

Barramundi (2016)

Lates calcarifer



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STOCK STATUS OVERVIEW

Jurisdiction	Stock	Fisheries	Stock status	Indicators
Western Australia	Kimberley Gillnet and Barramundi Managed Fishery	KGBMF	Sustainable	Catch, <u>CPUE</u> , effort
Northern Territory	Barramundi Fishery	BF	Sustainable	Catch, <u>CPUE</u> , Length and age, low harvest rate
Queensland	Central East Coast	ECIFFF	Sustainable	Catch, effort, length and age frequencies
Queensland	Mackay	ECIFFF	Sustainable	Catch, effort, <u>CPUE</u>
Queensland	North-East Coast	ECIFFF	Sustainable	Catch, effort, <u>CPUE</u> , length and age frequencies
Queensland	Northern Gulf of Carpentaria	GOCIFFF	Sustainable	Catch, effort, <u>CPUE</u>
Queensland	Princess Charlotte Bay	ECIFFF	Sustainable	Catch, effort, <u>CPUE</u>
Queensland	South-East Coast	ECIFFF	Negligible	
Queensland	Southern Gulf of Carpentaria	GOCIFFF	Transitional-depleting	Catch, effort, <u>CPUE</u> , length and age frequencies

BF Barramundi Fishery (NT), ECIFFF East Coast Inshore Fin Fish Fishery (QLD), GOCIFFF Gulf of Carpentaria Inshore Fin Fish Fishery (QLD), KGBMF Kimberley Gillnet and Barramundi Managed Fishery (WA)

STOCK STRUCTURE

Separate biological stocks of Barramundi exist at the scale of individual catchments across northern Australia[1,2]. However, the difficulty in obtaining relevant biological and catch-and-effort information to assess each individual biological stock has meant that Barramundi have been assessed as two separate management units (Northern Territory and Western Australia) and seven genetic biological stocks (Queensland: Southern Gulf of Carpentaria, Northern Gulf of Carpentaria, Princess Charlotte Bay, North-east coast, Mackay, central east coast and South-east coast). The high levels of stocking in catchments on the east coast Queensland is unlikely to compromise this stock structure as parents from the same genetic stock are used to produce fingerlings. The assessments of the management units are based on the biological stocks that receive the highest harvest rates and whose status is assumed to be representative of the highest level of exploitation that occurs on any biological stock within each unit.

Here, assessment of stock status is presented at the management unit level—Kimberley Gillnet and Barramundi Managed Fishery (Western Australia), Barramundi Fishery (Northern Territory); and the biological stock level—Southern Gulf of Carpentaria, Northern Gulf of Carpentaria, Princess Charlotte Bay, North-east coast, Mackay, Central east coast and South-east coast.

STOCK STATUS

Barramundi Fishery The commercial catch and nominal CPUE have both declined substantially in recent years, primarily due to the below average wet seasons since 2013 in the Northern Territory[4]. However, CPUE levels are still 22 per cent above the long-term average (1983–2012). Monitored stocks have a healthy length and age distribution with little sign of reduction in the proportion of older age classes, despite abundance surveys showing low levels of recruitment during recent wet seasons[4]. The above evidence indicates that the biomass of these stocks is unlikely to be recruitment overfished.

Recaptures from tagging programs indicate that the annual harvest rate from all sectors combined is consistently below five per cent and this level of fishing pressure is unlikely to cause the stocks to become recruitment overfished.

On the basis of the evidence provided above, the Barramundi Fishery (Northern Territory) management unit is classified as a **sustainable stock**.

Central East Coast A flood during the 2010–11 summer was followed by a five-fold increase in commercial catch in the Central east coast stock. The biggest increase was in the Gladstone area (from 9 t in 2010 to 363 t in 2011) from stocked fish moving into the fishery from Lake Awoonga. The Fitzroy catchment also experienced increased catchability and recruitment into the fishery in the high flow years (2010, 2011, 2013). The age frequencies (based on annual age-length key and length frequency) show that the strong 2010 cohort has dominated the catch since 2013[7]. Although catches have decreased in 2015 to 151 t, they are still more than double the catch prior to 2011. The above evidence indicates that the biomass of this stock is unlikely to be recruitment overfished.

The number of commercial fishing days and active operators have been relatively stable over the past 5 years. Seasonal closures (1 November–1 February) protect Barramundi during much of the October–January spawning season[17]. Queensland's 580–1200 mm slot size limits and spatial closures for Barramundi provide protection for the stock. At the end of the 2015 fishing year the main fishery area including the Fitzroy catchment was closed to commercial netting. The above evidence indicates that the current level of fishing pressure is unlikely to cause the stock to become recruitment overfished.

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

Kimberley Gillnet and Barramundi Managed Fishery The harvest strategy for Barramundi in the Kimberley Gillnet and Barramundi Managed Fishery in the Kimberley region of Western Australia is based on a constant commercial catch policy where the annual commercial catches of Barramundi are allowed to vary within a target catch range, which is based on a historical catch range during which the fishery was stable and levels of exploitation were considered to be sustainable. The target catch range has been calculated as 33–44 tonnes (t)[3].

The Barramundi catch in 2015 was 52 t; above the target catch range, but below the limit range (23–54 t). The increased catch was obtained with high catch per unit effort (CPUE) (around 130 kg per block day) across the fishery and indicates this increase was a result of increased recruitment and not an increase in effort in the fishery. The above evidence indicates that the biomass of these stocks is unlikely to be recruitment overfished.

In 2013, two licenses were removed from the Broome sector of the fishery[3]. This sector of the fishery is now recreational- and Indigenous-only fishing. This effort removal has reduced the potential level of fishing mortality. This level of fishing pressure is unlikely to cause the stocks to become recruitment overfished.

On the basis of the evidence provided above, the Kimberley Gillnet and Barramundi Managed Fishery (Western Australia) management unit is classified as a **sustainable stock**.

Mackay Reported commercial catches and catch rates in the Mackay stock have generally been increasing since 1989, with the 2015 catch of 90 t being 67 per cent higher than the long-term average (1992–2014) and almost reaching the historical high of 92 t in 2004. Nominal CPUE has also shown a similar upward trend[7] with the 2015 value being 34 per cent higher than the long-term average. The above evidence indicates that the biomass of this stock is unlikely to be recruitment overfished.

The number of operators reporting catch has declined slowly, although days fished has fluctuated with annual catch over the past 20 years. Queensland's 580–1200 mm slot size limits for Barramundi protects both small males and large females, ensuring that a proportion of the spawning stock is protected.

Seasonal

(1 November –1 February) and spatial closures reduce fishing pressure. New state-wide management arrangements were implemented in November 2015, including a reduction in net licences and spatial closures to commercial netting. One of these closures is within the Mackay biological stock area, although its impact on fishing pressure is unknown at this early stage[7]. The above evidence indicates that the current level of fishing pressure is unlikely to cause the stock to become recruitment overfished.

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

North-East Coast There are no current estimates of biomass or standardised catch rates available for this stock. Catch and nominal CPUE on the north east coast have shown rising trends from the start of compulsory catch reporting in 1989 to a peak in 2011. Catch and CPUE in 2015 are 83 and 87 per cent of the long-term averages (1992–2014) respectively. There appears to have been ongoing recruitment into the fishery although no strong year class has been observed in the age frequencies (based on annual age-length key and length frequency) since the strong 2008 cohort recruited into the fishery. The proportion of 3 year olds, an age at which they are expected to recruit into the fishery, was very low in the

2014 and 2015 catches. Although the biomass appears to have declined in 2013–15 as a result of poor wet seasons[12], the above evidence indicates that the biomass of the stock is unlikely to be recruitment overfished.

Anecdotal information from commercial fishers suggests that their fishing effort has reduced due to the poor economic returns. Effort in 2015 was less than 1800 days, which has not occurred since 1995. In 2015, the number of active operators (41 fishers) was at the lowest level since reporting began in 1989. Fishing effort is not controlled at the biological stock level and is managed as part of the broader east coast inshore net fishery. Estimated recreational harvest was more than 12 000 fish (approximately 46 t) and an additional 32 000 Barramundi were caught recreationally but released in 2013–14[7]. Although Barramundi have a low discard mortality rate, approximately 10 per cent[13,14] of these 32 000 released fish should be considered in the fishing mortality[7]. Spatial closures for the stock have been demonstrated to benefit Barramundi[15]. Queensland size limits (580–1200 mm slot limit) protect a proportion of the spawning stock as individuals can be sexually mature as males at 535 mm[16]. A seasonal closure from 1 November–1 February protects Barramundi during the October–February spawning season[17]. Overall, the above evidence indicates that the current level of fishing pressure is unlikely to cause the stock to become recruitment overfished.

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

Northern Gulf of Carpentaria

Commercial catch in 2015 was 66 per cent of the long-term average (1992–2014). Recreational catch is considered to be similar to the commercial catch; although recreational estimates are uncertain[7]. Nominal catch rates have shown a rising trend over the past 20 years. The 2015 level was 80 per cent higher than the long-term average. The above evidence indicates that the biomass of this stock is unlikely to be recruitment overfished.

Commercial effort is less than 50 per cent of the long-term average and a seasonal closure during October–January protects the stock during the spawning season. Biological evidence indicates that the growth rate of fish in this stock may be slower and fish may mature earlier than in other stocks[11], therefore the Queensland minimum size limit (580 mm) protects a much larger proportion of the spawning population. The above evidence indicates that the current level of fishing pressure is unlikely to cause the stock to become recruitment overfished.

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

Princess Charlotte Bay

The commercial catch is small (less than 5 t in 2015) and the level of recreational catch has not been determined for this stock. While nominal catch rates are within historical levels, this indicator is limited by variable seasonal conditions, changes in management and fishing methods and restrictions to the number of operators (currently two licences) able to access the foreshore area. In particular, current levels of catch and effort are approximately 11 per cent lower compared to the average levels during the period between 1992 and 2009. These large reductions were primarily a response to large spatial closures being implemented in Princess Charlotte Bay in 2009. These closures were principally brought in as a mechanism to limit fishery interactions with protected species and have effectively capped fishing to the very low levels observed in 2015. Princess Charlotte Bay also has a seasonal closure on net fishing during November–February that protects the stock during spawning. The above evidence indicates that the biomass of this stock is unlikely to be recruitment

overfished and that the current fishing pressure is unlikely to cause the stock to become recruitment overfished.

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

South-East Coast Stock status for the Queensland South-east coast biological stock is reported as negligible due to low or zero catches from this stock. Average Queensland catch in the past 10 years was 123 kg, with no catch in 2015.

Southern Gulf of Carpentaria The biomass of the Barramundi stock in the Southern Gulf of Carpentaria in the early-1980s was considered to be low compared to historical levels[5]and a series of management measures were implemented to aid in the stock's recovery[6]. Since commencement of compulsory commercial logbooks in 1989, the catch has increased from 520 t to a peak of 960 t in 2011. Catches and nominal CPUE then decreased substantially after 2012. The 2015 catch was 353 t which is 58 per cent of the long-term average (1992–2012) and the nominal catch rates (kg per 100 m of net) halved from more than 31 kg in 2011 to 15 kg in 2015, the lowest rate in 10 years. Age frequencies indicated recruitment to this stock has been poor in 3 of the past 4 years. In 2015, the recruiting age class (3 year olds) comprised just seven per cent of the commercial catch and 10 per cent of the recreational catch, while a single 4 year old age class was dominant (63 per cent of the commercial and 70 per cent of the recreational harvests)[7]. Below average rainfall and low river flow in the summers of 2012–13 and 2015–16 are likely to have contributed to decreased recruitment into the estuarine fishery by reducing growth and juvenile survivorship[8]. This suggests that for the period (2013–15) the biomass declined, but the stock is not yet considered to be in a recruitment overfished state. The above evidence indicates that the biomass of this stock is not likely to be recruitment overfished.

In 2015, fishing days and the number of active operators were the lowest level ever recorded due to poor economic returns from low catches. While the low catches and effort appear to be primarily driven by poor wet seasons, age frequencies are truncated to the left, indicating that the current level of fishing mortality is impacting the stock above environmental influences. Average or above average wet season conditions are needed to supports juvenile survivorship and growth, and barramundi are usually 3 years old before reaching legal minimum size. Therefore, it is likely that 2 or 3 years of favourable freshwater flows are required before the depleted proportion of recruiting 3 year old fish returns to healthy levels and the fishable biomass increases. Size limits (580–1200 mm slot limit) will help protect a proportion of the spawning stock, as males can be mature at 550 mm[9] while the upper size limit protects the large, highly fecund females[10]. Fishing pressure on barramundi is further reduced by a seasonal closure during the majority of the spawning season and spatial closures for commercial fishing that include all freshwater reaches. Notwithstanding these management measures, there is still a risk of recruitment overfishing occurring from the commercial and recreational sectors while the stock rebuilds. The above evidence indicates that the current level of fishing pressure control is likely to cause the stock to become recruitment overfished.

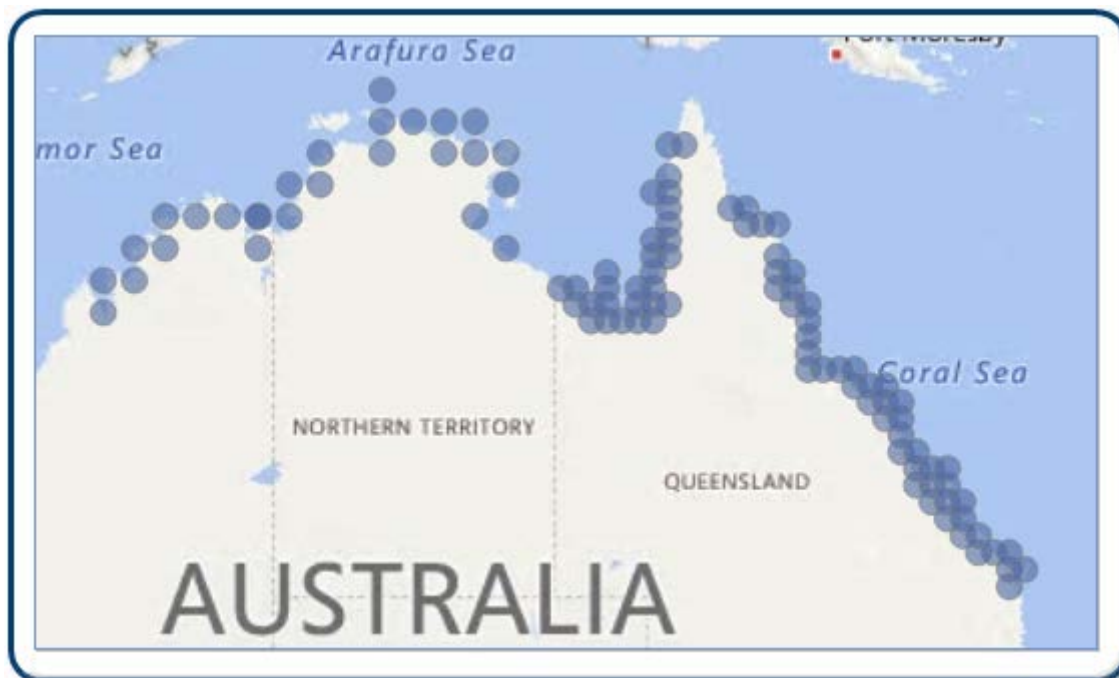
On the basis of the evidence provided above, the Southern Gulf of Carpentaria biological stock is classified as a **transitional–depleting stock**.

BIOLOGY

Barramundi biology[9]

Species	Longevity / Maximum Size	Maturity (50 per cent)
Barramundi	35 years; 1500 mm <u>TL</u>	Northern Territory: Males 2–5 years; 730 mm <u>TL</u> Females 5–7 years; 910 mm <u>TL</u> Queensland: Males 2–5 years; 640 mm <u>TL</u> Females 5–7 years; 820 mm <u>TL</u>

DISTRIBUTION



Distribution of reported commercial catch of Barramundi

TABLES

Commercial Catch Methods	Northern Territory	Queensland	Western Australia
Gillnet	✓	✓	
Unspecified		✓	
Various			✓

Fishing methods	Northern Territory	Queensland	Western Australia
Commercial			
Gillnet	✓	✓	
Unspecified		✓	
Various			✓
Indigenous			

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

Spatial zoning	✓	✓	✓
Active Vessels			
	Northern Territory	Queensland	Western Australia
	14 license in BF,	133 License in ECIFFF, 64 License in GOCIFFF,	4 Vessel in KGBMF,

KGBMF Kimberley Gillnet and Barramundi ManagedFishery(WA)

BF Barramundi Fishery(NT)

ECIFFF East Coast Inshore Fin Fish Fishery(QLD)

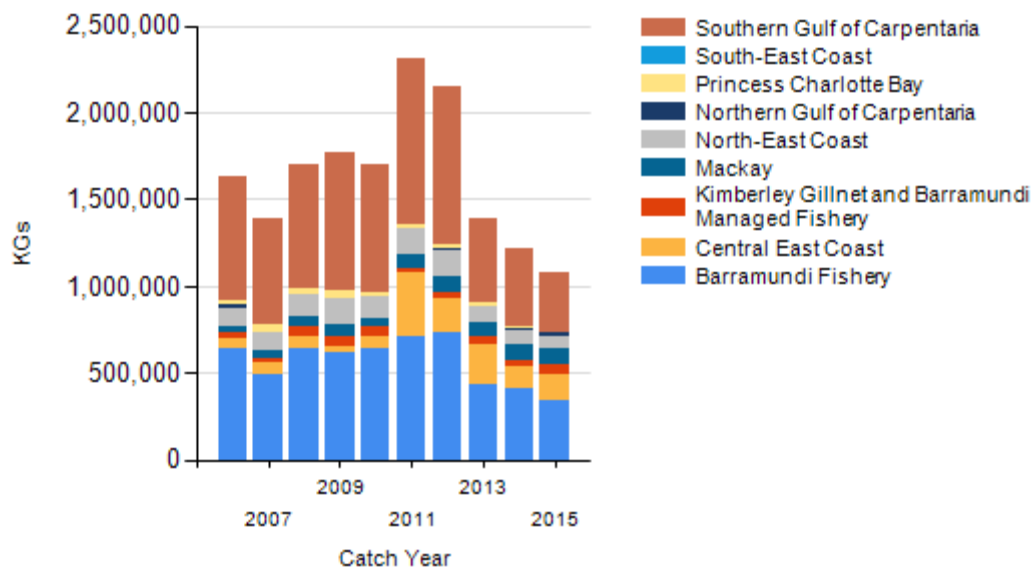
GOCIFFF Gulf of Carpentaria Inshore Fin Fish Fishery(QLD)

Catch			
	Northern Territory	Queensland	Western Australia
Commercial	344.199t in BF,	317.039t in ECIFFF, 366.895t in GOCIFFF,	52.396t in KGBMF,
Indigenous	110 t (in 2000)	Unknown	Unknown
Recreational	22 t FTO	Included in recreational estimate	3.57 t

BF Barramundi Fishery (NT), ECIFFF East Coast Inshore Fin Fish Fishery (QLD), GOCIFFF Gulf of Carpentaria Inshore Fin Fish Fishery (QLD), KGBMF Kimberley Gillnet and Barramundi ManagedFishery (WA),

- a Queensland – Indigenous (management methods)** In Queensland, under the Fisheries Act 1994 (Qld), indigenous fishers are able to use prescribed traditional and non-commercial fishing apparatus in waters open to fishing. Size and bag limits and seasonal closures do not apply to Indigenous fishers. Further exemptions to fishery regulations can be obtained through permits.
- b Queensland – Commercial (catch)** Princess Charlotte Bay catch is not reportable as fewer than five boats operated in the fishery in 2015.
- c Western Australia – Recreational (catch)** boat-based recreational catch from 1 May 2013–30 April 2014.
- d Queensland – Recreational (catch)** Survey of Queensland residents only from August 2013–October 14 18.

CATCH CHART



Commercial catch of Barramundi - note confidential catch not shown

EFFECTS OF FISHING ON THE MARINE ENVIRONMENT

- Commercial gillnets have almost no impact on the environment and are quite selective, with bycatch making up only a small proportion of the catch[13].
- However, commercial gillnets do interact with threatened, endangered and protected species and while reported interactions are low, the impact on the populations of these species is unknown[3,7,13]. The main mitigation method for limiting gillnet interaction with these species has been closing substantial parts of the fishing area to this gear[3,4,7].

ENVIRONMENTAL EFFECTS on Barramundi

- The duration, magnitude and timing of the wet season strongly drives biomass and harvest of Barramundi stocks, with large wet seasons resulting in higher recruitment than smaller wet seasons[8,12,19].

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