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Australian Government

Bureau of Rural Sciences

AUSTRALIA'S 2002–03 SOUTHERN BLUEFIN TUNA FISHING SEASON

by

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1. Introduction

This report summarises catches and fishing activities in the 2002–03 quota year[1] of the Australian southern bluefin tuna (*Thunnus maccoyii*; SBT) fishery. It also provides a summary of the history of the Australian SBT fishery. Caton *et al.* (1995) provides a more detailed historical description of the fishery.

History

Troll catches of SBT were reported as early as the 1920s off the east coast of Australia but significant commercial fishing for SBT commenced in the early 1950s with the establishment of a pole-and-live-bait fishery off New South Wales, South Australia and, later (1970), Western Australia. Purse seine gear overtook pole as the predominant method and catches peaked at 21 500 t in 1982. The bulk of this early Australian catch of SBT was canned. Following quota reductions in 1983–84, the Western Australian pole fishery for very small juveniles closed down and the south-eastern fishery began to target larger juveniles to supply the Japanese sashimi market. Surface catches were further reduced between 1989 and 1995 when about half of the Australian total allowable catch (TAC) was taken by Australia–Japan joint venture longliners in the Australian Fishing Zone (AFZ). The joint venture ceased in late 1995. From 1992 to 1998, domestic longliners operating off Tasmania and New South Wales also took around 5-10% of the total Australian catch.

In 1990–91 about 20 t of SBT tuna were transferred to fattening cages in Port Lincoln, South Australia, to enhance their value. These 'farming' operations increased from 3% of the Australian SBT TAC in 1991–92 to 98% in 1999–00 and has remained at or above that level since.

Following declaration of the Australian Fishing Zone (AFZ) in 1979, Japanese longliners fished under a range of bilateral conditions, real time monitoring program and joint-venture arrangements until 1997 when Japanese longliners were excluded from all AFZ fishing operations following failure to reach agreement on global TAC within the CCSBT. Caton and Ward (1996) provide copies of annual subsidiary agreements for the operations of bilateral-licensed longliners in the AFZ from 1979–80 to 1994–95.

Recent Seasons

The Australian domestic SBT catches for the 2002 and 2003 calendar years were 4711 t and 5822 t, respectively. The 2003 calendar year catch is larger than the previously agreed national allocation to Australia of 5265 t because it represents the aggregation of catches from periods in two quota years. The 2001–02 quota year catch was 5262 t while the catch for the 2002–03 quota year was 5391 t. The 2002–03 figure is over the previously agreed national allocation to Australia because two quota holders caught over the allocation in that season. This has been dealt with by deducting the over catch from their 2003–04 allocation.

[1] Various time periods, such as 'calendar years', 'fishing seasons' and 'quota years', can be used when describing Australia's SBT fishery. Unless otherwise indicated, we have used quota years in this report, but note that fishing seasons of the various fishery components often span quota years. The start and end dates of Australian quota years have varied and are presented in Appendix 1.

Quota Year	Western Australia				South Australia				New South Wales			Tasmania			Large Longliners			Australia Total				Total All Gears
	Albany Pole	Esperance Pole	Long-line	**Total**	Pole & Purse Seine	Farm Cages	Long-line	**Total**	Pole & Purse Seine	Long-line	**Total**	Troll	Long-line	**Total**	Aust. Charter	Joint-venture	**Total**	Domestic Surface	Domestic Long-line	Total Long-line	RTMP	
1988–89	204	221	0	425	4872	0	0	4872	0	1	1	2	0	2	0	684	684	5299	1	685	0	5984
1989–90	133	97	0	230	4199	0	0	4199	0	6	6	14	0	14	0	400	400	4443	6	406	0	4849
1990–91	175	45	0	220	2588	0	0	2588	0	15	15	57	0	57	255	881	1136	2865	15	1151	#300	4316
1991–92	17	0	0	17	1629	138	14	1781	34	90	124	36	20	56	59	2057	2116	1854	124	2240	800	4894
1992–93	0	0	0	0	716	722	68	1506	16	238	254	23	44	67	0	2735	2735	1477	350	3085	650	5212
1993–94	0	0	0	0	621	1294	55	1970	0	286	286	7	105	112	0	2299	2299	1922	446	2745	270	4937
1994–95	0	0	0	0	908	1954	2	2864	0	157	157	4	109	113	0	1295	1295	2866	268	1563	650	5080
1995–96	0	0	0	0	1447	3362	0	4809	28	89	117	0	262	262	0	0	0	4837	351	351	0	5188
1996–97	0	0	0	0	2000	2498	0	4497	7	229	236	2	242	244	0	0	0	4507	472	472	0	4978
1997–98	0	0	^0	0	916	3488	^0	4403	~0	475	475	!0	219	219	0	0	0	4433	664	664	0	5097
1998–99	0	0	^0	0	28	4991	^0	5018	~0	97	97	!0	116	116	0	0	0	5016	216	216	0	5232
1999–00	0	0	^0	0	0	5130	13	5143	0	114	114	0	!0	0	0	0	0	5130	127	127	0	5257
2000–01	0	0	^0	0	0	5162	6	5168	0	32	32	0	!0	0	0	0	0	5162	38	38	0	5247
2001–02	0	0	7	7	0	5234	0	5234	0	*22	*22	0	!0	0	0	0	0	5234	29	29	0	5262
2002–03	0	0	≈0	0	0	5375	0	5375	0	17	17	0	0	0	0	0	0	5375	17	17	0	5391

Note that a further 700t of Australian quota was ‘frozen’ (not allocated) in 1990–91.

^ 1997-98 and 1998-99 WA and SA non-farm catches are included in SA pole and purse seine catch, and in 1999–00 and 2000–01 WA longline catch is included in SA longline due to confidentiality guidelines.

~ 1997-98 to 1998-99 NSW pole and purse seine catches are included in NSW longline catch due to confidentiality guidelines.

! 1997-98 and 1998-99 Tas troll catches are included in Tas longline, and in 1999–00, 2000-01 and 2001-02 Tas longline catch is included in NSW longline due to confidentiality guidelines.

* 2001-02 NSW longline catch also includes QLD longline catch due to confidentiality guidelines.

≈ 2002-03 WA longline catch is included in NSW longline due to confidentiality guidelines.

Table 1: Australian Catch by Gear and State for Quota Years 1988-89 to 2002-03

Figure 1: Australian SBT Catch in 2002

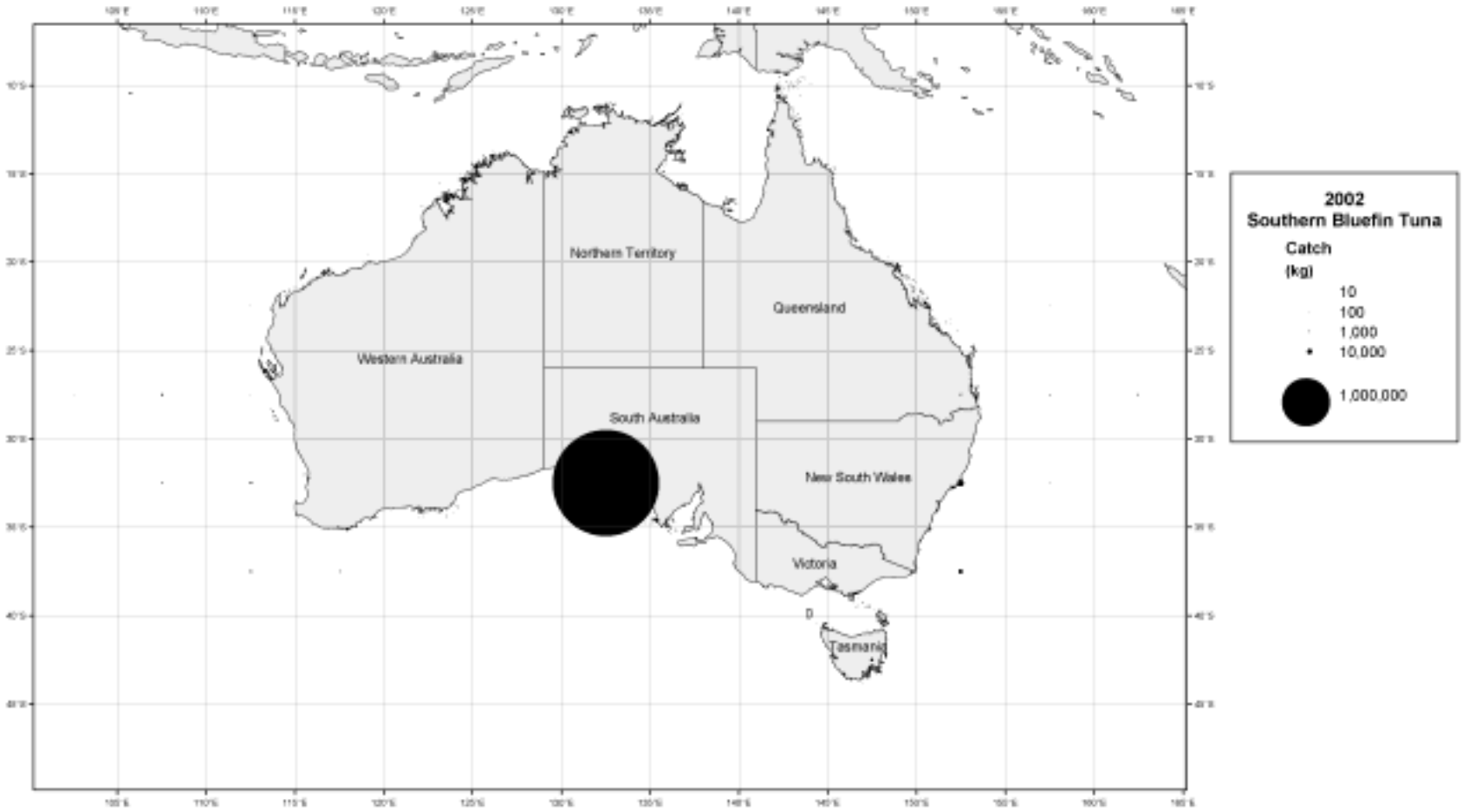
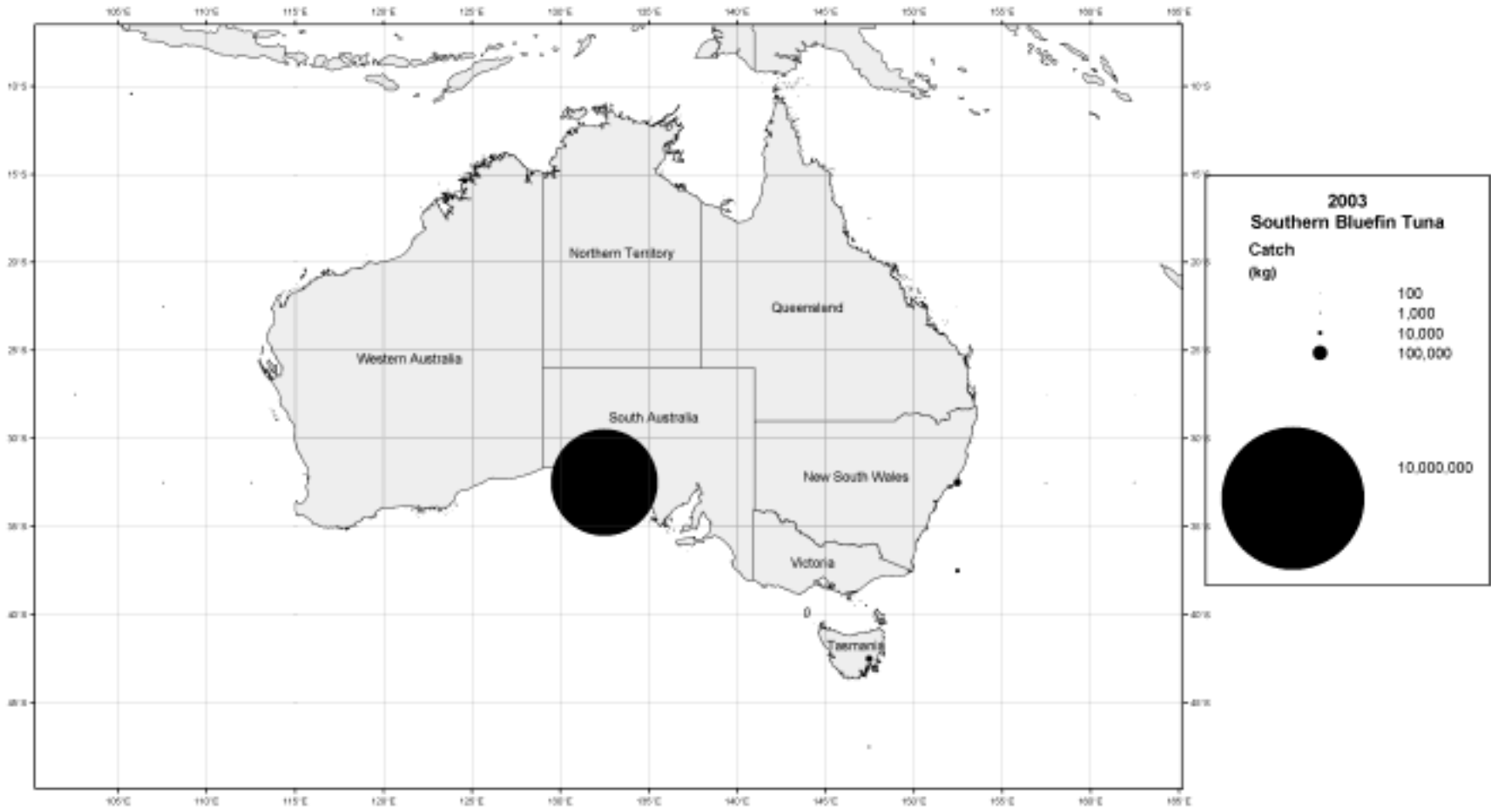


Figure 2: Australian SBT Catch in 2003



2. Catch and effort

In 2002–03, 99.7% of the Australian catch of SBT was taken by purse seine with the remainder taken by longline. Australian catch by gear and State for the quota years 1988-89 to 2002-03 is shown in Table 1. The Australian catch of SBT for the calendar years 2002 and 2003 is mapped in Figure 1 and Figure 2 respectively.

3. Nominal CPUE

Catch-per-unit-effort (CPUE) indices are not readily applicable for the Australian SBT fishery. The farm operations use purse seines to catch SBT, with assistance by former pole-and-line vessels as bait boats and the support of spotter planes. This makes it impossible to calculate a reasonable measure of nominal effort.

Australian longliners generally target more than one species in the season and the targeted effort (number of hooks targeting SBT) is not distinguishable from logbooks. For information the nominal SBT CPUE for all Australian longline effort is provided at Appendix 2.

No SBT have been landed by either troll or pole and line vessels since 1998-99.

4. Size composition

In the South Australian surface fishery there has been reduced competition for SBT among fishers following the introduction of individual transferable quotas. Since the late 1980s and 1990s the fishery has avoided the very small (<80cm) SBT, which were previously taken in bulk for canning (Caton *et al.* 1995). This resulted in an increase in the average length of SBT landed for fresh-chilled export. As the farm component of the fishery increased in the 1990's the average length has decreased. This is primarily due to selective targeting on schools to catch the best size for the farm fish, rather than an indication of decreased availability of large SBT (Table 2).

Table 2. Average fork length (cm) of SBT landed in each Australian state, 1989 to 2000.

Calendar Year	*Western Australia	*South Australia	Tasmania	NSW	Joint-Venture
1989	65.4	88.8	–	–	–
1990	65.6	89.3	96.0	112.8	–
1991	67.2	95.5	94.9	154.8	114.5
1992	66.1	97.0	93.4	109.2	108.0
1993	65.2	101.1	99.7	117.8	116.5
1994	–	97.4	125.5	121.3	124.8
1995	–	103.2	127.9	125.0	125.0
1996	–	102.7	132.7	139.7	–
1997	–	97.7	133.2	134.6	–
1998	–	94.9	134.5	136.1	–
1999	–	97.6	134.2	138.5	–
2000	–	97.0	–	154.3	–
2001	154.3	98.1	–	149.7	–
2002	–	98.4	–	159.9	–
2003	–	98.7	–	154.1	–

* Lengths are reported by calendar year, except for Western Australia and South Australia, which are by financial year (e.g. 1999 represents the financial year 1998-99) to cover the summer season

The size trends in the Tasmanian fishery reflect the change in orientation of the fishery from trolling to longlining operations since 1993. In the later years, the catch was dominated by longlining operations that tend to target the larger fish.

Since the late 1980s the average length of SBT landed in NSW has varied considerably because of the varying contribution of longline and sporadic surface catches to the overall catch levels. However, longline caught SBT off NSW have, in general, been considerably larger than SBT previously taken in this fishery.

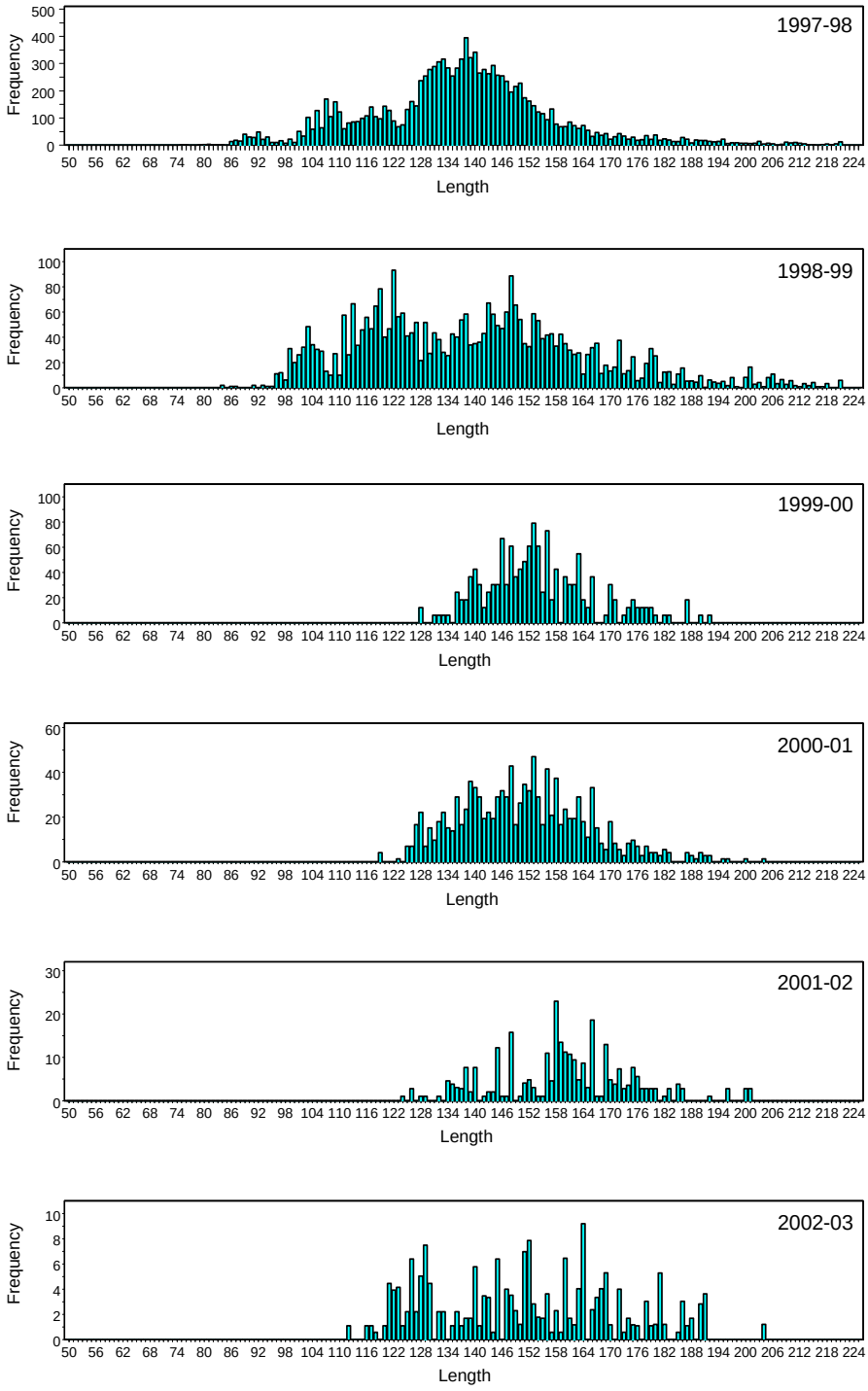


Figure 3: Length frequency histograms for SBT longline catch in Australian waters adjusted to total catch, 1997-98 to 2002-03 quota years.

In recent years it is debatable whether an analysis of average lengths is meaningful. This is due to the small numbers of fish now caught in the WA, NSW and TAS components of the Australian SBT fishery and changes in fishing operations (Figure 3 and Figure 4). Nevertheless, the near absence of smaller size classes (i.e. < 115 cm) in catches off NSW from the past four seasons is noted.

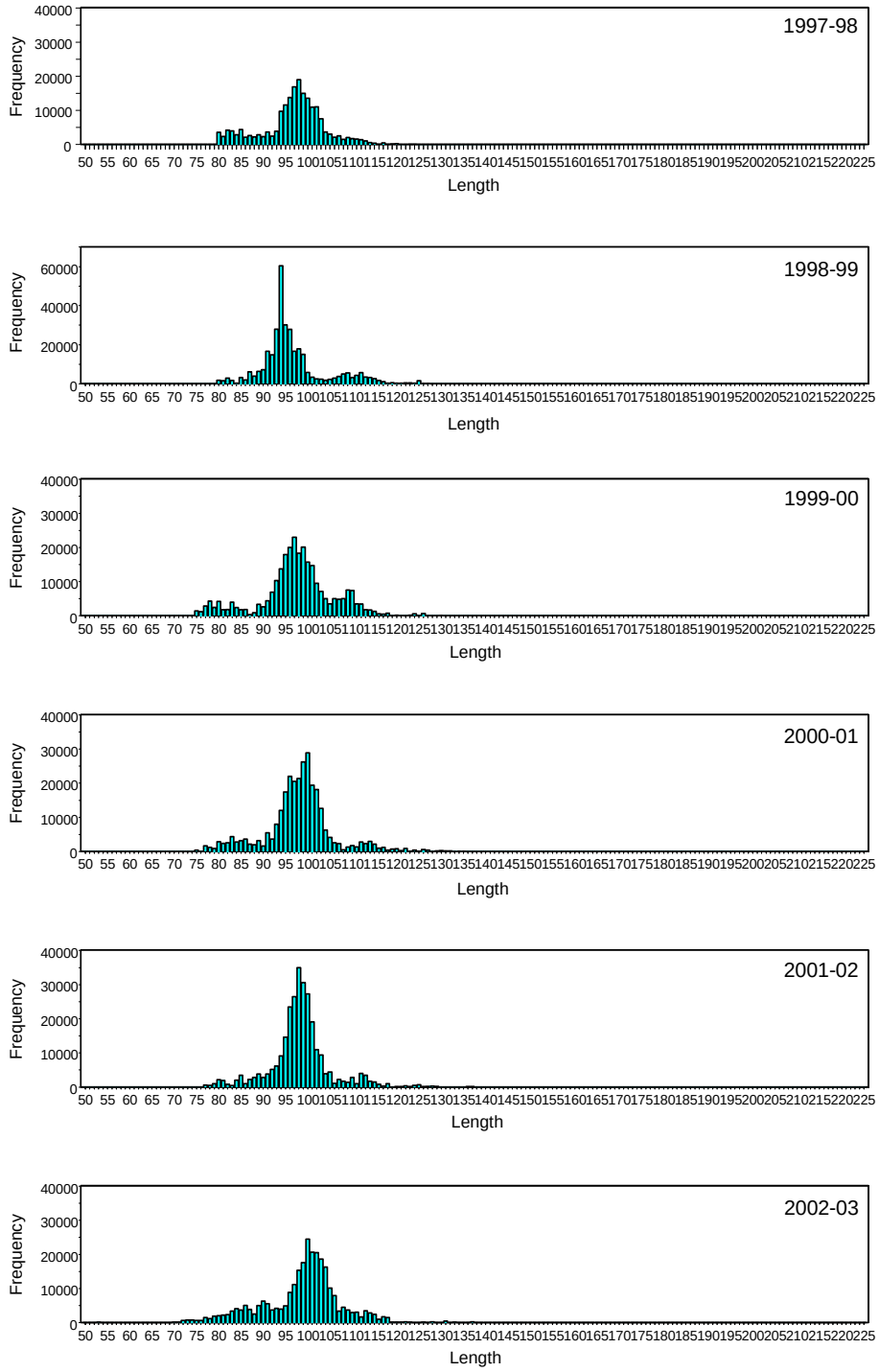


Figure 4: Length frequency histograms for SBT purse seine catch in Australian waters adjusted to total catch, 1997-98 to 2002-03 quota years.

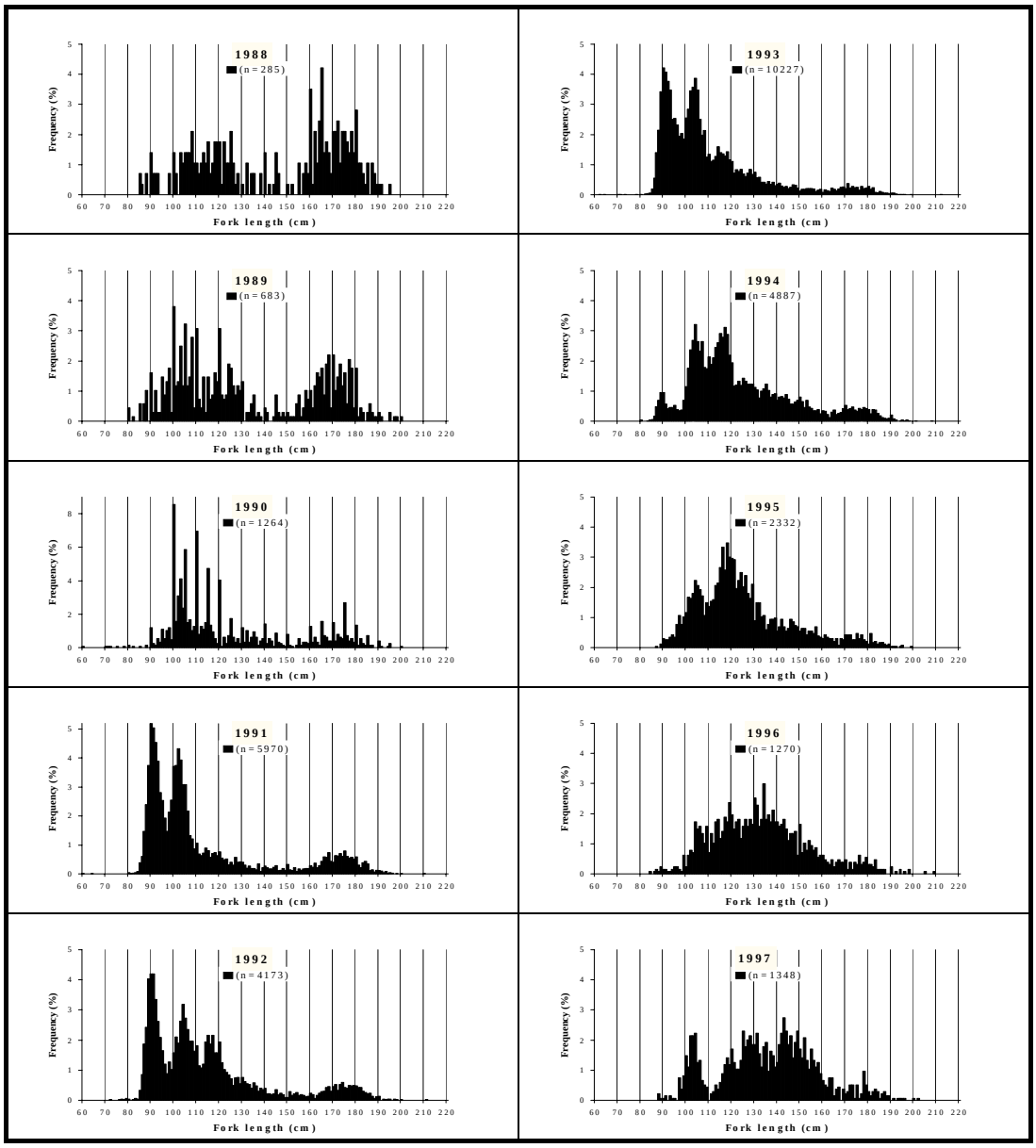


Figure 5: Length frequency histograms for SBT measured by Australian observers on Japanese longliners fishing in the Tasmania region, 1988 to 1997. The data include small SBT tagged and released by observers.

The percentage representation by length in the winter catches of Japanese longliners off eastern Tasmania from 1988 to 1997 shows substantial changes (Figure 5). Initially there were two groups, in essence representing a group of pre-adults (<130 cm) and older, adult SBT (>150 cm). Progressive increase in representation of younger ages was evident until 1992, and there was also a steady increase in the average length of the SBT comprising the larger mode. The 'trough' between the modes is consistent with intensive removals of small SBT in the early 1980s by Australia's surface fishery. The increasing representation of small SBT in the eastern Tasmania longline fishery after 1988 had been consistent with the escapement of smaller SBT as a result of the 1988 and 1989 quota reductions in Australia's surface fishery. The reversal of this trend from 1993 is apparent as reduced presence first of SBT <105 cm in 1994, then of SBT <120 cm in 1995, and subsequently of SBT <135 cm in 1996. This needs careful attention because one explanation could be reduced overall abundance of 3+ year-old SBT in 1994, 3+ and 4+ SBT in 1995 and

3+, 4+ and 5+ SBT in 1996. The reduced representation of those sizes was also noted in the reduced abundance of small SBT (<100 cm) in the Tasmania troll fishery in 1994 and 1995, and the failure of the troll fishery (which has depended upon small SBT) in 1996 and 1997.

In 1997, the troll fishery results were poor and, for the fourth successive year, the observer data from Japanese longliners for the Tasmania winter season showed a scarcity of SBT less than 105 cm. However, the 1997 data showed an increased representation of 105 cm SBT compared with their representation in 1996. In the absence of Japanese and joint-venture longline operations in the AFZ in 1998, no subsequent comparison is possible.

While the successive reduction in small SBT representation did not persist in 1997, the previous decreases may signal several weak year classes in the early 1990s. The changed representation of 105 cm SBT does not appear to have been associated with any change in fishing or reporting practices. Since about 1994, the Japan Tuna Federation apparently instructed all Japanese longliners to return SBT less than 25 kg to the sea, reportedly to protect small SBT.

5. Fleet size and distribution

In 2002–03, a total of 26 commercial fishing vessels landed SBT in Australian waters.

South Australia

The one- to five-year-old SBT, which school from late spring to autumn in surface waters of the eastern Great Australian Bight, South Australia, were fished by seven purse seiners during the 2002–03 quota year, but various live bait, pontoon-towing and feeding vessels were also involved. Fishing commenced in early December 2002 and finished in late March 2003.

Western Australia

Four longliners caught SBT off the WA coastline in 2002–03. For confidentiality reasons all catches are incorporated in the NSW longline catch. Longline fishing in WA commenced in July 2003 and finished in November 2003.

New South Wales

During 2002–03, 15 domestic longliners participated at some time in the area of the fishery for older juveniles and adults in deeper waters off NSW in winter. Longline fishing off NSW commenced in June 2003 and finished in October 2003.

6. Other relevant information

An overview of the 2004 SBT observer program is provided at Attachment 1.

CSIRO Marine Research commenced a SBT tagging program in the 1960s to study recruitment, mortality, growth and migration patterns. Between 1990 and 1997 there have been 67 893 conventional tags placed on tuna within Australian waters (Table 3) and 7 751 tags have been returned (11.5% recovery rate). Tags have been recovered by Australian and Japanese vessels in Australian waters, New Zealand and joint-venture longliners in New Zealand waters, and further afield from Japanese longliners on the high seas and Taiwanese longliners landing their catches at Mauritius. While the number of tags being returned is decreasing each year, the period at liberty before recapture is always increasing, consequently, providing progressively more valuable information on growth rates and long term movements of SBT (Stanley 2000). The

recruitment monitoring program decided to suspend the release of new tags after 1997, however the CCSBT resumed conventional tagging activity in January 2001 as a part of the CCSBT Scientific Research Programme.

Table 3. The number of SBT tagged and released by the CSIRO Marine Research Conventional Tagging Program, 1990–91 to 2002-03.

Season	Western Australia	New South Wales	South Australia	Tasmania	Total
1990-91	3306	-	4352	86	7744
1991-92	3050	-	4998	88	8136
1992-93	4941		5873	360	11174
1993-94	8679		7629	196	16504
1994-95	10160		7648	84	17892
1995-96	-	-	4218	109	4327
1996-97	-	-	2087	29	2116
2000-01					
2001-02	-	218	-	-	218
2002-03	-	222	-	-	222
Total	14954	17908	36805	952	70619

The CSIRO also conducts an archival tagging project. It began in 1993 with the development of archival tags suitable for small and medium sized tunas. Between 1993 and 2003 there have been 576 archival tags released in Tasmanian and South Australian waters with an 22% recovery rate (125 tags returned), including the 27 tags released in February 2000. There were 5 tags released in Western Australia in early 2001. These tags help in migration, movement and behavioural research (Gunn and 0'Reilly 2000).

In January 2001, the CSIRO commenced an acoustic monitoring program to provide information about the movement and migration pathways of juvenile (age 1-2) SBT in southern Australia. There were 59 acoustic tags released in 2003-04.

The aerial survey program was conducted over the South Australian west coast waters from 1991 to improve the understanding of surface abundance of juvenile SBT. The fieldwork component of the aerial survey project was suspended in 2000–01 to permit the completion of analytical work and reports have been presented at SBT recruitment monitoring workshops.

Since 1994 the Japan Marine Resources Research Centre (JAMARC) has carried out acoustic surveys in the Albany–Bremer Bay region of Western Australia in an attempt to develop abundance estimates for 1-year-old SBT (Nishida et al. 1999). Various experiments have been and continue to be conducted to help improve the survey techniques and increase knowledge on biological factors (Anon. 2000, Kemps *et al.* 1999 and Miyashita *et al.* 1999a,b).

7. References

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Caton, A.E., Ward, P. J., Colgan, M. K., Williams, K. F., Ramirez, C. and Skousen, T. (1995) The Australian 1989–90 to 1994–95 southern bluefin tuna seasons. Working Paper SBFWS/95/1, First meeting of the Scientific Committee of the Commission for the Conservation of Southern Bluefin Tuna, 10–19 July 1995, Shimizu, Japan.

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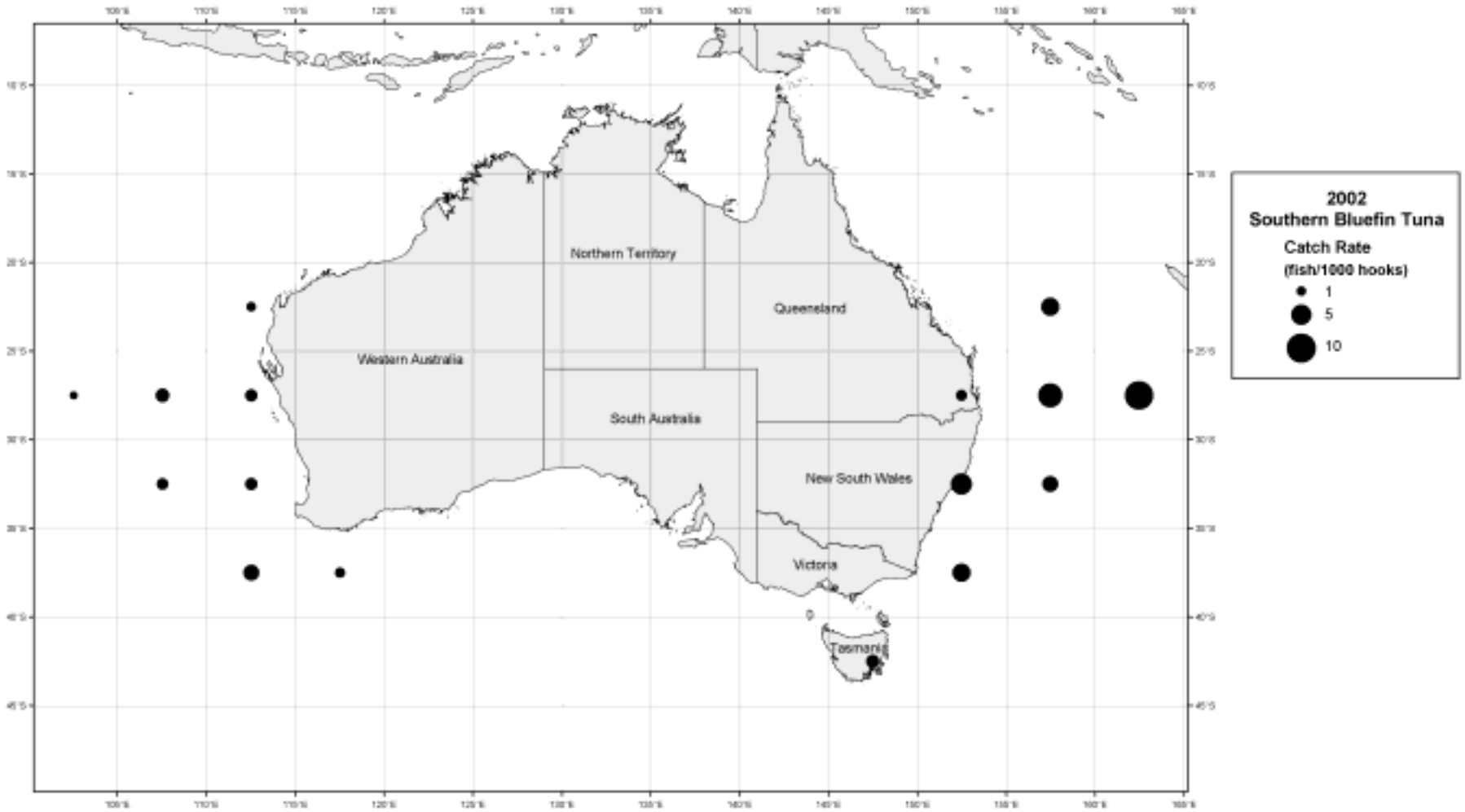
Miyashita, K., Sawada, K., and Nishide, T. (1999b) Acoustic estimation of the school density of juvenile southern bluefin tuna using a split-beam quantitative echo sounder system in Western Australia – Evaluation of sonar specialist's estimation. Working Paper RMWS/99/16, Eleventh Workshop on SBT Recruitment Monitoring, September 1999, Caloundra, Queensland.

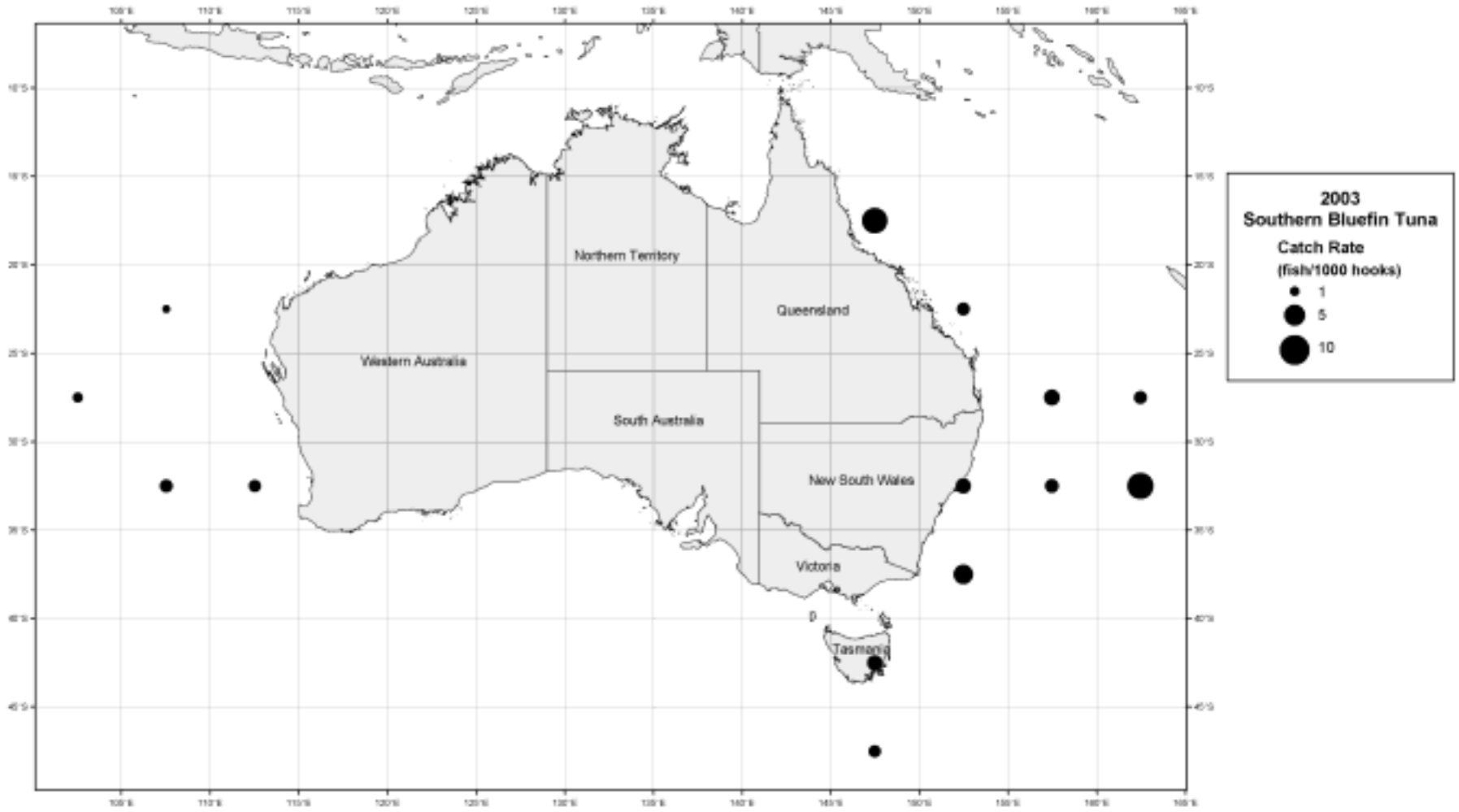
Stanley, C. (2000) Tag and sample recovery from the 1999–00 CSIRO/NRIFSF tagging program. Working Paper RMWS/00/4, Twelfth Workshop on SBT Recruitment Monitoring, October 2000, Hobart, Australia.

Appendix 1: SBT Season Dates 1988–89 to 2002–03

Quota Year	Start Date	End Date
1988-89	1 October 1988	30 September 1989
1989-90	1 October 1989	30 September 1990
1990-91	1 October 1990	30 September 1991
1991-92	1 October 1991	31 October 1992
1992-93	1 November 1992	31 October 1993
1993-94	1 November 1993	31 October 1994
1994-95	1 November 1994	15 December 1995
1995-96	16 December 1995	15 December 1996
1996-97	16 December 1996	30 November 1997
1997-98	1 December 1997	30 November 1998
1998-99	1 December 1998	30 November 1999
1999-00	1 December 1999	30 November 2000
2000-01	1 December 2000	30 November 2001
2001-02	1 December 2001	30 November 2002
2002-03	1 December 2002	30 November 2003

Appendix 2: Nominal CPUE for all Australian longliners in 2002 and 2003


Northern Territory
Queensland
Western Australia
South Australia
New South Wales
Victoria
Tasmania
2002
Southern Bluefin Tuna
Catch Rate
(fish/1000 hooks)
1
5
10


2003
Southern Bluefin Tuna
Catch Rate
(fish/1000 hooks)
1
5
10
Northern Territory
Queensland
Western Australia
South Australia
New South Wales
Victoria
Tasmania

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AN OVERVIEW OF

THE AUSTRALIAN SOUTHERN BLUEFIN TUNA OBSERVER PROGRAMME 2004

Abstract
The purse-seine observer programme for the 2003-04 Australian SBT fishing season took place between 33 and 34°S and 132 and 133°E in February and March 2004. Two trained and qualified observers monitored 21 purse-seine sets representing 13% of all sets in the fishery and from these observations an estimated 670 tonnes of SBT were caught during observed sets representing 13.8% of the actual tonnage caught for the 03-04 season. Observers also monitored and recorded SBT mortalities on two towing operations representing 5.5% of towing operations. The purse-seine observer programme in the Australian SBT fishery surpassed the target level of coverage but deployment of observers on vessels was not random and the data collected was not necessarily representative of the entire December to April purse seine fishing season.

Introduction
Fishing operations taking Southern Bluefin Tuna (SBT) in the Australian Fishing Zone were observed in the purse-seine sector in 2004. The first placement of observers on the Australian domestic purse-seine fleet took place in February 2004 targeting both purse-seine fishing and tow cage operations.

The 2004 observer programme for the longline sector commenced in June. At the time of writing there is very little observer data available for the 2003-04 season (1 December –30 November). The observations from longlining in 2003-2004 will therefore be addressed in next year's report to the CCSBT. Longline observations from 2002-2003 season were provided last year in CCSBT-ESC/0309/33.

A. Observer Training
The Australian Fisheries Management Authority has recruited and trained observers since its establishment in 1992. Approximately 23 observers are currently employed in the AFMA observer programme. They are sourced from universities around Australia and must have the ability to live and work at sea, have demonstrated experience in collecting biological data at sea and have knowledge of fisheries research and methodologies and experience in the collection of associated scientific data. Observers hold marine radio operators certificate of proficiency (or similar qualifications/experience) and a sea safety certificate and medical certificate. All observers are provided with 1.5 days of training that includes but is not limited to:

- occupational health and safety at sea;
- fishing methodologies;
- the collection of otoliths and other biological sampling at sea;
- length frequency data collection;
- data recording at sea;
- species identification;
- direct electronic entry of data at sea; and
- conversion factor work.

In the 2004 SBT purse-seine observer programme, two observers with marine science degrees were selected from the AFMA observer programme based on their qualifications and skills specific to the purse-seine fishing method. Collectively, these observers had four years experience working in the AFMA observer programme.

The training manual includes Identification Guides (previously provided to CCSBT members) and standard data record sheets. The manual has remained unchanged since the mid-1990s. One copy of the training manual is provided for each CCSBT delegation as Appendix 1.

B. Scientific Observer Programme Design and Coverage

The target coverage for the SBT purse-seine fleet operating out of Port Lincoln was 10% of the total catch and effort for the fishery and 100% of all operations while an observer is on board, as stated in the 2003-2004 season Project Plan (see Appendix 1). A target area between 33 to 34°S and between 131 and 133°E was selected as this is the area where most of the Australian SBT purse-seine effort has historically taken place. In addition to the target 10% coverage of catch and effort by SBT purse-seine vessels, it was planned to place observers on two tows, representing about 5% of all tows.

Observers spent 66 days at sea and observed fishing operations for 57 days (constituting 27 purse-seine days and 30 towing days).

Typically, less than 7% of total effort in the purse-seine sector of the Australian SBT fishery occurs in December. To improve the cost effectiveness of the programme, AFMA decided not to conduct observations in this month. The initial intention was to have one observer randomly assigned to the operation of several vessels during the months of January and February, as the majority of fishing effort typically occurs in these months. However due to crewing status and other vessel issues raised by the industry relating to the initially selected vessels, the first observer placement could not be facilitated until mid February. Subsequently, a second observer was deployed in the fishery to ensure 10% observer coverage was achieved.

As a result, observed effort for the SBT purse-seine fishing activity took place in February and March. Peak fishing activity during this time saw purse seine vessels in close proximity (10 to 20 nm) operating in the area 33°30'S 132°30'E allowing observers to transfer to other boats more easily. Figure 1 below indicates the areas fished and the areas observed.

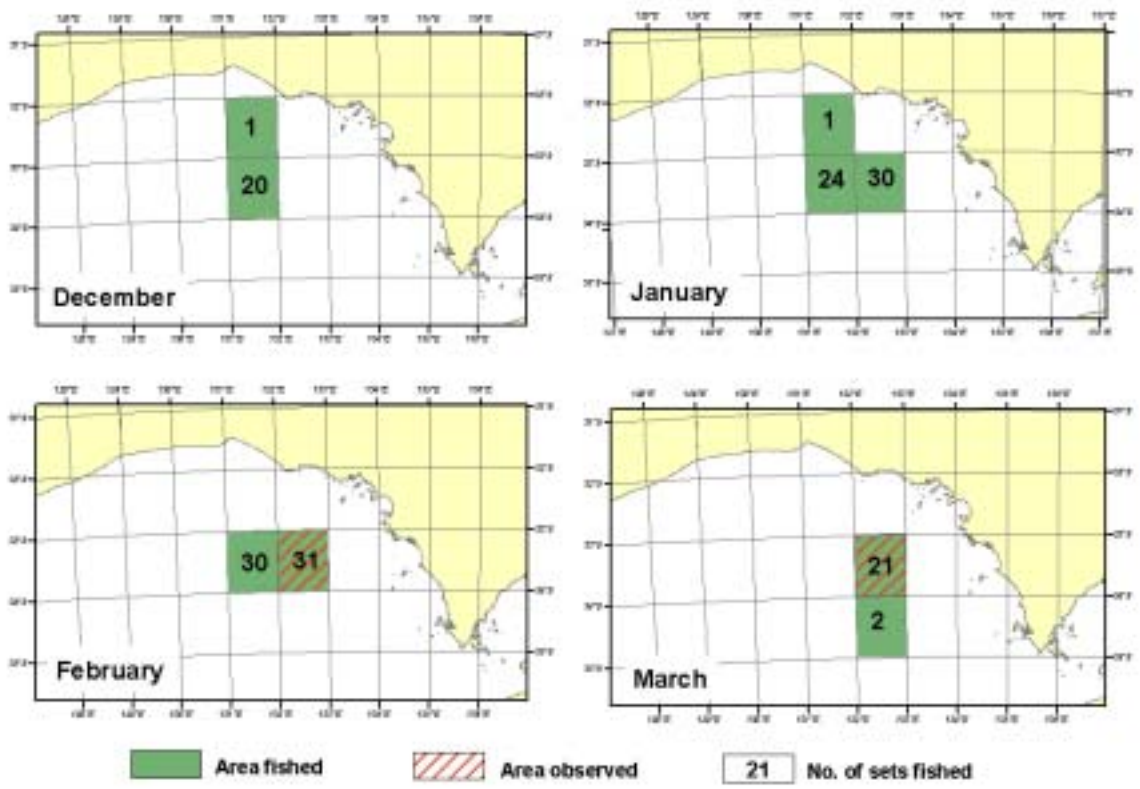

Figure 1. The number of sets recorded in the SBT purse-seine fishery from December 2003 -March 2004. The red hashing represents the areas where observations took place.

C. Observer Data Collected

The following is a summary of the observer-collected data.

Effort Data

In 2004, there were 21 purse-seine sets observed. Fishing operations observed in the purse-seine sector were based in the Great Australian Bight area between 33 °01' and 34° 00' South and 132°24' and 132°39' East (see Figure 1). Of these, 100% of completed sets were observed from the purse-seine vessel. The observed sets were 13% of all sets in the fishery for the 2003-04 season.

Data were gathered on the vessel characteristics, fishing gear and equipment. Comprehensive operational and environmental information were recorded for each set that occurred while the observer was on board. This included recording information on searching, chumming, setting and hauling activities. Information on Chumming operations by the fishing vessel and associated chumming vessels was also recorded. In addition, observers recorded information on the movement of some spotter aircraft and their time in the area preceding sets.

Two complete tows were observed representing 5.5% of the total number of tows for the 2003-04 season. Quantitative data was collected on the number of SBT mortalities, the date they occurred and whether they were retained or discarded. Data was also collected on:

- Towing methods
- Average towing speed
- Cage number and diameter
- Maximum cage depth
- Average weight of SBT transferred
- Estimated number of SBT
- Methods of counting and verifying fish counts

The 2004 purse-seine fishery observers met and exceeded the CCSBT data standard for effort data collection.

Catch Data

Observers recorded catch composition and fate of target and bycatch species where possible during all observed purse-seine sets. The time at start and end of observation, the observed catch in estimated number and estimated weight for SBT and all other species were recorded where possible.

As fish are taken alive for farming purposes in the purse-seine sector, it is not possible to obtain actual weight or length information at the time of catching the SBT as there is no opportunity to count numbers of fish accurately at sea or to handle the fish and record individual live fish weights/lengths. Consequently, both catch data and observed catch data are estimates only and these are reported below.

In total, observers estimated 670 tonnes of SBT were caught during observed sets. This observed catch accounted for 12.8% of the total estimated tonnage caught (5229 tonnes) by purse-seine vessels as recorded in logbooks in 2003/04. The observed estimated catch accounted for 13.8% of the actual tonnage caught (4860 tonnes) as recorded at time of transfer.

Observers monitored and made records of bycatch species where possible during all sets. Bycatch data were collected from visual observation of the catch before transfer to tow cages and through observation of any species meshed during hauling of the purse seine net. Few biological data were collected for bycatch species due to the small number of bycatch taken and lack of opportunity while observers were on the purse-seine vessels.

Table 1. The number and fate of bycatch species observed in the 2004 SBT purse-seine fishery.

Species	Quantity	Fate	
		Alive	**Mortality**
Skipjack (*Katsuwonis pelamis*)	284	179	5
Leatherjackets *(Thamnaconus degeni)*	47	?	≥21
Mako shark (*Isurus* spp.)	1	0	1
Hammerhead (*Sphyrna* spp.)	1	1	0
	333	**≥ 180**	**≥ 27**

From 21 sets observed 333 bycatch were recorded with the majority being skipjack tuna (n= 284). From these only five mortalities were noted. The others were noted swimming with the caged SBT following a transfer. A small number of leatherjackets (n=21) and sharks were the other bycatch species observed including one hammerhead shark and one mako shark. Mortalities were noted for most of the leatherjackets and the mako shark was also noted as a mortality.

The 2004 purse-seine fishery observers met the CCSBT data standard for catch data collection.

Length Frequency data

Although it was not possible to obtain length measurements for the live SBT catch, it was possible to measure SBT mortalities. The fishing and towing data is shown in the table below.

Table 2. The number and rate of SBT mortalities observed during fishing and towing.

	# SBT mortalities	**SBT mortality rate**
Fishing	27	1.3 per set observed
Towing	8	1 per 3.5 days tows observed
Total	35	

Twenty-two length measurements were obtained from SBT mortalities that occurred in purse-seining operations and during observed tows. It must be noted however that one observer did not have the appropriate measuring equipment on board the vessel. Therefore, six of the 22 length measurements were estimates only. Length of the SBT mortalities during fishing and towing ranged between 90-150 cm with a mean length of 115 cm.

Hobsbawn *et al*. (2004) conducted a length frequency analysis from measurements taken from the farmed SBT. This analysis is more robust and more likely to be representative of the entire SBT catch.

Biological data

There were few opportunities for observers to collect accurate SBT weight data. Weight measurements were made on some of the mortalities that occurred in purse seining operations and during observed tows. Other weights were estimated and recorded in the comments section of some entries.

There were no otoliths collected by observers from SBT. However there is an ongoing project to collect otoliths from farm mortalities and observers are currently being trained to take otolith samples when at sea. For a small number of SBT mortalities, sex and stomach contents were recorded.

Size of sub-samples relative to unobserved quantities

Observers provided 100 per cent coverage of purse-seine sets undertaken while observers were on board. Biological data was only recorded for SBT and bycatch mortalities. The biological samples

accounted for 0.07% of the total observed SBT catch and is therefore not representative of the entire catch.

D. Tag Return Monitoring

There were no tagged SBT returned in the presence of an observer for the purse-seine fishery. However, observers noted any sightings reported by divers involved in estimating the catch and the transfer of SBT to tuna cages. On one observer trip in February, 10-12 tagged fish were observed by divers. Tags in purse-seine caught SBT are typically reclaimed during harvesting at Port Lincoln tuna farms and returned to CCSBT.

E. Problems Experienced

The main problem experienced in the 2004 purse-seine season was deployment of observers. As industry was unable to provide access to the initially randomly selected vessels due to issues such as crew status, selection of vessels for participation in the observer programme was consequently determined by successful negotiations with fishing companies rather than random selection. This, coupled with bad weather, affected the timing of observer coverage with no observer work taking place in January. Furthermore, this deployment problem also affected the area observed, with no observer coverage between 131^{o}E and 132^{o}E (see Figure 1). Overall, while annual targets for catch and effort observations were met, observer coverage was not random with respect to deployment or necessarily representative of the entire season. Efforts to improve observer deployment for next season are in train and AFMA is hopeful that observer coverage is more representative for 2005.

Some biological data requested by the CCSBT could not be obtained due to the difficulties associated with sampling live fish. This included some length and weight measurements, sex identification and assessments of stomach contents. Next season, every effort will be made to ensure accurate biological information is obtained from each SBT mortality that is in good condition. But given there are few SBT mortalities during fishing and towing, the biological information obtained is not representative of the entire catch.

Conclusions

The purse-seine observer programme in the Australian SBT fishery surpassed their intended levels of coverage with observations taking place over 13.8 % of actual catch and 13% of observed effort but deployment was not random and coverage was not necessarily representative of the entire season.

Reference

Hobsbawn P.I., Findlay J.D. and McLoughlin K.J. 2004. Australia's 2002-03 Southern Bluefin Tuna Fishing Season. Working Paper CCSBT-SC/0409/SBT Fisheries, 9th meeting of the Scientific Committee of the Commission for the Conservation of Southern Bluefin Tuna, September 2004, Jeju, Korea.

Appendix

AFMA Project Plan: Pilot Observer operations for the purse-seine (South Aust) Southern Bluefin Tuna fishery 2003/2004 season.