

# Black Jewfish (2018)

*Protonibea diacanthus*



**Shane Penny:** Department of Primary Industry and Resources, Northern Territory, **Robyn Lovett:** Department of Agriculture and Fisheries, Queensland, **Fabian Trinnie:** Department of Primary Industries and Regional Development, Western Australia, **Stephen Newman:** Department of Primary Industries and Regional Development, Western Australia

## STOCK STATUS OVERVIEW

Jurisdiction	Stock	Fisheries	Stock status	Indicators
Western Australia	Western Australia	KGBMF, KGBMF    NBPMF    PFTIMF    PLF, NBPMF, PFTIMF, PLF	Sustainable	Catch
Northern Territory	Northern Territory	BF, CLF, DF, ONLF, TRF	Recovering	Biomass, egg production
Queensland	Gulf of Carpentaria	GOCIFFF  GOCDFFTF	Undefined	Catch
Queensland	Queensland East Coast	ECIFFF	Undefined	Catch

BF Barramundi Fishery (NT), CLF Coastal Line Fishery (NT), DF Demersal Fishery (NT), ONLF Offshore Net and Line Fishery (NT), TRF Timor Reef Fishery (NT), ECIFFF East Coast Inshore Fin Fish Fishery (QLD), KGBMF Kimberley Gillnet and Barramundi Managed Fishery (WA), NBPMF Nickol Bay Prawn Managed Fishery (WA), PFTIMF Pilbara Fish Trawl (Interim) Managed Fishery (WA), PLF Pilbara Line Fishery (WA), KGBMF || NBPMF || PFTIMF || PLF Various Fisheries combined due to 3 boat rule (WA), GOCIFFF||GOCDFFTF Gulf of Carpentaria Developmental Fin Fish Trawl Fishery || Gulf of Carpentaria Inshore Fin Fish Fishery (QLD)

## STOCK STRUCTURE

Black Jewfish is a widespread Indo-Pacific species found from Exmouth Gulf in Western Australia, north and east across Northern Australia, to the east coast of Queensland. The stock structure for this species has been investigated in the north-western part of its range from the western Gulf of Carpentaria to its southern extent along the west Australian coastline [Saunders et al. 2016]. The results indicated that separate stocks exist at the scale of tens of kilometres [Saunders et al. 2016]. However, it is extremely difficult to collect relevant biological and catch and effort information to assess each of these individual fine-scale biological stocks, although this fine-scale stock structure is an explicit consideration for fishery managers. Due to the logistic and operational constraints of the relevant monitoring, assessment and management agencies, assessment is only feasible at the jurisdictional level. This assumes that the assessment of stock status within a jurisdictional assessment unit is relevant to all biological stocks within that assessment unit.

Here assessment of stock status is presented at the jurisdictional level—Western Australia, Northern Territory; and at the management unit level—Gulf of Carpentaria and Queensland

East Coast (Queensland).

## STOCK STATUS

### **Gulf of Carpentaria**

In the Gulf of Carpentaria (Queensland), Black Jewfish are taken by commercial net fishers and recreational anglers. It has been verified that the majority of 'Unspecified jewfish' logbook entries for the Gulf of Carpentaria Inshore Fin Fish Fishery (Queensland) are considered to be Black Jewfish and hence commercial harvest figures have been altered to reflect this. Commercial catches have increased in recent years. Harvests have decreased from a reported historical high of 33 t in 1990 to an average of 4 t over the 2012–15 period, increasing again to 13.5 t in 2016 and 10.3 t in 2017. The number of licences in operation reached a low of 24 in the 2012–15 year period and has increased to 36 in 2016 and 50 in 2017.

From 1999–2000, there was a distinct lack of large mature fish found in the north Cape York region [Phelan 2002]. The overall downward trend in catches and the reduced spawning biomass, combined with the vulnerable biology of Black Jewfish (late maturing, aggregating to spawn), resulted in a two year ban on fishing for Black Jewfish in key aggregation areas. In 2002, Queensland prohibited the harvest of Black Jewfish in the north Cape York region (north of Crab Island) [Roelofs 2003]. No studies have been undertaken to measure recovery in this region or the overall biomass of Black Jewfish in the Queensland part of the Gulf of Carpentaria. There are no reliable estimates of recreational harvest for Black Jewfish in the Queensland Gulf of Carpentaria [Roelofs 2003], but it is known as a popular recreational species in the region.

It is likely that the high value of Black Jewfish swim bladders has resulted in an increase in fishing pressure as shown by the recent increase in fishing licenses. Black Jewfish are particularly vulnerable to fishing pressure due to their tendency to aggregate [Phelan 2008] and are slow to recover once depleted [Taillebois et al. 2017].

The Queensland legal size limit (600 mm TL) in the Gulf of Carpentaria is well below the reported age of first maturity for females (850–900 mm TL) and may not be effective in protecting spawning females from fishing. A conservative possession limit (two fish) reduces recreational fishing pressure on the stock. There is insufficient information available to confidently classify the status of the stock.

On the basis of the evidence provided above, the management unit Black Jewfish in the Gulf of Carpentaria is classified as an **undefined stock**.

### **Northern Territory**

Black Jewfish are harvested by commercial and recreational sectors across most of the Northern Territory, with the majority of catch occurring within the Greater Darwin Region (i.e. within a radius of approximately 150 km of this population centre). Within this region, Black Jewfish is a targeted species of the Coastal Line Fishery, contributing 68 per cent of the total harvest; the recreational fishing sector, contributing 21 per cent; Fishing Tour Operators, contributing 5 per cent; no estimates of the Indigenous harvest of Black Jewfish is available for the Northern Territory. For the purposes of this assessment only commercial logbooks and recreational data from the Greater Darwin Region have been used.

A 2014 stock assessment using a Stock Reduction Analysis [Grubert et al. 2013] indicated that Black Jewfish were overfished and that overfishing was occurring. The most recent assessment [NTG 2018, unpublished] updates the previous assessment incorporating data up to and including 2017. The results of the model indicate that, despite high recent exploitation levels, the Greater Darwin Region stocks were not overfished in 2017 and there was a 24 per cent probability that the stock is overfished and 5 per cent probability that current

harvest rates are causing overfishing. Biomass and egg production were estimated to be at 50 per cent and 47 per cent respectively of the unfished biomass. Given the recent information on the stock structure of this species [Saunders et al. 2016], it is likely that the assessment incorporates several populations. As the model is driven by the populations that receive the highest harvest rates in the Northern Territory, the assigned status can be assumed to be representative of these heavily-fished areas, with other less accessible areas being more lightly-fished. The recovery of this species is primarily driven by successive years of above average recruitment (indicated by the reduction in average length of monitored catches and an increase in the number of fish caught) as well as the management measures (catch limits and area closures) introduced in 2015 aimed to reduce the harvest of the species by 20 per cent in exploited areas [NTG 2017]. There is a high likelihood that the illegal harvest of this species, which historically has been non-existent, will increase the risk of this species being overfished in the future as the price of swim bladders exceeds \$750 per kg. The swim bladders are considered a delicacy and an aphrodisiac in some Asian countries. The current level of fishing mortality should allow further recovery, though the development of any illegal fishing mortality and its potential impact will need to be assessed.

On the basis of the evidence provided above, Black Jewfish in the Northern Territory is classified as a **recovering stock**.

**Queensland East Coast** Black Jewfish are taken by commercial net fishers and recreational anglers on the Queensland east coast. It has been verified that the majority of 'Jewfish-Other' logbook entries for the East Coast Inshore Fin Fish Fishery (Queensland) are considered to be Black Jewfish and hence commercial harvest figures have been altered to reflect this. Commercial catches have fluctuated over the last 20 years with an average catch of 15.9 t for the period 1996–2015 and a maximum of 30.5 t in 2003 during this period. There has recently been an increase in catch with a reported 25 t in 2016 and 46.4 t in 2017. Nominal catch rates have been steadily increasing over the last 20 years. In 2017, 53 licences reported Black Jewfish catch over 484 fishing days. This is an increase from 2016 where 38 licences reported catch over 299 fishing days. Fishing pressure from recreational and Indigenous activities are unknown [Webley et al. 2015].

It is likely that the high value of Black Jewfish swim bladders has resulted in an increase in fishing pressure and will continue to do so while these prices are attainable.

The legal size limit (750 mm TL) is below the reported age of first maturity for females and may not be effective in protecting spawning females from fishing. A conservative possession limit (two fish) reduces recreational fishing pressure on the stock. There is insufficient information available to confidently classify the status of the stock.

On the basis of the evidence provided above, the Queensland East Coast management unit is classified as an **undefined stock**.

**Western Australia** Black Jewfish are not a target species in the Kimberley Gillnet and Barramundi Managed Fishery of Western Australia but are landed in small quantities as by-product [Newman et al. 2018a]. They have also been landed in very small quantities as by-product in the Pilbara Fish Trawl Interim Managed Fishery, the Nickol Bay Prawn Managed Fishery and the Pilbara Line Fishery. The total commercial catch in Western Australia in 2017 was approximately 3.2 tonnes (t). Black Jewfish catches have only been reported from a small area of their range in Western Australia. They are landed by charter fishers, primarily in the Kimberley region of Western Australia, in small quantities. Furthermore, Barramundi has been classified as a sustainable stock in the Kimberley Gillnet and Barramundi Managed Fishery (Western Australia) management unit. Barramundi is an indicator species [see Newman et al. 2018b] for the North

Coast Nearshore and Estuarine Resource. Given, the status of Barramundi as an indicator species, there is an associated low level of risk associated with the biological sustainability of all species harvested in the North Coast Nearshore and Estuarine Resource. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired.

Given the low level of take, the above evidence indicates that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

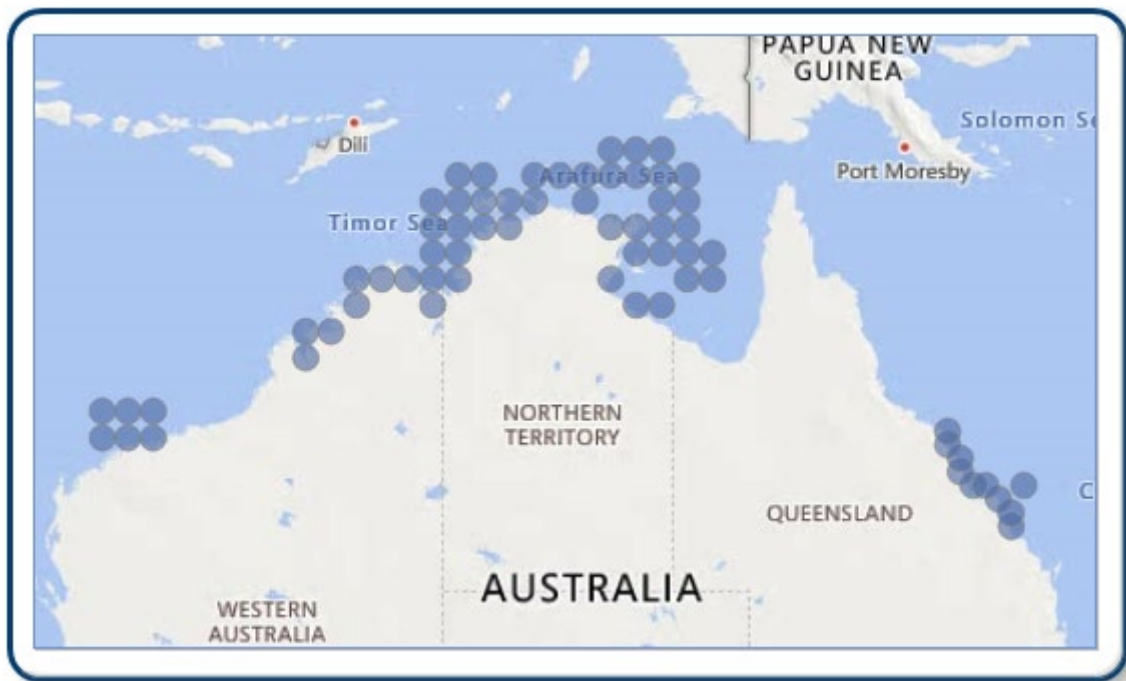
On the basis of the evidence provided above, Black Jewfish in Western Australia is classified as a **sustainable stock**.

## BIOLOGY

**Black Jewfish biology** [Phelan 2002, Welch et al. 2014]

Species	Longevity / Maximum Size	Maturity (50 per cent)
Black Jewfish	15 years, 1 500 mm TL, 30 kg	Northern Territory: 2 years, TL 890 mm

## DISTRIBUTION



Distribution of reported commercial catch of Black Jewfish

## TABLES

Commercial Catch Methods	Northern Territory	Queensland	Western Australia
Beach Seine	✓		
Demersal Longline	✓		
Fish Trap	✓		✓
Gillnet	✓		✓
Hand Line, Hand Reel or Powered Reels			✓

Hook and Line	✓	✓	
Midwater Trawl	✓		
Net		✓	
Otter Trawl	✓		✓
Pelagic Gillnet	✓		
Trawl		✓	
Trotline	✓		
Unspecified			✓

<b>Fishing methods</b>			
	<b>Northern Territory</b>	<b>Queensland</b>	<b>Western Australia</b>
<b>Charter</b>			
Handline	✓		✓
<b>Commercial</b>			
Fish Trap	✓		
Gillnet	✓		✓
Hand Line, Hand Reel or Powered Reels			✓
Hook and Line	✓	✓	
Net		✓	
Otter Trawl	✓		✓
Pelagic Gillnet	✓		
Trawl		✓	
Unspecified			✓
<b>Indigenous</b>			
Handline	✓	✓	✓
<b>Recreational</b>			
Handline	✓	✓	✓
Spearfishing	✓	✓	
Unspecified	✓		

<b>Management Methods</b>			
	<b>Northern Territory</b>	<b>Queensland</b>	<b>Western Australia</b>
<b>Charter</b>			
Bag limits			✓
Gear restrictions		✓	
Limited entry	✓		✓
Passenger restrictions	✓		✓
Possession		✓	✓

<b>limit</b>			
<b>Size limit</b>		✓	✓
<b>Spatial closures</b>		✓	
<b>Spatial zoning</b>			✓
<b>Commercial</b>			
<b>Catch limits</b>	✓	✓	
<b>Gear restrictions</b>	✓	✓	✓
<b>Limited entry</b>	✓	✓	✓
<b>Size limit</b>		✓	✓
<b>Spatial closures</b>	✓	✓	✓
<b>Spatial zoning</b>			✓
<b>Temporal closures</b>		✓	✓
<b>Vessel restrictions</b>	✓	✓	✓
<b>Indigenous</b>			
<b>Laws of general application</b>	✓		✓
<b>Recreational</b>			
<b>Bag limits</b>			✓
<b>Gear restrictions</b>	✓	✓	✓
<b>Licence (Recreational Fishing from Boat License)</b>			✓
<b>Possession limit</b>	✓	✓	✓
<b>Size limit</b>		✓	✓
<b>Spatial closures</b>	✓	✓	✓
<b>Active Vessels</b>			
	<b>Northern Territory</b>	<b>Queensland</b>	<b>Western Australia</b>
	14 LICENCES in BF, 14 LICENCES in CLF, 8 LICENCES in DF, 7 LICENCES in ONLF, 5 LICENCES in TRF,	53 in ECIFFF, 50 in GOCDFFTF,	4 in KGBMF, &lt;3 in NBPMF, &lt;3 in PFTIMF, 3 in PLF, 22 in Charter,

**BF** Barramundi Fishery(NT)

**CLF** Coastal Line Fishery(NT)

**DF** Demersal Fishery(NT)

**ONLF** Offshore Net and Line Fishery(NT)

**TRF** Timor Reef Fishery(NT)

**ECIFFF** East Coast Inshore Fin Fish Fishery(QLD)

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

**KGBMF** Kimberley Gillnet and Barramundi Managed Fishery(WA)

**NBPMF** Nickol Bay Prawn Managed Fishery(WA)

**PFTIMF** Pilbara Fish Trawl (Interim) Managed Fishery(WA)

**PLF** Pilbara Line Fishery(WA)

**Charter** Tour Operator(WA)

Catch	New South Wales	Northern Territory	Queensland	Western Australia
<b>Charter</b>				0.40 t
<b>Commercial</b>		6.66875t in BF, 168.83t in CLF, 21.332t in DF, 0.296t in ONLF, 11.337t in TRF,	46.4193t in ECIFFF, 10.336t in GOCIFFF  GOCDFFTF,	3.2427t in KGBMF    NBPMF    PFTIMF    PLF,
<b>Indigenous</b>	Unknown		Unknown	Unknown
<b>Recreational</b>	28 t in FTO; 55.8 t (in 2016, unpublished)		Unknown	0.70 t ± 0.19 t se

BF Barramundi Fishery (NT), CLF Coastal Line Fishery (NT), DF Demersal Fishery (NT), ONLF Offshore Net and Line Fishery (NT), TRF Timor Reef Fishery (NT), ECIFFF East Coast Inshore Fin Fish Fishery (QLD), KGBMF Kimberley Gillnet and Barramundi Managed Fishery (WA), NBPMF Nickol Bay Prawn Managed Fishery (WA), PFTIMF Pilbara Fish Trawl (Interim) Managed Fishery (WA), PLF Pilbara Line Fishery (WA), KGBMF || NBPMF || PFTIMF || PLF Various Fisheries combined due to 3 boat rule (WA), GOCIFFF||GOCDFFTF Gulf of Carpentaria Developmental Fin Fish Trawl Fishery || Gulf of Carpentaria Inshore Fin Fish Fishery (QLD),

**Western Australia – Recreational (Catch)** Boat-based recreational catch if from 1 September 2015–31 August 2016. These data are derived from those reported in Ryan et al. 2017.

**Western Australia – Recreational (management methods)** A Recreational Fishing from Boat Licence 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** 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.

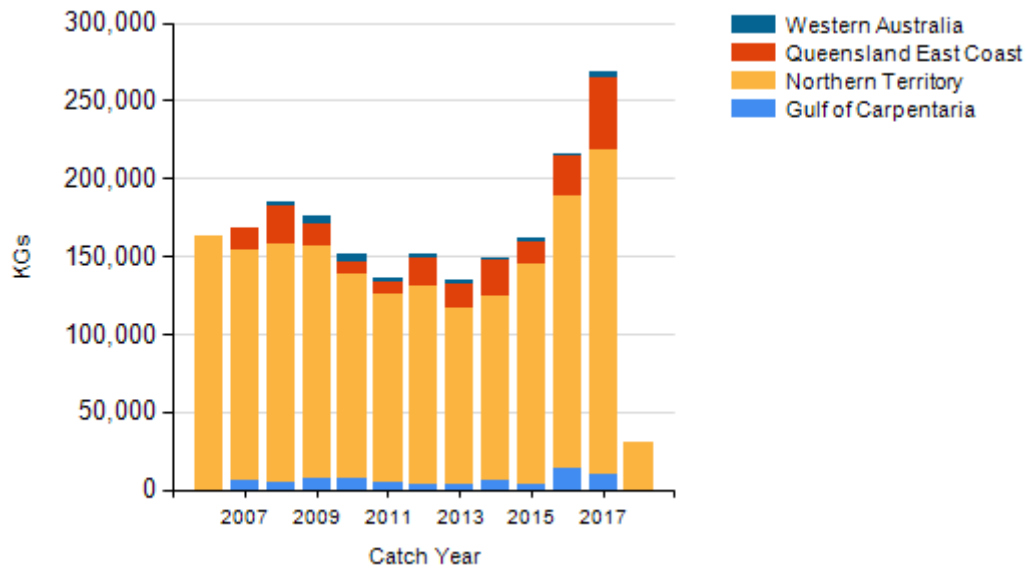
**Western Australia – Active Vessels** Data is confidential as there were fewer than three vessels operating in the Pilbara Fish Trawl Interim Managed Fishery.

**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.

**Northern Territory – Indigenous** 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”.

## CATCH CHART



Commercial catch of Black Jewfish - note confidential catch not shown

## EFFECTS OF FISHING ON THE MARINE ENVIRONMENT

### ENVIRONMENTAL EFFECTS on Black Jewfish

References	
110	Saunders, TM, Welch, D, Barton, D, Crook, D, Dudgeon, C, Hearnden, M, Maher, S, Ovenden, J, Taillebois, L and Taylor J 2016, Optimising the management of tropical coastal reef fish through the development of Indigenous capability. FRDC final report 2013/017.
111	Newman, SJ, Mitsopoulos, G, Skepper, C and Smith, E 2018, North Coast Nearshore and Estuarine Resource Status Report 2017. pp. 123-126. In: Gaughan, D.J. and Santoro, K. (eds.). Status Reports of the Fisheries and Aquatic Resources of Western Australia 2016/17: The State of the Fisheries. Department of Primary Industries and Regional Development, Western Australia, Perth, Australia. 237p.
112	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. Marine Policy, 88: 11–22.
113	Ryan, KL, Hall, NG, Lai, EK, Smallwood, CB, Taylor, SM, Wise, BS 2017, Statewide survey of boat-based recreational fishing in Western Australia 2015/16. Fisheries research Report No. 287. Department of Primary Industries and Regional Development, Government of Western Australia, Perth.
114	Northern Territory Government 2017, Status of key Northern Territory Fish Stocks Report 2015, Northern Territory Government Department of Primary Industry and Resources, Fishery Report 118.
115	Grubert, MA, Saunders, TM, Martin, JM, Lee, HS and Walters, CJ 2013, Stock Assessments of Selected Northern Territory Fishes, Fishery report no. 110, Northern Territory Fisheries.
116	Phelan, M 2008, Assessment of the implications of target fishing on Black Jewfish ( <i>Protonibea diacanthus</i> ) aggregations in the Northern Territory, Fisheries Research and Development Corporation project 2004/004, fishery report 91, Northern Territory Fisheries.
117	Roelofs, AJ 2003, Ecological Assessment of the Gulf of Carpentaria Inshore Finfish Fishery - A report to Environment Australia on the sustainable management of a multi-species tropical gillnet fishery, Department of Primary Industries and Fisheries, Brisbane.
118	Phelan, MJ 2002, Fishery biology and management of the Black Jewfish <i>Protonibea squamosa</i> (Sciaenidae) aggregations near Injinoo community, Far Northern Cape York. Stage 1: Initial characterisation of the aggregations and associated fishery, Fisheries Research and Development Corporation project 98/135, Department of Primary Industries,



	Queensland and Balkanu Cape York Development Corporation, Cairns.
119	Webley, J, McInnes, K, Teixeira, D, Lawson, A and Quinn, R 2015, Statewide Recreational Fishing Survey 2013-14, Queensland Department of Agriculture and Fisheries, Brisbane.
120	Taillebois, L, Barton, DP, Crook, DA, Saunders, T, Taylor, J, Hearnden, M, Saunders, RJ, Newman, SJ, Travers, MJ, Welch, DJ, Greig, A, Dudgeon, C, Maher, S and Ovenden, JR 2017, Strong population structure deduced from genetics, otolith chemistry and parasite abundances explains vulnerability to localized fishery collapse in a large Sciaenid fish, <i>Protonibea diacanthus</i> , <i>Evolutionary Applications</i> , vol. 10, no. 10, pp. 978–993.
121	Welch, DJ, Robins, J, Saunders, T, Courtney, T, Harry, A, Lawson, E, Moore, BR, Tobin, A, Turnbull, C, Vance, D and Williams, AJ 2014, Implications of climate change impacts on fisheries resources of northern Australia. Part 2: Species profiles, final report to the Fisheries Research and Development Corporation, project 2010/565, James Cook University, Townsville.