

Southern Calamari (2016)

Sepioteuthis australis



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STOCK STATUS OVERVIEW

Jurisdiction	Stock	Fisheries	Stock status	Indicators
Commonwealth	Commonwealth	SESSF (CTS)	Undefined	Catch
New South Wales	New South Wales	EGF, OTF, OTLF	Sustainable	Catch, effort, <u>CPUE</u> trends
Victoria	Victoria	CIF, ITF, PPBF	Sustainable	Catch, effort, <u>CPUE</u> trends
Tasmania	Tasmania	SF	Sustainable	Catch, effort, <u>CPUE</u> trends
South Australia	South Australia	MSF, NZRLF, SAPF, SZRLF	Sustainable	Catch, effort, <u>CPUE</u> trends

SESSF (CTS) Southern and Eastern Scalefish and Shark Fishery (Commonwealth Trawl Sector) (CTH), EGF Estuary General Fishery (NSW), OTF Ocean Trawl Fishery (NSW), OTLF Ocean Trap and Line (NSW), MSF Marine Scalefish Fishery (SA), NZRLF Northern Zone Rock Lobster Fishery (SA), SAPF South Australian Prawn Fishery (SA), SZRLF Southern Zone Rock Lobster Fishery (SA), SF Scalefish Fishery (TAS), CIF Corner Inlet Fishery (VIC), PPBF Port Phillip Bay Fishery (VIC), ITF Inshore Trawl Fishery (VIC)

STOCK STRUCTURE

The biological stock structure 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 are not available for Victoria)[1,2]. In contrast, another study using microsatellite markers found little genetic differentiation between seven study sites in Western Australia, South Australia, Victoria and Tasmania[3]. It also identified Tasmania as a possible important site for gene flow. Life history dynamics, and studies of movement and statolith microchemistry in Tasmania also suggest some localised biological stock structuring[4].

In the absence of conclusive evidence on biological stock boundaries, here 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 small catch of Southern Calamari in the Danish-seine component of the Southern and Eastern Scalefish and Shark Fishery (Commonwealth Trawl Sector). This undoubtedly comprises individuals from biological stocks that spawn, and spend the majority of their lives, in shallower state waters. 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. There is insufficient information available to confidently classify the status of this stock.

On the basis of the evidence provided above, Southern Calamari in the Commonwealth is classified as an **undefined stock**.

New South Wales In New South Wales, Southern Calamari is taken primarily as byproduct in the commercial Ocean Trawl Fishery, particularly off the central and southern coasts. Commercial landings in New South Wales were consistently above 50 t per annum until the mid-2000s, with a distinct peak of more than 100 tonnes (t) in the late-1990s[5]. For the past 8 years, catches have been relatively stable around a lower average of around 30 t per annum. These lower landings have resulted from a concurrent decrease in effort in the fishery. Nominal catch rates have been consistent over many years, with recent averages greater than historical rates[5]. 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 consumption and at much lower levels than in the southern states[6]. The above evidence indicates that the biomass is unlikely to be recruitment overfished and the level of fishing pressure is unlikely to cause the stock to become recruitment overfished.

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

South Australia The most recent stock assessment for Southern Calamari[12] in South Australia considered that the resource was being harvested within sustainable limits. Since this assessment, the state-wide commercial catch of Calamari has remained relatively high, consistently exceeding 350 t over the past 7 years. The recreational catch of Southern Calamari in South Australia continues to exceed that of other states, at an estimated 155 t in 2013–14[13]. Catch rates have remained relatively high in both the jig and the hauling net sectors of the fishery[13], indicating that the biomass is unlikely to be recruitment overfished and the level of fishing pressure is unlikely to cause the stock to become recruitment overfished.

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

Tasmania In Tasmania, the fishery for Southern Calamari developed rapidly in the mid-1990s, with landings peaking at around 100 t between 1997–98 and 2003–04. Management interventions, such as seasonal closures on some key spawning grounds and the introduction of species specific licences in the south-east resulted in fishing effort spreading to other areas of the state and a decrease in targeting of the species. Since 2009–10 however, landings have steadily increased off the north coast such that current landings from this area (40 t in 2014–15) now exceed those combined from the east and south-east (28 t in 2014–15)[10]. These catches have been accompanied by

increased levels of fishing effort, which rose sharply in 2014–15 to a historic high in the north of the state[10]. Recreational catches (last estimated at 65 t in 2012–13)[11]have also increased state-wide since 2000, and in particular off the north coast and are currently likely to be at a level equivalent to the commercial catch. Despite recent increases in fishing effort, particularly for squid-jig fishing, catch rates in the northern areas have continued to rise, while remaining stable in southern areas of the state[10]. While Southern Calamari may be vulnerable to intensive fishing pressure, the above evidence indicates that the biomass is unlikely to be recruitment overfished and the level of fishing pressure is unlikely to cause the stock to become recruitment overfished.

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

Victoria

Approximately 50 t of southern Calamari was commercially harvested in Victoria in 2015. Catch was predominantly taken from the Port Phillip Bay (45 per cent of total catch) and Corner Inlet fisheries (53 per cent). Haul seines were mainly used to catch Southern Calamari in the Corner Inlet Fishery (CIF) where catch rates displayed a long-term increasing trend since 1978–79, with a notable increase from 1997–98[7]. Annual catch rates since 1997–98 have been highly variable, reflecting their population and biological characteristics (short-lived, fast growth, rapid turnover). Catch rates in the CIF increased in 2014–15, and after a lower period from 2010–11 to 2013–14, were well above the long-term average[7]. Although recent catch rate information for the Port Phillip Bay Fishery is not available, the 2008 stock assessment suggested that there was no need to change existing management arrangements[8]. Despite the 5 year moving average catch rate declining in the past 5 years (2011–15), it remains above the long-term average. In recent years, recreational effort has increased in Port Phillip Bay; however, the impact on the total catch is unknown[9]. The above evidence indicates that the biomass is unlikely to be recruitment overfished and the level of fishing pressure is unlikely to cause the stock to become recruitment overfished.

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

BIOLOGY

Southern Calamari biology[1,14,15]

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

DISTRIBUTION



Distribution of reported commercial catch of Southern Calamari

TABLES

Commercial Catch Methods	Commonwealth	New South Wales	South Australia	Tasmania	Victoria
Coastal, Estuary and River Set Nets				✓	✓
Dab Net			✓	✓	
Danish Seine	✓				
Gillnet				✓	
Hand Line, Hand Reel or Powered Reels				✓	
Haul Seine			✓	✓	✓
Line					✓
Mesh Net					✓
Otter Trawl		✓	✓		✓
Squid Jigging			✓	✓	✓
Various		✓	✓	✓	✓

Fishing methods	Commonwealth	New South Wales	South Australia	Tasmania	Victoria
Commercial					
Dab Net			✓	✓	
Danish Seine	✓				
Gillnet				✓	

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Hand Line, Hand Reel or Powered Reels				✓	
Haul Seine			✓	✓	✓
Line					✓
Mesh Net					✓
Otter Trawl		✓	✓		✓
Squid Jigging			✓	✓	✓
Various		✓	✓	✓	
Indigenous					
Spearfishing				✓	
Squid Jigging		✓	✓	✓	
Unspecified					✓
Recreational					
Spearfishing				✓	✓
Squid Jigging		✓	✓	✓	✓
Management Methods					
	Commonwealth	New South Wales	South Australia	Tasmania	Victoria
Commercial					
Catch limits				✓	
Effort limits	✓				✓
Gear restrictions	✓	✓	✓	✓	✓
Limited entry	✓	✓	✓	✓	✓
Spatial closures		✓	✓	✓	✓
Temporal closures (spawning season)				✓	
Vessel restrictions		✓			
Indigenous					
Bag limits		✓	✓	✓	✓
Section 31 (1)(c1), Aboriginal cultural fishing authority		✓			
Spatial closures		✓			✓
Temporal				✓	✓

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closures (spawning season)					
Recreational					
Bag limits		✓	✓	✓	✓
Spatial closures		✓			✓
Temporal closures (spawning season)				✓	

Active Vessels	Commonwealth	New South Wales	South Australia	Tasmania	Victoria
	12 Vessel in SESSF (CTS),	11 License in EGF, 47 License in OTF, 7 License in OTLF,	222 license in MSF, 216 Vessel in MSF, 6 Vessel in SASRLF, 46 Vessel in SAPF,	61 Vessel in SF,	16 Fisher in CIF, 6 Fisher in ITF, 25 Fisher in PPBF,

SESSF (CTS) Southern and Eastern Scalefish and Shark Fishery (Commonwealth Trawl Sector)(CTH)

EGF Estuary General Fishery(NSW)

OTF Ocean Trawl Fishery(NSW)

OTLF Ocean Trap and Line(NSW)

MSF Marine Scalefish Fishery(SA)

SAPF South Australian Prawn Fishery(SA)

SASRLF South Australian Southern Rock Lobster Fishery(SA)

SF Scalefish Fishery(TAS)

CIF Corner Inlet Fishery(VIC)

PPBF Port Phillip Bay Fishery(VIC)

ITF Inshore Trawl Fishery(VIC)

Catch	Commonwealth	New South Wales	South Australia	Tasmania	Victoria
Commercial	1.692t in SESSF (CTS),	0.391t in EGF, 38.0495t in OTF, 0.1944t in OTLF,	370.493t in MSF, 22.5554t in SAPF,	104.107t in SF,	22.817t in CIF, 0.638t in ITF, 26.668t in PPBF,
Indigenous		Unknown	Unknown	Unknown	Unknown
Recreational		6 500 squid (2013–14)	155 t (2013–14)	65 t (2012–13)	Unknown

SESSF (CTS) Southern and Eastern Scalefish and Shark Fishery (Commonwealth Trawl Sector) (CTH), EGF Estuary General Fishery (NSW), OTF Ocean Trawl Fishery (NSW), OTLF Ocean Trap and Line (NSW), MSF Marine Scalefish Fishery (SA), NZRLF Northern Zone Rock Lobster Fishery (SA), SAPF South Australian Prawn Fishery (SA), SZRLF Southern Zone Rock Lobster Fishery (SA), SF Scalefish Fishery (TAS), CIF Corner Inlet Fishery (VIC), PPBF Port Phillip Bay Fishery (VIC), ITF Inshore Trawl Fishery (VIC),

a Commonwealth – Recreational The Commonwealth 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.

b Commonwealth – Indigenous The Commonwealth 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.

c Victoria – Indigenous In Victoria, regulations for managing recreational fishing are also applied to fishing activities by Indigenous people. Recognised Traditional Owners (groups that hold native title or have agreements under the Traditional Owner Settlement Act 2010 [Vic]) are exempt (subject to conditions) from the requirement to hold a recreational fishing licence, and can apply for permits under the Fisheries Act 1995 (Vic) that authorise customary fishing (for example, different catch and size limits or equipment). The Indigenous category in Table 3 refers to customary fishing undertaken by recognised Traditional Owners. In 2015, there were no applications for customary fishing permits to access Southern Calamari.

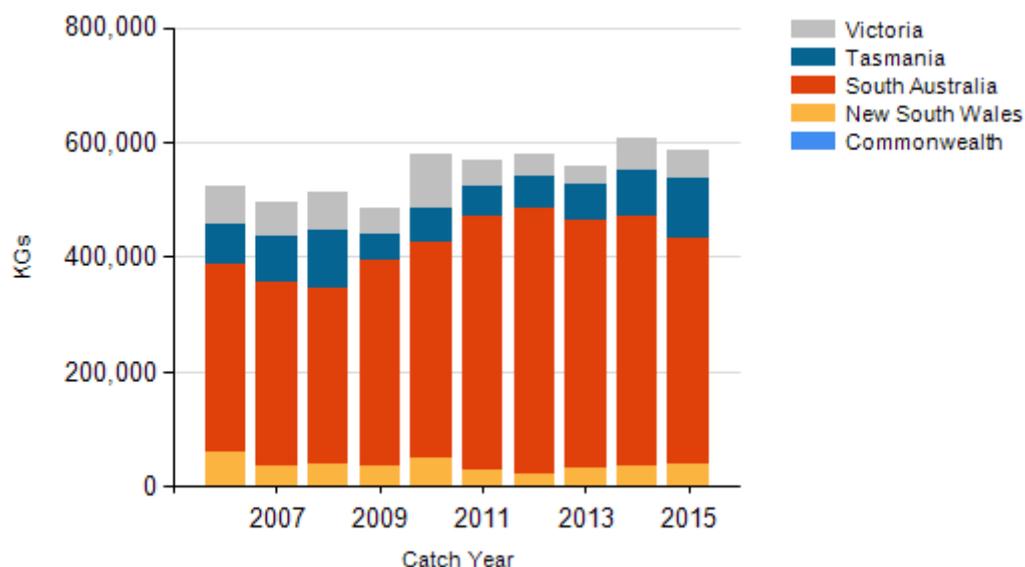
d New South Wales – Indigenous Aboriginal Cultural Fishing Interim Access Arrangement, allows an Indigenous fisher in New South Wales to take in excess of a recreational bag limit in certain circumstances, for example, if they are doing so to provide fish to other community members who cannot harvest themselves.

e New South Wales – Indigenous Aboriginal cultural fishing authority - the authority that Indigenous persons can apply to take catches outside the recreational limits under the Fisheries Management Act 1994 (NSW), Section 37 (1)(c1), Aboriginal cultural fishing authority.

f Tasmania – Indigenous (management methods) In Tasmania, aborigines engaged in aboriginal 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. Additionally, recreational bag and possession limits also apply. If using pots, rings, set lines or gillnets, aborigines must obtain a unique identifying code (UIC). The policy document Recognition of Aboriginal Fishing Activities for issuing a Unique Identifying Code (UIC) to a person for Aboriginal Fishing activity explains the steps to take in making an application for a UIC.

g Victoria – Indigenous (management methods) Subject to the defence that applies under Section 211 of the Native Title Act 1993 (Cth), and the exemption from a requirement to hold a Victorian recreational fishing licence, the non-commercial take by indigenous fishers is covered by the same arrangements as that for recreational fishing.

CATCH CHART



Commercial catch of Southern Calamari - note confidential catch not shown

EFFECTS OF FISHING ON THE MARINE ENVIRONMENT

- Beach seine/haul netting takes place over inshore seagrass habitats but has been shown to have negligible impact on seagrass or benthic invertebrate assemblages[16]. Jigs have little bycatch and do not negatively affect the environment.
- The Ocean Trawl Fishery (New South Wales) (OTF) mandates otter trawl nets must be fitted with a bycatch reduction device of an approved design to reduce the bycatch of small prawns and juvenile fish. Mesh size and gear restrictions are regulated to increase the target species selectivity of otter trawl and Danish-seine nets and codends.
- The effects of trawl fishing on the marine environment are assessed through an environmental risk assessment and risk management framework and mitigated through spatial closures, and the implementation of bycatch and discard work plans[17,18] in the Commonwealth Trawl Sector.
- Trawling, used in the Commonwealth Trawl Sector and the OTF, has potential for interactions with threatened, endangered and protected species. These fisheries have in place bycatch and discarding work plans[17,18] or bycatch catch triggers to reduce these interactions and environmental impacts.
- Interactions also occur with animals protected under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth), including marine mammals (dolphins, seals and sea lions), seabirds, some shark species and seahorses and pipefish (syngnathids). Spiny Pipehorse can be taken as incidental bycatch in dredges, trawls, seines and crayfish pots[19]. An ecological risk assessment (ERA) into the effects of fishing from the Danish seine sub-fishery of the Southern and Eastern Scalefish and Shark Fishery (Commonwealth Trawl Sector) indicated that the Spiny Pipehorse was at low risk because the fishery overlaps with only a small portion of the range of this species[20]. An ERA into the effects of fishing from the Otter trawl sub-fishery of the Southern and Eastern Scalefish and Shark Fishery (Commonwealth Trawl Sector) (SESSF [CTS]) considers the Spiny Pipehorse to be high risk because of high exposure to fishing (high proportion of range within the fishery, live in habitats that are likely to encounter the gear, and are the right size to be selected by the fishery)[21].
- Interactions with protected species are reported quarterly by the Australian Fisheries Management Authority (AFMA)[22] and on-board observer programs are used to validate the reporting in commercial logbooks.
- There is bycatch in the fish trawl sector. In 2006, mandatory requirements for otter trawls to use 90 mm square-mesh codend panels were introduced in an effort to reduce the bycatch of small species and juvenile fish[23].
- In 2007, the South East Trawl Fishing Industry Association released an industry code of practice that aims to minimise interactions with fur seals, as well as addressing the environmental impacts of the fishery more generally[24]. Operators have developed other mitigation protocols that have further reduced seal mortalities, including using breakaway ties that keep the net closed until it is below depths that seals regularly inhabit, adopting techniques to close the trawl opening during recovery to minimise opportunities for seals to enter the net, switching off gantry lights that are not required during night trawling to avoid attracting bait species and seals, and dumping offal only when the boat is not engaged in deploying or hauling gear[24].
- The AFMA mandated individual vessel seabird management plans[25]. The seabird action plans are used in the SESSF (CTS) to mitigate the impacts of trawling on seabirds. From 1 May 2017, all vessels in the SESSF (CTS) and Southern and Eastern Scalefish and Shark Fishery (Great Australian Bight Trawl Sector) fisheries must use one of the following mitigation devices: sprayers; bird bafflers; or pinkies with zero discharge fish waste[26].
- In 2012–13, an environmental risk assessment of the Scalefish Fishery (Tasmania) considered the risks to bycatch, threatened endangered and protected species and habitats from fishing for Southern Calamari using squid jigs as negligible. Changes to the ecosystem and community structure from fishing for Southern Calamari using squid jigs was considered a low risk as opposed to negligible, as they are an important predator and their removal could lead to negative effects on the ecosystem and community structure. Given that catch rates have been stable or increasing, it is

unlikely that fishing has reduced abundances to levels that would affect the ecosystem and community structure[27].

ENVIRONMENTAL EFFECTS on Southern Calamari

- Southern Calamari has highly variable life history characteristics including, variable growth rates, size and age at maturity and maximum size. The influence of environmental factors on survival, size-at-age and reproductive investment is complex and varies considerably from year to year[15]; the factors responsible remain poorly understood.
- Southern Calamari productivity and distribution is strongly influenced by environmental factors, such as temperature. Even a small increase in temperature greatly accelerates growth[1,28], which can impact reproduction and recruitment[29]. Studies on cephalopods throughout the world have shown that populations can proliferate in a warming environment combined with the removal of predators[30].
- Spawning occurs in shallow inshore waters, with egg mass deposits attached to seagrass, macro-algae and reef substrates[9,29]. Environmental pressures on these habitats include the effects of coastal development, marine pollution, ocean warming and changing weather patterns[31]. These pressures have the potential to influence the timing and location of spawning activities and success. It is also likely that seasonal environmental changes (such as changes in water temperature over preferred spawning areas) have an effect on annual spawning and recruitment success, contributing to the high interannual variability in biomass of this species[28].

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