



Australian Government
Department of Agriculture
ABARES

Australia's 2014–15 Southern Bluefin Tuna Fishing Season

P.I. Hobsbawn, H.M. Patterson, I. Stobutzki

Research by the Australian Bureau of Agricultural
and Resource Economics and Sciences

August 2016



Working Paper CCSBT-ESC/1609/SBT Fisheries–Australia prepared for
the CCSBT Extended Scientific Committee for the 21st Meeting of the
Scientific Committee

5–10 September 2016, Kaohsiung, Taiwan

Ownership of intellectual property rights

Unless otherwise noted, copyright (and any other intellectual property rights, if any) in this publication is owned by the Commonwealth of Australia (referred to as the Commonwealth).

Creative Commons licence

All material in this publication is licensed under a Creative Commons Attribution 3.0 Australia Licence, save for content supplied by third parties, logos and the Commonwealth Coat of Arms.



Creative Commons Attribution 3.0 Australia Licence is a standard form licence agreement that allows you to copy, distribute, transmit and adapt this publication provided you attribute the work. A summary of the licence terms is available from creativecommons.org/licenses/by/3.0/au/deed.en. The full licence terms are available from creativecommons.org/licenses/by/3.0/au/legalcode.

Cataloguing data

This publication (and any material sourced from it) should be attributed as: Hobsbawn, P, Patterson, HM & Stobutzki, I 2015, *Australia's 2014–15 southern bluefin tuna fishing season*, ABARES, Canberra, August. CC BY 3.0

Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES)

Postal address GPO Box 858 Canberra ACT 2601

Switchboard +61 2 6272 2010|

Facsimile +61 2 6272 2001

Email info.abares@agriculture.gov.au

Web agriculture.gov.au/abares

Inquiries regarding the licence and any use of this document should be sent to: copyright@agriculture.gov.au.

The Australian Government acting through the Department of Agriculture, represented by the Australian Bureau of Agricultural and Resource Economics and Sciences, has exercised due care and skill in preparing and compiling the information and data in this publication. Notwithstanding, the Department of Agriculture, ABARES, its employees and advisers disclaim all liability, including for negligence and for any loss, damage, injury, expense or cost incurred by any person as a result of accessing, using or relying upon information or data in this publication to the maximum extent permitted by law.

Acknowledgements

The authors thank Matt Daniel (AFMA) and Kelly Buchanan (DAWR) for their input and comments on this report. Work was funded by Fisheries Resources Research Fund and ABARES.

Contents

Summary	1
1 Introduction	2
History	2
Recent seasons	2
2 Catch and effort	5
Nominal CPUE	5
Size composition	5
3 Fleet size and distribution	13
South Australia (SA)	13
Western Australia (WA).....	13
New South Wales (NSW)	13
Tasmania (TAS)	13
Queensland (QLD)	13
4 Other relevant information	14
Recreational catch	14
Discards in the commercial fishery	16
Stereo-video commercial trial.....	17
Fish release trials	17
Research.....	18
References	19
Appendix 1 SBT fishing season dates 1988–89 to 2015–16	20
Appendix 2 Purse seine fishing season duration	21
Appendix 3 Australian surface catch for farm operations, 1994–95 to 2015–16	22
Appendix 4 Nominal CPUE for all Australian longliners, 2014 and 2015 calendar years	23
Appendix 5 Summary of observed catch and effort by year and sector	26
Appendix 6 Number of biological samples taken in observer programs (year and sector)	29
Appendix 7 An overview of the Australian SBT observer program	30
Observer sources and training.....	30
Purse seine fishery—Great Australian Bight 2015–16.....	30
Longline fishery	30
Scientific observer program design and coverage	31
Observer data	31
Tag return monitoring	33
Appendix 8 Australian southern bluefin tuna research projects	34

Summary

The 2014–15 Southern Bluefin Tuna (SBT) fishing season report summarises catches and fishing activities in the Australian Southern Bluefin Tuna Fishery up to and including the 2014–15 fishing season¹ (December 2014 – November 2015) and some preliminary results of the 2015–16 season (December 2015 – November 2016).

Australia's allocation as agreed by the Commission for the Conservation of Southern Bluefin Tuna was 5665 t for the 2014–15 fishing season. However, this was adjusted to account for overcatch in the previous fishing season so the effective TAC was 5557 t. A total of 27 commercial fishing vessels landed SBT in Australian waters in the 2014–15 fishing season for a total catch of 5519 t. A total of 89.6 per cent of the catch was taken by purse seine with the remainder taken by longline. Six purse seiners fished off South Australia for the Australian farming operations during the 2014–15 fishing season, with live bait, pontoon-towing and feeding vessels also involved. Most of the purse seine fishing commenced in early January 2015 and finished in late March 2015.

Length frequency data from the purse seine fishery from 2005–06 to 2006–07 indicated a shift to smaller fish, but this trend has showed signs of reversal since 2007–08, possibly due to the targeting of larger fish. The average length of SBT transferred to farms in South Australia in 2015–16 was 92.5 cm.

In the 2015–16 fishing season, observers monitored 18.9 per cent of purse seine sets where fish were retained for the farm sector and 20.2 per cent of the estimated SBT catch. In 2015, observers also monitored 5.9 per cent of longline hook effort in the Eastern Tuna and Billfish Fishery during the months and in the areas of the SBT migration through that fishery. Observer coverage of longline hook effort in the entire Western Tuna and Billfish Fishery was 7.2 per cent in 2015.

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.

1 Introduction

This report summarises catches and fishing activities in the 2014–15 fishing season of the Australian Southern Bluefin Tuna (*Thunnus maccoyii*; SBT) Fishery. It also provides preliminary data on the 2015–16 fishing season for the surface fishery and 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 (NSW), South Australia (SA) and, later (1970) Western Australia (WA). Purse seine gear overtook pole as the main fishing 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 WA 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 ventures ceased in late 1995. From 1992 to 1998, domestic longliners operating off Tasmania (TAS) and NSW also took around 5–10 per cent of the total Australian catch.

In 1990–91, about 20 t of SBT were transferred to fattening cages in Port Lincoln, SA, to enhance their value. Utilisation of the Australian SBT TAC in ‘farming’ operations increased from 3 per cent of the TAC in 1991–92 to 98 per cent in 1999–2000 and it has remained at similar high levels.

Following declaration of the AFZ in 1979, Japanese longliners fished under a range of bilateral conditions, a 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 a global TAC within the Commission for the Conservation of Southern Bluefin Tuna (CCSBT). Caton and Ward (1996) provides 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 commercial SBT catches for the 2014 and 2015 calendar years were 4559 t and 5824 t, respectively. The catches for the 2013–14 and 2014–15 fishing seasons were 5420 t and 5519 t, respectively (Table 1). The TAC for the 2014–15 fishing season was 5665 t. However, this was adjusted to account for overcatch in the previous fishing season so the effective TAC was 5557 t. This action is consistent with the guidelines in the CCSBT Compliance Plan-Corrective Actions Policy (Compliance policy guideline 3) adopted in October 2011 by the CCSBT. See Appendix 1 for quota year dates and Appendix 2 for duration of the farm sector fishing seasons.

Table 1 Australian Catch (t) by Gear and State for Fishing Seasons 1988–89 to 2013–14

Fishing Season	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	300a	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	0b	0	916	3488	0b	4403	0c	475	475	0d	219	219	0	0	0	4433	664	664	0	5097
1998–99	0	0	0b	0	28	4991	0b	5018	0c	97	97	0d	116	116	0	0	0	5016	216	216	0	5232
1999–00	0	0	0b	0	0	5130	13	5143	0	114	114	0	0d	0	0	0	0	5130	127	127	0	5257
2000–01	0	0	0b	0	0	5162	6	5168	0	32	32	0	0d	0	0	0	0	5162	38	38	0	5247
2001–02	0	0	7	7	0	5234	0	5234	0	22e	22e	0	0d	0	0	0	0	5234	29	29	0	5262
2002–03	0	0	0f	0	0	5375	0	5375	0	17	17	0	0	0	0	0	0	5375	17	17	0	5391
2003–04	0	0	0f	0	0h	4874	0g	4874	0	226e	226e	0	20	20	0	0	0	4874	247	247	0	5120
2004–05	0	0	0	0	0	5214	0	5214	0	35	35	0	0	0	0	0	0	5214	35	35	0	5248
2005–06	0	0	0	0	0	5302	0	5302	0	6	6	0	0	0	0	0	0	5302	6	6	0	5308
2006–07	0	0	0	0	0	5230	0	5230	0	4	4	0	0	0	0	0	0	5230	4	4	0	5234
2007–08	0	0	0	0	0	5211	0	5211	0	23	23	0	0	0	0	0	0	5211	23	23	0	5234
2008–09	0	0	0	0	2	5015	0	5017	11	213	225	0	<1	<1	0	0	0	5029	213	213	0	5242
2009–10i	0	0	0	0	0	3931	0	3931	0	161	161	0	0	0	0	0	0	3931	161	161	0	4091
2010–11j	0	0	0	0	0	3872	0	3872	0	85	85	1	0	1	0	0	0	3872	85	85	0	3958
2011–12	0	0	0	0	0	4485	0	4485	0	58	58	0	0	0	0	0	0	4485	58	58	0	4543
2012–13	0	0	<1	0	0	4198	0	4198	0	341	341	0	0	0	0	0	0	4198	341	341	0	4539
2013–14	0	0	0	0	0	5039k	11	5050	0	369	369	0	0	0	0	0	0	5039	380	380	0	5420
2014–15	0	0	0	0	0	4948l	0	4948	0	572m	572	0	0	0	0	0	0	4948	571	571	0	5519

See footnotes on following page. Note that ‘RTMP’ refers to the Real Time Monitoring Program.

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

B 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.

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

D 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.

E 2001–02 and 2003–04 NSW longline catch also includes QLD longline catch due to confidentiality guidelines.

F 2002–03 and 2003–04 WA longline catch is included in NSW longline due to confidentiality guidelines.

G 2003–04 SA longline catch is included in NSW longline due to confidentiality guidelines.

H 2003–04 additional SA purse seine catch that did not go into farm cages is included in SA farm cages catch due to confidentiality guidelines.

I Year 1 of the 2009–11 fishing season (2009–10).

J Year 2 of the 2009–11 fishing season (2010–11).

k. Includes <1t of trolling.

l. Includes <1t of pole-and-line.

m. Includes a <5t of rod-and-reel around NSW and rod-and-reel and longline around Tasmania, due to confidentiality constraints.

2 Catch and effort

In 2014–15, 89.6 per cent of the Australian catch of SBT was taken by purse seine off SA for farm operations. The remainder was taken by longline and rod-and-reel off NSW; pole-and-line off South Australia; and, longline, and rod-and-reel off Tasmania. Australian catch by gear and state from the 1988–89 to the 2014–15 fishing season is shown in Table 1. Catch by fishing season with number of vessels and vessel search hours are shown in Appendix 3. The Australian catch of SBT for the calendar years 2014 and 2015 is mapped in Figure 1 and Figure 2, respectively.

Nominal CPUE

Nominal catch-per-unit-effort (CPUE) indices for the Australian surface and longline fisheries are not viewed as indicative of stock status. The farm operations use purse seines to catch SBT, with assistance from bait vessels and spotter planes. This makes the development of a reasonable measure of nominal fishing effort difficult and complicates the interpretation of catch rates.

Australian longliners generally target more than one species in the fishing season and the targeted effort (number of hooks targeting SBT) is not distinguishable from logbooks. For information, nominal SBT CPUE for all Australian longline effort is provided at Appendix 4.

Size composition

In the SA purse seine fishery there has been reduced competition for SBT among fishers following the introduction of individual transferable quotas (ITQs). Starting in the late 1980s, the fishery targeted small (~80 cm) SBT, which were previously taken in bulk for canning (Caton et al. 1995). However, the size range of SBT taken has been variable since then. Closure of Australian canneries resulted in an increase in the average length of SBT landed for fresh-chilled export. As the farming component of the fishery increased in the 1990s, the average length of SBT landed in SA decreased from a peak of 103.2 cm in 1995 to a low of 81.9 cm in 2011 (Table 2). This is primarily due to selective targeting of schools to catch the best sized fish for farming. The average length of SBT landed in SA in 2015–16 was 92.5 cm.

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 by purse seine in South Australia (Figure 4). Similarly, the size trends in the Tasmania area (TAS) of the fishery reflect the change from trolling to longlining operations, which target larger fish, in 1993.

The percentage representation by length in the winter catches of Japanese longliners off eastern TAS from 1988 to 1997 showed substantial changes (Figure 5). Initially, there were two groups representing a group of pre-adults (<130 cm) and older adult SBT (>150 cm). A progressive increase in the 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 was consistent with intensive removals of small SBT in the early 1980s by Australia’s surface fishery. The reversal of this trend from 1993 was apparent by the reduced presence of SBT <105 cm in 1994, then of SBT <120 cm in 1995, and SBT <135 cm in 1996. The reduced representation of those sizes was noted in the reduced abundance

of small SBT (<100 cm) in the TAS troll fishery in 1994 and 1995, and the failure of the troll fishery (which depended upon small SBT) in 1996 and 1997. In 1997, the troll fishery results were poor and the observer data from Japanese longliners for the TAS winter season showed a scarcity of SBT less than 105 cm. However, the 1997 data showed an increased representation of less than 105 cm SBT compared with 1996. In the absence of Japanese and joint-venture longline operations in the AFZ since 1998, no subsequent comparison is possible.

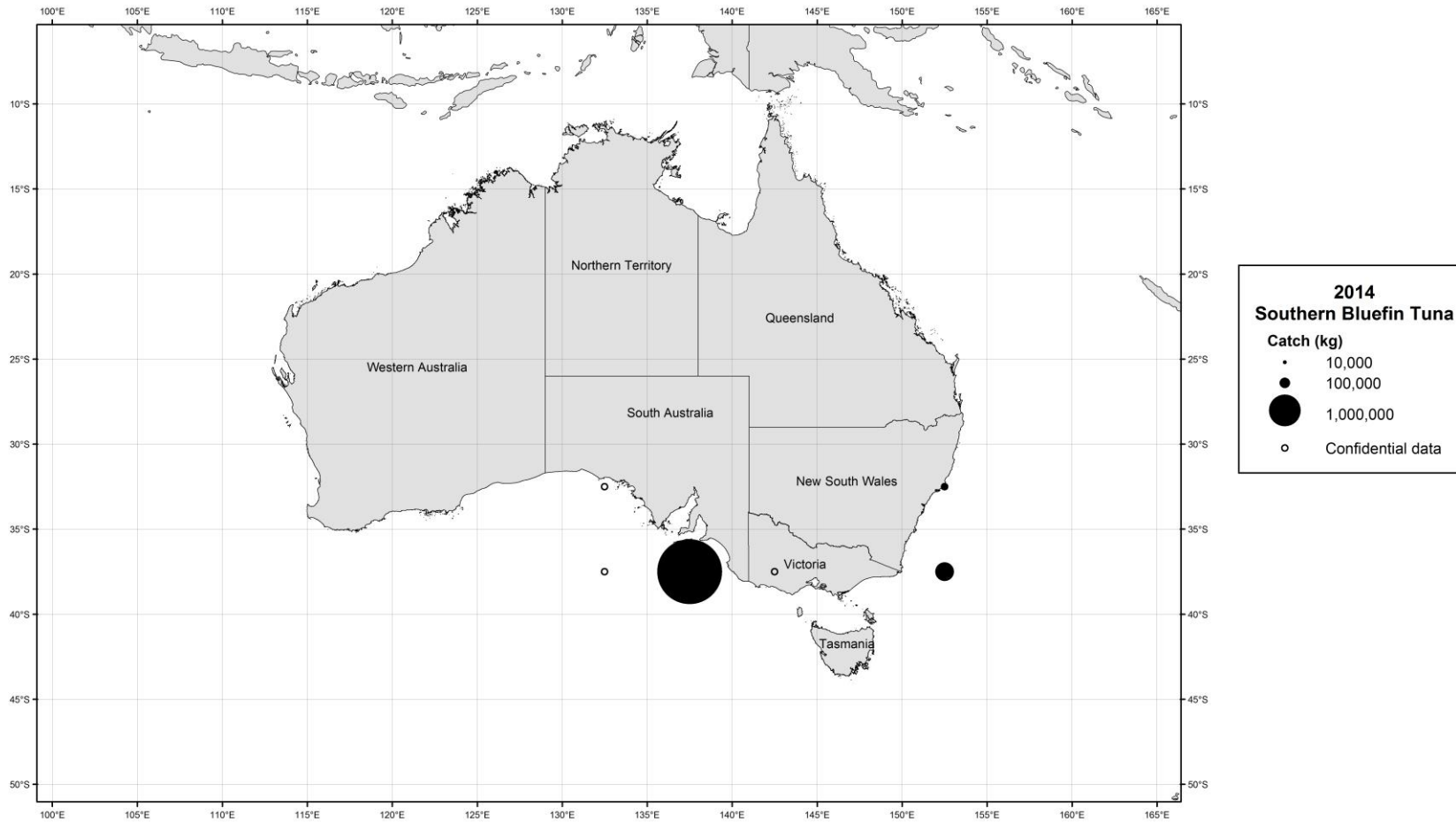


Figure 1 Australian SBT catch in the 2014 calendar year. Note that catch is centred in each grid square.

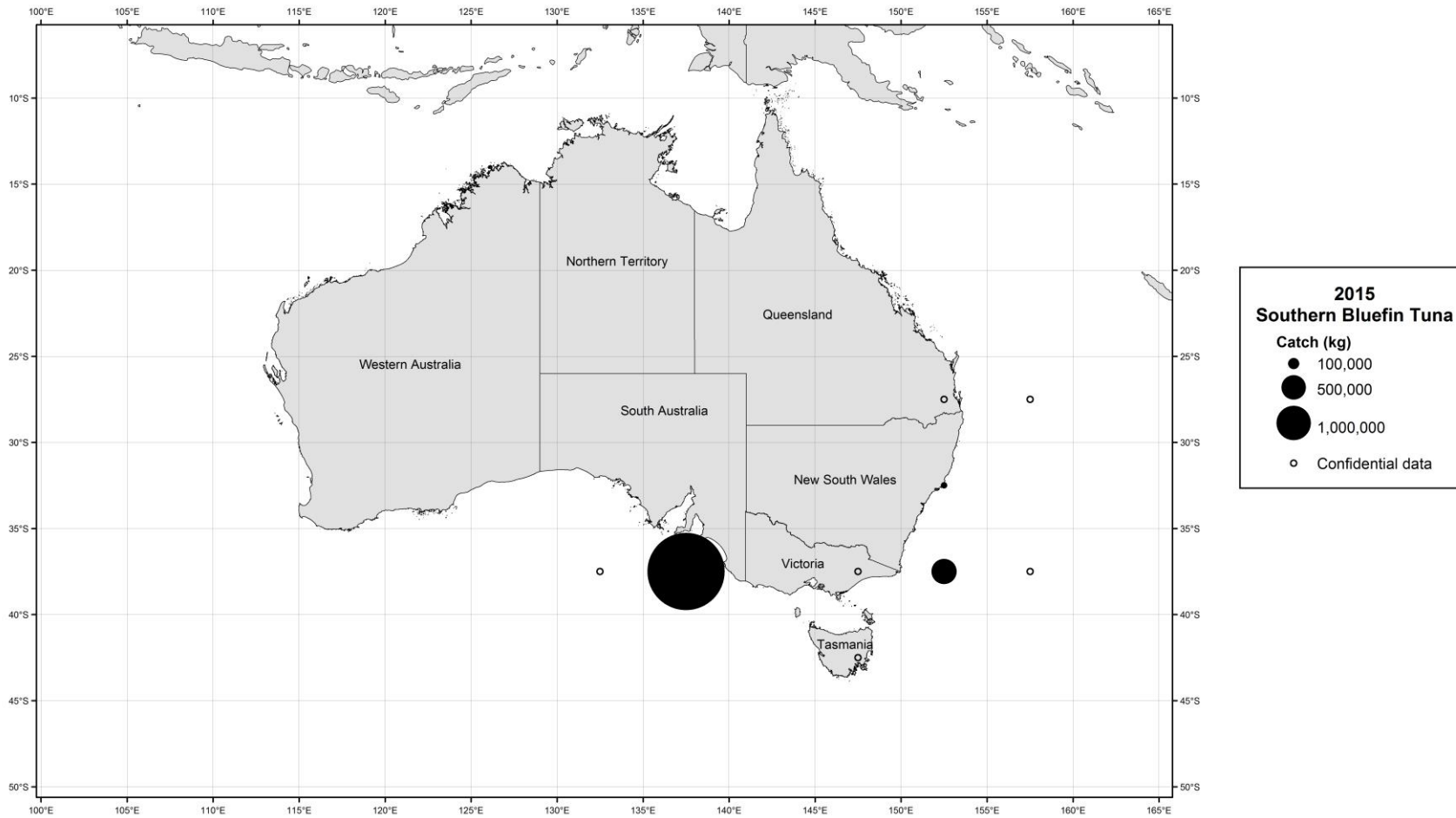


Figure 2 Australian SBT catch in the 2015 calendar year. Note that catch is centred in each grid square.

Table 2 Average fork length (cm) of SBT landed in each Australian state, 1989 to 2014

Calendar Year	Western Australia^a	South Australia^a	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	-
2004	-	93.6	-	161.9	-
2005	-	91.0	-	161.7	-
2006	-	90.7	-	154.1	-
2007	-	94.0	-	150.5	-
2008	-	93.9	-	166.7	-
2009	-	97.3	159.9	149.6	-
2010	-	94.4	-	146.7	-
2011	-	89.1	147.5	149.1	-
2012	-	93.0	-	167.0	-
2013	-	96.1	-	146.6	-
2014	-	94.7	-	155.2	-
2015	-	92.5 ^b	-	140.3	-

^aLengths are reported by calendar year, except for Western Australia, which are by financial year (e.g. 1998 represents the financial year 1998–99) and South Australia, which are by fishing season, to cover the summer season

^bPreliminary data for South Australia as the season does not finish until November 2016.

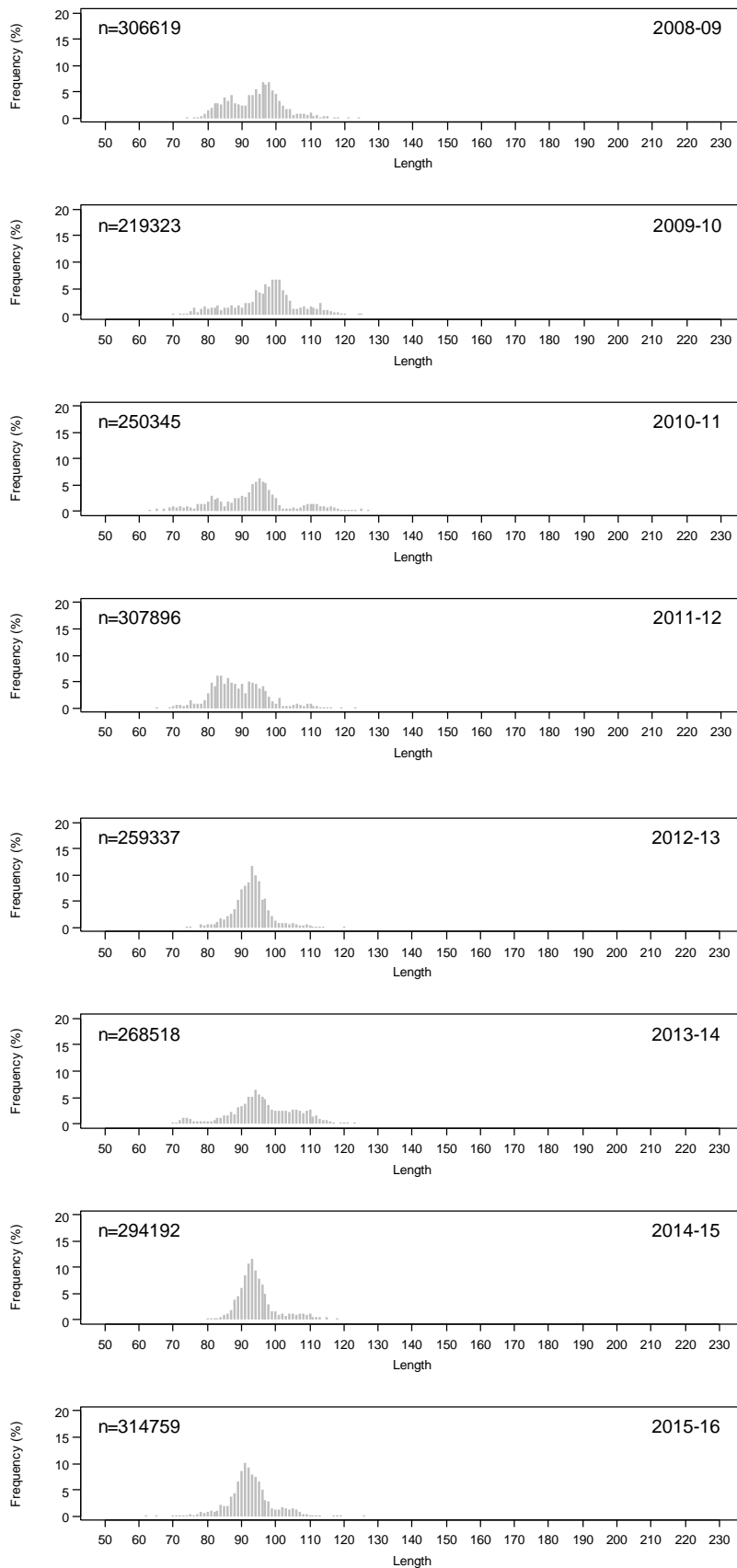


Figure 3 Length frequency of SBT purse seine catch in Australian waters raised to total catch, 2008–09 to 2015–16 fishing seasons (source: tow cage size monitoring database)

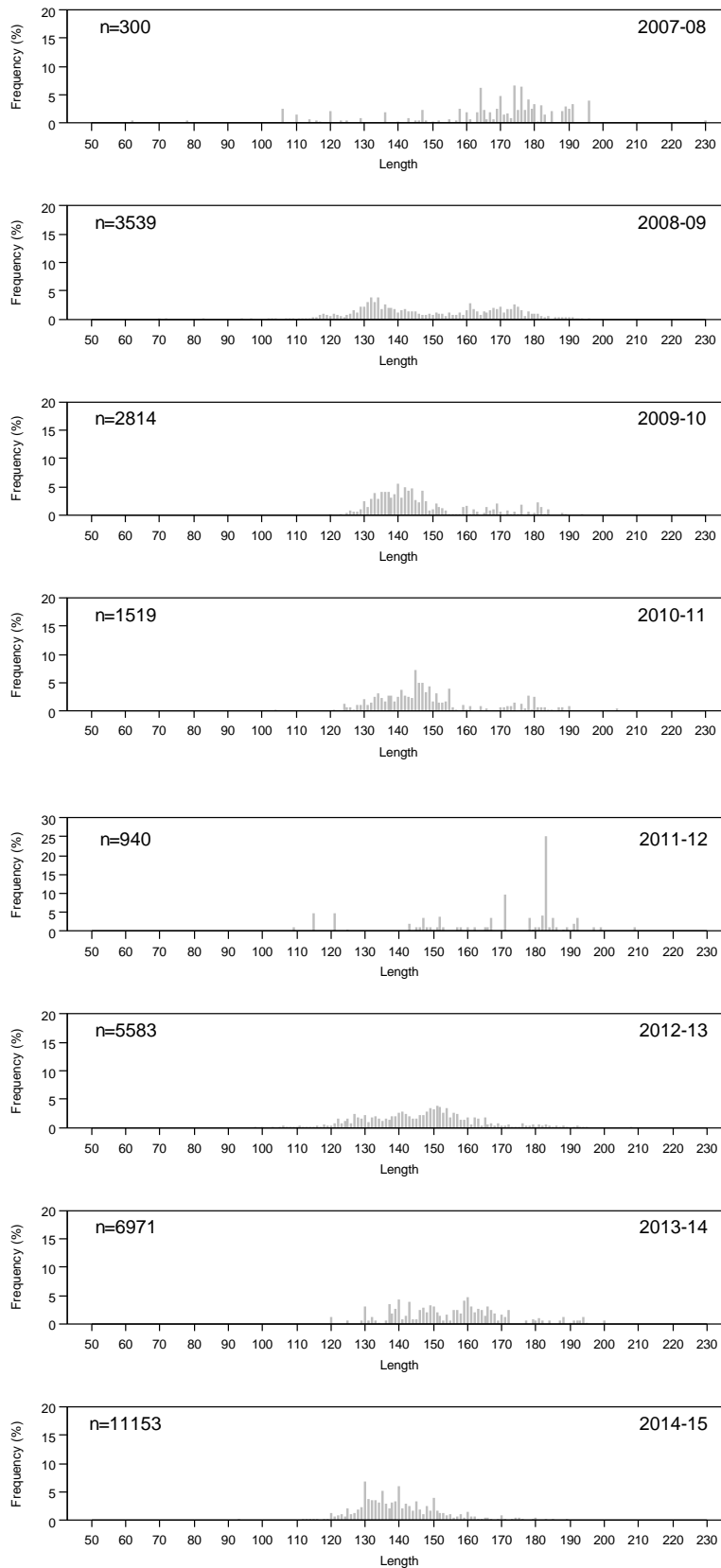


Figure 4 Length frequency histograms for retained SBT longline catch in Australian waters raised to total catch, 2007–08 to 2014–15 quota years (source: AFMA observer data and processor monitoring data)

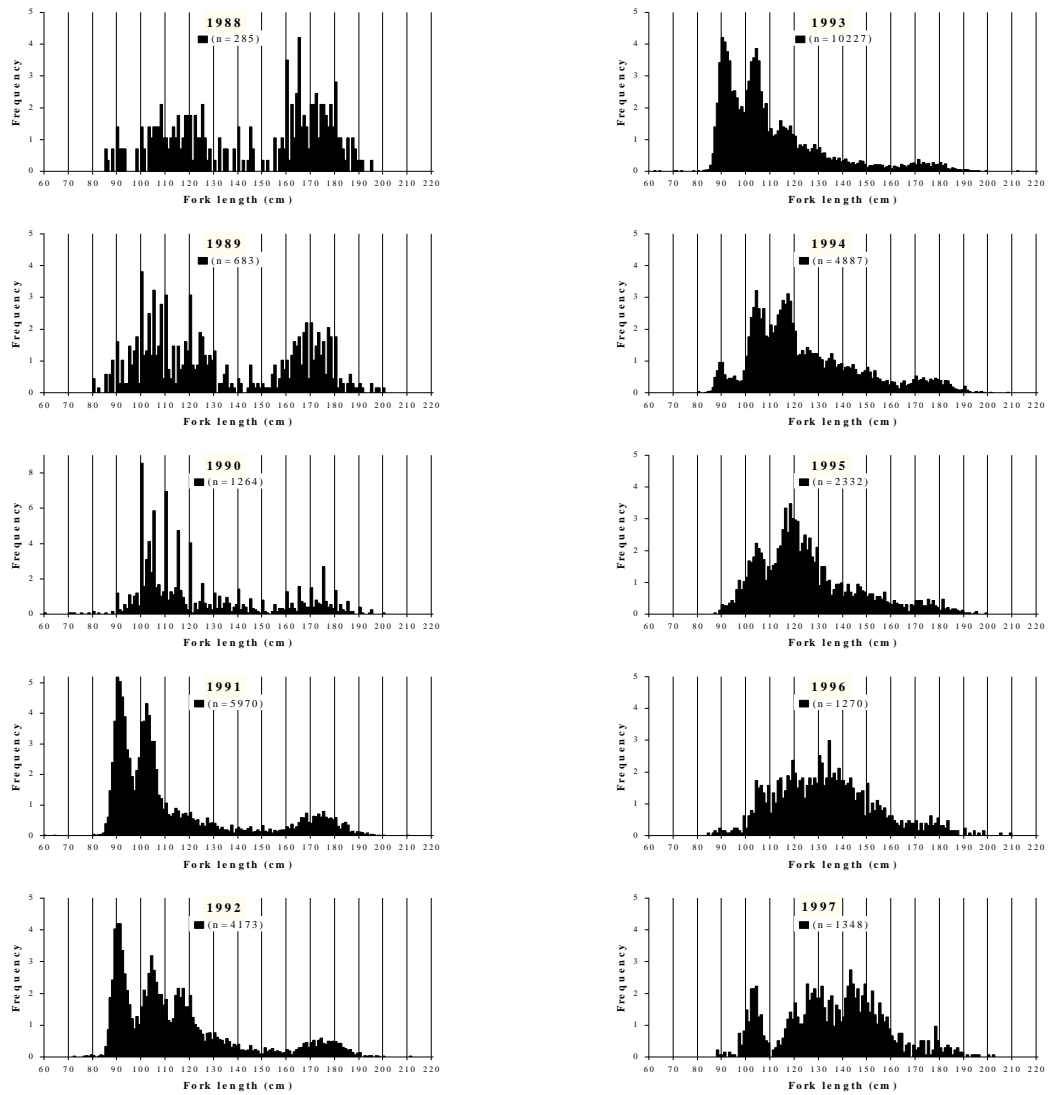


Figure 5 Length frequency of SBT measured by Australian observers on Japanese longliners fishing in the Tasmania region, 1988 to 1997. The data include small SBT tagged and released by observers.

3 Fleet size and distribution

In 2014–15, a total of 27 commercial fishing vessels landed SBT (or transferred to farm cages) in Australian waters.

South Australia (SA)

The one- to five-year-old SBT, which school from late spring to autumn in surface waters of the eastern Great Australian Bight, SA, were fished by six purse seiners during 2014–15, with various live bait, pontoon-towing and feeding vessels also involved. The majority of the purse seine fishing commenced in early January 2015 and finished in late March 2015. One vessel conducted pole and line operations in the waters off SA in the 2014–15 season. This catch was from the WTBF.

Western Australia (WA)

There were no SBT caught off WA in 2014–15. However, there was some catch in the WTBF which was taken off South Australia (see above paragraph).

New South Wales (NSW)

In 2014–15, 17 longliners reported landing both older juvenile and adult SBT in deeper waters off NSW. Four of these also fished off waters around Tasmania. One vessel also conducted rod-and-reel operations off NSW.

Tasmania (TAS)

In 2014–15, four longliners caught SBT off Tasmania. All of these also operated in waters off NSW. One vessel conducted rod-and-reel operations off Tasmania.

Queensland (QLD)

In 2014–15, two longliners caught SBT off Queensland. One these also operated in waters off NSW.

4 Other relevant information

Recreational catch

Recreational fishing for SBT occurs primarily off south-east TAS, NSW, SA, and western VIC. There is also some catch of small SBT off south-west WA. Angling for SBT has been popular among game fishers for many years, but has been increasing in popularity in the general recreational fishing sector in recent years (Rowse et al. 2008; Moore et al. 2015). Recreational fishing for SBT is managed by the relevant states. States that have a recreational fishing bag limit (number of fish that can be retained) for SBT include SA, VIC, TAS and NSW. SA also has a limit on the number of SBT taken per boat. Retention of SBT by recreational fishers is banned in QLD.

Overall, the data available on the recreational catch of SBT are limited and no estimates of total Australian recreational SBT catch are available. However, several recent recreational surveys have taken place in individual Australian states (Table 3). Recreational catch was estimated in SA and TAS in 2007–08. The TAS estimate was obtained from on-site surveys and charter logbooks (Forbes et al. 2009) and the SA catch estimate from a state-wide telephone-diary survey and charter fishery logbooks (Jones 2009; PIRSA unpublished data).

A survey of recreational SBT fishers was conducted in western VIC in March to July 2011 using onsite survey methods at boat launching ramps (Green et al. 2012). The survey estimated that a total of 19 700 SBT were retained during the survey period, weighing about 240 t. A further 6900 SBT were estimated to have been released by recreational fishers during the survey period. However, anecdotal evidence suggests that the catch was likely to be lower in 2012 than in 2011 as the fish were not as readily accessible.

A larger scale survey of recreational fishers was conducted in TAS from November 2011 to October 2012, based around an offsite telephone-diary survey, including a charter boat component using voluntary logbooks (Tracey et al. 2013). An onsite survey to estimate the catch of SBT was also conducted from March to July 2012. The telephone-diary survey indicated that 3243 SBT were retained over the year, equating to ~60 t. In addition, 1035 SBT were released. When the charter boat survey was included the total retained catch of SBT was estimated to be 75.8 t. The survey also estimated that ~27 t were taken by seals during recreational fishing.

A state-wide survey of recreational fishers in South Australia in 2013–14 estimated a total catch of southern bluefin tuna of 16 261 fish, of which an estimated 10 427 fish and 150.75 t were retained (Giri & Hall 2015). However, the error associated with the estimate is 47 per cent.

Tracey et al. (2016) details a study examining post-release survival and physiological stress in SBT captured recreationally. This study estimated a post-release survival rate of 86.6 per cent and indicates that SBT captured recreationally are likely to survive when released in the recreational sector. However, this result is again a best-case scenario and it is unclear how these results relate to commercial longline post-survival rates.

National estimate of recreational SBT catch

In 2013, Australia commenced a project with the relevant State jurisdictions to develop a methodology to obtain robust estimates of the total Australian recreational catch of SBT (Moore et al. 2015). The project incorporated elements of previous surveys, including the TAS off-site and VIC on-site surveys mentioned above. The project reviewed potential methodologies, conducted initial survey design work and tested on-site surveys in SA locations, from January to

August 2014. Given the different characteristics of the recreational effort in different regions, options for regularly estimating the national recreational catch of SBT are likely to combine targeted SBT surveys (both on- and off-site methods), charter boat logbooks and data collection from fishing tournaments. Options for the implementation of these methods are being considered.

Variation in recreational catch

As noted above, anecdotal evidence suggests that the recreational catch of SBT is highly variable between years and regions, for example, the catch in VIC was likely to be lower in 2012 than in 2011 as the fish were not as readily accessible. The mechanisms driving this variability are not well understood but likely include factors such as variation in the currents and oceanographic conditions. These environmental factors also likely affect the size of the fish that are available, as variation in the size of the SBT taken by recreational fishers has been documented both within and between years (e.g. Forbes et al. 2009; Tracey et al. 2013). Anecdotally, recreational fishers have noted that the size of the fish can vary between years.

Fisher behaviour also varies between regions and seasons and is likely to influence the level of fishing for SBT. In years where the fish are further offshore there is likely to be less effort to fish given the costs of fuel and the time and risk involved in tracking them down. In contrast, when the fish occur close to shore they may be available to a wider group of fishers. Fishers may also be motivated to fish (or not to fish) based on other factors such as the size of the fish being taken and the perceived abundance of fish in that year. It is also unclear whether the targeting behaviour of the recreational fishers varies between regions or over time.

Table 3 Summary of information available for the recreational fishing of southern bluefin tuna in Australia

Year	Location	Estimated retained catch (t)	Release rate	Size of fish (Weight)	Reference
2008	Victoria	29.1	NA	NA	PIRSA unpublished data
	Tasmania	14	20%	20 kg (median; range 10–110 kg)	Forbes et al. 2009
2011	Victoria	240	25%	12 kg (mean; range of means (9.19–105.35 kg)	Greene et al. 2012
2012	Tasmania	75.8	24%	16.67 kg (mean of measured fish; range 5.9–99.9 kg)	Tracey et al. 2013

NA = not available

Tag releases

The number of reported SBT tag releases by Australian recreational fishers is provided in Table 4. These data do not include recreational tag releases using CCSBT tags. There has been an increase in reported tag and release activity for SBT since 2005, particularly in SA. The trends in SBT tag-releases are difficult to interpret; tagging is influenced by various factors, including the abundance and distribution of SBT, angler participation rates (fishing effort), angler attitudes and behaviour, the condition of fish, the availability of tags and management measures (e.g. bag limits) in relation to fish size and catch rates.

Table 4 Reported tag releases of SBT by Australian recreational fishers, 1990 to 2014

Year	Percentage of total releases					No. of Releases
	TAS	NSW	SA	VIC	WA	
1990	7.1	0.0	14.3	57.1	21.4	14
1991	5.8	44.7	23.2	25.6	0.7	293
1992	5.6	18.5	48.1	24.1	3.7	54
1993	3.5	6.9	87.9	0.0	1.7	231
1994	0.0	14.3	76.2	0.0	9.5	63
1995	0.0	25.0	25.0	0.0	50.0	12
1996	0.0	25.8	74.2	0.0	0.0	159
1997	0.0	3.7	87.0	0.0	9.3	54
1998	4.8	0.8	52.5	40.6	1.3	377
1999	0.0	0.0	70.9	29.1	0.0	117
2000	0.0	0.4	99.1	0.4	0.0	224
2001	38.8	1.9	23.8	30.6	5.0	160
2002	39.4	2.6	25.9	25.4	6.7	193
2003	14.3	0.0	71.4	0.0	14.3	21
2004	31.8	0.0	45.5	0.0	22.7	22
2005	0.0	2.1	93.7	0.0	4.2	96
2006	7.2	0.2	84.7	0	7.9	584
2007	29.3	0.1	66.2	1.3	3.1	1303
2008	1.0	0	96.6	0.5	1.9	1006
2009	9.0	3.3	83.9	1.7	2.2	2044
2010	5.2	0.5	84.7	4.8	4.8	3329
2011	3.9	13.6	78.7	3.2	0.7	5766
2012	32.8	3.1	45.8	15.3	3.0	1818
2013	9.4	0.2	85.6	4.6	0.2	4114
2014	22.9	3.0	59.5	14.1	0.5	2288
2015*	11.8	0.7	76.6	10.3	0.7	1939

Source: NSW DPI Game Fish Tagging Program

* Preliminary data only

Discards in the commercial fishery

During 2015–16, no discarding of SBT, excluding observed releases noted in the observer section of the report, was observed or reported in logbooks collected in the purse-seine fishery in the Great Australian Bight.

In 2004, the Australian Fisheries Management Authority (AFMA) observers monitored longline operations in the Eastern Tuna and Billfish Fishery (ETBF) during the months and areas in which SBT were most likely to be taken incidentally (i.e. south of 30°S from May to September). Observer data showed that 56 per cent of longline caught SBT were discarded during the observed operations. In contrast, the level of SBT discards recorded in logbooks from other vessels fishing during the same period south of 30°S was 37.3 per cent. In response to this information, AFMA implemented tighter access controls, as well as increased observer coverage

in areas and at times where there is a high likelihood of SBT being caught (Appendix 5). The number of biological samples collected by the AFMA observer program is reported in Appendix 6.

In 2015, in the ETBF, south of 30°S and during the months of May to September, observers (both onboard and e-monitoring analysts) monitored 52 432 hooks of a total of 895 513, representing 5.9 per cent observer coverage of longline effort during the SBT migration. For the ETBF as a whole, 5.9 per cent of hooks were observed in 2015. The observed total catch number of SBT 733 individuals, of which 692 were retained, 41 fish were discarded (29 of which were reported as released alive and 8 of which were reports as having an undetermined life status) and none were tagged. ETBF logbooks for 2015 showed 10 814 SBT (511.9 t) were retained and 878 (7.5 per cent) were released.

During 2015, there was 7.2 per cent observer coverage of longline hook effort in the Western Tuna and Billfish Fishery (WTBF). Two vessels participated in the WTBF in 2015.

Stereo-video commercial trial

In 2011, the commercial trial of stereo-video technology in the SBT fishery was used to record SBT from eight transfers made from three cages. In total, 23 018 SBT were counted from the stereo-video recordings and overall stereo-video technology was demonstrated to be robust under commercial operating conditions. Technical details of the commercial trial were reported to the CCSBT Compliance Committee Meeting in 2011 (Anon. 2011; CCSBT-CC/1110/11). Work examining the automation of measurements using stereo-video is currently underway and the final report is expected in late 2016.

Fish release trials

In response to the operational characteristics of the SBT fishery, AFMA and the fishing industry agreed to undertake a three-year trial, commencing in 2007, to investigate a mechanism to allow a single release of live fish to avoid exceeding Australia's national allocation of SBT. The trial was supported by amendments to the Southern Bluefin Tuna Management Plan and by implementation standards agreed to by industry. The first release of the trial was conducted on 6 April 2008. Approximately 2000 SBT (approximately 39 t) were released at 35°14.5' S, 135°36.5' E. To select the release site, an aerial survey of three preferred release locations was conducted on 4 April 2008. These sites were selected because they are known as locations where wild SBT can be found. The final release site was selected because it had a strong presence of wild SBT indicating that the area was suitable habitat for SBT.

The second release took place on 17 March 2010 at 35°12.384'S, 135°45.424'E. The 2010 release lasted approximately 3 hours 20 minutes during which time divers estimated that 500 fish had been released. The release was observed by an AFMA Compliance Officer and the Protec Marine representative. All fish were released alive and vigorous with no mortalities observed during the release. Each release complied with a standard set of procedures and was considered a success.

The live release trial was reviewed in 2010 and an extension of the trial implemented for an additional three years expiring in 2013. The first release of the new trial period was undertaken on 1 May 2011. An estimated 1000 SBT were released at 35°13'S, 135°37'E, an area selected because of the presence of wild SBT. The release was observed by an AFMA Compliance officer and the Protec Marine representative. The release was considered a success with only two mortalities recorded.

The fish release trials have now concluded. Fish releases are now permitted by application under the Southern Bluefin Tuna Management Plan.

Research

Australia has a history of substantial investment in SBT-related research projects that are critical for the management of the stock. Appendix 8 provides an overview of the major research projects and associated costs that Australia has undertaken in recent years pertaining to SBT. Most recently, Australia's research has focused on projects related to the management and assessment of the fishery, such as the development of the management procedure, conduct of the scientific aerial survey, examining juvenile movements and the development of the close-kin genetics approach. Australia's investment in SBT-related science projects has increased over time and in recent years has exceeded one million Australian dollars per annum.

Projects funded solely or largely by Australia are vital to the management of the fishery and link to high priority projects identified under the 2014–18 CCSBT Scientific Research Plan. For example, until 2012, Australia funded the scientific aerial survey, and continued to fund the majority (> 85 per cent) of this critical survey in 2014. As notified and agreed by the Extended Commission, the aerial survey was not conducted in 2015 and was funded by the CCSBT in 2016. The scientific aerial survey is one of two data inputs for the management procedure and is the only fishery independent quantitative index of the abundance of juveniles.

Similarly, Australia funded the close-kin genetics work that is now an input to the operating model. The CCSBT has funded the continued collection of samples for close-kin genetics. Australia is investigating opportunities to fund the processing of the samples previously collected, to provide a time series of close-kin data for the 2017 stock assessment. In addition, Australia has funded and worked closely with Indonesia to improve the data derived from fish on the spawning grounds.

Australia funds and undertakes a significant proportion of intersessional science work which is essential for the ESC to meet its obligations. This annual work has included updating and reconditioning the operating model, including incorporating the close-kin results into the model, and running the management procedure. In addition, Australia has a history of innovative research in the fishery, and has provided new work on CPUE series and a large-scale archival tagging study to examine juvenile spatial dynamics, as well as initial work using otolith chemistry to examine the movement of juveniles. Australia provided funding to CCSBT to implement the gene-tagging pilot project. Such innovative projects continue to improve our understanding of the dynamics of the SBT stock and improve our ability to manage the stock.

References

- Anonymous 2011, *Technical assessment of the 2011 commercial trial of stereo-video in the Australian southern bluefin tuna farm sector*, Working paper CCSBT-CC/1110/11, Sixth meeting of the Compliance Committee of the Commission for the Conservation of Southern Bluefin Tuna, Bali, Indonesia, October 2011
- Caton, AE & Ward, PJ 1996, 'Arrangements on fisheries between the governments of Australia and Japan on tuna longlining, Annex to Ward PJ (Ed) (1996) Japanese longlining in eastern Australian waters 1962–1990', Bureau of Resource Sciences, Canberra
- Caton, AE, Ward, PJ, Colgan, MK, Williams, KF, Ramirez, C & 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, Shimizu, Japan, July 1995
- Forbes, E, Tracey, S & Lyle, J 2009 'Assessment of the 2008 recreational gamefish fishery of southeast Tasmania, with particular reference to southern bluefin tuna', Tasmanian Aquaculture and Fisheries Institute, University of Tasmania, Hobart
- Giri, K & Hall, K 2015, 'South Australian recreational fishing survey', Fisheries Victoria internal report series 62, Victorian Department of Economic Development, Jobs, Transport and Resources, Melbourne
- Green C, Brown P, Giri K, Bell J, & Conron S 2012, 'Quantifying the recreational catch of southern bluefin tuna off the Victorian coast', Recreational Fishing Grant Program – Research Report. Department of Primary Industries, Victoria
- Jones, K 2009, 'South Australian Recreational Fishing Survey', PIRSA Fisheries, Adelaide, 84 pp. South Australian Fisheries Management Series Paper No 54
- Moore, A, Hall, K, Khageswor, G, Tracey, S, Hansen, S, Ward, P, Stobutzki, I, Andrews, J, Nicol, S & Brown, P 2015, 'Developing robust and cost-effective methods for estimating the national recreational catch of southern bluefin tuna in Australia', FRDC report 2012/022.20, ABARES, Canberra
- Piasente, M, Stanley, B, Timmiss, T, McElderry, H, Pria, M, & Dyas, M 2012, *Electronic onboard monitoring pilot project for the Eastern Tuna and Billfish Fishery*, FRDC Project 2009/048, Australian Fisheries Management Authority, Canberra
- Rowell M, Moore, A, Sahlqvist, P & Begg, G 2008, 'Estimating Australia's recreational catch of southern bluefin tuna', Working Paper CCSBT-ESC/0809/17, Thirteenth meeting of the Scientific Committee of the Commission for the Conservation of Southern Bluefin Tuna, Rotorua, New Zealand, September 2008
- Tracey, S, Lyle, JM, Ewing, G, Hartmann, K & Mapleston, A 2013, *Offshore recreational fishing in Tasmania 2011/12*, Institute of Marine and Antarctic Studies, University of Tasmania, Hobart.
- Tracey, S, Hartmann, K, McAllister, J, Conron, S & Leef, M 2016 *Capture-induced physiological stress and post-release survival of recreationally caught Southern Bluefin Tuna*, Final report FRDC project 2013-025, Institute for Marine and Antarctic Studies, Hobart, Australia.

Appendix 1 SBT fishing season dates 1988–89 to 2015–16

Quota Year	Start Date	End Date
1988–89	1 Oct 1988	30 Sep 1989
1989–90	1 Oct 1989	30 Sep 1990
1990–91	1 Oct 1990	30 Sep 1991
1991–92	1 Oct 1991	31 Oct 1992
1992–93	1 Nov 1992	31 Oct 1993
1993–94	1 Nov 1993	31 Oct 1994
1994–95	1 Nov 1994	15 Dec 1995
1995–96	16 Dec 1995	15 Dec 1996
1996–97	16 Dec 1996	30 Nov 1997
1997–98	1 Dec 1997	30 Nov 1998
1998–99	1 Dec 1998	30 Nov 1999
1999–00	1 Dec 1999	30 Nov 2000
2000–01	1 Dec 2000	30 Nov 2001
2001–02	1 Dec 2001	30 Nov 2002
2002–03	1 Dec 2002	30 Nov 2003
2003–04	1 Dec 2003	30 Nov 2004
2004–05	1 Dec 2004	30 Nov 2005
2005–06	1 Dec 2005	30 Nov 2006
2006–07	1 Dec 2006	30 Nov 2007
2007–08	1 Dec 2007	30 Nov 2008
2008–09	1 Dec 2008	30 Nov 2009
2009–11 ^a	1 Dec 2009	30 Nov 2011
2011–12	1 Dec 2011	30 Nov 2012
2012–13	1 Dec 2012	30 Nov 2013
2013–14	1 Dec 2013	30 Nov 2014
2014–15	1 Dec 2014	30 Nov 2015
2015–16	1 Dec 2015	30 Nov 2016

^a Note that 2009–11 was a two-year season

Appendix 2 Purse seine fishing season duration

Quota Year	First Day of Season	Last Day of Season	1st Day	50%	75%	90%	Last Day	Duration
1993–94	1 Nov 93	31 Oct 94	49	113	127	138	175	127
1994–95	1 Nov 94	15 Dec 95	36	106	133	160	410 ^a	375 ^a
1995–96	16 Dec 95	15 Dec 96	1	67	87	131	365	365
1996–97	16 Dec 96	30 Nov 97	2	66	85	95	141	140
1997–98	1 Dec 97	30 Nov 98	19	67	84	98	364	346
1998–99	1 Dec 98	30 Nov 99	10	52	73	78	113	104
1999–00	1 Dec 99	30 Nov 00	4	56	65	79	118	115
2000–01	1 Dec 00	30 Nov 01	4	60	80	88	97	94
2001–02	1 Dec 01	30 Nov 02	9	61	75	80	121	113
2002–03	1 Dec 02	30 Nov 03	11	60	82	97	116	106
2003–04	1 Dec 03	30 Nov 04	9	66	87	102	115	107
2004–05	1 Dec 04	30 Nov 05	5	61	83	98	119	115
2005–06	1 Dec 05	30 Nov 06	18	70	92	99	358	341
2006–07	1 Dec 06	30 Nov 07	1	74	93	104	125	125
2007–08	1 Dec 07	30 Nov 08	10	58	91	94	99	90
2008–09	1 Dec 08	30 Nov 09	3	76	103	113	130	128
2009–11 ^b	1 Dec 09	30 Nov 10	3	52	69	78	84	82
2009–11 ^c	1 Dec 10	30 Nov 11	22	61	87	100	356	335
2011–12	1 Dec 11	30 Nov 12	22	71	85	99	110	89
2012–13	1 Dec 12	30 Nov 13	21	57	71	79	102	82
2013–14	1 Dec 13	30 Nov 14	18	58	63	64	69	52
2014–15	1 Dec 14	30 Nov 15	38	72	89	94	112	75
2015–16 ^d	1 Dec 15	30 Nov 16	19	62	72	75	86	68

'1st Day' = Day of First Capture, '50%', etc denote the day of the season on which that percentage of the catch had been taken, 'Last Day' = the Day of Last Capture.

^aFigures greater than 365 days because the season dates changed and extended this season for longer than one year.

^bYear 1 of the 2009–11 season (2009–10)

^cYear 2 of the 2009–11 season (2010–11)

^dNote that for the 2015–16 season, figures provided are preliminary as the fishing year does not finish until November 2016.

Appendix 3 Australian surface catch for farm operations, 1994–95 to 2015–16

Season	Estimated catch (t)	Actual catch (t)	Catcher vessels	Vessel search hours	Sets	No. 1° squares fished
1994–95	2179	2009	5	526	104	5
1995–96	2859	3442	6	631	89	11
1996–97	3134	2505	7	769	118	13
1997–98	3916	3629	7	671	143	8
1998–99	4418	4991	7	972	129	3
1999–00	4746	5131	8	764	107	5
2000–01	5100	5162	8	799	129	2
2001–02	5400	5234	7	1309	159	3
2002–03	5188	5375	7	1276	150	5
2003–04	5299	4874	6	1202	160	4
2004–05	5225	5215	8	1168	139	4
2005–06	5463	5302	7	1304	156	6
2006–07	5091	5230	6	1459	160	8
2007–08	4530	5211	7	1217	134	2
2008–09	4348	5017	7	1156	139	7
2009–11 ^a	3323	3931	6	417	78	3
2009–11 ^b	3840	3872	5	835	106	5
2011–12	4328	4485	5	1150	156	7
2012–13	4039	4198	5	1021	110	11
2013–14	4381	5029	6	752	101	4
2014–15	4789	4950	6	1016	154	6
2015–16 ^c	4826	4896	6	1317	124	6

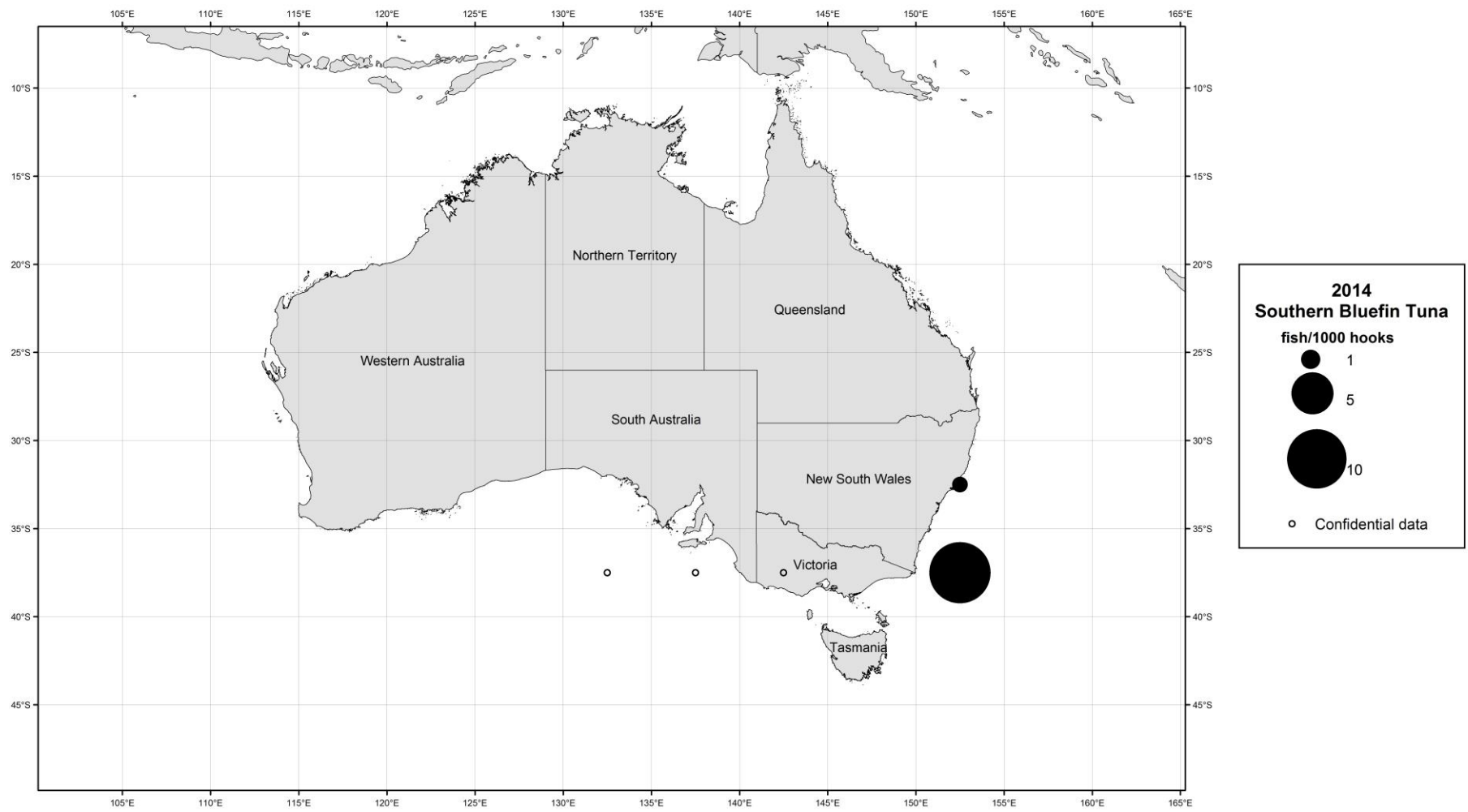
Note that estimated catch is derived from logbook data while actual catch is derived from landing data.

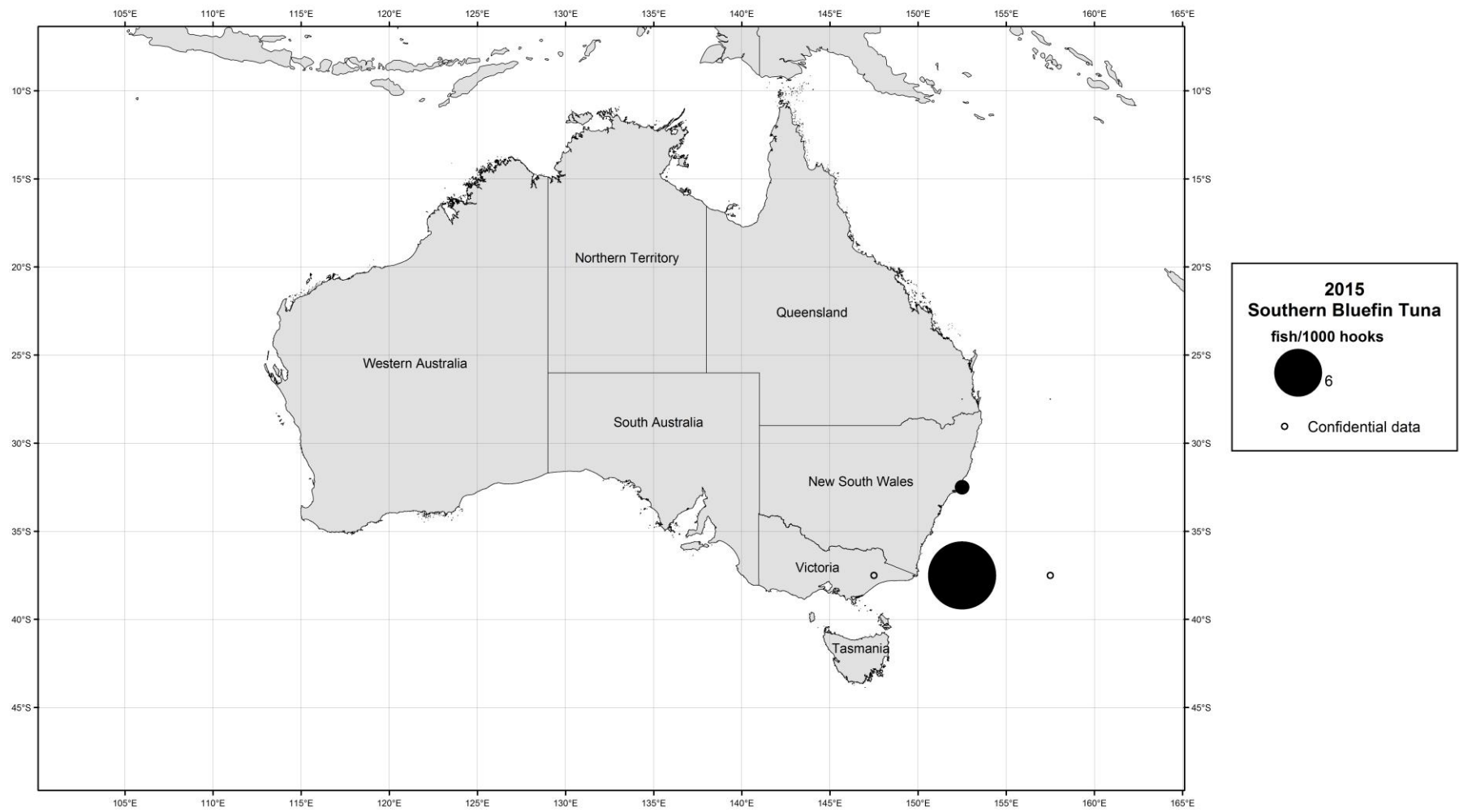
^aYear 1 of the 2009–11 season (2009–10)

^bYear 2 of the 2009–11 season (2010–11)

^cNote that for the 2015–16 season, figures provided are preliminary as the fishing year does not finish until November 2016.

Appendix 4 Nominal CPUE for all Australian longliners, 2014 and 2015 calendar years





Appendix 5 Summary of observed catch and effort by year and sector

Country	Year	Sector	Observers Deployed	Sea Days	Sets/Tows Observed	Observed Vessels	Observed Effort (% , units)	Observed Catch (% , units)	Total Cost
Australia	2002-03	Purse Seine ^a	N/A	47	24		11% (sets)	11% (est. total weight)	60,000 (A\$)
Australia	2002-03	Towing ^a	N/A	19	1		2.6% (tows)		(included above)
Australia	2002	East Coast Longline	17	323	198		14.4% (hooks)	35.5% (no. retained catch)	NA
Australia	2002	West Coast Longline	N/A	N/A	N/A		N/A (hooks)	N/A (no. retained catch)	NA
Australia	2003-04	Purse Seine ^a	2	27	21		13% (sets)	12.8% (est. total weight)	60,000 (A\$)
Australia	2003-04	Towing ^a	2	30	2		5.6% (tows)		(included above)
Australia	2003	East Coast Longline	10	242	168		14.9% (hooks)	55.2% (no. retained catch)	303,000 (60,000 A\$ SBT component)
Australia	2003	West Coast Longline	4	72	54		2.0% (hooks)	4.5% (no. retained catch)	42,247 (A\$)
Australia	2004-05	Purse Seine ^a	2	36	15		11.2% (sets)	8.5% (est. total weight)	60,000 (A\$)
Australia	2004-05	Towing ^a	2	24	2		5.7% (tows)		(included above)
Australia	2004	East Coast Longline	11		68		11.7% (hooks)	5.4% (no. retained catch)	966,000 (150,000 A\$ SBT component)
Australia	2004	West Coast Longline			59		3.9% (hooks)	0% (no. retained catch)	57,384(A\$)
Australia	2005-06	Purse Seine ^a	2	47	14		9.2% (sets)	10.1% (est. total weight)	78,000 (A\$)
Australia	2005	East Coast Longline	14		128		37.5% (hooks)	62.8% (no. retained catch)	723,289 (160,000 A\$ SBT component)
Australia	2005	West Coast Longline			47		9.1% (hooks)	(no observed catch)	0

Country	Year	Sector	Observers Deployed	Sea Days	Sets/Tows Observed	Observed Vessels	Observed Effort (% , units)	Observed Catch (% , units)	Total Cost
Australia	2006–07	Purse Seine ^a	2	50	9		5.6% (sets)	12.1% (est. total weight)	NA
Australia	2006–07	Towing ^a	2	41	2		6.5% (tows)		NA
Australia	2006	East Coast Longline	20		138		22.1% (hooks)	88.9% (no. retained catch)	NA
Australia	2006	West Coast Longline	1		8		17.4% (hooks)	(no observed catch)	NA
Australia	2007–08	Purse Seine ^a	2	19	16		11.8% (sets)	5.6% (est. total weight)	68,000 (A\$)
Australia	2007–08	Towing ^a	2	38	2		6.0% (tows)		(included above)
Australia	2007	East Coast Longline	17		156		30.2% (hooks – SBT Area)	23.2% (no. retained catch)	180,000 (A\$)
Australia	2007	West Coast Longline			10		1.9% (hooks)	No SBT caught	15,589 (A\$)
Australia	2008–09	Purse Seine	2	27	11 (fish retained) 8 (aborted)	3	7.9% (sets, fish retained)	15.3% (est. total weight)	77,215 (A\$)
Australia	2008–09	Towing	1	15	1	1	3.2% (tows)		(included above)
Australia	2008	East Coast Longline	31		676		47.9% (hooks – SBT Area)	34% (no. retained catch)	694,500 (A\$ – 08/09 fin year)
Australia	2008	West Coast Longline	3		25		16.7% (sets)	No SBT caught	16,800 (A\$ – 08/09 fin year)
Australia	2009–11 ^b	Purse Seine	1	3	7 (fish retained) 1 (aborted)	2	9.0% (sets, fish retained)	13.5% (est. total weight)	95,392 (A\$)
Australia	2009–11 ^b	Towing	1	27	1	1	4.2% (tows)		(included above)
Australia	2009	East Coast Longline	20		400		17.2% (hooks – SBT Area)	23% (no. retained catch)	332,562 (A\$ – 09/10 fin year)
Australia	2009	West Coast Longline	2		31		8.2% (sets)	No SBT caught	21,019 (A\$ – 09/10 fin year)
Australia	2009–11 ^c	Purse Seine	2	49	21 (fish retained) 11 (aborted)	2	19.8% (fish retained)	12.2% (est. total weight)	48,830 (A\$)
Australia	2009–11 ^c	Towing	2	22	1	1	3.7% (tows)		(included above)
Australia	2010	East Coast Longline	16		65		7.7% (hooks – SBT Area)	20.1% (no. retained catch)	417,240 (A\$ – 10/11 fin year)
Australia	2010	West Coast Longline	1		10		2.5% (hook effort)	No SBT caught	14,533 (A\$ – 10/11 fin year)

Country	Year	Sector	Observers Deployed	Sea Days	Sets/Tows Observed	Observed Vessels	Observed Effort (% , units)	Observed Catch (% , units)	Total Cost
Australia	2011–12	Purse Seine	1	17	17 (fish retained) 2 (aborted)	1	11.1% (fish retained)	13.8% (est. total weight)	45,000 (A\$)
Australia	2011–12	Towing	1	13	1	1	3.4% (tows)		(included above)
Australia	2011	East Coast Longline	9		76		9.6% (hooks – SBT Area)	17.7% (no. retained catch)	\$750,000 (A\$)
Australia	2011	West Coast Longline	1		4		1.7% (hook effort)	No SBT caught	\$11,500 (A\$)
Australia	2012–13	Purse Seine	2	30	14 (fish retained) 1 (aborted)	2	12.7% (fish retained)	13.9% (est. total weight)	\$75,000 (A\$)
Australia	2012–13	Towing	2	26	2	2	3.8% (tows)		(included above)
Australia	2012	East Coast Longline	9		50		6.2% (hooks – SBT Area)	16.1% (no. retained catch)	\$800,000 (A\$)
Australia	2012	West Coast Longline	3		61		17.9% (hook effort)	No SBT caught	\$90,000 (A\$)
Australia	2013–14	Purse Seine	2	17	16 (fish retained) 1 (aborted)	2	17.0% (fish retained)	21.9% (est. total weight)	na
Australia	2013–14	Towing	1	9	1	1	4% (tows)		
Australia	2013	East Coast Longline	10		87		10.4% (hooks – SBT Area)	19.5% (no. retained catch)	na
Australia	2013	West Coast Longline	0		0		0%	No observer coverage	
Australia	2014–15	Purse Seine	1	17	14 (fish retained)	1	9.1% (fish retained)	19.9% (est. total weight)	na
Australia	2014–15	Towing	1	20	1	1	4% (tows)		
Australia	2014	East Coast Longline	5		24		3.1% (hooks – SBT Area)	4.5% (no. retained catch)	na
Australia	2014	West Coast Longline	2		27		9.1%	31.8% (no. retained catch)	
Australia	2015–16	Purse Seine	2	15	25	2	18.9% (fish retained)	20.2% (est. total weight)	na
Australia	2015–16	Towing	2	21	2	2	7.1% (tows)		
Australia	2015	East Coast Longline			330		5.9% (hooks – SBT Area)	6.5% (no. retained catch)	na
Australia	2015	West Coast Longline			19		7.2%	No observed catch	na

^aAustralian purse seine and towing observer statistics are for the SBT fishing year December–November

^bYear 1 of the 2009–11 season (2009–10); ^cYear 2 of the 2009–11 season (2010–11); na = not available

Appendix 6 Number of biological samples taken in observer programs (year and sector)

Country	Year	Sector	Otoliths	Sex	Tags	Stomach contents	Length measurement
Australia	2002	Longline	0	124	165	0	300
Australia	2003	Longline	0	51	229	1	388
Australia	2004	Longline	5	62	0	5	187
Australia	2004–05	Purse seine	2	2	0	0	3
Australia	2005	Longline	63	189	19	12	264
Australia	2005–06	Purse seine	46	46	0	0	23
Australia	2006	Longline	0	4	1	0	32
Australia	2006–07	Purse seine	9	17	0	16	19
Australia	2007	Longline	9	41	0	0	42
Australia	2007–08	Purse seine	4	4	0	0	4
Australia	2008	Longline	0	84	0	1	99
Australia	2008–09	Purse seine	14	14	0	0	14
Australia	2009	Longline	0	746	0	0	810
Australia	2009–11 ^a	Purse seine	3	3	0	0	3
Australia	2010	Longline	0	563	0	0	563
Australia	2009–11 ^b	Purse seine	4	5	0	0	5
Australia	2011	Longline	0	255	0	0	255
Australia	2011–12	Purse seine	5	8	0	0	8
Australia	2012	Longline	0	70	0	0	69
Australia	2012–13	Purse seine	4	6	0	0	119
Australia	2013	Longline	0	1089	0	0	1089
Australia	2013–14	Purse seine	1	1	0	0	1
Australia	2014	Longline	0	290	0	0	290
Australia	2014–15	Purse seine	26	21	0	0	27
Australia	2015–16	Purse seine	3	15	0	0	15

^aYear 1 of the 2009–11 season (2009–10)

^bYear 2 of the 2009–11 season (2010–11)

Appendix 7 An overview of the Australian SBT observer program

Observer sources and training

AFMA has recruited and trained observers since its establishment in 1992. Approximately 16 observers are currently employed in the AFMA observer program. They are sourced from universities and the maritime industries from around Australia and require the ability to live and work at sea, have demonstrated experience in collecting biological data at sea, and have experience in fisheries research methodologies and collection of associated scientific data. Observers also hold marine radio operators certificate of proficiency (or similar qualifications and/or experience), a sea safety certificate and medical certificate, and have completed an AFMA observer training course.

In 2008 and 2009, in addition to the independent AFMA observers, an international observer from South Africa (Capricorn Fisheries Monitoring) was deployed. No international observers have been used since then.

AFMA implemented a trial of e-monitoring (i.e. on-board, fixed-mount digital video cameras) in the Eastern Tuna and Billfish Fishery in 2009–10 to evaluate the effectiveness of this technology for a range of fishery monitoring purposes and to conduct a cost–benefit analysis (Piasente et al. 2012). E-monitoring became compulsory for the Australian longline fleet from 1 July 2015. E-monitoring replaces human observers for all in-zone observer requirements. At least 10 per cent of video footage of all hauls will be reviewed to verify the accuracy of logbooks which are required to be completed for 100 per cent of shots. This review rate can be increased to target specific events.

Purse seine fishery—Great Australian Bight 2015–16

The purse seine observer program for the 2015–16 Australian SBT fishing season monitored fishing and tow operations in 35°15'–36°24'S and 135°35'–138°31'E in January, February and March 2016. Two Australian observers monitored 25 purse seine sets where fish were retained. No shots were aborted while the observers were onboard. This represents 18.9 per cent of the total sets in which fish were taken in 2015–16. From these observations an estimated 975 t of SBT were caught during observed sets, representing 20.2 per cent of the estimated tonnage caught. An estimated 27 t of fish were released alive, 17 t because they were too small for commercial use and 10 t because the tow cage was too full. The observers recorded a total of nine mortalities during purse seine operations, all of which were sampled. Two observers monitored two tow operations and recorded eight SBT mortalities during the towing operations, six of which was sampled. The other two mortalities were not sampled as they were not sufficiently secured to the tinny by the divers and did not make it back to the purse seine vessel for the observer to take samples.

Longline fishery

In 2015, in the ETBF, south of 30°S and during the months of May to September, observers (both onboard and e-monitoring analysts) monitored 52 432 hooks of a total of 895 513, representing 5.9 per cent observer coverage of longline effort during the SBT migration. For the fishery as a whole, 5.9 per cent of hooks were observed in 2015. The observed total catch number of SBT

733 individuals, of which 692 were retained, 41 fish were discarded (29 of which were reported as released alive and 8 of which were reports as having an undetermined life status) and none were tagged. ETBF logbooks for 2015 showed 10 814 SBT (511.9 t) were retained and 878 (7.5 per cent) were released.

During 2015, there was 7.2 per cent observer coverage of longline hook effort in the WTBF. Two vessels participated in this fishery in 2015.

Scientific observer program design and coverage

The target coverage for the SBT purse seine fleet operating out of Port Lincoln is 10 per cent of the total catch and effort for the fishery. Observers monitor 100 per cent of all fishing operations while on board. Most of the Australian SBT purse seine effort has historically taken place in an area between 33–35°S and 131–133°E.

The observers in the purse seine fishery in the 2015–16 fishing season spent 56 days at sea, and observed purse seiner activities for 15 days and tow activities for 21 days. The remainder of the days were spent in transit, searching or lost due to rough weather.

Observer data

Effort data

In 2016, two observers monitored 25 purse seine sets where fish were retained. No shots were aborted while the observer was onboard. Fishing operations observed in the purse seine sector were based in the Great Australian Bight between 35°15'–36°24'S and 135°35'–138°31'E (see Figure 6). The observed sets where fish were retained represent 18.9 per cent of all sets in the fishery where fish were retained.

Data were gathered on 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 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 tows were observed and data collected on the number of SBT mortalities and the date they occurred. Data were 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.

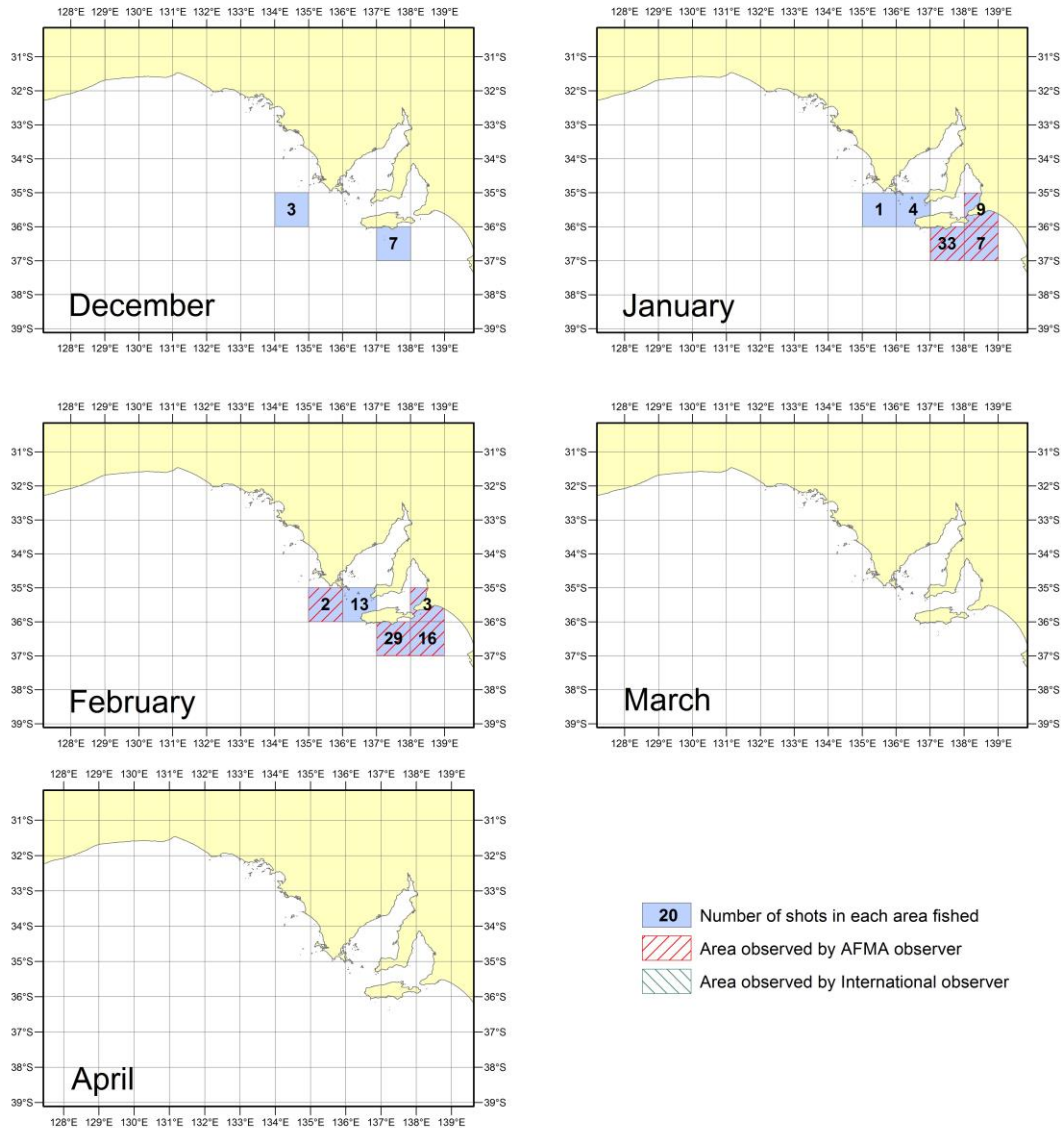


Figure 6 The number of sets recorded in the SBT purse seine fishery from December 2015 to April 2016. The hatching represents areas where observations took place.

Catch data

Observers recorded catch composition and fate of target and bycatch species where possible during all observed 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.

Because 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. Consequently, both catch data and observed catch data are estimates only and these are reported below.

In total, an estimated 975 t of SBT were caught during observed sets. This observed catch accounted for 20.2 per cent of the total estimated catch of 4826 t. The actual tonnage caught by purse seine vessels in the 2015–16 fishing season was 4896 t.

Length frequency data

It is not possible for onboard observers to obtain length measurements for the live SBT catch, but observers are required to take biological samples from all SBT mortalities. During purse seine operations, the observers recorded nine SBT mortalities, all of which were sampled. LCF for these fish ranged from 94 cm to 110 cm. During towing operations, the observer recorded eight SBT mortalities, six of which were sampled. The other two mortalities were not sampled as they were not sufficiently secured to the tinny by the divers and did not make it back to the purse seine vessel for the observer to take samples. LCF for the sampled fish ranged from 102 cm to 115 cm.

Biological data

Otoliths were obtained from three of the nine mortalities in the purse seine operations. No otoliths were obtained from the seven mortalities sampled in the tow operation, as the observer did not have the required sampling apparatus on hand. There is also an ongoing project to collect otoliths from farm mortalities.

No weight samples were obtained during purse seine operations. Weight samples were obtained for all six fish sampled during the tow operation. Weights ranged from 15.5 kg to 24 kg.

Tag return monitoring

There were no tagged SBT reported by the observer.

Appendix 8 Australian southern bluefin tuna research projects

The projects below represent the major research investment areas by Australia for the past several years that directly contribute to the work of the Commission.

Category	Project title	Year(s)	Amount (AU\$)
Data supporting SBT	Tagging juvenile SBT off South Africa	2006	\$100,000
	CCSBT conventional tagging programme	2006	\$170,832
	Archiving of hard parts for SBT in 2006/07	2006	\$28,231
	Archiving of hard parts for SBT in 2007/08–2009/10	2007	\$307,302
	Archiving of hard parts for routine ageing and developing age-length keys for the Australian SBT surface fishery 2010/11–2012/13	2010	\$304,643
	Development of SBT catch and effort monitoring program	2009	\$150,000
	Aerial survey in the Great Australian Bight (GAB) 2008	2008	\$427,274
	Aerial survey in the Great Australian Bight (GAB) 2009	2009	\$582,440
	Aerial survey in the Great Australian Bight (GAB) 2010	2010	\$621,625
	Aerial survey in the Great Australian Bight (GAB) 2011	2011	\$753,208
	Aerial survey in the Great Australian Bight (GAB) 2012	2012	\$778,120
	Aerial survey in the Great Australian Bight (GAB) 2013	2013	\$808,360
	Aerial survey in the Great Australian Bight (GAB) 2014	2014	\$661,635
SBT Research	Acoustic monitoring of juvenile SBT in the GAB	2002–07	\$150,000
	Spatial interactions among juvenile SBT at a global scale: a large-scale archival tag experiment	2003–11	\$2,549,000
	Analysis of overcatch data	2006	\$108,553
	Monitoring of the Japanese SBT market	2006	\$70,000
	Fishery-independent estimate of spawning biomass of southern bluefin tuna through identification of close-kin using genetic markers	2006–11	\$1,491,146
	Australian farm research program	2007	\$200,000

	Assessing operational feasibility of stereo video and evaluating monitoring options for the SBT farm sector	2007	\$395,130
	Further monitoring of the Japanese SBT market	2008	\$220,000
	Tasman residency and spawning migrations of adult SBT	2008–09	\$165,000
	Management Procedure development	2009	\$224,899
	SBT stereo-video project	2010	\$75,000
	Developing a management procedure based recovery plan for SBT	2011	\$358,130
	Otolith chemistry of juvenile southern bluefin tuna	2011–12	\$20,000
	Investigating new data sources and spatial operating models	2011–13	\$315,000
	Automation of measurements from underwater stereo-video	2011–14	\$30,000
	Forecasting spatial distribution of SBT habitat in the GAB (proposal)	2013–14	\$145,948
	Updating the CCSBT operating model and intersessional science	2014–15	\$529,301
	Intersessional science – Impact of no 2015 aerial survey on the MP	2015	\$118,385
Capacity building	Monitoring of longline catch of SBT landed in Indonesia	2003–04	\$130,508
	Monitoring of longline catch of SBT landed in Indonesia	2004–05	\$112,628
	Monitoring of longline catch of SBT landed in Indonesia	2006–08	\$397,389
Recreational fishing	Quantifying the recreational catch of SBT off the Victorian coast	2010–11	\$212,000
	Developing a methodology for obtaining regular, statistically robust estimates of recreational and charter fishing catch	2011–12	\$100,000
	Development of methods for obtaining national estimates of recreational catch	2013–15	\$570,000
	Capture-induced physiological stress and post-release survival of recreationally caught Southern Bluefin Tuna	2013–15	\$383,486

