Chapter 1
Overview

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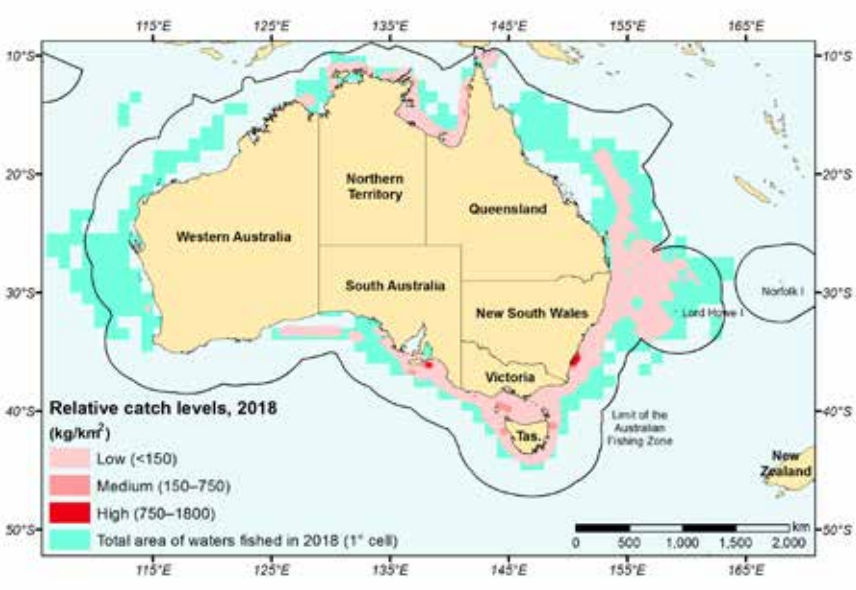
The Australian Government's approach to fisheries management includes maintaining fish stocks at ecologically sustainable levels and, within this context, maximising the net economic returns (NER) to the Australian community (Department of Agriculture and Water Resources 2018b). It also considers the impact of fishing activities on non-target species and the long-term sustainability of the marine environment, as required by the *Fisheries Management Act 1991* and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This requires an understanding of the biological status of stocks, the economic status of fisheries and the state of marine environments that support fisheries.

Fishery status reports 2019 provides an independent assessment of the biological status of fish stocks and the economic status of fisheries managed, or jointly managed, by the Australian Government (Commonwealth fisheries) (Figure 1.1). It summarises the performance of these fisheries in 2018 and over time, against the requirements of fisheries legislation and policy. The reports assess all key commercial species from Australian Government–managed fisheries and examine the broader impact of fisheries on the environment, including on non-target species.

To complete these reports, ABARES uses data and information from agencies such as the Australian Fisheries Management Authority (AFMA) and regional fisheries management organisations. The reports use information on catch and fishing effort, and other information for the most recent complete fishing season that is available, and the most recent stock assessments. Commonwealth fisheries operate with different fishing season dates, so the currency of catch data in the reports varies. To compare status from year to year, biological status and environmental status are presented for 2018. Economic status is presented for the 2017–18 financial year.

FIGURE 1.1 Relative catch levels of all Australian Government–managed fisheries, 2018



1.1 Assessing biological status

Assessments of stock status provide an indication of whether the current size of a fish stock is above the level at which the stock is considered to be overfished (biomass status) and whether current levels of catch will allow the stock to remain in that state (fishing mortality status). Stock status is expressed in relation to the reference points prescribed by the recently revised Commonwealth Fisheries Harvest Strategy Policy (HSP; Department of Agriculture and Water Resources 2018b).

Biomass (B) status relates to how many fish there are—specifically, whether the biomass in the year being assessed is above the level at which the risk to the stock is considered to be unacceptable. The HSP defines this level as the limit reference point, below which the stock is considered to be overfished.

Fishing mortality (F) status relates to the level of fishing pressure on a stock—specifically, whether fishing mortality in the year(s) being assessed is likely to result in the stock becoming overfished, or prevent the stock from rebuilding from an overfished state. If fishing mortality exceeds either of these thresholds, a stock is considered to be subject to overfishing.

Stocks are included in the *Fishery status reports* if they are a target or key commercial species in a fishery managed solely or jointly by the Australian Government and meet one or more of the criteria below. Conversely, stocks may be removed from the reports if they do not meet at least one of these criteria:

- a species or stock managed under a total allowable catch (TAC)
- a species or stock previously classified as 'overfished' that has not yet recovered to above the limit reference point.

In addition, stocks may be included if they meet one or more of the criteria below. Such stocks are assessed on a case-by-case basis:

- a species previously included in the *Fishery status reports* as a single stock that has been reclassified as multiple stocks to align with species biology or management
- a byproduct species of ecological and/or economic importance, if it meets one or more of the following criteria
  - for several consecutive years or fishing seasons, the total catch (landings and discards) of the byproduct species is approximately equal to, or greater than, that of any other stock currently targeted and/or assessed in that fishery or sector
  - the value of the total catch landed of the byproduct species is considered to be an important economic component of the fishery or sector
  - the byproduct species or stock is listed as being at high risk from fishing activity in the ecological risk assessment process for the fishery or sector.

1.2 Biological status in 2018

Fishery status reports 2019 assesses 96 fish stocks across 22 fisheries (Figure 1.2); 65 stocks were assessed across 9 fisheries that are managed solely by AFMA on behalf of the Australian Government, and 31 stocks were assessed across 13 fisheries that are managed jointly with other Australian jurisdictions or other countries. One new stock is included in *Fishery status reports 2019*: the Antarctic toothfish (*Dissostichus mawsoni*) stock in the Commission for the Conservation of Antarctic Marine Living Resources exploratory toothfish fishery in division 58.4.2, which was formally fished by an Australian vessel for the first time in 2018. This is a jointly managed stock because it occurs in the area covered by the Convention on the Conservation of Antarctic Marine Living Resources.

The status of the 96 fish stocks managed solely or jointly by the Australian Government in 2018 is summarised as follows:

- The number of stocks classified as not subject to overfishing (Figure 1.3) remained at 79 (79 in 2017), and the number of stocks classified as not overfished (Figure 1.4) increased to 70 (69 in 2017). Of these, 67 stocks were both not subject to overfishing and not overfished (65 in 2017).
- The number of stocks classified as subject to overfishing (Figure 1.3) remained at 2, and the number of stocks classified as overfished (Figure 1.4) increased to 11 (10 in 2017). One stock was classified as both overfished and subject to overfishing (0 in 2017).
- The number of stocks classified as uncertain with regard to fishing mortality increased to 15 (14 in 2017), and the number of stocks classified as uncertain with regard to biomass decreased to 15 (16 in 2017). Of these, 8 stocks were uncertain with respect to both fishing mortality and biomass.

Fishery status reports 2019 shows a continuation of the patterns seen in stock status in recent years, with four stocks changing status for 2018 (Figures 1.3 and 1.4). This is the sixth consecutive year that no stock in a fishery solely managed by the Australian Government has been classified as subject to overfishing.

Status outcomes are summarised separately for stocks in fisheries solely managed by the Australian Government and stocks in fisheries that are jointly managed. This allows an evaluation of the performance of fisheries management against the relevant legislation and policies, which may differ between these groups of fisheries.

FIGURE 1.2 Biological status of fish stocks in 2018, by fishery or sector

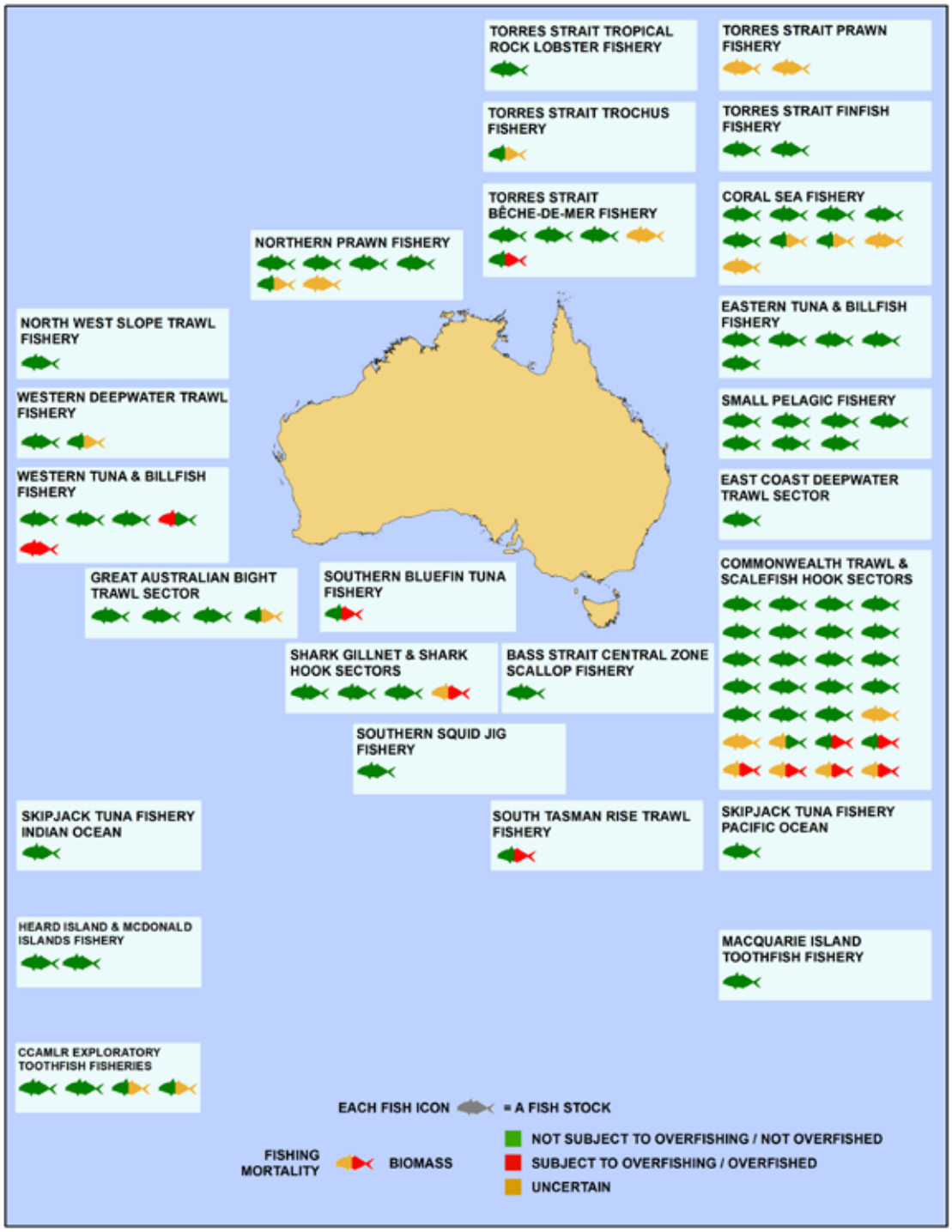


FIGURE 1.3 Fishing mortality status (number of stocks), 2004–2018

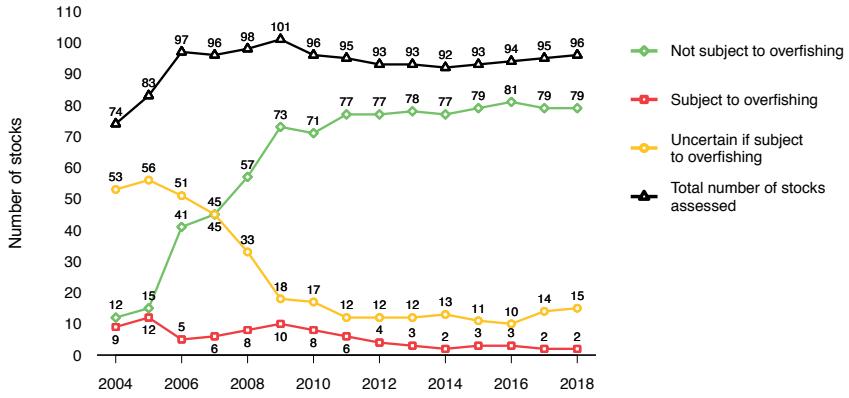
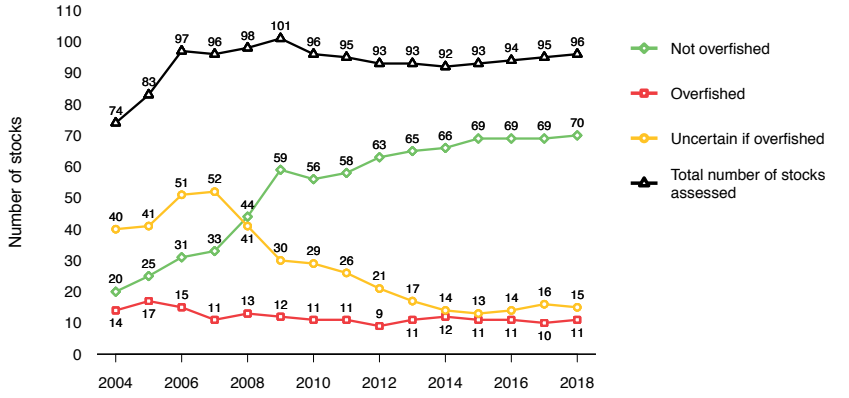


FIGURE 1.4 Biomass status (number of stocks), 2004–2018



Stocks that have changed status

Four stocks changed status in 2018. Status changes were largely due to improved and updated stock assessments, or uncertainty in setting the recommended biological catch (RBC). The status of four stocks in fisheries solely managed by the Australian Government changed in 2018 (Table 1.1). In the Southern and Eastern Scalefish and Shark Fishery (SESSF), the two deepwater shark stocks are now classified as uncertain for fishing mortality because catches in 2018 exceeded the RBC, and it is unknown whether this will deplete the population below its biomass limit reference point, given that the biomass for these stocks is also uncertain. Also in the SESSF, ocean perch (*Helicolenus barathri* and *H. percoides*) is now considered not subject to overfishing because the total fishing mortality in 2018 was below the RBC. The level of uncertainty around biomass for ruby snapper (*Etelis carbunculus*, *Etelis* spp.) has improved in the Western Deepwater Trawl Fishery. A stock assessment from the Western Australian–managed fisheries indicates that the stock is well above the limit reference point. This, together with the level of recent catches, has resulted in the stock now considered not overfished.

One stock in jointly managed fisheries changed status in 2018. The biomass status of striped marlin (*Kajikia audax*) stock in the Western Tuna and Billfish Fishery (WTBF) changed to uncertain in 2017 because biomass estimates from multiple assessment models used in 2017 ranged both above and below the limit reference point. An updated stock assessment in 2018 indicated that the stock was below the biomass limit reference point, while fishing mortality remained well above the level that would achieve maximum sustainable yield. The stock is now classified as both overfished and subject to overfishing.

TABLE 1.1 Stocks with a changed status in 2018 and their status in 2017

Fishery	Common name (scientific name)	2017		2018	
		Fishing mortality	Biomass	Fishing mortality	Biomass
Stocks in fisheries managed solely by the Australian Government					
Southern and Eastern Scalefish and Shark Fishery: Commonwealth Trawl Sector	Deepwater sharks, eastern zone (multiple species)				
Southern and Eastern Scalefish and Shark Fishery: Commonwealth Trawl Sector	Deepwater sharks, western zone (multiple species)				
Southern and Eastern Scalefish and Shark Fishery: Commonwealth Trawl Sector	Ocean perch (*Helicolenus barathri* and *H. percoides*)				
Western Deepwater Trawl Fishery	Ruby snapper (*Etelis carbunculus*, *Etelis* spp.)				
Stocks in fisheries managed jointly by the Australian Government					
Western Tuna and Billfish Fishery	Striped marlin (*Kajikia audax*)				

Fishing mortality Not subject to overfishing; Subject to overfishing; Uncertain

Biomass Not overfished; Overfished; Uncertain

Stocks classified as overfished and/or subject to overfishing

Stocks classified as overfished and/or subject to overfishing in 2018 are largely the same as in 2017 (Tables 1.2 and 1.3). Table 1.2 summarises the status determinations and why the stocks were classified as overfished or subject to overfishing; the full details and evidence are provided in the relevant chapters. Briefly, seven stocks in fisheries managed solely by the Australian Government were classified as overfished in 2018 (Tables 1.2 and 1.3). These stocks occur in the SESSF and are subject to stock rebuilding strategies. Blue warehou (*Seriolella brama*), eastern gemfish (*Rexea solandri*), orange roughy (*Hoplostethus atlanticus*), gulper sharks (*Centrophorus* spp.) and school shark (*Galeorhinus galeus*) are listed as conservation-dependent under the EPBC Act, which carries management requirements.

Five stocks in jointly managed fisheries were classified as overfished or subject to overfishing in 2017. This remains the same in 2018, but striped marlin in the WTBF is now classified as both overfished and subject to overfishing (Table 1.2).

Assessing fishing mortality status for overfished stocks

It is becoming increasingly difficult to assess fishing mortality status for a number of overfished stocks: blue warehou, eastern gemfish and redfish (*Centroberyx affinis*). This is a result of a range of factors, including a lack of data, and uncertainty in the catch data and in the assessments. These species are subject to rebuilding strategies, which specify a biologically reasonable time frame for recovery to a biomass above the limit reference point. Although all overfished stocks have an RBC of zero, their rebuilding strategies include an incidental catch allowance to account for catches that are regarded as unavoidable when fishing for other species.

Catches that breach these allowances have been reported for each species since rebuilding strategies were implemented for them. Such breaches constitute overfishing for the purposes of status determination. There is also some level of discarding of these species, which can vary between years and can be difficult to estimate. The level of discard mortality is also uncertain. Information on the level of discarding is often not available for the most recent season at the time of drafting of these reports. When the known retained catch of the species approaches the incidental catch allowance, it is often difficult to be certain that the total catch has not exceeded the allowance because of the uncertainties in discard estimates. This increases the uncertainty about the level of influence the incidental catch of the species (and potential overfishing) may have on its rebuilding time frame. Furthermore, the assessment models that are used to develop the catch allowances generally assume average conditions (for example, recruitment) for their projections. The purpose of these projections is not to track recovery annually but to predict an 'on average' expected rebuilding time frame. A failure to detect a trend in fishery data that resembles the trajectory of the projection is not necessarily evidence that the species is not responding but may reflect 'non-average' conditions. Moreover, some assessments are more than six years old, and the evidence for fishing mortality effects is inferred from indicators rather than estimation using an assessment model. These models also rarely include ecosystem effects, such as changes in trophic interactions, which may influence the effect that fishing mortality has on rebuilding time frames.

These realities can make it unclear whether incidental catch is hindering recovery of a stock and what time frame of recovery is biologically reasonable, and therefore whether a stock under a rebuilding plan is subject to overfishing. This is the case for blue warehou, eastern gemfish and redfish. It is becoming increasingly apparent that standard data collection and assessment protocols are unable to deliver a concise picture of fishing mortality status for these overfished stocks.

Status of Australian fish stocks reports

In January 2019, the Fisheries Research and Development Corporation (FRDC) released *Status of Australian fish stocks reports 2018*, the fourth in the series. The reports provide a national assessment of the status of key wild-capture fish stocks that are managed by the Australian Government, the states and the Northern Territory. The reports were initiated in 2012 by the FRDC and ABARES. They are developed collaboratively by the FRDC, ABARES, CSIRO, and government fishery research agencies in all states and the Northern Territory. The 2018 reports provide assessments for 406 stocks across 120 key species (or species complexes). The reports consider the same biological information as the *Fishery status reports*, but interpret that information within a nationally agreed classification system (see Appendix). This national reporting framework is designed to improve the ability to compare the status of fish stocks across Australia.

Tuna pens off the coast of Port Lincoln
Matt Daniel, AFMA

TABLE 1.2 Stocks classified as overfished and/or subject to overfishing in 2018, and their status in 2017

Fishery	Common name (scientific name)	2017		2018		Comments
		Fishing mortality	Biomass	Fishing mortality	Biomass	
Stocks in fisheries managed solely by the Australian Government						
SESSF: CTS and SHS Chapter 9	Blue warehou (*Seriolella brama*)					Total removals are below the incidental catch allowance, but the level of fishing mortality that will allow the stock to rebuild is unknown. There is no evidence that the stock is rebuilding.
SESSF: CTS and SHS Chapter 9	Gemfish, eastern zone (*Rexea solandri*)					Biomass is below the limit reference point. Uncertainty remains around total fishing mortality and rebuilding to the limit reference point within the specified time frame.
SESSF: CTS and SHS Chapter 9	Gulper sharks (*Centrophorus harrissoni*, *C. moluccensis*, *C. zeehaani*)					Populations are likely to be highly depleted, and fishing mortality is uncertain despite low landed catch and protection through closures.
SESSF: CTS Chapter 9	Orange roughy, southern zone (*Hoplostethus atlanticus*)					Closure of most areas deeper than 700 m and negligible catches. No updated stock assessment.
SESSF: CTS Chapter 9	Orange roughy, western zone (*Hoplostethus atlanticus*)					Closure of most areas deeper than 700 m and negligible catches. No updated stock assessment.
SESSF: CTS Chapter 9	Redfish (*Centroberyx affinis*)					Biomass is below the limit reference point. Catch is above the RBC, and it is unclear whether total removals are above the level that will allow rebuilding.
SESSF: SGSHS Chapter 12	School shark (*Galeorhinus galeus*)					Uncertain if the fishing mortality rate in 2017–18 will allow recovery within the specified time frame. Biomass is likely to remain below 20% of unexploited levels.

continued ...

TABLE 1.2 Stocks classified as overfished and/or subject to overfishing in 2018, and their status in 2017 continued

Fishery	Common name (scientific name)	2017		2018		Comments
		Fishing mortality	Biomass	Fishing mortality	Biomass	
Stocks in fisheries managed jointly by the Australian Government						
South Tasman Rise Trawl Fishery Chapter 28	Orange roughy (*Hoplostethus atlanticus*)					Fishery has been closed under domestic arrangements since 2007 because of stock depletion.
Torres Strait Bêche-de-mer Fishery Chapter 19	Sandfish (*Holothuria scabra*)					No catch in 2017. The most recent full survey (2009) indicated that the stock was overfished.
Southern Bluefin Tuna Fishery Chapter 23	Southern bluefin tuna (*Thunnus maccoyii*)					The estimate of spawning biomass is below 20% of unfished biomass. The global TAC, set in line with the management procedure, should allow rebuilding within the prescribed time frame.
WTBF Chapter 24	Striped marlin (*Kajikia audax*)					The most recent estimates of biomass from multiple models range above and below the default Commonwealth limit reference point. The current fishing mortality rate exceeds that required to produce MSY.
WTBF Chapter 24	Yellowfin tuna (*Thunnus albacares*)					The most recent estimate of spawning biomass is above the default Commonwealth limit reference point. The current fishing mortality rate is above that required to produce MSY.

Note: **CTS** Commonwealth Trawl Sector. **MSY** Maximum sustainable yield. **RBC** Recommended biological catch. **SESSF** Southern and Eastern Scalefish and Shark Fishery. **SGSHS** Shark Gillnet and Shark Hook sectors. **SHS** Scalefish Hook Sector. **TAC** Total allowable catch. **WTBF** Western Tuna and Billfish Fishery.

Table 1.3 Biological stock status of all stocks assessed in 2018, and their status since 2004

Fishery	Common name (scientific name)	Status																													
		2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016		2017		2018	
		Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass
Stocks in fisheries managed solely by the Australian Government																															
Bass Strait Central Zone Scallop Fishery	Commercial scallop (*Pecten fumatus*)																														
Coral Sea Fishery: Sea Cucumber Sector	Black teatfish (*Holothuria whitmaei*)																														
Coral Sea Fishery: Sea Cucumber Sector	Prickly redfish (*Thelenota ananas*)																														
Coral Sea Fishery: Sea Cucumber Sector	Surf redfish (*Actinopyga mauritiana*)																														
Coral Sea Fishery: Sea Cucumber Sector	White teatfish (*Holothuria fuscogilva*)																														
Coral Sea Fishery: Sea Cucumber Sector	Other sea cucumber species (~11 species)																														
Coral Sea Fishery: Aquarium Sector	Multiple species																														
Coral Sea Fishery: Lobster and Trochus Sector	Tropical rock lobster (*Panulirus ornatus*, possibly other species)																														
Coral Sea Fishery: Line and Trap Sector	Mixed reef fish and sharks																														
Coral Sea Fishery: Trawl and Trap Sector	Numerous fish, shark and crustacean species																														
Northern Prawn Fishery	Redleg banana prawn (*Fenneropenaeus indicus*)																														
Northern Prawn Fishery	White banana prawn (*Fenneropenaeus merguiensis*)																														

continued ...

Table 1.3 Biological stock status of all stocks assessed in 2018, and their status since 2004 continued

Fishery	Common name (scientific name)	Status																															
		2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016		2017		2018	
		Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass
Northern Prawn Fishery	Brown tiger prawn (*Penaeus esculentus*)																																
Northern Prawn Fishery	Grooved tiger prawn (*Penaeus semisulcatus*)																																
Northern Prawn Fishery	Blue endeavour prawn (*Metapenaeus endeavouri*)																																
Northern Prawn Fishery	Red endeavour prawn (*Metapenaeus ensis*)																																
North West Slope Trawl Fishery	Scampi (*Metanephrops australiensis*, *M. boschmai*, *M. velutinus*)																																
Small Pelagic Fishery	Australian sardine (*Sardinops sagax*)																																
Small Pelagic Fishery	Blue mackerel, east (*Scomber australasicus*)																																
Small Pelagic Fishery	Blue mackerel, west (*Scomber australasicus*)																																
Small Pelagic Fishery	Jack mackerel, east (*Trachurus declivis*)																																
Small Pelagic Fishery	Jack mackerel, west (*Trachurus declivis*)																																
Small Pelagic Fishery	Redbait, east (*Emmelichthys nitidus*)																																
Small Pelagic Fishery	Redbait, west (*Emmelichthys nitidus*)																																

continued ...

Table 1.3 Biological stock status of all stocks assessed in 2018, and their status since 2004 continued

Fishery	Common name (scientific name)	Status																															
		2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016		2017		2018	
		Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass
SESSF: Commonwealth Trawl and Scalefish Hook sectors	Blue-eye trevalla (*Hyperoglyphe antarctica*)																																
SESSF: Commonwealth Trawl and Scalefish Hook sectors	Blue grenadier (*Macruronus novaezelandiae*)																																
SESSF: Commonwealth Trawl and Scalefish Hook sectors	Blue warehou (*Seriolella brama*)																																
SESSF: Commonwealth Trawl Sector	Deepwater sharks, eastern zone (18 species)																																
SESSF: Commonwealth Trawl Sector	Deepwater sharks, western zone (18 species)																																
SESSF: Commonwealth Trawl Sector	Eastern school whiting (*Sillago flindersi*)																																
SESSF: Commonwealth Trawl Sector	Flathead (*Neoplatycephalus richardsoni* and 4 other species)																																
SESSF: Commonwealth Trawl and Scalefish Hook sectors	Gemfish, eastern zone (*Rexea solandri*)																																
SESSF: Commonwealth Trawl and Scalefish Hook sectors	Gemfish, western zone (*Rexea solandri*)																																
SESSF: Commonwealth Trawl and Scalefish Hook sectors	Gulper sharks (*Centrophorus harrissoni*, *C. moluccensis*, *C. zeehaani*)																																

continued ...

Table 1.3 Biological stock status of all stocks assessed in 2018, and their status since 2004 continued

Fishery	Common name (scientific name)	Status																																	
		2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016		2017		2018	
		Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass
SESSF: Commonwealth Trawl and Scalefish Hook sectors	Jackass morwong (*Nemadactylus macropterus*)																																		
SESSF: Commonwealth Trawl Sector	John dory (*Zeus faber*)																																		
SESSF: Commonwealth Trawl Sector	Mirror dory (*Zenopsis nebulosa*)																																		
SESSF: Commonwealth Trawl Sector	Ocean jacket (*Nelusetta ayraud*)																																		
SESSF: Commonwealth Trawl and Scalefish Hook sectors	Ocean perch (*Helicolenus barathri*, *H. percoides*)																																		
SESSF: Commonwealth Trawl Sector	Orange roughy, Cascade Plateau (*Hoplostethus atlanticus*)																																		
SESSF: Commonwealth Trawl Sector	Orange roughy, eastern zone (*Hoplostethus atlanticus*)																																		
SESSF: Commonwealth Trawl Sector	Orange roughy, southern zone (*Hoplostethus atlanticus*)																																		
SESSF: Commonwealth Trawl Sector	Orange roughy, western zone (*Hoplostethus atlanticus*)																																		
SESSF: Commonwealth Trawl Sector	Oreodory: smooth, Cascade Plateau (*Pseudocyttus maculatus*)																																		

continued ...

Table 1.3 Biological stock status of all stocks assessed in 2018, and their status since 2004 continued

Fishery	Common name (scientific name)	Status																																	
		2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016		2017		2018	
		Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass
SESSF: Commonwealth Trawl Sector	Oreodory: smooth, non–Cascade Plateau (*Pseudocyttus maculatus*)																																		
SESSF: Commonwealth Trawl Sector	Oreodory: other (*Neocyttus rhomboidalis*, *Allocyttus niger*, *A. verrucosus*)																																		
SESSF: Commonwealth Trawl and Scalefish Hook sectors	Pink ling (*Genypterus blacodes*)																																		
SESSF: Commonwealth Trawl Sector	Redfish (*Centroberyx affinis*)																																		
SESSF: Commonwealth Trawl and Scalefish Hook sectors	Ribaldo (*Mora moro*)																																		
SESSF: Commonwealth Trawl Sector	Royal red prawn (*Haliporoides sibogae*)																																		
SESSF: Commonwealth Trawl and Scalefish Hook sectors	Silver trevally (*Pseudocaranx georgianus*)																																		
SESSF: Commonwealth Trawl Sector	Silver warehou (*Seriolella punctata*)																																		
SESSF: East Coast Deepwater Trawl Sector	Alfonsino (*Beryx splendens*)																																		
SESSF: Great Australian Bight Trawl Sector	Bight redfish (*Centroberyx gerrardi*)																																		

continued ...

Table 1.3 Biological stock status of all stocks assessed in 2018, and their status since 2004 continued

Fishery	Common name (scientific name)	Status																													
		2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016		2017		2018	
		Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass
SESSF: Great Australian Bight Trawl Sector	Deepwater flathead (*Neoplatycephalus conatus*)																														
SESSF: Great Australian Bight Trawl Sector	Ocean jacket, west (*Nelusetta ayraud*)																														
SESSF: Great Australian Bight Trawl Sector	Orange roughy (*Hoplostethus atlanticus*)																														
SESSF: Shark Gillnet and Shark Hook sectors	Elephantfish (*Callorhinchus milii*)																														
SESSF: Shark Gillnet and Shark Hook sectors	Gummy shark (*Mustelus antarcticus*)																														
SESSF: Shark Gillnet and Shark Hook sectors	Sawshark (*Pristiophorus cirratus*, *P. nudipinnis*)																														
SESSF: Shark Gillnet and Shark Hook sectors	School shark (*Galeorhinus galeus*)																														
Southern Squid Jig Fishery	Gould's squid (*Nototodarus gouldi*)																														
Western Deepwater Trawl Fishery	Deepwater bugs (*Ibacus* spp.)																														
Western Deepwater Trawl Fishery	Ruby snapper (*Etelis carbunculus*)																														
Macquarie Island Toothfish Fishery	Patagonian toothfish (*Dissostichus eleginoides*)																														

continued ...

Table 1.3 Biological stock status of all stocks assessed in 2018, and their status since 2004 continued

Fishery	Common name (scientific name)	Status																															
		2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016		2017		2018	
		Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass
Stocks in fisheries managed jointly by the Australian Government																																	
South Tasman Rise Trawl Fishery	Orange roughy (*Hoplostethus atlanticus*)																																
Torres Strait Finfish Fishery	Coral trout (*Plectropomus* spp., *Variola* spp.)																																
Torres Strait Finfish Fishery	Spanish mackerel (*Scomberomorus commerson*)																																
Torres Strait Tropical Rock Lobster Fishery	Tropical rock lobster (*Panulirus ornatus*)																																
Torres Strait Prawn Fishery	Brown tiger prawn (*Penaeus esculentus*)																																
Torres Strait Prawn Fishery	Blue endeavour prawn (*Metapenaeus endeavouri*)																																
Torres Strait Bêche-de-mer Fishery	Black teatfish (*Holothuria whitmaei*)																																
Torres Strait Bêche-de-mer Fishery	Prickly redfish (*Thelenota ananas*)																																
Torres Strait Bêche-de-mer Fishery	Sandfish (*Holothuria scabra*)																																
Torres Strait Bêche-de-mer Fishery	White teatfish (*Holothuria fuscogilva*)																																
Torres Strait Bêche-de-mer Fishery	Other sea cucumbers (up to 18 species)																																
Torres Strait Trochus Fishery	Trochus (*Trochus niloticus*)																																
Eastern Tuna and Billfish Fishery	Striped marlin (*Kajikia audax*)																																

continued ...

Table 1.3 Biological stock status of all stocks assessed in 2018, and their status since 2004 continued

Fishery	Common name (scientific name)	Status																											
		2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016		2017		2018	
		Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass
Eastern Tuna and Billfish Fishery	Swordfish (*Xiphias gladius*)																												
Eastern Tuna and Billfish Fishery	Albacore (*Thunnus alalunga*)																												
Eastern Tuna and Billfish Fishery	Bigeye tuna (*Thunnus obesus*)																												
Eastern Tuna and Billfish Fishery	Yellowfin tuna (*Thunnus albacares*)																												
Skipjack Tuna Fishery: Pacific Ocean	Skipjack tuna (*Katsuwonus pelamis*)																												
Skipjack Tuna Fishery: Indian Ocean	Skipjack tuna (*Katsuwonus pelamis*)																												
Southern Bluefin Tuna Fishery	Southern bluefin tuna (*Thunnus maccoyii*)																												
Western Tuna and Billfish Fishery	Striped marlin (*Kajikia audax*)																												
Western Tuna and Billfish Fishery	Swordfish (*Xiphias gladius*)																												
Western Tuna and Billfish Fishery	Albacore (*Thunnus alalunga*)																												
Western Tuna and Billfish Fishery	Bigeye tuna (*Thunnus obesus*)																												
Western Tuna and Billfish Fishery	Yellowfin tuna (*Thunnus albacares*)																												
Heard Island and McDonald Islands Fishery	Mackerel icefish (*Champsocephalus gunnari*)																												
Heard Island and McDonald Islands Fishery	Patagonian toothfish (*Dissostichus eleginoides*)																												

continued ...

Table 1.3 Biological stock status of all stocks assessed in 2018, and their status since 2004 continued

Fishery	Common name (scientific name)	Status																											
		2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016		2017		2018	
		Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass
CCAMLR exploratory toothfish fisheries 58.4.1	Toothfish (*Dissostichus mawsoni*)																												
CCAMLR exploratory toothfish fisheries 58.4.2	Toothfish (*Dissostichus mawsoni*)																												
CCAMLR exploratory toothfish fisheries 88.1	Toothfish (*Dissostichus mawsoni*)																												
CCAMLR exploratory toothfish fisheries 88.2	Toothfish (*Dissostichus mawsoni*)																												

Fishing mortality Not subject to overfishing; Subject to overfishing; Uncertain

Biomass Not overfished; Overfished; Uncertain

Notes: **CCAMLR** Commission for the Conservation of Antarctic Marine Living Resources. **SESSF** Southern and Eastern Scalefish and Shark Fishery. Individual stocks may have been classified as multispecies stocks in earlier years. The status determination process changed in 2004—refer to Chapter 30 for more information. Grey shading indicates that the stock was not assessed.

Sushi and sashimi
Lee Georgeson, ABARES

1.3 Economic status

Assessing economic status

The evaluation of economic status in the *Fishery status reports* assesses each fishery's performance against the economic objective of the *Fisheries Management Act 1991* to maximise NER to the Australian community, within the constraints of ecologically sustainable development. Economic status is expressed in relation to the target reference points prescribed by the HSP, which are set at more conservative levels than the limit reference points used to assess biological status. At the stock level, economic status indicates whether the biomass is at a level that is consistent with achieving the HSP target reference point—a biomass target consistent with achieving maximum economic yield (MEY) from the fishery. When biomass is below the target reference point and moving further away from it, rebuilding of the stock would be required to bring the biomass closer to the reference point. When biomass is above the target reference point, fishing down the stock to the reference point is required to maximise NER. At the fishery level, moving stocks towards their respective target reference points leads to an improvement in the economic status of the fishery and helps ensure that the economic objective of the *Fisheries Management Act 1991* is met.

Determining whether economic status of a fishery is improving or deteriorating is constrained by data limitations and relies on interpretation of a number of economic indicators. For example, an increasing trend in fishery-level NER driven predominantly by an increasing trend in the economic productivity of a fishery provides a strong indicator that the economic status of the fishery is improving. However, an increasing trend in fishery-level NER caused predominantly by favourable movements in market prices for inputs and outputs is not conclusive evidence that the fishery is moving closer to its target, because changes in market prices change the position of the economic target reference point.

The ABARES financial and economic surveys are important for estimating NER and thereby assessing the economic performance of fisheries managed by the Australian Government. NER estimates provide a full account of the return to the community from managing fisheries because they include all revenues earned and costs incurred. These costs include economic costs (for example, wages, use of family labour in the business, economic depreciation), fishery management costs (including those components not cost recovered from industry) and the full cost of fuel—that is, inclusive of fuel tax credits gained by the fishery. As a result, NER are typically lower than aggregate fishery profitability derived through an accounting framework, which only considers explicit costs and revenues in deriving estimates of profits. To assess economic status, movements in NER are assessed alongside other economic indicators, including the extent to which stocks managed in the fishery have moved closer to their respective economic target reference points.

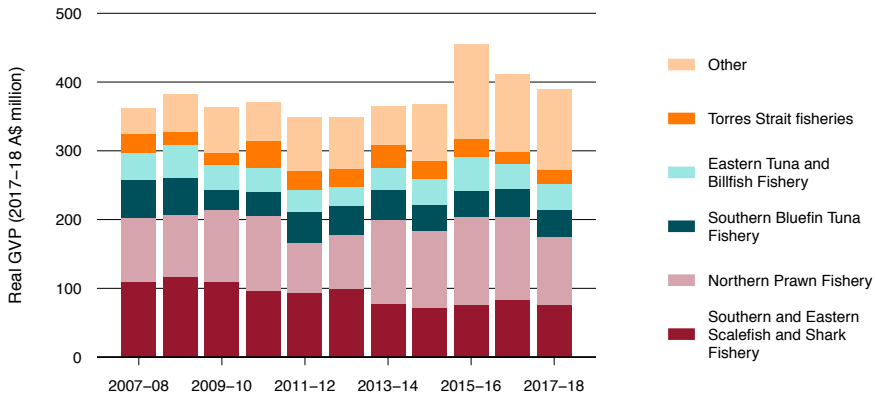
Direct estimates of NER are only available for key Commonwealth fisheries for which ABARES routinely assesses financial and economic performance by surveying industry. Where direct estimates of NER are not available, a range of indicators are used to assess the economic performance of fisheries, and to make inferences about trends in NER. Effects of management arrangements and performance of the fishery against the HSP's MEY objective are also assessed. For jointly managed fisheries (to which the HSP does not apply), economic performance is evaluated against relevant management objectives. Table 1.4 summarises indicators of economic performance.

Economic status in 2017–18

Fishery status reports 2019 assesses the economic status of all fisheries managed solely and jointly by the Australian Government. These fisheries generated an estimated gross value of production (GVP) of $390 million in 2017–18, accounting for 22% of wild-catch fisheries GVP in Australia ($1.79 billion).[1] These fisheries also accounted for about 12% of Australia's total fisheries and aquaculture GVP in 2017–18.

The Commonwealth fisheries GVP was dominated by production from four major fisheries in 2017–18 that together accounted for 65% of total Commonwealth fisheries GVP. In 2017–18, the Northern Prawn Fishery (NPF) made a large contribution to overall Commonwealth fishery GVP, with a GVP of $98.2 million (25% contribution). The multisector SESSF was also a valuable Commonwealth fishery, with a GVP of $76.4 million (20% contribution). The wild-catch sector of the Southern Bluefin Tuna Fishery (SBTF) and the Eastern Tuna and Billfish Fishery (ETBF) also made substantial contributions to fisheries GVP in 2017–18, with values of $39.7 million and $38.4 million, respectively (Figure 1.5).

FIGURE 1.5 Gross value of production of fisheries managed solely or jointly by the Australian Government, 2007–08 to 2017–18



1 GVP figures are subject to revision, and consequently may differ in past and future publications.

TABLE 1.4 Indicators and summary of economic status of Commonwealth fisheries for 2017–18

Fishery	Performance relative to MEY target	NER trend	Fishing right latency in fishing season	2016–17 fishery GVP (% change from 2015–16)
Bass Strait Central Zone Scallop Fishery	MEY target not specified	Negative in 2009–10 and 2010–11 (–$1.1 million). Likely to be increasing since 2010–11	Low uncaught TAC	$6.72 million (+12%)
Coral Sea Fishery	MEY target not specified	Not available	High uncaught TAC in the non-aquarium part of the fishery	Confidential
Norfolk Island Fishery	MEY target not specified	Not available	Offshore fishery closed to commercial fishing. Unknown in the inshore fishery	Not available
Northern Prawn Fishery	Tiger prawn stocks above B_{MEY} target. MEY catch trigger in place for banana prawns but too early to determine its effect on NER	Positive	Low unused effort	$98.15 million (–17%)
North West Slope Trawl Fishery	MEY target not specified	Not available	High non-participation by licence holders	Confidential
Small Pelagic Fishery	MEY target not specified	Not available	High uncaught TAC	Confidential
SESSF: Commonwealth Trawl and Scalefish Hook sectors **a**	Of the four key species, three are above or close to B_{MEY} targets. Some overfished stocks require rebuilding for improvement in economic status	Positive	High uncaught TAC for some species	$43.96 million (–7%)
SESSF: East Coast Deepwater Trawl Sector	No fishing effort	Not available	High uncaught TAC	Confidential
SESSF: Great Australian Bight Trawl Sector	Bight redfish and deepwater flathead above or close to B_{MEY} target	Not available but likely to be positive, and have decreased	High uncaught TAC	$9.16 million (–9%)
SESSF: Shark Hook and Shark Gillnet sectors **b**	Gummy shark stock close to, or above, target. Biomass of school shark requires rebuilding	Positive in 2016–17; estimated to become negative in 2017–18	Low uncaught TAC for key target species	$23.30 million (–8%)
Southern Squid Jig Fishery	MEY target not specified	Not available	High non-participation by licence holders	Confidential

2016–17 management costs (% share of GVP)	Primary management instrument	Comments about economic status
$0.39 million (6%)	ITQs and spatial management	NER are likely to have improved since 2010–11 (the last available survey year), when real NER were –$1.2 million (in 2017–18 dollars). It is uncertain whether NER are now positive. Compared with 2010–11, GVP in 2017–18 was higher, fewer vessels were used in the fishery, and unit fuel prices and total management costs of the fishery declined.
$0.16 million (confidential)	Catch triggers and TACs	Estimates of NER are not available, and the trend in economic performance for these sectors in 2017–18 is uncertain. Catch in the Aquarium Sector increased in 2017–18. Catch and effort in the Sea Cucumber Sector decreased in 2017–18, whereas catch and effort in the Line and Trap Sector increased relative to the previous year.
Not available	Input controls	Economic status is unknown.
$1.75 million (2%)	Individual transferable gear units (headrope length)	NER reached a high of $30.9 million in 2015–16, supported by a strong increase in tiger prawn catch, marking a fourth consecutive annual increase in NER. The performance in 2016–17 remained stable at $30.3 million. In 2017–18, lower GVP and higher unit fuel prices are expected to reduce NER.
$0.05 million (confidential)	Limited entry and catch triggers	Estimates of NER are not available. Increased catch in the 2016–17 and 2017–18 fishing seasons suggests increased GVP, but the effect of this on NER is uncertain because fishing costs in the 2016–17 and 2017–18 fishing seasons are likely to have increased. A high degree of latent fishing effort indicates that NER are likely to be low.
$1.42 million (confidential)	ITQs	NER in the CTS rose to $4.0 million in 2016–17, a result largely driven by lower operating costs. Preliminary estimates from the survey suggest that NER were –$0.17 million in 2017–18. This negative result is driven by lower forecast income and higher operating costs.
$2.69 million for CTS (6% of CTS GVP)	ITQs	NER in the CTS rose to $4.0 million in 2016–17, a result largely driven by lower operating costs. Preliminary estimates from the survey suggest that NER were –$0.17 million in 2017–18. This negative result is driven by lower forecast income and higher operating costs.
$0.00 million (confidential)	ITQs	Latency is high in the fishery. No fishing effort between 2013–14 and 2017–18, and low catches in 2018–19 indicate low NER.
$0.50 million (5%)	ITQs	A strong increase in fuel price, despite a moderate reduction in fishing hours, together with lower GVP and catch volumes, indicate that NER were likely to be lower in 2017–18 and 2018–19 than in 2016–17.
$2.44 million for GHTS (10% of GHTS GVP)	ITQs	NER for the GHTS were $4.0 million in 2016–17. Preliminary estimates indicate that NER were likely to be negative for 2017–18. Although gummy shark biomass is not constraining NER, the management of non-target species and marine mammal interactions has likely contributed to low NER in recent years.
$0.14 million (confidential)	Individual transferable gear units (jig machines)	Catch and effort in the fishery increased from 2016–17 to 2017–18. In the same period, catch-per-unit-effort increased, suggesting lower unit fishing costs, and prices for landed catch increased. This suggests that NER are likely to have improved.

continued ...

TABLE 1.4 Indicators and summary of economic status of Commonwealth fisheries for 2017–18 continued

Fishery	Performance relative to MEY target	NER trend	Fishing right latency in fishing season	2017–18 fishery GVP (% change from 2016–17)
Western Deepwater Trawl Fishery	MEY target not specified	Not available	High non-participation by licence holders	Confidential
Torres Strait Finfish Fishery	Not applicable **c**	Not available	Not applicable	$0.99 million (–18%)
Torres Strait Tropical Rock Lobster Fishery	Not applicable **c**	Not available	Low uncaught TAC	$15.01 million (+19%)
Torres Strait Prawn Fishery	Not applicable **c**	Not available	High unused effort	$4.60 million (+16%)
Torres Strait Bêche-de-mer Fishery	Not applicable **c**	Not available	High uncaught TAC	Not available
Torres Strait Trochus Fishery	Not applicable **c**	Not available	High uncaught TAC	Not available
Eastern Tuna and Billfish Fishery	MEY target not adequately specified or applied	Increasing trend; turned positive in 2010–11	Low uncaught quota for target species	$38.40 million (+8%)
Skipjack Tuna Fishery	MEY target not specified	No fishing	High non-participation by licence holders	No fishing
Southern Bluefin Tuna Fishery	MEY target not specified	Not available	Low uncaught TAC	$39.74 million (+3%)
Western Tuna and Billfish Fishery	MEY target not specified	Not available	High uncaught TAC (more than 95% in 2015 and 2016 fishing seasons)	Confidential
Heard Island and McDonald Islands Fishery	Not applicable **c**	Not available but likely to be positive	Low uncaught TAC	Confidential
Macquarie Island Toothfish Fishery	Not applicable **c**	Not available but likely to be positive	Low uncaught TAC	Confidential
CCAMLR exploratory toothfish fisheries	Not applicable **c**	Not available	Low uncaught TAC	Confidential

2017–18 management costs (% share of GVP)	Primary management instrument	Comments about economic status
$0.05 million (confidential)	Limited entry	Estimates of NER are unavailable and GVP is confidential because of the low number of active vessels in the fishery. An increase in catch and active vessels in the 2017–18 fishing season may indicate economic improvement in the fishery; however, this may have been offset by an increase in fishing costs. Whether NER increased or decreased in the 2017–18 fishing season is uncertain.
Not available	Non-tradeable quota	Estimates of NER are not available.
Not available	Limited entry for non–Traditional Inhabitant sector and TAC	NER in the fishery are uncertain, although economic conditions may have improved in the 2017–18 fishing season as a result of GVP increasing faster than effort.
$0.21 million (5%, AFMA costs only)	Tradeable effort units (nights)	Estimates of NER are unavailable. An increase in GVP and a decrease in hours trawled per vessel in 2017–18 indicate that NER may have improved.
Not available	TACs	Estimates of NER and GVP are unavailable. A low level of catch indicates low NER. Increased catch in 2018 resulted in some improvement in economic performance.
Not available	TACs	Little to no catch has been recorded in the fishery since 2010, suggesting fishers have a low incentive to fish.
$1.59 million (4%)	ITQs	Preliminary estimates suggest NER for the fishery remained positive between 2015–16 and 2017–18. NER improved significantly in 2015–16. Non–survey based estimates indicate that NER increased in 2017–18.
$0.06 million (no fishing)	Limited entry	No Australian vessels fished in 2017 or 2018.
$1.19 million (3%)	ITQs	NER are expected to have remained positive in 2017–18, reflecting low levels of quota latency. However, the overfished status of the stock poses a risk to future NER. Economic status will improve as the stock is rebuilt under the management procedure.
$0.24 million (confidential)	ITQs	Participation rate was low and latency remained high in 2018, suggesting little economic incentives to fish and relatively small NER.
$1.42 million (confidential)	ITQs	Estimates of NER are not available but are likely to be positive. Likely positive NER for the 2016–17 and 2017–18 fishing seasons are indicated by low levels of latency for targeted species.
$0.43 million (confidential)	ITQs	Estimates of NER are not available but are likely to be positive for the 2017–18 and 2018–19 fishing seasons due to low TAC latency for Patagonian toothfish in both seasons.
Confidential	Limited entry and TACs	Estimates of NER are not available, and NER remain uncertain. Australian fishers have been active across the exploratory areas from 2014–15 to 2017–18.

a NER estimates and management costs are only available for the CTS and exclude the Scalefish Hook Sector. **b** NER estimates and management costs are only available for the GHTS, which includes Scalefish Hook Sector catches and gillnet scalefish catches. **c** These fisheries are jointly managed fisheries that are not managed under MEY objectives. Statistics are provided by financial year.
Notes: **AFMA** Australian Fisheries Management Authority. $\mathbf{B_{MEY}}$ Biomass at maximum economic yield. **CCAMLR** Commission for the Conservation of Antarctic Marine Living Resources. **CTS** Commonwealth Trawl Sector. **GHTS** Gillnet, Hook and Trap Sector. **GVP** Gross value of production. **ITQ** Individual transferable quota. **MEY** Maximum economic yield. NER Net economic returns. **SESSF** Southern and Eastern Scalefish and Shark Fishery. **TAC** Total allowable catch. The South Tasman Rise Trawl Fishery is not shown because it has been closed since 2007.

Fisheries managed solely by the Australian Government

ABARES undertakes regular economic surveys of the most valuable fisheries managed solely by the Australian Government: the Commonwealth Trawl Sector (CTS), and the Gillnet, Hook and Trap Sector (GHTS) of the SESSF; and the NPF. These fisheries are managed under MEY objectives. Together, they accounted for 84% of the GVP of all solely Australian Government–managed fisheries in 2017–18.

The tiger prawn component of the NPF is explicitly managed to a MEY target, using a bio-economic model to set effort levels that are estimated to produce MEY. The banana prawn component of the NPF is separately managed through an MEY-based catch rate trigger for season closure. NER in the NPF increased to $30.9 million in 2015–16, and preliminary estimates indicate that NER remained stable in 2016–17 as a result of a strong catching season for banana prawns. In 2017–18, lower GVP and higher unit fuel prices are expected to have a dampening effect on NER (Bath, Curtotti & Mobsby 2018). The bio-economic modelling of the tiger prawn component of the fishery has facilitated an improvement in the economic performance of this component of the fishery.

In the CTS and the GHTS, MEY is pursued through the application of proxies for biomass targets (B_{MEY}) for individual stocks. For the most valuable species targeted in these two sectors, current biomass levels are generally estimated to be close to, or above, their respective B_{MEY} targets, meaning that stock levels are not constraining profits. NER in the CTS rose to $4.0 million in 2016–17, a result largely driven by lower operating costs. Preliminary estimates from the survey suggest that NER were –$0.17 million in 2017–18. This negative result is driven by lower forecast income and higher operating costs. In the GHTS, positive NER were maintained in the decade leading up to, and including, 2008–09. However, NER were negative in 2009–10, declining to –$0.4 million, as spatial closures aimed at reducing marine mammal interactions and efforts to avoid (overfished) school shark affected the sector's economic performance (Skirtun & Green 2015). Since then, NER have followed an increasing trend, with an estimated NER of $4.0 million in 2016–17. Preliminary estimates indicate that NER were likely to be negative for 2017–18. This negative result is potentially a result of lower catch volume of gummy shark and higher unit fuel prices. This reverses a trend of recovery in NER that started in 2013–14.

In the Great Australian Bight Trawl Sector, the development of a bio-economic model for the two key target species (deepwater flathead—*Platycephalus conatus*, and bight redfish—*Centroberyx gerrardi*) has improved the ability to target B_{MEY} (Kompas et al. 2012). The most recent stock assessments for bight redfish and deepwater flathead suggest that fishery profitability is unlikely to be constrained by stock status.

Some fisheries that had been small in previous years were significantly larger by 2017–18, including the Small Pelagic Fishery (SPF), the Bass Strait Central Zone Scallop Fishery (BSCZSF) and the Southern Squid Jig Fishery (SSJF). The BSCZSF and the SPF underwent management changes that allowed growth in GVP. For the BSCZSF, surveys in recent years have shown substantially larger biomass levels that have allowed higher TACs and more areas to be opened to fishing under the rules of the harvest strategy. In the SPF, the use of a large factory freezer midwater trawl vessel allowed a larger catch in 2015–16, but catches were sharply down in 2016–17 as a result of the trawler no longer operating in the fishery. An increase in the level of catch in 2017–18 suggests that GVP is likely to have increased in 2017–18. Changes in NER are uncertain, however, because of a lack of information about changes in the cost structures of the fishery. For the SSJF, catch and effort increased from 2016–17 to 2017–18. In the same period, catch-per-unit-effort increased, suggesting lower unit fishing costs, and prices for landed catch increased. This suggests that the economic incentive to fish increased in 2017–18 and that NER in the fishery are likely to have improved.

Low catch-and-effort levels in the other fisheries (Coral Sea Fishery, East Coast Deepwater Trawl Sector, North West Slope Trawl Fishery and Western Deepwater Trawl Fishery) indicate low NER in 2017–18. For these fisheries, it is often difficult to assess economic status because of a lack of economic data.

Jointly managed fisheries

Of the fisheries jointly managed by the Australian Government, the major fisheries include the SBTF, the ETBF, and the Torres Strait Tropical Rock Lobster Fishery (TSTRLF). Combined, these three fisheries generated a GVP of $93.1 million and accounted for 48% of the GVP of all jointly managed fisheries in 2017–18. Individually, these fisheries generated GVPs of $39.7 million, $38.4 million and $15.0 million, respectively, in 2017–18.

Estimates of NER are not available for the SBTF. However, the fishery provides fish to South Australia's southern bluefin tuna aquaculture industry (generating $126 million GVP at the farm gate in 2017–18). Although the stock's current low biomass level poses a risk to the future flow of NER from the fishery, the current international management arrangements, which are designed to allow the stock to rebuild, would be expected to improve NER in the future.

Economic status in the ETBF has improved. Preliminary estimates suggest that NER for the fishery remained positive between 2015–16 and 2017–18, driven by increased catch, higher prices of key species and a significant fall in the fuel price.

Torres Strait fisheries are managed in accordance with the *Torres Strait Fisheries Act 1984*. This Act details a range of management priorities, including acknowledging and protecting the traditional way of life and livelihood of Traditional Inhabitants. As a result, these fisheries are not evaluated against the MEY objective of the HSP in these reports, and achieving the fishery's economic potential needs to be considered alongside the social and cultural objectives of Torres Strait Islander and Aboriginal people. The TSTRLF was the most valuable commercial fishery in Torres Strait in 2017–18, followed by the Torres Strait Prawn Fishery.

Latency in fisheries

In many fisheries, the degree of latency—that is, the proportion of TAC left uncaught, or the level of non-participation by licence holders—is high (Table 1.4). High levels of latency indicate that the economic incentive to participate actively in the fishery is lacking and that the overall economic performance of the fishery is likely to be low. In general, input controls, such as allowable effort, and output controls, such as TACs, should be set in line with the aim of achieving MEY. When targets are not set at MEY levels, profits tend to be dissipated as a result of unconstrained fishing effort or catch. This may be the case when fishers collectively fish below the TAC or effort control target.

For some fisheries, the degree of latency can be explained in terms of the type of fishery and the industry structure. For example, for some jointly managed fisheries where Australia maintains an economic interest, latency may be high because the negotiated TAC for Australian fishers is not set according to MEY criteria. For some fisheries managed solely by the Australian Government, the fleet structure of the fishery may not be well aligned with the MEY target, and hence the TAC remains uncaught at the end of the fishing season.

However, for some fisheries, the reasons for persistently high latency remain unclear and warrant further investigation. For example, the TACs for a number of species in the SESSF have increasingly been undercaught in recent seasons.

The MEY target can be set higher than the optimum level for a number of reasons, including that:

- estimating MEY targets requires investments in data collection and modelling that are constrained by available resources; managers therefore frequently use proxy targets that may not be optimal for a given species or multispecies stock
- market conditions, such as fish prices or input prices for fuel and labour, may have changed, making a model-derived MEY target and/or proxy inaccurate
- a stock may be less abundant than anticipated, or located further afield, and thus more costly to catch
- regulatory changes in gear or spatial restrictions may mean that it is no longer economically profitable to catch to the previous MEY target.

Practical considerations sometimes make it difficult to catch to the MEY target. For example, an undercaught species may be co-caught with a targeted high-value species that has been fished to quota. Targeting the undercaught species may be too costly or impractical within a season. Similarly, a reduction in quota for a target species will likely reduce the catch of co-caught species. MEY targets designed for multispecies fisheries would help to address this cause of undercatch. In addition, fishers may not be able to obtain quota for the undercaught species because of the costs involved in obtaining quota in a market with few transactions.

1.4 Environmental status in 2018

The *Fishery status reports* examines the broader impact of fisheries on the environment, in response to the requirements of the *Fisheries Management Act 1991*, the EPBC Act and the Commonwealth Fisheries Bycatch Policy (Department of Agriculture and Water Resources 2018a). The Australian Government aims to implement an ecosystem-based approach to fisheries management as part of meeting the principles of ecologically sustainable development. This requires a holistic approach to management that considers fisheries' interactions with, and impacts on, bycatch species (including protected species), marine habitats, communities and ecosystems.

Ecological risk assessment

A key component of AFMA's ecosystem-based approach to fisheries management has been the application of an ecological risk management (ERM) framework that is designed to respond to the outcomes of the ecological risk assessment (ERA) process (Hobday et al. 2007). Fishery-specific ERM reports integrate the information from the ERAs and other management requirements, such as recovery plans and threat abatement plans, and detail AFMA's management response. Fishery-specific actions for bycatch and discarding are identified in fishery-specific bycatch and discarding workplans. The ERA framework has been revised, and reviews for the ETBF, the SESSF and the SPF have commenced.

Protected species interactions

During the normal course of fishing operations, fishers can interact with protected species listed under the EPBC Act. Legislation requires them to take all reasonable steps to minimise interactions and report any interactions that occur. AFMA reports interactions with protected species reported by fishers in logbooks to the Australian Government Department of the Environment and Energy quarterly. The species involved and the level of interactions vary between fisheries and sectors, as well as with gear, area and season. Although interactions with protected species are rare, they can still be a significant source of mortality for the affected populations.

Considerable progress has been made in some fisheries to implement measures to reduce interactions with protected species. Examples are:

- compulsory use of turtle excluder devices in the NPF
- implementation of a threat abatement plan for the incidental catch (or bycatch) of seabirds during pelagic longline fishing operations in the ETBF, the WTBF and the Macquarie Island Toothfish Fishery
- use of seal excluder devices in the SPF and in the winter blue grenadier trawl fishery of the SESSF
- gillnet fishing closures in the Shark Gillnet and Shark Hook sectors of the SESSF to avoid interactions with Australian sea lions.

Recently, there has been a focus on seabird interactions with trawl fisheries. Following sea trials in 2015 to assess the impact of two new devices designed to reduce seabird interactions, since 1 May 2017, all vessels in the CTS and the Great Australian Bight Trawl Sector must use one of the following mitigation devices: sprayers, bird bafflers or pinkies (large floats attached in front of trawl warps to scare birds away), with zero discharge of fish waste.

AFMA also introduced new dolphin mitigation strategies in the SPF and the GHTS of the SESSF that came into force on 10 May 2017. These strategies apply to all trawling operations in the SPF and the whole gillnet sector of the GHTS. They were developed in consultation with stakeholders and marine mammal experts.

Data collection

Limited availability of reliable data on interactions with protected species remains problematic in some fisheries. The rare nature of interactions with protected species creates a challenge for obtaining reliable estimates of interaction rates, particularly at lower levels of observer coverage. Reliable data are critical for determining the extent of interactions, evaluating the potential impact on populations (particularly for high-risk species) and demonstrating the effectiveness of management measures.

AFMA has continued to strengthen independent monitoring capabilities by introducing electronic monitoring (e-monitoring) programs in several fisheries and subfisheries to improve logbook reporting and to verify logbook reports of interactions with protected species. A preliminary comparison of catch-and-discard data for target, byproduct and bycatch species, as well as wildlife interactions, identified a significant increase in reported nominal discard and interactions per unit effort in the first two years after e-monitoring was introduced (Emery et al. 2019). While not discounting possible environmentally driven shifts in availability and abundance, or individual vessel effects, evidence suggests that e-monitoring has led to significant changes in logbook reporting, particularly in the ETBF (Emery et al. 2019).

E-monitoring became mandatory on 1 September 2014 for boats using automatic demersal longline gear, and on 1 July 2015 for gillnet boats that fish more than 50 days per year and manual demersal longline boats that fish more than 100 days per year. E-monitoring became mandatory in the ETBF and the WTBF on 1 July 2015 for pelagic longline boats that fish more than 30 days per year.

The aim is for e-monitoring analysts to randomly review 10% of the video footage, and a risk-based approach is used to audit more footage from boats that are suspected of misreporting. In the GHTS, all gillnet hauls are audited in the Australian sea lion management zones, to verify any bycatch of protected species. More information on e-monitoring can be found on the AFMA website.[2]

2 afma.gov.au/monitoring-enforcement/electronic-monitoring-program

1.5 References

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Blue grenadier
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