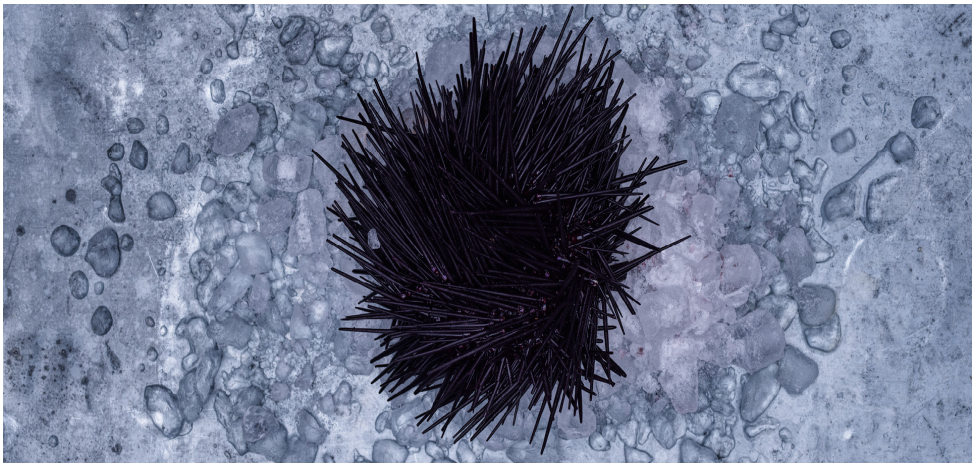
Longspined Sea Urchin (2020)

Centrostephanus rodgersii



Katie Cresswell: University of Tasmania, **Rowan C. Chick**: Department of Primary Industries, New South Wales, **Victorian Fisheries Authority**: Victorian Fisheries Authority, **Klaas Hartmann**: University of Tasmania

STOCK STATUS OVERVIEW

Jurisdiction	Stock	Stock status	Indicators
New South Wales	New South Wales	Sustainable	Catch, fishery-independent survey estimates of biomass
Victoria	Victoria	Sustainable	Catch, effort, CPUE trends
Tasmania	Tasmania	Sustainable	Catch, effort, CPUE trends, fishery-independent survey estimates of biomass.

STOCK STRUCTURE

Over the last several decades the Longspined Sea Urchin, *Centrostephanus rodgersii,* has undergone a range extension to Victoria and Tasmania from NSW due to extensions in the warm East Australia Current brought about by climate change [Johnson et al. 2005, Ridgway 2007, Ling 2008].

The strength of connectivity between regions and the species' capacity for self-recruitment at the extremes of its distribution remain poorly understood and are currently under investigation as part of an FRDC project "Larval dispersal for Southern Rock Lobster and Longspined Sea Urchin to support management decisions".

Understanding Longspined Sea Urchin population structure has been of particular importance as high urchin densities can damage kelp forests through overgrazing [Ling et al. 2009, Johnson et al. 2011, Marzloff et al. 2016] and this has resulted in notable habitat changes in areas of range extension. Due to this impact and the range-extending nature of this species, management measures are being actively pursued to decrease the population density in some jurisdictions.

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

STOCK STATUS

New South Wales

Longspined Sea Urchins are a targeted species within the Sea Urchin and Turban Shell (SUTS) Fishery and there is a relatively small recreational fishery. Only fishers with a SUTS Fishery licence can commercially harvest SUTS Fishery defined species, including the Longspined Sea Urchin. Divers harvest Longspined Sea Urchins, together with other SUTS Fishery species by hand, or with the use of a 'hook', resulting in no by-catch or byproduct. Longspined Sea Urchins are commercially harvested throughout their latitudinal distribution, from the subtropical northern coastal regions of NSW to the temperate southern NSW – Victorian border. They are harvested for their roe, the condition of which is influenced by their seasonal reproductive stage (typically harvested from late summer to autumn) and food quantity and quality [Byrne et al. 1998]. Urchins located in fringe (macro-algal covered reef) habitat produce roe of marketable quality, whereas those in barrens (crustose coraline algae covered 'bare rock') have poor quality or no roe. However, reducing the density of urchins or moving them from barrens to fringe will result in the production of quality roe [Blount et al. 2017].

Commercial catches have been relatively stable, averaging 67 tonnes (t) per annum since 2009–10 (range 34–108 t p.a.) [NSW DPI, unpublished data]. During 2018–19, NSW recreational fishery retained harvest estimates for all sea urchins was about 1 t (~2 400 individuals) [Murphy et al. 2020], the majority of which are considered Longspined Sea Urchin. No recreational catch estimates for sea urchins are available from previous state and national recreational fishing surveys, with sea urchins either not having been reported [West et al. 2015] or included into a species reporting group 'other' along with various other 'non-fish' species [Henry and Lyle 2003].

Fishery-independent surveys of the density and size structure (test diameter and weight) of Longspined Sea Urchins, in fringe and barrens habitat and calculations of the area of these habitats (out to 100 m from shore) were completed in NSW in 2000. From this study the biomass of Longspined Sea Urchins in fringe habitat was estimated to be about 20 000 t. This biomass estimate was considered close to unexploited levels because of limited fishing prior to 2000, and together with deterministic estimates of Maximum Sustainable Yield (MSY), that suggested annual catches of 1–5 per cent of the unexploited biomass, catches of 200–1000 t were considered to be sustainable independent of the population of Longspined Sea Urchins in barrens (estimated at about 30 000 t) [Worthington and Blount 2003].

Andrew et al. [1998] also surveyed the density and size structure of Longspined Sea Urchins in barrens and the extent of barrens along NSW coastal areas. Results from that study indicated no substantial change in barrens habitat compared with surveys at some similar locations done in 1988 [Underwood et al. 1991]. Moreover, Glasby and Gibson [2020] describe decadal patterns of change in areas of barrens in NSW, concluding that 55 per cent of sites investigated had either no change or fluctuations (±10%) in area of barrens. In the remaining 45 per cent of study locations, barrens area had increased on average ~20 m[2] per hectare of reef per year but with considerable variability among sites [Glasby and Gibson 2020] . There were no differences in the dynamics of barren habitat through time along a longitudinal gradient [Glasby and Gibson 2020].

Biomass estimates of Longspined Sea Urchins from NSW coastal reefs in 2000, together with consistent, relatively low annual levels of commercial harvest (below estimates of MSY), low levels of recreational catch and relative long-term stability in areas of habitat supporting Longspined Sea Urchins suggest that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired. The above 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, Longspined Sea Urchin in New South Wales is classified as a **sustainable stock**.

Tasmania

The first official report of Longspined Sea Urchin presence in Tasmania came from the state's north-east coast in 1978 [Edgar and Barrett 1997], with surveys and studies suggesting initial establishment of this species occurred further north in the Kent group (Bass Strait) during the mid-1960s [Johnson et al. 2005]. Since then, populations have expanded in Tasmania, being most abundant in the north but occurring with increasing abundance between Eddystone Point in the north and Recherche Bay in the south [Johnson et al. 2005]. Longspined Sea Urchin has been harvested commercially in Tasmania since 2009. The annual catch remained below 100 t until 2018, when it increased to 185 t [Creswell et al. 2019]. In 2019, 560 t were caught [Creswell et al. 2019]. This fishery is now the third largest in Tasmania per wet tonnage harvested. Despite the catch increase there is no evidence of widespread decrease in biomass as catch rates have remained stable except in the most heavily fished area of Sloop Reef in the northeast.

Catch rates would not necessarily decline as biomass falls because divers can shift to new areas. A recent survey of commercial divers has suggested that in some areas divers have been forced into deeper waters by using Nitrox to sustain high catch rates [Cresswell et al. 2019]. Fisheries-independent surveys indicate that biomass increased between 2001 and 2017 on the east coast of Tasmania, during which period only small fishing catches were taken. The survey showed a general trend of highest biomass/densities in the northeast to the lowest in the southeast [Johnson et al. 2005, Ling and Keane 2018]. Given that this species is not endemic to Tasmania and has a negative impact on the ecosystem here, a depleting status for the fishery may be desired.

In 2001–02, a fishery-independent survey in the 6–24 m depth region (where the dive fishery operates) estimated Longspined Sea Urchin biomass at 2 523 t. This depth band covered 80 per cent of the urchin biomass. A resurvey was conducted in 2016–17 and biomass was estimated at 4 434 t. Some small-scale removals from harvesting occurred through this period. Over the period between the two surveys, and accounting for removals by fishing, the average annual biomass increase was 153 tonnes. Catch in each of the three years since the last survey has exceeded this amount [Cresswell et. al. 2019].

Biomass in the Longspined Sea Urchin fishery is assessed by two methods: extrapolation from counts obtained from fishery-independent transect surveys; and trends in catch per unit effort (CPUE) by commercial divers. Biomass assessed by fishery-independent transect data has increased over the last two decades. State-wide CPUE has not decreased over the total area fished from 2009 to 2019 but has a downward trend in the most heavily fished area. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired.

Fishing mortality in the Longspined Sea Urchin fishery is assessed using catch (t) as a proxy. In the most recent season (2018–19) annual catch increased fivefold from the first 10 years of the fishery since 2009. Despite this large increase, catch is spatially concentrated, with 80 to 90 per cent of catch coming from a small area of the east coast, around the St Helens region. While stock for the entire east coast of Tasmania is likely to be sustainable despite the increases in total catch, there is evidence of a decrease in catch rates in the most heavily fished areas over time. This suggests that for the more heavily fished areas at the current level of fishing we would expect to see a further decrease in catch rates and localised depletion. However despite signs of localised depletion when assessed across the Tasmanian stock 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, Longspined Sea Urchin in Tasmania is classified as a **sustainable stock**.

Victoria

Victoria

The Longspined Sea Urchin fishery is confined to the Eastern Zone, extending from east of the coastal port of Lakes Entrance to the Victorian–NSW border. An assessment in 2019 found that landings and fishing effort had both showed an increasing trend in recent years since a low in the 2015 quota year [Conron et al. 2020].

CPUE has remained very stable at ~175 kg/hr for the last four quota years with a slight decrease over the last year [Conron et al. 2020]. However, CPUE is likely to be more reflective of the availability of urchins with roe of marketable quality rather than the species' abundance as a whole. This is illustrated by an increase in abundance of about 80 per cent observed from fishery independent surveys over the same period following a decrease (probably as a result of targeted urchin reduction programs to mitigate range expansion and restore kelp habitat from barrens) of about one third over the preceding two years [Conron et al. 2020]. This species is very abundant on barrens in deeper waters, however, commercial fishing effort is typically focused in shallower areas and where kelp habitat transitions to barrens.

Catch, effort, and CPUE trends for this species are largely reflective of market demand and can be influenced by changes in the availability of urchins with marketable roe. 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 [Conron et al. 2020]. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired. The above evidence also indicates that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

Based on the available evidence the Eastern Victorian Longspined sea urchin is classified as a **sustainable stock**.

BIOLOGY

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Species	Longevity / Maximum Size	Maturity (50 per cent)
Longspined Sea Urchin	25–30 years	4–5 years

DISTRIBUTION

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TABLES

Fishing methods			
	New South Wales	Tasmania	Victoria
Commercial			
Diving		✓	✓
Various	✓		
Recreational			
Diving	✓	✓	
Hand	✓	✓	

Management Methods		
	New South Wales	Tasmania
Commercial		
Licence	✓	
Limited entry		✓
Marine park closures		✓
Spatial closures	✓	
Recreational		
Bag and possession limits	✓	
Licence	✓	
Spatial	✓	

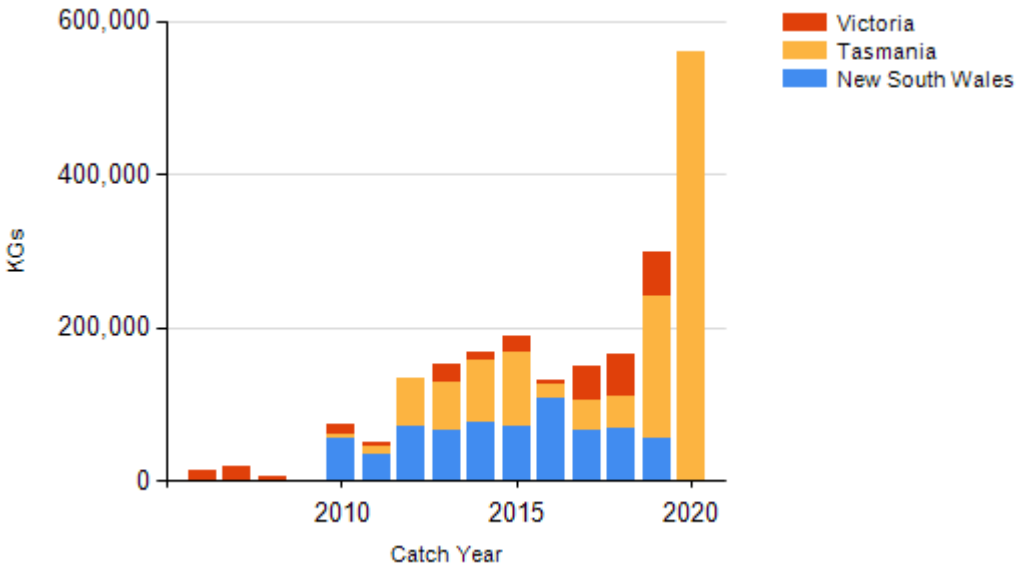
closures		

Catch			
	New South Wales	**Tasmania**	**Victoria**
Commercial	55.2206 t	185 t	59.3688 t
Indigenous	Unknown	Unknown	
Recreational	1 t	Unknown	

New South Wales – Indigenous 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*.

CATCH CHART



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