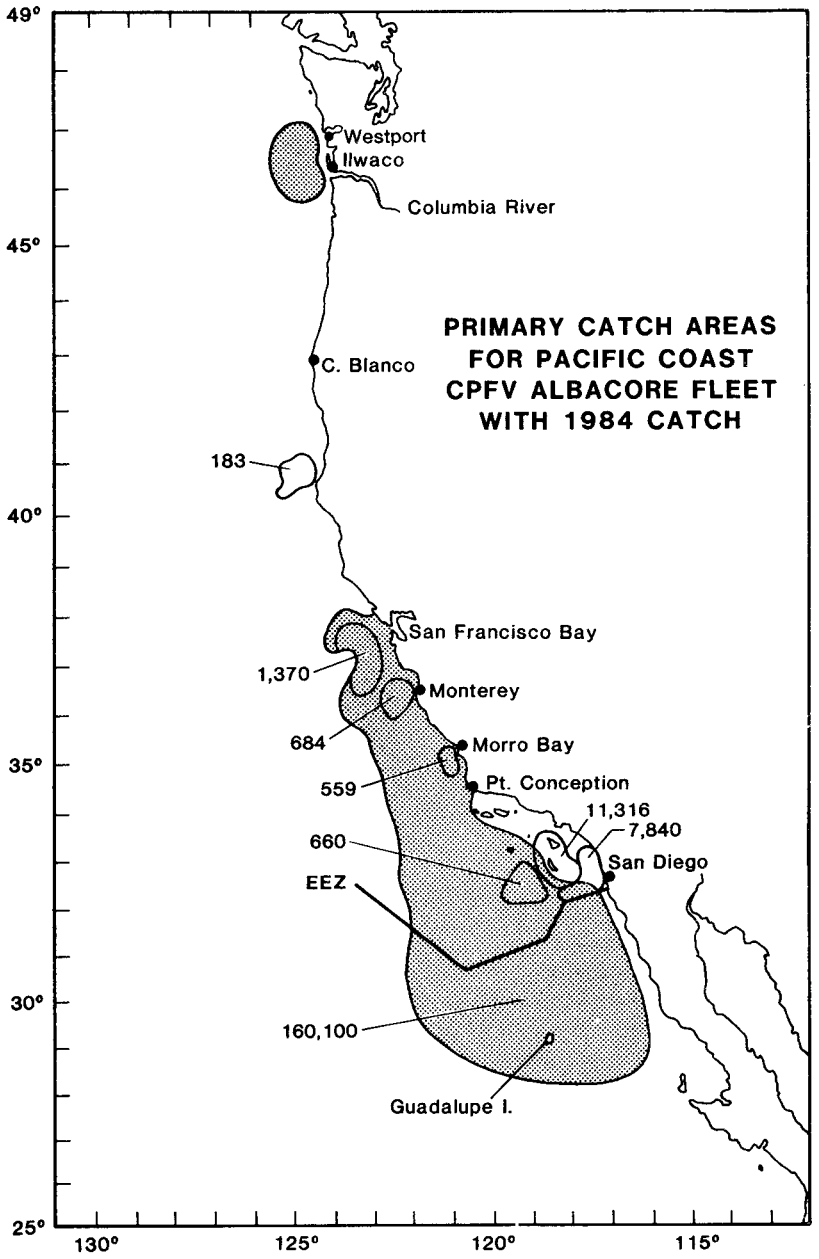

Figure 1.--Primary catch areas for the CPFV albacore fleet.

fortable vessels. In 1978, only 26 percent of the southern California vessels exceeded 65 feet and a few exceeded 100 feet, while only 5 percent of the central and northern California vessels exceed 65 feet (Gruen, Gruen, and Associates[3]).

Charter boats fishing for albacore off Oregon and Washington are temporarily drawn from the recreational Pacific salmon fishery and operate for albacore only when large quantities are close to shore. During the middle 1970's these vessels averaged 46 feet and none exceeded 65 feet in length (Lincoln and Culver, 1977). There has been continual upgrading of vessels in this fleet over the past several years; however, no large vessels have been able to move permanently into the fleet, and the size composition has not changed appreciably.

The most common fishing methods employed by the CPFV's include live bait fishing and trolling with lures and feather jigs (Dotson, 1980; Culver, 1977). Some regional variation in specific techniques has been developed to optimize local catches. For example, anglers in southern California normally troll with lures and feather jigs to locate areas of fish and then throw live anchovies in the water as chum to attract and hold the albacore at the boat while fishing with baited hooks. Jig fishing is more common in Washington and Oregon where the sportboats are usually salmon charter boats; however, many of these boats carry live bait on albacore trips. These boats are typically 25-55 feet long and carry only 6-12 passengers on 1-day trips. Albacore trips are usually scheduled only when strong local fishing is reported by commercial fishermen.

Regional Catch Information

Catch information from the CPFV fleet is collected by the individual state under whose jurisdiction the vessels operate. Each state has a survey program designed to sample the CPFV catch and to identify the economic importance of the major fisheries. The quantity and quality of statistics collected by the individual state agencies are highly variable, depending on the popularity of target species, economic importance of the species, status of targeted stocks, and political importance to a particular region.

California

Albacore, along with bluefin tuna,

[3]Gruen, Gruen, and Associates. 1979. The California commerical passenger fishing vessel and southern California live bait industries. NMFS Southwest Fish. Cent., La Jolla, Calif. Admin. Rep. LJ-79-31C, 83 p.

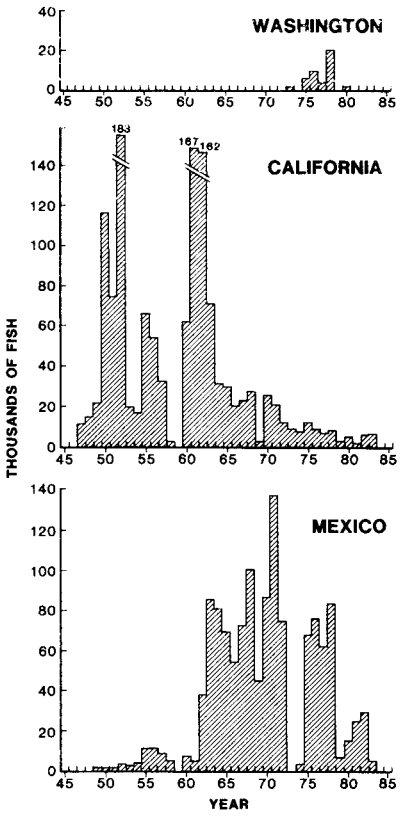

Figure 2.—Albacore catch from the waters off Mexico, California, and Washington.

Table 3.—Pacific Coast CPFV albacore catch (number of fish) and effort (C/A) by region.

			California								
	Mexico		San Diego to Pt. Conception		Pt. Conception to Oreg. border		Total		Oregon (No. of fish)	Washington	
Year	No.	C/A	No.	C/A	No.	C/A	No.	C/A		No.	C/A
1936-61	10,365	2.72	35,187	1.00	1,568	1.29	47,120	1.17			
1973	19		9,839				9,858			1,648	2.23
1974	3,850		8,964				12,814				
1975	68,296		13,266				81,562			5,494	3.40
1976	76,268		8,705				84,973			9,566	3.09
1977	62,678	1.65	6,504	1.58	1,092	0.66	70,274	1.60		4,275	1.77
1978	84,080		8,566				92,646			20,137	3.67
1979	7,260	1.50	1,021	0.61	1,915	1.01	10,196	1.21			
1980	15,657	1.36	1,290	1.93	4,362	1.08	21,309	1.32		1,540	3.08
1981	24,702	1.17	1,272	0.56	674	2.05	26,648	1.16			
1982	28,862	1.26	5,071	1.12	1,214	2.04	35,147	1.26	35	18	
1983[1]	8,968	1.84	2,990	2.05	5,203	2.21	17,161	1.98	0	0	

[1]Preliminary

Thunnus thynnus, were first reported taken in a sport fishery off Santa Catalina Island, Calif., at the turn of the century (Young, 1969). San Diego sport boats began traveling into the more productive Mexican waters (Fig. 2) in the middle 1950's for albacore, yellowtail, *Seriola lalandi*; white seabass, *Atractoscion nobilis*; Pacific barracuda, *Sphyraena argentea*; and billfish (Istiophoridae and Xiphiidae). The size, speed, and luxury of the southern California sport boats grew in response to these newly found areas off Baja California with some albacore vessels traveling as far as Guadalupe Island, 220 miles south of San Diego. The Channel Islands, nearby outer banks, and local Mexican waters all provide seasonally good albacore fishing for 1- and 2-day trips. These areas are only 30-80 miles offshore and sea conditions are normally favorable during the summer and fall months. Weather and sea conditions are commonly unfavorable north of Point Conception, Calif., because of the shorter warm-water periods and stronger prevailing winds that produce rougher seas for fishing.

The California Department of Fish and Game (CDFG) has required CPFV operators to maintain accurate records of their catch and number of passengers since 1936. Baxter and Young (1953) reported on the accuracy of some of these early records and found that albacore (also lingcod, *Ophiodon elongatus*; Pacific salmon, and yellowtail) counts were accurate over the 5-year study period (1947-51). They concluded that the high degree of accuracy was a result of the desirability of albacore, and that they were caught in relatively small numbers. By 1968, anglers frequenting southern California sport boats rated albacore the most desirable sport fish, and CPFV operators rated albacore seventh in overall importance to their business (Young, 1969).

California's historic albacore sport catch (1936-61) indicates an annual average of 41,000 albacore caught by 40,246 anglers. The catch per angler-trip (C/A) over this period averaged 1.17 with a range from 0.3 to 3.3 C/A (Clemens and Craig, 1965). Albacore effort data for 1936-61 have been merged with the data of other species taken in the same area and time period. Original records for many of these effort data are currently not available.

California anglers annually averaged 151 t (20,667 fish) between 1979 and 1983. The known number of albacore caught and the number caught per angler-trip for California, Oregon, and Washington are shown in Table 3. In southern California, albacore sportfishing dominates much of the CPFV fleet during summer and early fall. California's albacore sportfishing effort from 1979 to 1983 was conducted in the local Mexican waters; 11.3 percent occurred off southern California, and 10.6 percent occurred north of Point Conception. In contrast, records from 1936 to 1961 reveal that about 90 percent of the California effort occurred in southern California waters and 10 percent in Mexican waters, with almost no effort to the north.

Washington

The albacore CPFV fishery in Washington, which began in the early 1970's, was an offshoot of the very successful salmon charter boat fishery. The number of trips for ocean-going salmon began increasing rapidly in the late 1940's, and by early 1960's sportfishing expenditures were the single most important element in the local economy of several of Washington's coastal marine communities (Crutchfield and MacFarlane, 1968). By 1975, coastal salmon

charter boats exceeded 500,000 angler trips annually and had long since passed the effort expended by private boats (Phinney and Miller, 1977). This large, successful fishery provided the foundation for Washington's albacore charter boat fishery which began off Grays Harbor and the mouth of the Columbia River in 1970. Vessel owners found that the nearshore availability of albacore provided local saltwater anglers with good summer albacore fishing through 1978. This resource also served to boost lagging charter boat revenues brought on by decreasing salmon catches and increasing regulations.

Washington's first recreational albacore catch statistics were reported in 1973. In 1975, the Washington Department of Fisheries (WDF) began a survey to evaluate the importance of this new fishery. Catch and effort data (Table 4) were collected at the two southern coastal ports of Westport and Ilwaco (Lincoln and Culver, 1977). Survey data were not collected in 1974, although a moderately active charter boat fishery did occur. During the period for which data have been reported (1973-78), a total of 41,110 albacore weighing 308 t were landed in 13,344 angler trips, averaging 3.08 albacore per angler trip (C/A). No catch data were reported for 1979 and only 500 angler trips were reported for 1980. In both 1981 and 1982, albacore did not appear inshore. Consequently, only a few exploratory trips were scheduled and these were unproductive. The high angler catch rate observed when fish were present indicates a successful albacore sport fishery will develop any time albacore migrate within range of Washington's charter boats.

Oregon

Like Washington, the growth of Oregon's charter boat industry has long depended on various species of Pacific salmon (Wendler, 1960). Over 81,000 angler trips are logged annually for salmon; only a few have ever been reported for albacore.

Local nearshore upwelling normally displaces albacore too far offshore for Oregon's charter boats. Predominant northern winds in summer and fall transport surface waters offshore, allowing nearshore upwelling of colder waters. Lane (1965) found that, while it is a complex system, a breakdown of the normal wind patterns can result in a cessation of coastal, coldwater upwelling. As a result, albacore can move into these nearshore regions where they become available to local charter boats. Owen (1968) found that in addition to the general wind direction, the discharge of fresh water from the Columbia River into coastal and offshore areas affects albacore distribution and availability. A relatively weak upwelling was reported in 1976 (PMFC, 1977) and the Oregon Department of Fish and Wildlife (ODFW) reported that a small, opportunistic charter boat fishery for albacore developed during 1975 and 1976 (ODFW, 1977).

Interest in this sport fishery continued in 1977 and 1978 as albacore again became available 20-60 miles off Coos Bay and north to the mouth of the Columbia River. Some charter boats reported catches of up to five albacore, weighing from 15 to 20 pounds, per angler trip (PMFC, 1978). Nearshore availability has been lower since 1978 with few charter boat trips scheduled. Recent ODFW statistics indicate that only about 50 albacore were taken in 1980 and 24 in 1981. In 1982, five charter boats reported a total catch of four albacore. Oregon's sportsmen have demonstrated their interest in albacore and will certainly participate in a CPFV fishery when the fish come within 50 miles of shore.

Discussion

The commercial albacore fleets of at least five countries catch more than 70,000 t of albacore annually from the North Pacific. The U.S. Pacific coast albacore sport fishery lands less than 1 percent of the total commercial catch. Economists, however, have shown in some detail the importance of recreational fishing to regional economic growth, as well as the recreational benefits to the sportsman (Wendler, 1960; Holliday et al., 1984; Center for Natural Areas[4]).

In 1982, San Diego albacore fishermen made nearly 28,000 angler trips and spent over $1.5 million dollars on sportboat (CPFV) fees alone. The commercial value of this catch was less than $200,000. Additional revenues realized by local merchants for tackle, bait, fuel, food, and lodging have not been determined for the recreational albacore fishery, but they are significant during the season. The historic value and importance of the recreational albacore catch in northern California, Oregon, and Washington are practically undocumented. Washington's record of fishing effort in the middle 1970's was well documented, but no information exists for the periods when fishing was less than spectacular.

The tremendous fluctuation in Pacific coast CPFV catch rates is due to environmental factors that influence the

Table 4.—Washington albacore sport catch and effort reported for 1973 and 1975-78[1].

Year	No. of albacore	Total weight[2] (t)	No. of angler *trips*	Albacore per angler *trip*	No. of angler hours	Albacore per angler hour	Port sampled
1973	1,648	12.0	739	2.73			Westport
1975	5,494	45.0	1,615	3.40	10,873.9	0.51	Ilwaco
1976	947	9.2	720	1.03	5,185.1	0.16	Ilwaco
1976	8,609	83.5	2,373	3.63	21,183.0	0.41	Westport
1977	976	5.5	977	1.00	5,483.9	0.18	Ilwaco
1977	3,299	18.7	1,432	2.30	1,096.2	0.31	Westport
1978	5,748	38.2	1,796	3.20			Ilwaco
1978	14,389	95.7	3,692	3.90			Westport
Total	41,110	307.8	13,344	3.08	43,822.1	0.44	

[1]Adapted from Lincoln and Culver, 1977.
[2]Weights calculated from local commercial landings.

[4]Center for Natural Areas. 1980. Survey of partyboat passengers to summarize and analyze recreational demand for partyboat fishing in California. NMFS Southwest Fish. Cent., Admin. Rep. LJ-80-14C, 47 p.

nearshore distribution and surface availability of albacore. They normally begin moving into coastal Mexican and southern California waters in June as the waters warm to 15° - 18°C; and southern California vessels have little trouble reaching good fishing areas. North of Point Conception, Calif., albacore are present normally from mid-July through early September. Coastal upwelling of colder, deep ocean water and generally harsher oceanographic conditions combine to displace albacore beyond the range of the small, troll-type charter boats of northern California, Oregon, and Washington.

The anomalous warming periods in the eastern Pacific, known as El Niño, also disrupt the normal albacore distribution and migratory paths (Squire, 1983). This was particularly evident in 1959 when the fish did not move into southern California waters at all, and again in 1973 when the CPFV catch feel from a 5-year mean of more than 100,000 fish to less than 10,000 fish. It was during this latest period that Oregon and Washington charter boats did well on albacore around Grays Harbor and the mouth of the Columbia River. Oregon's charter boats worked these albacore schools, but effort was low compared with their other recreational fisheries and consequently was not included in their State Fisheries Census. The Washington Department of Fisheries found good activity and public interest in sustaining an albacore sport fishery, and several years of good catch and effort data were collected. Additionally, these El Niño years and those immediately following were excellent for the Oregon and Washington commercial jig boats, whose landings were well above average. The sport fishery failed in recent years due to a lack of fish within about 80 miles of shore.

The anomalous warming of 1976 was weak and short lived compared with those of 1972-73 and 1982-83 and consequently had little effect on California's recreational albacore catch. The 1982-83 El Niño was considered strong, and southern California anglers caught relatively few albacore in waters that were 1° - 3°C above normal. The warm waters attracted a record number of yellowfin, *Thunnus albacares*, and skipjack tuna, *Katsuwonus pelamis*, however, and most traditional albacore sportboats switched their effort to these tropical species by the end of July. In contrast to the 1972-73 El Niño, the recent warming did not appear to encourage the Oregon and Washington albacore charter boat fishery.

California's historic (1946-61) catch rate of 1.17 C/A and the current 3-year average of 1.32 C/A are much lower than Washington's average of 3.08 C/A. Comparing these catch rates can be misleading because effort data are not available over the same time periods, and differing modes of operation tend to enhance Washington's catch rate. These northern charter boat operators schedule albacore trips only when there are local areas of warm water or a strong commercial fishery close to shore. This selective manner of scheduling fishing trips tends to boost their success rate even though they have shorter or even nonexistent seasons. In California, albacore sport boats can usually catch enough fish to attract passengers even when they have to spend a significant amount of time scouting. Southern California's sport boats also carry more passengers per boat, some of whom may not actually fish.

More complete information describing catch statistics and the economic importance of west coast CPFV fisheries, focusing on the larger and migratory gamefish, would be useful. A specific CPFV monitoring program throughout the Pacific Northwest would help to emphasize the local importance of those recreational fisheries as well as to identify to what extent they are altered by fluctuating environmental conditions.

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