

# Rankin Cod (2018)

*Epinephelus multinotatus*



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## STOCK STATUS OVERVIEW

Jurisdiction	Stock	Fisheries	Stock status	Indicators
Western Australia	Kimberley	NDSMF	Sustainable	Indicator species status, catch
Western Australia	Pilbara	PFTIMF, PFTIMF    PLF    PTMF, PLF, PTMF	Sustainable	Spawning stock level, age structure, catch, CPUE
Northern Territory	Northern Territory	DF, TRF	Sustainable	Catch, SAFE assessment (fishery distribution range, fishing mortality rate)

DF Demersal Fishery (NT), TRF Timor Reef Fishery (NT), NDSMF Northern Demersal Scalefish Managed Fishery (WA), PFTIMF Pilbara Fish Trawl (Interim) Managed Fishery (WA), PLF Pilbara Line Fishery (WA), PTMF Pilbara Trap Managed Fishery (WA), PFTIMF || PLF || PTMF Various Fisheries combined due to 3 boat rule (WA)

## STOCK STRUCTURE

Rankin Cod is exploited primarily in the North Coast Bioregion of Western Australia [Newman et al. 2018a]. Catches of Rankin Cod taken in the Northern Territory are low. Rankin Cod is one of the indicator species used to assess the status of the demersal resources in the Pilbara subregion of the North Coast Bioregion [Newman et al. 2018b]. Johnson et al. [1993] examined allozymes (allelic variants of enzymes encoded by structural genes) from samples of Rankin Cod from the Lacepede Islands, Bedout Island, Lowendal Islands, Ningaloo and Shark Bay. There was evidence of a low level of genetic variation, indicating extensive connectivity among populations over large distances (at least 1 400 km). It was noted that no adjacent samples differed significantly, suggesting a latitudinal clinal change [Johnson et al. 1993], and a high degree of connection across populations throughout the sampled range (1 400 km) in Western Australia. Stephenson et al. [2001] examined stable isotopes in sagittal otolith carbonates of Rankin Cod from four locations; Shark Bay (Gascoyne), Ningaloo (Gascoyne), Pilbara, and Broome (Kimberley). The results of Stephenson et al. [2001] indicated that adult Rankin Cod do not mix extensively.

There is no evidence of discrete breeding populations of Rankin Cod in Western Australia, indicating that there is one biological stock. Although adults do not mix extensively, they all contribute to the total adult spawning biomass and larval dispersal. However, the limited mixing of adults among locations indicates some potential for localised depletion and supports the use

of regional fishery management boundaries in Western Australia (e.g. Pilbara and Kimberley). Given the large distances involved and uncertainty over actual mixing rates of juveniles and adults, the regionally separate stock assessments are appropriate for managing potentially different levels of fishing pressure and stock status of this resource in the Kimberley and Pilbara regions.

Here, assessment of stock status is presented at the management unit level—Pilbara and Kimberley (Western Australia); and at the jurisdictional level—Northern Territory.

## STOCK STATUS

**Kimberley** Rankin Cod is landed in the Northern Demersal Scalefish Managed Fishery (NDSMF) in the Kimberley management region of the North Coast Bioregion of Western Australia [Newman et al. 2018a]. Rankin Cod is assessed on the basis of the status of two indicator species (Red Emperor and Goldband Snapper) that represent the entire inshore demersal suite of species occurring at depths of 30–250 m [Newman et al. 2018b]. The major performance measures for these indicator species are estimates of spawning stock levels. Detailed integrated assessments of indicator species are undertaken every 4–5 years. The target level of spawning biomass is 40 per cent of the unfished level. The limit level is 30 per cent of the estimate of initial spawning biomass [DPIRD 2017]. The spawning biomass levels of these two indicator species were either greater than the target level or between the target level and the threshold level in the NDSMF in 2014 [Newman et al. 2018a]. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired.

The catch of Rankin Cod in the NDSMF has been stable and consistent for the past five years (2013–17), ranging from 51–80 t, with a mean annual catch of 63 t. The total recreational and charter catch for Western Australia was estimated at 18 t and 14 t respectively [DPIRD unpublished, Ryan et al. 2017]. These catch levels are less than those in the Pilbara management unit, for which the fishing mortality rate has been assessed to be between the threshold and target levels. 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 Kimberley management unit is classified as a **sustainable stock**.

**Northern Territory** Only small quantities of Rankin Cod have been caught by the Demersal Fishery and the Timor Reef Fishery since they began operating. Most recently, catches have been 0.23 t in the Demersal Fishery and 5.91 t in the Timor Reef Fishery. Because this species has always been an incidental catch in these fisheries, and is unlikely to be caught by recreational fishers (given its offshore distribution), a semi-quantitative sustainable assessment for fishing effects model [Zhou and Griffiths 2008] was used to assess the fishing mortality rate on this species, using data up to 2015. The model outputs indicated that there is a low risk of Rankin Cod being overfished at current levels of harvest, as there is very little spatial overlap in the area of fishing activity compared to the geographic distribution of this species in Northern Territory waters. Furthermore, fishing activity for this incidental species is constrained by the boundaries of the Demersal and Timor Reef fisheries. The above evidence indicates that the biomass of this stock is unlikely to be depleted, that recruitment is unlikely to be impaired; and 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, Rankin Cod in the Northern Territory management unit is classified as a **sustainable stock**.

**Pilbara**

Rankin Cod is landed in the Pilbara Demersal Scalefish Fisheries (PDSF), which includes the Pilbara Fish Trawl (Interim) Managed Fishery, the Pilbara Trap Managed Fishery and the Pilbara Line Fishery in the Pilbara management region of the North Coast Bioregion of Western Australia [Newman et al. 2018a]. The major performance measures for the Pilbara management unit are based on estimates of current spawning stock levels of Rankin Cod in the Pilbara Demersal Scalefish Fisheries. The target level of spawning biomass is 40 per cent of unfished (1972) biomass. The limit level is 30 per cent of the unfished spawning biomass [DPIRD 2017]. The spawning biomass level of Rankin Cod overall (across all management areas) was assessed to be greater than 40 per cent in the Pilbara Demersal Scalefish Fisheries in 2015 (the year the last integrated assessment was undertaken), using an integrated age structured model. Detailed integrated assessments are undertaken every 4–5 years. Estimates of relative spawning biomass for Rankin Cod from the integrated assessment have fluctuated above the target level since 1990. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired.

The catch of Rankin Cod in the PDSF has been variable but increasing for the past five years (2013–17), ranging from 45–154 tonnes (t), with a mean annual catch of 85 t. The total recreational and charter catch for Western Australia was estimated at 18 t and 14 t respectively [Ryan et al. 2017; DPIRD unpublished]. An assessment of fishing mortality derived from representative samples of the age structure of Rankin Cod has also been undertaken for separate management areas in the Pilbara subregion in 2015. These fishing mortality (F)-based assessments utilise the following reference levels based on ratios of natural mortality (M) that are applicable to each species, such that  $F_{target} = 2/3M$ ,  $F_{threshold} = M$  and  $F_{limit} = 3/2M$  [DPIRD 2017]. The fishing mortality based assessments and associated uncertainty ranges indicated that the fishing mortality levels on Rankin Cod in 2015 were mainly between target and threshold levels in all management areas. The above evidence indicates that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

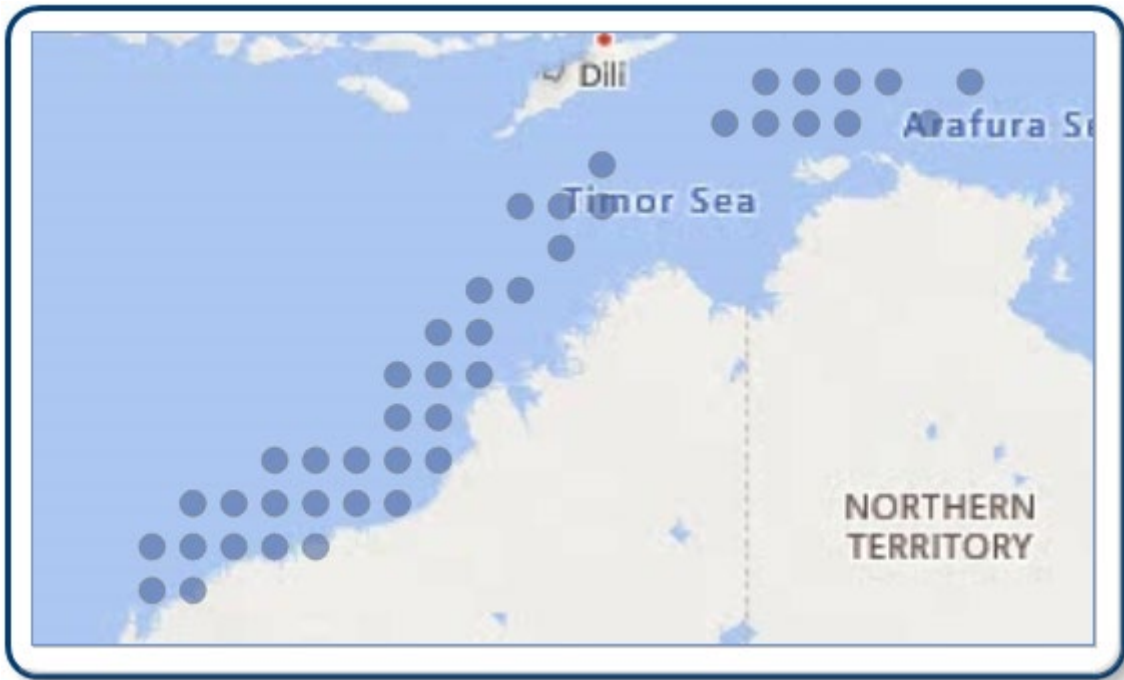
On the basis of the evidence provided above, the Pilbara management unit is classified as a **sustainable stock**.

**BIOLOGY**

**Rankin Cod biology** [Wakefield et al. unpublished data]

Species	Longevity / Maximum Size	Maturity (50 per cent)
Rankin Cod	24 years, 776 mm FL	2 years, 391 mm FL

**DISTRIBUTION**



Distribution of reported commercial catch of Rankin Cod

TABLES

Commercial Catch Methods	Northern Territory	Western Australia
Demersal Longline	✓	
Dropline	✓	
Fish Trap	✓	✓
Hand Line, Hand Reel or Powered Reels		✓
Otter Trawl	✓	✓
Unspecified		✓

Fishing methods	Northern Territory	Western Australia
<b>Charter</b>		
Hook and Line		✓
Various		✓
<b>Commercial</b>		
Fish Trap	✓	✓
Hand Line, Hand Reel or Powered Reels		✓
Otter Trawl		✓
Unspecified		✓
<b>Recreational</b>		
Hook and Line	✓	✓
Spearfishing		✓

<b>Management Methods</b>		
	<b>Northern Territory</b>	<b>Western Australia</b>
<b>Charter</b>		
Bag limits		✓
Limited entry		✓
Passenger restrictions		✓
Spatial closures		✓
Spatial zoning		✓
<b>Commercial</b>		
Effort limits		✓
Gear restrictions	✓	✓
Limited entry	✓	✓
Size limit		✓
Spatial closures	✓	✓
Spatial zoning	✓	✓
Total allowable catch	✓	✓
Total allowable effort		✓
Vessel restrictions		✓
<b>Indigenous</b>		
Laws of general application		✓
<b>Recreational</b>		
Bag limits		✓
Licence (Recreational Fishing from Boat License)		✓
Possession limit	✓	✓
Spatial closures		✓
<b>Active Vessels</b>		
	<b>Northern Territory</b>	<b>Western Australia</b>
	8 LICENCES in DF, 5 LICENCES in TRF,	&lt;3 in PFTIMF, 7 in PLF, &lt;3 in PTMF. 13 in

		Charter, 5 in NDSF,
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**DF** Demersal Fishery(NT)

**TRF** Timor Reef Fishery(NT)

**PFTIMF** Pilbara Fish Trawl (Interim) Managed Fishery(WA)

**PLF** Pilbara Line Fishery(WA)

**PTMF** Pilbara Trap Managed Fishery(WA)

**Charter** Tour Operator(WA)

**NDSF** Northern Demersal Scalefish Fishery(WA)

Catch		
	Northern Territory	Western Australia
<b>Charter</b>		14.0 t
<b>Commercial</b>	0.2272t in DF, 5.908t in TRF,	68.6571t in NDSMF, 154.053t in PFTIMF    PLF    PTMF,
<b>Indigenous</b>	Unknown	Unknown
<b>Recreational</b>	Unknown	17.76 t ± 2.08 t se

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**Western Australia – Commercial (management methods)** Rankin Cod forms part of the combined Total Allowable Commercial Catch for other mixed demersal species in the Gascoyne Demersal Scalefish Managed Fishery.

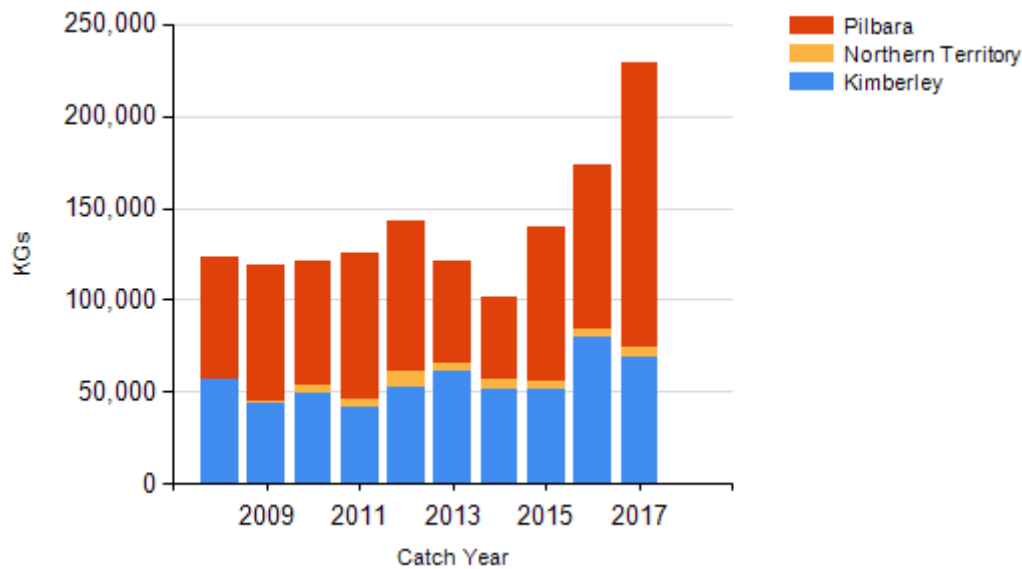
**Western Australia – Active Vessels** Data is confidential as there were fewer than three vessels in Pilbara Fish Trawl Interim Managed Fishery (Western Australia) and Pilbara Trap Managed Fishery (Western Australia).

**Western Australia – Recreational (Catch)** Boat-based recreational catch is from 1 September 2015–31 August 2016. These data are derived from those reported in Ryan et al. [2017].

**Western Australia – Recreational (management methods)** A Recreational Fishing from Boat License is required for the use of a powered boat to fish or to transport catch or fishing gear to or from a land-based fishing location.

**Western Australia – Indigenous** Subject to the defence that applies under Section 211 of the *Native Title Act 1993* (Cth), and the exemption from a requirement to hold a recreational fishing licence, the non-commercial take by indigenous fishers is covered by the same arrangements as that for recreational fishing.

## CATCH CHART



Commercial catch of Rankin Cod - note confidential catch not shown

## EFFECTS OF FISHING ON THE MARINE ENVIRONMENT

### ENVIRONMENTAL EFFECTS on Rankin Cod

References	
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