

Barramundi (2018)

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, CPUE, effort
Northern Territory	Barramundi Fishery	ACL, BF	Sustainable	Catch, CPUE, length and age, low harvest rate
Queensland	Central East Coast	ECIFFF	Sustainable	Catch, effort, length and age frequencies
Queensland	Mackay	ECIFFF	Sustainable	Catch, effort, CPUE
Queensland	North-East Coast	ECIFFF	Sustainable	Catch, effort, CPUE, length and age frequencies
Queensland	Northern Gulf of Carpentaria	GOCIFFF	Sustainable	Catch, effort, CPUE
Queensland	Princess Charlotte Bay	ECIFFF	Sustainable	Catch, effort, CPUE
Queensland	South-East Coast	ECIFFF	Negligible	Catch
Queensland	Southern Gulf of Carpentaria	GOCIFFF	Depleting	Catch, effort, CPUE, 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), ACL Aboriginal Coastal License (NT)

STOCK STRUCTURE

Separate biological stocks of Barramundi exist at the scale of individual catchments across northern Australia [Keenan 1994, Keenan 2000]. 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 (Kimberley Gillnet and Barramundi Managed Fishery, Western Australia; and Barramundi Fishery, Northern Territory) 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 of 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 (Queensland).

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 [DPIR 2018]. However, CPUE levels are still 22 per cent above the long-term average (1983–2012) and CPUE increased in 2016 [DPIR 2018]. 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 [DPIR 2018]. The above evidence indicates that the biomass of the stock is unlikely to be depleted and that recruitment is unlikely to be impaired.

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 impaired.

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

Central East Coast High river flow increases catchability and strong year-classes for this species [Staunton-Smith et al. 2004]. Floods in 2010, 2011 and 2013, in this area, have subsequently affected the catch and recruitment into the fishery. In 2011, there was a five-fold increase in commercial catch, mainly due to stocked fish from Lake Awoonga and other impoundments moving into the stock following the flood in late 2010 and early 2011. Although there was some fish-down over the following four years, the catch reported from the main fishery area, the Fitzroy catchment, remained at high levels, over 50 per cent higher than any year prior to 2011. The Fitzroy catchment was part of an area closed to net fishing at the end of the 2015 fishing season. Fishery-dependent monitoring of age and length in the Fitzroy River catchment showed a strong year class born during the 2009–10 summer. This supported the increased catch and catch rate from 2011 to 2015. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired.

Spatial closures for commercial fishers increased at the end of 2015 in the Central East Coast biological stock areas. Reductions in net licences and exclusion of commercial fishing from the main Barramundi fishing area has reduced commercial fishing pressure in the closed areas, although there are no data yet to indicate whether additional fishing pressure has transferred to open areas [QDAF 2018]. Size limits and seasonal closures for recreational and commercial Barramundi fishing ensure a proportion of the spawning stock is protected [Russell and Garrett 1985]. The recreational catch estimate of 5 t (which includes the Indigenous and charter fisheries) is comparatively small

(2013–14 survey) and less than half that reported during the 2010–11 survey [QDAF 2018]. Management changes, improved fishing infrastructure and promotion of the net-free zone are likely to have changed recreational fishing. However, there are no current catch and effort estimates. 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 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 was calculated as 33–44 tonnes (t) [Newman et al. 2018a]. Barramundi is also an indicator species [see Newman et al. 2018b] for the North Coast Nearshore and Estuarine Resource and as such the stock status of Barramundi subsequently determines the risk-level for the biological sustainability of the suite of species in the North Coast Nearshore and Estuarine Resource.

The Barramundi catch in 2017 was 52 t; above the target catch range, but below the upper end of the limit range (23–54 t). The catch was obtained with high catch per unit effort (CPUE) (around 115 kg per block day) across the fishery and indicates this level of catch is based on increased recruitment and not increased effort in the fishery. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired.

In 2013, two licences were removed from the Broome sector of the fishery [Newman et al. 2018a]. This sector of the fishery is now only exposed to recreational and Indigenous fishing. This effort removal has reduced the potential level of fishing mortality. 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 Gillnet and Barramundi Managed Fishery (Western Australia) management unit is classified as a **sustainable stock**.

Mackay

Reported commercial catch from the Mackay stock has been relatively stable over the last eight years at near historical highs. The 2016 catch of 99 t was the highest in the 1989–2017 time series of the fishery and the 68 t 2017 catch was above the 10 year average. Nominal CPUE trended upwards from 1989 to 2011 and has since stabilised. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired.

Days fished have fluctuated with annual catch over the past 20 years. There has been a generally decreasing trend in the number of operators reporting catch. In 2017 catch was reported against 42 licences, slightly lower than the 10 year average (2007–16) of 45. Recreational catch estimates (which include the Indigenous and charter fisheries) were 11 t in 2013–14. Queensland's 580–1200 mm slot size limits for Barramundi ensures the protection of a proportion of the spawning stock by protecting both small males and large females. Seasonal (1 November –1 February) and spatial closures reduce fishing pressure. New management arrangements in November 2015, included a reduction in net licences and spatial closures to commercial netting, including one in the Mackay biological stock area. The effect of these changes on commercial fishing pressure in Mackay is minimal but closures in other regions may have displaced effort into this region, at least in the short term [QDAF

2018]. 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 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. Nominal commercial CPUE (kg per 100 m net) from 2003 to 2012 showed a rising trend, reaching a historical high in 2011. In 2013, catch rates fell markedly and remained at this lower level in 2014 and 2015, after successive poor rainfall years. In 2016 and 2017, CPUE increased to near historical highs, especially after some good rainfall events prior to the closure of the 2017 season. Good monsoonal flows have been shown to affect recruitment and catchability in this stock [Balston 2009]. Age frequencies (based on annual age-length key and length frequency data) show continued recruitment into the fishery although no strong year class has been observed in the population since the 2008 cohort. The year-class strength of recruits (4 year olds) recorded in 2016 and 2017 is below the expected level. Biological monitoring and anecdotal reports indicate there are large (> 1 m) fish present in the stock. Although biomass has reduced due to unfavourable environmental conditions, the stock is likely to be above the 20 to 30 per cent biomass limit reference point [QDAF 2018]. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired.

Fishing effort is not controlled at the biological stock level and is managed as part of the broader East Coast Inshore Finfish Fishery. The number of active commercial operators accessing this stock is 38, the lowest since 1998 when compulsory logbook records began. The number of days fished commercially has declined to below 1 500 days, the lowest in over 20 years. The 2017 commercial catch increased from the 20 year lows experienced in 2013–16 to 96 t. Domestic recreational harvest (which includes the Indigenous and charter fisheries) is relatively high with over 12 000 fish (approximately 46 t) taken and an additional 32 000 Barramundi were released after capture in 2013–14 [QDAF 2018]. Although Barramundi have a high release survival rate (approximately 90 per cent) [De Lestang et al. 2004, Halliday et al. 2001] a proportion of released fish should be considered in the fishing mortality [QDAF 2018]. Spatial closures for the stock have been demonstrated to benefit Barramundi [Ley and Halliday 2004]. 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 [Garrett and Russell 1982]. A seasonal closure from 1 November–1 February protects Barramundi during the October–February spawning season [Russell and Garrett 1985]. 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 North-East Coast biological stock is classified as a **sustainable stock**.

Northern Gulf of Carpentaria

The small river systems in the Northern Gulf of Carpentaria are unlikely to support a high biomass of Barramundi. Commercial catch has been rising since a historical low in 2011 to 35 t in 2017. Catch rate over the past 20 years has displayed a generally rising trend. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired.

Commercial fishing effort has increased in recent years, but is still relatively low, with only six active operators and 344 fishing days within the region in 2017. This is the highest level of effort since 2006. Recreational catch in 2013–14 was recorded as similar to the commercial catch of the same year (12 t), though recreational estimates are uncertain [QDAF 2018]. 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 [Davis 1987], 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 mortality is unlikely to cause the stock to become recruitment impaired.

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 stock extends around 600 km from Cape Bedford north of Cooktown to the tip of Cape York [Keenan 1994]. The commercial catch is small (less than 5 t per year 2015–17), and the 2017 level is a historical low [QDAF 2018]. While nominal catch rates are within historical levels, this indicator is limited by variable seasonal conditions, changes in fishing power and to fisheries and protected area management.

Recreational catch surveys from 1986 to 1991 estimated the catch of national park visitors at between 4.4 t and 9.4 t by 1150 to 2450 visitors per year [Russell and Hales 1993]. In 2017 over 18 000 visitors camped in national parks in this region [QDES 2018], and more off-park accommodation options are now available. Extrapolation of the data is not possible due to the possible changes in length of stay and reasons for visits. However, available information suggests recreational fishing would dominate the catch from the Princess Charlotte Bay stock. The commercial catch and effort is very small and at historical low levels.

The large reduction in the number of commercial operators and days fished for this stock is primarily a response to large spatial closures applied to Princess Charlotte Bay in 2009. These closures were principally a mechanism to limit fishery interactions with protected species and have restricted fishing to the very low levels observed in recent years. A seasonal closure on targeting or harvesting Barramundi during November–February protects the stock during spawning. Minimum and maximum size limits and high release survival also reduce fishing pressure.

The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired. Furthermore, 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 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 and the stock is not subject to targeted fishing. Average Queensland catch in the past 10 years was 23 kg, with 9 kg reported in 2017. Phone and boat ramp surveys have not recorded any recreational catch. Fishing is unlikely to be having a negative impact on the stock.

Southern Gulf of Carpentaria

In the early-1980s the biomass of this stock was considered to be heavily depleted [Welch et al. 2002, Campbell et al. 2017], prompting management changes to aid recovery [Healy 1992]. Since 1989 commercial catch has increased from 520 t to a peak of 960 t in 2011. Catches and nominal CPUE decreased substantially during 2013–15 but 2017 catch (623 t) and CPUE (26 kg/100 m net) exceeded the 2003–12 averages. In 2017, six year old Barramundi, born during the high rainfall 2010–11 summer, constituted more than 50 per cent of the harvest. The recent low rainfall years of 2013–16 is likely to have decreased juvenile survival [Halliday et al. 2012], which has translated to there being very few 3–5 year olds in 2017. Recent stock assessment estimates of egg production were 0.33 to 0.41 of the unfished (1954) levels,

which is below the 0.48 target reference point but above the limit reference point [Campbell et al. 2017]. Additionally, this assessment estimated that biomass in (2015) was between 33 and 41 per cent of the unfished (1954) level. For the period 2013–15 biomass declined, but the stock is not yet considered to be recruitment impaired.

Fishing pressure on this stock is moderated by the existing size limits (580–1200 mm slot limit) that protect large, fecund females [Davis 1984] and allow most males to mature before entering the fishery [Davis 1982]. Fishing pressure 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 in the stock area. In 2017 commercial fishing catch and effort has risen above the historic lows recorded in 2013–15 [Campbell et al. 2017]. However, these increases appear to be primarily in response to increases in catchability rather than biomass, which is evident by the high contribution of a single age class in the 2017 catch. Consequently, there is still a significant risk that the current level of fishing mortality is likely to cause the stock to become recruitment impaired.

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

BIOLOGY

Barramundi biology [Davis 1982]

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

DISTRIBUTION



Distribution of reported commercial catch of Barramundi

TABLES

Commercial Catch Methods	Northern Territory	Queensland	Western Australia
Beach Seine	✓		
Gillnet	✓		✓
N/A		✓	
Net		✓	

Fishing methods			
	Northern Territory	Queensland	Western Australia
Charter			
Handline		✓	✓
Commercial			
Beach Seine	✓		
Gillnet	✓		✓
Net		✓	
Indigenous			
Handline		✓	✓
Spearfishing	✓	✓	✓
Traps and Pots		✓	
Recreational			
Handline	✓	✓	✓
Spearfishing	✓	✓	✓

Management Methods			
	Northern Territory	Queensland	Western Australia
Charter			
Bag limits			✓
Gear restrictions		✓	
Limited entry	✓		✓
Passenger restrictions	✓		✓
Possession limit			✓
Size limit			✓
Spatial closures			✓
Spatial zoning		✓	✓
Commercial			
Gear restrictions	✓	✓	✓
Limited entry	✓	✓	✓

Seasonal closures	✓	✓	✓
Size limit	✓	✓	✓
Spatial closures	✓	✓	✓
Spatial zoning		✓	✓
Vessel restrictions	✓	✓	✓
Indigenous			
Laws of general application			✓
Recreational			
Bag limits			✓
Gear restrictions	✓	✓	✓
Licence			✓
Licence (Recreational Fishing from Boat License)			✓
Possession limit	✓	✓	✓
Seasonal closures	✓	✓	
Size limit	✓	✓	✓
Spatial closures	✓	✓	✓
Spatial zoning	✓	✓	

Active Vessels	Northern Territory	Queensland	Western Australia
	14 LICENCES in BF, 12 LICENCES in ACL,	97 in ECIFFF, 69 in GOCIFFF,	4 in KGBMF, 33 in Charter,

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)

ACL Aboriginal Coastal License(NT)

Charter Tour Operator(WA)

Catch	Northern Territory	Queensland	Western Australia
Charter			4.7 t
Commercial	0.0614t in ACL.	226.905t in	52.566t in

	392.647t in BF,	ECIFFF, 667.083t in GOCIFFF,	KGBMF,
Indigenous	110 t (in 2000)	Unknown	Unknown
Recreational	155 t (in 2010)	166 ± 30 t (2013–14)	5.71 t ± 1.9 se

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), ACL Aboriginal Coastal License (NT),

Western Australia – Recreational (catch) Boat-based recreational catch between 1 September 2015 and 31 August 2016 from Ryan et al. [2017]. Please note that catches of Barramundi are underestimates as shore-based and boat-based fishers that only operated in freshwater were out of scope of the survey.

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 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.

Northern Territory – Indigenous (management methods) The *Fisheries Act 1988* (NT), specifies that "...without derogating from any other law in force in the Territory, nothing in a provision of this Act or an instrument of a judicial or administrative character made under it limits the right of Aboriginals who have traditionally used the resources of an area of land or water in a traditional manner from continuing to use those resources in that area in that manner".

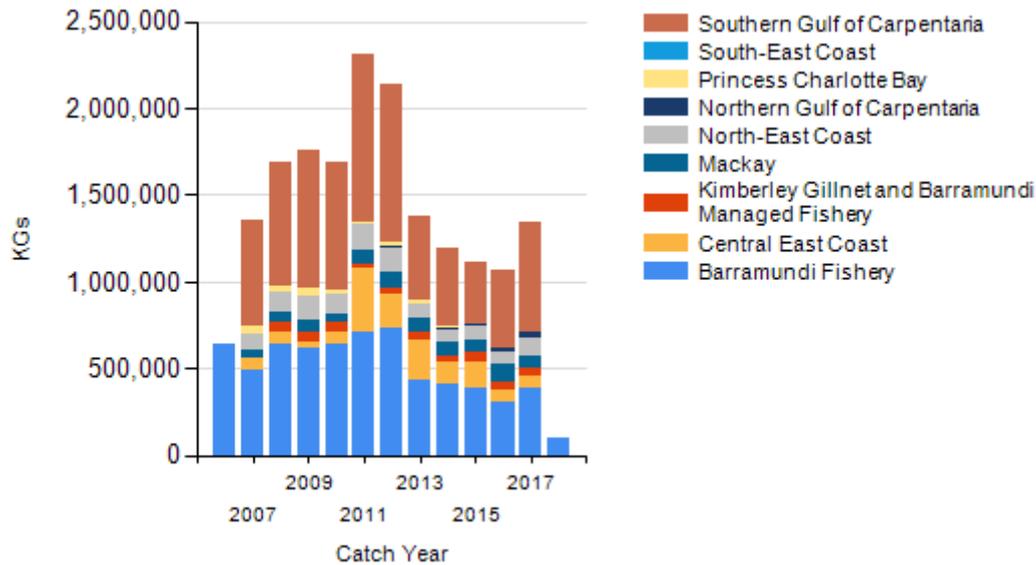
Northern Territory – Charter (management methods) In the Northern Territory, charter operators are regulated through the same management methods as the recreational sector, but are subject to additional limits on license and passenger numbers.

Queensland – Commercial (catch) Princess Charlotte Bay catch is not reportable as fewer than five boats operated in the fishery in 2017.

Queensland – Recreational (catch) Survey of Queensland residents only from August 2013–October 14 [Webley et al. 2015].

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.

CATCH CHART



Commercial catch of Barramundi - note confidential catch not shown

EFFECTS OF FISHING ON THE MARINE ENVIRONMENT

ENVIRONMENTAL EFFECTS on Barramundi

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