



# Australia's 2021–2022 Southern Bluefin Tuna Fishing Season

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We acknowledge the Traditional Custodians of Australia and their continuing connection to land and sea, waters, environment and community. We pay our respects to the Traditional Custodians of the lands we live and work on, their culture, and their Elders past and present.

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# Summary

The 2021–22 southern bluefin tuna (SBT) fishing season report summarises catches and fishing activities in the Australian Southern Bluefin Tuna Fishery up to and including the 2021–22 fishing season<sup>1</sup> (1 December 2021 – 30 November 2022).

Australia's allocation as agreed by the Commission for the Conservation of Southern Bluefin Tuna was 6,238.4 t for the 2021–22 fishing season. However, this was adjusted to account for a set aside for the recreational sector and to account for undercatch in the previous fishing season, so the effective TAC was 6,653.4 t. A total of 31 commercial fishing vessels landed SBT in Australian waters in the 2021–22 fishing season for a total catch of 5,972 t. A total of 82.75% of the catch was taken by purse seine with the remainder taken by longline, pole-and-line, rod-and-reel and trolling. Eight purse seiners fished off South Australia for the Australian farming operations during the 2021–22 fishing season, with live bait, pontoon-towing and feeding vessels also involved. Most of the purse seine fishing commenced in December 2021 and finished in March 2022.

Length-frequency data from the purse-seine fishery indicate a shift to smaller fish in recent years. Average lengths of SBT transferred to farms in South Australia declined from 96.4 cm in the 2016–17 season to 83.3 cm in 2021–22.

In the 2021–22 fishing season, observers monitored 9.6% of purse seine sets where fish were retained for the farm sector and 10.8% of the estimated SBT purse-seine catch. In 2022, the review rate for e-monitoring footage 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 was 10.8%. In 2022, the review rate for e-monitoring footage of longline hook effort in the entire Western Tuna and Billfish Fishery was 11.1%.

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<sup>1</sup> 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 2021–22 fishing season of the Australian Southern Bluefin Tuna (*Thunnus maccoyii*; SBT) Fishery. Caton et al. (1995) provides a more detailed historical description of the fishery.

## 1.1 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 1997. From 1992 to 1998, domestic longliners operating off Tasmania (TAS) and NSW also took around 5–10% 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% of the TAC in 1991–92 to 98% in 1999–2000. The purse-seine fishery now accounts for ~85% of the total catch.

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.

## 1.2 Recent seasons

The Australian commercial SBT catches for the 2021 and 2022 calendar years were 5,459 t and 6,266 t, respectively. The commercial catches for the 2020–21 and 2021–22 fishing seasons were 5,645 t and 5,972 t, respectively (Table 1). The commercial TAC for the 2021–22 fishing season was 5,926.5 t. However, this was adjusted to account for undercatch in the previous fishing season so the effective TAC was 6,653.4 t. This action is consistent with the guidelines in the CCSBT Resolution on Limited Carry-forward of Unfished Annual Total Available Catch of Southern Bluefin Tuna adopted in October 2017 by the CCSBT. See Appendix A for quota year dates and Appendix B for duration of the farm sector fishing season. Australia sets aside 5% of its annual TAC for mortality associated with recreational fishing. For the 2021–22 fishing season this equates to 311.9 t available to recreational fishers with the remaining TAC available for commercial fishing activities.

Australia's 2021–22 Southern Bluefin Tuna Fishing Season

**Table 1 Australian Catch (t) by Gear and State for Fishing Seasons 1988–89 to 2021–22**

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	300 <sup>a</sup>	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 <sup>b</sup>	0	916	3488	0 <sup>b</sup>	4403	0 <sup>c</sup>	475	475	0 <sup>d</sup>	219	219	0	0	0	4433	664	664	0	5097
1998–99	0	0	0 <sup>b</sup>	0	28	4991	0 <sup>b</sup>	5018	0 <sup>c</sup>	97	97	0 <sup>d</sup>	116	116	0	0	0	5016	216	216	0	5232
1999–00	0	0	0 <sup>b</sup>	0	0	5130	13	5143	0	114	114	0	0 <sup>d</sup>	0	0	0	0	5130	127	127	0	5257
2000–01	0	0	0 <sup>b</sup>	0	0	5162	6	5168	0	32	32	0	0 <sup>d</sup>	0	0	0	0	5162	38	38	0	5247
2001–02	0	0	7	7	0	5234	0	5234	0	22 <sup>e</sup>	22	0	0 <sup>d</sup>	0	0	0	0	5234	29	29	0	5262
2002–03	0	0	0 <sup>f</sup>	0	0	5375	0	5375	0	17	17	0	0	0	0	0	0	5375	17	17	0	5391
2003–04	0	0	0 <sup>f</sup>	0	0 <sup>h</sup>	4874	0 <sup>g</sup>	4874	0	226 <sup>e</sup>	226	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
2009–10 <sup>i</sup>	0	0	0	0	0	3931	0	3931	0	161	161	0	0	0	0	0	0	3931	161	161	0	4091
2010–11 <sup>j</sup>	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	5039 <sup>k</sup>	11	5050	0	369	369	0	0	0	0	0	0	5039	380	380	0	5420
2014–15	0	0	0	0	0	4948 <sup>l</sup>	0	4948	0	572 <sup>m</sup>	572	0	0	0	0	0	0	4948	571	571	0	5519
2015–16	0	0	0	0	0	4899 <sup>n</sup>	0	4899	0	554	554	0	180 <sup>o</sup>	180	0	0	0	4899	734	734	0	5633
2016–17	0	0	0	0	0	4683	0	4683	0	566 <sup>p</sup>	566	0	84 <sup>q</sup>	84	0	0	0	4683	650	650	0	5334
2017–18	0	0	0	0	0	5130 <sup>r</sup>	0	5130	0	1029 <sup>s</sup>	1029	0	0	0	0	0	0	5130	1029	1029	0	6159
2018–19	0	0	0	0	0	5294 <sup>t</sup>	0	5294	0	761	761	0	20 <sup>u</sup>	20	0	0	0	5308	766	766	0	6074
2019–20	0	0	0	0	0	4570 <sup>v</sup>	0	4570	0	833	833	0	26 <sup>w</sup>	26	0	0	0	4586	844	844	0	5429

**Table 2 Australian Catch (t) by Gear and State for Fishing Seasons 1988–89 to 2021–22, Cont.**

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	
2020–21	0	0	0	0	0	4593 <sup>x</sup>	0	4594	0	1023	1023	0	31 <sup>y</sup>	31	0	0	0	4606	1041	1041	0	5647 <sup>z</sup>
2021–22	0	0	0	0	0	4944 <sup>A</sup>	0	4944	0	988 <sup>B</sup>	988	0	38 <sup>C</sup>	38	0	0	0	4942	1013 <sup>D</sup>	1013	0	5970 <sup>D</sup>

Note that 'RTMP' refers to the Real Time Monitoring Program.

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

<sup>b</sup> 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.

<sup>c</sup> 1997–98 to 1998–99 NSW pole and purse seine catches are included in NSW longline catch due to confidentiality guidelines.

<sup>d</sup> 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.

<sup>e</sup> 2001–02 and 2003–04 NSW longline catch also includes QLD longline catch due to confidentiality guidelines.

<sup>f</sup> 2002–03 and 2003–04 WA longline catch is included in NSW longline due to confidentiality guidelines.

<sup>g</sup> 2003–04 SA longline catch is included in NSW longline due to confidentiality guidelines.

<sup>h</sup> 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.

<sup>i</sup> Year 1 of the 2009–11 fishing season (2009–10).

<sup>j</sup> Year 2 of the 2009–11 fishing season (2010–11).

<sup>k</sup> Includes <1t of trolling.

<sup>l</sup> Includes <1t of pole-and-line.

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

<sup>n</sup> Includes <5t of pole-and-line and rod-and-reel, due to confidentiality constraints.

<sup>o</sup> Includes <1t of trolling, due to confidentiality constraints.

<sup>p</sup> Includes <1t of trolling, due to confidentiality constraints.

<sup>q</sup> Includes <1t of trolling, rod-and-reeling and gillnetting, due to confidentiality constraints.

<sup>r</sup> Includes pole-and-line, due to confidentiality constraints.

<sup>s</sup> Includes longlining and rod-and-reeling off Tasmania, due to confidentiality constraints.

<sup>t</sup> Includes pole-and-line, due to confidentiality constraints.

<sup>u</sup> Includes trolling and rod-and-reeling, due to confidentiality constraints.

<sup>v</sup> Includes pole-and-line, due to confidentiality constraints.

<sup>w</sup> Includes trolling and rod-and-reeling, due to confidentiality constraints.

<sup>x</sup> Includes pole-and-line, due to confidentiality constraints.



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<sup>y</sup> Includes trolling off Western Australia and Tasmania, and rod-and-reeling off Tasmania, due to confidentiality constraints.

<sup>z</sup> Total catch reported in this table is 2t larger than the actual total catch for the 2020-21 season. This is due to 2t of SBT being caught in November 2021 but landed in December 2021. To assign the location of catch, logbook latitude and longitude values are required, which are assigned to seasons based on the date caught. This resulted in the discrepancy from the total catch as reported by landing data.

<sup>A</sup> Includes pole-and-line and trolling off South Australia and some trolling off Western Australia, due to confidentiality constraints.

<sup>B</sup> Includes longline in Queensland, due to confidentiality constraints.

<sup>C</sup> Includes trolling and rod-and-reeling off Tasmania and some rod-and-reeling off Victoria, due to confidentiality constraints.

<sup>D</sup> Total catch reported in this table is 2t lower than the actual total catch for the 2021-22 season. This is due to 2t of SBT being caught in November 2021 but landed in December 2021. To assign the location of catch, logbook latitude and longitude values are required, which are assigned to seasons based on the date caught. This resulted in the discrepancy from the total catch as reported by landing data.

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## 2 Catch and effort

### 2.1 Purse seine fishery

In 2021–22, 82.75% of the Australian catch of SBT was taken by purse seine off SA for farm operations. The remainder was taken by longline off NSW and Queensland; pole-and-line off South Australia; trolling off Western Australia; and, longline, trolling and rod-and-reel off Tasmania. Australian catch by gear and state from the 1988–89 to the 2021–22 fishing season is shown in Table 1. Catch by fishing season with number of vessels and vessel search hours are shown in Appendix C. The Australian catch of SBT for the calendar years 2021 and 2022 is mapped in Figure 4 and Figure 5, respectively.

#### 2.1.1 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. Australia does not consider these data suitable for interpreting catch rates as an index of abundance.

#### 2.1.2 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 2021–22 was 83.3 cm.

### 2.2 Longline fishery

The catch of SBT by the Australian longline fleet off the east coast has grown in recent years from 58 t in 2011–12 to 1,015 t in 2021–22. Approximately 95% of the Australian longline caught SBT are landed or processed in five main locations: Ulladulla, Bermagui, Eden, Sydney and Mooloolaba. Current in port sampling programs are mainly targeted at tropical tunas, however SBT length frequency data are also collected from the major ports during the months May – October (n=1800 in 2021–22).

As the catch has increased questions have been raised about whether it is necessary to collect otoliths for estimation of the age composition of the catch of this fishery (for use in the SBT operating models), and if so, how many otoliths are required and how will length-at-age data be used to estimate catch-at-age with required level of precision. The size range of SBT caught in the longline fishery (~110–180 cm fork length) is larger than those caught by the surface fishery (~80–110 cm) so length-at-age data currently collected by Australia cannot be applied to the longline fishery.

Australia engaged CSIRO in 2017 to evaluate the direct ageing requirements for the Australian longline fishery. The research concluded that based on the size range of SBT caught by the longline fishery a minimum sample size of 300 otoliths (~20 fish per 5-cm length class) for direct ageing per fishing season would be sufficient. It was noted that flexibility in the sampling program is important if the size range of SBT in the catch changes over time. The aim of the sampling program is to provide a representative estimate of length at age by collecting otoliths from the full range of sizes caught while maintaining sufficient numbers of otoliths in each size class to achieve the target level of precision. Australia is currently investigating options for the ongoing collection of otoliths and other data, however travel restrictions due to the COVID-19 pandemic continue to limit collection activities.

### **2.2.1 Nominal CPUE**

Nominal SBT CPUE for Australian longline effort and 4+ catch was provided in the 2023 data exchange and is shown at Appendix D and Appendix E.

### **2.2.2 Size composition**

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 6 and 7). 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 show modal changes through time (Figure 8). Modes that represent juvenile age classes were less visually evident in 1988 and 1989. Sample sizes were < 1000 in these years which may contribute to the lack of modal clarity. Modes at approximately 90 cm, 104 cm and 118 cm were visually evident in the period between 1991 and 1997. Progression of these modes into size classes >130 cm was also visually evident over this period. The absence of clear modes in the size range of 130 cm to 150 cm in the period 1988 to 1993 is consistent with intensive removals of small SBT in the early 1980s by Australia's surface fishery.

A reduced representation of SBT <105 cm was visually evident in 1994, then of SBT <120 cm in 1995, and SBT <135 cm in 1996. This coincided with a reduced abundance of small SBT (<100 cm) in the TAS troll fishery in 1994 and 1995, and the failure of the troll fishery in 1996 and 1997. The Japanese and joint-venture longline operations in the AFZ ceased operations in 1997.

Figure 1 Australian SBT catch in the 2018 calendar year. Note that catch is centred in each grid square.

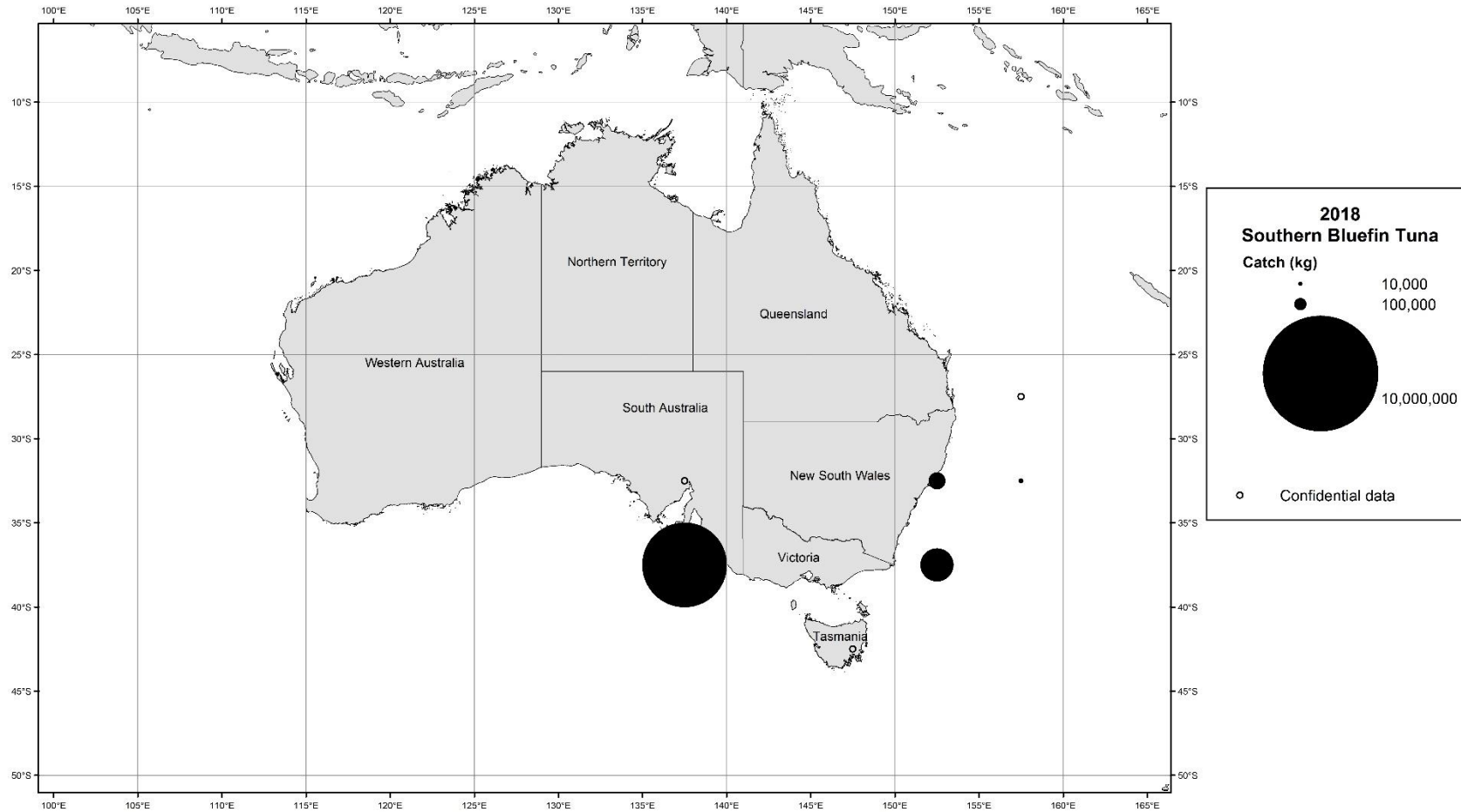


Figure 2 Australian SBT catch in the 2019 calendar year. Note that catch is centred in each grid square.

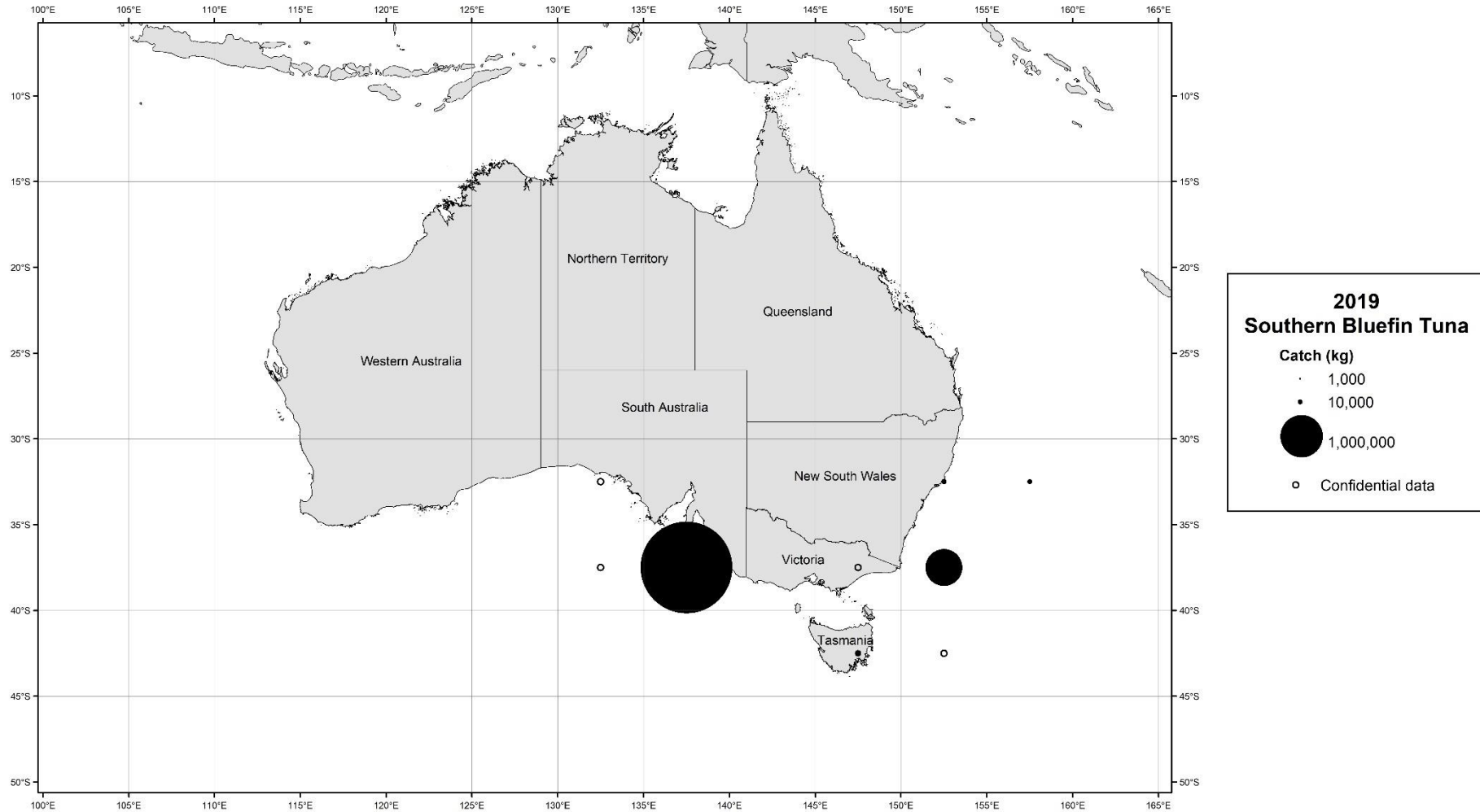


Figure 3 Australian SBT catch in the 2020 calendar year. Note that catch is centred in each grid square.

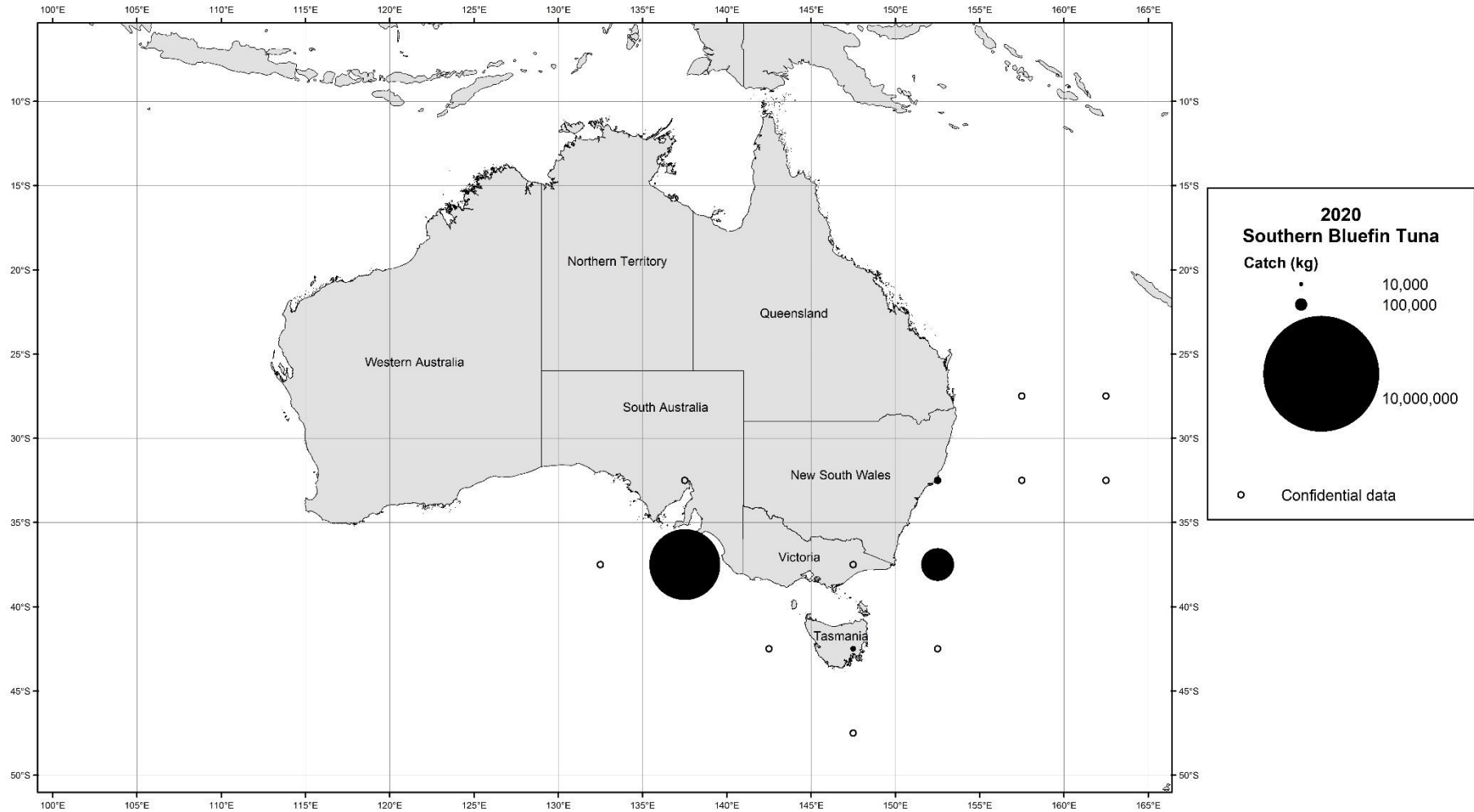


Figure 4 Australian SBT catch in the 2021 calendar year. Note that catch is centred in each grid square.

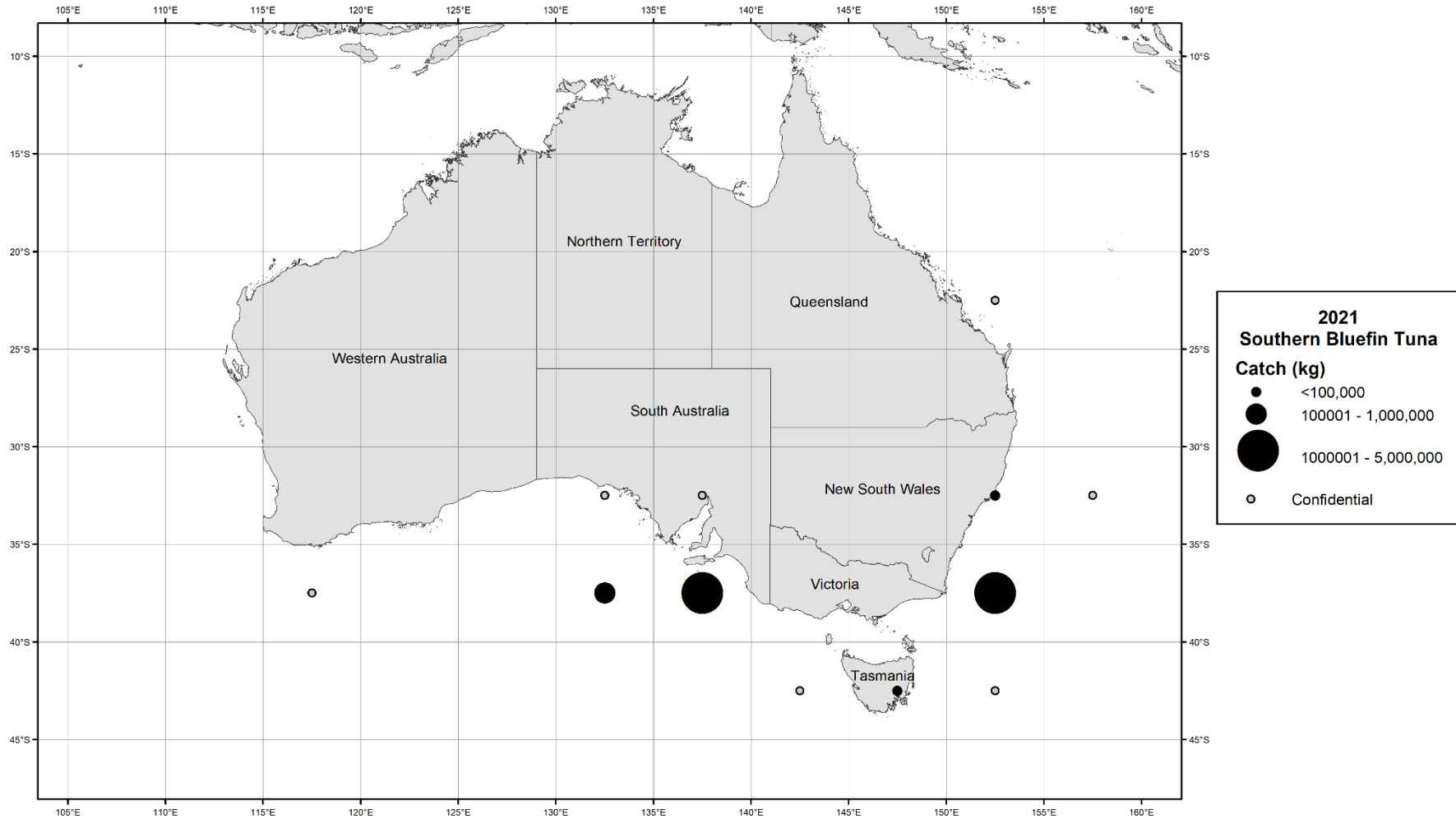
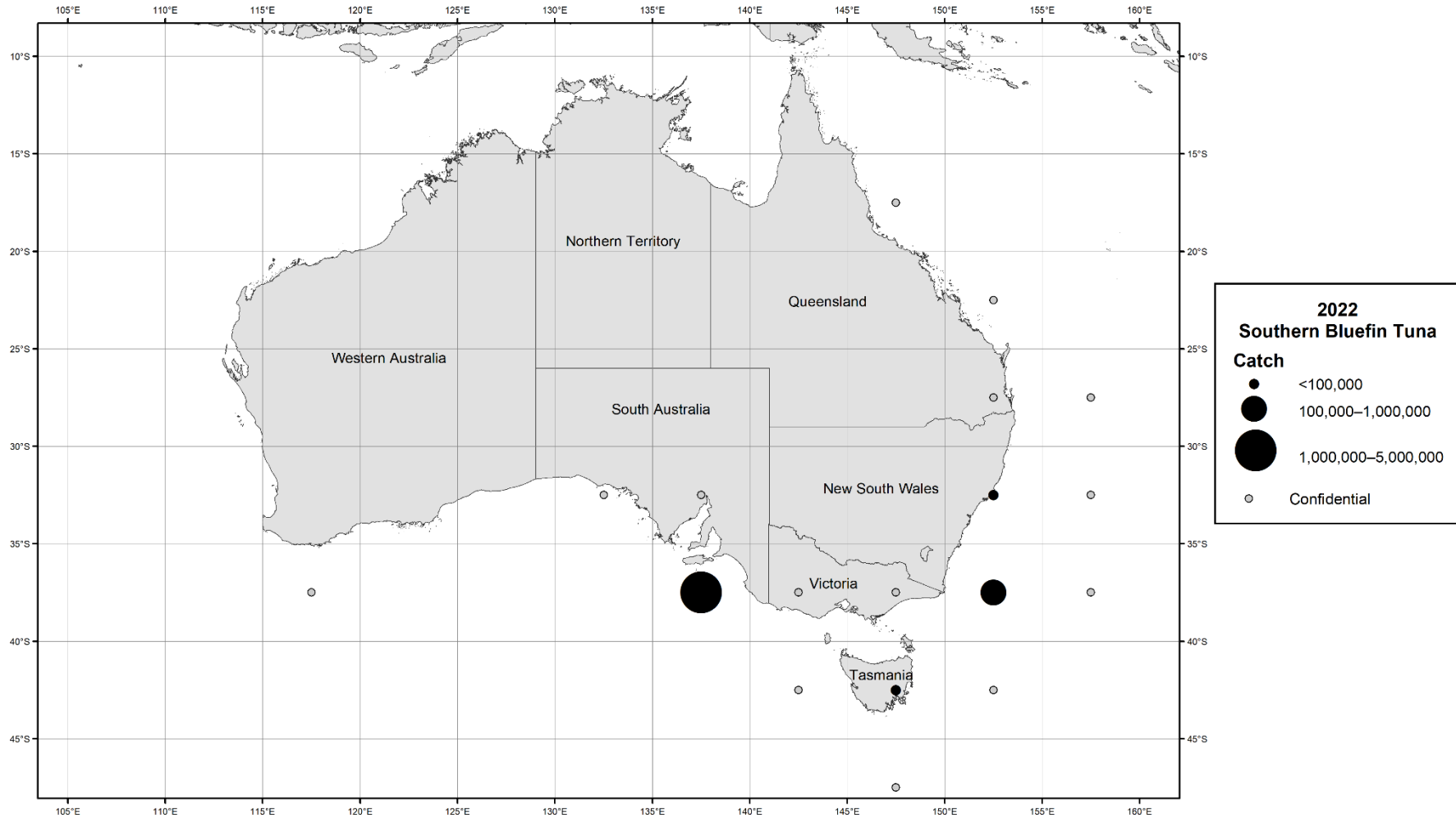


Figure 5 Australian SBT catch in the 2022 calendar year. Note that catch is centred in each grid square.



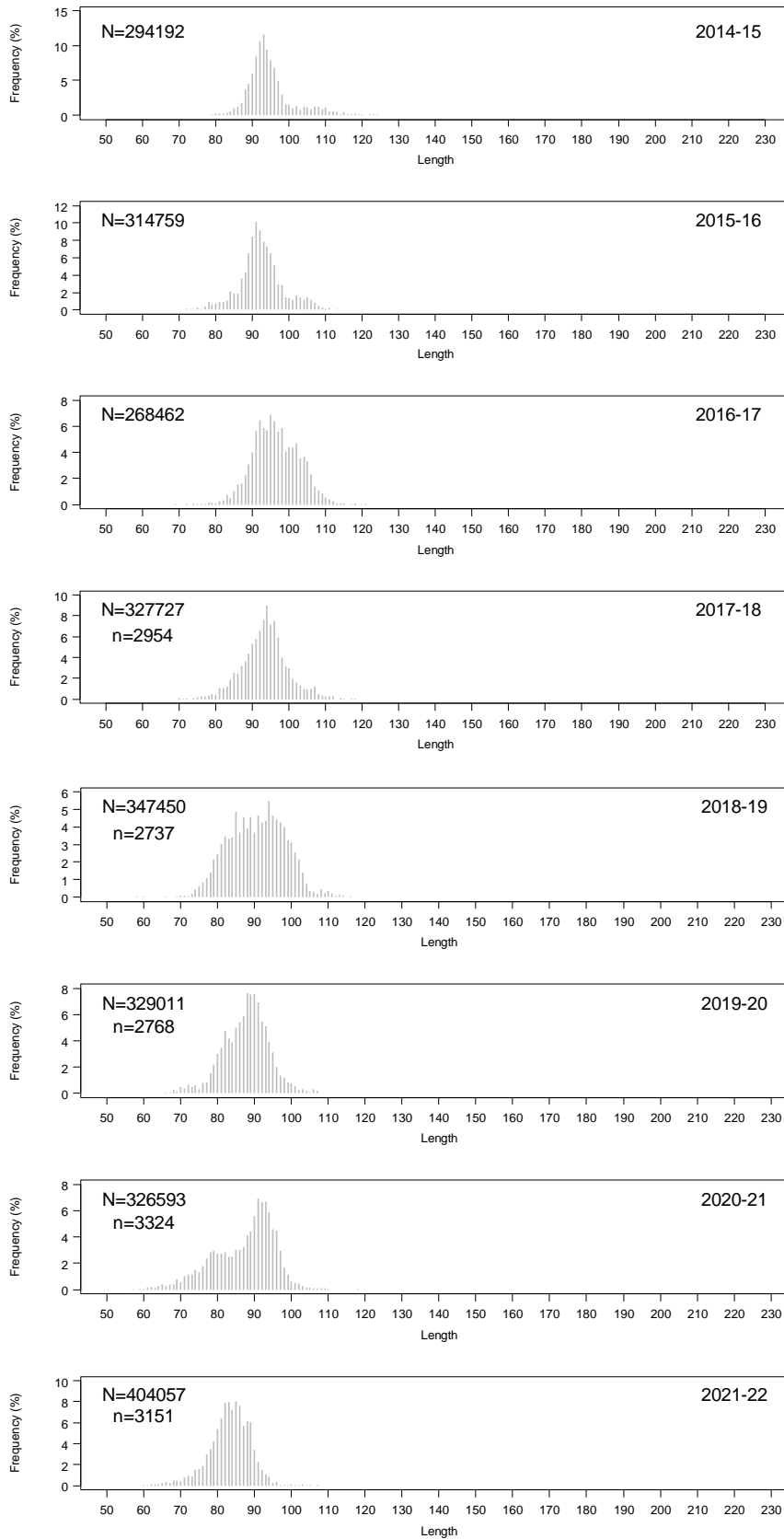


**Table 3 Average fork length (cm) of SBT landed in each Australian state, 1989 to 2022**

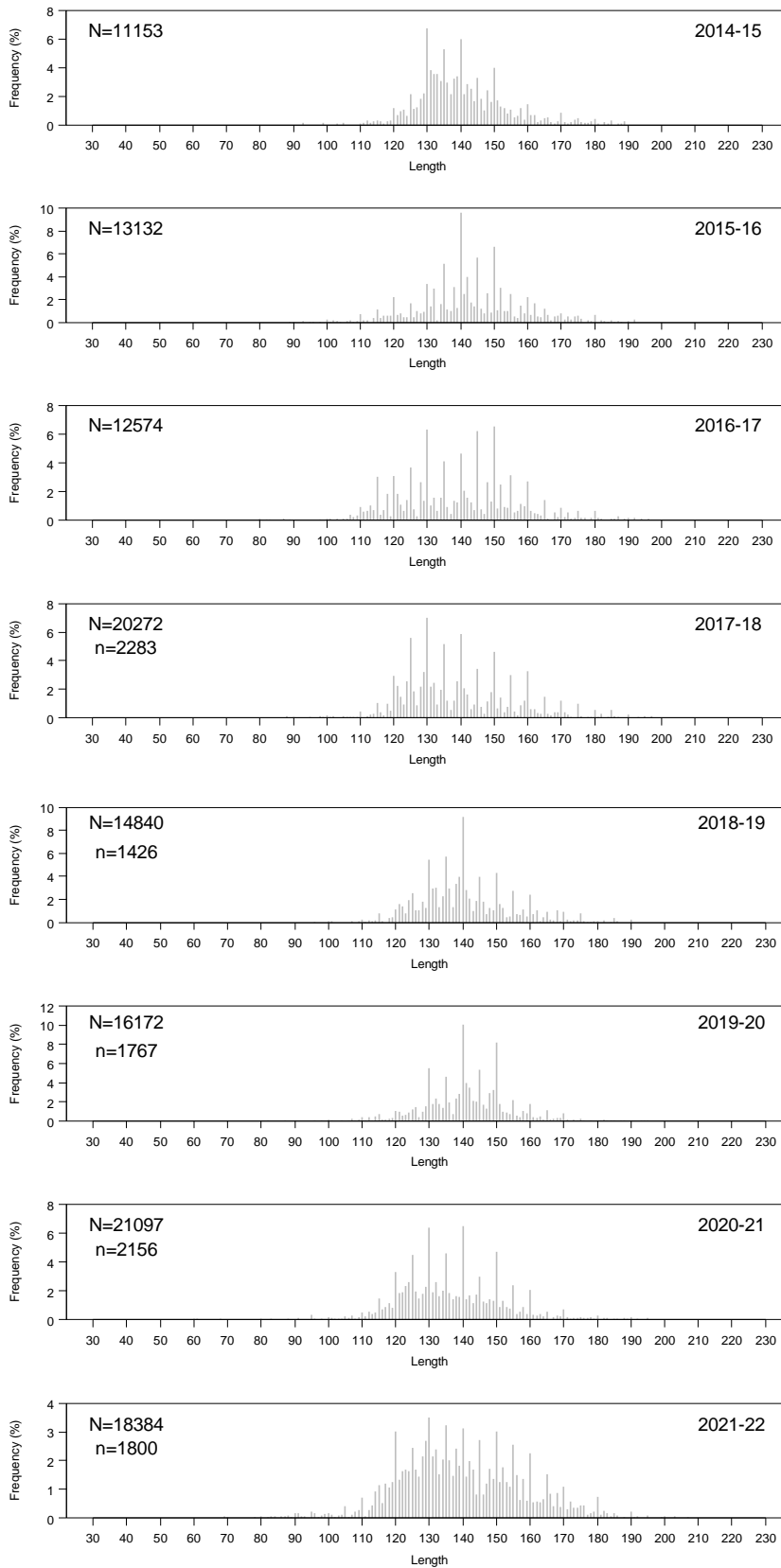
Calendar Year	Western Australia <sup>a</sup>	South Australia <sup>a</sup>	Tasmania	NSW	Joint-venture
1989	65.4	88.8	–	–	–
1990	65.6	89.3	96.0	112.8	–
1991	67.2	95.5	94.9	154.8	114.5
1992	66.1	97.0	93.4	109.2	108.0
1993	65.2	101.1	99.7	117.8	116.5
1994	–	97.4	125.5	121.3	124.8
1995	–	103.2	127.9	125.0	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	–	140.3	–
2016	–	96.4	–	142.9	–
2017	–	93.4	134.1	140.4	–
2018	–	90.6	133.5	139.5	–
2019	–	87.8	129.6	140.7	–
2020	–	87.2	132.5	141.4	–
2021	–	83.3	123.1	136.3	–
2022	–	–	133.0	140.1	–

<sup>a</sup> Lengths 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

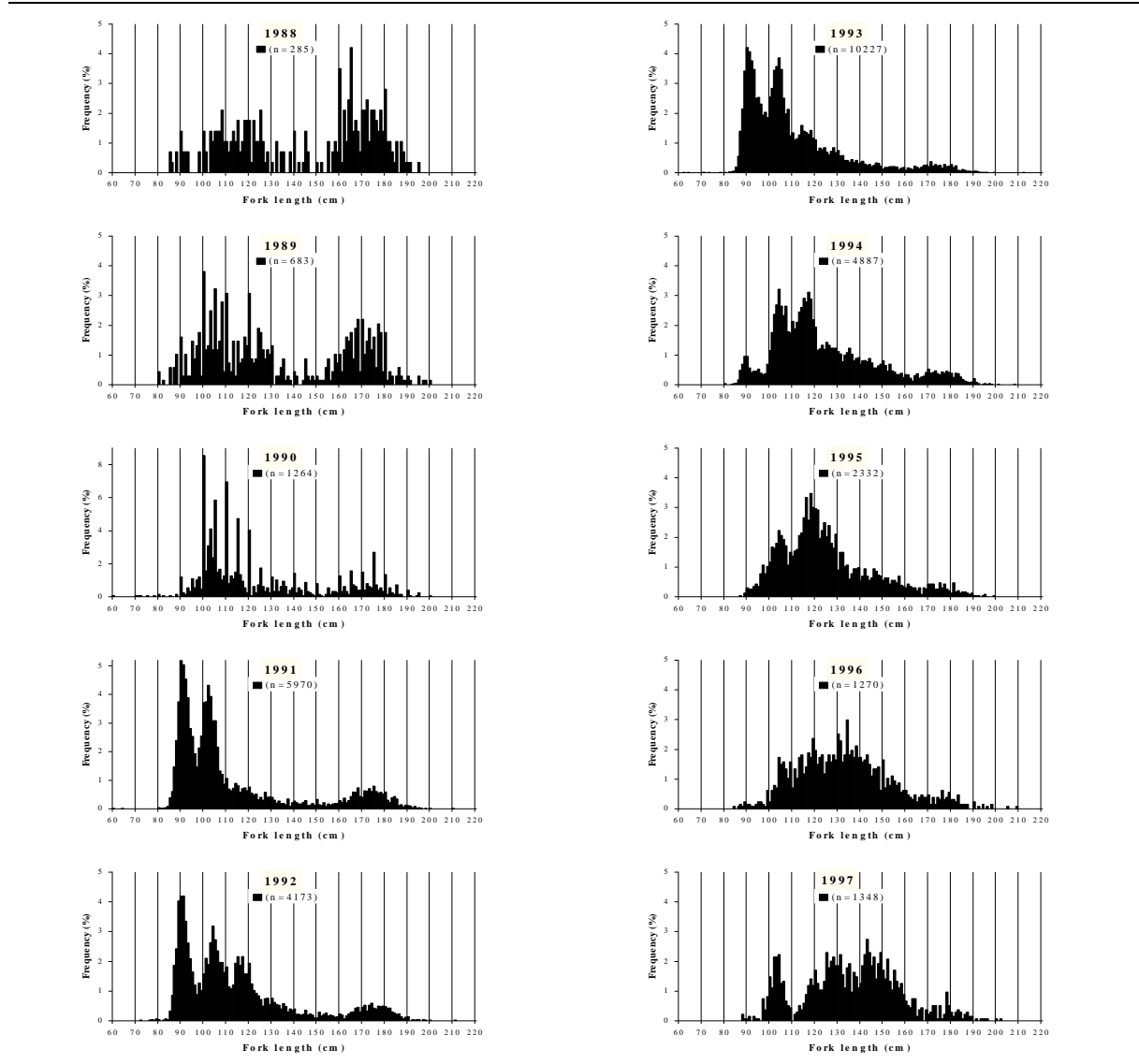
**Figure 1 Length frequency of SBT purse seine catch in Australian waters raised to total catch, 2014–15 to 2021–22 fishing seasons (source: tow cage size monitoring database)**



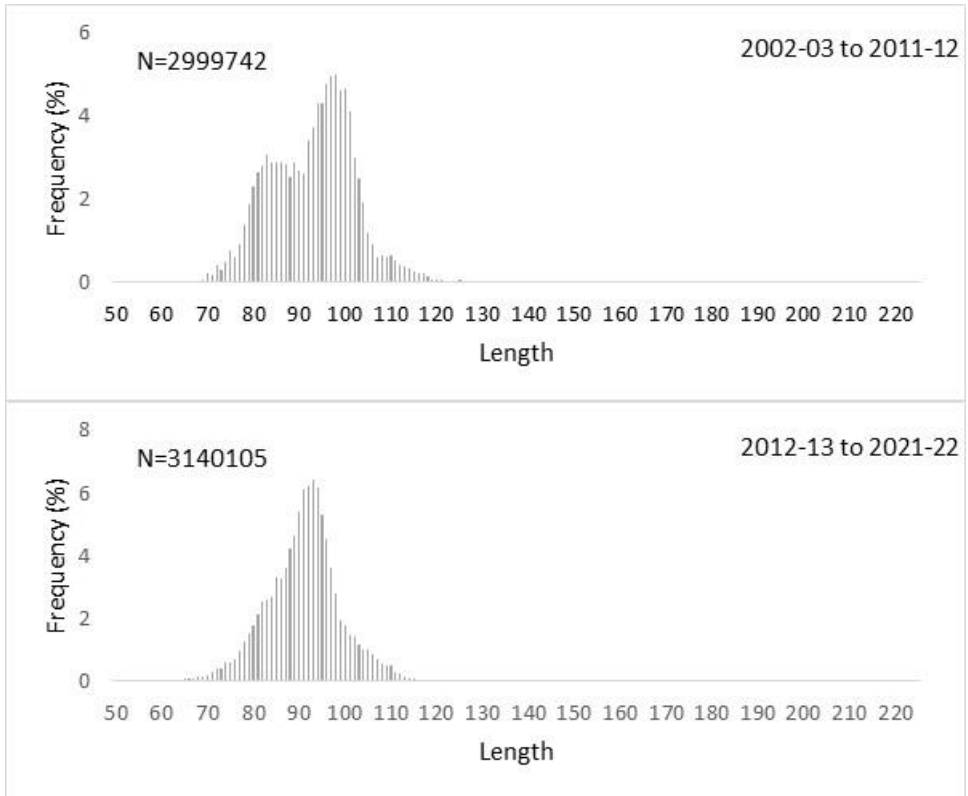
**Figure 2 Length frequency histograms for retained SBT longline catch in Australian waters raised to total catch, 2014–15 to 2021–22 quota years (source: AFMA observer data and processor monitoring data)**



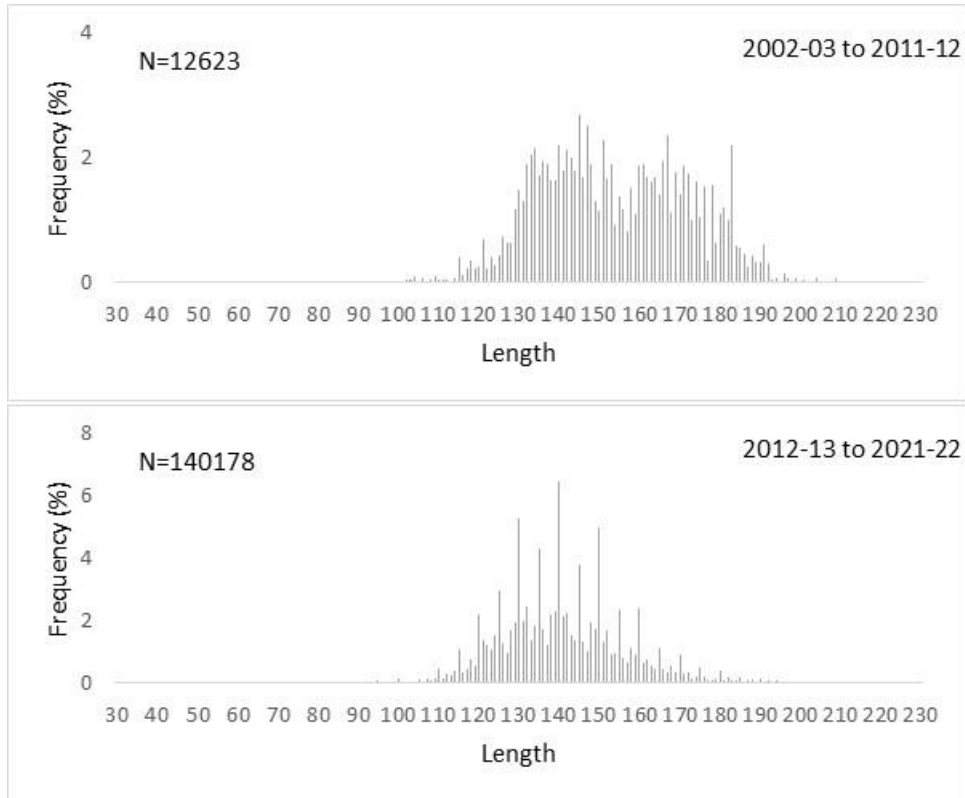
**Figure 3 Length frequency of SBT measured by Australian observers on Japanese longliners fishing in the Tasmania region, 1988 to 1997. The data include small SBT tagged and released by observers.**



**Figure 4 Length frequency histograms for retained SBT purse seine catch in Australian waters raised to total catch by decade, quota years (source: AFMA observer data and processor monitoring data)**



**Figure 5 Length frequency histograms for retained SBT longline catch in Australian waters raised to total catch by decade, quota years (source: AFMA observer data and processor monitoring data)**



## 3 Fleet size and distribution

In 2021–22, a total of 31 commercial fishing vessels landed SBT (or transferred to farm cages) in Australian waters.

### 3.1 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 eight purse seiners during 2021–22, with various live bait, pontoon-towing and feeding vessels also involved. The majority of the purse seine fishing commenced in mid-January 2022 and finished in early-March 2022. One vessel conducted pole-and-line operations and one vessel conducted trolling operations in the waters off SA in the 2021–22 season.

### 3.2 Western Australia (WA)

Two trolling vessels caught SBT off WA in 2021–22.

### 3.3 New South Wales (NSW)

In 2021–22, 20 longliners reported landing both older juvenile and adult SBT in deeper waters off NSW. Four of these vessels also fished waters around Tasmania and one also fished waters off Queensland.

### 3.4 Tasmania (TAS)

In 2021–22, four longliners caught SBT off Tasmania. They also operated in waters off NSW. Three vessels conducted rod-and-reel operations catching SBT off Tasmania. Two vessels conducted trolling operations catching SBT off Tasmania.

### 3.5 Queensland (QLD)

Two longline vessels caught SBT off Queensland in 2021–22. One of these vessels also fished waters of New South Wales.

### 3.6 Victoria (VIC)

One vessel conducted rod-and-reel operations catching SBT off Victoria.

## 4 Research and monitoring to improve estimates of attributable catch

### 4.1 Recreational fishing

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. 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.

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% and indicates that SBT captured recreationally are likely to survive when released. However, this result is a best-case scenario for recreational fishing using proper handling methods and it is unclear how these results relate to commercial longline post-survival rates.

#### 4.1.1 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 Tasmanian off-site and Victorian on-site surveys. The project reviewed potential methodologies, conducted initial survey design work and tested on-site surveys in SA locations, from January to August 2014.

A national survey of recreational fishing for SBT that commenced in 2018 has now been finalised (Tracey et al. 2020) and the survey report can be found at [https://www.imas.utas.edu.au/\\_data/assets/pdf\\_file/0003/1331796/National-Survey-of-Rec-Fishing-for-SBT-in-Australia.pdf](https://www.imas.utas.edu.au/_data/assets/pdf_file/0003/1331796/National-Survey-of-Rec-Fishing-for-SBT-in-Australia.pdf). The survey estimated recreational catch was 270 t for the survey year. Australia advised the CCSBT in 2020 that it would set aside 5% of its CCSBT allocation annually against recreational catch, starting in the 2020–21 season, which at the time was around 308 t. The additional amount set aside allows for fluctuation between years in the recreational fishery, plus some room for growth in recreational catch.



#### **4.1.2 Variation in recreational catch**

Anecdotal evidence suggests that the recreational catch of SBT can vary between years and regions. 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). COVID and associated restrictions also affected recreational fishing (Moore et al. 2023).

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. 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.

#### **4.1.3 Tag releases**

The number of reported SBT tag releases by Australian recreational fishers is provided in Table 3. 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 2022**

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	85.0	4.6	4.6	3501
2011	4.3	15.9	75.7	3.5	0.6	3351
2012	36.5	5.4	40.6	14.3	3.3	1042
2013	12.8	0.3	80.0	6.6	0.3	986
2014	22.9	3.0	59.5	14.1	0.5	2288
2015	16.4	1.0	72.3	9.7	0.6	2106
2016	35.8	0.6	55.3	8.1	0.2	2842
2017	29.3	2.2	58.9	8.9	0.8	1179
2018	18.5	2.8	56.9	21.0	0.7	1402
2019	28.9	0.5	46.2	23.2	1.2	1095
2020	42.1	0.3	32.8	24.2	0.7	1174
2021	35.8	6.3	51.3	6.3	0.3	1519
2022	29.5	0	61.4	9.0	0.1	2028

Source: NSW DPI Game Fish Tagging Program

## 4.2 Discards in the commercial fishery

### 4.2.1 Describe the various sources of information and data used in calculating the estimates

#### Purse-seine sector

Discarding of fish other than live release (immediately after encirclement or as a live release from tow cage) is not permitted in the purse seine sector. All dead fish encountered during purse seine operations, towing or transfers must be recorded in logbooks and accounted for under the quota system. To validate logbooks, observers and at sea inspections are used. In the 2021–22 fishing season, observers monitored 9.6% of purse seine sets where fish were retained for the farm sector and 10.8% of the estimated SBT catch. 100% of all transfers were monitored by Australian Fisheries

Management Authority (AFMA) representatives in Port Lincoln. During 2021–22, no discarding of SBT was reported in logbooks collected in the purse-seine fishery in the Great Australian Bight.

### **Longline sector**

During the period from May to October, the waters off the east coast of New South Wales (Australia) become an area of significant interaction between the Southern Bluefin Tuna Fishery (SBTF) and the Eastern Tuna and Billfish Fishery (ETBF). While the ETBF is a multi-species fishery, the SBT Fishery is a single species fishery that requires operators to hold SBT quota that is nominated to their boat in order to take the species.

To address the risk of interactions with SBT for vessels who do not hold quota, AFMA institutes restricted access areas in the ETBF annually. These arrangements require ETBF operators to have minimum SBT quota holdings and a fully operational electronic monitoring system installed in order to operate in designated areas of the ETBF where SBT are likely to interact with longline fishing gear.

The location and timing of the SBT zone is determined by analysing information from a range of sources; sea surface temperatures, landing data, VMS data and advice from industry. This information provides AFMA with an indication of the area where SBT are likely to occur.

The Southern Bluefin Tuna Fishery Management Plan 1995 outlines the rules relating to the fishery. Statutory fishing rights issued under the Plan state the following in relation to discarding of SBT in the longline sector.

The conditions for retaining and discarding SBT in the longline sector are outlined below.

*When fishing in the SBT Zone using the longline method the holder must:*

*a) on first entry (which includes being present or fishing in) to the SBT Zone hold at least 1*

*uncaught Southern Bluefin Tuna Statutory Fishing Right nominated to the boat nominated to this concession;*

*b) on every subsequent entry to the SBT Zone continue to hold at least 1 uncaught Southern Bluefin Tuna Statutory Fishing Right nominated to the boat nominated to this concession;*

*c) ensure all dead SBT are landed (retained) except those that are damaged by sharks to the point that they are not fit for human consumption;*

*d) ensure live SBT are either landed (retained) or released (providing they are in a live and vigorous state).*

*e) ensure any SBT that are to be released or discarded must be done so at the fish door in*

*full view of the e-monitoring system. SBT damaged by sharks must have the damaged portion facing the cameras. SBT that are undamaged and dead when discarded or live fish that are gaffed and released will be deducted from the concession holder's quota. The amount of quota decremented will be determined by the average weight of SBT retained for that trip.*

*f) ensure all SBT, whether retained, released or discarded are reported in the logbook.*

*g) carry an AFMA observer when notified by AFMA.*

### **E-Monitoring**

The baseline (e-monitoring) audit rate for all fisheries is a minimum 10% of shots per boat and a minimum of one shot per drive for each boat per month. The analyses include analysis of full catch composition for each shot selected for review. Catch composition, discards (including life status) and interactions with protected species on audited shots will be compared to logbook records with discrepancies flagged and reported. The focus of e-monitoring is on fishing activities. However, if behaviour that contravenes Australian or International law is observed in the process of viewing footage, it will be referred to the AFMA Compliance team for investigation.

#### **4.2.2 Describe the method applied for estimating the catch**

In 2022, e-monitoring observed 10.8% of longline hook effort in the ETBF during the months and in the areas of the SBT migration through that fishery. For the fishery as a whole, 9.3% of hooks were observed in 2022. The observed (via e-monitoring) total catch number of SBT was 1,828 individuals, of which 1,645 were retained, 178 fish were discarded (53 of which were reported as released alive, 62 were dead or damaged and 63 of which were reported as having an undetermined life status). The remaining five individuals escaped (two alive, and three of unknown life status). None were tagged.

#### **4.2.3 Provide the resulting estimated catch**

Logbook and electronic monitoring data for the 2022 fishing season indicate that 1,131 individual fish were predated in the sector over the course of the season. Due to the nature of predation, it is not possible to provide an accurate weight estimate of predated fish.

### **4.3 Customary and/or traditional fishing**

Not applicable

### **4.4 Artisanal fishing**

Not applicable

## 5 Other relevant information

### 5.1 Stereo-video commercial trial

In 2023 Australia commenced a trial of the cost effectiveness and accuracy of fully automated stereo video monitoring in Australia's tuna farms. Accuracy and length trials took place in March 2023. The second and final phase of the research is a transfer trial that will take between January and March 2024. The results will be reported to CCSBT.

# Appendix A: SBT fishing season dates 1988–89 to 2021–22

<b>Quota Year</b>	<b>Start Date</b>	<b>End Date</b>
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 <sup>a</sup>	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
2016–17	1 Dec 2016	30 Nov 2017
2017–18	1 Dec 2017	30 Nov 2018
2018–19	1 Dec 2018	30 Nov 2019
2019–20	1 Dec 2019	30 Nov 2020
2020–21	1 Dec 2020	30 Nov 2021
2021–22	1 Dec 2021	30 Nov 2022

<sup>a</sup> Note that 2009–11 was a two-year season

# Appendix B: 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 <sup>a</sup>	375 <sup>a</sup>
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 <sup>b</sup>	1 Dec 09	30 Nov 10	3	52	69	78	84	82
2009–11 <sup>c</sup>	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	1 Dec 15	30 Nov 16	19	62	72	75	86	68
2016–17	1 Dec 16	30 Nov 17	21	47	57	66	90	70
2017–18	1 Dec 17	30 Nov 18	15	67	80	92	113	99
2018–19	1 Dec 18	30 Nov 19	22	69	84	90	108	87
2019–20	1 Dec 19	30 Nov 20	15	58	85	102	107	93
2020–21	1 Dec 20	30 Nov 21	18	71	86	101	119	102
2021–22	1 Dec 21	30 Nov 22	41	71	79	85	93	53

'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.

<sup>a</sup>Figures greater than 365 days because the season dates changed and extended this season for longer than one year.

<sup>b</sup>Year 1 of the 2009–11 season (2009–10)

<sup>c</sup>Year 2 of the 2009–11 season (2010–11)

# Appendix C: Australian surface catch for farm operations, 1994–95 to 2021–22

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 <sup>a</sup>	3323	3931	6	417	78	3
2009–11 <sup>b</sup>	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	1235	154	6
2015–16	4826	4896	6	1076	124	6
2016–17	4036	4683	6	1004	109	5
2017–18	4920	5123	7	1137	191	6
2018–19	4750	5291	7	1366	154	9
2019–20	4224	4568	7	1248	142	12
2020–21	4203	4592	7	1101	152	14
2021–22	4639	4942	8	1041	136	16

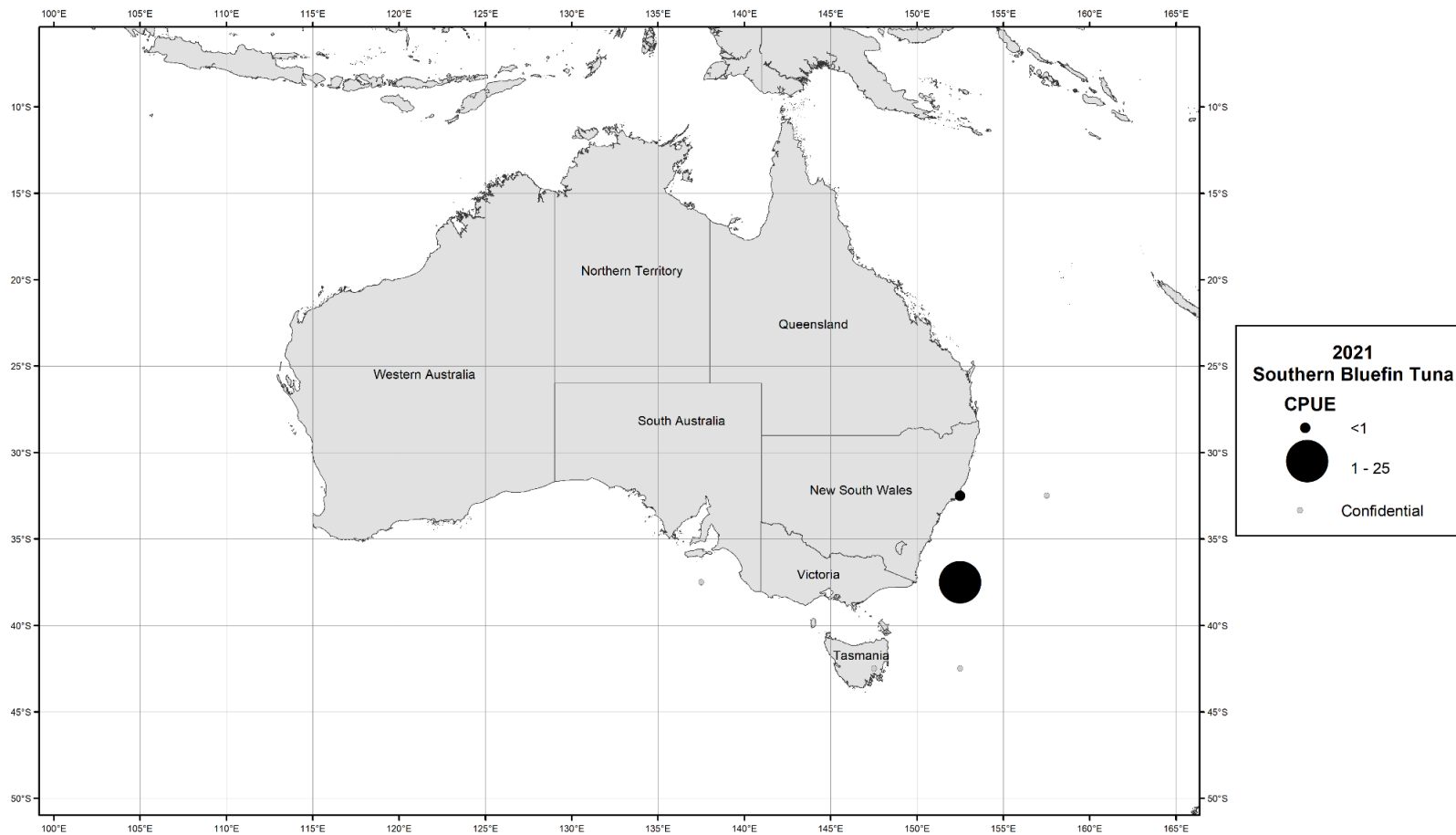
Note that estimated catch is derived from logbook data while actual catch is derived from landing data.

<sup>a</sup>Year 1 of the 2009–11 season (2009–10)

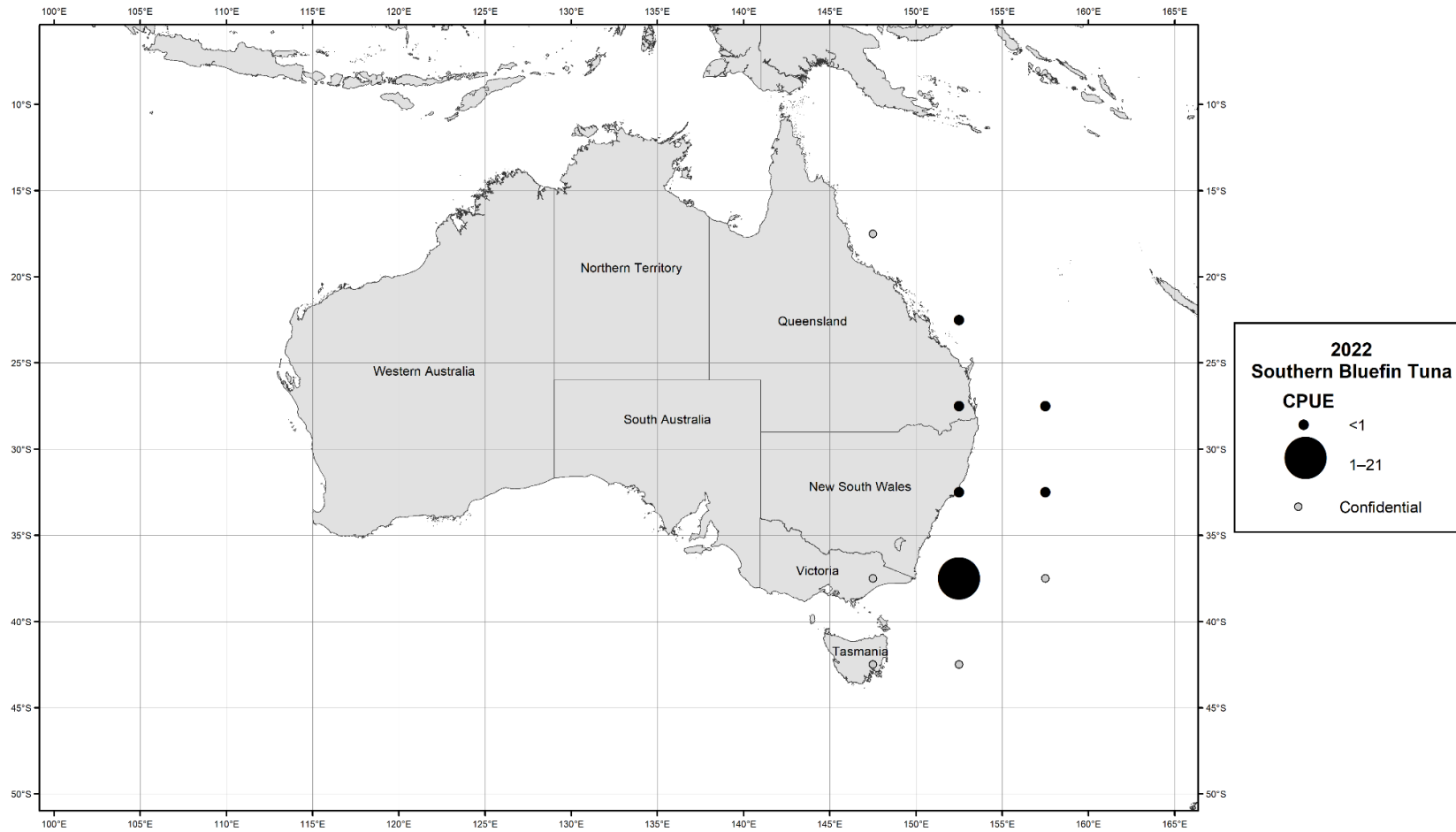
<sup>b</sup>Year 2 of the 2009–11 season (2010–11)



# Appendix D: Nominal CPUE by year and location for all Australian longliners, 2021 and 2022 calendar years



Australia's 2021–22 Southern Bluefin Tuna Fishing Season



# Appendix E: Nominal CPUE by calendar year for Australian longliners since 2000

Year	Nominal CPUE
2000	2.145
2001	2.374
2002	2.774
2003	2.428
2004	1.864
2005	1.769
2006	1.350
2007	1.404
2008	1.754
2009	2.523
2010	3.558
2011	3.291
2012	3.254
2013	3.664
2014	3.795
2015	5.195
2016	4.210
2017	5.271
2018	6.007
2019	7.743
2020	6.514
2021	7.547
2022	9.020

## Appendix F: 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 <sup>a</sup>	N/A	47	24		11% (sets)	11% (est. total weight)	60,000 (A\$)
Australia	2002–03	Towing <sup>a</sup>	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 <sup>a</sup>	2	27	21		13% (sets)	12.8% (est. total weight)	60,000 (A\$)
Australia	2003–04	Towing <sup>a</sup>	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 <sup>a</sup>	2	36	15		11.2% (sets)	8.5% (est. total weight)	60,000 (A\$)
Australia	2004–05	Towing <sup>a</sup>	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 <sup>a</sup>	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

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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 <sup>a</sup>	2	50	9		5.6% (sets)	12.1% (est. total weight)	NA
Australia	2006–07	Towing <sup>a</sup>	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 <sup>a</sup>	2	19	16		11.8% (sets)	5.6% (est. total weight)	68,000 (A\$)
Australia	2007–08	Towing <sup>a</sup>	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 <sup>b</sup>	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 <sup>b</sup>	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 <sup>c</sup>	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 <sup>c</sup>	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)

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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

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Country	Year	Sector	Observers Deployed	Sea Days	Sets/Tows Observed	Observed Vessels	Observed Effort (% units)	Observed Catch (% units)	Total Cost
Australia	2016–17	Purse Seine	2	11	20	2	18.3% (fish retained)	16.8% (est. total weight)	na
Australia	2016–17	Towing	2	18	2	2	9.1% (tows)		
Australia	2016	East Coast Longline			397		9.3% (hooks – SBT Area)	12.1% (no. retained catch)	na
Australia	2016	West Coast Longline			24		10.2%	No observed catch	na
Australia	2017–18	Purse Seine	2	37	40	2	20.9% (fish retained)	19.0% (est. total weight)	na
Australia	2017–18	Towing	1	20	1	2	3.4% (tows)		
Australia	2017	East Coast Longline			527		9.0% (hooks – SBT Area)	9.7% (no. retained catch)	na
Australia	2017	West Coast Longline			32		11.7%	No observed catch	na
Australia	2018–19	Purse Seine	2	35	22	2	14.3% (fish retained)	14.5% (est. total weight)	na
Australia	2018–19	Towing	2	25	2	2	7.7% (tows)		
Australia	2018	East Coast Longline			488		11.5% (hooks – SBT Area)	13.8% (no. retained catch)	na
Australia	2018	West Coast Longline			36		13.0%	No observed catch	na
Australia	2019–20	Purse Seine	2	34	14	2	9.9% (fish retained)	10.3% (est. total weight)	na
Australia	2019–20	Towing	2	21	2	2	7.7% (tows)		
Australia	2019	East Coast Longline			525		12.1% (hooks – SBT Area)	12.2% (no. retained catch)	na
Australia	2019	West Coast Longline			31		12.8%	No observed catch	na
Australia	2020	East Coast Longline			418		11.0% (hooks – SBT Area)	7.7% (no. retained catch)	na
Australia	2020	West Coast Longline			19		12.1%	No observed catch	na
Australia	2020–21	Purse Seine	2	95	41	3	12.6% (fish retained)	14.1% (est. total weight)	na
Australia	2020–21	Towing	2	18	2	2	7.4% (tows)		na

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Country	Year	Sector	Observers Deployed	Sea Days	Sets/Tows Observed	Observed Vessels	Observed Effort (% units)	Observed Catch (% units)	Total Cost
Australia	2021	East Coast Longline			404		12.0% (hooks – SBT Area)	12.9% (no. retained catch)	na
Australia	2021	West Coast Longline			23		8.3%	No observed catch	na
Australia	2021–22	Purse Seine	2	32	13	4	9.6% (fish retained)	10.8% (est. total weight)	na
Australia	2021–22	Towing	2	34	3	2	7.7% (tows)		na
Australia	2022	East Coast Longline			345		10.8% (hooks – SBT Area)	9.7% (no. retained catch)	na
Australia	2022	West Coast Longline			17		11.1%	No observed catch	na

<sup>a</sup>Australian purse seine and towing observer statistics are for the SBT fishing year December–November

<sup>b</sup>Year 1 of the 2009–11 season (2009–10)

<sup>c</sup>Year 2 of the 2009–11 season (2010–11)

na = not available



## Appendix G: 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 <sup>a</sup>	Purse seine	3	3	0	0	3
Australia	2010	Longline	0	563	0	0	563
Australia	2009–11 <sup>b</sup>	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
Australia	2016–17	Purse seine	0	23	0	0	23
Australia	2017–18	Purse seine	0	26	0	0	26
Australia	2018–19	Purse seine	0	8	0	0	8
Australia	2019–20	Purse seine	0	0	0	0	1
Australia	2020–21	Purse seine	0	0	0	0	36
Australia	2021–22	Purse seine	4	4	0	0	13

<sup>a</sup>Year 1 of the 2009–11 season (2009–10); <sup>b</sup>Year 2 of the 2009–11 season (2010–11)

# Appendix H: An overview of the Australian SBT observer program

## Observer sources and training

AFMA has recruited and trained observers since its establishment in 1992. Approximately 15 observers are currently employed in the AFMA observer program. They are sourced from universities and 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.

## Purse seine fishery – Scientific observer program design and coverage

The target coverage for the SBT purse seine fleet operating out of Port Lincoln is 10% of the total catch and effort for the fishery. Observers monitor 100% 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, although this has changed slightly in recent years (see Figure 11).

The observers in the purse seine fishery in the 2021–22 fishing season spent 65 days at sea and observed purse seiner activities for 22 days and tow activities for 34 days. The remainder of the days were spent in transit, searching, or lost due to rough weather.

## Purse seine fishery – Observer data collected

### Effort data

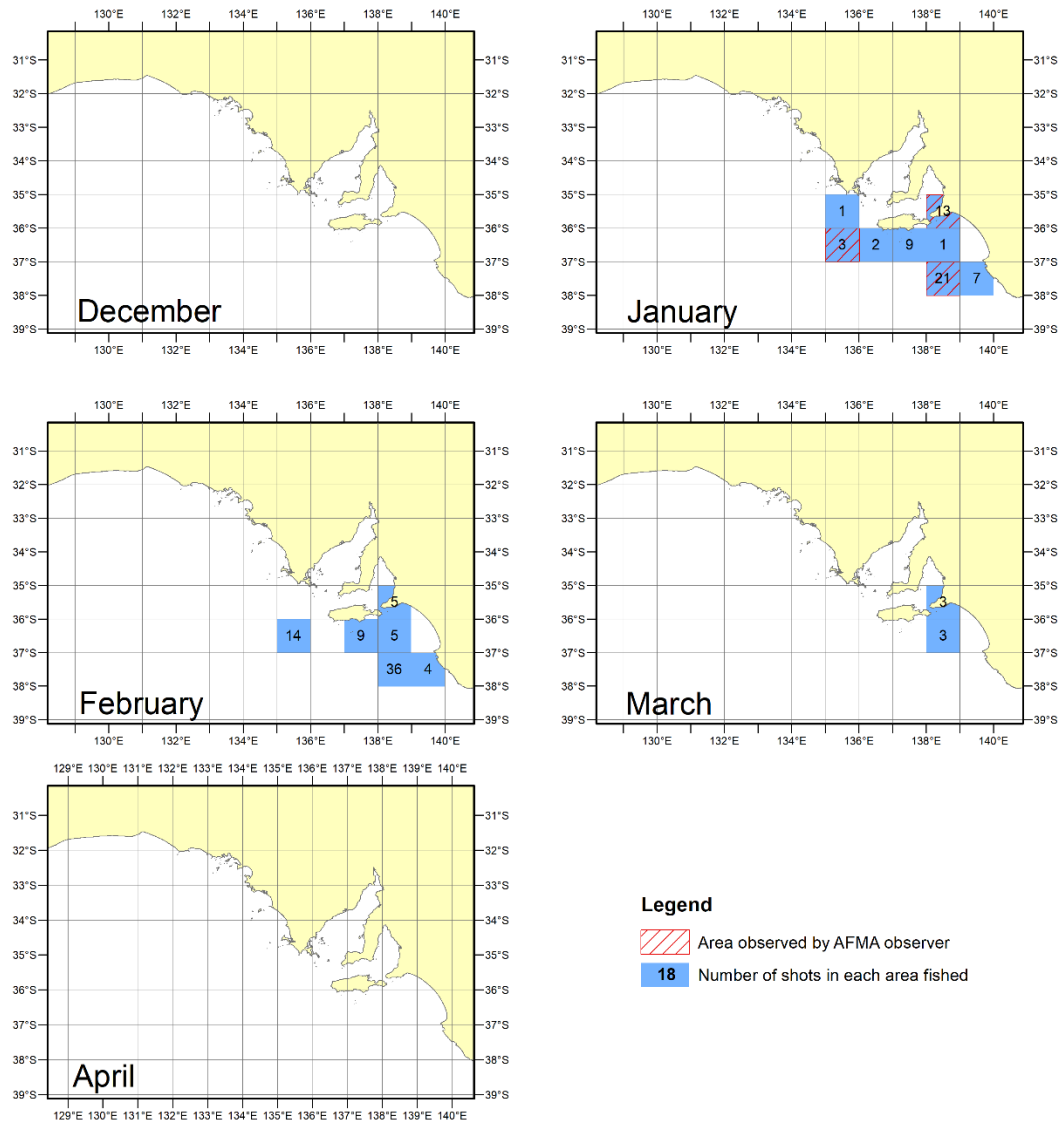
The purse seine observer program for the 2021–22 Australian SBT fishing season monitored fishing and tow operations in 35°47'–37°20'S and 135°42'–138°31'E in December 2021 and January and February 2022. Two Australian observers monitored 13 purse seine sets where fish were retained. This represents 9.6% of the total sets in which fish were taken in 2021–22. No fish were observed released.

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.

Three 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 2021 to April 2022. 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 499 t of SBT were caught during observed purse seine sets. This observed catch accounted for 10.8% of the total estimated purse seine catch of 4,639 t. No fish were observed released.

There were 66 mortalities observed during purse seine operations, six of which were sampled. Two observers monitored three tow operations and recorded seven SBT mortalities during the towing operation, all of which were sampled.

### **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 and towing operations, the observers recorded 73 SBT mortalities, 13 of which was sampled. The fork length for these fish ranged between 78–100 cm.

### **Biological data**

Four otoliths were obtained from the six sampled mortalities in the purse operations. No otoliths were obtained from the seven sampled mortalities in the tow operation. There is also an ongoing project to collect otoliths from farm mortalities.

Weights were obtained for seven of the 13 fish sampled during purse seine and towing operations. Weights ranged from 9 kg to 13 kg, with an average weight of 10.93 kg.

## **Longline fishery – Electronic monitoring design and coverage**

The target coverage for the Australian longline fleet is to review at least 10% of video footage of all hauls to verify the accuracy of logbooks. Logbooks are required to be completed for 100% of shots.

In 2022, in the ETBF, south of 30°S and during the months of May to September, e-monitoring monitored 153,888 hooks of a total of 1,422,287, representing 10.8% observer coverage of longline effort during the SBT migration. For the fishery as a whole, 9.3% of hooks were observed in 2022.

During 2022, there was 11.1% observer coverage of longline hook effort in the WTBF.

## **Longline fishery – Observer data collected**

### **Catch data**

In 2022, south of 30°S and during the months of May to September, the observed total catch number of SBT was 1,828 individuals, of which 1,645 were retained, and 178 fish were discarded (53 of which were reported as released alive, 62 were dead or damaged, and 63 of which were reports as having an undetermined life status). The remaining five individuals escaped (two of which were reported as alive, and three as having an undetermined life status). No SBT were tagged during observed longline operations in 2022. ETBF logbooks for 2022 showed 16,941 SBT (845.4 t) were retained and 5,448 (24%) were released.

The total number of other significant species observed caught and retained by longline, south of 30°S and during the months of May to September, were albacore (1,222), swordfish (229), yellowfin tuna (97), Ray's bream (96) and bigeye tuna (27). No other species were observed caught in the purse-seine fishery.

## **Tag return monitoring**

There were no tagged SBT observed in 2022.

# Appendix I: 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	Tagging juvenile SBT off South Africa	2006	\$100,000
SBTF	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

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	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
	Intersessional science – Updated stock assessment and MP work	2017	\$180,000
	Intersessional science – New MP work	2018	\$180,000
	Intersessional science – MP development	2019	\$185,000
	Intersessional science – MP development and stock assessment	2019–21	\$360,000
	Intersessional science – MP work and stock assessment	2021–24	\$425,000
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
	National survey for recreational catch of southern bluefin tuna	2018–20	\$2,311,936



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