

FISHERIES FOR TUNAS AND TUNA-LIKE SPECIES IN THE WESTERN REGION OF THE AUSTRALIAN FISHING ZONE¹

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OVERVIEW

Tuna fishing by Australian domestic vessels originally focussed on pole fishing and later combined poling and purse seining for southern bluefin tuna (*Thunnus maccoyii* – SBT) (Caton *et al.*, 1994, Caton *et al.*, 1995). When the Australian Fishing Zone (AFZ) became operative in 1979, Japanese pelagic longlining in the area came under Australian control. Domestic interest in pelagic longlining gradually increased. At first this developed off eastern Australia, where fresh-chilled yellowfin tuna (*Thunnus albacares*) were air-freighted to Japan. The fishery takes about 700 t of yellowfin a year. In the past year domestic

from small juvenile SBT, about half of the Australian SBT quota of 5265 t is taken by longline. Australia-Japan joint-venture longlining accounts for most of the longline catch, but about 300 t has been taken in domestic small-vessel longlining off the east coast. Australian surface fisheries for small juvenile SBT concentrate on capturing fish off South Australia (SA) for cage-rearing (about 2000 t), with about 500 t taken for immediate air-freighting fresh-chilled to Japan (Caton *et al.*, 1995).

CHARACTERISTICS OF THE AFZ

The waters of the AFZ include a broad continental shelf region off the northern Australian coast, narrow western and eastern continental margins, and a moderately broad southern shelf. The northern AFZ abuts the zones of Papua New Guinea to the east and Indonesia to the west. The oceanic region of the western AFZ is extensive, extended by the presence of island zones around Christmas Island and the Cocos/Keeling Islands. The area on which this paper focuses is within FAO Statistical Area 57, which extends from 129°E [the Western Australia (WA)/Northern Territory border] around the western and southern Australian coastline to 141°E [the SA/Victoria border].

longlining activities have commenced off the west coast, where bigeye tuna (*Thunnus obesus*) and yellowfin are the targets. Licensed Japanese longliners still operate around Australia under a bilateral agreement and take the typical range of pelagic species, but their area of operations and effort has been progressively restricted.

The main impetus for the change to longlining resulted from the introduction, and later halving, of SBT quotas by Australia, New Zealand and Japan from the mid-1980s because of concern at the extent of the reduction of the parental biomass and the resultant fall in recruitment. Now, in keeping with a policy of directing activity away

Under a domestic 'Offshore Constitutional Settlement' administrative and management responsibility for Australian resources of tuna and tuna-like species is split between State governments and the Commonwealth government. Responsibility for small tunas and seerfishes, which are distributed predominantly in waters of the continental shelf region, rests with the States. Throughout the western AFZ the responsibility for the larger tunas and billfishes rests with the Commonwealth government. However, this applies only in the case of commercial fishing; States maintain responsibility for management of recreational fishing activities. This division of responsibility has implications for matters such as legislation, licensing, research, and statistical data collection.

TYPES OF FISHERIES FOR TUNAS AND TUNA-LIKE FISH IN THE WESTERN AFZ

The fisheries for tunas and tuna-like species can be grouped into oceanic, coastal and recreational components. There are domestic and foreign oceanic components, but the coastal and recreational components are domestic. In general, there has been a trend of expansion in all domestic components and a decrease in the foreign component. This latter trend has resulted from progressive reduction in areas

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of access available to the foreign (Japanese pelagic longline) fleet and limits on the number of licensed vessels permitted access.

Foreign 'oceanic' fisheries

Japanese pelagic longliners commenced operations in the Indian Ocean region off the Australian north west shelf in the 1950s. The AFZ now encompasses some of those fishing grounds, and the longliners operate under a bilateral licensing arrangement. The progressive restriction has had most impact in areas or seasons where these longliners operated close to domestic commercial tuna fishing or recreational game angling. In recent years a component of the Japanese fleet has entered into joint-venture fishing arrangements, with the advantage that they were less restricted. Ward (ed., in press) provides summaries of annual subsidiary agreement conditions relating to Japanese longliner operations in the eastern AFZ from 1979-80 to 1994-95 and appends copies of the agreements.

Until the 1990s, when recreational interests lobbied successfully for more restricted access by foreign longliners, the WA region of the AFZ had generally had more flexible arrangements than other areas. In 1990-91, the number of bilateral licensed vessels permitted to operate off WA north of 34°S was limited to 50. That number has been progressively reduced to 20. Additionally, from 1992-93 the area within 50 nm of the west coast became closed permanently.

Australia-Japan joint-venture longline vessels commenced operations in 1988-89, and were given access to a considerably larger area of the AFZ than bilateral licensed vessels. Areas off WA were subsequently reduced to the extent that for 1994-95 the joint-venture vessels have been excluded from waters north of 34°S.

The WA region of the AFZ has been the least important area for Japanese longliners (Table 1). Most of the intensive operations off WA were located outside the AFZ and based on aggregations of SBT adjacent to the far southwest. The main activities within the zone during the 1984-1994 period involved bigeye in the southwest or yellowfin and bigeye in more northerly areas (Figure 1). Most of the effort occurred during the southern summer (Figure 2). Winter operations usually concentrated on SBT in regions away from WA.

Comparison of winter and summer catch rates of yellowfin show reasonable catch rates in both periods irrespective of major differences in effort levels (Figure 3). The bigeye comparisons highlight the importance of the island areas and the southwest region. Albacore catch rates are higher away from the main areas of high yellowfin catch rate. Winter catch rates for broadbill swordfish (*Xiphias gladius*) are high where bigeye catch rates are high, but the reverse seems to be the case in summer.

Annual effort in the western AFZ from 1984 to 1994 (Figure 4) shows a general declining trend in the significance of the northern area, apart from the increase in 1994, and an increase in the significance of the southwest corner of the AFZ. This suggests an increased focus on bigeye and decreased significance of yellowfin. Annual patterns of yellowfin catch rate (Figure 5) do not indicate any major change in catch rate. The areas fished annually have changed (Figure 6) and there has been some variability in the patterns of high bigeye catch rate (e.g., 1987). The main change has been a focus on more southern areas in recent years, but that is linked to changing access conditions, as are the modified patterns in northern areas.

Domestic 'oceanic' fisheries

The main domestic tuna fishery is the SBT fishery, which is administered by the Commonwealth Government. It commenced in the 1950s as a pole-and-live-bait operation (Caton *et al.*, 1994; Caton *et al.*, 1995); later, pole-and-line and purse-seine vessels fished cooperatively, the pole vessels keeping fish aggregated at the surface while a seine set was made around the school and the pole vessel. Catches peaked at 21,500 t in 1982. The introduction in 1983-84 of restrictive catch limits, their implementation by means of a system of individual transferable quotas (Franklin, 1987), and a halving of the quotas in 1988-89 (to an Australian quota of 5265 t, at which level it currently remains) forced major changes upon the fishery. Surface catches of purse-seine loads for canning were uneconomic at the reduced quota levels. Vessels were forced to concentrate on small loads (5-10 t) of pole-caught fish for export fresh-chilled to the more profitable Japanese *sashimi* market. The trolling and pole-and-line fishery off WA, which caught 6000 t in 1982 before catch limits were applied, gradually closed down. In part this was because the fish caught were too small for that market, but there was also a management policy of diverting effort away from the very small juvenile SBT which were common in the catch.

About half of the Australian quota has been leased to Japanese pelagic longliners under an Australia-Japan joint-venture arrangement which has operated since 1989. In an effort to further improve the value of the SBT catch, experimental cage-rearing of SBT commenced in SA in 1991, and its success prompted expansion to a utilisation of about 2000 t of the Australian quota in 1995. Some domestic vessels have also diversified to SBT longlining. This developed on the east coast off New South Wales, where small (8-25 m) longliners had established a successful monofilament-mainline fishery for yellowfin in the mid-1980s. That fishery, and a pole-and-line and purse-seine fishery for skipjack tuna (*Katsuwonus pelamis*) take several hundred and several thousand tonnes, respectively (Ward *et al.*, 1994a; Ward *et al.*, 1994b).

Good export prices for fresh-chilled tunas from other parts of Australia prompted attempts in the past 18 months to establish tuna export operations off the west coast. This has been associated with an expanding interest in domestic small-vessel longlining in that area, but has also included part-time tuna operations in conjunction with other west coast fisheries such as those for prawn and rock lobster. Access to the fishery was limited at the end of 1994 and the Commonwealth's Australian Fisheries Management Authority has established a management advisory committee, which is currently developing a western region management plan. The main species of interest are yellowfin, bigeye and broadbill swordfish. Catches of 30 t of yellowfin, 13 t of bigeye, and 8 t of broadbill had been landed after the first few months of longlining (T. Withear, Australian Fisheries Management Authority, pers. comm.). Most areas of western and southwestern WA had been visited, but the weather had hampered efforts in the southwest directed at bigeye, so the bulk of activity centered on yellowfin in the vicinity of the Houtman Abrolhos (29°S). At present less than a dozen longliners are active, but there is considerable interest among part-time operators using tuna handline gear, in conjunction with their normal operations in other fisheries (M. Sachse, Australian Fisheries Management Authority, pers. comm.).

Coastal fisheries

The target of the domestic coastal (continental shelf) fishery in Statistical Area 57 is Spanish mackerel (*Scomberomorus commerson*) off WA. The fishery is administered by the Western Australian Government. The main catches are taken north of 25°S. Incidental species are grey mackerel (*Scomberomorus semifasciatus*), longtail tuna (*Thunnus tonggol*) and dogtooth tuna (*Gymnosarda unicolor*), but they probably represent only a few percent of the catch. The WA fishery is continuous east of Statistical Area 57 with the troll fishery off Northern Territory (NT). The Spanish mackerel resource possibly extends across the Arafura Sea to Indonesia and Papua New Guinea. A range of gear types contribute to the catch, but most Spanish mackerel are taken by troll (S. Newman, WA Fisheries Dept., pers. comm.). About six or seven boats fish full-time for mackerel, and their individual annual catches may exceed 50 t. About 50 vessels have reported some level of involvement in trolling operations in each of the last three years (1992-1994).

The remainder of the Spanish mackerel catch is chiefly from off-season operations by prawn or rock lobster vessels, or bycatch from other fisheries such as the handline fishery. Overall, about 160-170 WA vessels have reported involvement in some form of operation taking tuna or tuna-like species in each of the last three years (K. Donohue and W. Lehre, WA Fisheries Dept., pers. comm.). Individual vessel catches may be to the order of 1-2 t annually. Production of Spanish mackerel increased from 217 t in 1992 to 302 t in 1993 to 450 t in 1994 (S.

Newman, WA Fisheries Dept., pers. comm.). This has prompted the WA Department of Fisheries to develop new management arrangements for the fishery. Two classes of licence will be introduced, 'A' licences to control full-time mackerel-fishing operations and 'B' licences to limit bycatches of mackerel in other fisheries.

While this paper concentrates on Statistical Area 57, it is pertinent to comment on recent trends in the adjacent NT troll fishery for Spanish mackerel, which is administered by the Northern Territory Government. This is a seasonal fishery (mainly June-December) located in the eastern Timor Sea (134°E) and western Gulf of Carpentaria (142°E), but with increasing effort closer to Darwin to service a developing export market for fresh-chilled fish (Baulch and Buckworth, 1995).

The NT Spanish mackerel catch increased rapidly from around 50-100 t in the mid-1980s to a peak of 256 t in 1990. It then declined to 117 t in 1993 before increasing to 168 t in 1994. The fluctuations in the 1990s appear to be a reflection of adjustment to management changes. The decrease in catch was a result of reduction in effort and a management arrangement after 1993 involving a 'two-for-one' licence surrender and transfer scheme. The fishery has potential for increased effort and landings. Currently 24 vessels have licences, but the management plan envisages reducing this to 15 vessels, each taking around 30 t of mackerel annually.

As in WA, Spanish mackerel makes up most of the NT catch. There is a small incidental catch of grey mackerel and longtail tuna. As an indication of its magnitude, the incidental catch of the latter species for all gear types in the NT fishery was around 5 t in 1993 and 1994.

Recreational fishing

Australians are keen recreational anglers. In WA and SA, they concentrate on coastal, bay and estuarine species, but the interest extends offshore to tunas and tuna-like species. Gamefishing charter operations have been common off eastern Australia for many years, and recently they have been developing rapidly off western Australia (for example, from 10 in the Kimberleys region in 1994 to 30 in 1995) with the growth of tourism in the northwest (S. Newman, WA Fisheries Dept., pers. comm.). There is also considerable recreational effort there by anglers with private runabouts, especially in the vicinity of Exmouth Gulf (114°E), Dampier Archipelago (117°E), Port Hedland (119°E) and, to a lesser extent, Broome (18°S). For example, the recreational angling fleet in the Dampier Archipelago region consists of about 300 vessels on a weekend during the main recreational fishing season.

Recreational catches include Spanish mackerel, yellowfin, wahoo (*Acanthocybium solandri*) and billfish, especially sailfish (*Istiophorus platypterus*) but also marlins, but most

pelagic species are acceptable (S. Newman, WA Fisheries Dept., pers. comm.). Catches overall are considerable no firm estimates are available, but they may be as much as reach 10-15% of the commercial catch. The anglers are a strong economic force, and have successfully negotiated restrictions on access by foreign longliners to the western AFZ. They have also been instrumental in securing an informal arrangement whereby foreign longliners return all blue marlin (*Makaira mazara*) and black marlin (*Makaira indica*) which are alive at the time of line retrieval.

In the southwest of WA and in SA there is recreational fishing for SBT in the vicinity of Rottnest Island, Bunbury, Albany, Streaky Bay and Port Lincoln, but this is more limited in scope.

The NT Spanish mackerel fishery includes a recreational troll component, with catches taken close to the coastal centres of Darwin, Nhulunbuy and Borroloola (Baulch and Buckworth, 1994). Bag limits of 5 fish per angler apply.

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Table 1. Japanese longline catches, in number and tonnes processed weight, and hooks set, for 'AFZ years' (1 November-31 October) 1979-1980 to 1993-1994, in the Australian 200-mile fishing zone, for the northeastern (N of 34°S), south-eastern, and western (W of 140°E) regions. Source: Radio reports by longline vessels; 1979-1980 and 1993-1994 data are incomplete.

Area	Year	Total Catch		Southern Bluefin		Albacore		Bigeye		Yellowfin		Black Marlin		1000 hooks	No. per 1000 h	Tonnes per 1000 h
		No.	T	No.	T	No.	T	No.	T	No.	T	No.	T			
NE	79-80	89,261	3,131.70	2,373	85.9	13,532	166.2	10,493	394.7	30,303	971.5	7,279	397.5	5,577	16	0.56
	80-81	143,002	4,256.00	3,365	114.7	38,002	447.2	9,474	426.4	60,733	1,781.90	1,685	134.9	7,749	18.5	0.55
	81-82	202,962	6,212.50	1,166	40.6	70,099	1,028.3	12,435	456.9	70,386	2,273.60	3,422	276.3	12,238	16.6	0.51
	82-83	162,401	4,485.40	975	42.5	66,848	851.4	10,350	347.7	49,819	1,498.10	3,749	311.2	8,462	19.2	0.53
	83-84	147,980	3,973.00	640	40.7	75,598	1,102.3	11,536	381.3	29,016	1,018.10	2,255	206.3	7,508	19.7	0.53
	84-85	217,151	5,050.60	770	9.5	97,943	1,227.8	14,654	516.1	71,268	1,840.60	2,040	171.1	8,083	26.9	0.62
	85-86	161,445	3,987.80	265	11.4	79,830	870.1	15,513	512.1	36,926	1,310.50	1,278	73.6	6,713	24	0.59
	86-87	181,146	4,300.00	693	29.3	82,798	940	14,750	481	54,062	1,582.2	1,285	99.1	7,186	25.2	0.60
	87-88	292,462	7,500.60	822	51.9	118,547	1,504.6	19,853	600.1	105,834	3,311.6	2,129	169.8	11,905	24.6	0.63
	88-89	307,023	7,225.50	1,490	48.9	140,800	1,731	21,704	677.7	89,541	2,808.2	2,743	189.2	12,988	23.6	0.56
	89-90	248,433	5,149.60	1,523	73.4	122,205	1,286.6	19,901	508.1	73,048	1,982.9	502	41.2	9,990	24.9	0.52
	90-91	183,322	3,798.90	1,130	46.3	93,147	925.2	17,208	455.8	3,885	1,199.3	-	-	7,312	25.1	0.52
	91-92	185,952	3,860.20	971	52.7	99,143	1,106.7	9,400	278.7	40,237	1,252.1	-	-	6,716	27.7	0.57
	92-93	244,414	5,216.70	10,010	426.9	145,678	1,904.7	6,784	243.5	64,238	1,867.1	-	-	7,025	34.8	0.74
	93-94	26,942	679.8	-	-	10,022	182	600	210.9	12,508	334.1	-	-	683	39.4	1.00
	SE	79-80	86,956	2,476.80	57,522	2,021.4	21,380	170.3	720	28.4	502	19.6	53	3.4	5,760	15.1
80-81		117,750	3,999.40	75,809	3,382.1	32,119	242.2	880	38	2,348	68.4	71	4.1	12,985	9.1	0.31
81-82		48,029	1,531.70	26,526	1,206.9	16,445	147	655	29.9	518	22.1	33	2	6,835	7	0.22
82-83		55,184	1,451.90	22,236	1,008.5	29,042	253.6	711	31.6	307	12.7	14	1.1	4,595	12	0.32
83-84		47,370	2,045.30	28,885	1,708.7	13,304	139.2	606	20.3	764	32.3	22	1.4	7,146	6.6	0.29
84-85		8,089	175.5	150	7	4,871	46	842	33.2	235	11	2	0.1	395	20.5	0.44
85-86		25,749	792.9	9,239	516.9	11,832	93.5	1,069	46.4	927	25.5	9	0.7	4,234	6.1	0.19
86-87		28,443	930.7	10,010	580.6	8,633	88.5	607	28	875	33.4	3	0.3	4,655	6.1	0.20
87-88		31,692	1,110.80	11,282	657.4	12,484	124.3	1,066	36.4	1,853	66.9	13	0.9	4,775	6.6	0.23
88-89		161,109	3,640.00	53,099	2385	88,666	655.7	1,995	74.7	3,604	128	57	1.3	14,155	11.4	0.26
89-90		119,309	2,485.20	49,528	1,722.7	57,977	483.7	1,363	44.9	956	27	1	0.2	12,310	9.7	0.20
90-91		134,467	2,131.40	52,344	1,491.6	31,204	263.5	1,506	54.7	2,664	84.1	-	-	8,663	15.5	0.25
91-92		147,224	3,506.40	75,410	2,271.4	48,639	481.3	2,288	100.7	1,436	53.4	-	-	11,279	13.1	0.31
92-93		177,677	4,180.40	93,409	2,925.2	61,764	592.5	1,801	85.9	3,002	104.5	-	-	13,841	12.8	0.30
93-94	20,872	648.2	8,322	534.4	773	9.1	97	4.9	678	28.2	-	-	4,108	5.1	0.16	
W	79-80	31,505	699.5	11,527	210.6	5,518	58.2	9,656	257.8	2,215	78.9	272	15.3	1,261	25	0.55
	80-81	65,025	1,442.90	21,779	380.2	15,186	146.6	10,753	313.3	11,887	372.4	638	35.5	2,276	28.6	0.63
	81-82	35,784	1,289.40	171	9.9	5,791	104.4	11,564	323.3	14,159	635.5	1,213	82.5	2,042	17.5	0.63
	82-83	43,503	1,482.10	126	5	6,038	101.5	19,288	638.9	13,700	502.9	1,039	65.4	2,390	18.2	0.62
	83-84	53,719	1,764.80	605	26.8	7,716	134.4	15,187	501.4	19,546	713.9	2,038	96.4	2,859	18.8	0.62
	84-85	73,513	2,596.00	209	18.4	8,335	145.3	23,105	724.3	30,272	1,173.4	3,233	177.3	4,479	16.4	0.58
	85-86	65,389	2,269.50	318	25.9	8,583	157.3	20,507	657.3	25,146	933.6	2,111	125.9	4,210	15.5	0.54
	86-87	60,168	1,998.70	215	17.2	9,134	152.9	29,123	985.2	15,069	549.7	943	62.2	4,451	13.5	0.45
	87-88	30,365	1,091.00	100	9.1	5,627	93.3	6,607	227.2	14,451	555.4	908	56.9	1,663	18.3	0.66
	88-89	16,220	544.5	52	5.5	2,201	44.1	3,788	135.6	7,137	234	1,064	50.5	996	16.3	0.55
	89-90	30,461	965.6	46	4.2	6,301	126.6	9,352	294	12,784	440.2	266	22.4	1,653	18.4	0.58
	90-91	6,927	189.8	30	1.9	1,461	25.8	2,470	69.9	1,206	33.8	-	-	344	20.2	0.55
	91-92	36,650	721.1	25,610	423.9	3,933	52.8	5,153	167.8	1,166	33.9	-	-	1,443	25.4	0.50
	92-93	33,738	980.1	7,674	245.4	5,149	71.4	12,104	387.1	2,110	86.5	-	-	2,661	12.7	0.37
	93-94	26,375	953.3	4,278	180.7	2,864	50.9	3,192	90.9	-	-	-	-	2,107	12.5	0.45

Figure 1. Distribution of longline fishing effort, catches and catch rates in the western Australian fishing zone (AFZ), 1984-94. These data are from TL04 logbooks completed by Japanese longliners operating under bilateral access agreements. They also include logbook data from Japanese longliners operating under joint-venture arrangements, and a few charter longliners.

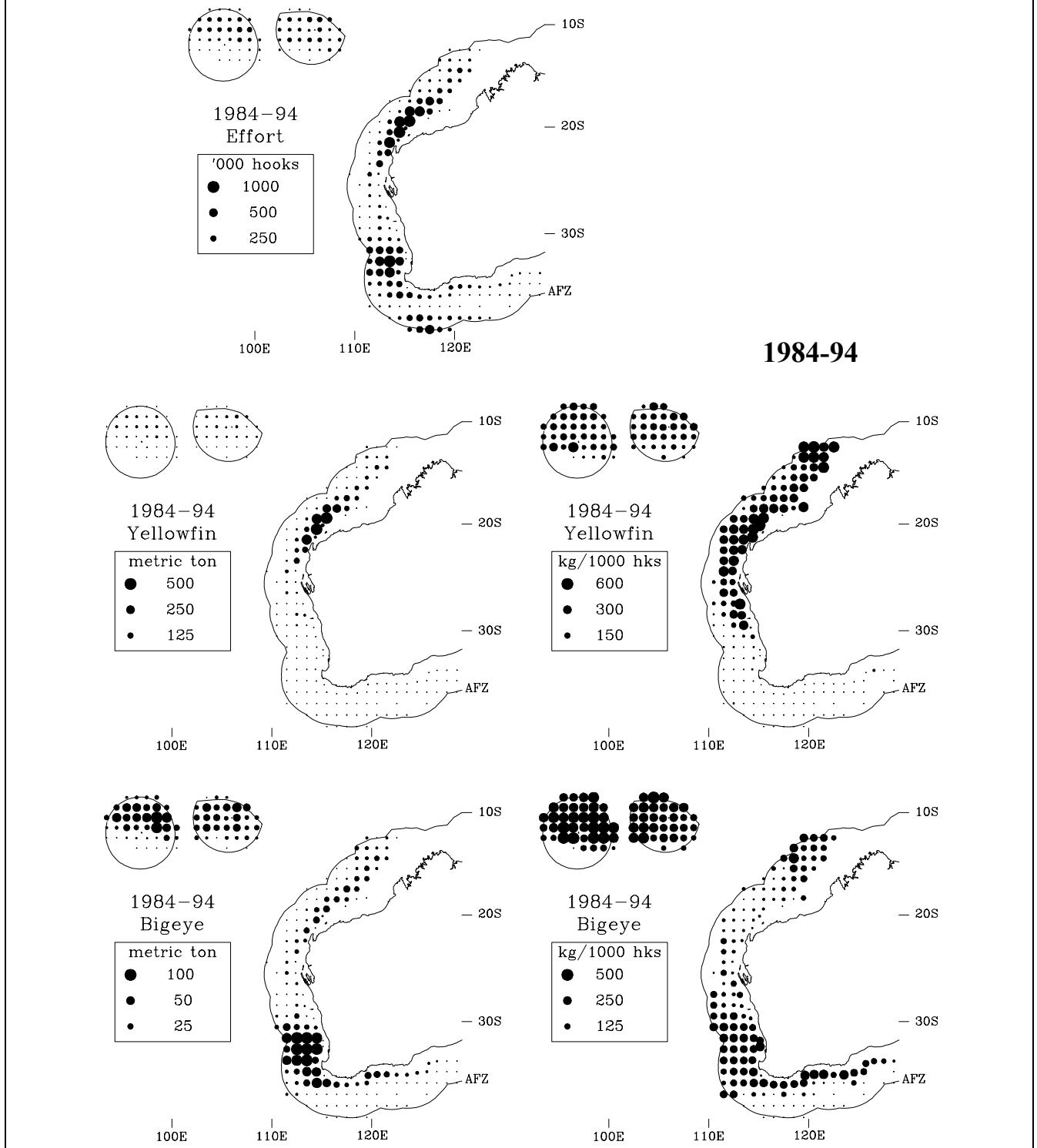
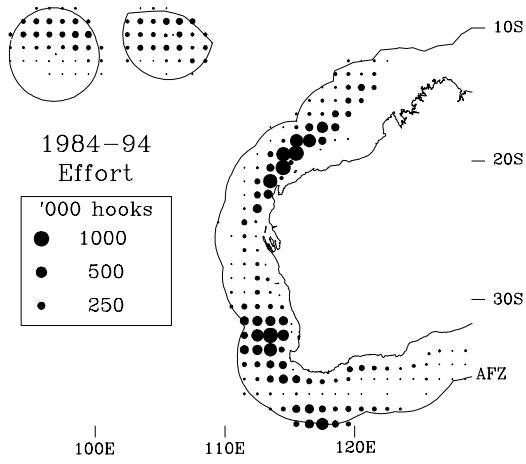


Figure 1. (Continued)



1984-94

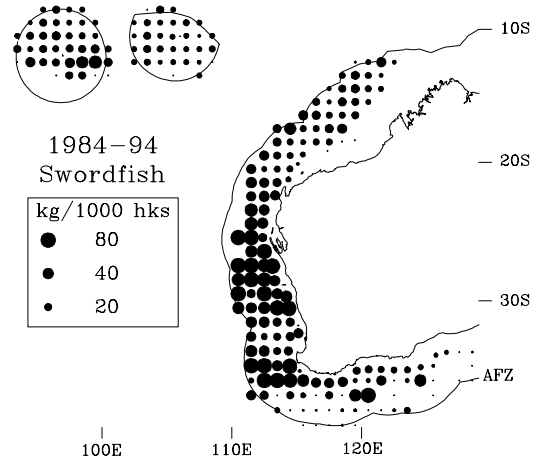
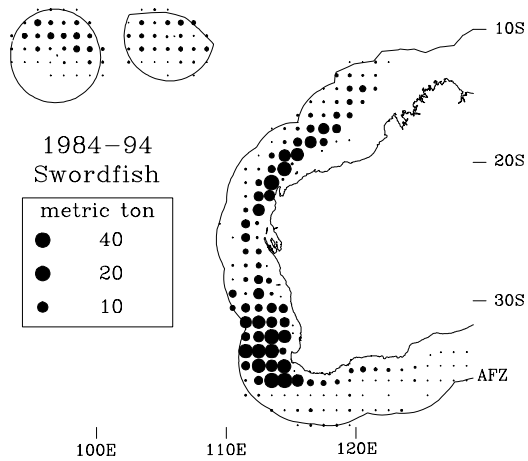
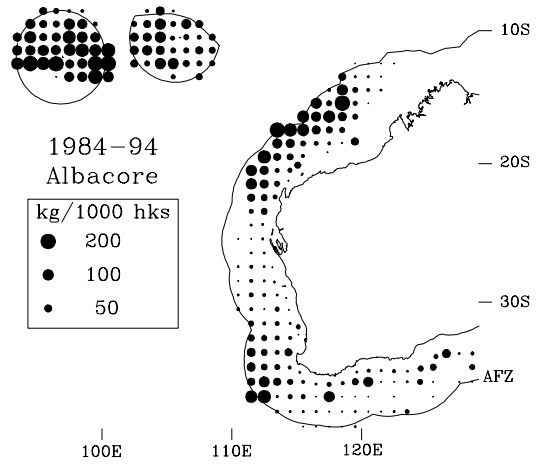
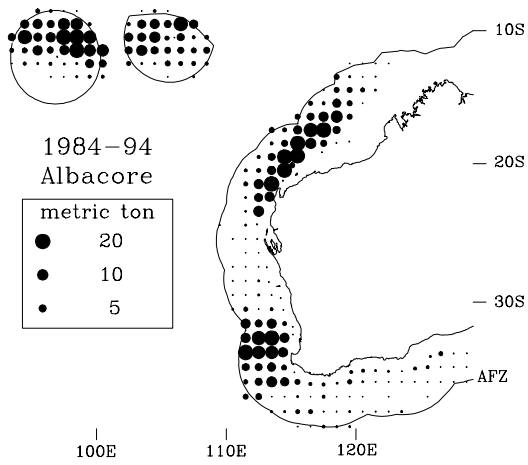


Figure 2. Seasonal distribution of longline fishing effort and catches in the western Australian fishing zone (AFZ) during summer (September-February) and winter (March-August), 1984-94. These data are from TL04 logbooks completed by Japanese longliners operating under bilateral access agreements. They also include logbook data from Japanese longliners operating under joint-venture arrangements, and a few charter longliners.

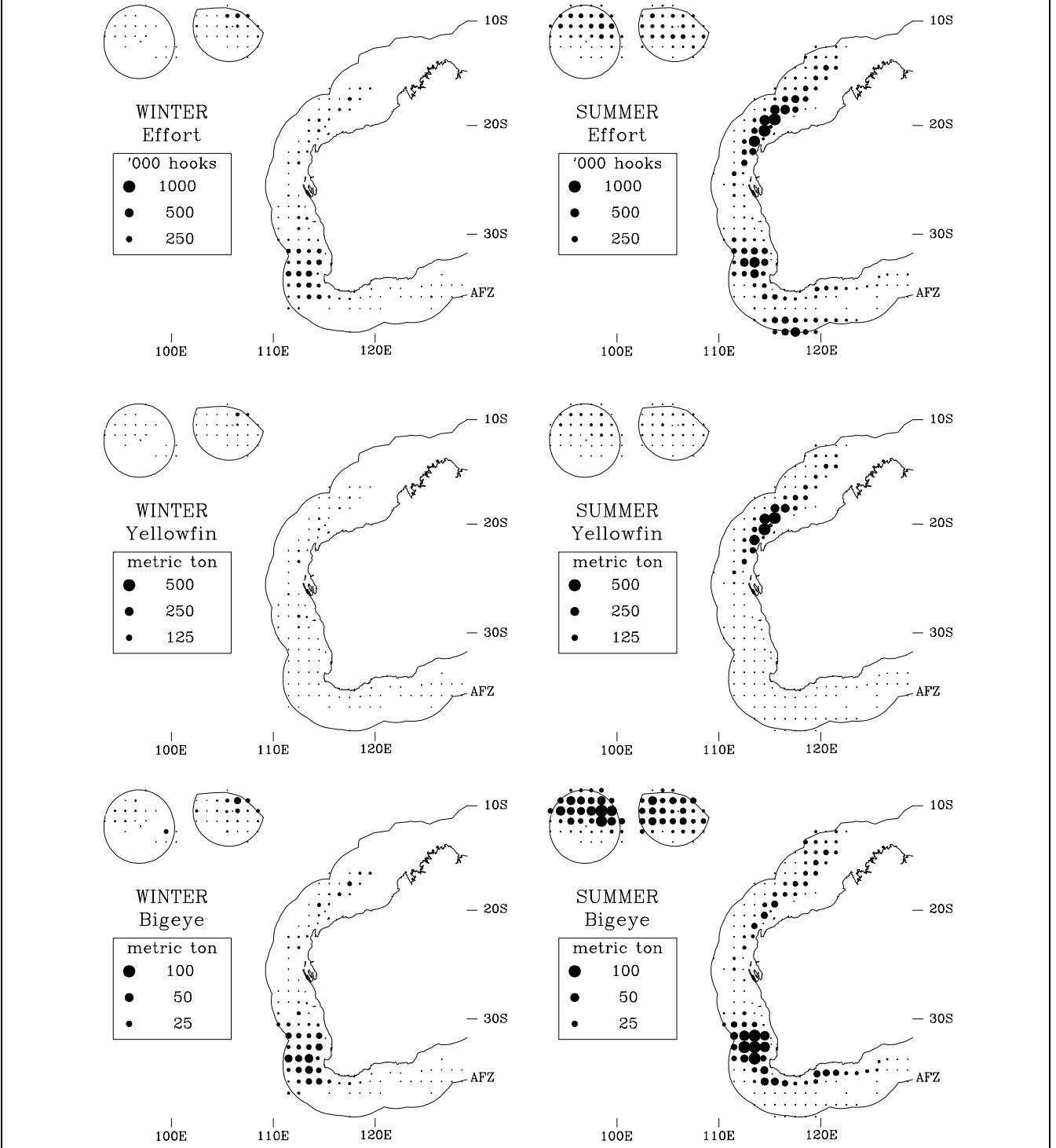


Figure 2. (Continued)

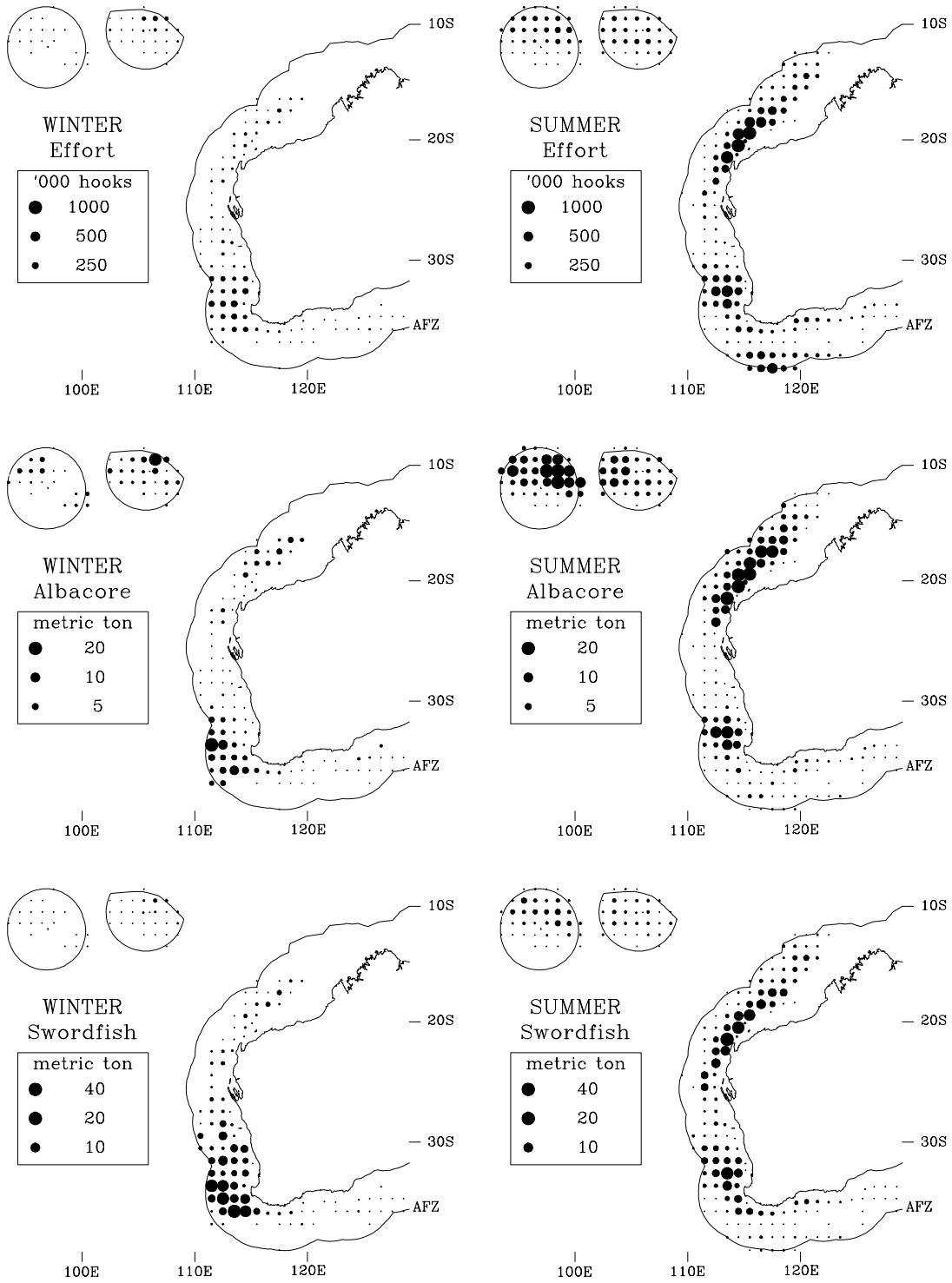


Figure 3. Seasonal distribution of longline fishing effort and catch rates in the western Australian fishing zone (AFZ) during summer (September-February) and winter (March-August), 1984-94. These data are from TL04 logbooks completed by Japanese longliners operating under bilateral access agreements. They also include logbook data from Japanese longliners operating under joint-venture arrangements, and a few charter longliners.

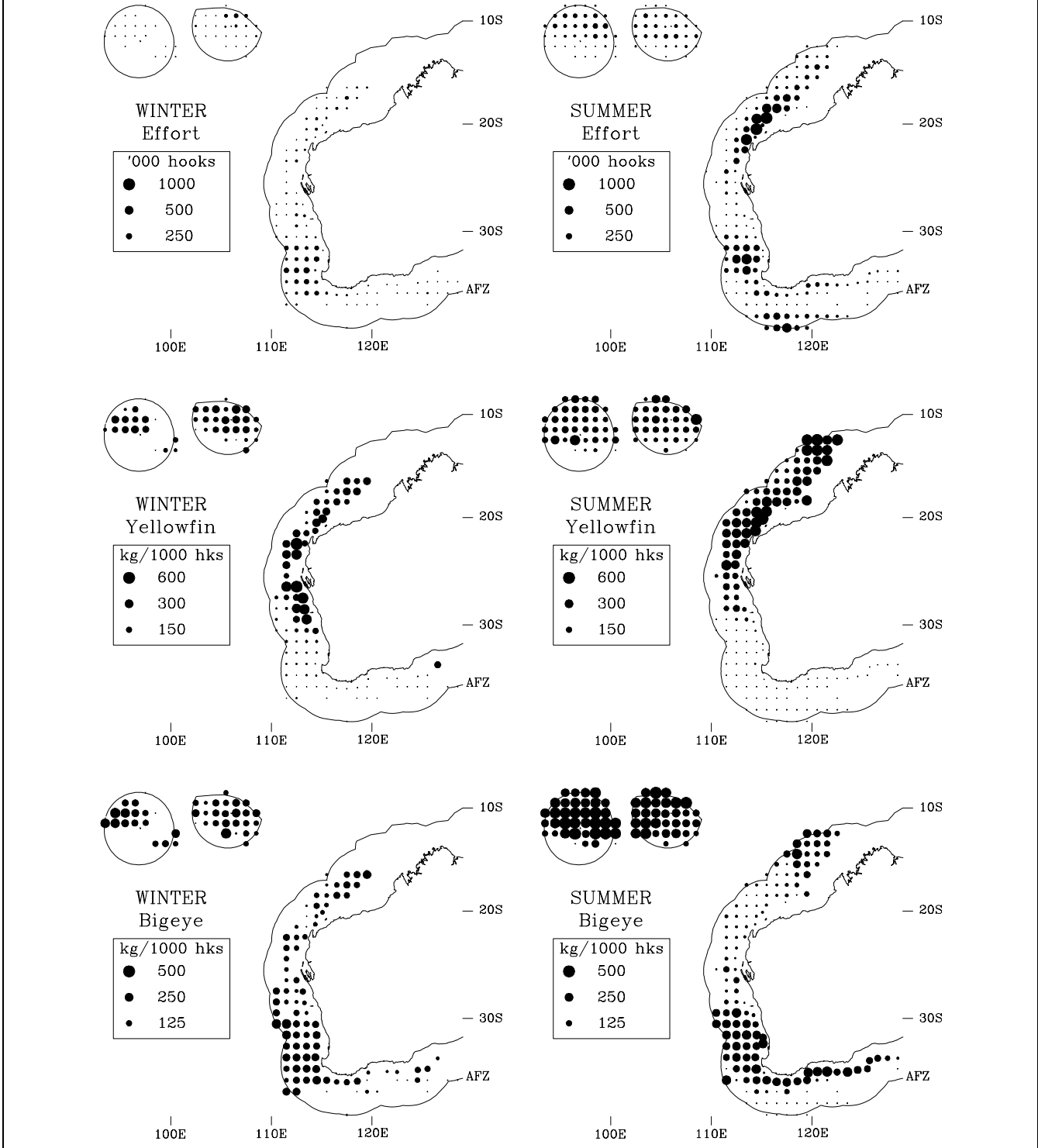


Figure 3. (Continued)

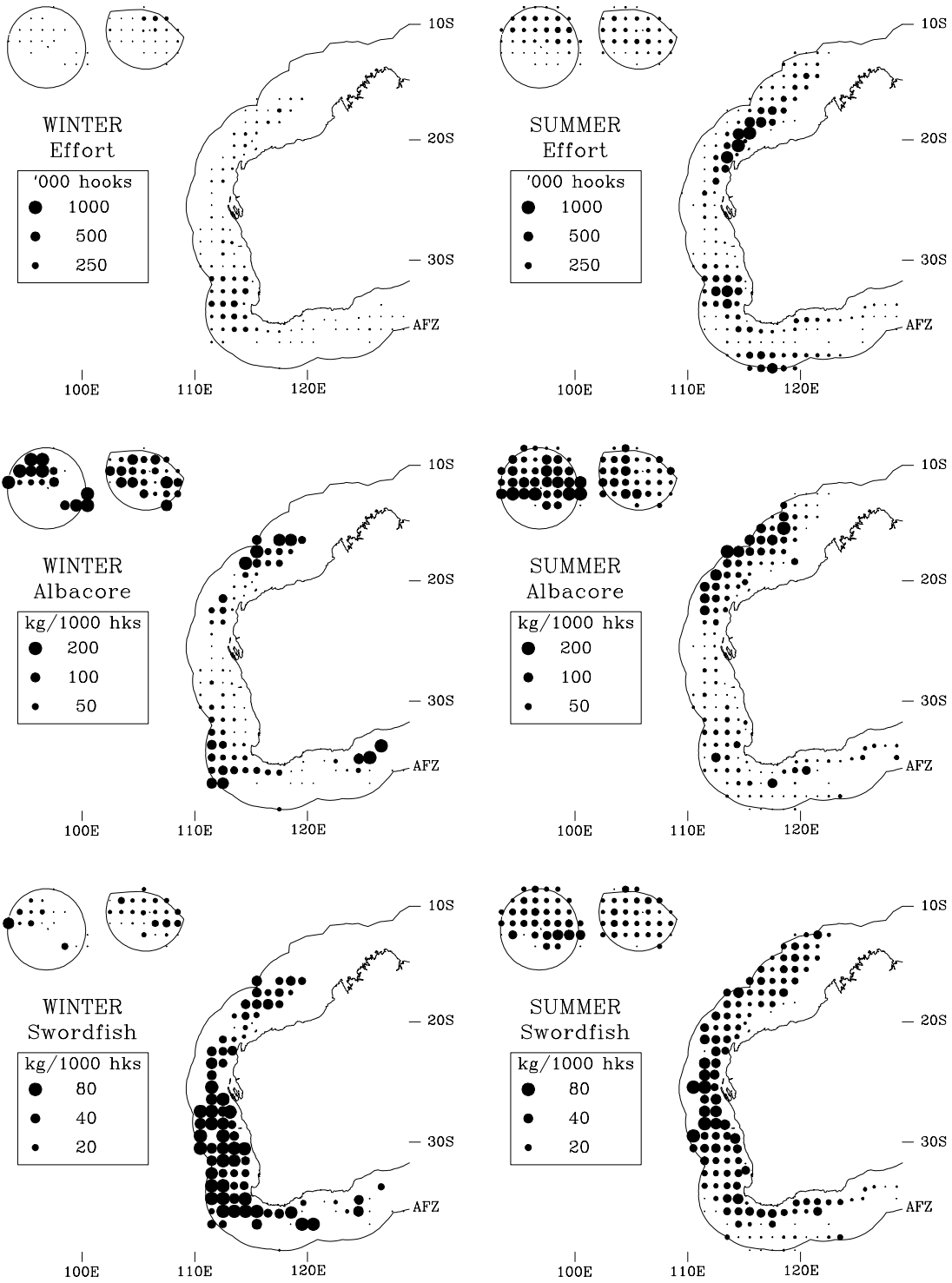


Figure 4. Annual distribution of longline fishing effort in the western Australian fishing zone (AFZ), 1984-94. These data are from TL04 logbooks completed by Japanese longliners operating under bilateral access agreements. They also include logbook data from Japanese longliners operating under joint-venture arrangements, and a few charter longliners.

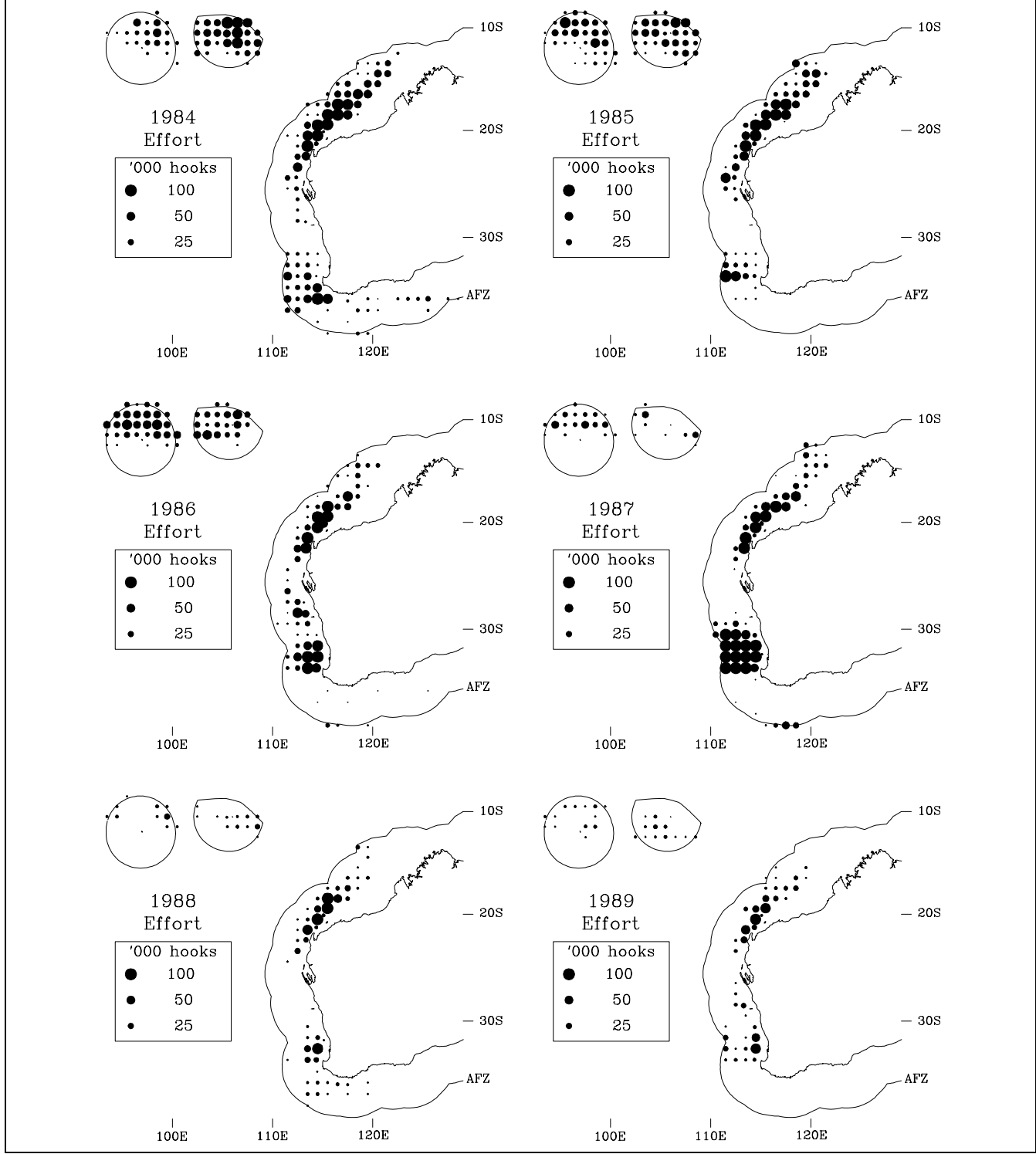


Figure 4. (Continued)

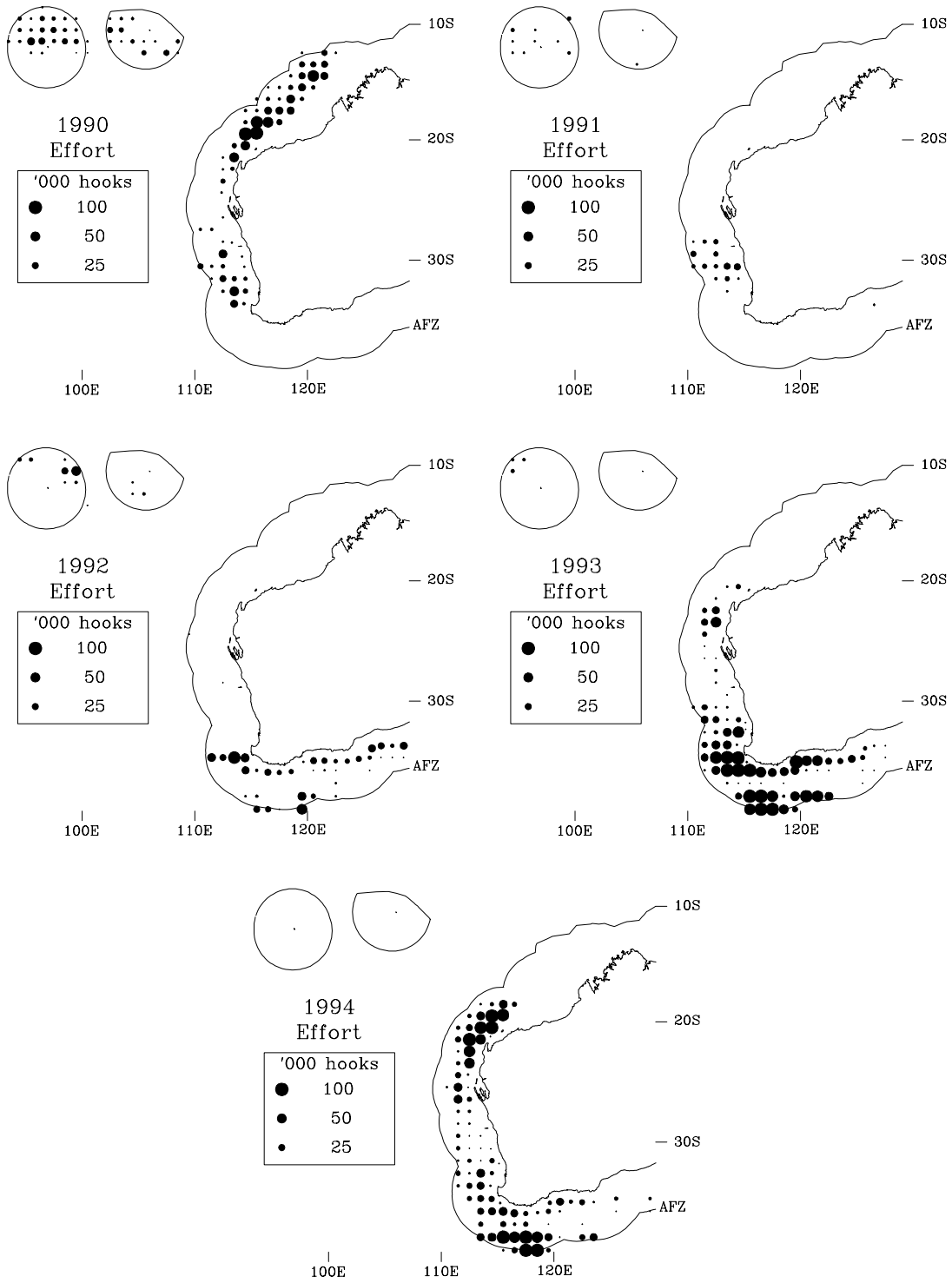


Figure 5. Annual distribution of longline catch rates of yellowfin tuna in the western Australian fishing zone (AFZ), 1984-94. These data are from TL04 logbooks completed by Japanese longliners operating under bilateral access agreements. They also include logbook data from Japanese longliners operating under joint-venture arrangements, and a few charter longliners.

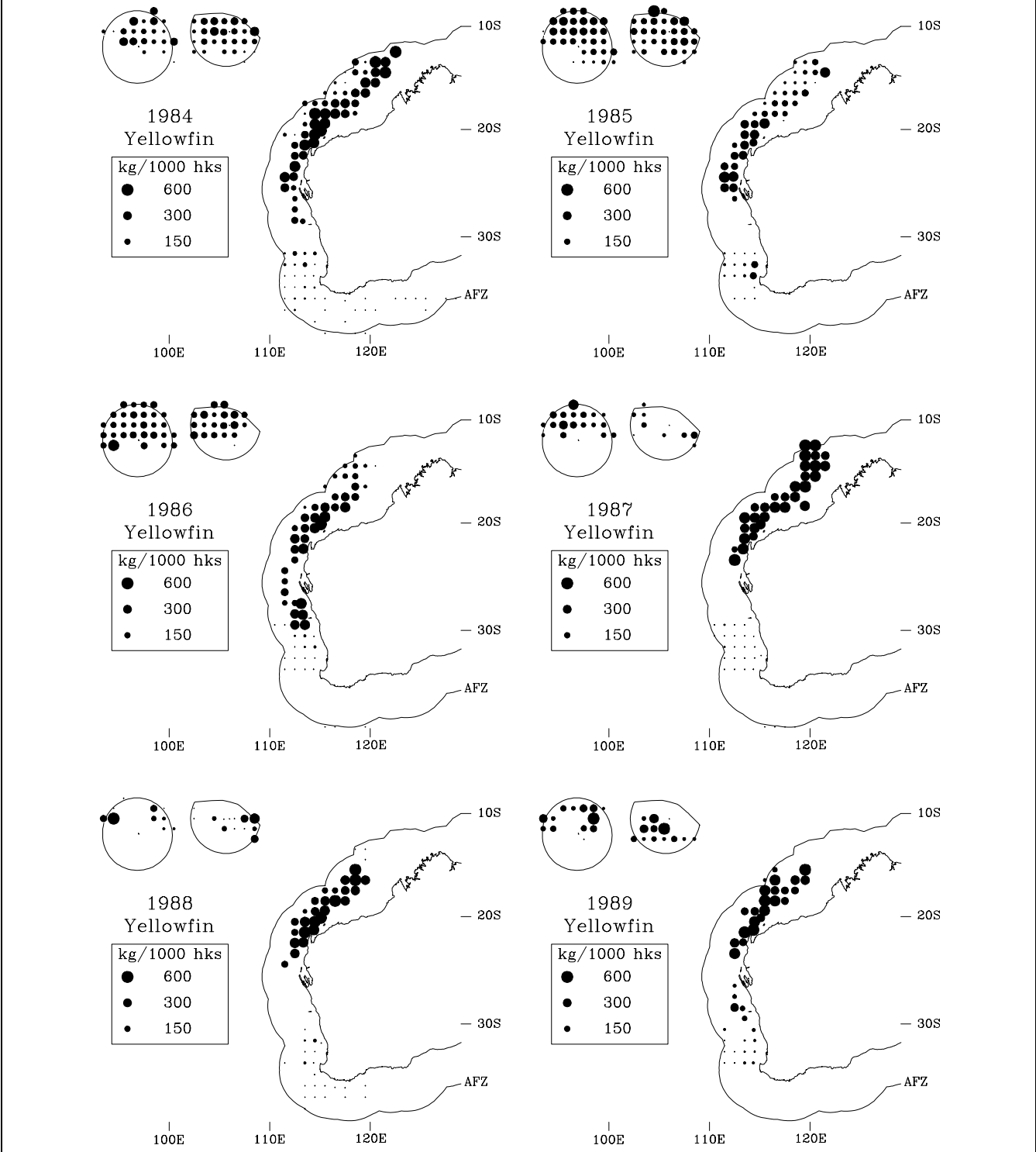


Figure 5. (Continued)

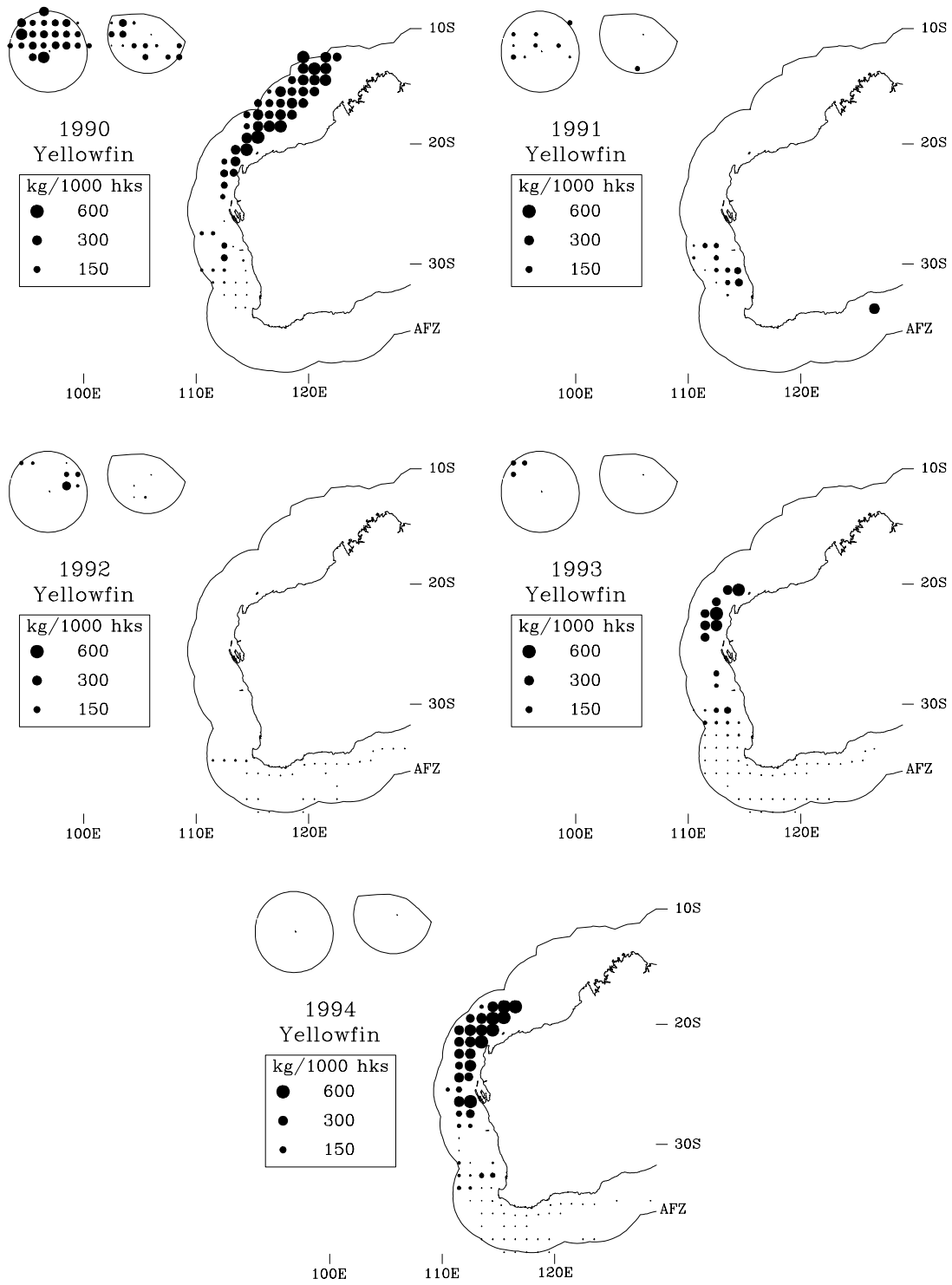


Figure 6. Annual distribution of longline catch rates of bigeye tuna in the western Australian fishing zone (AFZ), 1984-94. These data are from TL04 logbooks completed by Japanese longliners operating under bilateral access agreements. They also include logbook data from Japanese longliners operating under joint-venture arrangements, and a few charter longliners.

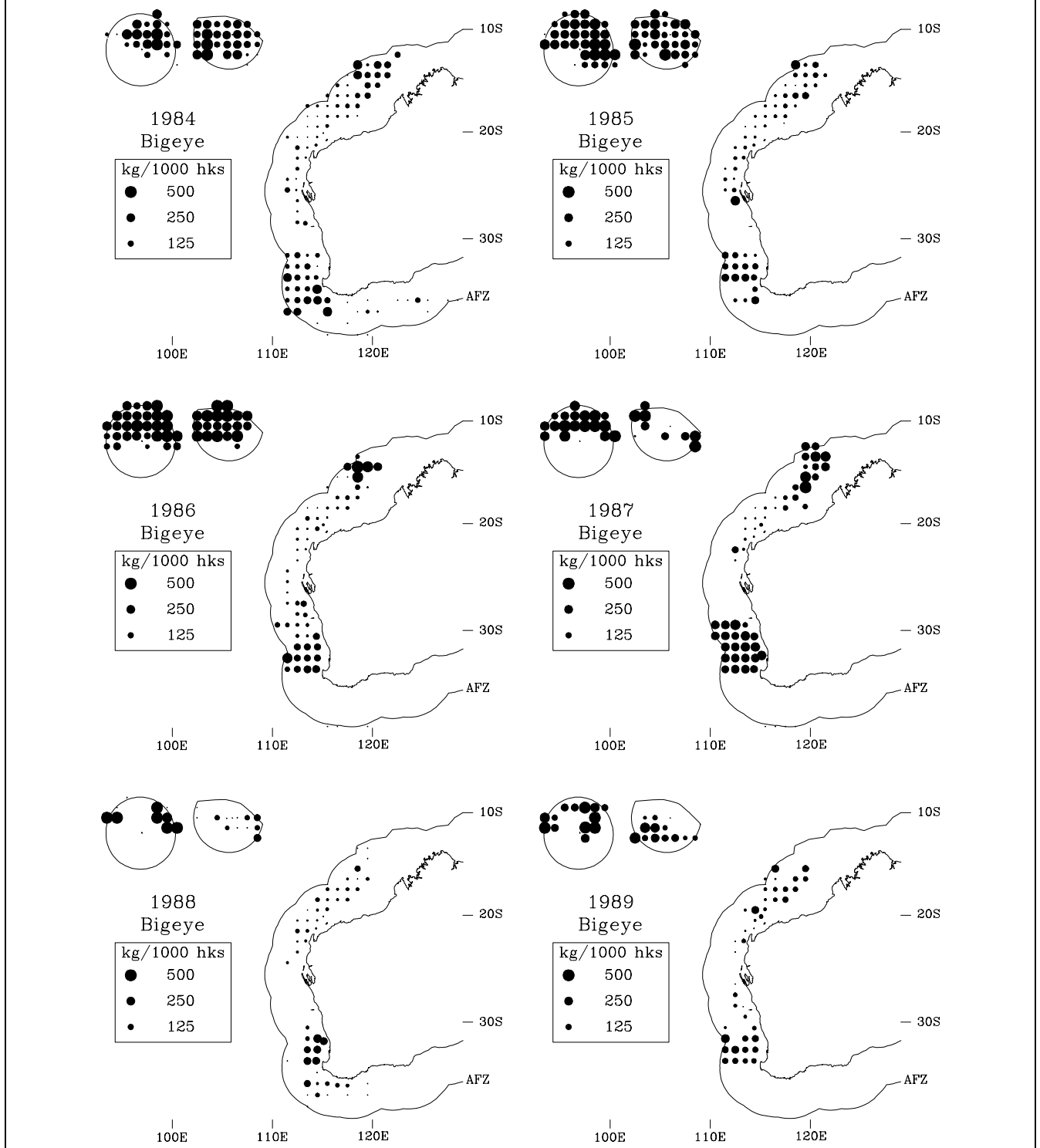


Figure 6. (Continued)

