

# Ballot's Saucer Scallop (2016)

*Ylistrum balloti*



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## STOCK STATUS OVERVIEW

Jurisdiction	Stock	Fisheries	Stock status	Indicators
Western Australia	Abrohlos Island and Mid-West Trawl managed Fishery	AIMWTMF	Environmentally limited	Recruitment surveys, catch rate, catch
Western Australia	Shark Bay Scallop Managed Fishery	SBSCMF	Transitional-recovering	Recruitment surveys, catch
Western Australia	South Coast Trawl Fishery	SCTF	Sustainable	Catch
Western Australia	South West Trawl Managed Fishery	SWTMF	Sustainable	Catch
Queensland	East Coast Otter Trawl Fishery	ECOTF	Overfished	Catch, catch rate

ECOTF East Coast Otter Trawl Fishery (QLD), AIMWTMF Abrolhos Islands and Mid West Trawl Managed Fishery (WA), SBSCMF Shark Bay Scallop Managed Fishery (WA), SCTF South Coast Trawl Fishery (Condition) (WA), SWTMF South West Trawl Managed Fishery (WA)

## STOCK STRUCTURE

Ballot's Saucer Scallops in Australian waters are now classified as *Ylistrum balloti* (formerly *Amusium balloti*) following a recent revision of the genus *Amusium*[1]. This species is distributed from Esperance in Western Australia, across the tropics, to the southern coast of New South Wales. Ballot's Saucer Scallops occur along most of the coast of Western Australia, but given the vast length of this coastline and the potential for regional differences in recruitment, four functionally independent management units have been established in this jurisdiction.

The eastern Australian stock stretches from Innisfail in Queensland to Jervis Bay in New South Wales. No fishery for Ballot's Saucer Scallop exists in New South Wales waters. The stock classification presented here is based on information from the commercial fishery in central and southern Queensland (latitude 22°–27° south).

Here, assessment of stock status is presented at the management unit level—Shark Bay Scallop Managed Fishery, Abrolhos Islands and Mid-West Trawl Managed Fishery, South West Trawl Managed Fishery and South Coast Trawl Fishery for Western Australia; and East Coast Otter Trawl Fishery for Queensland.

## STOCK STATUS

**Abrolhos Island and Mid-West Trawl managed Fishery** The Abrolhos Islands and Mid-West Trawl Managed Fishery (Western Australia) management unit is managed under an escapement policy. The impact on the spawning biomass is limited by fishing after the peak spawning period; setting the duration of fishing according to catch predictions (based on pre-season surveys); closing the fishery at a minimum catch rate threshold (250 kg meat weight per day); and by not opening sections of the fishery if Ballot's Saucer Scallop abundance is considered too low (below a specified target)[2].

Annual pre-season surveys have shown very low recruitment since 2011, and the fishery has been closed since 2012. The predicted catch for 2015 was below the target range (95 t meat weight), with minimal recovery in the southern part of the fishery, and the fishery remained closed. It may take several years of favourable conditions for the stock to recover. Research to assess the feasibility of supplementation measures such as translocation and/or the release of hatchery-produced spat (to aid in rebuilding the spawning biomass) continues.

Stock biomass within this management unit has fallen to a level where there is a significant risk of recruitment failure. Research surveys in 2015 indicated low Ballot's Saucer Scallop abundance, with catch predictions below the target level for resumption of fishing. The current low stock biomass is not due to overfishing or lack of appropriate fisheries management; it is the result of a series of poor recruitment events associated with sustained unfavourable environmental conditions dating back to the marine heat wave that began in late 2010[6,7]. The fishery has now been closed for five years to provide maximum protection to all remaining stock. Fisheries management has responded appropriately to the environmental change in productivity with a complete cessation of fishing since June 2011.

On the basis of the evidence provided above, the Abrolhos Islands and Mid-West Trawl Managed Fishery (Western Australia) management unit is classified as an **environmentally limited stock**.

**East Coast Otter Trawl Fishery** In Queensland, the most recent quantitative assessment[8] estimated that the spawning biomass of the East Coast biological stock in 2015 may be as low as five to six per cent of the unfished level (1977). Average monthly catch rates from January 2015–April 2016 (seven baskets per boat day) were the lowest in the 39-year catch record. Annual landings of Ballot's Saucer Scallop by the East Coast Otter Trawl Fishery in 2014 and 2015 were also near historical lows, at 280–300 t[9]. The stock is considered to be recruitment overfished.

Although fishing effort has reduced in recent years, standardised catch rates have not improved[9]. Ballot's Saucer Scallop stocks occasionally show marked annual variation in recruitment due to changes in environmental conditions[10]. Productivity of this species can be influenced by factors such as river flow and temperature[11] and the low rainfall in the region over the last three years may have also constrained recruitment. A number of management measures were

introduced in late 2016 to reduce fishing pressure, including spatial and temporal closures. The current level of fishing pressure is expected to allow the stock to recover from its recruitment overfished state; however, measurable improvements in biomass are yet to be detected.

On the basis of the evidence provided above, the East Coast Otter Trawl Fishery (Queensland) management unit is classified as an **overfished stock**.

**Shark Bay  
Scallop  
Managed  
Fishery**

The Shark Bay Scallop Managed Fishery (Western Australia) management unit is currently in a recovery phase. A trial quota system with a conservative total allowable commercial catch (TACC) and target ranges for resumption of fishing was implemented in 2015 to provide protection for the breeding stock and aid in recovery. Management measures in 2015 included a ban on Ballot's Saucer Scallop harvest from northern Shark Bay (to provide full protection for the breeding stock) and a conservative 100 tonnes (t) (meat weight) TACC in Denham Sound<sup>[2]</sup> (which is regarded as a separate stock from that in the northern Shark Bay). In 2015, a total of 57.6 t meat weight (288 t whole weight) was landed.

Fishery-independent recruitment surveys are conducted each year on this management unit, using well-established methodology<sup>[3–5]</sup>. Catch predictions for 2015 for the two separate stocks are derived from the correlation of the annual landed catch (meat weight) and the mean catch rate (number per nautical mile trawled) of recruit (0+) and residual (1+) scallops for standard survey sites for each area sampled in November 2014. The predictions were very low for northern Shark Bay (40 t meat weight, below the target of 100 t) and moderate for Denham Sound (175 t meat weight, above the 50 t target). The estimated spawning biomass in northern Shark Bay remains at record low levels, but recruitment of 0+ Ballot's Saucer Scallops has increased.

Prior to implementation of these management measures, the stock biomass within this management unit had fallen to a level where there was a significant risk of recruitment failure. The stock has fully recovered in Denham Sound and appears to be recovering slowly in northern Shark Bay. The current low stock biomass seems to be the result of a series of poor recruitment events associated with protracted unfavourable environmental conditions dating back to a marine heat wave that began in late 2010<sup>[6,7]</sup>. Fisheries management has responded to this environmentally driven decline in productivity with a complete cessation of fishing (for 3 years) until fishery-independent surveys have indicated potential for a modest harvest.

On the basis of the evidence provided above, Denham Sound has fully recovered and northern Shark Bay is in transitional recovery; therefore, the Shark Bay Scallop Managed Fishery (Western Australia) management unit is classified as a **transitional–recovering stock**.

**South Coast  
Trawl  
Fishery**

The South Coast Trawl Fishery (Western Australia) management unit is a low-activity fishery in which effort is related to the abundance of Ballot's Saucer Scallop in any given year, which can be highly variable (due to sporadic recruitment). The few vessels (up to four) that operate in the fishery only fish over one to three per cent of the allowable fishery area. In 2015, a total of 315 t whole weight was landed for 222 boat days. The mean catch rate in 2015 was 1419 kg whole weight per boat day compared with a mean of 1168 kg per boat day (range 669–1643 kg per boat day) for the previous 5 years. The above evidence indicates that the biomass of this stock is unlikely to be recruitment overfished<sup>[2]</sup>. It also indicates that the current level of fishing pressure is unlikely to cause the stock to become recruitment overfished.

On the basis of the evidence provided above, the South Coast Trawl Fishery (Western Australia) management unit is classified as a **sustainable stock**.

**South West Trawl Managed Fishery** The South West Trawl Managed Fishery (Western Australia) (SWTMF) management unit is a comparatively small, low-activity fishery in which effort has been related to either the abundance of Western King Prawn or Ballot's Saucer Scallop in any given year, which can be highly variable due to sporadic scallop recruitment. Only two to four vessels have operated in the fishery since 2005, and they have only covered approximately one to three per cent of the allowable fishery area[2]. Since 2005, an average of 168 boat days have been recorded annually, with a catch range of between 1 and 217 t whole weight, compared to 490 boat days on average the previous 10 years (1995–2004), with a catch range of between 3–23 t whole weight. The level of fishing pressure is unlikely to adversely impact the spawning biomass of Ballot's Saucer Scallop. No vessels fished in the SWTMF in 2015. The above evidence indicates that the fishing pressure is unlikely to cause the stock to become recruitment overfished. It also indicates that the biomass of this stock is unlikely to be recruitment overfished.

On the basis of the evidence provided above, the South West Trawl Managed Fishery (Western Australia) management unit is classified as a **sustainable stock**.

**BIOLOGY**

Ballot's Saucer Scallop biology[12–15]

Species	Longevity / Maximum Size	Maturity (50 per cent)
Ballot's Saucer Scallop	Maximum of 4 years and 140 mm <u>SH</u>	At 1 year of age and 85–90 mm <u>SH</u>

**DISTRIBUTION**



Distribution of reported commercial catch of Ballot's Saucer Scallop

**TABLES**

<b>Commercial Catch Methods</b>	<b>Queensland</b>	<b>Western Australia</b>
Otter Trawl	✓	✓
Unspecified		✓
Various		✓

<b>Fishing methods</b>	<b>Queensland</b>	<b>Western Australia</b>
<b>Commercial</b>		
Otter Trawl	✓	✓
Unspecified		✓
Various		✓

<b>Management Methods</b>	<b>Queensland</b>	<b>Western Australia</b>
<b>Commercial</b>		
Catch limits		✓
Effort limits		✓
Limited entry	✓	✓
Rotational closures	✓	
Size limit	✓	
Spatial closures	✓	✓
Vessel restrictions	✓	

<b>Active Vessels</b>	<b>Queensland</b>	<b>Western Australia</b>
	127 Vessel in ECOTF,	0 Vessel in AIMWTMF, 22 Vessel in SBSCMF, 4 Vessel in SCTF, 0 Vessel in SWTMF,

**ECOTF** East Coast Otter Trawl Fishery(QLD)

**AIMWTMF** Abrolhos Islands and Mid West Trawl Managed Fishery(WA)

**SBSCMF** Shark Bay Scallop Managed Fishery(WA)

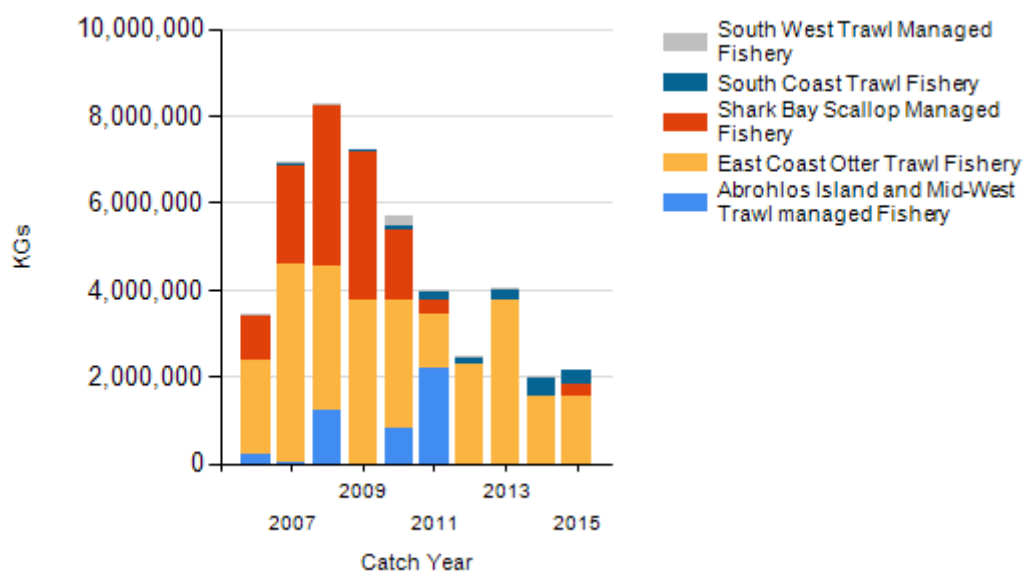
SCTF South Coast Trawl Fishery (Condition)(WA)

SWTMF South West Trawl Managed Fishery(WA)

Catch	Queensland	Western Australia
Commercial	1541.76t in ECOTF,	287.867t in SBSCMF, 314.945t in SCTF,
Indigenous	No catch	No catch
Recreational	No catch	No catch

ECOTF East Coast Otter Trawl Fishery (QLD), AIMWTMF Abrolhos Islands and Mid West Trawl Managed Fishery (WA), SBSCMF Shark Bay Scallop Managed Fishery (WA), SCTF South Coast Trawl Fishery (Condition) (WA), SWTMF South West Trawl Managed Fishery (WA),

### CATCH CHART



Commercial catch of Ballot's Saucer Scallop - note confidential catch not shown

### EFFECTS OF FISHING ON THE MARINE ENVIRONMENT

- Habitat effects of Western Australian and Queensland Ballot's Saucer Scallop fisheries are considered low risk, with trawl vessels generally sweeping a small proportion of the designated trawl area (six per cent in the Great Barrier Reef Marine Park [GBRMP])[16]. Furthermore, the physical impact of this gear on the sandy habitat that supports scallops is negligible within Western Australian Scallop fisheries[17], and intermediate to low in the Queensland East Coast Otter Trawl Fishery (ECOTF) within the GBRMP[16], where an estimated 45 per cent of the stock biomass and its associated benthic biota are protected from fishing impacts through permanent closures[16,18]. Rotational and temporal closures in the ECOTF also play a role in alleviating fishing pressure on the maturing stock and maintaining benthic assemblages.
- Food chain effects of Western Australian Ballot's Saucer Scallop fisheries are deemed low risk, with the total biomass taken by these operations being small. The high natural

recruitment variability and therefore Ballot's Saucer Scallop stock abundance[2] also means that few predators will have become highly dependent on this species[19]. Trawl-related risks to ecological processes within GBRMP are low[18].

- Bycatch reduction devices (grids) are mandatory mitigation measures to minimise fishing impacts in the Shark Bay Scallop Managed Fishery and the Abrolhos Islands and Mid-West Trawl Managed Fishery, as are turtle excluder devices in the East Coast Trawl Fishery. These gear modifications are effective in limiting bycatch of larger species such as turtles, sharks, rays and sea snakes[20,21]. Square mesh codends decrease bycatch of smaller aquatic organisms[22] and their use was mandated in 2015 for vessels towing scallop gear in the ECOTF. Compliance monitoring of bycatch reduction devices and vessel activities (through vessel monitoring systems) occurs in each management area.

#### ENVIRONMENTAL EFFECTS on Ballot's Saucer Scallop

- Strong La Niña events that are typically associated with strong Leeuwin Currents and warm sea surface temperatures often result in below-average Ballot's Saucer Scallop recruitment and may necessitate the closure of the Shark Bay Scallop Managed Fishery and/or the Abrolhos Islands and Mid-West Trawl Managed Fishery[23–26]. Between 2012–15, fishery closures in these two fisheries occurred due to a marine heat wave event in 2010–11 (associated with a strong La Niña) that resulted in mortality of breeding stock and subsequent very poor recruitment for a number of years[6,7,27,28]. Further research continues into understanding recruitment variation (including the collapse) of Ballot's Saucer Scallop stocks in Western Australia.
- Environmental variables affecting the Queensland east coast Ballot's Saucer Scallop stock productivity have also been the subject of recent research. Highly significant correlations were found between November catch rates and several oceanographic variables, including chlorophyll densities and seabed temperature anomalies in the preceding June and August, respectively[11]. While the precise causal mechanisms of these associations remain uncertain, concerns have arisen that current stock assessment procedures may not adequately account for these and other environmental factors[11].

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