

Red Emperor (2016)

Lutjanus sebae



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STOCK STATUS OVERVIEW

Jurisdiction	Stock	Fisheries	Stock status	Indicators
Western Australia	Gascoyne	GDSMF, WCDSIMF	Sustainable	Age structure, fishing mortality rates of indicator species
Western Australia	Kimberley	NDSMF	Sustainable	Spawning stock level; age structure, catch, <u>CPUE</u>
Western Australia	Pilbara	PTMF, PFTIMF	Sustainable	Spawning stock level; age structure, catch, <u>CPUE</u>
Northern Territory	Northern Territory	DF,CLF,TRF	Undefined	Catch, trigger reference points
Queensland	East Coast Queensland	CRFFF	Undefined	Catch
Queensland	Gulf of Carpentaria	GOCDFFTF, GOCLF	Undefined	Catch, standardised <u>CPUE</u> , observer surveys

DF,CLF,TRF Demersal Fishery, Coastal Line Fishery, Timor Reef Fishery (NT), CRFFF Coral Reef Fin Fish Fishery (QLD), GOCDFFTF Gulf of Carpentaria Developmental Fin Fish Trawl Fishery (QLD), GOCLF Gulf of Carpentaria Line Fishery (QLD), GDSMF Gascoyne Demersal Scalefish Managed Fishery (WA), NDSMF Northern Demersal Scalefish Managed Fishery (WA), PTMF, PFTIMF Pilbara Trap Managed Fishery, Pilbara Fish Trawl (Interim) Managed Fishery (WA), WCDSIMF West Coast Demersal Scalefish (Interim) Managed Fishery (WA)

STOCK STRUCTURE

Red Emperor is exploited primarily in the North Coast Bioregion of Western Australia[1]. Smaller catches are taken in the Northern Territory and Queensland. Red Emperor is one of the indicator species used to assess the status of the demersal resources in the North Coast Bioregion. In Western Australia, analysis of otolith stable isotopes indicates that Red Emperor comprises a number of separate biological stocks, one in each of the main management regions, the Kimberley, the Pilbara and the Gascoyne[2,3]. Reporting of status is undertaken at the level of these individual biological stocks in Western Australia. Because multiple stocks are present within Western Australia, there is a high likelihood of multiple stocks across the Northern Territory and Queensland. However, stock delineation is not currently known in these jurisdictions. In the Northern Territory, status is reported at the jurisdictional level, while in

Queensland, status is reported at the level of management units.

Here, assessment of stock status is presented at the biological stock level—Gascoyne, Pilbara and Kimberley (Western Australia); the jurisdictional level—Northern Territory; and the management unit level—Gulf of Carpentaria and East coast (Queensland).

STOCK STATUS

East Coast Queensland There has been no stock assessment to determine biomass.

The species is mainly harvested by the recreational sector. Recreational catch/harvest estimates^[7] fell from approximately 394 000/47 000 fish in 2000–01, to 89 000/35 000 in 2010–11, to 74 000/16 000 in 2013–14, with a decrease in recreational effort explaining some, but not all, the reduction. A harvest reduction of this magnitude was also reflected in charter catch over the same period (charter fishing is a subset of recreational fishing), mainly over the past 7 years.

Annual commercial catches have been 25–60 t since 2004–05, following several years of much higher catches from 1997–98 to 2004–05 (the catch from 1997–98 to 2004–05 was in the range 100–200 t per year). This decrease coincided with expansion of no-take marine reserves within the Great Barrier Reef Marine Park and the introduction of a quota management system for coral reef fin fish species. Both factors are likely to have influenced commercial catch.

Commercial harvest is not effectively constrained by this species being part of the 'other species' quota category which comprises many other coral reef finfish species, and with there being no individual species cap on any one species in this category. Therefore, there is insufficient information available to confidently classify the status of this stock.

Based on the evidence provided above, the East coast (Queensland) management unit is classified as an **undefined stock**.

Gascoyne The Gascoyne biological stock of Red Emperor is exploited as a component of the Gascoyne Demersal Scalefish Managed Fishery (Western Australia) (GDSMF)^[1]. Red Emperor is assessed on the basis of the status of several indicator species (Snapper—*Chrysophrys auratus*, Goldband Snapper—*Pristipomoides multidens*, Spangled Emperor—*Lethrinus nebulosus*) that represent the inshore demersal suite of species occurring at depths of 30–250 m. The major performance measures for these indicator species are either estimates of current spawning stock biomass levels or fishing mortality based assessments. The target level of spawning biomass is 40 per cent of the unfished level, and the limit level is 30 per cent of the unfished level. Indicator species assessments using an integrated age-structured model estimated that the spawning biomass levels of Snapper were close to 40 per cent of the unfished level in the GDSMF in 2011^[1]. The catch of Red Emperor in the Gascoyne is very low (11 tonnes [t]). The above evidence indicates that the biomass of this stock is unlikely to be recruitment overfished.

Fishing mortality based assessments^[1] (derived from catch curve analysis of representative samples of the age structure) indicated that the levels of F on the indicator species Goldband Snapper and Spangled Emperor were either lower than the target level, or above the limit level in some areas. This level of fishing

pressure is unlikely to cause the stock to become recruitment overfished.

Based on the evidence provided above, the Gascoyne (Western Australia) biological stock is classified as a **sustainable stock**.

Gulf of Carpentaria

Red Emperor has historically been taken by demersal fish trawl (Gulf of Carpentaria Development Fin Fish Trawl Fishery [Queensland] [GOCDFTF]) and by line (Gulf of Carpentaria Line Fishery [Queensland] [GOCLF]). Participants in the GOCLF primarily target Spanish Mackerel (*Scomberomorus commerson*) by trolling. Since 2010, catch of Red Emperor in this fishery has fallen to very low levels, primarily as a result of decline in fishing effort in the area. Harvest from the adjacent Northern Territory component of the stock has been low in recent years.

Commercial catches in the GOCDFTF have been historically variable. Fish trawl effort in the Gulf of Carpentaria declined markedly in 2012 and further in 2013–14 as a result of transfer of effort to Northern Territory regions outside the Gulf. Catch in 2015 was around 2 t. There is limited data on the distribution and abundance of Red Emperor in the Gulf of Carpentaria. Nominal commercial catch rates have been historically variable, although long-term standardised catch rates to 2009 showed significant declines[5]. Observer surveys in 2004–06 showed most Red Emperor caught in the GOCDFTF was discarded, the majority of which were immature (unpublished data). Red Emperor maximum sustainable yield (MSY) is estimated to be approximately 20 t in the eastern part of the Gulf of Carpentaria[6]. While catches have always been lower than the MSY, the high discard rate creates uncertainty in fishing mortality. Therefore, there is insufficient information available to confidently classify the status of this stock.

Based on the evidence provided above, the Gulf of Carpentaria (Queensland) management unit is classified as an **undefined stock**.

Kimberley

The major performance measures for the Kimberley biological stock of Red Emperor relate to spawning stock levels. The target level of spawning biomass is 40 per cent of unfished (1980) levels. The limit level is 30 per cent of the unfished levels. The spawning biomass level of Red Emperor was approximately 38 per cent in the Northern Demersal Scalefish Fishery (NDSF) in 2015 (the year the last integrated assessment was undertaken), as derived by synthesising the available data in an integrated age structured model[4]. Catch levels of Red Emperor in the NDSF over the past 5 years (2010–14) have been stable, ranging between 128 and 142 t, and are below the catch levels obtained for the preceding 5-year period (2005–09) of sustainable fishing, when catches ranged between 156 and 192 t[4]. From 2010–13 the catch rate trends of Red Emperor have been stable. The most recent assessment estimates that biomass in 2015 was 38 per cent of the unfished (1980) level. The stock is not considered to be recruitment overfished.

An assessment of fishing mortality derived from representative samples of the age structure of Red Emperor has also been undertaken for the NDSF in 2006, 2008 and 2012. These fishing mortality based assessments utilise reference levels defined above for the Gascoyne biological stock. The fishing mortality based assessments indicated that the fishing level on Red Emperor was close to the target reference level in 2012[4]. This indicates that fishing is not having an unacceptable impact on the age structure of the population. The above evidence indicates that the biomass of this stock is unlikely to be recruitment overfished.

Based on the evidence provided above, the Kimberley (Western Australia) biological stock is classified as a **sustainable stock**.

Northern Territory Red Emperor comprises around two per cent of the total catch in the Northern Territory offshore snapper fisheries and is managed as part of the 'group' species in the Timor Reef and Demersal Fisheries (Northern Territory). The performance indicators and trigger points are based on significant changes in species composition of the catch, used to indicate whether significant catch increases warrant further management efforts. Since 1995, catches of Red Emperor have varied between 1.5 and 4.5 per cent of the total annual catch and catches have increased from 20 t in 1995 to 64 t in 2015. The trigger point of an increase of more than 15 per cent of the species' previous year's catch weight, or of a species becoming dominant relative to other species in the group, was not reached in 2015.

This evidence suggests that the current level of fishing mortality is unlikely to cause Red Emperor in the Northern Territory to become recruitment overfished. However, there is insufficient information available to confidently classify the status of this stock.

Based on the evidence provided above, Red Emperor in the Northern Territory is classified as an **undefined stock**.

Pilbara The major performance measures for the Pilbara biological stock landed in the Pilbara Trap Managed Fishery and Pilbara Fish Trawl Interim Managed Fishery are similar to those in the Northern Demersal Scalefish Fishery, and are based on estimates of current spawning stock levels of Red Emperor. 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. The spawning biomass level of Red Emperor overall (across all management areas) was greater than 40 per cent in the Pilbara Demersal Scalefish Fisheries in 2007 (the year the last integrated assessment was undertaken), using an integrated age structured model[4]. The most recent assessment (2007) estimates that biomass in 2007 was 40 per cent of the unfished (1972) level. The stock is not considered to be recruitment overfished.

An assessment of fishing mortality derived from representative samples of the age structure of Red Emperor has also been undertaken for separate management areas in the Pilbara biological stock in 2007. These fishing mortality based assessments utilise the reference levels defined above for the Gascoyne biological stock. The fishing mortality based assessments indicated that the fishing level on Red Emperor in 2007 was between the target and the threshold level, but above the limit level in some areas[4]. This indicates that fishing was having an impact on the age structure of the population in some management areas. Effort reductions since 2008 have resulted in decreasing catch levels. In 2007, the Red Emperor catch from the Pilbara biological stock was 187 t. From 2008–10 the Red Emperor catch ranged from 154–167 t. In 2011, catches declined to 118 t and catches stabilised in the range of 50–61 t from 2012–14. In 2008–10, the catch rate trends of Red Emperor in all trawl managed areas increased each year. This was considered to be a response to the effort reductions imposed on the trawl fishery since 2008. In 2010–14 the catch rate trends of Red Emperor have been stable in all trawl managed areas, except Area 1, where there has been a slight decline. The above evidence indicates that the biomass of this stock is unlikely to be recruitment overfished.

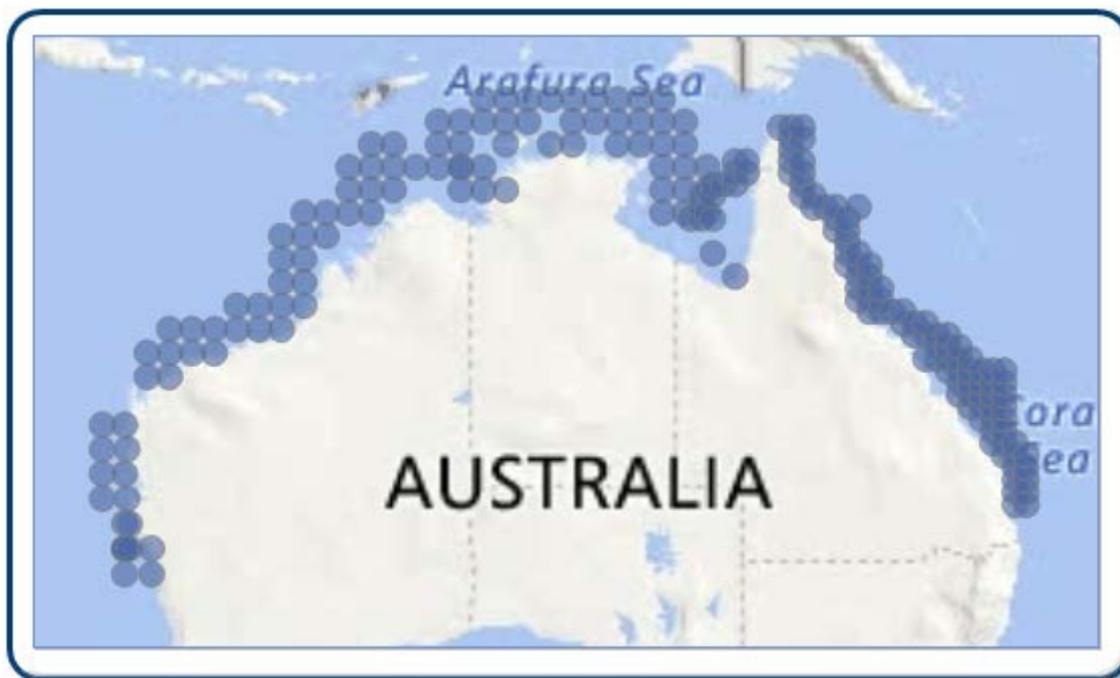
Based on the evidence provided above, the Pilbara (Western Australia) biological stock is classified as a **sustainable stock**.

BIOLOGY

Red Emperor biology[5,8–10]

Species	Longevity / Maximum Size	Maturity (50 per cent)
Red Emperor	40–45 years; 800 mm <u>FL</u> (860 mm <u>TL</u>)	4–6 years; 430–460 mm <u>FL</u> (460–490 mm <u>TL</u>)

DISTRIBUTION



Distribution of reported commercial catch of Red Emperor

TABLES

Commercial Catch Methods	Northern Territory	Queensland	Western Australia
Line		✓	
Otter Trawl		✓	
Various	✓		✓

Fishing methods	Northern Territory	Queensland	Western Australia
Commercial			
Line		✓	
Otter Trawl		✓	
Various	✓		✓
Indigenous			
Hand Line, Hand Reel or Powered		✓	

Reels			
Recreational			
Hand Line, Hand Reel or Powered Reels	✓	✓	✓
Spearfishing		✓	✓
Management Methods			
	Northern Territory	Queensland	Western Australia
Commercial			
Effort limits			✓
Gear restrictions	✓	✓	✓
Limited entry		✓	✓
Size limit		✓	✓
Spatial closures	✓	✓	✓
Spatial zoning	✓		✓
Total allowable catch	✓		✓
Total allowable effort			✓
Vessel restrictions		✓	✓
Indigenous			
Laws of general application			✓
Recreational			
Bag limits	✓		✓
Licence			✓
Limited entry			✓
Passenger restrictions			✓
Possession limit	✓	✓	✓
Size limit		✓	✓
Spatial closures	✓	✓	✓
Spatial zoning			✓
Active Vessels			
	Northern Territory	Queensland	Western Australia

	8 Vessel in CLF, 8 Vessel in DF, 8 Vessel in TRF,	175 License in CRFFF, 2 License in GOCDFFTF, 2 License in GOCLF,	8 License in NDSMF, 5 License in WCDGDLIMF, 37 License in WCDSCMF, 16 Vessel in GDSMF,
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CLF Coastal Line Fishery(NT)

DF Demersal Fishery(NT)

TRF Timor Reef Fishery(NT)

CRFFF Coral Reef Fin Fish Fishery(QLD)

GOCDFFTF Gulf of Carpentaria Developmental Fin Fish Trawl Fishery(QLD)

GOCLF Gulf of Carpentaria Line Fishery (QLD)

GDSMF Gascoyne Demersal Scalefish Managed Fishery(WA)

NDSMF Northern Demersal Scalefish Managed Fishery(WA)

WCDGDLIMF West Coast Demersal Gillnet and Demersal Longline (Interim) Managed Fishery(WA)

WCDSCMF West Coast Deep Sea Crustacean Managed Fishery(WA)

Catch			
	Northern Territory	Queensland	Western Australia
Commercial	64.763t in DF,CLF,TRF,	43.505t in CRFFF, 1.45t in GOCDFFTF, 0.149t in GOCLF,	10.6128t in GDSMF, 131.694t in NDSMF, 4.3458t in WCDSIMF,
Indigenous	Unknown	Included in recreational estimate	Unknown
Recreational	0.6 t	8 t	9.15 t

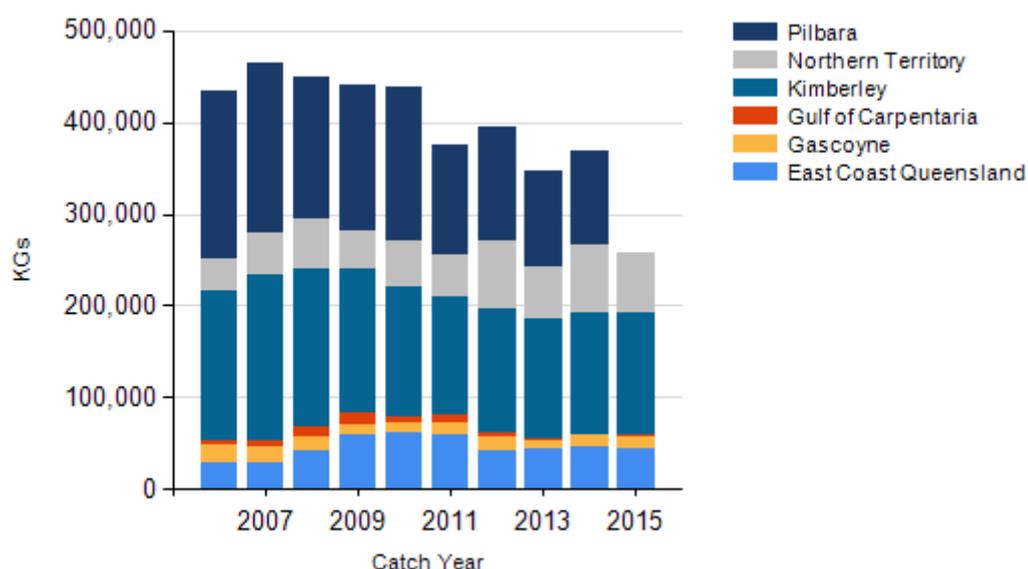
DF,CLF,TRF Demersal Fishery, Coastal Line Fishery, Timor Reef Fishery (NT), CRFFF Coral Reef Fin Fish Fishery (QLD), GOCDFFTF Gulf of Carpentaria Developmental Fin Fish Trawl Fishery (QLD), GOCLF Gulf of Carpentaria Line Fishery (QLD), GDSMF Gascoyne Demersal Scalefish Managed Fishery (WA), NDSMF Northern Demersal Scalefish Managed Fishery (WA), PTMF, PFTIMF Pilbara Trap Managed Fishery, Pilbara Fish Trawl (Interim) Managed Fishery (WA), WCDSIMF West Coast Demersal Scalefish (Interim) Managed Fishery (WA),

a Queensland – Commercial (fishing methods) In Queensland, Golden Snapper is trawled in only one of the Queensland fisheries in which it is caught commercially - the Gulf of Carpentaria Developmental Fin Fish Trawl Fishery

b Queensland – Indigenous (fishing methods) In Queensland, data for the Coral Reef Fin Fish Fishery and Deep Water Fin Fish Fishery relates to the 2014–15 financial year. Data for the Gulf of Carpentaria Line Fishery and Gulf of Carpentaria Developmental Fin Fish Trawl Fishery are for the 2015 calendar year.

c Queensland – Indigenous (management methods) In Queensland, under the Fisheries Act 1994 (Qld), indigenous fishers are entitled to use prescribed traditional and non-commercial fishing apparatus in waters open to fishing. Size and possession limits and seasonal closures do not apply to Indigenous fishers. Further exemptions to fishery regulations may be applied for through permits. **d Western Australia- Recreational (catch)** Boat-based recreational catch from 1 May 2013–30 April 2014.

CATCH CHART



Commercial catch of Red Emperor - note confidential catch not shown

EFFECTS OF FISHING ON THE MARINE ENVIRONMENT

- The maintenance of high levels of biomass of Red Emperor in each of the fisheries in Western Australia results in a negligible eco-trophic risk from these fisheries. Furthermore, there has been no reduction in either mean trophic level or mean maximum length in the finfish catches recorded within the Pilbara or Kimberley in Western Australia (that is, no indication of fishing down of the food web)[11].
- Available information indicates that there are minimal impacts on habitat from trap or line based fishing methods for Red Emperor[4].
- Impacts to the habitat from trawling are expected to be minimal as trawling is restricted to only seven per cent of the north-west shelf and parts of the Northern Territory. Trawling does not occur in the Kimberley region[1,4,8]. Trawl nets in the Northern Territory have been designed to fish off the sea bed, reducing interaction with benthic habitats[12].
- The bycatch of dolphins and turtles has been reduced significantly since the introduction of exclusion grids in Pilbara fish trawl nets in 2005. Given the area of distribution and expected population size of these protected species, the impact of the fish trawl fishery on the stocks of these protected species is likely to be minimal[15,16]. Gear and fishing modification continue to reduce this level of interaction[1,4,15].
- The main Western Australian fisheries that target Red Emperor have received either full Export Exemption or Approved Wildlife Trade Operation Exemption accreditation under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Northern Territory fisheries that target Red Emperor have received full Export Exemption accreditation under the Australian EPBC Act. The Queensland fisheries that target Red Emperor have received an Approved Wildlife Trade Operation Exemption accreditation under the EPBC Act. These assessments, subject to adherence to accompanying conditions and recommendations, demonstrate that these fisheries are managed in a manner that does not lead to overfishing, and that fishing operations have a minimal impact on the structure, productivity, function and biological diversity of the ecosystem.

ENVIRONMENTAL EFFECTS on Red Emperor

- Climate change and climate variability has the potential to impact fish stocks in a range of ways including influencing their geographic distribution (for example, latitudinal shifts in distribution). However, it is unclear how climate change may affect risks to sustainability for this species.
- Changes in oceanographic conditions have the potential to impact on the

replenishment rates of fish populations and also to impact on individual growth rates and spawning output[13].

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