REVIEW OF FISHERY TRENDS FOR BILLFISH SPECIES

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PURPOSE

To provide the Working Party on Billfish (WPB) with a range of fishery indicators, including catch and effort trends, for fisheries catching billfish species in the IOTC Area of Competence.

BACKGROUND

Prior to each WPB meeting the Secretariat develops a series of maps, figures and tables that highlight historical and emerging trends in the fisheries data held by the Secretariat. This information is used during each WPB meeting to inform discussions around stock assessment and in developing advice to the Scientific Committee.

RECOMMENDATION

That the Working Party on Billfish **NOTE** the range of fishery indicators provided in this paper, and to inform the Secretariat if variations of the indicators or new indicators are required to aid the WPB in developing its advice to the Scientific Committee.

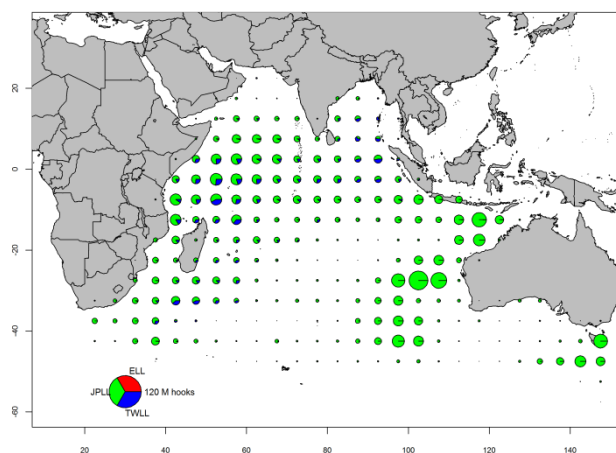[1] Data Coordinator IOTC (mh@iotc.org; Miguel.Herrera@iotc.org)
[2] Fisheries Expert IOTC (jm@iotc.org; Julien.Million@iotc.org)
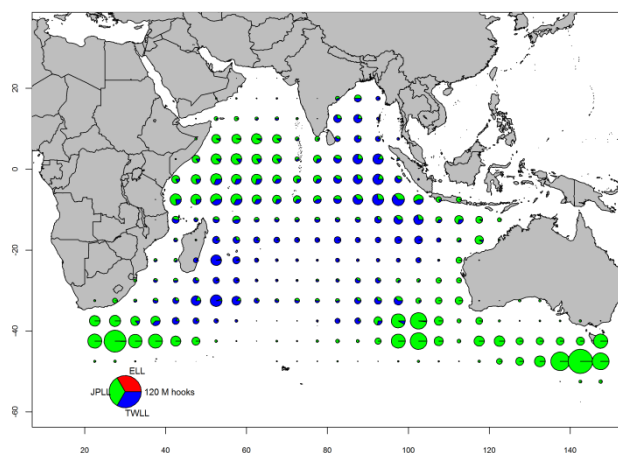
Effort by decade (1950–2009)

Effort 1950-1959
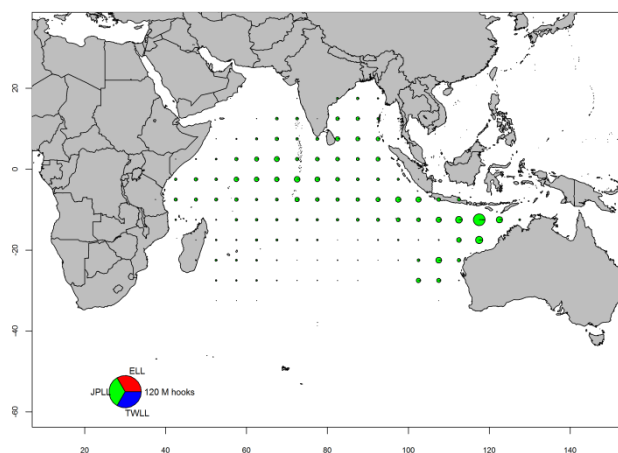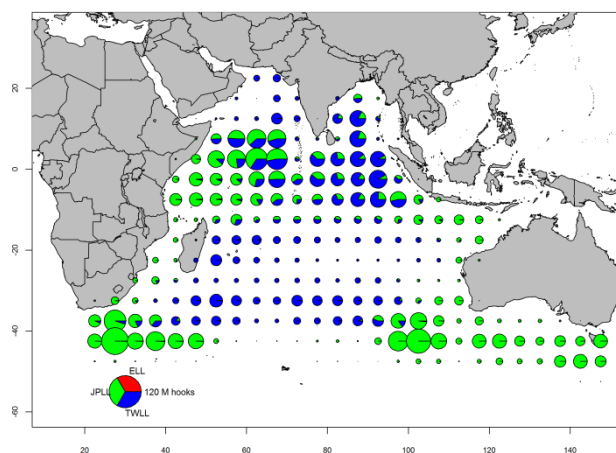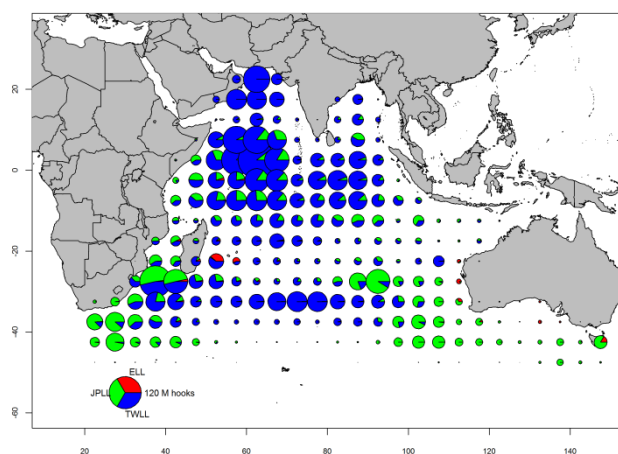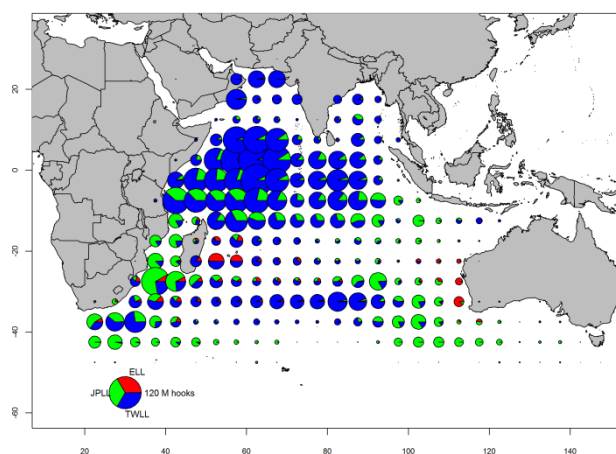
Effort 1960-1969
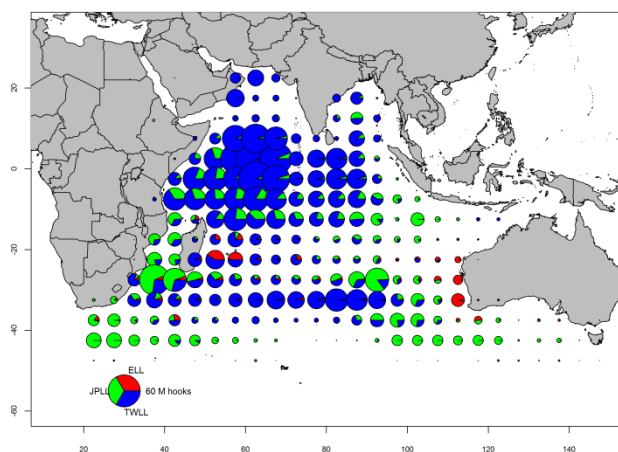
Effort 1970-1979

Effort 1980-1989

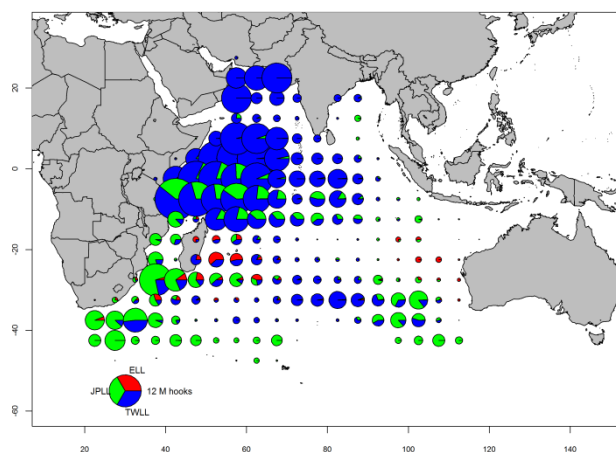Effort 1990-1999

Effort 2000-2009

Map 1-6: Number of hooks set (millions) from longline vessels flagged in Japan, Taiwan,China and Spain, by decade, and 5 degree square grid, for the years 1950-2009.

Effort by Year (2000–2009)
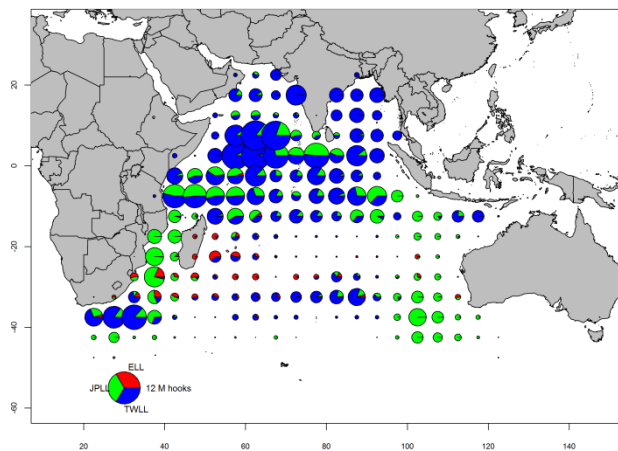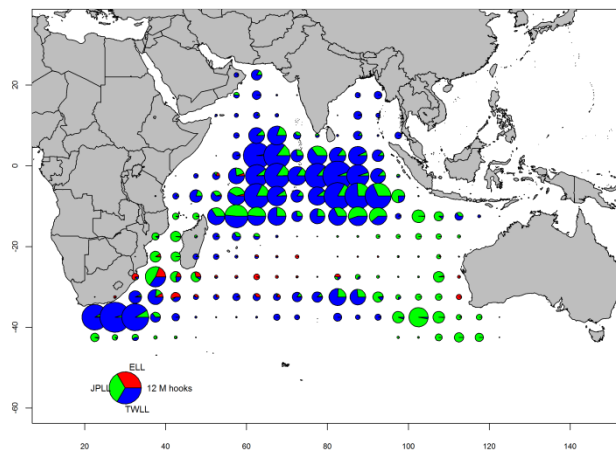
Map 7-12: Number of hooks set (millions) from longline vessels flagged in Japan, Taiwan,China and Spain, by year, and 5 degree square grid, for the years 2000-2009.
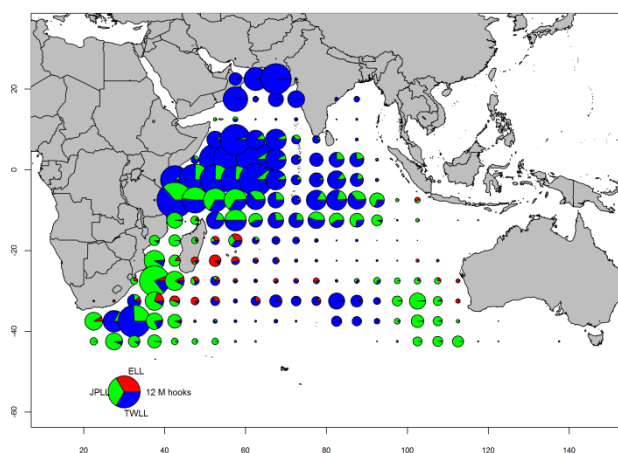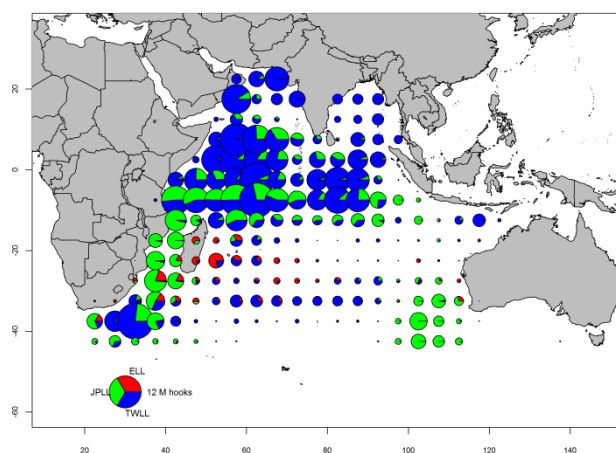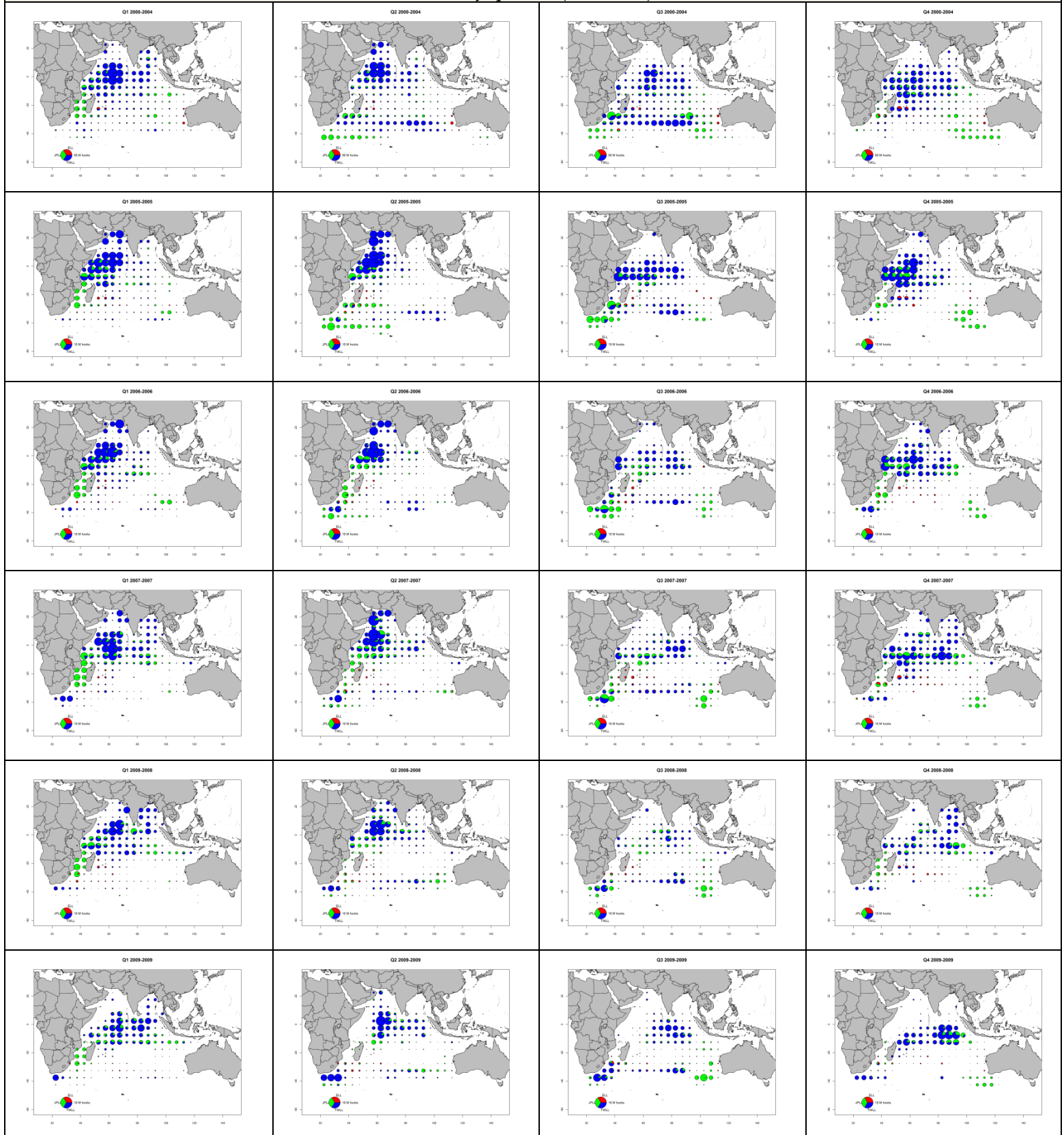
Effort by quarter (2000-2009)

Map 13-36: Number of hooks set (millions) from longline vessels flagged in Japan, Taiwan,China and Spain, by year, quarter and 5 degree square grid, for the years 2000-2009.

Swordfish (SWO)

Table 1. Best scientific estimates of the catches of swordfish by type of fishery for the period 1950-2009 (in metric tons). Data as of May 2011

| Fishery	By decade (average)						By year (last ten years)									
	1950s	1960s	1970s	1980s	1990s	2000s	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
AUEL				4	216	956	1,798	2,900	1,343	1,766	370	301	311	281	142	349
EUEL				6	570	7,803	1,212	3,116	6,442	7,484	11,319	13,159	11,541	9,972	6,966	6,815
ISEL					1,061	1,678	2,060	1,953	1,141	1,477	1,726	2,165	1,777	1,755	1,469	1,260
JPLL	209	988	1,205	1,396	2,218	1,660	1,727	1,347	1,327	1,220	1,580	1,773	2,177	2,382	1,772	1,292
TWLL	74	438	915	2,790	17,466	13,201	21,483	16,687	16,886	17,925	15,883	10,170	9,779	8,690	7,122	7,384
TWFL	4	4	19	178	1,917	2,643	1,952	1,589	2,272	3,915	3,766	2,731	2,424	2,402	2,197	3,183
ALGI	36	37	49	309	1,068	2,103	3,040	2,358	2,491	2,624	2,512	1,454	2,292	1,588	1,501	1,168
Total	*322*	*1,467*	*2,188*	*4,682*	*24,516*	*30,044*	*33,272*	*29,950*	*31,902*	*36,411*	*37,156*	*31,753*	*30,301*	*27,070*	*21,169*	*21,451*

Fisheries: Swordfish longline Australia (**AUEL**); Swordfish longline EU and assimilated (**EUEL**); Swordfish longline semi-industrial (**ISEL**); Longline Japan and assimilated (**JPLL**); Longline Taiwan,China and assimilated (**TWLL**); Fresh tuna longline (**TWFL**); Other fisheries (**ALGI**)

Table 2. Best scientific estimates of the catches of swordfish by fishing area for the period 1950-2009 (in metric tons). Data as of May 2011

Area	By decade (average)						By year (last ten years)									
	1950s	1960s	1970s	1980s	1990s	2000s	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
NW	117	551	650	1,469	7,242	9,793	8,928	7,891	12,241	15,074	12,232	10,893	10,280	8,711	6,623	5,058
SW	14	256	405	621	8,603	7,659	10,751	8,962	7,573	4,012	6,325	9,714	8,956	7,435	6,284	6,574
WS	0	3	63	132	80	18	18	14	45	32	31	15	5	13	4	4
NE	154	448	747	2,097	6,202	6,676	8,626	6,531	6,242	8,767	8,545	5,253	6,567	5,620	4,526	6,079
SE	37	204	311	353	2,379	5,896	4,944	6,538	5,801	8,524	10,022	5,877	4,494	5,291	3,731	3,738
ES	0	5	12	10	10	2	5	14	0	0	1	0	0	0	0	0

Areas: Northwest Indian Ocean (**NW**); Southwest Indian Ocean (**SW**); South Indian Ocean, western (**WS**); Northeast Indian Ocean (**NE**); Southeast Indian Ocean (**SE**); South Indian Ocean, eastern (**ES**)

Figure 1: Areas used for the assessment of swordfish (catches from areas WS/ES were assigned to areas SW/SE for the assessment)
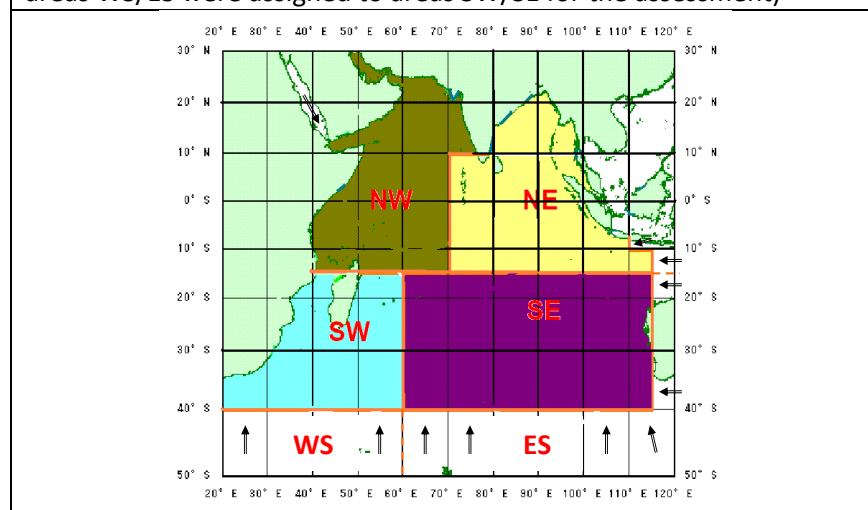
Swordfish (2000–2009)
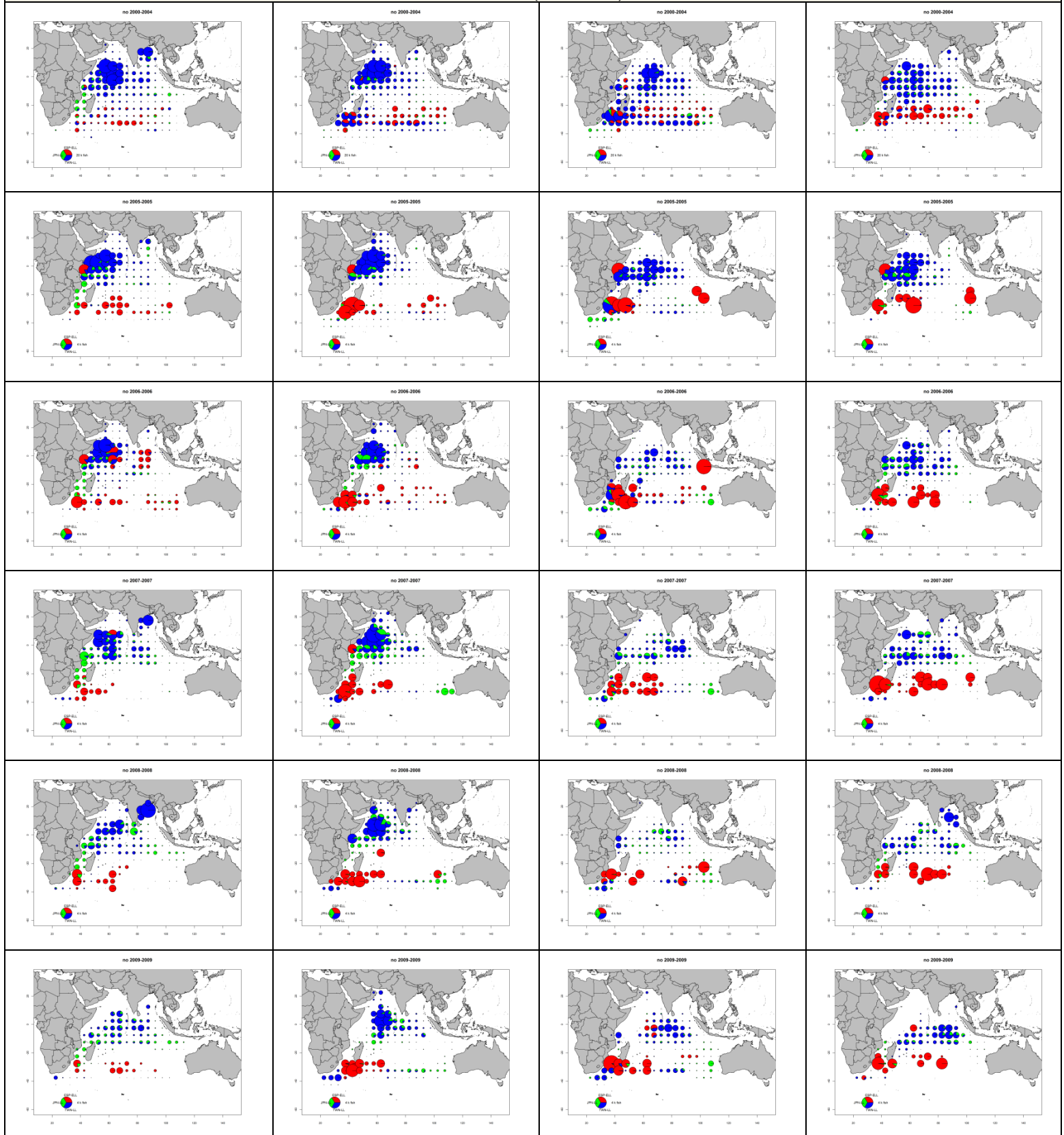
Map 37-60: Catches of swordfish (SWO; in number) from longline vessels flagged in Japan, Taiwan,China and Spain, by year, quarter and 5 degree square grid, for the years 2000-2009.

Figure 2: Catches of swordfish (metric tons) by type of fishery and year (1950-2009)
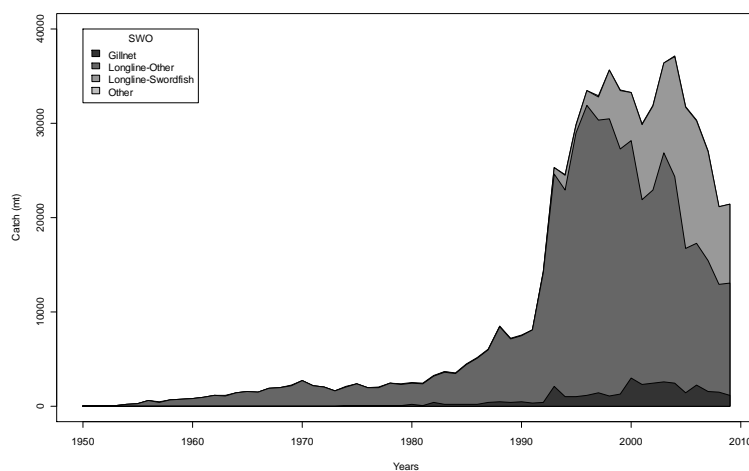

Figure 3: Swordfish average weight derived from catches-at-size estimated from the available length frequency samples of swordfish (average weights are shown only for years in which samples of swordfish are available)
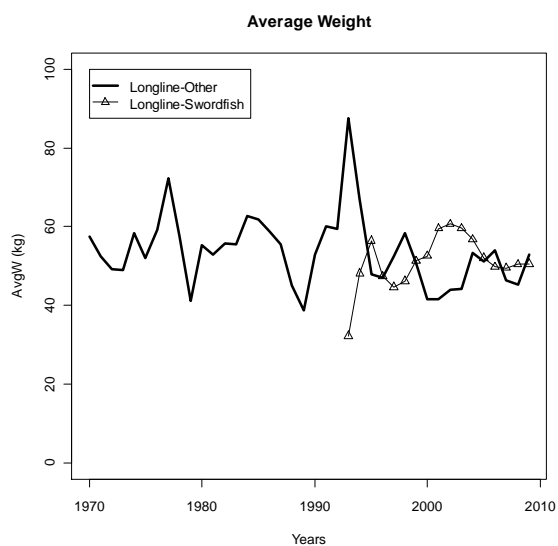
Figure 4: Number of swordfish measured for length; longline fleets targeting swordfish (continuous line); other longline fleets (triangle); other fleets (circle).
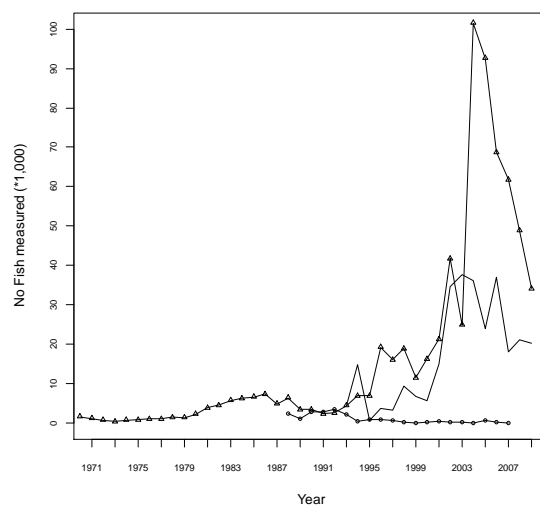

Figure 5: Number of squares fished *vs.* squares with swordfish catch for longliners of Japan
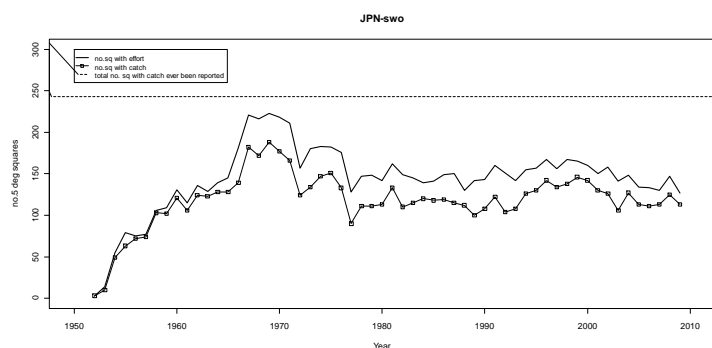
Figure 6: Number of squares fished *vs.* squares with swordfish catch for longliners of Taiwan,China
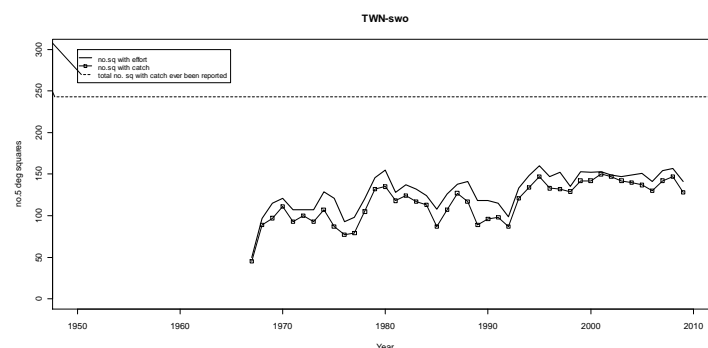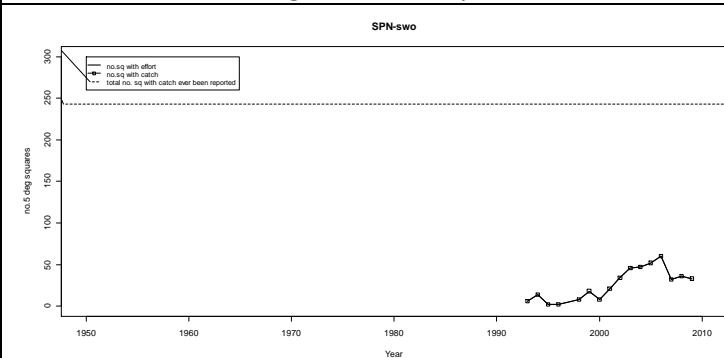
Figure 7: Number of squares fished *vs.* squares with swordfish catch for longliners of EU-Spain	

Blue marlin (BUM)

Table 3. Best scientific estimates of the catches of blue marlin by type of fishery for the period 1950-2009 (in metric tons). Data as of May 2011

Fishery	By decade (average)						By year (last ten years)									
	1950s	1960s	1970s	1980s	1990s	2000s	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Longline	2,563	3,512	3,473	4,960	7,115	7,221	8,172	5,940	7,423	8,784	8,451	7,391	7,541	6,094	6,151	6,257
Gillnet	3	4	10	194	2,406	2,786	3,524	4,732	2,219	2,124	1,972	3,188	3,842	2,059	1,921	2,276
Line	11	23	33	313	341	24	27	27	26	25	24	17	21	25	26	23
Other	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	*2,576*	*3,539*	*3,517*	*5,466*	*9,863*	*10,030*	*11,724*	*10,699*	*9,669*	*10,933*	*10,446*	*10,596*	*11,405*	*8,177*	*8,099*	*8,557*

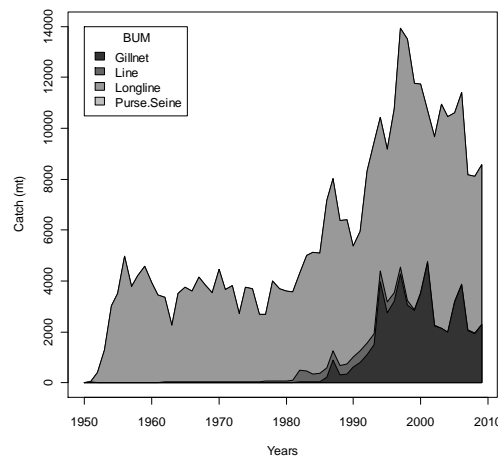Figure 8: Catches of blue marlin (metric tons) by type of fishery and year (1950-2009)

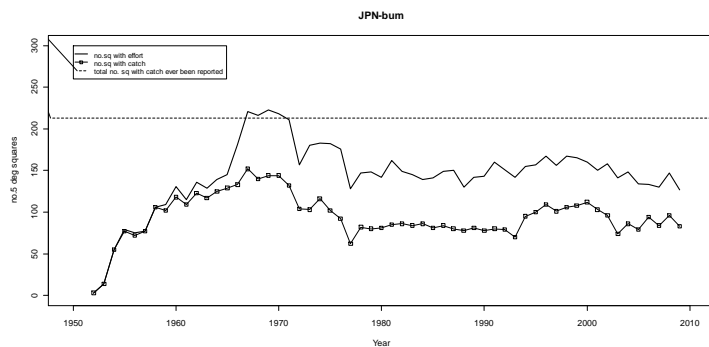Figure 9: Number of squares fished *vs.* squares with blue marlin catch for longliners of Japan

Figure 10: Number of squares fished *vs.* squares with blue marlin catch for longliners of Taiwan,China
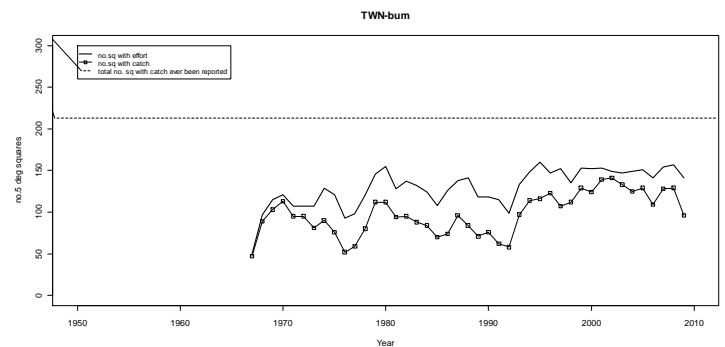
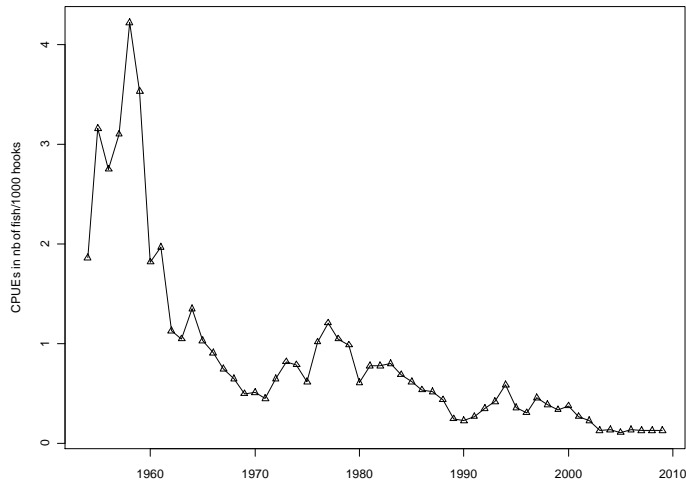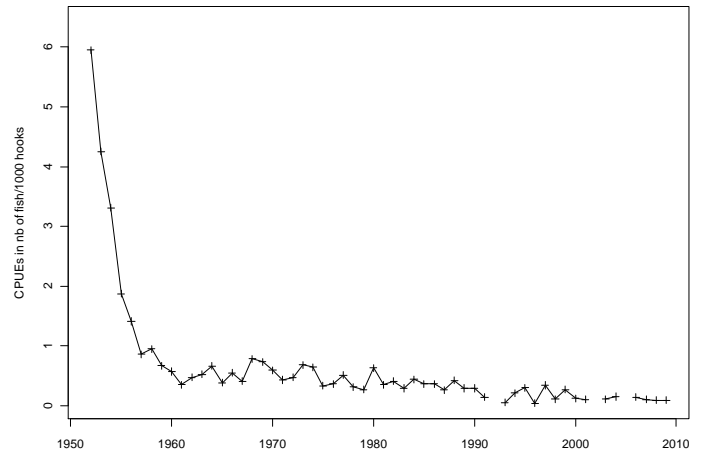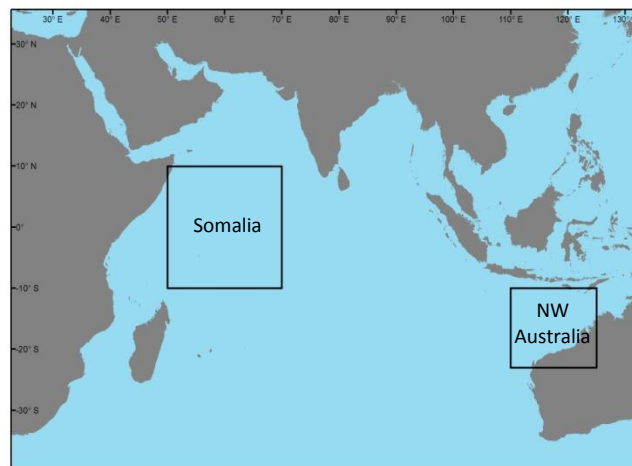| Figure 11: Nominal CPUE (number of fish by 1,000 hooks) of blue marlin caught by Japanese longliners off-Somalia	Figure 12: Nominal CPUE (number of fish by 1,000 hooks) of blue marlin caught by Japanese longliners northwest Australia

Figure 13: CPUE areas for marlins

Figure 14: Number of 5 degree squares with at least 10 fish caught for blue marlin (BUM)
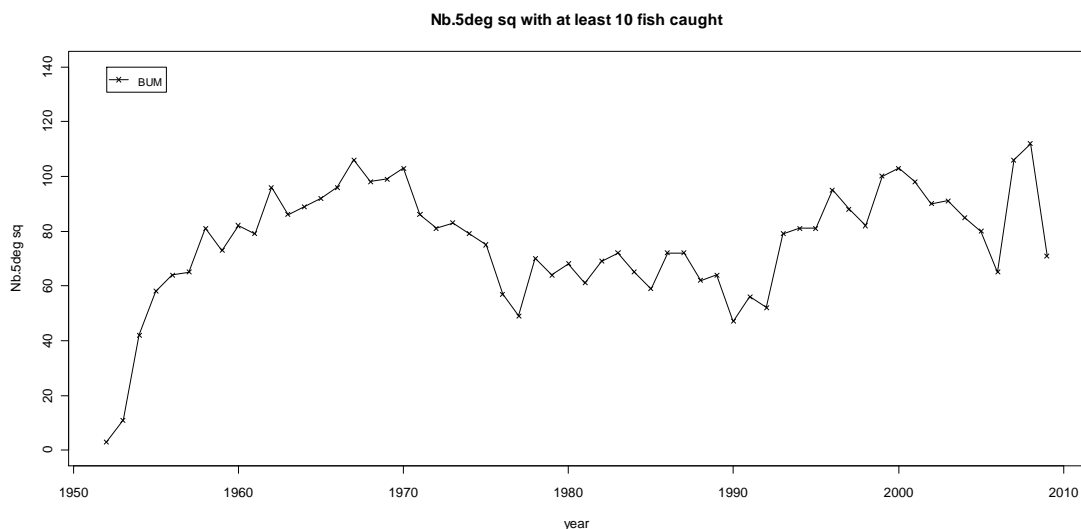
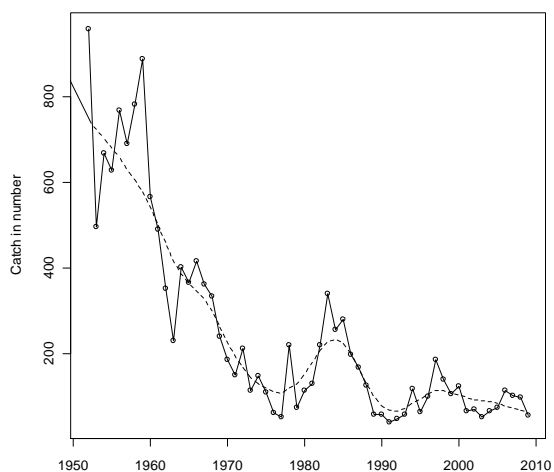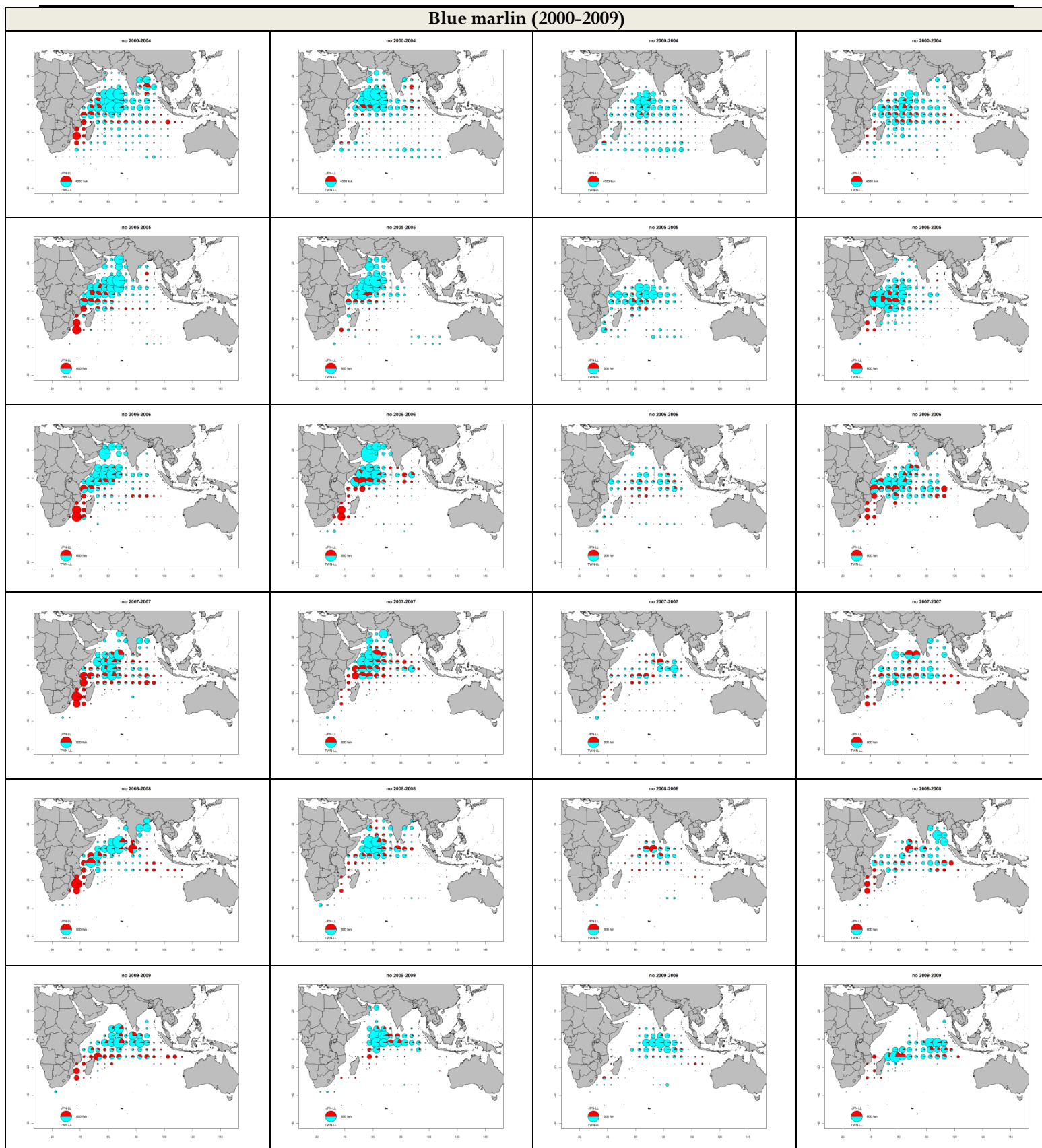**Nb.5deg sq with at least 10 fish caught**

Figure 15: Average catch (number of fish) in the three 5 degree square grids recording the highest catches of blue marlin in the Indian Ocean for the combined Japan and Taiwan,China longline fleets (1952-2009)

Blue marlin (2000–2009)

Map 61-84: Catches of blue marlin (BUM; in number) from longline vessels flagged in Japan and Taiwan,China, by year, quarter and 5 degree square grid, for the years 2000-2009.

Black marlin (BLM)

Table 4. Best scientific estimates of the catches of black marlin by type of fishery for the period 1950-2009 (in metric tons). Data as of May 2011

Fishery	By decade (average)						By year (last ten years)									
	1950s	1960s	1970s	1980s	1990s	2000s	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Longline	846	1,633	1,288	1,370	1,501	1,933	1,651	1,247	1,462	2,293	1,987	2,005	2,112	1,899	2,308	2,364
Gillnet	47	60	115	475	1,687	2,047	2,293	2,552	1,602	1,591	1,597	2,162	2,453	1,961	2,086	2,173
Line	15	19	25	177	231	213	127	146	162	183	195	201	250	273	311	285
Other	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0
Total	*908*	*1,713*	*1,431*	*2,023*	*3,419*	*4,193*	*4,071*	*3,945*	*3,226*	*4,068*	*3,780*	*4,369*	*4,815*	*4,133*	*4,706*	*4,823*

Figure 16: Catches of black marlin (metric tons) by type of fishery and year (1950-2009)
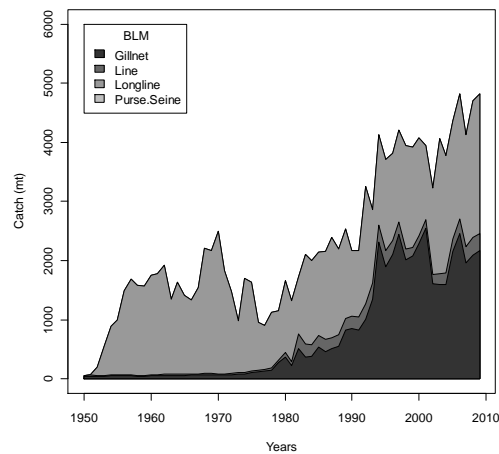

Figure 17: Number of squares fished *vs.* squares with black marlin catch for longliners of Japan
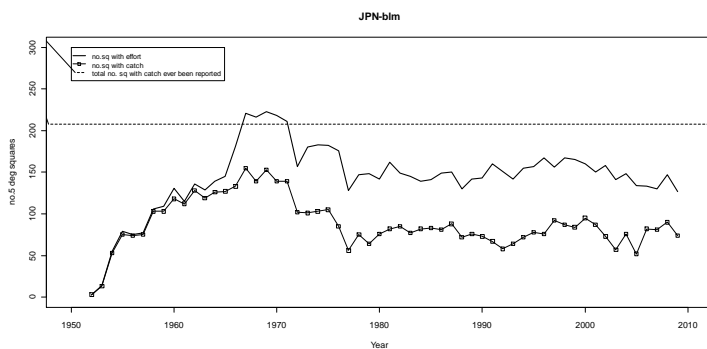

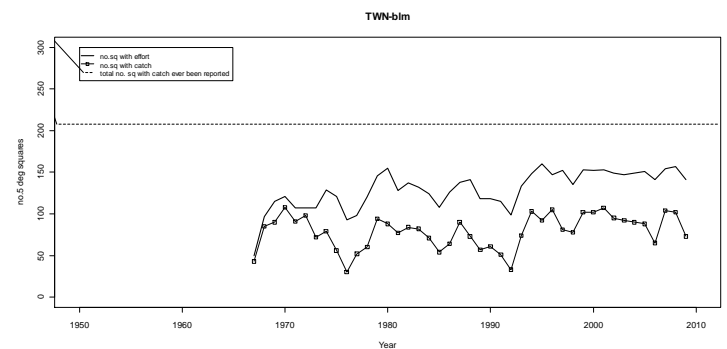Figure 18: Number of squares fished *vs.* squares with black marlin catch for longliners of Taiwan,China

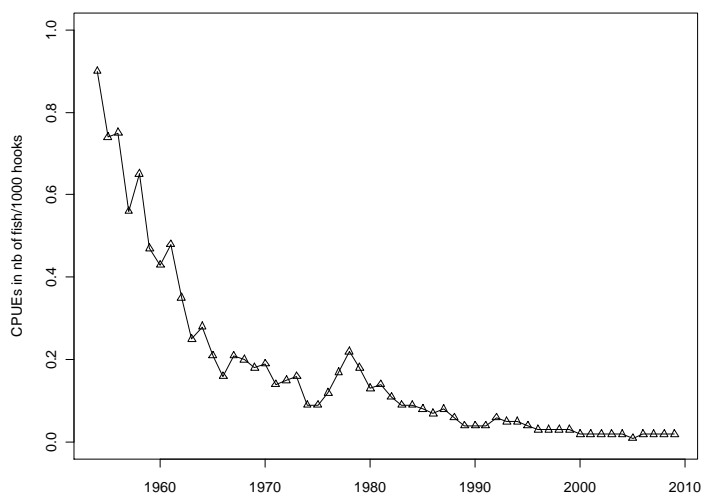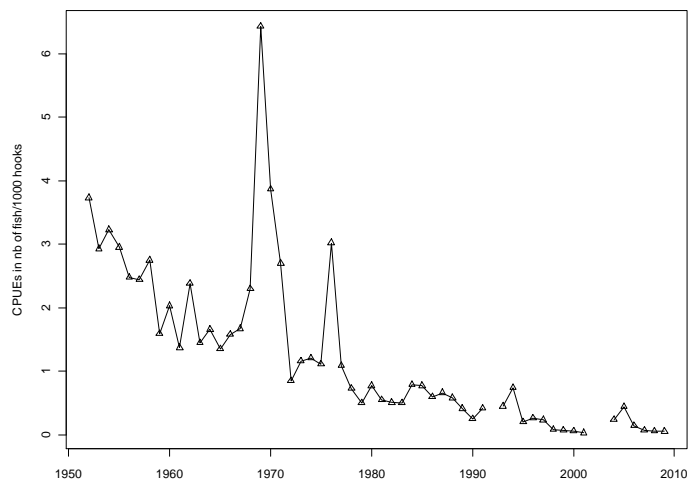| Figure 19: Nominal CPUE (number of fish by 1,000 hooks) of black marlin caught by Japanese longliners off-Somalia (Area as shown in Figure 13)	Figure 20: Nominal CPUE (number of fish by 1,000 hooks) of black marlin caught by Japanese longliners northwest Australia (Area as shown in Figure 13)

Figure 21: Number of 5 degree squares with at least 10 fish caught for black marlin (BLM)
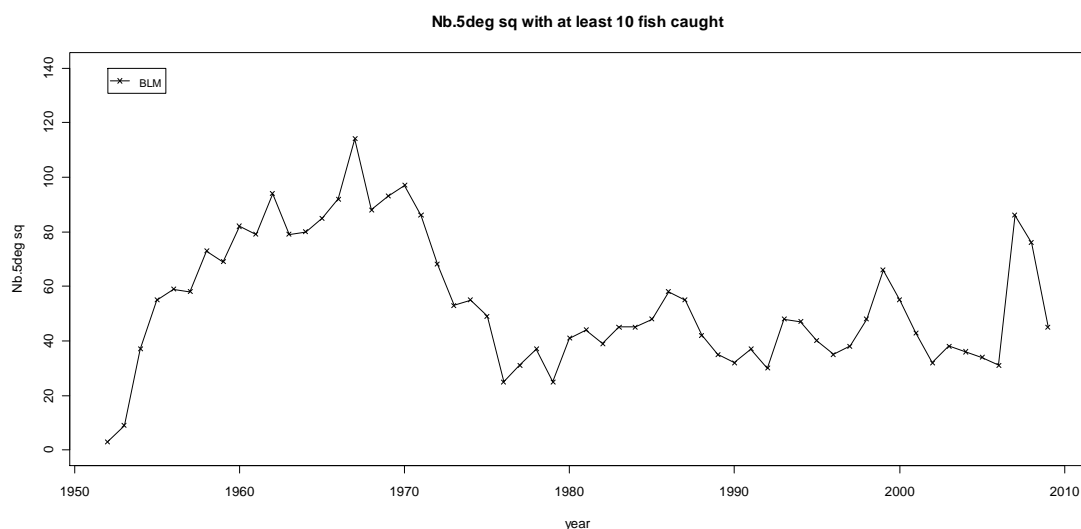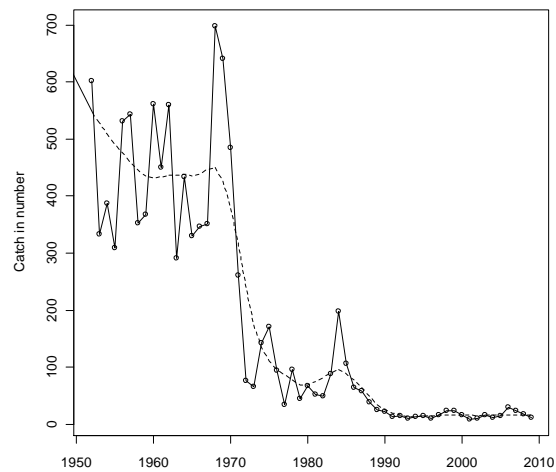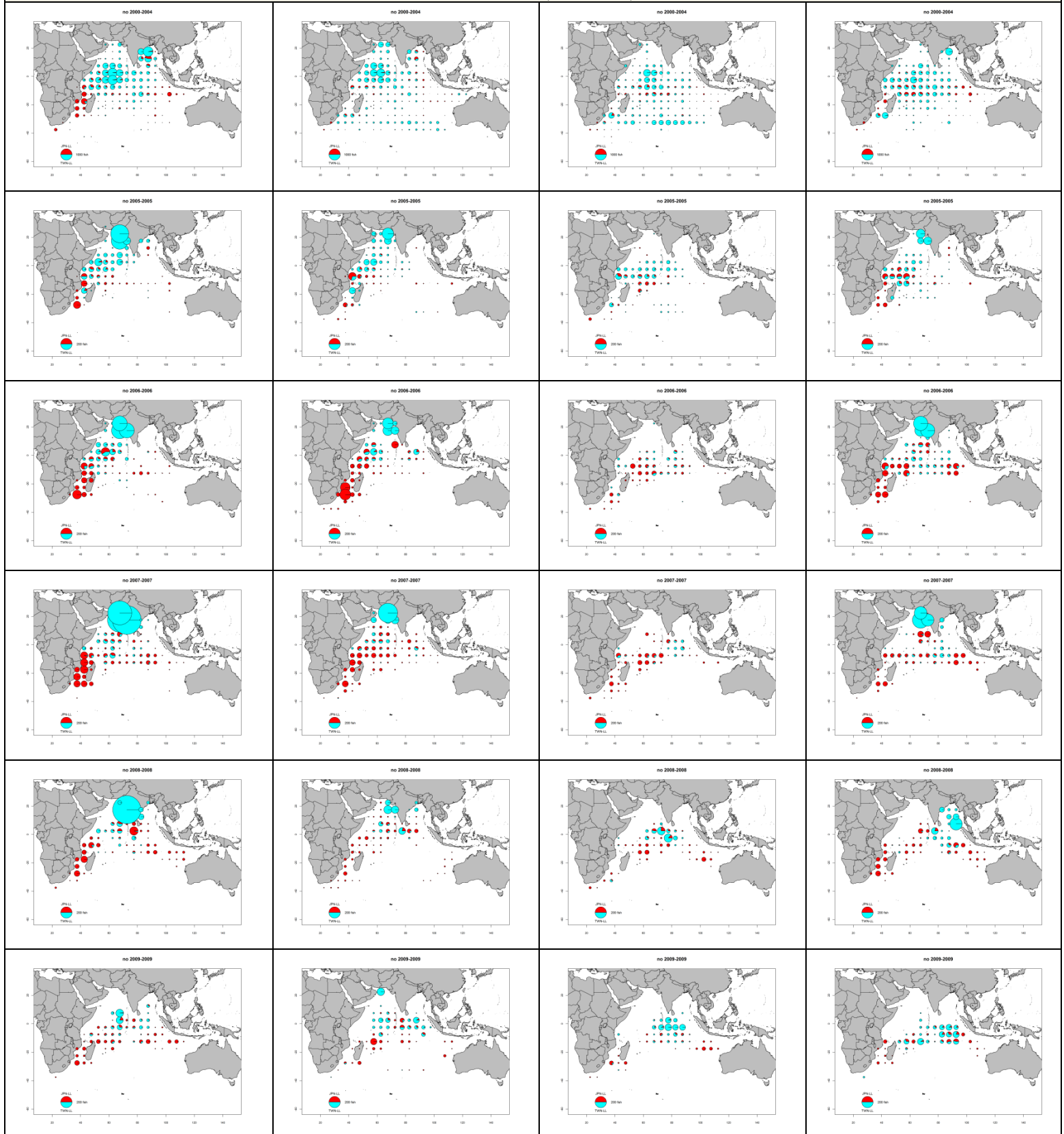
Figure 22: Average catch (number of fish) in the three 5 degree square grids recording the highest catches of black marlin in the Indian Ocean for the combined Japan and Taiwan,China longline fleets (1952-2009)

Black marlin (2000–2009)

Map 85-108: Catches of black marlin (BLM; in number) from longline vessels flagged in Japan and Taiwan,China, by year, quarter and 5 degree square grid, for the years 2000-2009.

Striped marlin (MLS)

Table 5. Best scientific estimates of the catches of striped marlin by type of fishery for the period 1950-2009 (in metric tons). Data as of May 2011

Fishery	By decade (average)						By year (last ten years)									
	1950s	1960s	1970s	1980s	1990s	2000s	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Longline	1,024	3,077	3,616	5,043	5,043	3,016	3,852	3,073	3,114	3,119	3,733	2,971	3,160	2,589	2,489	2,060
Gillnet	2	3	6	25	60	82	83	92	65	66	75	78	89	81	96	96
Line	0	0	1	11	35	39	44	46	39	38	35	36	36	41	41	29
Other	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0
Total	*1,026*	*3,080*	*3,626*	*5,080*	*5,138*	*3,137*	*3,979*	*3,210*	*3,218*	*3,223*	*3,842*	*3,085*	*3,286*	*2,712*	*2,626*	*2,185*

Figure 23: Catches of striped marlin (metric tons) by type of fishery and year (1950-2009)
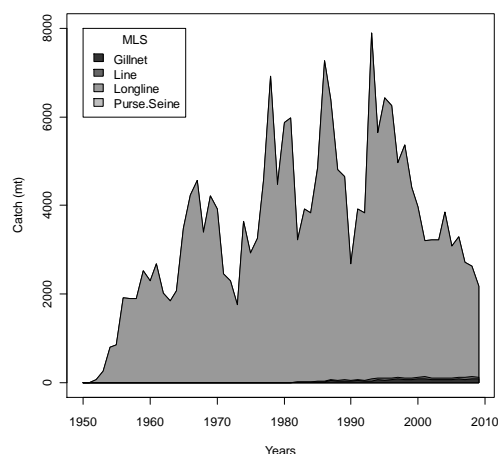

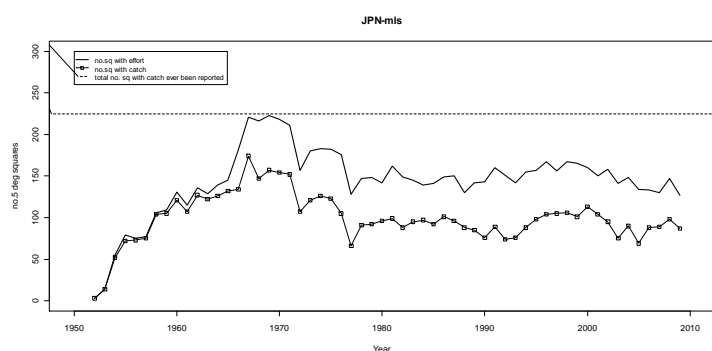Figure 24: Number of squares fished *vs.* squares with striped marlin catch for longliners of Japan

Figure 25: Number of squares fished *vs.* squares with striped marlin catch for longliners of Taiwan,China
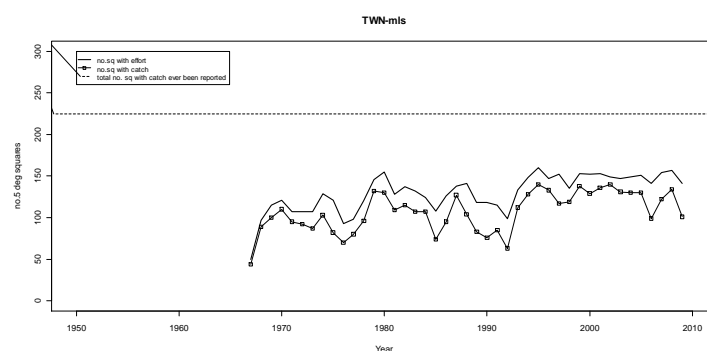
Figure 26: Nominal CPUE (number of fish by 1,000 hooks) of striped marlin caught by Japanese longliners off-Somalia (Area as shown in Figure 13)
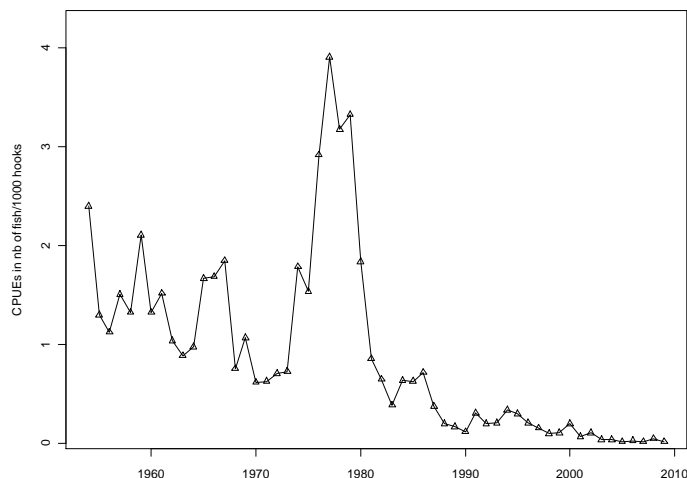
Figure 27: Nominal CPUE (number of fish by 1,000 hooks) of striped marlin caught by Japanese longliners northwest Australia (Area as shown in Figure 13)
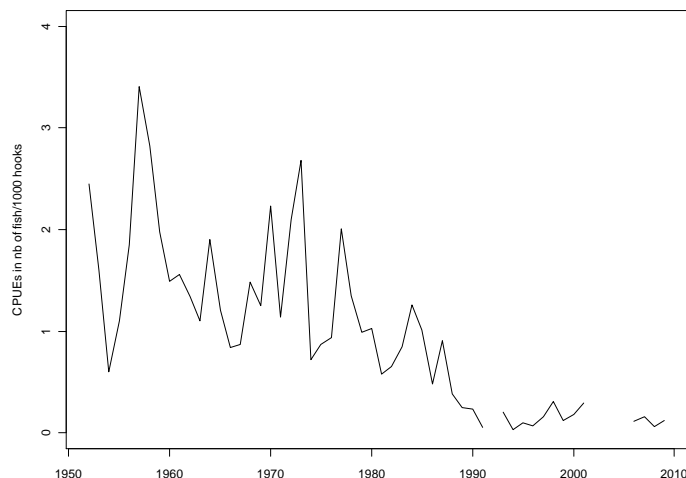
Figure 28: Number of 5 degree squares with at least 10 fish caught for striped marlin (MLS)

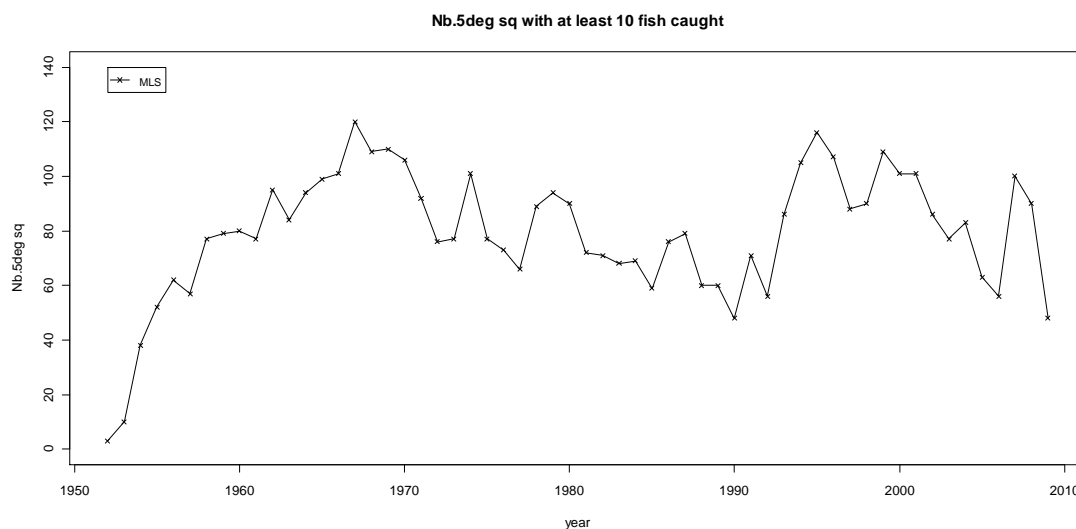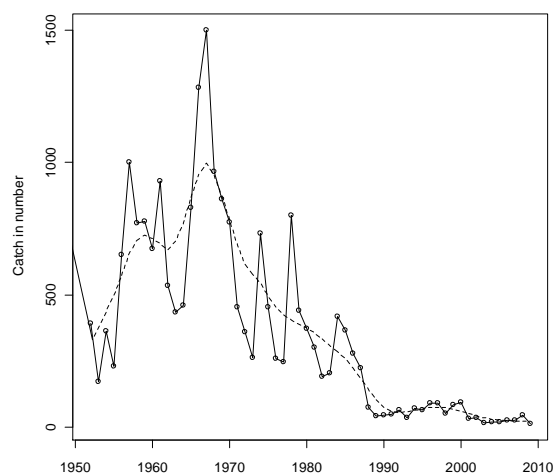Nb.5deg sq with at least 10 fish caught

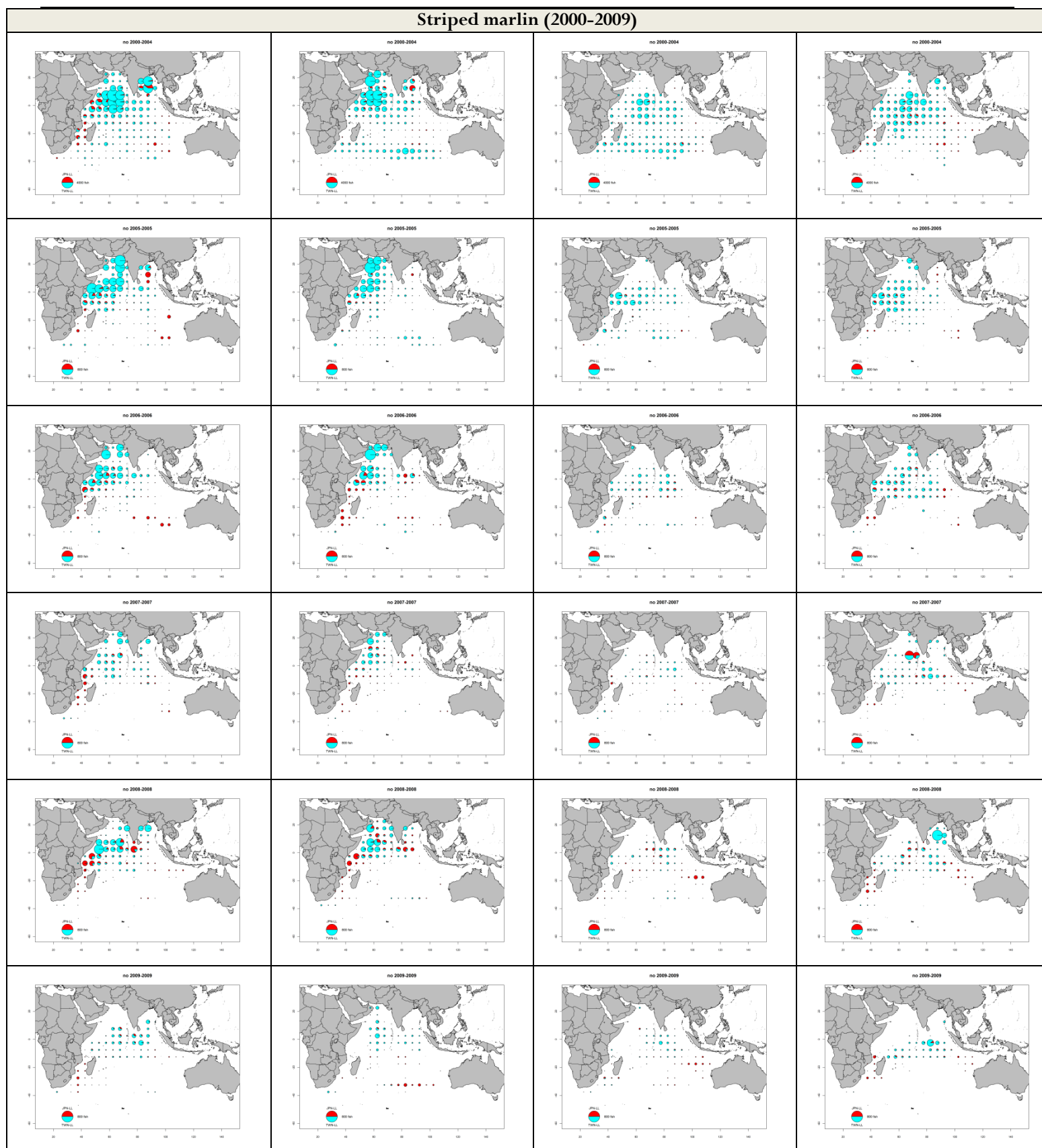Figure 29: Average catch (number of fish) in the three 5 degree square grids recording the highest catches of striped marlin in the Indian Ocean for the combined Japan and Taiwan,China longline fleets (1952-2009)

Striped marlin (2000-2009)

Map 109-132: Catches of striped marlin (MLS; in number) from longline vessels flagged in Japan and Taiwan,China, by year, quarter and 5 degree square grid, for the years 2000-2009.

Indo-Pacific sailfish (SFA)

Table 6. Best scientific estimates of the catches of Indo-Pacific sailfish marlin by type of fishery for the period 1950-2009 (in metric tons). Data as of May 2011

Fishery	By decade (average)						By year (last ten years)									
	1950s	1960s	1970s	1980s	1990s	2000s	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Longline	299	819	450	343	1,425	1,374	878	787	1,139	2,036	927	1,394	1,398	2,021	1,977	1,181
Gillnet	164	176	542	2,292	7,612	16,246	13,702	10,846	12,193	15,521	24,242	21,440	20,558	14,240	13,264	16,452
Line	106	155	260	1,262	2,741	3,246	3,010	2,947	2,954	2,842	2,947	3,635	3,714	3,474	3,506	3,432
Other	1	1	50	25	3	2	2	2	2	2	2	2	2	2	2	2
Total	*570*	*1,151*	*1,302*	*3,922*	*11,782*	*20,867*	*17,592*	*14,581*	*16,288*	*20,400*	*28,116*	*26,470*	*25,672*	*19,736*	*18,749*	*21,067*

Figure 30: Catches of Indo-Pacific sailfish (metric tons) by type of fishery and year (1950-2009)
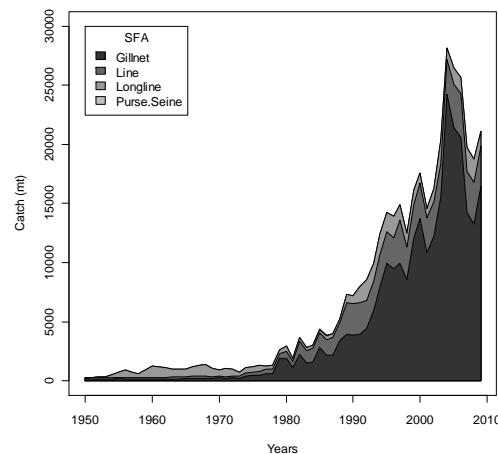

Figure 31: Number of squares fished *vs.* squares with Indo-Pacific sailfish catch for longliners of Japan
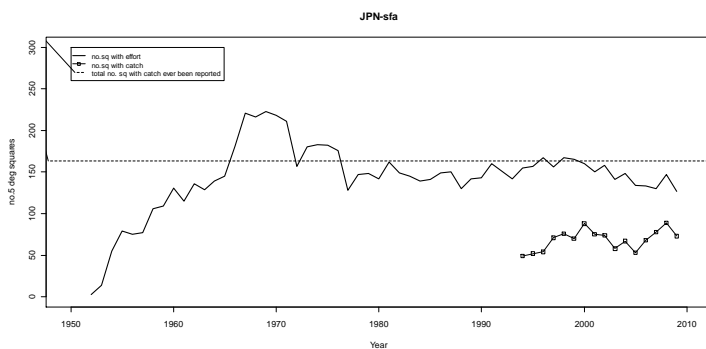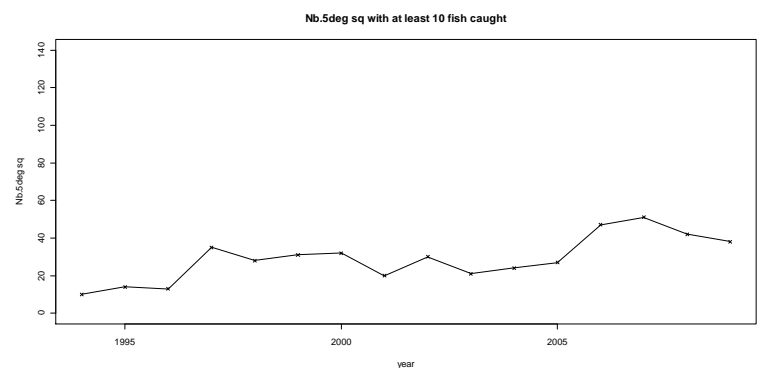

Figure 32: Number of 5 degree squares with at least 10 fish caught for Indo-Pacific sailfish (SFA)

Indo-Pacific sailfish (2000–2009)

Map 133-156: Catches of Indo-Pacific sailfish (SFA; in number) from longline vessels flagged in Japan, by year, quarter and 5 degree square grid, for the years 2000-2009.