

# Chapter 1

## Overview

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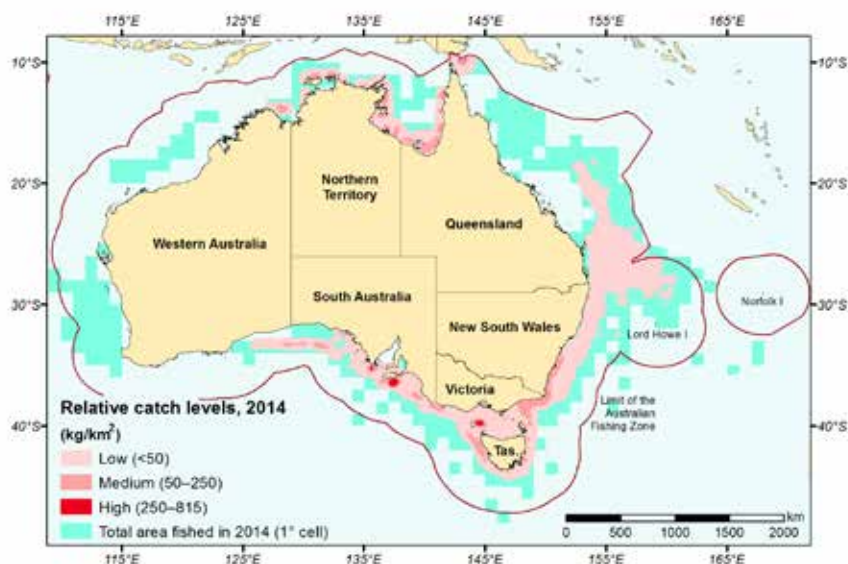
The Australian Government's approach to fisheries management is to maintain fish stocks at ecologically sustainable levels and, within this context, maximise the net economic returns (NER) to the Australian community (DAFF 2007). It also considers the impact of fishing activities on non-target species 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 2015* 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 2014, and, over time, against the requirements of fisheries legislation and policy. The reports aim to be comprehensive, and 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.

The 2015 reports assess 92 fish stocks across 21 fisheries. Total gross value of production (GVP) of Commonwealth fisheries in 2013–14 was \$338.2 million—13 per cent of Australia's total fisheries and aquaculture GVP (\$2.6 billion). The main fisheries, in terms of production volume, include the Southern and Eastern Scalefish and Shark Fishery (SESSF), the Northern Prawn Fishery (NPF), the Southern Bluefin Tuna Fishery (SBTF) and the Eastern Tuna and Billfish Fishery (ETBF). In the 2013–14 financial year, these four fisheries accounted for 85 per cent of the total production volume of fisheries managed by the Australian Government.

To complete these reports, ABARES uses a range of information and data sourced from agencies such as the Australian Fisheries Management Authority (AFMA) and regional fisheries management organisations. The reports use catch, fishing effort and other information for the most recent full season that is available, and the most recent stock assessment. Commonwealth fisheries operate with different season dates, so the currency of catch-and-effort data in the reports varies. The most recent catch-and-effort data used are for the SESSF 2014–15 season, which had an end date of 30 April 2015. To compare status from year to year, biological and environmental status is presented retrospectively for '2014'. Where possible, economic status is presented for the 2013–14 financial year.

**FIGURE 1.1** Relative catch levels of all Australian Government–managed fisheries, 2014



## 1.1 Assessing biological status

Assessments of stock status provide an indication of whether the current size of a fish stock is adequate to sustain the stock 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 Commonwealth Fisheries Harvest Strategy Policy (HSP; DAFF 2007).

Biomass status indicates how many fish there are—specifically, whether the biomass in the year being assessed is above or below 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 status reflects the level of fishing mortality on a stock in the year being assessed and whether that mortality level 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 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 target or key commercial species in a fishery managed solely or jointly by the Australian Government
- a species managed under a total allowable catch (TAC)
- a species previously classified as 'overfished' that has not yet recovered to above the limit reference point
- 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.

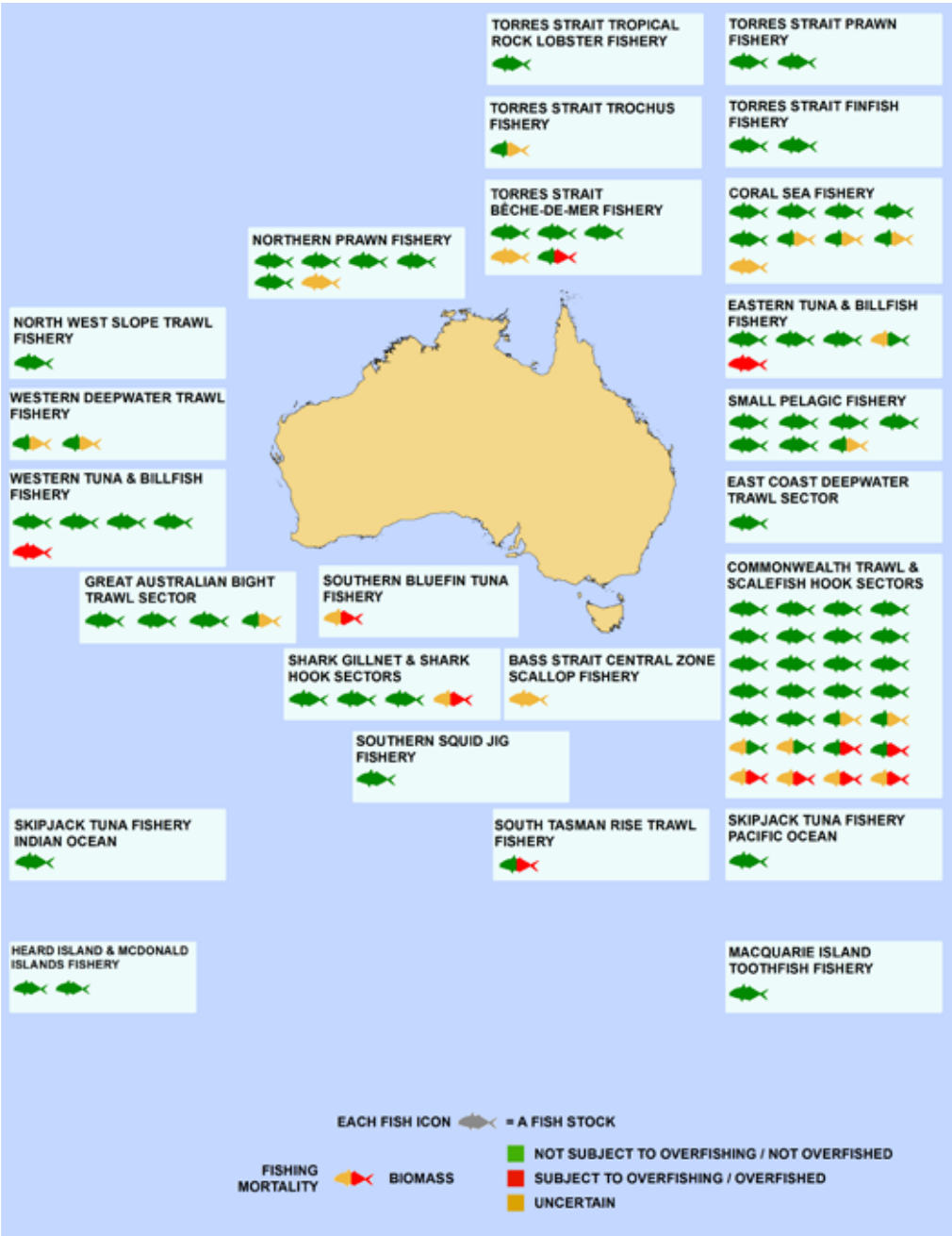
## 1.2 Biological status in 2014

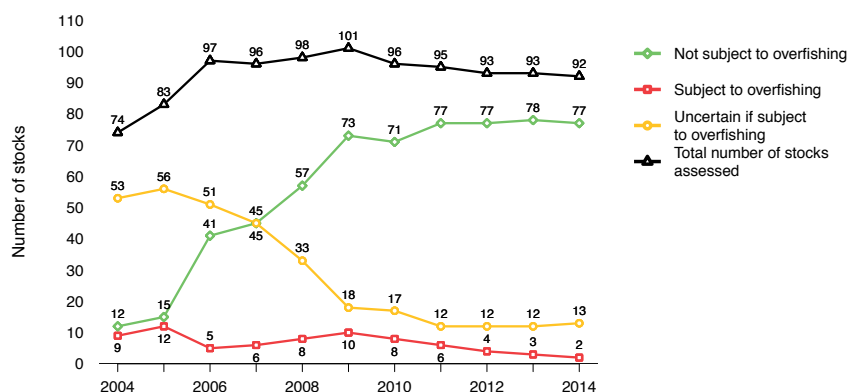
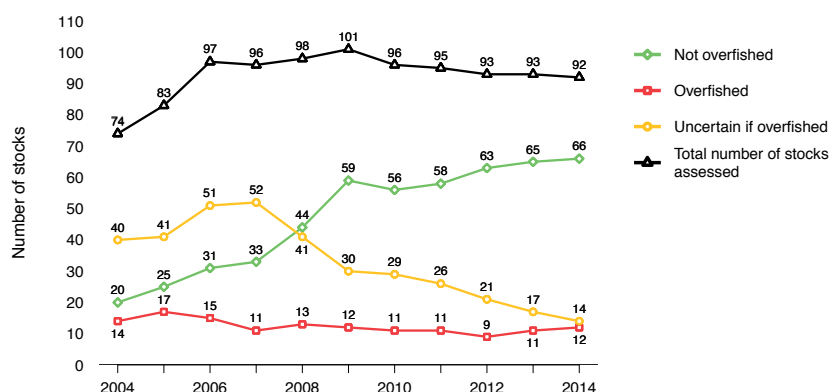
*Fishery status reports 2015* assesses 92 fish stocks across 21 fisheries (Figure 1.2): 65 stocks were assessed across 9 fisheries that are managed solely by AFMA on behalf of the Australian Government, and 27 stocks were assessed across 12 fisheries that are managed jointly with other Australian jurisdictions or other countries. Summary statistics are provided separately for solely domestically managed and jointly managed stocks. This allows an evaluation of performance of fisheries management against relevant legislation and policy.

The status of the 92 fish stocks managed solely or jointly by the Australian Government changed slightly in 2014, compared with the previous year (Figures 1.3 and 1.4):

- The number of stocks classified as not subject to overfishing decreased slightly to 77 (78 in 2013), and the number of stocks classified as not overfished increased to 66 (65 in 2013). Of these, 63 stocks were both not subject to overfishing and not overfished (61 in 2013).
- The number of stocks classified as subject to overfishing decreased slightly to 2 (3 in 2013), and the number of stocks classified as overfished increased slightly to 12 (11 in 2013). Of these, 2 stocks (bigeye tuna [*Thunnus obesus*] in the ETBF and striped marlin [*Tetrapturus audax*] in the Western Tuna and Billfish Fishery—WTBF) were both subject to overfishing and overfished (2 in 2013).
- The number of stocks classified as uncertain with regard to fishing mortality increased slightly to 13 (12 in 2013), and the number of stocks classified as uncertain with regard to biomass decreased to 14 (17 in 2013). Of these, 4 stocks were uncertain with regard to both fishing mortality and biomass.

FIGURE 1.2 Biological status of fish stocks in 2014, by fishery or sector



**FIGURE 1.3** Fishing mortality status (number of stocks), 2004 to 2014**FIGURE 1.4** Biomass status (number of stocks), 2004 to 2014

## Stocks managed solely by the Australian Government

### All stocks

In 2014, 65 stocks were assessed across the 9 fisheries managed by AFMA on behalf of the Australian Government. Of these:

- 55 stocks (85 per cent) were classified as not subject to overfishing, and 46 stocks (71 per cent) were classified as not overfished; of these, 44 stocks were both not subject to overfishing and not overfished
- no stocks were classified as subject to overfishing, and 7 stocks (11 per cent) were classified as overfished; this is the second time that no solely Australian Government-managed stocks have been subject to overfishing since 2006
- 10 stocks (15 per cent) were classified as uncertain with regard to the level of fishing mortality, and 12 stocks (18 per cent) were classified as uncertain with regard to the level of biomass; of these, 3 stocks were uncertain with regard to both fishing mortality and biomass.

Stocks that have changed status

The status of two solely Australian Government-managed fish stocks changed in 2014 (Table 1.1). Both changes reflect increased certainty around biomass resulting from new stock assessments, with one stock also changing because of uncertainty around fishing mortality.

The level of uncertainty around fishing mortality of redfish (*Centroberyx affinis*) in the SESSF Commonwealth Trawl and Scalefish Hook sectors (CTSHS) increased because it is unclear if current catches will allow the stock to rebuild. In 2013, orange roughy (eastern zone) was classified as uncertain with regard to biomass. An updated stock assessment based on catch, age composition and acoustic data estimated that the stock has rebuilt to above the limit reference point (Upston & Punt 2015). On this basis, the stock is classified as not overfished in 2014. Because catch was below the TAC and the recommended biological catch, the stock is assessed as not subject to overfishing in 2014. Targeted fishing for orange roughy (eastern zone) recommenced in the 2015–16 fishing season under a strict management plan to control fishing mortality.

The redfish stock is classified as overfished for the first time since 2006 because completion of the first quantitative (tier 1) stock assessment of the stock in 2014 estimated that spawning biomass is at 11 per cent of unexploited levels and below the limit reference point of 20 per cent of unfished biomass.

TABLE 1.1 Stocks with a changed status in 2014 and their status in 2013

Fishery	Common name (scientific name)	2013		2014	
		Fishing mortality	Biomass	Fishing mortality	Biomass
Stock managed solely by the Australian Government					
SESSF: Commonwealth Trawl Sector	Orange roughy, eastern zone ( <i>Hoplostethus atlanticus</i> )				
SESSF: Commonwealth Trawl Sector	Redfish, eastern ( <i>Centroberyx affinis</i> )				
Stocks managed jointly by the Australian Government					
Western Tuna and Billfish Fishery	Albacore ( <i>Thunnus alalunga</i> )				

Notes: SESSF Southern and Eastern Scalefish and Shark Fishery.

Fishing mortality	<div></div> Not subject to overfishing	<div></div> Subject to overfishing	<div></div> Uncertain
Biomass	<div></div> Not overfished	<div></div> Overfished	<div></div> Uncertain

## Stocks classified as subject to overfishing and/or overfished

Seven stocks managed solely by the Australian Government were classified as overfished in 2014 (Table 1.2). For the second time since 2006, no Australian Government-managed stocks were classified as subject to overfishing. All stocks classified as overfished are subject to stock rebuilding strategies, with the exception of redfish in the SESSF CTSHS, for which a rebuilding strategy is expected to be completed in 2016. The stocks classified as overfished in 2014 were blue warehou (*Seriotelella brama*), eastern gemfish (*Rexea solandri*), orange roughy (*Hoplostethus atlanticus*—southern and western zone stocks), redfish, gulper sharks (*Centrophorus harrissoni*, *C. moluccensis*, *C. zeehaani*) and school shark (*Galeorhinus galeus*).

Although the catch of blue warehou in recent years has been declining, it is unclear whether total mortality will allow the stock to rebuild to the limit reference point within the time frame specified in the rebuilding strategy. As a result, the stock is classified as uncertain with regard to the level of fishing mortality. The stock remains classified as overfished because the catch-per-unit-effort (CPUE) over the past four years is below the limit reference points for both eastern and western stocks.

The biomass of southern and western stocks of orange roughy was substantially reduced in the late 1980s and early 1990s. However, recent catches have been relatively low, and most areas deeper than 700 metres have been closed to trawling. As a result, these stocks remain classified as overfished but not subject to overfishing.

In the absence of any evidence of recovery to above the limit reference level, gulper sharks remain classified as overfished in 2014 because of the substantial historical depletion of Harrison's and southern dogfish in southern and eastern areas of Australia. The level of reported catch (including discards) of gulper sharks has declined over the past decade and continued to decline in the 2014–15 fishing season, but no evidence has been obtained showing rebuilding of the stock. As a result, gulper sharks remain classified as uncertain with regard to the level of fishing mortality in 2014.

The most recent stock assessment of eastern gemfish estimated that the stock was below the limit reference point, and so the stock remains classified as overfished in 2014. While commercial catches have been declining, uncertainty continues as to whether current levels of recruitment and removals will allow the stock to rebuild. Coupled with the time since the last full assessment (2010), this means that eastern gemfish remains classified as uncertain with regard to overfishing in 2014.

School shark biomass is estimated to be below the limit reference point, and the stock therefore remains classified as overfished. While school shark is subject to a rebuilding strategy, it is uncertain whether the stock can rebuild to the limit reference point under current fishing mortality levels.

## Assessing fishing mortality status for overfished stocks

For a number of overfished stocks, it is becoming increasingly difficult to assess fishing mortality status. For example, for stocks such as school shark and eastern gemfish, the most recent stock assessments indicate that these stocks are overfished. Both stocks have a recommended biological catch of zero and are subject to rebuilding strategies.

Incidental catch allowances are allocated for these stocks to allow fishing for other species to continue. These allowances are either fully caught or potentially exceeded in some years. Strictly speaking (and with perfect information), catch in excess of the level that is predicted to allow for recovery within a specified time frame

(typically the time frame of the rebuilding strategy) would constitute overfishing. However, for both stocks, while the stock assessments remain the best indicator of stock status, the assessments are dated and becoming increasingly uncertain. Additionally, there are contrary indicators of potential recovery, which include (but are not limited to) increasing levels of catch.

In the case of these two stocks, fishing mortality status in 2014 has been assessed as uncertain. Obtaining robust data to make definitive determinations of fishing mortality status for overfished stocks is challenging. This is further complicated by the age and uncertainty of assessments, and the reliability of inputs into these assessments. It is becoming increasingly apparent that standard data collection and assessment protocols struggle to deliver a concise picture of stock status for overfished stocks.

## Jointly managed stocks

### All stocks

In 2014, 27 stocks were assessed in 12 fisheries that are jointly managed by the Australian Government and other Australian jurisdictions, or with other countries through international arrangements. Of these:

- 22 stocks (81 per cent) were classified as not subject to overfishing, and 20 stocks (74 per cent) were classified as not overfished; of these, 19 stocks were classified as both not subject to overfishing and not overfished
- 2 stocks (7 per cent) were classified as subject to overfishing, and 5 stocks (19 per cent) were classified as overfished; of these, 2 stocks were classified as both subject to overfishing and overfished
- 3 stocks (11 per cent) were classified as uncertain with regard to the level of fishing mortality, and 2 stocks (7 per cent) were classified as uncertain with regard to the level of biomass; of these, 1 stock was uncertain with regard to both fishing mortality and biomass.

### Stocks that have changed status

The status of one stock jointly managed by the Australian Government changed in 2014 (Table 1.2). Status considers the impacts of all countries' fleets on the stocks. Previously, the albacore (*Thunnus alalunga*) stock in the WTBF was classified as subject to overfishing and not overfished. The Indian Ocean Tuna Commission assessed the albacore stock in 2014, and found that the estimated spawning biomass was above the default limit reference point of 20 per cent of initial unfished levels and was around the level that would support maximum sustainable yield (MSY). As a result, the WTBF stock remains classified as not overfished. The assessment also found that current fishing mortality was below the level that would support MSY. The stock is therefore now classified as not subject to overfishing. This decline in fishing mortality is likely to be related to the decline in piracy activities in the north-west Indian Ocean, which had previously displaced longline effort into traditional albacore areas in the southern and eastern Indian Ocean.

### Stocks classified as subject to overfishing and/or overfished

Five jointly managed stocks were classified as either overfished or subject to overfishing in 2014. Classification of these stocks remained the same as in 2013 (Table 1.2). As noted above, albacore in the WTBF is no longer classified as subject to overfishing.



The status of all the stocks assessed in 2014, and their status since 1992, are provided in Table 1.3.

**TABLE 1.2** Stocks classified as subject to overfishing and/or overfished in 2014, and their status in 2013

Fishery	Common name (scientific name)	2013		2014	
		Fishing mortality	Biomass	Fishing mortality	Biomass
Stocks managed solely by the Australian Government					
SESSF: Commonwealth Trawl and Scalefish Hook sectors	Blue warehou ( <i>Seriolella brama</i> )				
SESSF: Commonwealth Trawl and Scalefish Hook sectors	Gemfish, eastern zone ( <i>Rexea solandri</i> )				
SESSF: Commonwealth Trawl and Scalefish Hook sectors	Gulper sharks ( <i>Centrophorus harrissoni</i> , <i>C. moluccensis</i> , <i>C. zeehaani</i> )				
SESSF: Commonwealth Trawl Sector	Orange roughy, southern zone ( <i>Hoplostethus atlanticus</i> )				
SESSF: Commonwealth Trawl Sector	Orange roughy, western zone ( <i>Hoplostethus atlanticus</i> )				
SESSF: Commonwealth Trawl Sector	Redfish, eastern ( <i>Centroberyx affinis</i> )				
SESSF: Shark Gillnet and Shark Hook sectors	School shark ( <i>Galeorhinus galeus</i> )				
Stocks managed jointly by the Australian Government					
South Tasman Rise Trawl Fishery	Orange roughy ( <i>Hoplostethus atlanticus</i> )				
Torres Strait Bêche-de-mer Fishery	Sandfish ( <i>Holothuria scabra</i> )				
Eastern Tuna and Billfish Fishery	Bigeye tuna ( <i>Thunnus obesus</i> )				
Southern Bluefin Tuna Fishery	Southern bluefin tuna ( <i>Thunnus maccoyii</i> )				
Western Tuna and Billfish Fishery	Striped marlin ( <i>Tetrapturus audax</i> )				

Notes: SESSF Southern and Eastern Scalefish and Shark Fishery.

**Fishing mortality**    Not subject to overfishing    Subject to overfishing    Uncertain  
**Biomass**    Not overfished    Overfished    Uncertain

**Table 1.3** Biological stock status of all stocks assessed in 2014, and their status since 1992

Fishery	Common name (scientific name)	Status																																				
		1992	1993	1994	1996	1997	1998	1999	2001–02	2002–03	2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014							
											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 managed solely by the Australian Government																																						
Bass Strait Central Zone Scallop Fishery	Commercial scallop ( <i>Pecten fumatus</i> )																																					
Coral Sea Fishery: Sea Cucumber Sector	Black teatfish ( <i>Holothuria whitmaei</i> )																																					
Coral Sea Fishery: Sea Cucumber Sector	Prickly redfish ( <i>Thelenota ananas</i> )																																					
Coral Sea Fishery: Sea Cucumber Sector	Surf redfish ( <i>Actinopyga mauritiana</i> )																																					
Coral Sea Fishery: Sea Cucumber Sector	White teatfish ( <i>Holothuria fuscogilva</i> )																																					
Coral Sea Fishery: Sea Cucumber Sector	Other sea cucumber species (~11 spp.)																																					
Coral Sea Fishery: Aquarium Sector	Multiple species																																					
Coral Sea Fishery: Lobster and Trochus Sector	Tropical rock lobster ( <i>Panulirus ornatus</i> , 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																																					

continued ...

**Table 1.3** Biological stock status of all stocks assessed in 2014, and their status since 1992 continued

Fishery	Common name (scientific name)	Status																																				
		1992	1993	1994	1996	1997	1998	1999	2001-02	2002-03	2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014							
											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	Red-legged banana prawn ( <i>Fenneropenaeus indicus</i> )																																					
Northern Prawn Fishery	White banana prawn ( <i>Fenneropenaeus merguensis</i> )																																					
Northern Prawn Fishery	Brown tiger prawn ( <i>Penaeus esculentus</i> )																																					
Northern Prawn Fishery	Grooved tiger prawn ( <i>Penaeus semisulcatus</i> )																																					
Northern Prawn Fishery	Blue endeavour prawn ( <i>Metapenaeus endeavouri</i> )																																					
Northern Prawn Fishery	Red endeavour prawn ( <i>Metapenaeus ensis</i> )																																					
North West Slope Trawl Fishery	Scampi ( <i>Metanephrops australiensis</i> , <i>M. boschmai</i> , <i>M. velutinus</i> )																																					
Small Pelagic Fishery	Australian sardine ( <i>Sardinops sagax</i> )																																					
Small Pelagic Fishery	Blue mackerel, east ( <i>Scomber australasicus</i> )																																					
Small Pelagic Fishery	Blue mackerel, west ( <i>Scomber australasicus</i> )																																					

continued ...

**Table 1.3** Biological stock status of all stocks assessed in 2014, and their status since 1992 continued

Fishery	Common name (scientific name)	Status																																		
		1992	1993	1994	1996	1997	1998	1999	2001-02	2002-03	2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014					
											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
Small Pelagic Fishery	Jack mackerel, east ( <i>Trachurus declivis</i> )																																			
Small Pelagic Fishery	Jack mackerel, west ( <i>Trachurus declivis</i> )																																			
Small Pelagic Fishery	Redbait, east ( <i>Emmelichthys nitidus</i> )																																			
Small Pelagic Fishery	Redbait, west ( <i>Emmelichthys nitidus</i> )																																			
SESSF: Commonwealth Trawl and Scalefish Hook sectors	Blue-eye trevalla ( <i>Hyperoglyphe antarctica</i> )																																			
SESSF: Commonwealth Trawl and Scalefish Hook sectors	Blue grenadier ( <i>Macruronus novaezelandiae</i> )																																			
SESSF: Commonwealth Trawl and Scalefish Hook sectors	Blue warehou ( <i>Seriolella brama</i> )																																			
SESSF: Commonwealth Trawl Sector	Deepwater sharks, eastern zone (18 spp.)																																			
SESSF: Commonwealth Trawl Sector	Deepwater sharks, western zone (18 spp.)																																			
SESSF: Commonwealth Trawl Sector	Eastern school whiting ( <i>Sillago flindersi</i> )																																			
SESSF: Commonwealth Trawl Sector	Flathead ( <i>Neoplatycephalus richardsoni</i> and 4 other spp.)																																			

continued ...

**Table 1.3** Biological stock status of all stocks assessed in 2014, and their status since 1992 continued

Fishery	Common name (scientific name)	Status																																				
		1992	1993	1994	1996	1997	1998	1999	2001-02	2002-03	2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014							
											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	Gemfish, eastern zone ( <i>Rexea solandri</i> )																																					
SESSF: Commonwealth Trawl and Scalefish Hook sectors	Gemfish, western zone ( <i>Rexea solandri</i> )																																					
SESSF: Commonwealth Trawl and Scalefish Hook sectors	Gulper sharks ( <i>Centrophorus harrissoni</i> , <i>C. moluccensis</i> , <i>C. zeehaani</i> )																																					
SESSF: Commonwealth Trawl and Scalefish Hook sectors	Jackass morwong ( <i>Nemadactylus macropterus</i> )																																					
SESSF: Commonwealth Trawl Sector	John dory ( <i>Zeus faber</i> )																																					
SESSF: Commonwealth Trawl Sector	Mirror dory ( <i>Zenopsis nebulosa</i> )																																					
SESSF: Commonwealth Trawl Sector	Ocean jacket, eastern zone ( <i>Nelusetta ayraud</i> )																																					
SESSF: Commonwealth Trawl and Scalefish Hook sectors	Ocean perch ( <i>Helicolenus barathri</i> , <i>H. percoides</i> )																																					
SESSF: Commonwealth Trawl Sector	Orange roughy, Cascade Plateau ( <i>Hoplostethus atlanticus</i> )																																					

continued ...

**Table 1.3** Biological stock status of all stocks assessed in 2014, and their status since 1992 continued

Fishery	Common name (scientific name)	Status																	
		1992	1993	1994	1996	1997	1998	1999	2001-02	2002-03	2004	2005	2006	2007	2008	2009	2010	2011	2012
											Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality	Biomass	Fishing mortality
SESSF: Commonwealth Trawl Sector	Orange roughy, eastern zone ( <i>Hoplostethus atlanticus</i> )																		
SESSF: Commonwealth Trawl Sector	Orange roughy, southern zone ( <i>Hoplostethus atlanticus</i> )																		
SESSF: Commonwealth Trawl Sector	Orange roughy, western zone ( <i>Hoplostethus atlanticus</i> )																		
SESSF: Commonwealth Trawl Sector	Oreodory: smooth, Cascade Plateau ( <i>Pseudocyttus maculatus</i> )																		
SESSF: Commonwealth Trawl Sector	Oreodory: smooth, non-Cascade Plateau ( <i>Pseudocyttus maculatus</i> )																		
SESSF: Commonwealth Trawl Sector	Oreodory: other ( <i>Neocyttus rhomboidalis</i> , <i>Alloctytus niger</i> , <i>A. verrucosus</i> )																		
SESSF: Commonwealth Trawl and Scalefish Hook sectors	Pink ling ( <i>Genypterus blacodes</i> )																		
SESSF: Commonwealth Trawl Sector	Redfish, eastern ( <i>Centroberyx affinis</i> )																		
SESSF: Commonwealth Trawl and Scalefish Hook sectors	Ribaldo ( <i>Mora moro</i> )																		

continued ...

**Table 1.3** Biological stock status of all stocks assessed in 2014, and their status since 1992 continued

Fishery	Common name (scientific name)	Status																			
		1992	1993	1994	1996	1997	1998	1999	2001-02	2002-03	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
		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	Royal red prawn ( <i>Haliporoides sibogae</i> )																				
SESSF: Commonwealth Trawl and Scalefish Hook sectors	Silver trevally ( <i>Pseudocaranx georgianus</i> )																				
SESSF: Commonwealth Trawl Sector	Silver warehou ( <i>Seriolella punctata</i> )																				
SESSF: East Coast Deepwater Trawl Sector	Alfonsino ( <i>Beryx splendens</i> )																				
SESSF: Great Australian Bight Trawl Sector	Bight redfish ( <i>Centroberyx gerrardi</i> )																				
SESSF: Great Australian Bight Trawl Sector	Deepwater flathead ( <i>Neoplatycephalus conatus</i> )																				
SESSF: Great Australian Bight Trawl Sector	Ocean jacket, west ( <i>Nelusetta ayraud</i> )																				
SESSF: Great Australian Bight Trawl Sector	Orange roughy ( <i>Hoplostethus atlanticus</i> )																				
SESSF: Shark Gillnet and Shark Hook sectors	Elephantfish ( <i>Callorhinchus milii</i> )																				
SESSF: Shark Gillnet and Shark Hook sectors	Gummy shark ( <i>Mustelus antarcticus</i> )																				
SESSF: Shark Gillnet and Shark Hook sectors	Sawshark ( <i>Pristiophorus cirratus</i> , <i>P. nudipinnis</i> )																				

continued ...

**Table 1.3** Biological stock status of all stocks assessed in 2014, and their status since 1992 continued

Fishery	Common name (scientific name)	Status																	
		1992	1993	1994	1996	1997	1998	1999	2001–02	2002–03	2004	2005	2006	2007	2008	2009	2010	2011	2012
											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: Shark Gillnet and Shark Hook sectors	School shark ( <i>Galeorhinus galeus</i> )																		
Southern Squid Jig Fishery	Gould's squid ( <i>Nototodarus gouldi</i> )																		
Western Deepwater Trawl Fishery	Bugs ( <i>Ibacus</i> spp.)																		
Western Deepwater Trawl Fishery	Ruby snapper ( <i>Etelis carbunculus</i> )																		
Macquarie Island Toothfish Fishery	Patagonian toothfish ( <i>Dissostichus eleginoides</i> )																		

## Stocks managed jointly by the Australian Government

South Tasman Rise Trawl Fishery	Orange roughy ( <i>Hoplostethus atlanticus</i> )																		
Torres Strait Finfish Fishery	Coral trout ( <i>Plectropomus</i> spp., <i>Variola</i> spp.)																		
Torres Strait Finfish Fishery	Spanish mackerel ( <i>Scomberomorus commerson</i> )																		
Torres Strait Tropical Rock Lobster Fishery	Tropical rock lobster ( <i>Panulirus ornatus</i> )																		
Torres Strait Prawn Fishery	Brown tiger prawn ( <i>Penaeus esculentus</i> )																		
Torres Strait Prawn Fishery	Blue endeavour prawn ( <i>Metapenaeus endeavouri</i> )																		

continued ...



**Table 1.3** Biological stock status of all stocks assessed in 2014, and their status since 1992 continued

Fishery	Common name (scientific name)	Status																	
		1992	1993	1994	1996	1997	1998	1999	2001-02	2002-03	2004	2005	2006	2007	2008	2009	2010	2011	2012
											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
Torres Strait Bêche-de-mer Fishery	Black teatfish ( <i>Holothuria whitmaei</i> )																		
Torres Strait Bêche-de-mer Fishery	Prickly redfish ( <i>Thelenota ananas</i> )																		
Torres Strait Bêche-de-mer Fishery	Sandfish ( <i>Holothuria scabra</i> )																		
Torres Strait Bêche-de-mer Fishery	White teatfish ( <i>Holothuria fuscogilva</i> )																		
Torres Strait Bêche-de-mer Fishery	Other sea cucumbers (up to 18 spp.)																		
Torres Strait Trochus Fishery	Trochus ( <i>Trochus niloticus</i> )																		
Eastern Tuna and Billfish Fishery	Striped marlin ( <i>Tetrapturus audax</i> )																		
Eastern Tuna and Billfish Fishery	Swordfish ( <i>Xiphias gladius</i> )																		
Eastern Tuna and Billfish Fishery	Albacore ( <i>Thunnus alalunga</i> )																		
Eastern Tuna and Billfish Fishery	Bigeye tuna ( <i>Thunnus obesus</i> )																		
Eastern Tuna and Billfish Fishery	Yellowfin tuna ( <i>Thunnus albacares</i> )																		
Skipjack Tuna Fishery: Pacific Ocean	Skipjack tuna ( <i>Katsuwonus pelamis</i> )																		
Skipjack Tuna Fishery: Indian Ocean	Skipjack tuna ( <i>Katsuwonus pelamis</i> )																		

continued ...

**Table 1.3** Biological stock status of all stocks assessed in 2014, and their status since 1992 continued

Fishery	Common name (scientific name)	Status																																				
		1992	1993	1994	1996	1997	1998	1999	2001-02	2002-03	2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014							
											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
Southern Bluefin Tuna Fishery	Southern bluefin tuna ( <i>Thunnus maccoyii</i> )																																					
Western Tuna and Billfish Fishery	Striped marlin ( <i>Tetrapturus audax</i> )																																					
Western Tuna and Billfish Fishery	Swordfish ( <i>Xiphias gladius</i> )																																					
Western Tuna and Billfish Fishery	Albacore ( <i>Thunnus alalunga</i> )																																					
Western Tuna and Billfish Fishery	Bigeye tuna ( <i>Thunnus obesus</i> )																																					
Western Tuna and Billfish Fishery	Yellowfin tuna ( <i>Thunnus albacares</i> )																																					
Heard Island and McDonald Islands Fishery	Mackerel icefish ( <i>Champsocephalus gunnari</i> )																																					
Heard Island and McDonald Islands Fishery	Patagonian toothfish ( <i>Dissostichus eleginoides</i> )																																					

Note: **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. Note that grey shading indicates that the stock was not longer assessed.

**Fishing mortality**      ■ Not subject to overfishing      ■ Subject to overfishing      ■ Uncertain  
**Biomass**                ■ Not overfished                      ■ Overfished                      ■ Uncertain

## Status of key Australian fish stocks reports

On 10 December 2014, the Fisheries Research and Development Corporation released *Status of key Australian fish stocks reports 2014*, the second in the series. The reports provide a national assessment of the status of key wild-capture fish stocks that are managed by the Commonwealth and the states. The reports were initiated in 2012 by the Fisheries Research and Development Corporation and ABARES. They are developed collaboratively by ABARES and government fishery research agencies in all states and the Northern Territory, and CSIRO.

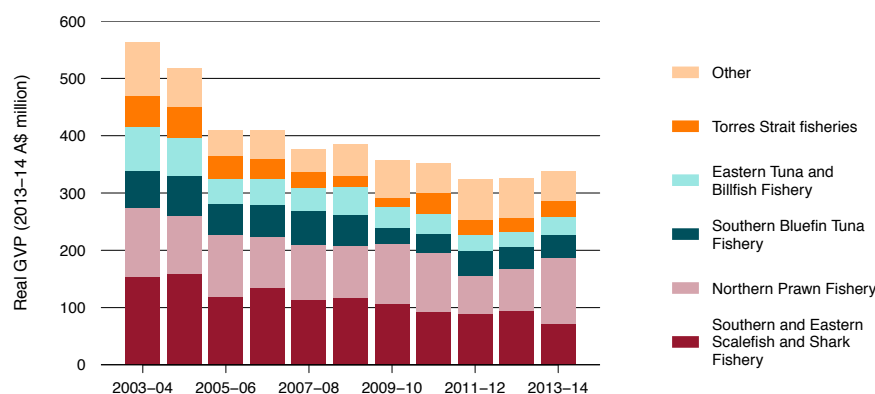
The 2014 reports provide stock assessments for 68 key species (or species complexes), 19 more than in the 2012 inaugural edition. These species and their stocks contributed around 85 per cent of the catch volume and 90 per cent of the value of Australian wild-capture fisheries in 2012–13. These reports consider the same biological information as the *Fishery status reports*, but interpret that information within a nationally agreed classification system (Appendix A). Of the 93 stocks assessed in the *Fishery status reports 2013–14*, 31 stocks are assessed in the *Status of key Australian fish stocks reports 2014* and are comparable. This national reporting framework is designed to improve the ability to compare the status of fish stocks across Australia.

## 1.3 Economic status in 2013–14

*Fishery status reports 2015* assesses the economic status of all fisheries managed solely and jointly by the Australian Government. These fisheries generated an estimated GVP of \$338.2 million in 2013–14, which is about 13 per cent of Australia's total fisheries and aquaculture GVP (\$2.6 billion).

Fishery GVP is dominated by production from a few major fisheries. In 2013–14, the NPF was the most valuable, with a GVP of \$115.2 million, making it the most valuable single-method fishery (Figure 1.5). The multisector SESSF was the second most valuable Australian Government–managed fishery, with a GVP of \$72.3 million. The wild-catch sector of the Southern Bluefin Tuna Fishery (SBTF) and the ETBF also made substantial contributions to fisheries GVP in 2013–14, with values of \$39.4 million and \$31.2 million, respectively. Together, these four fisheries accounted for 76 per cent of total fishery GVP.

**FIGURE 1.5** Gross value of production of fisheries managed solely or jointly by the Australian Government, 2003–04 to 2013–14



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

In many fisheries, the degree of latency—that is, the proportion of TAC left uncaught—is high (Table 1.4). Some industry stakeholders in these fisheries are concerned that this indicates low NER and that the fishery is failing to achieve its MEY objective under the HSP. In general, input controls, such as allowable effort, and output controls, such as TACs, are set with the aim of achieving MEY. If fishers collectively are fishing below the TAC, then either fishers are foregoing economically profitable opportunities, the MEY target has been set erroneously high or there are practical difficulties preventing fishers catching to the MEY target.

Fishers may forego these opportunities for a number of reasons. These include poor fleet performance—for example, as a result of transitioning to new skippers and crew who are inexperienced in the fishery—or personal reasons, including operators' disinclination to remain at sea for prolonged periods or because a fishing season overlaps with major events such as holidays. Market dynamics may also have a role, including tight labour markets causing difficulties with crewing vessels and lower than anticipated prevailing beach prices. These factors may be beyond the scope of management authorities to influence.

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

- estimating MEY targets is difficult and costly. As such, managers 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, have changed, making a model-derived MEY target and/or proxy redundant
- a stock is less abundant than anticipated, or located further afield, and thus more costly to catch
- regulatory changes in either gear or spatial restrictions 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 season, and fishers may also risk exceeding quota for the other species. Similarly, a reduction in quota for a target species is likely to reduce the catch of co-caught species. MEY targets designed for multispecies fisheries would help to address this cause of undercatch
- 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.

## Fisheries managed solely by the Australian Government

The ABARES financial and economic surveys are important for assessing the economic performance of fisheries managed solely or jointly by the Australian Government. Each fishery's NER can be estimated from the economic survey data. 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 93 per cent of the GVP of fisheries managed solely by AFMA and 52 per cent of the GVP of all Australian Government-managed fisheries in 2013–14.

For the NPF, real NER remained positive but decreased by more than \$11 million to \$3.7 million in 2011–12, as a result of lower landings of banana prawn (*Fenneropenaeus indicus* and *F. merguensis*). NER are estimated to have increased in 2012–13 to \$5.4 million, driven by higher projected fishing income from an increase in the average price received for banana prawn (Skirtun et al. 2014). The NPF is explicitly managed to an MEY target for the tiger prawn (*P. esculentus* and *P. semisulcatus*) component of the fishery, using a bio-economic model to set effort levels that are estimated to produce MEY. Estimates of NER for the CTS have been positive for the past nine financial years and have risen substantially, increasing from \$1.7 million in 2005–06 to \$4.5 million in 2011–12. NER decreased slightly in 2012–13 and are estimated to have decreased substantially in 2013–14, following a 29 per cent decrease in GVP generated in the fishery in that year. In comparison, the average NER for the previous five years (2000–01 to 2004–05) was –\$2.5 million; NER were as low as –\$6.1 million in 2002–03.

The CTS and GHTS are also managed to MEY targets for key commercial species. However, unlike in the NPF, fishery-specific  $B_{MEY}$  targets (biomass targets consistent with achieving MEY) have not been quantitatively estimated. Instead, MEY is targeted through the application of proxies for  $B_{MEY}$  (generally 1.2 times  $B_{MSY}$ —the biomass that should produce MSY), equivalent to 48 per cent (0.48) of the unfished biomass ( $B_0$ ) (see Glossary for definition of these terms). For the most valuable species targeted in these two sectors, biomass levels are generally estimated to be close to, or above, their respective  $B_{MEY}$  targets, meaning that stock levels are not constraining profits. An exception may be the eastern component of the pink ling (*Genypterus blacodes*) stock (the entire stock accounted for 10 per cent of GVP in the CTS and 6 per cent in the GHTS in 2013–14). Estimates of fishing mortality for the eastern and western components of this stock differ, making fishing mortality status for the combined stock uncertain (Table 1.3). Both sectors also have stocks that previously generated significant economic returns but are now overfished and require rebuilding. For example, orange roughy catches in the CTS previously accounted for more than half the sector's GVP, but two of the three orange roughy stocks previously fished in the CTS are assessed as overfished (the third, orange roughy—eastern zone is classified as not overfished, and targeted fishing recommenced in the 2015–16 fishing season). These stocks are subject to substantial spatial closures and other strict management arrangements to facilitate rebuilding.

In the GHTS, positive NER were maintained in the decade leading up to, and including, 2008–09. However, NER turned negative in 2009–10, declining to –\$0.4 million, and have remained negative since then (Skirtun & Green 2015). The recent reduction in economic performance in the GHTS occurred despite biomass levels of gummy shark (*Mustelus antarcticus*; the sector's main target species) being close to or above the stock's target reference point. Recent spatial closures aimed at reducing marine

mammal interactions and efforts to avoid school shark are likely to have contributed to the decline in the sector's recent economic performance. The fishery also targets a range of scalefish. Steady catches of scalefish after the introduction of spatial closures have continued to contribute to fishery-level NER.

In the Great Australian Bight Trawl Sector (GABTS), 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 assessment of bight redfish projected that biomass levels at the start of 2013–14 would be well above the stock's  $B_{MEY}$  target (Klaer 2011), potentially allowing increased profits to be generated as the stock is fished down to its target. The most recent stock assessment of deepwater flathead suggests that biomass levels have recently been rebuilt towards the  $B_{MEY}$  target (Chapter 11). Hence, fishery profitability is unlikely to be constrained by stock status.

The TAC for the Macquarie Island Toothfish Fishery was almost fully caught in the 2013–14 and 2014–15 fishing seasons, mainly as a result of improved sea conditions. This suggests that profitability is likely to be positive for the fishery. Low catch-and-effort levels in the other active fisheries (Coral Sea Fishery, East Coast Deepwater Trawl Sector, North West Slope Trawl Fishery, Small Pelagic Fishery and Western Deepwater Trawl Fishery) indicate low NER in these fisheries in 2013–14.

The Bass Strait Central Zone Scallop Fishery (BSCZSF) produced negative NER in both 2009–10 (–\$1.1 million) and 2010–11 (–\$1.0 million) (George et al. 2012). These negative NER are likely to reflect the poor biological status of the stock and recently reported scallop die-offs, which have resulted in reduced catches. The development of an appropriate economic target for the BSCZSF harvest strategy, consistent with the intent of the HSP, is a challenge for the fishery. Since the fishery's reopening, higher GVPs of \$1.3 million and \$4.0 million were achieved in 2008–09 and 2009–10, respectively. However, real GVP has continued to decrease since 2009–10, largely as a result of lower landed catch; GVP was \$0.5 million in 2013–14. As a result, NER in 2013–14 are likely to remain negative.

Catch rates in the Southern Squid Jig Fishery increased substantially in the 2011 and 2012 seasons, and beach prices reached their highest levels in more than a decade. The fishery's GVP increased from \$0.10 million in 2009–10 to \$1.69 million in 2010–11. Profitability in the 2012 season is likely to have increased, despite a small decrease in effort, with a further increase in GVP to \$2.1 million in 2011–12. However, in 2012–13, the real average beach price fell 41 per cent to \$1.50 per kilogram as global supply returned to more normal levels, with GVP declining to \$0.2 million. In the 2013–14 fishing season, low availability of squid and low fishing effort resulted in the lowest jig fishery catch on record. As a result, NER are expected to be negative for the fishery in 2013–14, with low availability of squid in traditional fishing grounds increasing per-unit fishing costs.

## Jointly managed fisheries

Of the fisheries jointly managed by the Australian Government and international jurisdictions, major fisheries in value terms include the SBTF, the ETBF and the Torres Strait Tropical Rock Lobster Fishery (TSTRLF). In 2013–14, these fisheries generated GVP of \$39.4 million, \$31.2 million and \$20.9 million, respectively. Combined, these three fisheries accounted for 61 per cent of the GVP of all jointly managed fisheries and 27 per cent of the GVP of all Australian Government-managed fisheries in 2013–14.

Estimates of NER are not available for the SBTF. However, the fishery produces a high-value product and is potentially highly profitable, despite the overfished state of its stock. The SBTF primarily provides fish to South Australia's southern bluefin tuna aquaculture industry. The GVP of the South Australian southern bluefin tuna aquaculture sector was \$123.7 million in 2013–14. The overfished status of southern bluefin tuna means that a proportion of the historical NER was generated while total catch levels on the global stock were unsustainable. The stock's current low biomass level may pose a risk to the future flow of NER from the fishery. If the international management arrangements allow the stock to rebuild, economic status would be expected to improve.

Economic status in the ETBF has improved. In 2010–11, NER were positive for the first time since 2000–01 (George & New 2013). In 2011–12, NER are estimated to have increased to \$3.0 million (preliminary estimate), with a decrease in operating costs outweighing a decline in revenue. The NER estimates for 2012–13 are not available and are uncertain. Improved economic performance in the fishery is consistent with an increasing trend in economic productivity since the early 2000s (Stephan & Vieira 2013). This has occurred at the same time as the reduction in fleet size, driven primarily by market forces in the early 2000s and the Securing our Fishing Future structural adjustment package later in the decade. These changes are likely to have left the more efficient vessels operating in the fishery. The fishery's move to individual transferable quotas in 2011 and a new harvest strategy may result in further improvement in economic performance.

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, such as their rights in relation to traditional fishing; managing commercial fisheries for optimum use; and having regard, in developing and implementing licensing policy, to the desirability of promoting economic development and employment opportunities for Traditional Inhabitants in the Torres Strait area. As a result, although the Protected Zone Joint Authority has asked management forums to provide advice on applying the HSP to Torres Strait fisheries, these fisheries are not evaluated against the MEY objective of the HSP in these reports.

The TSTRLF was the most valuable commercial fishery in Torres Strait in 2013–14. In contrast to the period 2009–10 to 2011–12, both production and GVP were more stable in 2012–13 and 2013–14. GVP increased by 4 per cent in 2013–14 to \$20.9 million, with a higher composition of tail production than the previous year. However, the proportionally faster increase in effort than GVP indicates that NER to the fishery are likely to have declined.

Management objectives for the Torres Strait Prawn Fishery Management Plan 2008 include promoting economic efficiency and ensuring the optimal use of fishery resources. Despite these objectives, negative NER have persisted in the fishery for the past decade. NER for the fishery increased from –\$2.4 million in 2010–11 to –\$1.8 million in 2011–12 (the last year for which NER estimates are available). The fishery has persistently high levels of latent effort. Achieving the fishery's economic potential needs to be considered alongside the social and cultural objectives of Torres Strait Islander and Aboriginal people.

**TABLE 1.4** Indicators and summary of economic status of Commonwealth fisheries for 2013–14

<b>Fishery</b>	<b>Performance relative to MEY target</b>	<b>NER trend</b>	<b>Fishing right latency</b>
Bass Strait Central Zone Scallop Fishery	MEY target not specified	Negative in 2009–10 and 2010–11 (–\$1.1 million)	High uncaught TAC
Coral Sea Fishery	MEY target not specified	Not estimated	High uncaught TAC
Norfolk Island Fishery	MEY target not specified	Not estimated	Unknown
Northern Prawn Fishery	Tiger prawn stocks approaching $B_{MEY}$ target. MEY targets not specified for banana prawn	Positive and increasing	Low unused effort
North West Slope Trawl Fishery	MEY target not specified	Not estimated	High non-participation by licence holders
Small Pelagic Fishery	MEY target not specified	Not estimated	High uncaught TAC
SESSF: Commonwealth Trawl and Scalefish Hook sectors <b>a</b>	Of the five key species, most are close to $B_{MEY}$ targets. Overfished stocks require rebuilding for improvement in economic status	Positive but decreasing	High uncaught TAC
SESSF: East Coast Deepwater Trawl Sector	Fishing mortality below economic target reference point	Not estimated	High non-participation by licence holders
SESSF: Great Australian Bight Trawl Sector	Bight redfish above $B_{MEY}$ target. Deepwater flathead just below $B_{MEY}$ target	Not estimated but likely to be positive, but have decreased	High uncaught TAC
SESSF: Shark Hook and Shark Gillnet sectors <b>b</b>	Gummy shark stock close to, or above, target. Biomass of school shark requires rebuilding	Turned slightly negative in 2010–11 and 2011–12 for GHTS. Estimated to remain negative in 2013–14	Low uncaught TAC
Southern Squid Jig Fishery	MEY target not specified	Not estimated	High non-participation by licence holders
Western Deepwater Trawl Fishery	MEY target not specified	Not estimated	High non-participation by licence holders



2013–14 fishery GVP (% change from 2012–13)	2013–14 management costs (% share of GVP)	Primary management instrument	Comments
\$0.5 million (+6%)	0.3 million (60%)	ITQs and spatial management	NER in 2013–14 are likely to be negative, given large decreases in effort, catch and GVP in the years following the surveyed years, when real NER were estimated to be –\$1.1 million
Confidential	\$0.1 million (confidential)	Catch triggers and TACs	Estimates of NER are not available. Aquarium Sector catch decreased substantially in 2013–14, indicating a decrease in NER. For the remainder of the fishery, it is unclear how changes in gear used and reduced catch have affected NER
Not available	Not available	Input controls	The offshore fishery is closed to commercial fishing. Only non-commercial fishing occurs in the inshore fishery. Economic status is unknown
\$115 million (+58%)	\$1.9 million (2%)	Individual transferable gear units (headrope length)	ABARES has not surveyed the NPF since 2011–12, when NER were \$3.8 million. Returns are estimated to have increased in 2012–13 and 2013–14 owing to increased landings of tiger prawn and banana prawn. Overall, the economic status of the fishery has improved since adopting an MEY target for tiger prawn in 2004
Confidential	\$0.09 million (confidential)	Limited entry and catch triggers	Estimates of NER are not available for the fishery, although the high degree of latent effort indicates that NER are likely to be low
Confidential	\$0.4 million (confidential)	ITQs	Estimates of NER are not available but are likely to be low, given the low levels of effort and high latency in the fishery
\$41.2 million (–28%)	\$2.9 million for CTS (7% of CTS GVP)	ITQs	NER for the CTS were \$4.2 million in 2012–13 and \$1.4 million in 2013–14 (preliminary). A positive trend in NER since 2002–03, partly driven by increased economic productivity, suggests a move towards MEY. Some key species are close to their $B_{MEY}$ targets, but economic status can still be improved by rebuilding some overfished stocks
Confidential	\$0 million (confidential)	ITQs	A high level of latency indicates low NER
\$11 million (–9%)	\$0.3 million (3%)	ITQs	NER are likely to have decreased slightly in 2013–14, since positive impacts on fishery profitability from marginally lower effort are not strong enough to offset the impact of a higher fuel price and lower GVP on profitability
\$15.8 million (–9%)	\$2.3 million for GHTS (16% of GHTS GVP)	ITQs	Preliminary estimates for 2013–14 indicate that NER are likely to remain negative. Although gummy shark biomass is not constraining NER, the management of non-target species marine mammal interactions is likely to have contributed to a fall in NER in the fishery in recent years
\$0.01 million (–98%)	\$0.05 million (500%)	Individual transferable gear units (jig machines)	NER are likely to have decreased in the 2014 season, as indicated by a decrease in GVP and a large decrease in effort
Confidential	\$0.08 million (confidential)	Limited entry	Estimates of NER are not available, but a decrease in unit effort and a low number of active fishing permits in recent years indicate that NER have been low

continued ...

**TABLE 1.4** Indicators and summary of economic status of Commonwealth fisheries for 2013–14 continued

<b>Fishery</b>	<b>Performance relative to MEY target</b>	<b>NER trend</b>	<b>Fishing right latency</b>
Torres Strait Finfish Fishery	Not applicable <sup>c</sup>	Not estimated	Not applicable
Torres Strait Tropical Rock Lobster Fishery	Not applicable <sup>c</sup>	Not estimated	Low uncaught TAC
Torres Strait Prawn Fishery	Not applicable <sup>c</sup>	Negative	High unused effort
Torres Strait Bêche-de-mer and Trochus fisheries	Not applicable <sup>c</sup>	Not estimated	Low uncaught quota for teatfish; high for all other stocks
Eastern Tuna and Billfish Fishery	MEY target not adequately specified or applied	Increasing trend; turned positive in 2010–11	Low uncaught quota for striped marlin, swordfish and yellowfin tuna; high for albacore and bigeye tuna
Skipjack Tuna Fishery	MEY target not specified	No fishing	High non-participation by licence holders
Southern Bluefin Tuna Fishery	MEY target not specified	Not estimated but likely to be positive	Low uncaught TAC
Western Tuna and Billfish Fishery	MEY target not specified	Not estimated	High uncaught TAC
Heard Island and McDonald Islands Fishery	Not applicable <sup>c</sup>	Not estimated but likely to be positive	Low uncaught TAC
Macquarie Island Toothfish Fishery	Not applicable <sup>c</sup>	Not estimated	Low uncaught TAC

2013–14 fishery GVP (% change from 2012–13)	2013–14 management costs (% share of GVP)	Primary management instrument	Comments
\$1.4 million (+69%)	Not available	Non-tradeable quota	Estimates of NER are not available. Leasing arrangements are likely to generate some positive economic returns to the Torres Strait community
\$9.4 million (–44%)	Not available	Limited entry, size limits, gear limits and bag limits	NER are likely to have decreased because of higher effort and lower GVP in 2013–14. The fishery is meeting its objective to provide commercial opportunities for Traditional Inhabitants, but it is uncertain whether its objective to optimise value is being met
\$5.8 million (–2%)	\$0.2 million (3%, AFMA costs only)	Tradeable effort units (nights)	NER for the fishery increased from –\$2.7 million in 2011–12 to –\$2.3 million in 2012–13. Improvement in NER in 2012–13 is mainly attributed to an increase in catch, the prices of major species caught by the fishery and a possible decline in input costs
Not available	Not available	TACs	Estimates of NER are not available
\$31.2 million (+22%)	\$1.5 million (5%)	ITQs	NER were \$3.0 million in 2011–12 (preliminary estimate). NER estimates for 2013–14 are not available. The move to ITQs and a new harvest strategy may support improvement
No fishing	\$0.05 million (no fishing)	Limited entry	No Australian vessels fished in 2013 or 2014. Fishing is opportunistic, and highly dependent on availability and the domestic cannery market
\$39.4 million (+0.1%)	\$1.6 million (4%)	ITQs	NER are expected to have remained positive. The overfished status of the stock poses a risk to future NER. Economic status will improve if the stock can be rebuilt under the management procedure
Confidential	\$0.2 million (confidential)	ITQs	Latency remained high in 2014, with only a small proportion of the total allowable commercial catch caught, suggesting low NER
Confidential	\$0.8 million (confidential)	ITQs	Estimates of NER are not available but were most likely positive in 2012–13 and 2013–14 because the TACs for mackerel icefish and Patagonian toothfish were mostly caught
Confidential	\$0.3 million (confidential)	ITQs	Estimates of NER are not available but were most likely positive in 2012–13 and 2013–14 because the TAC for Patagonian toothfish was mostly caught

**a** NER estimates and management costs are only available for the Commonwealth Trawl Sector 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. **B<sub>MEY</sub>** Biomass at maximum economic yield. **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.

## 1.4 Environmental status in 2014

The *Fishery status reports* examine the broader impact of fisheries on the environment, in response to the requirements of the *Fisheries Management Act 1991* and the EPBC Act. 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.

As part of the review of the Commonwealth Policy on Fisheries Bycatch, CSIRO assessed trends in bycatch for several Commonwealth fisheries (Tuck et al. 2013). It found that data limitations precluded the accurate assessment of trends in bycatch. For example, variations between years in observer coverage, fishing gear types, seasons, areas and sampling protocols could lead to misleading estimates of bycatch trends. Furthermore, bycatch rates need to be interpreted with caution, because a decrease may result from the success of mitigation measures, a decrease in susceptibility to the gear or a decrease in abundance of the population of the bycatch species. However, anecdotal evidence and incomplete data suggest that fisheries that introduced mitigation measures generally had successful outcomes. A more detailed review of this research is presented in the SESSF overview chapter (Chapter 8).

### 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 (TAPs), and detail AFMA's management response. Fishery-specific actions with respect to bycatch and discarding are identified in fishery-specific bycatch and discarding workplans.

### Protected species interactions

During the normal course of fishing operations, fishers can interact with protected species listed under the EPBC Act, but 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 Department of the Environment on a quarterly basis. 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 usually rare, they can be a significant source of mortality for the affected populations.

Some fisheries have made considerable progress in implementing measures to reduce interactions with protected species. The use of turtle excluder devices became compulsory in the NPF in 2001 and is reported to have reduced turtle bycatch from approximately 5700 turtles a year before 2001 to approximately 30 a year after 2001 (Griffiths et al. 2007). In 2014 in the NPF, 60 turtles were reported as being entangled in gear, all of which were reported as being released alive. Coupled with industry education programmes, these devices have reportedly also been effective in reducing the bycatch of other large animals, such as stingrays and sharks.

The provisions of the TAP for the incidental catch (or bycatch) of seabirds during pelagic longline fishing operations (AAD 2001, 2006, 2014) apply to all longline fisheries managed by the Australian Government, including the ETBF, the WTBF and the Macquarie Island Toothfish Fishery. Over the life of the first plan (2001 to 2006), substantial progress was made towards reducing the threat of pelagic longline fishing operations to seabirds (AAD 2006). A review of the 2006 TAP for seabirds in 2011 noted that positive results had been achieved, including improved avoidance of, and reduction in, seabird bycatch over nearly five years. Despite considerable progress in mitigation of seabird bycatch in Commonwealth longline fisheries, the review concluded that a TAP was still required and that a variation to the 2006 TAP for seabirds was appropriate. The TAP was updated again in 2014. The updated TAP maintains the majority of actions described in the 2006 TAP and refines existing measures, based on scientific research. New actions include removing the requirement for thawed bait, use of new line-weighting measures, considering the conservation status of seabirds, considering the potential need for more rigorous management responses and facilitating improvements to independent monitoring.

Interactions with fur seals and dolphins in the Small Pelagic Fishery were identified as an issue of concern in 2004–05. Management has since focused on collection of data to understand the level of interaction, research into mitigation measures and introduction of seal excluder devices. At this time, AFMA established the Cetacean Mitigation Working Group to help develop long-term management strategies. Low levels of effort in recent years, coupled with use of mitigation measures, are understood to have resulted in few interactions. Increased effort in the 2015–16 fishing season resulted in a number of interactions with seals and dolphins. These will be reported in *Fishery status reports 2016*.

Seal excluder devices have been compulsory in the winter blue grenadier (*Macruronus novaezelandiae*) trawl fishery (of the SESSF) since 2005. The changed fishing practices appear to have reduced the incidence of seal bycatch in the midwater trawl nets of factory vessels.

The AFMA observer programme covers most Commonwealth fisheries. Dedicated observer coverage in 2006 to examine interactions between the Shark Gillnet and Shark Hook sectors (SGSHS) of the SESSF and Australian sea lions (*Neophoca cinerea*) identified a level of bycatch that was potentially significant for this endemic species. AFMA has since implemented management measures to reduce the bycatch of Australian sea lions in shark gillnets (AFMA 2010, 2011a). These include gillnet fishing closures around known breeding colonies and the establishment of seven areas (zones) that will be closed if gillnet fishing interactions exceed the zone-based triggers. Zone-based triggers set an overall bycatch level of 15 animals per year across the seven management zones. As at 25 August 2015, all zones were open. All boats using gillnets in these management areas are subject to 100 per cent observer coverage, using either AFMA observers or an electronic monitoring system. In 2014, no Australian sea lions were netted in gillnet operations in the GHTS.

The recent increase in observer coverage in the SGSHS identified bycatch and mortalities of dolphins as an issue of concern when using gillnets. However, the limited historical observer coverage in the SGSHS means that the extent or significance of the issue is uncertain. In September 2014, AFMA updated the dolphin strategy, which retains aspects of the previous plan (AFMA 2011a), such as a closure in the area of most observed interactions. The updated strategy uses an individual responsibility approach to encourage fishers to innovate and adopt best practice to minimise interactions, and requires either an electronic monitoring system or an AFMA observer to be on board (AFMA 2014). Management responses for dolphin bycatch will culminate in closures for individual fishers if they are unable to resolve the issues themselves. Interactions with seabirds in the SGSHS also became apparent when observer coverage increased in the sector. In response, AFMA required offal management measures and net cleaning to reduce seabird interactions (AFMA 2011b).

The potential significance of seabird mortalities resulting from interactions with trawl cables (warp strikes) has been identified as an issue globally, as well as in Commonwealth fisheries and in early fishery bycatch action plans (Phillips et al. 2010). However, obtaining reliable data is difficult because of the difficulties associated with observing warp strikes. A dedicated seabird bycatch observer programme is being trialled in the SESSF. Industry has implemented vessel-specific seabird management plans in the CTS and the GABTS.

The potential for interactions with seals in the CTS wet-boat and Danish-seine sectors of the SESSF was identified by the ERA process for these sectors. Previous studies suggested that more than 700 seals could be caught annually in the wet-boat sector (NSSG & Stewardson 2007). Trials of seal excluder devices in the wet-boat sector have achieved positive results (Knuckey 2009), and industry has adopted a code of conduct that includes voluntary measures to minimise seal bycatch. However, reliably estimating the level of interactions remains difficult.

## 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 programmes in several fisheries and subfisheries. Electronic monitoring is a cost-effective data collection and logbook verification tool. However, it is not yet known whether it will provide adequate data to manage infrequent events or interactions with animals that are difficult to identify on video.

The electronic monitoring cameras are activated during fishing operations, generally when the net or line hydraulics are running during the set and haul. The cameras remain active for a time after the haul to record the processing of catch, and all video and sensor data are recorded to a hard drive on the boat. Hard drives are encrypted and tamper-evident. Hard drives with video data are exchanged frequently (monthly or at the end of any trip longer than a month) and submitted to AFMA for analysis. A random portion of the video footage is analysed, and data on catch, effort and protected species interactions are compared with logbook reports. This provides independent verification of catch, discards and interactions with protected species, and ensures that the same reporting standards are followed across the fleet.

Electronic monitoring is well established in fisheries around the world. It has been used in Australia since 2011 when it was introduced in the GHTS to comply with a requirement for 100 per cent observer coverage in the Australian Sea Lion Management Zones. Electronic 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 fishing more than 100 days per year. Electronic 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.

At a minimum, 10 per cent of the video footage is analysed at random, with a risk-based approach 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 protected species bycatch.

## Cumulative impacts

The wide distribution of many protected species across the Australian Fishing Zone means that some species may interact with a number of fisheries, including fisheries in other jurisdictions and on the high seas. Although interactions in a single fishery may be low, the cumulative impact across several fisheries could be significant and needs to be considered. Data constraints limit the assessment and understanding of cumulative impacts across fisheries and jurisdictions (Phillips et al. 2010).

## 1.5 Policy reviews

In May 2013, the Australian Government Department of Agriculture, Fisheries and Forestry (now the Department of Agriculture and Water Resources) released separate review reports on the HSP (DAFF 2013a) and the Commonwealth Policy on Fisheries Bycatch 2000 (DAFF 2013b). The reviews included public comment on discussion papers, stakeholder workshops, and technical reviews by ABARES, CSIRO and the University of Wollongong.

The review of the HSP concluded that this policy has largely been successful in improving the management of Commonwealth fisheries and has provided a strong foundation for fisheries management. The review noted that, in most respects, the policy and guidelines meet or exceed international obligations and best practice. The review's key recommendations for improving the policy include providing additional direction or guidelines on stock rebuilding strategies and discarding of commercial species; implementing the MEY objective in multispecies fisheries; and ensuring that the policy applies to all commercial species, including byproduct species.

The bycatch policy review recommended the development of a revised bycatch policy, including new policy objectives and principles, and a revised definition of bycatch. Key recommendations of this review included development of a tiered approach to monitoring, assessing and managing bycatch; development of guidelines to underpin implementation of the revised policy (similar to those for the HSP); use of trigger points and decision rules, where appropriate; and a performance monitoring and reporting framework to evaluate the implementation and effectiveness of the bycatch policy.

The HSP and bycatch policy review reports do not provide any policy direction themselves, but are intended to inform the future revision and update of the policy framework for Commonwealth fisheries. These reviews complement the high-level Review of Fisheries Management undertaken by Mr David Borthwick, AO, PSM, in 2012–13. Both policies are now being revised, and the current policy settings will continue to apply until this process is complete and new policies are adopted.

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