

# Shortspined Sea Urchin (2023)

*Heliocidaris erythrogramma*



**John Keane:** Institute for Marine and Antarctic Studies, University of Tasmania, **Justin Bell:** Victorian Fisheries Authority, **Rowan C. Chick:** New South Wales Department of Primary Industries, **Katherine Heldt:** South Australian Research and Development Institute, **Lachlan Strain:** Department of Primary Industries and Regional Development, Western Australia, **Katie Cresswell:** Institute for Marine and Antarctic Studies, University of Tasmania

## STOCK STATUS OVERVIEW

Jurisdiction	Stock	Stock status	Indicators
Western Australia	Western Australia	Negligible	
New South Wales	New South Wales	Negligible	
Victoria	Victoria	Sustainable	
Tasmania	Tasmania	Sustainable	Commercial catch and CPUE
South Australia	South Australia	Undefined	

## STOCK STRUCTURE

The Shortspined Sea Urchin, *Heliocidaris erythrogramma*, is endemic to Australia and distributed along protected or moderate energy rocky reefs and seagrass beds in temperate and sub-tropical waters from Western Australia to southern Queensland and around Tasmania [Kailola et al. 1993; Williamson 2015; Keesing 2020]. Two subspecies of the Shortspined Sea Urchin have been identified, *H. erythrogramma erythrogramma* and *H. erythrogramma armigera*, with the latter occurring in Western Australia [Binks et al. 2011]. Commercial catches of only *H. erythrogramma erythrogramma* have been reported.

The Shortspined Sea Urchin can be found to depths of 35 m, but is most abundant in shallow waters < 20m in bays and estuaries, sometimes forming barrens [Pederson and Johnson 2008; Bell et al. 2023]. Lower abundances are observed in highly exposed sites, such as those along the southern and south-west coasts of Tasmania that are dominated by bull kelp habitat

[Keesing 2020]. Shortspined Sea Urchins have a hard shell (test) surrounding the soft tissue (such as the dermis, podia, pedicellariae, and gonads), pointed primary spines (10–25 mm in length) and blunt secondary spines [Kailola et al. 1993]. The test diameter is generally < 90mm [Clark 1946] but in Tasmania larger individuals have been recorded up to 125mm test diameter (Growth & Ritz 1994). The Shortspined Sea Urchin has a short pelagic larval duration of three to five days and has limited dispersal capacity [Williams and Anderson 1975]. Significant population differentiation occurs at spatial scales of 1000 kms or less, with differences in mtDNA genotypes between central New South Wales (Sydney and Jervis Bay), Victoria (Port Phillip Bay) and Tasmania (Hobart) [McMillan et al. 1992].

Given the knowledge regarding stock structure and different jurisdictional management objectives, this species is assessed here at the jurisdictional level—New South Wales, Tasmania, Victoria, South Australia and Western Australia.

## STOCK STATUS

**New South Wales** Stock status for the New South Wales stock is reported as **Negligible** due to historically low catches in this jurisdiction and the stock has generally not been subject to targeted fishing. The New South Wales commercial catch in 2017–18 to 2021–22 averaged approximately 0.2 t per year, and Shortspined Sea Urchin is not known to be a major component of recreational landings. Fishing is unlikely to be having a negative impact on the stock.

**South Australia** South Australia’s commercial catch of Shortspined Sea Urchin over the past 19 years (2003–04 to 2022–23) has averaged less than 8.5 t per annum, and the species is not a major component of recreational landings. There is no published assessment of this species, and there are no data available to estimate biomass or exploitation rates. In addition, there is no knowledge on recruitment or harvestable biomass, and there are no defined target or limit reference levels. This prevents assessment of current stock size or fishing pressure. Consequently, there is insufficient information available to confidently classify the status of this stock.

On the basis of the evidence provided above, the South Australia Fishery management unit for this species is classified as an **undefined stock**.

**Tasmania** The commercial harvest of Shortspined Sea Urchin in Tasmania can be traced back to the 1960s, with a sustained fishery commencing in the 1980s [Hayward 2013]. Commercial catches peaked in the late 1980s with 250 dive licenses contributing to 359 t harvested [Sanderson et al. 1996] however, landings have since gradually declined. In 2005 a cap on the maximum number of commercial dive licenses was introduced, currently 53 licenses, with each license allowing harvest of both Shortspined and Longspined sea urchins (*Centrostephanus rodgersii*), as well as periwinkles (*Lunella undulata*). Management of Shortspined Sea Urchin includes a TAC of 175 t divided between five fishing zones, a minimum TD of 80 mm (from September 1st 2023) which has increased several times over over the last few years. Size (TD) at 50% maturity is estimated at 40.1 mm at 2.5 years of age, with size plus 1–4 years of growth post maturity being 52.5 (50.5–54.3) mm, 64.2 (59.9–68.3) mm, 75.0 (68.1–81.8) mm and 85 (75.0–81.8) mm, respectively (averaged across 11 eastern and southern Tasmanian sites; Keane, unpublished data). Therefore, the current size limit allows for approximately 3 years of spawning before urchins enter the fishery, up from 1 year when the size limit was 60 mm. Variability in growth is

STATUS OF AUSTRALIAN FISH STOCKS REPORT  
Shortspined Sea Urchin (2023)

evident, driven by habitat and urchin density as evidenced in previous localised studies [Pederson and Johnson 2008; Sanderson et al. 1996].

Catch Caps within zones have also been implemented over the last few seasons to disperse effort and to minimise risk of localised depletion to valuable stocks. Catch rates are stable within zones and catch cap areas. Areas with an overabundance of urchins of lower value (poor roe quality) still remain and a dispersion of effort to such areas via is hoped to improve roe quality over time as densities decrease [Sanderson et al. 1996]. There are also Shortspined Sea Urchin barrens in some areas with unmarketable roe.

Shortspined Sea Urchin is traditionally the most valuable and, therefore, preferred target species harvested by the commercial dive fishery (CDF) in Tasmania. The fishing season is generally from late September until December when the roe is at the highest quality and maximum profitability. This season is the complement to the Longspined Sea Urchin season which takes place from December to June. Tasmanian Shortspined Sea Urchin roe is primarily shipped to established markets in Sydney and Melbourne

Management actions in recent years were aimed to protect egg production through increasing size limits and dispersing effort spatially by introducing catch caps. The above evidence, including stable catch rates, market constraints and management action indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired. Furthermore, the above evidence also indicates that the current level of fishing mortality in Tasmania is unlikely to cause the stock to become recruitment impaired.

On the basis of the evidence provided above, Shortspined Sea Urchin in Tasmania is classified as a **sustainable stock**.

## Victoria

Shortspined Sea Urchins are distributed throughout Victoria, but only harvested commercially in the eastern management zone, from Lakes Entrance to the NSW border, and in Port Phillip Bay. Landings in both fisheries have been variable through time, reaching up to nearly 40 t and 50 t in the eastern zone and Port Phillip Bay fisheries respectively [Bell et al. 2023]. Landings were 8t in the eastern zone and 36.5 t in Port Phillip Bay in 2020–21. Shortspined Sea Urchins are also harvested by recreational fishers and although the landings are not known, they are likely to be low in comparison to commercial catches in both locations.

In eastern Victoria, Shortspined Sea Urchin catch rates have remained relatively stable through time, reaching historic highs in 2021–22 [Bell et al. 2023]. Catch rates in Port Phillip Bay are lower, and more variable, with anecdotal reports by divers suggesting they are influenced by water clarity, algal growth and, as is usual in urchin fisheries, roe quality, which tends to be more variable in Port Phillip Bay. Nevertheless, catch rates show no declining trend and were also the highest on record in 2021–22 [Bell et al. 2023]. In addition, large portions of Port Phillip Bay contain extensive Shortspined Sea Urchin barrens with very high densities that are not valuable to fisheries due to poor roe quantity and quality. As such, it is possible that the fishery could reach maximum production (i.e., catch as many urchins with marketable roe as is financially viable) without posing a risk to the stock as a whole [Bell et al. 2023].

The above evidence, including low overall catches, stable catch rates and market constraints, indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired. Furthermore, the above evidence

STATUS OF AUSTRALIAN FISH STOCKS REPORT  
Shortspined Sea Urchin (2023)

also indicates that the current level of fishing mortality in Victoria is unlikely to cause the stock to become recruitment impaired.

On the basis of the evidence provided above, Shortspine Sea Urchin in Victoria is classified as a **sustainable stock**.

**Western Australia**

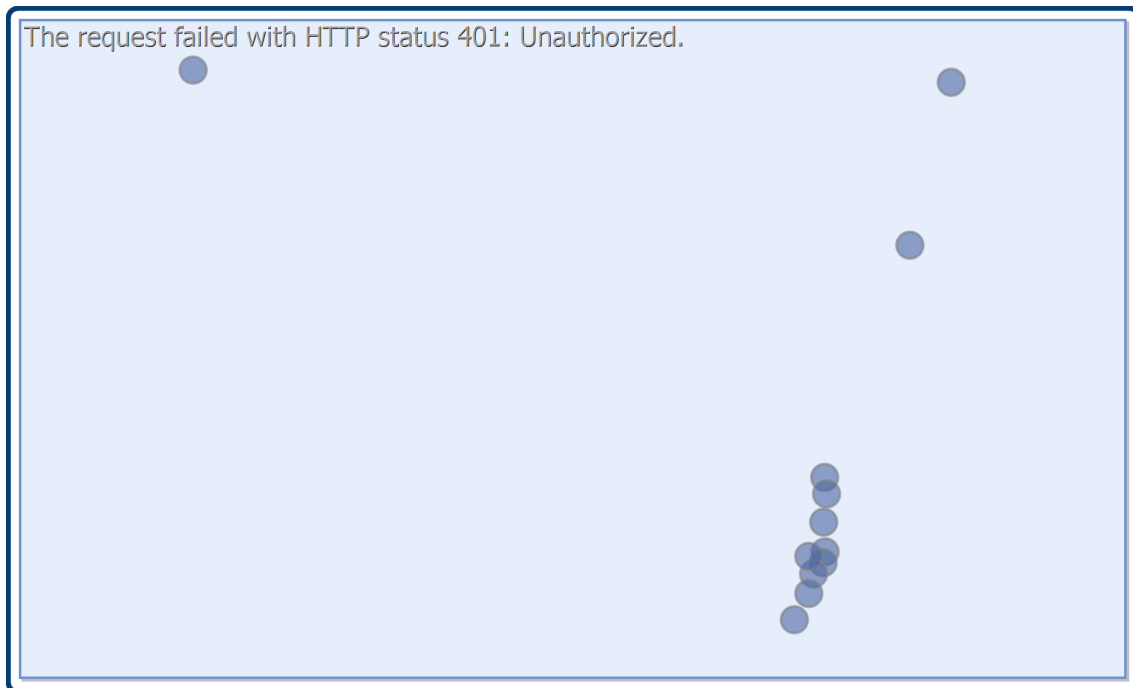
Stock status for Shortspined Sea Urchin in WA is reported as **Negligible** due to no recorded catch by any sector in this jurisdiction. A Developmental Commercial Sea Urchin Fishery has been established in WA but the Shortspined Sea Urchin is not targeted by the commercial fishers. The current level of fishing effort and thus fishing mortality are unlikely to be having a negative impact on the stock.

**BIOLOGY**

**Shortspined Sea Urchin biology.** [Keesing 2020]

Species	Longevity / Maximum Size	Maturity (50 per cent)
Shortspined Sea Urchin	20–30 years, max length 125 mm	2-3 years

**DISTRIBUTION**



Distribution of reported commercial catch of Shortspined Sea Urchin.

**TABLES**

STATUS OF AUSTRALIAN FISH STOCKS REPORT  
Shortspined Sea Urchin (2023)

Fishing methods				
	New South Wales	South Australia	Tasmania	Victoria
<b>Commercial</b>				
Diving	✓		✓	✓
Unspecified		✓		
<b>Recreational</b>				
Hand		✓	✓	✓
Hand collection	✓			

Management Methods					
	New South Wales	South Australia	Tasmania	Victoria	Western Australia
<b>Commercial</b>					
Catch limits			✓		
Gear restrictions	✓			✓	
Licence		✓	✓	✓	
Limited entry	✓			✓	✓
Marine park closures	✓			✓	
Size limits			✓		
Spatial closures	✓				
Total allowable catch				✓	
Trigger limits		✓			
<b>Recreational</b>					
Bag and possession limits	✓				
Bag limits				✓	
Bag/boat limits		✓			
Gear restrictions	✓			✓	
Licence	✓			✓	
Marine park closures	✓			✓	

STATUS OF AUSTRALIAN FISH STOCKS REPORT  
Shortspined Sea Urchin (2023)

<b>Spatial closures</b>	✓				
-------------------------	---	--	--	--	--

Catch					
	New South Wales	South Australia	Tasmania	Victoria	Western Australia
<b>Commercial</b>	0.0714 t	0 t	107.18 t	44.441 t	0 t
<b>Indigenous</b>	Unknown	Unknown	Unknown	Unknown	
<b>Recreational</b>	Unknown	Unknown	Unknown	Unknown	

**New South Wales – Indigenous (Management Methods).**

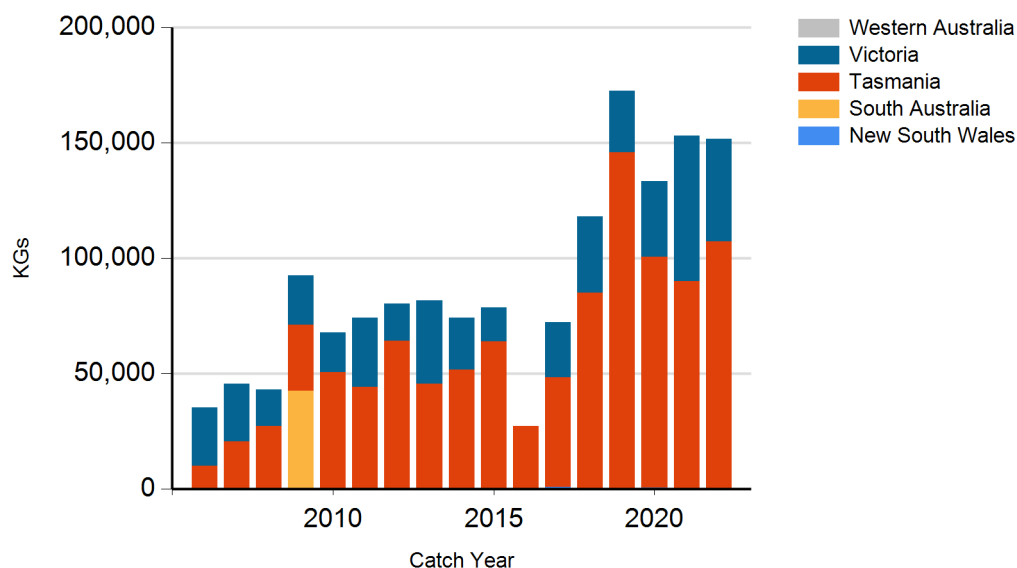
<https://www.dpi.nsw.gov.au/fishing/aboriginal-fishing>

**Tasmania – Living Marine Resources Management Act**

**1995.** <https://www.legislation.tas.gov.au/view/html/inforce/current/act-1995-025>

**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*.

**CATCH CHART**



STATUS OF AUSTRALIAN FISH STOCKS REPORT  
Shortspined Sea Urchin (2023)

Commercial catch of Shortspined Sea Urchin - note confidential catch not shown.

<b>References</b>	
PIRSA 2017	PIRSA 2017, Policy for the management of the South Australian Commercial Miscellaneous Dive Fisheries activities. Government of South Australia 2017. Adelaide, South Australia. 23pp
Hayward 2013	Hayward, P 2013, Invasive opportunities and Eco-culinary activism: The harvesting, marketing and consumption of Tasmanian Sea Urchins. <i>Locale: The Australasian-Pacific Journal of Regional Food Studies</i> , 3, 71 – 90.
Kailola et al. 1993	Kailola, PJ, Williams, MJ, Stewart, PC, Reichelt, RE, McNee, A and Grieve, C 1993, Australian Fisheries Resources. Canberra: Bureau of Resource Sciences. 422 pp
Keesing 2020	Keesing, JK 2020, Sea Urchins: in Lawrence, JM (ed.) 2020, <i>Biology and Ecology</i> . Fourth Edition, Vol. 43. Elsevier.
Bell et al. 2023	Bell, JD, Ingram, BA, Gorfine, HK and Conron SD 2023, Review of key Victorian fish stocks — 2022, Victorian Fisheries Authority Science Report Series No. 38, First Edition, June 2023. VFA: Queenscliff. 146pp.
Binks et al. 2011	Binks, RM, Evans, JP and Prince, J 2011, Fine-scale patterns of genetic divergence within and between morphologically variable subspecies of the sea urchin <i>Heliocidaris erythrogramma</i> (Echinometridae). <i>Biol. J. Linn. Soc.</i> 103, 578–592.
Growns and Ritz 1994	Growns, JE and Ritz, DA 1994, Colour variation in southern Tasmania populations of <i>Heliocidaris erythrogramma</i> (Echinometridae: Echinoidea). <i>Marine and Freshwater Research</i> , 45(2), pp.233-242.
Dix 1997	Dix, TG 1977, Reproduction in Tasmanian populations of <i>Heliocidaris erythrogramma</i> (Echinodermata: Echinometridae). <i>Marine and Freshwater Research</i> , 28(4), pp.509-520.
McMillan et al. 1992	McMillan, WO, Raff, RA, Palumbi, SR 1992, Population genetic consequences of developmental evolution in sea urchins (Genus <i>Heliocidaris</i> ). <i>Evolution</i> 46, 1299–1312.
Pederson and Johnson 2008	Pederson, HG and Johnson, CR 2008, Growth and age structure of sea urchins ( <i>Heliocidaris erythrogramma</i> ) in complex barrens and native macroalgal beds in eastern Tasmania. <i>ICES J. Mar. Sci.</i> 65, 1–11.
Williams and Anderson 1975	Williams, DHC and Anderson, DT 1975, The reproductive system, embryonic development, larval development and metamorphosis of the sea urchin <i>Heliocidaris erythrogramma</i> (Val.) (Echinodermata: Echinoidea). <i>Aust. J. Zool.</i> 23, 371–403.
Williamson 2015	Williamson, JE 2015, Sea urchin aquaculture in Australia. <i>Echinoderm aquaculture</i> , pp.225-243.