

**DATA SUMMARY FOR THE SOUTHERN AND WESTERN  
TUNA AND BILLFISH (SWTBF)**

**A summary of logbook catch and effort information for the SWTBF  
fishery over the period 1986-2003**

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This document provides a tabular and graphical summary of logbook catch and effort information for the Southern and Western Tuna and Billfish fishery over the period 1986-2003.

Species abbreviations:

YFT = yellowfin tuna

BET = bigeye tuna

SWO = broadbill swordfish

STM = striped marlin

ALB = albacore

## MAIN FEATURES OF THE DATA

- There has been a large (of an order of magnitude) increase in the number of sets, hooks and vessels, and in the average annual effort per vessel since 1997, but this has stabilised and slightly decreased since 2001 (Tables 1 and 2; Figures 1-4)
- The majority of trips involve one set per day (Table 2; Figure 5). In the last 5 years, the average number of hooks per set has increased from ~1000 to ~1300 (Figure 5; Figure 6).
- The fleet has shown spatial expansion over time in terms of the number of one-degree squares fished, particularly since 1998 (Table 3; Figure 7). In more recent years fishing has extended progressively offshore (Figure 8).
- The number of one-degree squares in which the target species are caught has reflected the spatial expansion of the fleet, with the exception of albacore. This species is only caught in a few (generally <20) one degree squares (Figure 7).
- Catches, particularly of yellowfin and bigeye tuna and broadbill swordfish, have increased since 1997, reflecting the increase in effort. Total catches have stabilised and slightly decreased since 2001. Catch of striped marlin has decreased markedly since 1999 (Table 4; Figures 9-10).
- The annual average weight of retained fish peaked in 1992 for all of the target species with the exception of albacore. Average weights have generally remained stable since 1997, with bigeye tuna average weight increasing since 2000 (NB no weights were recorded for the 4 striped marlin caught in 2001) (Table 5; Figure 11).
- In the last 5 years, the majority of effort has been distributed between 20°S and 36°S (Figure 12). Swordfish, bigeye tuna and albacore catches showed similar latitudinal distributions. In 1999 and 2001, the majority of swordfish and bigeye tuna were caught south of 30°S, but in 2003 swordfish and bigeye tuna catches were more evenly distributed south of 26°S. Albacore were mainly caught at the southernmost latitudes in 2001, but in 1999 and 2003 the latitudinal mode was between 27°S and 29°S. Striped marlin and yellowfin tuna catches had similar latitudinal distributions, with modes at about 21°S and 28°S in recent years.
- Temporal patterns of nominal catch-per-unit-effort (CPUE) varied for each species (Table 5; Figure 13). Broadbill swordfish CPUE consistently increased since 1988. This increase became more rapid since 1997, with swordfish CPUE increasing from less than 150 kg per 1000 hooks to a peak of ~ 350 kg per 1000 hooks in 2001. Bigeye tuna CPUE decreased markedly from 1986 to 1988, after which time it has stabilised at about 100 kg per 1000 hooks. Yellowfin tuna CPUE has shown large inter-annual variability but peaked in 1997 at ~460kg per 1000 hooks. Striped marlin CPUE has not exceeded 25kg per 1000 hooks except in 1989 (63kg per 1000 hooks). Albacore CPUE

peaked at ~240kg in 1991 before declining to less than 40kg per 1000 hooks since 1995.

- Swordfish catch rates showed evidence of decrease inshore, but increased in newly exploited offshore areas over the last 6 years (Figures 14-15). Conversely, bigeye tuna, while caught further offshore in recent years, showed higher catch rates being maintained inshore. This suggests that the progressive offshore expansion of the fleet may have occurred in response to decreasing swordfish catch rates inshore.

**Table 1:** SWTBF summary of effort. Note that “effort” refers to numbers of hooks

Year	IDS	Names	Days Fished	Sets where Hooks $\geq$ 50			Sets where Hooks $<$ 50		Total Sets	Total Effort	Effort (1000s)
				Sets	Effort	Mean Effort	Sets	Effort			
1986	1	1	23	23	54,708	2379	0	0	23	54,708	55
1987	3	3	141	125	294,516	2356	16	37,698	141	332,214	332
1988	3	3	58	58	140,240	2418	0	0	58	140,240	140
1989	6	6	308	307	677,032	2205	1	2,205	308	679,237	679
1990	7	7	168	166	353,651	2130	3	6,391	169	360,042	360
1991	4	4	22	4	4,460	1115	18	20,070	22	24,530	25
1992	7	7	81	78	71,850	921	4	3,685	82	75,535	76
1993	9	9	261	261	359,231	1376	2	2,753	263	361,984	362
1994	16	16	353	360	387,195	1076	2	2,151	362	389,346	389
1995	17	15	546	576	530,944	922	5	4,609	581	535,553	536
1996	11	11	405	419	282,291	674	11	7,411	430	289,702	290
1997	13	13	435	408	521,102	1277	38	48,534	446	569,636	570
1998	24	23	1,036	1,062	1,041,634	981	28	27,463	1,090	1,069,097	1,069
1999	44	42	3,634	3,778	3,528,653	934	20	18,680	3,798	3,547,333	3,547
2000	52	51	5,861	5,986	6,209,508	1037	39	40,456	6,025	6,249,964	6,250
2001	46	43	5,431	5,513	6,237,564	1131	36	40,731	5,549	6,278,295	6,278
2002	41	40	4,989	5,039	5,975,294	1186	49	58,105	5,088	6,033,399	6,033
2003	27	27	2,930	2,972	3,753,316	1263	19	23,995	2,991	3,777,311	3,777
avg(98-03)	39	38	3,980	4,058	4,457,662	1,089	32	34,905	4,090	4,492,567	4,493

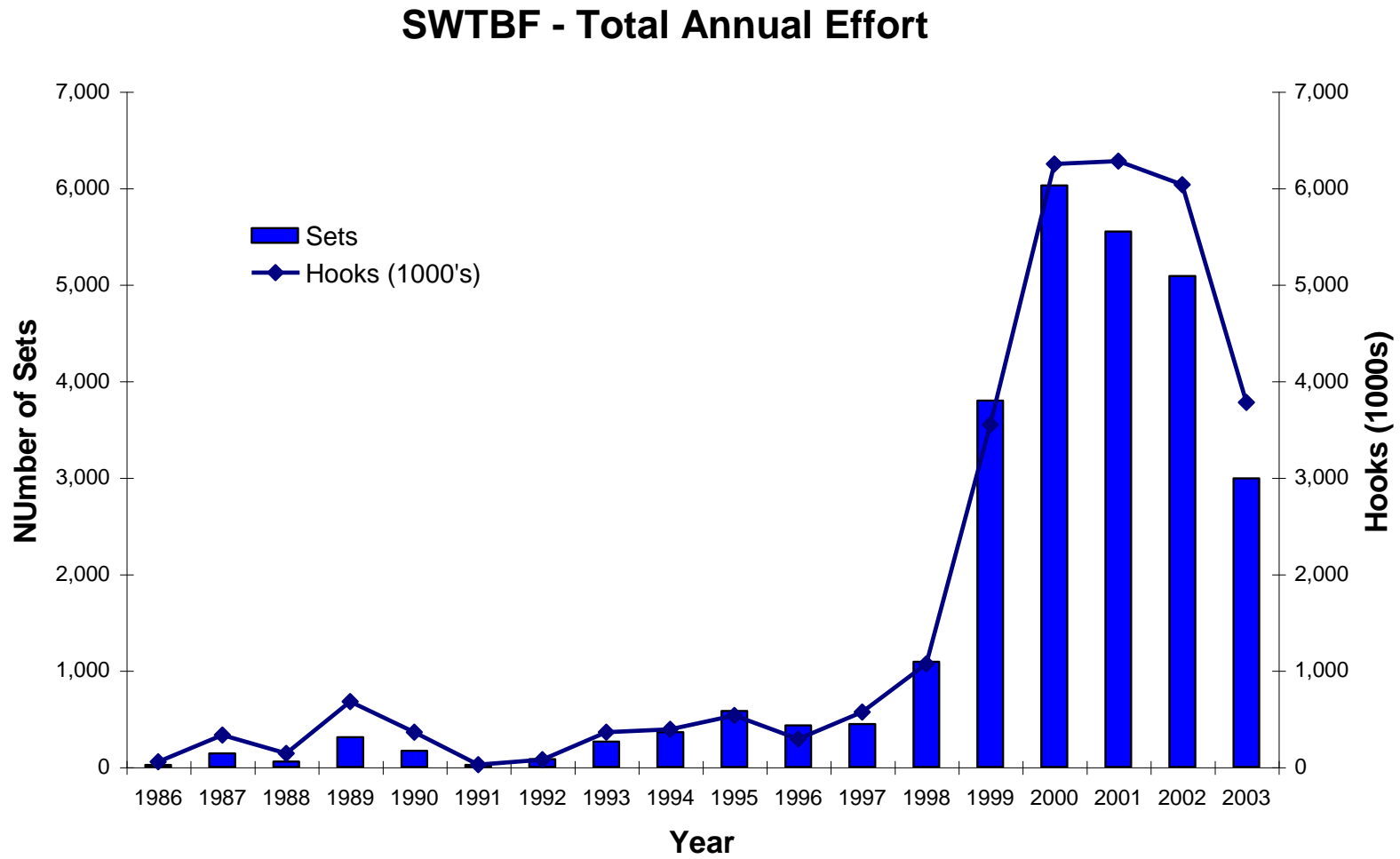
**Table 2:** SWTBF vessel summary, including the total number of vessels recording catch for each species

year	days/boat	sets/boat	sets/day	hooks/boat	hooks/day	hooks/set	total	YFT	BET	SWO	STM	ALB
1986	23.0	23.0	1.000	54,708	2379	2379	1	0	1	1	1	1
1987	47.0	47.0	1.000	110,738	2356	2356	3	1	2	1	0	2
1988	19.3	19.3	1.000	46,747	2418	2418	3	1	2	1	0	2
1989	51.3	51.3	1.000	113,206	2205	2205	6	5	5	4	3	5
1990	24.0	24.1	1.006	51,435	2143	2130	7	5	5	6	2	6
1991	5.5	5.5	1.000	6,133	1115	1115	4	1	2	1	0	4
1992	11.6	11.7	1.012	10,791	933	921	7	2	6	5	1	7
1993	29.0	29.2	1.008	40,220	1387	1376	9	5	5	6	1	7
1994	22.1	22.6	1.025	24,334	1103	1076	16	10	13	10	3	10
1995	36.4	38.7	1.064	35,704	981	922	15	12	10	11	6	11
1996	36.8	39.1	1.062	26,337	715	674	11	10	8	8	4	8
1997	33.5	34.3	1.025	43,818	1310	1277	13	6	6	5	3	6
1998	45.0	47.4	1.052	46,482	1032	981	23	17	17	17	11	15
1999	86.5	90.4	1.045	84,460	976	934	42	34	36	36	27	30
2000	114.9	118.1	1.028	122,548	1066	1037	51	46	49	49	7	40
2001	126.3	129.0	1.022	146,007	1156	1131	43	36	41	42	2	41
2002	124.7	127.2	1.020	150,835	1209	1186	40	35	40	40	5	39
2003	108.5	110.8	1.021	139,900	1289	1263	27	26	27	27	1	23
avg(98-03)	101.0	103.8	1.0	115,038.9	1,121.5	1,088.7	37.7	32.3	35.0	35.2	8.8	31.3

**Table 3:** Number of one-degree squares fished by the SWTBF, and the number of squares in which each of the main target species was caught

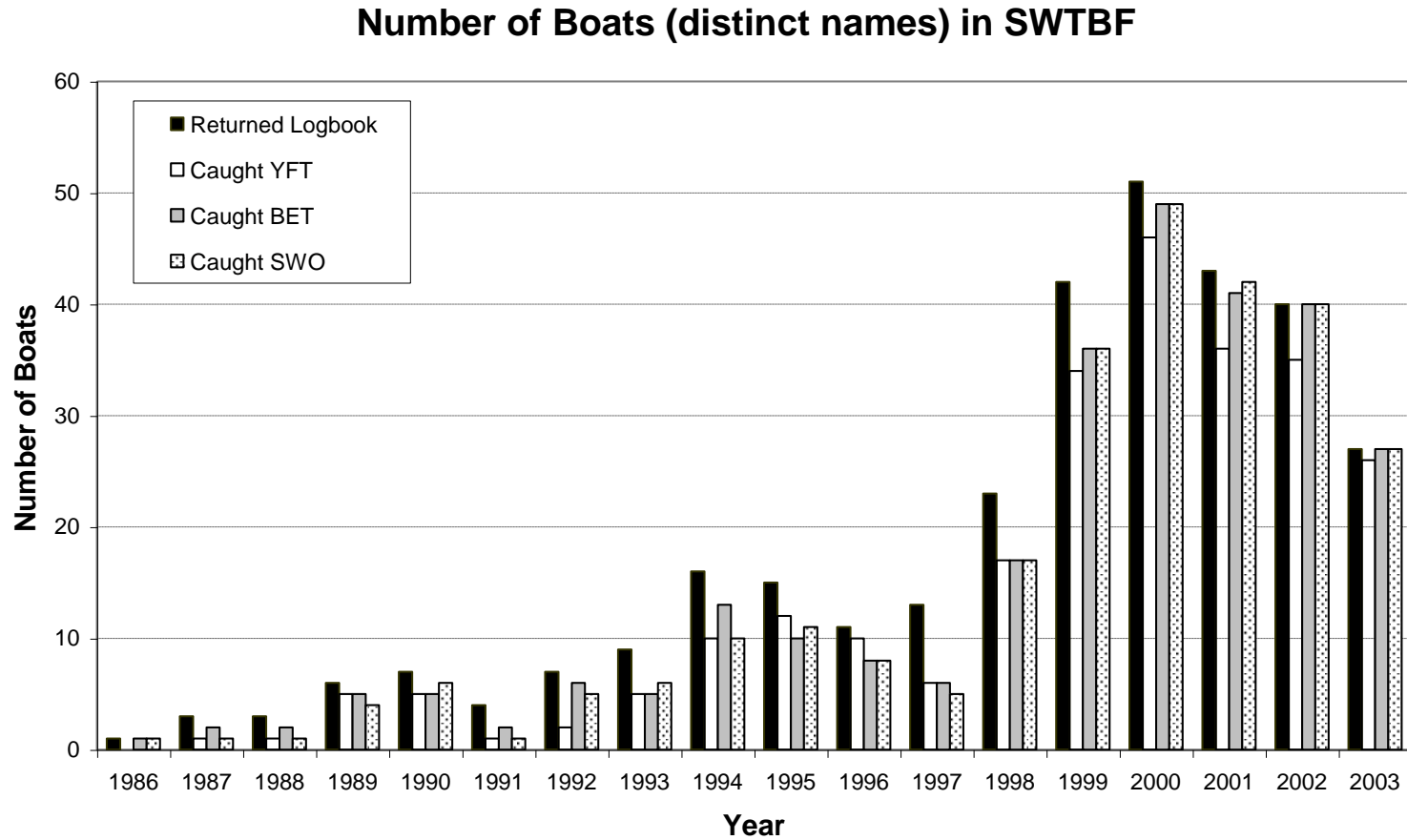
Year	Total	YFT	BET	SWO	STM	ALB
1986	4	0	4	3	1	4
1987	48	4	39	2	0	41
1988	16	1	12	2	0	15
1989	62	45	48	41	33	49
1990	46	33	36	33	16	22
1991	15	2	4	3	0	10
1992	21	7	10	7	1	18
1993	38	8	29	24	1	32
1994	38	19	25	28	4	24
1995	53	32	29	31	12	22
1996	37	25	19	23	9	13
1997	30	23	21	22	15	20
1998	59	33	45	48	19	38
1999	114	73	98	101	41	56
2000	157	94	134	148	14	95
2001	157	101	132	143	2	120
2002	183	125	163	180	9	154
2003	186	121	150	182	1	145
avg(98-03)	143	91	120	134	14	101

**Figure 1:** SWTBF total annual effort by sets and hooks

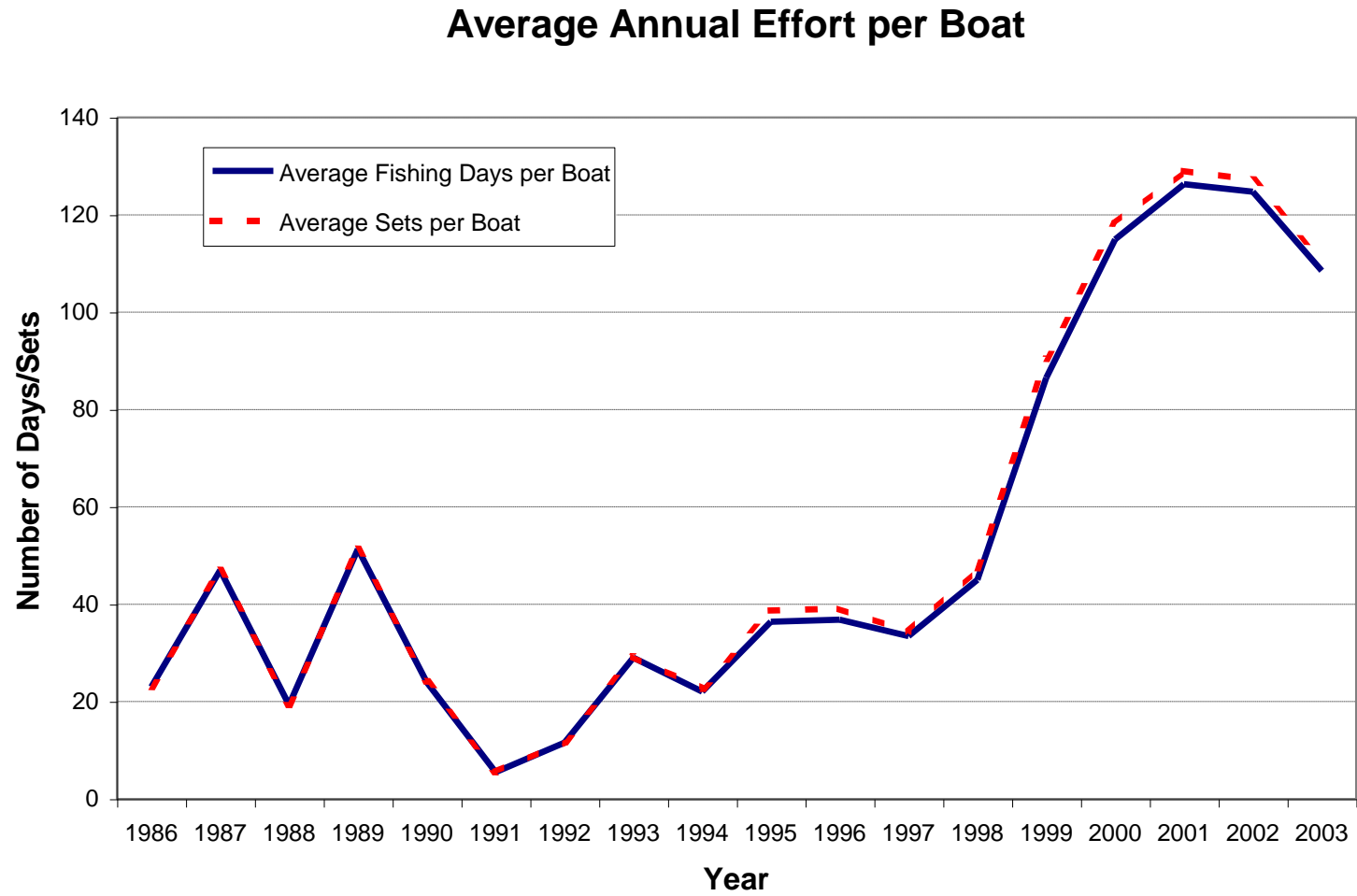




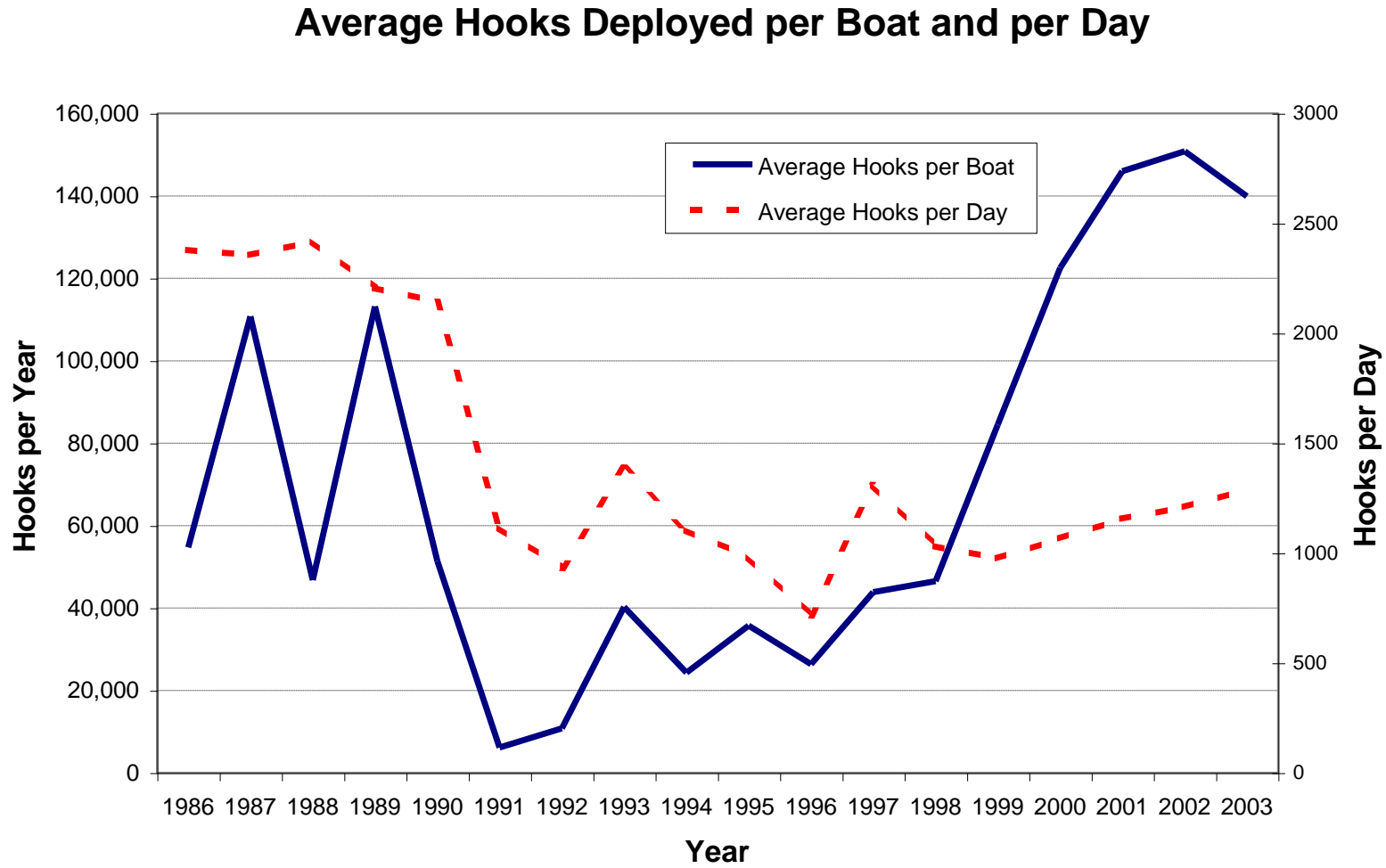
**Figure 2:** The number of vessels (identified by unique name) returning logbooks, and recording catches of the three main target species



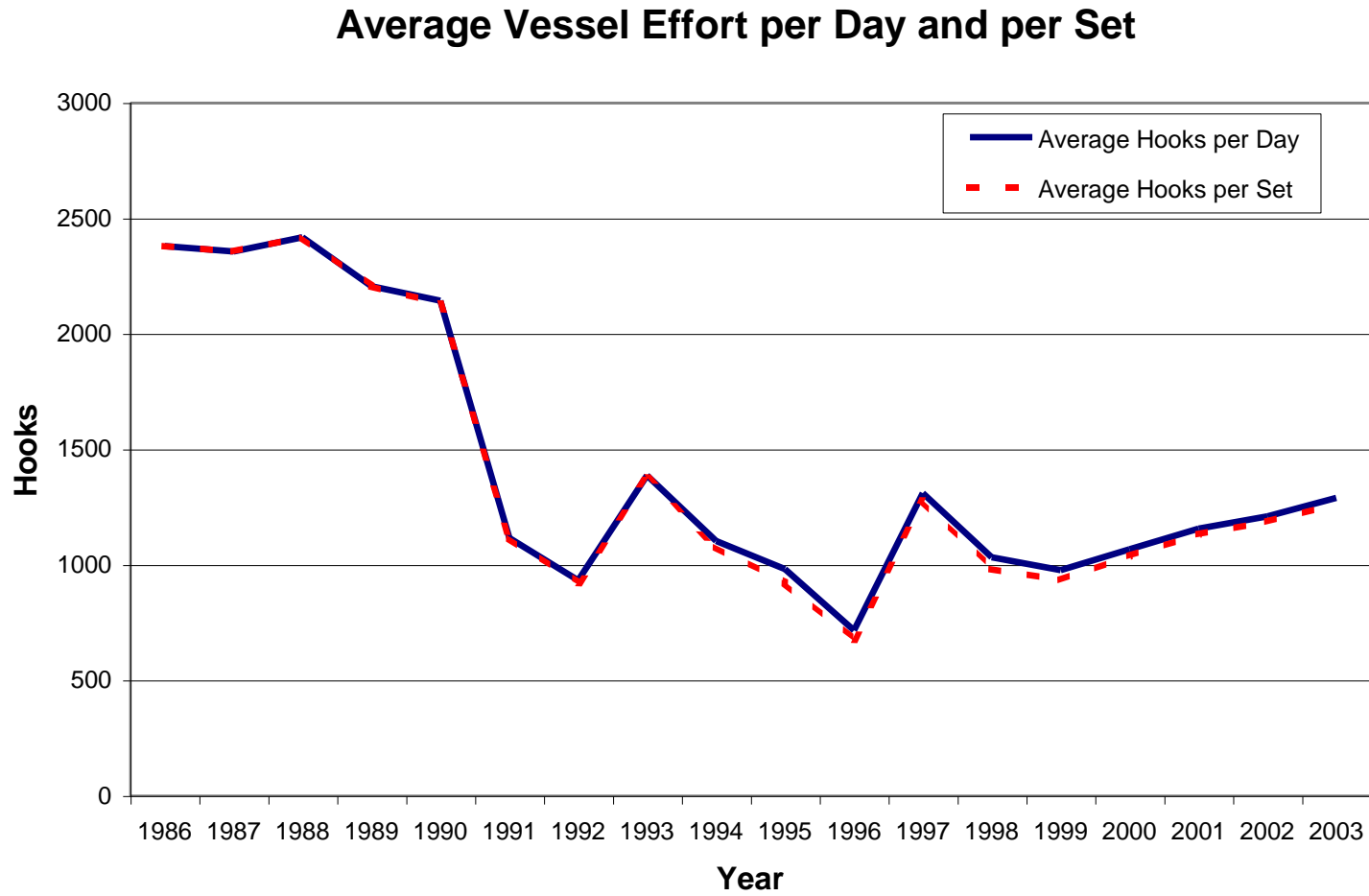
**Figure 3:** Average annual effort per boat, in terms of average numbers of fishing days and sets



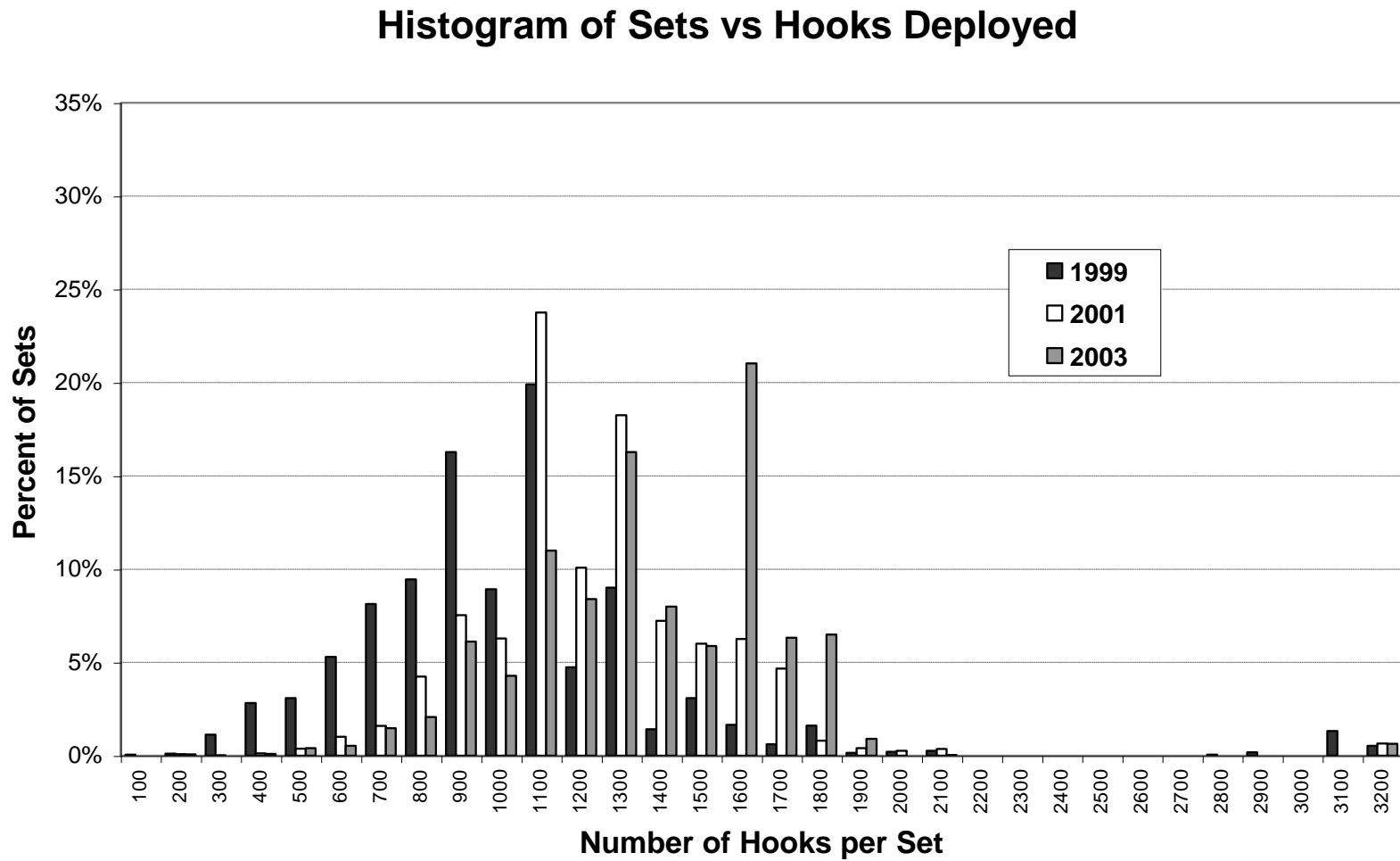
**Figure 4:** Average number of hooks deployed per boat and per day



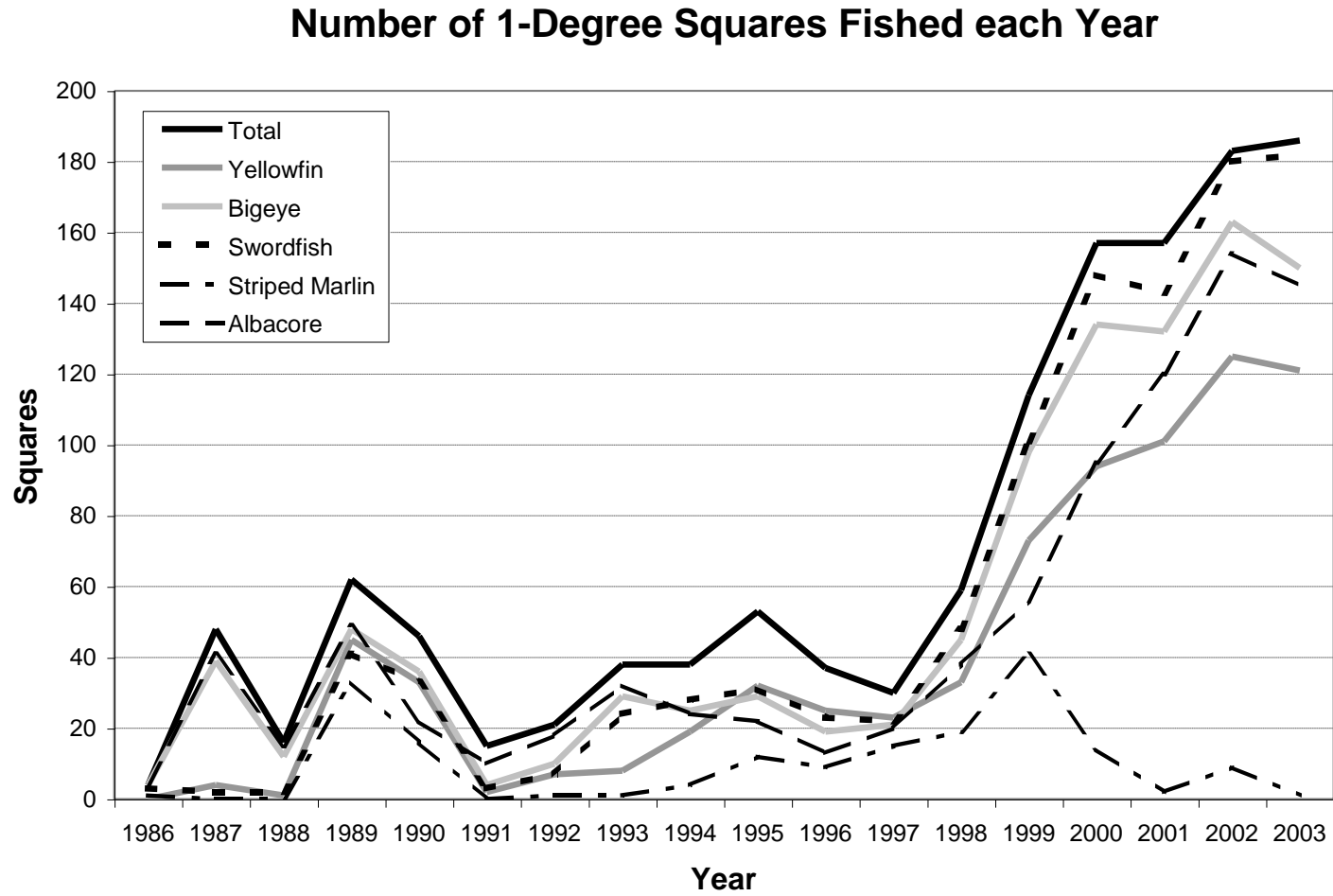
**Figure 5:** Average vessel effort per day and per set



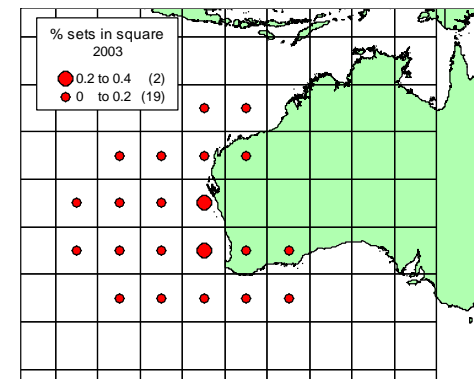
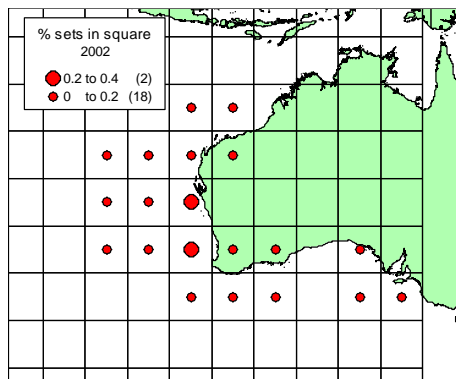
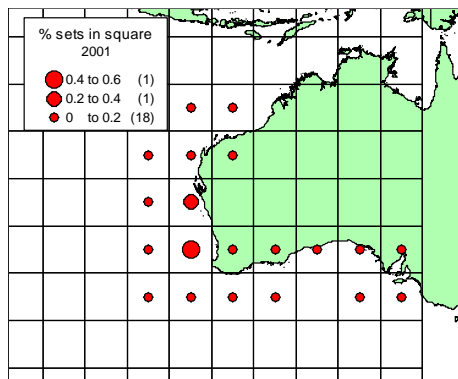
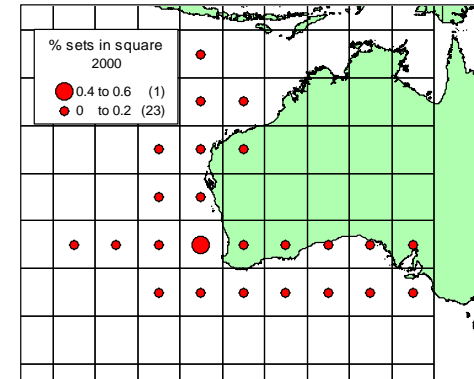
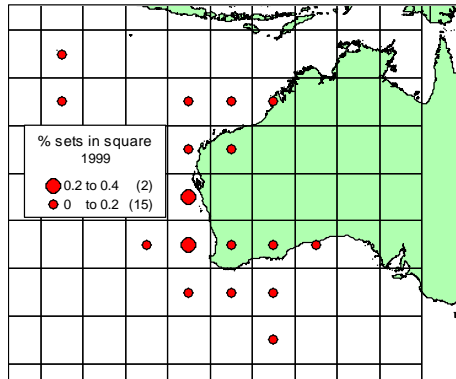
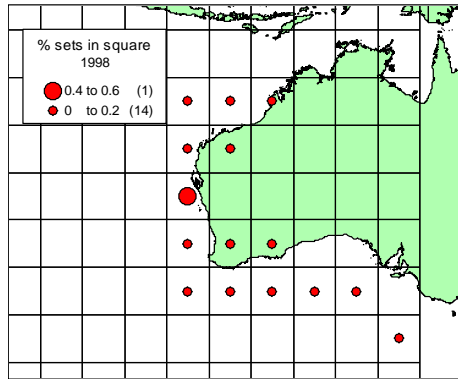
**Figure 6:** Histogram of hooks deployed per set, for 1999, 2001 and 2003



**Figure 7:** Number of 1-degree squares fished each year



**Figure 8:** Maps showing the relative distribution of annual sets by 5-degree square, for the years 1998-2003



**Table 4:** Annual catch summary for the SWTBF, by numbers and weight (whole weight in tonnes)

Year	Yellowfin Tuna		Bigeye Tuna		Broadbill Swordfish		Striped Marlin		Albacore Tuna	
	Number	Weight	Number	Weight	Number	Weight	Number	Weight	Number	Weight
1986	0	0.0	665	19.8	25	0.7	2	0.1	1,189	21.8
1987	68	3.0	1,372	52.4	3	0.2	0	0.0	682	14.4
1988	9	0.3	196	7.9	3	0.2	0	0.0	621	11.3
1989	4,944	182.2	1,389	63.7	368	28.8	804	42.5	1,173	37.5
1990	1,899	63.0	898	38.9	268	18.8	84	2.3	223	6.5
1991	56	0.7	21	1.2	3	0.3	0	0.0	288	5.9
1992	167	8.6	121	10.4	14	1.8	2	0.3	1,183	16.0
1993	86	2.2	697	31.7	150	14.7	1	0.1	3,188	37.1
1994	503	16.0	779	26.3	495	39.1	8	0.7	3,803	42.1
1995	1,676	61.8	1,585	55.7	956	69.3	49	2.8	302	5.4
1996	3,282	104.3	811	25.9	390	23.8	58	3.6	229	3.4
1997	6,363	262.3	1,589	45.7	589	26.9	335	12.0	896	21.3
1998	6,727	230.9	4,806	160.8	4,846	238.1	254	8.8	1,617	24.1
1999	10,367	406.4	12,668	412.1	22,055	1,012.7	673	22.9	1,493	20.2
2000	13,195	437.2	13,006	442.3	29,901	1,697.4	45	2.0	2,707	33.3
2001	16,880	597.6	12,470	414.5	29,425	2,164.0	4	0.0	7,582	121.2
2002	9,049	372.6	13,243	450.2	28,464	2,025.4	24	1.3	5,117	88.4
2003	4,354	197.2	6,101	217.5	17,805	1,154.2	1	0.1	4,819	84.4
avg(98-03)	10,095	374	10,382	350	22,083	1,382	167	6	3,889	62

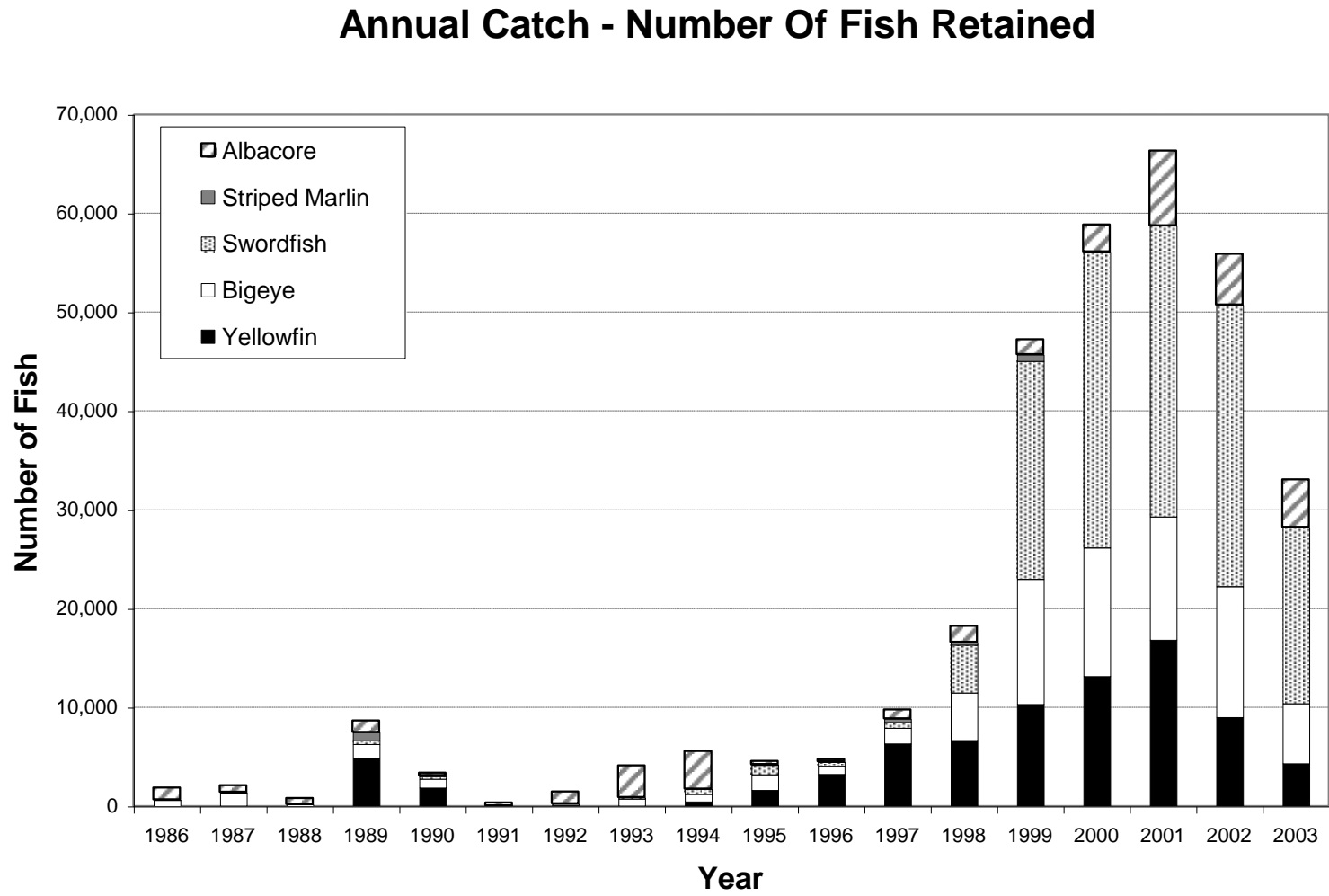


**Table 5:** Annual average fish (whole) weights (kg) and nominal catch rates (catch-per-unit-effort, CPUE) for the SWTBF

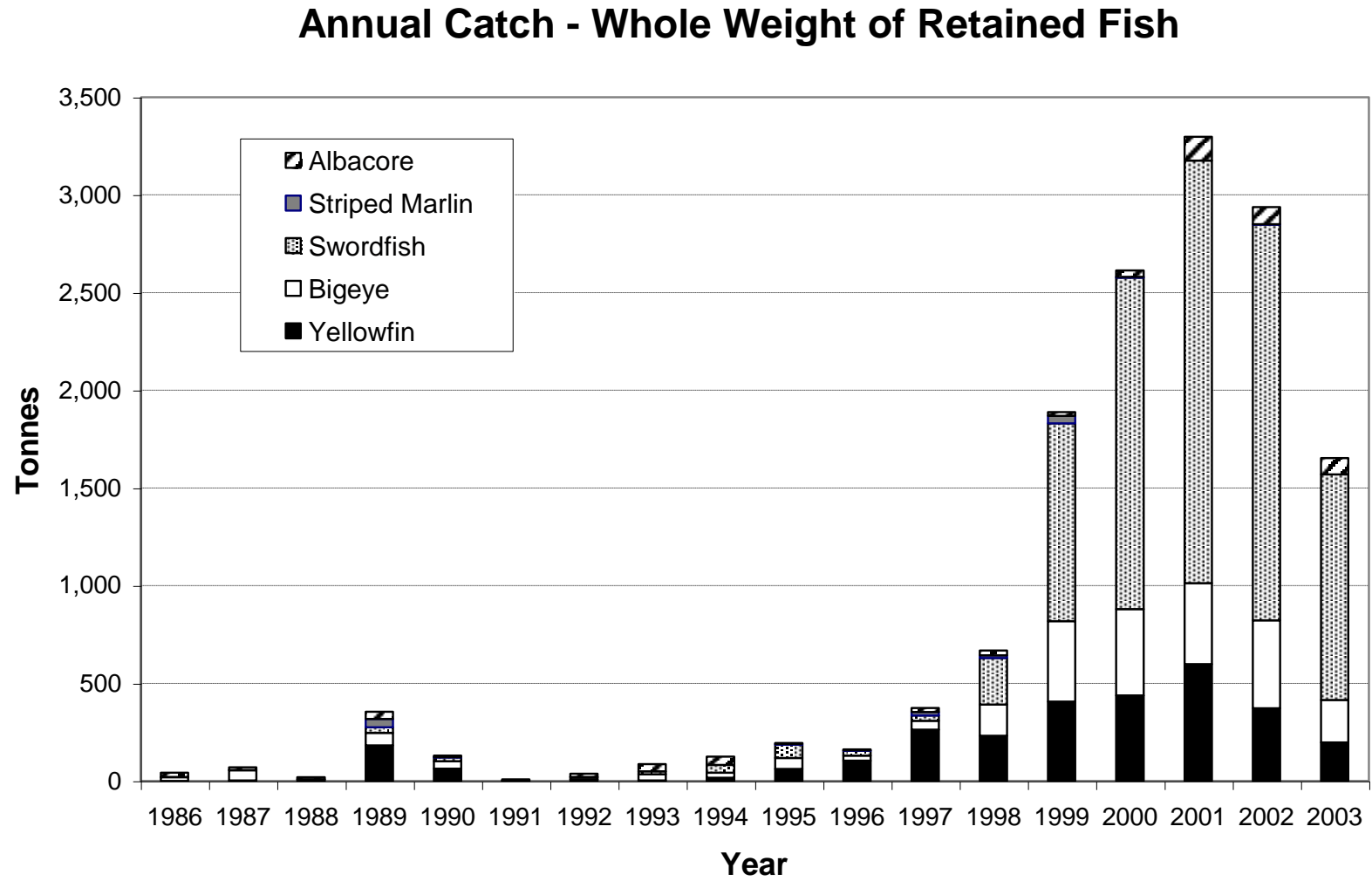
Year	Yellowfin Tuna			Bigeye Tuna			Broadbill Swordfish			Striped Marlin			Albacore Tuna		
	Avg WWT	CPUE(No)	CPUE(Wt)	Avg WWT	CPUE(No)	CPUE(Wt)	Avg WWT	CPUE(No)	CPUE(Wt)	Avg WWT	CPUE(No)	CPUE(Wt)	Avg WWT	CPUE(No)	CPUE(Wt)
1986				30	12.16	362.60	30	0.46	13.60	35	0.04	1.26			
1987	43	0.2	8.9	38	4.13	157.72	54	0.01	0.49				21	2.05	43.39
1988	30	0.1	1.9	40	1.40	56.45	54	0.02	1.16				18	4.43	80.28
1989	37	7.3	268.3	46	2.04	93.73	78	0.54	42.35	53	1.18	62.61	32	1.73	55.27
1990	33	5.3	175.1	43	2.49	107.98	70	0.74	52.12	27	0.23	6.27	29	0.62	18.11
1991	13	2.3	29.4	59	0.86	50.47	106	0.12	12.92				20	11.74	238.89
1992	52	2.2	114.1	86	1.60	137.63	126	0.19	23.29	151	0.03	4.00	13	15.66	211.29
1993	26	0.2	6.2	45	1.93	87.58	98	0.41	40.53	94	0.00	0.26	12	8.81	102.37
1994	32	1.3	41.1	34	2.00	67.63	79	1.27	100.39	85	0.02	1.75	11	9.77	108.03
1995	37	3.1	115.4	35	2.96	103.93	72	1.79	129.38	58	0.09	5.32	18	0.56	10.00
1996	32	11.3	359.9	32	2.80	89.47	61	1.35	82.19	62	0.20	12.51	15	0.79	11.56
1997	41	11.2	460.4	29	2.79	80.31	46	1.03	47.14	36	0.59	21.04	24	1.57	37.31
1998	34	6.3	216.0	33	4.50	150.40	49	4.53	222.75	35	0.24	8.25	15	1.51	22.50
1999	39	2.9	114.6	33	3.57	116.17	46	6.22	285.49	34	0.19	6.46	14	0.42	5.68
2000	33	2.1	70.0	34	2.08	70.78	57	4.78	271.59	45	0.01	0.32	12	0.43	5.32
2001	35	2.7	95.2	33	1.99	66.02	74	4.69	344.68	0	0.00	0.00	16	1.21	19.31
2002	41	1.5	61.8	34	2.19	74.62	71	4.72	335.70	55	0.00	0.22	17	0.85	14.65
2003	45	1.2	52.2	36	1.62	57.57	65	4.71	305.56	60	0.00	0.02	18	1.28	22.35
avg(98-03)	38	2.78	101.6	34	2.66	89.3	60	4.94	294.3	38	0.07	2.5	15	0.95	15.0

CPUE(No) = Number per 1000 Hooks      CPUE(Wt) = Kilograms per 1000 Hooks

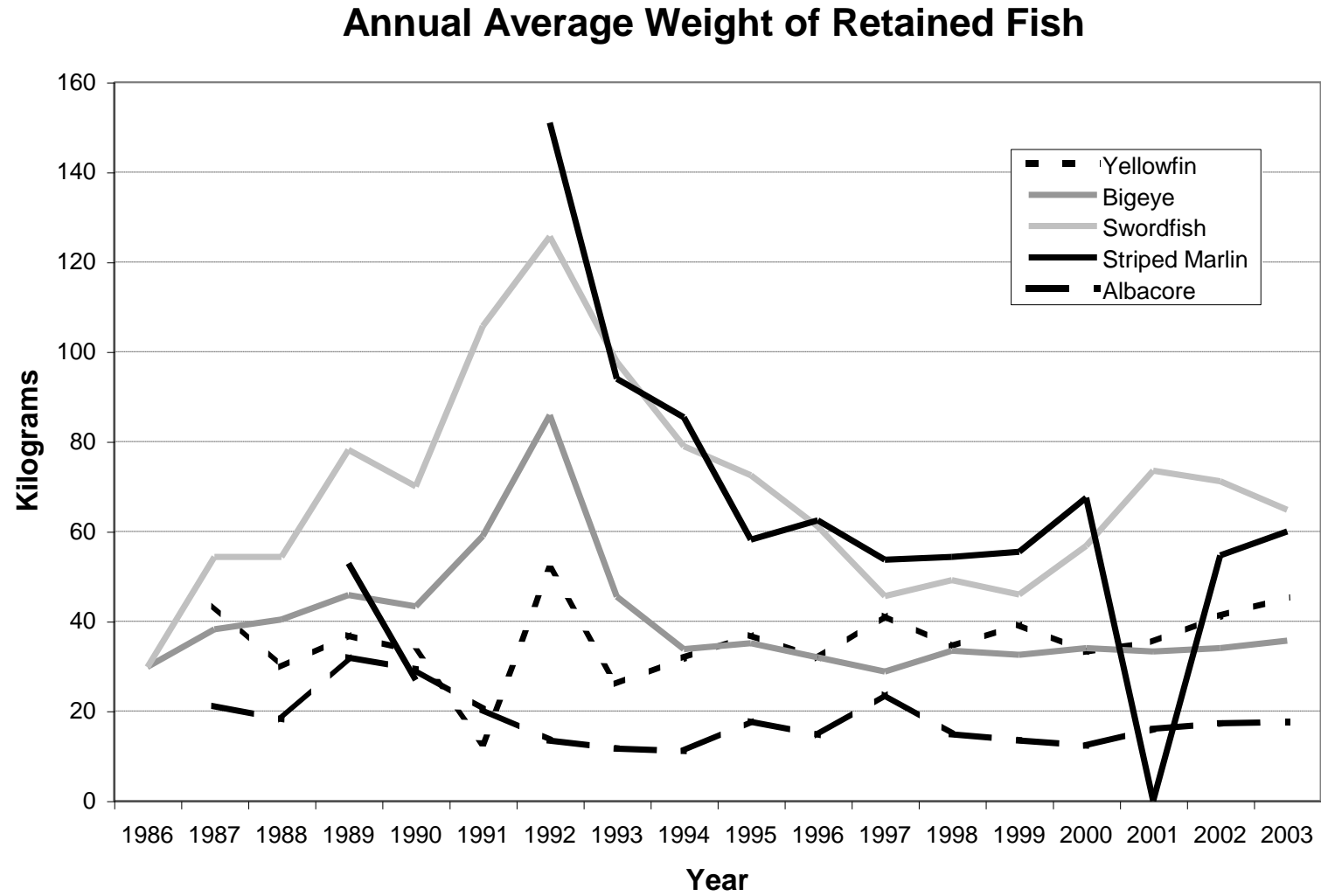
**Figure 9:** Annual SWTBF catch by number of fish retained



**Figure 10:** Annual SWTBF catch by whole weight of fish retained

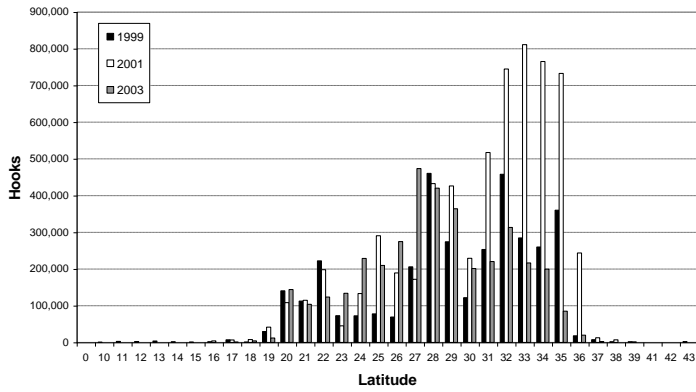


**Figure 11:** Annual average weight of retained fish

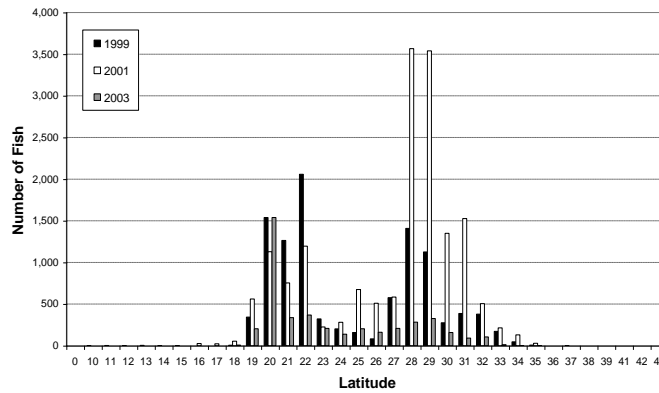


**Figure 12:** Effort (hooks) and catch by species, by latitude, for 1999, 2001 and 2003

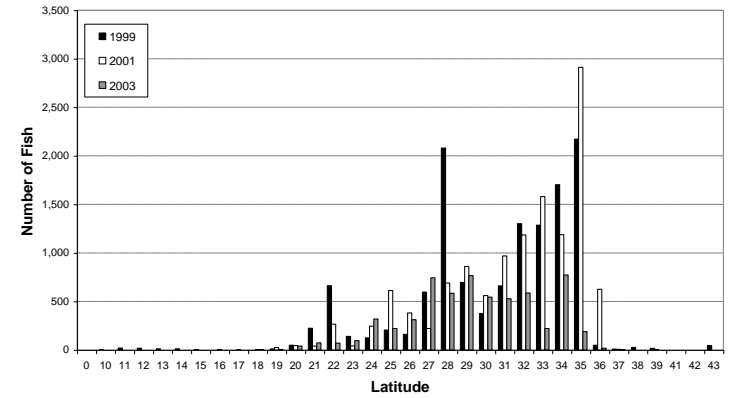
**Number of Hooks Deployed by Latitude**



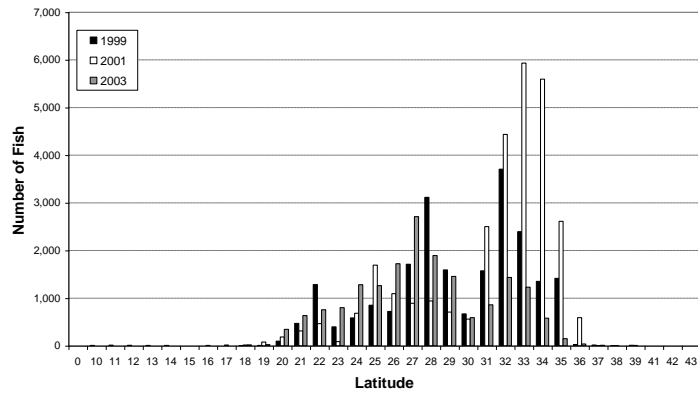
**Number of Yellowfin Caught by Latitude**



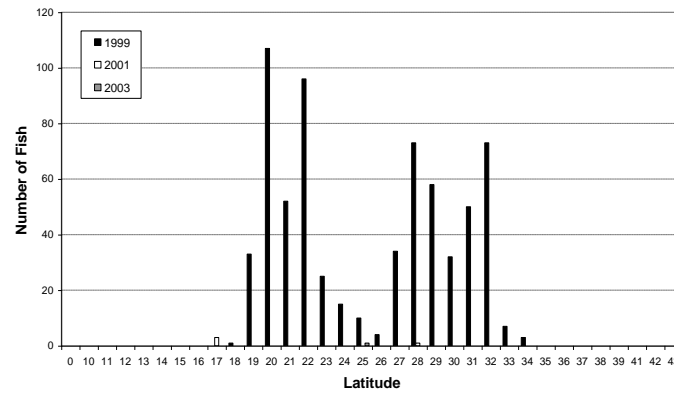
**Number of Bigeye Caught by Latitude**



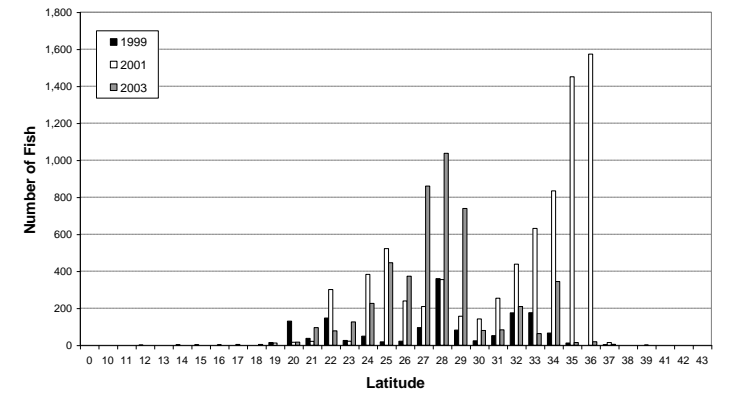
**Number of Swordfish Caught by Latitude**



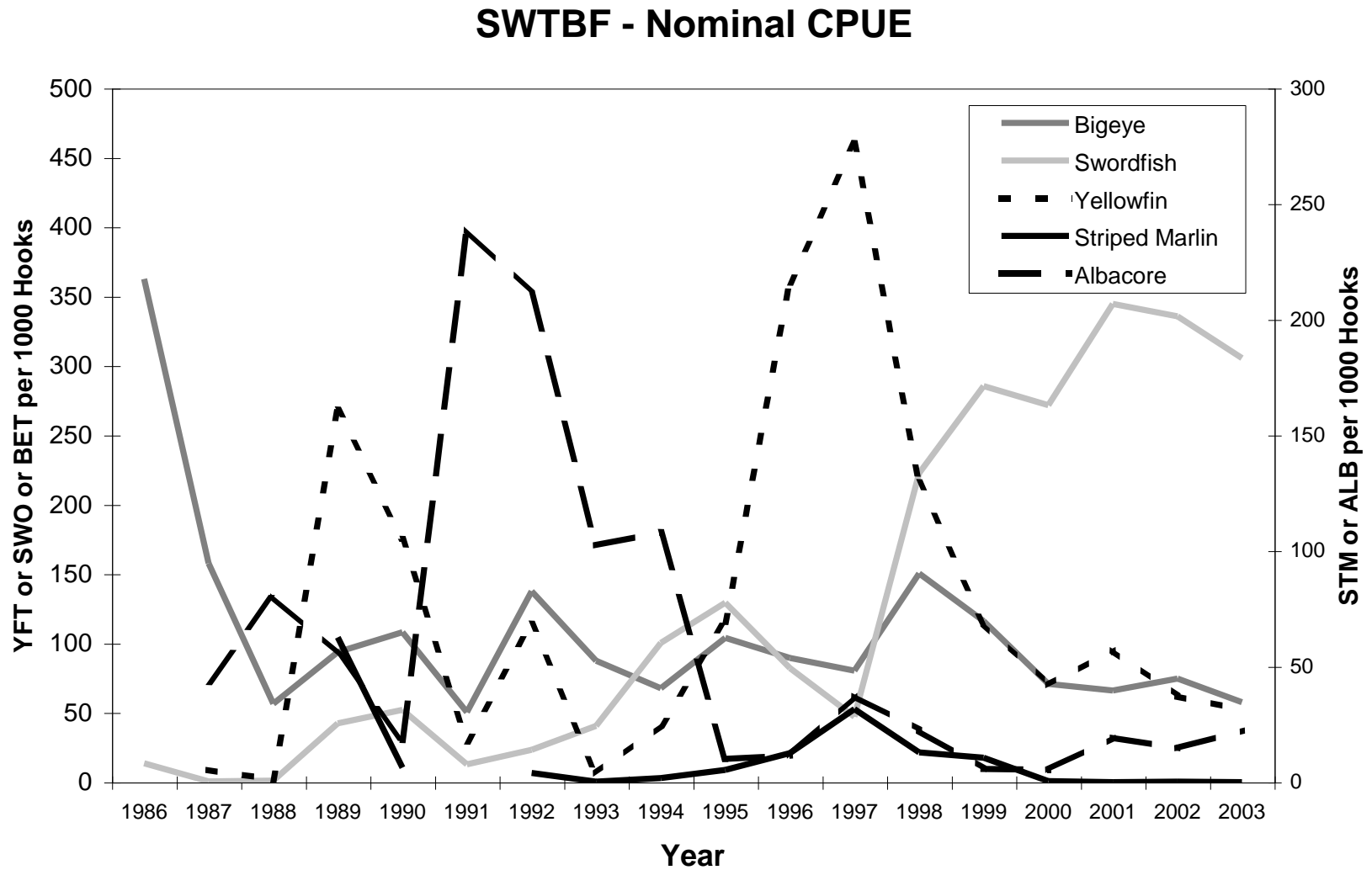
**Number of Striped Marlin Caught by Latitude**



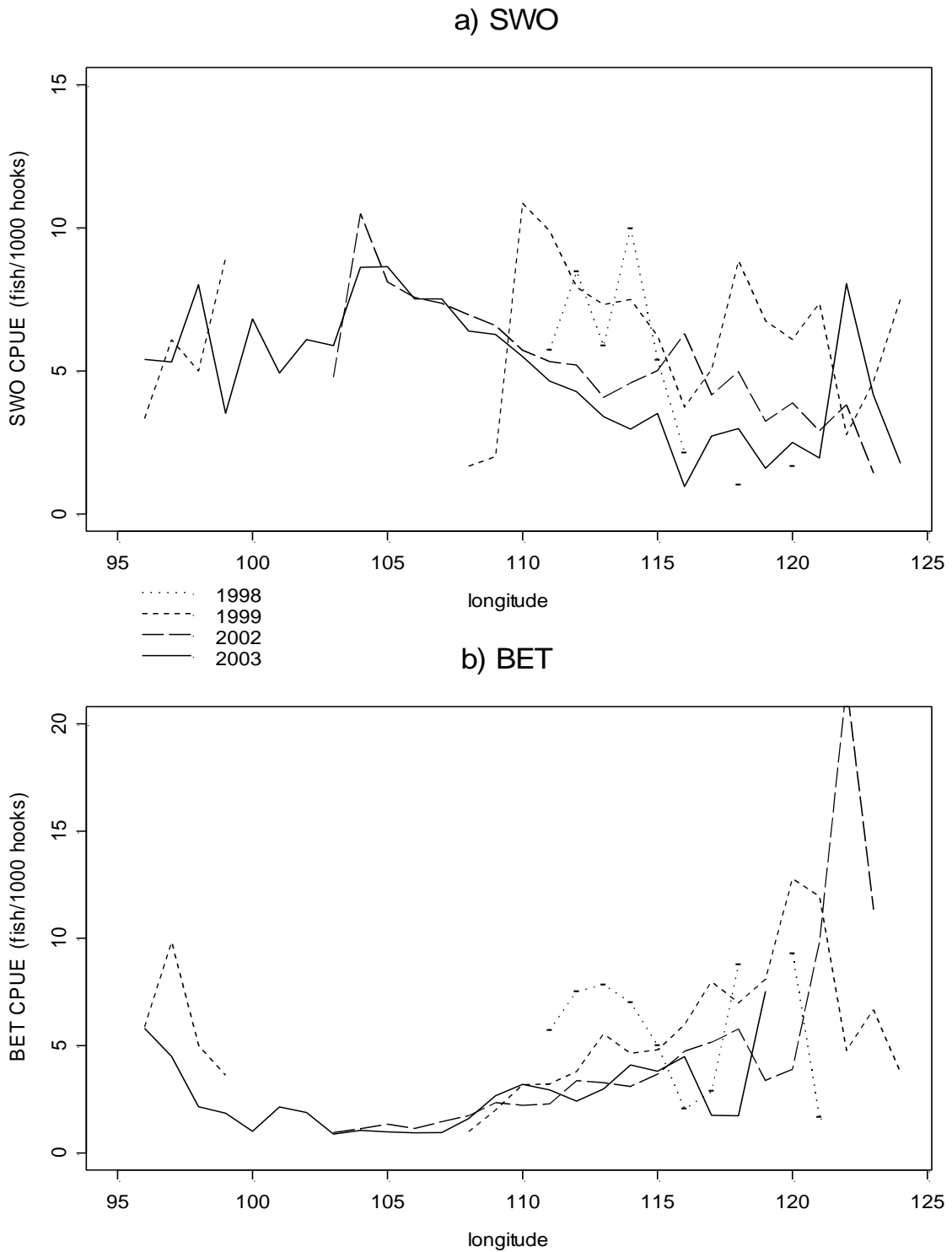
**Number of Albacore Tuna Caught by Latitude**



**Figure 13:** Nominal catch-per-unit-effort (kilograms of fish per 1000 hooks) by species for the S



**Figure 14:** Plots of mean CPUE (fish per 1000 hooks) vs. longitude (degrees East) for a) broadbill swordfish and b) bigeye tuna, for the years 1998, 1999, 2002 and 2003.



**Figure 15:** Time series of mean annual broadbill swordfish and bigeye tuna CPUE (fish per 1000 hooks), for two inshore and two offshore longitudes

