NATIONAL FISHERY REPORT 2003 - AUSTRALIA

Don Bromhead, Scott Graham and John Kalish

Bureau of Rural Sciences
Department of Agriculture, Fisheries and Forestry
Canberra, ACT, Australia

ABSTRACT

This paper summarises catch, effort and fleet statistics for Australian tuna and billfish fisheries operating in the Indian Ocean Tuna Commission (IOTC) area of competence in the 2002 calendar year, as well as providing some historical perspective on domestic catch and effort trends in this region. The predominant gear used by Australian vessels catching tuna and billfish in the IOTC area of competencewere longline and purse seine. Total longline effort in 2002 was 5.98 million hooks, down from more than 6.2 million hooks in 2001. The longline fishery targets swordfish (2000 mt in 2002), but also takes significant catches of yellowfin (354 mt), and bigeye (418 mt). Catches of swordfish and yellowfin were slightly lower than in 2001, but bigeye catches were slightly higher than in 2001 (385 mt). There were 40 domestic longliners fishing in this region in 2002, a decline from 50 vessels in 2000. The purse seine fishery targets southern bluefin tuna which are towed to cages near shore for fattening. Late season catches of skipjack are taken by purse seiners in some years. In 2002, 1144 mt of skipjack was caught by purse seine (up from 897 mt in 2001). Just over 5000 mt of southern bluefin has been caught and towed to fattening cages by domestic purse seiners in each of the past four years.

1 – INTRODUCTION

This paper summarises catch and effort by Australian domestic tuna and billfish fisheries in the Indian Ocean Tuna Commission (IOTC) area of competence in 2002, as well as presenting some historical effort data and catch data for the main target species for comparison. Details of active fleet size are also provided where possible. Australia's tuna and billfish fisheries are managed by the Australian Government as the Southern and Western Tuna and Billfish Fishery (SWTBF), Southern Bluefin Tuna Fishery (SBTF) and the Eastern Tuna and Billfish Fishery (ETBF) (Caton 2002). The vast majority of the catches taken by Australian vessels in the IOTC area of competence are by vessels licensed to operate in the SWTBF and the SBTF. However, in some years large catches of skipjack tuna are taken in the south western Pacific Ocean, between 148°E and 150°E longitude which is included in Australia's ETBF. The predominant domestic gear types catching tuna and billfish are longline and purse seine. There is also an active recreational fishery operating in this area targeting tuna and billfish.

2 - LONGLINE FISHERY

Complete longline catch and effort data are available to the end of 2002. Catch and effort statistics were compiled using logbook data. Historically, the main catch in Australia's western waters was taken by Japanese longliners operating in the Australian Fishing Zone (AFZ) under bilateral agreements. They targeted high-value bigeye (*Thunnus obesus*) in the southwest, and yellowfin (*T. albacares*) and striped marlin (*Tetrapturus audax*) in the northwest. The last bilateral agreements allowing fishing by Japanese longliners in the AFZ ended on November 1997. A domestic pelagic longline fishery has developed subsequently, using monofilament mainline gear and targeting broadbill swordfish (*Xiphius gladius*), with minor catches of bigeye and yellowfin tuna (Kalish 2002).

2-1. Fishing vessels

Most Australian longliners operating in the IOTC region are 15–30 m long and fish with monofilament-longline gear. They store their catch on ice, in ice slurry or in brine spray systems. Trips are generally of 3–10 days' duration with a set of generally less than 1000 hooks before sunrise each day, although during 2001 daytime setting south of 30°S was restricted to minimise interactions with seabirds. The longliners that target swordfish, the main catch of the fishery, use shallow (20–120 m) night sets with squid baits and chemical light-sticks. Most longlining activity is within the AFZ, but effort beyond the 200 mile limit has increased in recent years. The range offshore is limited for most vessels by their small size and lack of freezer facilities. In the west, most of the catch is landed at three ports: Fremantle, Geraldton and Carnarvon. Most of the southern landings have been made at Albany and, more recently, Port Lincoln. Significant distances between some fishing grounds and ports have resulted in longer trips (of up to 14 days) (Kalish 2002).

The majority of longline vessels operating in the IOTC region are licensed by the Australian Fisheries Management Authority (AFMA) to fish in the Southern and Western Tuna and Billfish Fishery. AFMA issued a total of 90 domestic longline permits in 2001, the same number as in 2000. Forty longline vessels were active (i.e. fished more than one day) in this region in 2002 compared to 43 in 2001 and 50 in 2000 (see Table 1). This follows a rapid increase in the number of active longliners since 1997 when there were only 9 active vessels operating in the fishery.

Recent years have been characterised by the replacement of small (15–20 m) longliners, with the larger purpose-built vessels able to operate under a wider range of weather conditions and further offshore. The lack of freezer capacity on domestic longline vessels limits the range of operations, but with potentially large catches of bigeye tuna and broadbill swordfish just beyond the AFZ, freezer vessels may be economically viable.

2-2. Fishing Effort

Australia has one of the largest Exclusive Economic Zones (EEZ) in the world with extensive waters in the Indian Ocean region; however, catches of tuna and billfish have been relatively low in these waters, particularly in the more coastal areas. In the north, the Australian EEZ extending into the Indian Ocean has a wide continental shelf and this limits tuna fisheries in this region. Longline fishing effort has been concentrated in oceanic waters along the western and southern coasts in particular in regions associated with undersea plateaus and banks between 20ºS and 40ºS (Figure 1). Fishing rarely extended beyond the EEZ prior to 1999, but there has been increasing activity recorded outside the EEZ in the period since. In 2001 large catches of skipjack tuna were taken in the south western Pacific Ocean between 148°E and 150°E longitude, an area included in the IOTC area of competence.

In the SWTBF, fishing effort increased from 0.5 million hooks in 1997 to 6.21 million hooks in 2001, making it Australia's fastest growing fishery during that period. In 2002, a slight decrease in effort occurred with 5.98 millions hooks set and a small decrease in the number of vessels engaged in fishing.

2-3. Catch

The domestic longline fishery in the IOTC region had been, up to 2001, one of the most rapidly growing fisheries in Australia; the total catch increased six-fold between 1997 (370 t) and 2000 (2500 t), reflecting a more than 10 fold increase in total effort (0.5 million to 6.2 million hooks). The longline fishery targets predominantly broadbill swordfish, but also catches bigeye tuna and yellowfin tuna, with most of the catch exported fresh-chilled to markets in Japan and the USA.

Information on catch in weight from 1990 to 2002 caught by Australian longliners in the Indian Ocean region is shown in Table 2 and the geographical distribution of catch in 2002 for the target species are shown in Figures 2 to 4.

Catches of the principal target species, broadbill swordfish, were slightly less in 2002 (1999 mt) than in 2001 (2135 mt) which represented the peak catch of swordfish for the SWTBF since its development. Swordfish annual catches had increased rapidly to this peak from around 235 mt in 1998. Yellowfin and bigeye are caught in similar amounts in this fishery, although there is some variation between years in relative proportions. 354 mt of yellowfin were caught in 2002, significantly less than in the three previous years, which had catches of more than 400 mt (peaking at 557 mt in 2001). Catches of bigeye have varied between 385 – 433 mt over the past four years, with 418 mt caught in 2002. A number of byproduct species are taken in smaller, but still significant amounts including albacore (71 mt in 2002), blue shark (52 mt) and rudderfish (31 mt) (Table 2) Catches of rudderfish may be overestimated due to incorrect identification of escolar and oilfish as rudderfish. Catches of marlin species are included in Table 2; however, a landing ban on istiophorid species was enforced by the Western Australian government in 1999, hence retained catch of marlin since this time has been low or zero.

Japanese catches in the western Australian AFZ: In 1999 the domestic SWTBF catches first exceeded the historic Japanese average annual AFZ catches for the principal tuna and billfish species. The peak Japanese combined longline catch for albacore, bigeye, yellowfin, swordfish and striped marlin was 1643 t in 1987. The 1987 Japanese peak SWTBF-region catch was dominated by 892 t of bigeye tuna, far greater than their (next largest) 1993 bigeye catch of 384 t. In most years between 1983 and 1997 the Japanese catch was dominated by yellowfin tuna, but the catches were highly variable, ranging between 3 t and 866 t (Kalish 2002).

3 - PURSE SEINE FISHERY

In the IOTC area of competence, most Australian purse seiners targeting tunas operate in the Southern Bluefin Tuna Fishery, with purse seiners employed to catch schooling southern bluefin tuna. After capture, the purse seiners tow the southern bluefin tuna to farm pens in Port Lincoln (Great Australian Bight – Southern Australia) where the fish are fattened for subsequent sale on Japanese markets. Skipjack has occasionally been a target of purse seiners following the end of the southern bluefin tuna surface fishery around March to April, with catches of more than 1000 mt taken in some years.

3-1. Fishing vessels

The southern bluefin tuna farm operations use purse seine vessels to catch fish, with assistance by former pole-and-line vessels as bait boats and the support of spotter planes (Findlay 2003).

Seven purse seine vessels fished for southern bluefin tuna in the 2001-02 financial year, with the assistance of various live bait, pontoon-towing and feeding vessels. Fishing for that financial year commenced in late December 2001 and finished in March 2002 (Findlay 2003). Purse seine fishers often use spotter aircraft and satellite thermal imagery to locate schools. Most purse seine vesssels are 20-25m long (two are 40-45m) (Caton 2002).

3-2. Fishing Effort

During the 2001-2002 southern bluefin tuna quota year (1 December 2001 to 30 November 2002) purse seiners spent 1308 vessel search hours fishing for southern bluefin tuna and made 159 purse seine sets. In 2002, 267 hours were spent by purse seiners in this region fishing for skipjack tuna.

3-3. Catch

Since 1990, most of the domestic catch of skipjack in the IOTC region of competence has been taken by purse seine (lone or assisted by pole and line). Off the South Australian coast, where the southern bluefin tuna fishery operates, skipjack has been a late season (March-April) target of purse seiners and the total annual catch has varied between 300-1400 mt during the mid to late 1990s. In recent years, purse seine catch has increased from 486 mt in 2000 to 1144 mt in 2002, with most of this being processed through the cannery at Port Lincoln (Table 2).

Since 1991, when purse seine towing of southern bluefin tuna to farms for fattening first commenced in this region, the purse seine catch of SBT has rapidly increased from 138 mt (1991) to over 5000 mt annually from 1998 onwards (Findlay 2003).

4 - RECREATIONAL FISHERY

Western Australia has a keen recreational fishing sector with gamefishers targeting sailfish (*Istiophorus platypterus*), black marlin (*Makaira indica*), blue marlin (*M. mazara*), striped marlin (*Tetrapturus audax*) and yellowfin tuna. Consideration of recreational fishing interests in the late 1980s had resulted in the prohibition of Japanese longlining within 50 nm of the Western Australian coast. It also led to Japanese agreement that billfish other than swordfish would not be targeted, and that all black and blue marlin taken alive would be released. In 1994 Western Australia passed legislation preventing the landing of all billfish of the family Istiophoridae. However, this legislation was not enforced until December 1999. Meanwhile, in 1998 the Australian Government banned the retention of blue and black marlin, whether alive or dead, taken anywhere in the AFZ by commercial fishing.

5. – OBSERVER PROGRAM

The “Pilot Scientific Monitoring Program for the Southern and Western Tuna and Billfish Fishery” commenced in March 2003. The program is a collaborative arrangement between, the Bureau of Rural Sciences (BRS), Western Australian Fisheries (a state fisheries agency), Western Australian Pelagic Longliners Association (an industry association), the longlining industry and the Australian Fisheries Management Authority (AFMA).

The primary objectives of the Pilot Scientific Monitoring Program are to collect from the SWTBF:

- information on species composition and quantities, weight and length structure and other related catch information on retained and discarded catch;
- biological data and samples, as required by scientific researchers (e.g. age, growth and reproduction studies);
- information on wildlife interactions with the vessel and its fishing gear
- information on operational aspects of the vessel (e.g. gear, processing methods, bait)
- environmental and oceanographic data.

Five observer trips were completed between March to October 2003 and a total of 45 longline sets were observed. Fish species recorded on longlines by the observers are listed in Table 3.

6 - RESEARCH

The following is a list of current research activities that are investigating issues relevant to the Southern and Western Tuna and Billfish Fishery. The organisations

engaged in the research activity are indicated. Research focusing on the Southern Bluefin Tuna Fishery and the Eastern Tuna and Billfish Fishery is not included.

- Development of a robust set of stock status indicators for the Southern and Western, and the Eastern Tuna and Billfish Fisheries (CSIRO Marine Laboratories, Hobart)
- Pilot scientific monitoring program for the Southern and Western Tuna and Billfish Fishery (BRS Fisheries and Marine Sciences Program, Canberra)
- A review of byproduct interactions, biology and economics in Australia's tuna and billfish fisheries (BRS Fisheries and Marine Sciences Program, Canberra)
- Southern and Western Tuna and Billfish Fishery size monitoring program (WW Fisheries Consultants, Sydney)
- Southern and Western Tuna and Billfish Fishery ecological risk assessment" (CSIRO Marine Laboratories; BRS Fisheries and Marine Sciences Program; Australian Fisheries Management Authority)
- Review and analysis of information required for the determination of Total Allowable Catch (TAC) and decision rules relevant to the Southern and Western Tuna and Billfish Fishery (CSIRO Marine Laboratories, Hobart)
- A scientific appraisal of the suitability of underwater setting chute technology as a seabird mitigation measure for Australian tuna longline fisheries (Brothers (consultant), Hobart)
- On-board chilled storage of broadbill swordfish: assessing and improving post harvest quality (Queensland Department of Primary Industry, Brisbane)
- Acoustic tracking system for marine mammals around fishing gear and preliminary trials of predation mitigation prototypes for line based fisheries (Queensland Fisheries Service, Brisbane)
- Educating fishers about sea turtles and sea turtle bycatch mitigation in Australia's longline fisheries (Belldi Consulting, Eumundi)

7 - ENVIRONMENTAL ISSUES

A number of environmental issues have been identified as being of concern in the Indian Ocean waters fished by Australia's domestic fisheries. They include the catches of sharks and marlins, interactions with seabirds and sea turtles, and the discarding and loss of fishing gear and packaging (Kalish 2002).

General bycatch issues: In response to bycatch issues, the Australian Fisheries Management Authority has formulated a Bycatch Action Plan for the three Australian Government – managed tuna fisheries (ETBF, SWTBF and SBTF). Over 60 marine species have been recorded from AFZ longline catches, including tuna and tuna-like species, billfish, sharks, rays, various other fish species, seabirds, and sea turtles and marine mammals. Commercial markets have developed in Australia and overseas for several other byproduct species, including escolar or black oilfish (*Lepidocybium flavobrunneum*), oilfish (*Ruvettus pretiosus*) and dolphinfish or mahi mahi

(*Coryphaena hippurus*). Species such as wahoo (*Acanthocybium solandri*) also have been identified as having commercial potential.

Shark bycatch: In 2000 a Bureau of Rural Sciences report highlighted high levels of shark bycatch and the widespread practice of 'shark finning' in Australia's tuna fisheries. Soon after, legislation was enacted that prohibits the practice of shark finning by Australian fishers.

Turtle bycatch: Bycatch of turtles has been reported in domestic longline logbooks and during interviews with Australian operators that fish in Indian Ocean waters. A Bureau of Rural Sciences project examined the extent of turtle bycatch in Australia's tuna longline fisheries and identified activities to mitigate interaction (Robins et al 2002). In addition, further research in this area has been supported.

Seabird bycatch: Industry and the Australian Government are exploring development of fishing practices to reduce the take of baits, thereby reducing the associated mortality of seabirds. In August 1998 the Minister for the Environment approved a Threat Abatement Plan to reduce the incidental catch of seabirds by longliners. All SWTBF operators are currently required to carry an approved bird-scaring 'tori' line; to use it and set at night only when operating south of 30ºS; and to not discharge offal during line setting and hauling (Caton 2002)

Lightsticks: Seabirds feeding on fish eggs deposited on floating lightsticks (from longline vessels) have been shown to occasionally accidentally swallow the lightsticks, and then regurgitate plastic fragments when feeding their chicks, potentially choking them. Recently, concerns have been expressed over large numbers of lightsticks washing ashore on the coast of Australia. Alternative types of lightstick (including a new design which does not unclip upon hauling) are being employed by some longliners (Caton 2002).

Live bait: Live bait is not often used in the SWTBF. The impact of the removal of baitfish on the ecology of coastal areas is not known, and the issue is being investigated in the eastern Australian tuna longline fisheries, where live bait is often used. If similar practices develop in the SWTBF, it will be important to consider the potential impact of baitfish removal on the ecosystem.

8 - FURTHER READING

Campbell, R.A., Tuck, G.N., Pepperell, J.G. and Larcombe J.W.P. (1998) *Synopsis on the Billfish Stocks and Fisheries Within the Western AFZ and the Indian Ocean.* Australian Fisheries Management Authority, Canberra, 122 pp.

Caton, A. (2002) *Fishery Status Reports 2001*. Bureau of Rural Sciences, Canberra, Australia.

Findlay, J. (2003) Australias 2001-02 southern bluefin tuna fishing season. Working Paper CCSBT-SC/ presented at the Seventh Meeting of the Scientific Committee of the Commission for the Conservation of Southern Bluefin Tuna September 2003,Christchurch New Zealand.

Kalish, J.M. (2002) Southern and Western Tuna and Billfish Fishery. *In* Caton (ed.) *Fishery Status Reports*, Bureau of Rural Sciences, Canberra, Australia.

Larcombe, J.W.P., Caton, A., Williams, D.McB. and Speare, P.J. (1997) *Western Tuna and Billfish Fisheries Research.* Bureau of Resource Sciences, Canberra, 205 pp.

Robins, C.M., Bache, S. and Kalish, S. (2002) *Interactions between sea turtles and Australia's longline fisheries*. Bureau of Rural Sciences, Canberra.

Williams, K. (1984) Australian skipjack surveys inconclusive. *Australian Fisheries* 43(20):34–38.

Table 1 – Number of Australian longline vessels actively fishing between 1986 and 2002 in the Indian Ocean. (Active vessels denoted by vessels fishing one or more days).

Year	Active vessels
1986	1
1987	3
1988	3
1989	6
1990	7
1991	4
1992	7
1993	9
1994	16
1995	15
1996	11
1997	9
1998	19
1999	37
2000	50
2001	43
2002	40

Table 2 – Total annual effort and catch as whole estimated weights (scaled up from landed processed weights) for three target species (yellowfin tuna, bigeye tuna and swordfish), three major byproduct species (albacore tuna, dolphinfish and rudderfish) and three marlin species caught by Australian fisheries operating in the Southern and Western Tuna and Billfish Fishery between 1990-2002. Species catches are for the longline fishery, with the exception of skipjack, which is caught by the purse seine fishery. According to Campbell (2001), data recorded by fishers in the early years is likely to be a mix of whole and processed weights, therefore the data presented here for years prior to 2000 are likely to be underestimates of whole weight.

Year	Effort (hooks x 10^6)	Yellowfin	Bigeye	Swordfish	Skipjack*	Albacore	Blue Shark	Rudderfish	Blue Marlin	Black marlin	Striped marlin
1986	0.05	0.00	16.76	0.49	635.10	14.47	0.00	0.00	0.00	0.00	0.05
1987	0.29	2.55	44.28	0.11	1208.80	9.56	0.00	0.00	0.00	0.02	0.00
1988	0.14	0.23	6.69	0.11	81.90	7.47	0.00	0.00	0.00	0.00	0.00
1989	0.68	157.63	53.79	19.07	2.20	24.89	0.00	0.00	9.37	17.82	27.89
1990	0.35	54.53	32.86	12.44	635.70	4.32	0.00	0.00	4.55	3.90	1.40
1991	0.00	0.72	1.06	0.21	0.00	3.89	0.00	0.00	0.00	0.00	0.00
1992	0.07	7.46	8.51	1.12	334.00	12.04	0.00	0.00	0.00	0.00	0.20
1993	0.36	1.98	26.72	9.64	29.00	33.65	0.00	0.00	0.00	0.00	0.06
1994	0.39	14.06	22.66	26.38	1201.00	40.20	0.00	0.00	0.08	0.42	0.45
1995	0.53	53.16	47.00	46.07	465.00	3.55	0.00	0.00	0.05	0.05	1.86
1996	0.28	89.07	21.68	15.68	335.27	2.55	0.00	6.28	0.00	0.01	2.36
1997	0.52	246.45	42.99	25.35	27.00	16.64	0.03	9.82	1.55	2.59	11.68
1998	1.04	232.06	160.45	235.74	1400.20	23.48	0.44	34.64	0.00	0.00	8.82
1999	3.53	405.06	411.48	1009.55	826.00	20.05	0.41	54.50	0.00	0.00	22.59
2000	6.20	427.40	433.40	1684.90	486.00	30.59	24.15	82.48	0.00	0.00	1.69
2001	6.21	557.46	385.99	2135.62	897.80	93.85	26.11	46.13	0.00	0.00	0.00
2002	5.98	354.64	418.51	1999.76	1144.01	71.97	52.49	31.40	0.00	0.00	0.73

Table 3 – Fish species recorded on longlines by observers in the Pilot Scientific Monitoring Program for the Southern and Western Tuna and Billfish Fishery between March-October 2003. Data were collected over 45 longline sets.

ALB	Thunnus alalunga	Albacore
ALO	Alepisaurus brevirostris	Short snouted lancetfish
ALV	Alopias vulpinus	Thresher shark
ALX	Alepisaurus ferox	Long snouted lancetfish
BAR	Sphyraena spp	Barracudas nei
BET	Thunnus obesus	Bigeye tuna
BSH	Prionace glauca	Blue shark
BSK	Cetorhinus maximus	Basking shark
CEO	Centrolophus niger	Rudderfish
DGS	Squalus acanthias	Picked dogfish
DOL	Coryphaena hippurus	Common dolphinfish
GPF	Gastropsetta frontalis	Shrimp flounder
LEC	Lepidocybium flavobrunneum	Escolar
MOP	Mola spp	Sunfish
OIL	Ruvettus pretiosus	Oilfish
PLS	Dasyatis violacea	Pelagic stingray
PSK	Pseudocarcharias kamoharai	Crocodile shark
PTH	Alopias pelagicus	Pelagic thresher shark
RMB	Manta birostris	Giant manta
SKJ	Katsuwonus pelamis	Skipjack tuna
SMA	Isurus oxyrinchus	Shortfin mako shark
SPN	Sphyrna spp	Hammerhead sharks nei
SSP	Tetrapturus angustirostris	Shortbill spearfish
STI	Dasyatis spp	Stingrays nei
SWO	Xiphias gladius	Swordfish
WAH	Acanthocybium solandri	Wahoo
YFT	Thunnus albacares	Yellowfin tuna

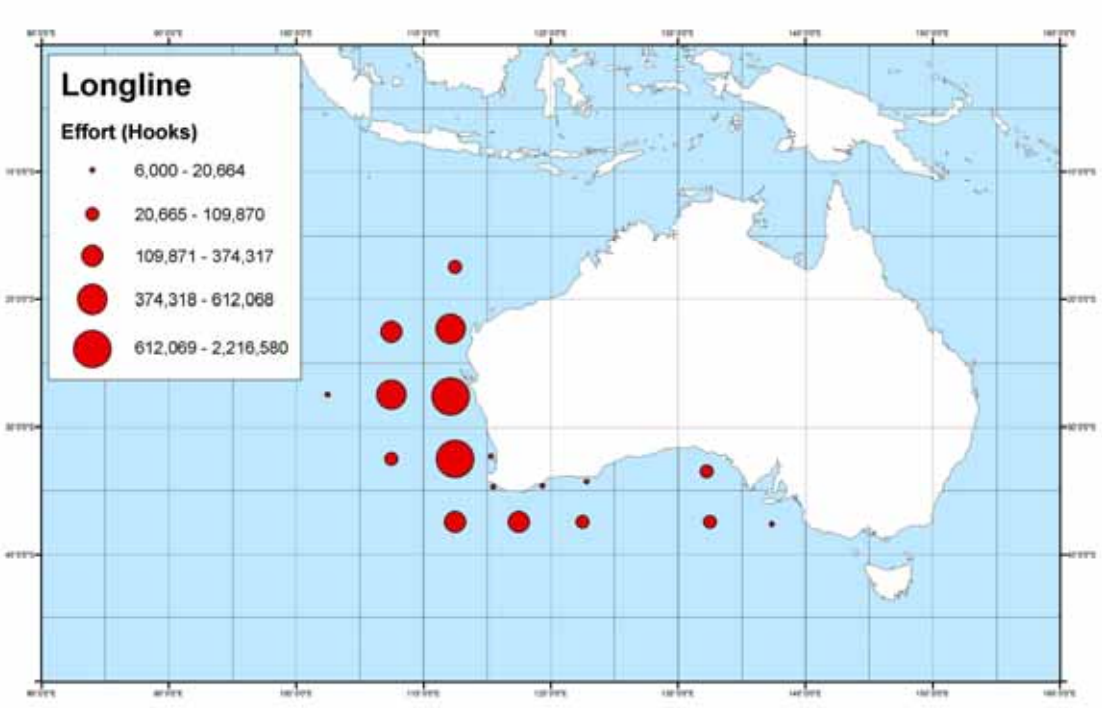

Figure 1 – Distribution of longline effort (hooks) for Australian longline vessels in the Indian Ocean in 2002. (Note: due to confidentiality restrictions, data only shown in 5º squares where five or more vessels were active.)

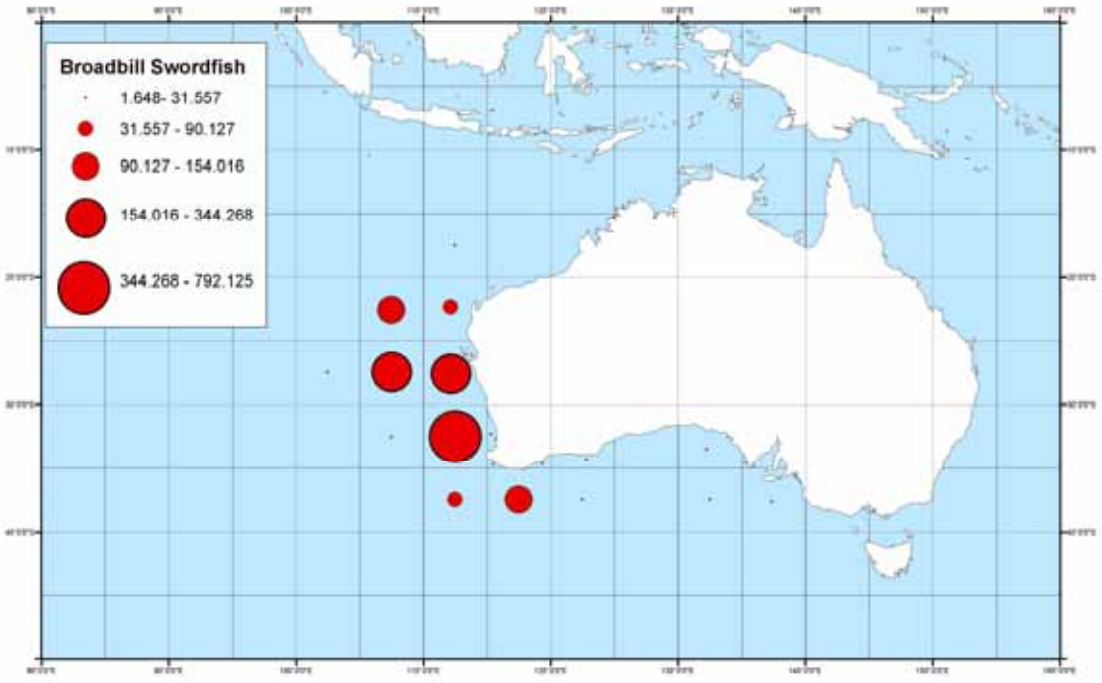

Figure 2 – Distribution of longline catch (metric tonnes) of broadbill swordfish taken by Australian longline vessels operating in the Indian Ocean in 2002. (Note: due to confidentiality restrictions, data only shown in 5º squares where five or more vessels were active.)

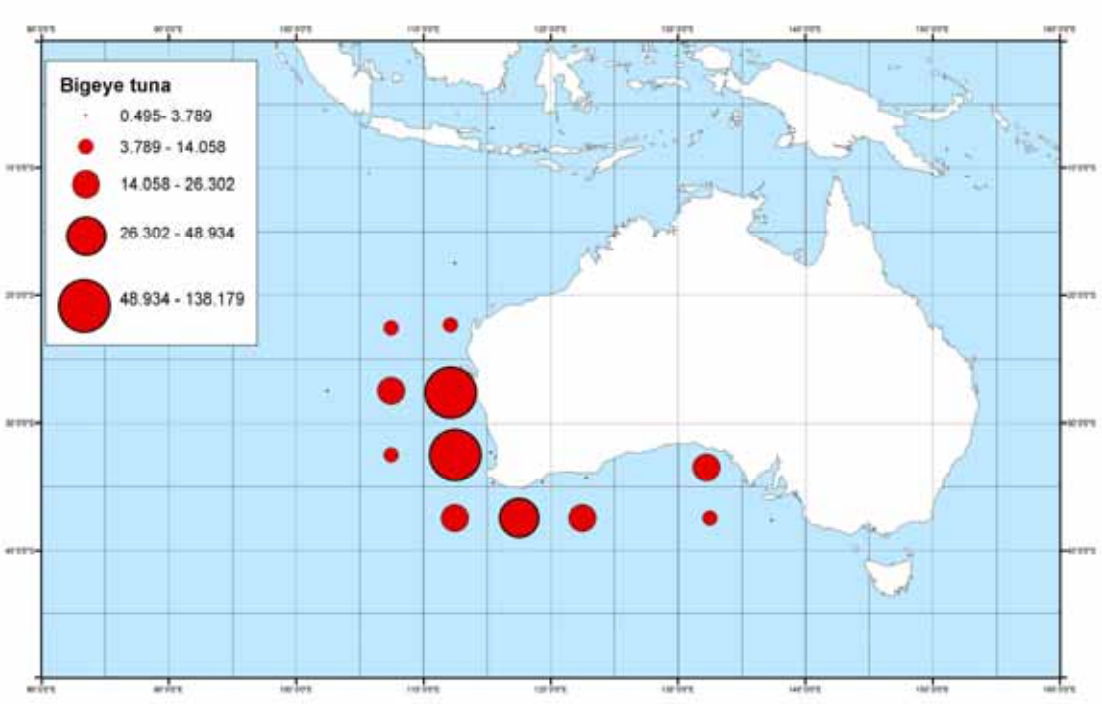

Figure 3 – Distribution of longline catch (metric tonnes) of bigeye tuna taken by Australian longline vessels operating in the Indian Ocean in 2002. (Note: due to confidentiality restrictions, data only shown in 5º squares where five or more vessels were active.)

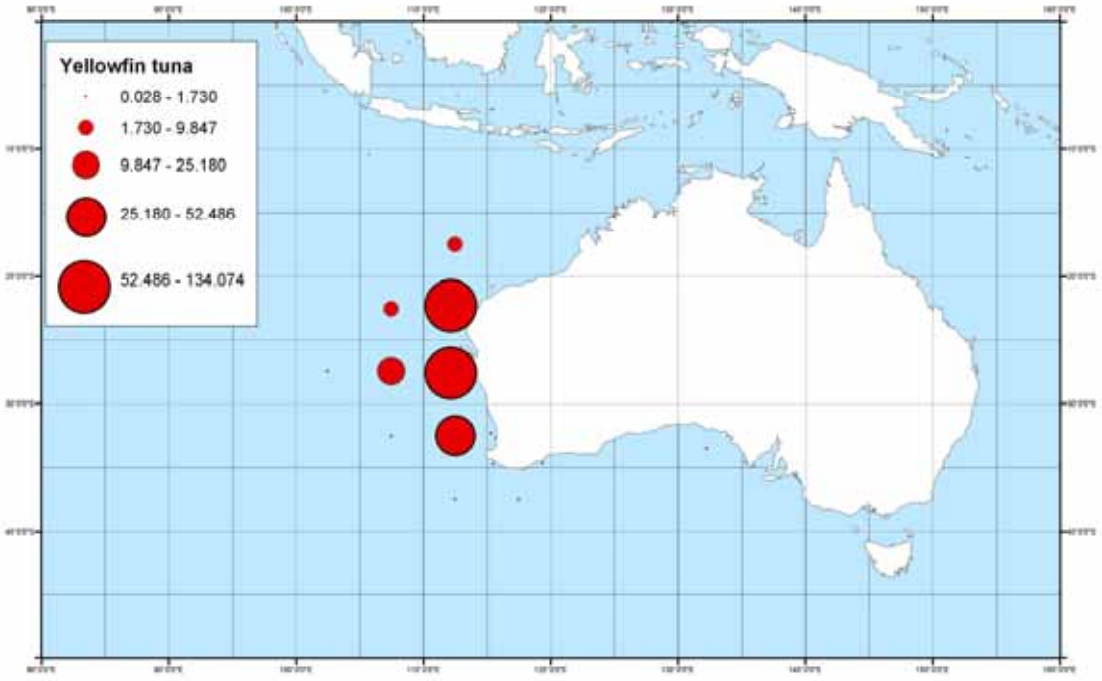

Figure 4 – Distribution of longline catch (metric tonnes) of yellowfin tuna taken by Australian longline vessels operating in the Indian Ocean in 2002. (Note: due to confidentiality restrictions, data only shown in 5º squares where five or more vessels were active.)

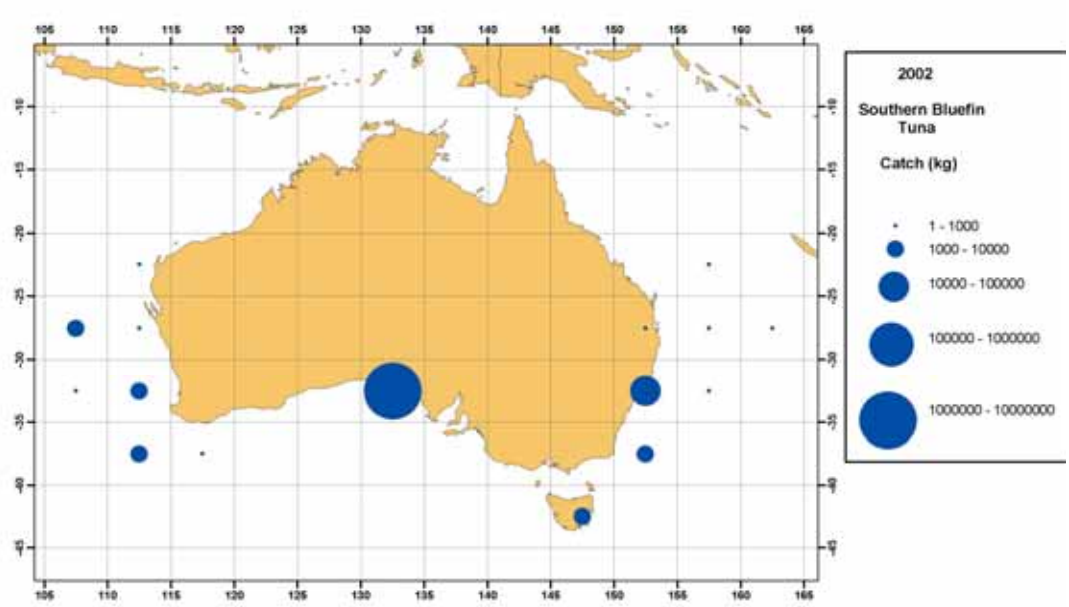

Figure 5 – Distribution of catch (kg) of southern bluefin tuna taken by Australian longline and purse seine vessels operating in Australian waters in 2002.