

SILVER TREVALLIES (2020)

Pseudocaranx georgianus, *Pseudocaranx* sp. "dentex" & *Pseudocaranx wrighti*, *Pseudocaranx dinjerra*



Ashley Fowler: Department of Primary Industries, New South Wales, **Rowan C. Chick:** Department of Primary Industries, New South Wales, **Nils Krueck:** Institute for Marine and Antarctic Studies, University of Tasmania, **David Fairclough:** Department of Primary Industries and Regional Development, Western Australia, **Victorian Fisheries Authority:** Victorian Fisheries Authority, **Timothy Emery:** Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), **Anthony Roelofs:** Department of Agriculture and Fisheries, Queensland, **Paul Rogers:** South Australian Research and Development Institute, **Emily Fisher:** Department of Primary Industries and Regional Development, Western Australia

STOCK STATUS OVERVIEW

Jurisdiction	Stock	Stock status	Indicators
Commonwealth	Commonwealth	Sustainable	Catch, CPUE
Western Australia	Western Australia	Sustainable	Catch, effort, CPUE, Catch MSY
Queensland	Queensland	Undefined	Catch
New South Wales	New South Wales	Depleted	Catch, CPUE, biomass, fishing mortality, spawning potential, length and age structures
Victoria	Victoria	Sustainable	Catch, effort, CPUE
Tasmania	Tasmania	Sustainable	Catch, effort
South Australia	South Australia	Sustainable	Catch, effort, CPUE

STOCK STRUCTURE

Silver Trevallies comprises a complex of species that inhabits estuarine and coastal waters (depths of 10–230 m) throughout southern temperate Australia, from southern Queensland, south through New South Wales, Tasmania, Victoria, South Australia and southern and central Western Australia [Smith-Vaniz and Jelks 2006, Bearham et al. 2020].

The biological stock structure of Silver Trevallies is uncertain. Fisheries are based on a species complex that varies by region, with *Pseudocaranx georgianus* present in all jurisdictions except Queensland, *Pseudocaranx wrighti* present in all jurisdictions except Queensland and New South Wales, *Pseudocaranx dinjerra* only present in Western Australia, and *Pseudocaranx* sp.

'*dentex*' only present in Queensland [Smith-Vaniz and Jelks 2006, Gomon et al. 2008, Bearham et al. 2020]. Investigations of population connectivity and post-settlement movement are also limited. Despite fast swimming ability, tag-recapture studies in Western Australia, New South Wales and New Zealand indicate restricted post-settlement movement of *P. georgianus*, potentially leading to ecological stock structuring over moderate (hundreds of kilometres) spatial scales [James 1980, Fairclough et al. 2011, Fowler et al. 2018].

Here, assessment of stock status is presented at the jurisdictional level—Commonwealth, Western Australia, Queensland, New South Wales, Victoria, Tasmania and South Australia.

STOCK STATUS

Commonwealth Silver Trevallies (assumed to be *P. georgianus*) in Commonwealth fisheries is managed as a Tier 4 stock under the Southern and Eastern Scalefish and Shark Fishery (SESSF) Harvest Strategy Framework [AFMA 2019]. The 2017 analysis [Haddon & Sporcic 2017] informed the management of the stock for the 2019–20 fishing season.

The Tier 4 analysis by Haddon and Sporcic [2017] used the reference period 1992–2001 and excluded data from historical catches taken within the Batemans Marine Park. The analysis identified a rapid decline in CPUE from 1990, to be near the limit reference point of 20 per cent of unfished biomass by 2000. The CPUE then increased to 2010, when it was above the target, but has since declined and appears relatively flat and stable between the limit and the target reference points [Haddon and Sporcic 2017]. The 2017 analysis produced a one year recommended biological catch (RBC) of 445 t.

Landed catch in the Commonwealth Trawl and Scalefish Hook sectors of the SESSF was 21 tonnes (t) in the 2019–20 fishing season (8.3 t in 2018–19 fishing season). The majority of the catch in the 2019–20 fishing season was taken in the trawl sector (20.9 t). Discards have been estimated to be 119.6 t based on the weighted average of the previous four calendar years (2015 to 2018) [Burch et al. 2019]. Since 1991, when reliable records began, catches have been well below the RBCs produced by the 2013 and 2017 analyses and the total fishing mortality in recent years has been below corresponding TACs. Since the 2017 analysis, the TAC has been gradually reduced to 292 t for the 2019–2020 fishing season.

The above evidence indicates that the stock is unlikely to be depleted and the current level of fishing pressure is unlikely to cause the stock to become recruitment impaired. On the basis of the evidence provided above, Silver Trevallies in the Commonwealth is classified as a **sustainable stock**.

New South Wales

Morphological and genetic evidence indicates that the Silver Trevallies stock in New South Wales is single-species, consisting only of *Pseudocaranx georgianus* [Smith-Vaniz and Jelks 2006, Bearham et al. 2020]. The stock supported historical commercial catches in excess of 1 000 t per year during the 1980s, but the commercial catch has declined steadily since that time to 41.9 t in 2019; the lowest level since the 1980s peak. Interpreting this decline is complicated by changes in the historical reporting of catch between the state and Commonwealth jurisdictions, as well as management changes within New South Wales that have affected the spatial distribution of effort and fishery reporting through time. Within the state, reduction in the area available to commercial fisheries for Silver Trevallies, through the implementation of recreational fishing havens and marine parks (particularly the Batemans Marine Park), has likely reduced catch and potentially influenced catch rates, thereby creating difficulties in defining useful reference points to assess current stock status. A minimum legal length (MLL) of 300 mm total length (TL) was also introduced in late 2007, further

impacting the quantity of landed catch and potentially confounding the interpretation of trends in fishery-dependent indicators through time.

Trends in standardised catch rates (kg per day, hereafter 'catch rates') in New South Wales vary, depending on the area, fishing method, and time-period examined [Fowler and Chick 2019]. Catch rates including all areas declined during 1998–2009 for both major fishing methods - fish trawling and fish trapping. Catch rates during the most recent period (2010–2019) either declined or remained steady, depending on fishing method and area examined. Catch rates during 2019 were among the lowest observed since the start of time-series in 1998.

Two data-limited assessment models were applied to historical trawl catch data from New South Wales during 1955–2019 - a boosted regression tree (BRT) model [Zhou et al. 2017a] and an Optimised Catch-Only Model [OCOM, Zhou et al. 2017b, reported in Fowler and Chick 2019]. Estimates of biomass relative to biomass at maximum sustainable yield (B/Bmsy) from the BRT modelling decreased throughout the period, with a substantial decline in 2016 to their lowest levels in 2019 (< 0.1). A value below 1 indicates biomass is insufficient to achieve maximum sustainable yield. However, estimates were highly uncertain throughout the period. B/Bmsy estimates from OCOM remained stable and above one between 1955 and the mid-1970s, then decreased substantially during the 1980s and 1990s, remaining low (< 0.5) and stable from 2000 to 2019. Estimates of fishing mortality relative to fishing mortality at maximum sustainable yield (F/Fmsy) from OCOM remained below one until the early 1980s, after which they increased substantially and remained above one until the late 2010s. A value above 1 indicates fishing mortality is too high to achieve maximum sustainable yield. Trends in B/Bmsy and F/Fmsy from OCOM were similar across a range of natural mortality values examined (0.05-0.15).

Observer studies and monitoring of landed catches in New South Wales have shown that the length of Silver Trevallies captured by the Ocean Trawl Fishery (OTF) declined substantially between the periods 1987–90, 1993–95 and 1997–99 [Liggins 1996, Rowling and Raines 2000]. The proportion of larger-sized Silver Trevallies landed has continued to decline since 2007, when the MLL was introduced [Stewart et al. 2015].

A Length Based – Spawning Potential Ratio (LB-SPR) model was applied to commercial length data sampled from fish markets in New South Wales during 12 years between 2004 and 2018 [Fowler and Chick 2019]. SPR represents an estimate of current spawning potential of the stock relative to that in an unfishery population. Estimates of fishing mortality relative to natural mortality (F/M) from the model were highly variable throughout the period (range: 1.6 to 7.4), with values in the last three years ranging between 3.0 and 5.4. Estimated SPR was consistently low and stable across years, ranging between 0.14 and 0.26.

The only age-based assessment of the Silver Trevallies stock indicated that total mortality increased substantially between 1987–90 and 1997–99 [Rowling and Raines 2000]. This analysis estimated that fishing mortality was greater than natural mortality by the 1997–99 period and that the fishery exhibited age class truncation. Given the ongoing length truncation observed in the fishery, it is likely that the total mortality rate and degree of age class truncation have persisted. Due to the MLL in New South Wales waters, discarding in the OTF is substantial and may exceed 50 per cent at times, based on number of individuals [NSW DPI, unpublished data]. Discard mortality in the OTF therefore remains a concern to the status of the stock. Some protection to the Silver Trevallies stock is afforded by marine parks in eastern Australia, but total fishing mortality is still likely higher than natural mortality.

While acknowledging difficulties in interpreting the change, estimates of

retained landings by resident recreational fishers in New South Wales have decreased. The most recent estimate of the recreational harvest of Silver Trevallies in NSW was approximately 15 300 fish, with an estimated weight of approximately 8 t during 2017–18 (Murphy et al. 2020). Estimates were based on a survey of Recreational Fishing Licence (RFL) Households. RFL households were comprised of at least one member who possessed a long-term (1 and 3 years duration) fishing licence and included other fishers resident within their households. A similar survey of RFL households was done in 2013–14 and provides a comparison with data from the 2017–18 survey. The estimated catch of Silver Trevally in 2013–14 was approximately 49 000 fish weighing approximately 27 t (West et al. 2015).

The lack of a suitable reference period from which to evaluate changes in biomass (or a proxy) creates uncertainty around stock status and will continue to hinder detection of biomass reductions to levels that might impair recruitment in New South Wales. Uncertainty about stock status is further driven by limited understanding of stock structure, with at least some component of the New South Wales stock shared with the adjacent Commonwealth jurisdiction, which has classified the resource as sustainable. However, the substantial declines in commercial and recreational catch and CPUE in New South Wales since the late-1990s, combined with model estimates indicating biomass is at or below 20 per cent unfished biomass, and long-term truncation of length structure indicate that biomass is likely depleted and recruitment is likely impaired. The above evidence indicates that current fishing mortality levels are expected to prevent the stock recovering from a recruitment impaired state.

On the basis of the evidence provided above, Silver Trevallies in New South Wales is classified as a **depleted stock**.

Queensland

Catch and effort data for Silver Trevallies (*P. sp. 'dentex'*) in Queensland are poor. Commercial and charter catches of Silver Trevallies are not reported specifically, and the species is included as part of a broader 'Trevally-unspecified' category. Silver Trevallies were reported specifically in recreational fishing surveys up until 2013–14 and approximately 2000 fish were landed [Webley et al. 2015]. They are no longer reported separately in the statewide survey owing to the uncertainty in species identity. It is unlikely that the combined commercial and recreational catches exceeded 10 t in 2019. Silver Trevallies are not subject to size restrictions, although a combined recreational possession limit of 20 applies to members of the Carangidae family. There is insufficient information available to confidently classify the status of the stock.

On the basis of the evidence provided above, Silver Trevallies in Queensland is classified as an **undefined stock**.

South Australia

In South Australia, Silver Trevallies are taken by fishers in South Australia's commercial multi-species, multi-gear and multi-sectoral Marine Scalefish Fishery (MSF) and by recreational fishers [Steer et al. 2020]. Few commercial fishers actively target these species. Total annual commercial catch has been highly variable ranging from 4 t in 2003–04 to 22 t in 2000–01. Total commercial catch was around 5 t in 2018–19. In 2018, each of the main performance indicators showed a down-turn, but no trigger reference points were breached [Steer et al. 2020].

The recreational catch is taken using rods and lines and is substantial relative to the commercial catch. The State-wide recreational survey in 2013–14 estimated that 73 924 Silver Trevallies were captured by the recreational sector, of which 57 140 fish were harvested. The estimated total

recreational harvest weight was 15 t (Giri and Hall 2015).

There is no information available on the catch of Silver Trevallies by Aboriginal and Torres Strait Islander people in South Australian waters.

The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired. Furthermore, the above evidence indicates that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

On the basis of the evidence presented above, Silver Trevallies in South Australia is classified as a **sustainable stock**.

Tasmania

In Tasmanian waters, Silver Trevallies (only *P. georgianus* recorded) are byproduct species of the Tasmanian Scalefish Fishery, caught predominately using gillnet and beach seine gears. Recorded commercial catches have been low, with a maximum of 8 t recorded in 1998 and an annual average of approximately 4 t recorded over the past ten years. The total recorded commercial catch in 2018–19 was 3.7 t. Commercial catch and effort appear to show a positive relationship, but given that the species are not actively targeted, catch rates are not considered to provide a reliable index of relative abundance.

Four estimates of recreational catches using line and gillnet methods since 2000–01 were generally higher than those of the commercial sector, varying between a low of 1.9 t in 2012–13 and a peak of 8.5 t in 2017–18 [Lyle et al. 2019]. In comparison to other jurisdictions, total catch and effort in Tasmania appear to be low, indicating that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired. The data further indicate that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

On the basis of this evidence, Silver Trevallies in Tasmania are classified as a **sustainable stock**.

Victoria

Very large quantities of Silver Trevallies (*P. georgianus*) were landed in Bass Strait using mesh nets up until 1991, however the offshore mesh net fishery is now managed by the Commonwealth and has largely ceased. Since then, landings have been predominantly from seine nets in Gippsland Lakes and Corner Inlet-Nooramunga with a declining catch trend through time as effort with this gear has declined in both fisheries [Conron et al. 2020].

There has been high variability in Silver Trevallies CPUE from seine netting in both the Gippsland Lakes and Corner Inlet-Nooramunga. This is likely to reflect a combination of varying abundance in inshore waters as this species frequents waters offshore, and that it is mostly caught as a by-product while targeting other species. Additionally, there has been very low seine fishing effort in the Gippsland Lakes in recent years and the high catch rate in 2017–18 may not be representative of stock abundance as it is influenced by the catches of a single fisher who landed >2000 kg on multiple occasions. Nevertheless, in both Gippsland Lakes and Corner Inlet, CPUE is above the reference period (1998–2015) average indicating that there are no local signs of depletion [Conron et al. 2020].

The low Silver Trevallies catch in recent years arising from low seine netting effort in Victoria implies that fishing operations are unlikely to cause impaired recruitment under current practices. Indeed, the Gippsland Lakes commercial fishery was closed in 2020 following a licence buy-out so fishing mortality is likely to have reduced further. Given the high catch rates observed in Victorian waters during recent years and low levels of effort, it is unlikely that Silver Trevallies in Victoria are depleted or at risk of becoming

recruitment impaired [Conron et al. 2020]. The above evidence indicates that the biomass of this stock is unlikely be depleted and that recruitment is unlikely to be impaired. The above evidence also indicate that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

On the basis of the evidence provided above, Silver Trevally in Victoria is classified as a **sustainable stock**.

Western Australia

Commercial catches of Silver Trevallies (likely to be mostly *P. georgianus*) in Western Australia have remained low (2–10 t) between 2008–09 and 2018–19. Catch rates by line fisheries (the dominant method of capture) have remained low and steady at 0.3–3 kg per block day. This reflects the low level of commercial targeting of this species. Most of the catch is landed as byproduct by commercial line fisheries, including the West Coast Demersal Scalefish (Interim) Managed Fishery and open access fishing in the South Coast Bioregion (east of longitude 115°30'E), which focus effort on other demersal species, such as West Australian Dhufish and Snapper. Management regulation of effort in the former fishery limits fishing pressure and catches of Silver Trevallies (along with state-wide recreational regulations such as a minimum legal length and bag limit) [Gaughan and Santoro 2020]. The open access fishery on the south coast is undergoing review to progress it to formal management.

Recreational sector (private boat-based recreational fishers and tour operators) retained catches of Silver Trevallies in Western Australia decreased from ~32 t in 2011–12 to ~18 t in both 2013–14 and 2015–16 and to 15 t in 2017–18, with the majority taken in the West Coast Bioregion (WCB). Nearly all of the catch of Silver Trevallies (96 per cent in 2017–18) in the WCB is taken by private boat-based fishers, who primarily target demersal species like West Australian Dhufish and Snapper. Line fishing effort by private boat-based fishers in the WCB between 2013–14 and 2017–18 has remained lower than in 2011–12, and relatively steady [Ryan et al. 2019]. Demersal species are currently in recovery, after revision of management regulations between 2008 and 2010, which limit effort and thus catch of species typically caught on boats, possibly including Silver Trevallies [Fairclough et al. 2018].

A data-limited Catch-MSY model of the West Australian stock of Silver Trevallies produced an MSY of 66 t (95 per cent CLs 51–92 t) and annual catches have been below this level in almost all years since 1975–76. Although uncertain, annual estimates of B have not fallen below BMSY and indicate an increase to well above this level following a recent extended period of low catches. The estimated stock depletion in 2018 was 0.86 of the unfished level, with the lower 95 per cent CL well above the threshold value of 0.5 associated with MSY. Fishing mortality has been maintained well below the estimated FMSY of 0.29 year⁻¹ since 1975–76. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that the current level of fishing pressure is unlikely to cause the stock to become recruitment impaired.

On the basis of the evidence provided above, Silver Trevallies in Western Australia is classified as a **sustainable stock**.

BIOLOGY

Silver Trevallies biology [Rowling and Raines 2000]

Species	Longevity / Maximum Size	Maturity (50 per cent)
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SILVER TREVALLIES	13–18 years, 690–938 mm TL	190–200 mm TL
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DISTRIBUTION



Distribution of reported commercial catch of Silver Trevallies. No catch distribution data are provided for Queensland as Silver Trevallies are not distinguished from other trevally species in relevant Queensland commercial fishery logbooks.

TABLES

Fishing methods	Commonwealth	New South Wales	Queensland	South Australia	Tasmania	Victoria	Western Australia
Charter							
Hook and Line		✓		✓			
Rod and reel							✓
Commercial							
Beach Seine							✓
Danish Seine	✓						
Dropline							✓
Fish Trap		✓					
Gillnet							✓
Hand Line, Hand Reel or Powered Reels							✓
Handline				✓			
Haul Seine		✓					✓
Hook and Line		✓				✓	
Line			✓				✓

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Mesh Net		✓					
Net			✓			✓	
Otter Trawl	✓	✓					
Unspecified			✓	✓	✓		
Various		✓					
Recreational							
Beach Seine					✓		
Gillnet					✓		
Hook and Line		✓	✓	✓	✓	✓	✓
Rod and reel							✓
Spearfishing		✓					✓
Unspecified							✓

Management Methods							
	Commonwealth	New South Wales	Queensland	South Australia	Tasmania	Victoria	Western Australia
Charter							
Bag limits		✓		✓			✓
Fishing gear and method restrictions				✓			
Gear restrictions		✓					
Licence		✓		✓			✓
Limited entry				✓			
Marine park closures							✓
Passenger restrictions		✓					✓
Possession limit			✓				✓
Size limit		✓		✓			✓
Spatial closures		✓	✓				
Spatial zoning							✓
Commercial							
Fishing gear and method restrictions		✓			✓	✓	✓
Gear restrictions	✓		✓	✓			
Limited entry	✓	✓	✓	✓	✓	✓	✓
Marine park closures	✓						

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Quota	✓						
Size limit		✓		✓	✓	✓	✓
Spatial closures	✓	✓	✓			✓	✓
Spatial restrictions				✓			
Total allowable catch	✓						
Recreational							
Bag limits		✓		✓	✓	✓	✓
Fishing gear and method restrictions				✓			
Gear restrictions		✓					
Licence		✓			✓	✓	
Licence (boat-based sector)							✓
Marine park closures							✓
Possession limit		✓	✓		✓	✓	✓
Size limit		✓		✓	✓	✓	✓
Spatial closures		✓	✓			✓	

Catch	Commonwealth	New South Wales	Queensland	South Australia	Tasmania	Victoria	Western Australia
Charter				Unknown			< 1 t
Commercial	2.1623 t	40.2304 t	0.9814 t	5.39773 t	3.73942 t	21.4059 t	2.54504 t
Indigenous	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown (No catch under permit)	Unknown
Recreational	Unknown	27 t (2013–14)	~2 t	14.57 t (in 2013–14)	1.9 t (in 2012–13)	37 t (2003)	17 t (± 2 se) (in 2015–16)

Commonwealth – Commercial (Management Methods/Catch) Data provided for the Commonwealth align with the Commonwealth Southern and Eastern Scalefish and Shark Fishery for the 2018-19 financial year.

Commonwealth – Recreational The Commonwealth does not manage recreational fishing in Commonwealth waters. Recreational fishing in Commonwealth waters is managed by the state or territory immediately adjacent to those waters, under its management regulations.

Commonwealth – Indigenous The Australian government does not manage non-commercial

Indigenous fishing in Commonwealth waters, with the exception of Torres Strait. In general, non-commercial Indigenous fishing in Commonwealth waters is managed by the state or territory immediately adjacent to those waters.

Western Australia – Recreational (management methods) In Western Australia, a licence is required to recreationally fish from a powered vessel.

Western Australia – Recreational (Catch) Shore based catches are unknown, thus landings would be underestimated.

Queensland – Indigenous (management methods) for more information see <https://www.daf.qld.gov.au/business-priorities/fisheries/traditional-fishing>

New South Wales – Recreational (Catch) Murphy et al. [2020].

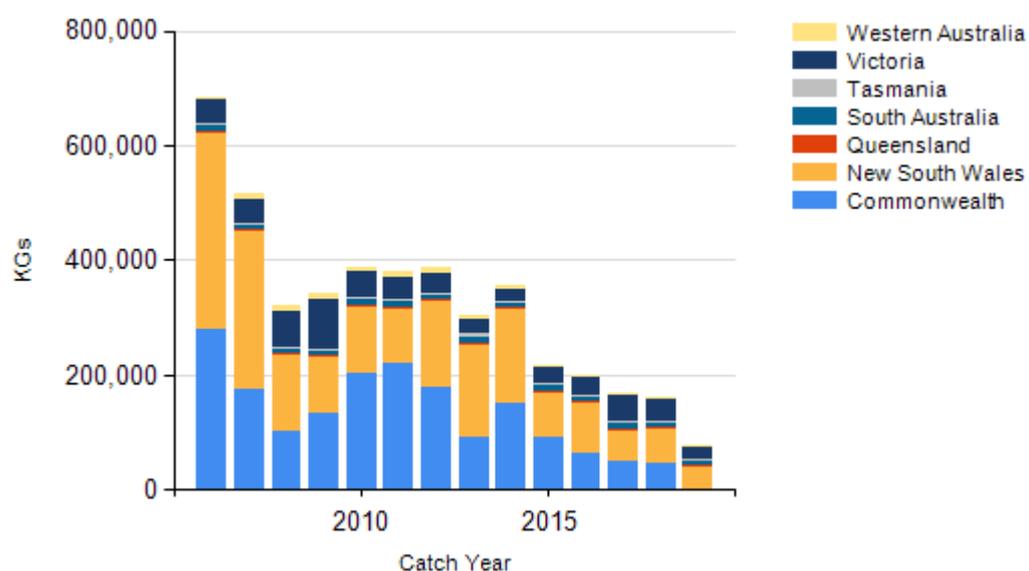
New South Wales – Indigenous <https://www.dpi.nsw.gov.au/fishing/aboriginal-fishing>

Victoria – Commercial (catch) Silver trevally (*Pseudocaranx georgianus*) is not differentiated from other trevallies caught in Victorian commercial fisheries.

Victoria – Indigenous A person who identifies as Aboriginal or Torres Strait Islander is exempt from the need to obtain a Victorian recreational fishing licence, provided they comply with all other rules that apply to recreational fishers, including rules on equipment, catch limits, size limits and restricted areas. Traditional (non-commercial) fishing activities that are carried out by members of a traditional owner group entity under an agreement pursuant to Victoria’s *Traditional Owner Settlement Act 2010* are also exempt from the need to hold a recreational fishing licence, subject to any conditions outlined in the agreement. Native title holders are also exempt from the need to obtain a recreational fishing licence under the provisions of the Commonwealth’s *Native Title Act 1993*.

Tasmania – Indigenous (management methods) In Tasmania, Indigenous persons engaged in traditional fishing activities in marine waters are exempt from holding recreational fishing licences, but must comply with all other fisheries rules as if they were licensed. If using pots, rings, set lines or gillnets, Indigenous fishers must obtain a unique identifying code (UIC). The policy document "Recognition of Aboriginal Fishing Activities" details application procedures for issuing a UIC.

CATCH CHART



Commercial catch of Silver Trevallies - note confidential catch not shown

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