

Orange Roughy (2020)

Hoplostethus atlanticus



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STOCK STATUS OVERVIEW

Jurisdiction	Stock	Stock status	Indicators
Commonwealth	Cascade Plateau	Sustainable	Biomass, current and historical fishing pressure
Commonwealth	Eastern Zone	Sustainable	Biomass, current and historical fishing pressure
Commonwealth	Great Australian Bight	Undefined	Catch history
Commonwealth	South Tasman Rise	Depleted	Catch history, catch rates
Commonwealth	Southern Zone	Depleted	Biomass, current and historical fishing pressure
Commonwealth	Western Zone	Depleted	Biomass, current and historical fishing pressure

STOCK STRUCTURE

Orange Roughy is assumed to consist of multiple regional stocks. The species is managed and assessed as a number of discrete regional management units and/or biological stocks, six of which are presented here.

Orange Roughy within the Australian Fishing Zone form a single genetic stock [Gonçalves da Silva et al. 2012]; however, separate demographic units exist despite genetic similarity [Morison et al. 2012]. Orange Roughy on the Cascade Plateau has distinct morphometrics, parasite populations, size and age composition, and spawning time, and is considered to be a separate management unit within the Southern Remote Zone [AFMA 2013]. The Orange Roughy stock in the South Tasman Rise is considered to be a discrete population. Research indicates that there is more genetic structure in global Orange Roughy populations than has previously been detected, although Australian and New Zealand stocks could not be differentiated [Varela et al. 2013].

Here, assessment of stock status is presented at the management unit level—Eastern Zone, Southern Zone, Western Zone and Great Australian Bight; and at the biological stock level—Cascade Plateau and South Tasman Rise.

STOCK STATUS

Cascade Plateau

Orange Roughy (Cascade Plateau) in Commonwealth fisheries is managed as a Tier 1 stock under the SESSF Harvest Strategy Framework [AFMA, 2019].

The last full assessment in 2006 used acoustic survey abundance indices to assess spawning aggregations on the Cascade Plateau [Wayte and Bax 2007]. The base-case model from the 2006 assessment estimated female spawning biomass to be 73 per cent of the unfished biomass (0.73SB0) [Wayte and Bax 2007]. An update to this assessment in 2009 used an alternative acoustic biomass estimate for 2005, with the addition of landed catch from 2007 to 2009 [Wayte 2009]. The updated assessment estimated that the female spawning biomass would be 64 per cent of the unfished biomass in 2011 if the RBC (315 t) was fully caught in 2010 [Wayte 2009]. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired.

Noting low fishing effort, catches and a lack of new data, AFMA implemented a 500 t total allowable catch (TAC), which has been rolled over at this level since 2009. These TACs have been largely uncaught. This stock was scheduled for an assessment in 2014, but, because there were no new catch or acoustic survey data, the assessment was postponed. Commonwealth landed catch in the trawl sector of the SESSF was 23.6 t in the 2019–20 fishing season (0 t in 2018–19 fishing season) [Emery et al. 2020]. Discards are not known [Burch et al. 2019]. 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, the Cascade Plateau biological stock is classified as a **sustainable stock**.

Eastern Zone

Orange Roughy (Eastern Zone) in Commonwealth fisheries is managed as a Tier 1 stock under the SESSF Harvest Strategy Framework [AFMA, 2019]. The 2017 Tier 1 stock assessment [Haddon, 2017] informed the management of the stock for the 2019–20 fishing season. The assumed stock structure is a combination of eastern zone (primarily St Helens Hill and St Patricks Head) and Pedra Branca from the southern zone. This is based on the hypothesis that a proportion of Orange Roughy (Southern Zone) migrate to the main spawning grounds in the Eastern Zone (St Helens Hill or St Patricks Head) to spawn in winter [Upston et al. 2014].

The 2017 base-case assessment [Haddon 2017] estimated that the spawning stock biomass at the start of 2017 was 34 per cent of the unfished spawning stock biomass (0.34SB0), which is above the limit reference point. The stock is therefore unlikely to be depleted and recruitment is unlikely to be impaired.

Forward projection of the base-case assessment in accordance with the Commonwealth Harvest Strategy Policy to limit fishing pressure to a level that is likely to allow a sustained increase in spawning biomass led to an RBC of 1 347 t for the 2019–20 fishing season and a 3-year-average RBC of 1 345 t. Because the stock assessment was for the Eastern Zone stock plus the Pedra Branca seamount (in the Southern Zone), it was necessary to allocate the TAC between the Eastern and Southern Zone management units. This allocation was based on historical effort data and stock assessment allocations, resulting in a 7 per cent allocation to the Southern (Pedra Branca) zone and a 93 per cent allocation to the Eastern Zone. The TAC for Orange Roughy (Eastern Zone) was 900 t for the 2019–20 fishing season. Commonwealth landed catch in the trawl sector of the SESSF was 618.5 t in the 2019–20 fishing season (855.8 t in 2018–19 fishing season) [Emery et al. 2020]. Discards have been estimated to be 2.6 t based on the weighted average of the previous four fishing seasons (2015–16 to 2018–19) [Burch et al., 2019], which when combined, is below the RBC of 1 347 t calculated from the 2017 assessment and below the 900 t TAC. This level of

fishing pressure is unlikely to cause the stock to become recruitment impaired.

Based on the evidence provided above, the Eastern Zone management unit is classified as a **sustainable stock**.

Great Australian Bight

No quantitative stock assessment has been conducted for Orange Roughy (Great Australian Bight) because the available data are sporadic and spatially scattered [Knuckey et al. 2010]. The most recent review of data in this fishery was completed in 2004 [Wayte 2004].

Early catches were reported as coming from temporary feeding aggregations associated with cold-water upwelling off Kangaroo Island and Port Lincoln. Catches from these aggregations ranged from 2 500–3 784 t [Newton 1989]. Aggregations have not been found in the same locations since then [Wayte 2004]. A spawning aggregation was discovered in 1990 on a ridge 30 nautical miles from the Port Lincoln grounds [Newton and Turner 1990]. This aggregation, which has not been seen since, initially supported high trawl catches of around 40 t per shot, typical of lightly exploited Orange Roughy fisheries, but only yielded a total catch of 800 t before catch rates declined.

Orange Roughy was listed as conservation dependent under the *Environment Protection and Biodiversity Conservation Act 1999* in 2006. A deepwater management strategy was implemented to address the requirements of the Orange Roughy Conservation Programme [AFMA 2006], under which commercial fishing was closed in several Orange Roughy zones in the Great Australian Bight, particularly the areas deeper than 700 m. More than 96 per cent of the historical catch (1988–2005) and more than 99 per cent of the more recent catch (2001–05) was taken in these closed zones. Until sustainable harvest levels can be determined, fishing will be allowed in these zones only under a research programme that has been approved by the Australian Fisheries Management Authority. The Orange Roughy incidental catch allowance was 50 t for the 2018–19 and 2019–20 fishing seasons with zero reported catch.

As there have been no recent surveys and there is no representative catch-trend data to determine the abundance of Orange Roughy (Great Australian Bight), the stock biomass is uncertain. There is insufficient information available to confidently classify the status of this stock.

On the basis of the evidence provided above, the Great Australian Bight management unit is classified as an **undefined stock**.

South Tasman Rise

The only assessment of the Orange Roughy (South Tasman Rise) used catches and catch rates in a standardised catch per tow analysis, as well as examining acoustic data collected during the winter spawning seasons of 1998–2002 [Wayte et al. 2003]. Standardised catch per tow analysis indicated that catch rates declined by 92 per cent between 1997–98 and 2002–03 [Wayte et al. 2003].

Anecdotal information suggests that illegal catches in 1999 may have been substantially higher than documented. These illegal catches may have contributed to reduction of the initial (and likely relatively small) stock biomass, producing the reduced catches and catch rates recorded in 2002–03 [Wayte et al. 2003]. No recovery was evident after this, and estimated relative abundance in 2002–03 was only eight per cent of abundance in 1997–98 [Wayte et al. 2003]. No significant acoustic marks, indicative of spawning aggregations, were apparent during industry surveys in 2000, 2001 or 2002. The assessment concluded that there was little doubt that the stock size, or the availability of fish to the fishery, had decreased dramatically after the first couple of years of the fishery and had shown no signs of recovery. The fishery has not been surveyed since 2002 and has been closed since 2007–08. The biomass of this stock is

likely to be depleted and recruitment is likely to be impaired.

The above evidence indicates that the absence of fishing should allow the stock to recover from its recruitment impaired state. However, detection of increases in biomass has not been attempted.

On the basis of the evidence provided above, the South Tasman Rise biological stock is classified as a **depleted stock**.

Southern Zone

Orange Roughy (Southern Zone) in Commonwealth fisheries is currently managed under a rebuilding strategy [AFMA 2014]. In 2006, the species was listed as conservation dependent under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The last assessment of Orange Roughy (Southern Zone) in 2000 used standardised catch-per-shot abundance indices from vessels that had regularly fished this zone to estimate abundance in 2001 to be below the limit reference point, at 7 per cent of unfished levels (0.07SB0) [Wayte 2002]. Because there has been no update to the analysis, the South East Resource Assessment Group continues to advise a RBC of zero. The above evidence indicates that the stock is depleted and that recruitment is likely to have been impaired.

Following the institution of the rebuilding strategy, Orange Roughy (Southern Zone) is limited to incidental catch allowances, to allow for unavoidable catches while targeting other species. Consequently, AFMA set an incidental catch allowance of 31 t for the 2019–20 fishing season, with an additional 63 t allocated for the Pedra Branca area (assessed as part of Orange Roughy (Eastern Zone)). Commonwealth landed catch in the trawl sector of the SESSF was 91.1 t in the 2019–20 fishing season (78.5 t in 2018-19 fishing season) [Emery et al. 2020]. Discards are not known [Burch et al., 2019]. There are no reliable indicators to determine if this level of fishing mortality will allow the stock to rebuild.

On the basis of the evidence provided above, and in the absence of any evidence to suggest that the stock has rebuilt to above the limit reference point, the Southern Zone (Commonwealth) management unit is classified as a **depleted stock**.

Western Zone

Orange Roughy (Western Zone) in Commonwealth fisheries is currently managed under a rebuilding strategy [AFMA 2014]. In 2006, the species was listed as conservation dependent under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The last accepted assessment of Orange Roughy (Western Zone) was in 2002. It projected that there was a greater than 90 per cent probability that the 2004 biomass would be less than 30 per cent of the 1985 biomass [Wayte and Bax 2002]. A comparison of the age composition in 1994 to 1996 with that in 2004 showed a marked reduction in the modal age, indicating a heavily fished stock, although it is uncertain whether all the otolith samples were from the same stock. In 2017, a preliminary age-based surplus production model was applied to the stock [Haddon 2018], which indicated a potential recovery in the stock, with a spawning biomass depletion of 32 per cent (0.32SB0) estimated for 2015. This preliminary model was not recommended for use in management, but the improvement in spawning biomass suggested that further sampling and exploration of the condition of the stock was warranted. Because there has been no update to the assessment, the South East Resource Assessment Group continues to advise a RBC of zero. The above evidence indicates that the stock is depleted and that recruitment is likely to have been impaired.

Following the institution of the rebuilding strategy, Orange Roughy (Western Zone) is limited to incidental catch allowances, to allow for unavoidable catches

while targeting other species. Consequently, AFMA set an incidental catch allowance of 60 t for the 2019–20 fishing season. Commonwealth landed catch in the trawl sector of the SESSF was 24 t in the 2019–20 fishing season (19 t in 2018–19 fishing season) [Emery et al. 2020]. Discards have been estimated to be 29.9 t based on the weighted average of the previous four fishing seasons (2015–16 to 2018–19) [Burch et al. 2019]. There are no reliable indicators to determine if this level of fishing mortality will allow the stock to rebuild.

On the basis of the evidence provided above, and in the absence of any evidence to suggest that the stock has rebuilt to above the limit reference point, the Western Zone (Commonwealth) management unit is classified as a **depleted stock**.

BIOLOGY

Orange Roughy biology [Fenton et al. 1991, Thomsen 1998, Kloser et al. 2015, Froese and Paul 2016]

Species	Longevity / Maximum Size	Maturity (50 per cent)
Orange Roughy	149 years, 750 mm TL	~27–32 years, ~350–370 mm TL

DISTRIBUTION



Distribution of reported commercial catch of Orange Roughy

TABLES

Fishing methods	Commonwealth
Commercial	
Otter Trawl	✓

Management Methods	
	Commonwealth
Commercial	
Gear restrictions	✓
Limited entry	✓
Marine park closures	✓
Quota	✓
Spatial closures	✓
Total allowable catch	✓
Total allowable catch (incidental)	✓

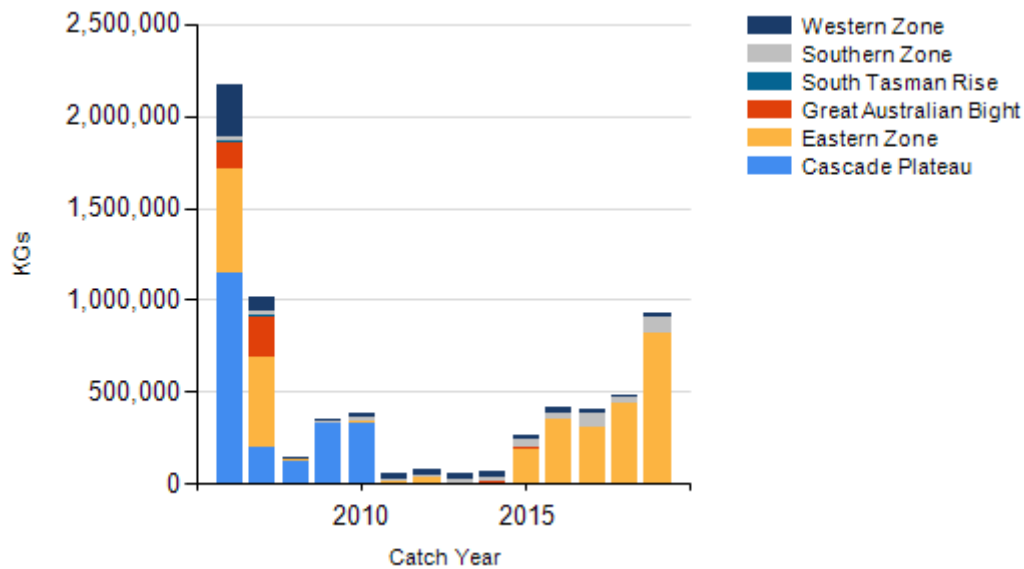
Catch	
	Commonwealth
Commercial	927.38 t

Commonwealth – Commercial (Management Methods/Catch) Data provided for the Commonwealth align with the Commonwealth Southern and Eastern Scalefish and Shark Fishery for the 2018-19 financial year.

Commonwealth – Recreational The Commonwealth does not manage recreational fishing in Commonwealth waters. Recreational fishing in Commonwealth waters is managed by the state or territory immediately adjacent to those waters, under its management regulations.

Commonwealth – Indigenous The Australian government does not manage non-commercial Indigenous fishing in Commonwealth waters, with the exception of Torres Strait. In general, non-commercial Indigenous fishing in Commonwealth waters is managed by the state or territory immediately adjacent to those waters.

CATCH CHART



Commercial catch of Orange Roughy - note confidential catch not shown

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