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# Australia's 2020–2021 Southern Bluefin Tuna Fishing Season

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# Summary

The 2020–21 southern bluefin tuna (SBT) fishing season report summarises catches and fishing activities in the Australian Southern Bluefin Tuna Fishery up to and including the 2020–21 fishing season<sup>1</sup> (1 December 2020 – 30 November 2021).

Australia's allocation as agreed by the Commission for the Conservation of Southern Bluefin Tuna was 6,238.4 t for the 2020–21 fishing season. However, this was adjusted to account a set aside for the recreational sector, so the effective commercial TAC was 5,926.5 t. A total of 36 commercial fishing vessels landed SBT in Australian waters in the 2020–21 fishing season for a total catch of 5,645 t. A total of 81.3% of the catch was taken by purse seine with the remainder taken by longline, pole-and-line, rod-and-reel and trolling. Seven purse seiners fished off South Australia for the Australian farming operations during the 2020–21 fishing season, with live bait, pontoon-towing and feeding vessels also involved. Most of the purse seine fishing commenced in December 2020 and finished in March 2021.

Length frequency data from the purse seine fishery from 2005–06 to 2006–07 indicated a shift to smaller fish compared to previous years, 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 2020–21 was 85.7 cm.

In the 2020–21 fishing season, observers monitored 13.2% of purse seine sets where fish were retained for the farm sector and 14.1% of the estimated SBT catch. In 2021, e-monitoring also monitored 12.0% 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 8.3% in 2021.

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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 2020–21 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 2020 and 2021 calendar years were 4,757 t and 5,459 t, respectively. The catches for the 2019–20 and 2020–21 fishing seasons were 5,429 t and 5,645 t, respectively (Table 1). The TAC for the 2020–21 fishing season was 6,165 t. However, this was adjusted to account for overcatch in the previous fishing season so the effective TAC was 5,926.5 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's 2020–21 Southern Bluefin Tuna Fishing Season

**Table 1 Australian Catch (t) by Gear and State for Fishing Seasons 1988–89 to 2020–21**

| Fishing Season       | Western Australia |           |                |       | South Australia |                   |                |       | New South Wales |                   |       | Tasmania       |                  |       | Large Longliners |         |       | Australia Total |          |       |                  | Total             |
|----------------------|-------------------|-----------|----------------|-------|-----------------|-------------------|----------------|-------|-----------------|-------------------|-------|----------------|------------------|-------|------------------|---------|-------|-----------------|----------|-------|------------------|-------------------|
|                      | Albany            | Esperance | Long-          | Total | Pole &          | Farm              | Long-          | Total | Pole &          | Long-             | Total | Troll          | Long-            | Total | Aust.            | Joint-  | Total | Domestic        | Domestic | Total | RTMP             | All               |
|                      | Pole              | Pole      | line           |       | Purse           | Cages             | line           |       | Purse           | line              |       |                | line             |       | Charter          | venture |       | Surface         | Long-    | Long- |                  | Gears             |
|                      |                   |           |                |       | Seine           |                   |                |       | Seine           |                   |       |                |                  |       |                  |         |       |                 | line     | line  |                  |                   |
| 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              |
| 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> |

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

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<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

<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.

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## 2 Catch and effort

### 2.1 Purse seine fishery

In 2020–21, 81.3% 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 2020–21 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 2020 and 2021 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 2020–21 was 85.7 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 1,041 t in 2020–21. 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=2156 in 2020–21).

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**

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 D and Appendix E.

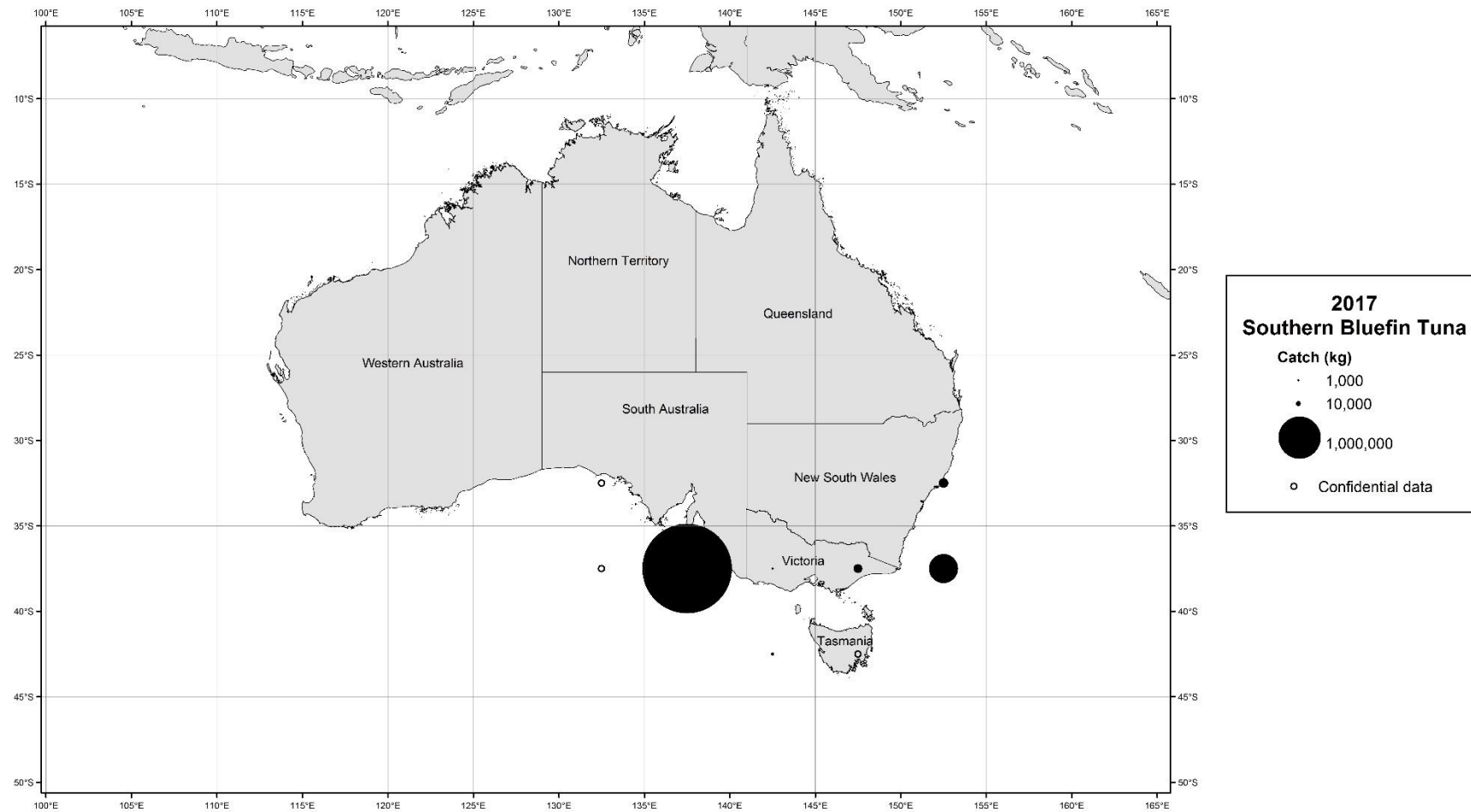
### **2.2.2 Size composition**

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.

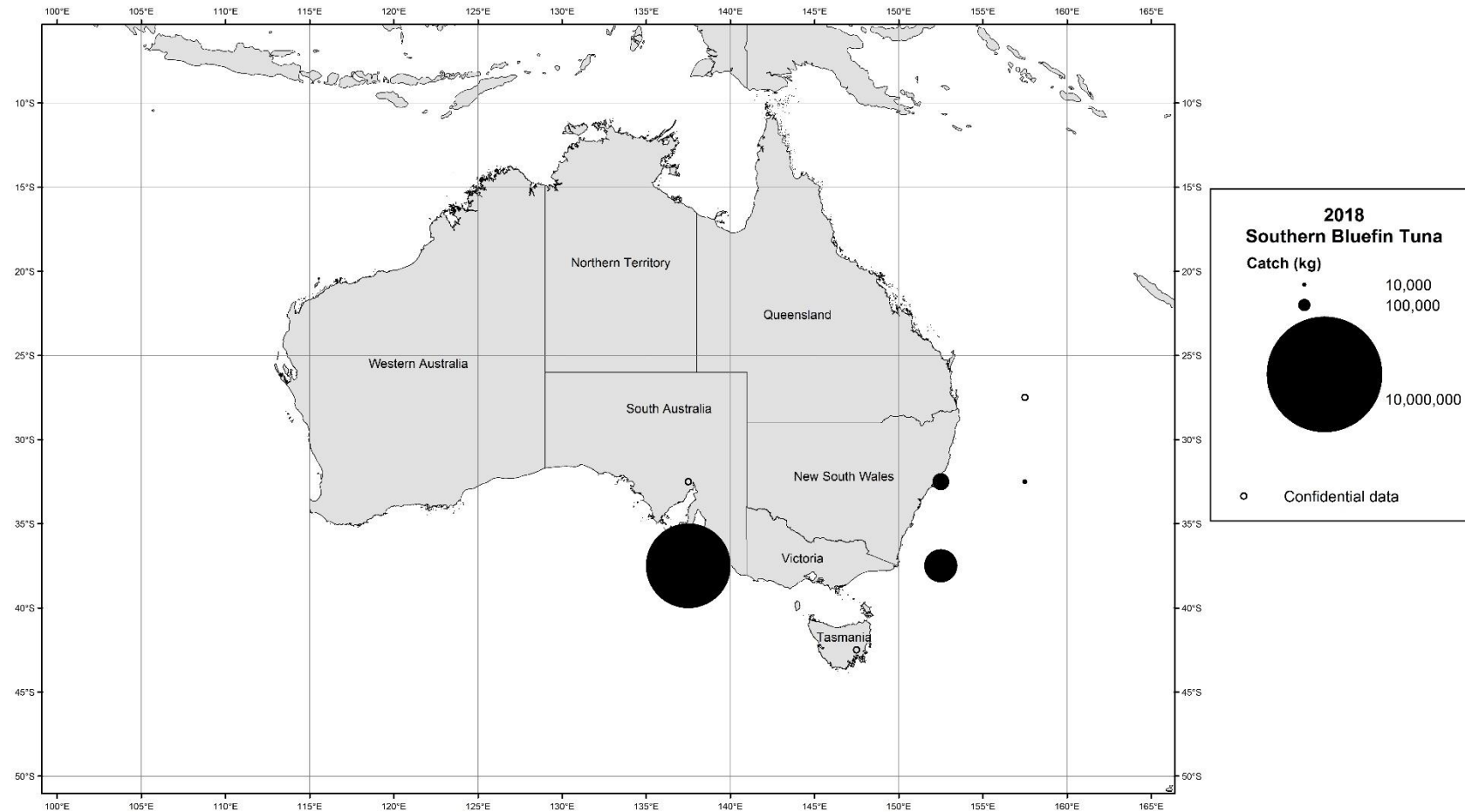
The percentage representation by length in the winter catches of Japanese longliners off eastern TAS from 1988 to 1997 show modal changes through time (Figure 8). Modes that represent juvenile age classes were less visually evident in 1988 and 1989. Sample sizes were < 1000 in these years which may contribute 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.

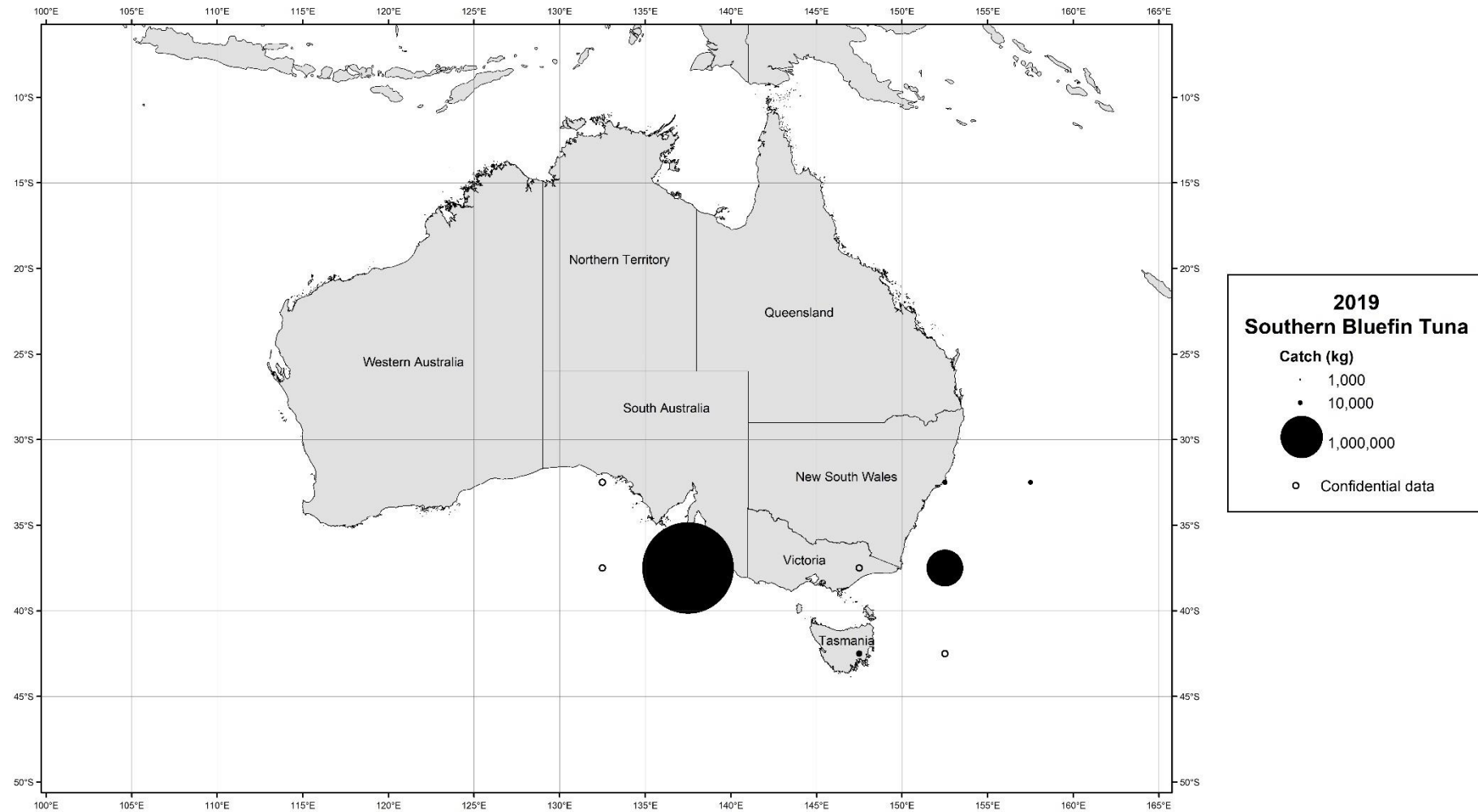
**Figure 1 Australian SBT catch in the 2017 calendar year. Note that catch is centred in each grid square.**



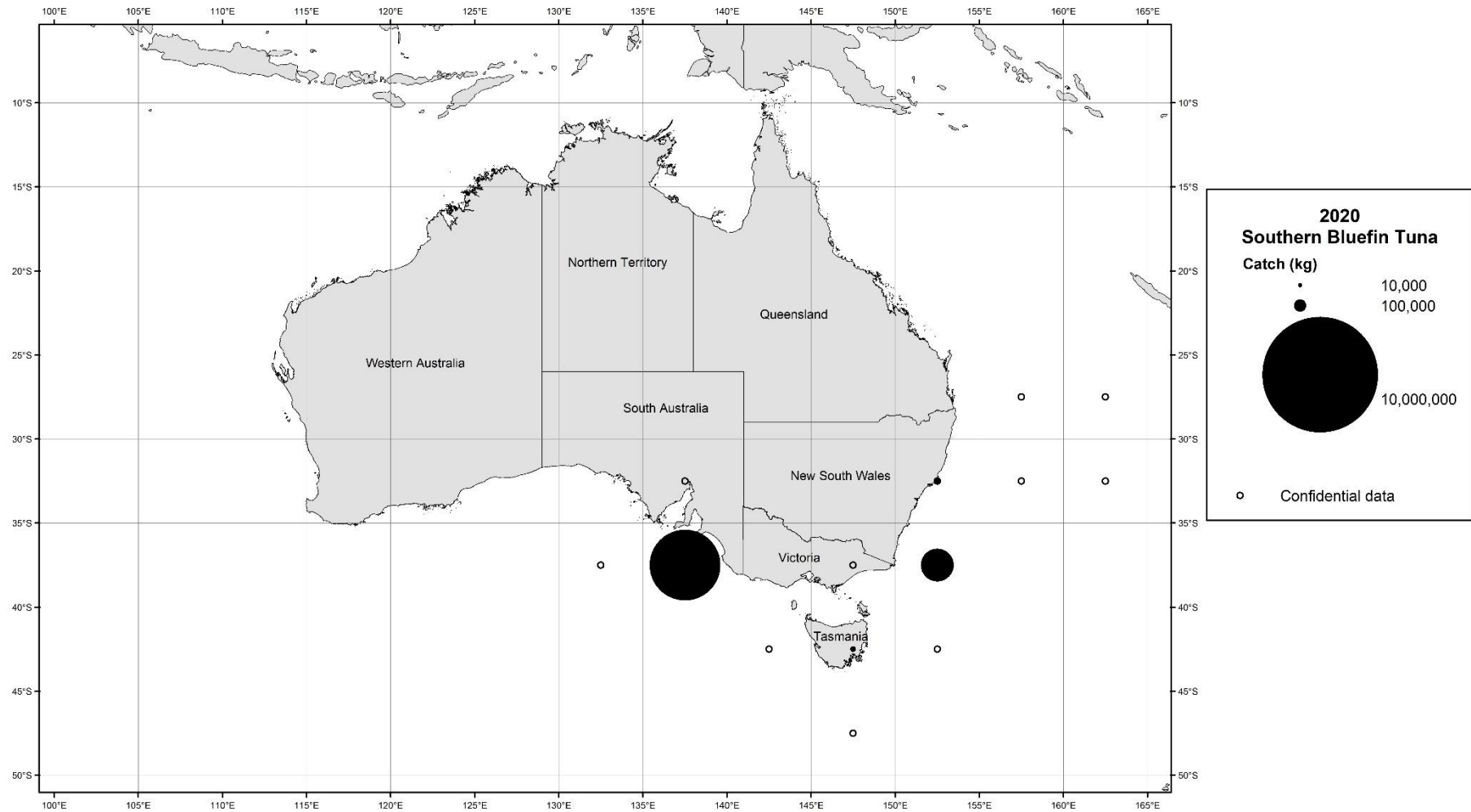
**Figure 2 Australian SBT catch in the 2018 calendar year. Note that catch is centred in each grid square.**



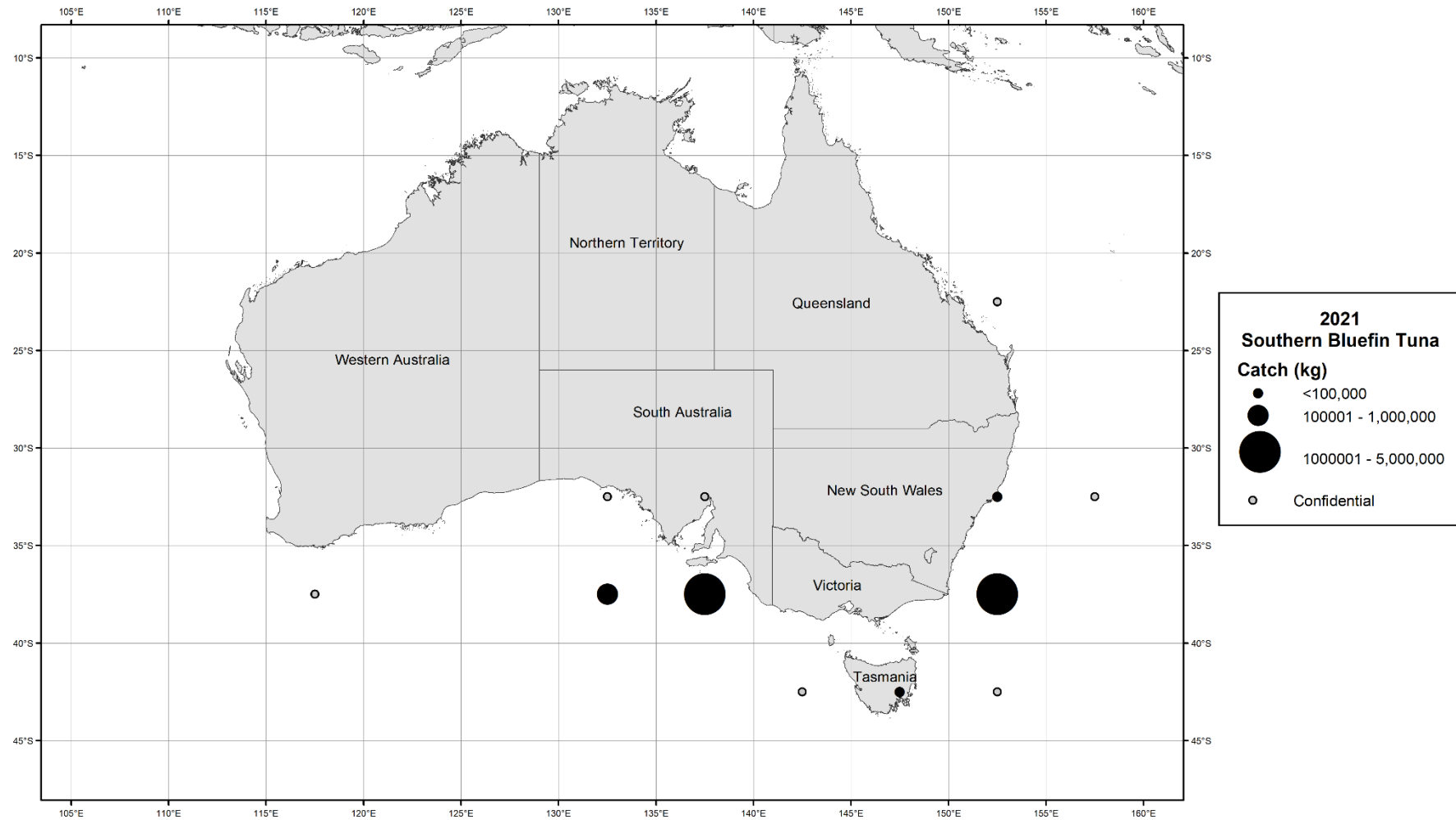
**Figure 3 Australian SBT catch in the 2019 calendar year. Note that catch is centred in each grid square.**



**Figure 4 Australian SBT catch in the 2020 calendar year. Note that catch is centred in each grid square.**



**Figure 5 Australian SBT catch in the 2021 calendar year. Note that catch is centred in each grid square.**

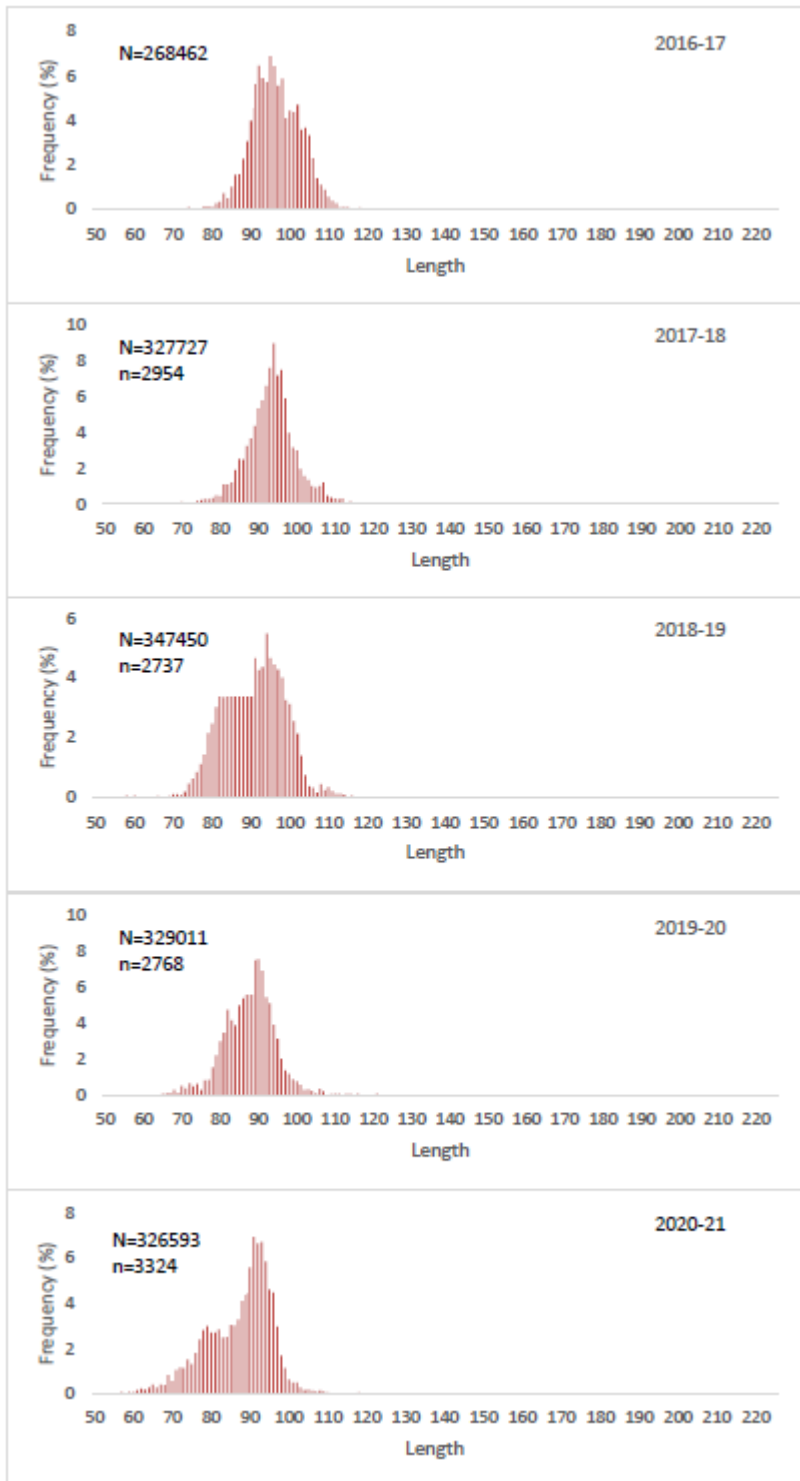


**Table 2 Average fork length (cm) of SBT landed in each Australian state, 1989 to 2021**

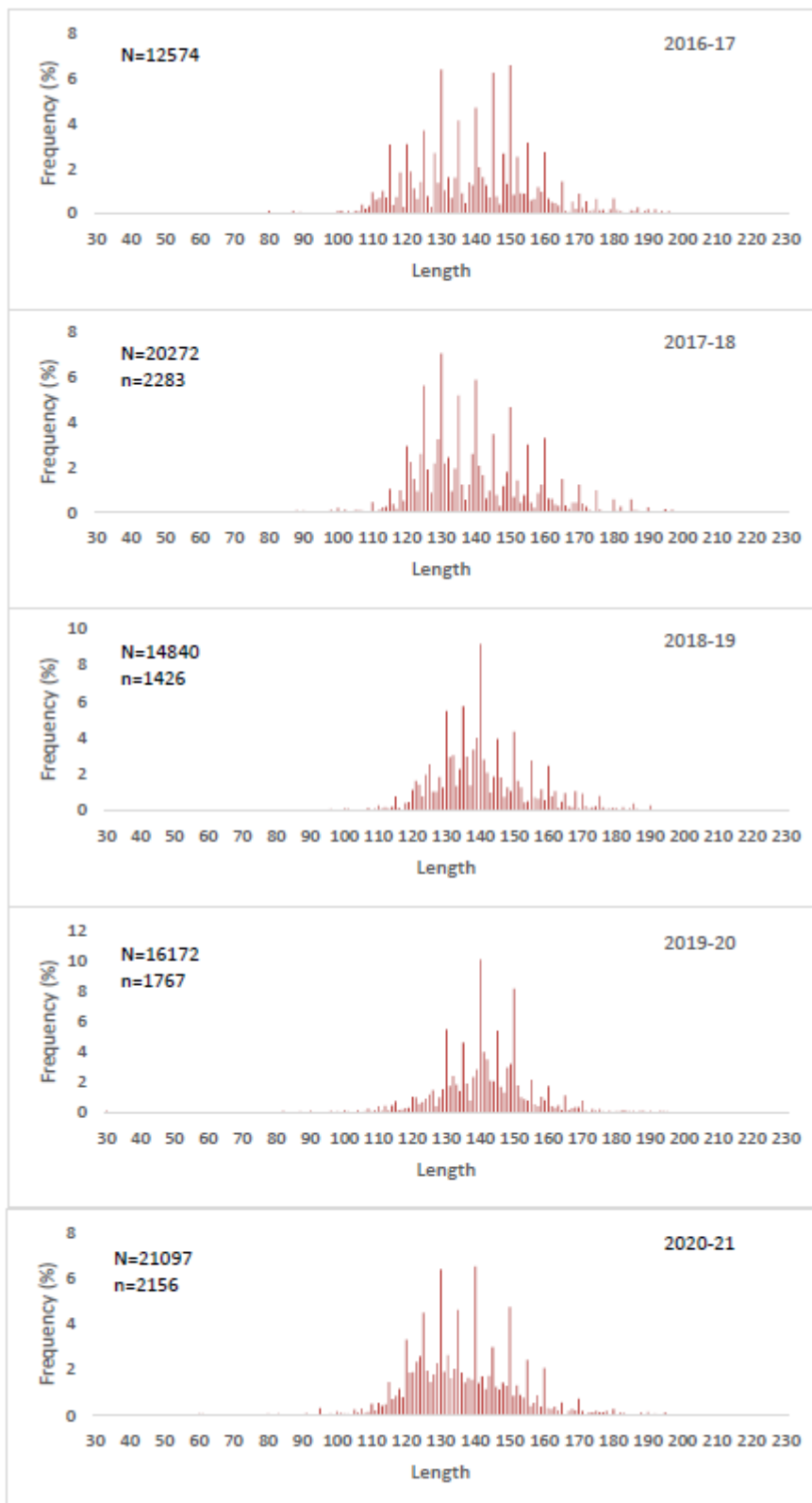
| <b>Calendar Year</b> | <b>Western Australia<sup>a</sup></b> | <b>South Australia<sup>a</sup></b> | <b>Tasmania</b> | <b>NSW</b> | <b>Joint-venture</b> |
|----------------------|--------------------------------------|------------------------------------|-----------------|------------|----------------------|
| 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                 | –                                    | –                                  | 123.1           | 136.3      | –                    |

<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

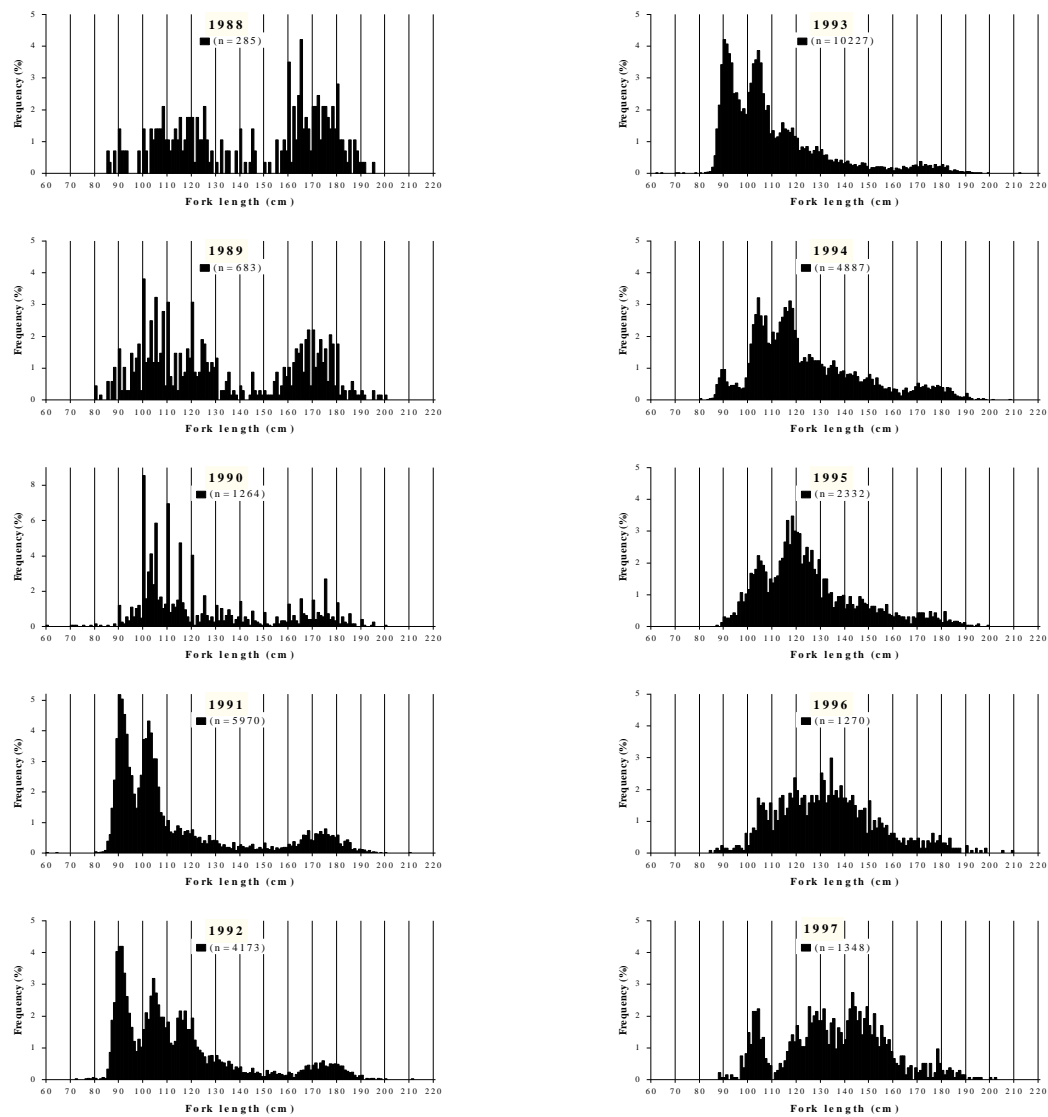




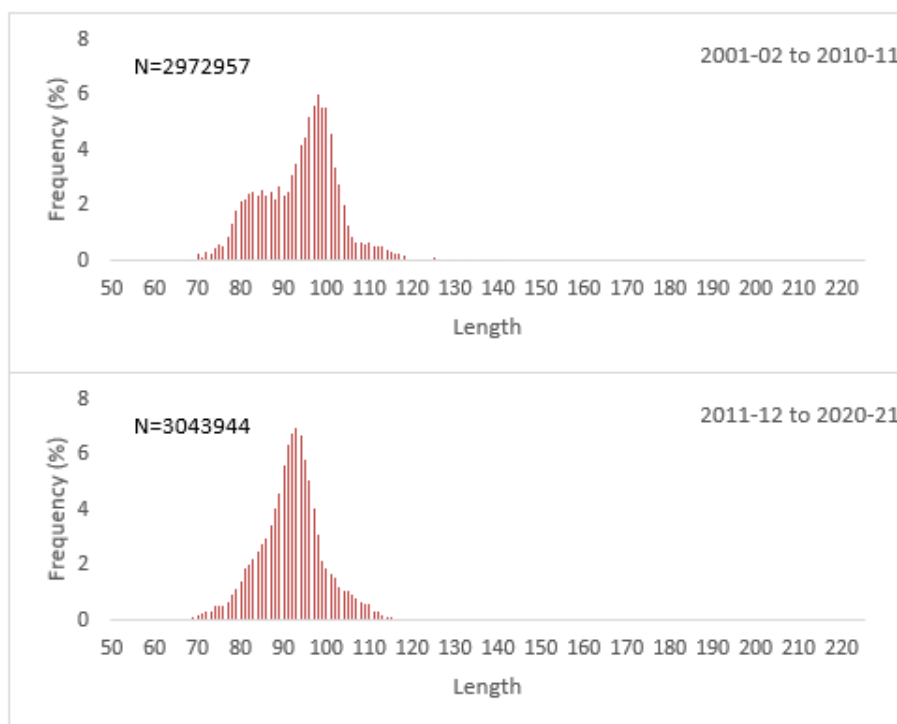
**Figure 6 Length frequency of SBT purse seine catch in Australian waters raised to total catch, 2016–17 to 2020–21 fishing seasons (source: tow cage size monitoring database)**



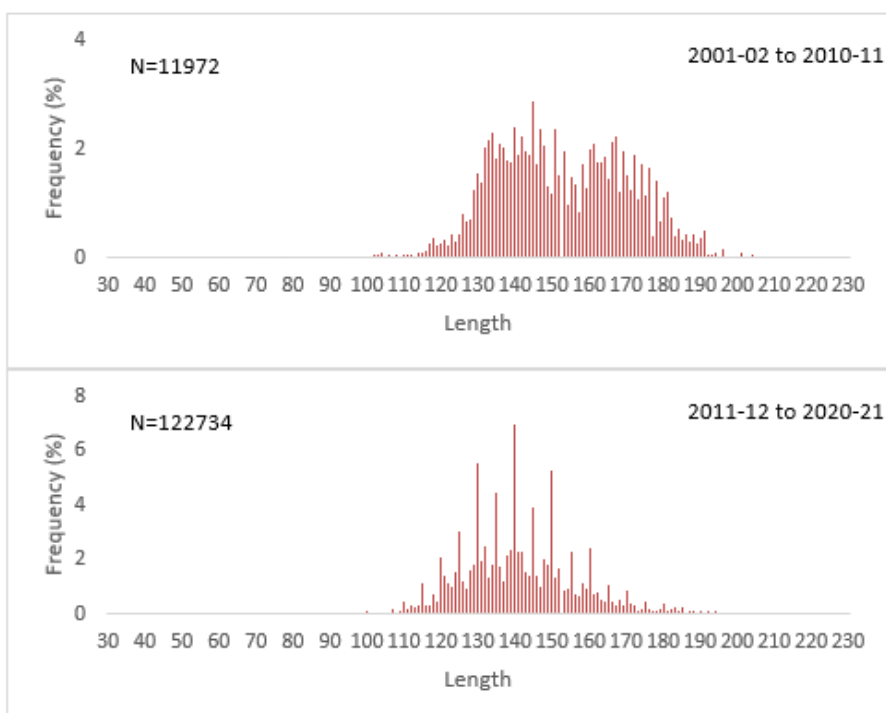
**Figure 7** Length frequency histograms for retained SBT longline catch in Australian waters raised to total catch, 2016–17 to 2020–21 quota years (source: AFMA observer data and processor monitoring data)



**Figure 8** 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 9 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 10 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 2020–21, a total of 36 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 seven purse seiners during 2020–21, with various live bait, pontoon-towing and feeding vessels also involved. The majority of the purse seine fishing commenced in mid-December 2020 and finished in mid-March 2021. One vessel conducted pole-and-line operations in the waters off SA in the 2020–21 season.

### 3.2 Western Australia (WA)

Two vessels caught SBT off WA in 2020–21.

### 3.3 New South Wales (NSW)

In 2020–21, 20 longliners reported landing both older juvenile and adult SBT in deeper waters off NSW. One of these vessels also fished waters around Tasmania and one also fished waters off Queensland.

### 3.4 Tasmania (TAS)

In 2020–21, one longliner caught SBT off Tasmania. They also operated in waters off NSW. Two vessels conducted rod-and-reel operations catching SBT off Tasmania. Four vessels conducted trolling operations catching SBT off Tasmania.

### 3.5 Queensland (QLD)

One vessel caught SBT off Queensland in 2020–21.

## 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, 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).

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 3 Reported tag releases of SBT by Australian recreational fishers, 1990 to 2021**

| 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 | 37.8                         | 5.2  | 50.5 | 6.2  | 0.3  | 1328            |

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 2020–21 fishing season, observers monitored 13.2% of purse seine sets where fish were retained for the farm sector and 14.1% of the estimated SBT catch. 100% of all transfers were monitored by Australian Fisheries Management Authority (AFMA) representatives in Port Lincoln. During 2020–21, no discarding of SBT, excluding observed live releases noted in the observer section of



the report, 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 2021, e-monitoring observed 12.0% 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, 9.9% of hooks were observed in 2021. The observed (via e-monitoring) total catch number of SBT was 3,229 individuals, of which 2,737 were retained, 469 fish were discarded (247 of which were reported as released alive, 99 were dead or damaged and 123 of which were reported as having an undetermined life status). The remaining 23 individuals escaped (17 alive, and 6 of unknown life status). None were tagged.

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

Logbook and electronic monitoring data for the 2021 fishing season indicate that 611 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 2011, the commercial trial of stereo-video technology in the SBTF 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). Following the first trial, the Australian Government adopted a policy that stereo video would not be implemented in Australian tuna farms until the technology was 'cost effective and fully automated'.

General work examining the automation of measurements of fish using stereo-video was reported in Shaifait et al. (2017)

(<https://academic.oup.com/icesjms/article/74/6/1690/3056949>). Copies of this paper were provided to CCSBT 24.

In 2020, Australia advised the CCSBT that it would again trial the cost effectiveness and accuracy of fully automated stereo systems in situ in Australia's tuna farms. At CCSBT28 Australia noted that while progress had been made with the stereo-video trial, the COVID-19 pandemic and associated restrictions in Australia had delayed the trial.

Following further logistical delays related to the COVID-19 pandemic, Australia expects the trial to proceed in early 2023.

# Appendix A: SBT fishing season dates 1988-89 to 2020-21

| 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 <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 |

<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              |

'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 2020-21

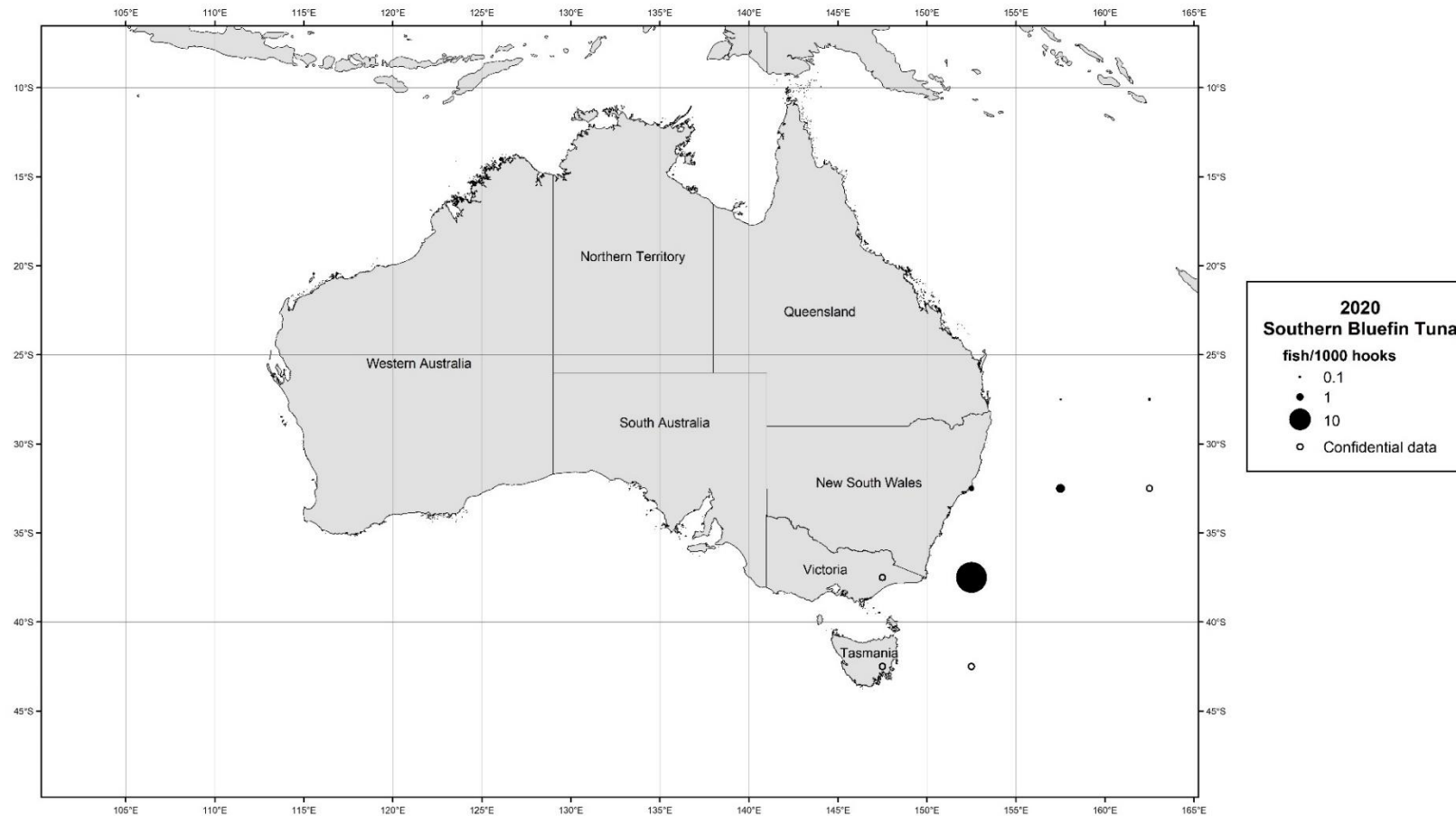
| Season               | Estimated<br>catch (t) | Actual<br>catch (t) | Catcher<br>vessels | Vessel search<br>hours | Sets | No. 1° squares<br>fished |
|----------------------|------------------------|---------------------|--------------------|------------------------|------|--------------------------|
| 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                       |

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

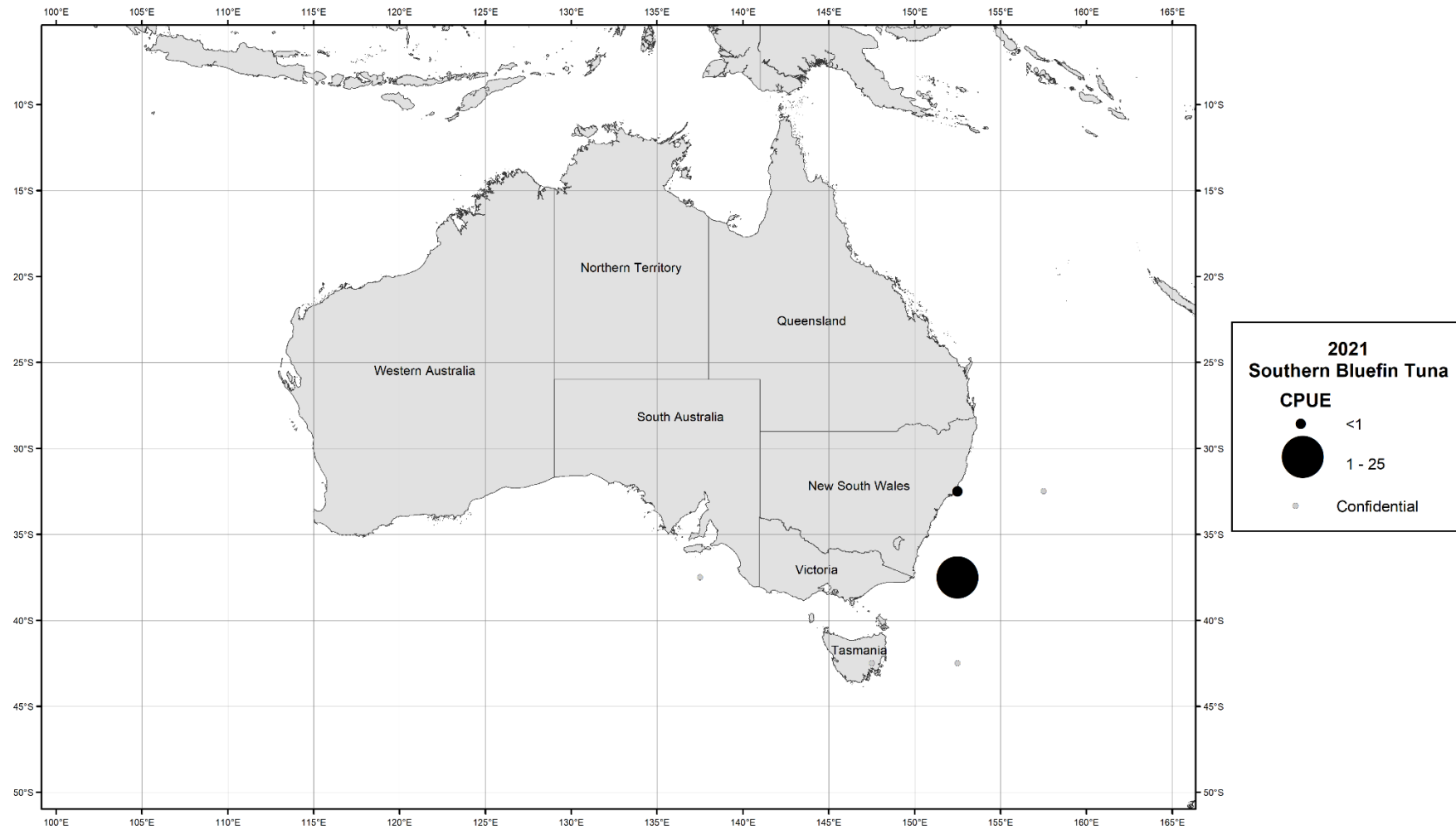
<sup>a</sup>Year 1 of the 2009–11 season (2009–10)

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

## Appendix D: Nominal CPUE by year and location for all Australian longliners, 2020 and 2021 calendar years



## Australia's 2020–21 Southern Bluefin Tuna Fishing Season





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

| Year | Nominal<br>CPUE |
|------|-----------------|
| 2000 | 0.12            |
| 2001 | 0.23            |
| 2002 | 0.08            |
| 2003 | 0.14            |
| 2004 | 0.76            |
| 2005 | 0.13            |
| 2006 | 0.11            |
| 2007 | 0.07            |
| 2008 | 0.24            |
| 2009 | 1.47            |
| 2010 | 1.62            |
| 2011 | 1.04            |
| 2012 | 0.81            |
| 2013 | 3.93            |
| 2014 | 5.32            |
| 2015 | 5.13            |
| 2016 | 8.24            |
| 2017 | 11.05           |
| 2018 | 7.15            |
| 2019 | 7.42            |
| 2020 | 6.68            |
| 2021 | 11.92           |

## 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 (%<br>, units) | Observed Catch (%<br>, units) | Total Cost                          |
|-----------|---------|--------------------------|--------------------|----------|--------------------|------------------|--------------------------------|-------------------------------|-------------------------------------|
| Australia | 2002–03 | Purse Seine <sup>a</sup> | N/A                | 47       | 24                 |                  | 11% (sets)                     | 11%<br>(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%<br>(no. retained catch) | NA                                  |
| Australia | 2002    | West Coast Longline      | N/A                | N/A      | N/A                |                  | N/A (hooks)                    | N/A<br>(no. retained catch)   | NA                                  |
| Australia | 2003–04 | Purse Seine <sup>a</sup> | 2                  | 27       | 21                 |                  | 13% (sets)                     | 12.8%<br>(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%<br>(no. retained catch) | 303,000 (60,000 A\$ SBT component)  |
| Australia | 2003    | West Coast Longline      | 4                  | 72       | 54                 |                  | 2.0% (hooks)                   | 4.5%<br>(no. retained catch)  | 42,247 (A\$)                        |
| Australia | 2004–05 | Purse Seine <sup>a</sup> | 2                  | 36       | 15                 |                  | 11.2% (sets)                   | 8.5%<br>(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%<br>(no. retained catch)  | 966,000 (150,000 A\$ SBT component) |
| Australia | 2004    | West Coast Longline      |                    |          | 59                 |                  | 3.9% (hooks)                   | 0%<br>(no. retained catch)    | 57,384 (A\$)                        |
| Australia | 2005–06 | Purse Seine <sup>a</sup> | 2                  | 47       | 14                 |                  | 9.2% (sets)                    | 10.1%<br>(est. total weight)  | 78,000 (A\$)                        |
| Australia | 2005    | East Coast Longline      | 14                 |          | 128                |                  | 37.5% (hooks)                  | 62.8%<br>(no. retained catch) | 723,289 (160,000 A\$ SBT component) |
| Australia | 2005    | West Coast Longline      |                    |          | 47                 |                  | 9.1% (hooks)                   | (no observed catch)           | 0                                   |

Australia's 2020–21 Southern Bluefin Tuna Fishing Season

| Country   | Year                 | Sector                   | Observers Deployed | Sea Days | Sets/Tows Observed                 | Observed Vessels | Observed Effort<br>(%, units) | Observed Catch<br>(%, units)  | Total Cost                     |
|-----------|----------------------|--------------------------|--------------------|----------|------------------------------------|------------------|-------------------------------|-------------------------------|--------------------------------|
| Australia | 2006–07              | Purse Seine <sup>a</sup> | 2                  | 50       | 9                                  |                  | 5.6% (sets)                   | 12.1%<br>(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%<br>(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%<br>(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%<br>(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)<br>8 (aborted)  | 3                | 7.9% (sets, fish retained)    | 15.3%<br>(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%<br>(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)<br>1 (aborted)   | 2                | 9.0% (sets, fish retained)    | 13.5%<br>(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%<br>(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)<br>11 (aborted) | 2                | 19.8% (fish retained)         | 12.2%<br>(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%<br>(no. retained catch) | 417,240 (A\$ – 10/11 fin year) |
| Australia | 2010                 | West Coast Longline      | 1                  |          | 10                                 |                  | 2.5%<br>(hook effort)         | No SBT caught                 | 14,533 (A\$ – 10/11 fin year)  |

Australia's 2020–21 Southern Bluefin Tuna Fishing Season

| Country   | Year    | Sector              | Observers Deployed | Sea Days | Sets/Tows Observed                | Observed Vessels | Observed Effort<br>(%, units) | Observed Catch<br>(%, units)  | Total Cost       |
|-----------|---------|---------------------|--------------------|----------|-----------------------------------|------------------|-------------------------------|-------------------------------|------------------|
| Australia | 2011–12 | Purse Seine         | 1                  | 17       | 17 (fish retained)<br>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%<br>(no. retained catch) | \$750,000 (A\$)  |
| Australia | 2011    | West Coast Longline | 1                  |          | 4                                 |                  | 1.7%<br>(hook effort)         | No SBT caught                 | \$11,500 (A\$)   |
| Australia | 2012–13 | Purse Seine         | 2                  | 30       | 14 (fish retained)<br>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%<br>(no. retained catch) | \$800,000 (A\$)  |
| Australia | 2012    | West Coast Longline | 3                  |          | 61                                |                  | 17.9%<br>(hook effort)        | No SBT caught                 | \$90,000 (A\$)   |
| Australia | 2013–14 | Purse Seine         | 2                  | 17       | 16 (fish retained)<br>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%<br>(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%<br>(no. retained catch)  | na               |
| Australia | 2014    | West Coast Longline | 2                  |          | 27                                |                  | 9.1%                          | 31.8%<br>(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%<br>(no. retained catch)  | na               |
| Australia | 2015    | West Coast Longline |                    |          | 19                                |                  | 7.2%                          | No observed catch             | na               |

Australia's 2020–21 Southern Bluefin Tuna Fishing Season

| Country   | Year    | Sector              | Observers Deployed | Sea Days | Sets/Tows Observed | Observed Vessels | Observed Effort<br>(%, units) | Observed Catch<br>(%, 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         |
| Australia | 2021    | East Coast Longline |                    |          | na <sup>d</sup>    |                  | 12.0% (hooks – SBT Area)      | 12.9% (no. retained catch)   | na         |
| Australia | 2021    | West Coast Longline |                    |          | na <sup>d</sup>    |                  | 8.3%                          | No observed catch            | na         |

## Australia's 2020–21 Southern Bluefin Tuna Fishing Season

<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)

<sup>d</sup>Data is not available for 2021 at this time

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                 |

<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 2020–21 fishing season spent 95 days at sea and observed purse seiner activities for 28 days and tow activities for 17 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

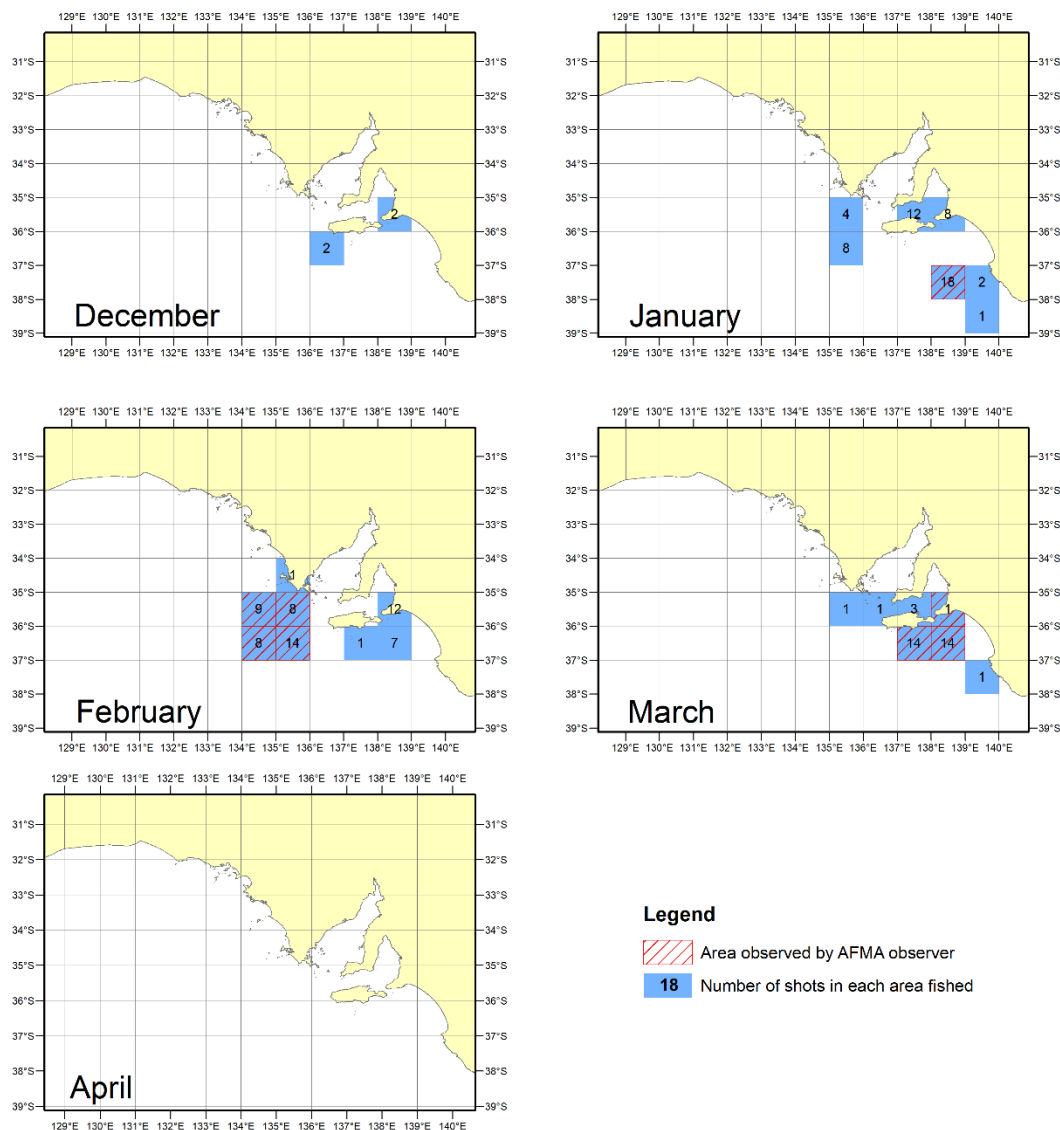
The purse seine observer program for the 2020–21 Australian SBT fishing season monitored fishing and tow operations in 34°33'–38°39'S and 134°13'–139°45'E in January, February, and March 2021. Two Australian observers monitored 20 purse seine sets where fish were retained. This represents 13.2% of the total sets in which fish were taken in 2020–21. Fish were released alive from 13 shots as they were deemed to be too small.



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 11** The number of sets recorded in the SBT purse seine fishery from December 2020 to April 2021. 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 593 t of SBT were caught during observed purse seine sets. This observed catch accounted for 14.1% of the total estimated purse seine catch of 4,203 t. An estimated 175 t of fish were released alive because the fish were too small.

There were twenty-six mortalities observed during purse seine operations, twenty-five of which were sampled. Two observers monitored two tow operations and recorded fourteen SBT mortalities during the towing operation, ten 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 forty SBT mortalities, thirty-five of which was sampled. The fork length for these fish ranged between 66-112 cm.

### **Biological data**

No otoliths were obtained from the twenty-five sampled mortalities in the purse operations. No otoliths were obtained from the ten sampled mortalities in the tow operation. There is also an ongoing project to collect otoliths from farm mortalities.

Weights were obtained for all thirty-five fish sampled during purse seine and towing operations. Weights ranged from 5 kg to 26 kg, with an average weight of 14.85 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 2021, in the ETBF, south of 30°S and during the months of May to September, e-monitoring monitored 123,310 hooks of a total of 1,034,878, representing 12.0% observer coverage of longline effort during the SBT migration. For the fishery as a whole, 9.9% of hooks were observed in 2021.

During 2021, there was 8.3% observer coverage of longline hook effort in the WTBF.

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

The observed total catch number of SBT was 3,229 individuals, of which 2,737 were retained, and 469 fish were discarded (247 of which were reported as released alive, 99 were dead or damaged, and 123 of which were reports as having an undetermined life status). The remaining 23 individuals escaped (17 of which were reported as alive, and 6 as having an undetermined life status). No SBT were tagged during observed longline operations in 2021. ETBF logbooks for 2021 showed 15,472 SBT (729.1 t) were retained and 4,620 (23%) 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, is not currently available for 2021.

### **Tag return monitoring**

There were no tagged SBT observed in 2021.



# 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 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     |

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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  | 2021–23 | \$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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