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National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southwest Fisheries Science Center

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CATCH AND EFFORT FROM HAWAII'S LONGLINE FISHERY SUMMARIZED BY QUARTERS AND FIVE DEGREE SQUARES

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National Marine Fisheries Service
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ABSTRACT

This report provides quarterly and yearly summaries of Hawaii's pelagic longline catch (numbers of fish) and effort (hooks) reported by five-degree (latitude by longitude) squares based on the National Marine Fisheries Service longline logbook program. Species summarized include albacore (*Thunnus alalunga*), bigeye tuna (*T. obesus*), yellowfin tuna (*T. albacares*), striped marlin (*Tetrapturus audax*), blue marlin (*Makaira mazara*), black marlin (*M. indica*), swordfish (*Xiphias gladius*), mahimahi (*Coryphaena hippurus*), and wahoo (*Acanthocybium solandri*). Estimates of catch by weight are derived from a combination of logbook data and commercial catch reports. Hawaii's longline fishery has grown dramatically since 1985 and represents the bulk of the U.S. longline fishery in the Pacific. As a result of this expansion, a federal regulation was enacted in 1990 requiring longline vessels fishing, transhipping, or landing fish in the U.S. Exclusive Economic Zone (EEZ) to submit logbooks. This has resulted in a comprehensive source of information on the domestic fishery both within and beyond the EEZ. Data summarized here by quarter reflect the seasonal pattern of fishing. Yearly summaries provide insight into large-scale trends. Species identification and numbers are provided by the fishermen themselves, and no independent verification of logbook entries has been attempted in this report.

INTRODUCTION

Hawaii's longline fishery has expanded greatly since the 1980s (Boggs and Ito, 1993; Pooley, 1993). This expansion caused an increase in exploratory fishing and a shift in the species targeted (Table 1). Historically a tuna fishery, longliners began targeting swordfish in the late 1980's and greatly increased their geographical range of fishing in the 1990's (Boggs and Ito, 1993; Pooley, 1993). In November 1990, the National Marine Fisheries Service (NMFS) began collecting longline logbooks from every vessel operating out of Hawaii (Dollar and Yoshimoto, 1991). Logbooks contain information on the number of hooks set, geographical position of set, and the names and number of all fish caught. These data have been summarized in yearly reports by NMFS (Ito, 1991; Ito, 1992; Dollar, 1993; Dollar, 1994), without position data. This report combines longline logbook information on effort, catch, and position with estimates of quarterly mean weight of fish derived from the state of Hawaii Division of Aquatic Resources (HDAR) commercial catch reports. Total weight of fish caught by five-degree (latitude by longitude) "squares" was estimated using number caught times mean weight. Number of fish caught was used in order to be inclusive of all fish caught whereas the mean weight is based only on fish kept; thus, slight overestimation of catch weights is possible. To ensure the confidentiality of individual fishermen's reports, the location of catches is only shown where four or more vessels fished in a five-degree square during a quarter. Data from five-degree bins fished by fewer than four vessels were pooled as quarterly summaries with position data removed (See Tables 2 and 3).

The nonconfidential data summaries in this report were originally prepared in response to a request from the Food and Agriculture Organization of the United Nations (FAO) for use in generating an atlas of Pacific tuna catches. This report presents the data summaries, documents the procedures used to generate those summaries, and provides a low resolution description of the fishery suitable for general distribution. Fishery performance indices such as catch-per-unit-effort require evaluation of detailed data on the type of longline fishing effort that is not provided in this report.

DATA SOURCES

Longline logbook procedures require fishermen to keep an accurate record of activities and catch. We did not attempt to verify the accuracy of logbook entries. There may be some cases of species misidentification, inaccurate position data, and under reporting of catch. For instance, black marlin are much less common than reported, especially for the first year of the logbook program; both black and blue marlin probably include misidentified striped marlin, the predominant marlin caught by Hawaii longliners. Except for marlin identifications, the problems with the data probably do not impair the overall picture of the fishery. Data are summarized by

five-degree squares using the southeast corner of each square as the reference point. Thus, sets from longitude 140°-144.99° W, and latitude 15°-19.99° N are tabulated as total for 140° W and 15° N (Tables 2 and 3). Mapped data are centered on the midpoint of each five-degree square. Catches in numbers are the actual numbers by species reported in longline logbooks and catches in weights are the estimated weights by species in kg based on HDAR data. Logbook information is continually updated and this report reflects data received as of June 1995. The tabular data are available in electronic format (upon request).

Commercial fish catches reported to HDAR often include both the number and weight of catch by trip for longline vessels. Compliance with HDAR reporting requirements was relatively complete during 1991-94, and the majority of reports included both number and weight. Quarterly mean weights of each species from HDAR longline trip reports do not contain individual set locations. No attempt is made in this report to account for differences in average weight by area; rather, one mean weight is used for each species in each quarter for all areas. Swordfish are usually processed at sea and HDAR weights reflect landed weights. Swordfish weights given here include a 33% increase to convert landed weight to round weight.[1] Other species are usually landed whole, and no correction for processing is made here. A list of the taxa summarized (Table 1) shows which species are presented individually and denotes (with an asterisk) taxa that are grouped into a category called "other". The other category contains many unidentified species, and no estimate of weight is given for this group. Mean HDAR weights were available for the individual species in all quarters except for black marlin in the first quarter of 1993; therefore, overall mean weight from all available quarters was used as an estimate for average weight of black marlin in the first quarter of 1993. In conjunction with HDAR, NMFS also sampled commercial fish landings from Hawaii's wholesale fish markets. These data provide an alternative source of weight estimates that appear in other reports (Ito, 1991; Ito, 1992).

DATA SUMMARIES

Effort

Fishing effort (number of hooks set) and location change seasonally (Fig. 1). During the first quarter of the year effort is concentrated between latitude 15° and 35° N, and longitude 150° to 180° W (Fig. 2). During the second quarter the fleet moves south and spreads farther east and west. Third quarter effort is extended over the broadest geographical range; whereas, effort in the fourth quarter contracts. Only

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[1]Unpublished data. NMFS Honolulu Laboratory, 2570 Dole St. Honolulu, Hawaii 96822.

during the last two quarters does substantial effort occur north of latitude 35° N. Annual effort increased from 1991 to 1993 in the number of hooks set and areas fished, indicating a growth in the fishery as well as the amount of exploratory fishing (Fig. 3).

Albacore

Albacore catch increased every year from 1991 to 1993 and levelled off in 1994 (Fig. 4). Albacore catches averaged by quarter during 1991-94 were never above 50,000 kg for any five-degree square (Fig. 5). Catches were greatest in the fourth quarter (Fig. 4) between latitude 30° and 40° N (Fig. 5) and catches were most concentrated around the main Hawaiian Islands in the second and third quarters. Yearly changes in the geographical distribution of albacore catches (Fig. 6) appear to reflect the distribution of effort (Fig. 3), but large catches occurred around the main Hawaiian Islands in 1993-94.

Bigeye Tuna

Bigeye tuna has been a major target species of the Hawaii longline fishery since the 1950s. Bigeye tuna catches have increased over the years with a peak of over 20,000 fish caught in the fourth quarter of 1994 (Fig. 7). Catches by quarter show that most bigeye tuna are caught in the first and fourth quarters (Fig. 7) around the main Hawaiian Islands (Fig. 8). Yearly catch distributions show that the largest bigeye tuna catches tend to occur south of latitude 30° N (Fig. 9).

Yellowfin Tuna

Yellowfin tuna catches do not appear to be increasing (Fig. 10). Only two of the five-degree squares show an average quarterly catch of over 50,000 kg, and both occur south of latitude 20° N (Fig. 11). Yearly summaries show the distribution of catch tends to be concentrated around or southward of the main Hawaiian Islands (Fig. 12).

Swordfish

Swordfish was a minor component of the Hawaii longline fishery until the 1990s when it became a major target species. Night longline fishing with light sticks is now practiced by a substantial portion of the fleet. Swordfish catches tend to peak in 1991 and in 1993 (e.g., over 25,000 fish in the second quarters of 1991 and 1993), but the maximum quarterly catch in 1994 was just over 18,000 fish in the first quarter (Fig. 13). No second quarter peak occurred in 1994, and catches were poor. Quarterly catches clearly show the seasonal nature of the swordfish fishery with large catches between latitude 25°-35° N in the first quarter, large catches between latitude

20° -30° N in the second quarter, and the most northward distribution of catches in the last two quarters (Fig. 14). Yearly catches of swordfish contracted from a wide distribution of large catches in 1993 to a narrower distribution of large catches in 1994 (Fig. 15). Some longline vessels left the swordfish fishery in 1994, and the reduction in number and distribution of catch may be the result of less effort directed at swordfish rather than a reduction in the abundance of swordfish.

Striped Marlin

Striped marlin catches were lowest in the third quarter and tended to peak in the second and fourth quarters (Fig. 16). Quarterly catch distributions indicate that the second quarter peak is widespread, whereas the fourth quarter peak occurs around the main Hawaiian Islands (Fig. 17). Yearly catch patterns of striped marlin indicate that the largest catches tend to be distributed south of latitude 30° N and especially around the main Hawaiian Islands (Fig. 18).

Blue and Black Marlins

Confusion over marlin species among some longline fishermen has caused blue marlin to often be reported as black marlin and striped marlin to be reported as either of these species. The decline in reported blue and black marlin catches after 1991 (Figs. 19 and 22) suggests improved species identification. Based on other data, the largest catches of blue marlin should occur in the second and third quarters and this pattern appears during 1993-94 (Fig. 19), but not in the quarterly average maps of catch (Fig. 20). The annual distribution of reported blue marlin catches (Fig. 21) appears similar to that of striped marlin. Black marlin is the least common marlin in the Hawaii fishery. Peak catches may occur in the second quarter (Fig. 22). Quarterly averages of black marlin are never over 50,000 kg for any five-degree square (Fig. 23). Yearly reported catch of black marlin in any five-degree square exceeds 50,000 kg only in 1991 (Fig. 24), and this probably reflects species misidentification.

Mahimahi

Mahimahi catches are numerous but comprise only a small fraction of total longline catch by weight. Mahimahi catches were smallest in the first quarter (Fig. 25). In the second and third quarters most mahimahi were caught north of the main Hawaiian Islands at latitude 25°-30° N (Fig. 26). The highest annual catches occurred in this area during 1992 (Fig. 27).

Wahoo

Wahoo is not a major target species in Hawaii's longline fishery. The number of wahoo reported for any one quarter for the fishery as a whole was generally less than 1,000 except when catches peaked in the second quarter (Fig. 28). The largest catches occur around the main Hawaiian Islands and a little farther north in the second quarter (Fig. 29). Yearly catch maps show the largest catches are always south of 25° N (Fig. 30).

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CITATIONS

Boggs, C. H., and R. Y. Ito.
1993. Hawaii's pelagic fisheries. Mar. Fish. Rev. 55(2): 69-82.

Dollar, R. A., and S. S. Yoshimoto.
1991. The federally mandated longline fishing log collection system in the western Pacific. Honolulu Lab., Southwest Fish. Sci. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96822-2396. Southwest Fish. Sci. Cent. Admin. Rep. H-91-12, 35 p.

Dollar, R. A.
1993. Annual report of the 1992 western Pacific longline fishery. Honolulu Lab., Southwest Fish. Sci. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96822-2396. Southwest Fish. Sci. Cent. Admin. Rep. H-93-12, 25 p.

Dollar, R. A.
1994. Annual report of the 1993 western Pacific longline fishery. Honolulu Lab., Southwest Fish. Sci. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96822-2396. Southwest Fish. Sci. Cent. Admin. Rep. H-94-06, 38 p.

Ito, R. Y.
1991. Western Pacific pelagic fisheries in 1990. Honolulu Lab., Southwest Fish. Sci. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96822-2396. Southwest Fish. Sci. Cent. Admin. Rep. H-91-10, 43 p.

Ito, R. Y.
1992. Western Pacific pelagic fisheries in 1991. Honolulu Lab., Southwest Fish. Sci. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96822-2396. Southwest Fish. Sci. Cent. Admin. Rep. H-92-15, 38 p.

Pooley, S. G.
1993. Hawaii's marine fisheries: some history, long-term trends, and recent developments. Mar. Fish. Rev. 55(2):7-19.

Table 1.--List of common and scientific names of fish taxa summarized in this report. Data on the first nine species were summarized separately. Other taxa (marked with an asterisk) were summarized as a single group.

Common name	Scientific name
Albacore tuna	*Thunnus alalunga*
Bigeye tuna	*Thunnus obesus*
Yellowfin tuna	*Thunnus albacares*
Broadbill swordfish	*Xiphias gladius*
Blue marlin	*Makaira mazara*
Striped marlin	*Tetrapturus audax*
Black marlin	*Makaira indica*
Wahoo (ono)	*Acanthocybium solandri*
Mahimahi (dolphin fish)	*Coryphaena hippurus*
*Pomfret	Bramidae
*Sharks	Various families
*Oilfish/Escolar	Gempylidae
*Bluefin tuna	*Thunnus thynnus*
*Skipjack tuna	*Katsuwonus pelamis*
*Unidentified tuna	Tribe Thunnini
*Indo-Pacific sailfish	*Istiophorus platypterus*
*Shortbill spearfish	*Tetrapturus angustirostris*

Table 2--Quarterly catch in numbers of fish by Hawaii's longline fishery from 1991-1994 aggregated by five-degree squares; Q=quarter, Lng=longitude, Lat=latitude north, Hooks=number of hooks set, Alb=albacore, Bet=bigeye tuna, Yft=yellowfin tuna, Swf=swordfish, Stm=striped marlin, Blm=blue marlin, Bkm=black marlin, Mah=mahimahi, Wah=wahoo, and Oth=other species including unidentified species. Bottom of table shows data where location of fishing is confidential.

Year	Q	Lng	Lat	Hooks	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah	Oth
1991	1	150 W	15	196062	83	879	138	13	539	64	6	572	13	1089
1991	1	150 W	20	549591	142	2589	191	92	861	492	37	1292	49	1964
1991	1	155 W	10	21484	3	118	21	16	67	9	1	35	17	58
1991	1	155 W	15	214523	21	942	127	82	523	143	35	712	67	683
1991	1	155 W	20	1184072	401	5909	1174	2272	2565	1739	242	3737	102	3794
1991	1	155 W	25	72235	134	240	54	613	53	29	21	183	7	320
1991	1	155 W	30	76703	407	303	46	2016	42	7	0	22	1	538
1991	1	160 W	5	20728	0	198	261	1	13	6	3	31	14	101
1991	1	160 W	10	9100	25	28	4	0	6	13	0	11	6	8
1991	1	160 W	15	51513	15	192	29	33	140	14	10	66	11	198
1991	1	160 W	20	223834	69	1362	263	891	938	323	129	279	47	1225
1991	1	160 W	25	419436	535	1213	396	5613	254	131	44	977	23	3179
1991	1	160 W	30	95783	48	281	95	2264	22	21	3	56	1	1719
1991	1	165 W	20	68232	14	359	72	747	168	55	1	65	0	872
1991	1	165 W	25	186947	276	788	261	2765	140	41	21	344	7	2428
1991	1	165 W	30	41733	44	206	53	1120	1	0	0	83	3	808
1991	1	170 W	25	23116	18	165	32	389	16	0	0	31	0	396
1991	2	150 W	15	121060	230	274	40	25	245	18	7	75	56	501
1991	2	150 W	20	303845	495	372	105	650	860	180	55	433	234	1419
1991	2	150 W	25	13560	28	14	3	181	12	2	0	29	2	73
1991	2	155 W	15	442556	908	1034	551	628	894	798	195	940	208	1658

Table 2--Continued

Year	Q	Lng	Lat	Hooks	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah	Oth
1991	2	155 W	20	670098	482	793	934	4294	1052	673	430	1613	164	2252
1991	2	155 W	25	325831	175	421	523	3564	450	176	252	1234	49	1356
1991	2	155 W	30	81619	108	50	79	1913	46	0	0	791	8	767
1991	2	160 W	10	48462	83	328	28	11	25	13	5	4	15	195
1991	2	160 W	15	243326	686	556	116	43	532	224	37	146	158	912
1991	2	160 W	20	120361	38	110	193	862	210	189	86	433	22	579
1991	2	160 W	25	642333	411	785	1159	7094	962	354	325	2937	61	3827
1991	2	160 W	30	65616	106	58	87	830	17	8	0	497	1	1423
1991	2	165 W	20	5838	0	14	12	54	56	4	15	31	3	75
1991	2	165 W	25	396643	121	1035	541	5596	839	316	107	2202	52	3947
1991	2	165 W	30	29927	16	61	39	462	22	4	4	172	5	282
1991	2	170 W	25	11194	0	19	7	161	25	9	4	8	1	277
1991	3	145 W	25	16750	4	85	16	30	50	25	0	619	2	82
1991	3	150 W	15	54480	121	100	51	34	32	16	9	77	60	222
1991	3	150 W	20	245681	561	615	100	249	157	51	38	724	76	958
1991	3	155 W	15	285243	233	1015	847	257	159	181	204	423	141	1201
1991	3	155 W	20	345066	572	297	1071	889	166	113	177	781	128	1194
1991	3	155 W	25	95295	58	310	211	332	116	61	40	700	15	547
1991	3	155 W	30	21495	10	92	10	76	14	9	1	317	3	303
1991	3	160 W	15	17980	29	25	49	11	5	8	6	12	8	146
1991	3	160 W	20	31624	24	30	138	46	25	4	44	21	7	240
1991	3	160 W	25	234921	103	830	464	906	276	126	145	2163	56	1826
1991	3	160 W	30	194967	17	916	196	619	258	209	188	2581	29	2759
1991	3	160 W	35	48233	15	33	6	810	72	19	4	448	1	1891
1991	3	160 W	40	10762	0	0	0	71	0	0	0	0	0	811
1991	3	165 W	25	125185	28	474	52	1040	72	70	59	92	8	1767

Table 2--Continued

Year	Q	Lng	Lat	Hooks	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah	Oth
1991	3	165 W	30	66685	4	266	14	929	32	32	4	145	0	2142
1991	3	165 W	35	66379	14	73	20	1244	109	39	6	525	1	2577
1991	3	165 W	40	73452	8	1	0	826	1	0	0	0	0	1057
1991	3	170 W	25	32948	2	171	14	378	46	20	17	22	2	1099
1991	3	170 W	30	19131	15	49	11	213	12	9	4	56	3	652
1991	3	170 W	35	45773	6	50	7	933	65	15	0	308	1	2612
1991	3	170 W	40	4980	1	1	0	24	0	0	0	0	0	591
1991	4	150 W	15	203621	61	809	71	77	220	62	39	510	73	681
1991	4	150 W	20	672965	610	2571	170	216	1104	267	109	1829	191	2458
1991	4	155 W	5	8540	9	39	45	12	0	10	5	5	4	131
1991	4	155 W	15	623028	464	2759	403	183	568	194	143	1829	207	2307
1991	4	155 W	20	379620	290	1543	154	256	720	431	88	1521	122	1286
1991	4	155 W	25	279400	239	1562	329	883	399	262	215	1479	40	1080
1991	4	155 W	30	18350	132	96	5	170	2	3	0	2	0	272
1991	4	155 W	35	16570	88	15	2	171	1	0	0	0	0	443
1991	4	160 W	5	12520	0	55	118	56	2	21	6	5	8	214
1991	4	160 W	15	47490	16	205	47	15	73	3	2	109	40	338
1991	4	160 W	20	78725	20	353	69	71	140	36	11	143	7	1055
1991	4	160 W	25	239384	238	1388	300	621	406	291	119	953	36	1333
1991	4	160 W	30	319880	2108	996	170	4488	54	13	22	48	4	3954
1991	4	160 W	35	124380	1191	261	31	2015	22	9	1	9	0	2923
1991	4	165 W	25	54630	32	409	122	221	50	45	26	99	1	359
1991	4	165 W	30	11940	85	17	4	208	0	0	0	2	0	103
1991	4	165 W	35	20552	238	34	4	340	3	0	0	0	0	368
1991	4	165 W	40	6312	2	0	0	20	0	0	0	0	0	154
1992	1	150 W	15	100700	10	383	31	18	144	31	18	182	19	294

Table 2--Continued

Year	Q	Lng	Lat	Hooks	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah	Oth
1992	1	150 W	20	243880	2	944	70	13	310	83	7	333	27	678
1992	1	150 W	25	34710	61	65	42	732	5	0	1	156	5	256
1992	1	155 W	10	70310	12	232	13	10	145	12	15	143	61	359
1992	1	155 W	15	485040	58	2018	105	82	1249	259	87	1386	233	2031
1992	1	155 W	20	471515	212	2074	379	761	894	458	59	456	53	1569
1992	1	155 W	25	244209	527	1021	449	3125	54	32	11	807	43	1948
1992	1	155 W	30	158257	378	475	109	2215	21	12	1	150	2	2342
1992	1	160 W	10	10620	6	36	3	2	23	0	10	36	14	45
1992	1	160 W	15	120710	33	365	39	5	414	101	20	181	51	765
1992	1	160 W	20	217000	30	973	141	30	1104	121	21	72	15	1575
1992	1	160 W	25	345350	719	821	453	4169	56	40	22	484	53	3389
1992	1	160 W	30	261971	597	609	135	3336	47	19	29	17	9	4119
1992	1	165 W	25	298073	524	1184	452	4777	44	14	20	338	19	4053
1992	1	165 W	30	76410	132	356	67	1285	24	6	1	56	2	1073
1992	1	170 W	25	55770	133	353	59	1110	7	1	1	20	0	1406
1992	2	145 W	25	72976	62	456	25	698	80	44	15	1399	6	520
1992	2	150 W	15	43470	34	86	3	16	145	1	5	39	25	183
1992	2	150 W	20	95982	11	117	11	667	160	21	18	239	2	313
1992	2	150 W	25	356589	733	426	149	4379	295	44	73	4331	37	2080
1992	2	150 W	30	19460	7	15	8	243	17	4	6	192	1	194
1992	2	155 W	10	267225	40	1013	53	49	267	93	56	19	141	1291
1992	2	155 W	15	641707	573	3063	417	324	883	363	164	301	322	3138
1992	2	155 W	20	253468	89	56	61	2098	423	229	63	415	40	919
1992	2	155 W	25	621039	790	330	324	7651	474	228	149	3894	119	3233
1992	2	155 W	30	66404	128	69	73	703	37	8	3	618	7	754
1992	2	160 W	5	25760	1	226	94	10	4	5	15	2	3	241

Table 2--Continued

Year	Q	Lng	Lat	Hooks	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah	Oth
1992	2	160 W	10	140020	227	919	80	28	86	42	24	13	69	1022
1992	2	160 W	15	163296	228	875	66	53	154	20	33	48	58	880
1992	2	160 W	20	38140	13	26	15	391	92	67	7	92	13	381
1992	2	160 W	25	315802	395	383	176	3615	279	181	56	2001	46	2191
1992	2	160 W	30	21764	16	22	10	159	18	33	0	527	2	325
1992	2	165 W	20	4300	1	4	2	20	9	4	0	5	0	78
1992	2	165 W	25	143907	91	266	100	1506	186	34	16	1261	13	2088
1992	2	170 W	20	8100	0	6	0	79	31	4	0	40	1	168
1992	2	170 W	25	46505	2	118	21	453	151	10	7	269	6	704
1992	3	145 W	25	120800	17	1741	12	669	104	54	32	4330	10	504
1992	3	145 W	30	25500	11	27	1	166	48	26	2	151	0	166
1992	3	150 W	15	29130	49	70	9	4	3	4	9	56	26	68
1992	3	150 W	20	129400	291	338	16	90	258	45	23	793	41	694
1992	3	150 W	25	115952	48	327	9	790	128	64	25	4584	8	654
1992	3	150 W	30	66800	70	46	9	552	105	51	30	441	0	393
1992	3	150 W	35	25250	1	0	0	226	16	11	0	32	0	897
1992	3	155 W	10	18960	2	58	11	0	7	7	4	5	7	71
1992	3	155 W	15	511427	561	1059	1347	339	268	232	265	383	182	2670
1992	3	155 W	20	87170	71	104	47	121	128	20	17	1060	28	548
1992	3	155 W	25	74200	18	322	37	337	85	64	27	3742	6	534
1992	3	155 W	30	21000	0	97	4	114	16	7	16	771	1	591
1992	3	160 W	10	21919	12	86	12	2	9	4	3	0	5	131
1992	3	160 W	15	139413	354	417	146	15	101	44	26	34	67	941
1992	3	160 W	20	18210	17	18	34	13	18	8	0	37	5	106
1992	3	160 W	25	49030	14	211	24	133	39	34	20	2198	13	431
1992	3	160 W	30	20300	0	88	6	47	11	14	7	1319	2	377

Table 2--Continued

Year	Q	Lng	Lat	Hooks	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah	Oth
1992	3	160 W	35	10700	4	8	2	74	4	1	0	233	0	214
1992	3	160 W	40	4800	0	0	0	76	0	0	0	0	0	215
1992	3	165 W	25	26293	1	77	8	165	30	22	3	234	8	428
1992	3	165 W	30	12870	0	49	4	130	2	6	3	324	10	72
1992	3	165 W	35	8700	3	2	1	89	19	0	0	418	0	535
1992	3	165 W	40	50080	1	0	0	934	0	0	0	0	0	2940
1992	3	170 W	25	51541	0	62	4	447	55	14	0	182	3	986
1992	3	170 W	35	95080	8	59	2	1768	262	28	2	1988	5	2800
1992	3	170 W	40	67500	1	5	0	1443	0	1	0	7	3	2455
1992	3	175 W	25	31363	3	73	3	464	77	9	0	259	4	681
1992	3	175 W	40	87348	0	61	2	2717	0	20	1	95	22	728
1992	4	145 W	25	16300	76	123	12	28	24	28	2	1099	1	162
1992	4	145 W	30	3800	12	14	4	15	1	5	4	46	0	47
1992	4	145 W	35	28650	130	30	0	307	3	0	2	248	0	215
1992	4	145 W	40	19320	116	82	0	264	0	2	2	393	0	145
1992	4	150 W	15	156177	19	1126	177	8	324	63	66	258	23	795
1992	4	150 W	20	456444	831	2570	111	150	1450	150	61	1420	73	2134
1992	4	150 W	25	4450	13	34	7	11	2	0	0	184	0	12
1992	4	150 W	30	21100	612	80	13	92	5	0	5	102	2	103
1992	4	150 W	35	15600	73	31	0	184	0	0	1	361	1	226
1992	4	155 W	15	267445	28	1335	228	14	659	118	42	525	36	1546
1992	4	155 W	20	1114524	1137	8680	668	1612	2601	510	173	5169	244	4466
1992	4	155 W	25	93560	129	655	42	348	104	61	14	1339	9	531
1992	4	155 W	30	91958	1645	280	18	614	17	1	2	29	0	899
1992	4	155 W	35	10852	132	1	0	92	2	1	0	41	0	278
1992	4	160 W	15	14995	0	91	9	1	61	1	19	43	0	134

Table 2--Continued

Year	Q	Lng	Lat	Hooks	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah	Oth
1992	4	160 W	20	62422	11	281	51	66	317	20	12	97	6	827
1992	4	160 W	25	37500	10	252	40	197	23	12	1	249	2	381
1992	4	160 W	30	152446	1166	468	72	1801	21	11	11	184	3	1686
1992	4	160 W	35	24150	284	10	1	389	0	2	3	35	1	1356
1992	4	160 W	40	10750	2	0	0	251	0	0	0	74	0	1040
1992	4	165 W	25	15610	41	96	12	89	14	3	0	41	0	303
1992	4	165 W	30	168620	794	451	20	2502	26	9	7	6	2	5143
1992	4	165 W	35	68502	2641	108	24	1503	32	8	1	5	5	3622
1992	4	170 W	25	31750	28	414	18	268	19	4	0	68	2	312
1992	4	170 W	30	16940	34	73	0	129	2	0	0	0	4	865
1992	4	170 W	35	34532	113	35	3	463	0	2	0	0	6	2092
1992	4	170 W	40	19400	2	2	0	456	0	0	0	0	0	2091
1992	4	175 E	40	20844	0	2	0	949	0	0	0	0	0	1233
1992	4	175 W	30	9750	57	59	13	88	13	0	0	4	0	510
1992	4	175 W	35	43110	1140	124	11	1111	19	2	0	2	1	5337
1992	4	175 W	40	53820	1	0	0	1924	0	0	0	0	0	2498
1993	1	145 W	25	11150	1	28	11	219	4	2	0	118	1	99
1993	1	150 W	15	268658	20	1775	819	22	487	136	23	1101	72	1287
1993	1	150 W	20	135046	86	867	79	16	164	26	7	366	11	545
1993	1	150 W	25	137876	90	161	97	2600	25	7	1	251	13	982
1993	1	150 W	30	61196	6	112	18	942	7	0	1	47	0	633
1993	1	155 W	10	26980	8	137	48	1	61	15	4	90	37	190
1993	1	155 W	15	495914	146	2664	1158	15	996	180	68	1564	274	2242
1993	1	155 W	20	302394	325	2337	383	610	555	85	11	703	21	1125
1993	1	155 W	25	147658	393	613	240	1636	49	14	3	209	9	1346
1993	1	155 W	30	132102	69	316	96	1902	31	4	0	58	4	2149

Table 2--Continued

Year	Q	Lng	Lat	Hooks	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah	Oth
1993	1	160 W	15	185775	182	1376	458	9	273	69	13	478	88	1437
1993	1	160 W	20	306735	225	2204	579	116	581	56	15	419	24	2131
1993	1	160 W	25	197005	347	1409	428	2290	40	27	2	169	14	2407
1993	1	160 W	30	109246	341	297	56	1467	17	4	4	14	0	1060
1993	1	165 W	15	9200	22	101	17	1	14	9	0	23	10	73
1993	1	165 W	20	80974	100	530	222	9	162	22	5	95	14	622
1993	1	165 W	25	346046	639	2356	423	5252	57	20	8	146	9	5563
1993	1	165 W	30	149910	310	764	37	2149	25	7	12	9	1	5666
1993	1	170 W	25	135861	291	919	190	2333	29	5	1	37	6	2730
1993	1	170 W	30	42607	389	332	55	543	3	0	0	1	0	2120
1993	1	175 W	25	13300	65	41	24	148	3	0	0	0	0	229
1993	2	145 W	20	36100	38	81	9	269	42	4	2	92	28	240
1993	2	145 W	25	212010	216	683	276	2543	119	47	17	1083	81	1120
1993	2	145 W	30	47218	31	137	47	727	22	1	0	181	5	178
1993	2	150 W	15	84792	229	172	57	15	149	21	17	38	103	490
1993	2	150 W	20	503341	910	1593	340	3607	990	421	102	876	222	1835
1993	2	150 W	25	393634	288	1000	358	5170	307	162	76	1804	101	1681
1993	2	150 W	30	109965	89	145	100	1621	18	10	8	692	18	785
1993	2	155 W	10	79300	81	386	70	23	49	15	15	39	104	506
1993	2	155 W	15	879552	1920	3615	1045	200	1198	480	137	852	1098	5312
1993	2	155 W	20	278629	209	826	208	1530	738	134	78	404	93	1005
1993	2	155 W	25	171960	215	313	112	2021	157	91	61	1282	29	1159
1993	2	155 W	30	23974	32	16	33	308	3	3	2	130	1	572
1993	2	160 W	10	18240	41	57	17	0	17	6	2	16	28	128
1993	2	160 W	15	272630	1062	683	257	56	455	98	27	219	346	1885
1993	2	160 W	20	52005	23	203	58	30	126	1	28	53	13	333

Table 2--Continued

Year	Q	Lng	Lat	Hooks	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah	Oth
1993	2	160 W	25	60480	44	101	42	685	98	15	5	318	11	581
1993	2	165 W	15	12530	58	64	13	1	12	10	0	25	7	111
1993	2	165 W	20	11190	15	36	8	17	51	7	0	25	8	97
1993	2	165 W	25	196692	158	742	104	2733	334	114	38	554	11	2824
1993	2	170 W	20	22750	20	74	9	270	99	24	0	34	2	445
1993	2	170 W	25	71066	48	641	40	1115	113	77	27	226	12	2530
1993	2	175 E	25	135904	88	320	130	2246	608	74	0	378	21	3683
1993	2	175 E	30	7020	1	12	5	66	31	0	0	86	1	329
1993	2	175 W	20	14254	10	29	4	146	72	8	0	20	1	271
1993	2	175 W	25	28094	31	87	40	283	133	12	0	106	1	633
1993	3	145 W	25	36880	1	304	27	181	44	31	8	698	0	142
1993	3	145 W	30	4600	1	18	2	12	5	1	0	62	0	29
1993	3	145 W	35	12600	2	4	0	119	11	1	0	108	0	993
1993	3	150 W	15	30190	76	28	48	4	4	6	6	50	27	147
1993	3	150 W	20	163520	590	390	137	56	129	63	17	320	70	726
1993	3	150 W	25	36170	11	164	23	188	63	31	7	449	2	138
1993	3	155 W	15	520940	728	366	1826	128	346	457	155	425	165	3059
1993	3	155 W	20	77020	97	92	367	231	104	60	45	191	23	273
1993	3	155 W	25	27840	9	183	26	137	27	39	9	228	8	265
1993	3	160 W	15	307130	629	597	647	32	167	163	42	133	211	2383
1993	3	160 W	20	73230	69	46	129	19	40	50	1	32	30	449
1993	3	160 W	25	48112	14	194	75	183	106	44	29	180	7	713
1993	3	160 W	30	7220	0	15	4	38	36	6	0	77	1	181
1993	3	160 W	35	9360	6	4	0	37	10	2	0	41	0	209
1993	3	165 W	25	99620	18	850	61	1103	176	118	30	178	10	1616
1993	3	165 W	30	43620	2	288	8	381	55	46	18	175	2	753

Table 2--Continued

Year	Q	Lng	Lat	Hooks	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah	Oth
1993	3	165 W	35	10550	26	4	1	78	10	1	0	25	0	281
1993	3	170 E	40	40618	50	0	0	928	0	0	0	0	0	2548
1993	3	170 W	25	132960	9	799	46	1508	151	32	37	161	20	1983
1993	3	170 W	30	160448	15	971	46	1760	278	109	55	400	9	3467
1993	3	170 W	35	14330	11	0	0	190	14	6	0	51	1	1305
1993	3	170 W	40	16200	0	0	0	158	0	0	0	0	0	1001
1993	3	175 E	25	12100	4	48	21	266	22	8	0	40	4	332
1993	3	175 E	30	29868	0	61	8	450	110	16	0	166	2	1051
1993	3	175 E	35	33120	4	32	1	552	92	7	0	90	1	3271
1993	3	175 E	40	145757	68	5	1	3358	4	2	0	11	2	11208
1993	3	175 W	30	57541	8	61	3	840	158	50	6	450	4	1822
1993	3	175 W	35	67623	22	50	7	1330	179	33	6	354	2	7747
1993	3	175 W	40	46642	9	0	0	583	0	0	0	0	0	3107
1993	4	150 W	15	114812	185	569	101	22	255	62	2	222	49	714
1993	4	150 W	20	493550	961	2323	243	51	1185	247	20	929	101	2074
1993	4	155 W	15	111940	15	443	123	15	536	38	8	181	47	683
1993	4	155 W	20	1125969	612	6930	1094	352	2392	413	64	1861	403	3987
1993	4	155 W	25	83530	52	550	154	203	91	63	24	292	13	1159
1993	4	155 W	30	72200	2159	149	17	505	14	5	1	53	0	790
1993	4	155 W	35	24628	482	15	0	176	8	1	0	26	0	1691
1993	4	160 W	15	85030	1	599	171	4	296	32	4	47	51	697
1993	4	160 W	20	223053	2	1803	268	38	972	143	13	154	92	2091
1993	4	160 W	25	103420	25	987	350	430	59	50	4	227	22	774
1993	4	160 W	30	159352	1236	275	61	1387	27	27	1	211	4	2771
1993	4	160 W	35	20650	146	12	2	292	2	0	0	72	0	553
1993	4	165 W	20	9500	8	37	7	37	90	4	0	23	1	131

Table 2--Continued

Year	Q	Lng	Lat	Hooks	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah	Oth
1993	4	165 W	25	56970	19	374	109	491	32	20	0	42	1	875
1993	4	165 W	30	220205	1880	409	180	2069	53	30	3	162	12	3241
1993	4	165 W	35	126978	1820	50	20	1611	24	10	1	17	0	4410
1993	4	170 E	40	11468	5	0	0	139	0	0	0	0	0	1216
1993	4	170 W	25	17995	183	102	24	59	15	4	0	24	0	608
1993	4	170 W	30	158900	3081	414	207	1765	36	22	1	134	19	3088
1993	4	170 W	35	128368	4229	168	33	1869	38	8	1	15	0	9831
1993	4	170 W	40	4600	5	0	0	8	0	0	0	0	0	735
1993	4	175 E	40	8184	5	0	0	108	0	0	0	0	0	874
1993	4	175 W	35	18460	186	25	15	210	8	0	0	2	0	4777
1993	4	175 W	40	22150	203	0	0	279	0	0	0	0	0	2536
1994	1	145 W	25	14782	34	1	8	143	2	0	0	20	0	98
1994	1	145 W	30	28599	109	23	22	239	4	1	0	25	0	338
1994	1	150 W	15	122060	14	487	52	3	195	25	3	134	52	595
1994	1	150 W	20	222651	17	935	161	10	232	22	2	149	44	932
1994	1	150 W	25	239036	441	163	154	2833	26	6	1	386	34	1714
1994	1	150 W	30	305535	202	540	236	4245	32	24	8	279	9	4380
1994	1	155 W	10	46300	17	215	8	2	76	8	0	68	59	260
1994	1	155 W	15	260755	70	904	110	15	393	72	8	273	164	1116
1994	1	155 W	20	695020	454	4863	1502	663	742	280	26	376	65	2583
1994	1	155 W	25	86230	178	123	76	952	27	7	2	91	7	1046
1994	1	155 W	30	31628	51	57	45	381	2	0	1	30	0	785
1994	1	160 W	15	143500	50	597	89	5	253	41	5	200	63	684
1994	1	160 W	20	687449	124	4176	746	70	1733	144	15	260	110	3671
1994	1	160 W	25	66490	59	148	147	512	15	12	5	28	5	1366
1994	1	160 W	30	36979	118	104	48	478	6	10	0	8	1	2614

Table 2--Continued

Year	Q	Lng	Lat	Hooks	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah	Oth
1994	1	165 W	20	81370	27	450	58	5	123	33	1	54	8	576
1994	1	165 W	25	119340	90	283	165	1618	25	25	4	57	2	2556
1994	1	165 W	30	92860	371	181	84	1417	19	8	2	10	0	3190
1994	1	170 W	25	242532	1410	456	301	2817	19	4	2	185	11	6519
1994	1	170 W	30	94042	961	223	103	1217	8	1	0	9	1	3887
1994	1	175 W	25	25826	274	47	32	264	1	0	0	1	0	1511
1994	1	175 W	30	66328	744	180	65	623	9	1	0	1	1	3880
1994	2	145 W	25	74080	6	33	9	624	5	5	5	393	0	585
1994	2	145 W	30	27970	5	1	0	217	4	0	0	33	0	221
1994	2	150 W	15	19450	5	52	3	1	34	7	0	22	15	184
1994	2	150 W	20	108579	23	73	8	449	41	21	14	422	25	615
1994	2	150 W	25	320617	112	93	28	3176	69	38	13	499	9	2173
1994	2	150 W	30	85436	23	32	10	659	14	1	0	134	0	1017
1994	2	155 W	5	46630	0	296	182	2	1	7	5	0	23	164
1994	2	155 W	10	99010	32	403	18	39	41	43	8	41	90	489
1994	2	155 W	15	550198	741	896	546	407	800	317	59	370	319	3064
1994	2	155 W	20	85650	17	65	40	314	84	39	16	183	8	454
1994	2	155 W	25	149905	20	24	20	1336	25	37	4	207	1	1006
1994	2	155 W	30	16920	4	6	1	153	4	1	0	26	0	296
1994	2	160 W	0	30670	0	276	453	6	0	4	0	0	4	106
1994	2	160 W	5	221960	0	1532	2290	24	25	27	16	2	48	755
1994	2	160 W	10	67340	33	247	21	7	72	20	3	19	60	272
1994	2	160 W	15	462630	843	1136	270	117	1008	215	56	217	353	2734
1994	2	160 W	20	34460	40	11	134	83	35	36	5	37	6	318
1994	2	160 W	25	60820	8	9	19	443	27	30	6	91	4	1440
1994	2	165 W	10	37300	95	288	43	7	22	3	7	2	21	244

Table 2--Continued

Year	Q	Lng	Lat	Hooks	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah	Oth
1994	2	165 W	15	37160	125	59	8	27	125	17	13	10	39	175
1994	2	165 W	20	14100	14	14	17	93	48	17	1	7	4	371
1994	2	165 W	25	106180	5	83	41	825	125	48	9	267	0	2683
1994	2	165 W	30	6570	0	1	0	52	6	4	0	52	0	354
1994	2	170 E	25	58335	11	102	4	657	134	30	2	87	10	1418
1994	2	170 W	20	84393	23	76	13	508	219	35	18	43	1	1467
1994	2	170 W	25	165556	106	99	22	1751	95	45	8	289	8	3456
1994	2	170 W	30	7120	5	0	1	51	2	10	0	32	0	469
1994	2	175 E	25	4300	1	4	0	17	3	1	0	2	0	172
1994	2	175 W	20	27736	4	19	1	248	90	15	0	28	2	284
1994	2	175 W	25	85388	7	92	13	843	136	50	8	130	4	1404
1994	2	175 W	30	11800	3	7	1	118	19	5	2	53	0	645
1994	3	145 W	25	13420	12	52	1	15	10	3	0	443	0	48
1994	3	150 W	15	32830	94	58	10	4	8	8	2	72	10	200
1994	3	150 W	20	145290	518	294	14	14	70	39	3	531	35	672
1994	3	155 W	15	616450	771	1071	1594	245	360	1005	35	1120	210	3421
1994	3	155 W	20	57200	112	66	67	33	15	53	6	340	6	236
1994	3	155 W	25	17700	11	152	3	34	19	12	0	437	0	103
1994	3	160 W	15	347385	969	776	909	266	225	458	29	249	171	2738
1994	3	160 W	20	87830	73	51	379	84	31	124	7	102	16	927
1994	3	160 W	25	52635	32	196	24	112	39	31	9	933	1	312
1994	3	160 W	30	18290	2	63	9	34	19	7	0	213	0	97
1994	3	160 W	35	3280	64	0	0	36	0	0	0	100	0	253
1994	3	165 W	25	18214	1	36	4	88	15	16	3	119	0	602
1994	3	165 W	30	59034	7	389	16	230	44	15	15	705	1	1284
1994	3	165 W	35	17880	270	1	0	156	2	1	0	329	0	572

Table 2--Continued

Year	Q	Lng	Lat	Hooks	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah	Oth
1994	3	165 W	40	7530	2	0	0	28	0	0	0	6	0	1244
1994	3	170 E	25	9870	1	10	1	101	10	5	1	14	3	311
1994	3	170 W	25	57502	13	82	3	517	28	18	6	26	3	1594
1994	3	170 W	30	37698	10	98	4	366	12	13	1	176	0	1086
1994	3	170 W	35	3570	18	0	0	30	0	0	0	42	0	225
1994	3	170 W	40	54712	41	0	0	404	0	0	0	11	0	6007
1994	3	170 W	45	4860	0	0	0	15	0	0	0	0	0	430
1994	3	175 E	40	2960	3	0	0	5	0	0	0	0	0	153
1994	3	175 W	25	32445	1	49	20	253	23	11	1	25	2	728
1994	3	175 W	30	29220	8	26	3	360	13	8	1	82	0	964
1994	3	175 W	40	10050	5	0	0	71	0	0	0	0	0	1449
1994	4	145 W	30	33410	368	35	1	530	15	3	0	295	1	358
1994	4	145 W	35	86870	712	39	4	1534	30	14	0	650	0	966
1994	4	150 W	15	68290	32	504	45	1	133	6	2	161	2	510
1994	4	150 W	20	660093	1963	5936	148	33	670	145	19	3360	74	3121
1994	4	150 W	35	18800	211	2	0	293	8	2	4	255	0	552
1994	4	155 W	15	185170	115	970	240	22	167	258	12	1183	33	1308
1994	4	155 W	20	814973	4271	5982	273	306	869	218	18	6500	72	3494
1994	4	155 W	25	23787	30	208	15	67	16	4	1	671	2	188
1994	4	155 W	35	7820	53	0	0	74	0	0	0	23	0	573
1994	4	160 W	15	196095	526	1879	331	21	276	76	11	1278	35	1975
1994	4	160 W	20	630739	2268	5785	646	64	503	118	8	1917	68	5677
1994	4	160 W	25	134820	312	1310	156	540	99	25	3	1630	7	800
1994	4	160 W	35	119432	3292	11	5	1448	36	14	1	968	1	3490
1994	4	165 W	25	13560	39	44	1	57	10	1	1	154	0	91
1994	4	165 W	30	17810	105	25	3	97	2	0	1	131	0	426

Table 2--Continued

Year	Q	Lng	Lat	Hooks	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah	Oth
1994	4	165 W	35	62851	1433	6	0	726	18	3	1	395	1	5139
1994	4	170 W	30	36619	1203	37	4	291	7	2	0	61	4	622
1994	4	170 W	35	35630	781	5	3	325	5	1	0	88	0	2561
1994	4	175 W	35	36958	1581	4	0	509	4	1	0	66	0	1845
1991	1	.	.	10550	21	69	14	41	26	6	0	51	3	58
1991	2	.	.	54949	82	188	125	333	59	8	1	67	10	1289
1991	3	.	.	61640	46	163	63	369	78	85	2	463	8	4448
1991	4	.	.	95157	132	262	112	311	94	167	21	346	33	972
1992	1	.	.	74148	48	329	83	562	86	26	19	47	28	788
1992	2	.	.	50465	41	191	129	398	51	17	1	147	23	564
1992	3	.	.	46962	8	76	128	641	48	46	7	270	3	1528
1992	4	.	.	6816	7	9	0	50	0	0	0	0	0	555
1993	1	.	.	13100	7	28	19	107	1	1	0	5	5	131
1993	2	.	.	32354	15	46	30	335	61	0	2	118	1	1649
1993	3	.	.	48350	25	110	23	261	28	8	2	138	10	4346
1993	4	.	.	33868	423	113	22	103	78	5	7	81	1	1748
1994	1	.	.	86120	107	230	51	303	83	14	2	113	40	595
1994	2	.	.	48685	12	55	5	416	37	26	7	121	4	1205
1994	3	.	.	66610	141	146	35	214	55	46	7	128	20	2507
1994	4	.	.	56450	410	234	61	207	51	21	1	452	1	2524

Table 3 --Quarterly estimates of total weight (kg) of fish by Hawaii's longline fishery from 1991-1994 aggregated by five-degree squares; Q=quarter, Lng=longitude, Lat=latitude north, Alb=albacore, Bet=bigeye tuna, Yft=yellowfin tuna, Swf=swordfish stm=striped marlin, Blm=blue marlin, Bkm=black marlin, Mah=mahimahi, and Wah=wahoo. Bottom of table shows data where location of fishing is confidential.

Year	Q	Lng	Lat	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah
1991	1	150 W	15	2034	36030	6112	578	11184	5569	468	4713	189
1991	1	150 W	20	3479	106123	8459	4090	17866	42809	2889	10646	711
1991	1	155 W	10	74	4837	930	711	1390	783	78	288	247
1991	1	155 W	15	515	38613	5625	3645	10852	12442	2733	5867	973
1991	1	155 W	20	9825	242210	51996	101003	53224	151310	18895	30793	1481
1991	1	155 W	25	3283	9838	2392	27251	1100	2523	1640	1508	102
1991	1	155 W	30	9972	12420	2037	89622	872	609	0	181	15
1991	1	160 W	5	0	8116	11560	44	270	522	234	255	203
1991	1	160 W	10	613	1148	177	0	125	1131	0	91	87
1991	1	160 W	15	368	7870	1284	1467	2905	1218	781	544	160
1991	1	160 W	20	1691	55828	11648	39610	19464	28104	10072	2299	682
1991	1	160 W	25	13108	49721	17539	249529	5271	11398	3436	8050	334
1991	1	160 W	30	1176	11518	4208	100647	457	1827	234	461	15
1991	1	165 W	20	343	14715	3189	33208	3486	4786	78	536	0
1991	1	165 W	25	6762	32300	11560	122920	2905	3567	1640	2835	102
1991	1	165 W	30	1078	8444	2347	49790	21	0	0	684	44
1991	1	170 W	25	441	6763	1417	17293	332	0	0	255	0
1991	2	150 W	15	6095	12204	2120	1892	9014	1305	513	761	916
1991	2	150 W	20	13118	16569	5565	49197	31639	13054	4029	4395	3826
1991	2	150 W	25	742	624	159	13699	441	145	0	294	33
1991	2	155 W	15	24062	46054	29203	47532	32890	57871	14286	9541	3401

Table 3--Continued

Year	Q	Lng	Lat	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah
1991	2	155 W	20	12773	35320	49502	325003	38703	48806	31502	16372	2681
1991	2	155 W	25	4638	18751	27719	269751	16556	12764	18462	12525	801
1991	2	155 W	30	2862	2227	4187	144791	1692	0	0	8029	131
1991	2	160 W	10	2200	14609	1484	833	920	943	366	41	245
1991	2	160 W	15	18179	24764	6148	3255	19572	16244	2711	1482	2583
1991	2	160 W	20	1007	4899	10229	65243	7726	13706	6300	4395	360
1991	2	160 W	25	10892	34964	61427	536929	35392	25672	23810	29811	997
1991	2	160 W	30	2809	2583	4611	62821	625	580	0	5045	16
1991	2	165 W	20	0	624	636	4087	2060	290	1099	315	49
1991	2	165 W	25	3207	46099	28673	423549	30867	22916	7839	22350	850
1991	2	165 W	30	424	2717	2067	34968	809	290	293	1746	82
1991	2	170 W	25	0	846	371	12186	920	653	293	81	16
1991	3	145 W	25	115	3913	914	1737	1346	2020	0	5800	29
1991	3	150 W	15	3487	4603	2912	1969	861	1293	935	721	864
1991	3	150 W	20	16168	28308	5710	14418	4226	4121	3946	6784	1094
1991	3	155 W	15	6715	46720	48364	14882	4280	14625	21185	3964	2030
1991	3	155 W	20	16485	13671	61154	51478	4469	9130	18381	7318	1843
1991	3	155 W	25	1672	14269	12048	19225	3123	4929	4154	6559	216
1991	3	155 W	30	288	4235	571	4401	377	727	104	2970	43
1991	3	160 W	15	836	1151	2798	637	135	646	623	112	115
1991	3	160 W	20	692	1381	7880	2664	673	323	4569	197	101
1991	3	160 W	25	2968	38205	26494	52462	7430	10181	15058	20267	806
1991	3	160 W	30	490	42163	11192	35844	6945	16887	19524	24184	418
1991	3	160 W	35	432	1519	343	46903	1938	1535	415	4198	14
1991	3	160 W	40	0	0	0	4111	0	0	0	0	0
1991	3	165 W	25	807	21818	2969	60222	1938	5656	6127	862	115

Table 3--Continued

Year	Q	Lng	Lat	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah
1991	3	165 W	30	115	12244	799	53794	861	2586	415	1359	0
1991	3	165 W	35	403	3360	1142	72034	2934	3151	623	4919	14
1991	3	165 W	40	231	46	0	47830	27	0	0	0	0
1991	3	170 W	25	58	7871	799	21888	1238	1616	1765	206	29
1991	3	170 W	30	432	2255	628	12334	323	727	415	525	43
1991	3	170 W	35	173	2302	400	54026	1750	1212	0	2886	14
1991	3	170 W	40	29	46	0	1390	0	0	0	0	0
1991	4	150 W	15	1468	30556	3346	2683	6547	4902	2891	4442	1048
1991	4	150 W	20	14677	97107	8010	7526	32855	21109	8080	15931	2741
1991	4	155 W	5	217	1473	2120	418	0	791	371	44	57
1991	4	155 W	15	11164	104207	18989	6377	16904	15338	10601	15931	2970
1991	4	155 W	20	6977	58279	7256	8920	21427	34075	6523	13248	1751
1991	4	155 W	25	5750	58997	15502	30768	11874	20714	15938	12882	574
1991	4	155 W	30	3176	3626	236	5924	60	237	0	17	0
1991	4	155 W	35	2117	567	94	5958	30	0	0	0	0
1991	4	160 W	5	0	2077	5560	1951	60	1660	445	44	115
1991	4	160 W	15	385	7743	2215	523	2172	237	148	949	574
1991	4	160 W	20	481	13333	3251	2474	4166	2846	815	1246	100
1991	4	160 W	25	5726	52425	14136	21639	12083	23006	8821	8301	517
1991	4	160 W	30	50718	37619	8010	156383	1607	1028	1631	418	57
1991	4	160 W	35	28655	9858	1461	70212	655	712	74	78	0
1991	4	165 W	25	770	15448	5749	7701	1488	3558	1927	862	14
1991	4	165 W	30	2045	642	188	7248	0	0	0	17	0
1991	4	165 W	35	5726	1284	188	11847	89	0	0	0	0
1991	4	165 W	40	48	0	0	697	0	0	0	0	0
1992	1	150 W	15	194	14512	1328	1031	4905	2517	1206	1480	334

Table 3--Continued

Year	Q	Lng	Lat	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah
1992	1	150 W	20	39	35768	2998	744	10559	6740	469	2707	475
1992	1	150 W	25	1185	2463	1799	41918	170	0	67	1268	88
1992	1	155 W	10	233	8790	557	573	4939	974	1005	1163	1073
1992	1	155 W	15	1126	76462	4497	4696	42541	21031	5828	11268	4098
1992	1	155 W	20	4117	78584	16233	43579	30450	37190	3952	3707	932
1992	1	155 W	25	10234	38686	19231	178955	1839	2598	737	6561	756
1992	1	155 W	30	7341	17998	4668	126843	715	974	67	1220	35
1992	1	160 W	10	117	1364	128	115	783	0	670	293	246
1992	1	160 W	15	641	13830	1670	286	14101	8201	1340	1472	897
1992	1	160 W	20	583	36867	6039	1718	37602	9825	1407	585	264
1992	1	160 W	25	13963	31108	19402	238741	1907	3248	1474	3935	932
1992	1	160 W	30	11594	23075	5782	191038	1601	1543	1943	138	158
1992	1	165 W	25	10176	44862	19359	273558	1499	1137	1340	2748	334
1992	1	165 W	30	2563	13489	2870	73586	817	487	67	455	35
1992	1	170 W	25	2583	13375	2527	63565	238	81	67	163	0
1992	2	145 W	25	1490	17059	1256	50281	3431	3725	911	10045	101
1992	2	150 W	15	817	3217	151	1153	6219	85	304	280	419
1992	2	150 W	20	264	4377	553	48048	6862	1778	1094	1716	34
1992	2	150 W	25	17614	15937	7486	315443	12653	3725	4435	31097	620
1992	2	150 W	30	168	561	402	17505	729	339	365	1379	17
1992	2	155 W	10	961	37896	2663	3530	11452	7873	3403	136	2362
1992	2	155 W	15	13769	114587	20950	23339	37872	30732	9965	2161	5394
1992	2	155 W	20	2139	2095	3065	151130	18142	19387	3828	2980	670
1992	2	155 W	25	18984	12345	16278	551142	20330	19302	9053	27959	1993
1992	2	155 W	30	3076	2581	3668	50641	1587	677	182	4437	117
1992	2	160 W	5	24	8455	4723	720	172	423	911	14	50

Table 3--Continued

Year	Q	Lng	Lat	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah
1992	2	160 W	10	5455	34380	4019	2017	3689	3556	1458	93	1156
1992	2	160 W	15	5479	32734	3316	3818	6605	1693	2005	345	972
1992	2	160 W	20	312	973	754	28166	3946	5672	425	661	218
1992	2	160 W	25	9492	14328	8842	260408	11966	15323	3403	14367	771
1992	2	160 W	30	384	823	502	11454	772	2794	0	3784	34
1992	2	165 W	20	24	150	100	1441	386	339	0	36	0
1992	2	165 W	25	2187	9951	5024	108485	7978	2878	972	9054	218
1992	2	170 W	20	0	224	0	5691	1330	339	0	287	17
1992	2	170 W	25	48	4414	1055	32632	6476	847	425	1931	101
1992	3	145 W	25	455	69866	596	38908	3114	4312	1972	24465	155
1992	3	145 W	30	295	1084	50	9654	1437	2076	123	853	0
1992	3	150 W	15	1312	2809	447	233	90	319	555	316	402
1992	3	150 W	20	7793	13564	794	5234	7725	3593	1417	4480	633
1992	3	150 W	25	1285	13123	447	45945	3832	5110	1541	25900	124
1992	3	150 W	30	1875	1846	447	32104	3144	4072	1849	2492	0
1992	3	150 W	35	27	0	0	13144	479	878	0	181	0
1992	3	155 W	10	54	2328	546	0	210	559	247	28	108
1992	3	155 W	15	15024	42498	66852	19716	8024	18525	16332	2164	2812
1992	3	155 W	20	1901	4174	2333	7037	3832	1597	1048	5989	433
1992	3	155 W	25	482	12922	1836	19600	2545	5110	1664	21142	93
1992	3	155 W	30	0	3893	199	6630	479	559	986	4356	15
1992	3	160 W	10	321	3451	596	116	269	319	185	0	77
1992	3	160 W	15	9480	16734	7246	872	3024	3513	1602	192	1035
1992	3	160 W	20	455	722	1687	756	539	639	0	209	77
1992	3	160 W	25	375	8467	1191	7735	1168	2715	1233	12419	201
1992	3	160 W	30	0	3531	298	2733	329	1118	431	7452	31

Table 3--Continued

Year	Q	Lng	Lat	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah
1992	3	160 W	35	107	321	99	4304	120	80	0	1316	0
1992	3	160 W	40	0	0	0	4420	0	0	0	0	0
1992	3	165 W	25	27	3090	397	9596	898	1757	185	1322	124
1992	3	165 W	30	0	1966	199	7561	60	479	185	1831	155
1992	3	165 W	35	80	80	50	5176	569	0	0	2362	0
1992	3	165 W	40	27	0	0	54320	0	0	0	0	0
1992	3	170 W	25	0	2488	199	25997	1647	1118	0	1028	46
1992	3	170 W	35	214	2368	99	102825	7844	2236	123	11232	77
1992	3	170 W	40	27	201	0	83923	0	80	0	40	46
1992	3	175 W	25	80	2929	149	26986	2305	719	0	1463	62
1992	3	175 W	40	0	2448	99	158017	0	1597	62	537	340
1992	4	145 W	25	1750	4820	415	1501	785	2010	226	7539	16
1992	4	145 W	30	276	549	138	804	33	359	451	316	0
1992	4	145 W	35	2994	1176	0	16459	98	0	226	1701	0
1992	4	145 W	40	2671	3214	0	14154	0	144	226	2696	0
1992	4	150 W	15	438	44128	6126	429	10598	4523	7447	1770	376
1992	4	150 W	20	19138	100718	3842	8042	47430	10770	6883	9741	1193
1992	4	150 W	25	299	1332	242	590	65	0	0	1262	0
1992	4	150 W	30	14094	3135	450	4932	164	0	564	700	33
1992	4	150 W	35	1681	1215	0	9865	0	0	113	2476	16
1992	4	155 W	15	645	52319	7891	751	21556	8472	4739	3602	588
1992	4	155 W	20	26185	340169	23119	86425	85079	36618	19521	35459	3987
1992	4	155 W	25	2971	25669	1454	18657	3402	4380	1580	9186	147
1992	4	155 W	30	37884	10973	623	32919	556	72	226	199	0
1992	4	155 W	35	3040	39	0	4932	65	72	0	281	0
1992	4	160 W	15	0	3566	311	54	1995	72	2144	295	0

Table 3--Continued

Year	Q	Lng	Lat	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah
1992	4	160 W	20	253	11012	1765	3538	10369	1436	1354	665	98
1992	4	160 W	25	230	9876	1384	10562	752	862	113	1708	33
1992	4	160 W	30	26853	18341	2492	96557	687	790	1241	1262	49
1992	4	160 W	35	6541	392	35	20856	0	144	339	240	16
1992	4	160 W	40	46	0	0	13457	0	0	0	508	0
1992	4	165 W	25	944	3762	415	4772	458	215	0	281	0
1992	4	165 W	30	18286	17675	692	134140	850	646	790	41	33
1992	4	165 W	35	60822	4233	831	80581	1047	574	113	34	82
1992	4	170 W	25	645	16225	623	14368	621	287	0	466	33
1992	4	170 W	30	783	2861	0	6916	65	0	0	0	65
1992	4	170 W	35	2602	1372	104	24823	0	144	0	0	98
1992	4	170 W	40	46	78	0	24448	0	0	0	0	0
1992	4	175 E	40	0	78	0	50879	0	0	0	0	0
1992	4	175 W	30	1313	2312	450	4718	425	0	0	27	0
1992	4	175 W	35	26254	4860	381	59564	621	144	0	14	16
1992	4	175 W	40	23	0	0	103152	0	0	0	0	0
1993	1	145 W	25	21	1030	394	13026	150	152	0	728	17
1993	1	150 W	15	426	65302	29320	1309	18272	10325	1834	6793	1223
1993	1	150 W	20	1834	31897	2828	952	6153	1974	558	2258	187
1993	1	150 W	25	1919	5923	3473	154644	938	531	80	1549	221
1993	1	150 W	30	128	4120	644	56029	263	0	80	290	0
1993	1	155 W	10	171	5040	1718	59	2289	1139	319	555	629
1993	1	155 W	15	3113	98009	41456	892	37370	13666	5422	9650	4655
1993	1	155 W	20	6929	85978	13711	36282	20824	6453	877	4338	357
1993	1	155 W	25	8379	22552	8592	97307	1838	1063	239	1290	153
1993	1	155 W	30	1471	11626	3437	113128	1163	304	0	358	68

Table 3--Continued

Year	Q	Lng	Lat	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah
1993	1	160 W	15	3880	50623	16396	535	10243	5238	1036	2949	1495
1993	1	160 W	20	4797	81085	20728	6900	21799	4252	1196	2585	408
1993	1	160 W	25	7398	51837	15322	136206	1501	2050	159	1043	238
1993	1	160 W	30	7270	10927	2005	87255	638	304	319	86	0
1993	1	165 W	15	469	3716	609	59	525	683	0	142	170
1993	1	165 W	20	2132	19499	7948	535	6078	1670	399	586	238
1993	1	165 W	25	13623	86677	15143	312381	2139	1518	638	901	153
1993	1	165 W	30	6609	28108	1325	127819	938	531	957	56	17
1993	1	170 W	25	6204	33810	6802	138763	1088	380	80	228	102
1993	1	170 W	30	8293	12214	1969	32297	113	0	0	6	0
1993	1	175 W	25	1386	1508	859	8803	113	0	0	0	0
1993	2	145 W	20	968	3097	411	21386	1666	289	179	686	458
1993	2	145 W	25	5504	26111	12616	202169	4721	3396	1523	8079	1324
1993	2	145 W	30	790	5238	2148	57797	873	72	0	1350	82
1993	2	150 W	15	5835	6576	2605	1193	5911	1517	1523	283	1683
1993	2	150 W	20	23187	60900	15541	286757	39273	30421	9140	6535	3627
1993	2	150 W	25	7338	38230	16364	411016	12179	11706	6810	13458	1650
1993	2	150 W	30	2268	5543	4571	128870	714	723	717	5162	294
1993	2	155 W	10	2064	14757	3200	1829	1944	1084	1344	291	1699
1993	2	155 W	15	48922	138201	47767	15900	47525	34685	12277	6356	17941
1993	2	155 W	20	5325	31578	9508	121635	29276	9683	6990	3014	1520
1993	2	155 W	25	5478	11966	5120	160670	6228	6576	5466	9564	474
1993	2	155 W	30	815	612	1508	24486	119	217	179	970	16
1993	2	160 W	10	1045	2179	777	0	674	434	179	119	458
1993	2	160 W	15	27060	26111	11747	4452	18050	7081	2419	1634	5654
1993	2	160 W	20	586	7761	2651	2385	4998	72	2509	395	212

Table 3--Continued

Year	Q	Lng		Lat	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah
1993	2	160	W	25	1121	3861	1920	54458	3888	1084	448	2372	180
1993	2	165	W	15	1478	2447	594	80	476	723	0	187	114
1993	2	165	W	20	382	1376	366	1352	2023	506	0	187	131
1993	2	165	W	25	4026	28367	4754	217274	13250	8238	3405	4133	180
1993	2	170	W	20	510	2829	411	21465	3927	1734	0	254	33
1993	2	170	W	25	1223	24505	1828	88643	4483	5564	2419	1686	196
1993	2	175	E	25	2242	12234	5942	178557	24119	5347	0	2820	343
1993	2	175	E	30	25	459	229	5247	1230	0	0	642	16
1993	2	175	W	20	255	1109	183	11607	2856	578	0	149	16
1993	2	175	W	25	790	3326	1282	22499	5276	867	0	791	16
1993	3	145	W	25	29	14525	1310	10826	1216	2133	517	5842	0
1993	3	145	W	30	29	860	97	718	138	69	0	519	0
1993	3	145	W	35	58	191	0	7118	304	69	0	904	0
1993	3	150	W	15	2193	1338	2329	239	111	413	388	419	389
1993	3	150	W	20	17022	18634	6647	3349	3564	4336	1098	2678	1009
1993	3	150	W	25	317	7836	1116	11245	1741	2133	452	3758	29
1993	3	155	W	15	21003	17487	88598	7656	9560	31451	10011	3557	2379
1993	3	155	W	20	2798	4396	17807	13817	2874	4129	2907	1599	332
1993	3	155	W	25	260	8744	1262	8194	746	2684	581	1908	115
1993	3	160	W	15	18147	28525	31392	1914	4614	11218	2713	1113	3043
1993	3	160	W	20	1991	2198	6259	1136	1105	3441	65	268	433
1993	3	160	W	25	404	9269	3639	10946	2929	3028	1873	1507	101
1993	3	160	W	30	0	717	194	2273	995	413	0	644	14
1993	3	160	W	35	173	191	0	2213	276	138	0	343	0
1993	3	165	W	25	519	40613	2960	65972	4863	8121	1938	1490	144
1993	3	165	W	30	58	13761	388	22788	1520	3166	1163	1465	29

Table 3--Continued

Year	Q	Lng	Lat	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah
1993	3	165 W	35	750	191	49	4665	276	69	0	209	0
1993	3	170 E	40	1443	0	0	55505	0	0	0	0	0
1993	3	170 W	25	260	38176	2232	90196	4172	2202	2390	1348	288
1993	3	170 W	30	433	46394	2232	105269	7681	7501	3552	3348	130
1993	3	170 W	35	317	0	0	11364	387	413	0	427	14
1993	3	170 W	40	0	0	0	9450	0	0	0	0	0
1993	3	175 E	25	115	2293	1019	15910	608	551	0	335	58
1993	3	175 E	30	0	2915	388	26915	3039	1101	0	1389	29
1993	3	175 E	35	115	1529	49	33016	2542	482	0	753	14
1993	3	175 E	40	1962	239	49	200848	111	138	0	92	29
1993	3	175 W	30	231	2915	146	50242	4366	3441	388	3767	58
1993	3	175 W	35	635	2389	340	79550	4946	2271	388	2963	29
1993	3	175 W	40	260	0	0	34870	0	0	0	0	0
1993	4	150 W	15	3972	26692	4606	1134	8326	4890	114	1436	760
1993	4	150 W	20	20633	108972	11081	2629	38690	19481	1142	6011	1567
1993	4	155 W	15	322	20781	5609	773	17500	2997	457	1171	729
1993	4	155 W	20	13140	325086	49886	18145	78099	32573	3653	12041	6251
1993	4	155 W	25	1116	25801	7022	10464	2971	4969	1370	1889	202
1993	4	155 W	30	46354	6990	775	26031	457	394	57	343	0
1993	4	155 W	35	10349	704	0	9072	261	79	0	168	0
1993	4	160 W	15	21	28099	7798	206	9664	2524	228	304	791
1993	4	160 W	20	43	84579	12221	1959	31736	11278	742	996	1427
1993	4	160 W	25	537	46300	15960	22165	1926	3944	228	1469	341
1993	4	160 W	30	26537	12900	2782	71496	882	2129	57	1365	62
1993	4	160 W	35	3135	563	91	15052	65	0	0	466	0
1993	4	165 W	20	172	1736	319	1907	2939	315	0	149	16

Table 3--Continued

Year	Q	Lng	Lat	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah
1993	4	165 W	25	408	17544	4970	25310	1045	1577	0	272	16
1993	4	165 W	30	40364	19186	8208	106651	1730	2366	171	1048	186
1993	4	165 W	35	39075	2346	912	83042	784	789	57	110	0
1993	4	170 E	40	107	0	0	7165	0	0	0	0	0
1993	4	170 W	25	3929	4785	1094	3041	490	315	0	155	0
1993	4	170 W	30	66149	19421	9439	90981	1175	1735	57	867	295
1993	4	170 W	35	90797	7881	1505	96342	1241	631	57	97	0
1993	4	170 W	40	107	0	0	412	0	0	0	0	0
1993	4	175 E	40	107	0	0	5567	0	0	0	0	0
1993	4	175 W	35	3993	1173	684	10825	261	0	0	13	0
1993	4	175 W	40	4358	0	0	14382	0	0	0	0	0
1994	1	145 W	25	730	45	378	7932	64	0	0	146	0
1994	1	145 W	30	2340	1028	1039	13256	128	78	0	182	0
1994	1	150 W	15	301	21774	2455	166	6226	1942	192	977	838
1994	1	150 W	20	365	41804	7602	555	7408	1709	128	1086	709
1994	1	150 W	25	9468	7288	7272	157136	830	466	64	2814	548
1994	1	150 W	30	4337	24143	11144	235454	1022	1864	513	2034	145
1994	1	155 W	10	365	9613	378	111	2427	621	0	496	950
1994	1	155 W	15	1503	40418	5194	832	12548	5592	513	1990	2642
1994	1	155 W	20	9747	217425	70924	36774	23692	21748	1667	2741	1047
1994	1	155 W	25	3822	5499	3589	52804	862	544	128	663	113
1994	1	155 W	30	1095	2548	2125	21133	64	0	64	219	0
1994	1	160 W	15	1074	26692	4203	277	8078	3184	321	1458	1015
1994	1	160 W	20	2662	186709	35226	3883	55335	11184	962	1895	1772
1994	1	160 W	25	1267	6617	6941	28399	479	932	321	204	81
1994	1	160 W	30	2533	4650	2267	26513	192	777	0	58	16

Table 3--Continued

Year	Q	Lng	Lat	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah
1994	1	165 W	20	580	20120	2739	277	3927	2563	64	394	129
1994	1	165 W	25	1932	12653	7791	89744	798	1942	256	416	32
1994	1	165 W	30	7965	8093	3966	78596	607	621	128	73	0
1994	1	170 W	25	30273	20388	14213	156248	607	311	128	1349	177
1994	1	170 W	30	20633	9970	4864	67502	255	78	0	66	16
1994	1	175 W	25	5883	2101	1511	14643	32	0	0	7	0
1994	1	175 W	30	15974	8048	3069	34555	287	78	0	7	16
1994	2	145 W	25	157	1345	435	42305	216	440	457	2881	0
1994	2	145 W	30	131	41	0	14712	173	0	0	242	0
1994	2	150 W	15	131	2119	145	68	1467	616	0	161	232
1994	2	150 W	20	602	2975	386	30441	1770	1847	1279	3093	387
1994	2	150 W	25	2932	3790	1352	215321	2978	3343	1187	3658	139
1994	2	150 W	30	602	1304	483	44678	604	88	0	982	0
1994	2	155 W	5	0	12062	8787	136	43	616	457	0	356
1994	2	155 W	10	838	16422	869	2644	1770	3783	731	301	1391
1994	2	155 W	15	19399	36512	26361	27593	34528	27886	5388	2712	4932
1994	2	155 W	20	445	2649	1931	21288	3625	3431	1461	1341	124
1994	2	155 W	25	524	978	966	90576	1079	3255	365	1517	15
1994	2	155 W	30	105	245	48	10373	173	88	0	191	0
1994	2	160 W	0	0	11247	21871	407	0	352	0	0	62
1994	2	160 W	5	0	62429	110561	1627	1079	2375	1461	15	742
1994	2	160 W	10	864	10065	1014	475	3108	1759	274	139	928
1994	2	160 W	15	22070	46292	13036	7932	43505	18914	5114	1591	5457
1994	2	160 W	20	1047	448	6470	5627	1511	3167	457	271	93
1994	2	160 W	25	209	367	917	30034	1165	2639	548	667	62
1994	2	165 W	10	2487	11736	2076	475	950	264	639	15	325

Table 3--Continued

Year	Q	Lng	Lat	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah
1994	2	165 W	15	3273	2404	386	1831	5395	1495	1187	73	603
1994	2	165 W	20	367	571	821	6305	2072	1495	91	51	62
1994	2	165 W	25	131	3382	1979	55932	5395	4223	822	1957	0
1994	2	165 W	30	0	41	0	3525	259	352	0	381	0
1994	2	170 E	25	288	4157	193	44542	5783	2639	183	638	155
1994	2	170 W	20	602	3097	628	34441	9452	3079	1644	315	15
1994	2	170 W	25	2775	4034	1062	118711	4100	3959	731	2118	124
1994	2	170 W	30	131	0	48	3458	86	880	0	235	0
1994	2	175 E	25	26	163	0	1153	129	88	0	15	0
1994	2	175 W	20	105	774	48	16814	3884	1320	0	205	31
1994	2	175 W	25	183	3749	628	57152	5870	4399	731	953	62
1994	2	175 W	30	79	285	48	8000	820	440	183	388	0
1994	3	145 W	25	330	2026	49	753	320	235	0	3247	0
1994	3	150 W	15	2586	2260	491	201	256	626	190	528	157
1994	3	150 W	20	14250	11457	687	703	2239	3051	286	3892	549
1994	3	155 W	15	21210	41737	78218	12302	11516	78611	3332	8210	3295
1994	3	155 W	20	3081	2572	3288	1657	480	4146	571	2492	94
1994	3	155 W	25	303	5923	147	1707	608	939	0	3203	0
1994	3	160 W	15	26657	30241	44605	13357	7198	35825	2761	1825	2683
1994	3	160 W	20	2008	1987	18598	4218	992	9699	666	748	251
1994	3	160 W	25	880	7638	1178	5624	1248	2425	857	6839	16
1994	3	160 W	30	55	2455	442	1707	608	548	0	1561	0
1994	3	160 W	35	1761	0	0	1808	0	0	0	733	0
1994	3	165 W	25	28	1403	196	4419	480	1252	286	872	0
1994	3	165 W	30	193	15159	785	11549	1408	1173	1428	5168	16
1994	3	165 W	35	7428	39	0	7833	64	78	0	2412	0

Table 3--Continued

Year	Q	Lng	Lat	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah
1994	3	165 W	40	55	0	0	1406	0	0	0	44	0
1994	3	170 E	25	28	390	49	5072	320	391	95	103	47
1994	3	170 W	25	358	3196	147	25961	896	1408	571	191	47
1994	3	170 W	30	275	3819	196	18378	384	1017	95	1290	0
1994	3	170 W	35	495	0	0	1506	0	0	0	308	0
1994	3	170 W	40	1128	0	0	20287	0	0	0	81	0
1994	3	170 W	45	0	0	0	753	0	0	0	0	0
1994	3	175 E	40	83	0	0	251	0	0	0	0	0
1994	3	175 W	25	28	1910	981	12704	736	860	95	183	31
1994	3	175 W	30	220	1013	147	18077	416	626	95	601	0
1994	3	175 W	40	138	0	0	3565	0	0	0	0	0
1994	4	145 W	30	7522	1335	37	22841	417	246	0	1658	16
1994	4	145 W	35	14553	1488	147	66109	834	1150	0	3653	0
1994	4	150 W	15	654	19228	1658	43	3697	493	209	905	33
1994	4	150 W	20	40124	226458	5452	1422	18626	11906	1981	18883	1211
1994	4	150 W	35	4313	76	0	12627	222	164	417	1433	0
1994	4	155 W	15	2351	37006	8842	948	4643	21184	1251	6648	540
1994	4	155 W	20	87299	228213	10057	13187	24158	17900	1877	36530	1179
1994	4	155 W	25	613	7935	553	2887	445	328	104	3771	33
1994	4	155 W	35	1083	0	0	3189	0	0	0	129	0
1994	4	160 W	15	10751	71684	12194	905	7673	6240	1147	7182	573
1994	4	160 W	20	46358	220698	23799	2758	13983	9689	834	10774	1113
1994	4	160 W	25	6377	49977	5747	23272	2752	2053	313	9161	115
1994	4	160 W	35	67288	420	184	62403	1001	1150	104	5440	16
1994	4	165 W	25	797	1679	37	2456	278	82	104	865	0
1994	4	165 W	30	2146	954	111	4180	56	0	104	736	0

Table 3--Continued

Year	Q	Lng	Lat	Alb	Bet	Yft	Swf	Stm	Blm	Bkm	Mah	Wah
1994	4	165 W	35	29291	229	0	31288	500	246	104	2220	16
1994	4	170 W	30	24589	1412	147	12541	195	164	0	343	65
1994	4	170 W	35	15964	191	111	14006	139	82	0	495	0
1994	4	175 W	35	32316	153	0	21936	111	82	0	371	0
1991	1	.	.	515	2828	620	1823	540	522	0	420	44
1991	2	.	.	2173	8374	6625	25204	2171	580	73	680	164
1991	3	.	.	1326	7503	3597	21367	2100	6868	208	4338	115
1991	4	.	.	3176	9896	5277	10837	2797	13203	1557	3014	474
1992	1	.	.	932	12466	3555	32183	2929	2111	1273	382	493
1992	2	.	.	985	7145	6481	28670	2187	1439	61	1055	385
1992	3	.	.	214	3050	6353	37280	1437	3673	431	1526	46
1992	4	.	.	161	353	0	2681	0	0	0	0	0
1993	1	.	.	149	1030	680	6364	38	76	0	31	85
1993	2	.	.	382	1759	1371	26633	2420	0	179	880	16
1993	3	.	.	721	5256	1116	15611	774	551	129	1155	144
1993	4	.	.	9082	5301	1003	5309	2547	394	400	524	16
1994	1	.	.	2297	10283	2408	16806	2650	1087	128	824	644
1994	2	.	.	314	2241	241	28203	1597	2287	639	887	62
1994	3	.	.	3879	5690	1717	10746	1759	3598	666	938	314
1994	4	.	.	8380	8927	2247	8921	1418	1724	104	2540	16

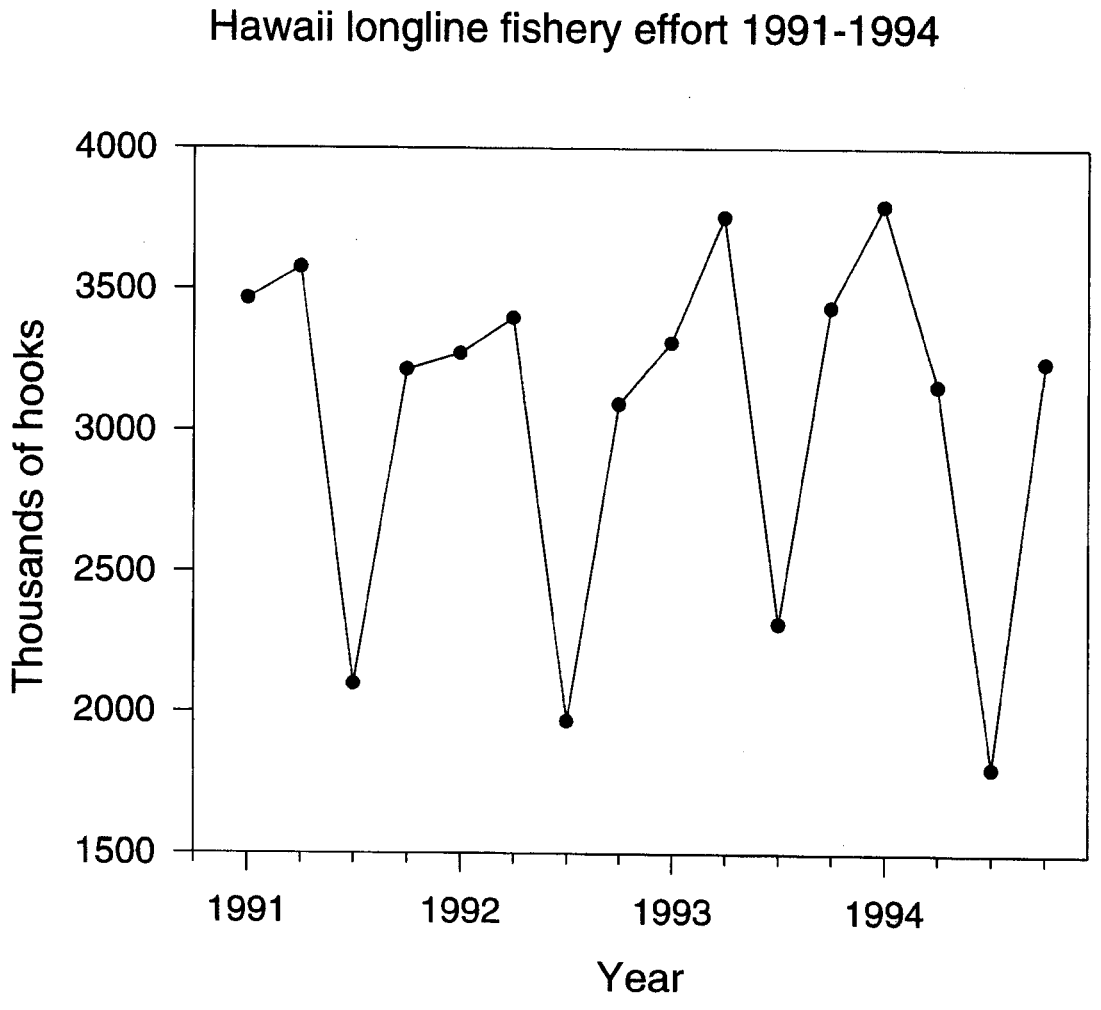

Figure 1. Time series of longline effort by quarter showing total number of hooks set from 1991 to 1994.

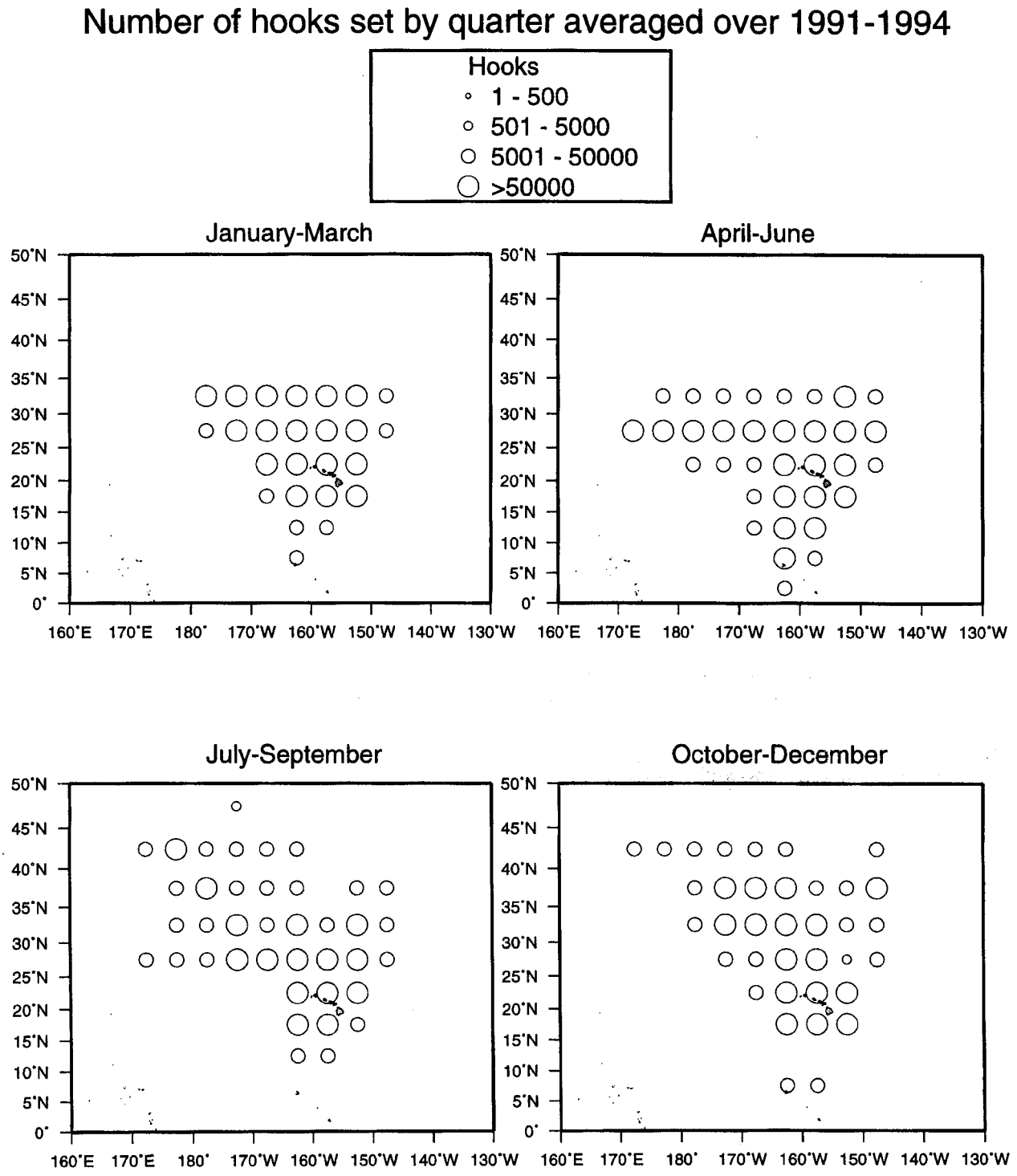

Figure 2. Number of hooks set by the longline fishery by quarter averaged over 1991 to 1994. Data are aggregated into five-degree squares.

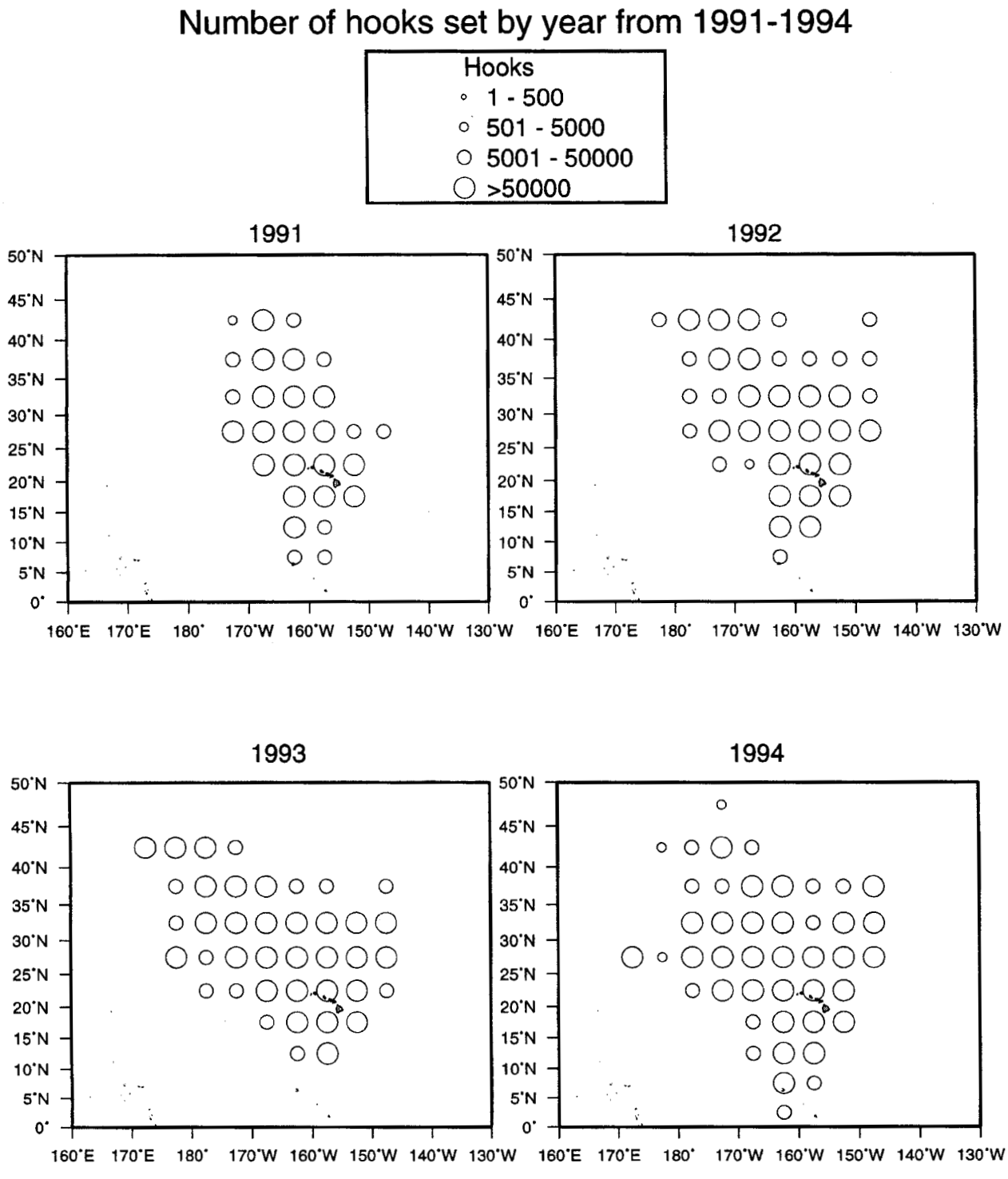

Figure 3. Total number of hooks set by the longline fishery by year from 1991 to 1994. Data are aggregated into five-degree squares.

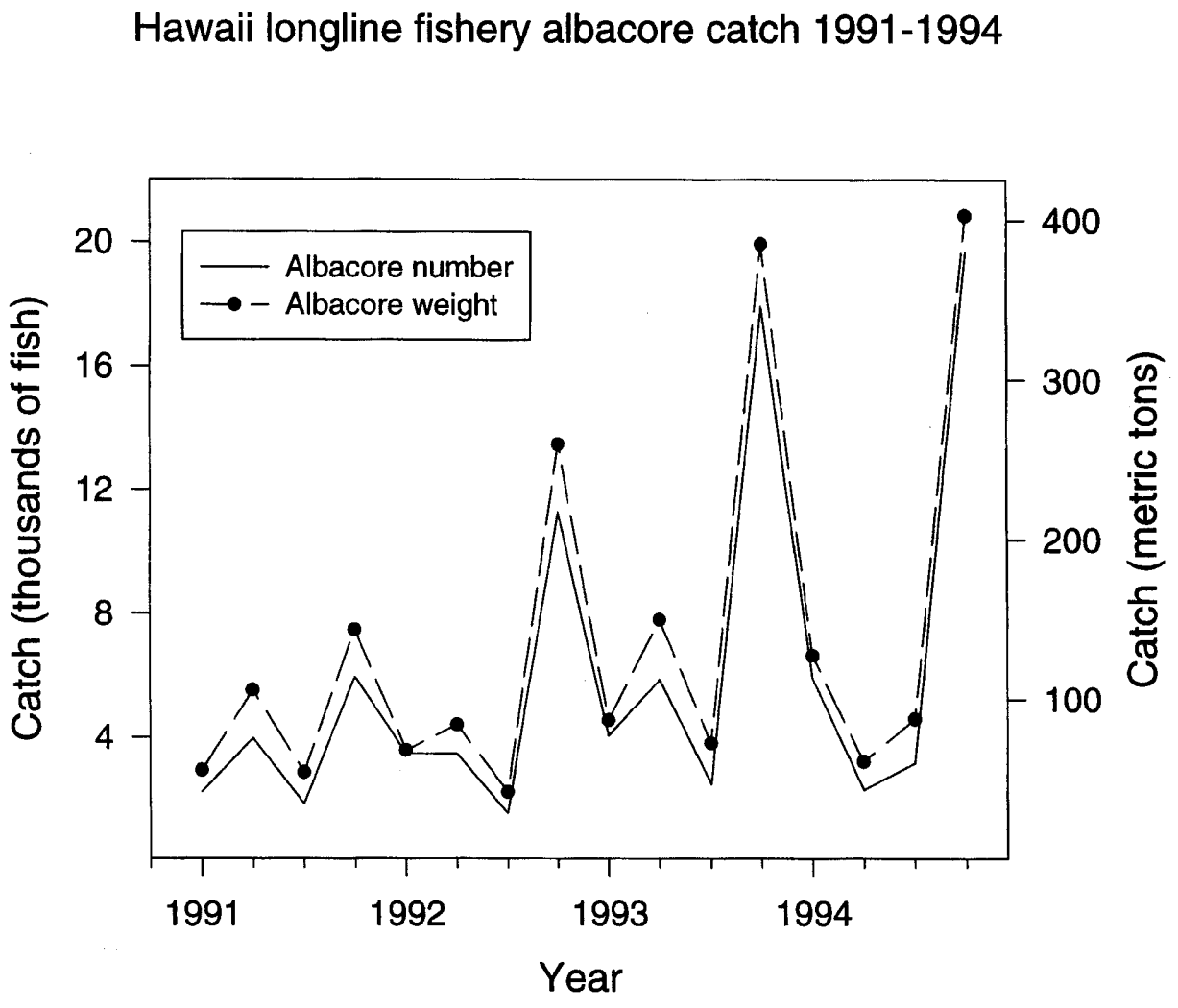

Figure 4. Time series of albacore catch by quarter from 1991 to 1994. Left axis shows number of fish caught in thousands and right axis shows estimated weight in metric tons based on mean weights of fish from each quarter multiplied by the number caught.

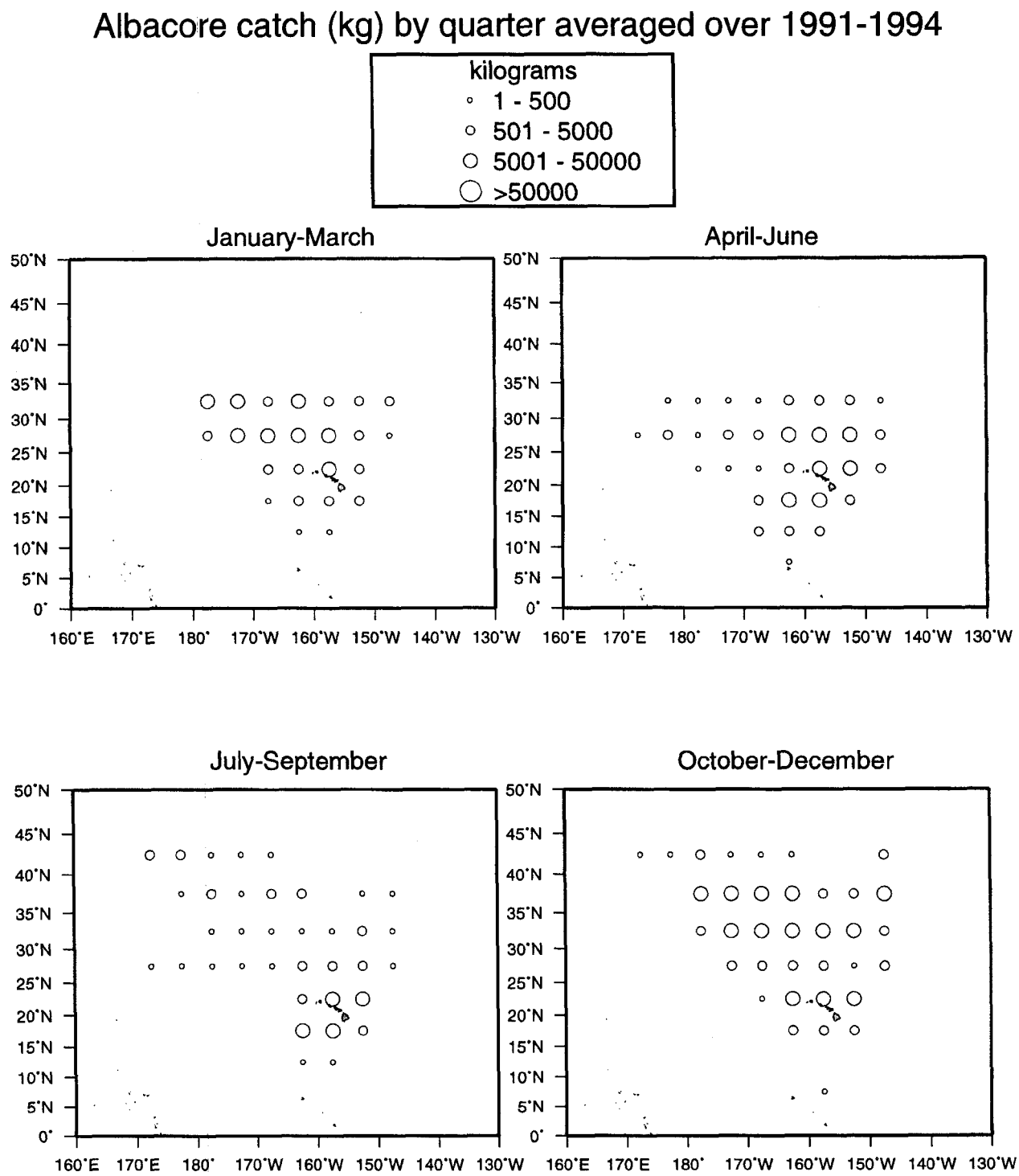

Figure 5. Albacore catch (kg) by the longline fishery by quarter averaged over 1991 to 1994. Weights are estimated from mean weight of fish from each quarter multiplied by the number of fish caught in each five-degree square.

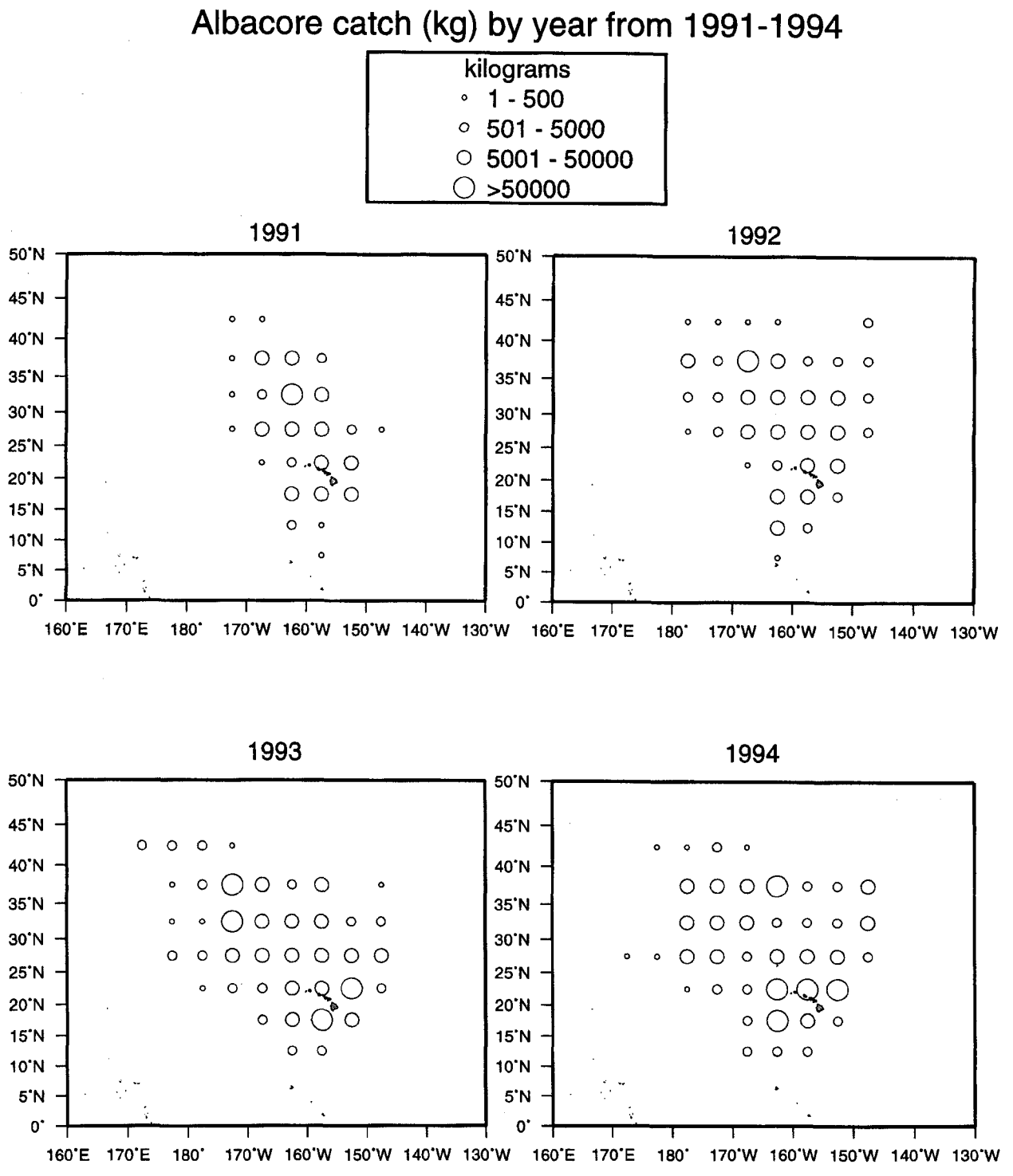

Figure 6. Albacore catch (kg) by the longline fishery by year from 1991 to 1994. Weights are estimated from mean weight of fish from each quarter multiplied by the number of fish caught in each five-degree square.

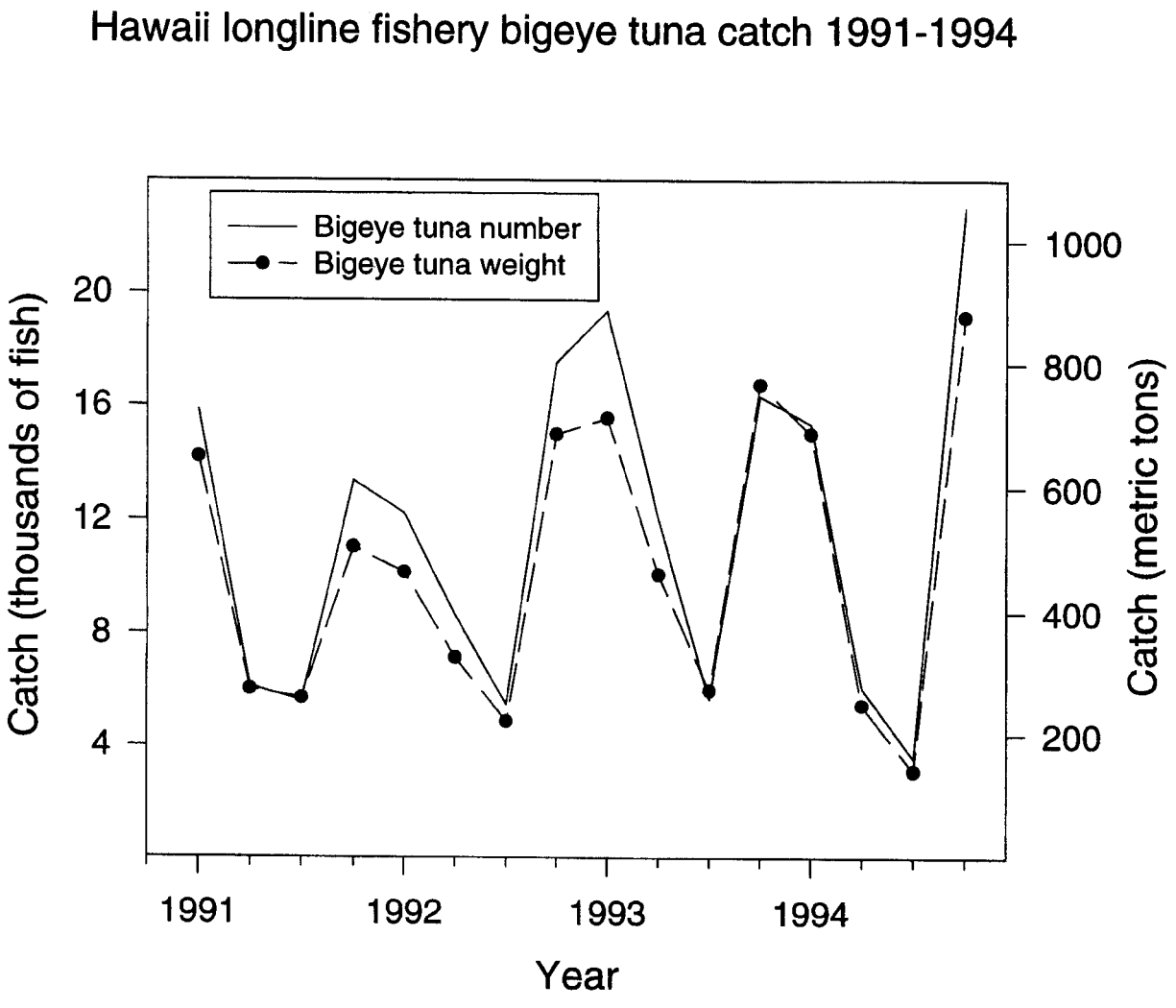

Figure 7. Time series of bigeye tuna catch by quarter from 1991 to 1994. Left axis shows number of fish caught in thousands and right axis shows estimated weight in metric tons based on mean weights of fish from each quarter multiplied by the number caught.

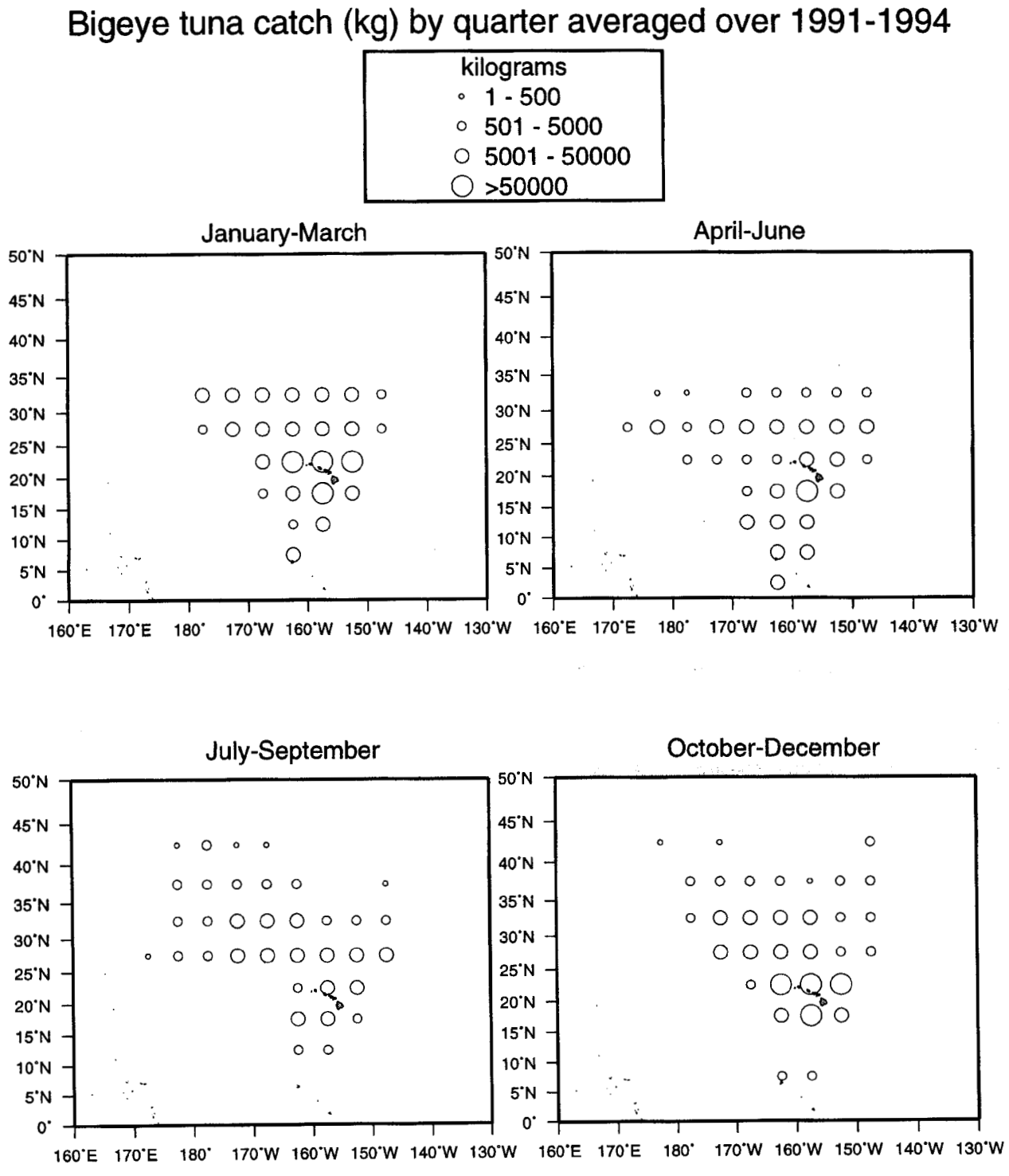

Figure 8. Bigeye tuna catch (kg) by the longline fishery by quarter averaged over 1991to 1994. Weights are estimated from mean weight of fish from each quarter multiplied by the number of fish caught in each five-degree square.

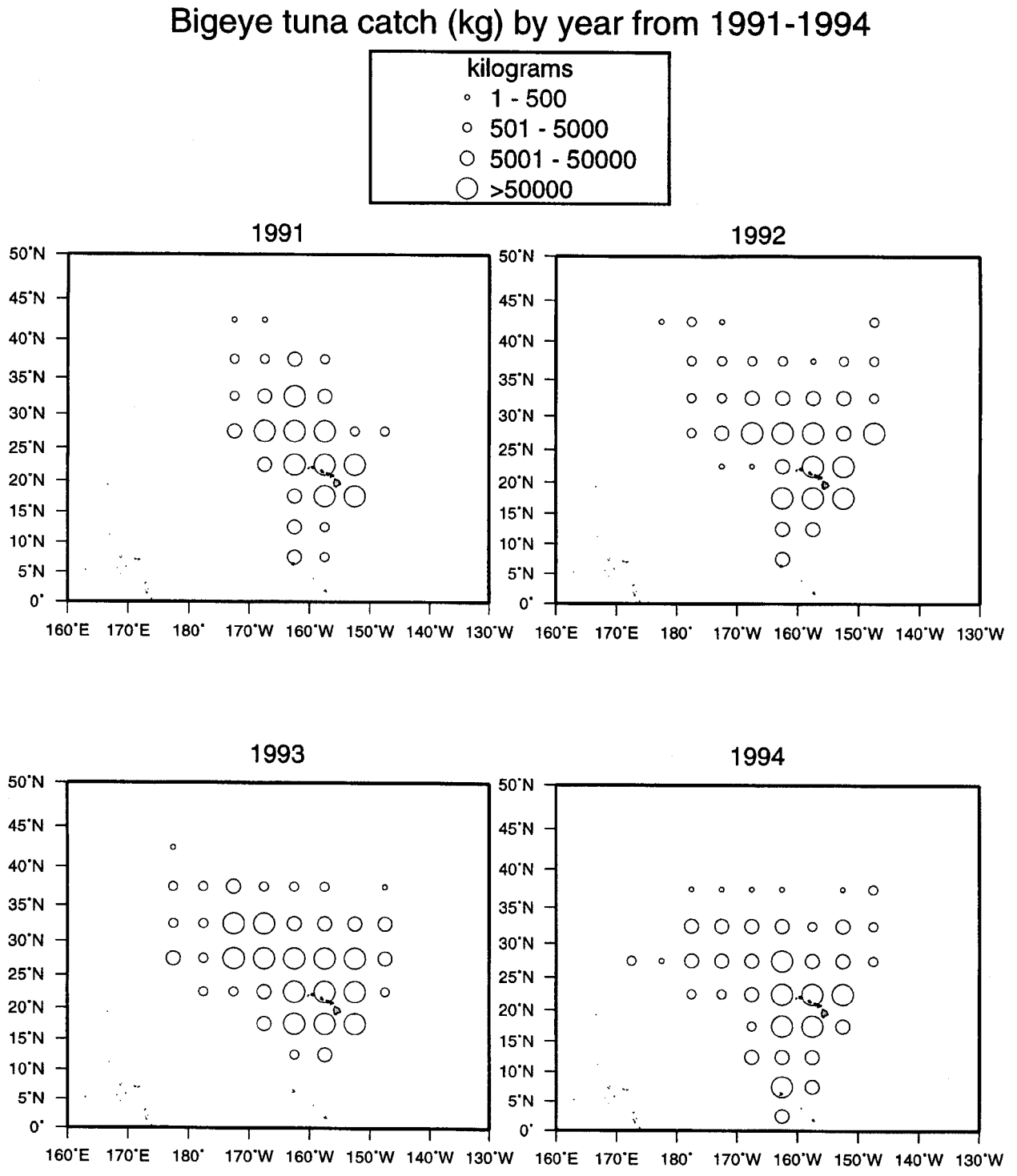

Figure 9. Bigeye tuna catch (kg) by the longline fishery by year from 1991 to 1994. Weights are estimated from mean weight of fish from each quarter multiplied by the number of fish caught in each five-degree square.

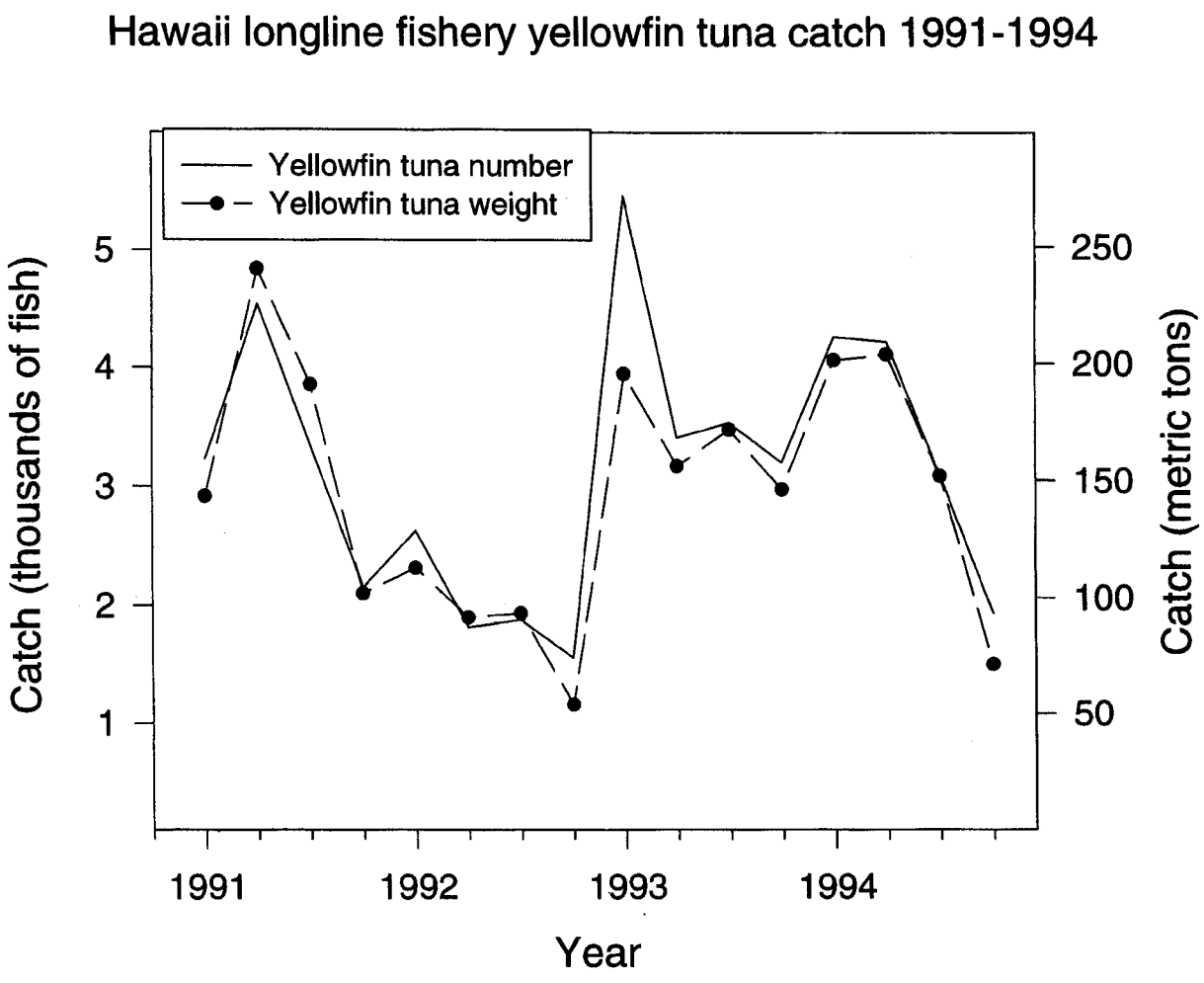

Figure 10. Time series of yellowfin tuna catch by quarter from 1991 to 1994. Left axis shows number of fish caught in thousands and right axis shows estimated weight in metric tons based on mean weights of fish from each quarter multiplied by the number caught.

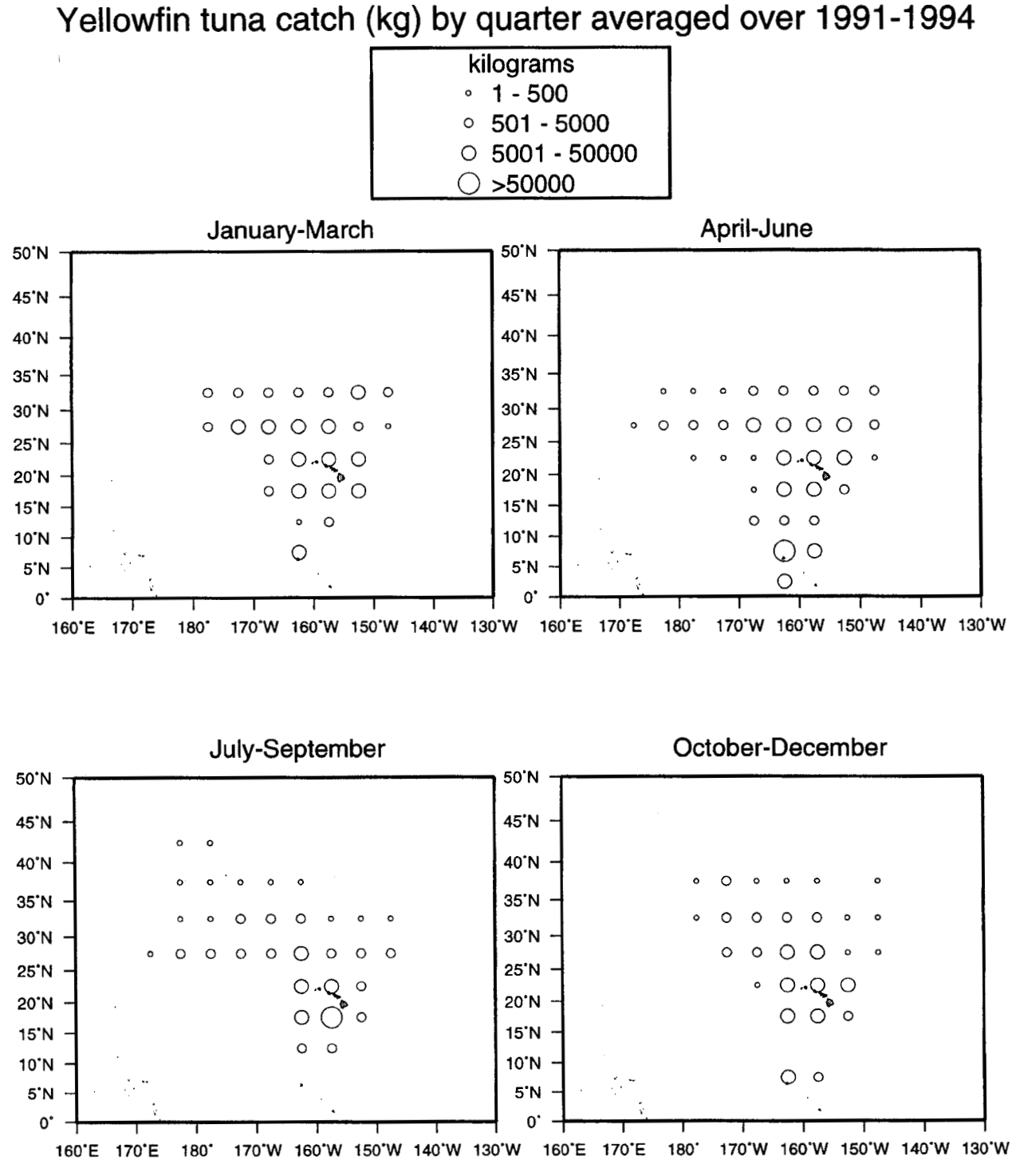

Figure 11. Yellowfin tuna catch (kg) by the longline fishery by quarter averaged over 1991 to 1994. Weights are estimated from mean weight of fish from each quarter multiplied by the number of fish caught in each five-degree square.

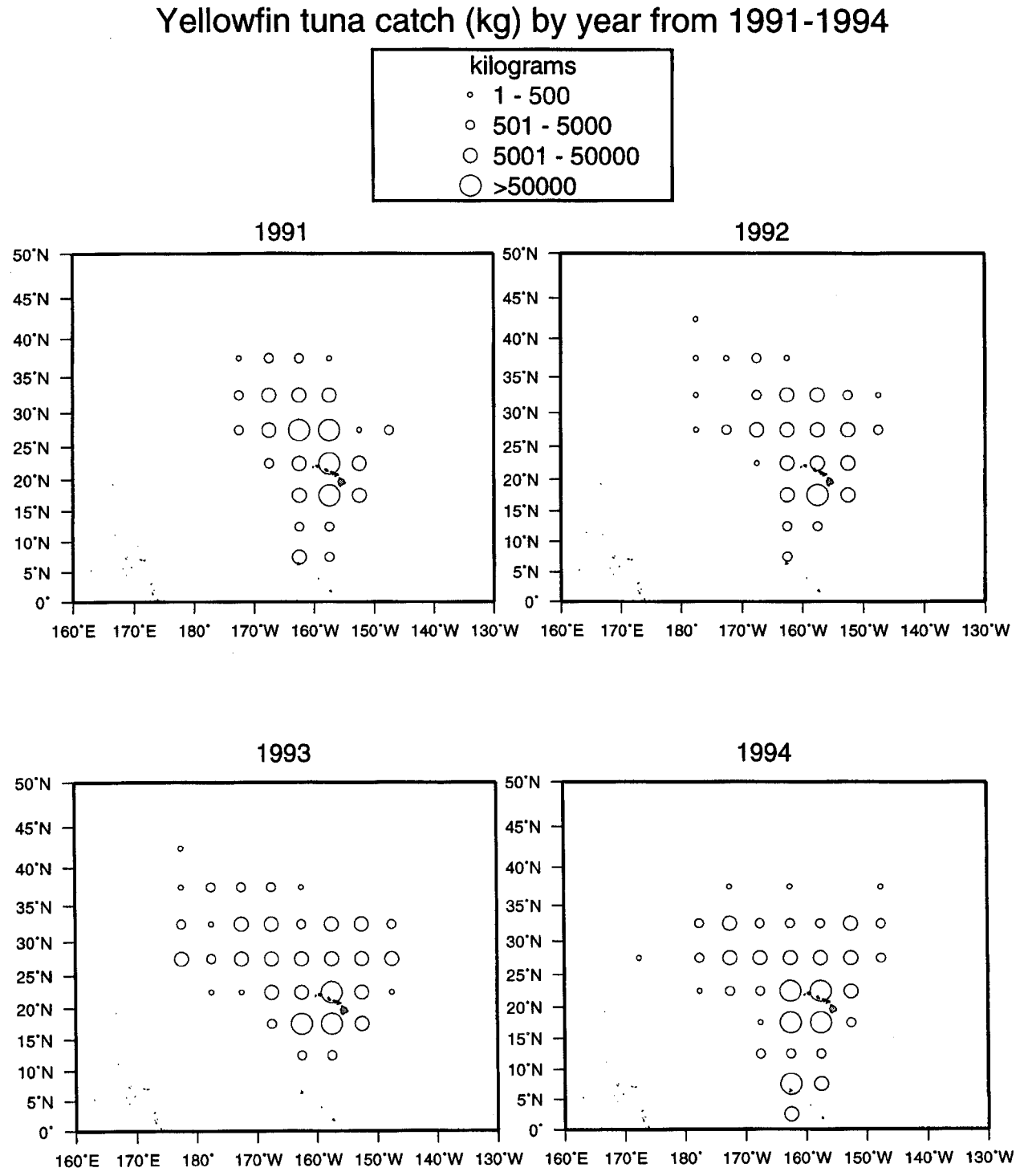

Figure 12. Yellowfin tuna catch (kg) by the longline fishery by year from 1991 to 1994. Weights are estimated from mean weight of fish from each quarter multiplied by the number of fish caught in each five-degree square.

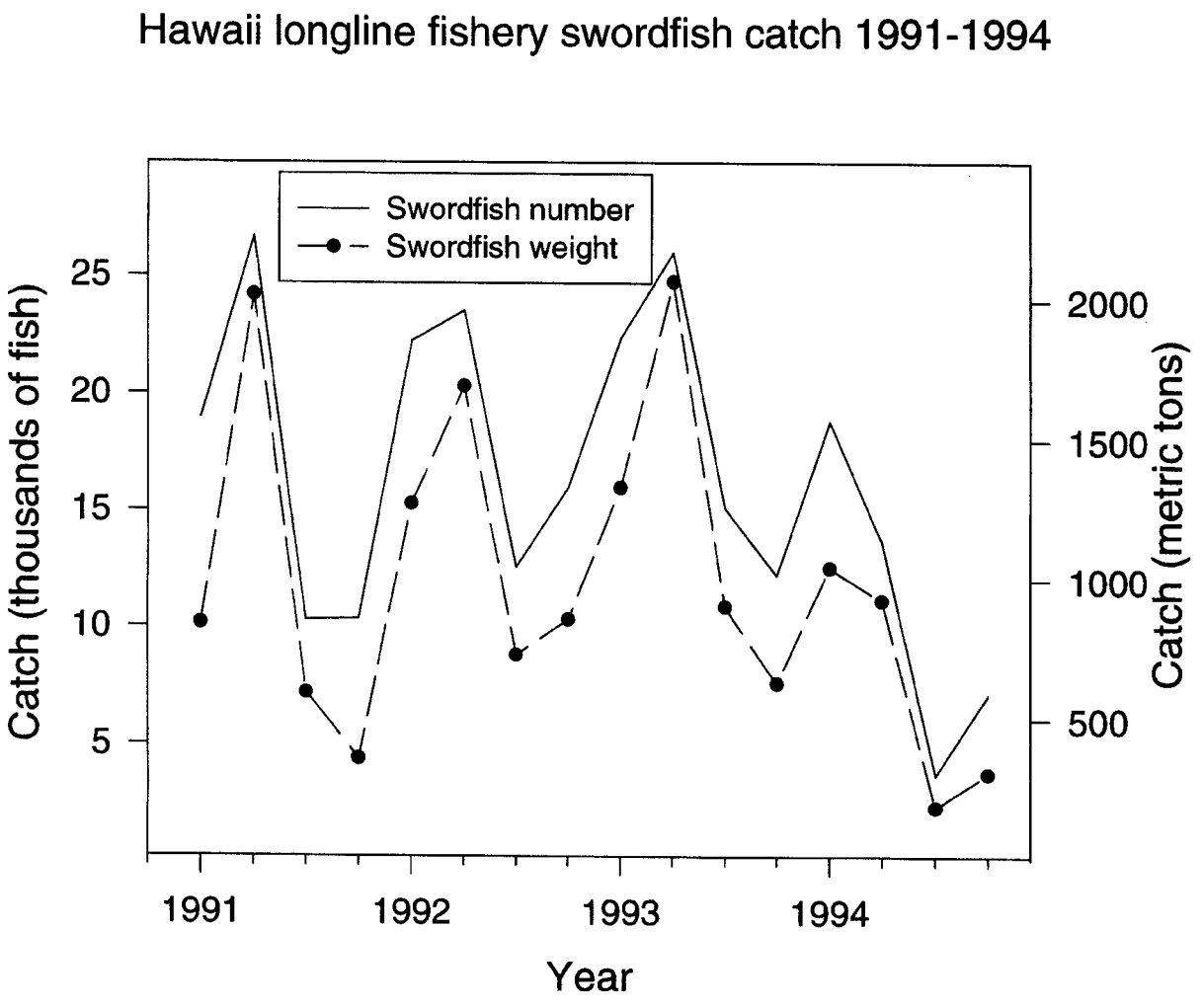

Figure 13. Time series of swordfish catch by quarter from 1991 to 1994. Left axis shows number of fish caught in thousands and right axis shows estimated weight in metric tons based on mean weights of fish from each quarter multiplied by the number caught.

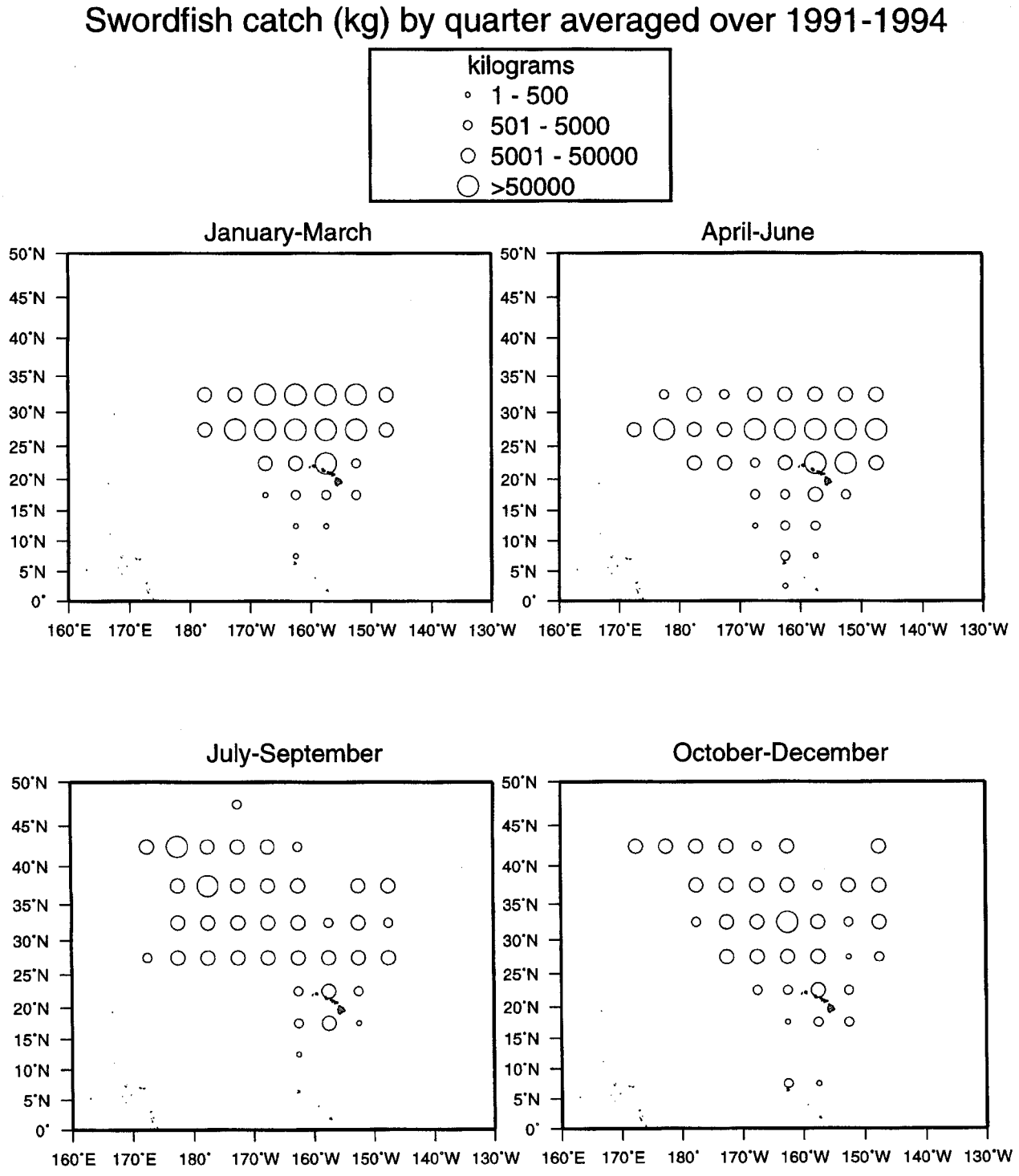

Figure 14. Swordfish catch (kg) by the longline fishery by quarter averaged over 1991 to 1994. Weights are estimated from mean weight of fish from each quarter multiplied by the number of fish caught in each five-degree square.

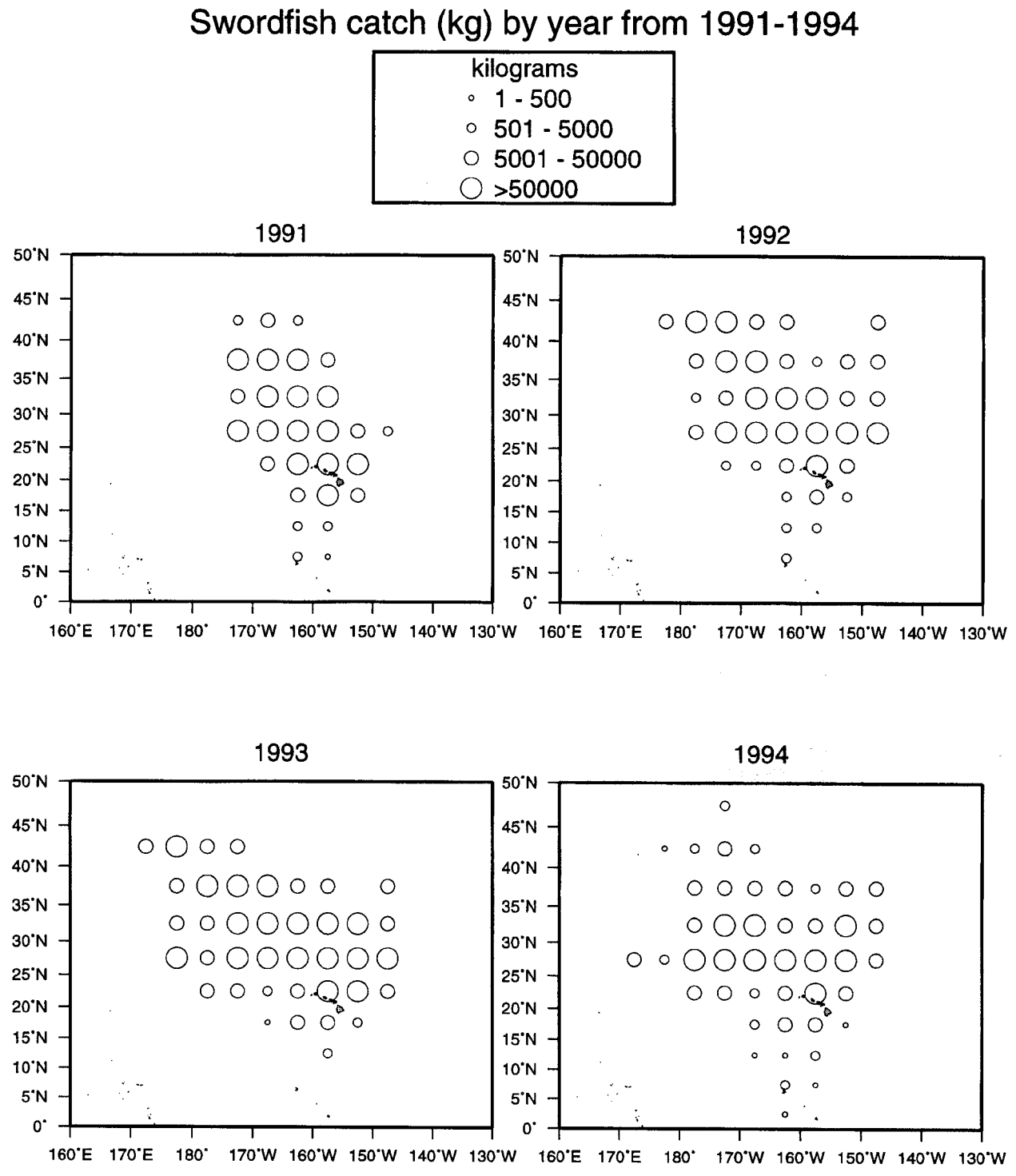

Figure 15. Swordfish catch (kg) by the longline fishery by year from 1991 to 1994. Weights are estimated from mean weight of fish from each quarter multiplied by the number of fish caught in each five-degree square.

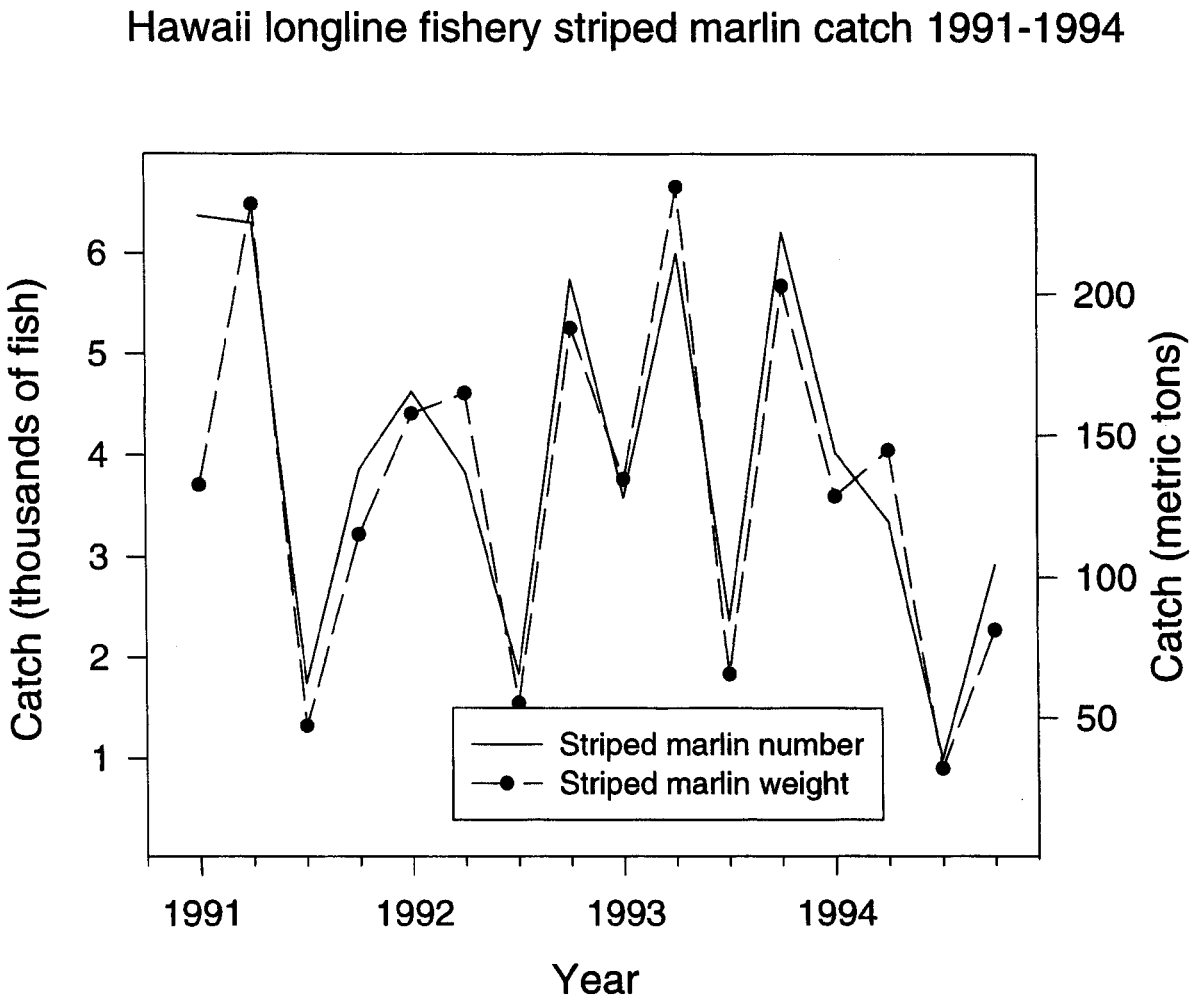

Figure 16. Time series of striped marlin catch by quarter from 1991 to 1994. Left axis shows number of fish caught in thousands and right axis shows estimated weight in metric tons based on mean weights of fish from each quarter multiplied by the number caught.

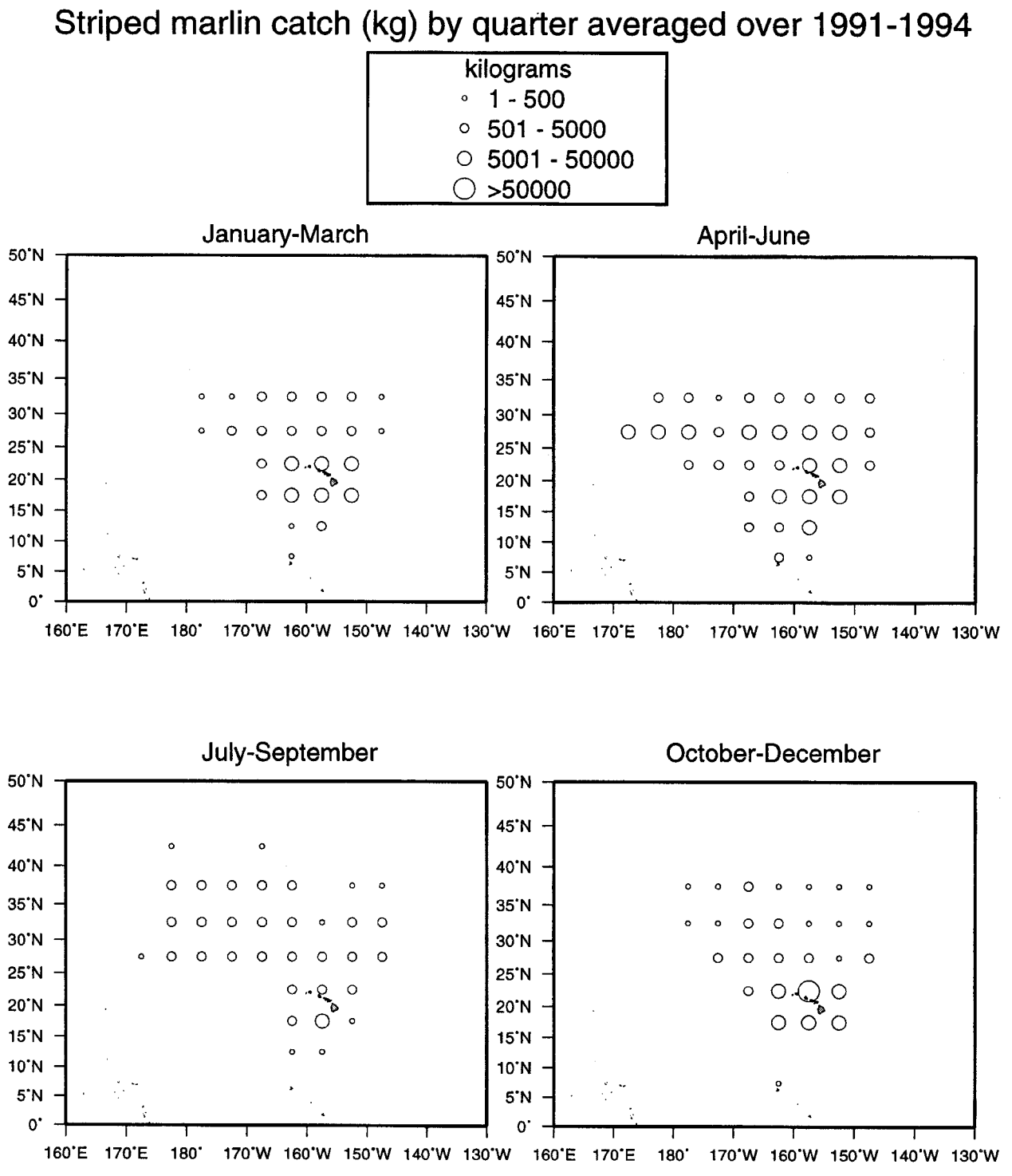

Figure 17. Striped marlin catch (kg) by the longline fishery by quarter averaged over 1991 to 1994. Weights are estimated from mean weight of fish from each quarter multiplied by the number of fish caught in each five-degree square.

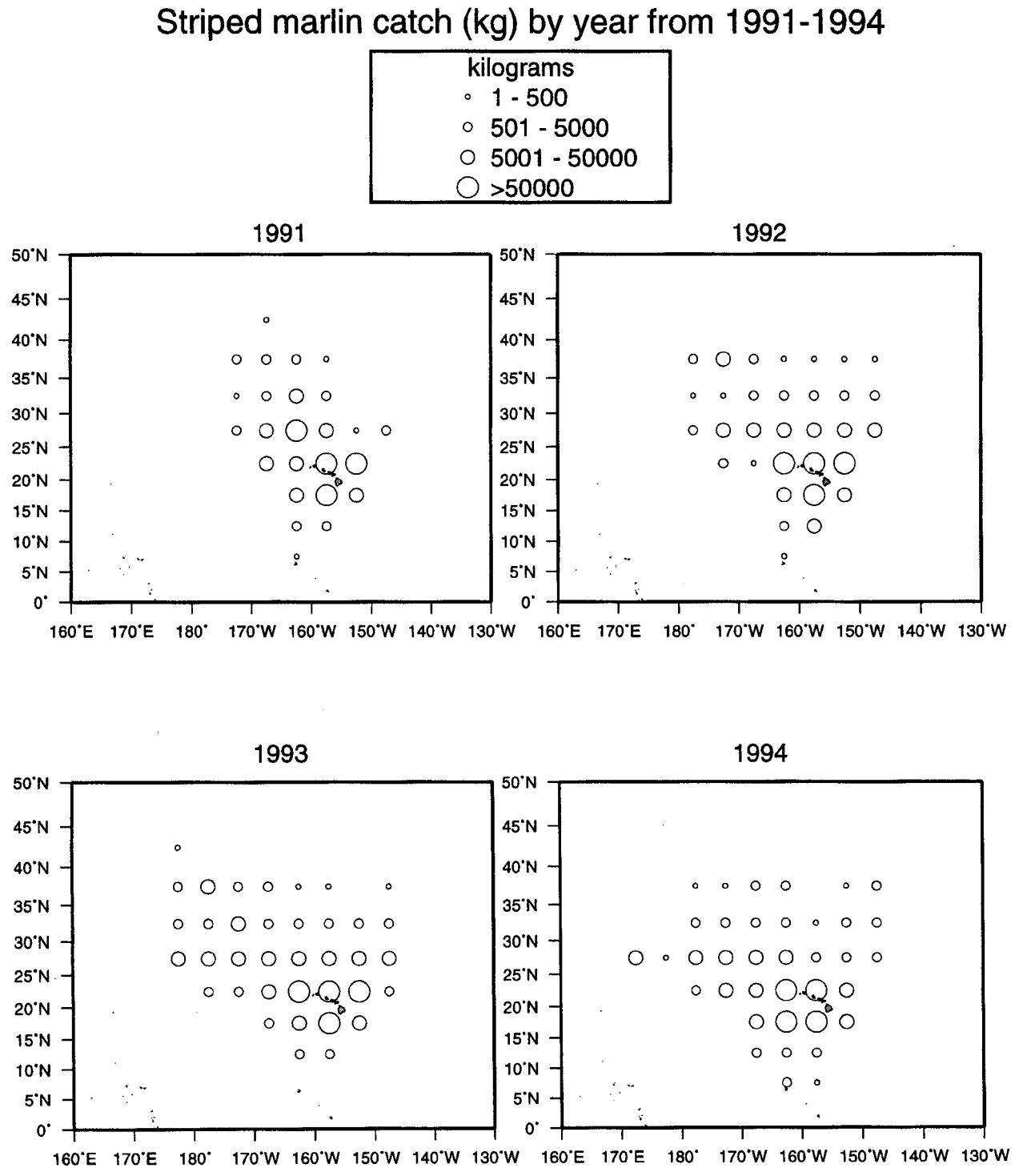

Figure 18. Striped marlin catch (kg) by the longline fishery by year from 1991 to 1994. Weights are estimated from mean weight of fish from each quarter multiplied by the number of fish caught in each five-degree square.

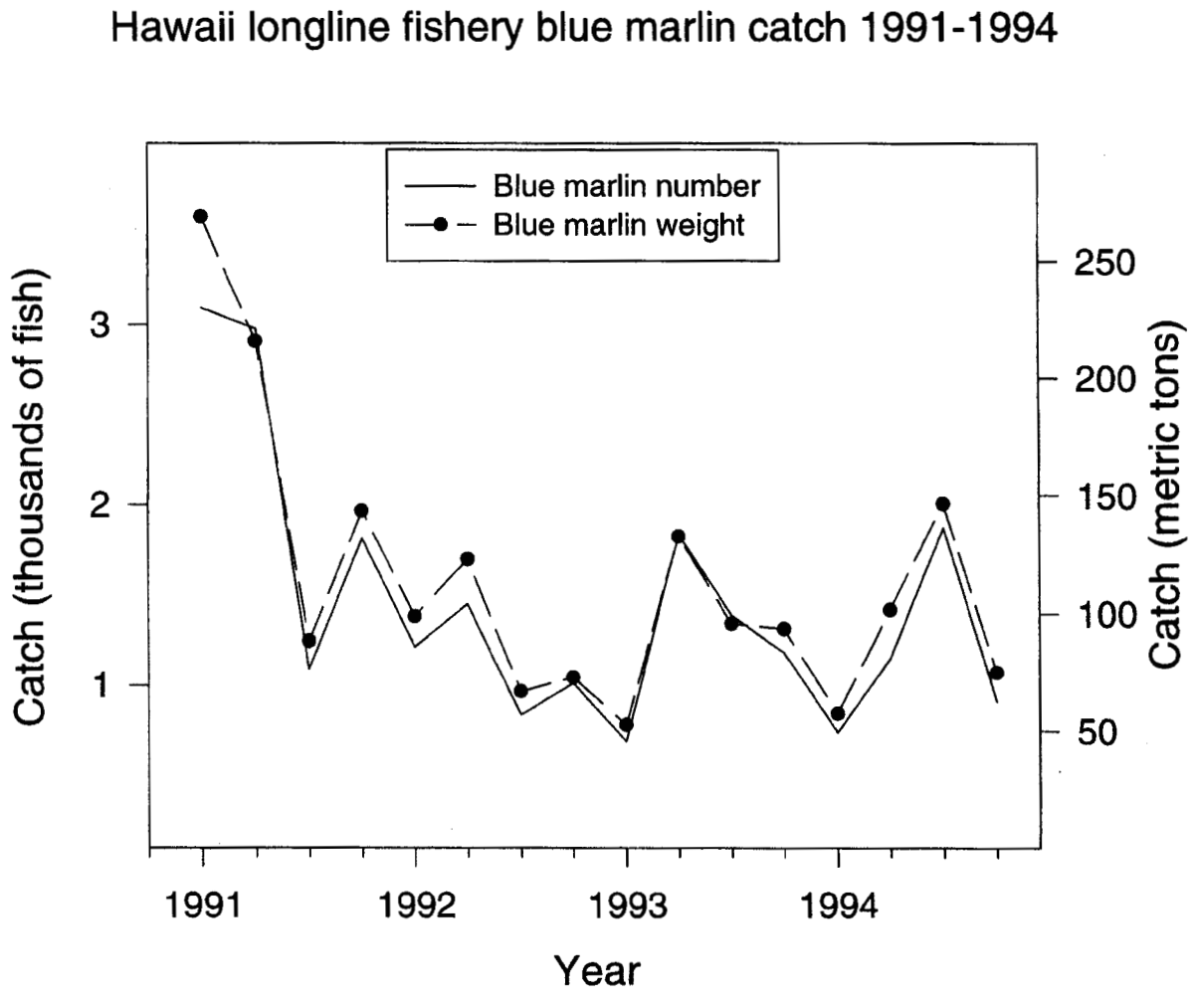

Figure 19. Time series of blue marlin catch by quarter from 1991 to 1994. Left axis shows number of fish caught in thousands and right axis shows estimated weight in metric tons based on mean weights of fish from each quarter multiplied by the number caught.

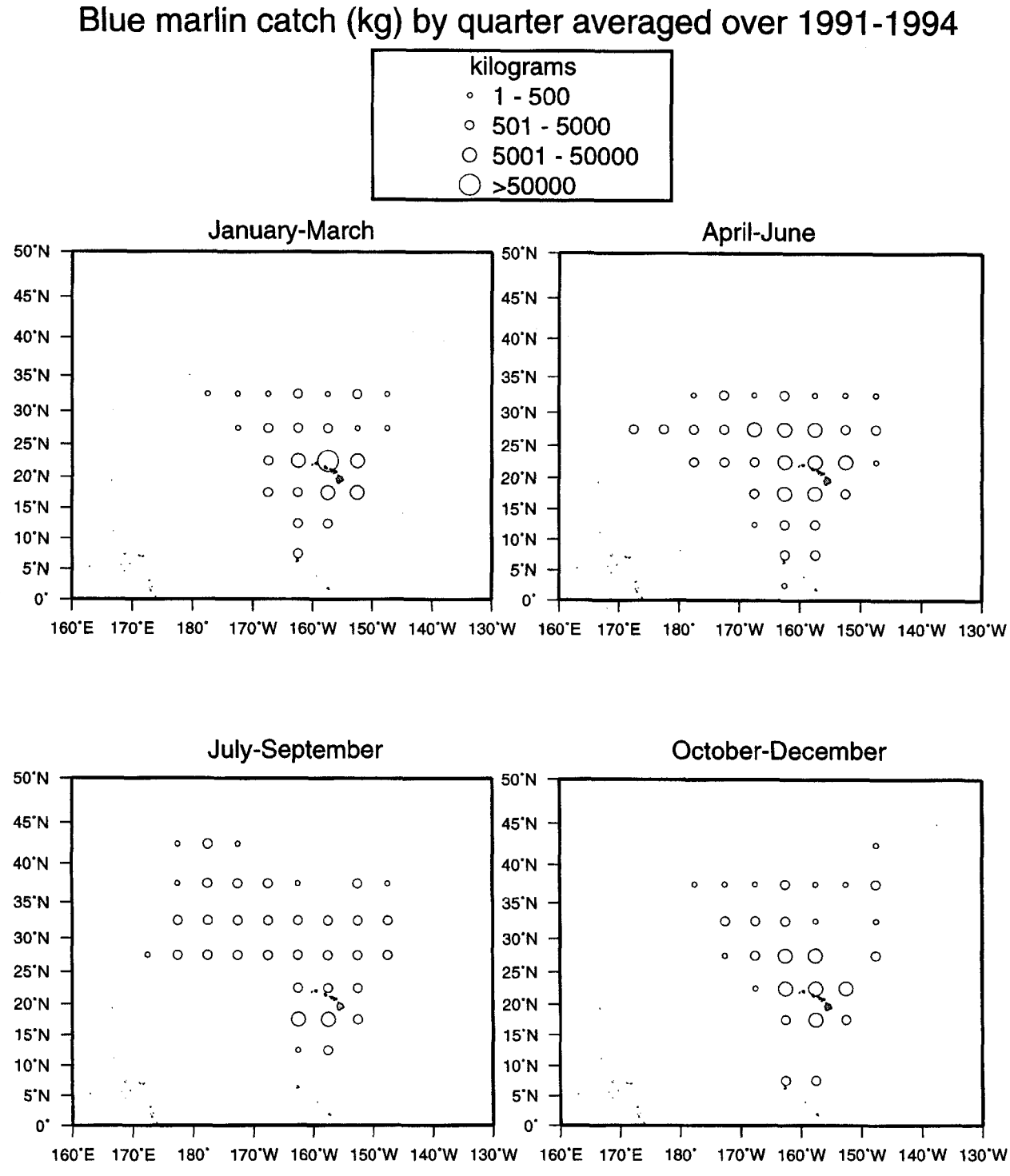

Figure 20. Blue marlin catch (kg) by the longline fishery by quarter averaged over 1991 to 1994. Weights are estimated from mean weight of fish from each quarter multiplied by the number of fish caught in each five-degree square.

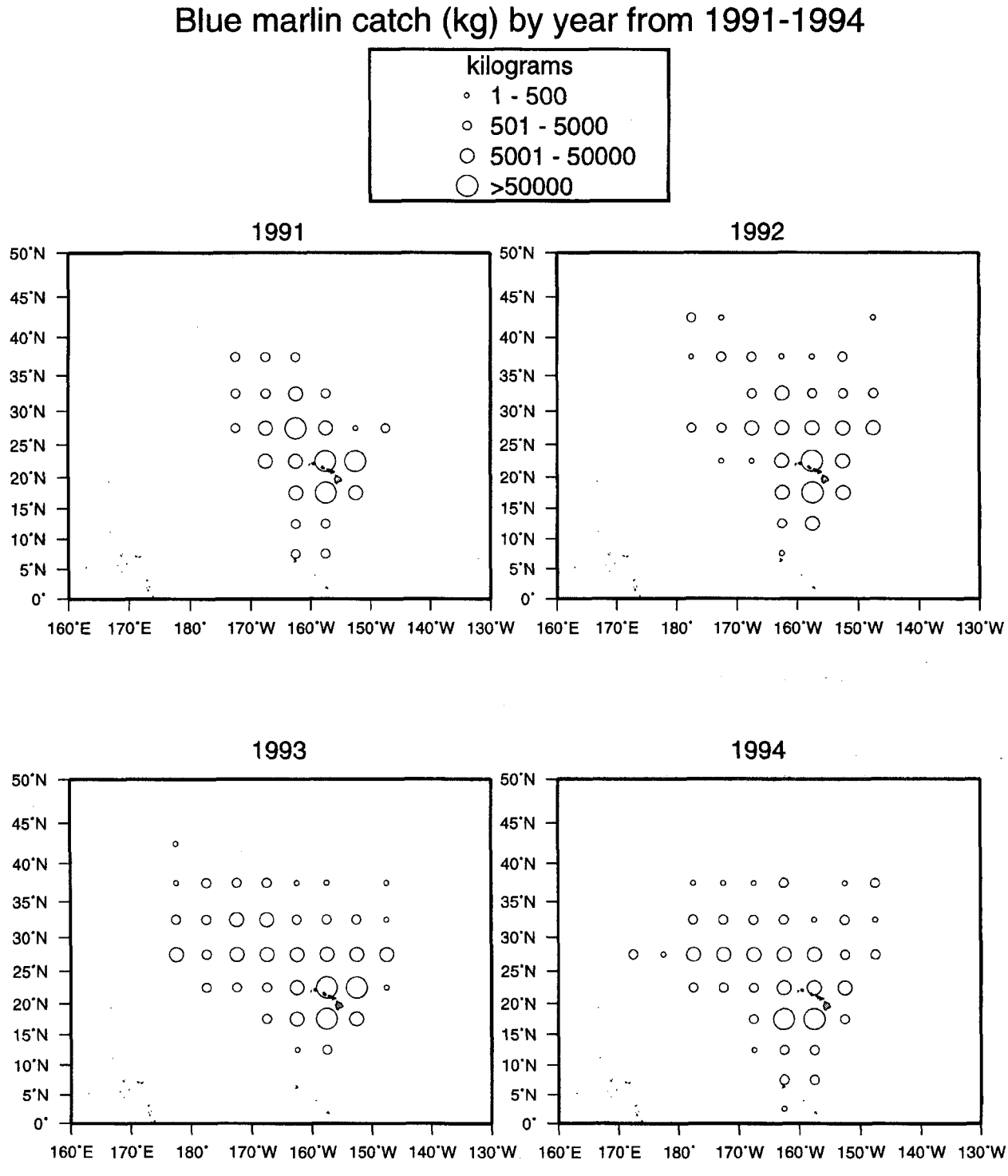

Figure 21. Blue marlin catch (kg) by the longline fishery by year from 1991 to 1994. Weights are estimated from mean weight of fish from each quarter multiplied by the number of fish caught in each five-degree square.

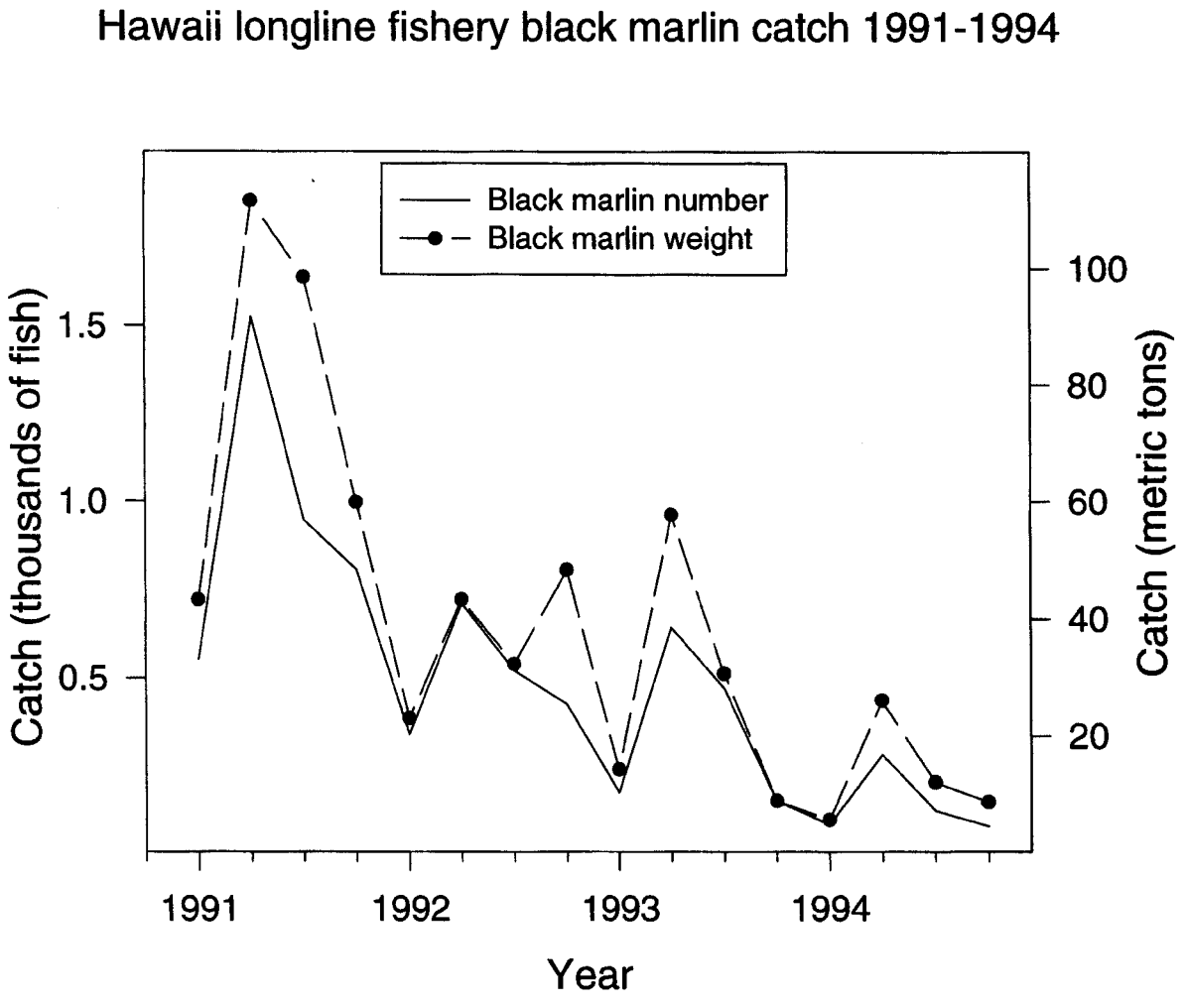

Figure 22. Time series of black marlin catch by quarter from 1991 to 1994. Left axis shows number of fish caught in thousands and right axis shows estimated weight in metric tons based on mean weights of fish from each quarter multiplied by the number caught.

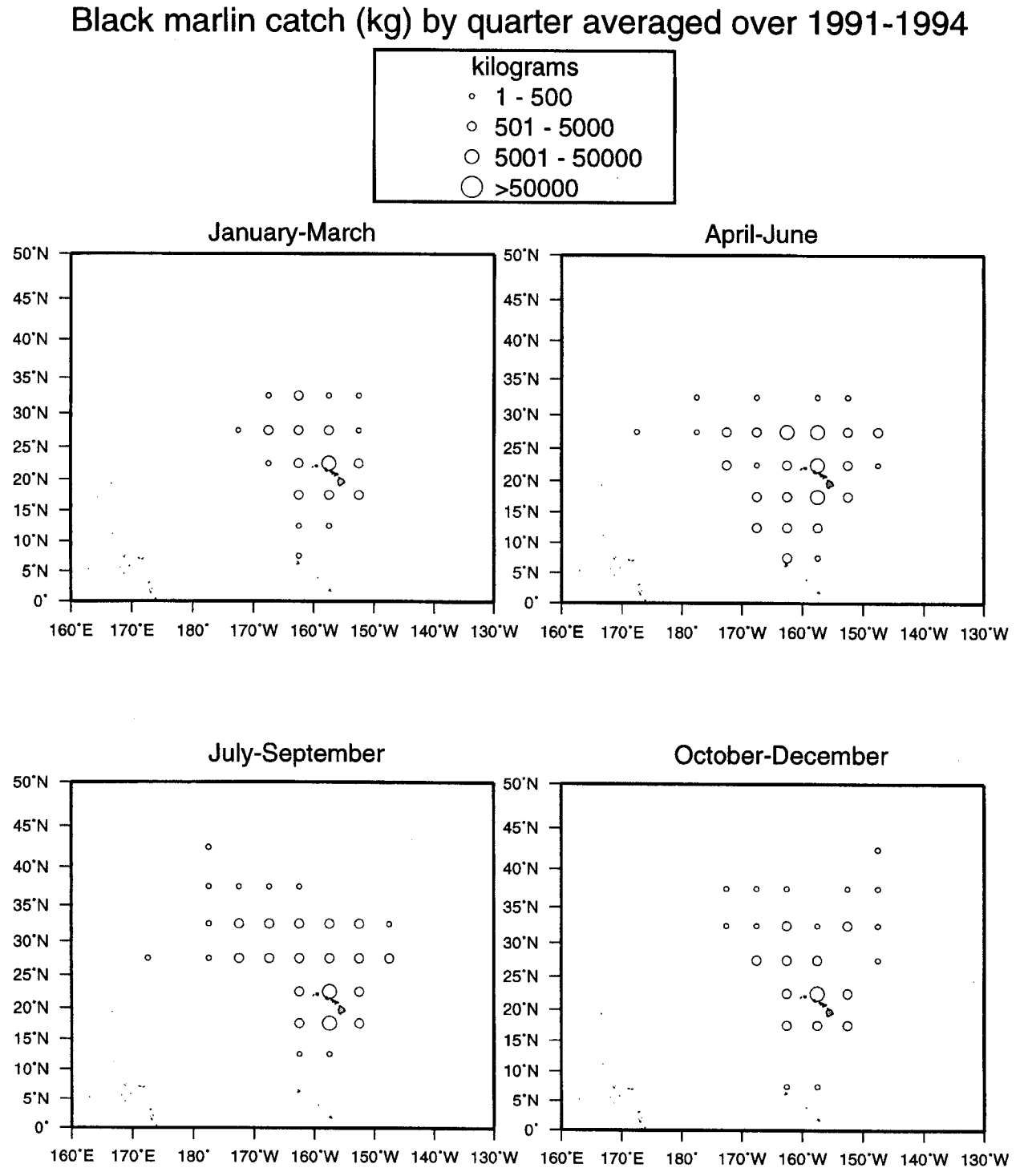

Figure 23. Black marlin catch (kg) by the longline fishery by quarter averaged over 1991 to 1994. Weights are estimated from mean weight of fish from each quarter multiplied by the number of fish caught in each five-degree square.

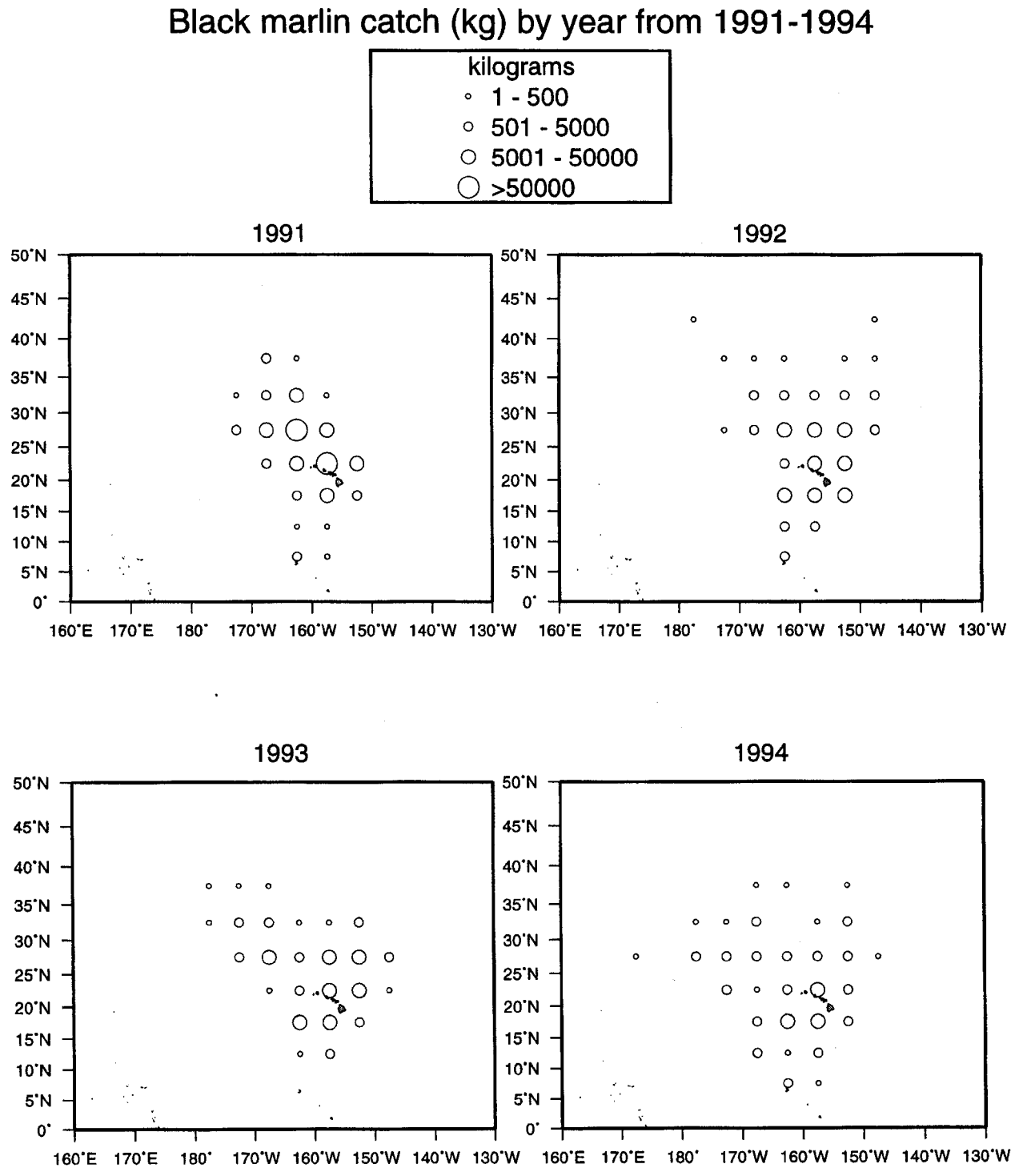

Figure 24. Black marlin catch (kg) by the longline fishery by year from 1991 to 1994. Weights are estimated from mean weight of fish from each quarter multiplied by the number of fish caught in each five-degree square.

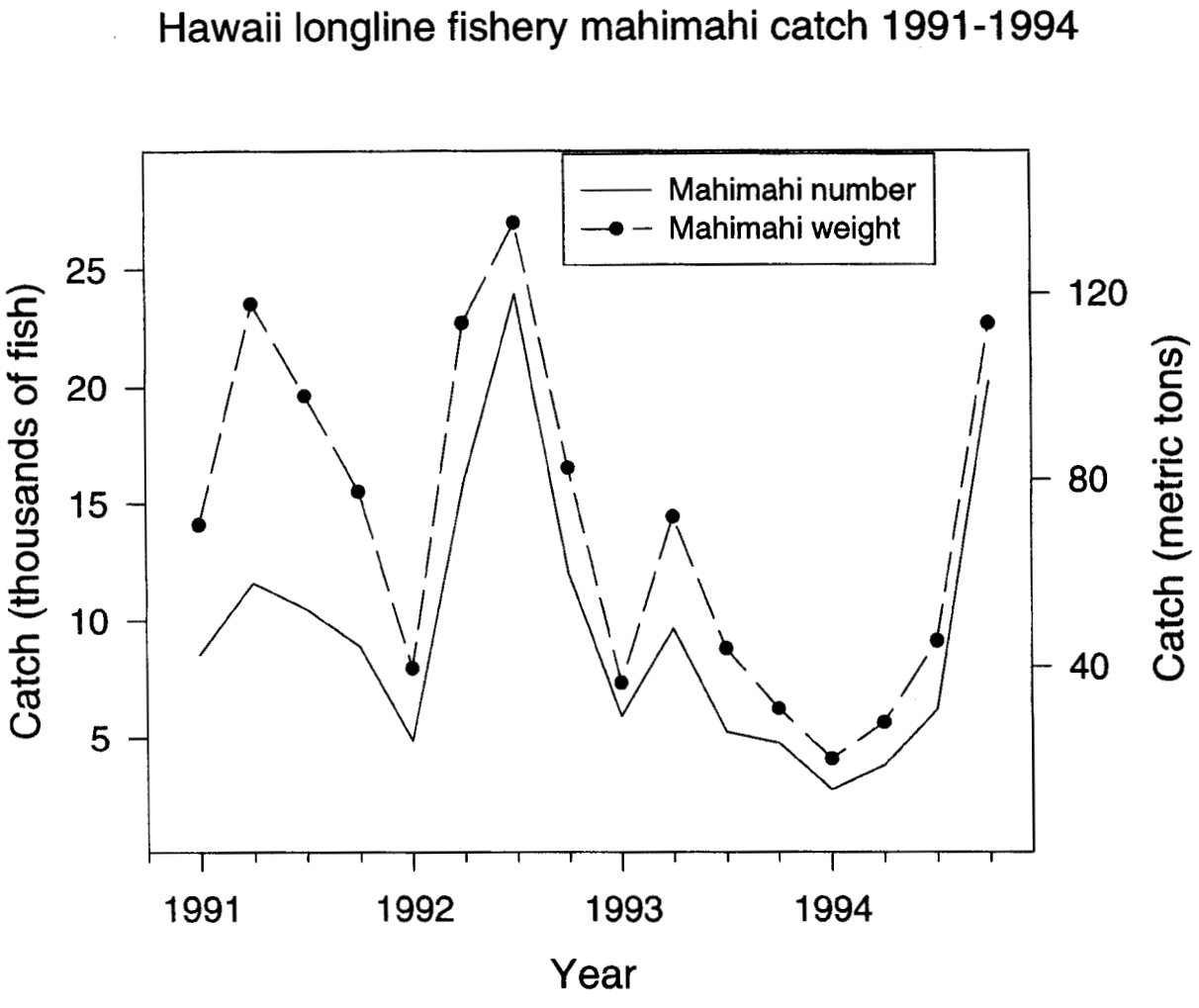

Figure 25. Time series of mahimahi catch by quarter from 1991 to 1994. Left axis shows number of fish caught in thousands and right axis shows estimated weight in metric tons based on mean weights of fish from each quarter multiplied by the number caught.

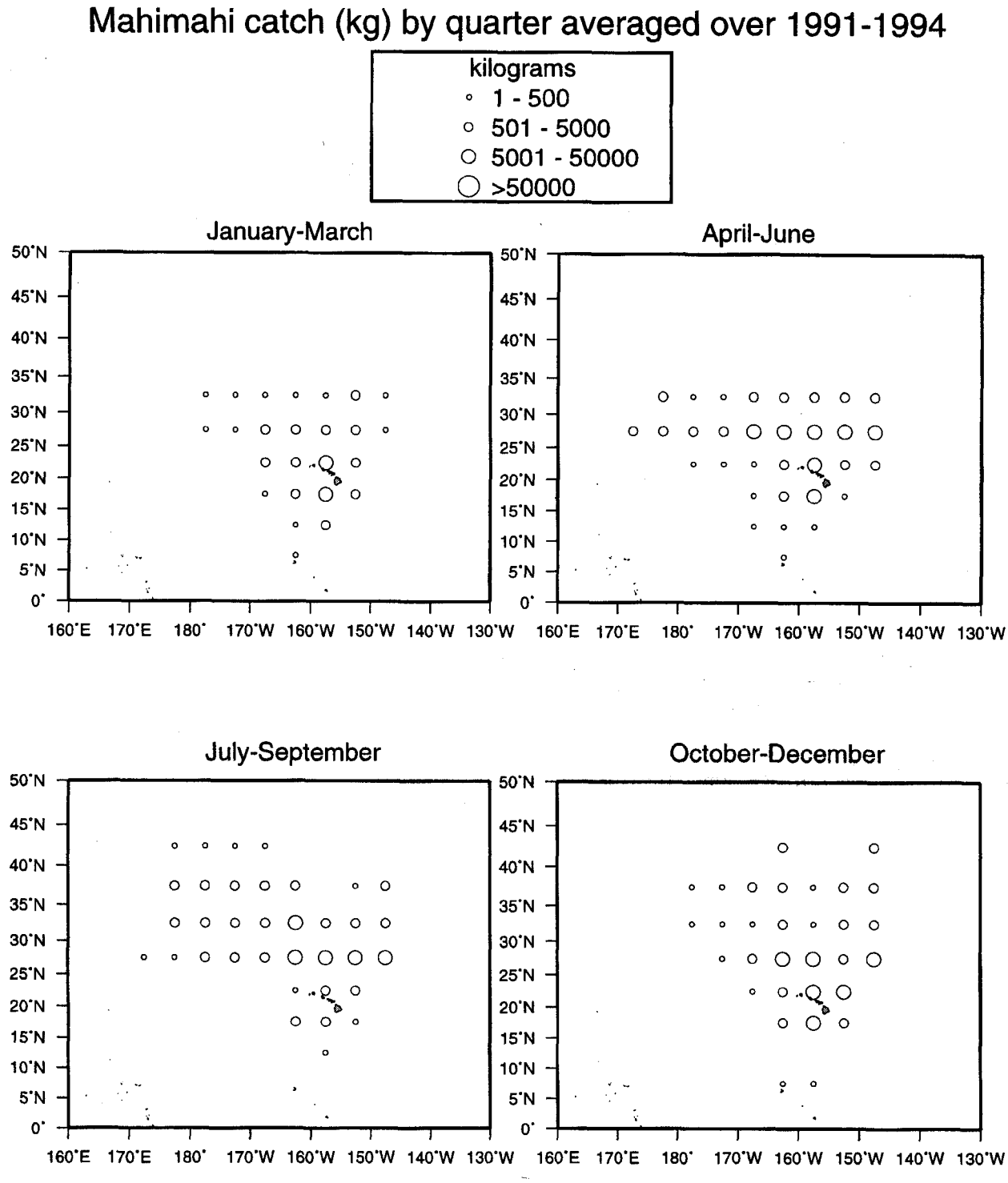

Figure 26. Mahimahi catch (kg) by the longline fishery by quarter averaged over 1991 to 1994. Weights are estimated from mean weight of fish from each quarter multiplied by the number of fish caught in each five-degree square.

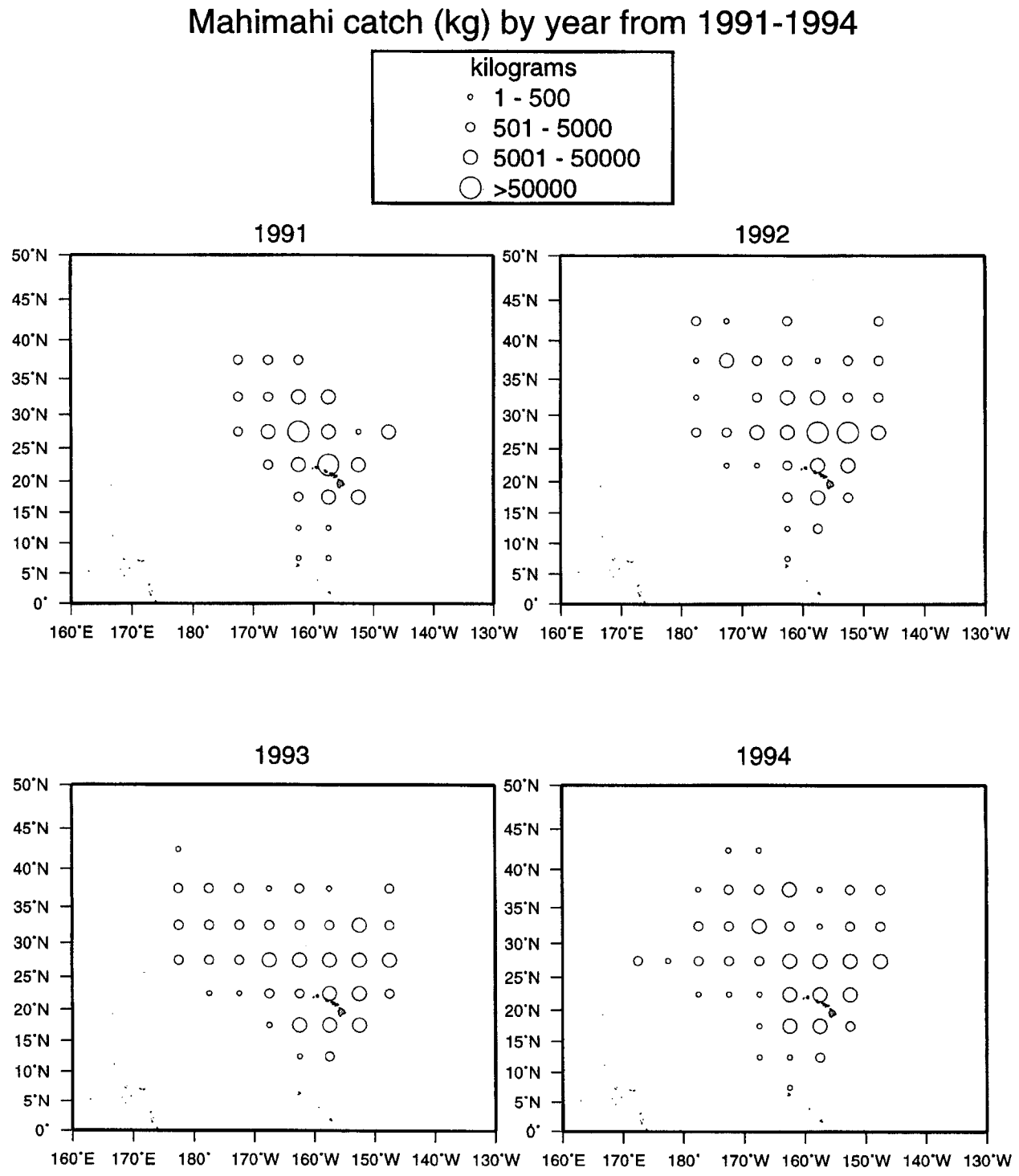

Figure 27. Mahimahi catch (kg) by the longline fishery by year from 1991 to 1994. Weights are estimated from mean weight of fish from each quarter multiplied by the number of fish caught in each five-degree square.

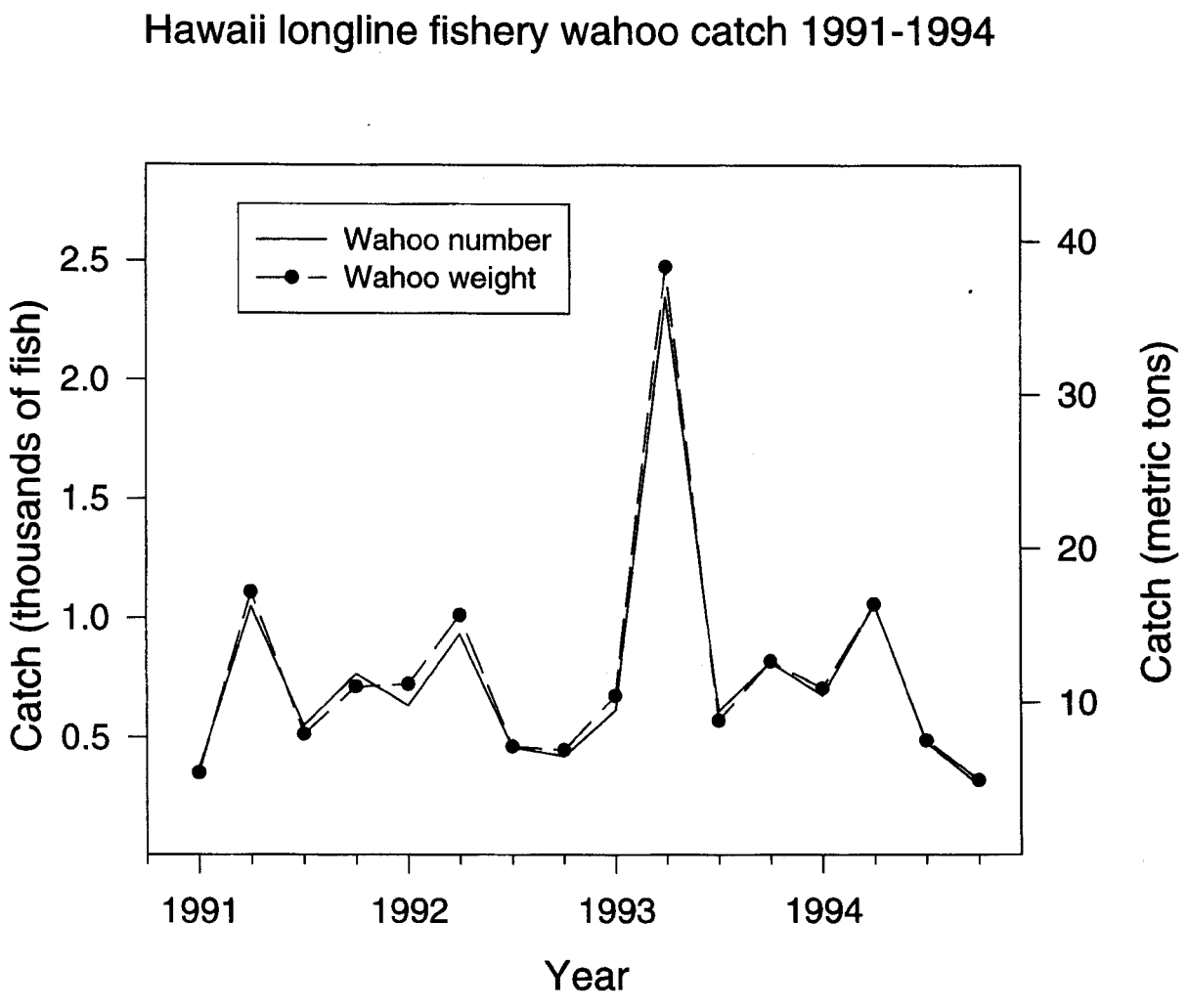

Figure 28. Time series of wahoo catch by quarter from 1991 to 1994. Left axis shows number of fish caught in thousands and right axis shows estimated weight in metric tons based on mean weights of fish from each quarter multiplied by the number caught.

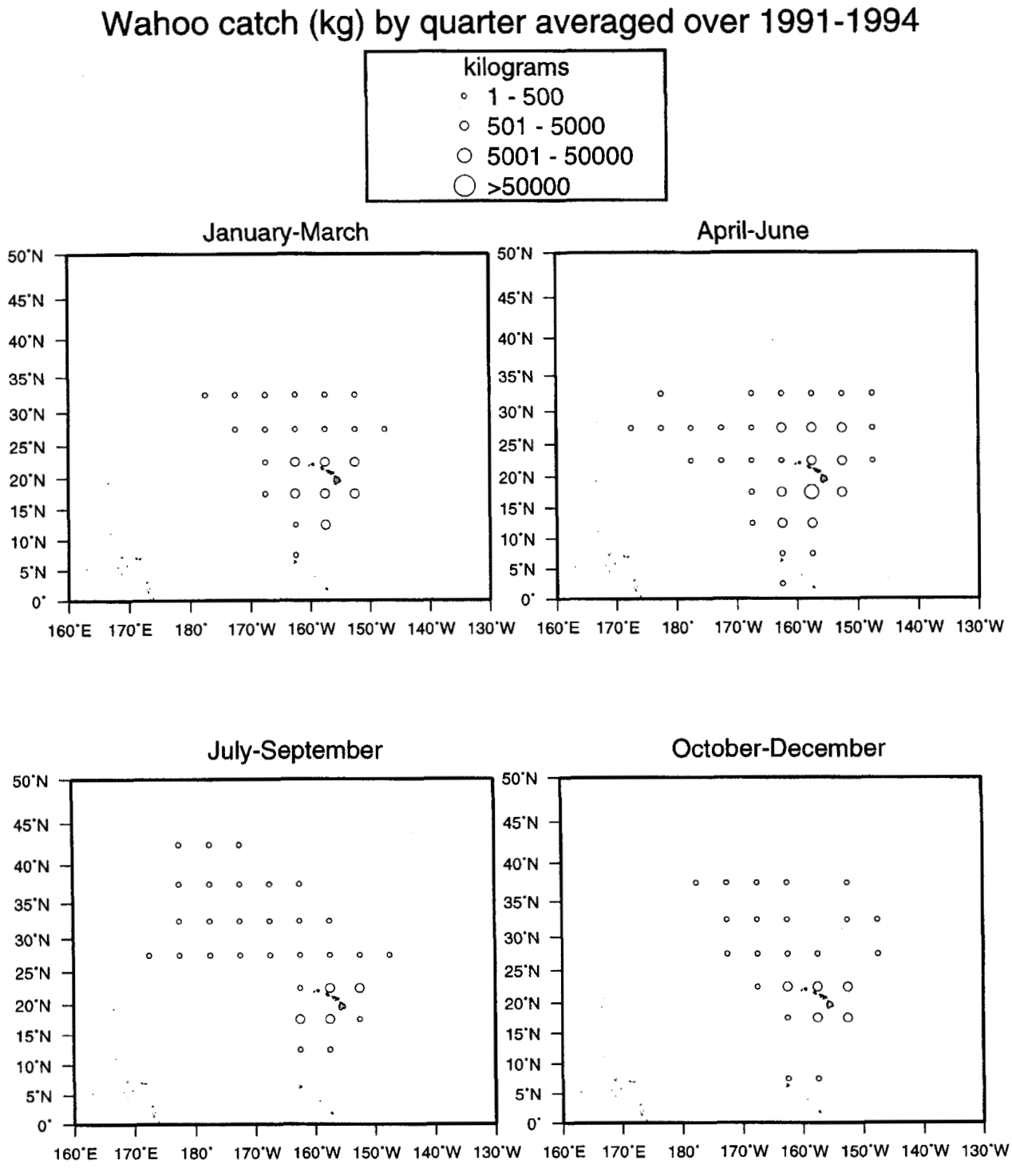

Figure 29. Wahoo catch (kg) by the longline fishery by quarter averaged over 1991 to 1994. Weights are estimated from mean weight of fish from each quarter multiplied by the number of fish caught in each five-degree square.

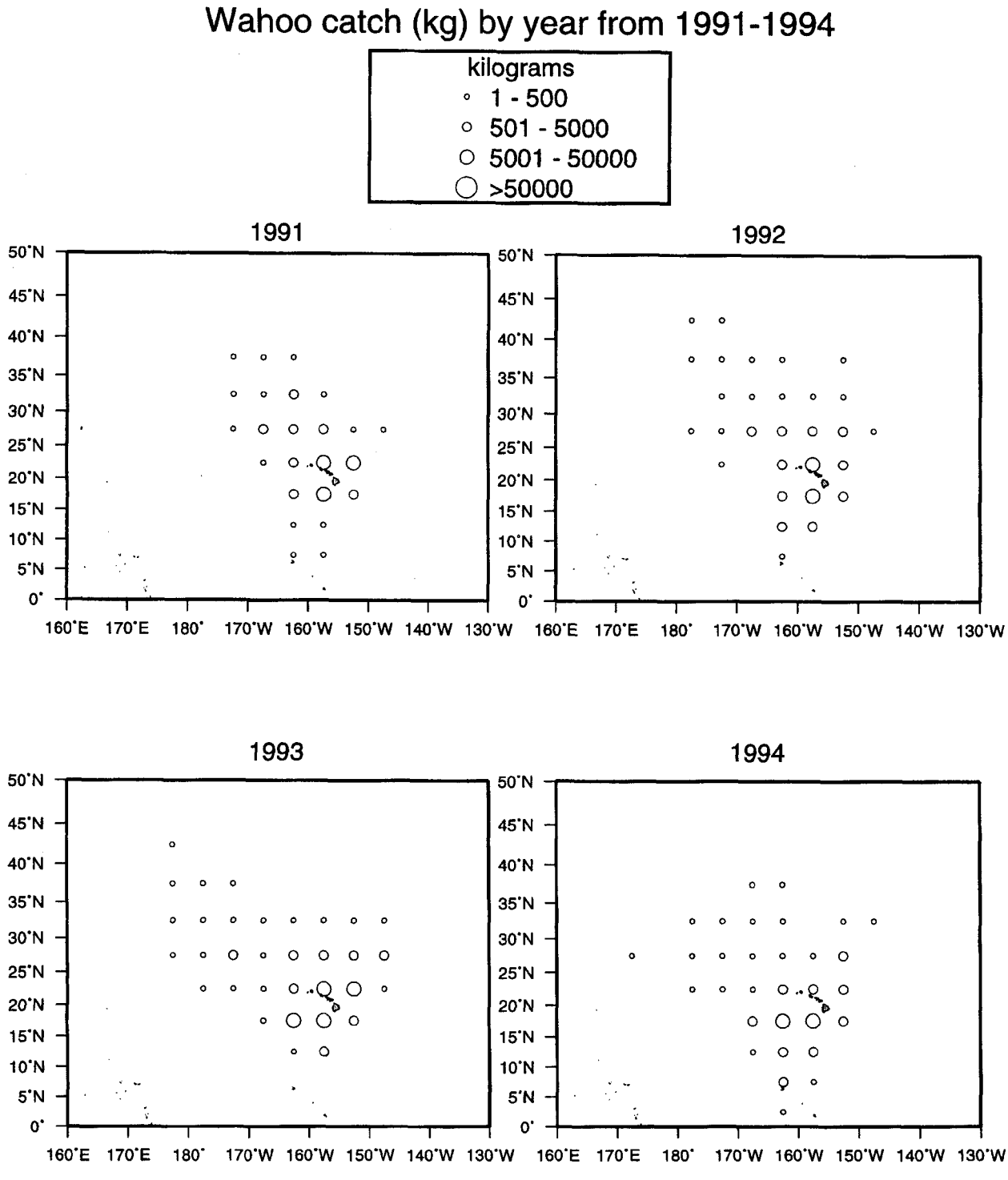

Figure 30. Wahoo catch (kg) by the longline fishery by year from 1991 to 1994. Weights are estimated from mean weight of fish from each quarter multiplied by the number of fish caught in each five-degree square.

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