Southern Calamari (2020)

Sepioteuthis australis

Nils Krueck: Institute for Marine and Antarctic Studies, University of Tasmania, **Karina Hall**: NSW Department of Primary Industry, **Victorian Fisheries Authority**: Victorian Fisheries Authority, **Rocio Noriega4**: Australian Bureau of Agricultural and Resource Economics and Sciences, **Rocio Noriega**: Australian Bureau of Agricultural and Resource Economics and Sciences, **Michael Drew**: SARDI Aquatic Sciences, South Australia

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 < 2 tonnes (t) per year taken. Total catch was 1 t in 2017–18 and 3

t in 2018–19. 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. Fishing 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 byproduct species in the commercial Ocean Trawl Fishery (OTF), particularly by the fish trawl sector off the central and southern coasts [Hall 2015]. Total commercial landings in New South Wales were consistently above 50 t per annum until the mid-2000s, with a peak of 145 t in 1997–98 [Hall 2018]. There was a considerable decrease in catches in 2006–07, and for the past 13 years, commercial catches have been lower at around 30–50 t per annum [Hall 2020].

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 southern states [Hall 2018]. The most recent estimate of the recreational harvest of Southern Calamari in NSW was approximately 15 247 squid or around 8.5 t during 2017–18 [Murphy et al. 2020]. This estimate was based on a survey of Recreational Fishing Licence (RFL) Households, comprised of at least one fisher possessing a long-term (1 or 3 years duration) fishing licence and any other fishers resident within their household. The equivalent estimated recreational harvest in 2013–14 was 14 per cent smaller at around 13 087 squid [Murphy et al. 2020]. A survey of Aboriginal cultural fishing in the Tweed River catchment identified squid as a common component of marine invertebrate catches [Schnierer and Egan 2016]; however, 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 8 116 and 3 402 days fished, respectively, in 1997–98 to 995 and 1 045 days fished in 2018–19 [Hall 2020]. 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 per cent in the early 1990s to a distinct peak of 57.4 kg per day in 1998, followed by a rapid decline by over 50 per cent until 2002. Since then catch rates have been more stable above or near the long-term average of 26.6 kg per day [Hall 2020]. Catch rates in the prawn trawl sector show an opposing historical trend, with monthly CPUE decreasing by over 80 per cent in the early 1990s and remaining below the long-term average since. 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].

While there is possible localised depletion in northern New South Wales, which should be investigated further, 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 2020 and used data to the end of December 2018 [Steer et al. 2020]. The primary measure for biomass and fishing mortality is targeted catch-per-unit-

effort (CPUE) from jig and hauling-net fishers [Steer et al. 2020]. The total reported commercial catch of Southern Calamari in 2018, combined across all fisheries (including catch by prawn fisheries), was 412 t and has remained relatively stable (> 350 t) over the last six years. The total catch in the MSF was 322 t during 2018–19. The combined catch of the three regional prawn fisheries accounted for 35.5 t in 2018–19. The average by-product caught in the three South Australian prawn trawl fisheries was approximately 40 t per year. 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 20 kg per fisherday[-1], respectively [Steer et al. 2020]. Declines in CPUE of up to 18 per cent over the past three to five years in Spencer Gulf indicate regional depletion maybe evident within the South Australian stock. The recreational catch of Southern Calamari in South Australia continues to exceed that of other states, at an estimated 155 t in 2013–14 [Giri and Hall 2015]. 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 in the State's south-east. Annual catches rose to around 100 t between 1998–99 and 2004–05. Management interventions, such as the introduction of a species-specific licence and seasonal closures on key spawning grounds, were put in place due to declines in both catch and catch rates. Since these interventions, catches, effort and catch rates in the State's south-east have generally been stable, with average annual catches of around 20–30 t reported from this region since 2006–07 [Krueck et al. 2020].

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 [Krueck et al. 2020]. These catches have been 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 sustainable [Moore et al. 2018]. However, data for 2017–18 indicated a substantial decline in both north coast catches and catch rates, leading to a revised classification of the stock as depleting [Moore et al. 2019]. In 2018–19, both the total commercial catch (107 t) and catch rates increased back to levels comparable to peak conditions in the 2015–16 and 2016–17 seasons [Krueck et al 2020].

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]. In 2017–18, recreational catch was reduced by about 50 per cent (31 t)—similar to commercial catches in that season.

Sharp declines in catches and catch rates on the North coast initiated fishery-independent egg surveys from late 2017, with numbers of eggs per month during the spawning season showing significant correlations to total commercial catch [Ewing et al 2020]. Thus, limited spawning activity on north coast fishing grounds and a low associated abundance of spawning adults appear to have caused the sharp drop in commercial catch and catch rates during the 2017–18 season. Even if local environmental factors may 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. To address this concern, temporal closures have been introduced on both the east cost (mid-October to mid-November) and then on the north coast (October), where effort has increased most intensively over the last few seasons. However, temporal closures do not cover the known range of the Southern Calamari spawning season, during which peak fishing activity occurs [Ewing et al. 2020]. In response to this situation and recent concerns expressed

by fishery stakeholders about the status of stocks under increasing fishing effort, management is currently considering options to reduce participation.

In addition to the trends and concerns described above, estimates of maximum sustainable yield (MSY) based on the "Catch-MSY" approach after Haddon and Punt [2018] indicate that recent catches of Southern Calamari exceed sustainable limits of 75 t (95 per cent CI = 64–84 t) across state waters and 33 t (95 per cent CI = 23–48 t) on the North coast [Moore et al 2018]. 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 also indicates that the current level of fishing mortality is likely to cause the stock to become recruitment impaired.

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

Victoria

Catches of calamari are almost entirely taken by haul seine net and have averaged 47 t statewide during the past 5 years [VFA 2019]. Prior to the 1990s squid jig was also important, but effort by squid jig has virtually ceased [Conron et al. 2020]. 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 after cessation of the Western Port (WP) commercial fishery and with the imminent closure of the Port Phillip Bay (PPB) commercial net fishery in 2022 Conron et al. 2020]. State-wide commercial catches have declined by over 60 per cent from a peak period during the early 2000s because of progressive buyouts of commercial licences, implemented to improve recreational fishing access by hook and line methods, rather than decline in stock biomass [Conron et al. 2020].

CPUE of commercial seines has remained above the average for the period from 1979–2015 for the last 3–4 years in both CI and PPB [Conron et al. 2020]. Recreational CPUE from creel surveys has generally been between the average and minimum for the same reference period since 2006, with the 2007 CPUE marginally above the average [Conron et al. 2020]. In recent years, recreational effort has increased in PPB; however, the impact on the total catch is unknown [Green 2015]. 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. There is no evidence to suggest recruitment impairment and in the context of their biology and the relatively low level of fishing pressure the stock is expected to remain sustainable into the future.

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

Fishing methods					
	Commonwealth	New South Wales	South Australia	Tasmania	Victoria
Charter					
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			✓	✓	
Trawl		✓			
Unspecified			✓	✓	
Recreational					
Diving					✓
Hand held-Implements					✓
Hook and Line		✓			✓
Spearfishing				✓	

Squid Jigging			✓	✓	

Management Methods					
	Commonwealth	New South Wales	South Australia	Tasmania	Victoria
Charter					
Bag limits		✓			✓
Gear restrictions		✓			✓
Licence					✓
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		1 445 squid (2018-19)			
Commercial	2.963 t	29.2109 t	291.863 t	107.402 t	61.133 t

Indigenous		Unknown	Unknown	Unknown	Unknown (No catch under permit)
Recreational		15 247 squid (2017-18)	155 t (2013–14)	65 t (2012–13)	Unknown

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.

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.

New South Wales – Recreational (catch totals) Estimate from Murphy et al. [2020], based on a survey of Recreational Fishing Licence households.

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

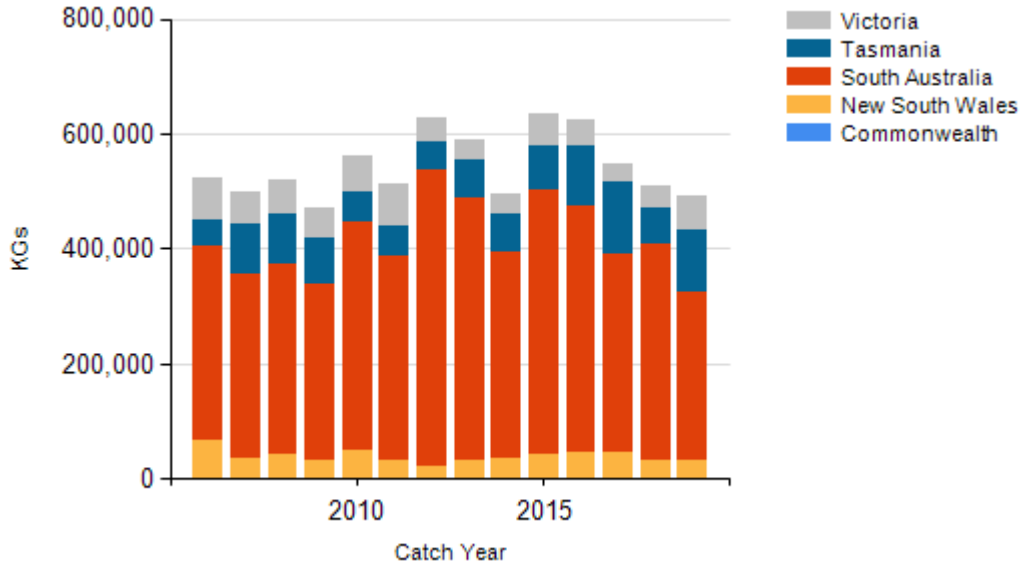
Victoria – Indigenous (Management Methods) A person who identifies as Aboriginal or Torres Strait Islander is exempt from the need to obtain a Victorian recreational fishing licence, provided they comply with all other rules that apply to recreational fishers, including rules on equipment, catch limits, 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 2018/19.

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://dpipwe.tas.gov.au/Documents/Policy%20for%20Aboriginal%20tags%20and%20alloting%20an%20UIC.pdf).

CATCH CHART



Commercial catch of Southern Calamari - note confidential catch not shown

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