

## 38. Red Emperor *Lutjanus sebae*

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**Table 1:** Stock status determination for Red Emperor

Jurisdiction	Queensland		Northern Territory	Western Australia	
<i>Stock</i>	CRFFF	Gulf of Carpentaria (GOCDFTF, GOCLF)	Northern Territory (DF, TRF, FTF)	NDSF	PDSF
<i>Stock status</i>					
	Undefined	Undefined	Undefined	Sustainable	Sustainable
<i>Indicators</i>	Catch, quota usage, length frequencies, performance indicators	Catch, performance indicators	Catch, trigger reference points	Spawning stock level, age structure, catch, CPUE	Spawning stock level, age structure, catch, CPUE

CPUE = catch per unit effort; CRFFF= Coral Reef Fin Fish Fishery (Queensland); DF = Demersal Fishery (Northern Territory); FTF = Finfish Trawl Fishery (Northern Territory); GOCDFTF= Gulf of Carpentaria Development Fin Fish Trawl Fishery (Queensland); GOCLF= Gulf of Carpentaria Line Fishery (Queensland); NDSF= Northern Demersal Scalefish Fishery (Western Australia); PDSF= Pilbara Demersal Scalefish Fisheries (Western Australia); TRF = Timor Reef Fishery (Northern Territory)

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## Stock structure

Red Emperor is exploited primarily in the North Coast Bioregion of Western Australia<sup>1</sup>, where it is one of the indicator species used to assess the status of the demersal resources. Smaller catches are taken in the Northern Territory and Queensland. In Western Australia, Red Emperor comprises separate biological stocks, one in each of the main management regions: the Northern Demersal Scalefish Fishery (Western Australia) and the Pilbara Demersal Scalefish Fisheries (Western Australia)<sup>2-3</sup>. Status is reported at the level of individual biological stocks in Western Australia. Since multiple biological stocks are present in Western Australia, there is a high likelihood of multiple biological stocks across the Northern Territory. However, there is currently no clear evidence of biological stock delineation in this jurisdiction, and status is reported at the jurisdictional level. Separate biological stocks are present in the Gulf of Carpentaria and on the Queensland east coast<sup>4</sup>. Status is reported at the level of individual biological stocks in Queensland.

## Stock status

### *Coral Reef Fin Fish Fishery (Queensland) biological stock*

Commercial catches have increased steadily since the introduction of quota in 2003–04. Increased specificity in commercial logbooks implemented in 2007 will help to determine status in the future, but more information is required on age structure and recreational catch<sup>5-6</sup>. There is currently insufficient information available to confidently classify the status of the biological stock; hence the biological stock is classified as an **undefined stock**.

### *Gulf of Carpentaria biological stock*

Commercial catches and catch rates have increased since 2007. Limited data are available on the distribution and abundance of Red Emperor in the Gulf of Carpentaria<sup>5-7</sup>. There is currently insufficient information available to confidently classify the status of the biological stock; hence the biological stock is classified as an **undefined stock**.

### *Northern Territory*

Red Emperor comprises around 2 per cent of the total catch in the Northern Territory offshore snapper fisheries and is managed as part of the 'byproduct' species group in the Demersal Fishery and Finfish Trawl Fishery (Northern Territory). The performance indicators and trigger points are based on significant changes in species composition of the catch<sup>8</sup>. Since 1995, catches of Red Emperor have remained at 2–4.5 per cent of the total annual catch and, since 2002, catches have remained between 40 and 50 tonnes (t). The trigger reference point (if annual catch increases as a proportion of the total catch by more than 25 per cent above the five-year average) was not reached in 2010.

This evidence indicates that the current level of fishing mortality is unlikely to cause Red Emperor in the Northern Territory to become recruitment overfished. However, at present, insufficient information is available to determine the biomass of the species. On the basis of the evidence provided above, Red Emperor in the Northern Territory is classified as an **undefined stock**.

### *Northern Demersal Scalefish Fishery (Western Australia) biological stock*

The major performance measures for Red Emperor in the Northern Demersal Scalefish Fishery (Western Australia) biological stock 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 of Red Emperor was greater than 40 per cent of the unfished

level in the Northern Demersal Scalefish Fishery (Western Australia) biological stock in 2007 (the year the last integrated assessment was undertaken), as derived by synthesising the available data in an integrated age-structured model<sup>9</sup>. The biological stock is not considered to be recruitment overfished.

An assessment of fishing mortality derived from representative samples of the age structure of Red Emperor was also undertaken for the Northern Demersal Scalefish Fishery (Western Australia) biological stock in 2006 and 2008. These fishing mortality (F)–based assessments use reference levels that are based on ratios of natural mortality (M) for each species, such that  $F_{target} = \frac{2}{3}M$ ,  $F_{threshold} = M$  and  $F_{limit} = \frac{3}{2}M$ . The fishing mortality–based assessments indicated that the fishing level on Red Emperor was lower than the target level in 2006 and 2008<sup>9</sup>. This indicates that fishing is not having an unacceptable impact on the age structure of the population.

Red Emperor catch levels in the Northern Demersal Scalefish Fishery from 2006 to 2010 have been relatively stable, ranging between 142 and 176 t<sup>9</sup>. This evidence indicates that the current level of fishing mortality is unlikely to cause the biological stock to become recruitment overfished.

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

### *Pilbara Demersal Scalefish Fisheries (Western Australia) biological stock*

The major performance measures for Red Emperor in the Pilbara Demersal Scalefish Fisheries biological stock are similar to those in the Northern Demersal Scalefish Fishery (Western Australia) biological stock and relate to spawning stock levels. 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 of Red Emperor overall was greater than 40 per cent of the unfished level in the Pilbara Demersal Scalefish Fisheries (Western Australia) biological stock in 2007 (the year the last integrated assessment was undertaken), as derived by synthesising the available data in an integrated age-structured model<sup>9</sup>. The biological stock is not considered to be recruitment overfished.

An assessment of fishing mortality derived from representative samples of the age structure of Red Emperor was also undertaken for separate management areas in the Pilbara Demersal Scalefish Fisheries (Western Australia) in 2007. These fishing mortality (F)–based assessments use reference levels that are based on ratios of natural mortality (M) for each species, such that  $F_{target} = \frac{2}{3}M$ ,  $F_{threshold} = M$  and  $F_{limit} = \frac{3}{2}M$ . 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<sup>9</sup>. 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 and stabilising catch levels. In 2007, the Red Emperor catch in the Pilbara Demersal Scalefish Fisheries was 187 t. The catch dropped to 154 t in 2008 and remained at a similar level in 2009 (159 t) and 2010 (167 t). From 2008 to 2010, 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. This evidence indicates that the current level of fishing mortality is unlikely to cause the biological stock to become recruitment overfished.

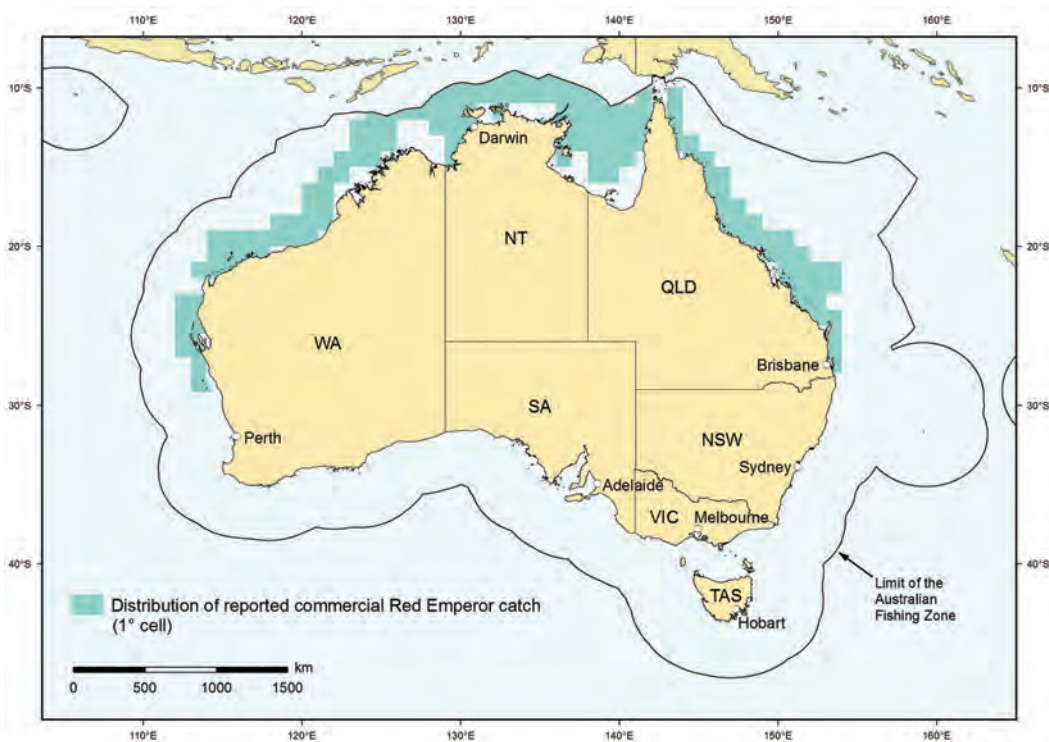
On the basis of the evidence provided above, the biological stock is classified as a **sustainable stock**.

**Table 2:** Red Emperor biology<sup>2,4,10-11</sup>

<i>Longevity and maximum size</i>	40 years; 80 cm FL, 86 cm TL
<i>Maturity (50%)</i>	Females: 8–10 years; 43 cm FL, 46 cm TL Males: 8 years; 46 cm FL, 49 cm TL

FL = fork length; TL = total length

**Figure 1:** Distribution of reported commercial catch of Red Emperor in Australian waters, 2010

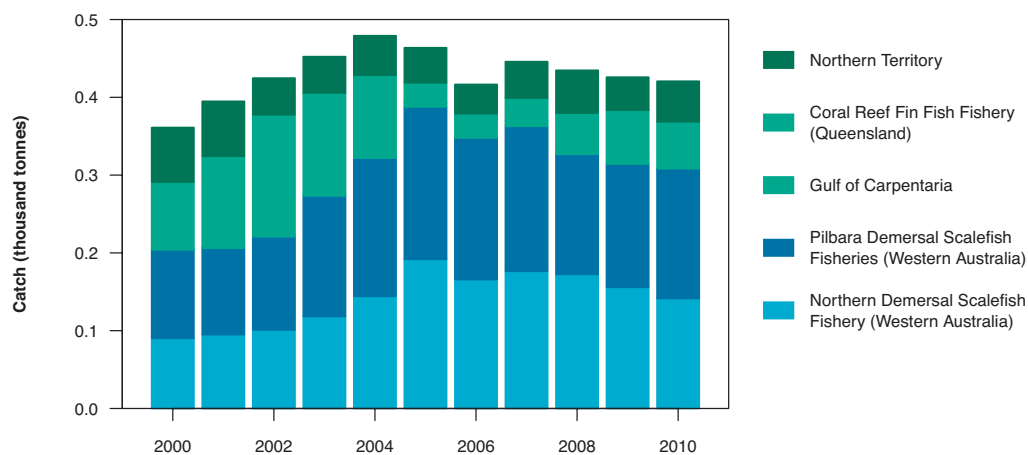


### Main features and statistics for Red Emperor fisheries in Australia in 2010

- Fishing for Red Emperor employs a number of methods, including baited traps, vertical lines (e.g. handlines and droplines) and semidemersal fish trawls.
- A range of input and output controls have been applied to Red Emperor across the three jurisdictions (Western Australia, Northern Territory and Queensland):
  - > Input controls include limited entry, total allowable effort, gear restrictions and spatial zonation.
  - > Output controls include total allowable catch, and bag and size limits (for recreational fishers).

- The number of commercial vessels that caught Red Emperor in 2010 was 206 in the Coral Reef Fin Fish Fishery (Queensland), 2 in the Gulf of Carpentaria Developmental Fin Fish Trawl Fishery (Queensland), 0 in the Gulf of Carpentaria Line Fishery (Queensland), 13 in the Northern Territory, 7 in the Northern Demersal Scalefish Fishery (Western Australia) and 13 in the Pilbara Demersal Scalefish Fisheries (Western Australia) (6 in the Pilbara Fish Trawl and Fish Trap Fisheries and 7 in the Pilbara Line Fishery).
- The total amount of Red Emperor caught commercially in Australia in 2010 was 438 t, comprising 60 t on the east coast, 5 t in the Gulf of Carpentaria, 52 t in the Northern Territory and 321 t in Western Australia (142 t in the Northern Demersal Scalefish Fishery, 167 t in the Pilbara Demersal Scalefish Fisheries and 13 t in other fisheries).
- The total amount of Red Emperor caught in the charter sector in 2010 was 37.4 t, comprising 19 t on the east coast, 4.5 t in the Gulf of Carpentaria, 1.2 t in the Northern Territory and 12.7 t in Western Australia. An estimated 3676 Red Emperor were caught in the Western Australian charter sector in 2010.
- No data are available for the recreational catch in 2010 for the east coast of Australia, the Gulf of Carpentaria, the Northern Territory or Western Australia. Indigenous catches in northern Australia are unknown, but are assumed to be negligible based on previous surveys<sup>12</sup>.
- The impact of illegal, unreported and unregulated fishing in northern Australian waters, primarily by foreign fishers, remains uncertain. However, since 2007, increased surveillance across the north of Australia has resulted in a substantial reduction in the number of foreign fishing vessels accessing Australian waters.

**Figure 2:** Commercial catch of Red Emperor in Australian waters, 2000–10 (calendar year)



Note: Queensland east coast catch is by financial year (e.g. 2010 corresponds to 2009–10 data).

## Catch explanation

The catch of Red Emperor increased steadily between 2000 and 2004, before levelling out and decreasing slightly towards 2010. Catch from the Northern Territory has remained steady at around 50 t per year since 2002. The decrease in catch from 2004 may relate to the introduction of individual transferable quotas in Queensland's fisheries, which significantly reduced catch and effort. In more recent years (2009–10), commercial catch has remained steady at approximately 60 t. The total catch of Red Emperor from Western Australian biological stocks has remained relatively stable, despite variation in effort allocation levels across the different biological stocks.

## 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 to meet biological stock recruitment requirements results in a negligible risk to the overall ecosystem from these fisheries. Furthermore, research demonstrated that there has been no reduction in either mean trophic level or mean maximum length in the finfish catches recorded in the Pilbara or Kimberley in Western Australia (i.e. no fishing-down of the food web)<sup>13</sup>.
- The trap and line-based fishing methods for Red Emperor have minimal impacts on habitat<sup>9</sup>.
- Impacts on habitat from trawling are expected to be minimal because trawling is restricted to only 7 per cent of the North West Shelf and parts of the Northern Territory. Trawling does not occur in the Kimberley region<sup>14</sup>.
- Bycatch of dolphins and turtles during trawling has been reduced significantly since the introduction of bycatch reduction devices in Pilbara 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. Gear and fishing modification continue to reduce the level of interaction<sup>1</sup>.

## Environmental effects on Red Emperor

- Climate change and variability have the potential to impact fish stocks in a range of ways, including influencing their geographic distribution (e.g. latitudinal shifts in distribution). However, it is unclear how climate change may affect risks to sustainability.
- Changes in ocean chemistry have the potential to impact on the replenishment rates of fish populations<sup>15</sup>, and on individual growth rates and spawning output<sup>16</sup>.

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