

Orange Roughy (2016)

Hoplostethus atlanticus



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STOCK STATUS OVERVIEW

Jurisdiction	Stock	Fisheries	Stock status	Indicators
Commonwealth	Cascade Plateau	SESSF (CTS)	Sustainable	Biomass, fishing mortality
Commonwealth	Eastern Zone	SESSF (CTS)	Sustainable	Biomass, fishing mortality
Commonwealth	Great Australian Bight	SESSF (GABTS)	Undefined	Catch history
Commonwealth	South Tasman Rise	STRTF	Overfished	Catch history, catch rates
Commonwealth	Southern Zone	SESSF (CTS)	Overfished	Biomass, fishing mortality
Commonwealth	Western Zone	SESSF (CTS)	Overfished	Biomass, fishing mortality

SESSF (CTS) Southern and Eastern Scalefish and Shark Fishery (Commonwealth Trawl Sector) (CTH), SESSF (GABTS) Southern and Eastern Scalefish and Shark Fishery (Great Australian Bight Trawl Sector) (CTH), STRTF South Tasman Rise Trawl Fishery (CTH)

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 on the Cascade Plateau has distinct morphometrics, parasite populations, size and age composition, and spawning time, and is considered to be a separate stock[1]. 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[2], although Australian and New Zealand stocks could not be differentiated.

Recent research[3] using single nucleotide polymorphism techniques concluded that there was genetic connectivity between Orange Roughy across five fishing areas off the Tasmanian coast.

However, it remains unclear whether there is a single panmictic population or several highly connected populations.

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	<p>The most recent (2006) stock assessment for Orange Roughy on the Cascade Plateau estimated female spawning biomass to be 72–73 per cent of the unfished biomass and produced a long-term recommended biological catch of 315 t[10]. The stock is not considered to be recruitment overfished.</p> <p>Noting low fishing effort, catches and a lack of new data, the Australian Fisheries Management Authority implemented a 500 t 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 data, the assessment was postponed. Fishing effort has been negligible in recent years; only 2 t of Orange Roughy from this stock was landed in 2015–16, indicating that the stock is not being recruitment overfished.</p> <p>The most recent assessment estimated the spawning biomass at 63 per cent of unfished levels, and fishing effort and catch have been negligible in recent years.</p> <p>On the basis of the evidence provided above, the Cascade Plateau biological stock is classified as a sustainable stock.</p>
Eastern Zone	<p>The most recent stock assessment in 2014 predicted female spawning biomass in 2015 to be 26 per cent, with an estimated unfished female spawning biomass of 38 727 tonnes (t)[4]. The stock structure assumption used in the Eastern zone stock assessment model is based on the hypothesis that a proportion of Southern zone Orange Roughy migrate to the main spawning grounds in the Eastern zone (St Helens Hill or St Patricks Head) to spawn in winter[4].</p> <p>The stock assessment model assumes zero deviation from the stock recruitment relationship from 1980 onwards. This results in uncertainty around the impact of historical overfishing on the stock because recruits from the peak period of fishing are only now entering the fishery. Adding to this uncertainty, there is some evidence for compensatory decreases in length at maturity and increases in fecundity for overfished Orange Roughy stocks[5–6]. While the stock assessment indicates a high probability that the stock is above the limit reference point of 20 per cent of unfished biomass, these uncertainties mean that the time the stock will take to rebuild to the target reference point is highly uncertain. Given that the stock is near the limit reference point, and because of these aforementioned uncertainties, it is not possible to make a definitive statement about whether or not the stock is considered to be recruitment overfished.</p> <p>The total allowable catch (TAC) was set at 500 t for the 2015–16, 2016–17 and 2017–18 fishing seasons[7]. The TAC was derived from assessment results 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. 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</p>

a seven per cent allocation to the Southern (Pedra Branca) zone and a 93 per cent allocation to the Eastern zone. This resulted in an Eastern zone TAC of 465 t for the 2015–16 fishing season, of which 436 t was landed.

As catch of Orange Roughy in the Eastern zone was constrained to within the TAC, this level of fishing pressure is unlikely to cause further stock depletion.

Fishing mortality is being appropriately controlled; an updated Eastern zone stock assessment showed that the stock has rebuilt to above the limit reference point.

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 in the Southern and Eastern Scalefish and Shark Fishery Great Australian Bight Trawl Sector (Commonwealth) (SESSF [GABTS]) because the available data are sporadic and spatially scattered[11]. The most recent review of data for Orange Roughy in this fishery was completed in 2004[13].

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 2500–3784 t[13]. Aggregations have not been found in the same locations since then[14]. A spawning aggregation was discovered in 1990 on a ridge 30 nautical miles from the Port Lincoln grounds[15]. 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[16], 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 allocated research quota for the 2015–16 season was 200 t; none was used. The Orange Roughy incidental catch allowance remained at 50 t for the 2015–16 fishing season, with zero reported catch. Existing management arrangements in the SESSF (GABTS) fishery have been maintained under the updated Orange Roughy Rebuilding Strategy[17].

As there have been no recent surveys and there is no representative catch-trend data to determine the abundance of Orange Roughy in the 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 stock within the South Tasman Rise Trawl Fishery 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[11]. Standardised catch per tow analysis indicated that catch rates declined by 92 per cent between 1997–98 and 2002–

03[12].

Anecdotal information suggests that illegal catches in 1999 may have been substantially higher than documented. These reductions in catch and catch rate, when the cumulative total reported catch was 11 341 t, indicate that the initial stock biomass was not large and had been considerably reduced by 2002–03[12].

No recovery was evident after this, and estimated relative abundance in 2002–03 was only eight per cent of abundance in 1997–98[12]. 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 stock is considered to be recruitment overfished.

The above evidence indicates that the absence of fishing should allow the stock to recover from its recruitment overfished state. However, measureable improvements are yet to be detected.

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

Southern Zone

The assessment for the Southern zone has not been updated since 2000. Standardised catch per shot abundance indices, using only data from vessels that had regularly fished this zone, estimated the abundance in 2001 to be about seven per cent of unfished levels (spawning biomass of 0.07SB0)[8]. Because there has been no update to the assessment of the Southern stock, the Slope Resources Assessment Group continues to advise a recommended biological catch of zero. The stock is considered to be recruitment overfished.

There is a current incidental catch allowance of 35 t and with the allocation from the Eastern zone stock of 31 t, the TAC was 66 t for the 2015–16 fishing season. Of this, 57 t was caught in 2015–16. The above evidence indicates that management measures are currently constraining fishing pressure to a level that should allow the stock to recover from its recruitment overfished state. However, measureable improvements are yet to be detected.

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 management unit is classified as an **overfished stock**.

Western Zone

The Western zone was most recently assessed in 2002. This assessment estimated that there was a greater than 90 per cent probability that the 2004 biomass was less than 30 per cent of the 1985 biomass[9]. No evidence has been found of spawning aggregations in this region. The stock is considered to be recruitment overfished.

Because there has been no update to the assessment of the Western stock, Slope Resources Assessment Group continues to advise a recommended biological catch of zero. There is a current incidental catch allowance of 60 t and catches in the Western zone have been low (22 t in 2015–16). The above evidence indicates that management measures are currently constraining fishing pressure to a level that should allow the stock to recover from its recruitment overfished state. However, measureable improvements are yet to be detected.

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 management unit is classified as an **overfished stock**.

BIOLOGY

Orange Roughy biology[18–21]

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

DISTRIBUTION



Distribution of reported commercial catch of Orange Roughy

TABLES

Commercial Catch Methods	Commonwealth
Otter Trawl	✓
Unspecified	✓

Fishing methods	Commonwealth
Commercial	
Otter Trawl	✓
Unspecified	✓

Management Methods	

	Commonwealth
Commercial	
Limited entry	✓
Spatial closures	✓
Total allowable catch	✓

Active Vessels	Commonwealth
	38 Vessel in SESSF (CTS), 3 Vessel in SESSF (GABTS), 0 Vessel in STRTF,

SESSF (CTS) Southern and Eastern Scalefish and Shark Fishery (Commonwealth Trawl Sector)(CTH)

SESSF (GABTS) Southern and Eastern Scalefish and Shark Fishery (Great Australian Bight Trawl Sector)(CTH)

STRTF South Tasman Rise Trawl Fishery(CTH)

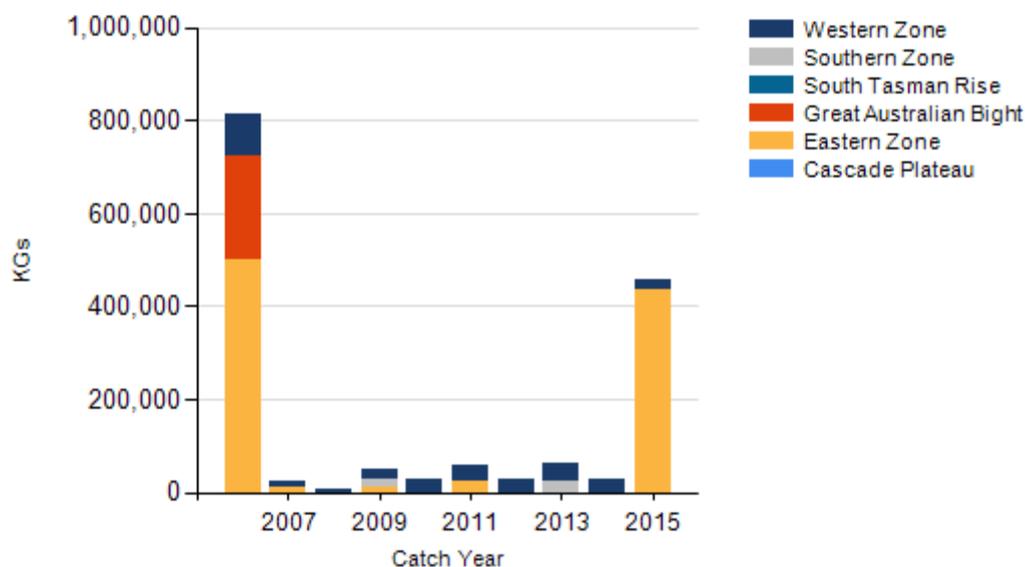
Catch	Commonwealth
Commercial	458.68t in SESSF (CTS),
Indigenous	Unknown
Recreational	Unknown

SESSF (CTS) Southern and Eastern Scalefish and Shark Fishery (Commonwealth Trawl Sector) (CTH), SESSF (GABTS) Southern and Eastern Scalefish and Shark Fishery (Great Australian Bight Trawl Sector) (CTH), STRTF South Tasman Rise Trawl Fishery (CTH),

a Commonwealth – Recreational The Australian Government 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.

b 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

EFFECTS OF FISHING ON THE MARINE ENVIRONMENT

- Most of the catch of Orange Roughy is taken by targeting spawning aggregations using demersal trawl gear. Consequently, bycatch in this fishery is generally low compared to other trawl fisheries that target multiple species.
- There is bycatch in the fish trawl sector. In 2006, mandatory requirements for otter trawls to use 90 mm square-mesh codend panels were introduced in an effort to reduce the bycatch of small species and juvenile fish[22].
- Interactions can occur with animals protected under the *Environment Protection and Biodiversity Conservation Act 1999*, including marine mammals (dolphins, seals and sea lions), seabirds, some shark species and seahorses and pipefish (syngnathids). These interactions are reported quarterly by the Australian Fisheries Management Authority (AFMA)[23] and on-board observer programs are used to validate the reporting in commercial logbooks.
- In 2007, the South East Trawl Fishing Industry Association released an industry code of practice that aims to minimise interactions with fur seals, as well as addressing the environmental impacts of the fishery more generally[24]. Operators have developed other mitigation protocols that have further reduced seal mortalities, including using breakaway ties that keep the net closed until it is below depths that seals regularly inhabit, adopting techniques to close the trawl opening during recovery to minimise opportunities for seals to enter the net, switching off gantry lights that are not required during night trawling to avoid attracting bait species and seals, and dumping offal only when the boat is not engaged in deploying or hauling gear.
- The AFMA mandated individual vessel seabird management plans[25]. The seabird action plans are used in the Southern and Eastern Scalefish and Shark Fishery (Commonwealth Trawl Sector) (SESSF [CTS]) to mitigate the impacts of trawling on seabirds. From 1 May 2017, all vessels in the SESSF (CTS) and Southern and Eastern Scalefish and Shark Fishery (Great Australian Bight Trawl Sector) (Commonwealth) (SESSF [GABTS]) fisheries must use one of the following mitigation devices: sprayers; bird bafflers; or pinkies with zero discharge of fish waste[26].
- The effects of trawl fishing on the marine environment are assessed through an environmental risk assessment and risk management framework and mitigated through spatial closures, and the implementation of bycatch and discard work plans[27,28] in the SESSF (CTS) and SESSF (GABTS) fisheries.

ENVIRONMENTAL EFFECTS on Orange Roughy

- Potential effects of climate change on south-east Australian demersal fisheries include changes in distribution, and both negative and positive impacts on recruitment, growth rates and abundance[29].

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