SOUTHWEST FISHERIES SCIENCE CENTER

NATIONAL MARINE FISHERIES SERVICE SOUTHWEST FISHERIES SCIENCE CENTER P.O. BOX 271 LA JOLLA, CA 92038

JULY 1991

SUMMARY OF THE 1990 NORTH PACIFIC ALBACORE FISHERIES DATA

By

Gary M. Rensink and Forrest R. Miller

ADMINISTRATIVE REPORT LJ-91-21

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Southwest Fisheries Science Center
National Marine Fisheries Service, NOAA
La Jolla, California 92038

and

Forrest R. Miller
Inter-American Tropical Tuna Commission
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INTRODUCTION

During the 1990 north Pacific fishing season (May-October), over 350 logbooks were distributed by the Western Fishboat Owners Association (WFOA) and port samplers throughout California, Oregon, and Washington to U.S. albacore fishermen for voluntary record keeping. Logbooks were collected, or information from vessel logbooks were abstracted, by representatives from the California Department of Fish and Game (CF&G), Washington Department of Fisheries (WDF), and the Oregon Department of Fish and Wildlife (OF&W). Landings were also sampled for sizes of fish.

This report is a summary of data for the 1990 fishing season. Available data from foreign fisheries are also presented for comparison.

COVERAGE RATES

Samplers collected catch and fishing effort statistics from vessels who completed U.S. Pacific Albacore Logbooks, or abstracted fishing information from vessel logbooks, and measured lengths of individual fish (fork length) from landed catches. Coverage rates for catch-and-effort and length-frequency statistics were calculated as the ratio of sampled landings in weight to total landings.

Catch-and-effort and length-frequency statistics from the U.S. north Pacific albacore fishery were collected at landing ports throughout California, Oregon and Washington. NMFS observers on board five U.S. jigboats also completed U.S. Pacific Albacore logbooks, and recorded length-frequency, gillnet damage, and various other data (Bartoo, Holts and Brown 1991). The majority of the landings were from jigboats, with lesser quantities from baitboats, gillnet boats, purse seiners, and vessels using a combination of bait and jig fishing gears (Table 1). The overall sampling coverage for catch-and-effort information was 57% in 1990, an increase from 36% in 1989 (Table 2). Length-frequency sampling coverage was

56% in 1990, an increase from 28% in 1989. 1990 landings in Oregon and Washington were much higher than landings in 1989, and coverage increased for both catch-and-effort and length-frequency sampling in most ports.

TOTAL CATCH AND EFFORT

The 1990 U.S. north Pacific albacore fishery started in late May and continued through mid-October. The 450+ vessels participating in the U.S. albacore fishery expended an estimated 5,250 days fishing (sampled days fishing/coverage rate) compared to 8,100 days fishing in 1989. In 1990, catches were highest in August, roughly 550 miles west of the Columbia River, and in September, about 125 miles west of the Queen Charlotte Islands (Figures 1a-f). Catches from the commercial fishery rebounded from a record low of 1,918 mt in 1989 to 2,818 mt in 1990 (Figure 2, Table 3), an increase of 47%. Sport catches were estimated at 24 mt, almost all in areas off of northern Baja California.

Data from most of the foreign north Pacific albacore fisheries are available only through 1989 (Table 3). Japanese longline and gillnet catches of albacore have remained stable since 1986. Japanese baitboat catches dropped dramatically in 1988 and rebounded only slightly in 1989, due to a combination of targeting more on skipjack, a reduction in fleet size, and declines in catch per effort (Figure 2).

CATCH PER UNIT EFFORT

Estimates of catch per unit effort (number of fish caught per day fished, CPUE) for jigboats in the U.S. north Pacific fishery are independent of vessel size and are the ratio of catch to effort in each 1° square and month. Annual estimates are an average of all months and 1° squares. CPUE in 1990 (36 fish/day) increased 24% from that in 1989 (29 fish/day) (Figure 3). The highest CPUE in 1990 occurred 1,200 miles north of the Hawaiian Islands in July (170 to 270 fish/day), and 500 miles west of northern Oregon in August (190 to 225 fish/day) (Figures 4a-f). Both of the above areas were farther off shore than the 325 miles west of northern California and Oregon where the highest CPUE (120 to 260 fish/day) occurred in 1989.

LENGTH FREQUENCY

Over 43,000 albacore were measured for fork length (tip of snout to fork of the tail) from the landings of vessels participating in the 1990 U.S. north Pacific fishery (Table 1). Length-frequency data were summarized by gear and 5-degree latitudinal bands for inshore (east of 140°W) and offshore (west of 140°W) areas. The average fork length of fish measured increased from 65.1 cm (12.6 lbs) in 1989 to 71.0 cm (16.4 lbs) in 1990 (Figure 5), an increase of 30%. Fish ranged in size from 40 to 118 cm (Figure 7).

U.S. jigboat catches in 1990 consisted primarily of albacore with modes centered around 65 and 80 cm (probably 3- and 4-year- old fish), as opposed to a single mode

centered around 65 cm in 1989 (Figures 6 and 8b) (Coan, et al. 1990). Catch from vessels using a combination of bait and jig gears also consisted primarily of 3- and 4-year-old fish, although 4-year-old albacore represented a much smaller percentage of the total (Figures 6 and 8c). The size distribution of fish caught by purse seine vessels was bimodal, with centers at 56 and 75 cm and a noticeable absence of fish in between (Figures 6 and 8d). Baitboats caught fish that fell primarily into two size ranges; 58-68 cm and 72-82 cm (Figures 6 and 8a), although the length-frequency histogram may be biased due to the small sample size. The U.S. north Pacific albacore fleet caught the larger fish (75-85 cm) in the offshore areas (west of 140°W longitude) or north of 50°N latitude (Figures 8a-d). These larger fish were not present in significant numbers in 1989's catches, perhaps due to a lack of fishing effort in the offshore areas.

SEA SURFACE TEMPERATURE

Sea-surface temperatures (SSTs) recorded by commercial transport ships, fishing boats and research vessels were compiled into monthly means and plotted on charts with 1° latitude-longitude resolution. Analyses of mean SSTs on these charts show the distribution of SST contours (isotherms) and the location of surface ocean fronts. Areas fished successfully in 1990 by the U.S. north Pacific albacore fleet are shaded on the SST charts to show the relationship among areas of fishing, surface ocean fronts and SST isotherm patterns (Figures 9a-e).

During the 1990 albacore season SSTs were as much as 1°C (1.8°F) above normal in the offshore region west of 125°W. Coastal upwelling was strong enough from Cape Blanco to Monterey Bay (37-43°N latitudes) to bring to the surface cooler sub-surface water from 1° to 2°C (1.8° to 3.6°F) below normal east of 125°W. As a result there were sharp SST fronts within 60 to 100 nautical miles of the West Coast from July through September during the peak fishing season. Albacore fishing was most active on the warm (western) side of the SST fronts. Some upwelling developed fairly sharp ocean fronts within 75 nautical miles of Vancouver Island and the West Coast to the Columbia River, especially during August and the first half of September.

From Monterey Bay to Point Conception coastal upwelling was not strong during the season and the SST frontal boundaries were weaker than usual except during the last half of August and most of September. South of Point Conception SST's were 1°C (1.8°F) or more above normal during most of the albacore season. There were no significant ocean fronts south of Point Conception. The warm ocean conditions and weak upwelling off Southern California may have contributed to the unusually poor albacore fishing in the Southern California waters.

NMFS OBSERVED TRIPS

National Marine Fisheries Service observers accompanied five U.S. troll vessels on six trips, starting in late May and finishing in early October 1990 (Bartoo, Holts and Brown

1991). The observers recorded daily catches, gillnet inflicted damage on albacore in the catch, and fish lengths and weights over a wide fishing area of the north Pacific Ocean.

A total number of 19,526 albacore were examined and measured. Overall, 12.4% (7.2% recent damage, 5.2% healed scars from earlier net encounters) of the catch examined showed evidence of net related damage. The highest incidence of injuries from recent encounters with drift nets, up to 18%, occurred west of 140°W in schools of larger fish weighing 20-25 pounds. Less than 5% of the albacore caught east of 140°W had fresh marks from gillnet encounters. Preliminary analysis indicated no significant weight difference between fish with and without gillnet marks.

SUMMARY

The 1990 U.S. north Pacific albacore commercial fishery landings (2,818 mt) represented a 47% increase over landings in 1989, but were the second lowest landings ever recorded. Catch rates increased 24% from 29 fish/day in 1989 to 36 fish/day in 1990. Increased catches of larger fish resulted in a 30% increase in the average size of albacore caught (12.6 lbs. in 1989; 16.4 lbs. in 1990). Sampling coverage increased from 36% and 28% in 1989 to 57% and 56% in 1990 for catch-and-effort and length-frequency respectively. Weak or non-existent SST frontal boundaries from Monterey Bay south may have contributed to the poor albacore fishing off of central and southern California. Data collected during the NMFS observed trips showed that 12% of the albacore caught had been damaged by previous encounters with gillnets.

ACKNOWLEDGEMENTS

We thank the captains and crews of the U.S. north Pacific albacore fishing fleet, and William Perkins of the Western Fishboat Owners Association for their cooperation and continuing support of this program. We also thank Mary Larson of CF&G, Larry Hreha of OF&W, Brian Culver of WDF, Russ Porter of the Pacific States Marine Fisheries Commission (PMFC), and members of their staffs for distributing logbooks and collecting albacore fishing information during the fishing seasons.

Atilio Coan, Jr., Norm Bartoo, and Gary Sakagawa reviewed drafts of this report and provided useful comments. Henry Orr illustrated the maps, and Karen Handschuh prepared figures and typed the final draft of the manuscript.

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Coan, A.L., Jr., G. Rensink, C. Perrin, and F. Miller. 1990. Summary of the 1989 north and south Pacific albacore fisheries data. SWFSC Admin. Rpt. LJ-90-91. 38 p.

Table 1. Sampling results of the U.S. North Pacific albacore fishery by gear for 1989 and 1990.

Gear-type	Effort (days)	Catch (number)	No. of Fish Measured
1989			
Bait	30	3,559	756
Jig	2,094	113,900	9,353
Bait & Jig	31	3,691	428
Gillnet	90	242	53
Purse Seine	0	0	0
Unknown	589	0	0
TOTAL	2,834	121,392	10,590
1990			
Bait	71	8,609	107
Jig	2,849	198,469	40,341
Bait & Jig	135	15,580	2,884
Gillnet	41	16	11
Purse Seine	19	7,292	327
Unknown	33	0	0
TOTAL	3,148	229,966	43,670

Table 2. Sampling coverage for the U.S. North Pacific albacore fishery by state for 1989 and 1990.

State Where Fish Landed	Landings (mt)			Number of Landings	
	Total	Sampled	Coverage	Total	Sampled
1989					
Catch-and-Effort:					
California	584.3	206.8	35%	491	84
Oregon	476.2	219.3	46%	205	94
Washington	858.0	270.1	31%	143	44
TOTAL	1,918.5	696.2	36%	839	222
Length-Frequency:					
California	584.3	245.3	42%	491	74
Oregon	476.2	132.7	28%	205	44
Washington	858.0	152.3	18%	143	19
TOTAL	1,918.5	530.3	28%	839	137
1990					
Catch-and-Effort:					
California	723.1	575.8	80%	271	54
Oregon	942.3	483.3	51%	325	97
Washington	1,152.9	540.2	47%	163	52
TOTAL	2,818.3	1,599.3	57%	759	203
Length-Frequency:					
California	723.1	497.7	69%	271	56
Oregon	942.3	326.2	35%	325	47
Washington	1,152.9	747.6	65%	163	63
TOTAL	2,818.3	1,571.5	56%	759	166

Table 3. Catches of north Pacific albacore in metric tons by fisheries, 1952-1990.

	JAPAN[1]					TAIWAN		KOREA[2]	UNITED STATES[3]						CANADA	
YEAR	BAIT	LONG LINE	GILL NET	OTHER GEAR	TOTAL	LONG LINE	GILL NET	LONG LINE	BAIT	JIG	SPORT	GILL NET	PURSE SEINE	TOTAL		GRAND[4] TOTAL
1952	41,786	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	18,432		124	40,731					14,855	48			14,903	74	55,708
1959	14,252	15,802		67	30,121					20,990	0			20,990	212	51,323
1960	25,156	17,369		76	42,601					20,100	557			20,657	5	63,263
1961	18,636	17,437		268	36,341				2,837	12,061	1,355			16,253	4	52,598
1962	8,729	15,764		191	24,684				1,085	19,760	1,681			22,526	1	47,211
1963	26,420	13,464		218	40,102				2,432	25,147	1,161			28,740	5	68,847
1964	23,858	15,458		319	39,635	26			3,411	18,392	824			22,627	3	62,291
1965	41,491	13,701		121	55,313	261			417	16,545	731			17,693	15	73,282
1966	22,830	25,050		585	48,465	271			1,600	15,342	588			17,530	44	66,310
1967	30,481	28,869		520	59,870	305			4,113	17,826	707			22,646	161	82,982
1968	16,597	23,961		1,109	41,667	482			4,906	20,444	951			26,301	1,028	69,478
1969	32,107	18,006		1,480	51,593	569			2,996	18,839	358			22,193	1,365	75,720
1970	24,376	15,372		956	40,704	1,482			4,416	21,041	822			26,279	354	68,819
1971	53,198	11,035		1,262	65,495	1,739			2,071	20,537	1,175			23,783	1,587	92,604
1972	60,762	12,649	1	921	74,333	2,904			3,750	23,608	637			27,995	3,558	108,790
1973	69,811	16,059	39	1,883	87,792	128			2,236	15,667	84			17,987	1,270	107,177
1974	73,576	13,053	224	1,065	87,918	84			4,777	20,187	94			25,058	1,207	114,267
1975	52,157	10,060	166	402	62,785	254		319	3,243	18,975	640			22,858	101	86,317
1976	85,336	15,896	1,070	1,394	103,696	565		971	2,700	15,932	713			19,345	252	124,829
1977	31,934	15,737	688	1,039	49,398	301		65	1,497	10,005	537			12,039	53	61,856
1978	59,877	13,061	4,029	3,209	80,176	278		174	950	16,682	810			18,442	23	99,093
1979	44,662	14,249	2,856	1,280	63,047	106		27	303	6,801	74			7,178	521	70,879
1980	46,743	14,743	2,896	1,516	65,988	39		15	382	7,574	168			8,124	212	74,378
1981	27,426	18,020	16,825	959	63,230	163		600	748	12,694	195			13,637	200	77,830
1982	29,615	16,762	17,217	1,054	64,648	521		1,070	425	6,661	257			7,343	104	73,686
1983	21,098	15,103	9,514	471	46,186	512		1,233	607	9,512	87			10,206	225	58,362
1984	26,015	15,111	13,177	3,898	58,201	471		1,041	1,030	9,378	1,427		3,728	15,563	50	75,326
1985	20,714	14,320	20,199	1,940	57,173	109		2,169	1,498	6,431	1,176	2		9,107	56	68,614
1986	16,096	12,945	9,670	2,192	40,903				432	4,708	196	3		5,339	30	46,272*
1987	19,091	14,642	9,900	1,394	45,027				158	2,766	74	5		3,003	104	48,134*
1988	6,216	14,000	8,555	1,208	29,979	38	11,366		598	4,212	64	15		4,889	155	46,427*
1989	8,629	13,765	9,128	2,987	34,509				54	1,860	160	4		2,078	200	36,787*
1990									115	2,603	24	29	71	2,842	305	3,137*

1. Japaneses baitboat catches include fish caught by research vessels. Longline catches for 1952-60 exclude minor amounts taken by vessels under 20 tons; catches from 1958-68 were readjusted in 1988; catches are estimated by multiplying annual number of fish caught by average weight statistics. Gillnet catches for 1983-88 include south Pacific catches and are for the directed fishery.
2. Korean longline catches calculated from FAO statistics and Korean catch/effort data.
3. U.S. jigboat catches for 1952-60 include fish caught by baitboats, for 1961-85 include fish landed in Hawaii, for 1984-88 include gillnet catches. Figures for 1990 are preliminary.
4. Values for 1986-90 are partial total catches.

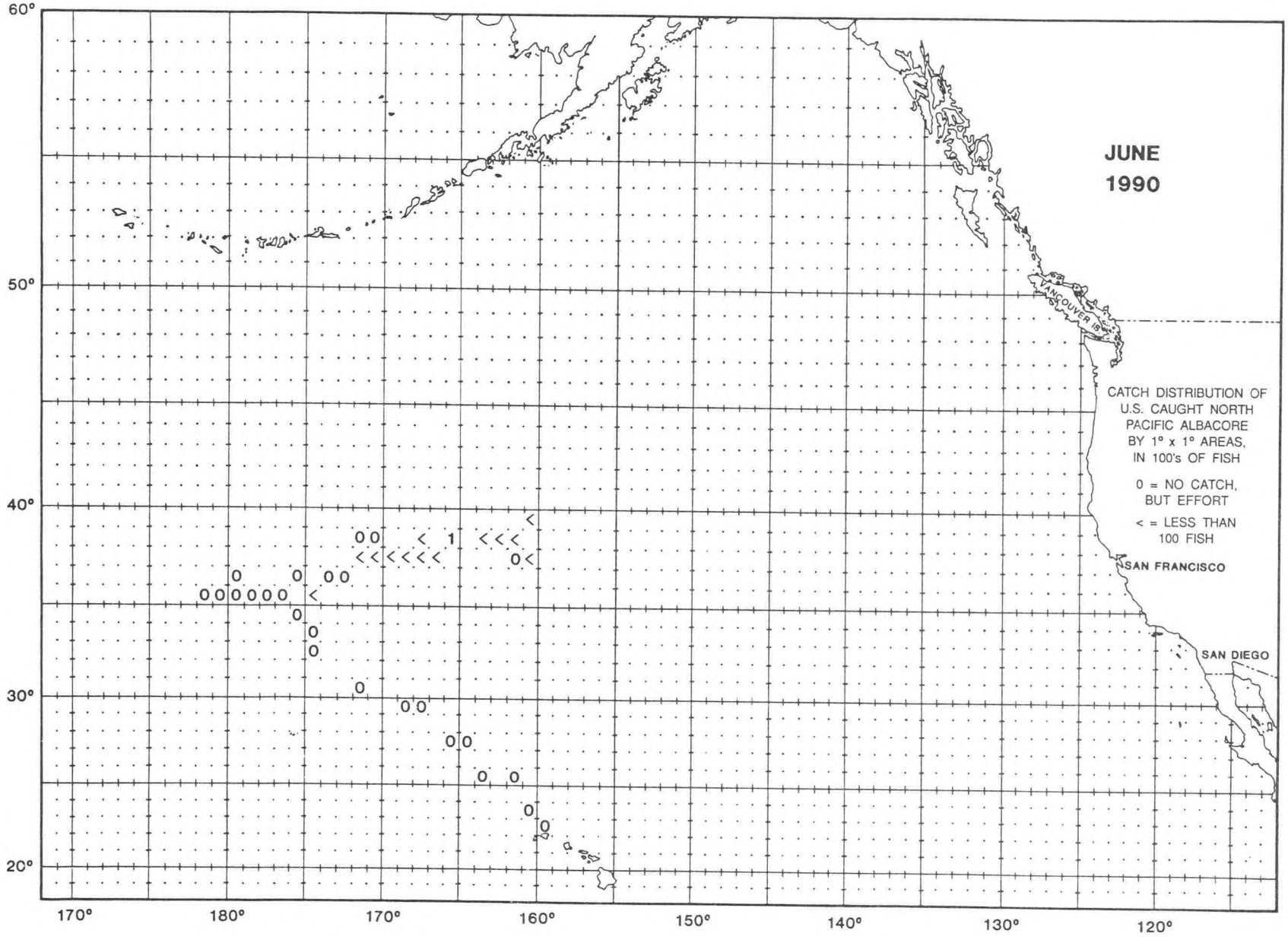

Figure 1a. U.S. albacore catch (numbers of fish) by 1° quadrangle in the north Pacific, June 1990.

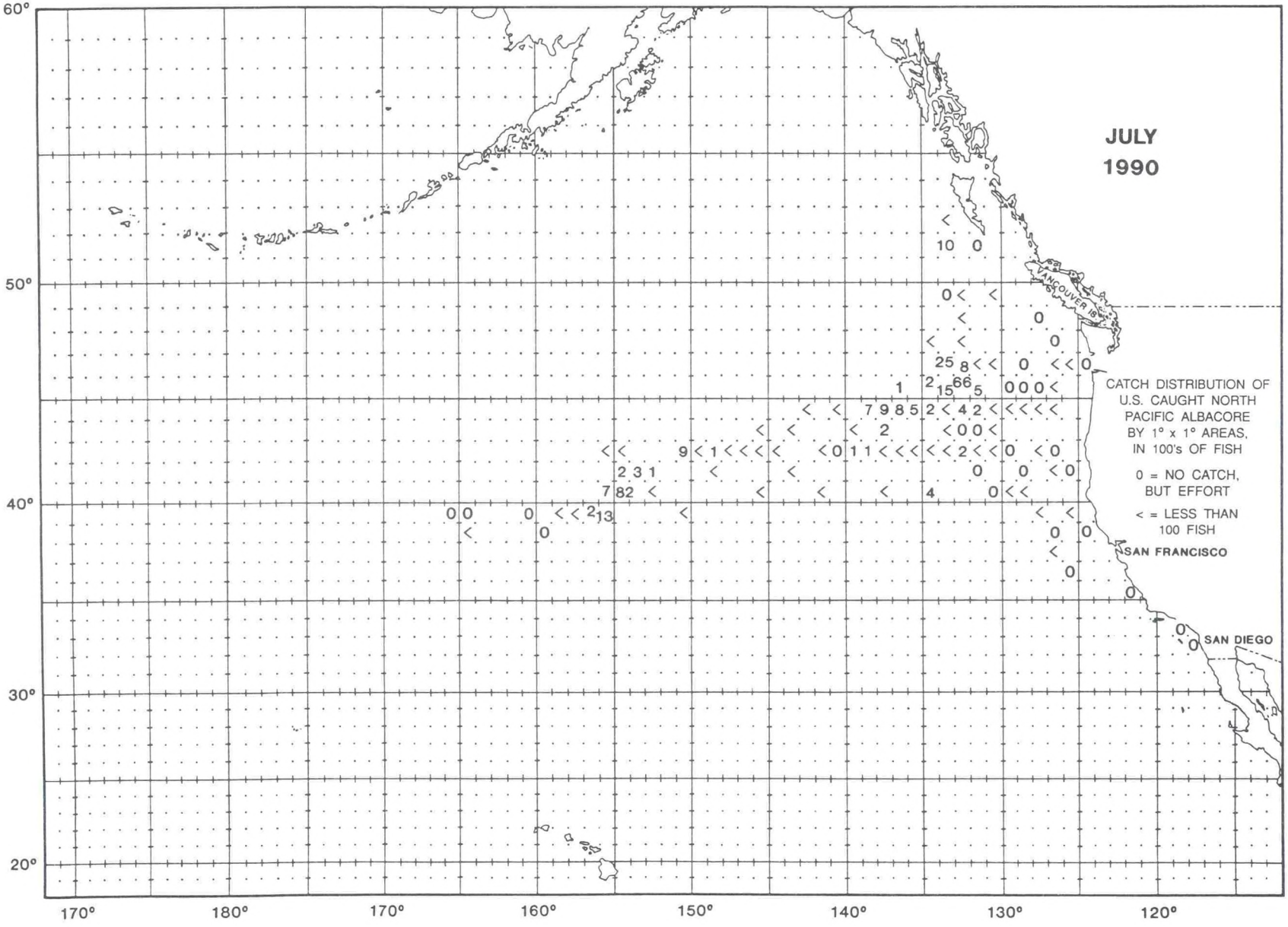

Figure 1b. U.S. albacore catch (numbers of fish) by 1° quadrangle in the north Pacific, July 1990.

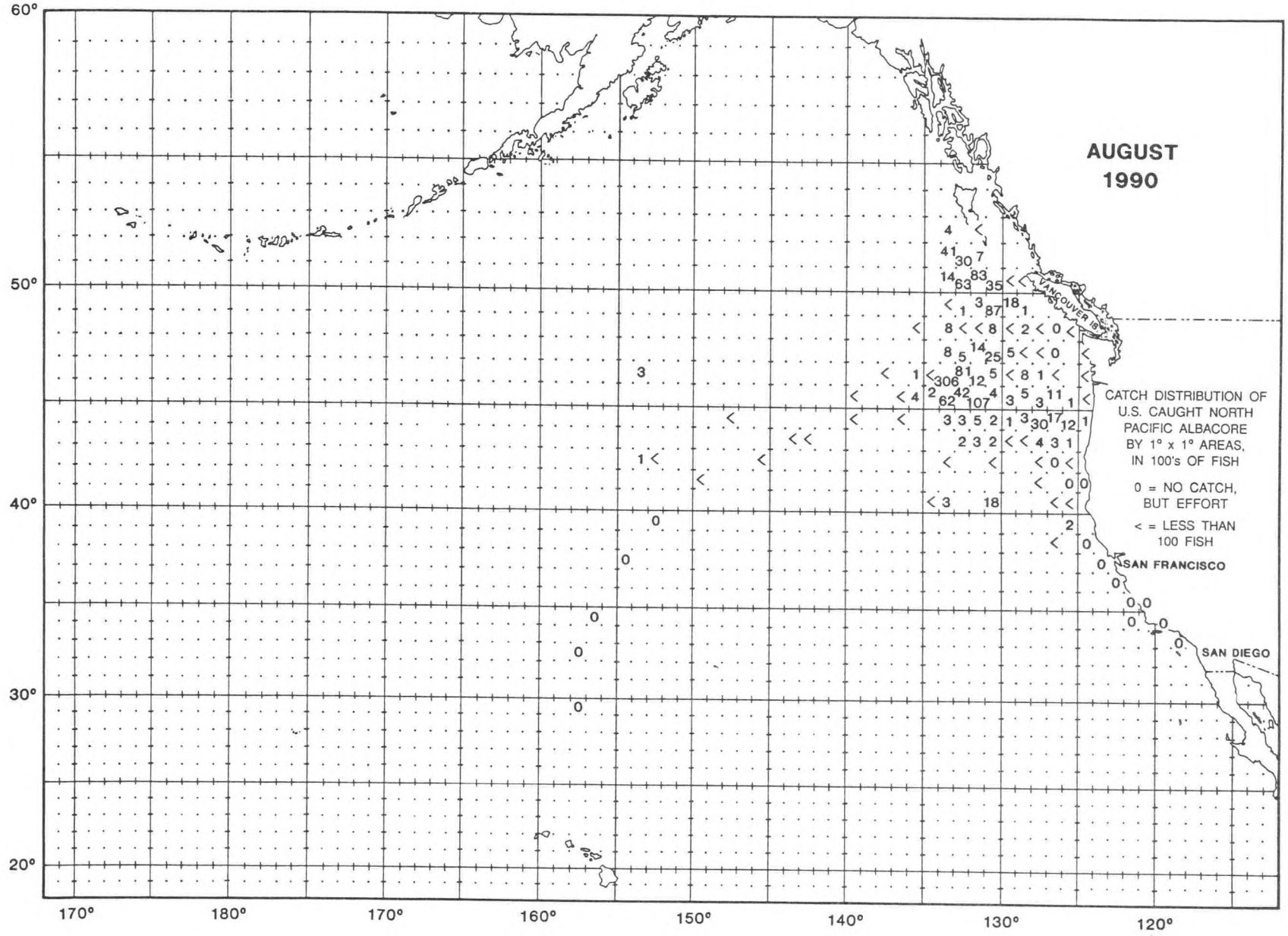

Figure 1c. U.S. albacore catch (numbers of fish) by 1° quadrangle in the north Pacific, August 1990.

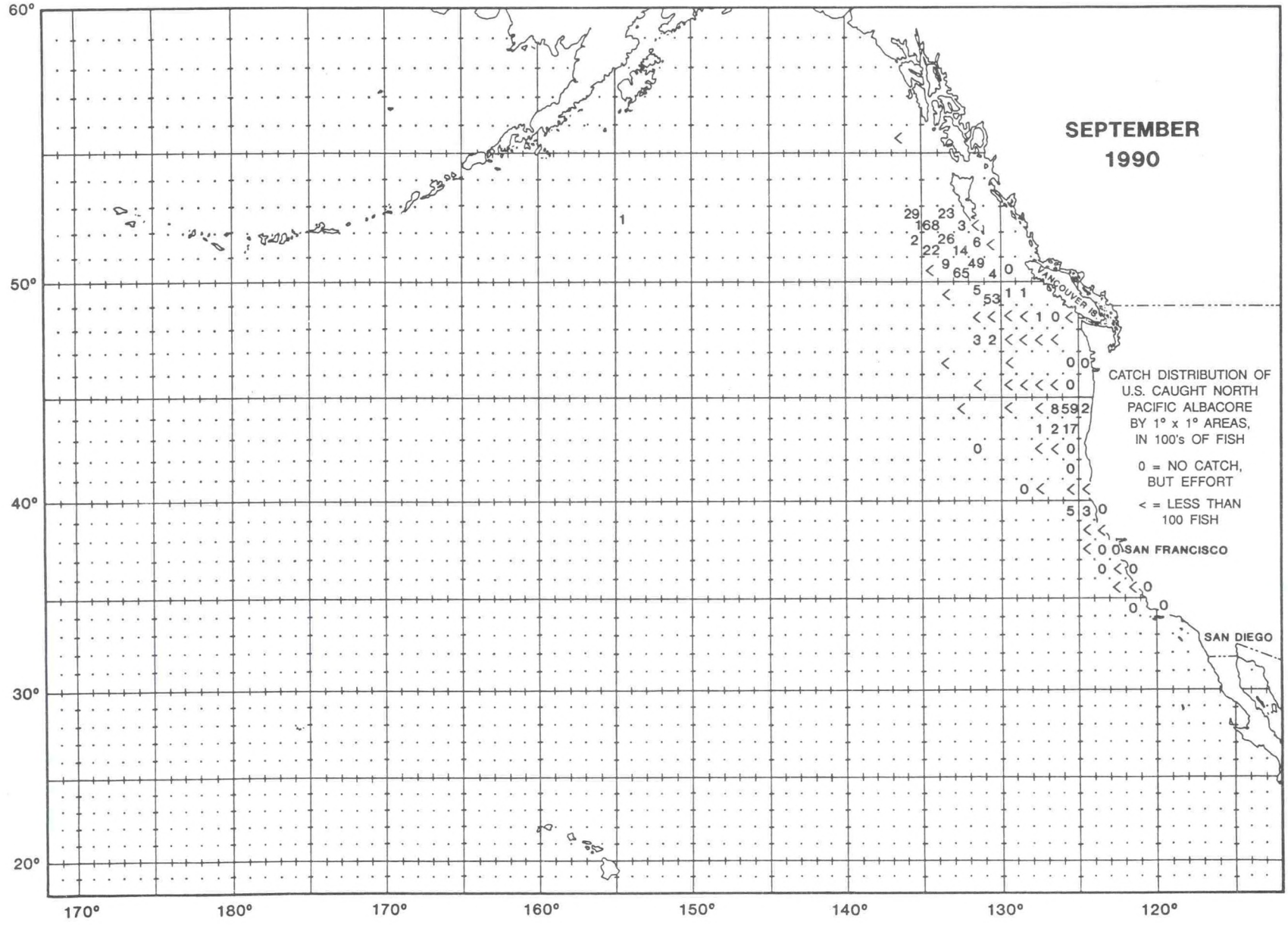

Figure 1d. U.S. albacore catch (numbers of fish) by 1° quadrangle in the north Pacific, September 1990.

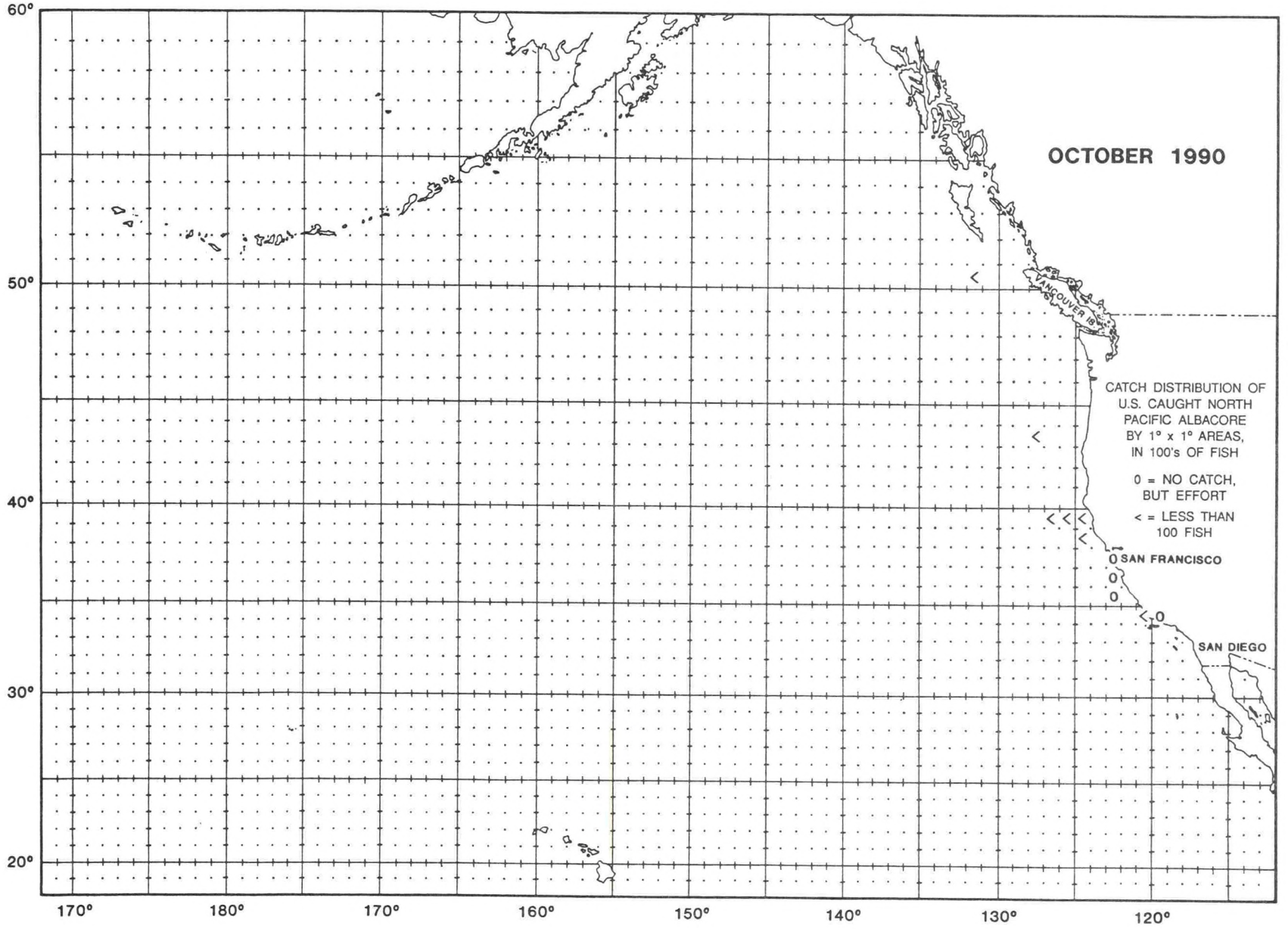

Figure 1e. U.S. albacore catch (numbers of fish) by 1° quadrangle in the north Pacific, October 1990.

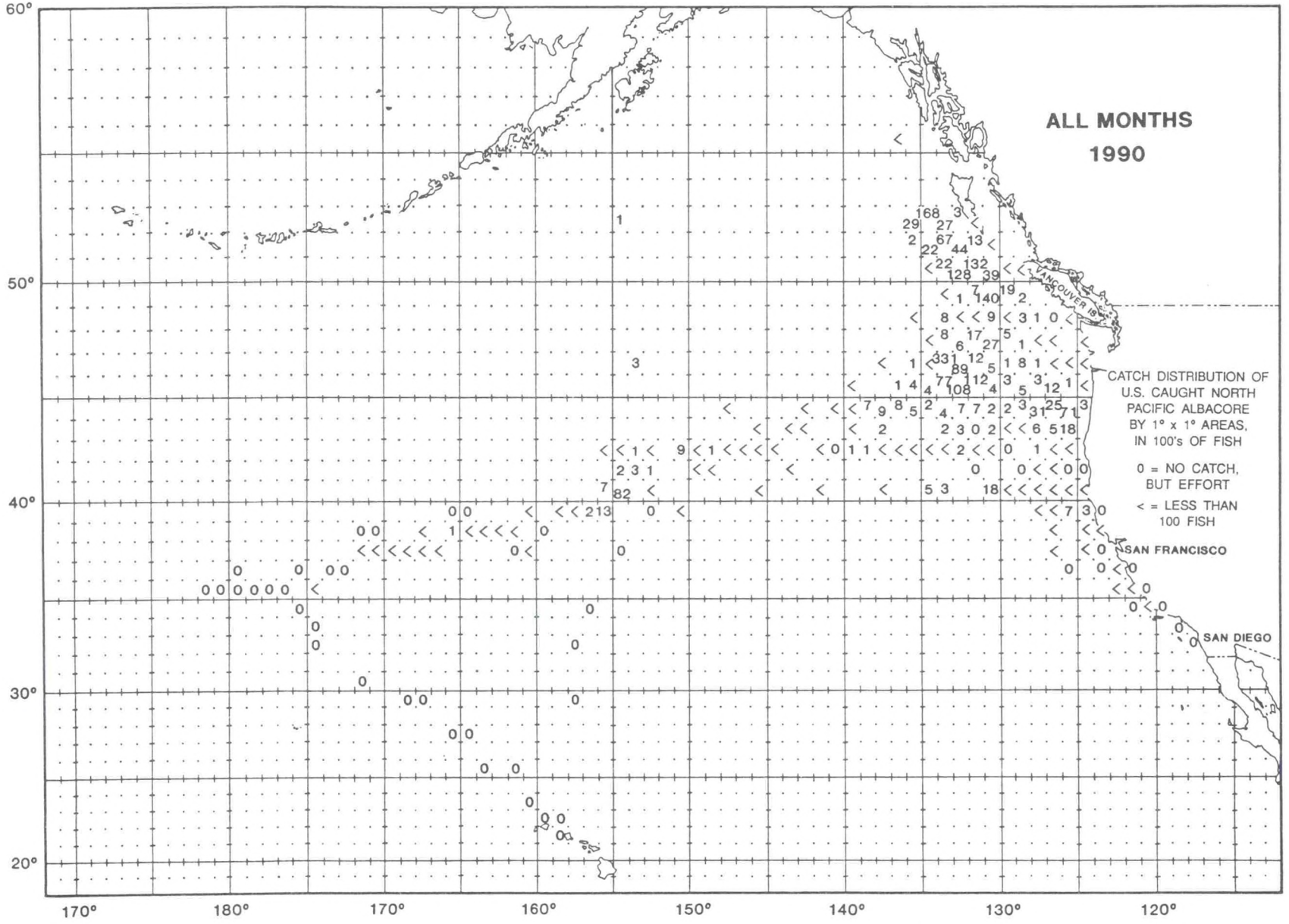

Figure 1f. U.S. albacore catch (numbers of fish) by 1° quadrangle in the north Pacific, 1990 season.

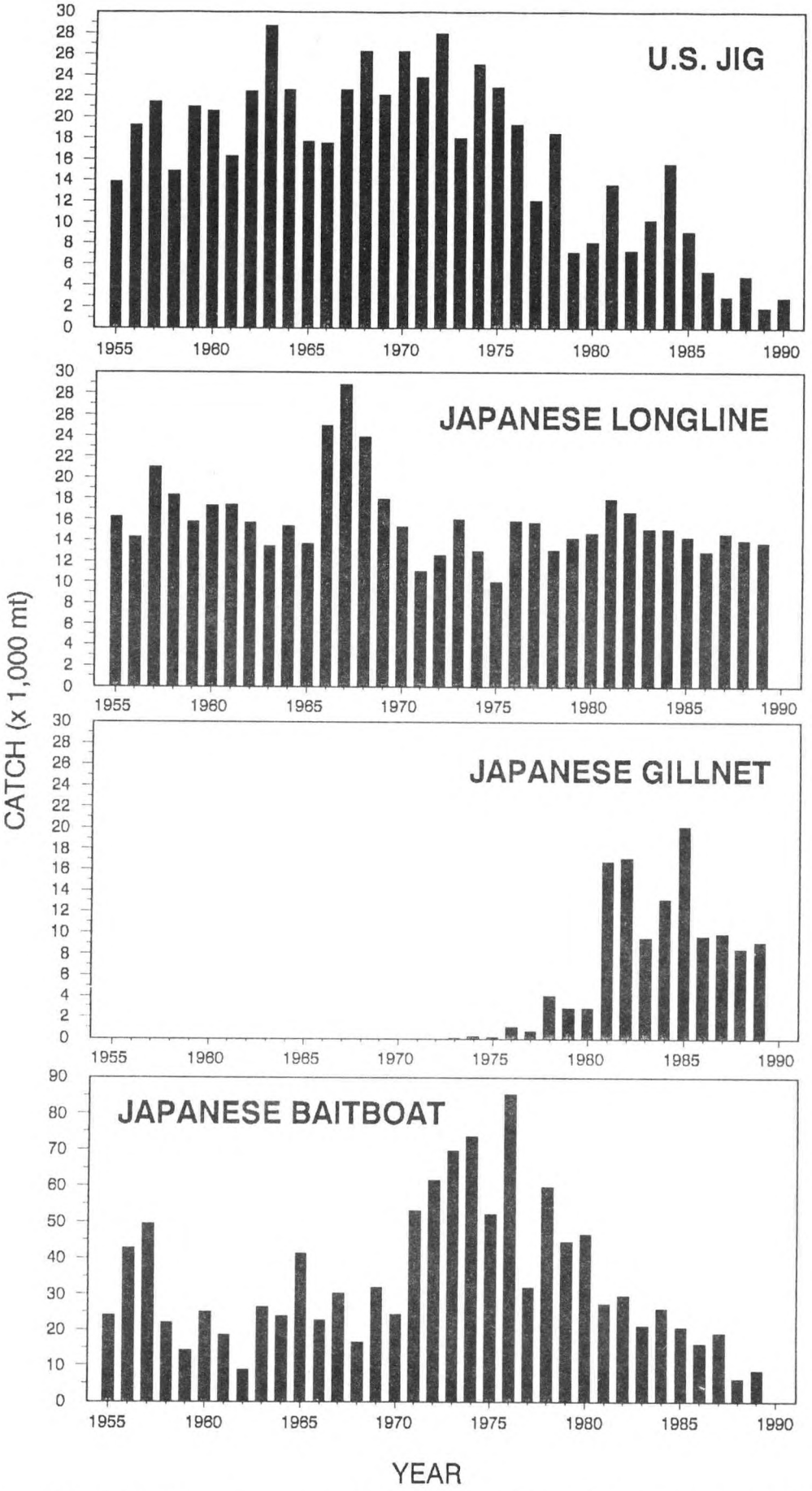

Figure 2. North Pacific albacore catch (metric tons) by selected fishery, 1955 - 1990.

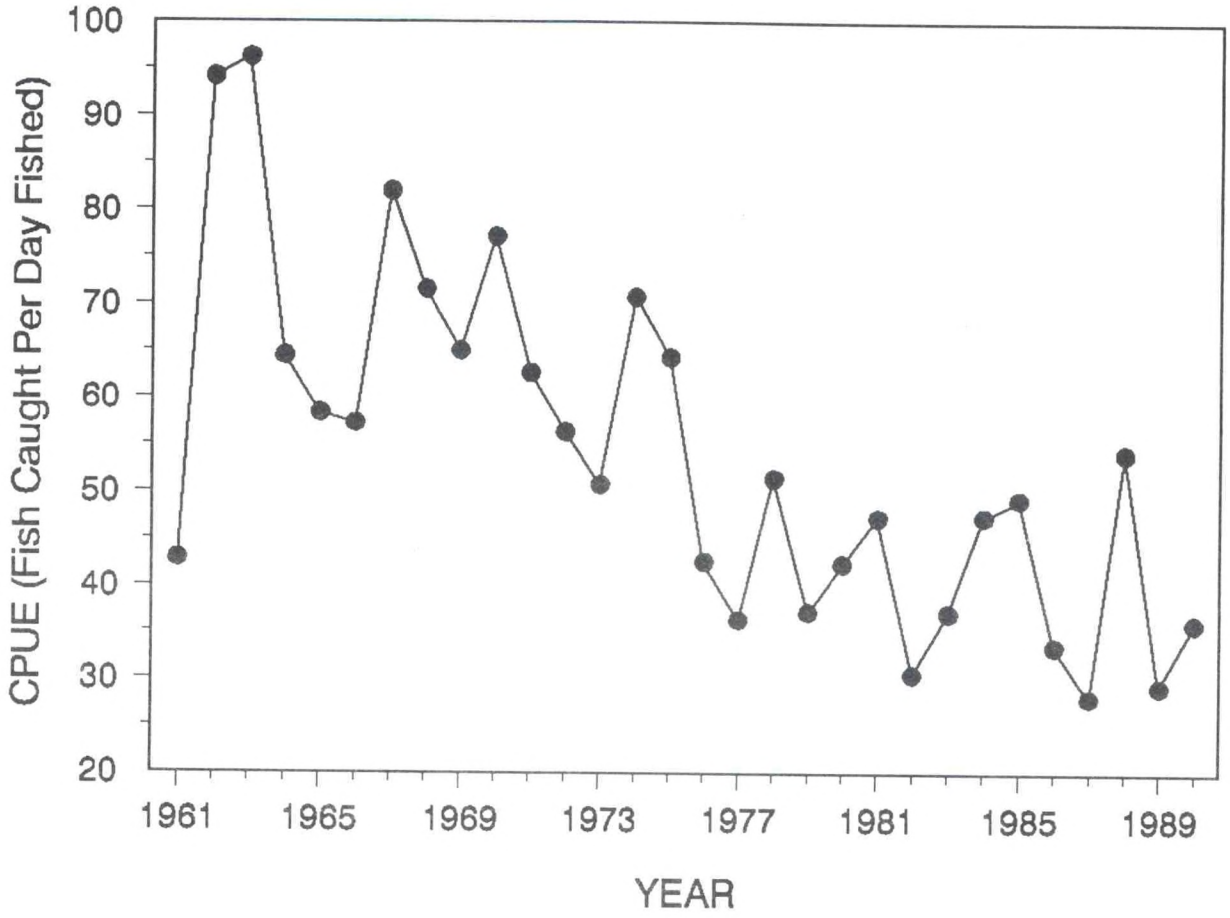

Figure 3. U.S. north Pacific albacore jigboat CPUE by year.

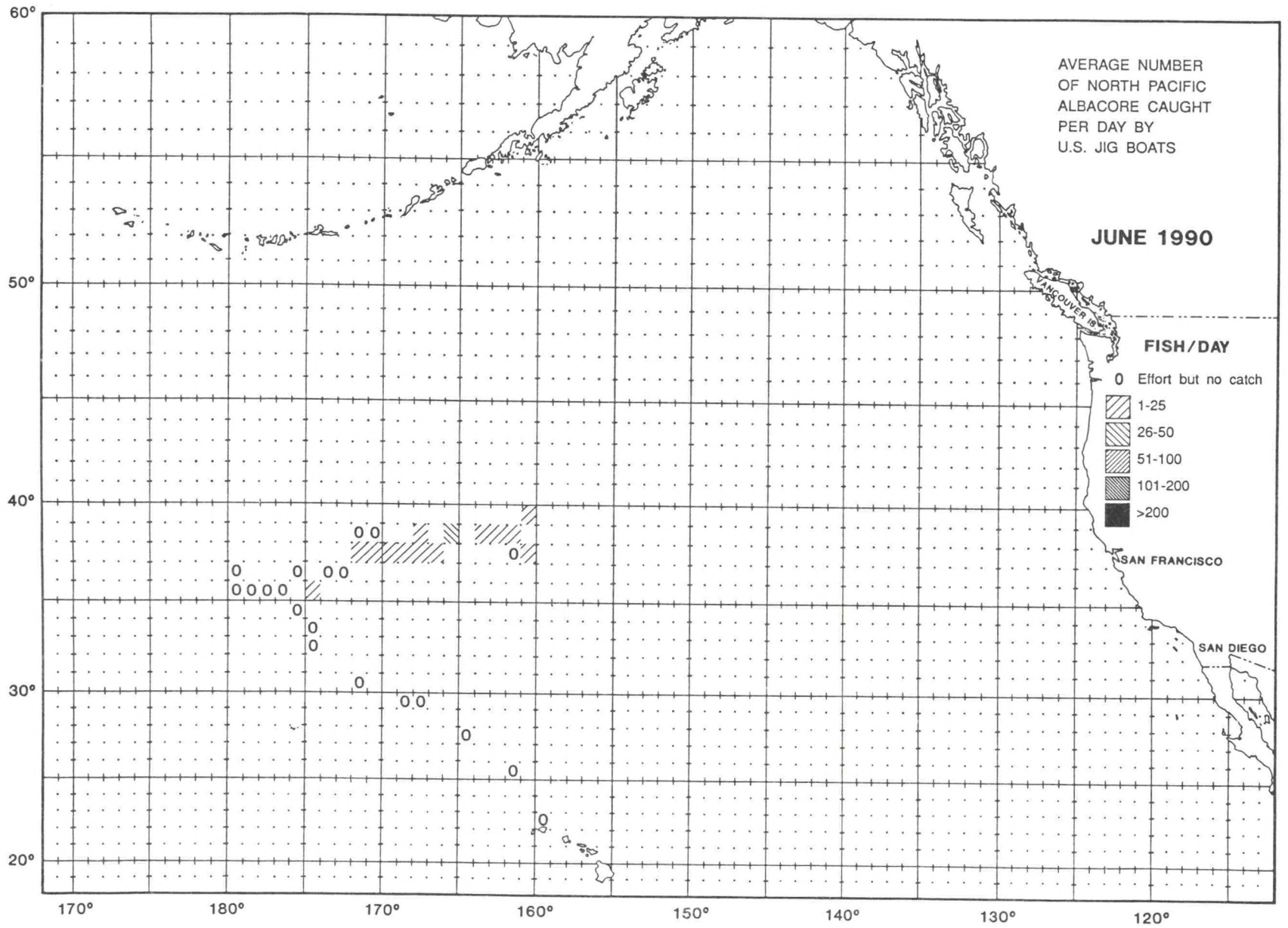

Figure 4a. U.S. albacore jigboat CPUE by 1° quadrangle in the north Pacific, June 1990.

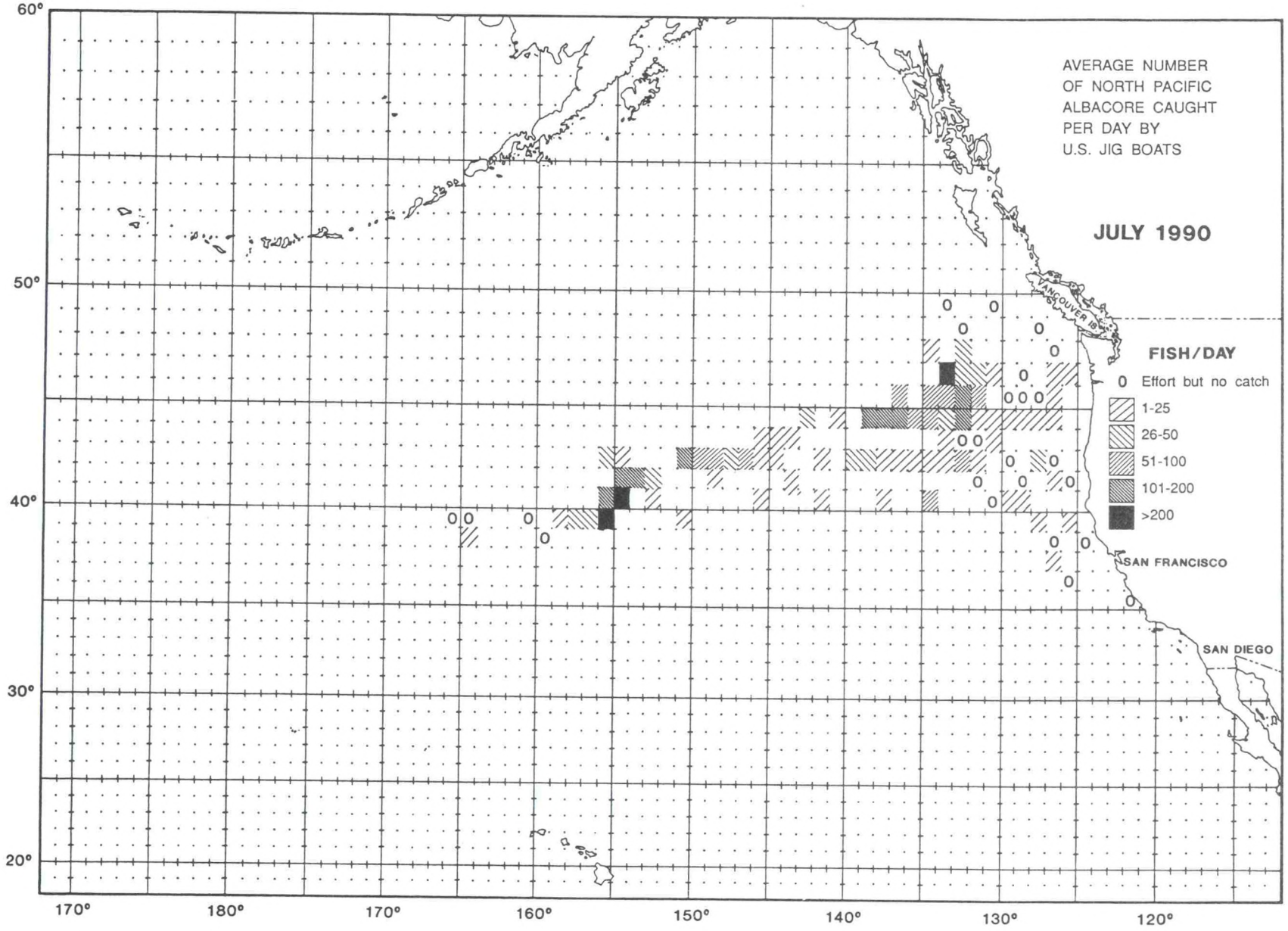

Figure 4b. U.S. albacore jigboat CPUE by 1° quadrangle in the north Pacific, July 1990.

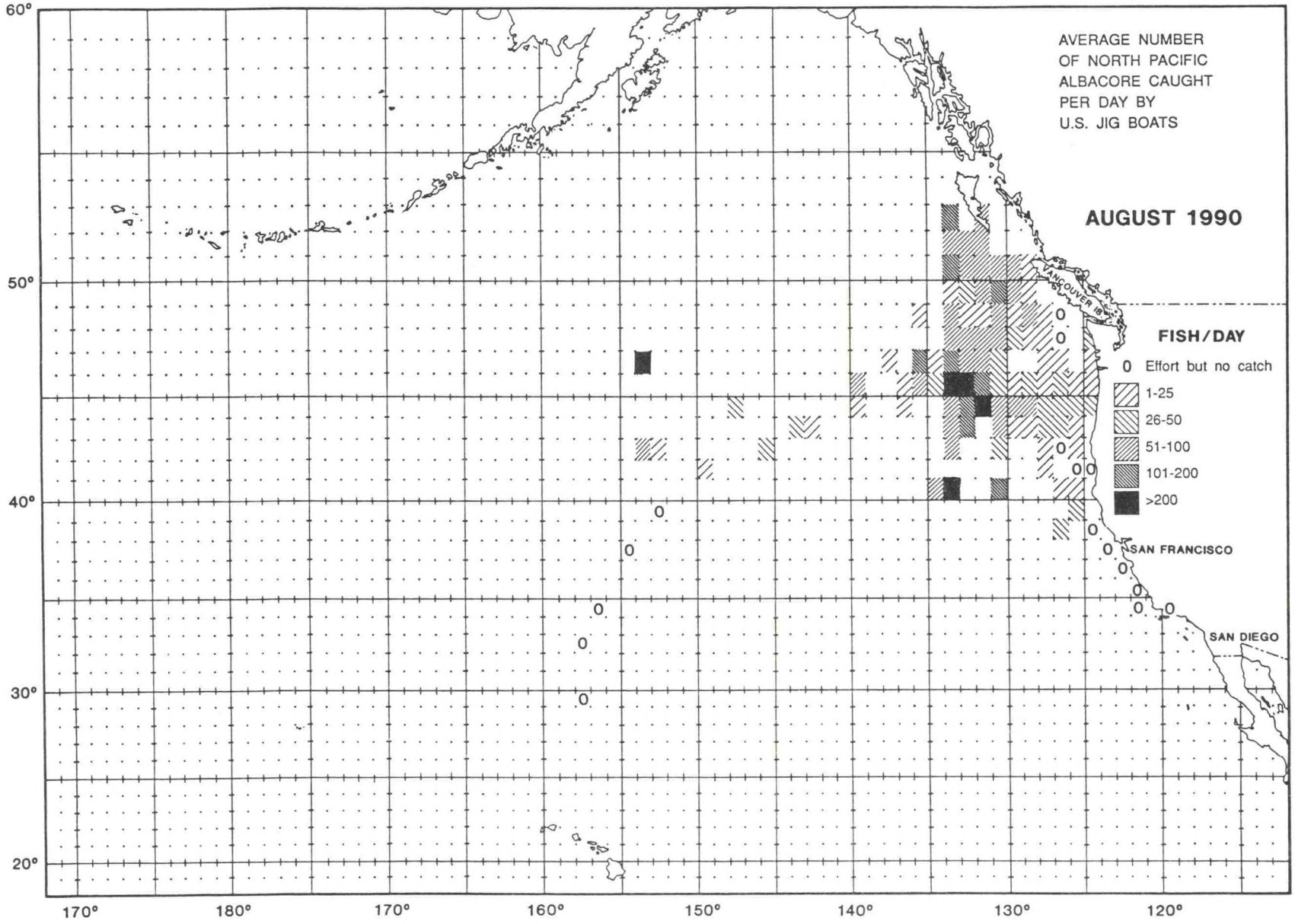

Figure 4c. U.S. albacore jigboat CPUE by 1° quadrangle in the north Pacific, August 1990.

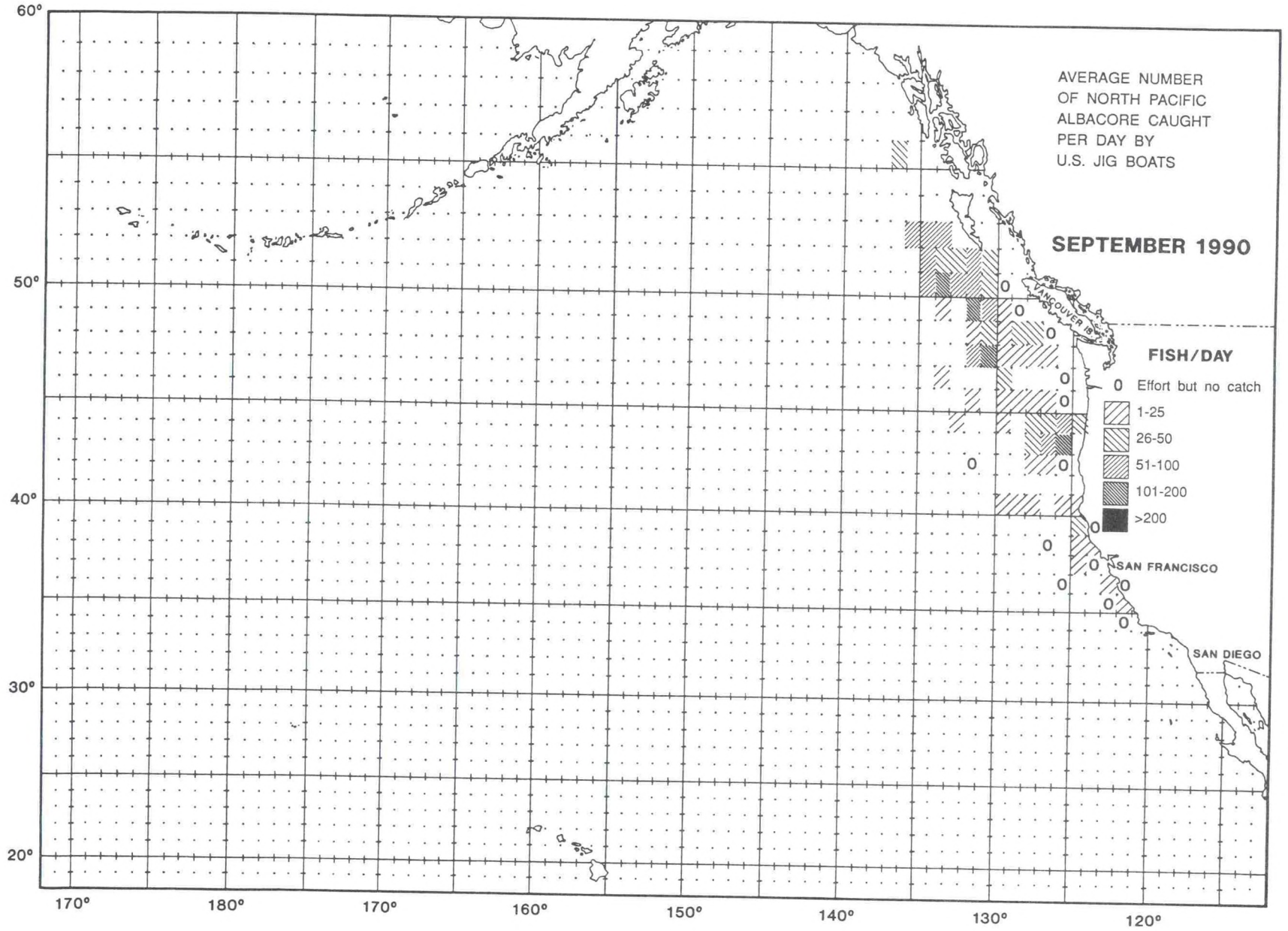

Figure 4d. U.S. albacore jigboat CPUE by 1° quadrangle in the north Pacific, September 1990.

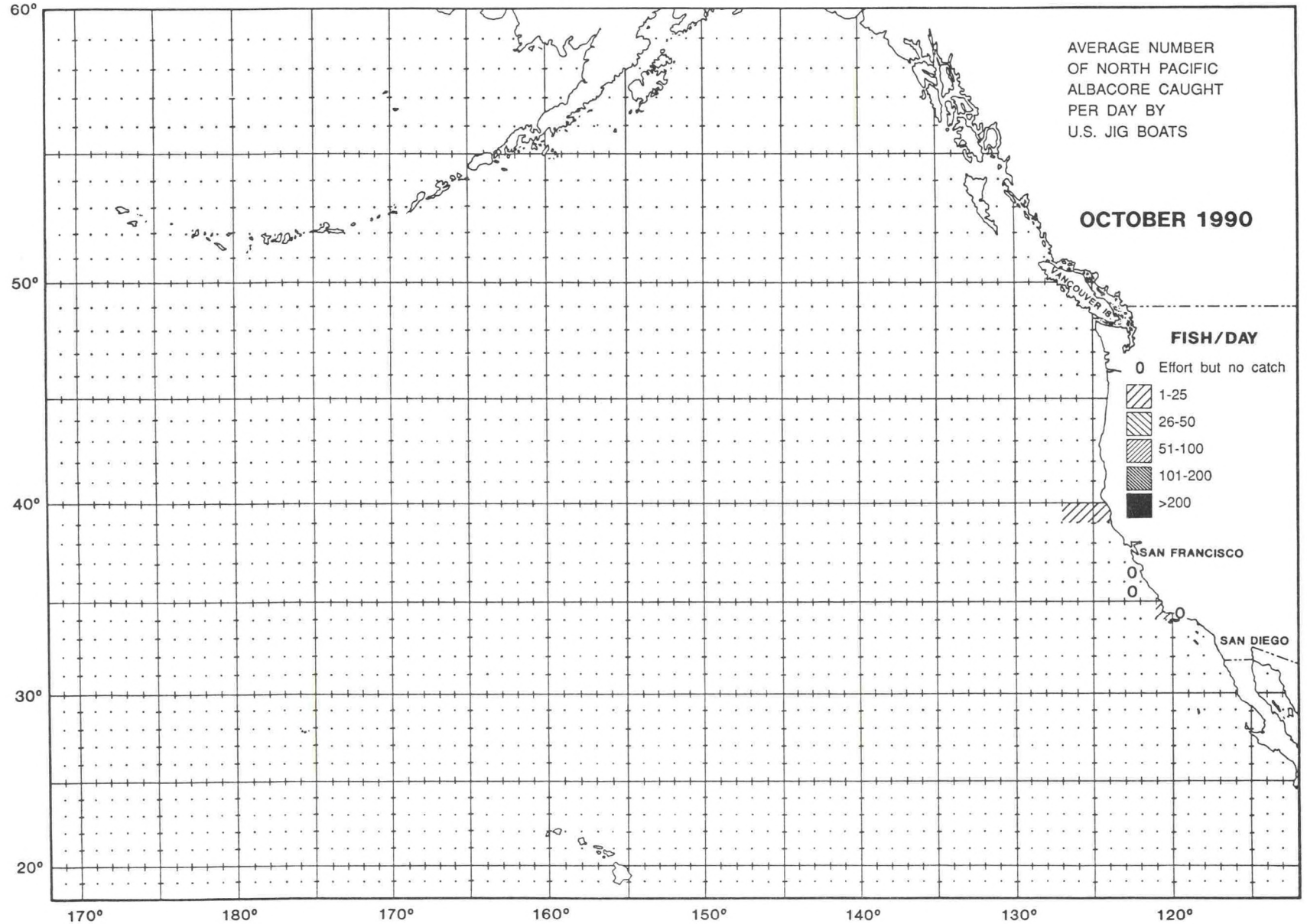

Figure 4e. U.S. albacore jigboat CPUE by 1° quadrangle in the north Pacific, October 1990.

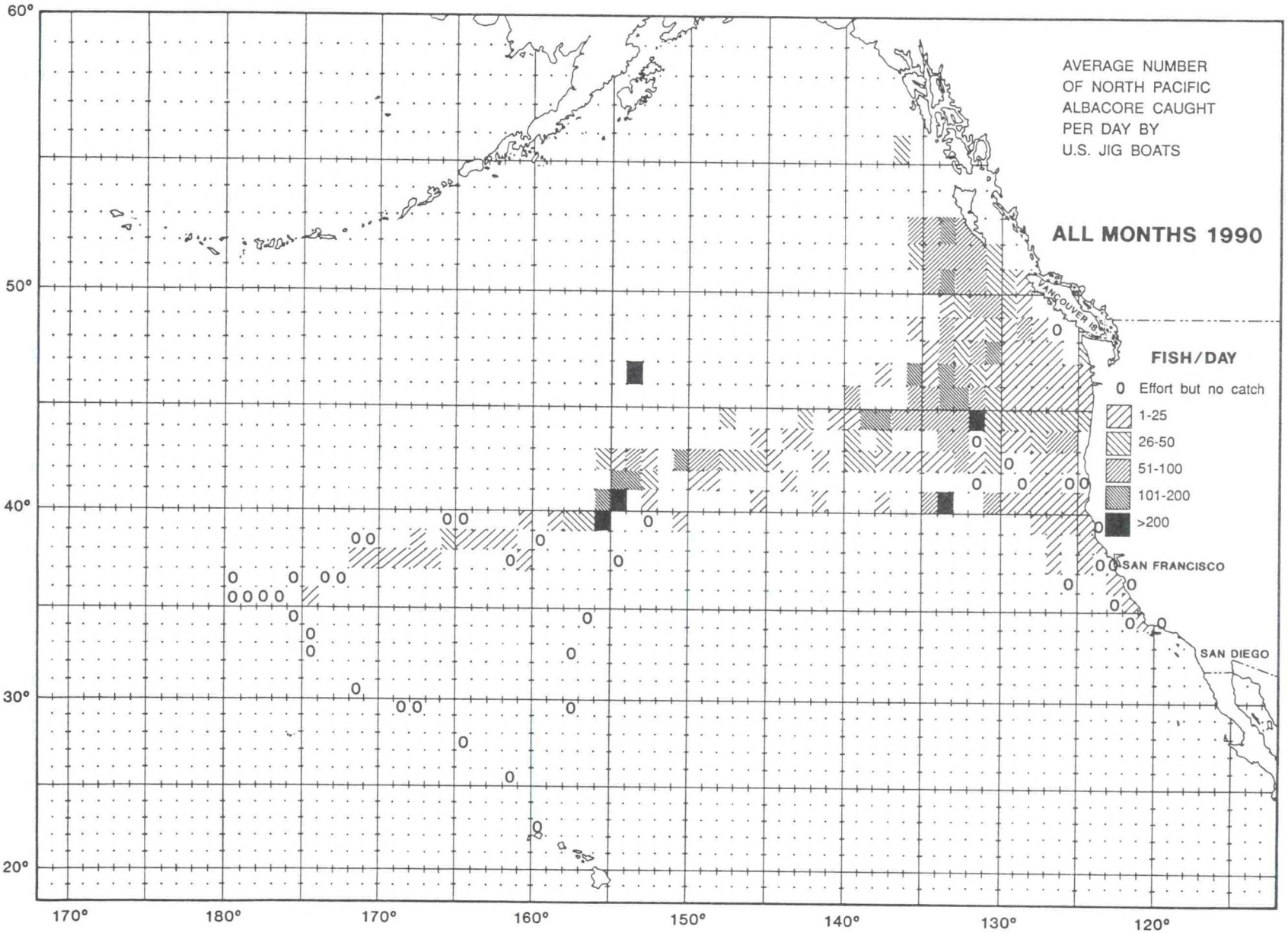

Figure 4f. U.S. albacore jigboat CPUE by 1° quadrangle in the north Pacific, 1990 season.

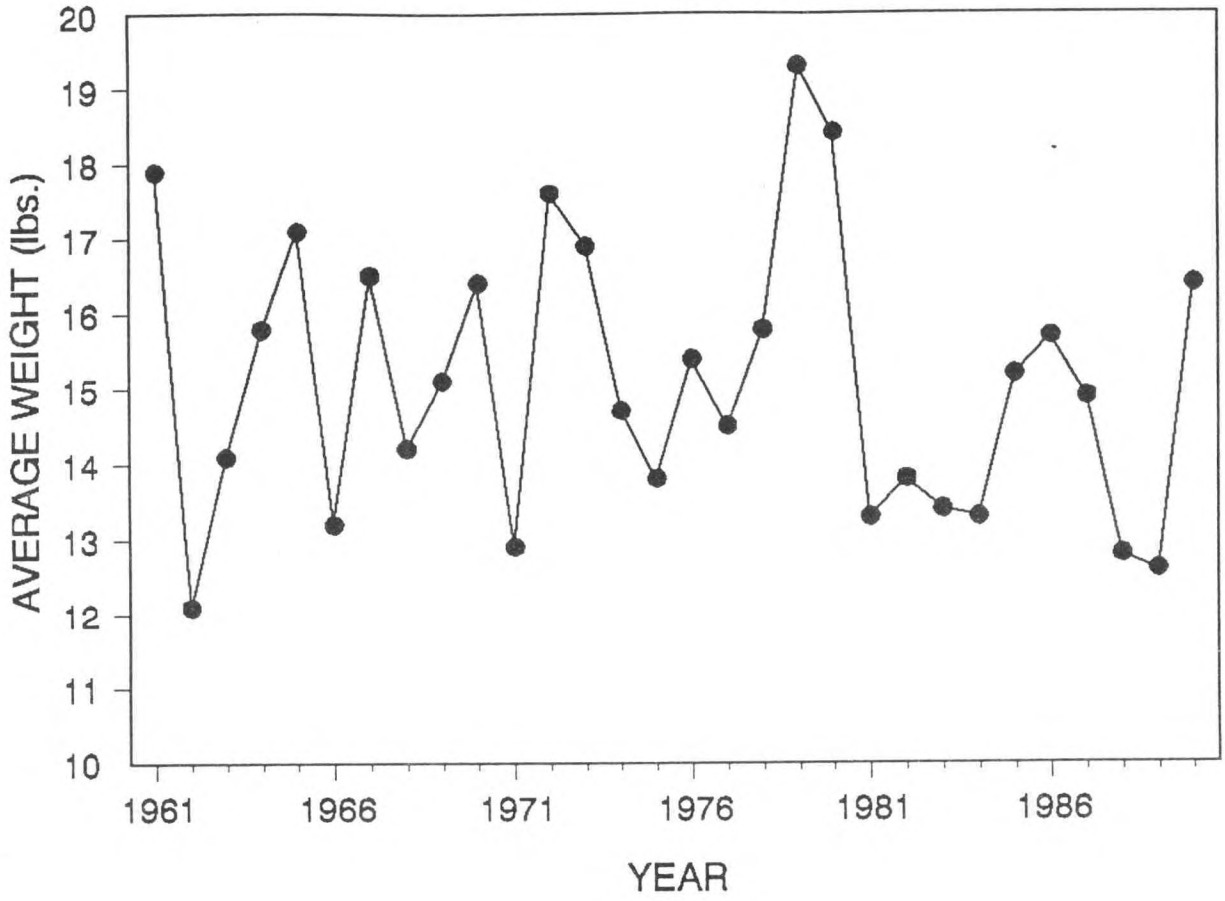

Figure 5. Average weight (lbs.) of north Pacific albacore caught by U.S. vessels by year.

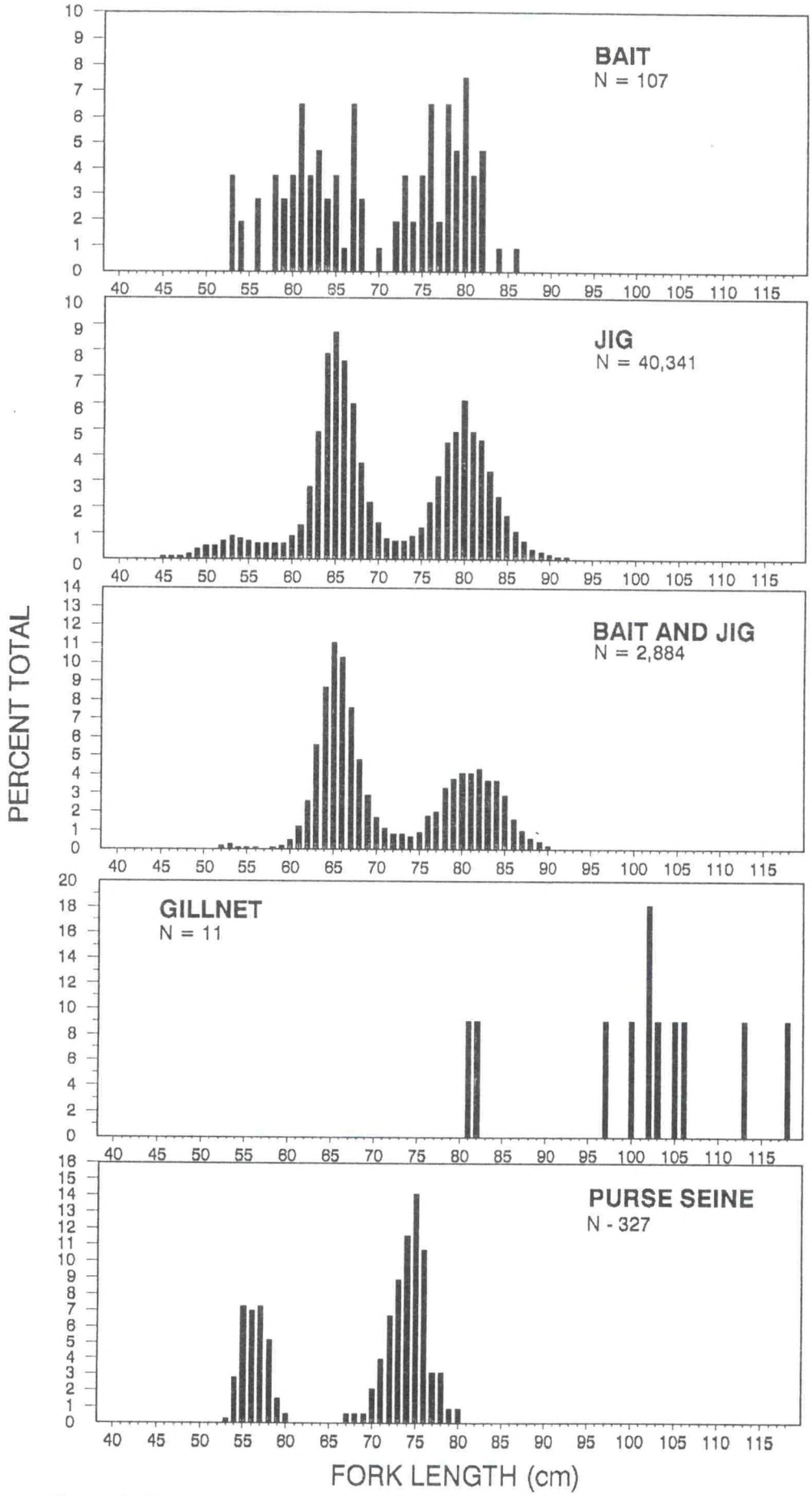

Figure 6. Length-frequency histograms of fish caught by the U.S. north Pacific albacore fleet in 1990 by gear. (N = number of fish measured)

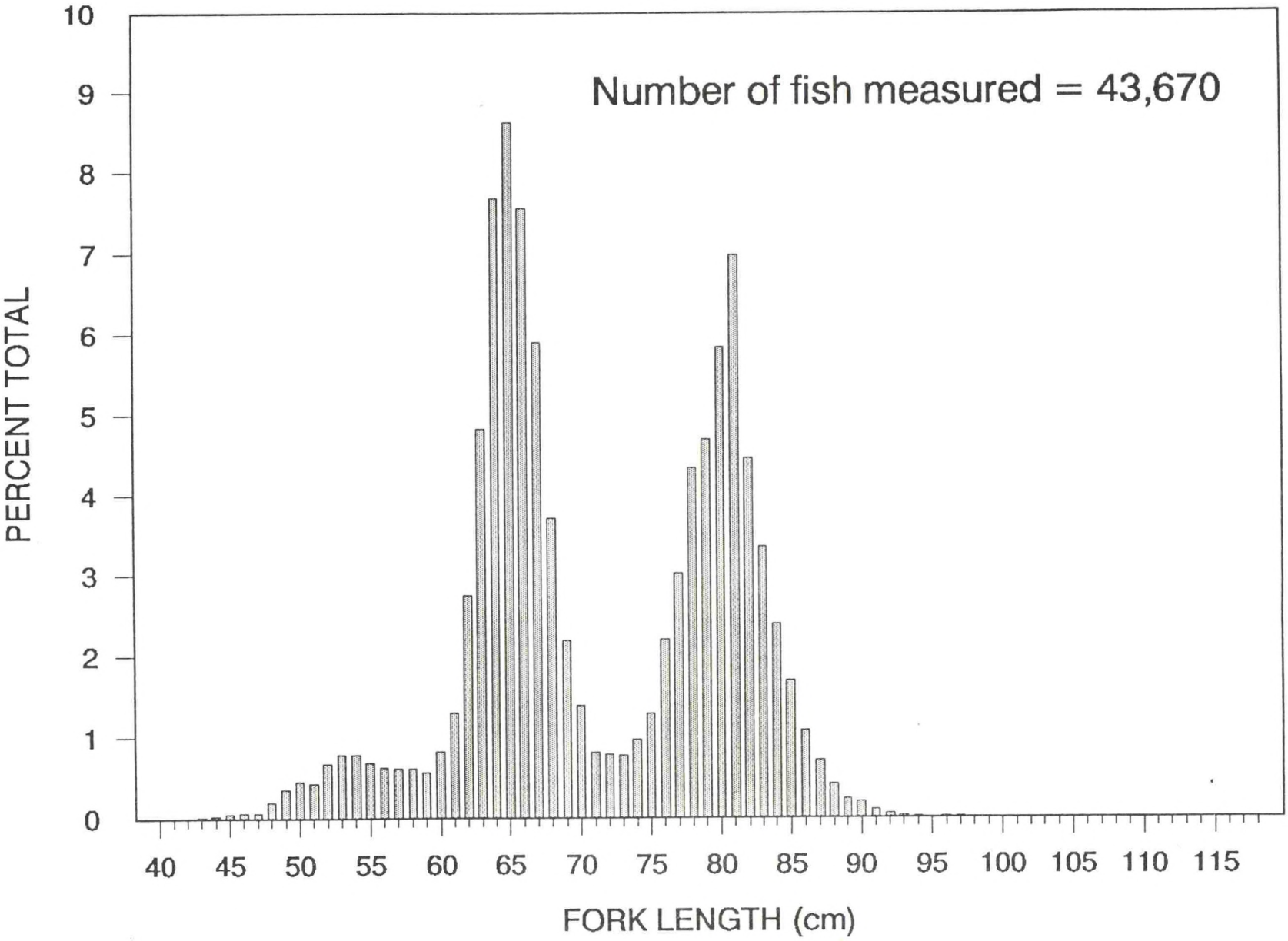

Figure 7. Length-frequency histogram of fish caught by the U.S. north Pacific albacore fleet in 1990.

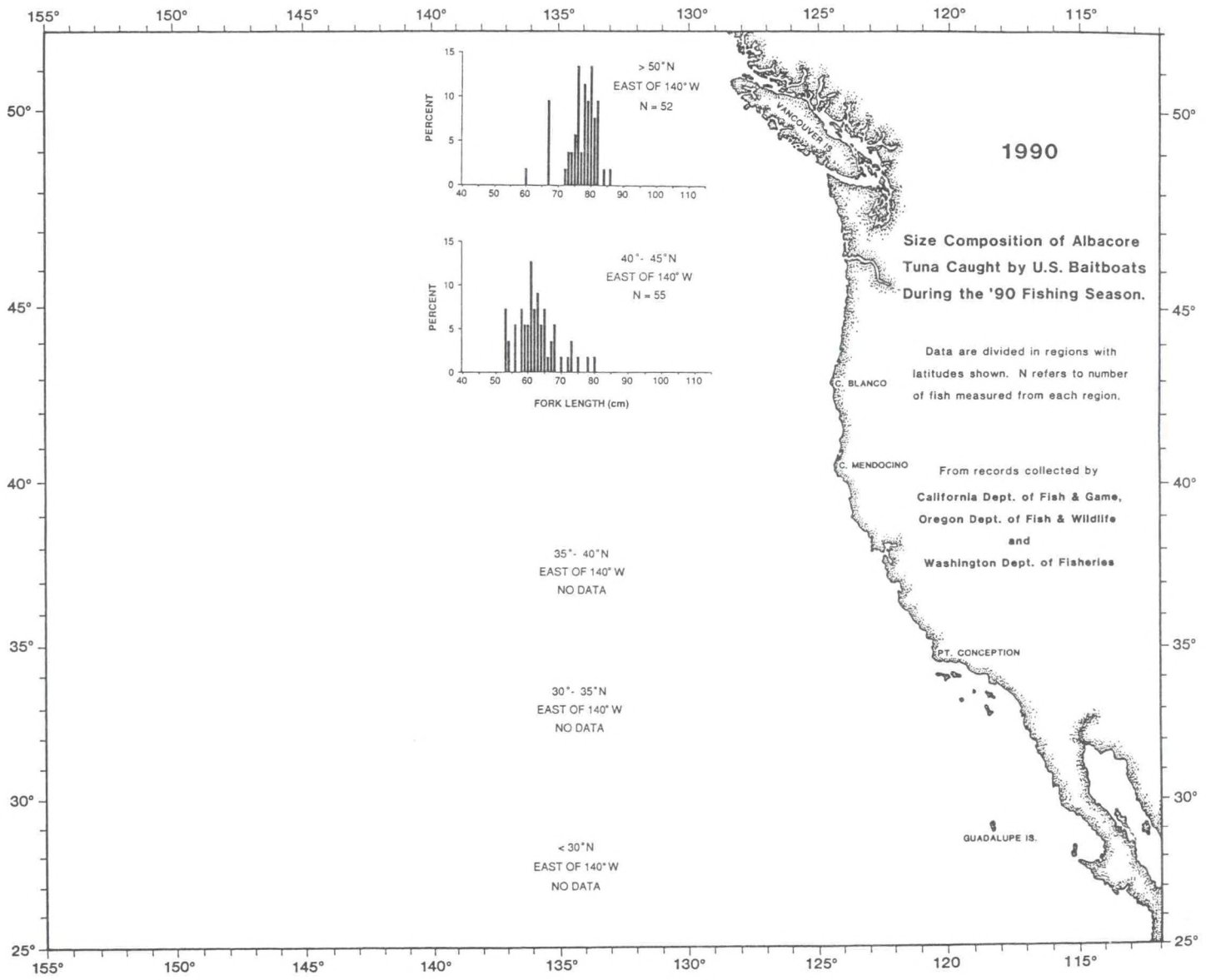

Figure 8a. Length-frequency histograms of albacore caught by U.S. vessels fishing bait in the north Pacific, 1990 season.

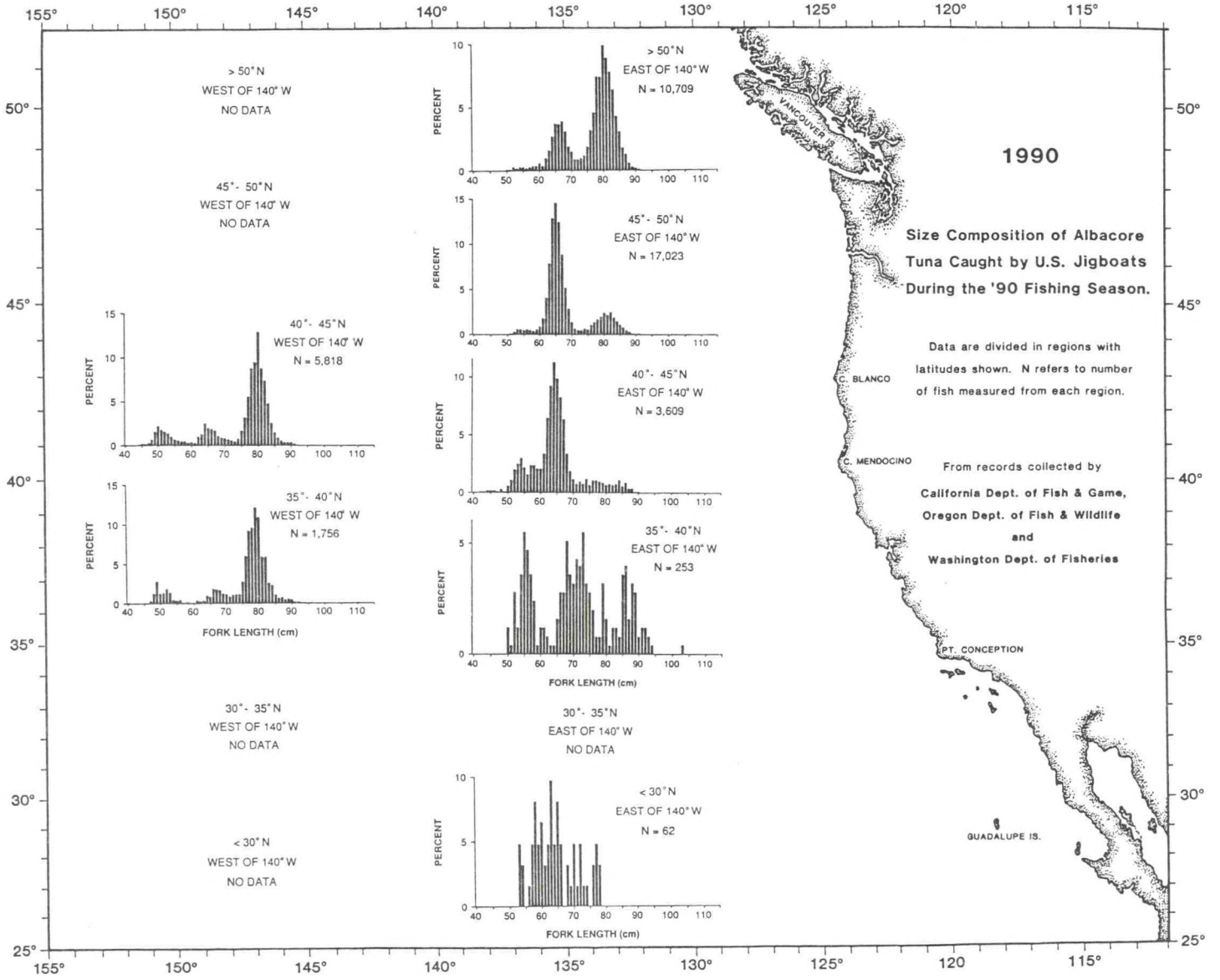

Figure 8b. Length-frequency histograms of albacore caught by U.S. vessels fishing jig in the north Pacific, 1990 season.

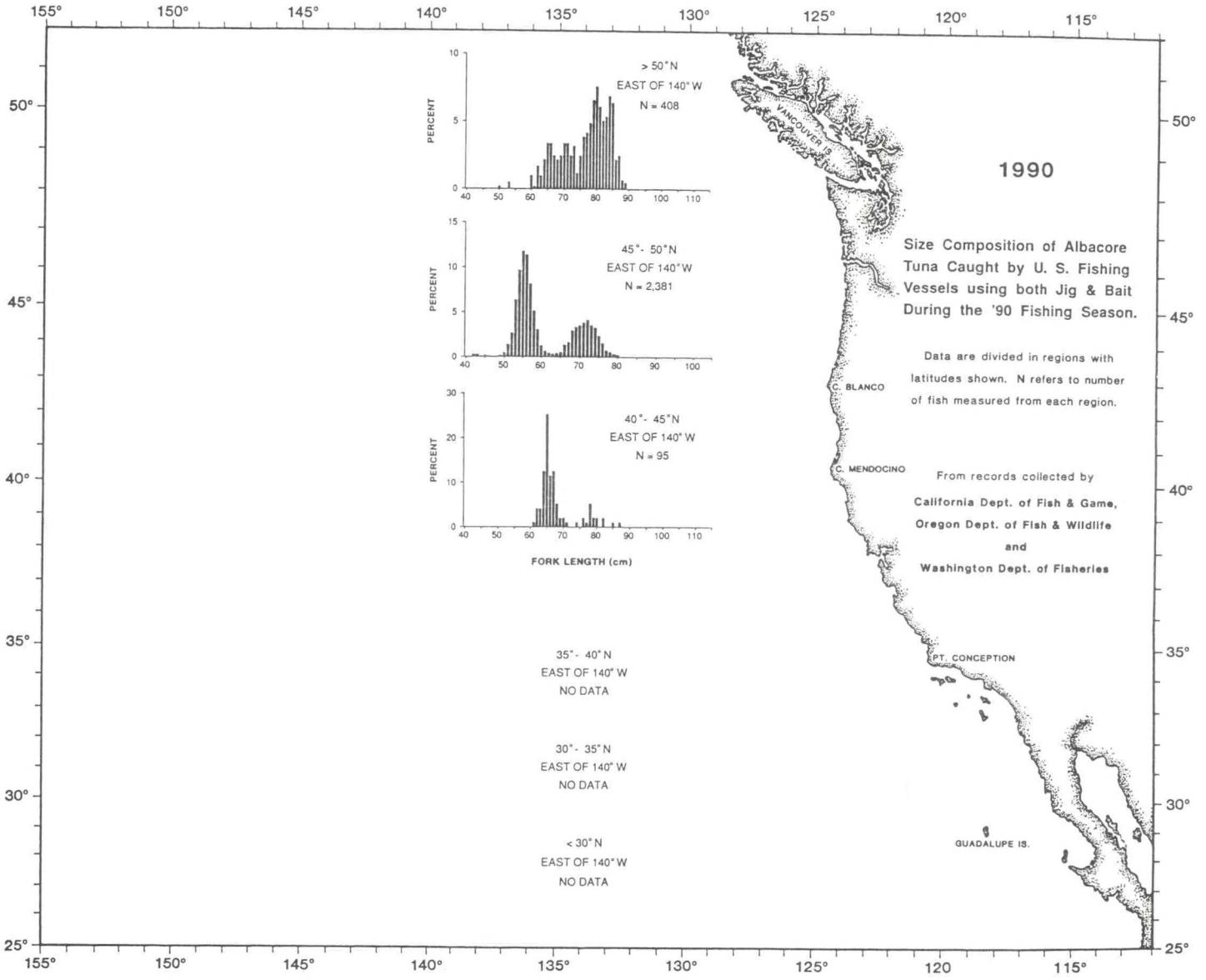

Figure 8c. Length-frequency histograms of albacore caught by U.S. vessels fishing bait and jig in the north Pacific, 1990 season.

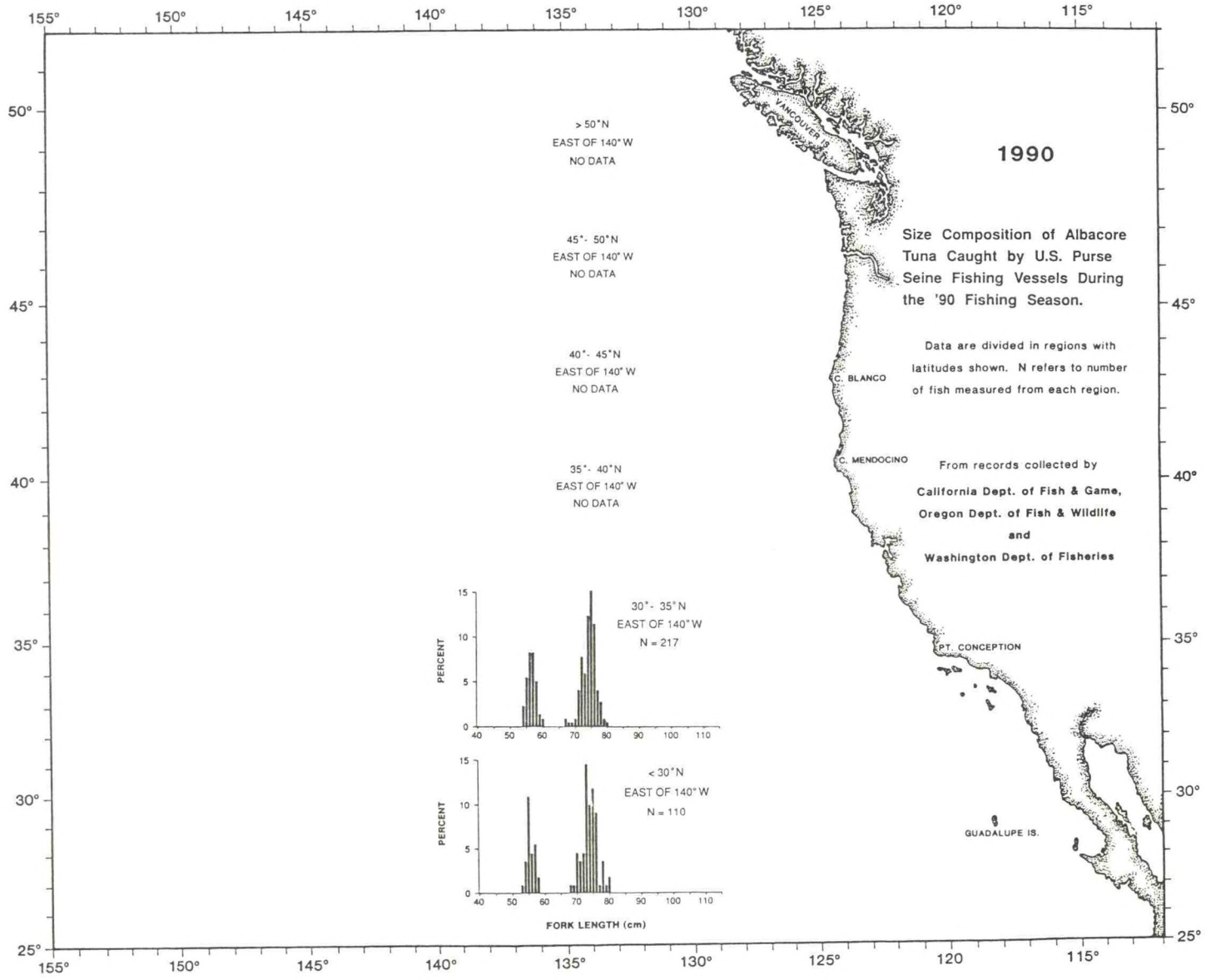

Figure 8d. Length-frequency histograms of albacore caught by U.S. vessels fishing purse seine in the north Pacific, 1990 season.

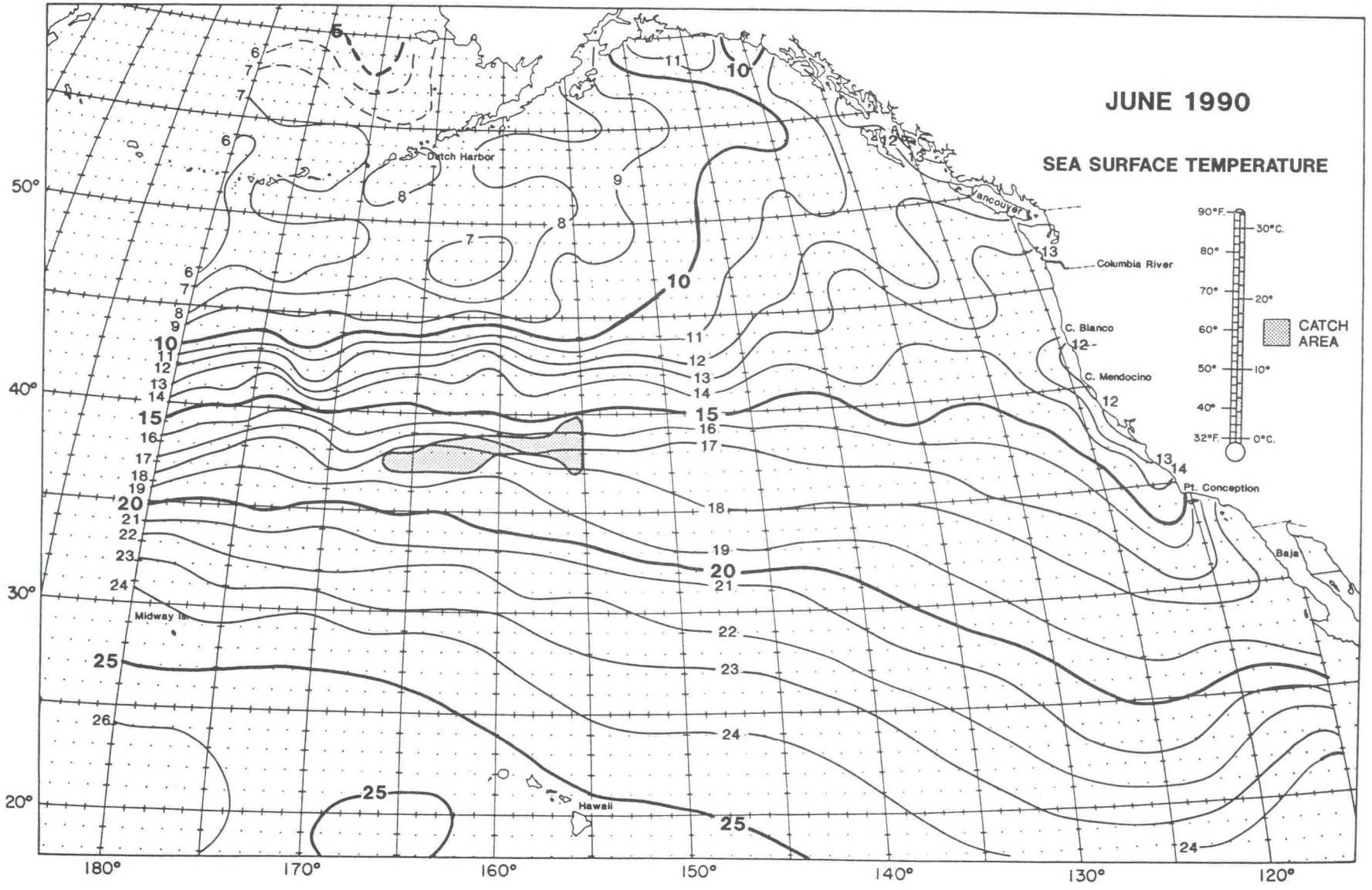

Figure 9a. Average sea-surface temperature (SST) isopleths (°C) and U.S. albacore catch area for the north Pacific, June 1990.

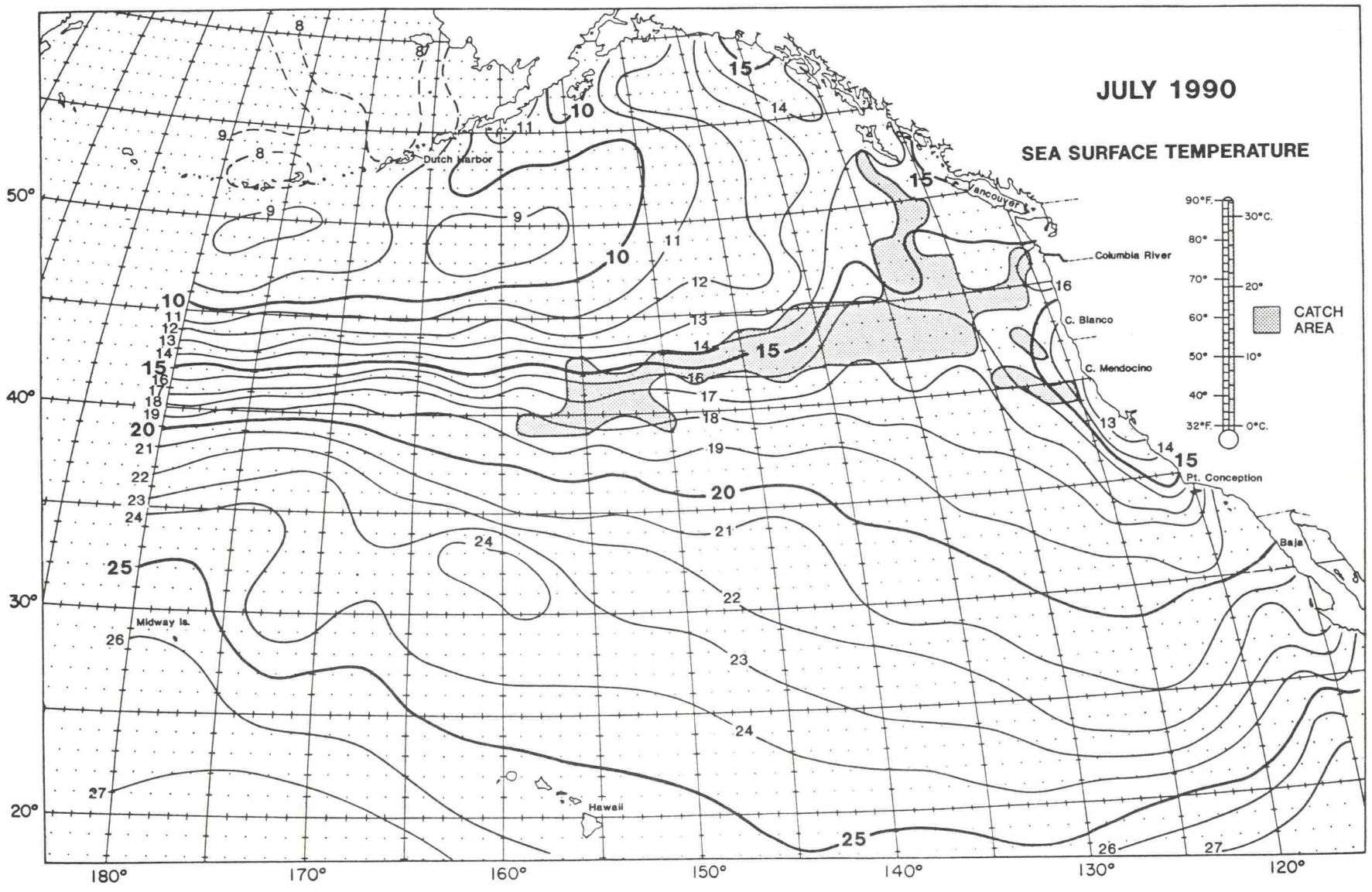

Figure 9b. Average sea-surface temperature (SST) isopleths (°C) and U.S. albacore catch area for the north Pacific, July 1990.

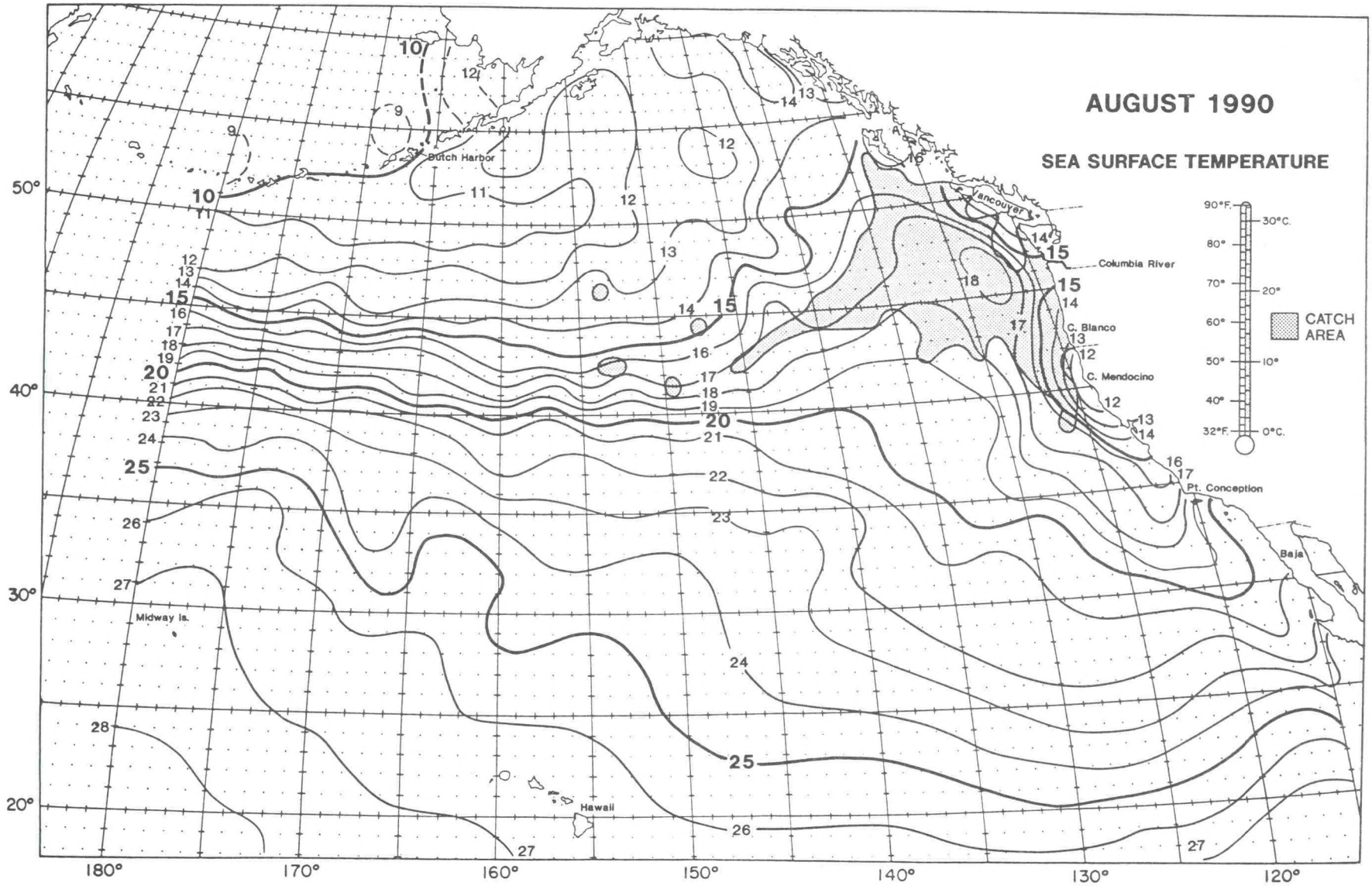

Figure 9c. Average sea-surface temperature (SST) isopleths (°C) and U.S. albacore catch area for the north Pacific, August 1990.

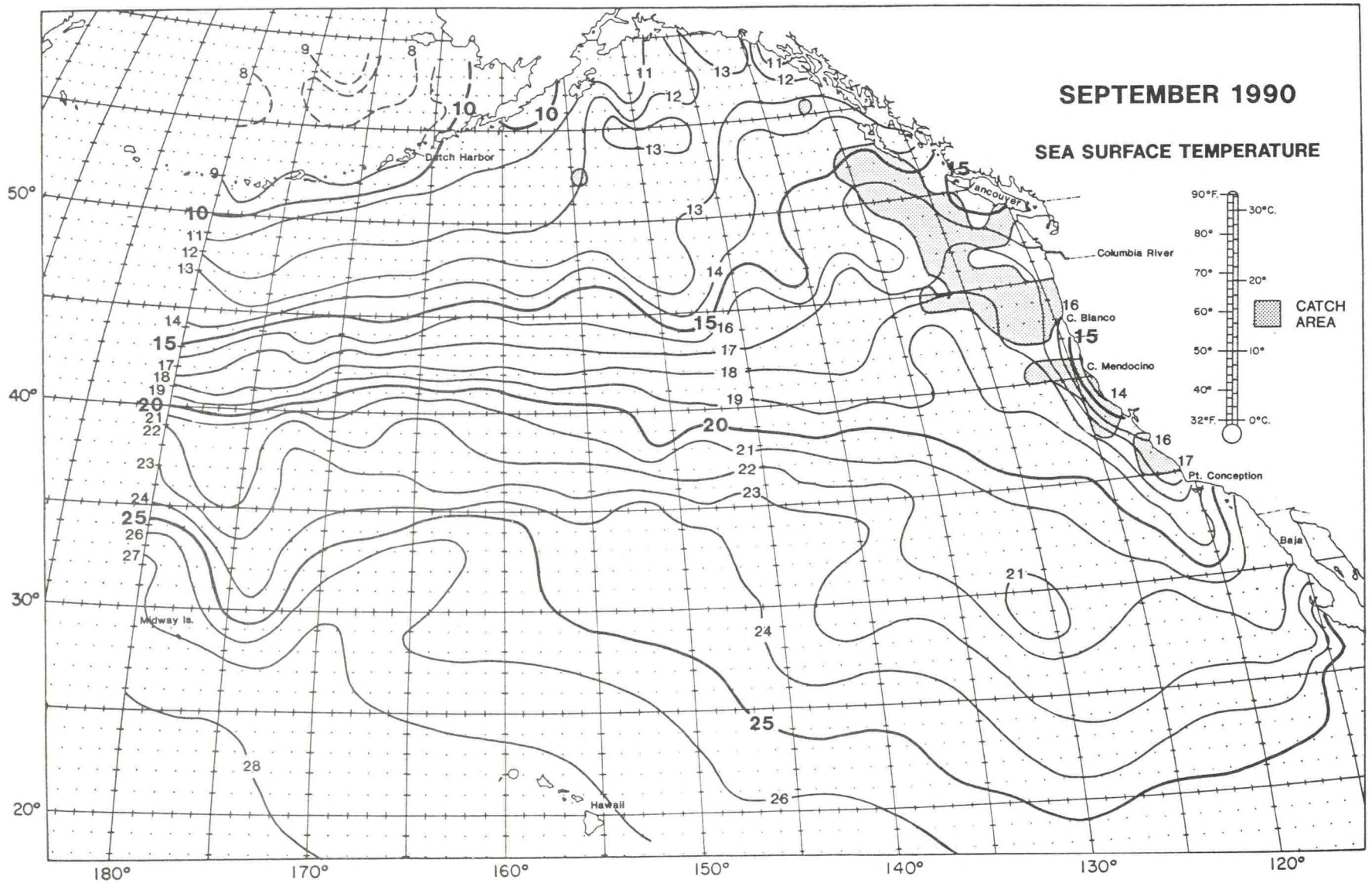

Figure 9d. Average sea-surface temperature (SST) isopleths (°C) and U.S. albacore catch area for the north Pacific, September 1990.

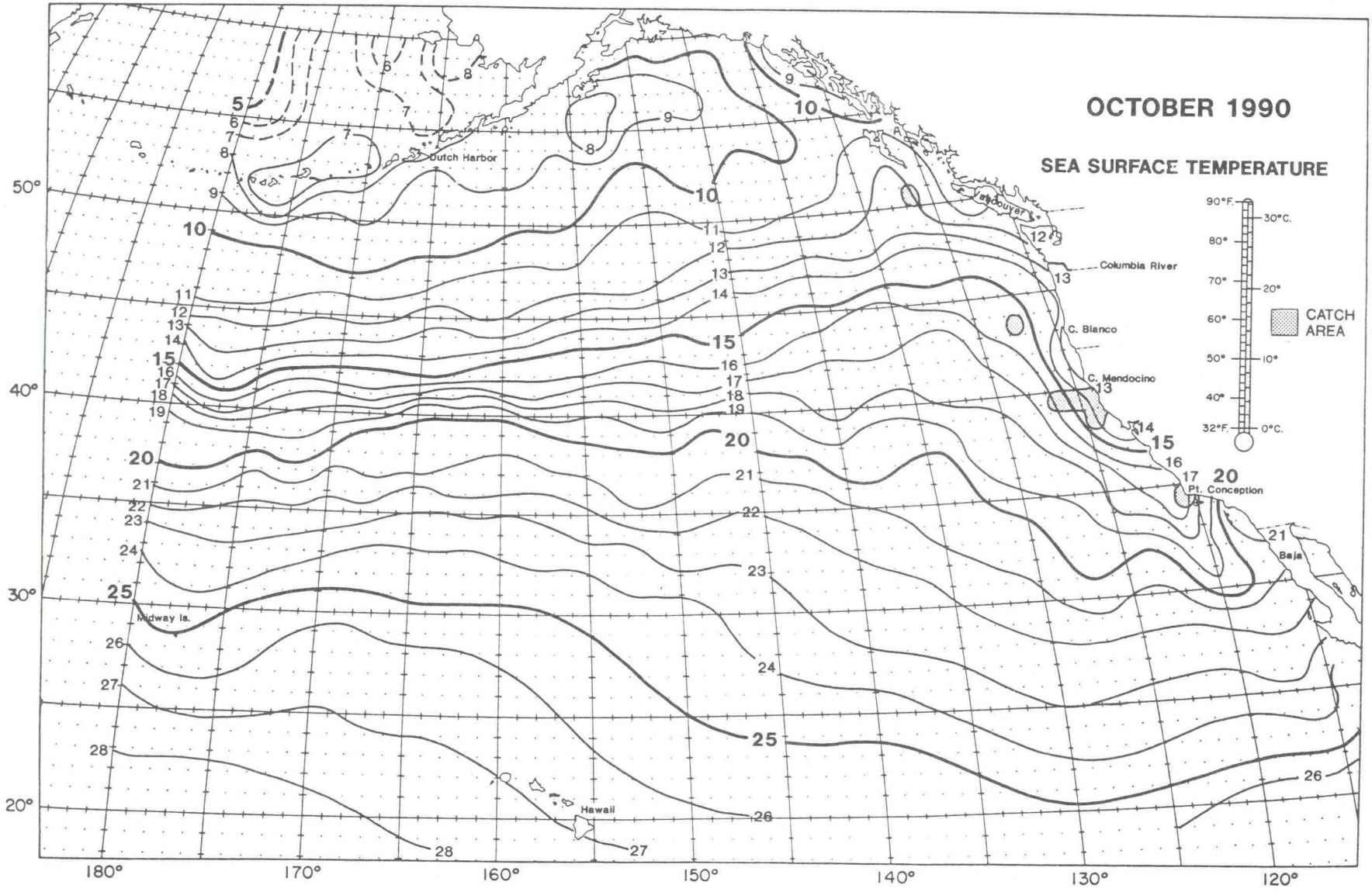

Figure 9e. Average sea-surface temperature (SST) isopleths (°C) and U.S. albacore catch area for the north Pacific, October 1990.