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MAY 1985

SUMMARY OF THE 1984 NORTH PACIFIC ALBACORE FISHERY DATA

By

Anthony P. Majors and Forrest R. Miller

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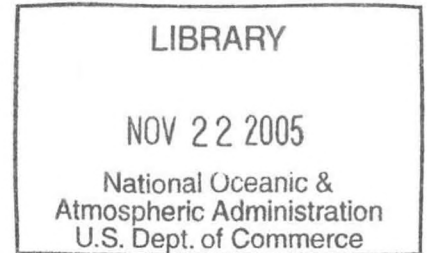
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SUMMARY OF THE 1984 U. S. NORTH PACIFIC ALBACORE FISHERY DATA

INTRODUCTION

This year marks the 11th successive year of a cooperative data collection effort on the United States North Pacific albacore fishery. For 1984, over 900 logbooks were distributed to fishermen before the beginning of the fishing season (March-May) by mail and during the season (June-September) at unloading docks. Albacore catch and effort information recorded in these logbooks by fishermen were submitted to samplers employed by state fisheries agencies. In the cases where fishermen did not have access to logbooks, samplers conducted interviews for the necessary information. These samplers also measured and collected length-frequency samples of the unloaded catch. Cooperating groups involved in the distribution of logbooks and the collection of data include California Department of Fish and Game (CDFG), Oregon Department of Fish and Wildlife (ODFW), Washington Department of Fisheries (WDF), Pacific Marine Fisheries Commission (PMFC), Western Fishboat Owners Association (WFOA) and the Honolulu Laboratory of the Southwest Fisheries Center.

In this report, we present data collected from the 1984 U.S. North Pacific albacore fishery. Areas covered include the traditional fishing grounds off the U.S. west coast, areas north of Hawaii, and areas in the western Pacific. Data are summarized and compared with those collected in 1983. Also included is a section on purse seine albacore catches in areas off southern California early in the 1984 fishing season. Landings from foreign fisheries including Canada, Japan, and Taiwan from 1952 to 1983 are also included for comparison purposes.

SAMPLING COVERAGE

Sampling coverage for the U.S. North Pacific albacore fishery in 1984 was measured as the ratio of sampled landings in weight to total landings in weight. During the 1984 U.S. North Pacific albacore fishing season, an estimated 31,165,325 lbs (14,136 mt) of albacore were landed at ports throughout California, Hawaii, Oregon, Washington and Puerto Rico. Of this total, approximately 53% (16,588,832 lbs; 7,525 mt) was sampled for catch and effort (information collected from voluntary logbooks and interviews), and 1% (423,846 lbs; 192 mt) was sampled for length-frequency. Catch and effort coverage rates, as estimated from sampled landings in weight, increased from 35% in 1983 to 53% in 1984, an increase of 18%. Coverage rates for length-frequency samples decreased from 3% in 1983 to 1% in 1984, a decrease of 2%.

Although catch and effort coverage rates for California in 1984 were more than double the 1983 rates, sampling efforts in this state again had the lowest coverage among the four states. Approximately 91% of the U.S. total albacore catch for the year was landed in this state in 1984, as compared with 73% in 1983. This increase was caused by the closing of many buying stations in Oregon and Washington that forced most of the albacore fishing vessels to land catches in California. The 18% increase in total catch landed in California may have caused the lower sampling coverage since sampling effort was established according to landing patterns from previous years. The following table gives the sampling coverage by state and year.

SAMPLING COVERAGE : 1984

State	Total Landings in Pounds	Landings in Pounds Sampled	Percent Coverage	Vessel Landings Sampled	Avg. Landings in Pounds Per Vessel
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Catch and Effort

California	28,250,000	14,695,187	52%	587	24,989
Hawaii	840,000	753,263	90%	13	57,943
Oregon	1,650,466	970,448	59%	131	7,408
Washington	154,859	139,934	90%	31	5,354
Puerto Rico	154,000	-	-	-	-
(Other)	116,000	-	-	-	-
Total	31,165,325	16,558,832	53%	762	21,730

Length Frequency

California	28,250,000	266,323	1%	332	-
Hawaii	840,000	10,257	1%	15	-
Oregon	1,650,466	142,632	9%	79	-
Washington	154,859	4,624	3%	9	-
Puerto Rico	154,000	-	-	-	-
(Other)	116,000	-	-	-	-
Total	31,165,325	423,846	1%	435	-

SAMPLING COVERAGE : 1983

State	Total Landings in Pounds	Landings in Pounds Sampled	Percent Coverage	Vessel Landings Sampled	Avg. Landings in Pounds Per Vessel
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Catch and Effort

California	16,342,942	3,855,936	24%	391	9,861
Hawaii	1,411,766	1,127,014	80%	25	45,080
Oregon	3,409,739	2,163,910	63%	276	7,840
Washington	1,149,320	719,502	63%	103	6,985
Total	22,313,767	7,866,362	35%	795	9,894

Length Frequency

California	16,342,942	331,324	2%	435	-
Hawaii	1,411,766	24,066	2%	47	-
Oregon	3,409,739	188,986	6%	109	-
Washington	1,149,320	91,714	8%	43	-
Total	22,313,767	636,090	3%	634	-

CATCH

Total reported commercial catch (excludes sport) for the U.S. North Pacific albacore fishery in 1984 was 31,165,325 lbs (14,136 mt). This represents a 40% increase from the 22,313,767 lbs (10,119 mt) recorded for 1983 (Table 1, Figure 1). The U.S. albacore surface fleet in 1984, like that in 1983, fished extensively in areas west of 140° west longitude from early May to late August (Figure 2). In this report, and in the 1983 report, we arbitrarily divided the fishery into two areas: (1) the inshore area, from the U.S. coastline to 140° west longitude, and (2) the offshore area, west of 140° west longitude.

Catches in early April and throughout May in 1984 were reported by vessels in transit to central and western Pacific early in the season. The 1984 fishing season started in inshore areas off southern California in late May; but catches were not significant until early June. In 1984, the fishing season came to a close in inshore areas off central California in late October. In 1983, the fishing continued strong through October, and gradually came to a close in inshore areas off southern California during the month of November. Like offshore fishing in 1983, the offshore fishing in 1984 continued strong through the month of August, and eventually came to a close in early September.

Although the distribution of catches in the offshore and inshore areas for both years was similar, there were significant differences between the 1984 and 1983 albacore fishing seasons. There was a 19% increase in the inshore catch and a 18% decrease in the offshore catch for 1984, compared with the catches in those areas for 1983. In 1984, the inshore catch was 83% of the total landings, and offshore catch was 17%. In 1983, the inshore catch was 65% of the total landings, and the offshore catch was 35%. This increase in catch inshore for 1984 was due to an increase in catch in areas south of 40° north latitude where over 87% of the inshore catch was taken. Approximately 33% of this inshore catch in areas south of 40° north latitude was taken by purse seiners, and 18% by sportboats. The area inshore and north of 40° north latitude, which was very productive in 1983, was less productive throughout the season in 1984 (Figure 2).

EFFORT

Total fishing effort (days fished) for the U. S. North Pacific albacore fishery for the 1984 fishing season was significantly higher than that of 1983. There was an increase of 32% from the reported 7,838 days fished in 1983 to the reported 10,321 days fished in 1984. In 1984, 77% of the effort (7,956 days fished) spent in the inshore area yielded 77% of the sampled catch (12,848,990 lbs.), while in 1983, 75% of the effort (5,888 days fished) spent in this same area yielded 65% (5,201,764 lbs.). In 1984, 23% of the effort (2,365 days fished) spent in the offshore area yielded 23% of the sampled catch (3,903,773 lbs.), while in 1983, 25% of the effort (1,861 days fished) spent in this same area yielded 35% (2,758,627 lbs.). The large number of standard-size jigboats (45-foot) operating in inshore areas may have contributed to higher catches in 1984 (Figure 3).

PURSE SEINERS

In 1984, small purse seiners fished and successfully landed albacore for the first time since the early 1960s. Efforts to catch pure albacore schools were successful in these earlier years, with catches of 215,733 lbs (98 mt) in 1960, and 1,960,065 lbs (889 mt) in 1961 (Clemens and Craig, 1965). For 1984, total landings of 8,220,000 lbs (3,728 mt) were reported caught by smaller seiners in inshore areas 50 to 100 miles off San Diego. These vessels, which averaged 85 feet (26 meters) in length, reported catches of 12,576 lbs (5 mt) per day fishing in July and early August. Approximately 55% of this catch was sampled for catch and effort (4,488,138 lbs; 2035 mt), and a little less than 1% (31,034 lbs; 14 mt) for length-frequency. Sets were mainly on bait schools. Sizes of fish caught in these sets were very similar to sizes of fish taken by baitboats (Figure 7).

CATCH-PER-UNIT EFFORT BY JIGBOATS

Estimated standardized catch-per-unit effort (CPUE), in numbers of fish per day's fishing for a standard 45-foot (14 meter) jigboat decreased from 88.0 fish per day in 1983 to 82.0 fish per day in 1984 (Figure 4).

Estimates of CPUE for 1984 were highest during the first half of the month of July (table below). These high catches during the early part of the season were reported mainly from inshore areas off San Diego. Catch rates of 67 fish per day for a 45-foot (14 meter) vessel in 1983, although normal for this time period in the season, was considerably less than the 127 fish per day recorded for the same time period in 1984. The following table lists catch (in numbers of fish), standardized effort (days fished), and CPUEs of the most productive time periods from July to September for 1984 and 1983.

Months:	July		August		September	
Time Period: (Days)	1-15	16-31	1-15	16-31	1-15	16-30

1984	-----					
Catch:	115,520	93,635	147,796	117,806	66,074	52,612
Effort:	908	880	1,478	1,589	1,328	876
CPUE:	127	106	100	74	50	60

1983	-----					
Catch:	13,382	92,053	118,589	120,711	81,326	35,626
Effort:	201	1,267	1,234	934	890	686
CPUE:	67	73	96	129	91	52

In 1984, there were 14 fewer 1-degree squares with CPUEs greater than 200 fish per day than in 1983 (Figure 5). The majority of the 1-degree squares with CPUEs greater than 200 were located in the offshore area, similar to the location of high CPUEs in 1983. Unlike 1983, however, where high CPUEs were located south of 40° north latitude, 1-degree squares with high CPUEs for 1984 were predominantly located north of 40° north latitude.

LENGTH FREQUENCY

During the 1984 albacore fishing season, 84% of length-frequency samples for U. S. North Pacific albacore catches were taken from jigboats. Of these samples, approximately 88% were taken from the inshore area. Only 6% of the sampled catches were from baitboats, 3% were from vessels using both jig and bait, and 7% were from purse seiners (Figure 7).

The average length of albacore measured in 1984 was 66.1 centimeters (cm) in fork length (tip of nose to fork of tail). This was very similar to the 66.2 cm average fork length recorded for 1983. Albacore caught inshore and north of 40° north latitude for both 1984 and 1983 were mostly in the range of 60 to 66 cm in length (Figure 6). However, there was a slight increase from 1983 in the number of 74 to 80 cm fish caught in this area for 1984. The area inshore and south of 40° north latitude for 1984 showed a decrease in catch of fish between 74 and 80 cm in length. Most of the albacore caught by the larger jigboats offshore in 1984 were between 60 and 66 cm; the same size fish were also caught in these areas in 1983.

SEA-SURFACE TEMPERATURE

We compiled sea-surface temperatures (SST) observed from commercial transport vessels, fishing boats, and research vessels into monthly means and plotted them on charts with 1-degree quadrangle resolution. These charts provided useful information on the distribution of temperature isotherms and the location of surface ocean fronts (Figure 8).

By April 1984, there was no evidence, in the SSTs north of Point Conception, of El Niño (warm water) conditions. El Niño conditions had dominated the mixed layer off the U.S. west coast in late 1982 and all of 1983. However, in areas inshore and south of Point Conception, the residual effects of the 1982-83 El Niño remained during most of 1984 with SSTs 1.0° C to 2.0° C (1.8° F to 3.6° F) above normal. In inshore areas along the coastal regions of the U.S. and British Columbia, SSTs were normal or slightly below normal from April through October 1984. In areas offshore between 35° north latitude and 45° north latitude, SSTs were 1.0° C to 3.0° C (1.8° F to 5.4° F) below normal during the albacore season. In these offshore areas, ocean frontal boundaries were strongest from 130° west longitude to the mid-Pacific (Figure 8). In contrast, the Gulf of Alaska and the subtropical region offshore south of 35° north latitude had SSTs up to 1.0° C (1.8° F) above normal. SSTs of up to 2.0° C (3.8° F) above normal were also recorded in areas inshore off Baja California.

During most of the albacore fishing season, the most persistent temperature fronts were found along the U.S. west coast from 35° north latitude to 40° north latitude, 60 to 200 miles from the coast. Strong ocean frontal boundaries were also found south of Point Conception between 118° and 121° west longitude. The inshore areas off Oregon and northern California in August and September 1984 were the only areas north of 35° north latitude that experienced above normal SSTs during the albacore season. The colder than normal SSTs which persisted off most of the U.S. west coast were associated with strong and steady northerly winds, which recurred following the El Niño of 1982-83.

DISCUSSION

The albacore fishing season in 1984, although more successful than the 1983 season, did not start until late May; significant catches were reported in early June. In contrast, the 1983 fishing season started earlier, in early May, when jigboats leaving for areas north of Hawaii and

around Midway Island reported catches west of Erben Bank. The average size of albacore caught in 1984 was 66.1 cm in length (13.1 lbs) which was very similar to the 1983 average size of 66.2 cm (13.2 lbs). Favorable environmental conditions inshore off Baja and southern California may have contributed to higher catches for 1984, and the success of different types of gear used by the fishing fleet during the season.

Major observed differences between the 1984 and 1983 fishing seasons included: 1) the fleet spent more time and caught more fish in inshore areas, especially those south of 40° north latitude, 2) the total commercial catch increased 40%, 3) the sportboat fishery had its most successful year since 1971, 4) the purse seine fleet, for the first time in over 20 years, caught albacore in large numbers, 5) the majority of high CPUE areas were located north of 40° north latitude, 6) well-defined frontal areas persisted continually during the fishing season in inshore areas south of 40° north latitude.

ACKNOWLEDGEMENTS

We thank William Perkins of WFOA, captains and crews of the U.S. albacore fishing fleet for their cooperation in this research effort. We also thank Russ Porter of PMFC, Brian Culver of WDF, Terri Dickerson of CDFG, Tom Hida of the Honolulu Laboratory of the Southwest Fisheries Center, Larry Hreha of ODFW, and members of their staffs for distributing logbooks and collecting albacore fishing information during the fishing season. Christina Show provided programming support. Document reviewed by Norman Bartoo, Atilio Coan and Michael Laurs.

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Table 1. Catches for North Pacific albacore in metric tons, 1952-1984.

Table 1. Catches for North Pacific albacore in metric tons, 1952-1984.

Year	Japan			Taiwan		United States			Canada			
	Bait-boat	Long-line	Gill-net	Other gear	Total	Long-line	Bait-boat	Jig-boat	Sport	Total	Jig-boat	Grand Total
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	12,392	-	61,458
1955	24,236	16,277	-	136	40,649	-	-	13,264	577	13,848	-	54,590
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	15,764	-	268	36,341	-	-	12,054	1,355	16,246	4	52,591
1962	8,729	13,464	-	191	24,684	-	-	19,753	1,681	22,519	1	47,204
1963	26,420	15,458	-	218	40,102	-	-	25,142	1,161	28,735	5	68,812
1964	23,858	13,701	-	319	39,635	26	-	18,389	824	22,624	3	62,283
1965	41,491	25,050	-	121	55,313	16	-	16,461	731	17,609	15	72,953
1966	22,830	28,869	-	585	48,465	16	-	15,169	588	17,357	44	65,882
1967	30,481	23,961	-	520	59,870	17	-	17,814	707	22,634	161	82,682
1968	16,597	23,961	-	1,109	41,667	15	-	4,906	20,441	26,298	1,028	69,008
1969	32,107	18,006	-	1,480	51,593	21	-	2,996	18,826	22,180	1,365	75,157
1970	24,376	15,372	-	956	40,704	23	-	4,416	21,039	26,277	345	67,358
1971	53,198	11,035	-	1,262	65,495	24	-	2,071	22,496	25,442	1,587	92,548
1972	60,762	12,649	1	921	74,333	25	-	3,750	23,600	27,987	3,558	105,903
1973	69,811	16,059	39	1,883	87,792	35	-	2,236	15,652	17,972	1,270	107,059
1974	73,576	13,053	224	1,065	87,918	40	-	4,777	20,177	25,048	1,207	114,213
1975	51,157	10,060	166	402	62,785	28	-	3,243	18,926	22,809	101	85,723
1976	85,336	15,896	1,070	1,394	103,696	37	-	2,700	16,314	19,727	252	123,712
1977	31,934	15,737	688	1,039	49,398	561	-	1,497	10,012	12,046	53	62,058
1978	59,877	13,061	4,029	3,209	80,176	53	-	950	15,700	17,460	23	97,712
1979	44,662	14,249	2,856	1,280	63,047	81	-	3,03	6,253	6,630	289	70,047
1980	46,743	14,743	2,986	1,516	65,988	-	-	382	7,599	8,149	212	74,349
1981	27,426	18,020	17,425	956	63,827	-	-	748	12,280	13,223	200	77,250
1982	29,615	16,762	17,947	1,054	65,378	-	-	425	6,661	7,343	1	72,722
1983	21,098	-	-	-	-	-	-	607	9,512	10,206	103	-
1984	-	-	-	-	-	-	-	832	1,278	15,414	2	-

Remarks:

1. Figures for 1982-84 are preliminary.
2. Japanese longline catches for 1952-60 exclude minor amounts taken by vessels under 20 gross tons. Longline catches in weight are estimated by multiplying annual number of fish caught by average weight statistics.
3. Japanese baitboat catches include catches by research vessels.
4. Jigboat catches for years 1952-60 include baitboat catches.
5. United States sportcatch is a minimum estimate based on partial coverage.
6. Grand totals omit unknown but minor catches by longline and baitboat vessels of the Republic of Korea.
7. United States total for 1984 include catches (3,728 mt) by purse seines.

TOTAL CATCH BY FISHERY

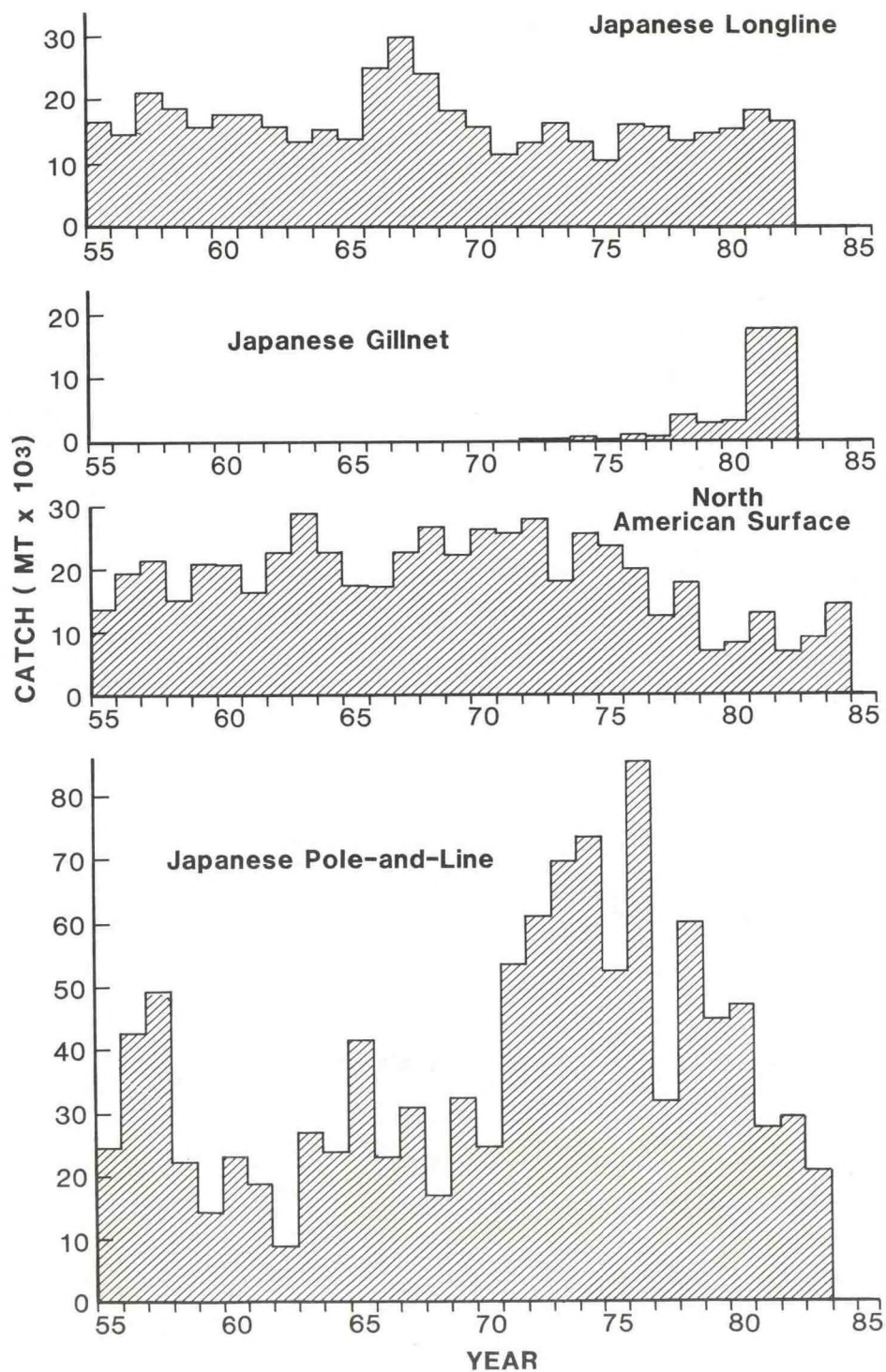


Figure 1. Total catch (metric tons) by fishery and gear.

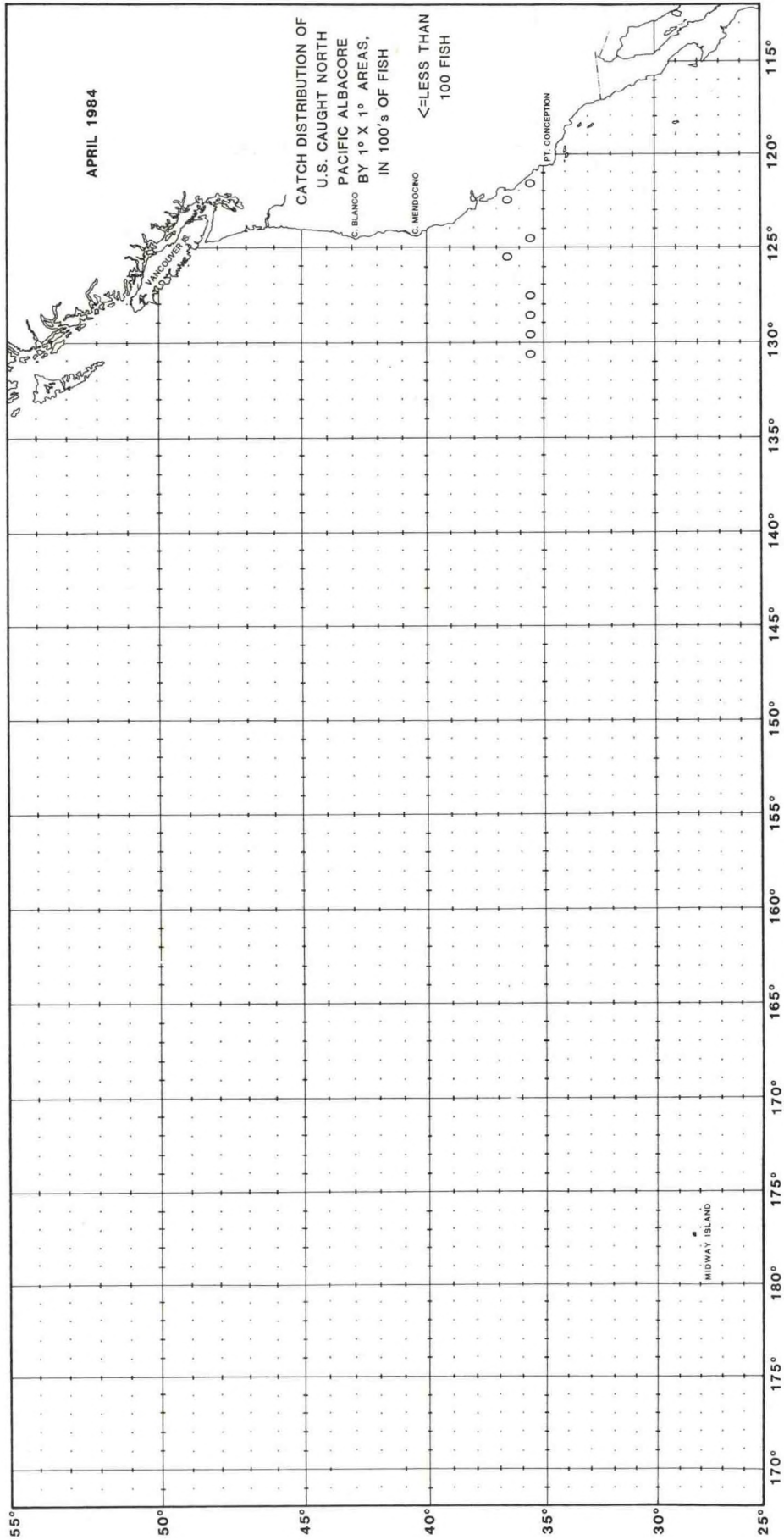
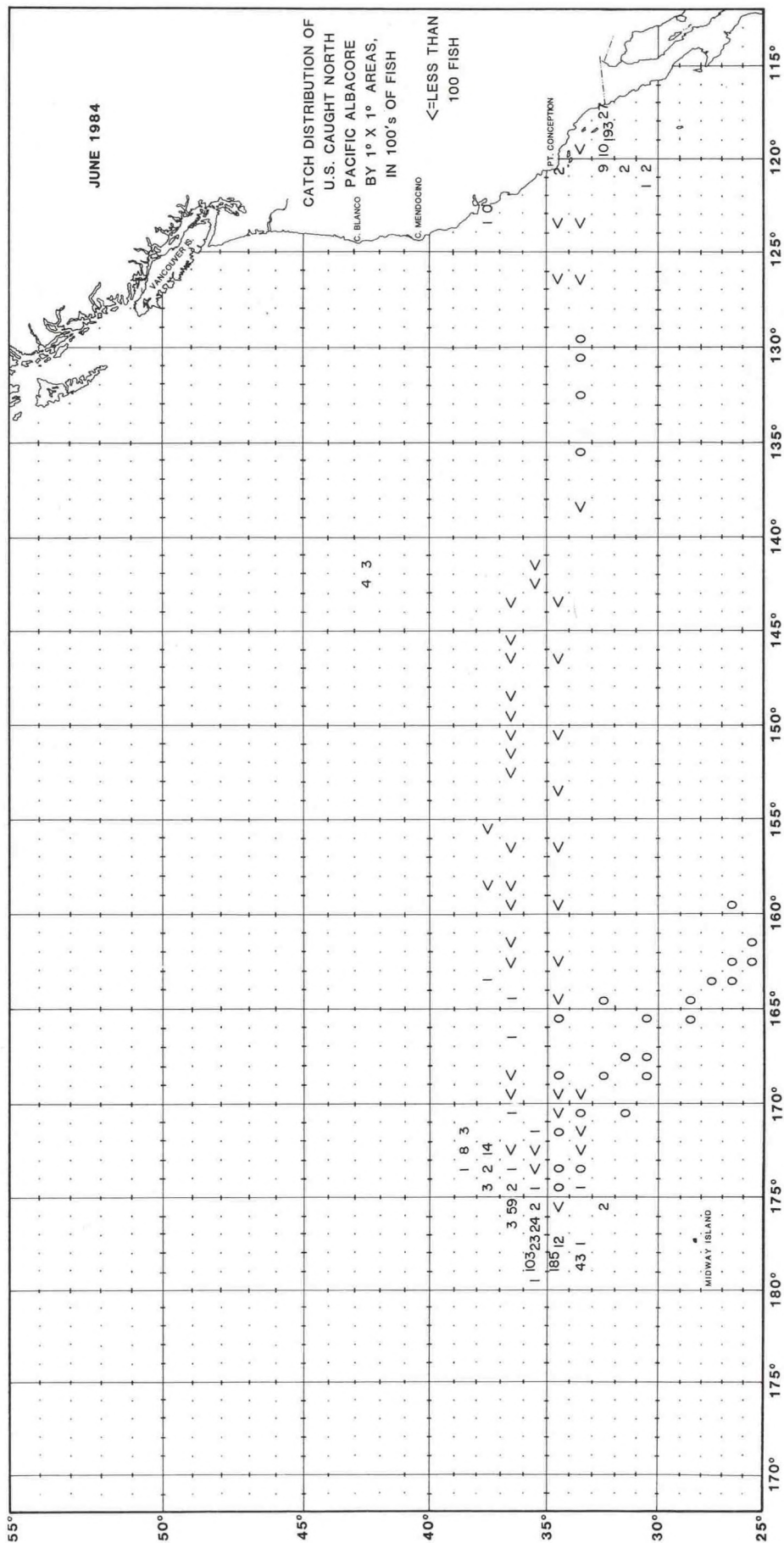


Figure 2a. Combined jigboat and baitboat fishery catches (in numbers of fish) by 1-degree square area, April 1984.



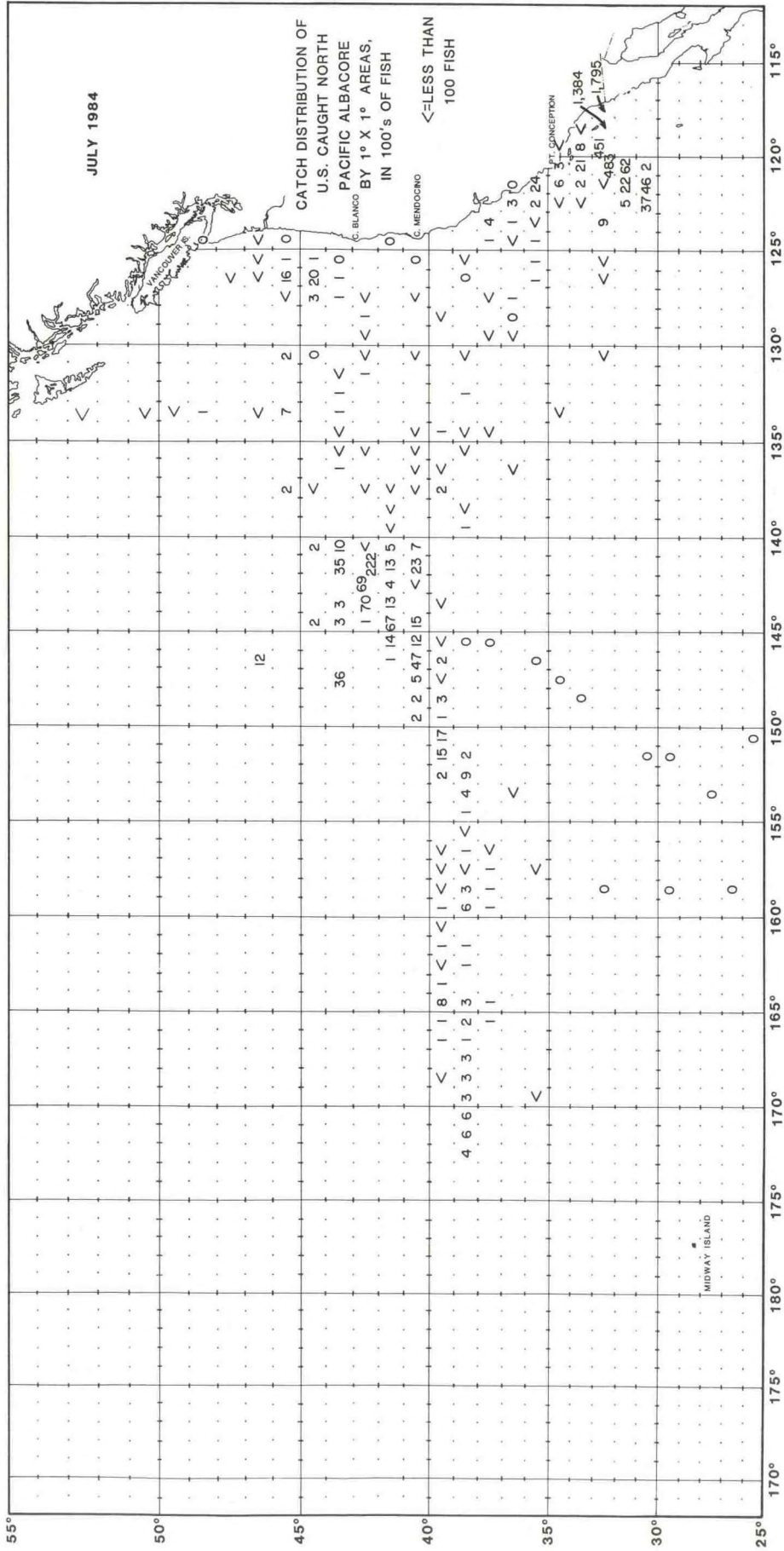


Figure 2d. Combined jigboat and baitboat fishery catches (in numbers of fish) by 1-degree square area, July 1984.

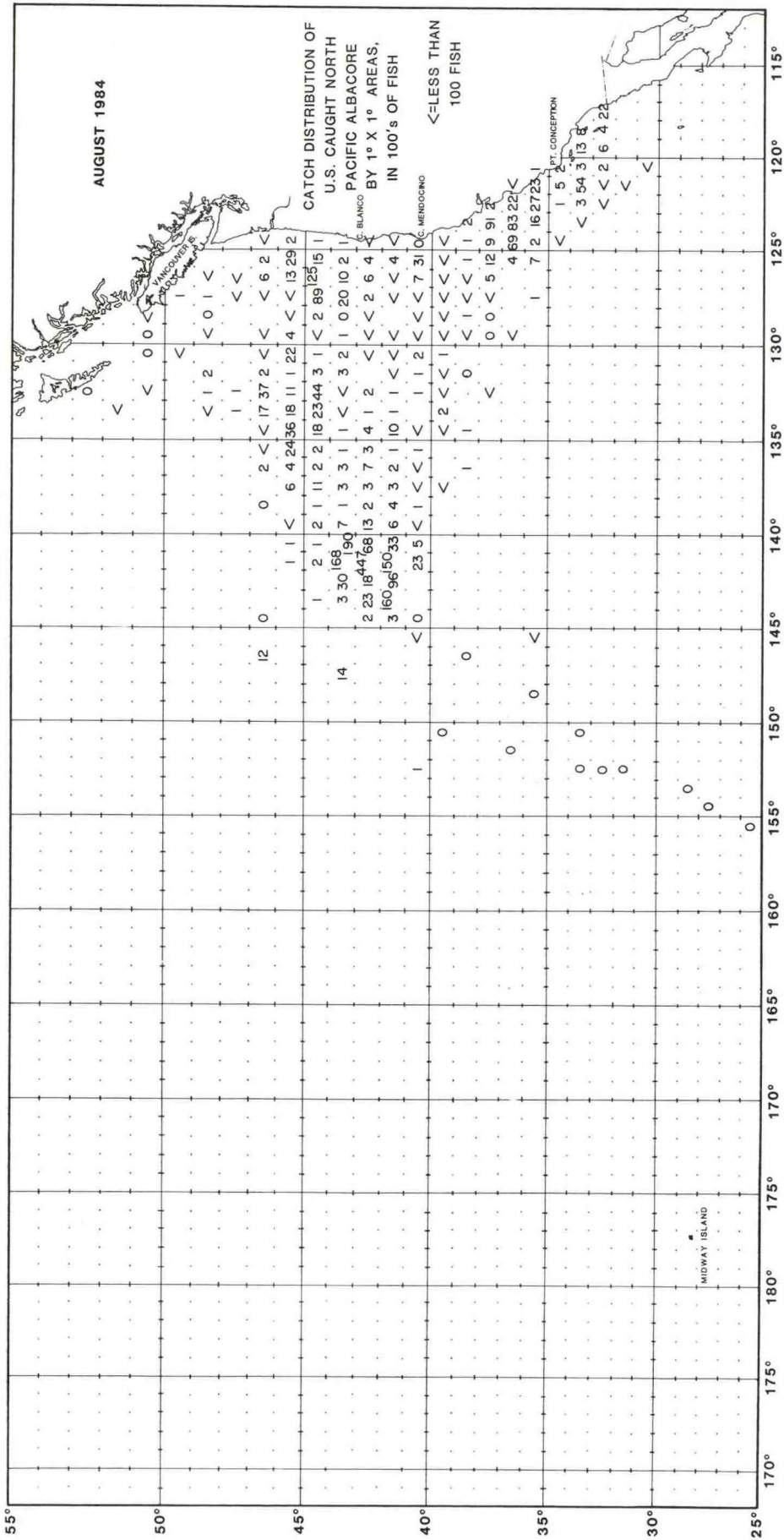


Figure 2e. Combined jibgoat and baitboat fishery catches (in numbers of fish) by 1-degree square area, August 1984.

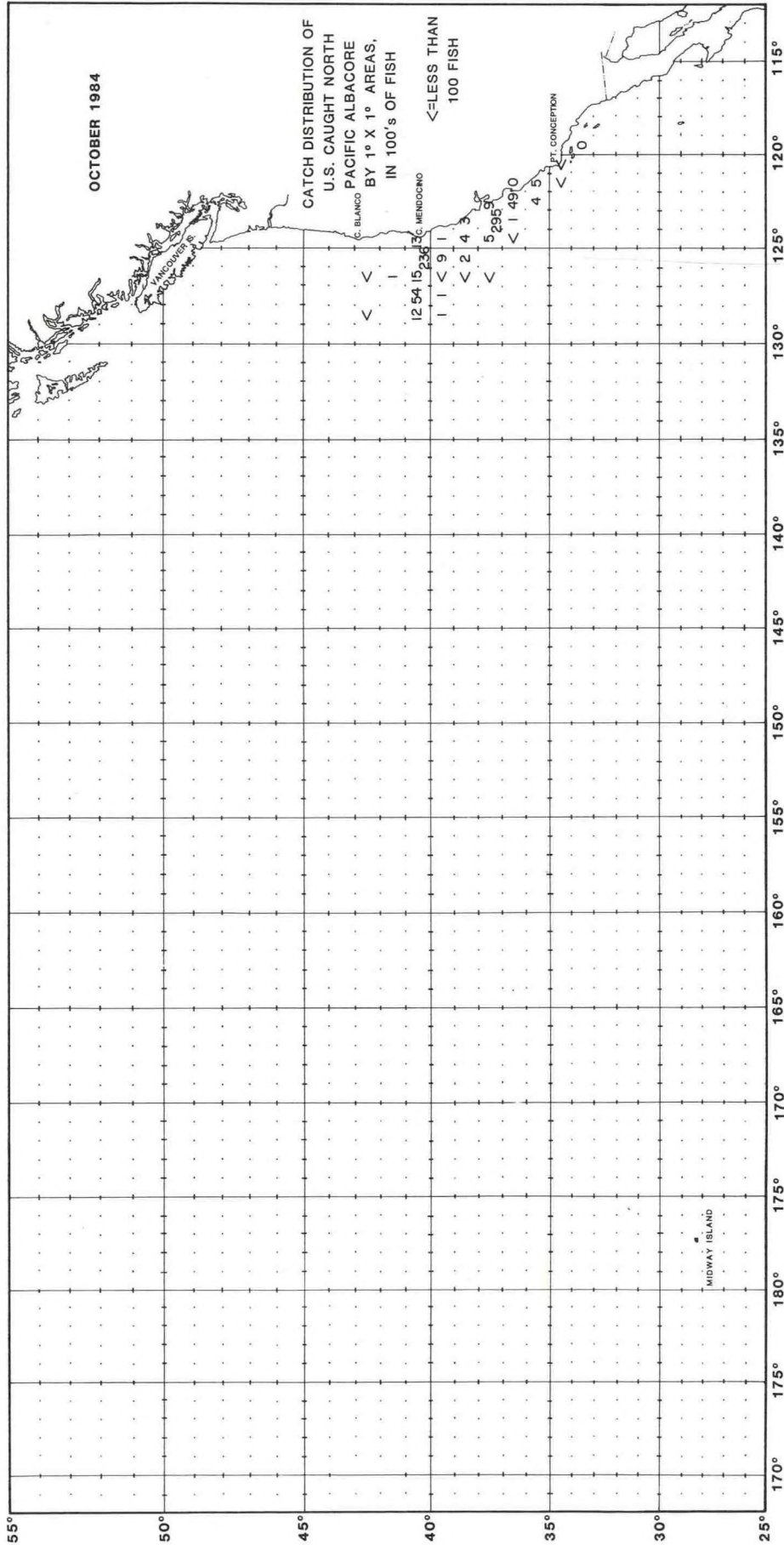


Figure 2g. Combined jigboat and baitboat fishery catches (in numbers of fish) by 1-degree square area, October 1984.

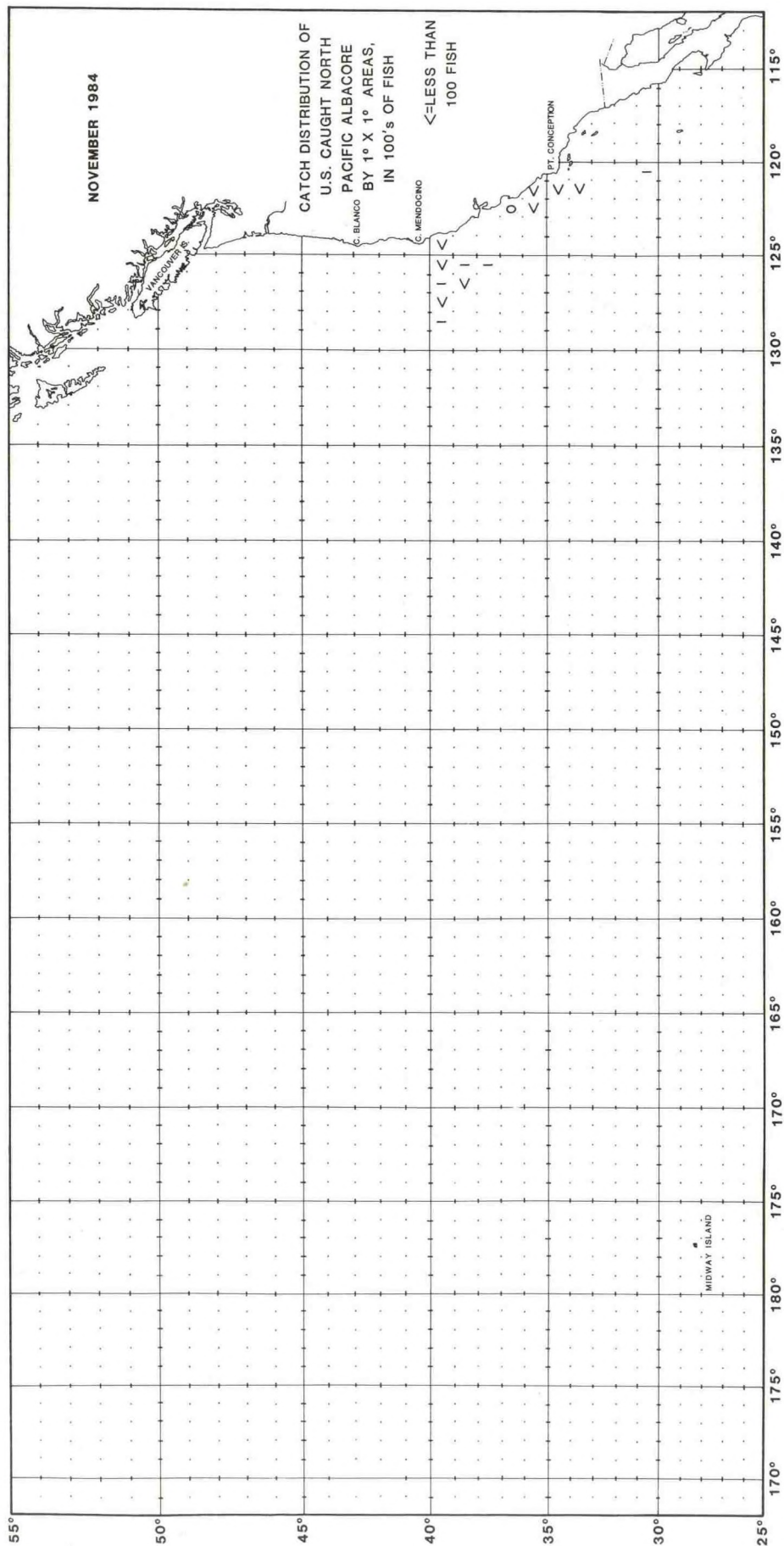


Figure 2h. Combined jigboat and baitboat fishery catches (in numbers of fish) by 1-degree square area, November 1984.

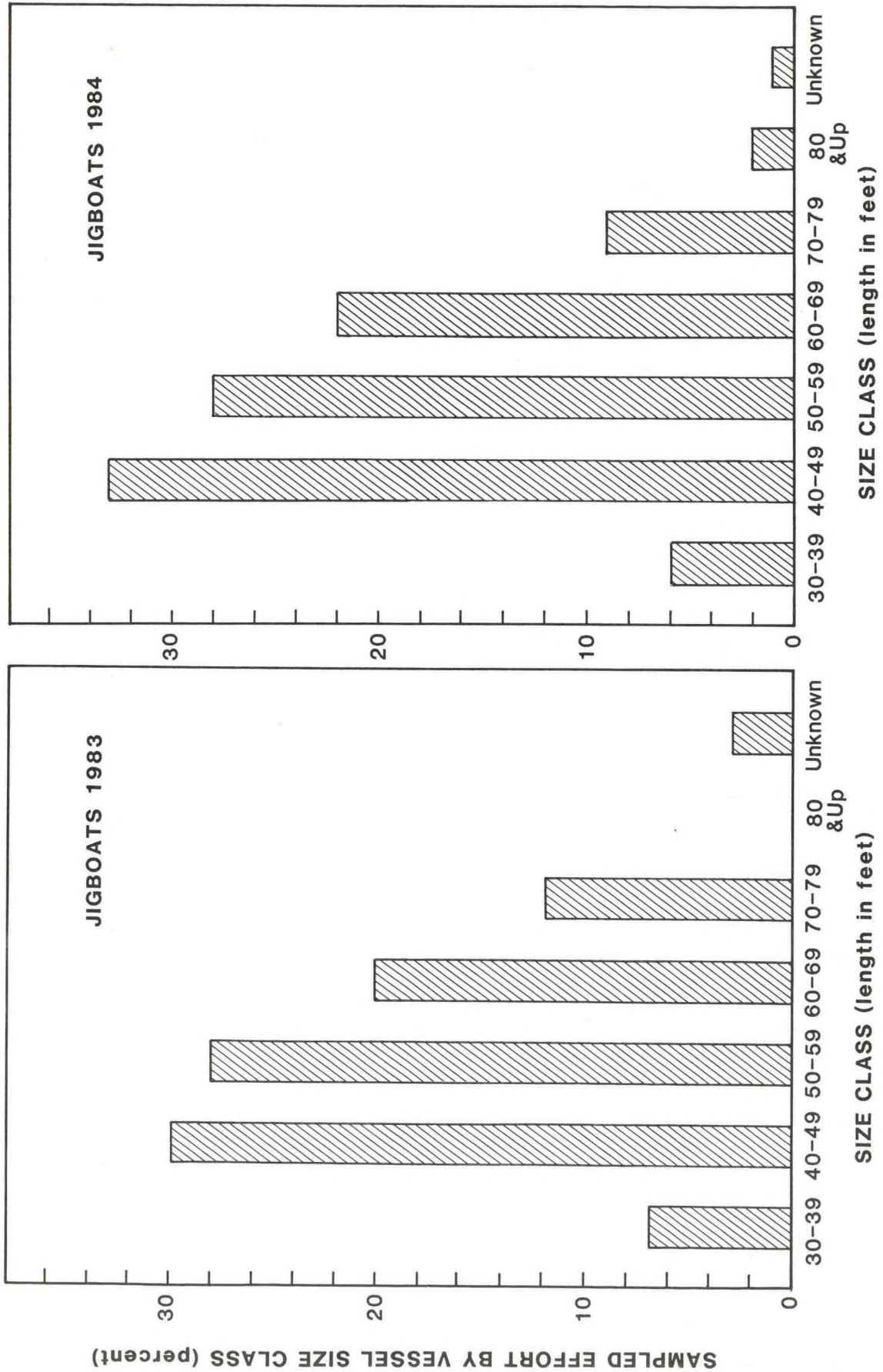


Figure 3. Sampled effort by vessel size class (jibgoats) and year.

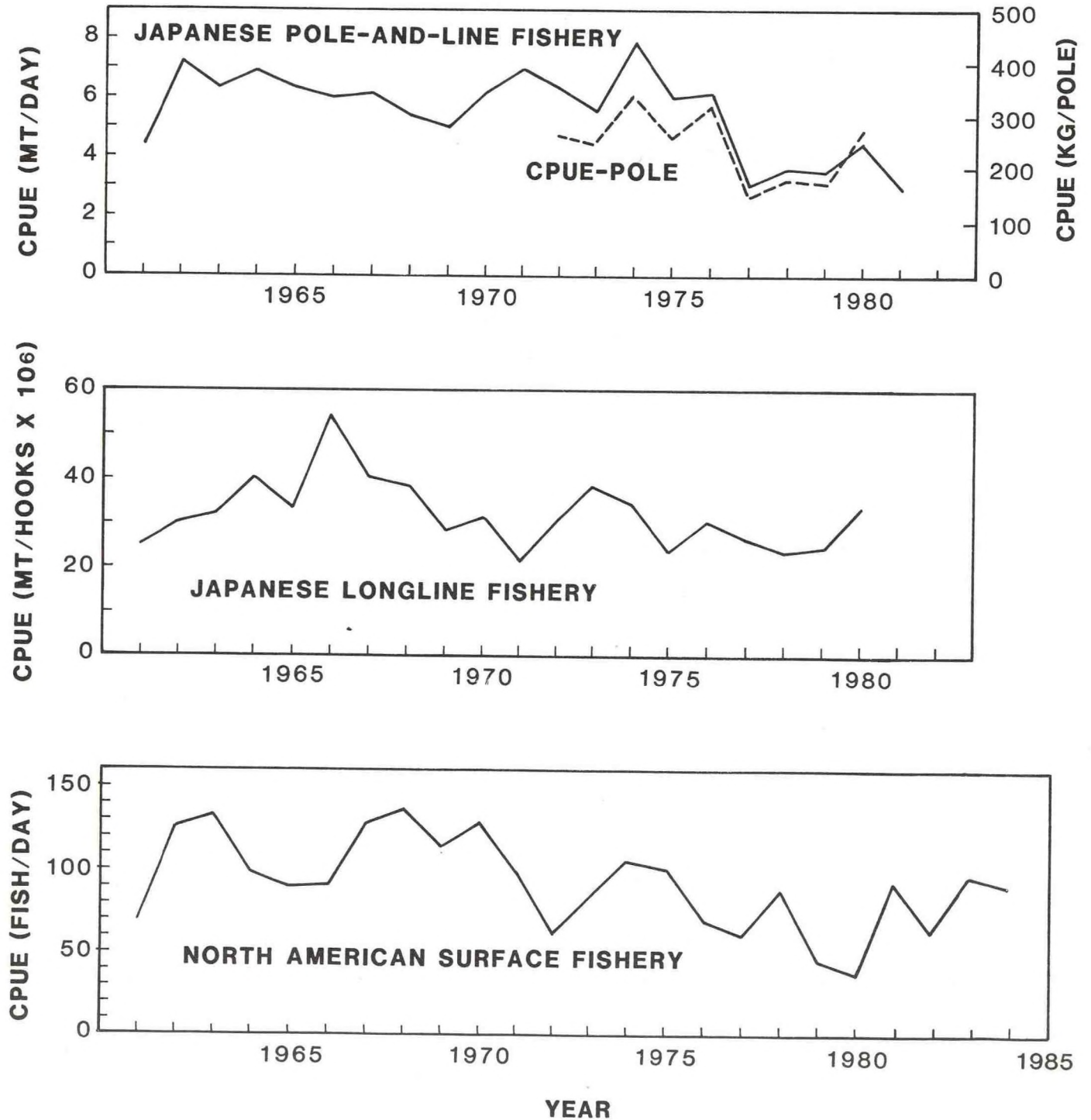


Figure 4. North Pacific albacore catch-per-unit effort (CPUE) by fishery and gear.

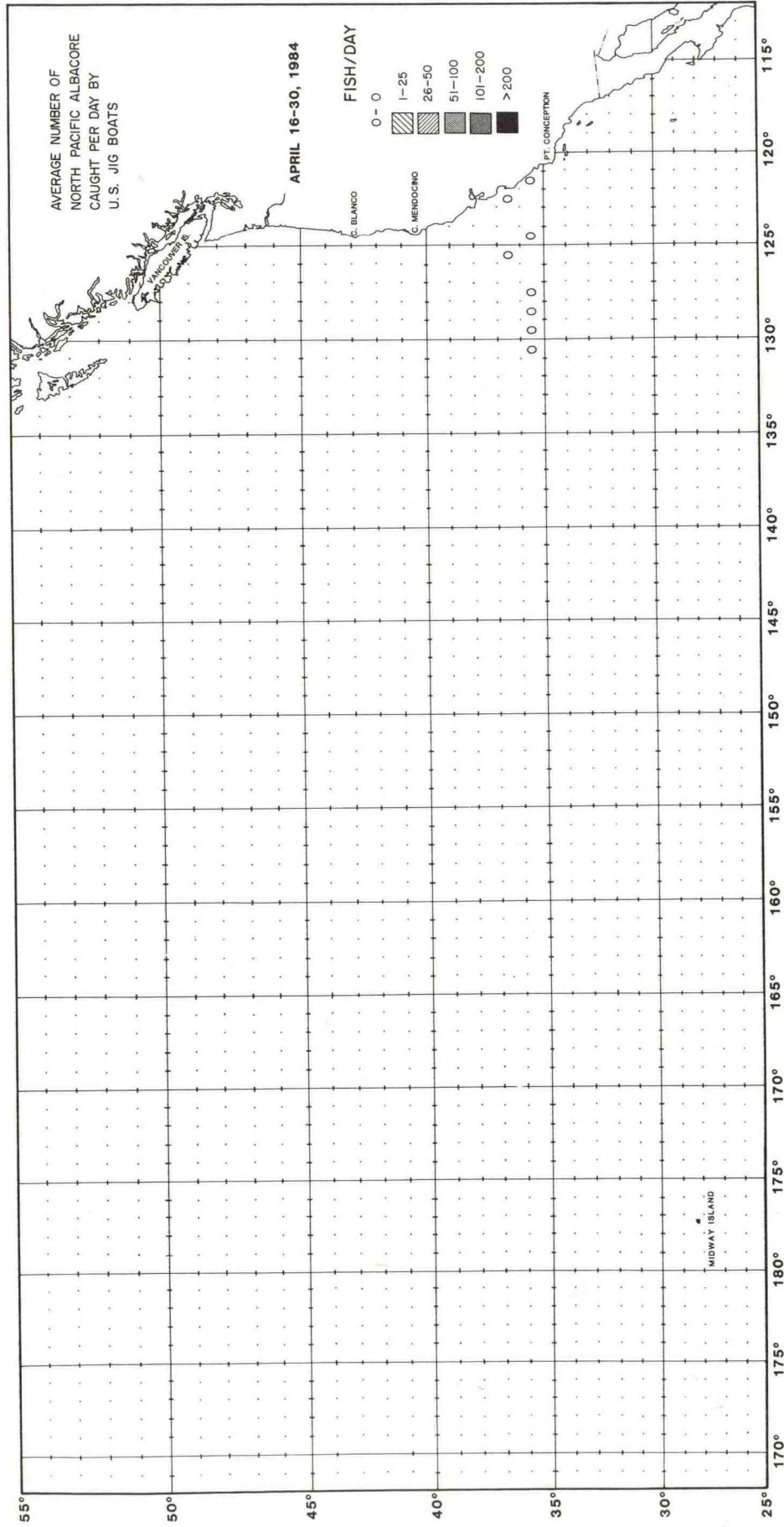


Figure 5a. Jibgoat catch-per-standard day fishing by 1-degree square area and half-month, April 16-30, 1984.

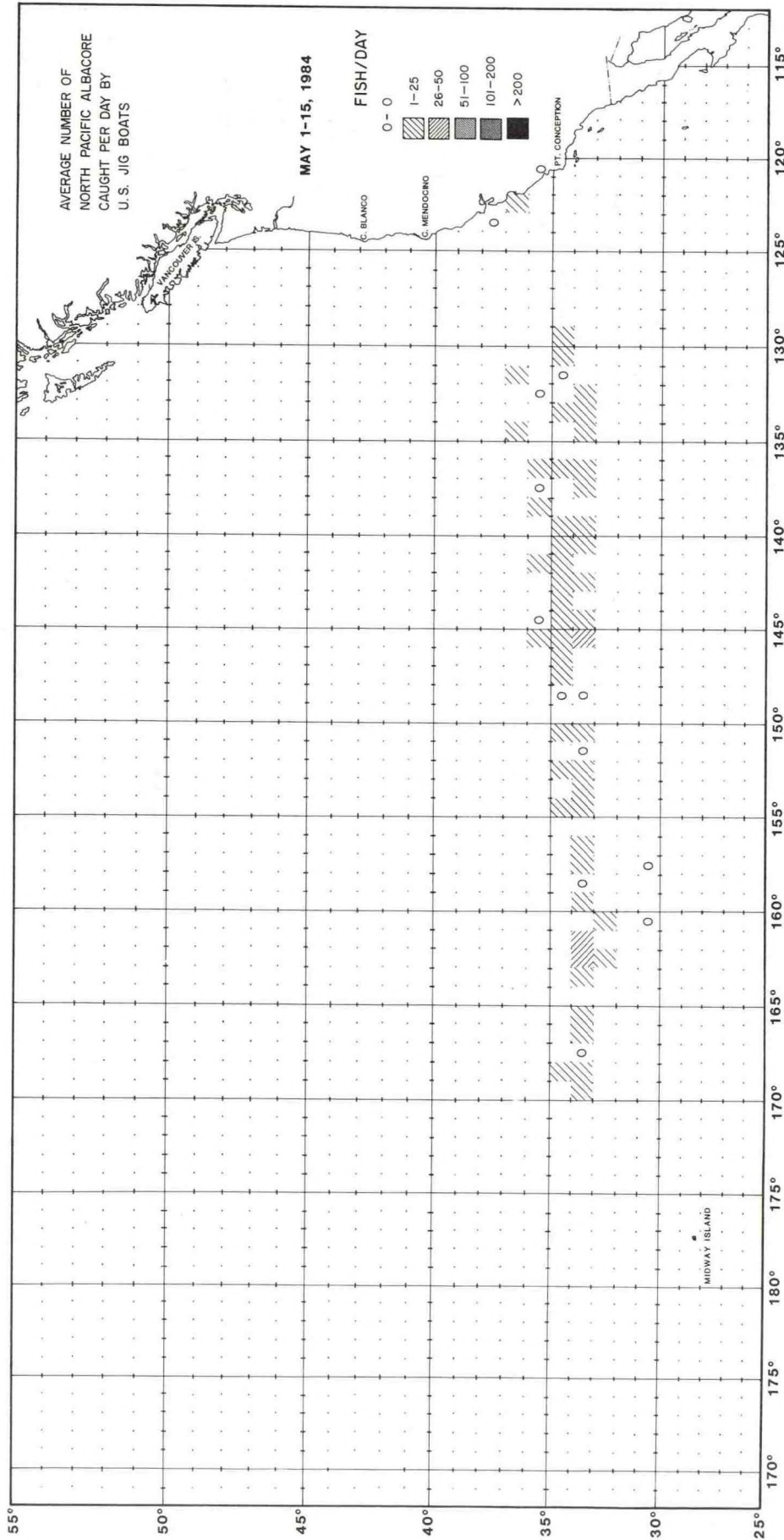


Figure 5b. Jibgoat catch-per-standard day fishing by 1-degree square area and half-month, May 1-15, 1984.

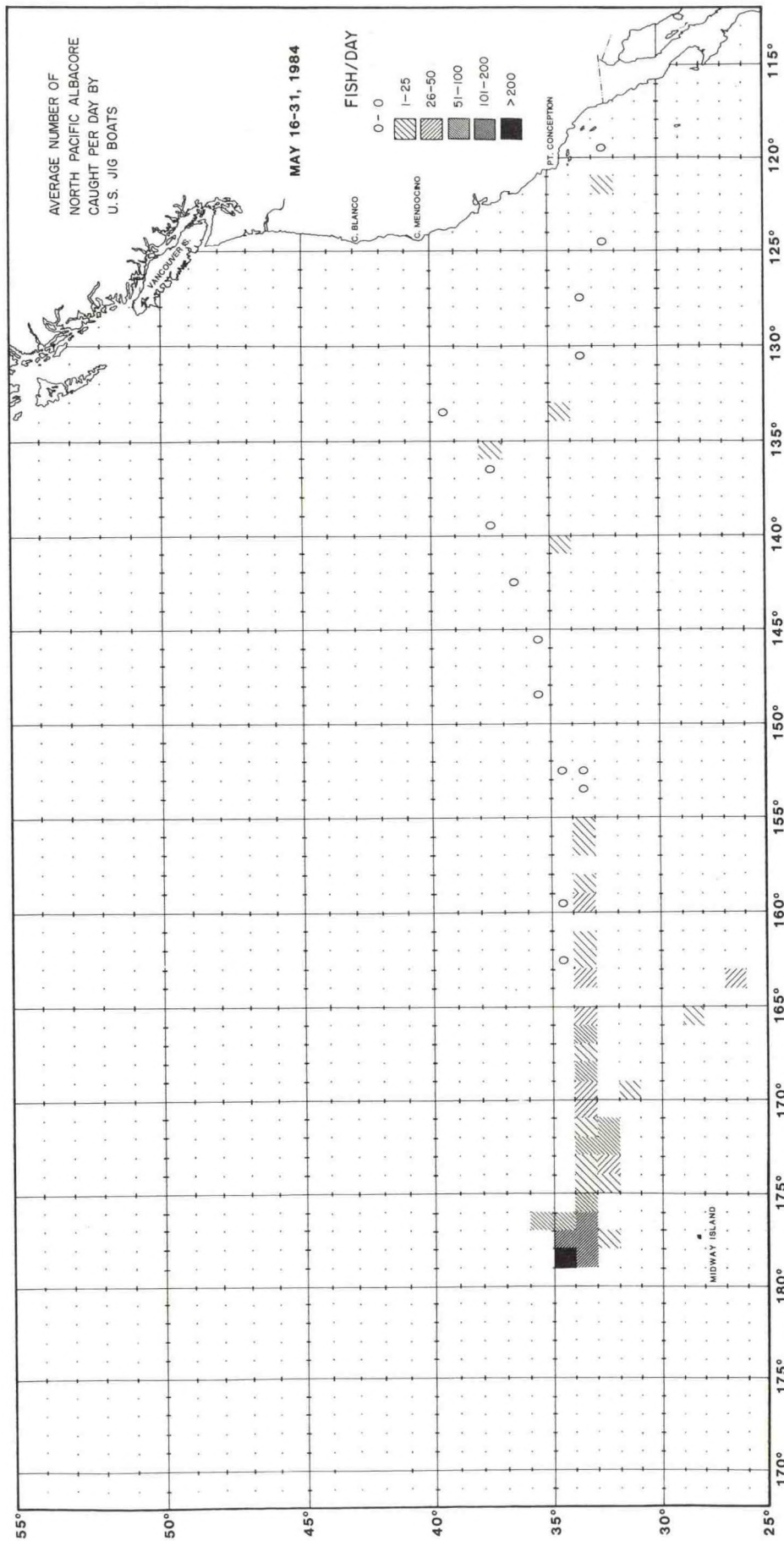


Figure 5c. Jigboat catch-per-standard day fishing by 1-degree square area and half-month, May 16-31, 1984.

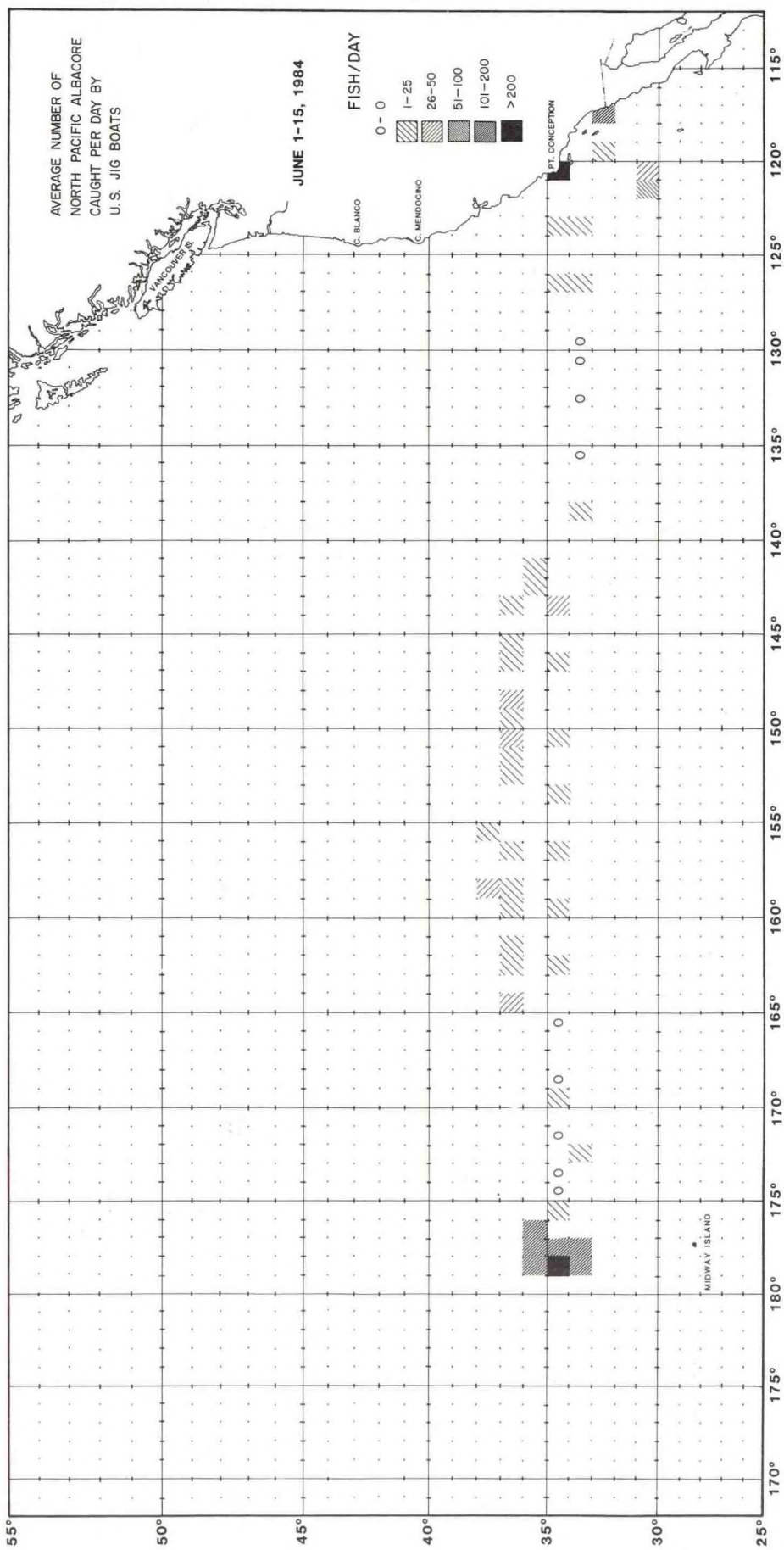


Figure 5d. Jibgoat catch-per-standard day fishing by 1-degree square area and half-month, June 1-15, 1984.

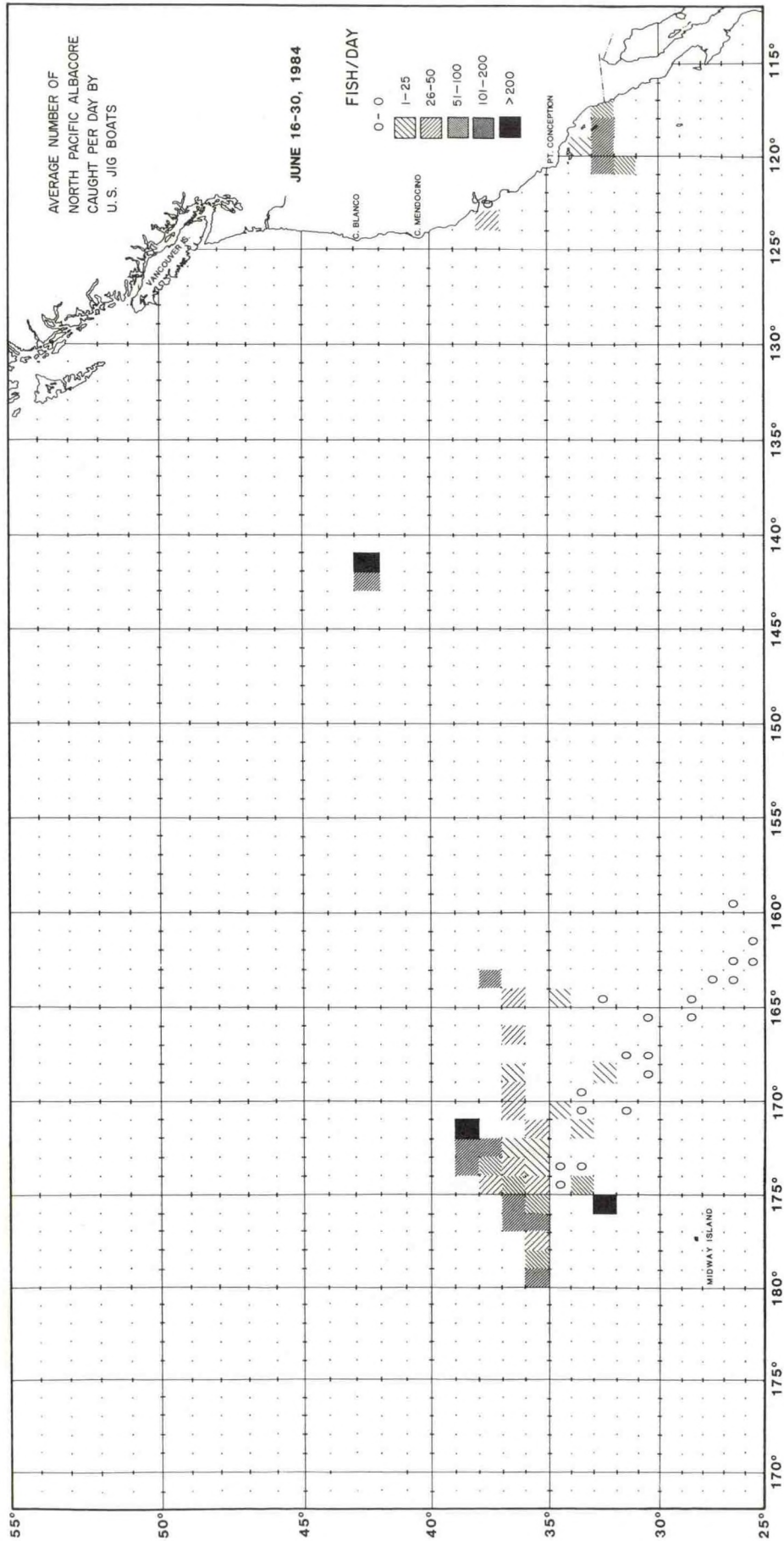


Figure 5e. Jibgoat catch-per-standard day fishing by 1-degree square area and half-month, June 16-30, 1984.

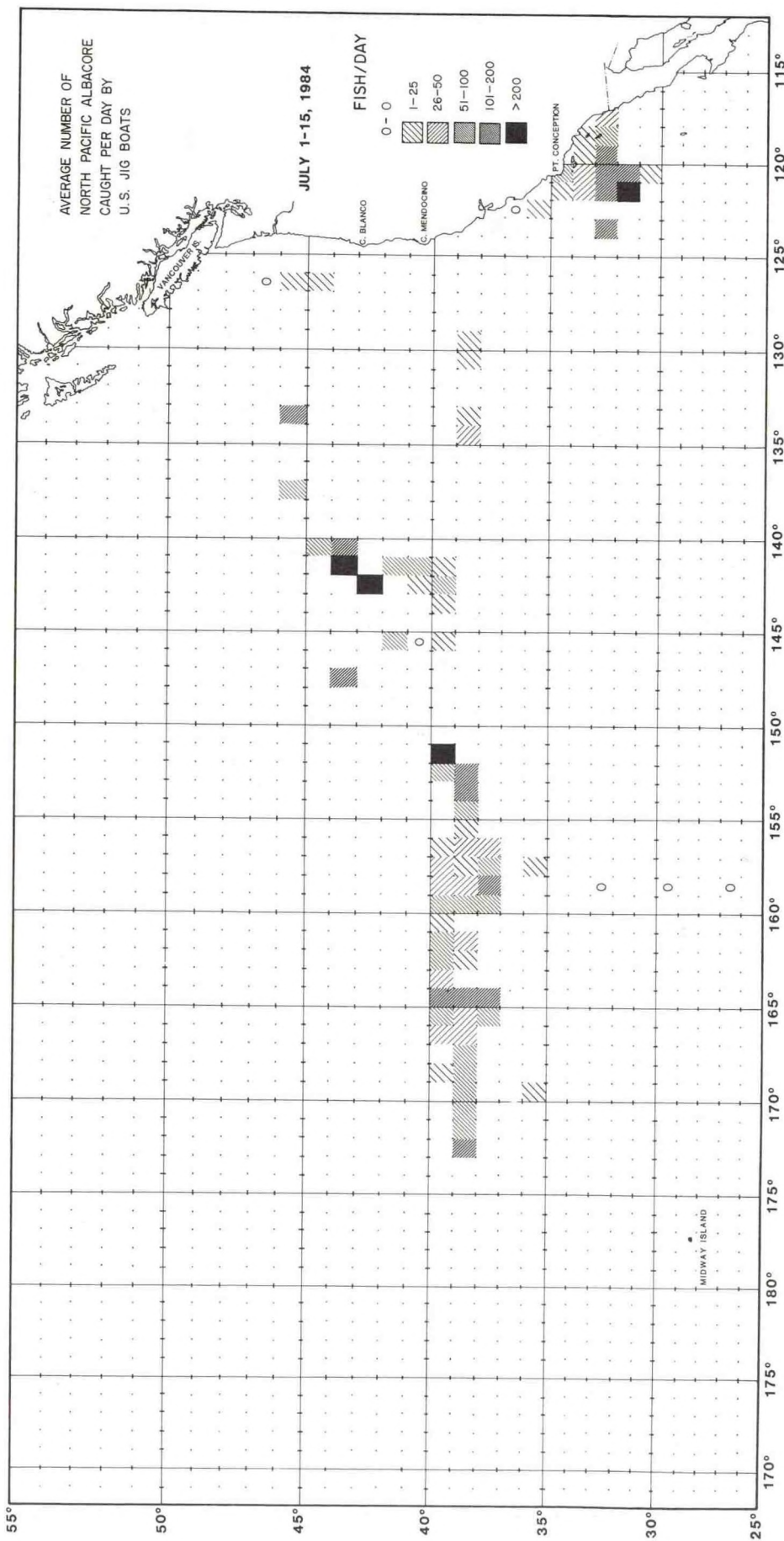


Figure 5f. Jigboat catch-per-standard day fishing by 1-degree square area and half-month, July 1-15, 1984.

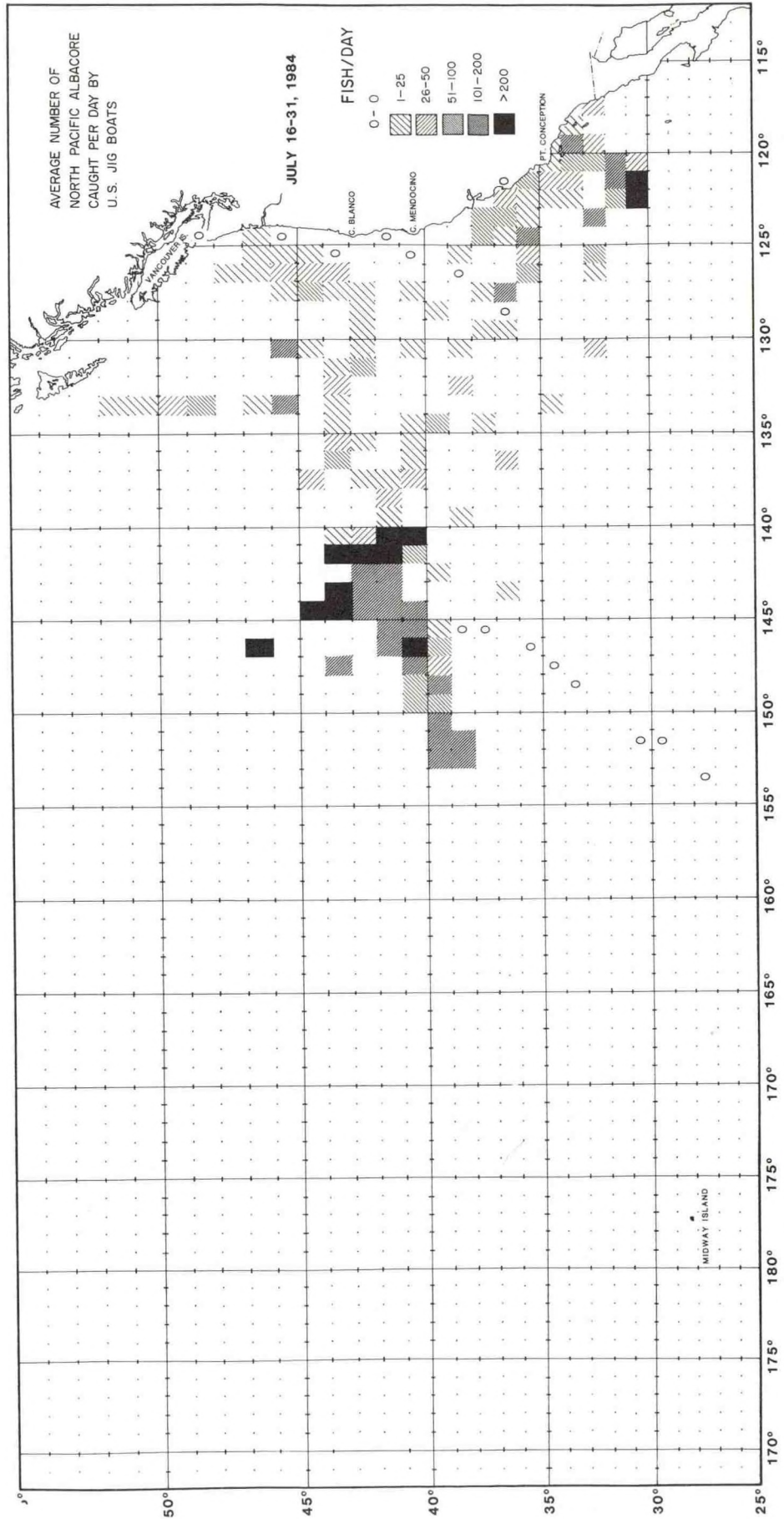


Figure 5g. Jigboat catch-per-standard day fishing by 1-degree square area and half-month, July 16-31, 1984

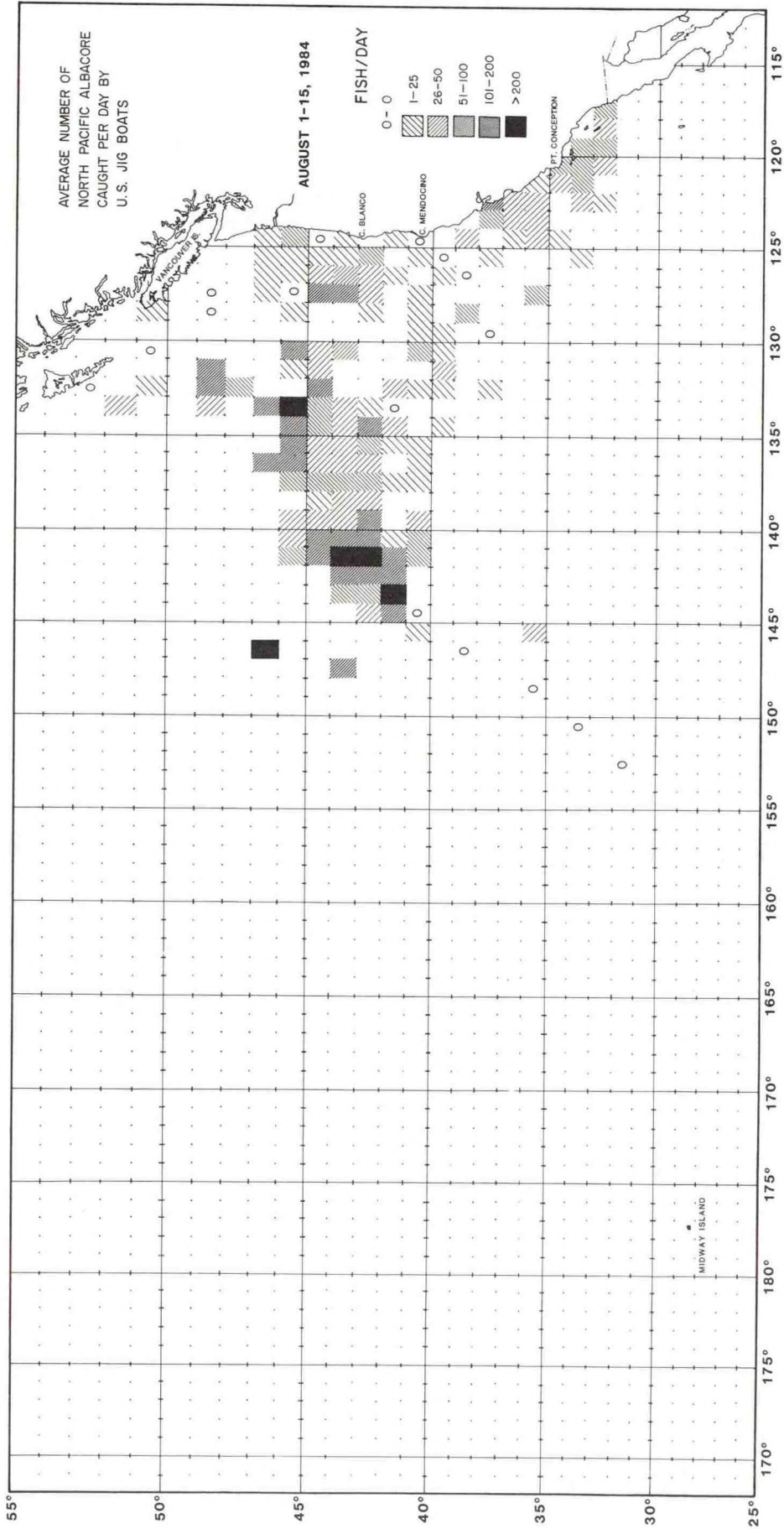


Figure 5h. Jigboat catch-per-standard day fishing by 1-degree square area and half-month, August 1-15, 1984.

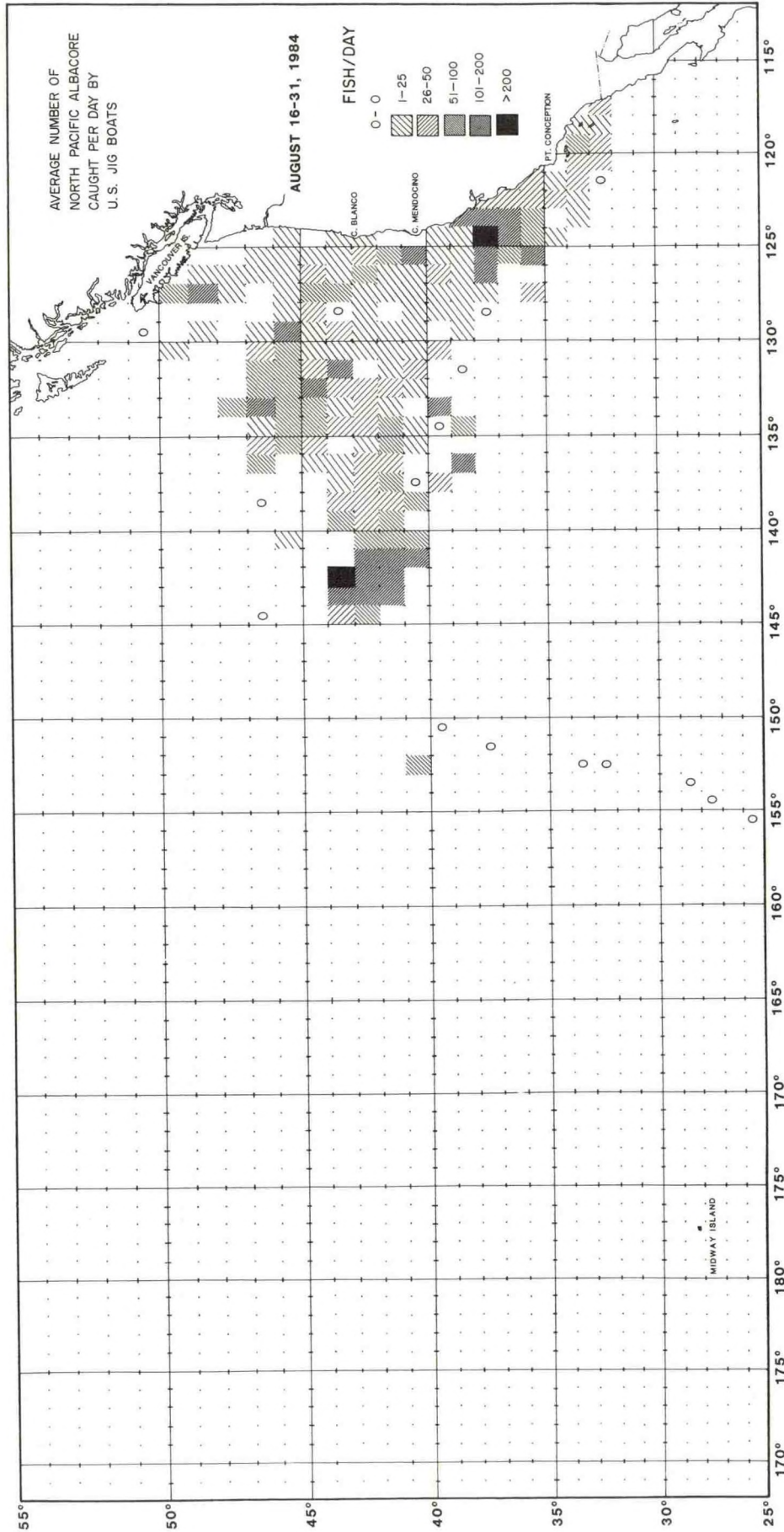


Figure 5i. Jigboat catch-per-standard day fishing by 1-degree square area and half-month, August 16-31, 1984.

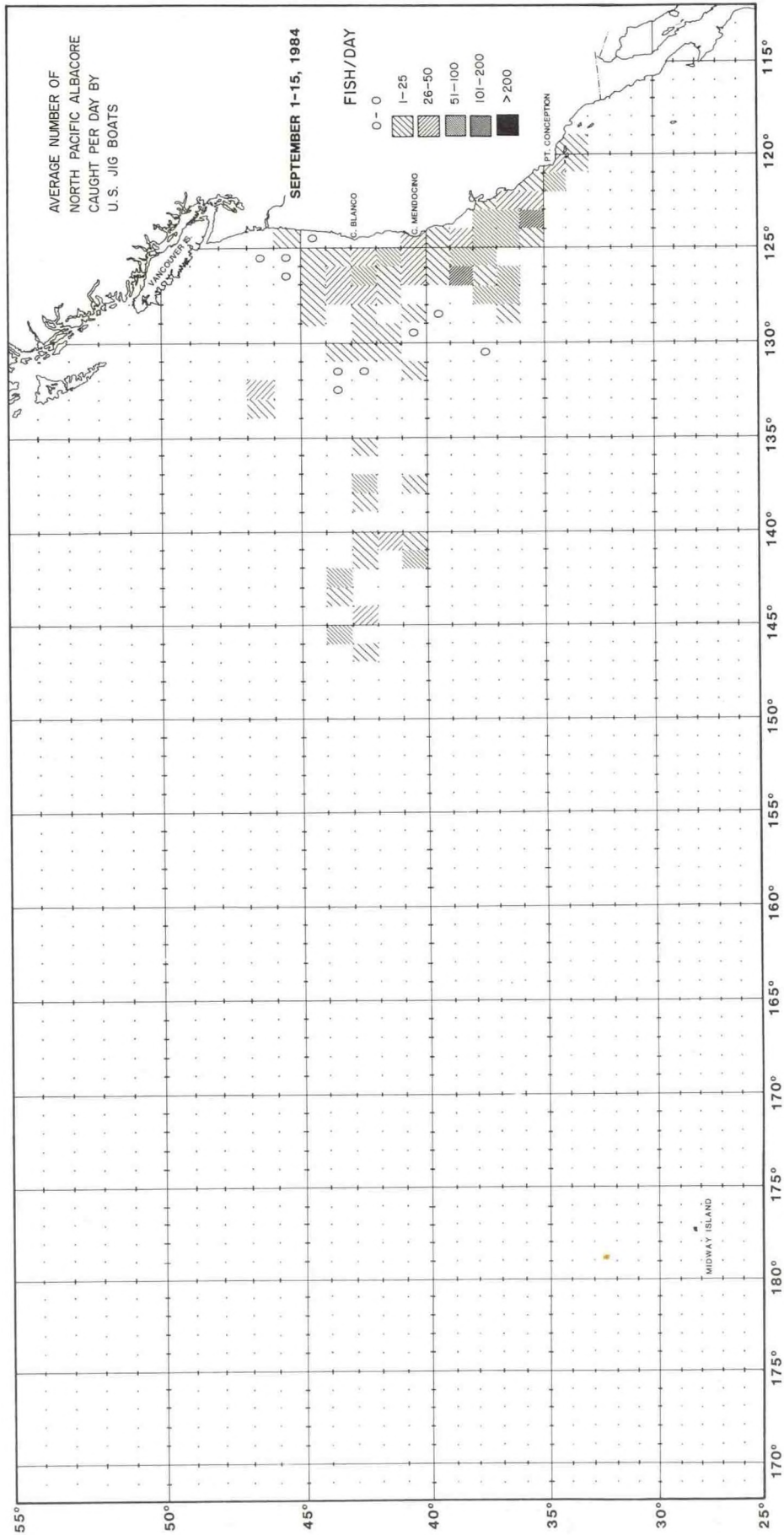


Figure 5j. Jigboat catch-per-standard day fishing by 1-degree square area and half-month, September 1-15, 1984.

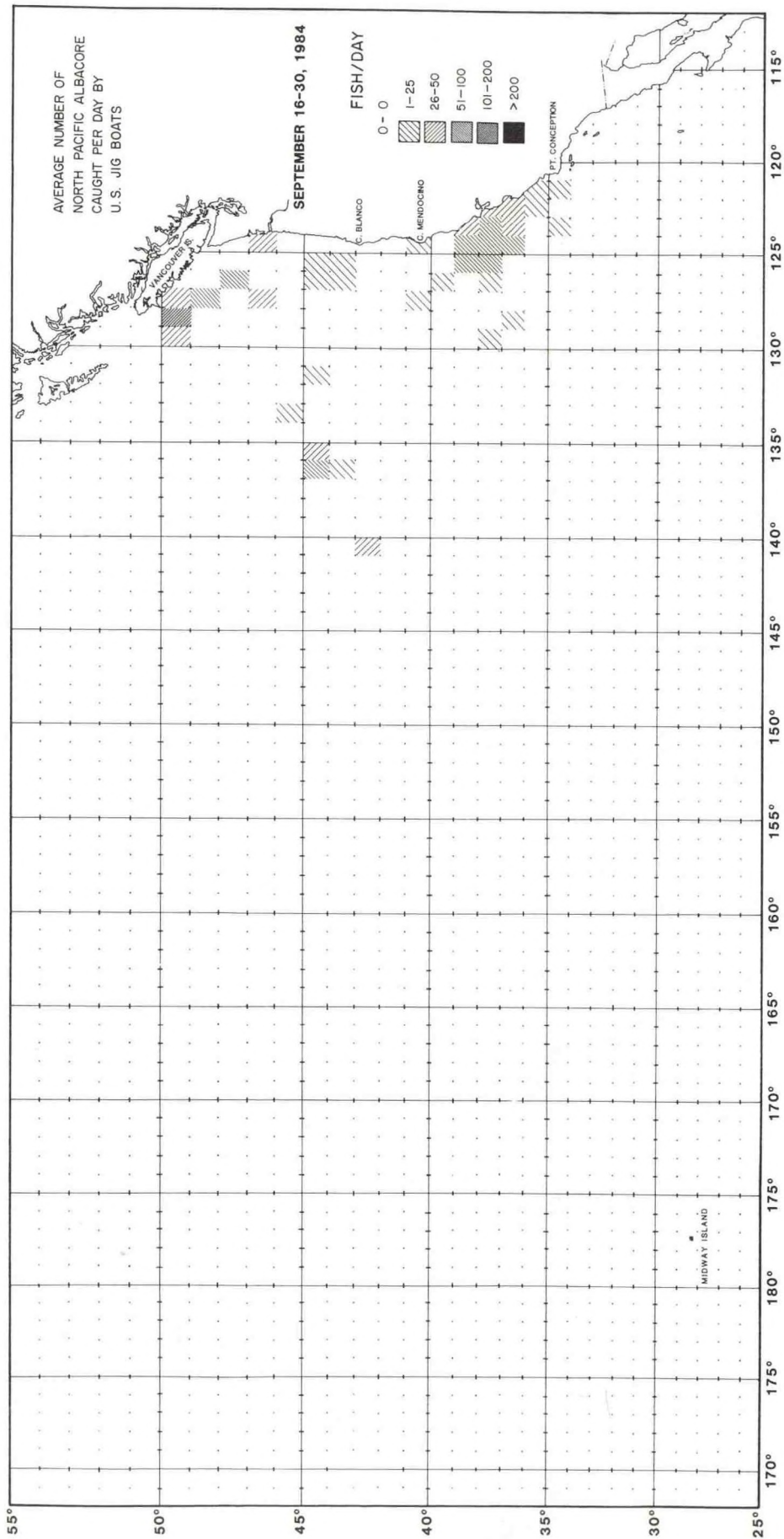


Figure 5k. Jigboat catch-per-standard day fishing by 1-degree square area and half-month, September 16-30, 1984.

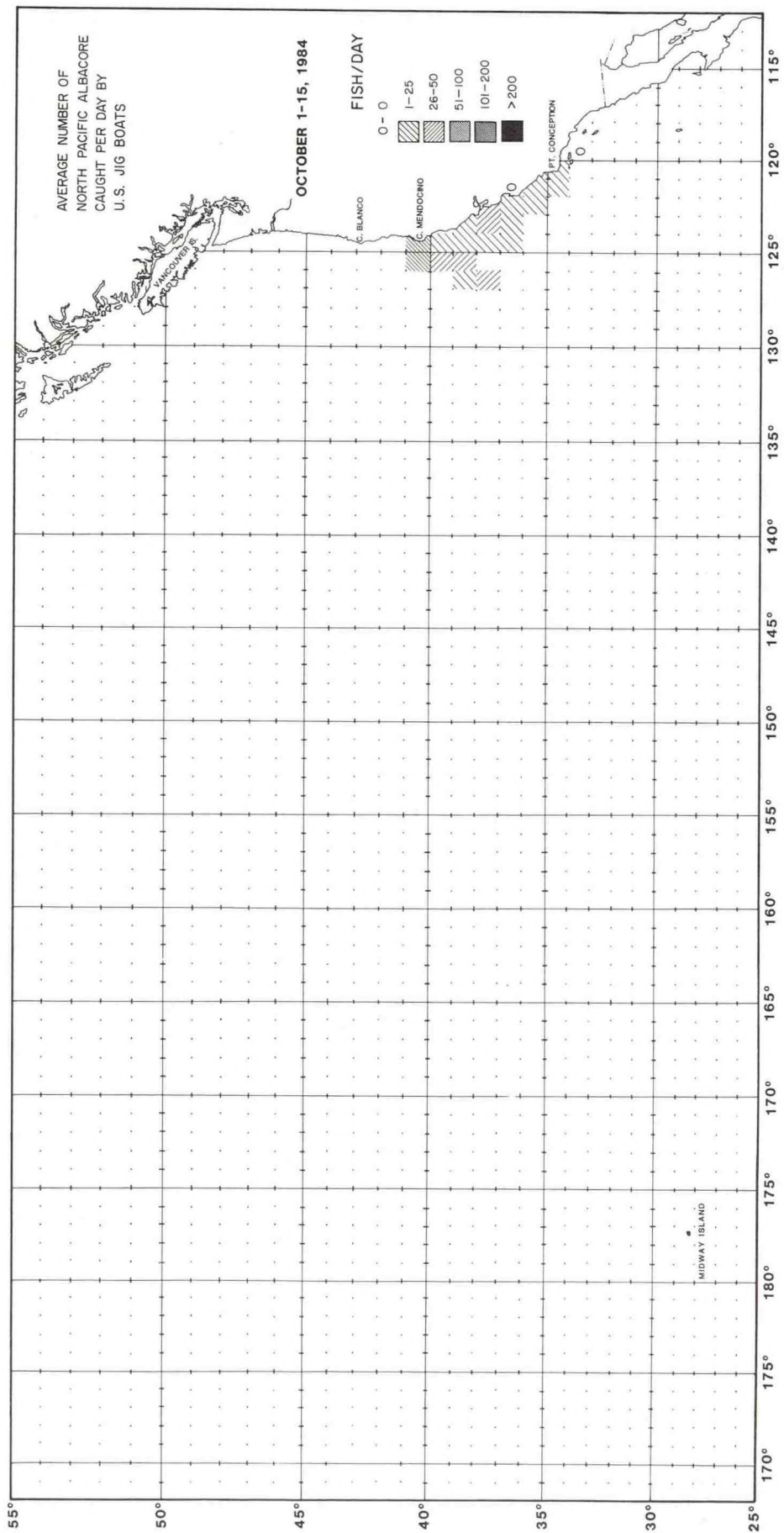


Figure 51. Jibgoat catch-per-standard day fishing by 1-degree square area and half-month, October 1-15, 1984.

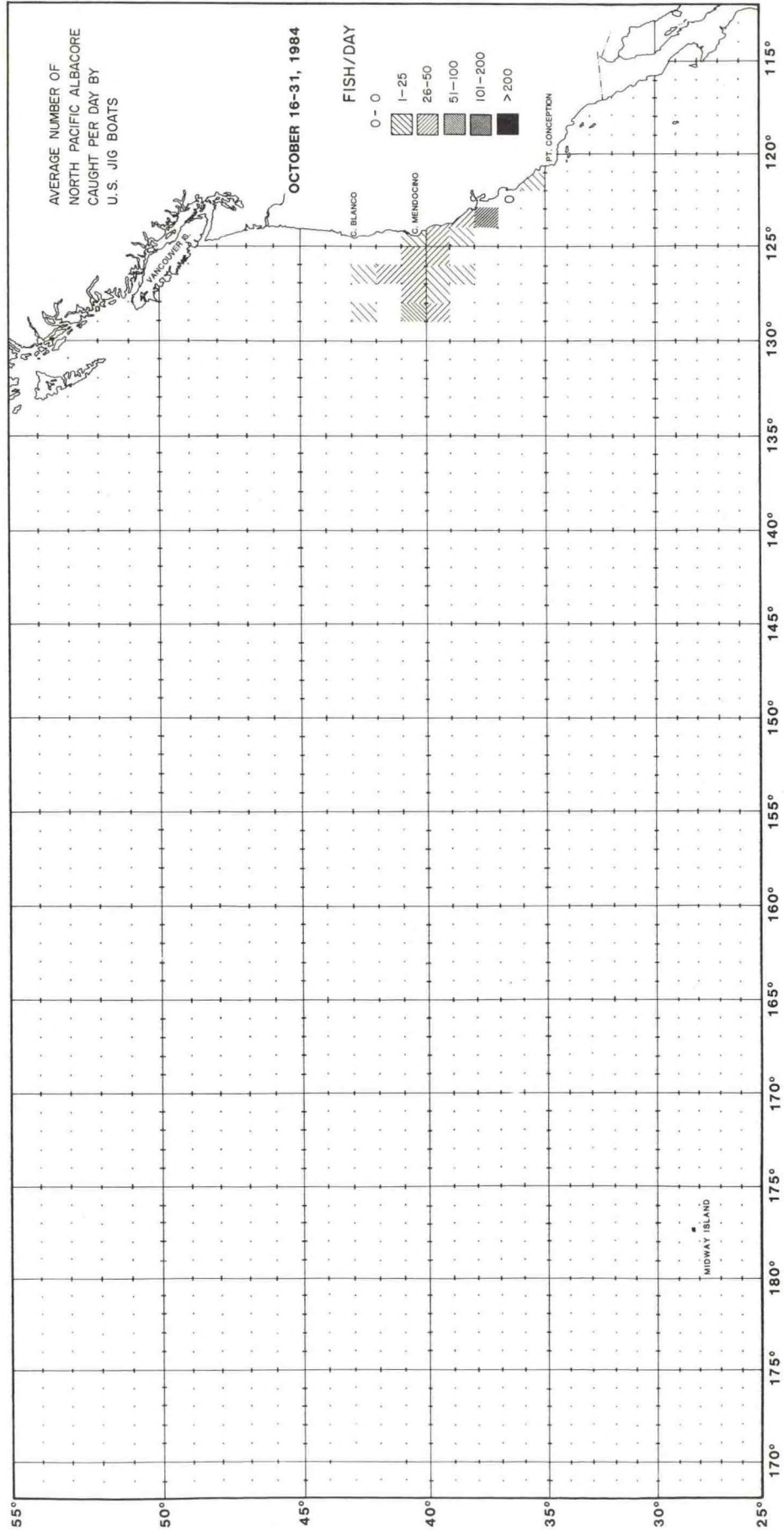


Figure 5m. Jigboat catch-per-standard day fishing by 1-degree square area and half-month, October 16-31, 1984.

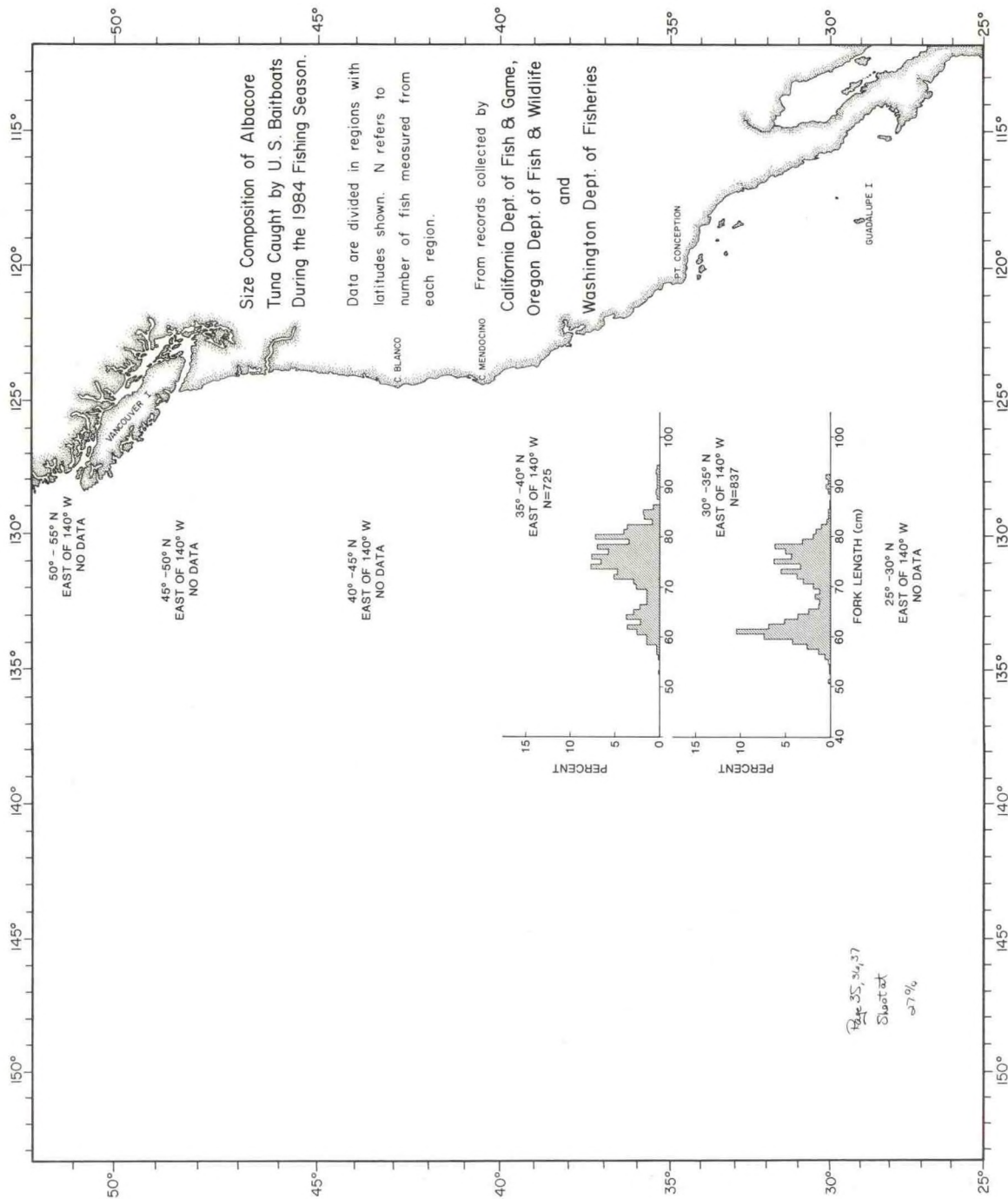


Figure 6a. Length-frequency histograms of 1984 North Pacific albacore caught by U.S. baitboat fishery.

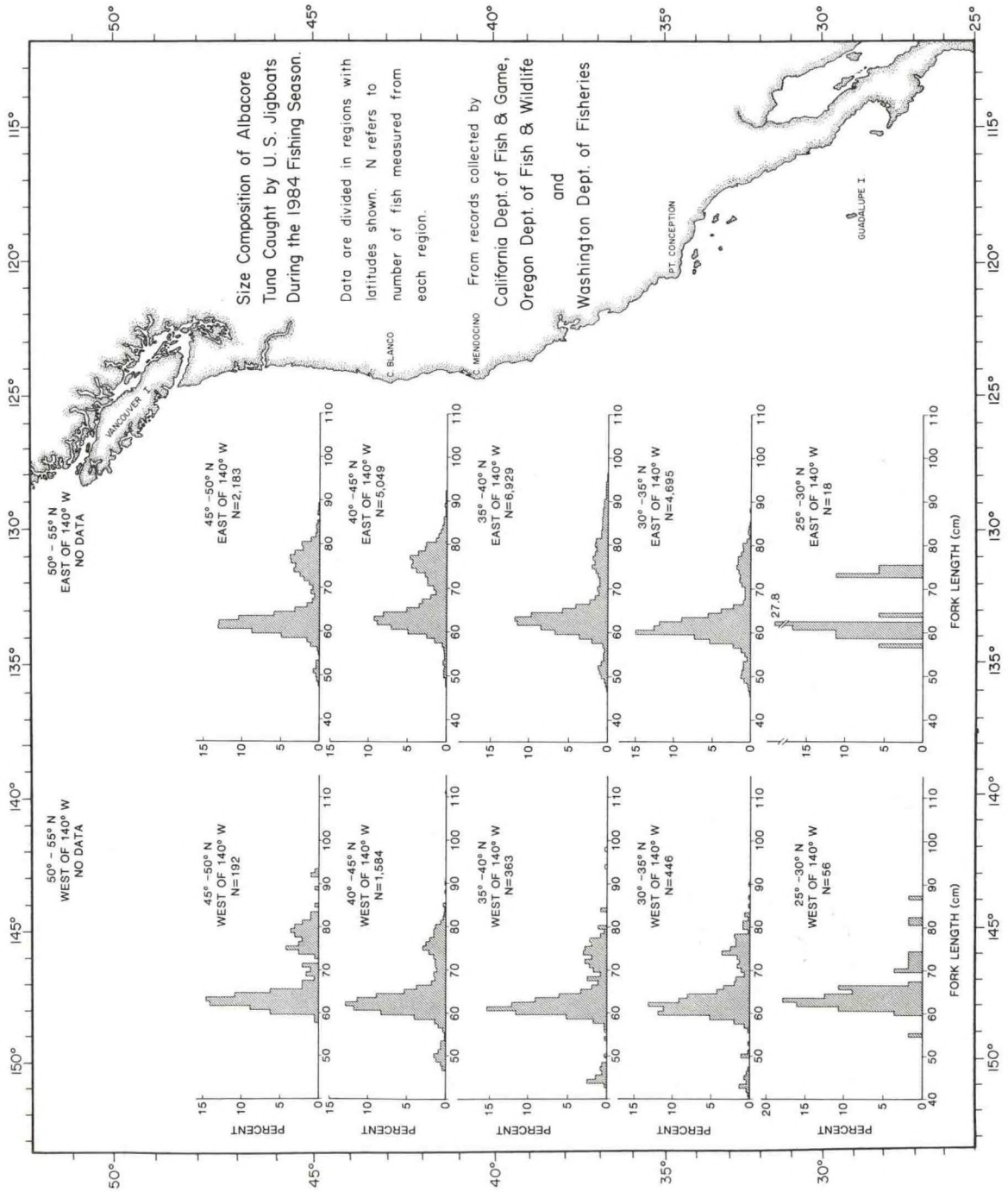


Figure 6b. Length-frequency histograms of 1984 North Pacific albacore caught by U.S. Jigboat fishery.

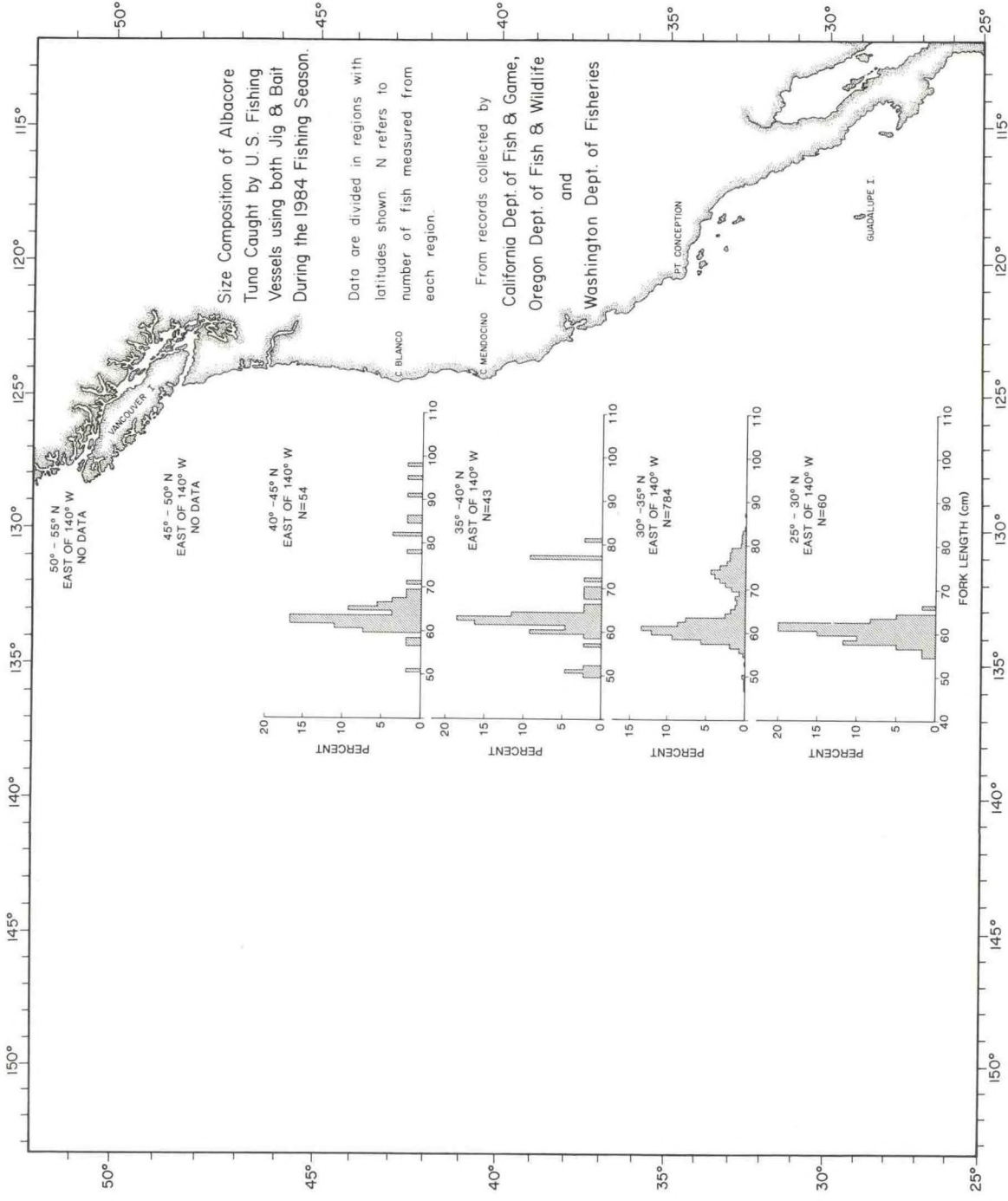


Figure 6c. Length-frequency histograms of 1984 North Pacific albacore caught by U.S. vessels using both bait and jig.

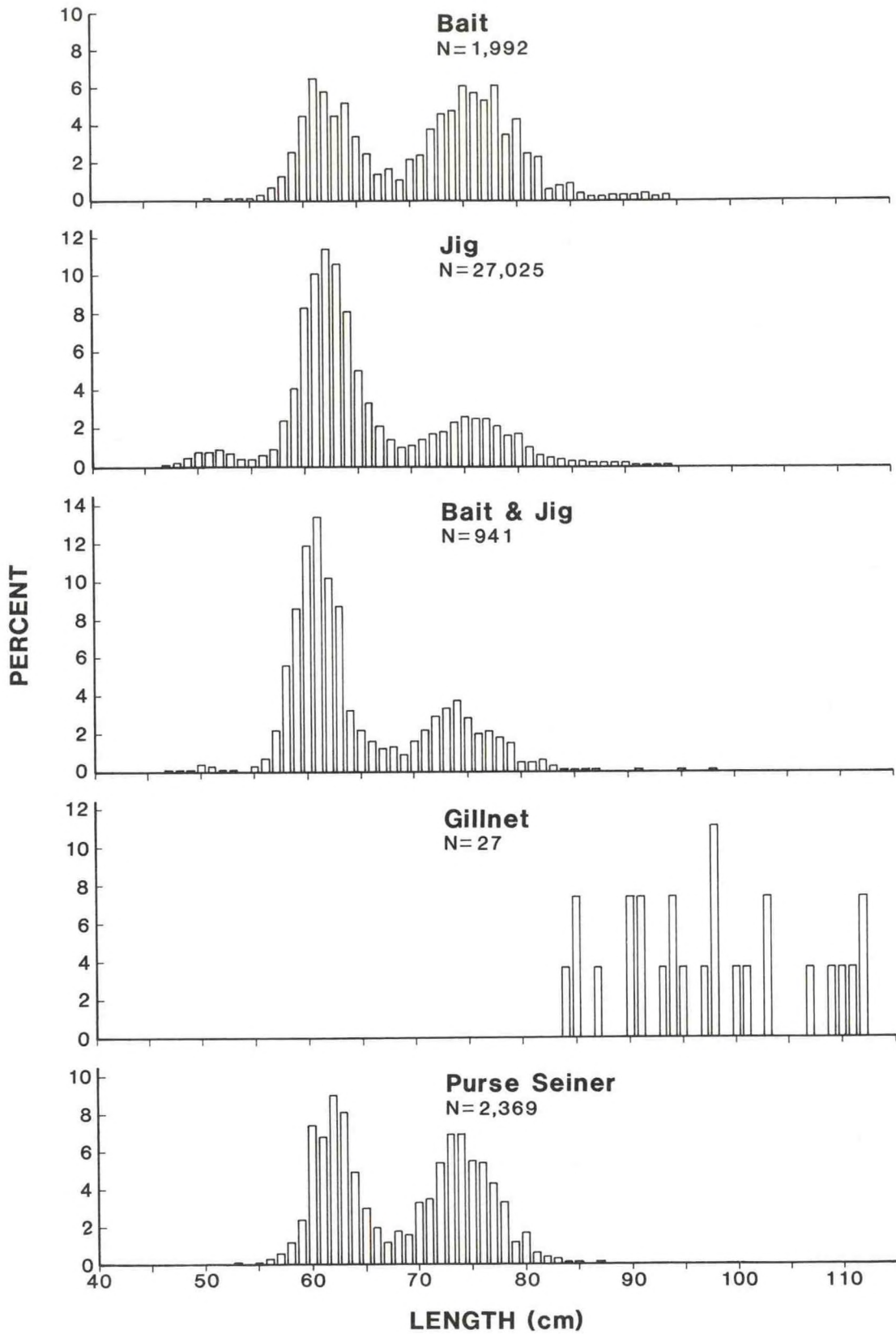


Figure 7. Size composition of albacore tuna caught by the U.S. surface fleet for 1984 by gear.

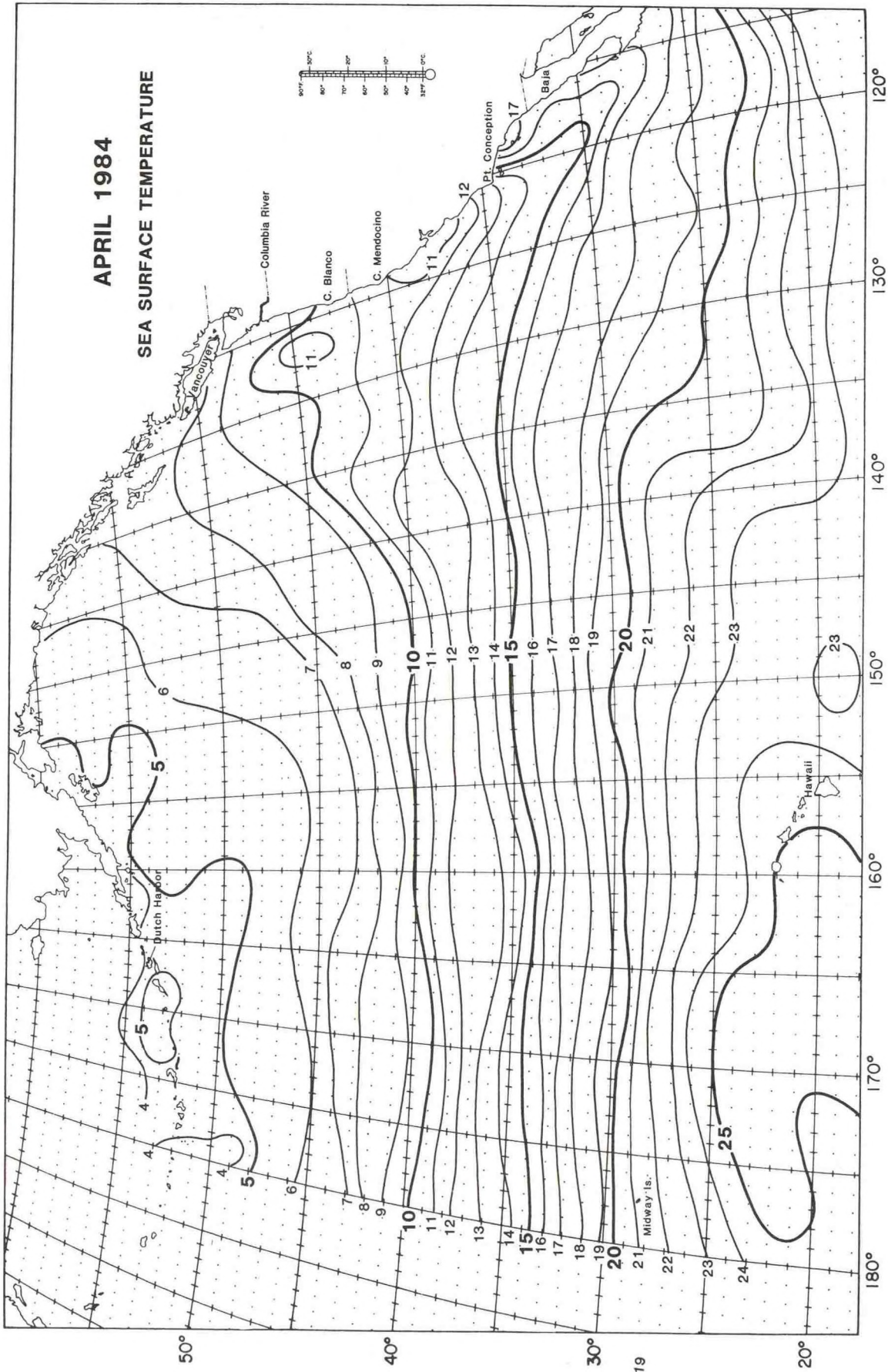


Figure 8a. Average sea surface temperature isopleths ($^{\circ}\text{C}$) by month for the eastern Pacific Ocean, April 1984.

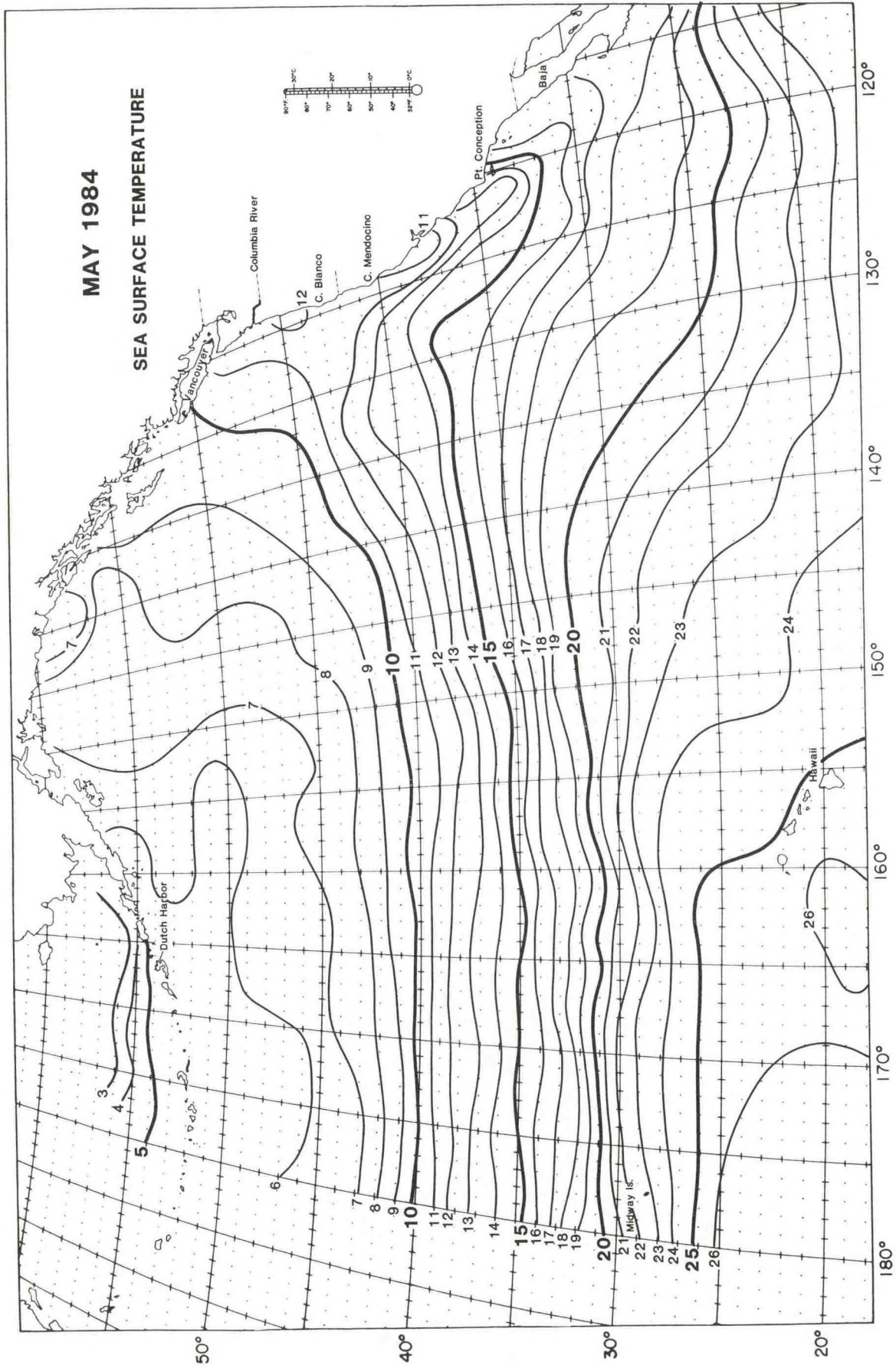


Figure 8b. Average sea surface temperature isopleths ($^{\circ}\text{C}$) by month for the eastern Pacific Ocean, May 1984.

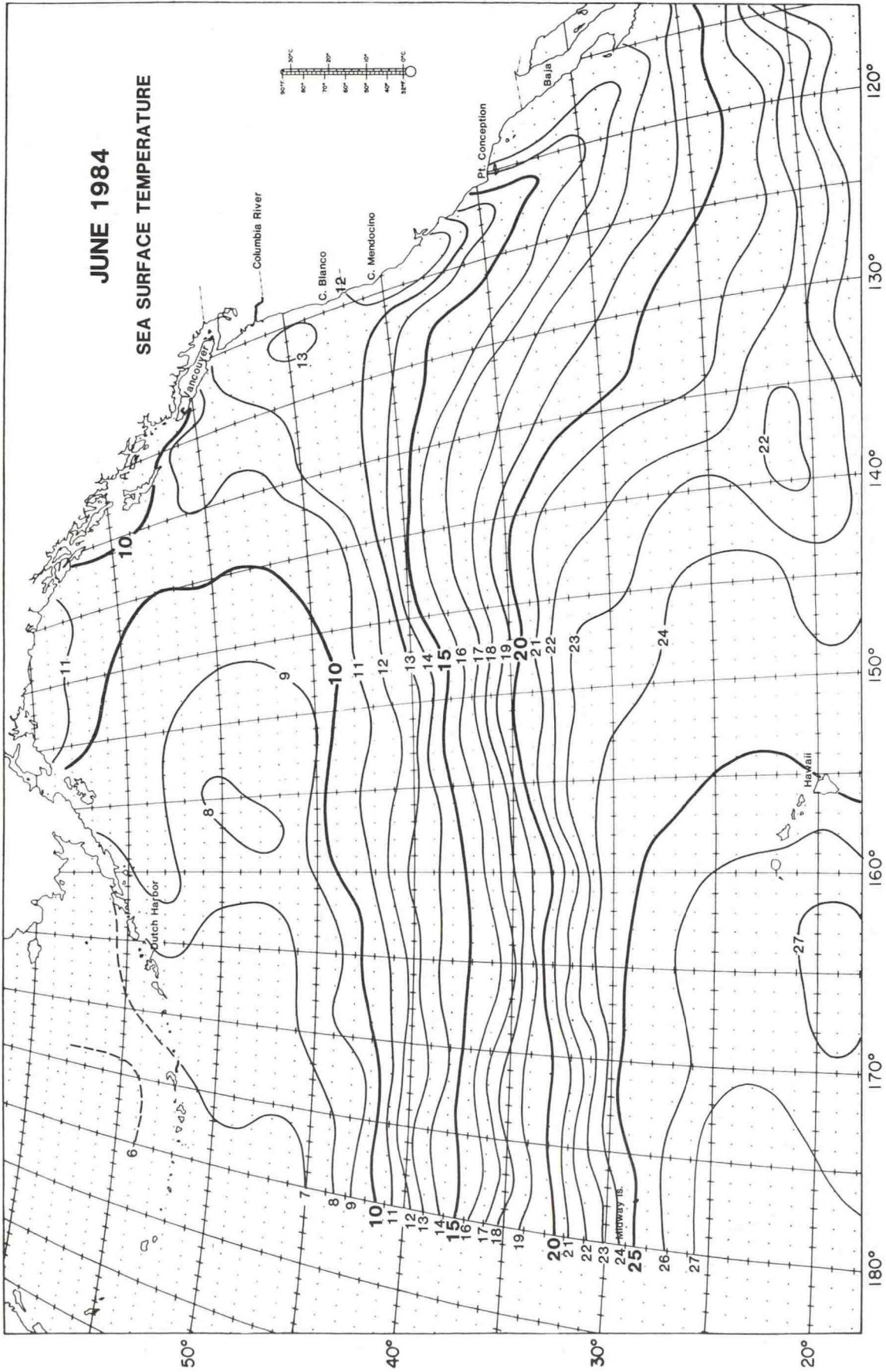


Figure 8c. Average sea surface temperature isopleths (°C) by month for the eastern Pacific Ocean, June 1984.

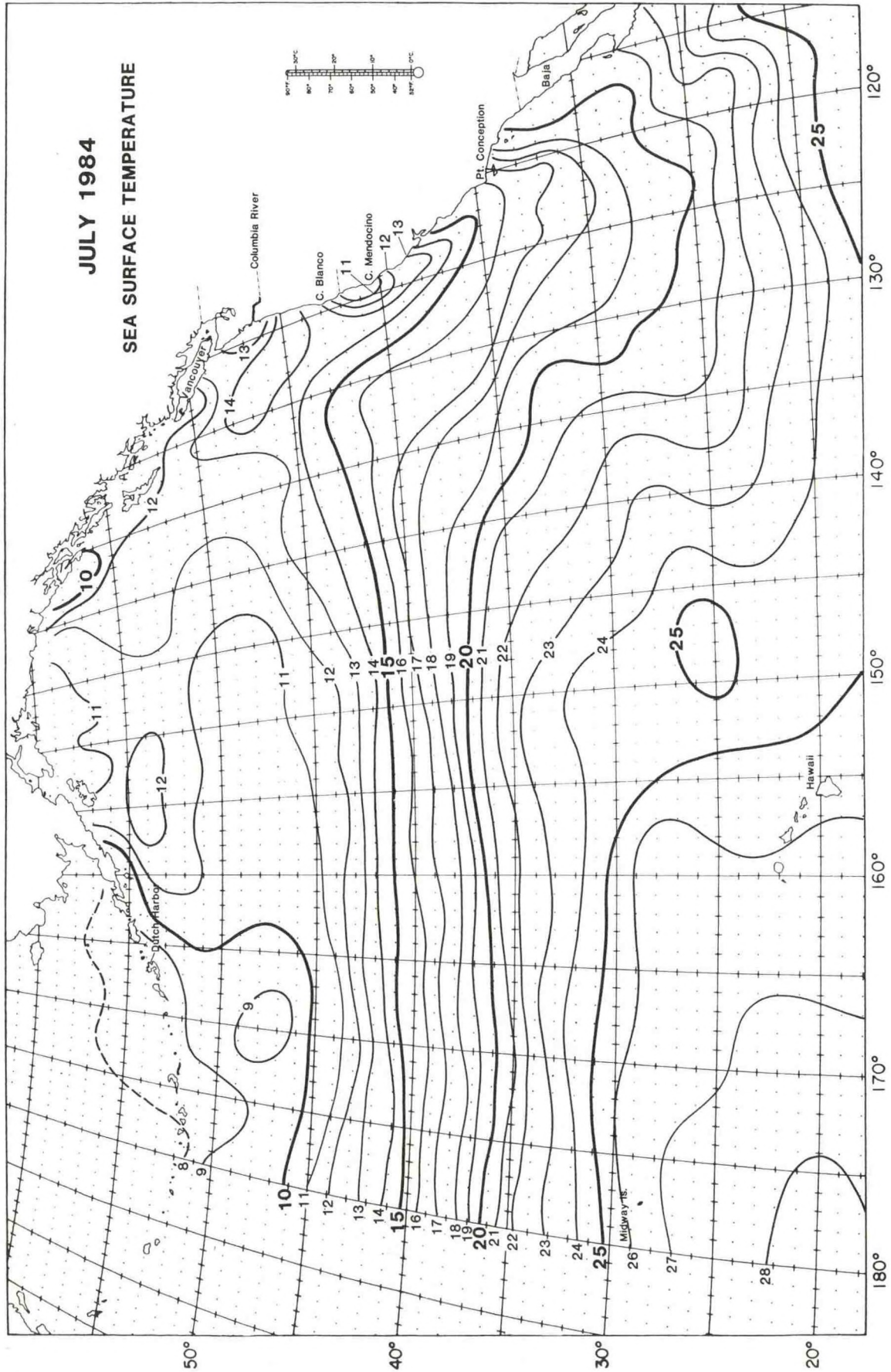


Figure 8d. Average sea surface temperature isopleths ($^{\circ}\text{C}$) by month for the eastern Pacific Ocean, July 1984.

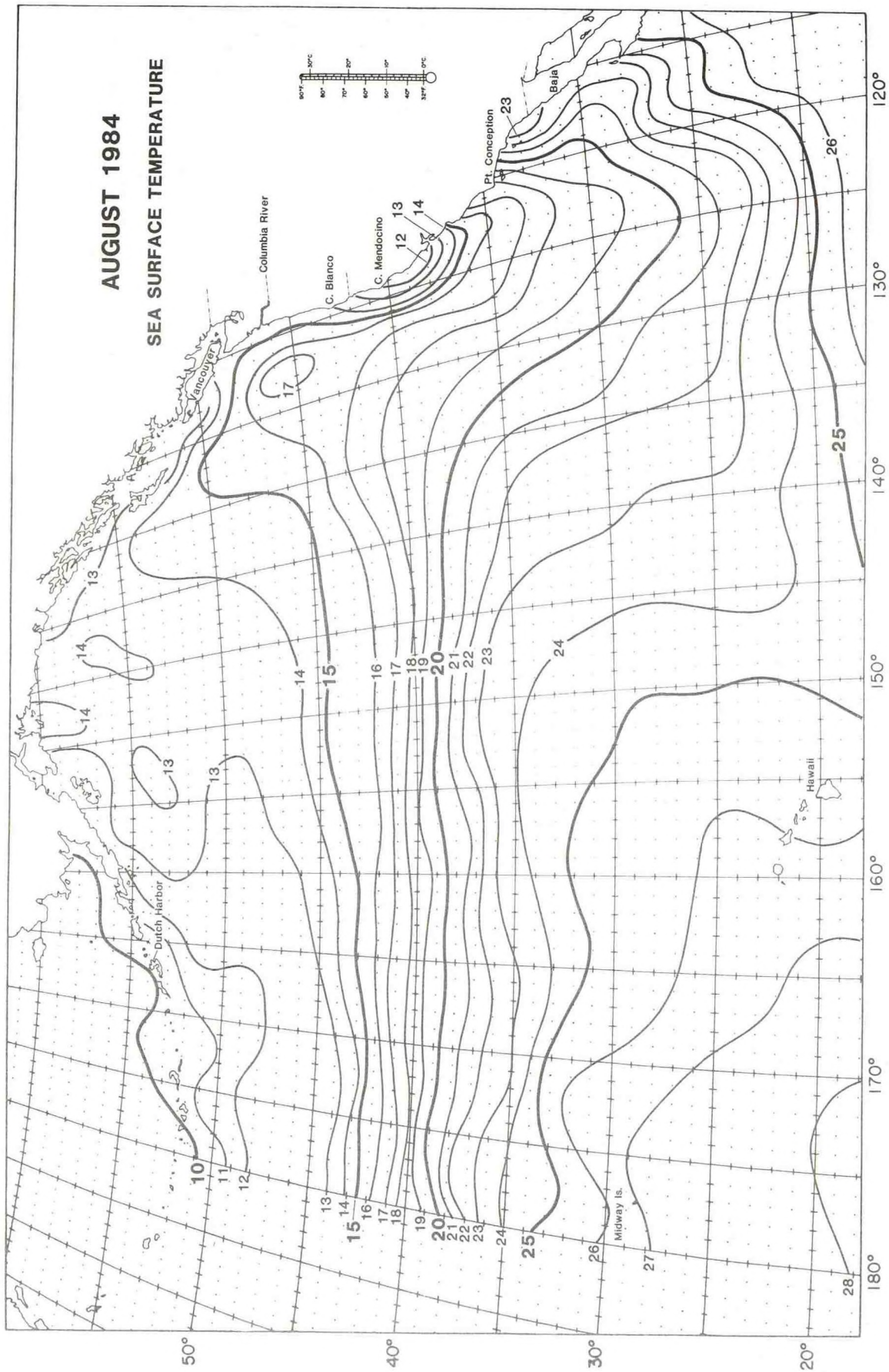


Figure 8e. Average sea surface temperature isopleths ($^{\circ}\text{C}$) by month for the eastern Pacific Ocean, August 1984.

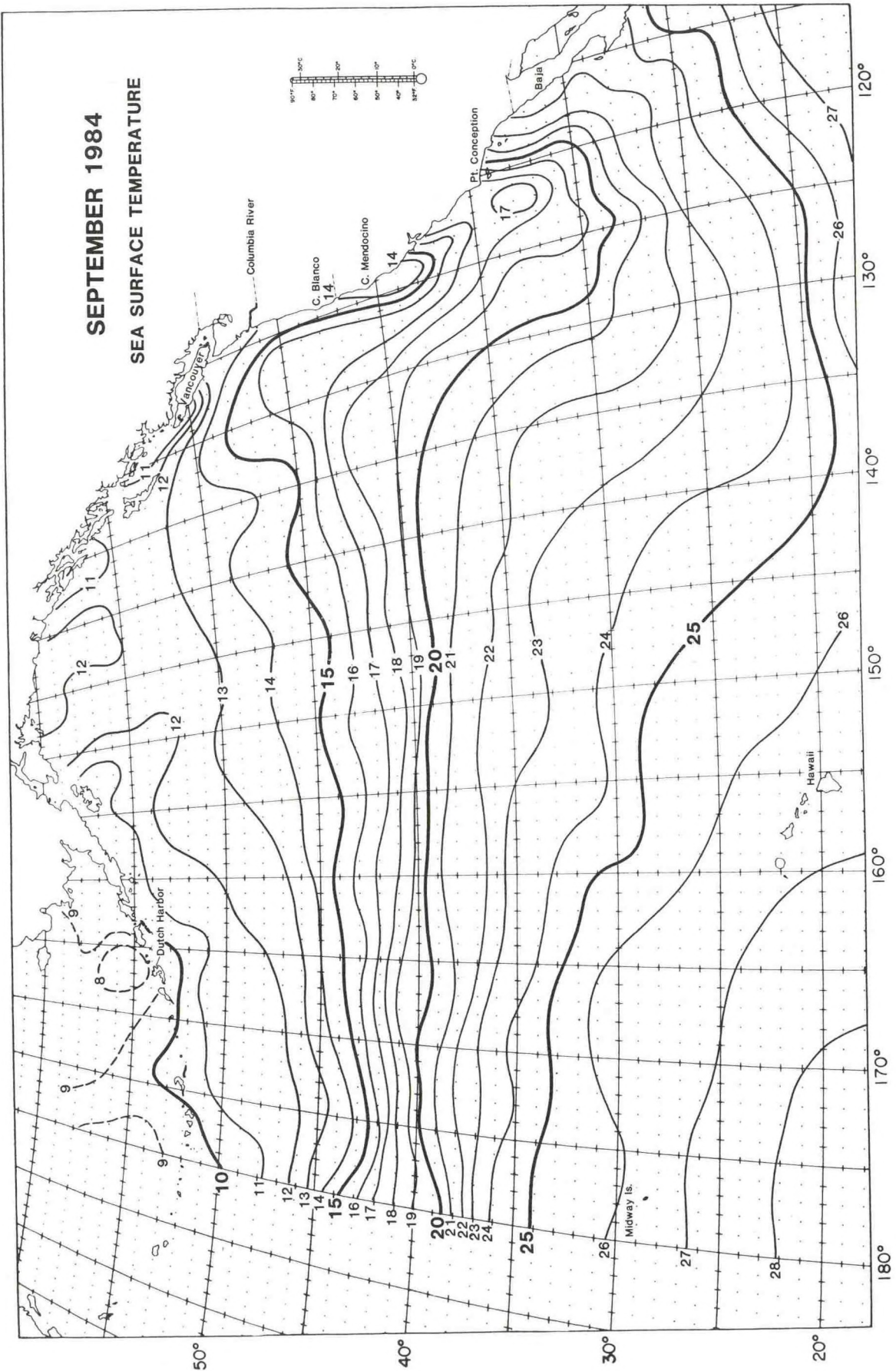


Figure 8f. Average sea surface temperature isopleths ($^{\circ}\text{C}$) by month for the eastern Pacific Ocean, September 1984.

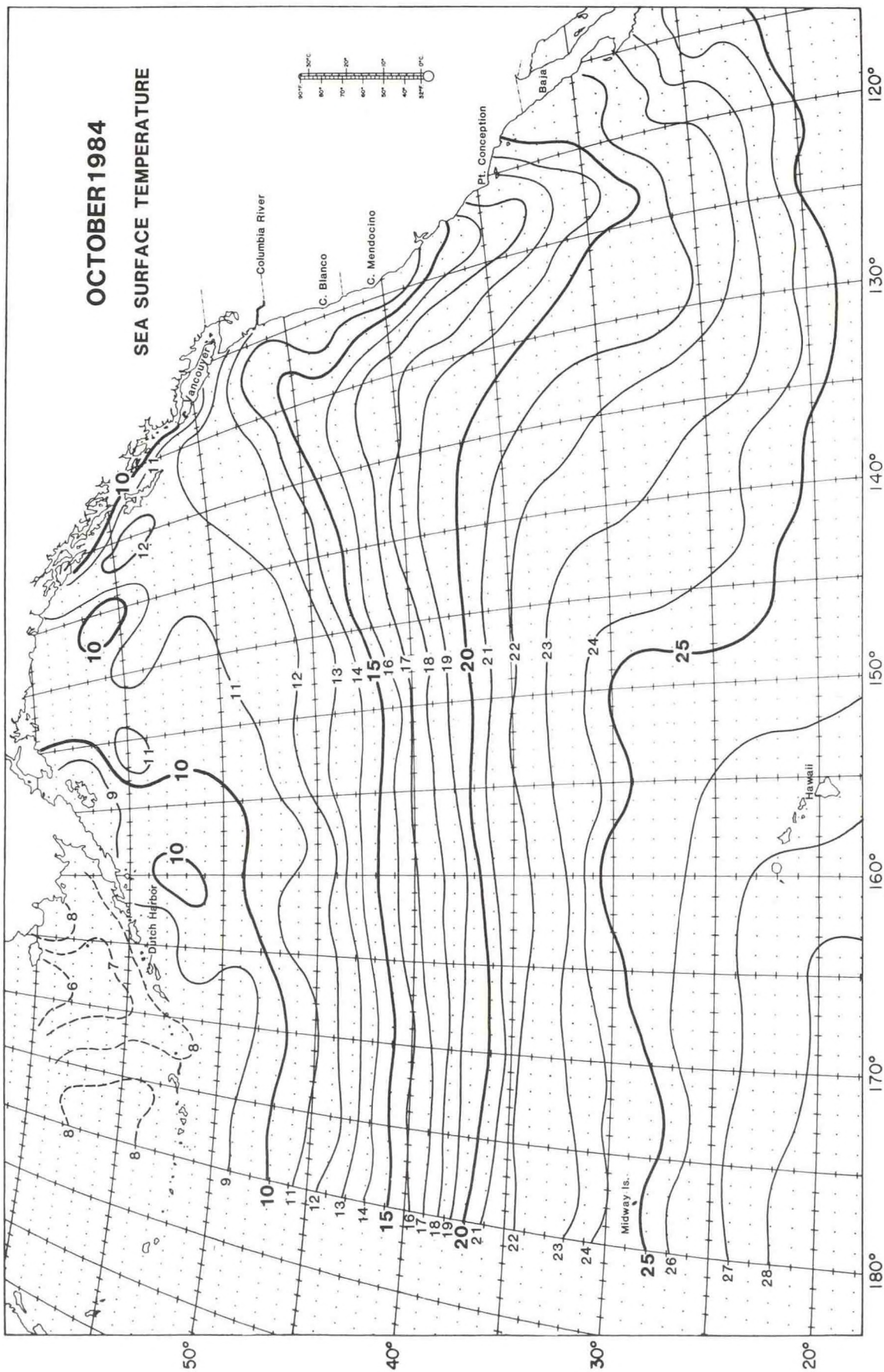


Figure 8g. Average sea surface temperature isopleths ($^{\circ}\text{C}$) by month for the eastern Pacific Ocean, October 1984.