

Southern Calamari (2023)

Sepioteuthis australis



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STOCK STATUS OVERVIEW

Jurisdiction	Stock	Stock status	Indicators
Commonwealth	Commonwealth	Negligible	Catch
New South Wales	New South Wales	Sustainable	Catch, effort, CPUE trends
Victoria	Victoria	Sustainable	Catch, effort, CPUE trends
Tasmania	Tasmania	Depleting	Catch, effort, CPUE trends
South Australia	South Australia	Sustainable	Catch, effort, CPUE trends

STOCK STRUCTURE

The biological structure of populations across the distributional range of Southern Calamari is complex and potentially dynamic. One study using allozyme markers identified three genetic types with overlapping distributions and possible stocks off Western Australia, South Australia, New South Wales and Tasmania (data were not available for Victoria) [Triantafillos and Adams 2001]. In contrast, another study using microsatellite markers found little genetic differentiation between seven study sites in Western Australia, Victoria, Tasmania and South Australia [Smith et al. 2015]. The same study identified Tasmania as a possibly important site for gene flow. Life history dynamics and studies of movement and statolith microchemistry in Tasmania suggest some localised population structuring [Pecl et al. 2011]. In the absence of conclusive evidence on biological stock boundaries, assessment of stock status is presented at the jurisdictional level—Commonwealth, New South Wales, Victoria, Tasmania and South Australia.

STOCK STATUS

Commonwealth Commonwealth fishers take a very small catch of Southern Calamari in the Danish-seine component of the Southern and Eastern Scalefish and Shark Fishery (Commonwealth Trawl Sector). During the past 10 years, there has been an average < 1.5 tonnes (t) per year taken. Total catch was 1.3 t in 2020–21 and 1.7 t in 2021–22. A larger quantity of squid caught in trawls and reported as Southern Calamari is probably Gould’s Squid (*Nototodarus gouldi*) and is not included here. Commonwealth catch is unlikely to be having a negative impact on the stock.

Based on the evidence provided above, Southern Calamari in Commonwealth-managed fisheries is classified as a **negligible stock**.

New South Wales In New South Wales, Southern Calamari is taken primarily as a by-product species in the commercial Ocean Trawl Fishery (OTF), particularly by the fish trawl sector off the central and southern coasts [Hall 2020]. Total commercial landings in New South Wales were consistently above 50 t per year until the mid-2000s, with a peak of 145 t in 1997–98 [Hall 2020]. There was a considerable decrease in catches in 2006–07, and since then, commercial catches have fluctuated between 25–55 t per annum. The most recent catch in 2021–22 was 27.7 t [Hall 2023].

Recreational anglers and charter boat operators in New South Wales also take significant quantities of Southern Calamari in estuaries, bays and inshore ocean waters, but often for bait rather than human consumption and at much lower levels than in southern states [Hall 2020]. The most recent estimate of the recreational harvest of Southern Calamari in NSW was approximately 30,403 squid during 2019–20 [Murphy et al. 2022]. This estimate was based on a survey of Recreational Fishing Licence (RFL) Households, comprised of at least one fisher possessing a long-term (one or three years duration) fishing licence and any other fishers resident within their household. The equivalent estimates from previous surveys in 2017–18 and 2013–14 were considerably smaller at around 15,247 and 13,087 squid harvested, respectively [Murphy et al. 2020]. The annual statewide Aboriginal harvest of Southern Calamari in New South Wales is unknown.

The reduced commercial landings in recent years have resulted from a concurrent decrease in effort in the prawn and fish trawl sectors of the OTF from 8 081 and 3,370 days fished, respectively, in 1997–98 to 252 and 749 days fished in 2021–22 [Hall 2023]. Standardised catch rates for the two sectors indicate differing historical trends, with mean monthly CPUE (catch-per-unit-effort in kg per day) for the fish trawl sector increasing by over 80% in the early 1990s to a distinct peak of 57.4 kg per day in 1998, followed by a rapid decline by over 50% until 2002. Since then, catch rates have been more stable and were above average levels (7 kg per hour trawled) over the last three years [Hall 2023]. Historical catch rates in the prawn trawl sector decreased by over 80% in the early 1990s and continued to trend downwards until 2013–14. Since, then, catch rates have improved slightly and were above average levels (0.4 kg per hour trawled) over the last three years [Hall 2023]. This sector has always reported lower catches and catch rates, because fishing occurs in the northern extremity of the species' distribution. Populations and catches in northern New South Wales are most likely to be impacted by any southwards range shift in response to climate change [Pecl and Jackson 2008].

Collectively, the above evidence indicates that the biomass is unlikely to be depleted and that recruitment is unlikely to be impaired. Furthermore, the

current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

On the basis of the evidence provided above, Southern Calamari in New South Wales is classified as a **sustainable stock**.

South Australia

Southern Calamari is considered a primary species within South Australia's commercial multispecies, multi-gear and multi-sectoral Marine Scalefish Fishery (MSF). The most recent assessment of Southern Calamari was completed in 2023 and used data to the end of June 2022 [Smart et al. 2023]. The primary measure for biomass and fishing mortality is targeted catch-per-unit-effort (CPUE) from jig and hauling-net fishers [Smart et al. 2023]. The total reported commercial catch of Southern Calamari in 2021–22, combined across all fisheries (including catch by prawn fisheries), was 322 t and has remained relatively stable (>300 t) for more than two decades. The total catch in the MSF was 278 t during 2021–22. The combined catch of the three regional prawn fisheries accounted for 44.2 t in 2021–22. Commercial targeted CPUE in the MSF has remained relatively high in both the jig and the hauling net sectors of the fishery, exceeding 15 and 30 kg per fisher day, respectively [Smart et al. 2023]. The recreational catch of Southern Calamari in South Australia continues to exceed that of other states, at an estimated 219 t in 2021–22 [Beckmann et al. 2023]. 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 provided above, Southern Calamari in South Australia is classified as a **sustainable stock**.

Tasmania

The commercial fishery for Southern Calamari in Tasmania initially developed in the mid-1990s. Annual catches rose to around 100 t between 1998–99 and 2004–05. Total commercial catches then decreased to less than 60 t in 2009–10 before increasing again to peak levels > 110 t in 2016–17. In 2021–22, the total commercial catch amounted to 86.3 t. Overall similar trends were evident for total effort, and, thus, total CPUE was fairly stable from 2000–01 onwards [Sharples et al. 2023]. Estimates of recreational catches of Southern Calamari indicate a consistently increasing interest by this sector, peaking with an estimated catch of 64 t in 2012–13 [Lyle et al. 2019]. The latest estimate from 2017–18 revealed recreational catch was reduced by about 50% (31 t) - similar to commercial catches in that season.

Substantial regional variation is apparent in commercial catch and effort trends over the duration of the time series, which challenges inference of stock status from trends in total catches described above. During initial fishery development, catch and effort were highest on the east and southeast coasts. Subsequent declines in catch and effort in these regions triggered management interventions, including the introduction of a species-specific licence and seasonal closures of key spawning grounds. Catches, effort and catch rates in the State's south-east have been relatively stable at substantially reduced levels since then, averaging around 20–30 t since 2006–07 [Krueck et al. 2020]. Concurrently, since the late 2000s, commercial landings of Southern Calamari off the State's north coast have increased from around 15 t prior to 2007 to > 80 t in 2016–17 [Moore et al. 2019]. These catch increases were accompanied by increased levels of both fishing effort (vessel days) and catch rates. With no clear indication that fishing mortality was excessive, the stock was considered

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sustainable [Moore et al. 2019]. However, data for 2017–18 revealed a sharp decline in both north coast catches and catch rates, leading to a revised classification of the stock as depleting [Moore et al. 2019]. These sharp declines initiated fishery-independent egg surveys on the north coast from late 2017, with numbers of eggs per month during the spawning season showing significant correlations to commercial catch [Ewing et al 2020]. Thus, limited spawning activity on north coast fishing grounds and a low associated abundance of spawning adults might have caused the drop in commercial catch and catch rates during the 2017–18 season. Even if local environmental factors are likely to play a role, the drivers of substantial variation in spawning activity on the north coast remain unclear [Ewing et al. 2020], providing reason for caution against further depleting the stock even if catches and effort had increased again in 2018–19 [Krueck et al. 2020]. To address concerns about north coast populations, extended temporal closures have been introduced (August–October). However, even these extended temporal closures do not fully cover the known range of the Southern Calamari spawning season [Ewing et al. 2020]. In response to continuing concerns expressed by fishery stakeholders about the status of stocks, further management intervention is being considered, including (1) options to reduce participation and/or (2) further adjusting the temporal closure.

In addition to the trends and concerns described above, estimates of maximum sustainable yield (MSY) based on the 'CMSY' approach after Froese et al. [2017, 2021] indicate that peak catches of Southern Calamari notably exceeded maximum sustainable levels in all key fishing areas in the south-east coast region, while in the north coast regions catches have started fluctuating around maximum sustainable levels over the last six to seven years [Sharples et al. 2023].

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

On the basis of the evidence presented above, Southern Calamari in Tasmania is classified as a **depleting stock**.

Victoria

Catches of Southern Calamari in Victoria are almost entirely taken by seine nets with landings averaging around 45 t state-wide during the past five years and being 47 t in 2021–22. Prior to the 1990s squid jig was also important, but effort by squid jig has virtually ceased. There has been a decline in seine effort in all bays and inlets with Corner Inlet (CI) now accounting for most of the commercial catch and seine effort following the closure of the Western Port (WP) commercial fishery in 2009 and the Port Phillip Bay (PPB) commercial net fishery in 2022 [Bell et al. 2023]. As a result, state-wide commercial landings have declined by over 60% from a peak period during the early 2000s [Bell et al. 2023]. Southern Calamari are targeted by recreational fishers in bays and inlets, and coastal waters, throughout the state, although there is no current information on landings.

Catch rates by commercial seine nets in Corner Inlet have been around, or above, historic highs since 2017–18 in CI [Bell et al. 2023]. Recreational catch rates from creel surveys have been relatively consistent since 2004, though these declined in 2020–21 before returning to around average in 2021–22 [Bell et al. 2023].

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Given that Southern Calamari only live for a maximum of one year, the available stock within any given year is reflective of annual spawning success, and inter-annual changes in catch rate likely reflect this aspect of their population biology.

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

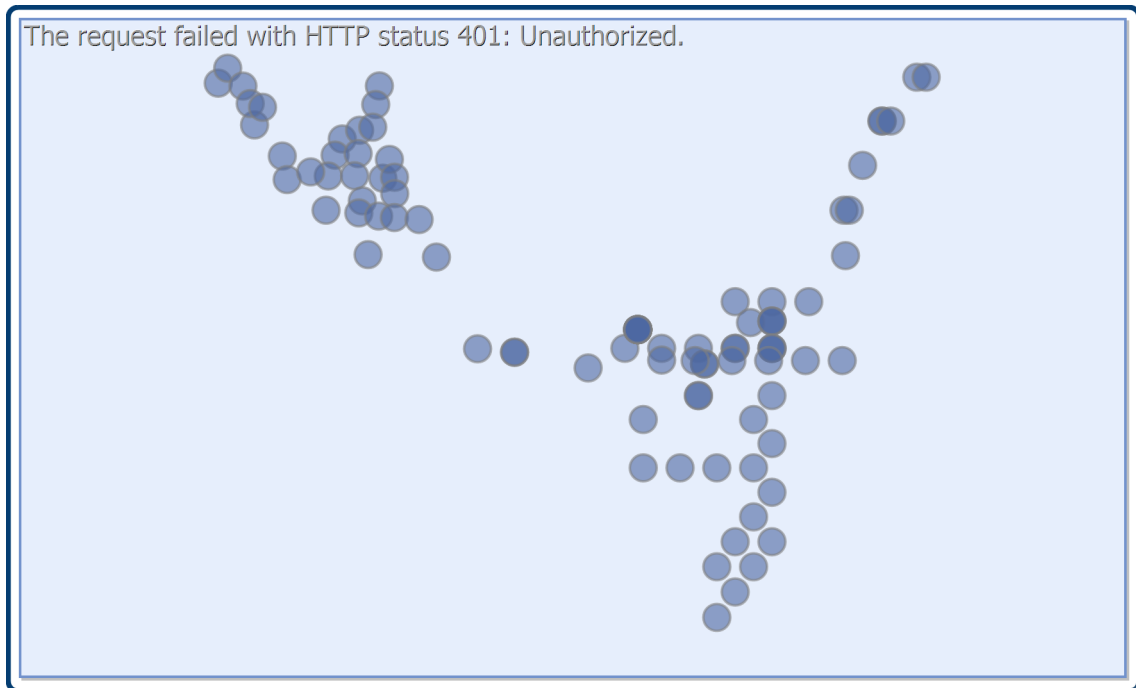
On the basis of the evidence provided above, Southern Calamari in Victoria is classified as a **sustainable stock**.

BIOLOGY

Southern Calamari biology [Pecl 2001; Pecl et al. 2004; Triantafillos 2004]

Species	Longevity / Maximum Size	Maturity (50 per cent)
Southern Calamari	< 1 year, 550 mm ML, 3–4 kg	3–6 months; 150–200 mm ML

DISTRIBUTION



Distribution of reported commercial catch of Southern Calamari

TABLES

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Fishing methods					
	Commonweal th	New South Wales	South Australia	Tasmania	Victoria
Charter					
Handline		✓			
Hook and Line		✓			✓
Commercial					
Danish Seine	✓	✓			
Hand Line, Hand Reel or Powered Reels				✓	
Haul Seine				✓	
Hook and Line					✓
Net					✓
Otter Trawl		✓			
Seine Nets			✓		
Squid Jigging			✓	✓	
Unspecified			✓	✓	
Various		✓			
Recreational					
Diving					✓
Hand held-Implements					✓
Handline		✓			
Hook and Line		✓			✓
Spearfishing				✓	
Squid Jigging			✓	✓	

Management Methods					
	Commonweal th	New South Wales	South Australia	Tasmania	Victoria
Charter					
Bag limits		✓			✓
Gear restrictions		✓			✓
Licence					✓

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Spatial closures		✓			✓
Commercial					
Effort limits					✓
Gear restrictions	✓	✓	✓		✓
Licence					✓
Limited entry	✓	✓	✓	✓	✓
Spatial closures		✓	✓	✓	✓
Temporal closures (spawning season)				✓	
Vessel restrictions		✓			
Recreational					
Bag and possession limits				✓	✓
Bag limits		✓	✓	✓	✓
Gear restrictions		✓	✓		✓
Licence					✓
Spatial closures		✓			✓
Temporal closures (spawning season)				✓	

Catch					
	Commonwealth	New South Wales	South Australia	Tasmania	Victoria
Charter		712 squid (2021–22)			
Commercial	1.748 t	27.6565 t	278.304 t	86.2942 t	36.8218 t
Indigenous		Unknown	Unknown	Unknown	Unknown (No catch under permit)
Recreational		30 403 squid (2019–20)	219 t (2021–22)	31 t (2017–18)	Unknown

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

Commonwealth – Indigenous. The Australian government does not manage non-commercial Indigenous fishing (with the exception of the Torres Strait). In general, non-commercial Indigenous fishing in Commonwealth waters is managed by the states or territory immediately adjacent to those waters. In the Torres Strait both commercial and non-commercial Indigenous fishing is managed by the Torres Strait Protected Zone Joint Authority (PZJA) through the Australian Fisheries Management Authority (Commonwealth), Department of Agriculture Fisheries and Forestry (Queensland) and the Torres Strait Regional Authority. The PZJA also manages non-Indigenous commercial fishing in the Torres Strait.

Commonwealth – Commercial (Management Methods/Catch). Data provided for the Commonwealth align with the Commonwealth Southern and Eastern Scalefish and Shark Fishery for the 2021–22 financial year.

New South Wales – Commercial (Catch). Data are provided in financial years.

New South Wales – Recreational (Catch). Estimate from Murphy et al. [2020, 2022], based on a survey of Recreational Fishing Licence households. Note, estimates for Southern Calamari are highly uncertain, with a relative standard error of greater than 30% and based on survey data from fewer than 20 households.

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

Victoria – Indigenous (Management Methods). 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*.

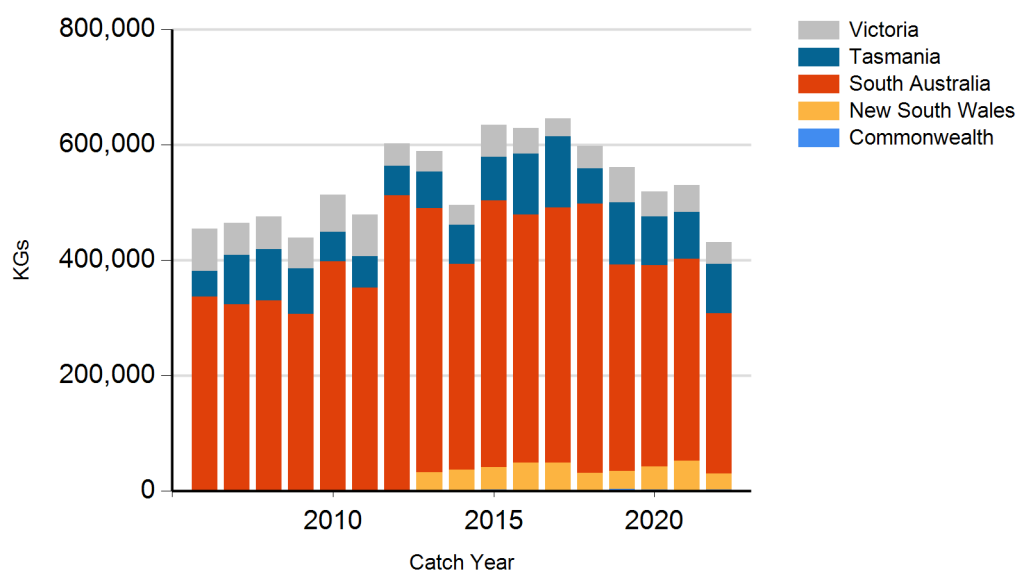
Tasmania – Commercial (Catch). Catches reported for the Tasmanian Scalefish Fishery are for the period 1 July to 30 June the following year. The most recent (complete) assessment available is for 2021–22.

Tasmania – Recreational (Management Methods). In Tasmania, a recreational licence is required for fishers using dropline or longline gear, along with nets, such as gillnet or beach seine. A bag limit of 10 individuals and a possession limit of 20 individuals is in place for recreational fishers.

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. For details, see the policy document 'Recognition of Aboriginal Fishing Activities' (<https://fishing.tas.gov.au/Documents/Policy%20for%20Aboriginal%20tags%20and%20alloting%20an%20UIC.pdf>).

CATCH CHART

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Commercial catch of Southern Calamari - note confidential catch not shown

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