

Rankin Cod (2020)

Epinephelus multinotatus



Stephen Newman: Department of Primary Industries and Regional Development, **Thor Saunders:** Department of Industry, Tourism and Trade, Northern Territory, **Fabian Trinnie:** Department of Primary Industries and Regional Development, **Corey Wakefield:** Department of Primary Industries and Regional Development

STOCK STATUS OVERVIEW

| Jurisdiction | Stock | Stock status | Indicators |
|---------------------------------------|-------------------------|--------------|--|
| Western Australia | Pilbara | Sustainable | Spawning stock level, age structure, catch, CPUE |
| Western Australia, Northern Territory | North-western Australia | Sustainable | Catch, indicator species status |

STOCK STRUCTURE

Rankin Cod are widely distributed throughout the Indian Ocean. Within Australia, Rankin Cod are distributed from the Houtman Abrolhos Islands in Western Australia, north to the waters offshore from Darwin in the Northern Territory. Rankin Cod is exploited primarily in the North Coast Bioregion of Western Australia [Newman et al. 2020]. 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. 2018].

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

Northern Territory combined) and Pilbara regions.

Here, assessment of stock status is presented at the management unit level—Pilbara and North-western Australia.

STOCK STATUS

North-western Australia

Rankin Cod is landed in the Northern Demersal Scalefish Managed Fishery (NDSMF) in the Kimberley region of the North Coast Bioregion of Western Australia [Newman et al. 2020]. 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. 2018]. 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, with a threshold reference level of 30 per cent and a limit reference level of 20 per cent of the estimate of initial spawning biomass [DPIRD 2017]. The spawning biomass levels of these two indicator species were at the threshold level in the NDSMF in 2017 [Newman 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 catch of Rankin Cod in the NDSMF has been variable for the past 10 years (2010–19), ranging from 41–80 t, with a mean annual catch of 56 t. 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.

For the Northern Territory part of the management unit, only relatively small catches are recorded in the Timor Reef and Demersal fisheries. Targeting of Rankin Cod by these fisheries is constrained by the fact that this species distribution largely resides outside of these fisheries boundaries. As a result, during the period 2010–2019 the average annual catch by these fisheries was < 4.5 t. Additionally, the generally offshore distribution of Rankin Cod in NT waters means that the recreational and Fishing Tour Operator landings are likely to be negligible. Consequently, the Northern Territory component is considered to only contribute a negligible catch to this stock.

On the basis of the evidence provided above, the North-western Australia 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. 2018]. 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, with a threshold reference level of 30 per cent and a limit reference level of 20 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 over the last 10 years (2010–2019) have ranged from 45–230 t. The catch of Rankin Cod has been increasing for the past five years (2015–19), ranging from 84–230 tonnes (t), with a mean annual catch of 138 t. 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.

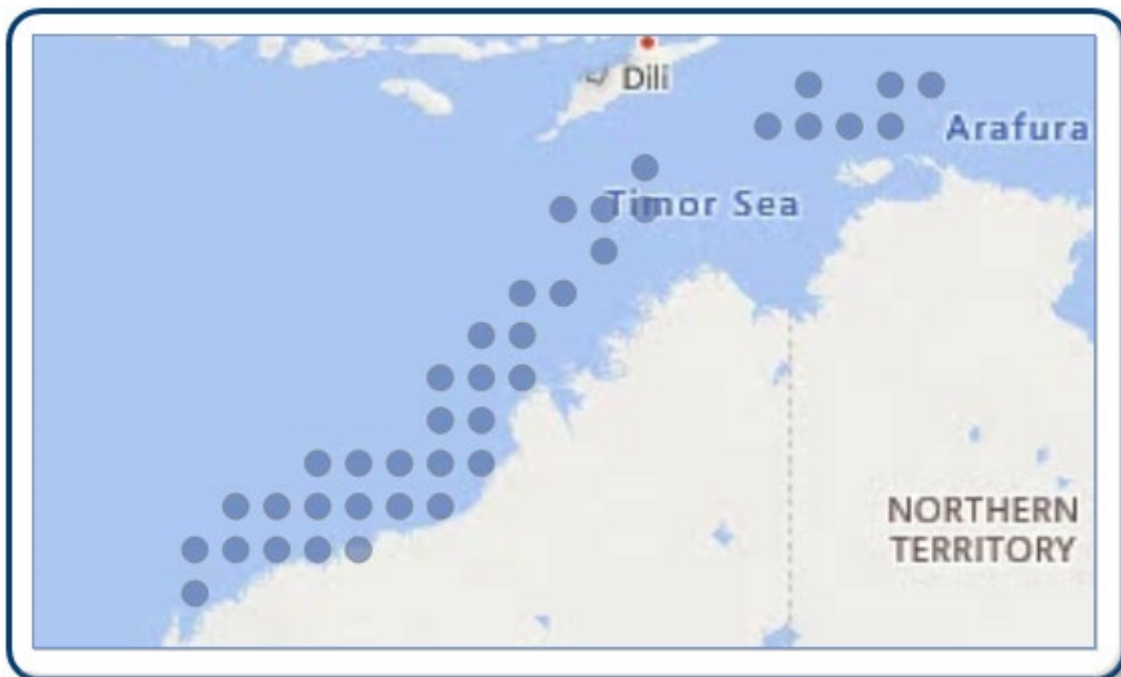
On the basis of the evidence provided above, the Pilbara management unit is classified as a **sustainable stock**.

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

| Fishing methods | | |
|--|---------------------------|--------------------------|
| | Northern Territory | Western Australia |
| Charter | | |
| Hook and Line | ✓ | |
| Rod and reel | | ✓ |
| Spearfishing | | ✓ |
| Commercial | | |
| Fish Trap | ✓ | ✓ |
| Hand Line, Hand Reel or Powered Reels | | ✓ |
| Otter Trawl | | ✓ |
| Recreational | | |
| Hook and Line | ✓ | ✓ |
| Spearfishing | | ✓ |

| Management Methods | | |
|---------------------------|---------------------------|--------------------------|
| | Northern Territory | Western Australia |
| Charter | | |
| Bag limits | | ✓ |
| Limited entry | | ✓ |
| Passenger restrictions | | ✓ |
| Spatial closures | | ✓ |
| Spatial zoning | | ✓ |
| Commercial | | |
| Effort limits | | ✓ |
| Gear restrictions | ✓ | ✓ |
| Limited entry | ✓ | ✓ |
| Size limit | | ✓ |
| Spatial closures | ✓ | ✓ |
| Spatial zoning | ✓ | ✓ |
| Total allowable catch | ✓ | ✓ |
| Total allowable effort | | ✓ |
| Vessel restrictions | | ✓ |
| Recreational | | |
| Bag limits | | ✓ |

| | | |
|---|---|---|
| Licence (Recreational Fishing from Boat License) | | ✓ |
| Possession limit | ✓ | ✓ |
| Spatial closures | | ✓ |

| Catch | Northern Territory | Western Australia |
|--------------|--------------------|-------------------|
| Charter | 0 | 18 t |
| Commercial | 1.9682 t | 240.42 t |
| Indigenous | Unknown | Unknown |
| Recreational | 0 | 27 t (2017/18) |

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.

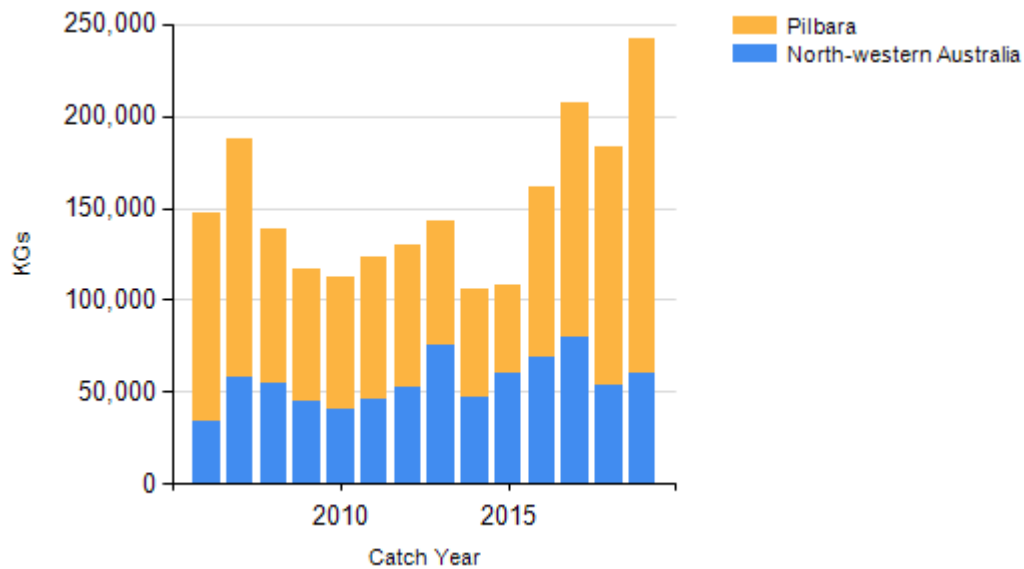
Western Australia – Active Vessels Data is confidential as there were fewer than three vessels in Pilbara Fish Trawl Interim Managed Fishery (Western Australia) and Pilbara Trap Managed Fishery (Western Australia).

Western Australia – Recreational (Catch) Boat-based recreational catch is from 1 September 2017–31 August 2018. These data are derived from those reported in Ryan et al. [2019].

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 (management methods) Subject to application of 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

| References | |
|------------------------|--|
| Johnson et al. 1993 | Johnson MS, Hebbert DR and Moran MJ 1993, Genetic analysis of populations of north-western Australian fish species. <i>Australian Journal of Marine and Freshwater Research</i> , 44: 673–685. |
| DPIRD 2017 | DPIRD 2017, North Coast demersal scalefish resource harvest strategy 2017 – 2021. Version 1.0. Fisheries Management Paper No. 285. Department of Primary Industries and Regional Development, Government of Western Australia, Perth, Australia. 35p. |
| Newman et al. 2020 | Newman, S.J., Wakefield, C., Skepper, C., Boddington, D. and Blay, N. 2020. North Coast Demersal Resource Status Report 2019. pp. 159-168. In: Gaughan, D.J. and Santoro, K. (eds.). <i>Status reports of the fisheries and aquatic resources of Western Australia 2018/19: The State of the Fisheries</i> . Department of Primary Industries and Regional Development, Western Australia, Perth, Australia. 291p. |
| Newman et al. 2018 | Newman SJ, Brown JI, Fairclough DV, Wise BS, Bellchambers LM, Molony BW, Lenanton RCJ, Jackson G, Smith KA, Gaughan DJ, Fletcher WJ, McAuley RB and Wakefield CB 2018, A risk assessment and prioritisation approach to the selection of indicator species for the assessment of multi-species, multi-gear, multi-sector fishery resources. <i>Marine Policy</i> , 88: 11–22. |
| Ryan et al. 2019 | Ryan KL, Hall NG, Lai EK, Smallwood CB, Tate A, Taylor SM and Wise BS 2019. Statewide survey of boat-based recreational fishing in Western Australia 2017/18. Fisheries Research Report No. 297, Department of Primary Industries and Regional Development, Government of Western Australia, Perth. 195pp. |
| Stephenson et al. 2001 | Stephenson PC, Edmonds JS, Moran MJ and Caputi N 2001, Analysis of stable isotopes to investigate stock structure of red emperor and Rankin cod in northern Western Australia. <i>Journal of Fish Biology</i> , 58: 126–144. |