Review of key Victorian fish stocks — 2017

November 2017
Victorian Fisheries Authority
Science Report Series No. 1

Review of key Victorian fish stocks — 2017

Victorian Fisheries Authority

November 2017

Victorian Fisheries Authority
Science Report Series No. 1

Published by the Victorian Government, Victorian Fisheries Authority (VFA), November 2017

Authorised by the Victorian Government, 1 Spring Street, Melbourne.

Printed by VFA Queenscliff, Victoria.

Preferred way to cite this publication:

Victorian Fisheries Authority (2017). Review of key Victorian fish stocks — 2017
Victorian Fisheries Authority Science Report Series No. 1.

ISSN 2203-3122 (Print)
ISSN 2204-6933 (Online)

ISBN 978-1-925629-90-3 (Print)
ISBN 978-1-925629-91-0 (pdf/online)

Author Contact Details:
Fisheries Management and Science Branch, Victorian Fisheries Authority
PO Box 114, Queenscliff Vic 3225

Copies are available from the website www.vfa.vic.gov.au

For more information contact the VFA Customer Service Centre 136 186

Disclaimer

Accessibility

If you would like to receive this publication in an accessible format, such as large print or audio, please telephone 136 186, or email customer.service@vfa.vic.gov.au

Deaf, hearing impaired or speech impaired? Call us via the National Relay Service on 133 677 or visit www.relayservice.com.au

This document is also available in PDF format on the internet at www.vfa.vic.gov.au

Contents

List of Tables

List of Figures

Executive Summary

The Victorian Fisheries Authority (VFA) is an independent statutory authority responsible for effectively managing the more than 90 wild fish stocks that are recreationally and/or commercially fished in Victoria. The VFA does this using a risk-based approach to prioritise the allocation of resources for monitoring, assessment and management. In support of this, Fisheries Victoria the predecessor of the VFA, held a workshop in Geelong Victoria in April 2017 with interstate management and science staff to review the status of 28 key Victorian fish species/stocks/management units.

Modelled on similar workshops in Queensland and New South Wales, this was the first time this approach was undertaken in Victoria. This trial of an annual fish stocks status review process was designed to address the shortcomings of intermittent stock assessments, better highlight where additional work may be required and meet State and National reporting requirements.

The objectives of the workshop and the resulting report were to:

- review the status of key Victorian fish stocks to determine their exploitation status
- provide fisheries managers and policy makers with the information and advice they need to guide their decisions, work prioritisation and policy development
- identify the information requirements to improve future assessments
- streamline State and Commonwealth reporting requirements for obtaining and maintaining export approval under the *Environment Protection and Biodiversity Conservation Act 1999* and cost recovery
- align stock assessments with Victoria's stock reporting and the Commonwealth Status of Key Australian Fish Stocks.

The workshop considered stock status information from a wide variety of sources including integrated assessment models, fisheries dependent catch per unit effort, fisheries independent surveys, and catch length composition. The quality and breadth of information varied across stocks/species/management units. This information was supplemented by comments from meeting participants as well as through discussion. All of the information was considered using the Status of Australian Fish Stocks methodology (2016 version).

Based on the workshop finding and further internal review:

- the majority of the assessed stocks are sustainably fished
- greenlip abalone — central zone, and greenlip abalone — western zone were overfished
- blacklip abalone — central zone, blacklip abalone — eastern zone, southern rock lobster — eastern zone and southern sea garfish — state-wide were transitional depleting and at higher risk of becoming overfished
- sand flathead- Port Phillip Bay is environmentally limited
- giant crab, pipi, yellow-eye mullet and sand crab were undefined and their risk of overfishing is uncertain due to insufficient information being available to determine their status.

It is expected that in 2017-18 Fisheries Management will develop a management response document to provide a framework to guide managers to respond to the results of the assessment process.

An evaluation at the end of the meeting provided useful feedback regarding future improvements to the process. These will be considered over this next year to shape the next years process. Of paramount consideration is the establishment of more robust management objectives and reference points as well as an approach to how and when species should be reviewed given limited resources. Given the positive feedback from this workshop, implementing regular stock status reviews as opposed to a pre-determined assessment schedule may provide a more adaptive and resource efficient approach to managing Victoria's fisheries while ensuring sustainability of the stocks.

Introduction

The Victorian Fisheries Authority (VFA) is the agency responsible for managing the State's fisheries resources under the guiding principles of ecological sustainable development consistent with the obligations under the *Fisheries Act 1995* and the *Victorian Fisheries Authority Act 2016*.

Commercial, recreational and Indigenous fishing provides a wide range of social and economic benefits to Victorians. Many of Victoria's fisheries are, however, complex, multi-species and multi-method and are subject to competing consumptive and non-consumptive uses, with access and impacts becoming increasingly weighted towards the recreational sector. Managing complex, wild fisheries to ensure long-term sustainability in the face of naturally varying fish populations, climate change, expanding human population, increased urbanisation and competing stakeholder interests is challenging. To ensure that resources are managed sustainably and maximise the economic, social and cultural benefits, a strong evidence base informed by knowledge of the stock status is required.

The VFA prioritises the allocation of resources for the monitoring and assessment activities required to inform management of stocks based on importance to the community and risk to the resource. Abalone, rock lobster, Port Phillip Bay and Western Port snapper and King George whiting and Gippsland Lakes black bream fisheries, for example, are subject to complex monitoring and assessment. Smaller, lower value and lower risk fisheries, such as the recreational fisheries in regional Victorian rivers and estuaries, are assessed using simpler and less resource intensive approaches such as Angler Diary programs. Investment in new and cost effective data collection technologies is a high priority of the VFA.

Few Victoria fisheries have formal management plans and harvest strategies or defined management objectives and reference points. Preliminary reference points were used to guide this review and will be refined over the next year to improve the process.

The VFA (then Fisheries Victoria) has undertaken stock assessments on a rotational basis (usually every three to five years) for the last decade but recently reviewed the effectiveness and appropriateness of this approach. The VFA subsequently invited interstate fisheries scientists and managers to review the most up to date information using the *Status of Australian Fish Stocks* (www.fish.gov.au; SAFS) classification framework for 28 key fishery species/stocks. A similar approach is used in New South Wales and Queensland and provides the opportunity to integrate the review and management of straddling stocks across jurisdictions.

Stock Assessment Objectives and Performance Indicators

The objectives of this report are to:

- review the status of key Victorian fish stocks to determine their exploitation status
- provide fisheries managers and policy makers with the information and advice they need to guide their decisions, work prioritisation and policy development
- identify the information requirements to improve future assessments
- streamline State and Commonwealth reporting requirements for obtaining and maintaining export approval under the *Environment Protection and Biodiversity Conservation Act 1999* and cost recovery
- align stock assessments with Victoria's stock reporting and the Commonwealth Status of Key Australian Fish Stocks.

Most of the reviews in this report are based on a weight of evidence approach using four indicators:

- *biomass* which is estimated directly using surveys or models or using catch per unit effort (CPUE) as a proxy
- *fishing pressure* using total catch and effort or proxies
- *recruitment* using fishery independent sampling of recruits and or pre-recruits.

Workshop attendees assessed each indicator against performance measures used in previous stock/fishery assessments:

- commercial catch and effort for all species and by all commercial fishery licenses holders
- recreational fishery catch and effort for all species in large fisheries (i.e. Port Phillip Bay, Western Port and the Gippsland Lakes)
- commercial fishery size composition (i.e. abalone, rock lobster, snapper, King George whiting, rock flathead and black bream)
- size composition of fishery catches or from fishery independent surveys (i.e. abalone, rock lobster, snapper, King George whiting and black bream)
- angler diary program catch and effort and size composition (i.e. snapper, King George whiting, sand flathead and black bream).

Catch per unit effort (CPUE) is the most commonly use proxy for biomass trends in fisheries assessments and is available for all stocks assessed in this review. Victorian commercial fishers have reported catch and effort information since 1978 by Victorian commercial fisheries since 1978 but corresponding information has only been consistently collected for selected recreational species and locations since the early 2000s. There are, therefore, no time series for catches and very limited data on effort trends available for these fisheries. CPUE for some fisheries is standardised to reduce the influence of factors that are known to effect variation and trends but are unrelated to real changes in biomass.

CPUE reference levels represent the estimated biomass above which a stock is sustainably fished or, alternatively, below which represents unsustainable fishing and the stock is at risk of overfishing. Reference levels are generally the average CPUE over the time or reference period during which catches and or CPUE were reasonably stable, irrespective of short-term variability (Figure 1). It is assumed that the stock is at a sustainable equilibrium with respect to fishing pressure during these periods.

The level below which the stock biomass is considered at very high risk of recruitment overfishing and collapse and where management action is recommended is the limit reference point. Identifying reference periods is not, however, always straightforward, particularly where changes in fishing effort and catch have been driven by changes to management and or targeting of the stock. Some stocks exhibit long-term trends without clear periods of stability. A more refined analytical framework for determining the reference periods may be required in these circumstances.

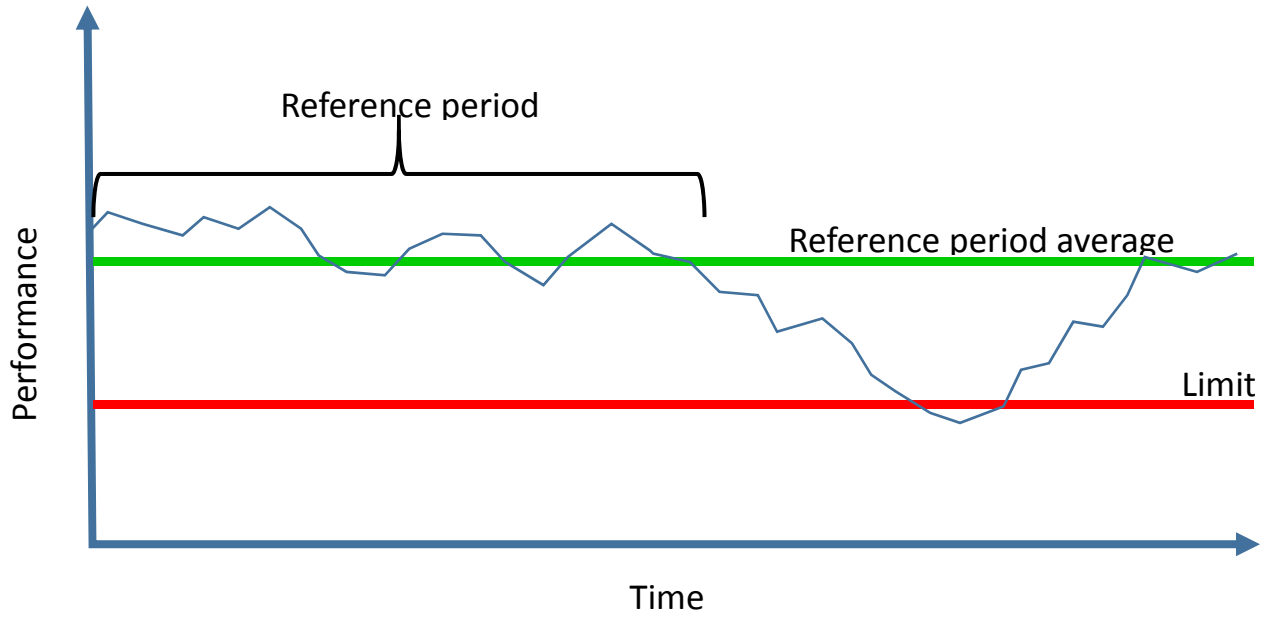


Figure 1. The relationship between reference periods, reference levels and performance measures.

The default reference period for most Victorian commercial finfish fisheries is the period between the start of CPUE data collection in 1978 and the last year included in this report (i.e. 2015). Shorter reference periods are used where, for example, the fishery has recently been developed or management changed (e.g. wrasse licences being made transferable), there is limited time series data (e.g. recreational fisheries in Port Phillip Bay, Western Port and the Gippsland Lakes) or where a clear step change caused by increased fishing power (i.e. gear change and uptake of technology) or environmental change (e.g. sand flathead in Port Phillip Bay) has occurred.

For species where harvest strategies are in place (i.e. rock lobster) or in development (i.e. abalone) or reference levels/limits are specified in management plans (i.e. giant crab), alternative approaches and reference periods may be applied. For other stocks limit reference point were nominally set to 50 per cent of the reference CPUE.

The reference levels and limits used in this review may not indicate that the fishery is at maximum sustainable or economic yield but are consistent with a precautionary approach to making management decisions aimed at avoiding ongoing stock depletion and recruitment overfishing where limited data is available (AFMA 1995).

The Stock Review Process

The status stock review workshop was held in Geelong, Victoria on April 27–28, 2017. Departmental and invited interstate fisheries managers and scientists reviewed the available biological, fishery and other information and used a weight-of-evidence approach to attempt to reach a consensus on the exploitation status for each stock.

The assessment process was comprised of four parts:

1. The selection and prioritisation of species/stocks to be reviewed (undertaken prior to the workshop and not described in this report)
2. VFA scientists presented the relevant information for the species/stock and the proposed exploitation status
3. Group discussion guided by the workshop chair followed by an anonymous voting by workshop participants on the exploitation status for the stock
4. Consideration was also given to stock classifications in the Status of Australian Fish Stocks Reports 2016 and current VFA stock management risk status reporting (https://vfa.vic.gov.au/operational-policy/publications-and-resources/status-of-victorian-fisheries).

A key objective of the review was to provide managers with advice on the status of stocks in relation to becoming, or already being, recruitment overfished. Information presented was therefore primarily interpreted to indicate if stocks are at risk of becoming recruitment overfished or have become recruitment overfished. Assigning an exploitation status of each stock was guided by the *Status of Australian Fish Stocks Reports 2016* framework (Stewardson *et al.* 2016) outlined in Table 1.

Table 1. Stock status framework used in the Status of Australian Fish Stocks 2016.

Stock status	Description	Potential implications for management of the stock
Sustainable stock	Stock for which biomass (or biomass proxy) is at a level sufficient to ensure that, on average, future levels of recruitment are adequate (i.e. not recruitment overfished) and for which fishing pressure is adequately controlled to avoid the stock becoming recruitment overfished	Appropriate management is in place
Transitional-recovering stock	Recovering stock — biomass is recruitment overfished, but management measures are in place to promote stock recovery, and recovery is occurring	Appropriate management is in place, and the stock biomass is recovering
Transitional-depleting stock	Deteriorating stock — biomass is not yet recruitment overfished, but fishing pressure is too high and moving the stock in the direction of becoming recruitment overfished	Management is needed to reduce fishing pressure and ensure that the biomass does not deplete to an overfished state
Overfished stock	Spawning stock biomass has been reduced through catch, so that average recruitment levels are significantly reduced (i.e. recruitment overfished). Current management is not adequate to recover the stock, or adequate management measures have been put in place but have not yet resulted in measurable	Management is needed to recover this stock; if adequate management measures are already in place, more time may be required for them to take effect
Environmentally limited	Spawning stock biomass has been reduced to the point where average recruitment levels are significantly reduced, primarily as a result of substantial environmental changes/impacts, or disease outbreaks (i.e. the stock is not recruitment overfished). Fisheries management has responded appropriately to the environmental change in productivity	Appropriate management is in place
Undefined stock	Indicates that insufficient information exists to determine stock status.	Data required to assess stock status are needed

Results of the Stock Review

Workshop participants reviewed twenty-eight species/stocks of the more than over 90 Victorian species/stocks (Appendix 1). The outcomes of the stock review process are summarised in Table 2. The detailed information for each stock is outlined in sections 4.1–4.10. The management arrangements for each species/stock are outlined in Appendix 2.

Table 2. The outcomes of the stock review process.

Species	Management Unit/Stock	Victorian Fisheries Authority Classification	Workshop Classification Voting Results
Rock lobster, southern	Western zone	Sustainable	96% Sustainable, 4% Transitional depleting (n=25)
Rock lobster, southern	Eastern zone	Transitional depleting	90% Transitional depleting, 5% Sustainable, 5% Transitional recovering (n=25)
Giant crab	Bass Strait	Undefined	67% Undefined, 13% Overfished, 13% Transitional depleting, 8% Sustainable (n=25)
Snapper	Eastern stock	Sustainable	56% Sustainable, 44% Undefined (n=25)
Snapper	Western stock	Sustainable	100% Sustainable (n=25)
Abalone, blacklip	Central zone	Transitional depleting	63% Transitional depleting, 26% Overfished 11% Sustainable (n=19)
Abalone, blacklip	Western zone	Sustainable	96 % Sustainable , 4% Transitional depleting (n=24)
Abalone, blacklip	Eastern zone	Transitional depleting	95% Transitional depleting, 5% Overfished (n=21)
Abalone, greenlip	Central zone	Overfished	96% Overfished, 4% Undefined (n=25)
Abalone, greenlip	Western zone	Overfished	95% Overfished, 5% Undefined (n=19)
Whiting, King George	State-wide	Sustainable	100% Sustainable (n=21)
Flathead, southern sand	Port Phillip Bay	Environmentally limited[1]	23% Environmentally limited, 73% Overfished, 4% Transitional depleting (n=22)
Bream, black	Gippsland Lakes	Sustainable	90% Sustainable, 10% Overfished (n=20)
Bream, black	Eastern estuaries	Sustainable	100 % Sustainable (n=11)
Bream, black	Western estuaries	Sustainable	100 % Sustainable (n=20)
Garfish, southern	State-wide	Transitional depleting	38% Transitional depleting, 31% Sustainable, 31% Undefined (n=13)
Pipi	State-wide	Undefined	100 % Undefined
Mullet, yellow-eye	State-wide	Undefined	33% Transitional depleting, 58% Undefined, 8 % Environmentally limited (n=12)
Australian salmon	Eastern Victoria	Sustainable	Not Presented, No Vote
Australian salmon	Western Victoria	Sustainable	Not Presented, No Vote
Flathead, rock	Corner Inlet-Nooramunga	Sustainable	100 % Sustainable (n=13)
Flathead, southern bluespotted	State-wide	Sustainable	Not Presented, No Vote
Calamari, southern	State-wide	Sustainable	100 % Sustainable (n=13)
Wrasse (blue throat and purple)	Coastal waters	Sustainable	92 % Sustainable, (n=13)
Crab, sand	State-wide	Undefined	Not Presented, No Vote
Shark, gummy	State-wide	Sustainable	100 % Sustainable, 8% Undefined (n=12)
Tailor	Gippsland Lakes	Sustainable	Not Presented, No Vote
Trevally, silver	State-wide	Sustainable	31% Transitional depleting, 38 % Sustainable, 31% Undefined (n=13)

[1] The classification decision is based on the Status of Australian Fish Stocks 2016 and current VFA stock management risk status reporting.

Southern Rock Lobster (*Jasus edwardsii*): Western Zone and Eastern Zone

Stock Structure and Biology

Southern rock lobster is considered to be a single biological stock across southern Australia because the species occurs in a continuous distribution across this range and has an extensive and protracted pelagic larval dispersal phase. Larval release occurs across the southern continental shelf and the pelagic phyllosoma larval phase lasts around 12 to18 months. Oceanographic modelling indicates that dispersal occurs over large spatial scales, suggesting a single biological stock. Genetic analyses also indicate a single stock across south-eastern Australia.

Southern rock lobster can live to more than 20 years and grow to >20 cm carapace length (CL). Length at maturity (50 per cent) is at 5.9 to 12.2 cm CL. Lobsters are slow growing taking four to six years to reach the legal minimum length (LML) of 10.5 mm CL (female) and 11.0 cm CL (male).

Management / Assessment Unit

The Victorian Rock Lobster Fishery (commercial) is comprised of western zone and eastern zone management units (Figure 2). Both zones also support a recreational fishery.

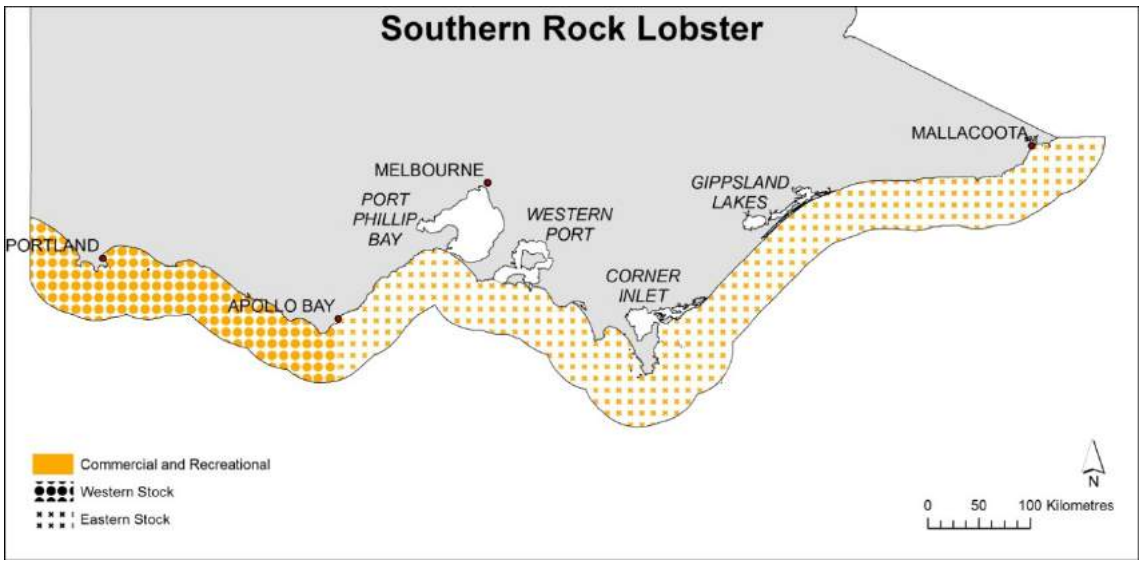


Figure 2. Western and eastern zone management units for the Victorian Rock Lobster Fishery.

Assessment Summary

The performance of the Victorian Rock Lobster Fishery is evaluated against the biological reference points, decision rules and associated limit reference points specified in the fishery's harvest strategy (DIP 2010). The limit reference points used in the harvest strategy to set the commercial fishery TACC are egg production (model generated), standardised CPUE (fishery dependent) and pre-recruit abundance (see below). Biomass and exploitation rate, whilst not used in setting the TACC, are monitored as part of the overall stock health.

The pre-recruit reference index (PRI) is determined using data from fixed-site surveys and on-board observations and is averaged, weighting regions by their past commercial catch. The calculated PRI is then compared against a reference point calculated from a reference period 2005–2014.

The limit reference point for egg production is 20 per cent of the unfished level.

Western Zone

The most recent rock lobster stock assessment[2] found:

- *Biomass* — egg production in 2015–2016 was 42 per cent of the unfished level (E_{1951}; Figure 3) and available biomass has increased since 2009–2010 (Figure 4). CPUE is 0.51 kg/pot-lift and has increased since 2009–2010 (Figure 5). The exploitation rate (34 per cent) is above the level required to rebuild stocks (≤ 32.5 per cent; Figure 4). The pre-recruit index is below threshold and there are signs of reduced recruitment in recent years (Figure 7).
- *Fishing pressure* — commercial catch has been stable in recent years at quota levels. Effort has declined over last 10 years to just over 300,000 pot-lifts per year (Figure 7).

The above evidence indicates that the current level of fishing pressure is unlikely to cause the stock to become recruitment overfished.

On the basis of the evidence provided above, the western zone southern rock lobster stock is classified as a **sustainable** stock (Table 1).

[2] https://vfa.vic.gov.au/commercial-fishing/rock-lobster/stock-reports

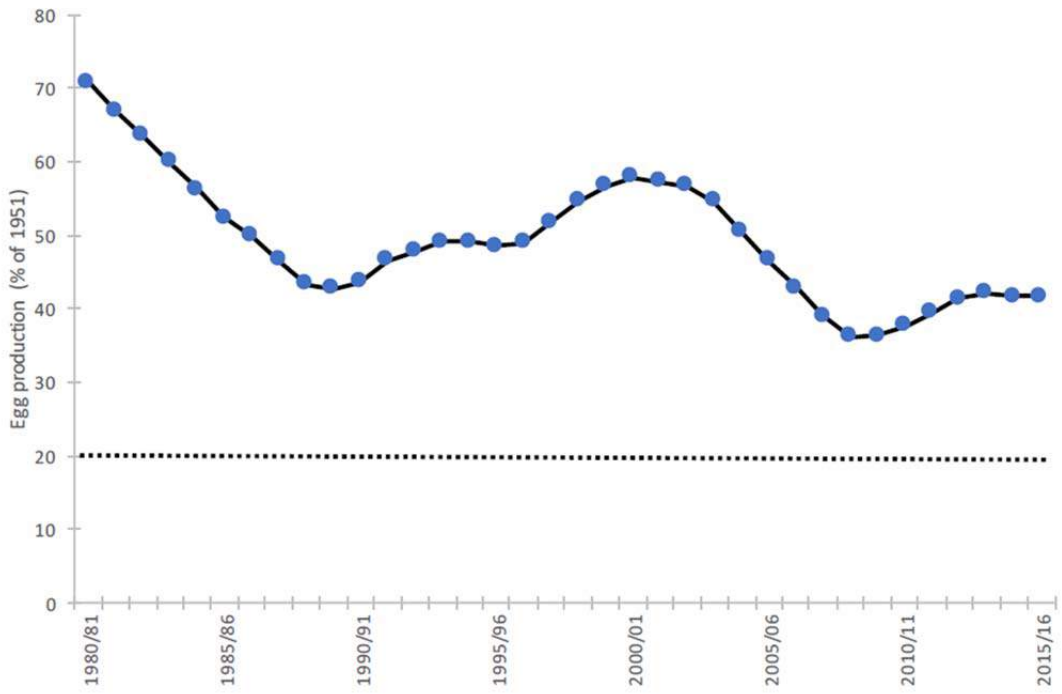


Figure 3. Model estimated egg production through time in the western zone rock lobster fishery. The limit reference point (dotted line) is 20 per cent of egg production estimated in 1951 (an unfished reference point).

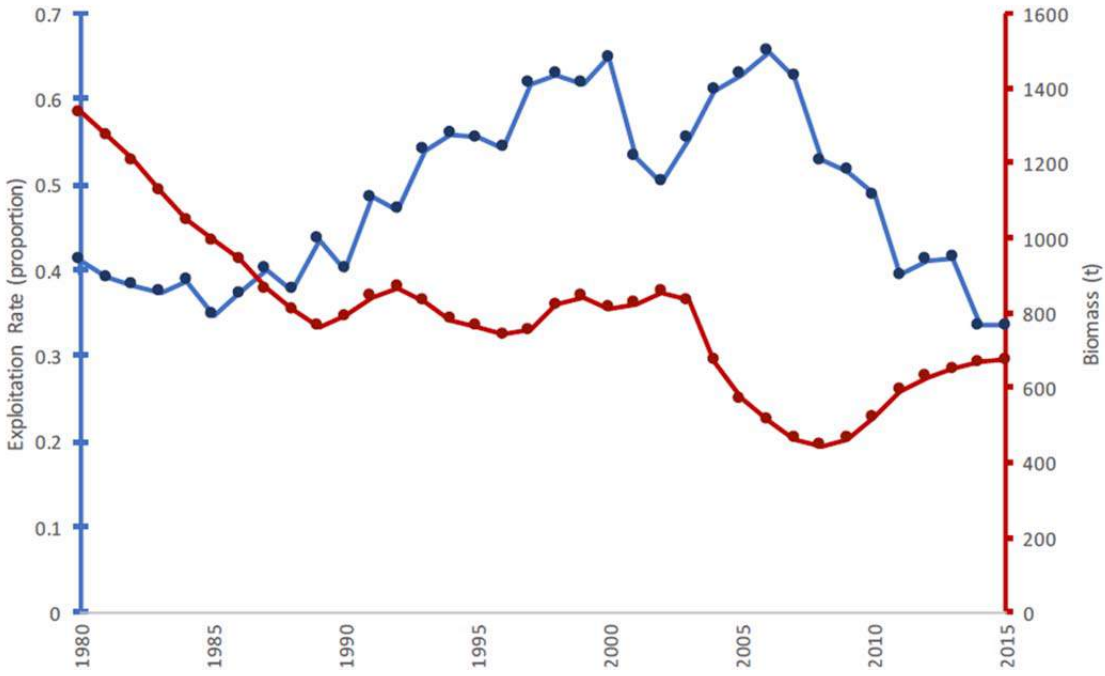


Figure 4. Model estimated available biomass (red line) and fishing exploitation rates (blue line) in the western zone rock lobster fishery between 1980 and 2015.

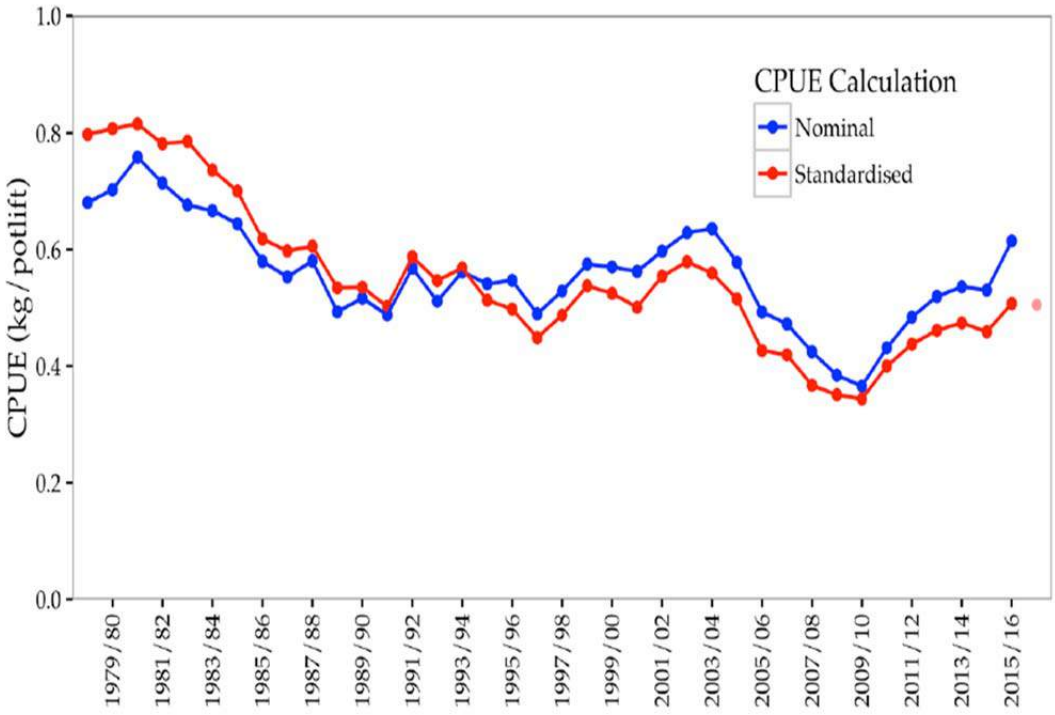


Figure 5. Standardised and nominal CPUE (kg/pot-lift) in the western zone rock lobster commercial fishery from 1978–1979 to 2015–2016. The standardised CPUE for the partially completed 2016–2017 year through to February 2017 is shown by the light red dot.

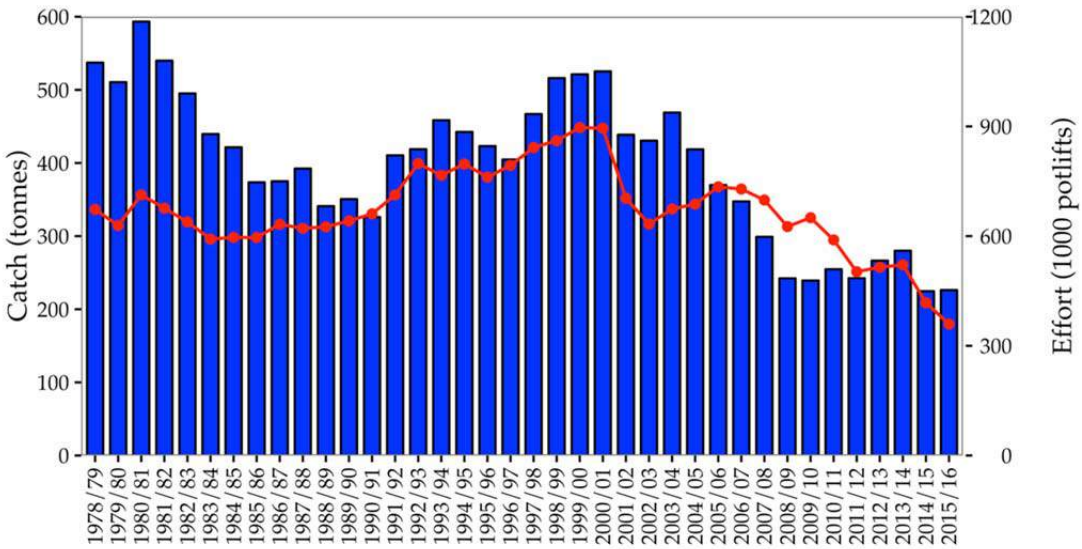


Figure 6. Total catch (blue bars) and nominal effort (red line) in the western zone rock lobster fishery from 1978–1979 to 2015–2016.

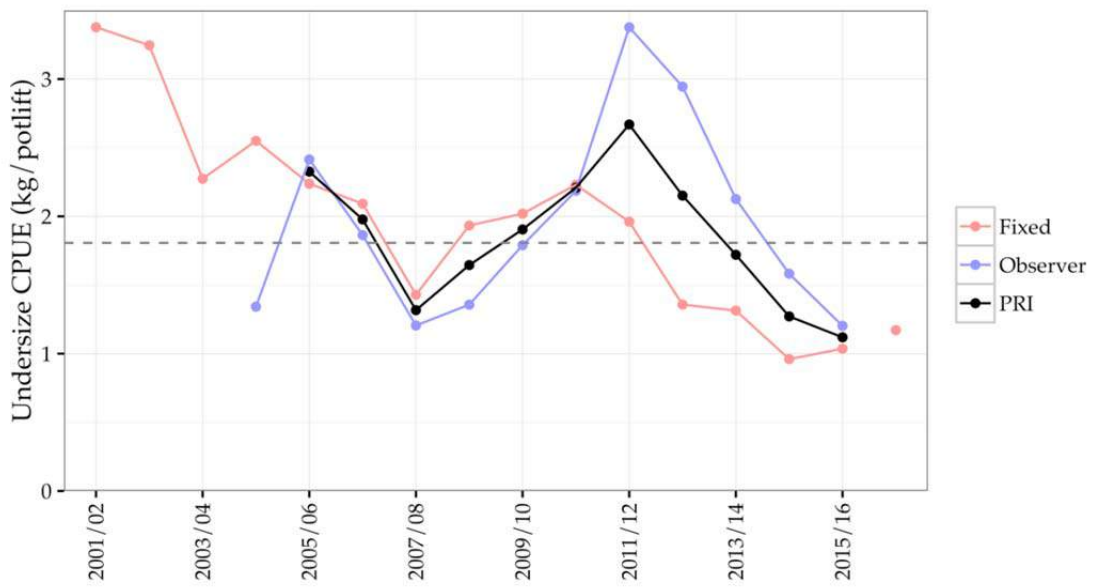


Figure 7. The undersize catch rate (kg/pot-lift) for the western zone rock lobster fishery from fixed sites, observer coverage and the final combined PRI. The dashed line shows the trigger point (1.81 undersize/pot-lift).

Eastern Zone

The most recent rock lobster stock assessment for found:

- *Biomass — egg production in 2015–2016 was 26.6 per cent of the unfished level (E1951) (*

  Figure 3 and Figure 8). Available biomass has decreased in the last two years after five years of connective increases (Figure 9). CPUE is 0.48 kg/pot-lift and has decreased since 2012–2013. (Figure 10). The 20.4 per cent exploitation rate is above the 15 per cent required to rebuild the stock (Figure 4 and Figure 9,). The PRI index is below the threshold and there signs of reduced recruitment in recent years (Figure 12).

- *Fishing pressure* — commercial catch has been stable in recent years at quota levels. Effort has been declining over the last 10 years to just over 100,000 pot-lifts (Figure 11).

The above evidence indicates that the current level of fishing pressure has not yet caused the stock to become recruitment overfished, but fishing pressure is likely too high and moving the stock in the direction of becoming recruitment overfished.

On the basis of the evidence provided above, the eastern zone southern rock lobster stock is classified as a **transitional-depleting** stock (Table 1).

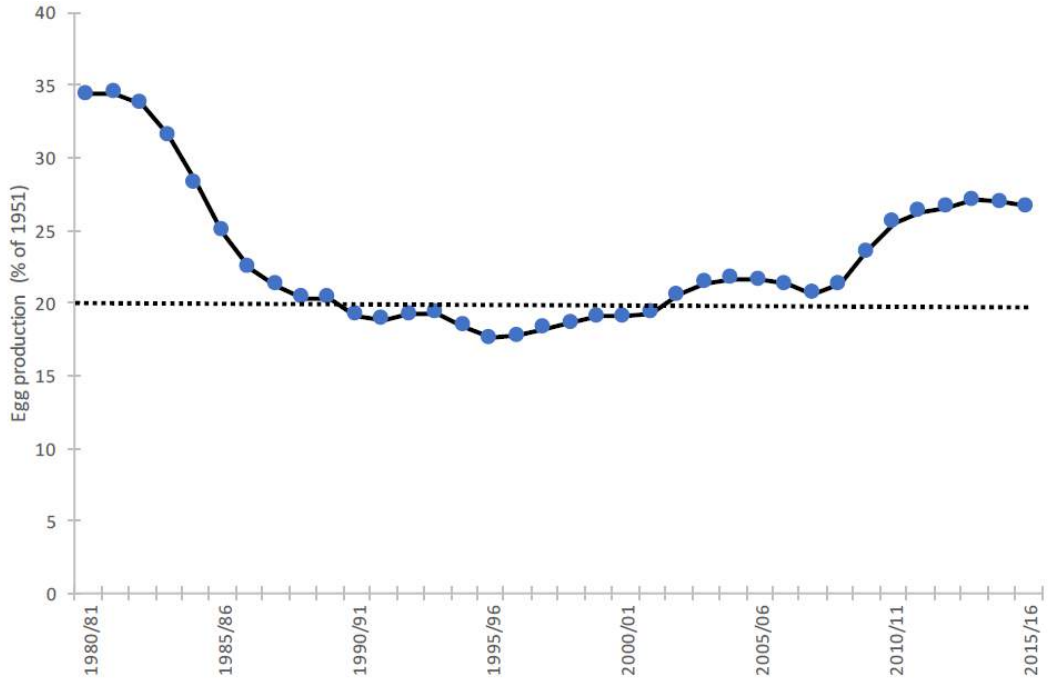


Figure 8. Model estimated egg production through time in the eastern zone rock lobster fishery. The limit reference point (dotted line) is 20 per cent of egg production estimated in 1951 (an unfished reference point).

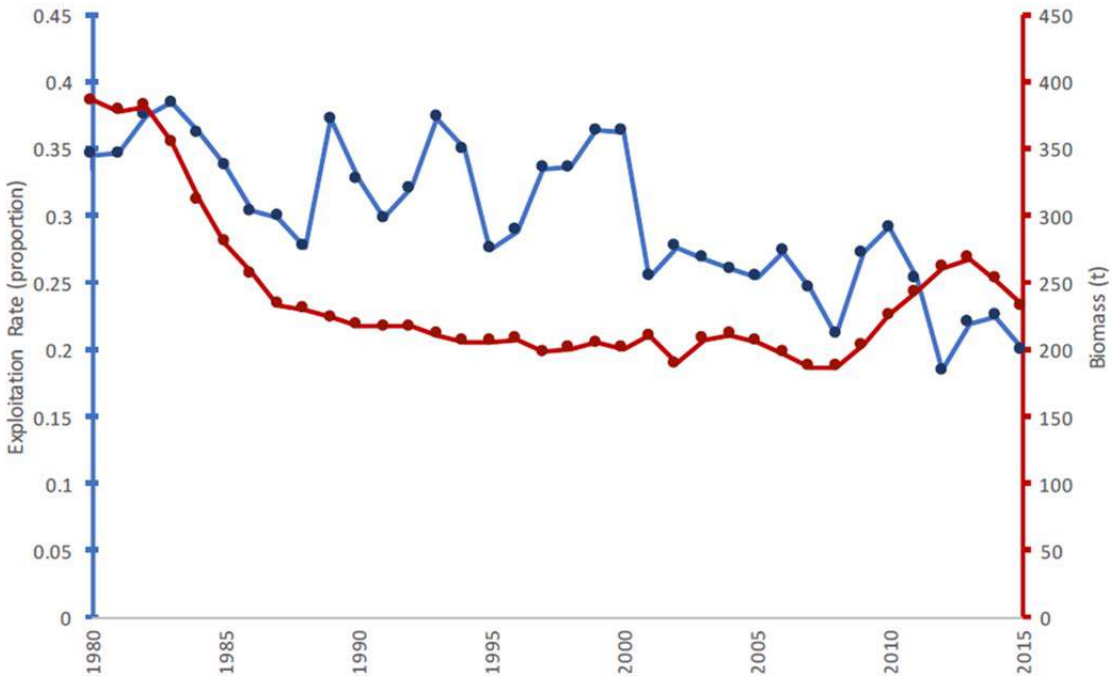


Figure 9. Available biomass and exploitation rate for the eastern zone rock lobster stock (1980–2015).

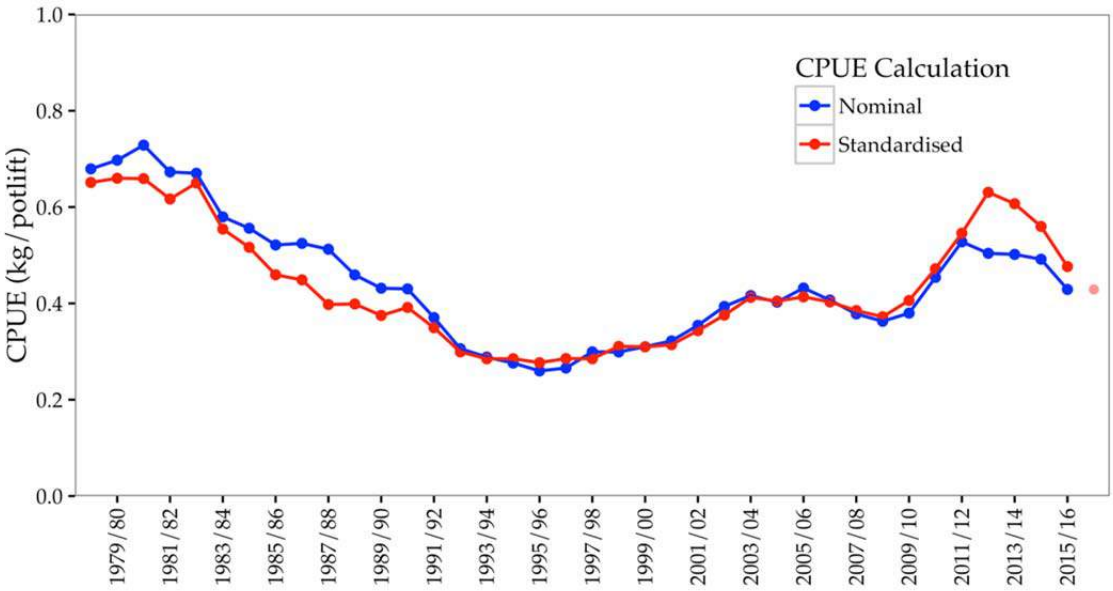


Figure 10. Standardised and nominal CPUE (kg/pot-lift) for the eastern zone rock lobster fishery from 1978–1979 to 2015–2016. The standardised CPUE for the partially completed 2016–2017 year through to February 2017 is shown by the light red dot.

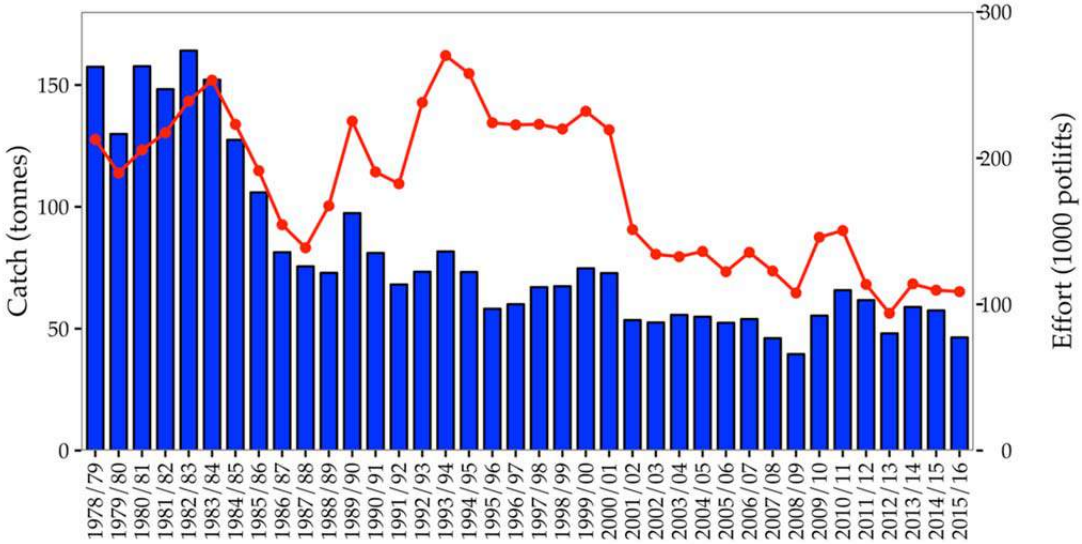


Figure 11. Total catch (blue bars) and nominal effort (red line) in the eastern zone rock lobster fishery from 1978–1979 to 2015–2016.

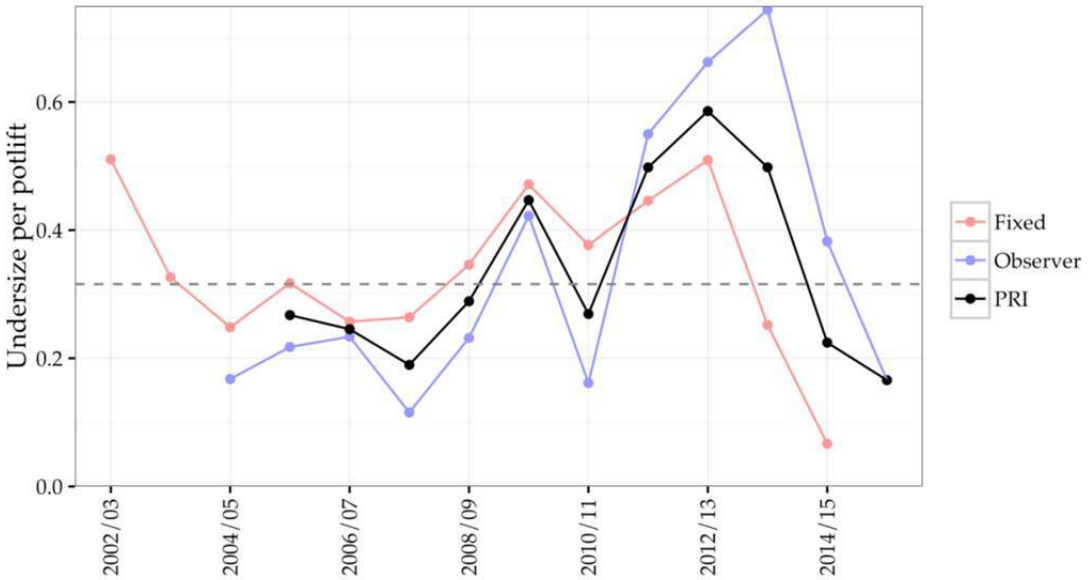


Figure 12. The undersize catch rate (kg/pot-lift) for the eastern zone rock lobster fishery as calculated from fixed sites, observer coverage and the final combined PRI. The dashed line shows the trigger point (0.32 undersize/pot-lift).

Giant Crab (*Pseudocarcinus gigas*): Bass Strait

Stock Structure and Biology

Giant crab is a single genetically homogenous population that endemic to southern Australia. Broad-scale connectivity of the stock is believed to be caused by widespread larval dispersal.

Giant crab can live to 30+ years and can grow to more than 200 mm CL. Size at maturity (50 per cent) is 125 to 140 mm CL. Giant crab are slow growers with long intermoult periods. Females and males taking approximately 7 and 5 years, respectively, to reach the LML of 150 mm CL. The main spawning period is during autumn and occurs along the continental shelf between Western Australia and Tasmania.

Assessment Summary

The status of the Victorian Giant Crab Fishery is evaluated against the biological performance measures, limit reference points (LRP), triggers and associated decision rules specified in the fishery's management plan (DPI 2010).

The most recent giant crab stock assessment found:

- *Biomass* — commercial CPUE (0.91 kg/24-hour pot-lift has been above the LRP of 0.52 kg/24-hour pot-lift for the past five years (Figure 14).
- *Fishing pressure* — commercial catch (and quota) levels have been reduced to half that of the period from 2001–2002 to 2010–2011 (Figure 15). There is evidence of a spatial contraction of the fishery.

There are concerns over separating the Victorian and Tasmanian giant crab fisheries for assessment and management. The Tasmanian fishery is overfished and is considered to be the same stock. In the future it will be important to determine whether assessment should occur at a jurisdictional (management unit) level or stock level. A review of the entire fishery (including the Tasmanian stock) would be expected to classify its status as overfished.

On the basis of the evidence provided above, the Victorian component of the giant crab stock is classified as an **undefined stock** (

Table 1).

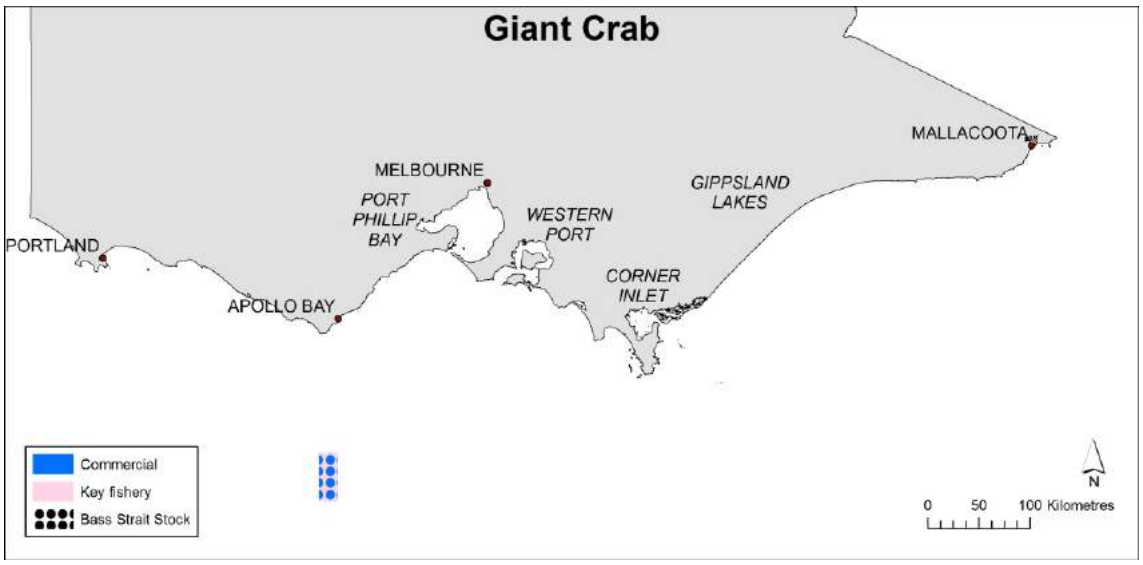


Figure 13. Bass Strait spatial management unit for the Victorian giant crab fishery.

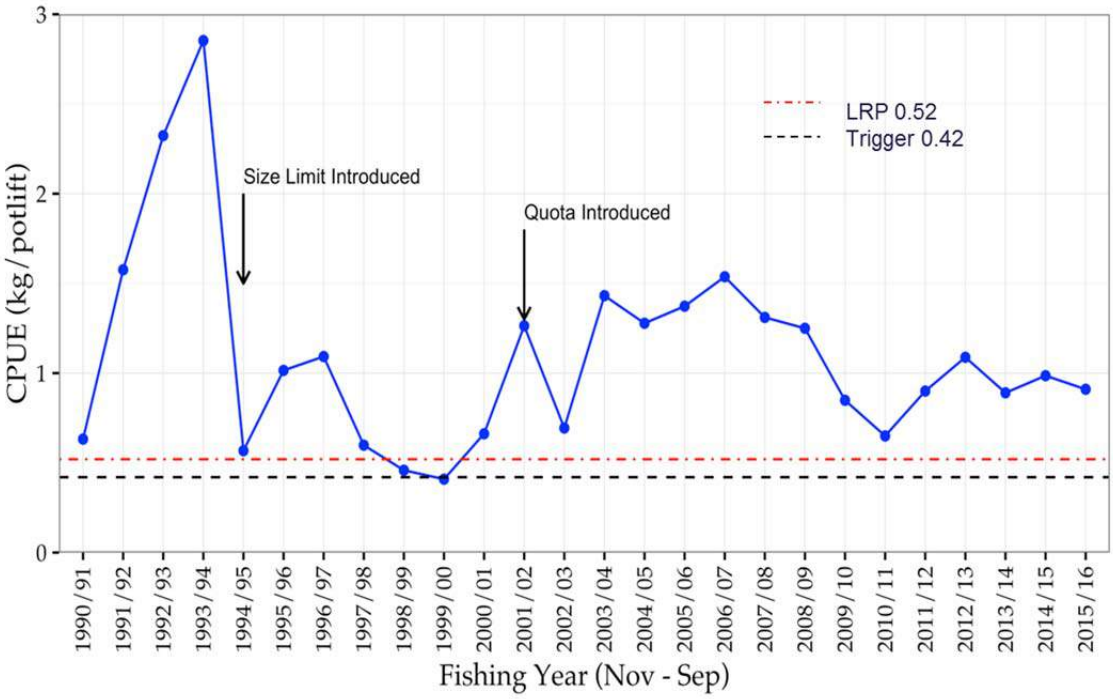


Figure 14. CPUE for the commercial Bass Strait giant crab fishery (from 1990–1991 to 2015–2016).

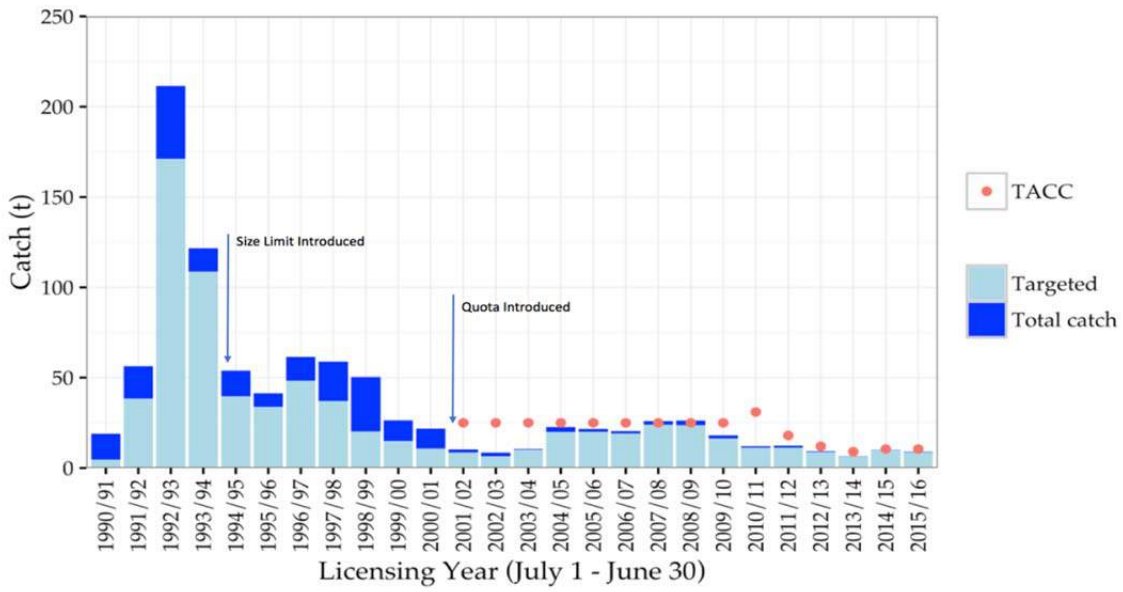


Figure 15. Total commercial catch of giant crab in Victorian waters from 1990–1991 to 2015–2016.

Snapper (*Chrysophrys auratus*): Western and Eastern Stocks

Stock Structure and Biology

The Victorian snapper population is considered to be comprised of two stocks:

- *Western stock*: Wilsons Promontory (VIC) to Investigator Strait (SA)
- *Eastern stock*: Wilsons Promontory to southern NSW

Snapper can live to at least 39 years and grow to at least 110 cm total length (TL). Length at maturity (50 per cent) is 42 cm TL (LML = 28 cm) which is reached at approximately 5 years of age. Snapper have high fecundity and are slow growing (L_∞ = 92, K = 0.1).

The main spawning period is from November to January and Port Phillip Bay is the main spawning area responsible for most of the western stock replenishment. The spawning aggregations that also occur along inshore reefs between Corner Inlet and Lakes Entrance are thought to be important for replenishing the eastern stock in Victorian waters.

Management / Assessment Unit

The western and eastern snapper stocks support both recreational and commercial Victorian fisheries. The largest fisheries are in Port Phillip Bay (commercial and recreational) and Western Port (recreational), both of which are based on the western stock. The western stock fisheries account for the majority of the Victorian snapper harvest and receive most of the assessment and management attention. This report considers each stock separately, although there is limited information to inform assessment of the eastern stock.

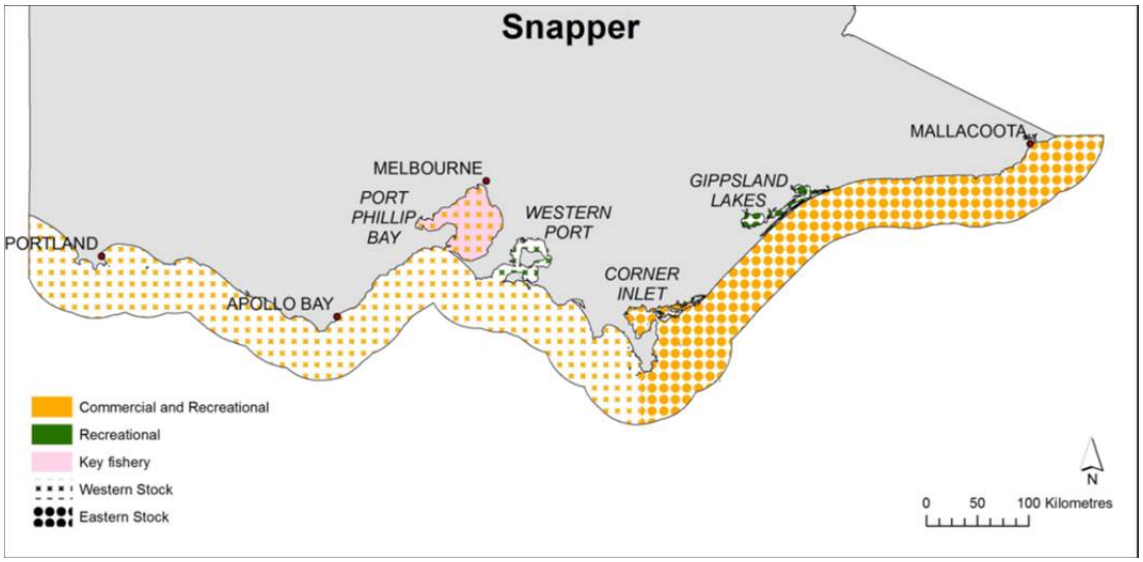


Figure 16. Western and eastern stocks of Victorian snapper and key fisheries.

Assessment Summary

Western Stock

The Western snapper stock was evaluated using standardised CPUE trends for commercial long-line catches in Port Phillip Bay and CPUE for the recreational fishery from annual creel surveys in Port Phillip Bay during the peak fishing season. Creel survey data was sub-setted to include data for the peak adult fishing season during October to December and for targeted snapper fishing trips by avid (experienced) anglers. The performance of the CPUE was assessed in relation to the specified reference level and limit points using the reference period 2002–2015.

Snapper pre-recruit abundance from fishery independent surveys in Port Phillip Bay provided a secondary indicator of past and future stock replenishment rates.

The impact of fishing pressure was reviewed using time series of catch, effort and length composition data.

This assessment found:

- *Biomass* — CPUE trends for both the commercial (Figure 17) and recreational (Figure 18) fisheries is decreasing from a long-term high and is expected to stabilise and then increase again as pre-recruit year classes recruit to the fishery over the next four years (Figure 19).
- *Fishing pressure* — overall there has been decreased commercial catch since the 2009–2010 peak (Figure 20). Commercial longline fishing effort has been stable over the last five years (Figure 21) while recreational effort (from boat ramps) has increased (Figure 22). Length frequency indicators for commercial (Figure 23) and recreational (Figure 24) fishery are stable and in recent years show higher proportions of smaller fish which consistent with expectations from pre-recruit survey data.
- *Recruitment* — recent high juvenile recruitment from spawning in 2013 and 2014 that will bolster the adult fishery over the next three to four years (Figure 19).

On the basis of the evidence provided, the Victorian component of the western Victorian snapper stock is classified as a **sustainable stock** (Table 1).

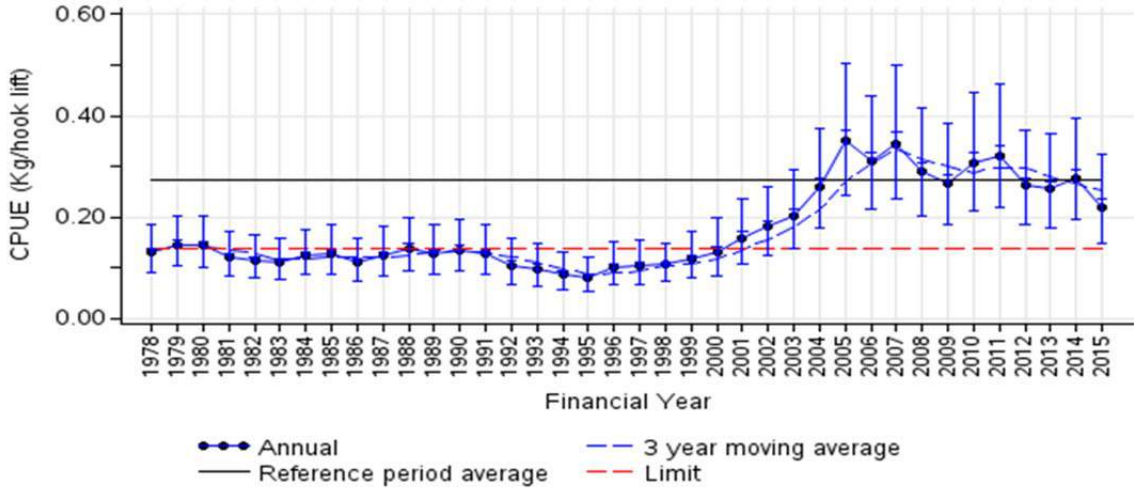


Figure 17. CPUE (±95% CL) for the Port Phillip Bay (western stock) snapper longline fishery (1978–2015). Reference period 2002–2015.

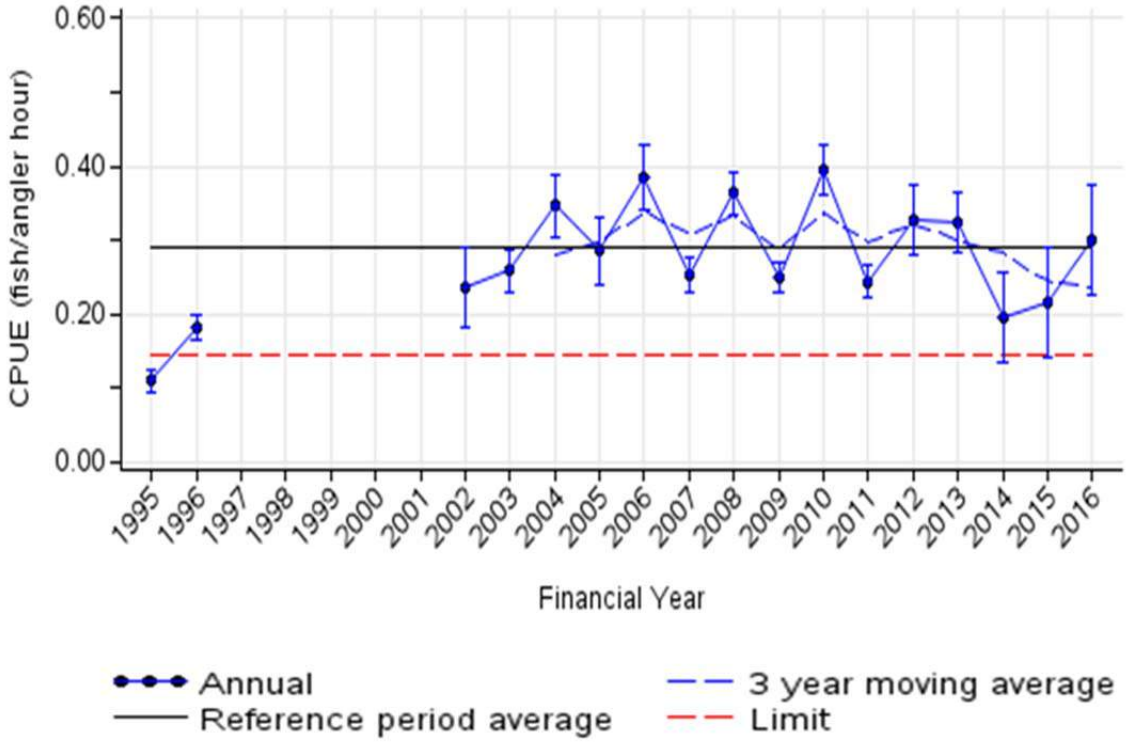


Figure 18. CPUE (±95% CL) for the Port Phillip Bay (western stock) recreational snapper fishery (1995–1996 and 2002–2016). Reference period 2002–2015.

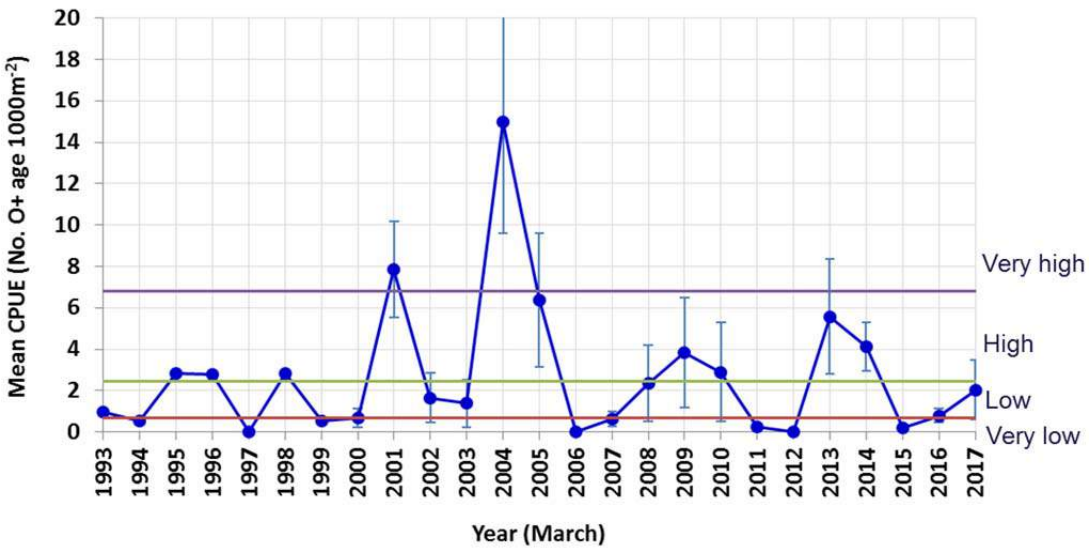


Figure 19. CPUE (±95% CL) for pre-recruit (0+ age) snapper in Port Phillip Bay (1993–2017).

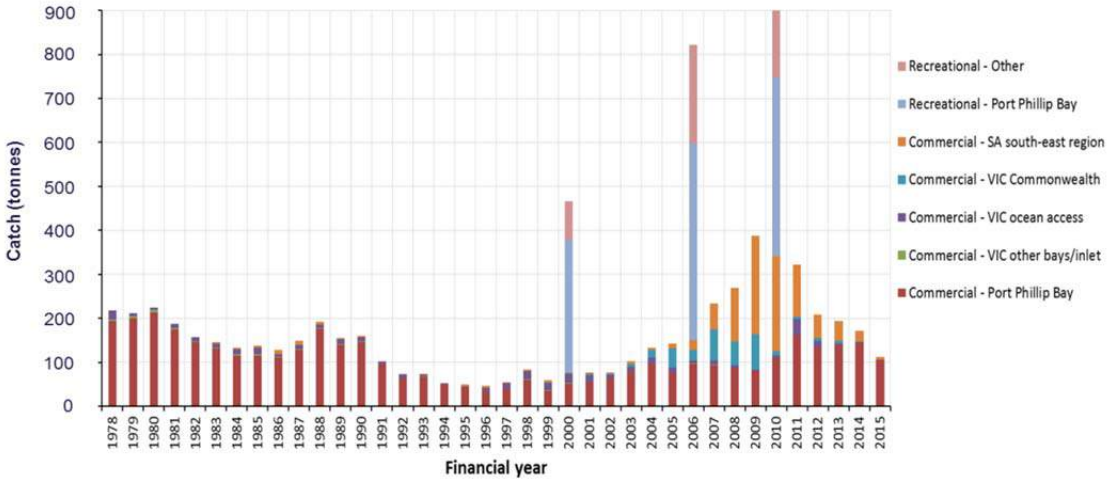


Figure 20. Estimated snapper harvest from the western Victorian stock, 1978–2015. Recreational catch estimates are only available for 2000, 2006 and 2010 financial years.

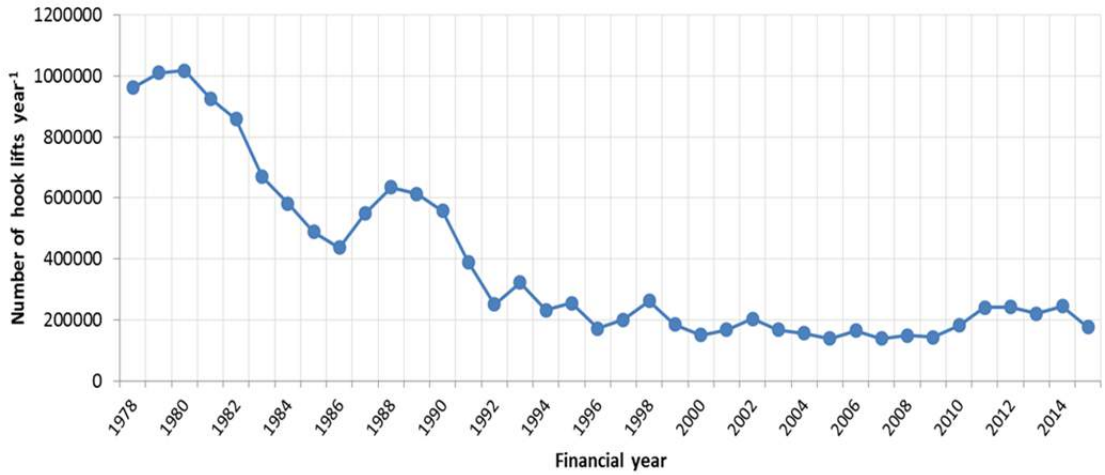


Figure 21. Fishing effort for the Port Phillip Bay commercial snapper longline fishery (1978–2015).

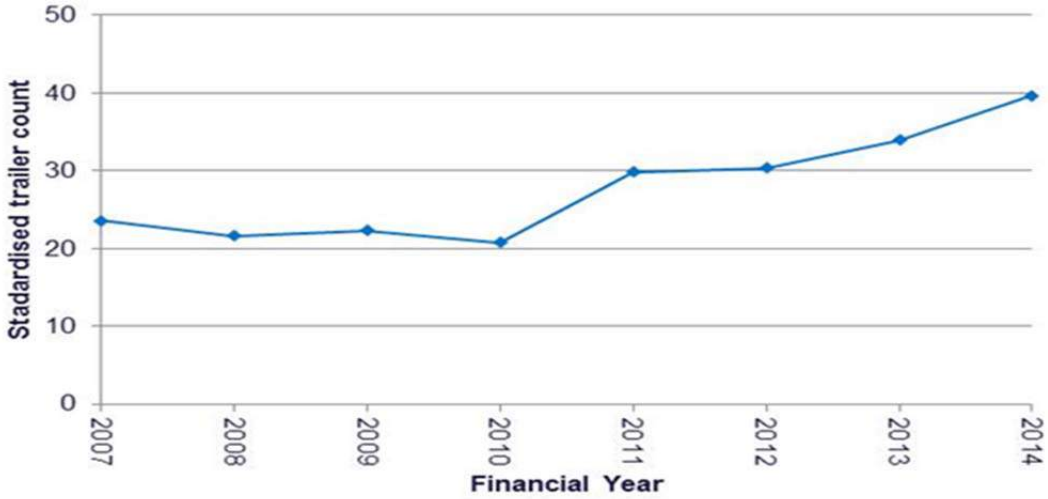


Figure 22. Boat-based fishing effort for the Port Phillip Bay recreational snapper fishery (1978–2015).

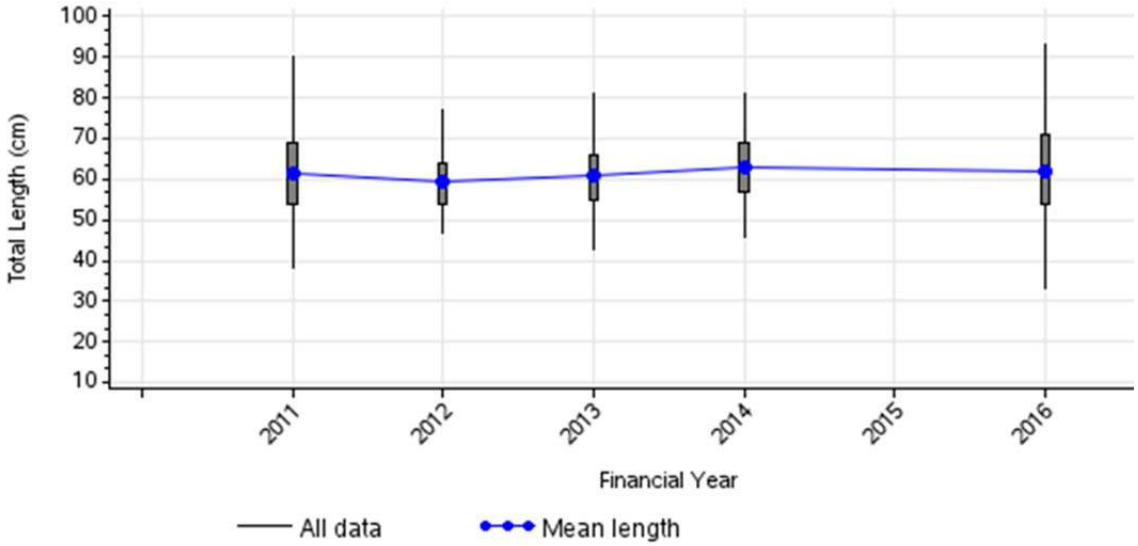


Figure 23. Size composition of snapper sampled from the Port Phillip Bay commercial snapper longline fishery (2011–2016).

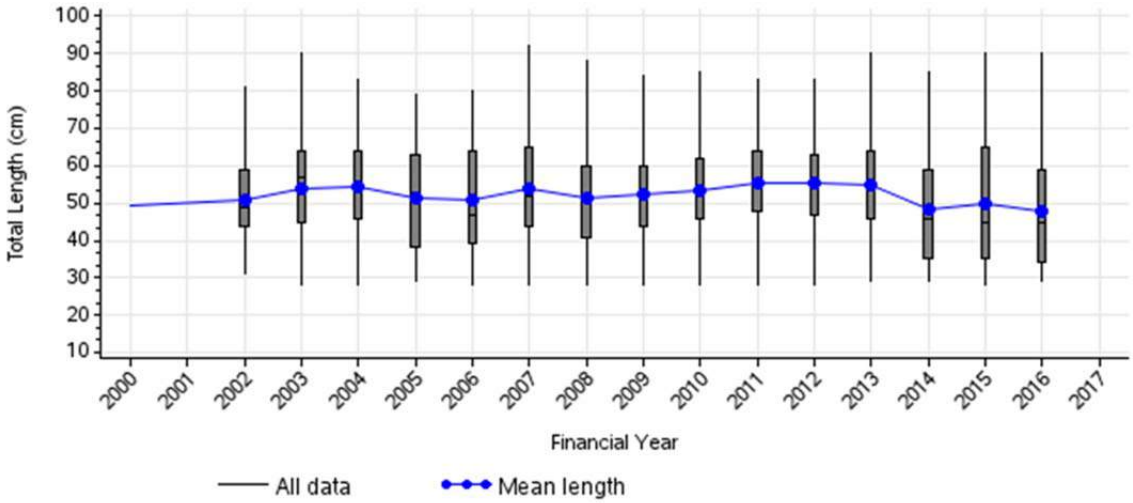


Figure 24. Size composition of snapper sampled from the Port Phillip Bay recreational fishery (2011–2016).

Eastern Stock

There is no suitable CPUE proxy of the stock biomass or pre-recruit abundance measures for the eastern snapper stock. Anecdotal information, however, suggests the stock is healthy. The impact of fishing pressure was assessed using a time series of catch information and showed that the fishery peaked at about 50 tonnes in 2006–2008. The commercial catches attributable to the Commonwealth fleet have also shown a decreasing trend due to industry imposed rules to help reduce the catch of snapper, which is considered a State managed species under the 1995 Offshore Constitutional Settlement arrangements.

While there is limited data, the relatively low and reducing commercial impacts and the endorsements by local fishers that the stock is healthy provided the evidence that supported the eastern Victorian snapper stock to be classified as a **sustainable** stock (Table 1).

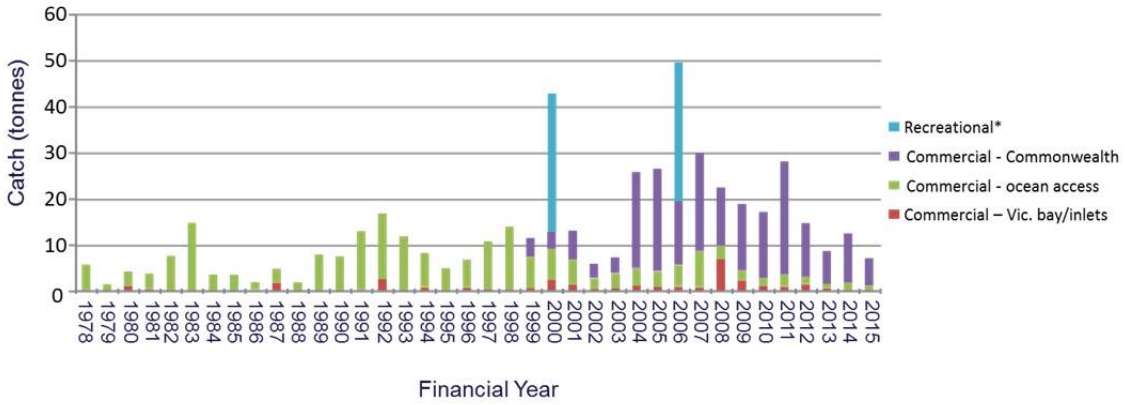


Figure 25. Total catch of snapper from the eastern Victorian stock, 1978–2015. Recreational catch estimates only available for the 2000 and 2006 financial years.

Blacklip Abalone (*Haliotis rubra*): Western, Eastern and Central Zones

Stock Structure and Biology

Victorian blacklip abalone comprise a panmictic population sustained by episodic localised recruitment. Blacklip abalone are long lived (reaching a maximum age of 20+ years) and can grow to a shell length of 20 cm. Length at maturity (50 per cent) is reached after approximately five years at 8 to12 cm shell length. Abalone have a high fecundity and a variable growth rate (average 2 cm/year). The main spawning period is late spring to early summer.

Management / Assessment Units

The Victorian fishery for blacklip abalone is comprised of the western, central and eastern management zones (Figure 26), all of which support recreational and commercial fisheries. This report assesses each zone separately.

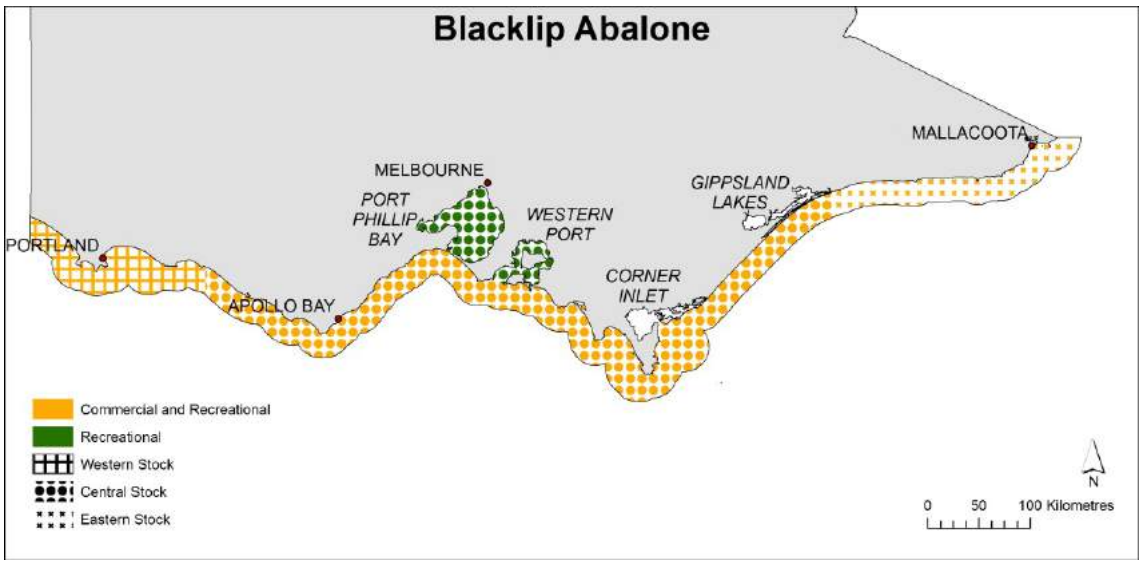


Figure 26. Western, central and eastern zone blacklip abalone fishery management units for Victoria.

Assessment Summary

A blacklip abalone harvest strategy is in development that has proposed thresholds and limits for CPUE. The suggested threshold for CPUE for the eastern and central zones is based on the minimum among the 3-year moving averages of unstandardised CPUE rounded upwards to nearest 10 kg/h reported during a reference period of 1989–2015, with an additional 10 kg/h added to eastern zone to provide increased conservatism, whereas a reference period of 2009–2015, without rounding upwards is proposed for the western zone. This different approach in defining the western zone threshold reflects a view that the stock has become reduced by disease and is unlikely to rebuild to pre-disease levels. The limits are two-thirds of their respective threshold values. Although the harvest strategy will implement these at a sub-zonal scale, meaning that these reference values will vary within each zone, in this assessment they have been generalised to a zone-wide scale.

Fishery independent survey data on pre-recruit and recruit abundance has also been used in past blacklip abalone assessment, but this monitoring has been down-scaled compared with previous assessment processes. For these data, the standard approach (as described earlier, using the long-term average as the reference level) for indicating reference levels and limit points is applied.

The impact of fishing pressure was assessed using time series catch, effort and size composition data.

Eastern Zone

This assessment found:

- *Biomass* — CPUE trended upward from 1979 until 2012, although catches (limited by TACC since 1988) have been declining (Figure 27). Part of the explanation for increasing CPUE during the period from1980 to 1990 has been suggested to relate to increased fishing efficiency. Fishing efficiency likely stabilised by the late 1990–2000s, and CPUE has recently trended down since 2012 (Figure 26). Fishery independent surveys results indicated declines for both pre-recruits (Figure 28) and recruits (Figure 29) since the start of the time series in 2003.
- *Fishing pressure* — progressive reductions have been made in the TACC for the commercial fishery. The recreational catch is unknown.

On the basis of the evidence provided above, the eastern zone blacklip abalone fishery is classified as **transitional-depleting** (Table 1).

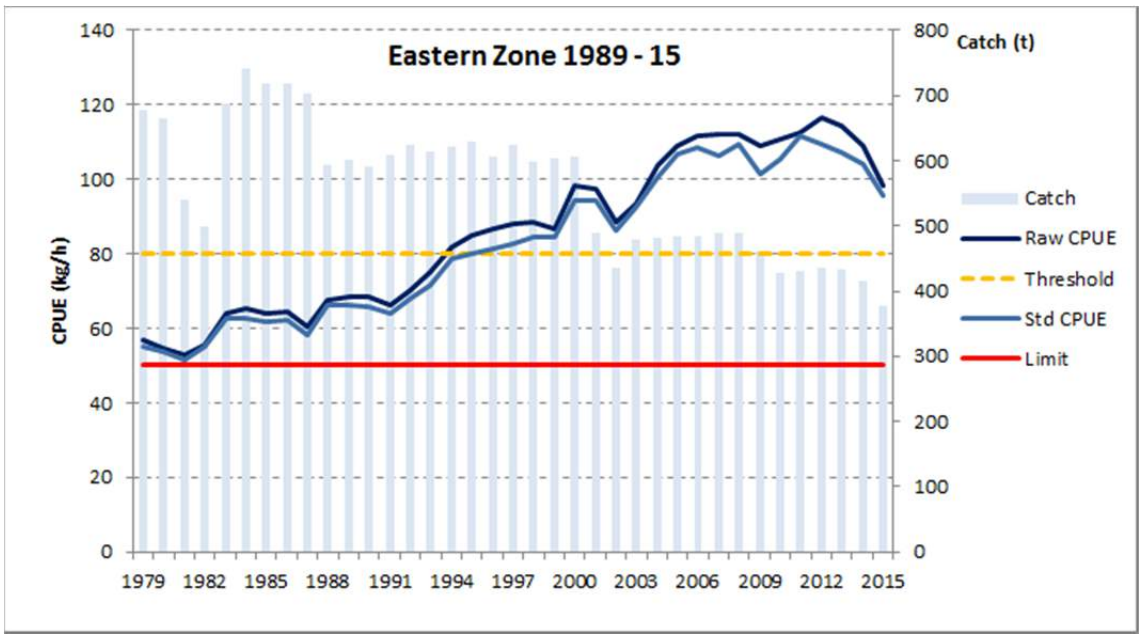


Figure 27. CPUE (raw = nominal, Std = standardised) and catch of the eastern zone blacklip abalone fishery (1979–2015).

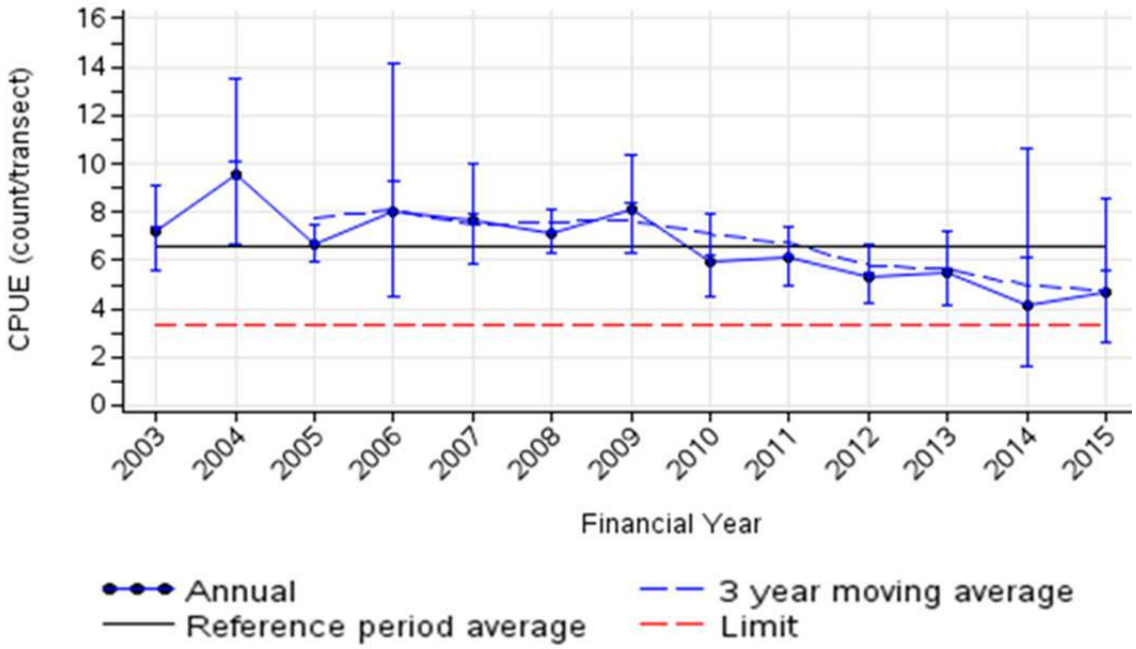


Figure 28. CPUE (±95% CL) for pre-recruit blacklip abalone from fishery independent surveys in the eastern zone (2003–2015).

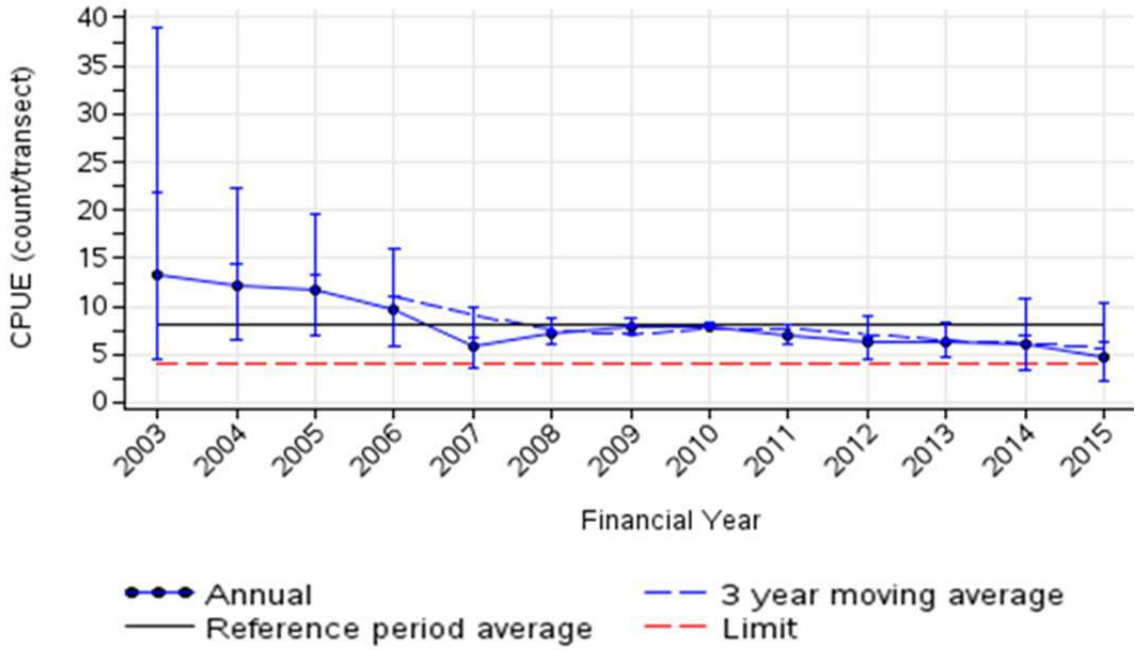


Figure 29. CPUE (±95% CL) for recruited blacklip abalone from fishery independent surveys in the eastern zone (2003–2015).

Central Zone

This assessment found:

- *Biomass* — CPUE trended up from 1979 until 2000, at least partly influenced by gains in fishing efficiency, however, since 2001 CPUE has declined (Figure 30). There has been a slight increase in the most recent year, but more years of data are required to indicate if this is the start of a recovering trend. Fishery independent surveys results show declining trends abundance for both pre-recuits (Figure 31) and recruits (Figure 32), from the first year of the time series in 2003, until 2008–2009, after which the pre-recruit and recruit indices have stabilised at lower levels.
- *Fishing pressure* — the TACC for the commercial fishery was reduced substantially from 620 tonnes in 2006–2007 to 285 tonnes in 2010–2011, and has since ranged from 275–308 tonnes. The recreational catch is unknown.

On the basis of the evidence provided above, the central zone blacklip abalone fishery is classified as **transitional-depleting** (Table 1).

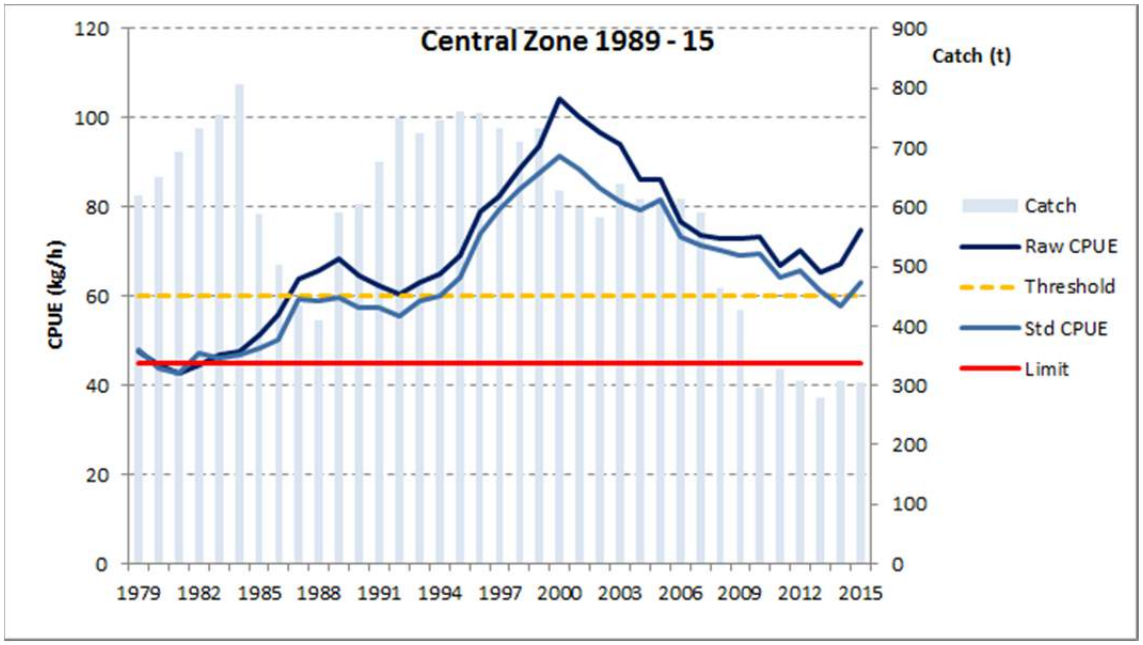


Figure 30. CPUE (raw = nominal, Std = standardised) and catch of the central zone blacklip abalone fishery (1979–2015).

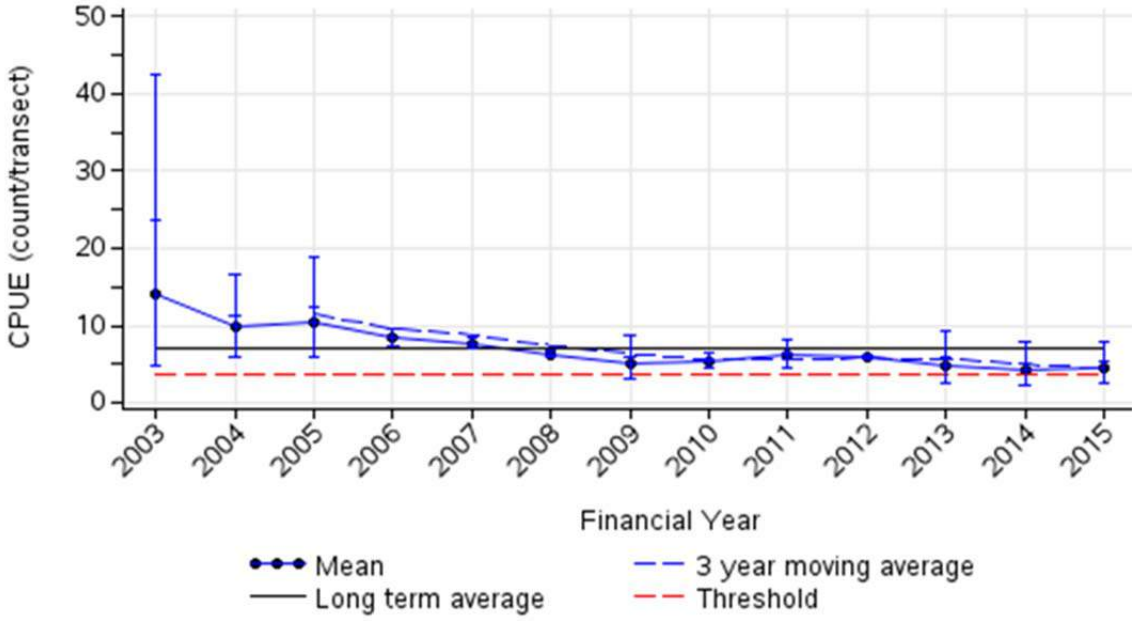


Figure 31. CPUE (±95% CL) for pre-recruit blacklip abalone from fishery independent surveys in the central zone (2003–2015).

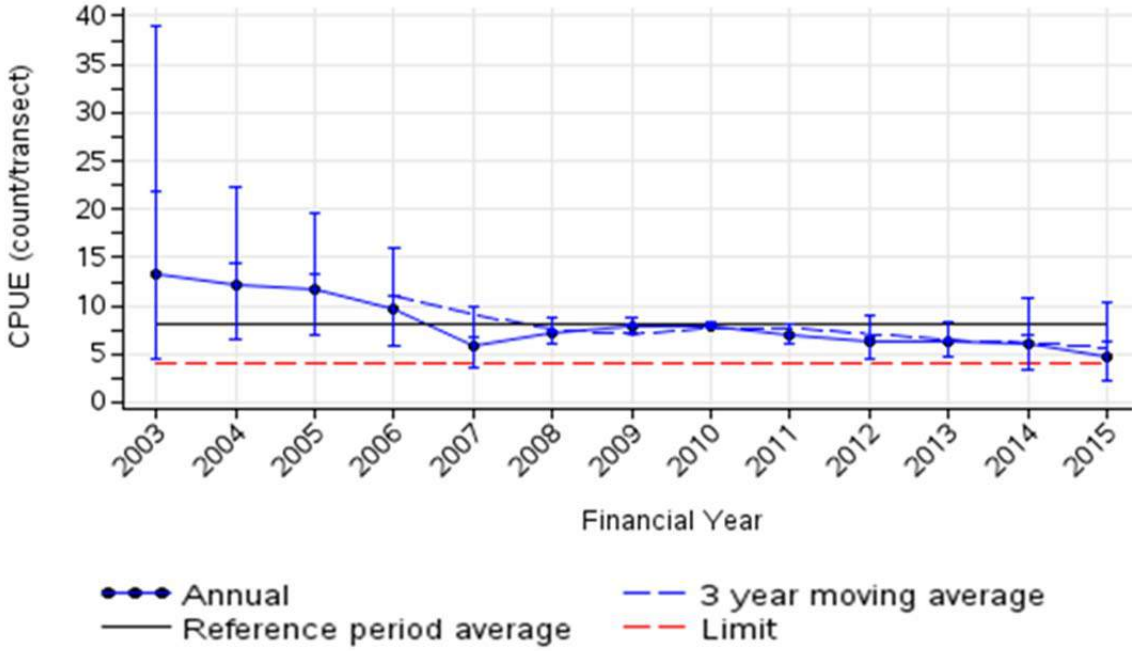


Figure 32. CPUE (±95% CL) for recruited blacklip abalone from fishery independent surveys in the central zone (2003–2015).

Western Zone

This assessment found:

- *Biomass* — CPUE fluctuated in line with dips in the stock and management responses e.g. quota introduction, subsequent TACC decreases and size limit increases giving rise to a gradually increasing trend overall from 1979 until 2006 when the impacts of AVG disease mortalities and associated changes to management of the fishery occurred. Structured fishing from 2009–2011 post-disease makes it difficult to interpret CPUE data for that period. However, since 2011 when "normal" fishing operations resumed, CPUE increased until 2013, and has since stabilised at lower than pre-AVG levels, but similar to levels recorded in the mid-1980s and mid-1990s (Figure 33). Fishery independent surveys results indicate the abundance of pre-recruits (Figure 34) and recruits (Figure 35) have been stable post-AVG.
- *Fishing pressure* — the TACC of the commercial fishery has been greatly reduced post-AVG (from 221 to 62 tonnes) and the LML has increased (from 120 mm to 130 mm). The recreational catch is unknown.

On the basis of the evidence provided above, the western zone blacklip abalone fishery is classified as **sustainable** (Table 1).

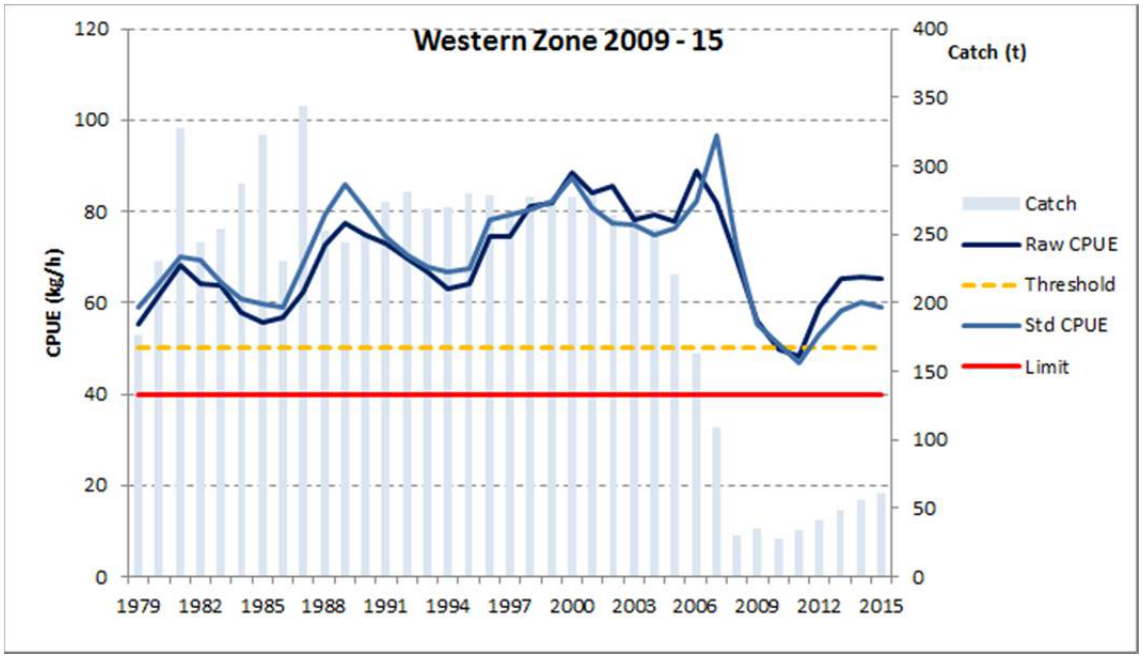


Figure 33. CPUE (raw = nominal, Std = standardised) and catch of the western zone blacklip abalone fishery (1979–2015).

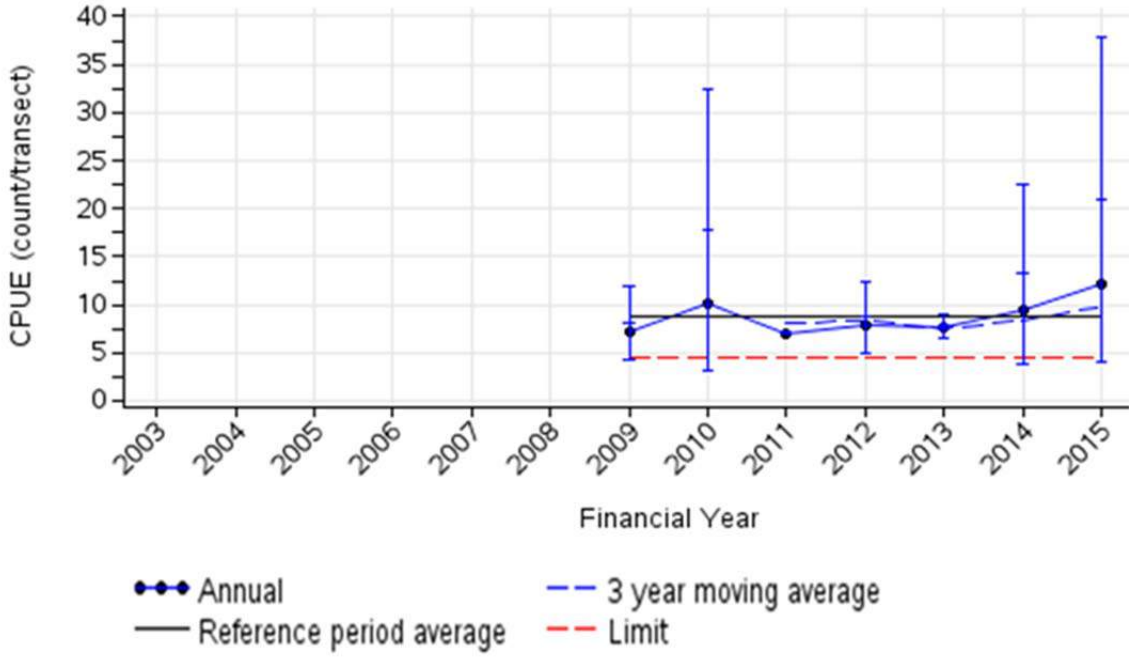


Figure 34. CPUE (±95% CL) for pre-recruit blacklip abalone from fishery independent surveys in the western zone (2003–2015).

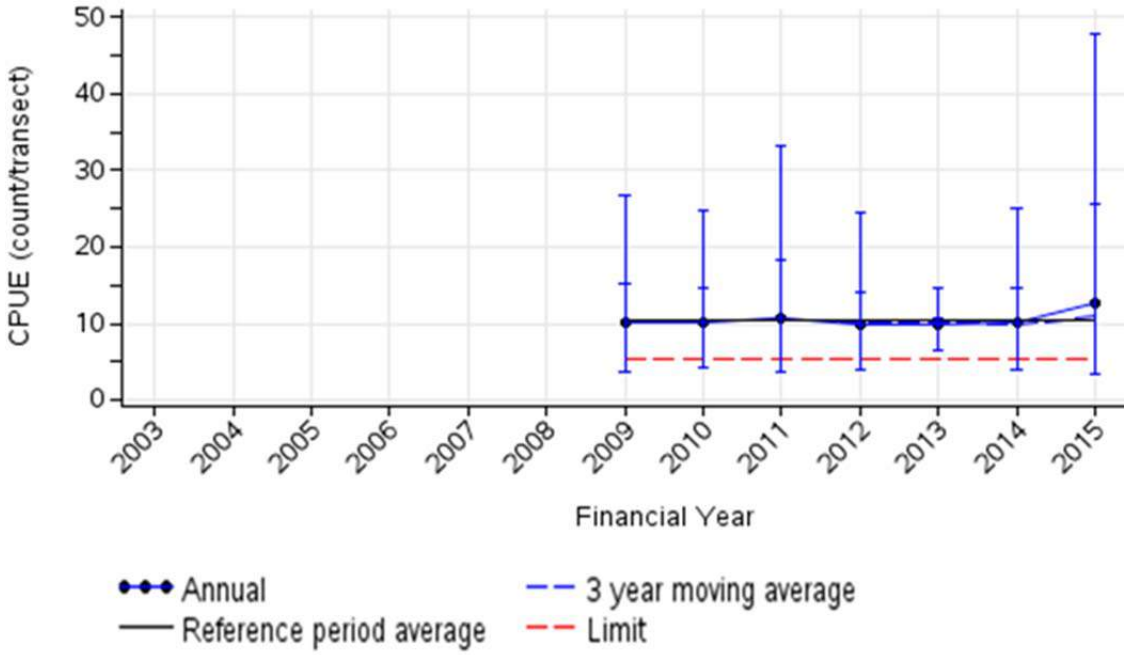


Figure 35. CPUE (±95% CL) for recruited blacklip abalone from fishery independent surveys in the western zone (2003–2015).

Greenlip Abalone (*Haliotis laevigata*): Western and Central Zones

Stock Structure and Biology

Like blacklip abalone, Victorian greenlip abalone is considered to comprise a panmictic population. Greenlip abalone are also long-lived (20+ years), highly fecund and experience episodic localised recruitment. Length at maturity (50 per cent) is reached at three to five years and 70 to120 mm and they can grow to a shell length of at least 23 cm.

The main spawning period is late spring to early summer. Greenlip abalone are less cryptic than blacklip abalone. There was high fishing mortality in the central zone during the 1960s and 1970s without recovery. Greenlip stocks in Victoria are limited, and fragmented, because the species is at the edge of its geographic range so only those regions that have supported commercially viable catches during the past have been reviewed.

Management

Management arrangements for greenlip abalone are the same for as blacklip abalone, except for catch and size limits. The greenlip abalone LML in the Western Zone is 13 cm and 14.5 and 15 cm in the Central Zone depending on the area. Port Phillip Bay is closed to recreational greenlip harvest.

Assessment Summary

Western Zone

Catch of greenlip abalone ceased in the western zone in 2013. Before 2013, the performance of the stock biomass was evaluated using trends in the proportion of greenlip and blacklip abalone in the catch and the total catch and CPUE of both species combined.

This assessment found:

- *Biomass* — catch patterns are consistent with recent serial depletion among disease-free stocks (Figure 37). Before catches ceased in 2013 there was a very high probability that CPUE was declining (Figure 38).
- *Fishing pressure* — a 1.4 tonne TACC is set for 2017–2018; recreational catch is unknown.

On the basis of the evidence provided above, the western zone greenlip abalone fishery is classified as **overfished** (Table 1).

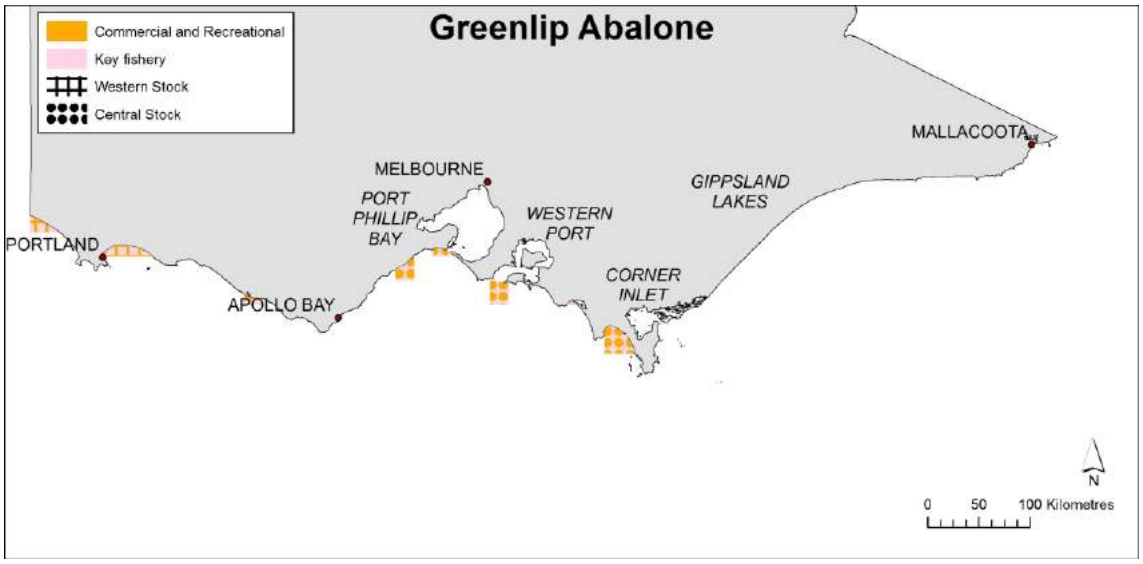


Figure 36. Western, central and eastern zone management units for the Victorian greenlip abalone fishery. Note: there is no greenlip catch in the eastern zone.

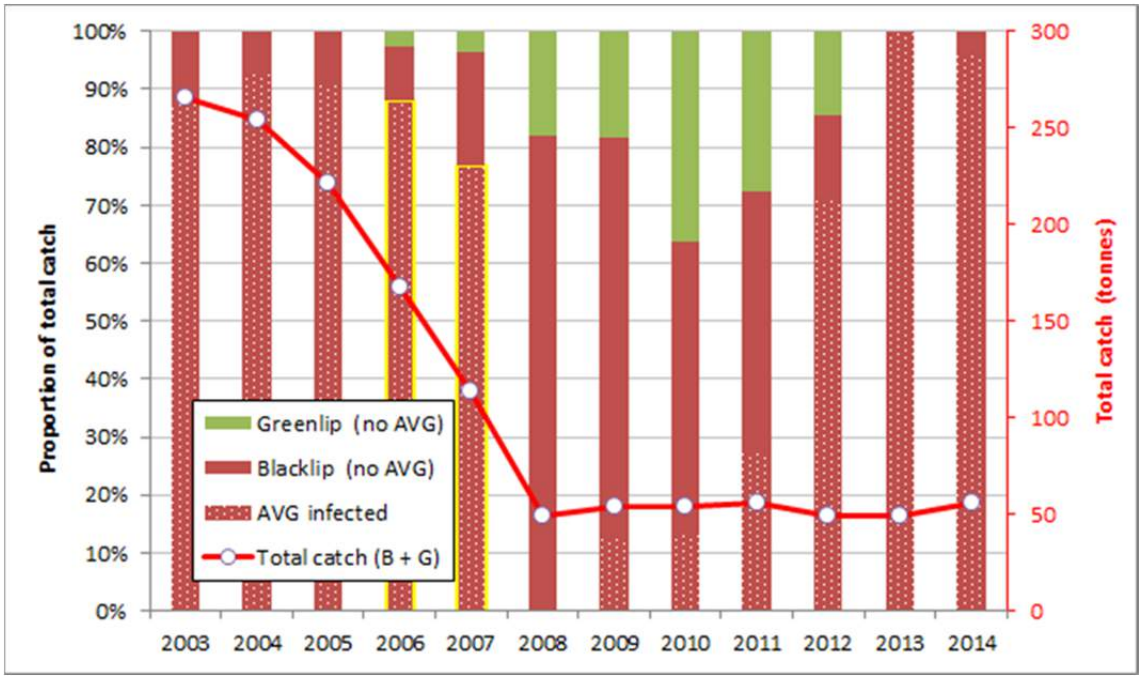


Figure 37. Total catches, and proportions of all abalone catches attributable to blacklip and greenlip abalone in the western zone per annum from 2008 to 2014. Stippling indicates pre-and post-AVG catches from infected reefs, yellow borders indicate years with active AVG.

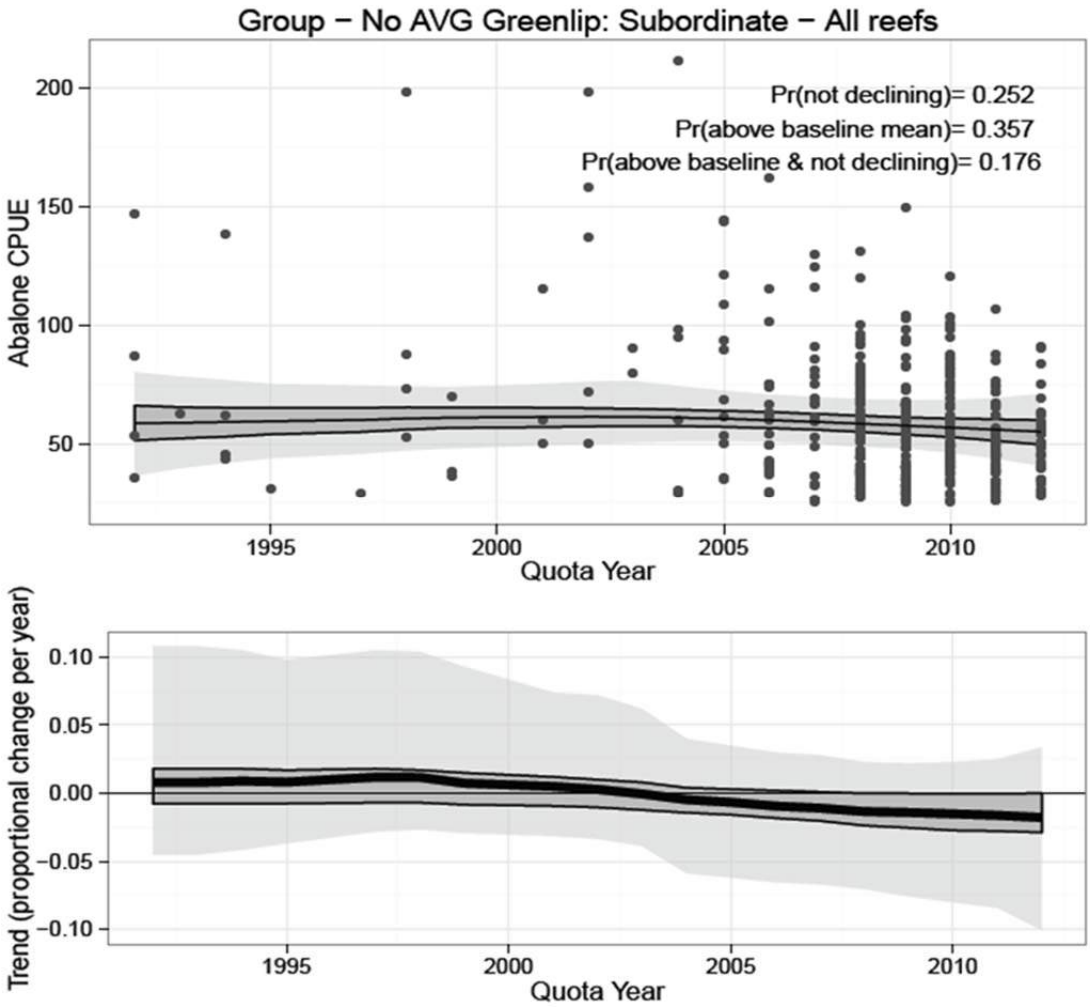


Figure 38. Bayesian analysis of trends in commercially caught greenlip abalone CPUE and proportional changes per quota year (1992–2012).

Central Zone

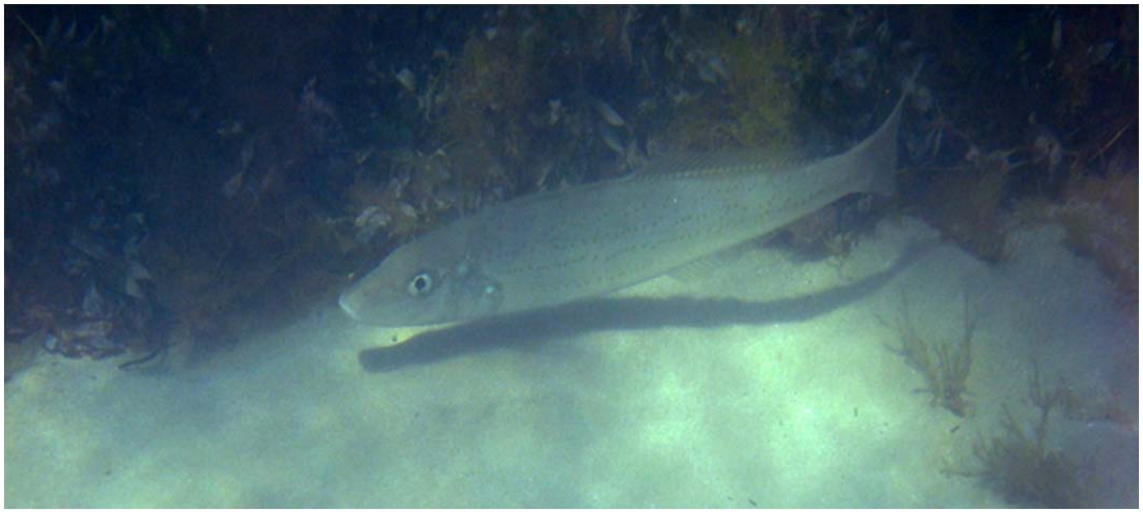
There is no significant fishery for greenlip abalone in the central zone but the population does not appear to have recovered after the high commercial catches in 1960s and 1970s.

This assessment found:

- *Biomass* — No current information.
- *Fishing pressure* — the 3.4 tonne TACC for the commerial fishery is rarely taken.

On the basis of the evidence provided above, the Central Zone greenlip abalone is classified as **overfished** (Table 1).

King George Whiting (*Sillaginodes punctatus*): State-wide



Stock Structure and Biology

The Victorian King George whiting population is considered to comprise a State-wide stock, extending into eastern South Australia. The main fisheries are in Port Phillip Bay, Western Port and Corner Inlet, with both commercial and recreational components in Port Phillip Bay and Corner Inlet (Figure 38). In Victorian bays and inlets most King George whiting that are harvested are immature fish less than 4 years of age. Juvenile whiting migrate out of bays and inlets at 3–5 years of age to complete their adult lives in coastal waters where they can live to approximately 20 years and reach lengths of at least 60 cm. It is thought that the majority of King George whiting that recruit into Victorian bay and inlet fisheries originate from spawning in coastal waters off far western Victorian and south-east South Australia (Figure 39). King George whiting are highly fecund and have a moderate to high growth rate. The offshore spawning and long-larval dispersal phase prior to settlement into the bay and inlet nursery areas means that settlement rates of larvae are highly variable from year to year depending on ocean currents. This variability, coupled with the short residence time of juveniles with these areas (typically only two years when most fish are available for harvest) means that the bay and inlet fisheries are naturally highly variable.

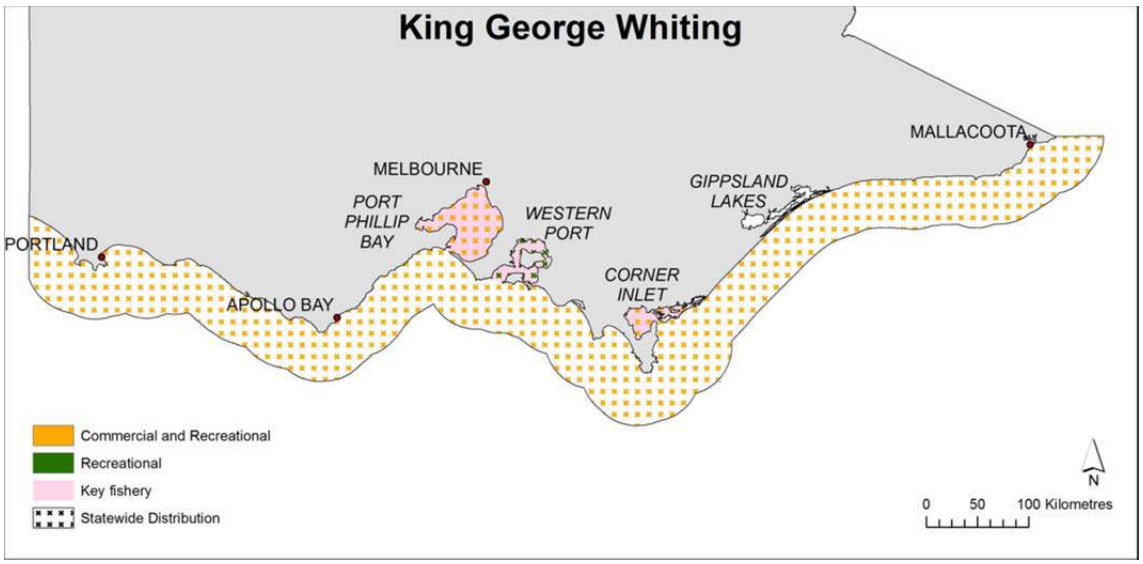


Figure 39. Victorian King George whiting stock/spatial management units and key fisheries.

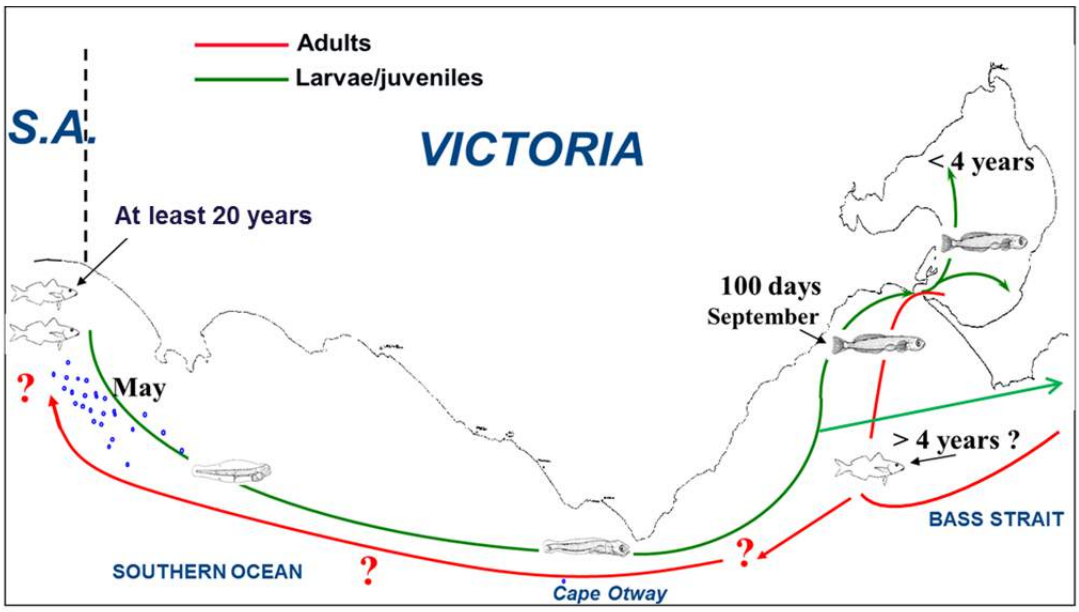


Figure 40. Representation of the life-history of King George whiting.

Assessment Summary

The status of King George whiting in Victoria was evaluated using CPUE trends for commercial haul seine in Port Phillip Bay and Corner Inlet, and CPUE for the recreational fisheries in Port Phillip Bay and Western Port. Creel survey data is sub-setted to include data for targeted King George whiting fish trips by avid (experienced) anglers. The performance of the CPUE biomass proxies was assessed in relation to the specified reference levels and limit points using the reference period 1979–2015 for commercial data, 1998–2015 for recreational Western Port data, and 1995–2015 recreational Port Phillip Bay data, excluding missing years

King George whiting pre-recruit abundance from fishery independent surveys in Port Phillip Bay provides a secondary indicator of past and future biomass trends, and stock replenishment rates.

The impact of fishing pressure was assessed using time series of catch, effort and length composition data.

This assessment found:

- *Biomass* — CPUE for commercial haul seine catches in Cornet Inlet and Port Phillip Bay (Figure 41), and CPUE of catches from the recreational fisheries in Western Port and Port Phillip Bay (Figure 42) have all increased since 2014, and are well above the reference level. Prior to 2014 they all showed similar variability, typical for bay and inlet King George whiting fisheries, with none showing evidence of sustained declines. Pre-recruit (post-larval) surveys results show that recent peaks in abundance were observed in 2013 and 2016 (Figure 43). The 2013 peak has fully recruited to the fishery in 2015–2016 and has driven the recent high CPUE. These fish will now be departing the bay and inlet fisheries for coastal waters, and the CPUE is expected to decline in 2017–2018 until the 2016 recruits enter the fishery in late 2018 through 2019.
- *Fishing pressure* — commercial catches have been historically cyclic, with the most recent peaks in 2010 and 2011 (Figure 44). In 2015 catches increased, primarily driven by higher catches coming from the Corner Inlet fishery, as the effort in the Port Phillip Bay fishery started to reduce due to the buy-out of most licences in April 2016. The effort in the Port Phillip Bay fishery has now been substantially reduced, and catches are expected to continue to reduce in coming years. Commercial haul seine effort in Port Phillip Bay effort has decreased since the most recent peak in 2011, and in 2015 was at the lowest level since 1978 (Figure 45). Commercial haul seine effort in Corner Inlet has increased since 2013, after a decline from 2000 to 2009, but remains well below the historical highs during the late 1990s and early 2000s (Figure 45). Recreational boat fishing effort has increased in both Western Port and Port Phillip Bay in recent years (Figure 46). Length frequency indicators for the recreational fishery are stable, and in 2016 show higher proportions of larger fish (Figure 47).

On the basis of the evidence provided above, the Victorian King George whiting stock is classified as **sustainable** (Table 1).

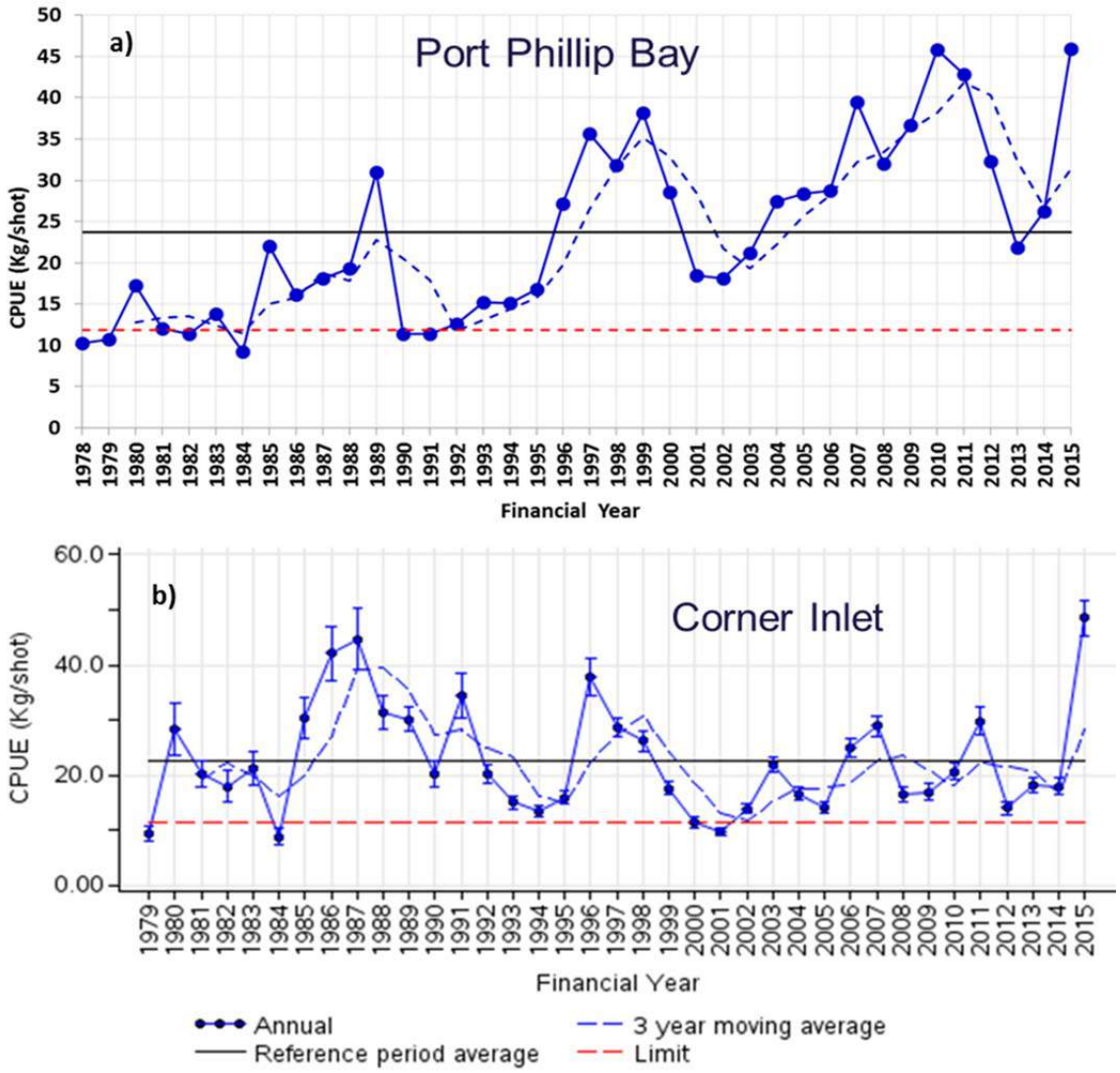


Figure 41. Commercial haul seine CPUE (nominal) for King George whiting in a) Port Phillip Bay and b) Corner Inlet, 1979–2015.

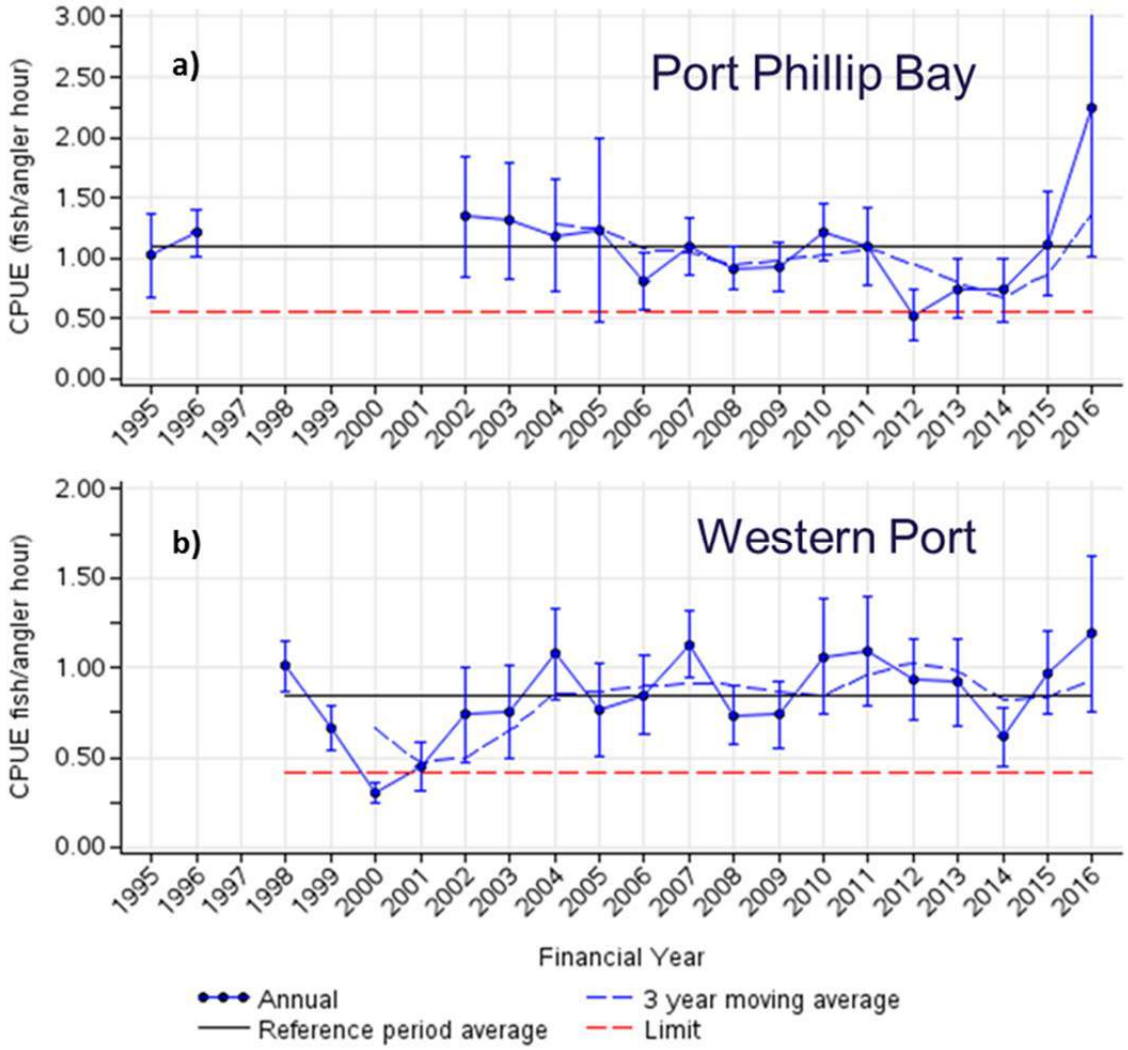


Figure 42. Recreational CPUE for King George whiting in a) Port Phillip Bay and b) Western Port, 1995–2016.

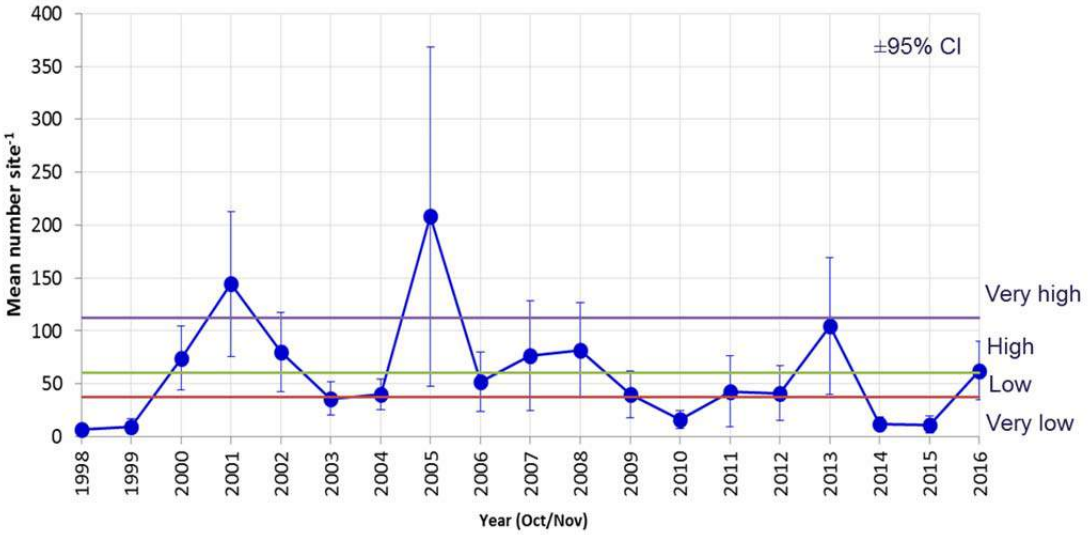


Figure 43. CPUE (±95% CL) for pre-recruit (post-larval) King George whiting from fishery independent surveys in Port Phillip Bay (1998–2016) with indications or relative levels (very low < 30, low 30–60, high 60–90, very high > 90th percentile).

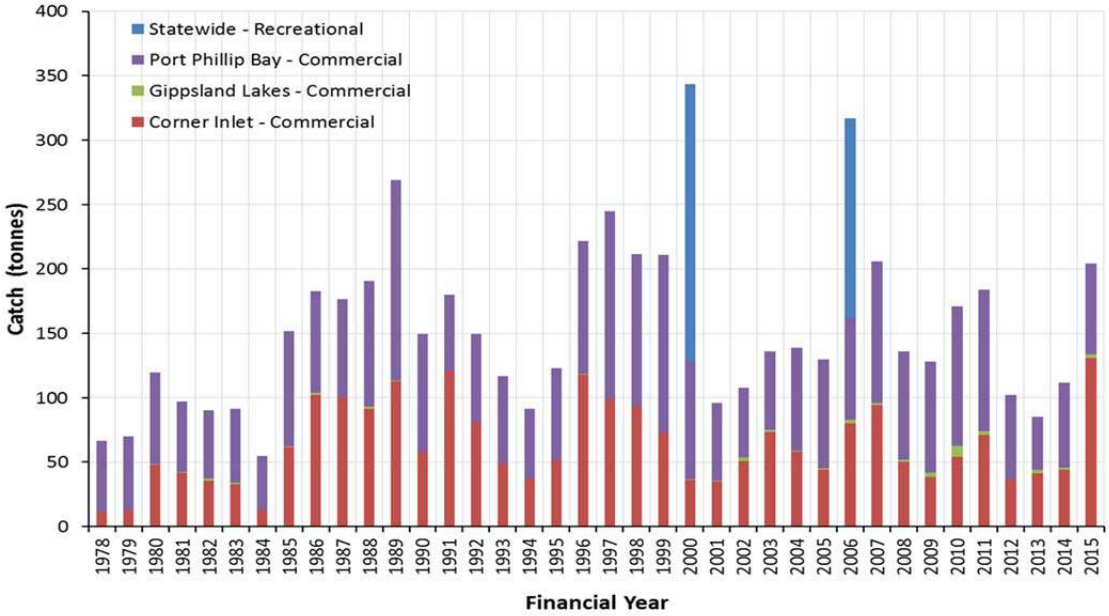


Figure 44. Total Victorian King George whiting commercial harvest, with regional catches indicated from 1978 to 2015. State-wide recreational estimates are shown for 2000 and 2006.

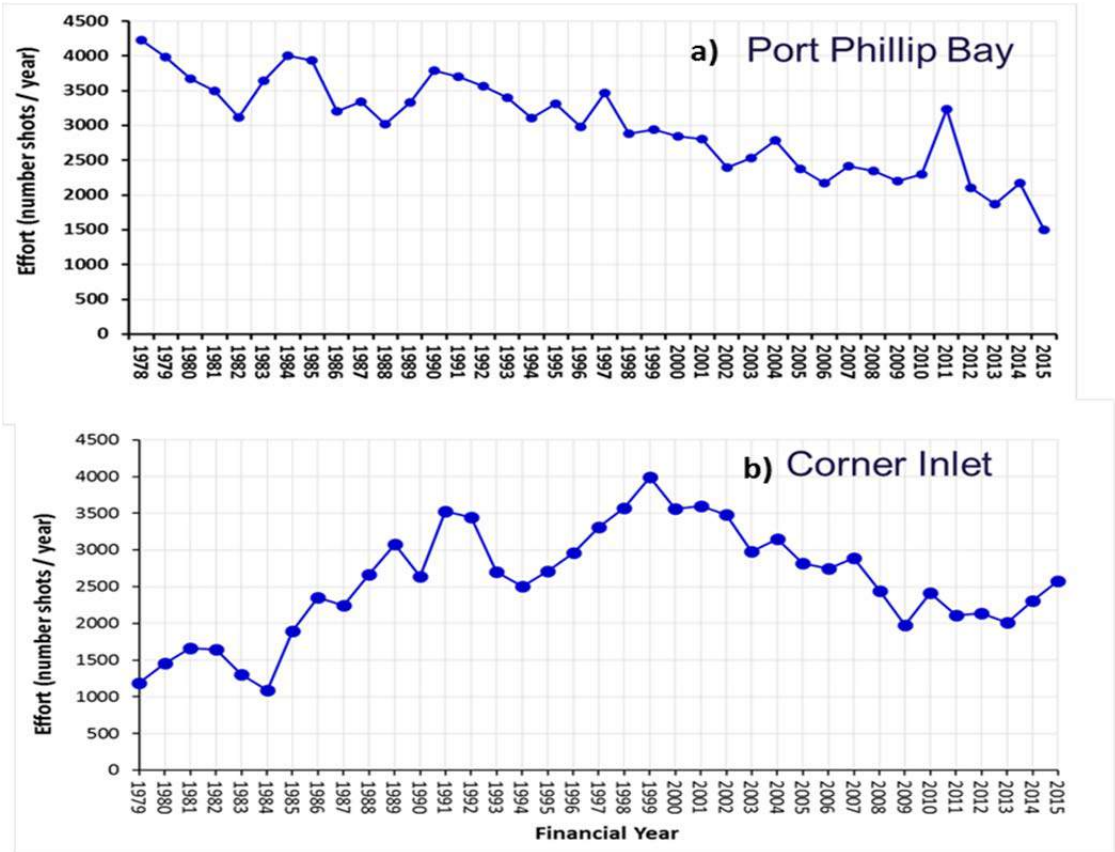


Figure 45. Commercial King George whiting haul seine effort for a) Port Phillip Bay and b) Corner Inlet.

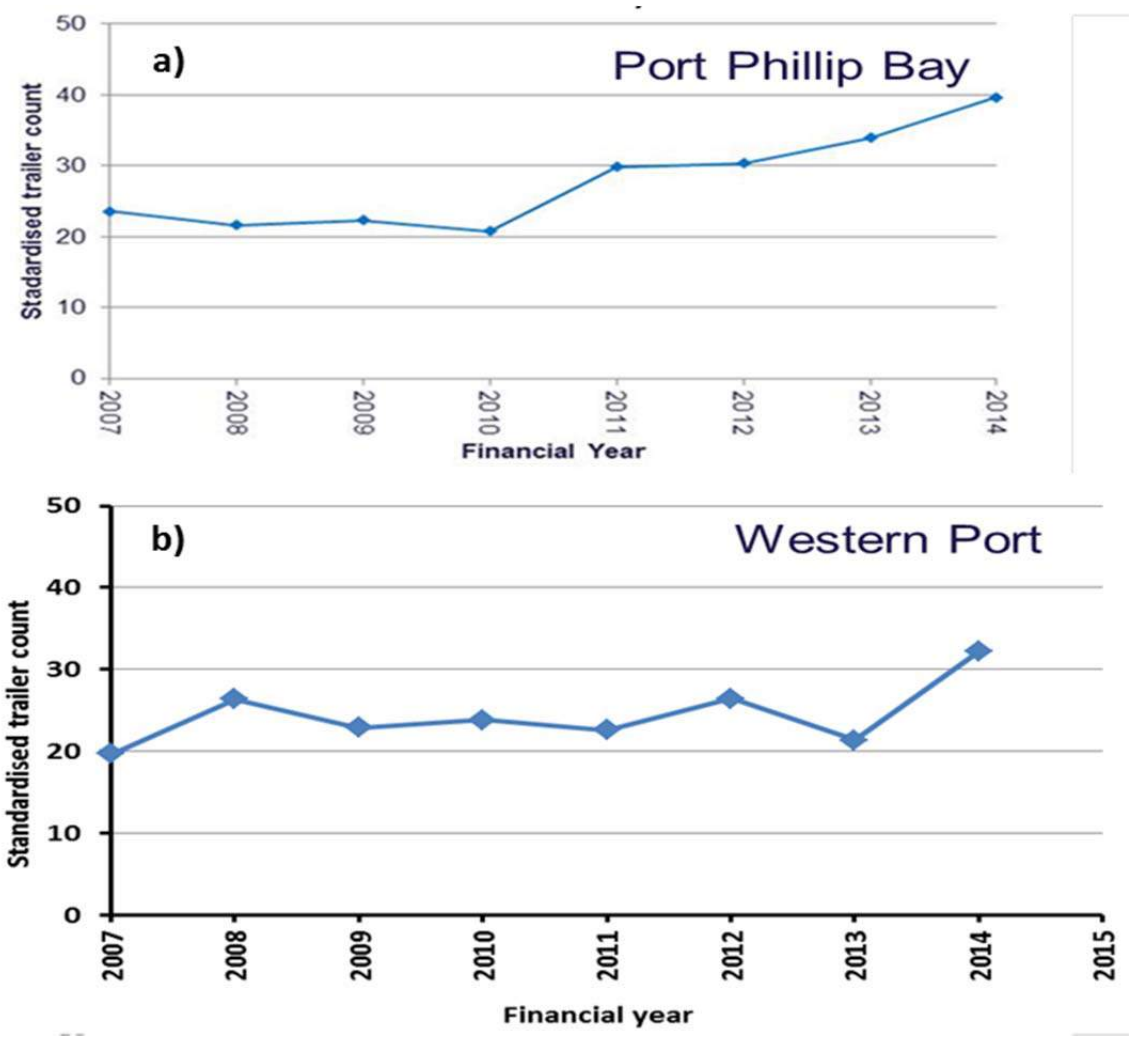


Figure 46. Recreational boat fishing King George whiting effort index (standardised trailer counts) for a) Port Phillip Bay and b) Western Port, 2007–2015.

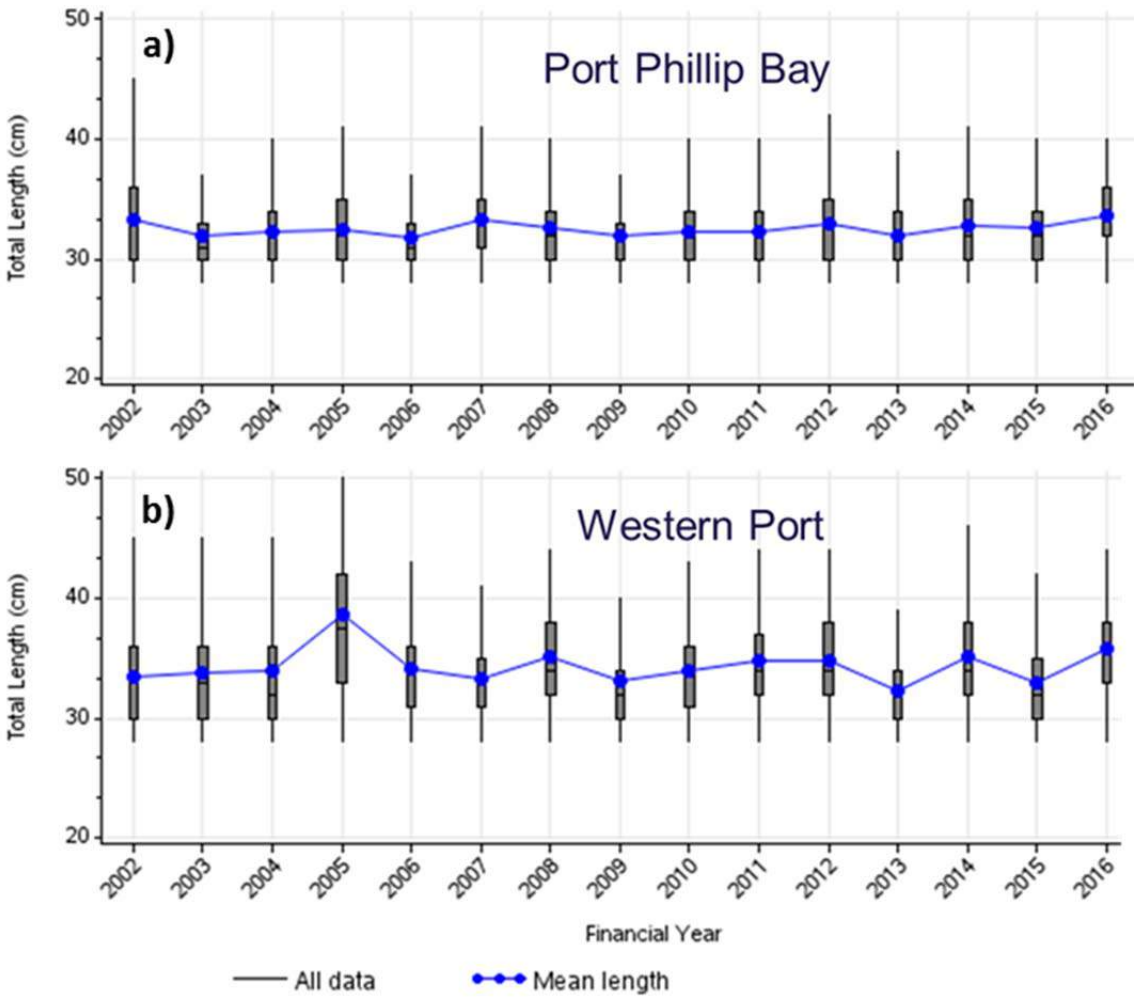


Figure 47. Size composition of King George whiting sampled from recreational catches from a) Port Phillip Bay and b) Western Port (2002–2016). Note: minimum size is 27 cm LML.

Southern Sand Flathead (*Platycephalus bassensis*): Port Phillip Bay

Stock Structure and Biology

Sand flathead are distributed all along the Victorian coast in coastal waters and bays and inlets (Figure 47). The most important fishery is in Port Phillip Bay and this fishery is the focus of this assessment. Most of the Port Phillip Bay sand flathead catch is taken by recreational fishers with only minor commercial harvest.

The Port Phillip Bay sand flathead population is considered to be a mostly self-replenishing sub-population. The main spawning period is October to March. Port Phillip Bay is the main spawning area for the Port Phillip Bay population.

Sand flathead in Port Phillip Bay can live to at least 23 years and can grow to a size of 40 cm TL. Length at maturity (50 per cent) is reached at two to five years of age and 22 to 25 cm TL. Sand flathead are highly fecund and have a moderate growth rate (K = 0.4–0.6).

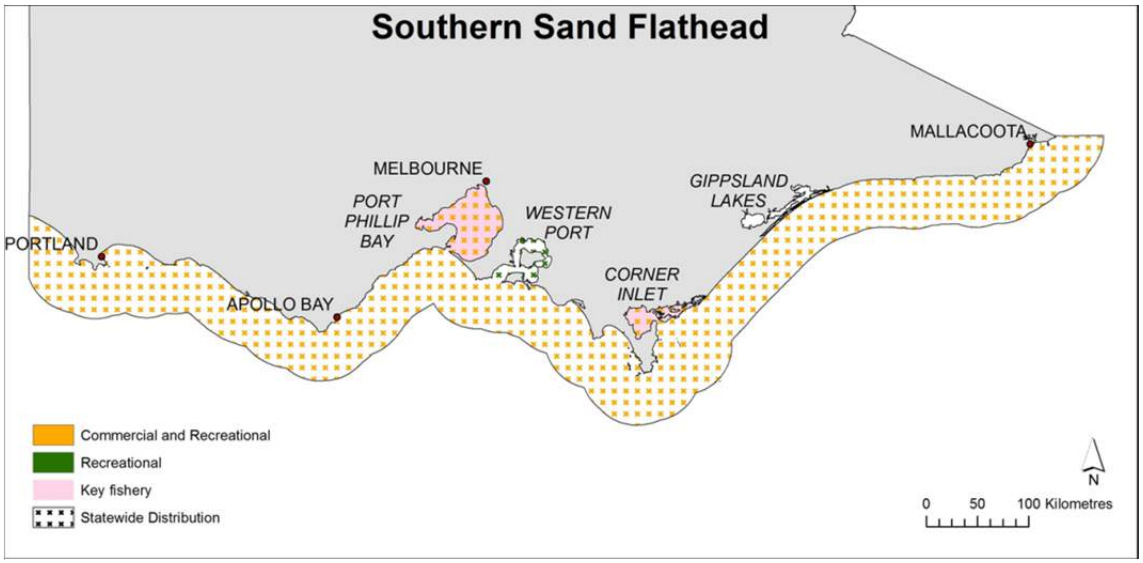


Figure 48. Victorian sand flathead stock/spatial management units and key fisheries.

Assessment Summary

Port Phillip Bay

The status of stock biomass was evaluated using CPUE trends for commercial longline harvest in Port Phillip Bay, and nominal CPUE for recreational catch rates from annual creel surveys in Port Phillip Bay. The performance of the CPUE biomass proxies were assessed in relation to the specified reference levels and limit points. Additional information is available from biomass estimates from fishery independent trawl surveys between 1990 and 2011.

Sand flathead pre-recruit abundances from fishery independent trawl surveys in Port Phillip Bay provide a secondary indicator of stock replenishment rates.

The impact of fishing pressure was assessed using time series of catch, effort and length composition data.

This assessment found:

- *Biomass* — CPUE trends for both the commercial and recreational fisheries (Figure 49) and the independent trawl surveys (Figure 50) show there has been a major decrease in biomass from the 1990s onwards. Since 2000 biomass has stabilised at an historical low level. Pre-recruit abundance survey data shows episodic high and prolonged recruitment events in the late 1980s and 1990s, but prolonged low recruitments since 1998, with the exception of two higher recruitment events in 2004 and 2013 (Figure 51). The prolonged period of low recruitment has driven the downward trend in the CPUE biomass proxies. Environmental factors, in particular prolonged drought, are thought to be linked to prolonged low recruitment in the 2000s, however, high or prolonged recruitment events have not occurred since drought conditions ended in 2010
- *Fishing pressure* — recreational and commercial catch has deceased over the last 20 years (Figure 52). Recreational effort by boat fishers has increased since 2010, but has been stable for the long-line fishery since 2000 (Figure 53). The length frequency composition for the recreational catch has contracted to smaller fish in 2015, but the mean length has been realtively stable since 2006 (Figure 54). Estimates of exploitation rates of spawning biomass (fish > 25 cm TL) during the 2000s were 38 per cent (26 to 50 per cent) in 2000–2001 and 44 per cent (31 to 58 per cent) in 2006–2007.

The decline in abundance is a result of prolonged low recruitment since 2000, which was at least partly driven by environmental (drought) factors. The prospect for a rapid recruitment driven recovery seems limited as there have been no very high recruitment events for the 6 years post-drought.

The Port Phillip Bay sand flathead stock was previously classified as “environmentally limited” in the Status of Australian Fish Stocks 2016 which is also consistent with the Victorian stock status risk management category classification of “Amber” (https://vfa.vic.gov.au/operational-policy/publications-and-resources/status-of-victorian-fisheries/southern-sand-flathead).

Most of the 2017 workshop participants, however, classified the Port Phillip Bay sand flathead stock as overfished based on the presented information. The VFA has, in response to its internal reporting, engaged an inter-agency working group to investigate replicating fresh water flows that have historically triggered recruitment of sand flathead. A secondary project is also underway to examine the feasibility of stocking sand flathead into Port Phillip Bay to rebuild populations.

On the basis of the above information the Port Phillip Bay sand flathead stock is classified as **environmentally limited** (Table 1).

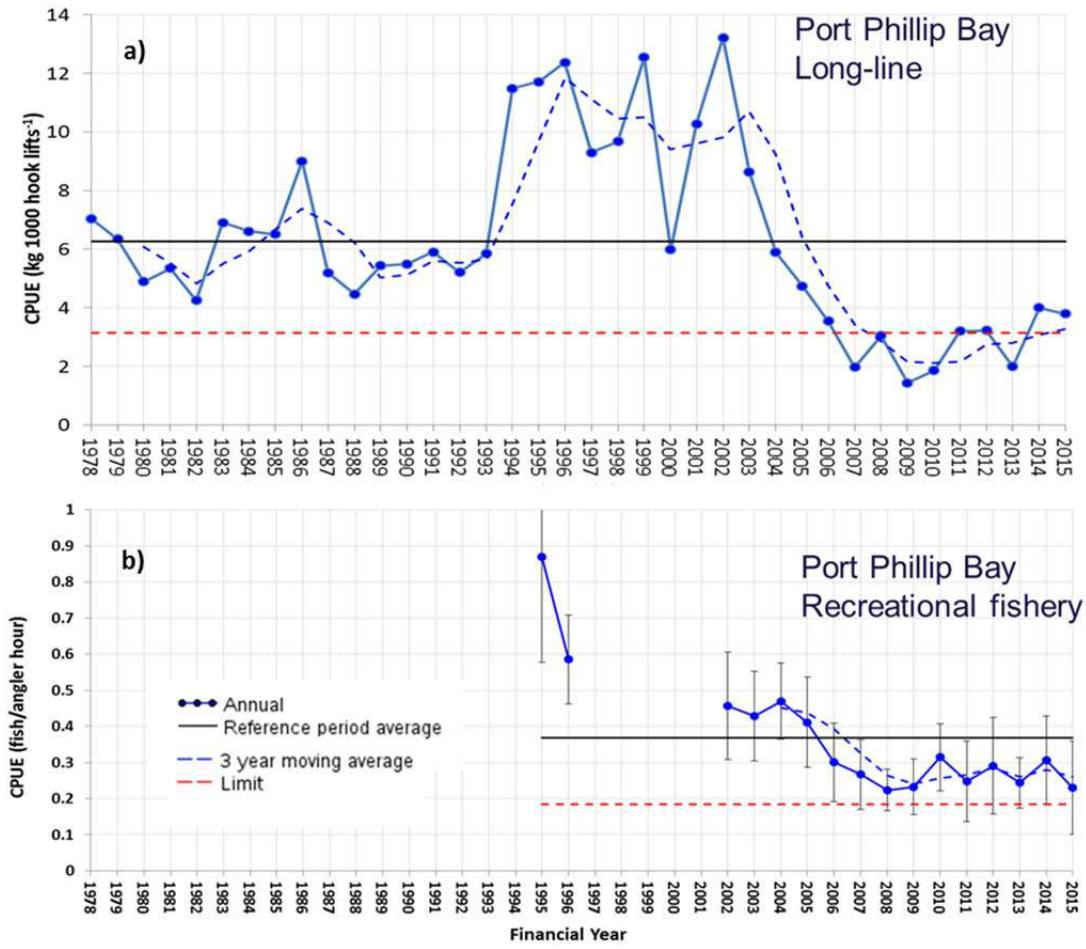


Figure 49. Port Phillip Bay sand flathead CPUE (±95% CL) for a) commercial longline harvest (1978–2015) and b) recreational fisheries (2002–2015).

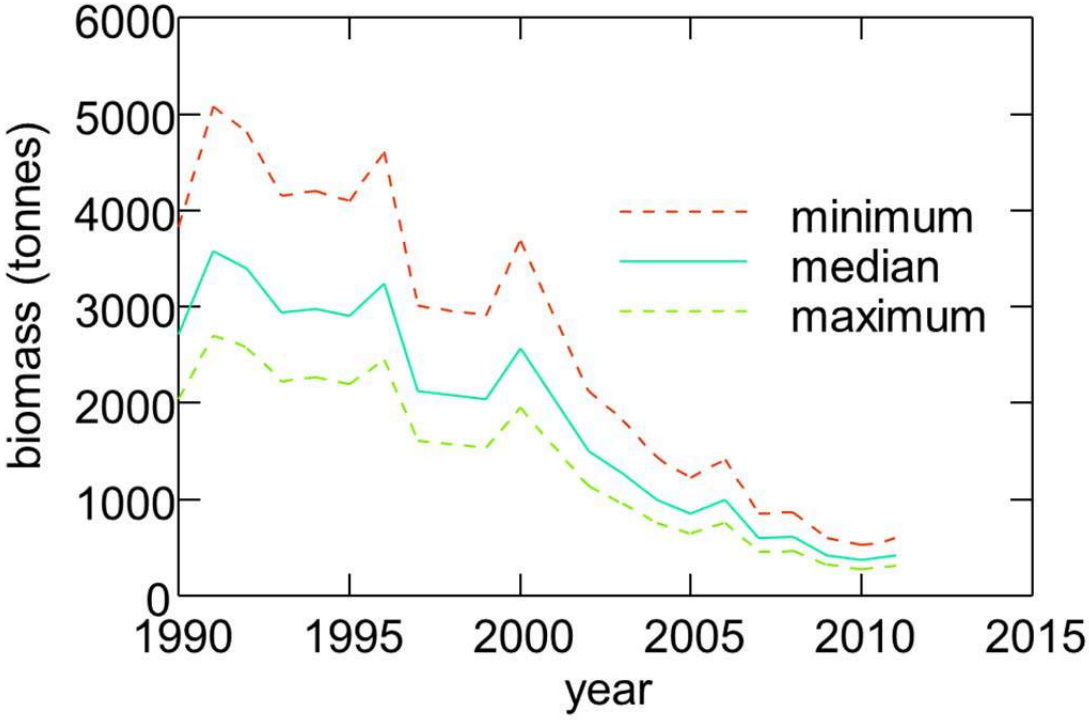


Figure 50. Sand flathead biomass estimates from fishery independent trawl surveys in Port Phillip Bay (1990–2011).

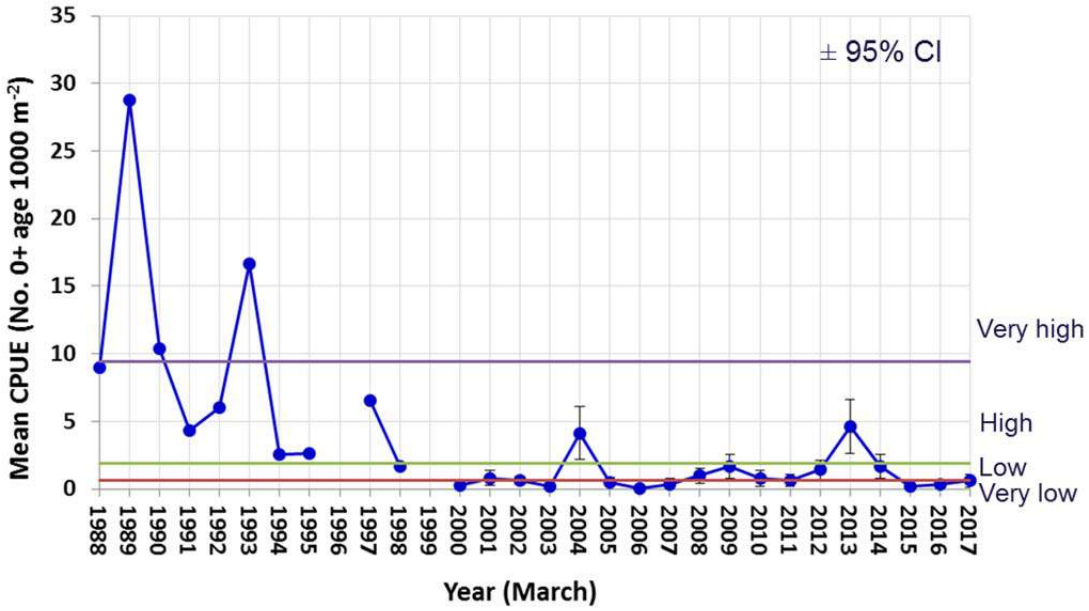


Figure 51. CPUE (±95% CL) for pre-recruit (0+ age) sand flathead from fishery independent surveys in Port Phillip Bay (1988–2017).

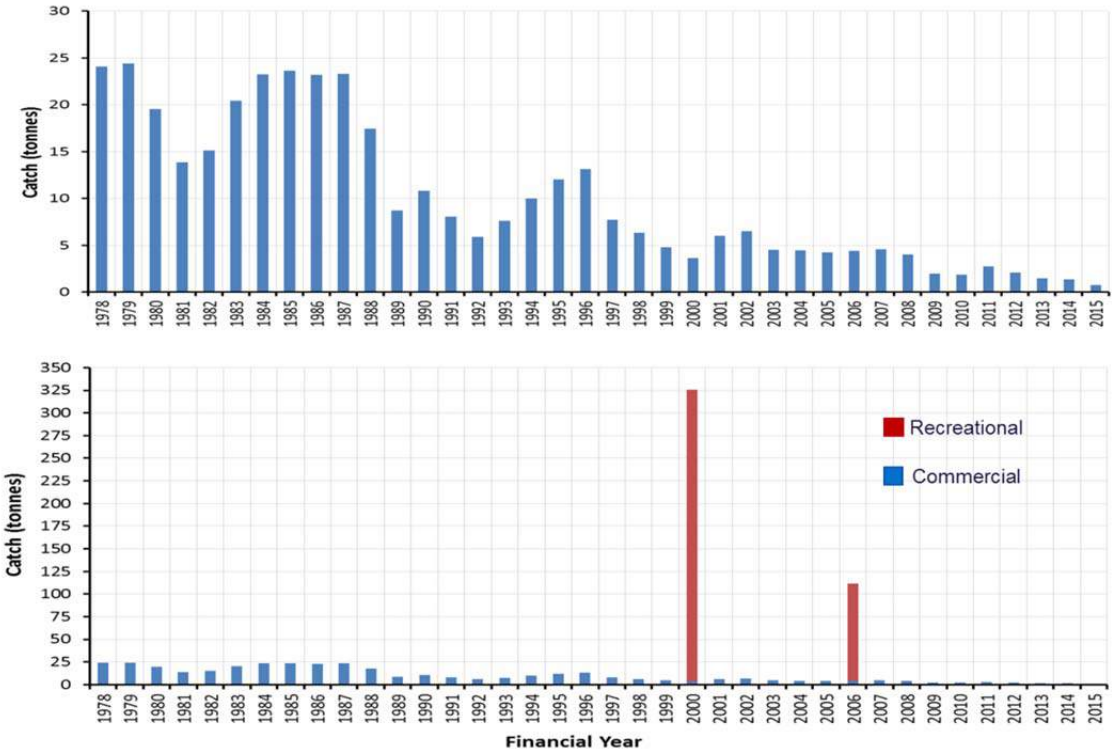


Figure 52. Sand flathead catches from Port Phillip Bay for the commercial fishery (above graph) and the commercial catches with surveyed recreational catches in 2000 and 2006.

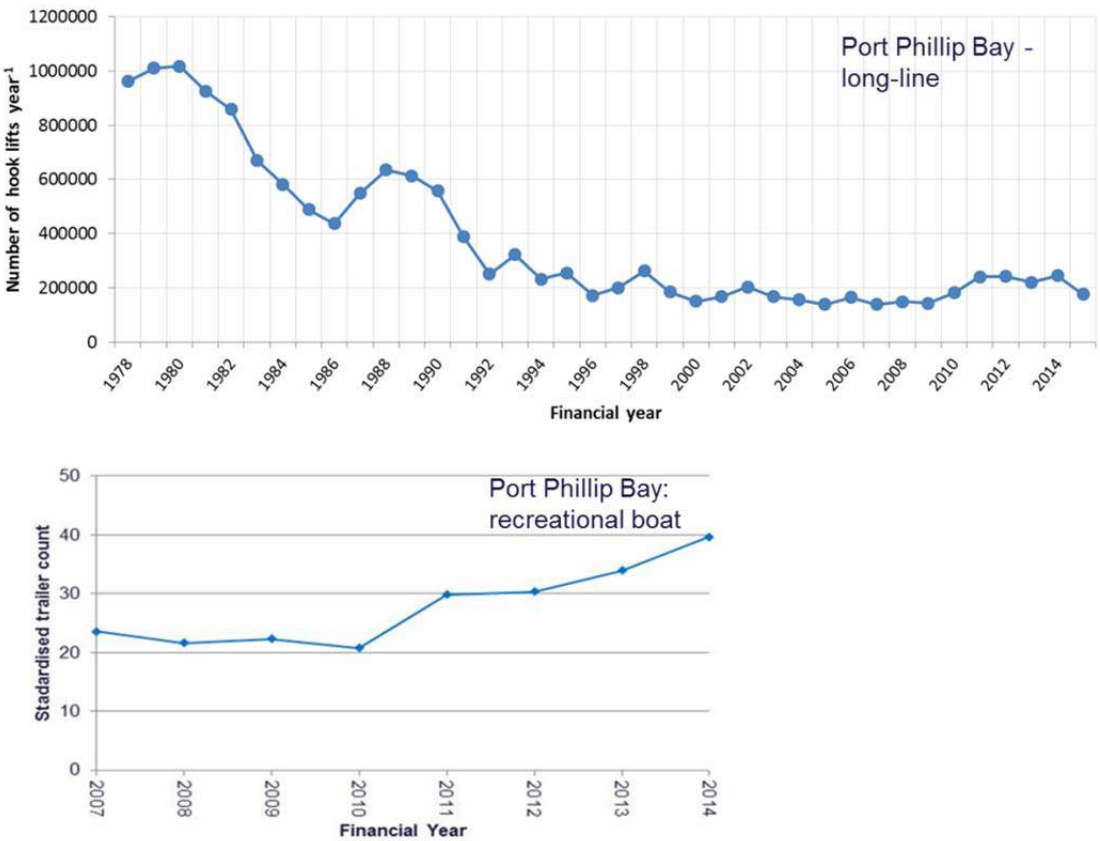


Figure 53. Fishing effort for sand flathead in Port Phillip Bay from the commercial long line fishery (1979–2015) and recreational boat-based fishing (2007–2014).

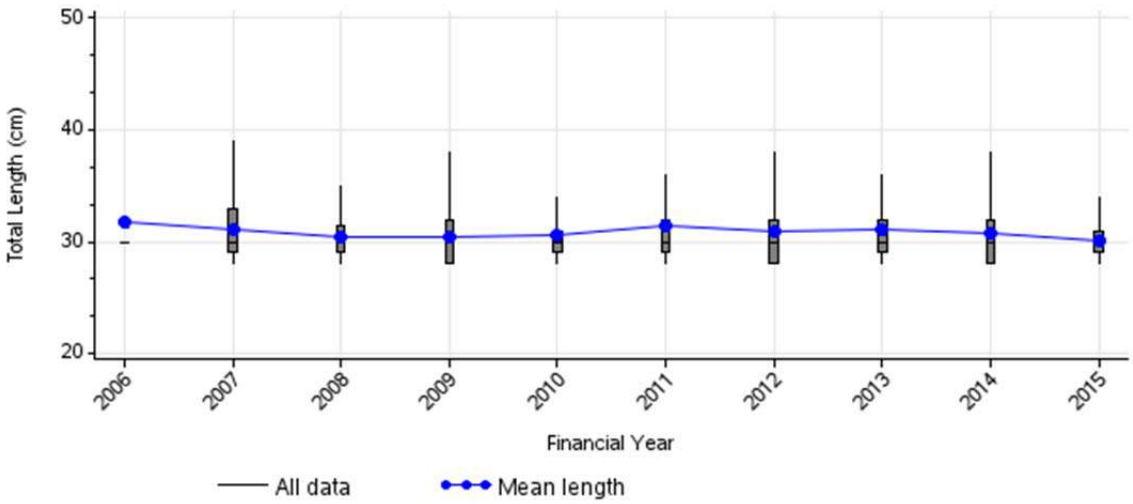


Figure 54. Size composition of sand flathead sampled from the Port Phillip Bay recreational fishery (2007–2015).

Black Bream (*Acanthopagrus butcheri*): Gippsland Lakes

Stock Structure and Biology

Back bream populations in the Gippsland Lakes, Lake Tyers, Mallacoota Inlet and the Glenelg River and other minor inlets and river estuaries and are considered to be self-replenishing discrete stocks, with limited mixing among adjacent estuaries (Figure 55).

Black bream can live to at least 29 years and grow to a size of at least 60 cm TL. Size at maturity (50 per cent) is reached at two years of age and 20 cm TL (LML = 28 cm). Black bream have a high fecundity and variable growth rate taking three to eight years to reach the current LML. The main spawning period is October to February, and spawning occurs in estuaries, often associated with the salt-wedge.

Assessment Summary

Gippsland Lakes

The status of stock biomass from Gippsland Lakes was evaluated using standardised CPUE trends from commercial mesh-netting harvests and recreational fishery catch rates from creel surveys. The performance of the CPUE biomass proxies were assessed in relation to the specified reference levels and limit points.

Black bream pre-recruit abundance from fishery independent surveys in Gippsland Lakes provide a secondary indicator of past and future biomass trends, and stock replenishment rates.

The impact of fishing pressure was assessed using time series of catch and effort, for the commercial fishery, and length composition data sampled from commercial and recreational fishery catches.

This assessment found:

- *Biomass* — CPUE for the commercial mesh-net fishery has decreased since the most recent peak around 2010–2012, and is currently below the reference level, but is higher than the lowest levels recorded in the early 1990s and early 2000s (Figure 56). Recreational CPUE is at the reference level, but is lower than the highest levels recorded in 1995 and 1999–2000 (Figure 56). Recreational CPUE estimates in recent years have high uncertainty due to low sample size (Figure 56). Independent trawl surveys of pre-recruits suggests that there has been 3 above-average spawning events in the past 7 years (Figure 57), suggesting that these year classes will support the fishery over the next 1–5 years.
- *Fishing pressure* — commercial catch has decreased since the most recent peak in 2011, and in 2015 was similar to the lowest levels recorded since 1978 (Figure 58). Commercial effort increased from 2009 to 2014, but decreased in 2015, and was well below historical peaks in the late 1980s and early 1990s (Figure 59). Length frequency indicators collected by both recreational fishers (Figure 60), commercial mesh (Figure 61) and from the Bream Classic Fishing Competition (Figure 62) are relatively stable, although the research angler length composition post 2009 appears to be lacking the larger fish that were present in most years prior (Figure 60).

On the basis of the evidence provided above, the Gippsland Lakes black bream stock is classified as **sustainable** (Table 1).

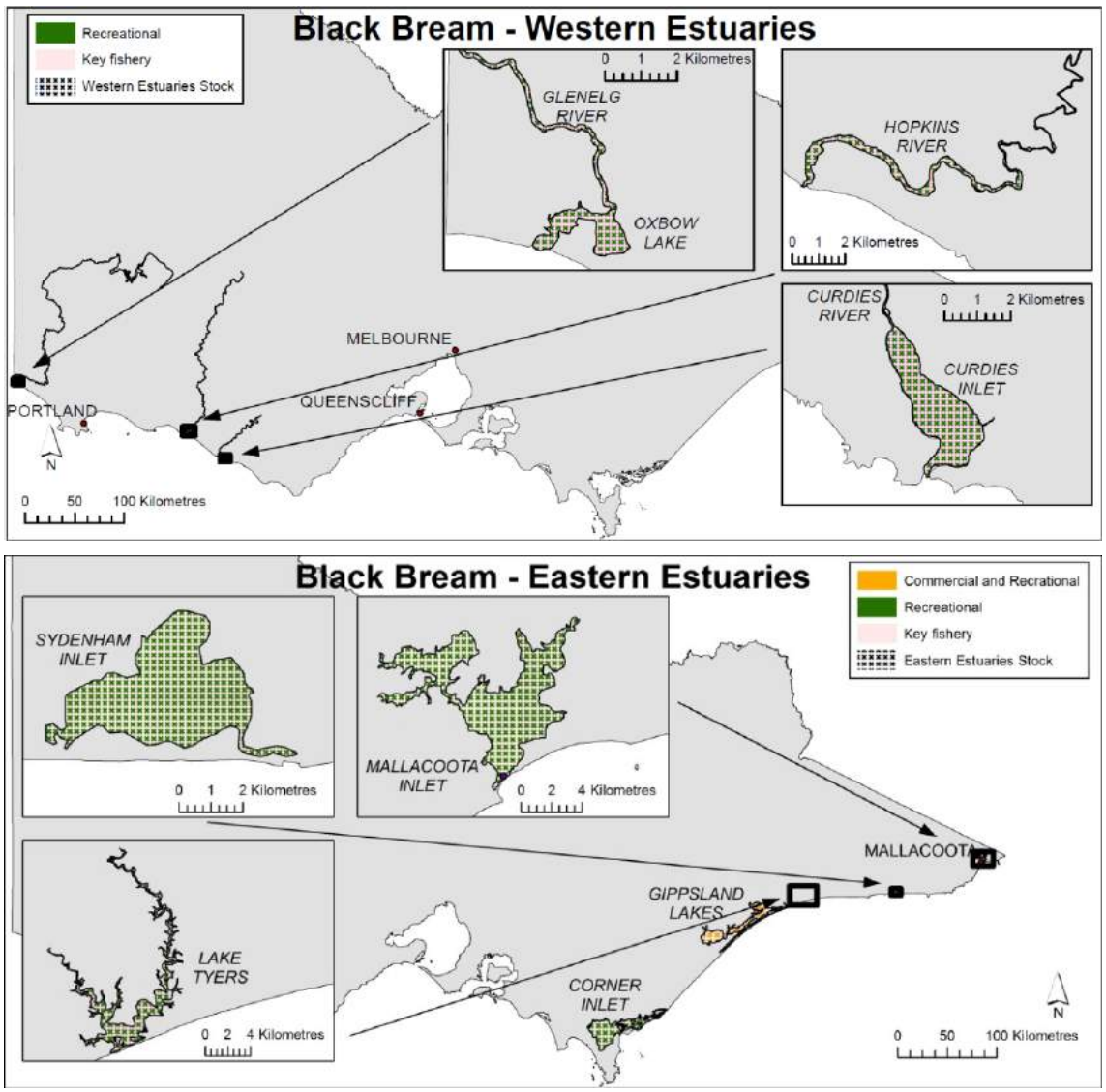


Figure 55. Victorian black bream stocks/spatial management units for western and eastern Victoria.

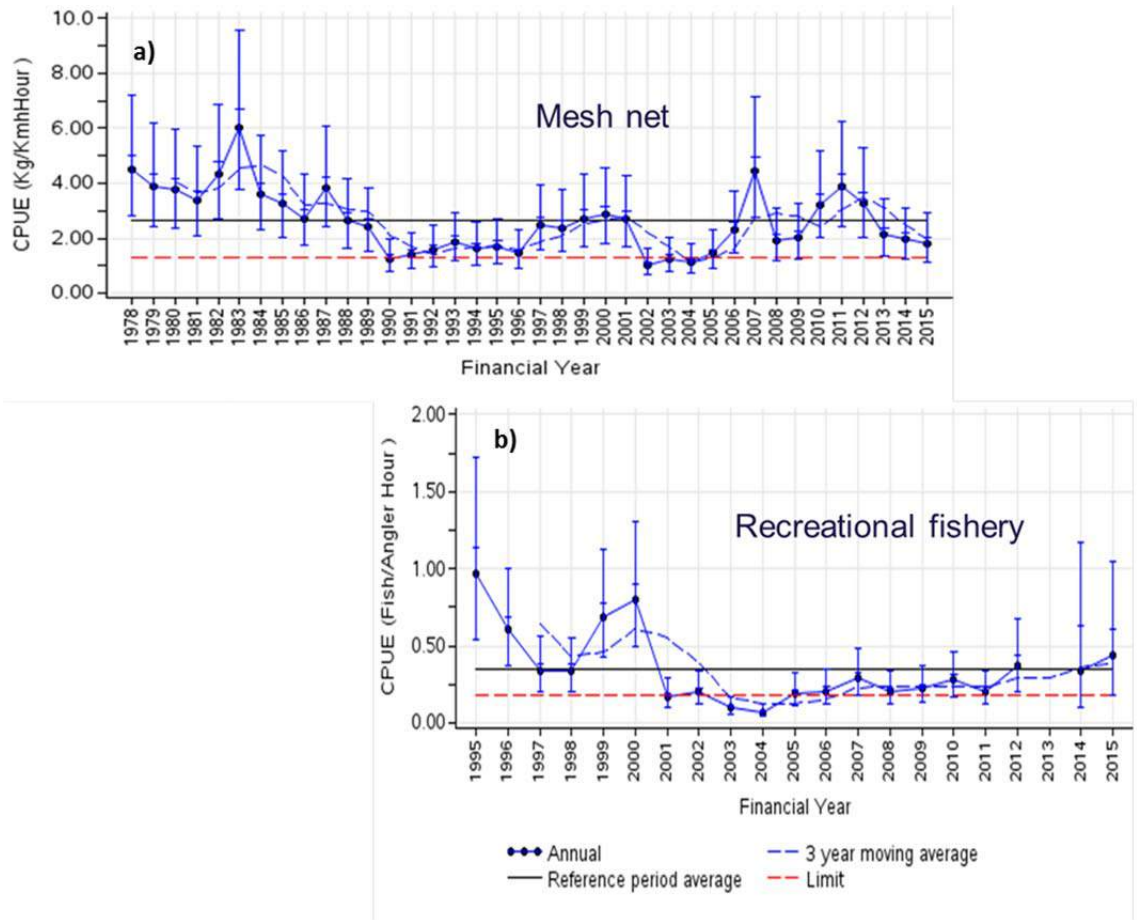


Figure 56. Gippsland Lakes CPUE (standardised) of a) commercial mesh-net catches and b) recreational fishing catches.

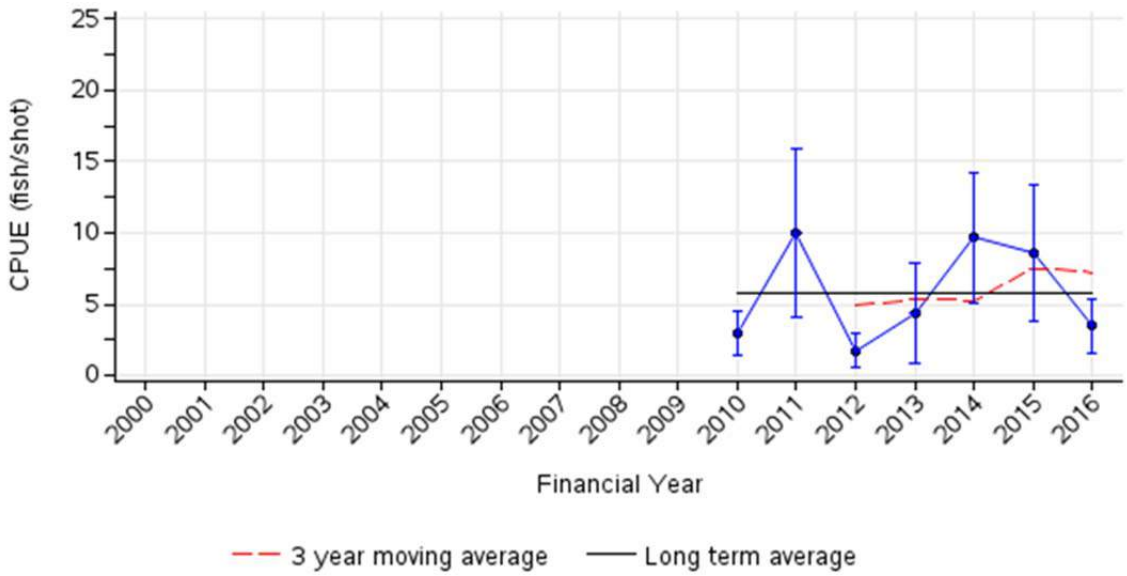


Figure 57. Gippsland Lakes CPUE (±95% CL) for pre-recruit black bream (0+ age) from fishery independent surveys (2010–2016).

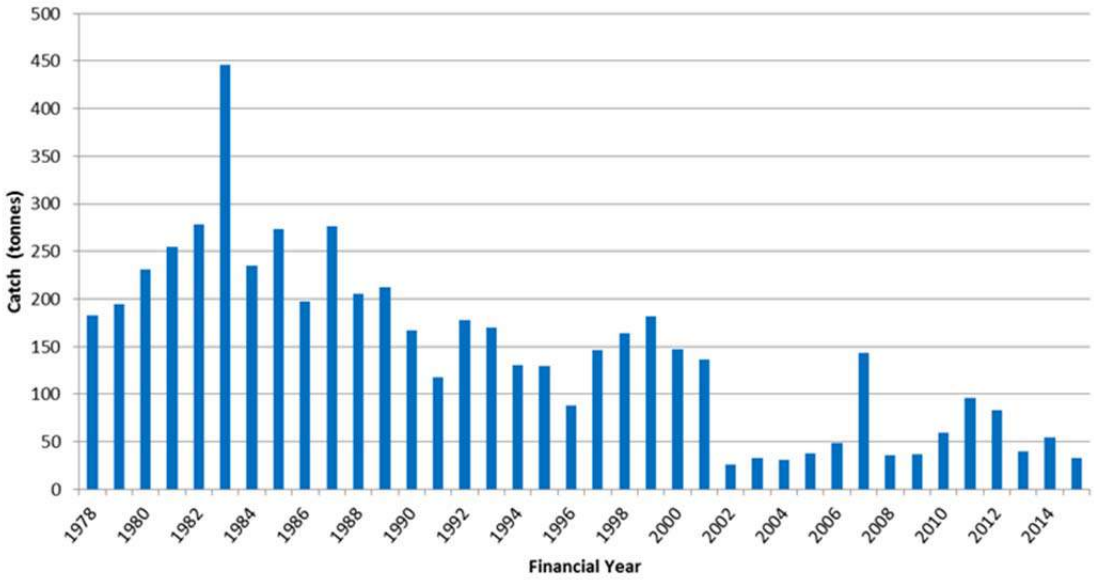


Figure 58. Commercial mesh-net catches of black bream from the Gippsland Lakes (1978–2015).

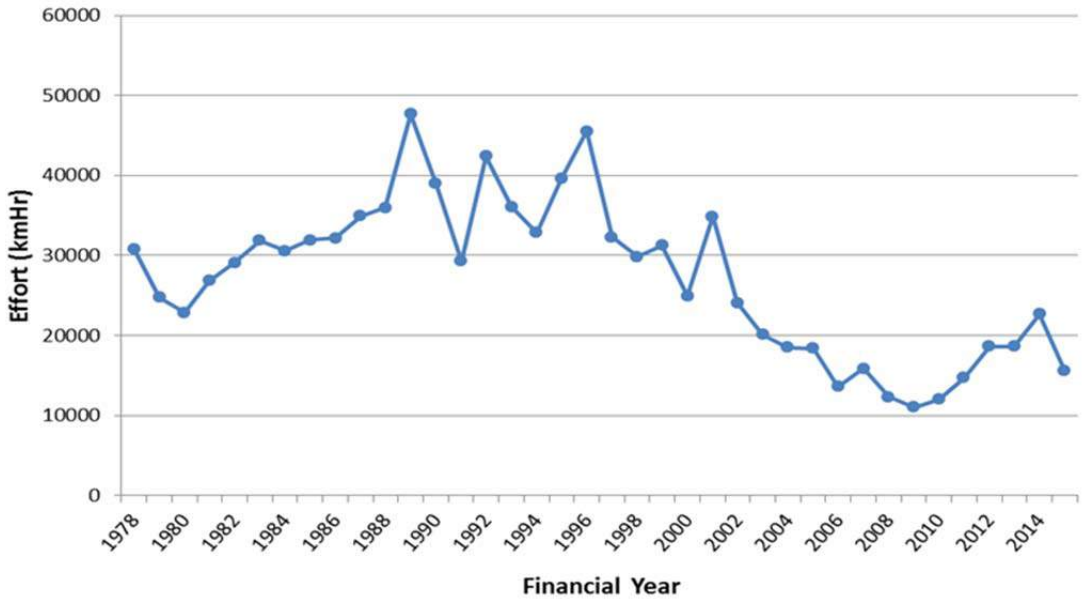


Figure 59. Commercial mesh-net effort from the Gippsland Lakes (1978–2015).

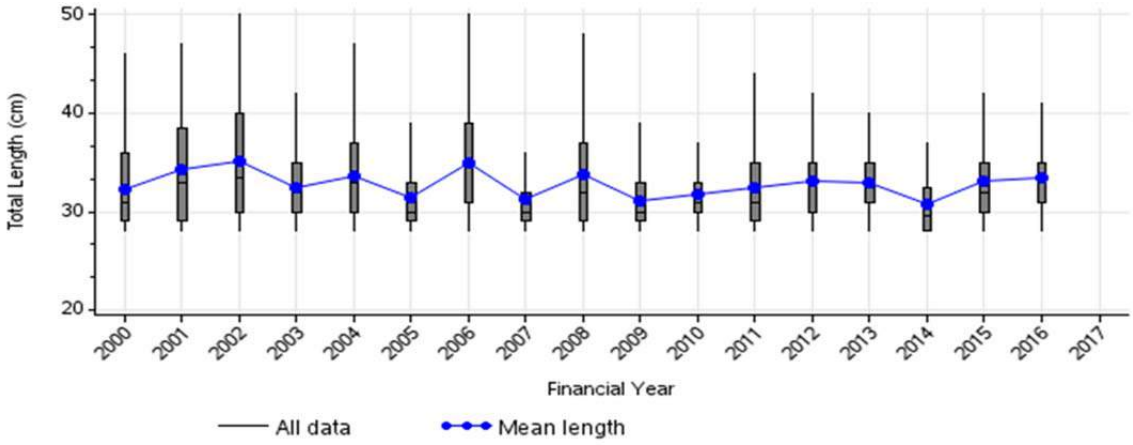


Figure 60. Size composition (LML and above) of black bream sampled by research anglers fishing the Gippsland Lakes fishery (2000–2016).

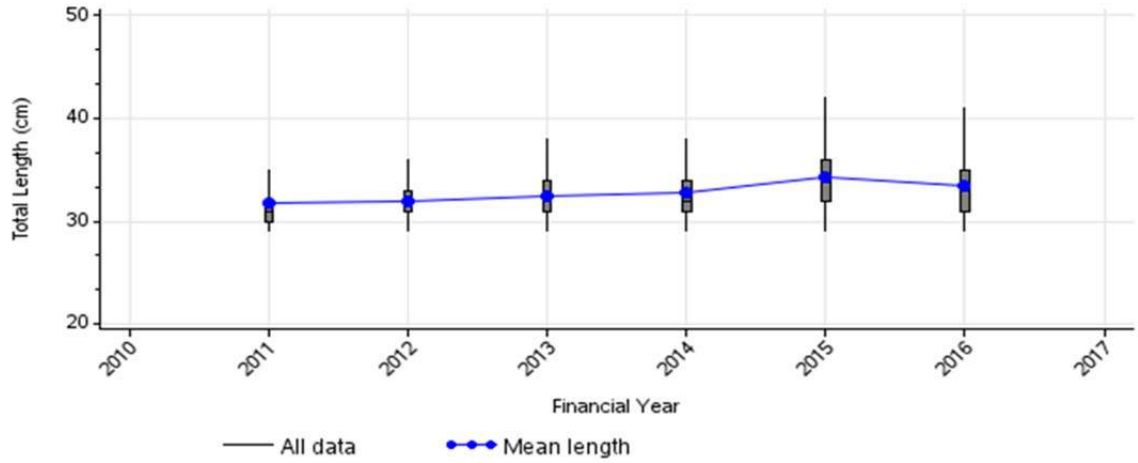


Figure 61. Size composition of black bream harvested by commercial mesh-nets (M4) from the Gippsland Lakes fishery (2011–2016).

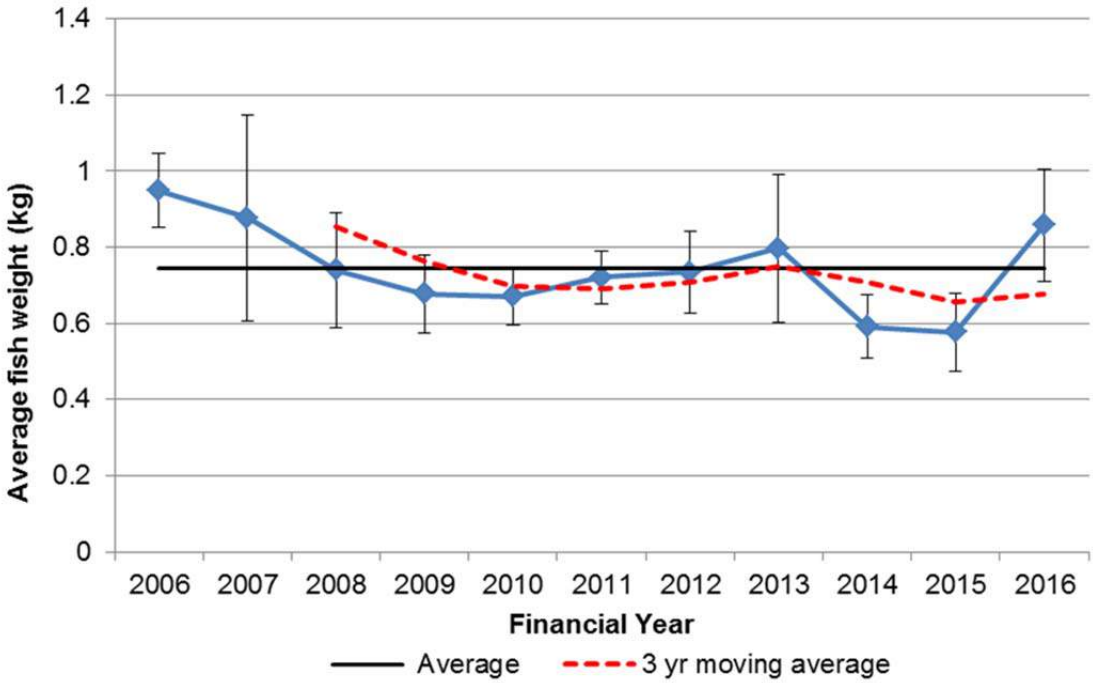


Figure 62. Average weight of black bream (±95% CL) weighed in by recreational anglers participating in the Gippsland Lakes Bream Classic fishing competition (2006–2016).

Glenelg River

The status of stock biomass and impact of fishing pressure was evaluated using CPUE and size compostion from fishers paticipating in an angler fishing diary program. There is no commercial fishing for black bream in the Glenelg River.

This review found:

- *Biomass* — CPUE was above the reference level in 2015, and has been relatively stable since an increase in 2007 (Figure 63).
- *Fishing pressure* — length frequency has varied over time. While length composition has been stable since 2011, the mean and maximum sizes are lower than reported in the late 1990s and early 2000s (Figure 64).

On the basis of the evidence provided the Glenelg River bream stock is classified as **sustainable** (Table 1).

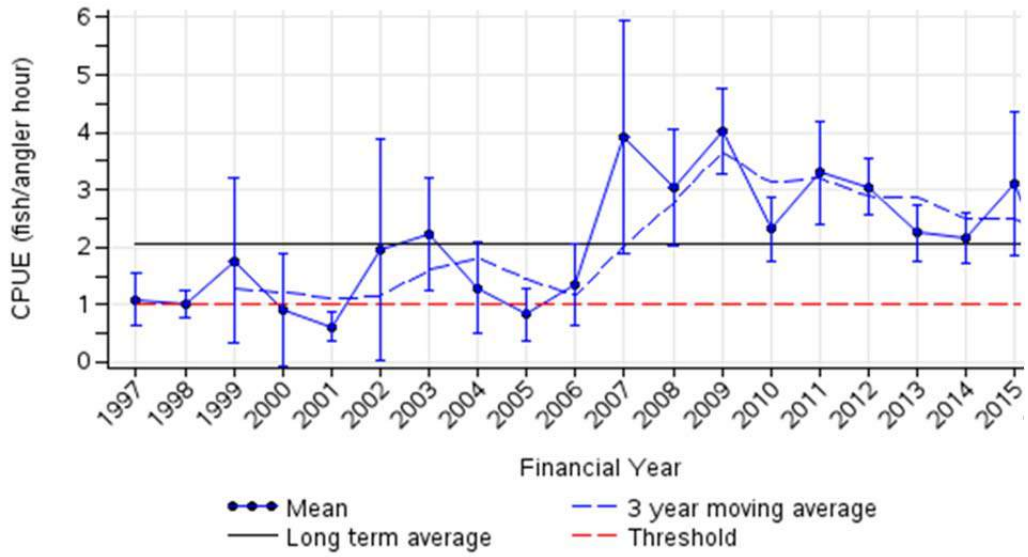


Figure 63. CPUE (±95% CL) for black bream caught by fishing diary program anglers fishing in the Glenelg River (1997–2015).

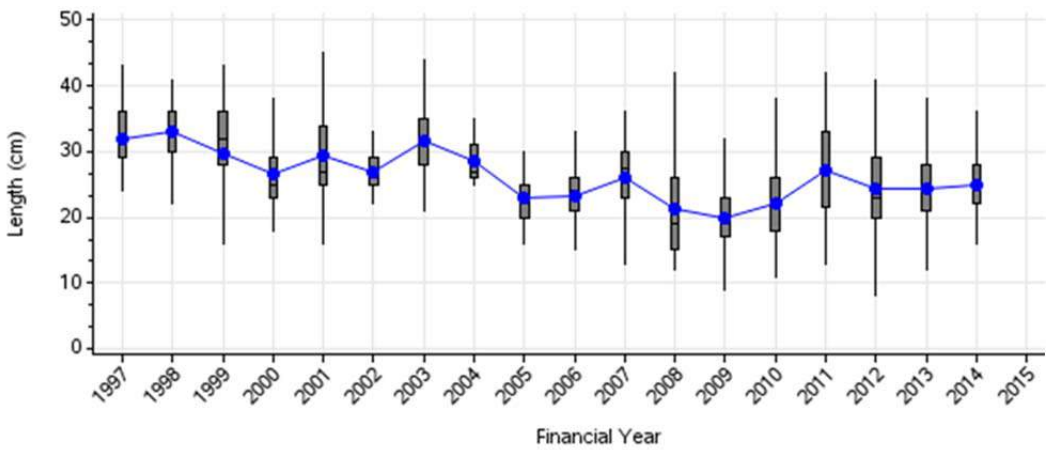


Figure 64. Size composition of black bream sampled by diary program anglers fishing the Glenelg River (1997–2014).

Lake Tyers

The status of stock biomass and impact of fishing pressure was evaluated using CPUE and size composition data from fishers participating in an angler diary program. Thers is no commercial fishery in Lake Tyers.

This assessment found:

- *Biomass* — average CPUE trends for angler diaries are above the reference level (Figure 65).
- Fishing pressure — length frequency indicators are stable. Although the maximum length of fish has reduced in recent years, it is still around 40 cm TL and well above samples from the 2000s (Figure 66).

On the basis of the evidence provided above the Lake Tyers bream stock is classified as **sustainable** (Table 1).

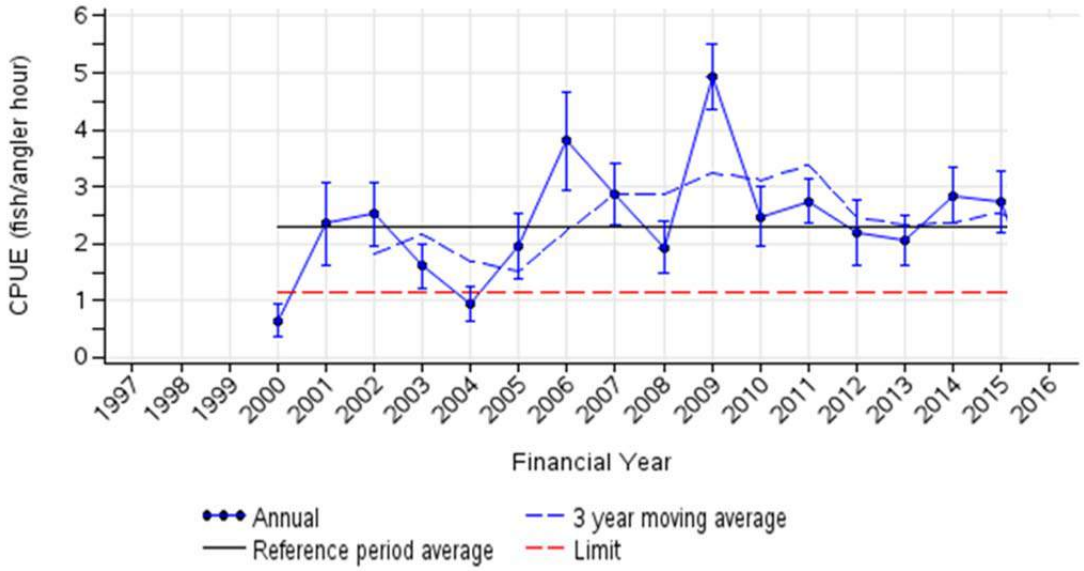


Figure 65. CPUE (±95% CL) for black bream caught by diary program anglers fishing in Lake Tyers (1997–2015).

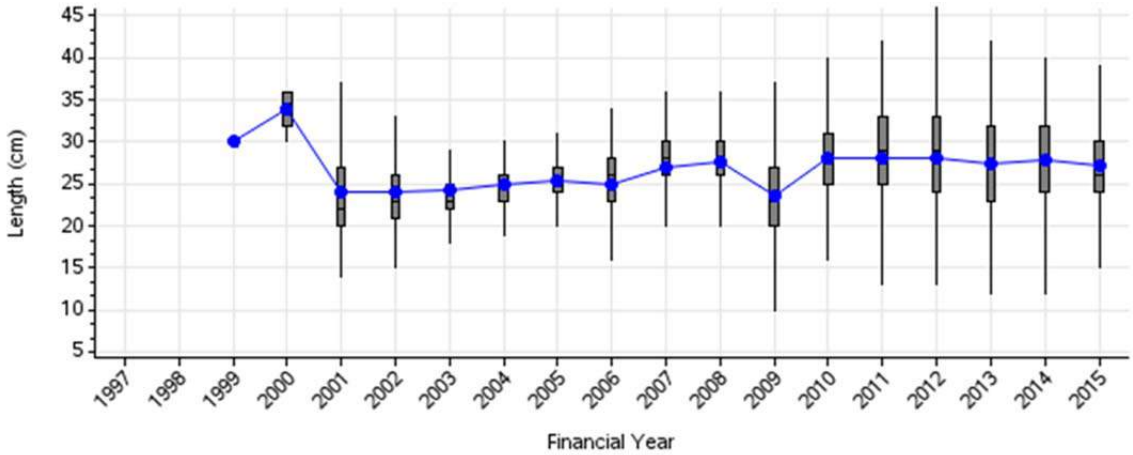


Figure 66. Size composition of black bream sampled by diary program anglers fishing in Lake Tyers (1997–2014).

Southern Garfish (*Hyporhamphus melanochir*): State-wide

Stock Structure and Biology

The Victorian southern sea garfish population is considered to comprise a single stock that is genetically similar to southern sea garfish in the South Australian gulfs but is distinct from the Tasmanian stock.

Garfish can live to 12 years and grow to 46 cm total length (TL). Size at maturity (50 per cent) is reached at approximately 19 months of age and 21 cm TL. There is no LML in Victoria. Garfish have a low fecundity and a medium growth rate (L_∞ = 33 cm, K = 0.3). The main spawning period is October to March. Bays and inlets are the main spawning areas.

Management / Assessment Unit

Southern sea garfish support recreational and commercial fisheries, with the larger fisheries located in Port Phillip Bay (commercial and recreational) and Corner Inlet (commercial and recreational). Smaller fisheries are located in Western Port (recreational) and the Gippsland Lakes (commercial and recreational). This report considers Victorian southern garfish as a single stock (Figure 67).

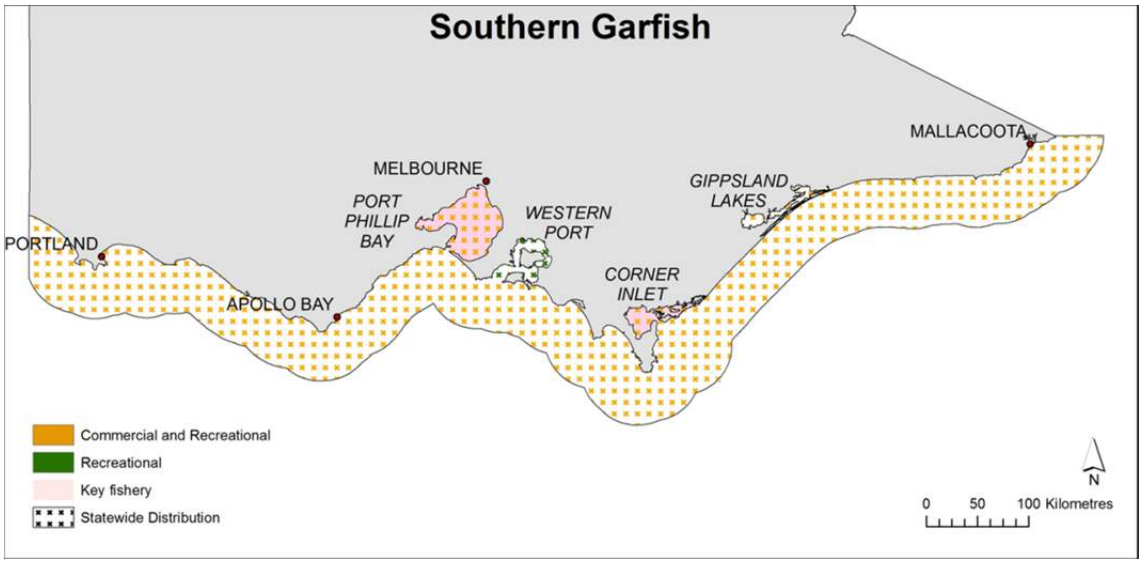


Figure 67. State-wide stock/spatial management unit for the Victorian southern garfish fisheries.

Assessment Summary

State-wide stock

For this assessment the status of the southern sea garfish stock was evaluated using nominal CPUE for commercial haul seine harvests in Corner Inlet and Port Phillip Bay. Recreational fishery data was not available. The performance of the CPUE biomass proxies were assessed in relation to the specified reference level and limit points using a default reference period (1979–2015).

The impact of fishing pressure was assessed using time series of commerial catch and effort data.

This assessment found:

- *Biomass* — commercial haul seine CPUE trends for both Corner Inlet (Figure 68) and Port Phillip Bay (Figure 69) southern sea garfish show long-term declines and are below the reference level for both locations. For Port Phillip Bay in the most recent three years, CPUE was below the limit point. This has only occurred in over one other period, in 1996 and 1997 (Figure 69).
- *Fishing pressure* — there have been decreasing commercial catches from Corner Inlet since 2000 (Figure 70). Annual haul seine fishing effort in Corner Inlet has also declined from a peak of 4,000 shots/year in 1999, to 2,000–2,500 shots/year in recent years (Figure 71). Despite the reduction in both catch and effort, CPUE has continued to decline. Garfish catches in Port Phillip Bay were higher from 1979 to the mid-1990s than they have been over the recent 10–15 years (Figure 72). There has been a long-term decline in southern sea garfish haul seine effort in Port Phillip Bay from peaks of about 4,000 shots/year in the late 1970s and mid-1980s to 1,500 shots/year in 2015 (Figure 73). Effort in Port Phillip Bay will decline to negligible levels over the next 5 years as all netting is phased out of Port Phillip Bay. However, despite declining catch and effort, CPUE has continued to decline.

On the basis of the evidence provided, the Victorian component of the Victorian garfish stock is classified as a **transitional depleting** stock (Table 1).

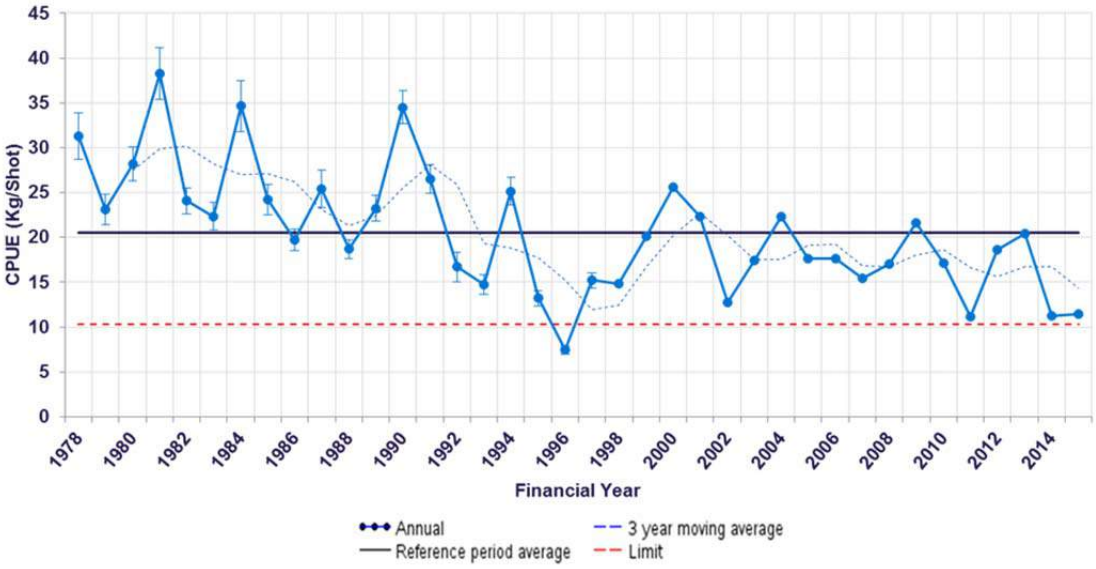


Figure 68. Southern sea garfish CPUE (±95% CL) for the Corner Inlet haul seine fishery (1978–2015).

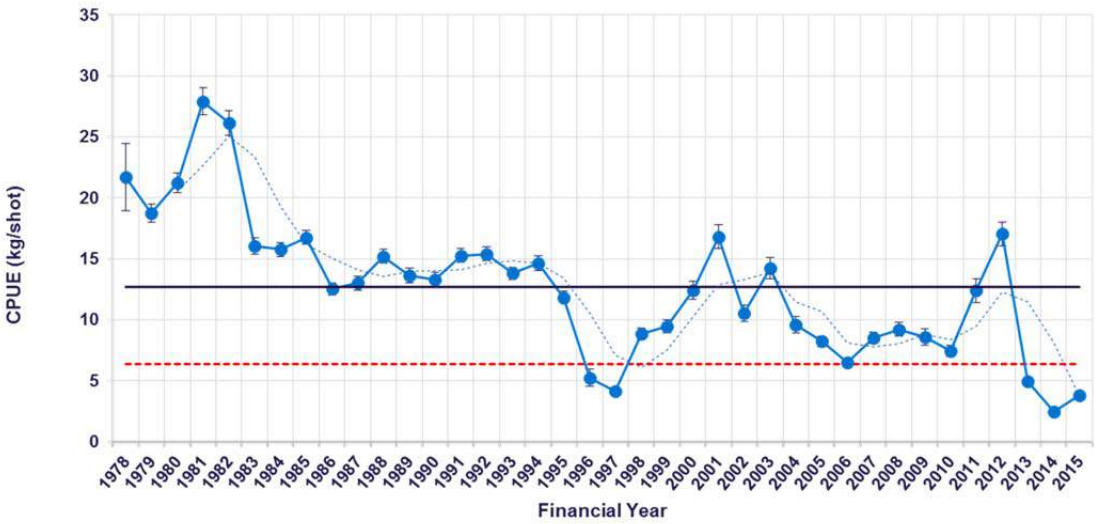


Figure 69. Southern sea garfish CPUE (±95% CL) for the Port Phillip Bay haul seine fishery (1978–2015).

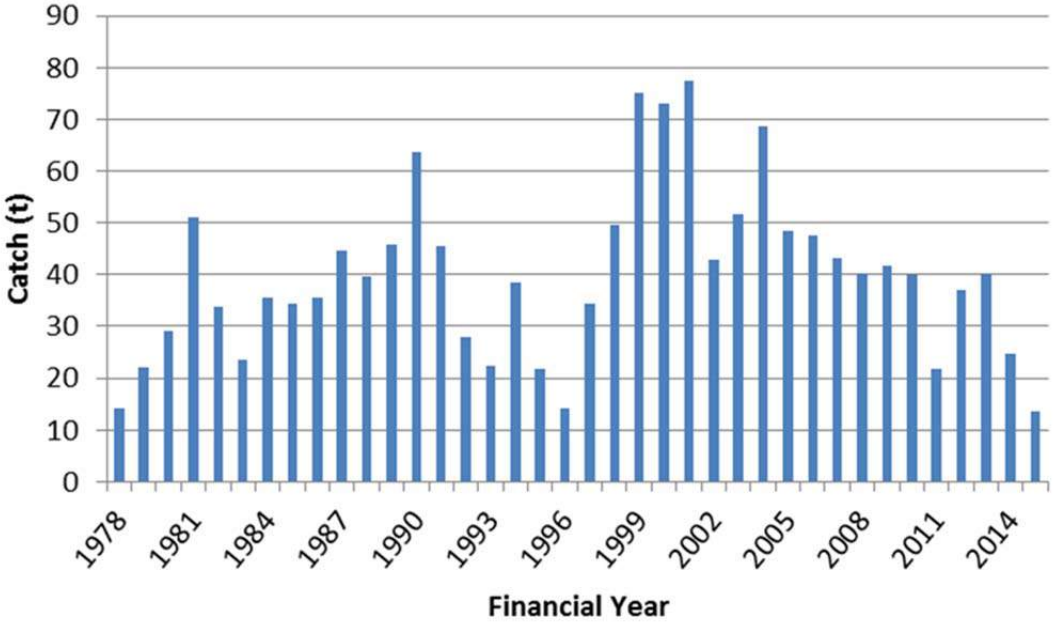


Figure 70. Commercial harvest of southern sea garfish from Corner Inlet (1978–2015).

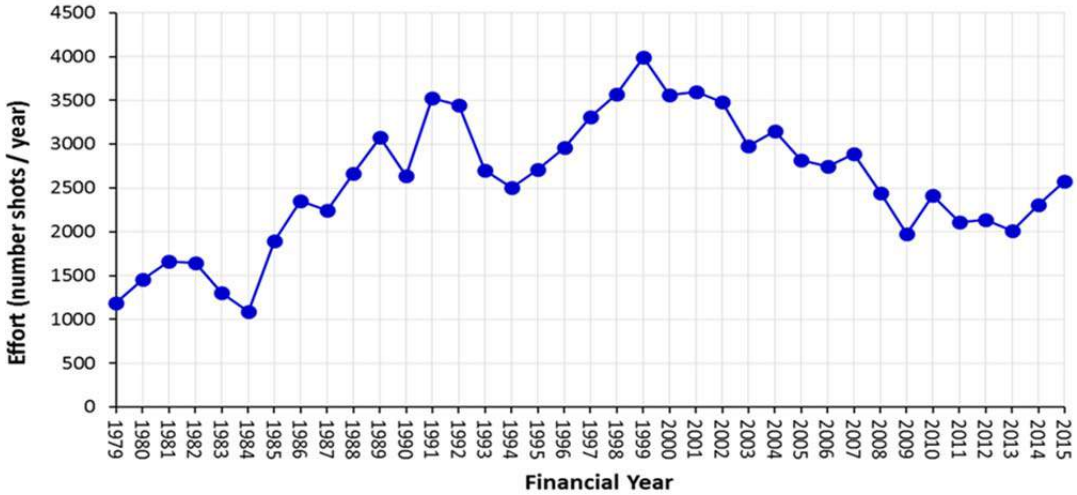


Figure 71. Haul seine effort for the commercial southern sea garfish fishery from Corner Inlet (1978–2015).

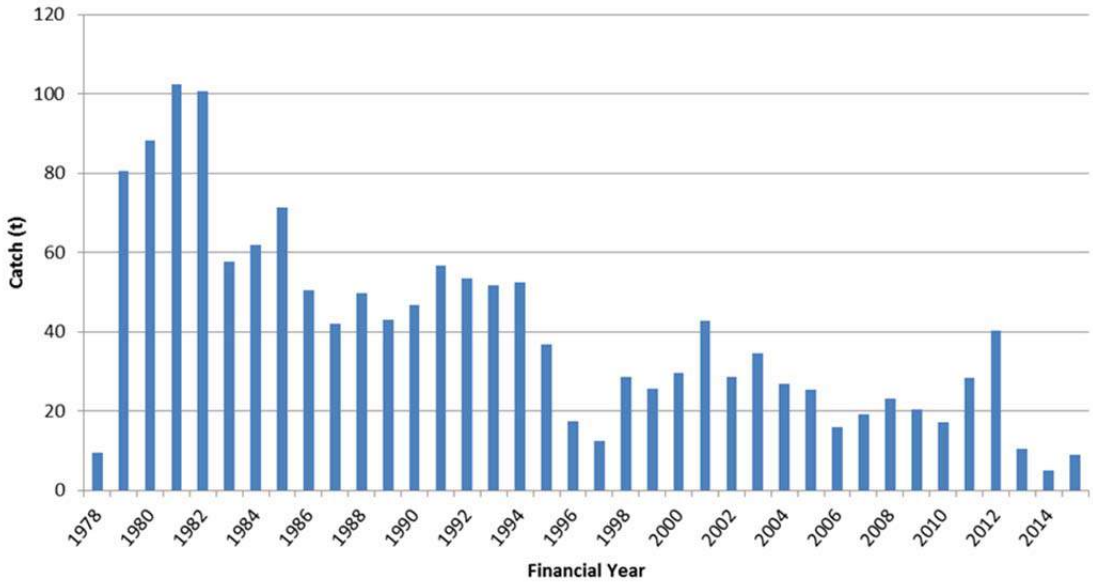


Figure 72. Commercial catches of southern sea garfish from Port Phillip Bay (1978–2015).

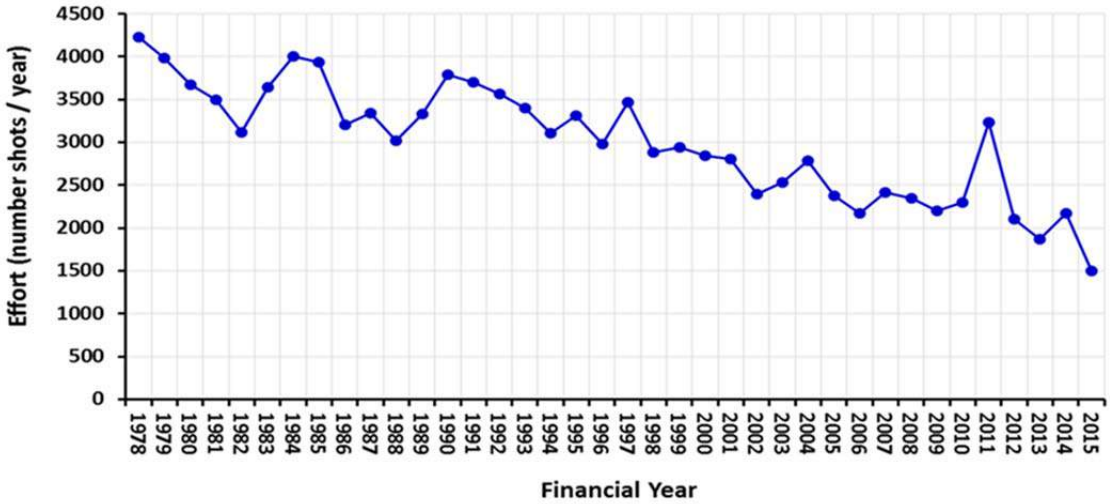


Figure 73. Haul seine effort for the commercial southern sea garfish fishery from Port Phillip Bay (1978–2015).

Pipi (*Donax deltoides*): State-wide

Stock Structure and Biology

Genetically, the Victorian pipi population comprises of at least two biological stocks either side of Bass Strait. There is no biological information available for Victorian pipi. In South Australia, pipi can live to 3–5 years of age and grow to 61 mm SL (shell length) compared with New South Wales populations, where they live to 1–2 years of age and grow to 75 mm SL. In South Australia, maturity (50 per cent) is reached at 10 months of age and 28 mm SL and in New South Wales maturity is reached at 1 year of age and 37 mm SL. Pipi are highly fecund and are widely dispersed in the larval stage.

Management / Assessment Unit

Victorian pipi stocks support recreational and commercial fisheries in several main areas. Commercial fisheries occur mainly in Discovery Bay and Venus Bay and are restricted to 4 areas across the state. Recreational fisheries occur across the state including coastal beaches, bays and inlets, although the predominant recreational harvest areas are also at Venus and Discovery Bay (Figure 74). This report considers Victorian pipi as a single stock.

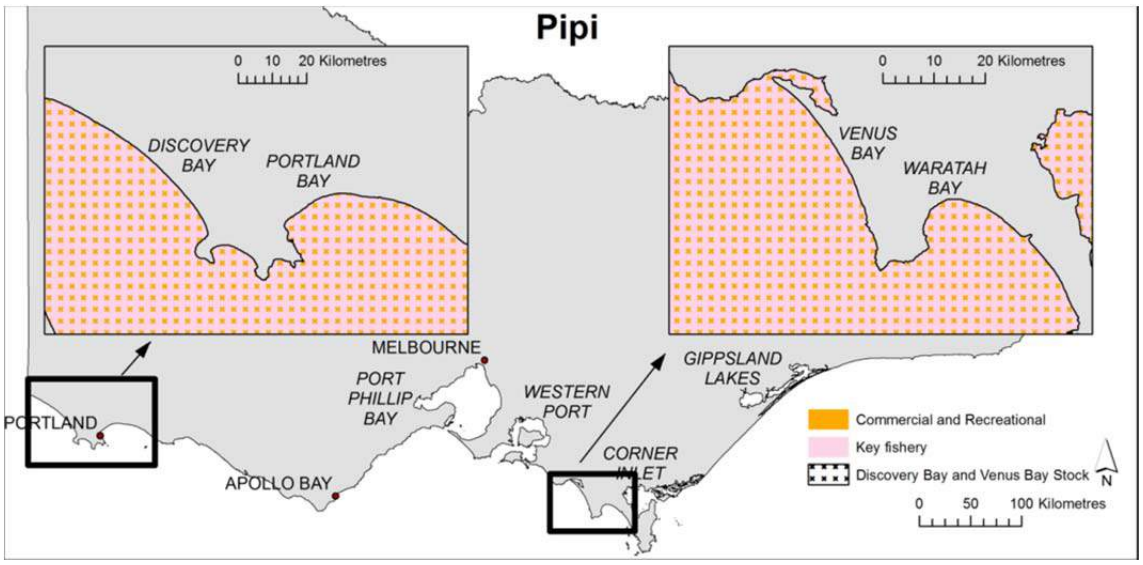


Figure 74. State-wide stock/spatial management units for the Victorian pipi fisheries.

Assessment Summary

State-wide

For this assessment the status of the pipi stock was evaluated using nominal CPUE trends for the commercial fishery based in the Discovery Bay area. Recreational fishery data was not avaliable. The performance of the CPUE biomass proxy was assessed in relation to the specified reference level and limit points using the reference period 1998–2015.

The impact of fishing pressure was assessed using time series of commerial catch and effort data.

This assessment found:

- *Biomass* — commercial fishery CPUE trends in the recent 5 years have been above the reference level (Figure 75).
- *Fishing pressure* —commercial catches in the last 5 years have been between 50 and 90 tonnes (Figure 76). There was very little catch recorded for the fishery prior to 2011 and it is likely that this fishery is still adjusting to targeted commercial fishing. Annual fishing effort has been stable over the last 4 years (Figure 77).

On the basis of the evidence provided, the Victorian component of the Victorian stock stock is classified as an **undefined stock** (Table 1).

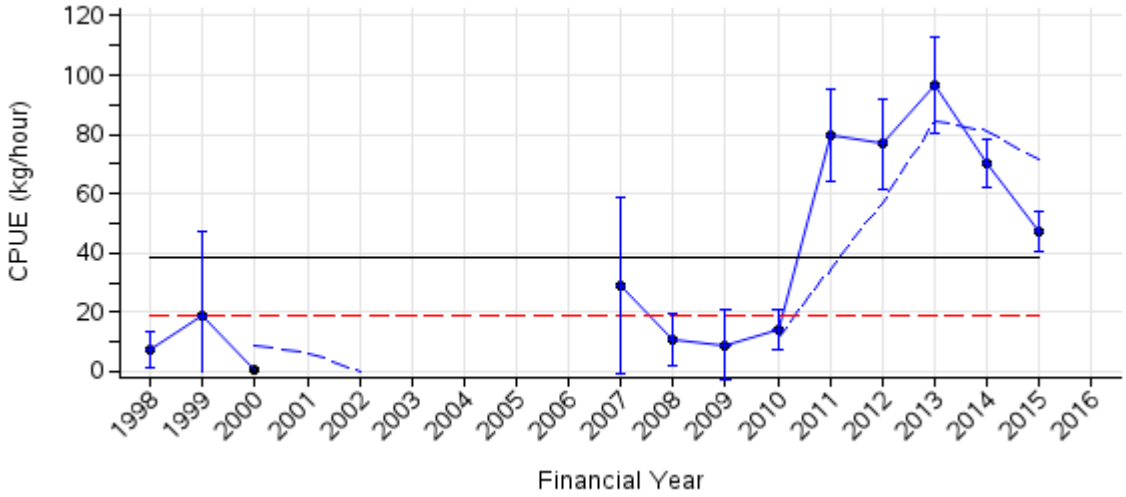


Figure 75. CPUE (±95% CL) for the commercial pipi fishery in the Discovery Bay area (1998–2015).

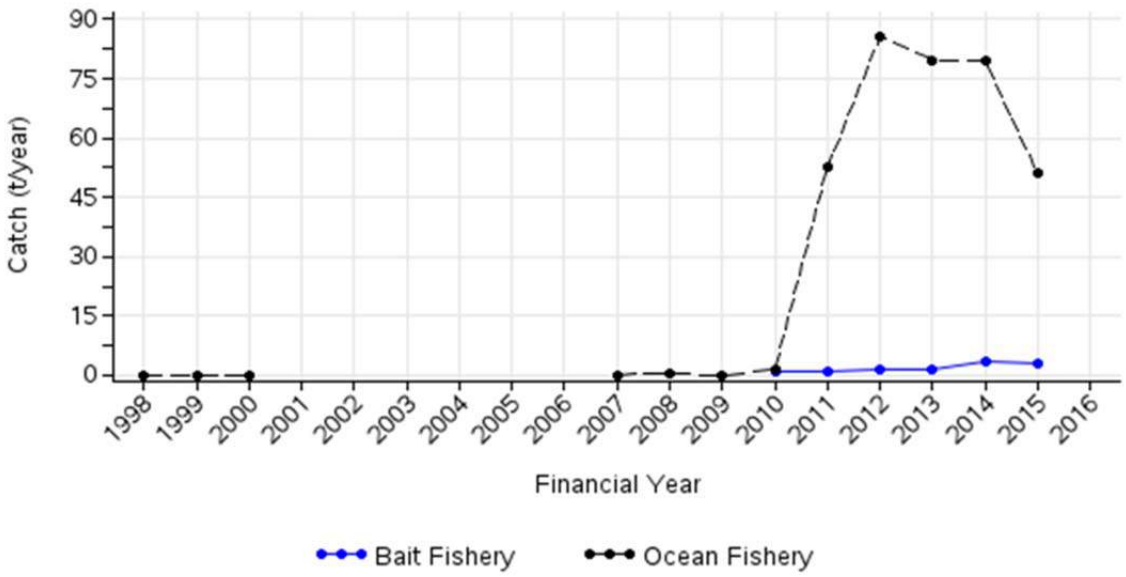


Figure 76. Total state-wide commercial catches of pipi by the bait and ocean access licenced commercial fisheries (1998–2015).

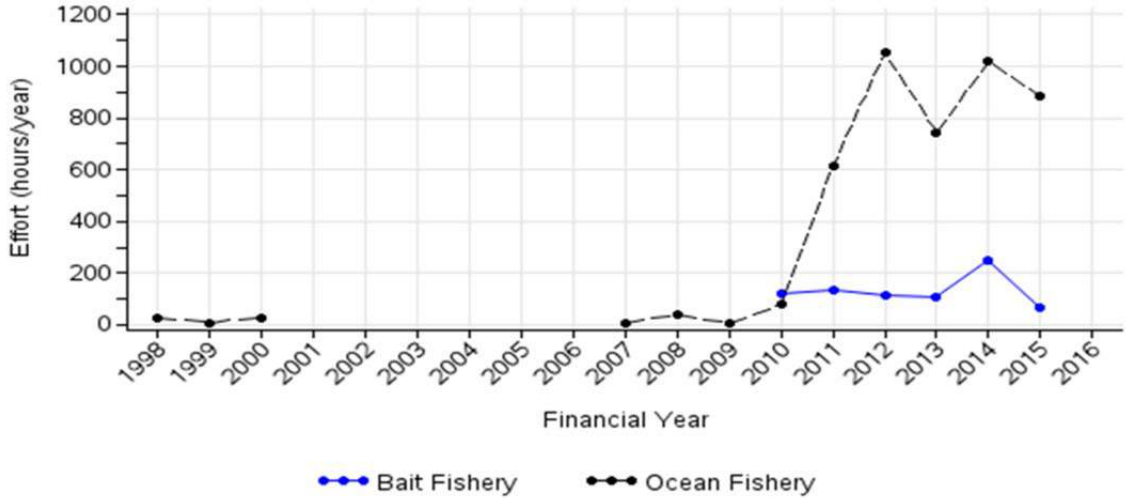


Figure 77. Commercial fishing effort for pipi by the bait and ocean access licenced commercial fisheries (1978–2015).

Yellow-Eye Mullet (*Aldrichetta forsteri*): State-wide

Stock Structure and Biology

Genetically, the Victorian yellow-eye mullet population is considered part of a broader eastern Australian stock. Yellow-eye mullet live to ten years and grow to 44 cm TL. Maturity (50 per cent) is reached at 2 to 3 years of age and 20–26 cm TL. Yellow-eye mullet are highly fecund and are fast growers. The main spawning period is summer/autumn in inshore coastal regions and the larval stages are widely dispersed.

Management / Assessment Unit

The Victorian component of the eastern Australian yellow-eye mullet stock supports recreational and commercial fisheries. Commercial fisheries occur mainly in Port Phillip Bay, Corner Inlet and the Gippsland Lakes. This report considers Victorian yellow-eye mullet as single stock (Figure 78).

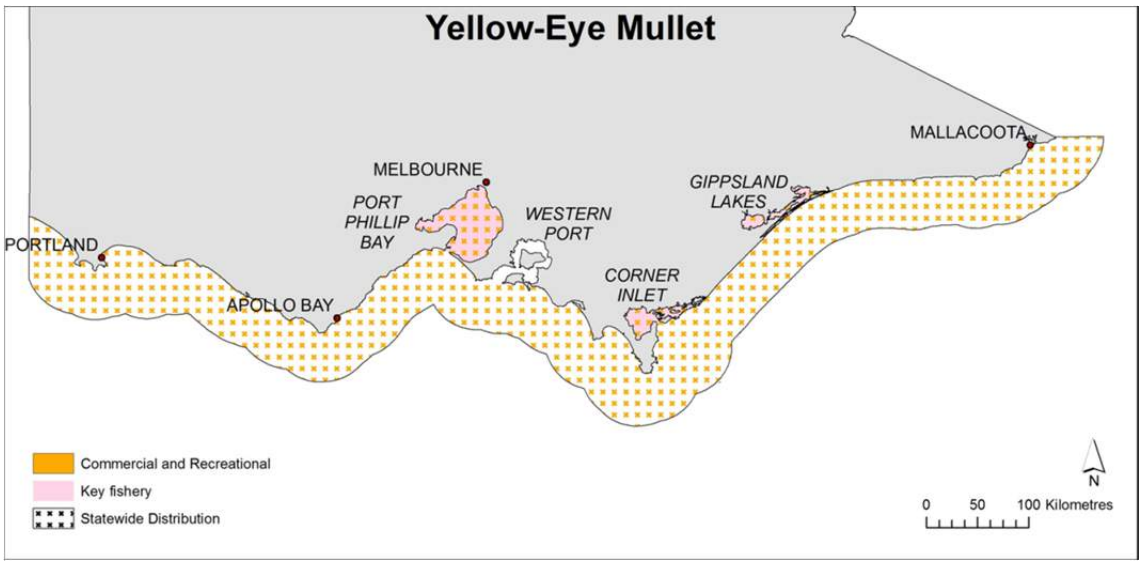


Figure 78. State-wide stock/spatial management units for the Victorian yellow-eye mullet fisheries.

Assessment Summary

State-wide stock

For this assessment the status of the yellow-eye stock biomass was evaluated using nominal CPUE trends for commercial haul seine fishing in Corner Inlet, haul seine and mesh-netting in Port Phillip Bay, and for mesh-net fishing in the Gippsland Lakes. Recreational fishery data were not available. The performance of the CPUE biomass proxies was assessed in relation to the specified reference level and limit points using the default reference period 1979–2015.

The impact of fishing pressure was assessed using time series of commercial catch, and effort data.

This assessment found:

- *Biomass* — commercial haul seine and mesh-net CPUE in Port Phillip Bay declined after a peak in the mid-1980s to be consistently below the reference level by the early 2000s. Despite some stability at lower levels during the 2000s, the decline has continued in recent years, with both annual indices below the limit level 2015 (Figure 79). Haul seine CPUE in Corner Inlet (Figure 80) and mesh-net CPUE in Gippsland Lakes (Figure 81) also show long-term declining trends. The 3 year averaged haul seine CPUE in Corner Inlet was below the limit level in most of the 2000s, and despite showing a recent increase, the annual index was below the limit level in 2015 (Figure 80).
- *Fishing pressure* — Port Phillip Bay commercial catches (haul seine and mesh-net) of yellow-eye mullet have decreased since the mid-1980s from a combined peak of over 70 tonnes in 1986 to approximately 15 tonnes in 2015 (Figure 82). Haul seine effort has declined over the long-term and mesh-net effort has been variable, but generally lower than pre-2000s levels over the last decade (Figure 83). Effort with these gear types will continue to decline due to removal of commercial netting from Port Phillip Bay.

Corner Inlet commercial yellow-eye mullet catches were generally higher pre-2000s than post-2000s and display a long-term declining trend (Figure 86). Annual haul seine fishing effort in Corner Inlet has also declined from a peak of 4,000 shots in 1999 to 2,000–2,500 shots in recent years (Figure 85).

Gippsland Lakes commercial mesh-net effort is commonly directed to more highly valued species such as black bream than yellow-eye mullet. Mesh-net catches of yellow-eye mullet from the Gippsland Lakes over the last 10 years have been consistently lower than than most catches in the preceeding years (Figure 86). Commercial effort increased from 2009 to 2014, but decreased in 2015, and was well below historical peaks in the late 1980s and early 1990s (Figure 87).

On the basis of the evidence provided , the Victorian component of the yellow-eye mullet population is classified as a **undefined stock** (Table 1).

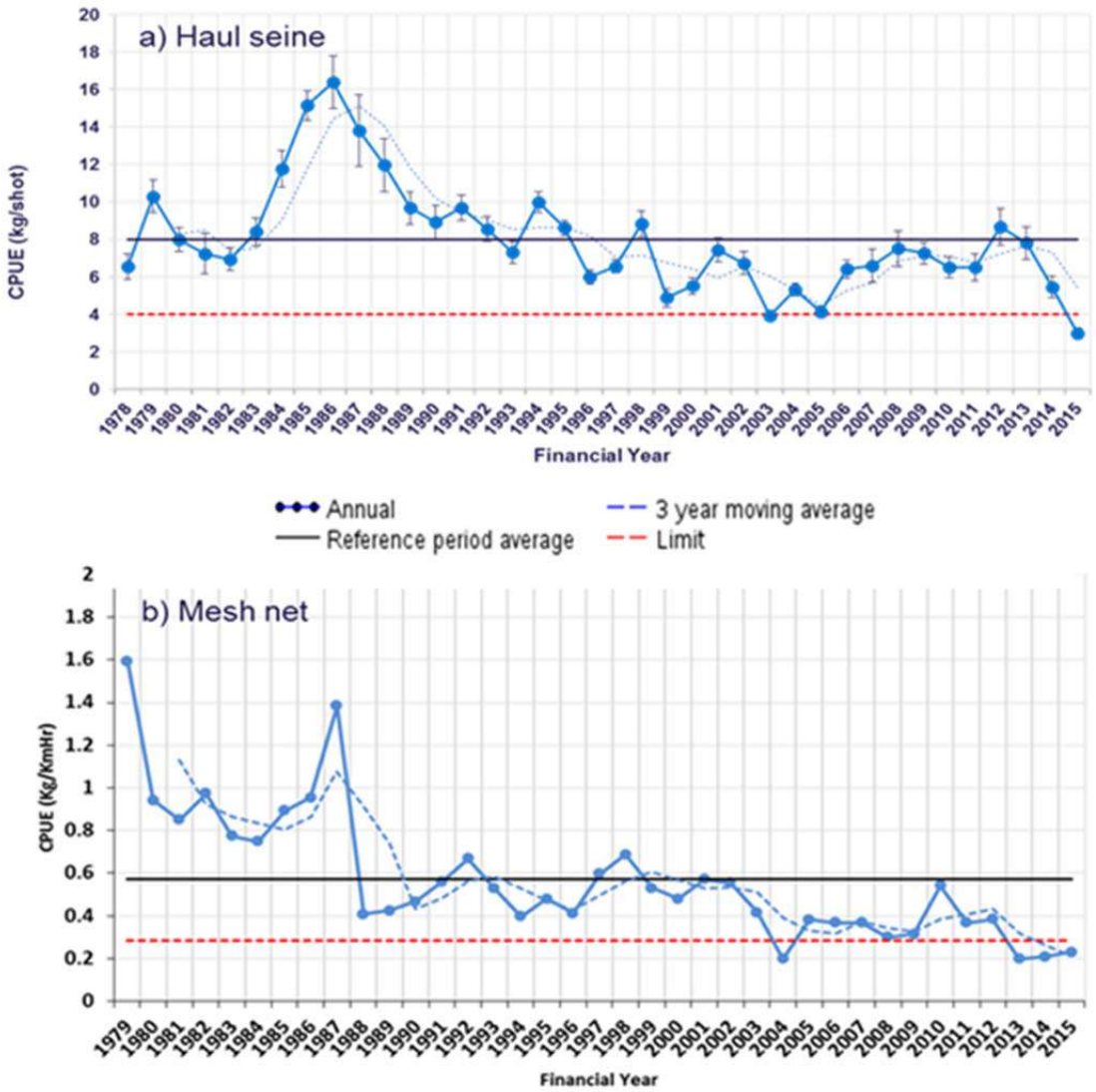


Figure 79. Yellow-eye mullet CPUE (±95% CL) for the Port Phillip Bay commercial fishery by gear type a) haul seine and b) mesh-net (1978–2015).

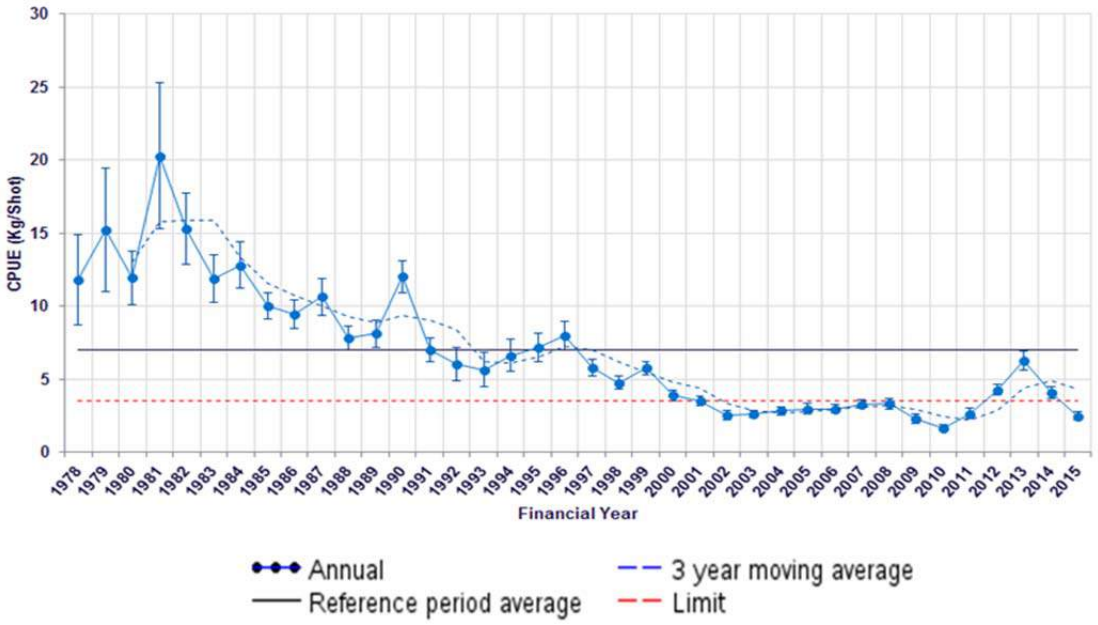


Figure 80. Yellow-eye mullet CPUE (±95% CL) for the Corner Inlet commercial haul seine fishery (1978–2015).

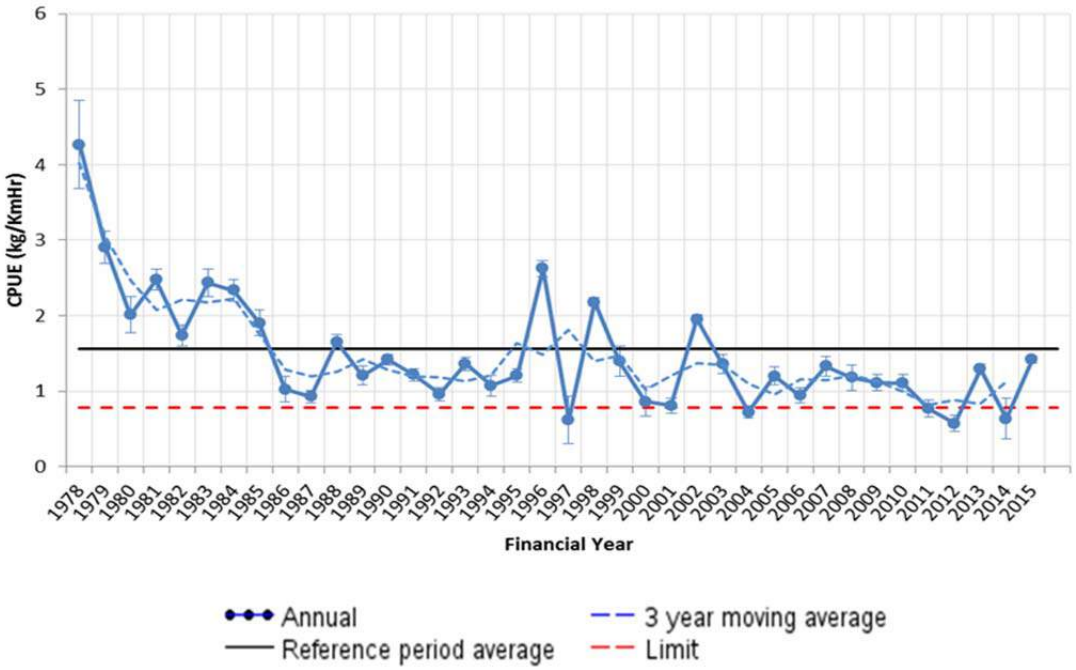


Figure 81. Yellow-eye mullet CPUE (±95% CL) for the Gippsland Lakes commercial mesh-net fishery (1978–2015).

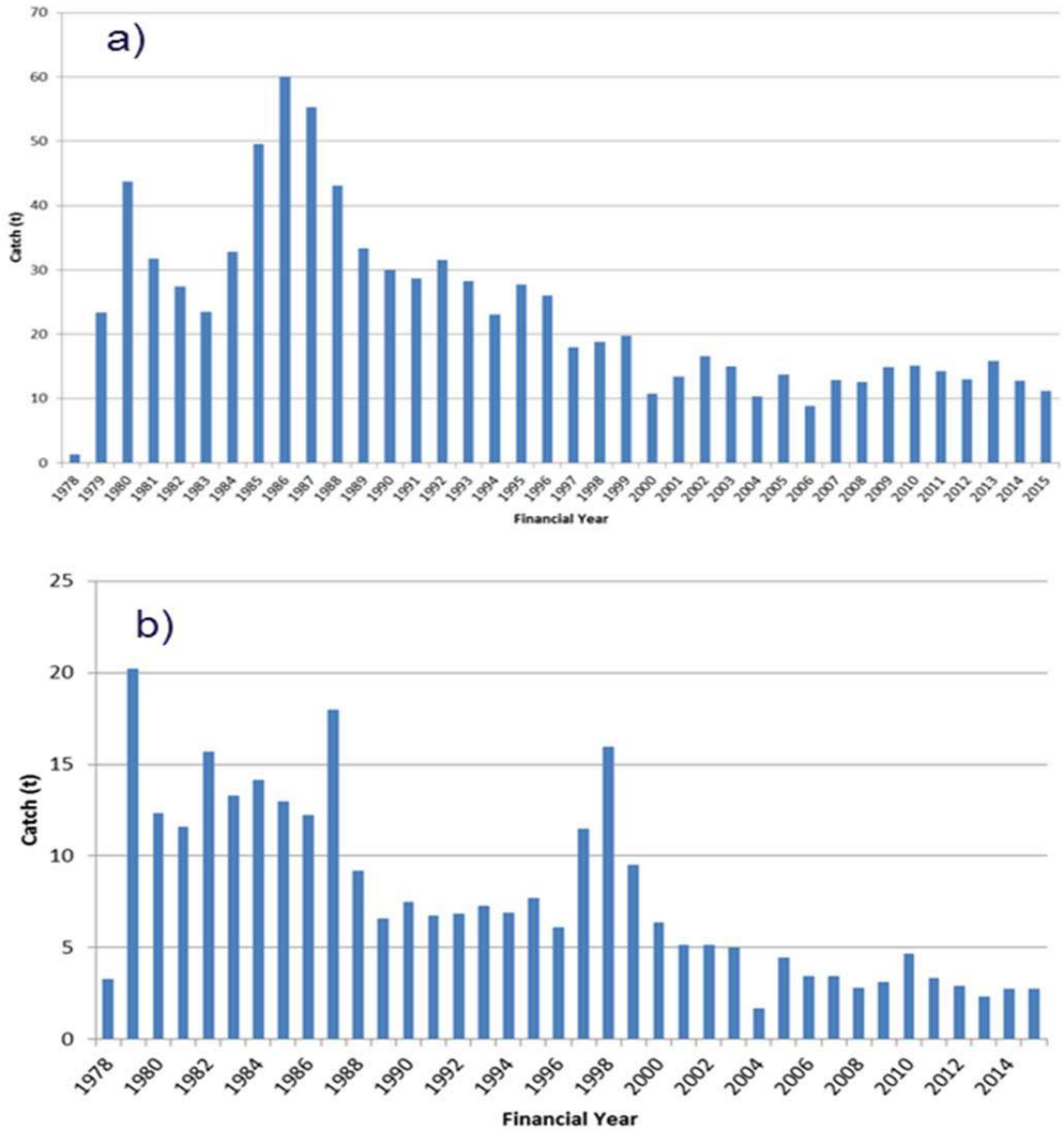


Figure 82. Commercial catches of yellow-eye mullet from Port Phillip Bay by gear type a) haul seine and b) mesh-net (1978–2015).

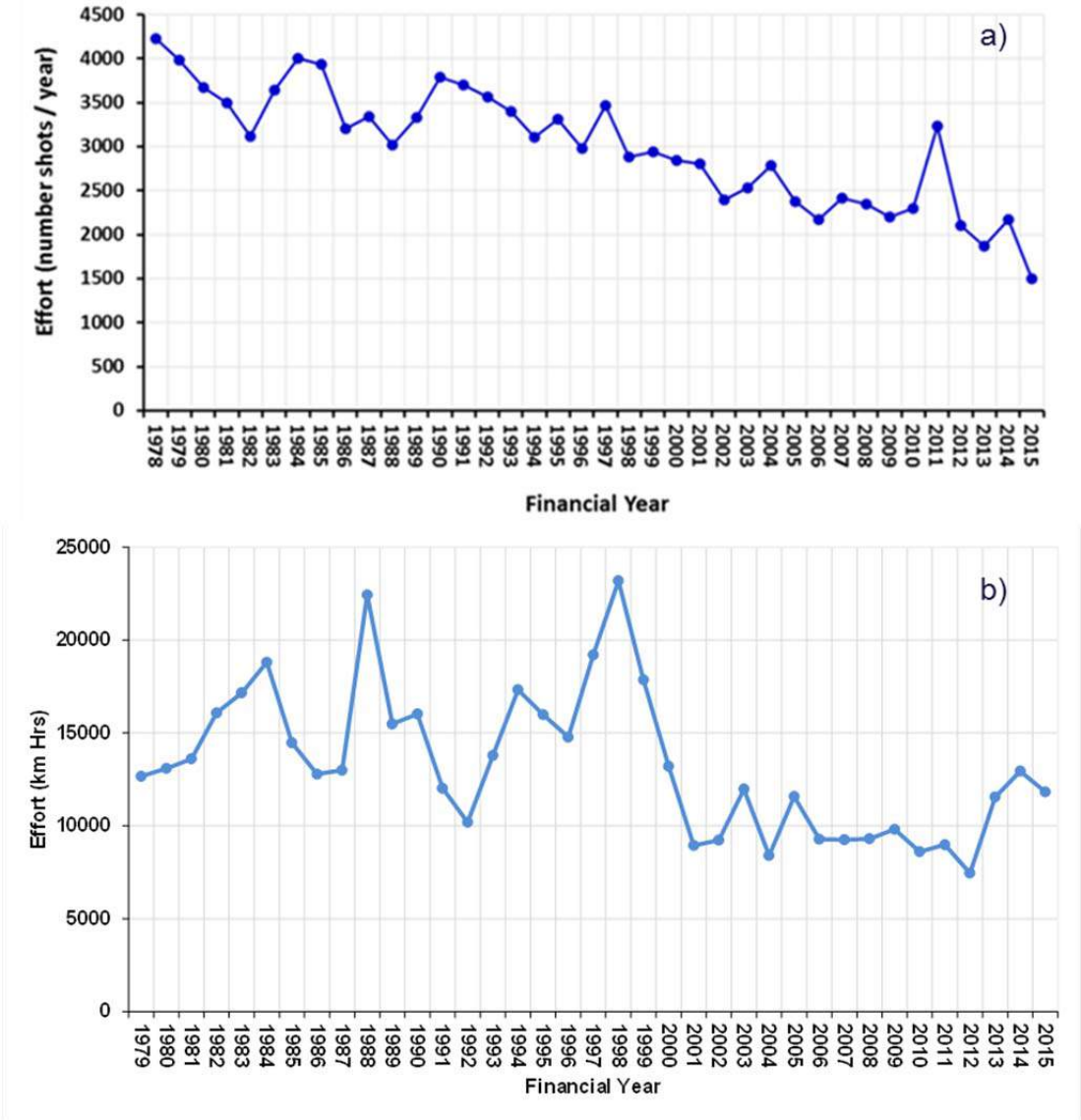


Figure 83. Yellow-eye mullet commercial fishery effort from Port Phillip Bay by gear type a) haul seine and b) mesh-net, in the Port Phillip Bay commercial fishery (1978–2015) (note: mesh-net effort in 1978 is not reported due to data reliability issues).

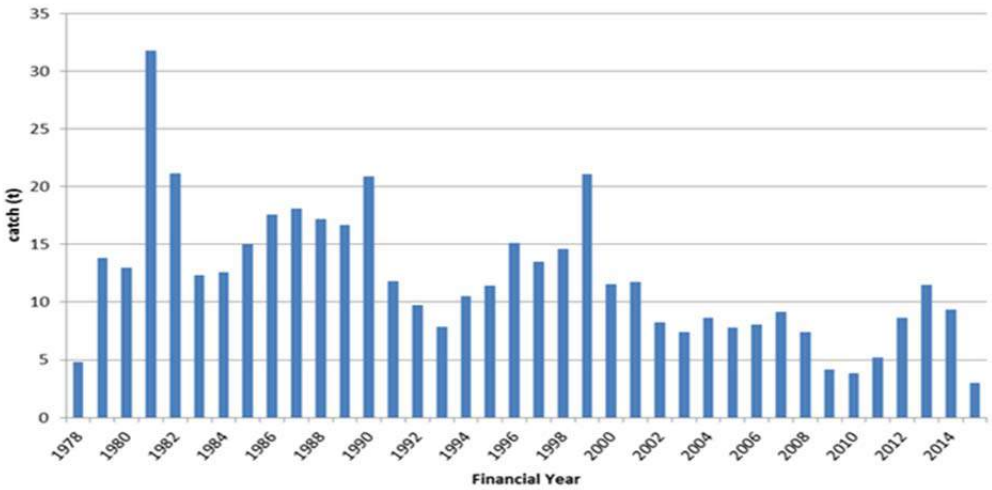


Figure 84. Commercial haul seine catches of yellow-eye mullet from Corner Inlet (1978–2015).

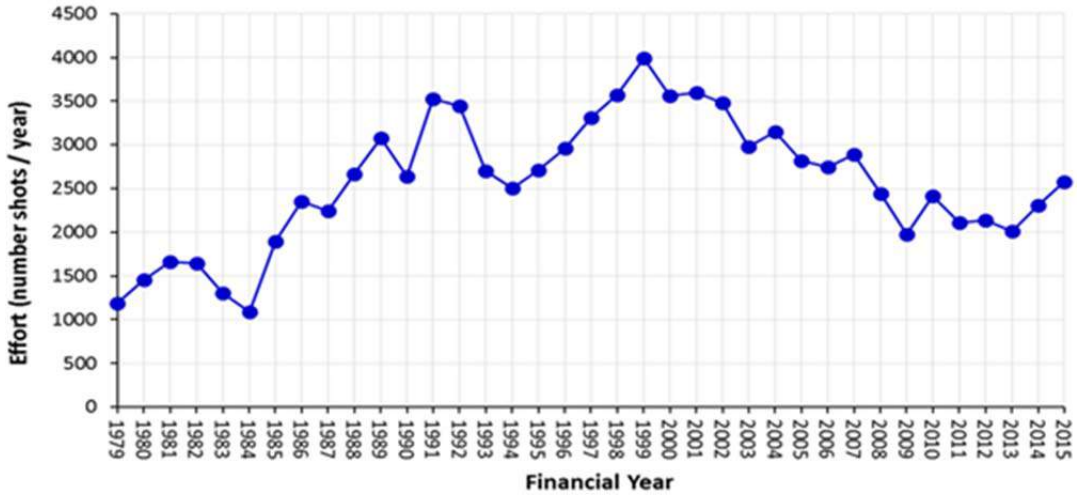


Figure 85. Commercial haul seine effort for yellow-eye mullet from Corner Inlet (1979–2015).

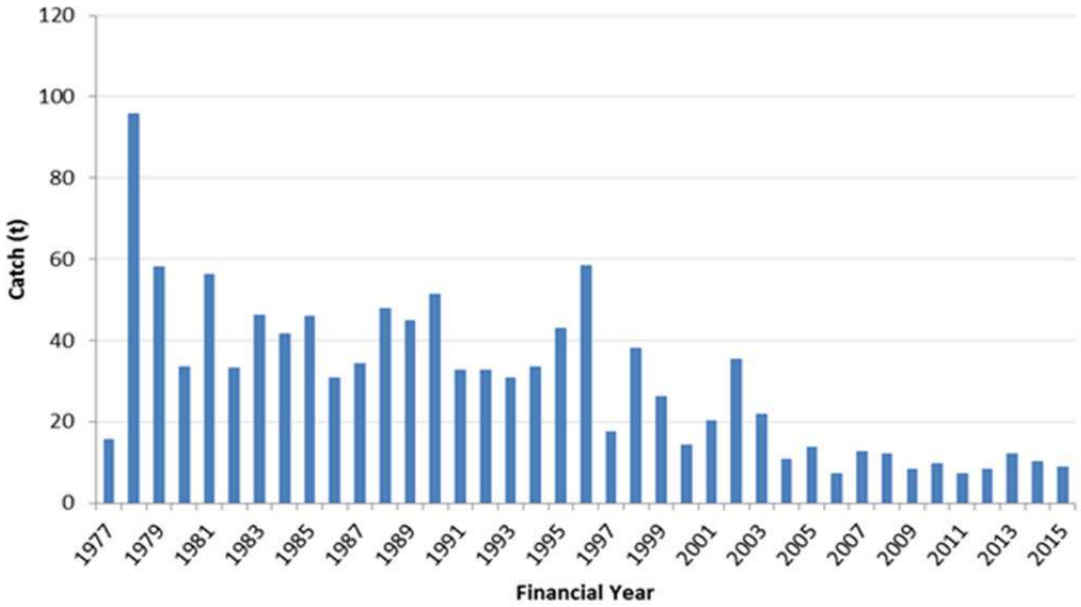


Figure 86. Commercial mesh-net catches of yellow-eye mullet from Gippsland Lakes (1977–2015).

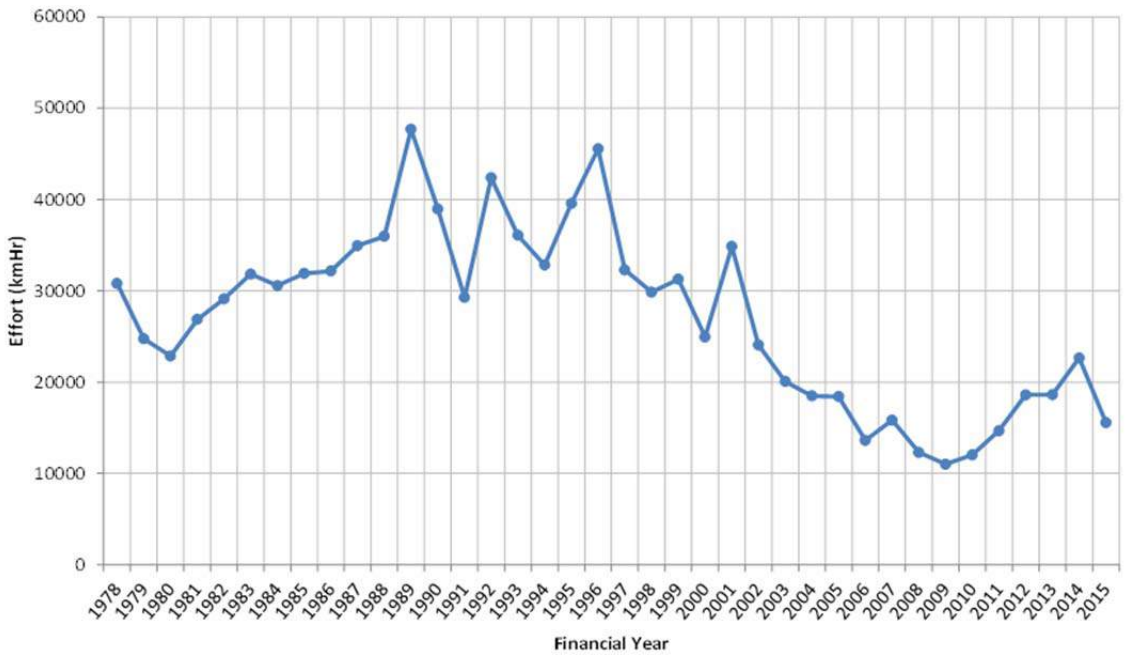


Figure 87. Commercial mesh-net effort for yellow-eye mullet from Gippsland Lakes (1978–2015).

Rock Flathead (*Platycephalus laevigatus*): Corner Inlet-Nooramunga

Stock Structure and Biology

The stock structure of rock flathead in Victorian waters is unknown. Female rock flathead can live to 21 years and grow to 44 cm TL. Male rock flathead can live to 16 years and grow to 49 cm TL. Maturity (50 per cent) is reached at 2 years and 23 cm TL (LML = 27 cm TL). Rock flathead are highly fecund and are fast growers. The main spawning period is spring/summer in inshore coastal regions.

Management / Assessment Unit

Rock flathead supports commercial mesh-net fisheries in Corner Inlet and Port Phillip Bay. There are also very small recreational fisheries in Port Phillip Bay and Corner Inlet. This report only considers the population of rock flathead in Corner Inlet, as a single management unit (Figure 88).

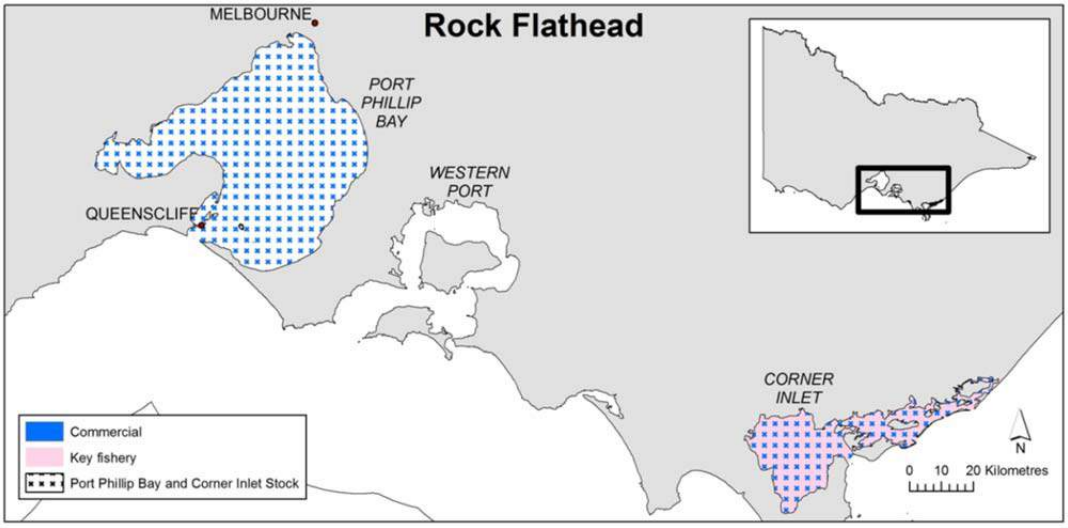


Figure 88. State-wide stock/spatial management units for the Victorian rock flathead fisheries.

Assessment Summary

Corner Inlet

For this assessment the status of the Corner Inlet rock flathead population was evaluated using nominal CPUE trends for commercial mesh-netting. Recreational fishery data were not available. The performance of the CPUE biomass proxy was assessed in relation the specified reference level and limit points using the reference period 1979–2015.

The impact of fishing pressure was assessed using time series of commercial catch, effort data and size composition from haul seine catches due to the selectivity bias of mesh-nets.

This assessment found:

- *Biomass* — commercial mesh-net CPUE in Corner Inlet has shown a long-term declining trend since 2005, with variability at shorter time-scales (i.e. peaking in 2009, 2010), but has remained above the reference level. In 2015 the 3-year-averaged CPUE had increased, and was above the reference level (Figure 89).
- *Fishing pressure* — commercial rock flathead catches from Corner Inlet peaked at 80–100 tonnes from 2009 to 2012 but have declined since (Figure 90). Mesh-net effort, which accounts for most of the rock flathead catch in Corner Inlet, has decreased by approximately half from 2012 to 2015 (Figure 91). Length frequency indicators collected from samping of haul seine catches are stable (Figure 92).

On the basis of the evidence provided, the Corner Inlet component of the Victorian rock flathead population is classified as **sustainable** (Table 1).

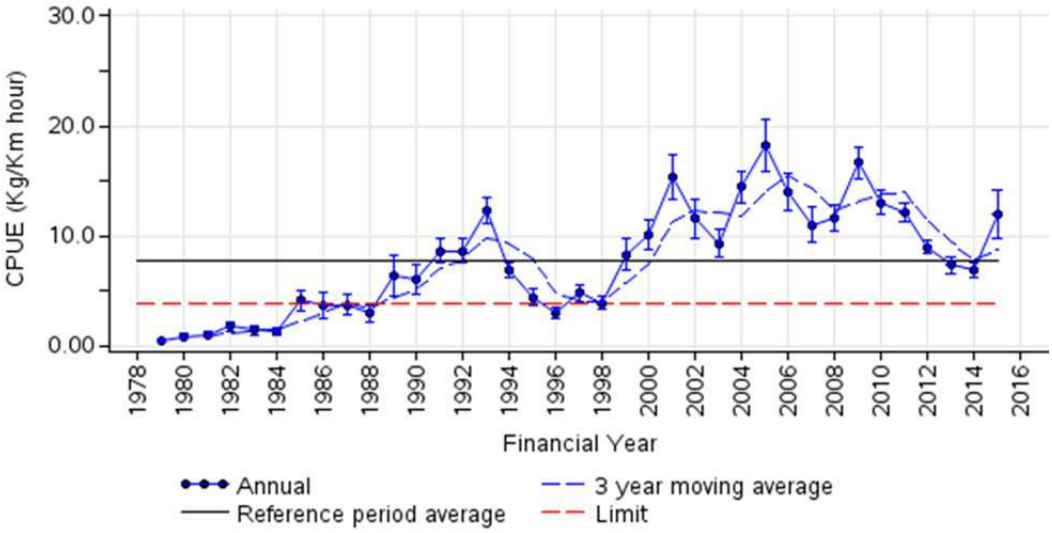


Figure 89. CPUE (±95% CL) from the Gippsland Lakes commercial mesh-net rock flathead fishery (1978–2015).

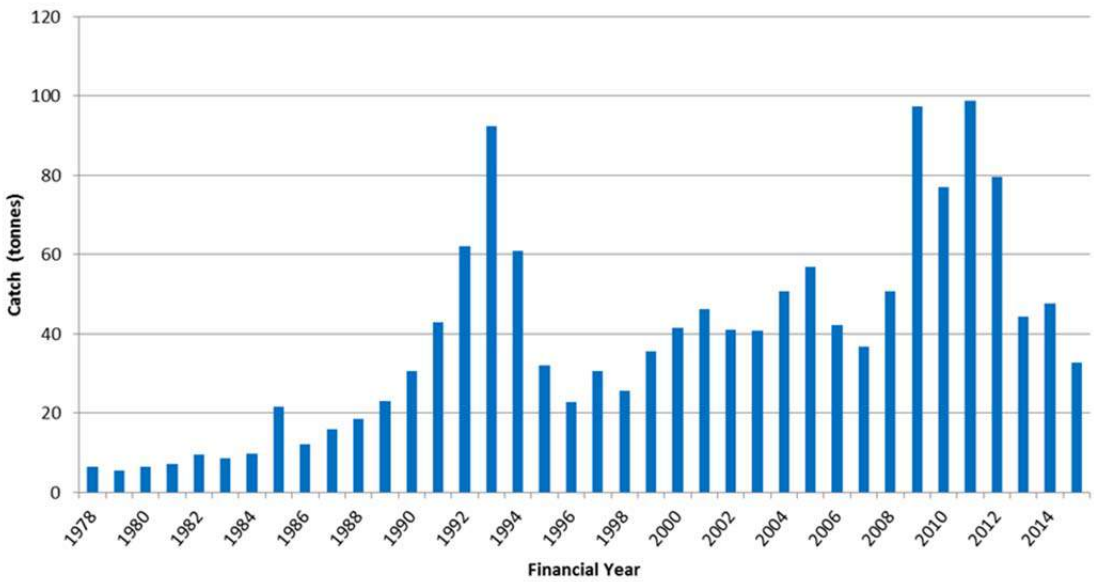


Figure 90. Total catches of rock flathead from the Corner Inlet commercial fishery for all gear types (1978–2015).

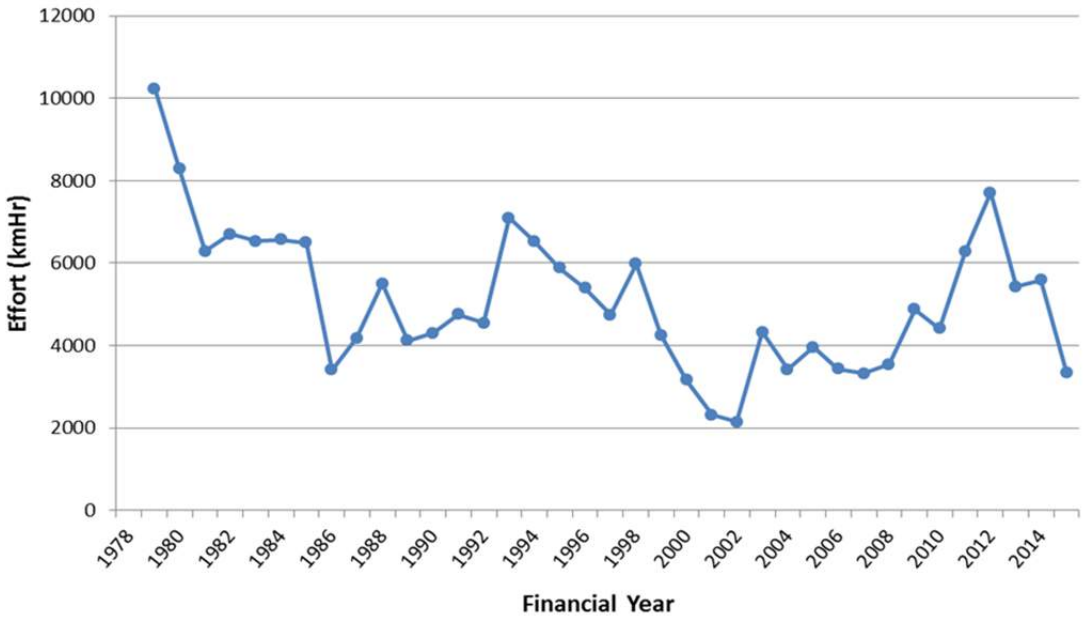


Figure 91. Rock flathead commercial mesh-net fishing effort for the Corner Inlet fishery (1978–2015). (Mesh-net accounts for most of the catch).

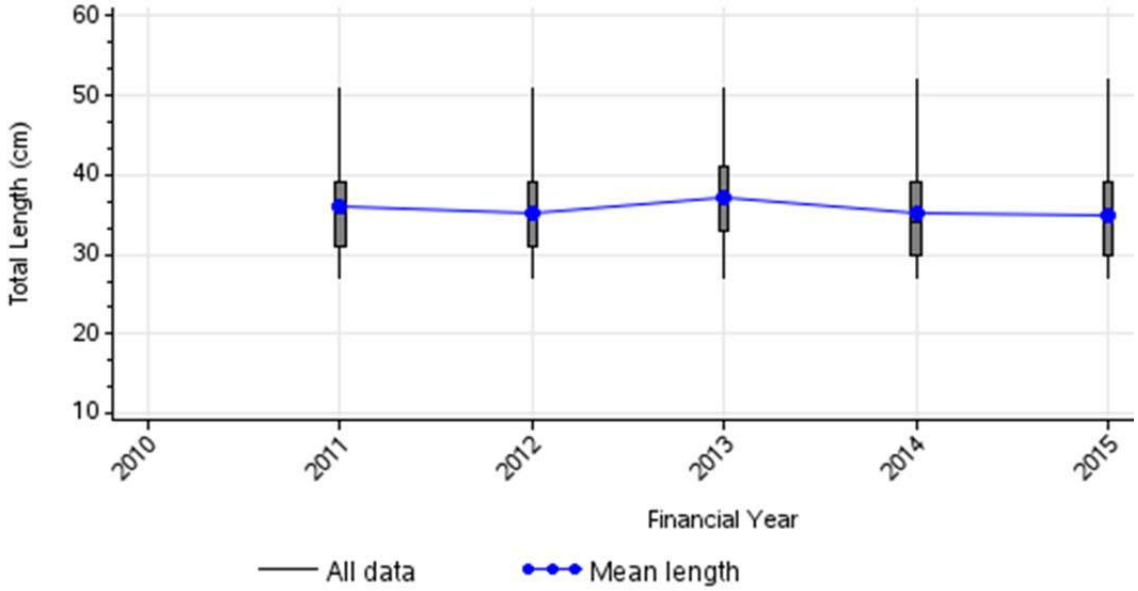


Figure 92. Size composition of rock flathead sampled from the commercial haul seine fishery in Corner Inlet (2011–2015).

Southern calamari *Sepioteuthis australis*: State-wide

Stock Structure and Biology

The population of southern calamari in Victorian waters is genetically similar and considered a single stock with phenotypic variation. Southern calamari live to less than 1 year and grow to 55 cm mantle length (ML). Maturity (50 per cent) is reached at 3 to 6 months /15-20 cm ML (LML=27cm TL). Calamari are moderately fecund and are fast growers. The main spawning period is spring/summer in inshore coastal regions with eggs laid in seagrass and reef algal habitats.

Management / Assessment Unit

The Victorian southern calamari population supports commercial fisheries in Corner Inlet and Port Phillip Bay. There are also recreational fisheries in Port Phillip Bay, Corner Inlet, Western Port and coastal waters. This report considers Victorian population calamari a state-wide stock (Figure 93).

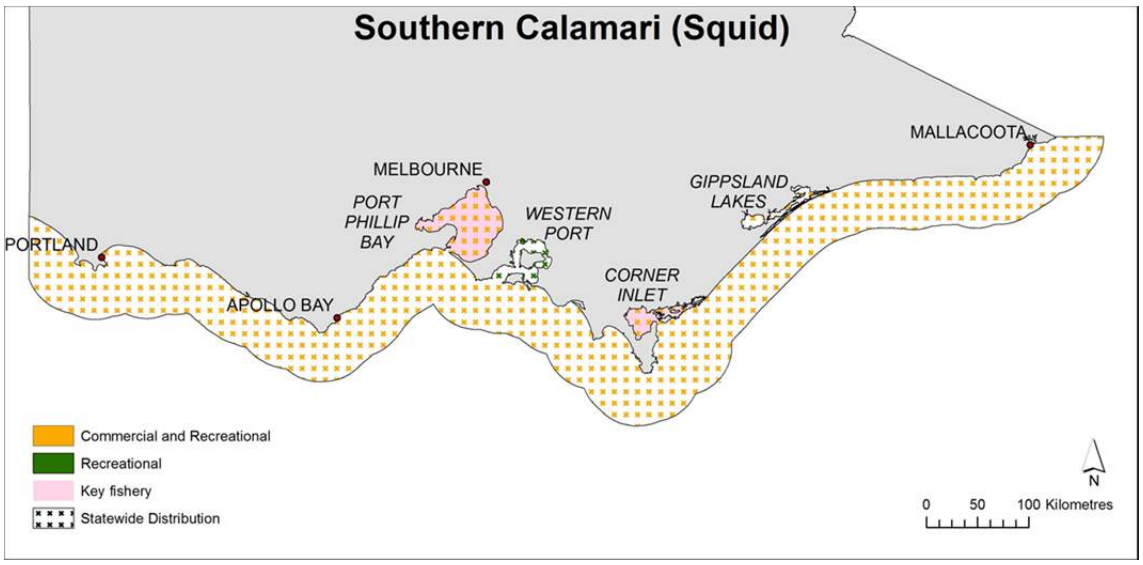


Figure 93. State-wide stock/spatial management units for the Victorian southern calamari fisheries

Summary of the Assessment

Corner Inlet

For this assessment the status of the Corner Inlet southern calamari population was evaluated using nominal CPUE trends for commercial fishery haul seine in Port Phillip Bay and Corner Inlet, and recreational fishers targeting calamari in Port Phillip Bay. The performance of the CPUE biomass proxies were assessed in relation the specified reference level and limit points using the reference period 1979-2015 for the haul seine fishery and 2004-2016 for the recreational fishery.

The impact of fishing pressure was assessed using time series of commercial catch, and effort data. Fishing pressure was assessed using calamari size composition from surveyed samples of recreational fishery catches.

This assessment found:

- *Biomass* – Commercial fisheries CPUE has been highly variable from year to year but stationary for the last fifteen years and above the reference level in Port Phillip Bay and Corner Inlet (Figure 94 and Figure 95). Averaged recreational CPUE for calamari in Port Phillip Bay was also stable over the reference period (Figure 96).
- *Fishing pressure* – Commercial catches of calamari from Port Phillip Bay have varied between 20 to 50 tonnes over the last fifteen years (Figure 97) while commercial catches from Corner Inlet have ranged from about 10 and 40 tonnes over a similar period (Figure 98). There has been a long-term decline in haul seine effort in Port Phillip Bay from peaks for about 4,000 shots in the late 1970s and mid-1980s to 1,500 shots in 2015 (Figure 83). Annual haul fishing effort in Corner Inlet has also declined from a peak of 4,000 shots in 1999 to 2,000-2,500 shots in recent years (Figure 85).

On the basis of the evidence provided, the Victorian state-wide calamari population is classified as **sustainable** (Table 1).

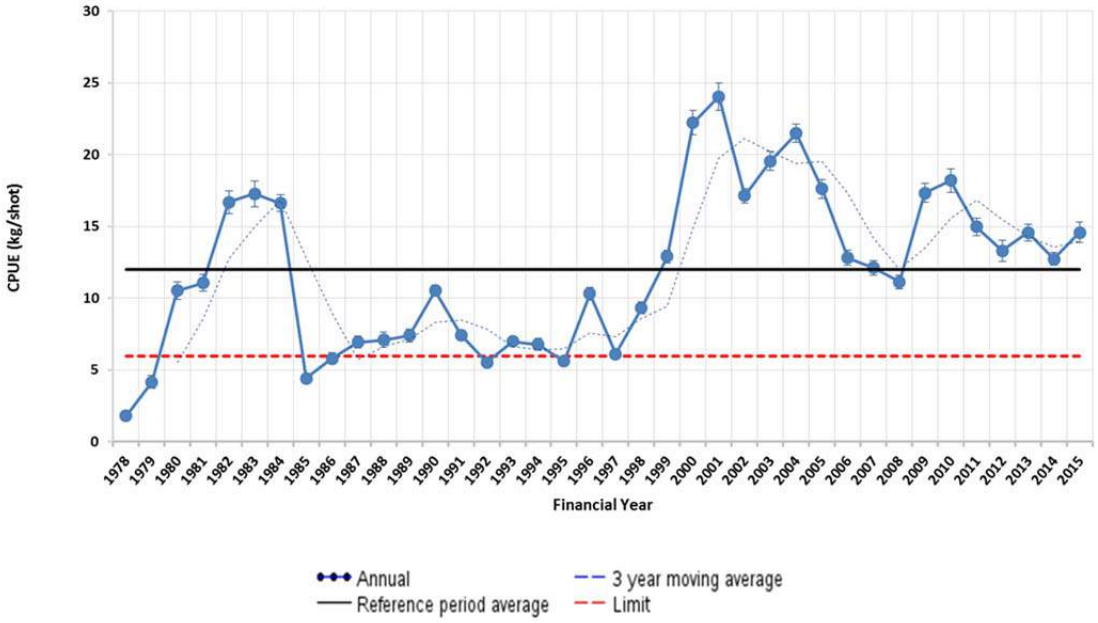


Figure 94. Southern calamari CPUE (±95% CL) for the Port Phillip Bay haul seine fishery (1978-2015).

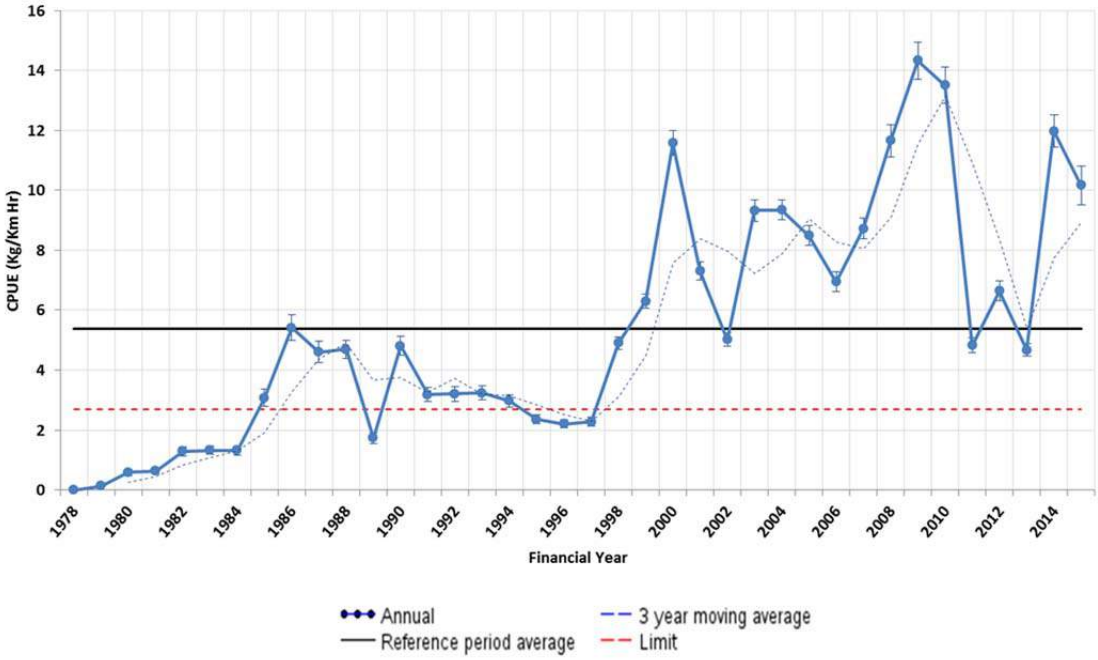


Figure 95. Southern calamari CPUE (±95% CL) for the Corner Inlet haul seine fishery (1978-2015).

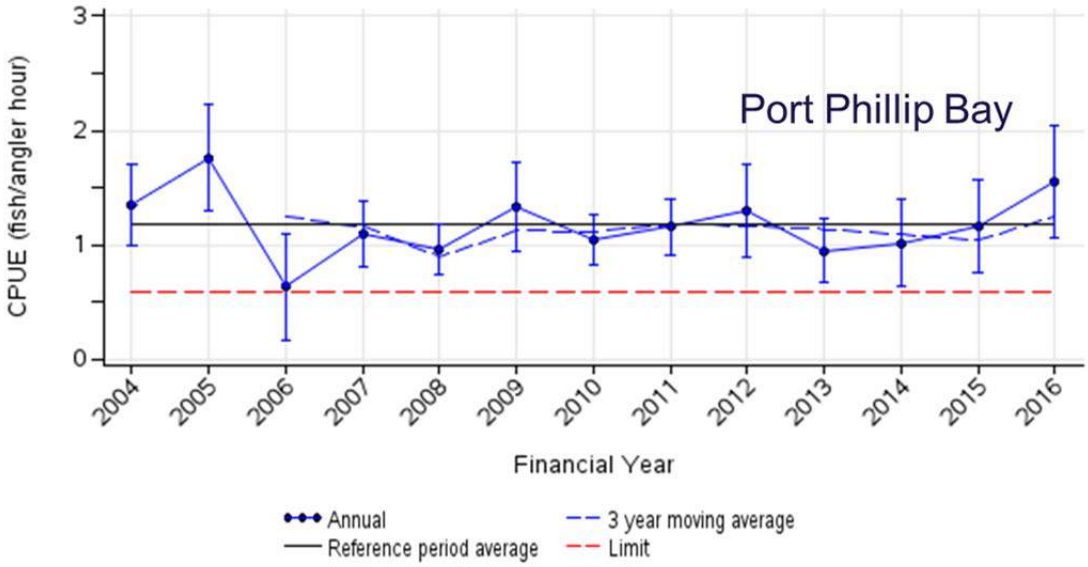


Figure 96. Southern calamari CPUE (±95% CL) for the Port Phillip Bay recreational fishery (2004-2016).

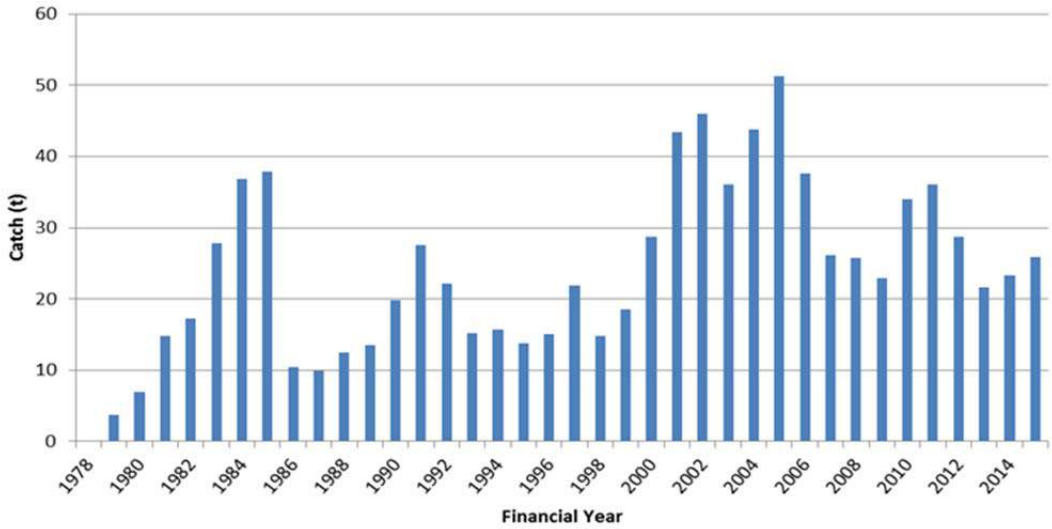


Figure 97. Total catches of southern calamari from the Port Phillip Bay haul seine net fishery (1978-2015).

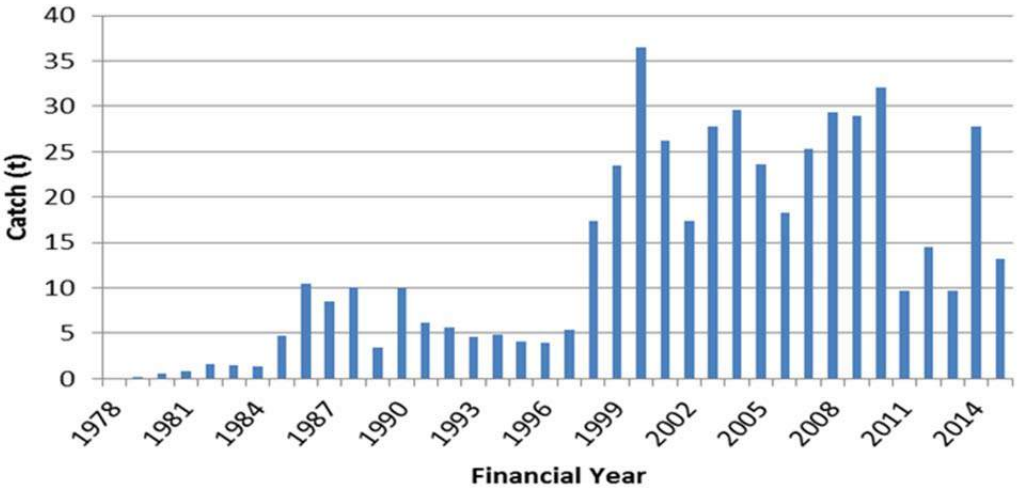


Figure 98. Total catches of southern calamari from the Corner Inlet haul seine net fishery (1978-2015).

Blue Throat and Purple Wrasse (*Notolabrus tetricus and N. fucicola*): Coastal Waters

Blue throat wrasse

Purple wrasse

Stock Structure and Biology

The stock structure of wrasse in Victorian waters is uncertain. Blue throat wrasse live to 23 years and grow to over 50 cm total length (TL). Purple wrasse live to 24 years and grow to over 45 cm total length (TL). Maturity (50 per cent) for blue throat wrasse is reached at four to eight years (20–30 cm TL), and for purple wrasse at three years (18 cm TL). Blue throat wrasse can change sex (female to male) from 5 years of age. Purple wrasse do not change sex. Wrasse are highly fecund and are fast growers. The main spawning period is spring. Wrasse are territorial and highly reef associated.

Management / Assessment Unit

Victorian wrasse populations support local port based commercial fisheries. The fishery uses mostly hook and line to harvest wrasse from in-shore waters (<30m) for the restaurant market all year round. There is also a small recreational fishery. This report considers the Victorian wrasse fishery as western, central and eastern assessment zones, although the fishery is managed at a state-wide scale (Figure 99).

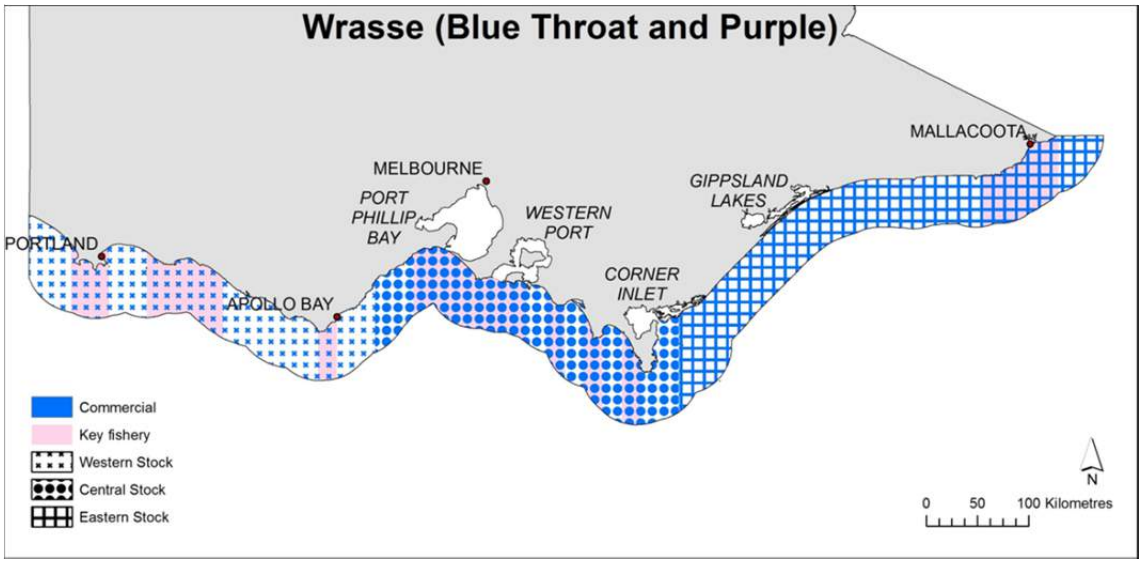


Figure 99. State-wide stock/spatial assessment zones for the Victorian wrasse fisheries.

Assessment Summary

For this assessment the status of the Victorian wrasse commercial fishery (both blue throat and purple wrasse combined) was evaluated using standardised CPUE trends for commercial fishery separated by western, central and eastern zones. CPUE is based on catches by hand-line fishing method only and combined across species as reporting at the species level is not considered reliable. The performance of the CPUE biomass proxies were assessed in relation to the specified reference level and limit points using the reference period 1998–2015.

The impact of fishing pressure was assessed using time series of commercial catch, effort data. There is no information available on recruitment or the recreational fishery.

This assessment found:

- *Biomass* —CPUE has been stable for the commercial wrasse fisheries in the central and eastern zones at about the reference level, but has recently declined in the western zone (Figure 100).
- *Fishing pressure* — total catches of wrasse have been stable in the central and eastern zones and have declined in the western zone (Figure 101). Fishing effort for wrasse has been stable since 2009 in all zones (Figure 102).

On the basis of the evidence provided, the Victorian wrasse populations in the western, central and eastern management zones are classified as **sustainable** (Table 1).

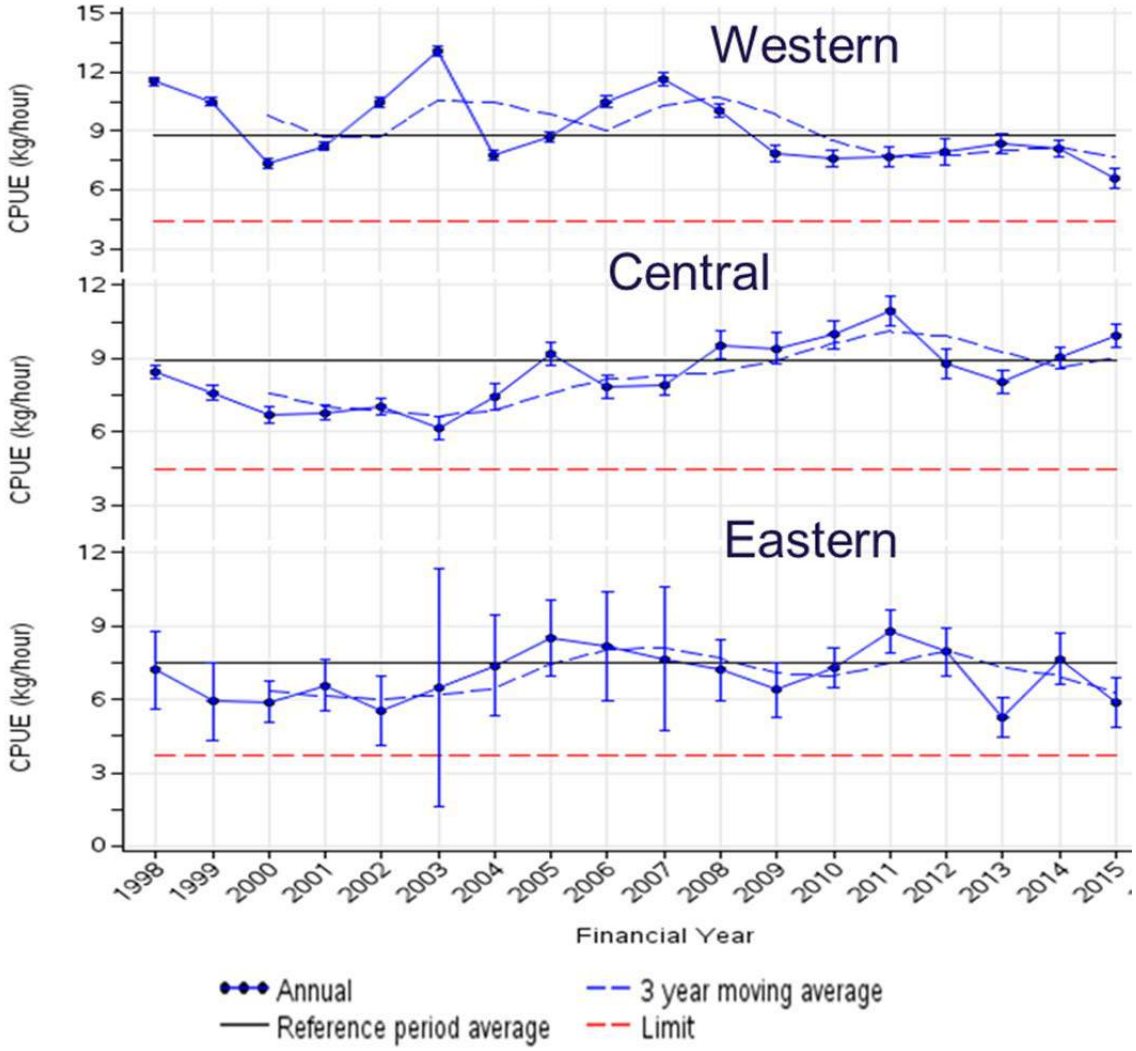


Figure 100. CPUE (±95% CL) for wrasse caught by commercial hand-line fishing in the western, central and eastern commercial fishery assessment zones (1998–2015).

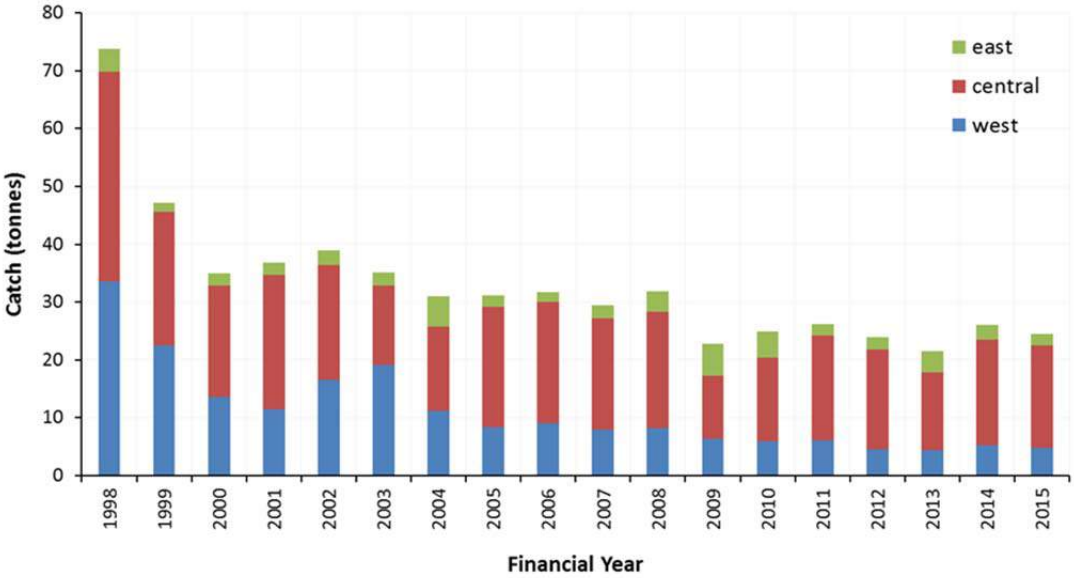


Figure 101. Total commercial catches of wrasse by zone from Victorian waters (1998–2015).

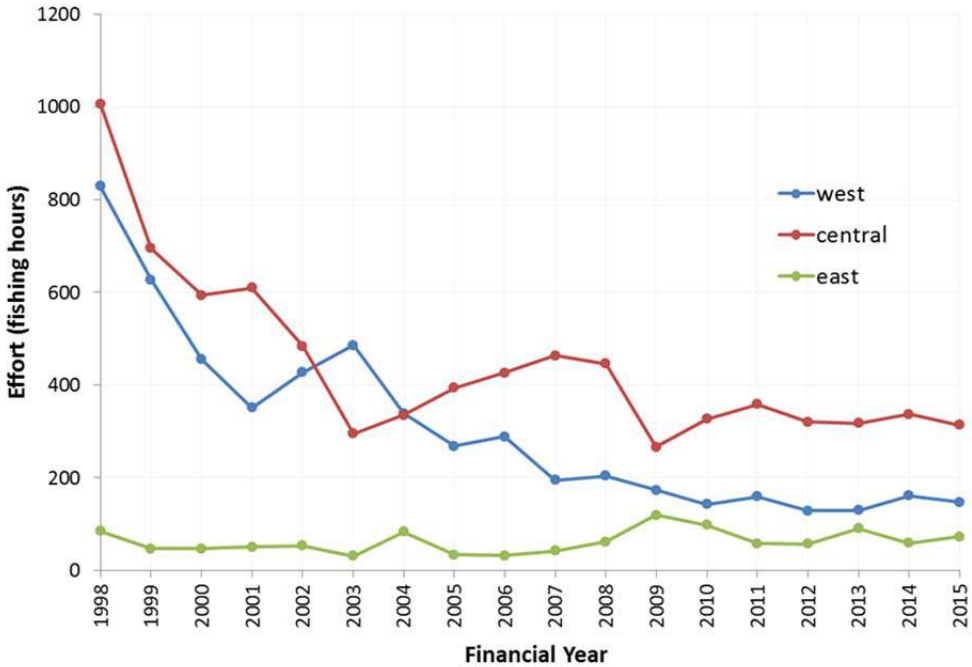


Figure 102. Total wrasse hand-line fishing effort by zone from Victorian waters (1998–2015).

Gummy Shark (*Mustelus antarcticus*): State-wide

Stock Structure and Biology

Gummy shark populations in Victorian waters are a component of a single biological stock for south-eastern Australia. Gummy shark live to 16 years and grow to over 180 cm total length (TL) (25 kg total body mass). Maturity (50 per cent) for females is at 110–125 cm TL and for males is at 95–115 cm TL. Gummy shark have low fecundity (an average of 14 pups per breeding cycle) and an 11 to12 month gestation period. The growth rate of male gummy shark (K = 0.253) is higher than for females (K = 0.123). The peak ovulation and parturition period is November to December with swallow coastal waters, including sheltered bays, as the preferred pupping habitat.

Management / Assessment Unit

The gummy shark populations in Victorian waters support commercial gillnet and hook fisheries as well as recreational fisheries in Port Phillip Bay, Western Port, Corner Inlet and other inshore coastal waters. The Commonwealth Southern and Eastern Scalefish and Shark Fishery harvests by far the largest component of the gummy shark catch and is managed by the Commonwealth of Australia using a harvest strategy that includes age structured and pup production outputs to inform quota setting decisions. This report considers the Victorian gummy shark population in Victorian waters as a state-wide stock (Figure 103).

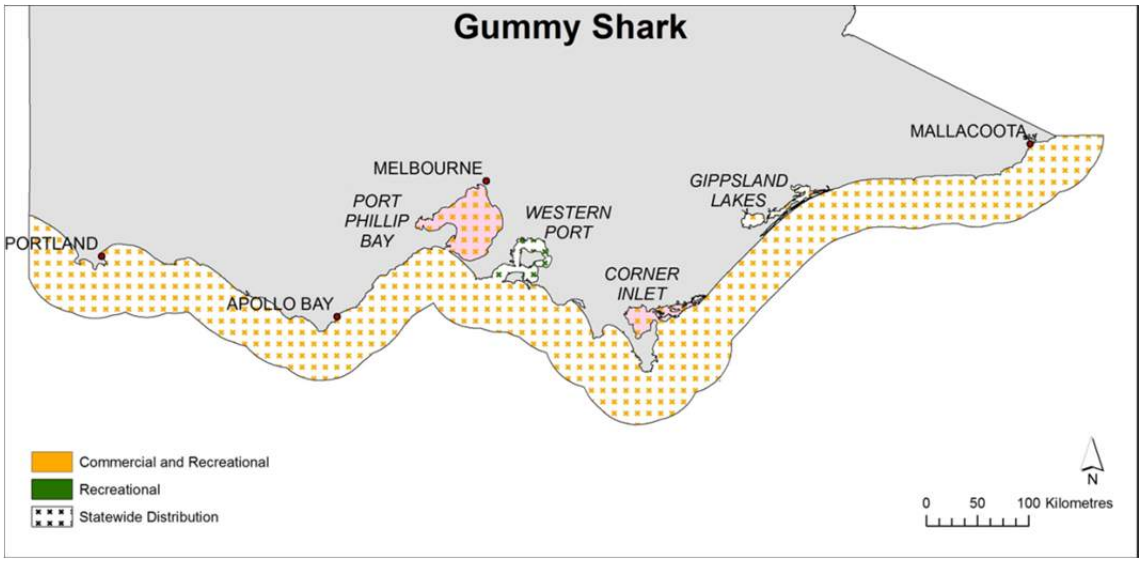


Figure 103. State-wide stock/spatial management units for the Victorian gummy shark fishery.

Assessment Summary

For this assessment the status of the state-wide gummy shark population was evaluated using total commercial gummy shark catch and modelled gummy shark catch output for the Southern and Eastern Scalefish and Shark Fishery, nominal CPUE trends for the Victorian commercial gummy shark fishery from Corner Inlet and Port Phillip Bay, and for the Western Port recreational fishery for gummy shark. The performance of the CPUE biomass proxies were assessed in

relation to the specified reference level and limit points using the reference period 1998–2015 for the Corner Inlet and Western Port fisheries and 1978–2015 for the Port Phillip Bay fishery. The impact of fishing pressure was assessed using time series of commercial catch and recreational fishery size composition data.

This assessment found:

- *Biomass* — total catch from the Southern and Eastern Scalefish and Shark Fishery commercial gummy shark fishery in recent years has been below the recommended biological catch limit (Figure 104). CPUE has declined for the Victorian commercial mesh-net fisheries in Corner Inlet (Figure 105) and Port Phillip Bay (Figure 106) and is below the reference levels in both locations, and recently was below the limit level in Port Phillip Bay. Averaged CPUE for the recreational fishery in Western Port is stable (Figure 107).
- *Fishing pressure* — total catches have been stable in Corner Inlet for the last years 10 years (Figure 108) and in Port Phillip Bay for the last 5 years, but at a lower level than the previous 10 years (Figure 109). The average length of gummy shark sampled from the Western Port recreational fishery is stable (Figure 110).

On the basis of the evidence provided, the Victorian component of the gummy shark stock is classified as **sustainable** (Table 1).

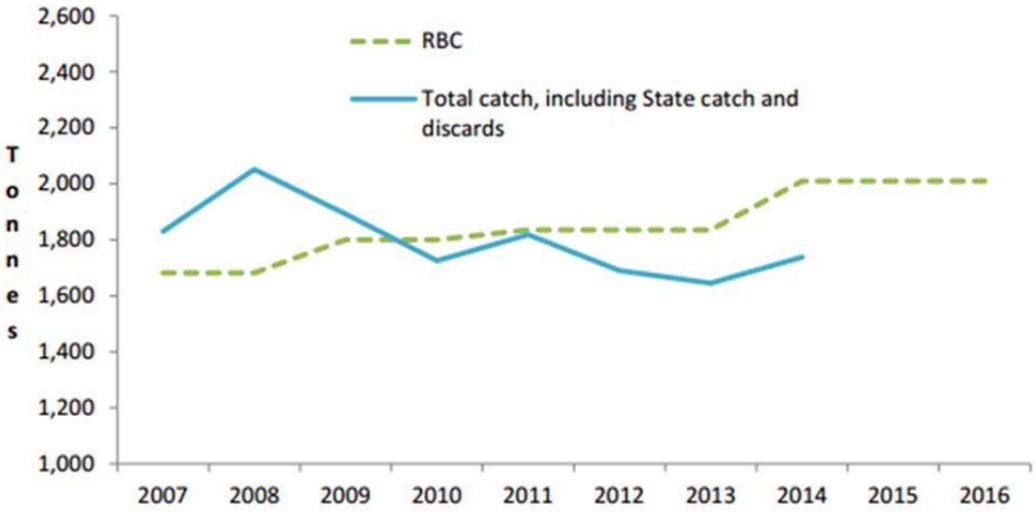


Figure 104. Total catch and recommended biological catch (RBC) for the Southern and Eastern Scalefish and Shark Fishery commercial gummy shark fishery.

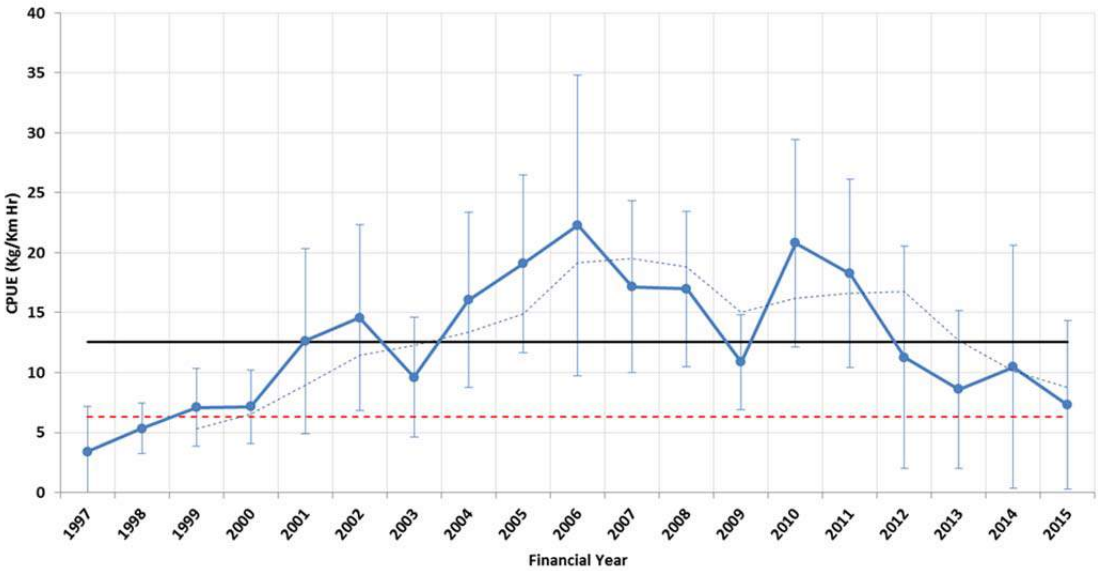


Figure 105. CPUE (±95% CL) for the Corner Inlet commercial gummy shark mesh-net fishery (1997–2015).

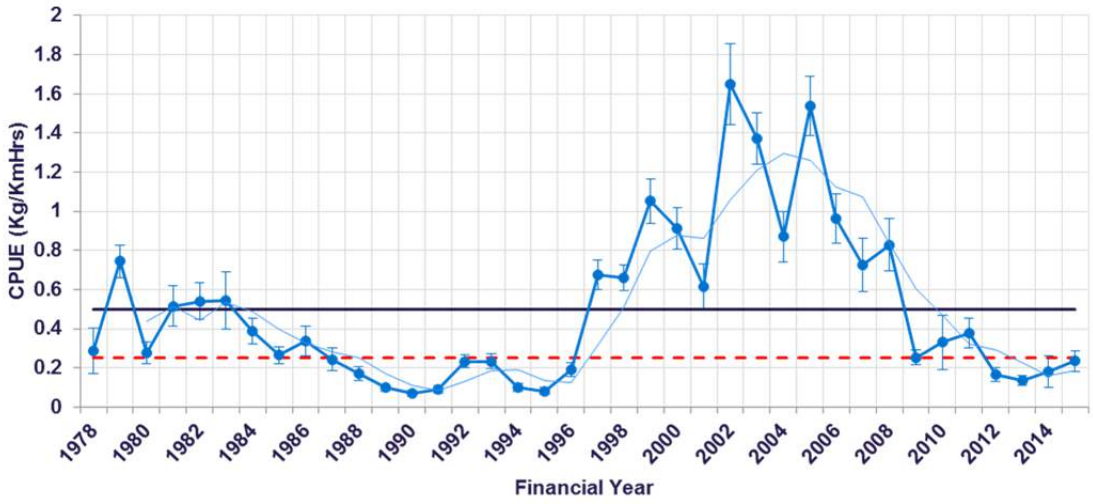


Figure 106. CPUE (±95% CL) for the Port Phillip Bay commercial gummy shark mesh-net fishery (1978–2015).

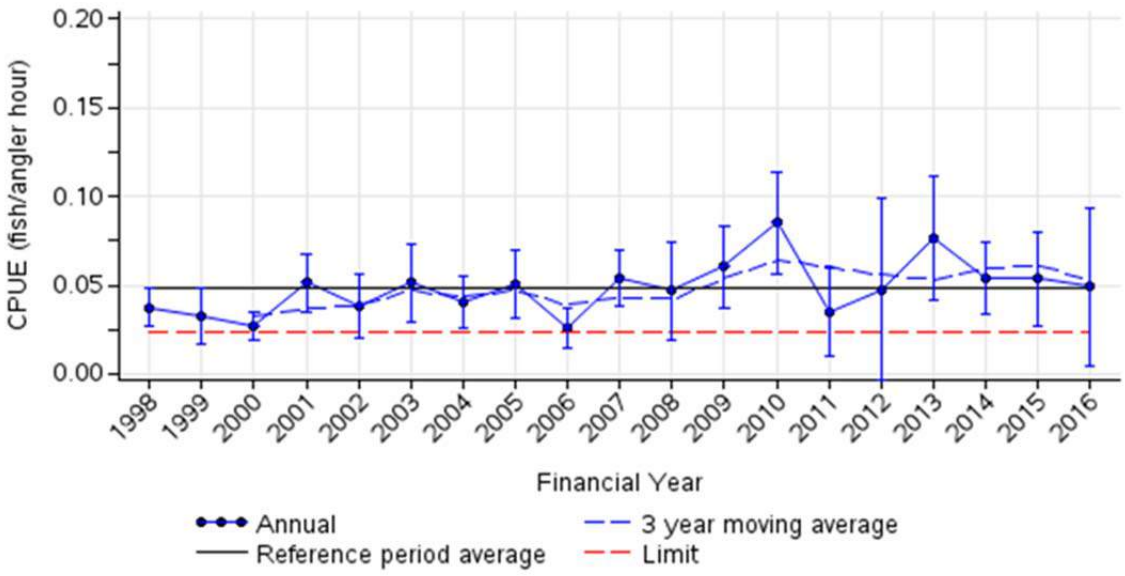


Figure 107. CPUE (±95% CL) for the Western Port gummy shark recreational fishery (1978–2016).

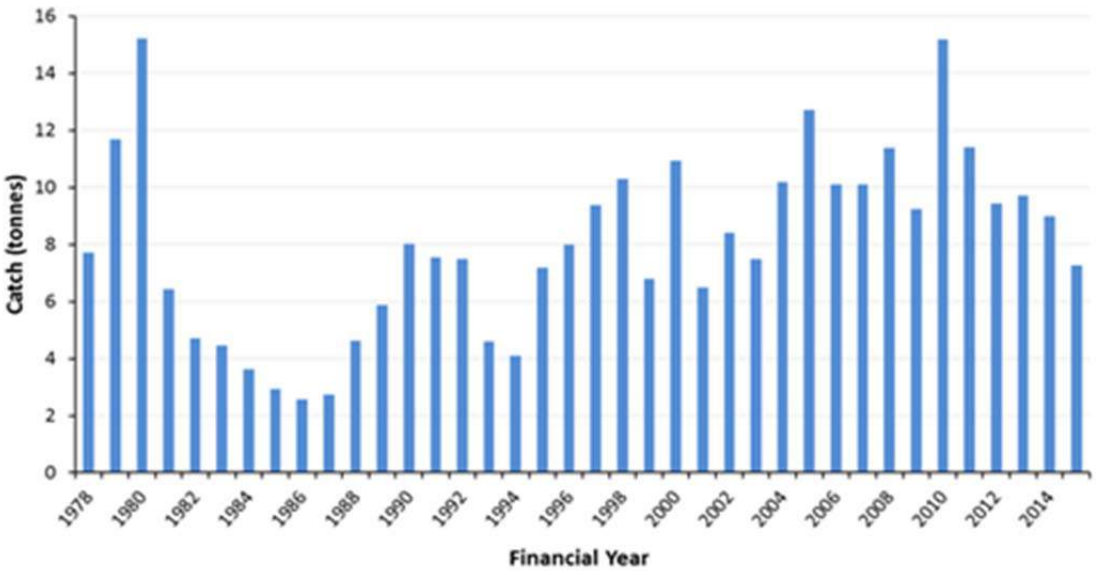


Figure 108. Total catches of gummy shark from the Corner Inlet commercial mesh-net fishery (1978–2015).

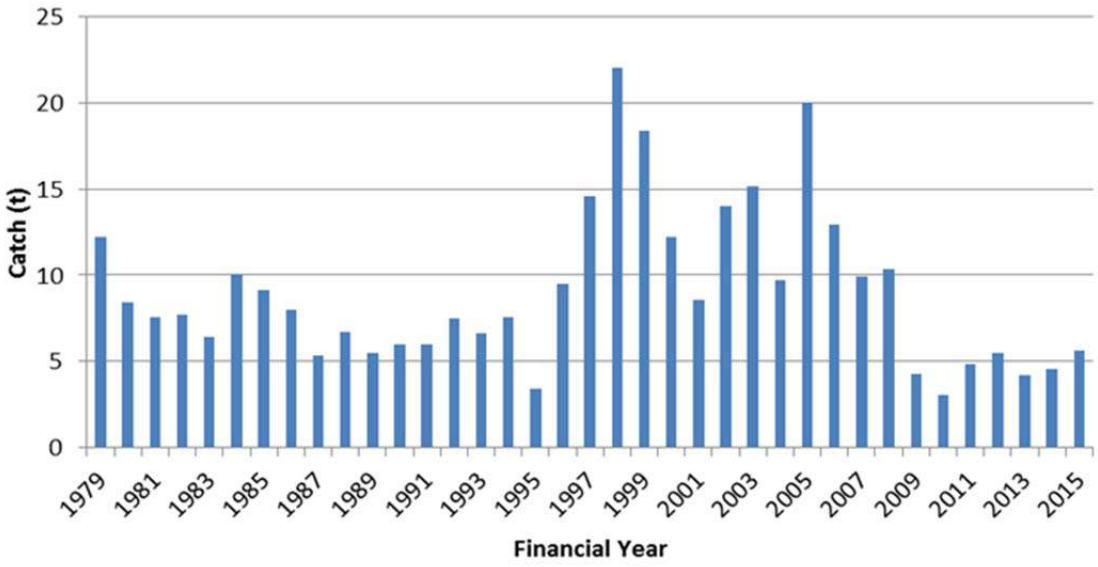


Figure 109. Total catches of gummy shark from the Port Phillip Bay commercial fishery (all gear types) (1978–2015).

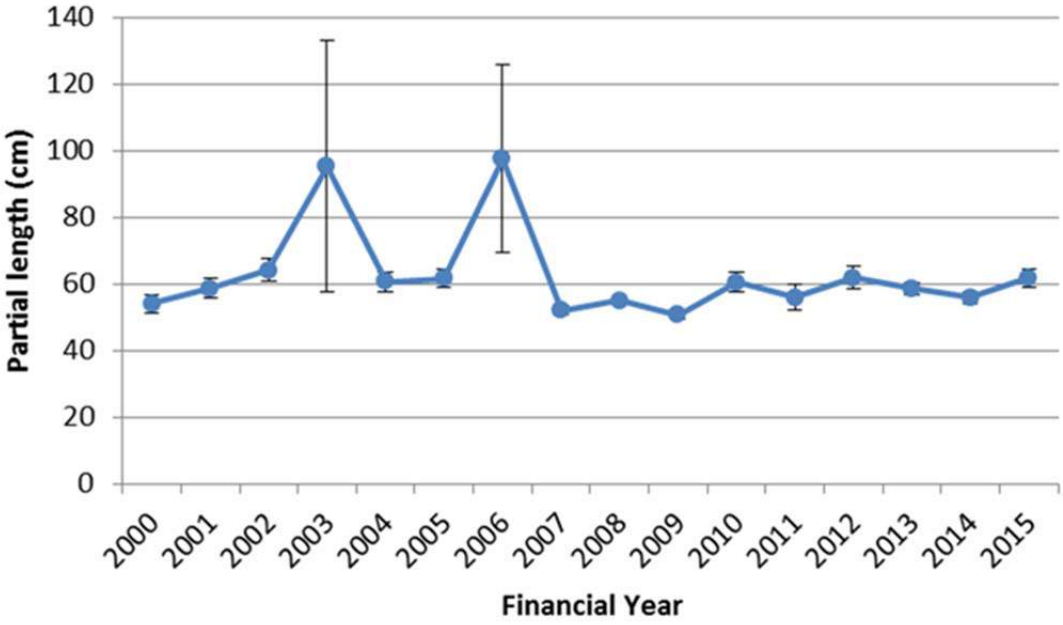


Figure 110. Average gummy shark partial length for the Western Port recreational fishery (2000–2015).

Silver Trevally (*Pseudocaranx georgianus*): State-wide

Stock Structure and Biology

The Victorian silver trevally population is part of a broader south-eastern Australian stock. Silver trevally live to 25 years and grow to 60 cm TL. Silver trevally reach maturity (50 per cent) at 25–30 cm TL, are highly fecund and have a slow-moderate grow rate (K = 0.1–0.4). The main spawning period is spring-autumn in coastal waters.

Management / Assessment Unit

The Victorian component of the silver trevally stock supports recreational and commercial fisheries. Commercial fisheries occur mainly in Corner Inlet and the Gippsland Lakes, but recreational fisheries occur throughout the state's bays, inlets and coastal waters. This report considers Victorian silver trevally as single state-wide management unit (Figure 111).

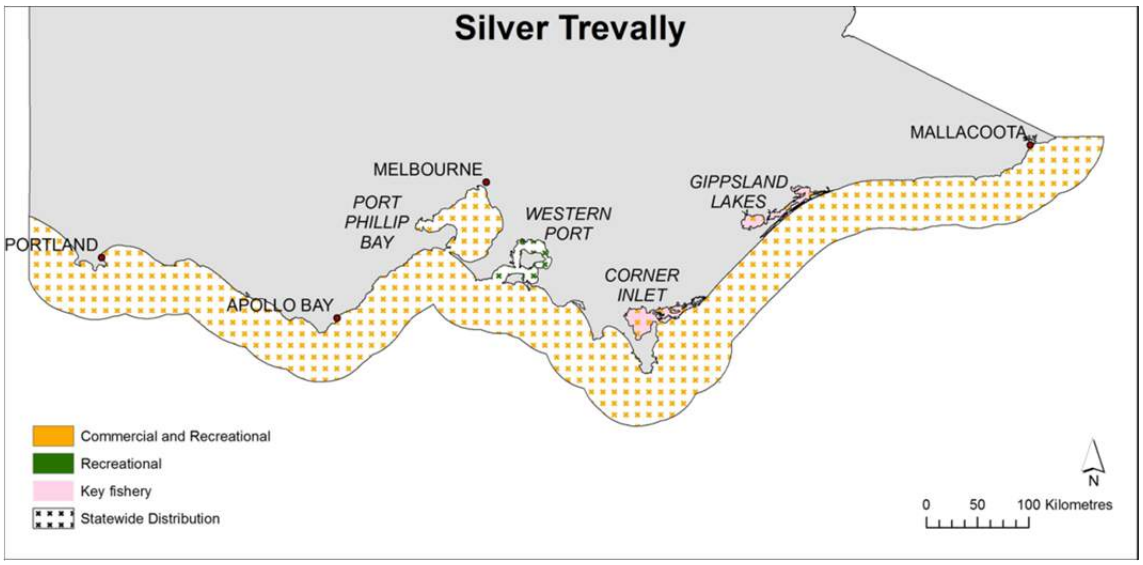


Figure 111. State-wide stock/spatial management unit for the Victorian silver trevally fishery.

Assessment Summary

For this assessment the status of the silver trevally population was evaluated using nominal CPUE trends for the Corner Inlet and Gippsland Lakes haul seine fisheries. The performance of the CPUE biomass proxies was assessed in relation to the specified reference level and limit points using the reference period 1998–2015. The impact of fishing pressure was assessed using time series of commercial catch and effort.

This assessment found:

- *Biomass* — CPUE has declined for the commercial fisheries in Corner Inlet (Figure 112) and in the Gippsland Lakes (Figure 113). CPUE is still above the limit point for the Corner Inlet fishery but below the limit point in the Gippsland Lakes fishery.
- *Fishing pressure* — total catches have been stable in recent years at a lower level than the recent peak in 2008 (Figure 114). The Corner Inlet fishery has consistently accounted for the largest component of the commercial catch. The silver trevally catch from the Corner Inlet fishery was also greater than the state-wide recreational fishery catch, estimated in 2000, as part of the National Recreational Fishing Survey (NRFS). Annual haul seine fishing effort in Corner Inlet has also declined from a peak of 4,000 shots in 1999 to 2,000–2,500 shots in recent years. Annual haul fishing effort in the Gippsland Lakes fishery has increased to about 600 shots from a low base of less than 200 shots in 2008–2009.

On the basis of the evidence provided, the Victorian component of the silver trevally stock is classified as **sustainable** (Table 1).

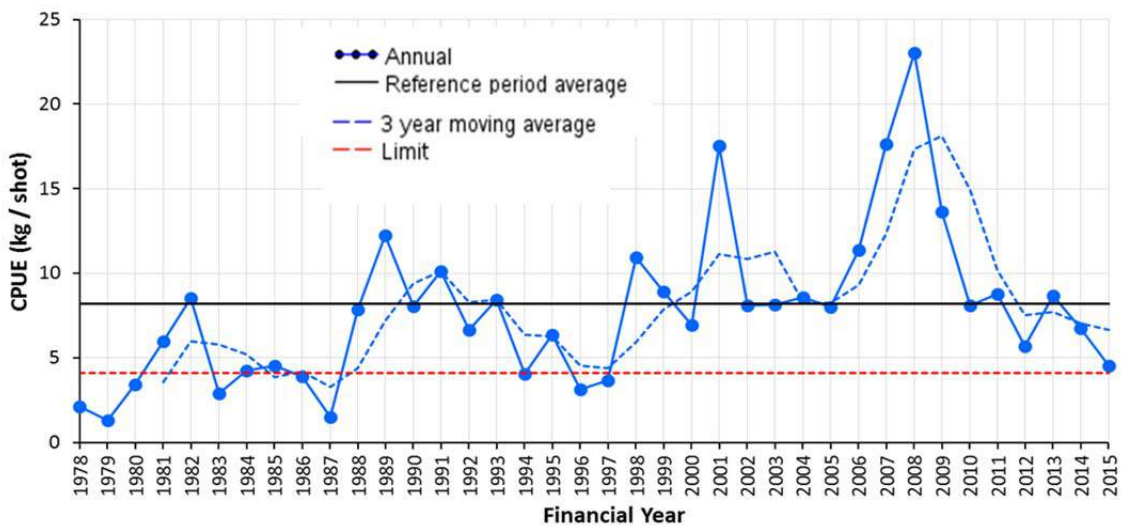


Figure 112. CPUE (±95% CL) for the Corner Inlet commercial silver trevally haul seine fishery (1978–2015).

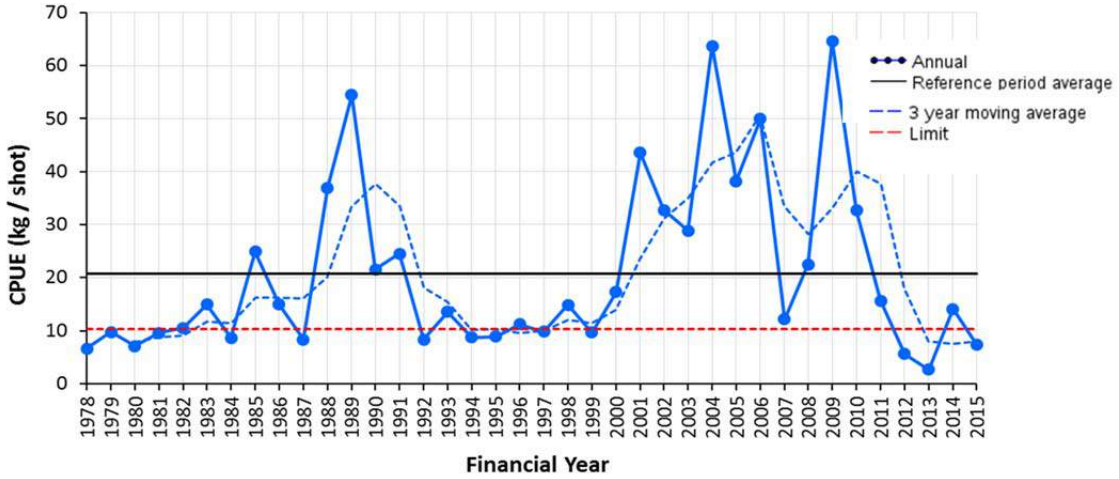


Figure 113. CPUE (±95% CL) for the Gippsland Lakes commercial silver trevally haul seine fishery (1978–2015).

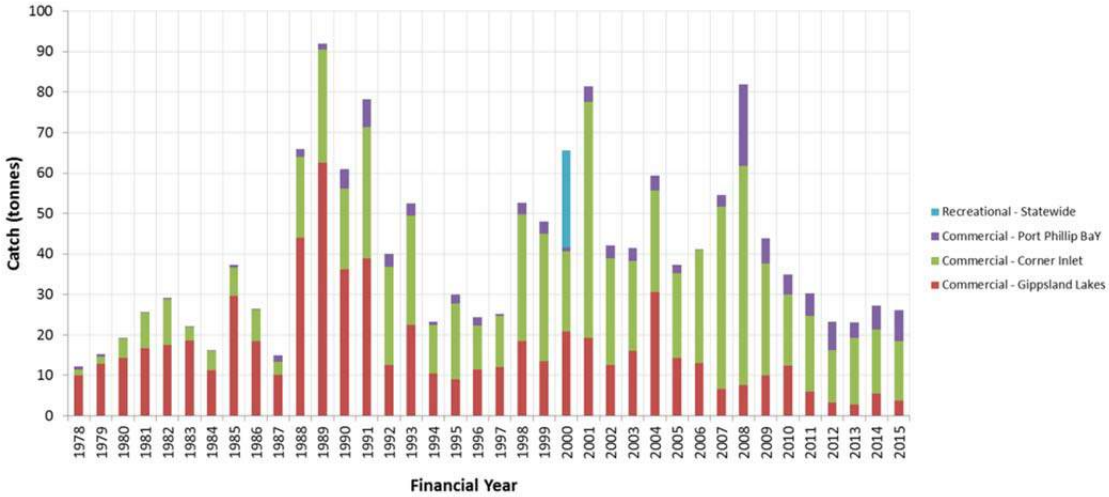


Figure 114. Total catch of silver trevally for commercial fisheries from Port Phillip Bay, Corner Inlet and Gippsland lakes (1978–2015), and including the state-wide recreational catch in 2000.

Southern Bluespotted Flathead (*Platycephalus speculator*): State-wide

Stock Structure and Biology

The stock structure of southern bluespotted flathead in Victorian waters is unknown. In Western Australian waters southern bluespotted flathead can live to at least 12 years and grow to 90 cm TL. Southern bluespotted flathead mature

(50 per cent) at 1–2 years (males 25 cm, females 32 cm), are highly fecund and are have a moderate growth rate (L_∞ = 42–48 cm, K = 0.5–0.6). The main spawning period is spring/summer in marine bays and coastal waters.

Management / Assessment Unit

The Victorian component of the southern bluespotted flathead population supports commercial fisheries in Corner Inlet and Port Phillip Bay. There are also recreational fisheries in Port Phillip Bay, Western Port and Corner Inlet. This report considers the population of southern bluespotted flathead in Victorian waters as a state-wide management unit (Figure 115).

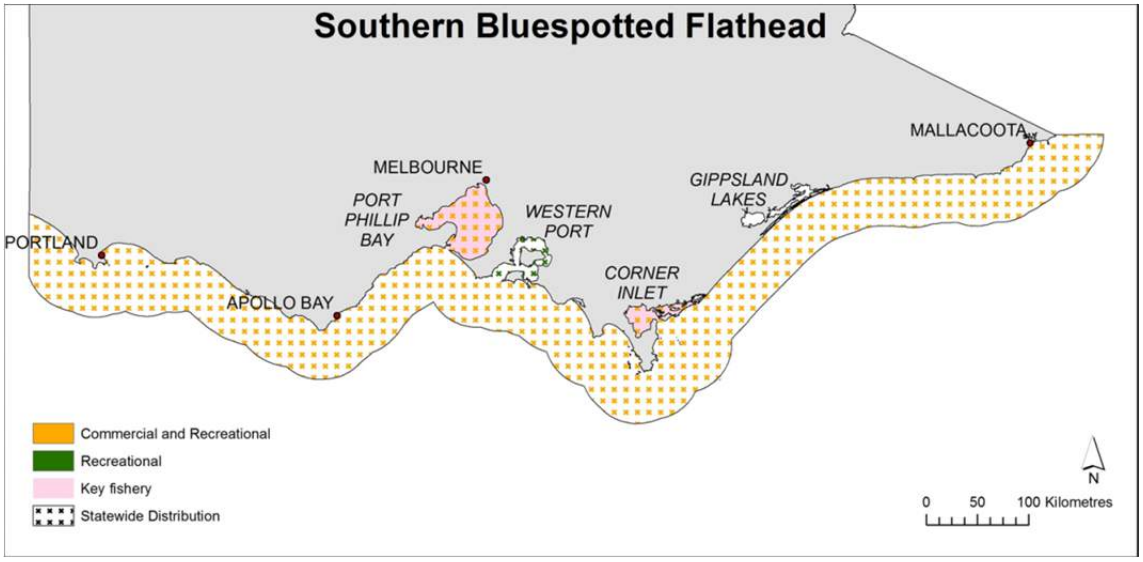


Figure 115. State-wide stock/spatial management unit for the Victorian southern bluespotted flathead fishery.

Assessment Summary

For this assessment the status of the southern bluespotted flathead population was evaluated using nominal CPUE trends for the Corner Inlet and Port Phillip Bay commercial mesh-net fisheries. The performance of the CPUE biomass proxies was assessed in relation to the specified reference level and limit points using a reference period of 1978–2015 for Port Phillip Bay and 2000–2015 for Corner Inlet (prior to 2000, the reporting of flathead species. i.e. southern sand flathead and southern bluespotted flathead is unreliable for Corner Inlet). The impact of fishing pressure was assessed using a time series of commercial catch and effort.

This assessment found:

- *Biomass* — CPUE for the commercial fisheries in Corner Inlet (Figure 116) and Port Phillip Bay (Figure 113) indicated increasing CPUE in the most recent year and long-term highly variable CPUE fluctuating around the long-term reference levels. Overall southern bluespotted flathead CPUE has been stable and above the reference levels.
- *Fishing pressure* — total catches of southern bluespotted flathead have been stable in both the Port Phillip Bay and Corner Inlet fisheries (Figure 118). Annual mesh-net fishing effort in Corner Inlet declined from a peak of 8,000 km hours in 2012 to 4,000 km hours in 2015. Annual mesh-net fishing effort in Port Phillip Bay in 2015 was about 5,000 km hours following a stable period between 2000–2014 when the annual effort averaged at about 10,000 km hours. With the significant removal of licences, effort in the Port Phillip Bay mesh-net fishery is likely to continue to reduce until completely phased out by 2022.

On the basis of the evidence provided, the Victorian component of the southern bluespotted flathead stock is classified as **sustainable** (Table 1).

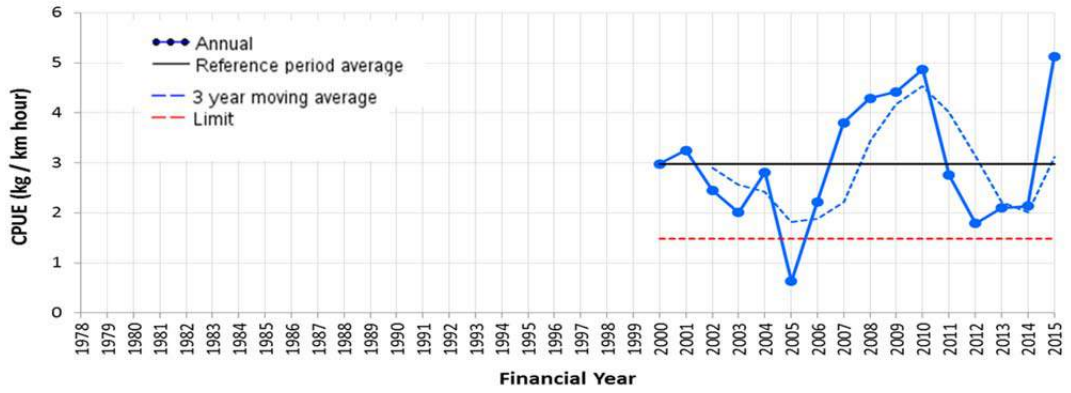


Figure 116. CPUE (±95% CL) for the Corner Inlet southern bluespotted flathead commercial mesh-net fishery (1978–2015).

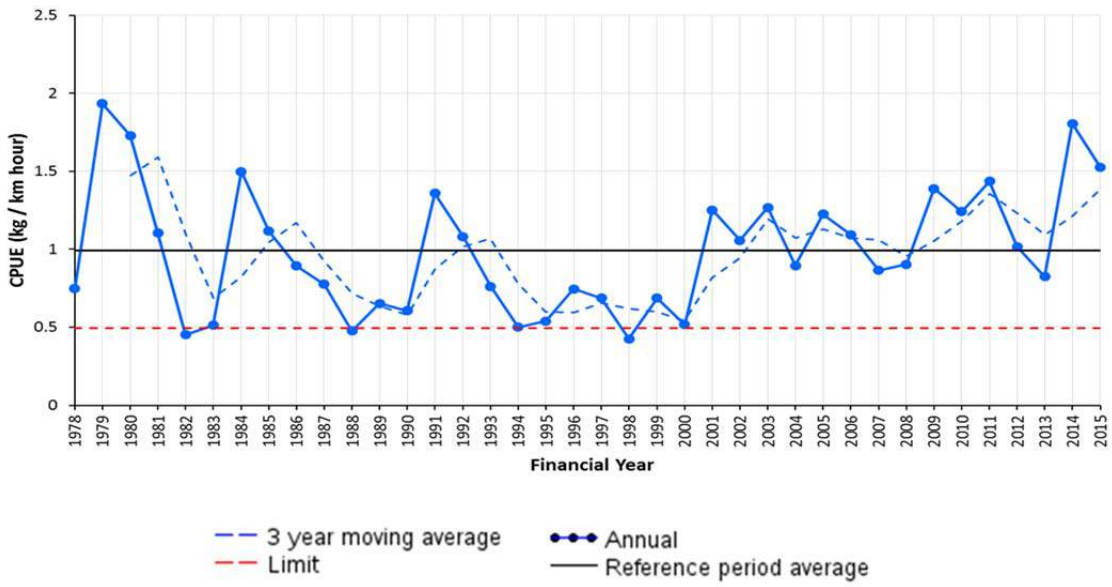


Figure 117. CPUE (±95% CL) for the Phillip Bay southern bluespotted flathead commercial mesh-net fishery (1978–2015).

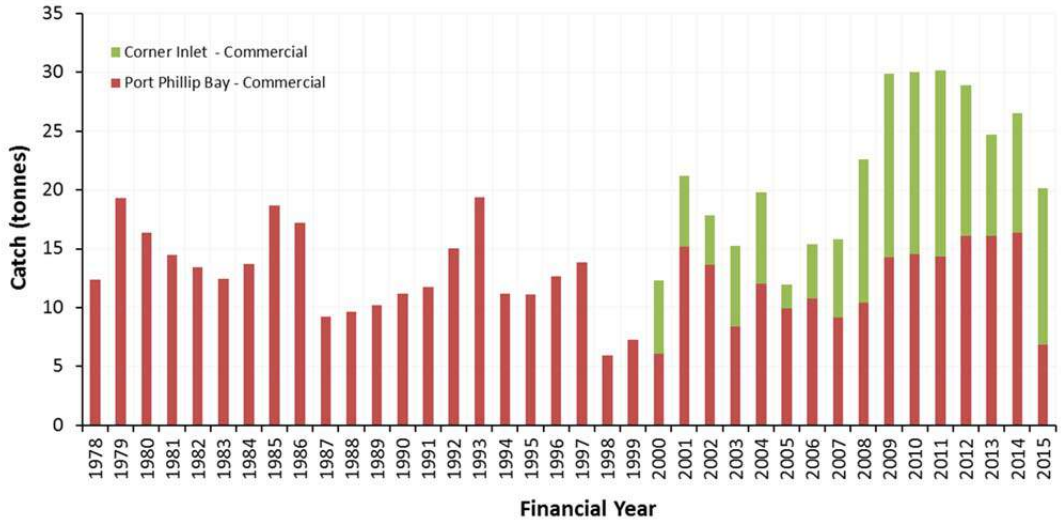


Figure 118. Total commercial catch of southern bluespotted flathead from Port Phillip Bay (1978–2015) and Corner Inlet (1999–2015).

Sand Crab (*Ovalipes australiensis*): State-wide

Stock Structure and Biology

The stock structure of sand crab in Victorian waters is unknown. Sand crab can grow to a carapace width (CW) of up to 20 cm.

Management / Assessment Unit

The Victorian sand crab populations support a commercial inshore trawl fishery, mainly off Gippsland. The extent of the recreational fishery is unknown. This report considers the population of sand crab in Victorian waters as a state-wide management unit (Figure 119).

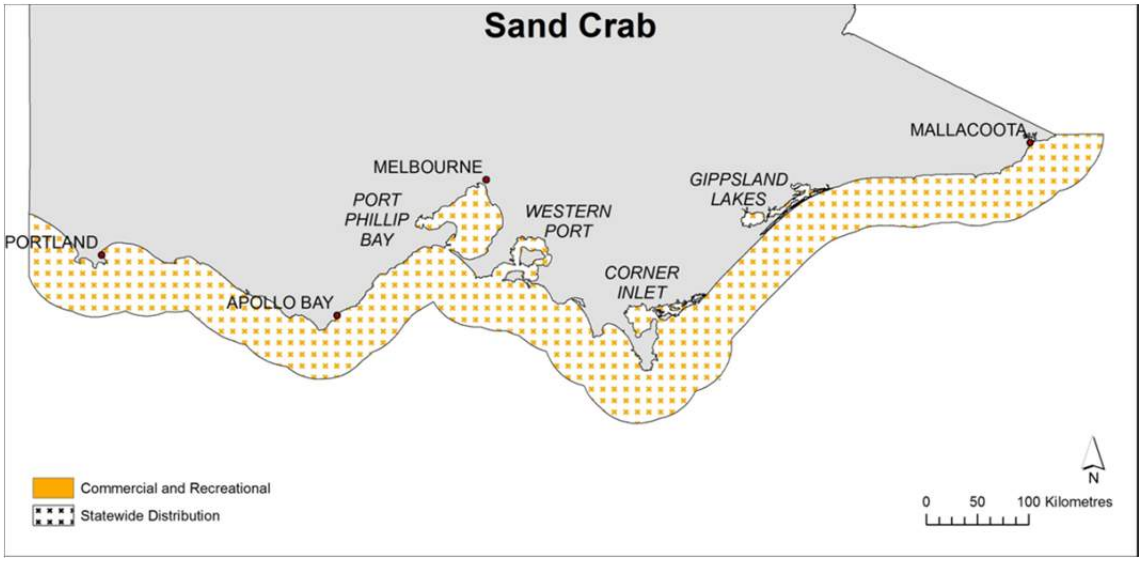


Figure 119. State-wide stock/spatial management unit for the Victorian sand flathead fishery.

Assessment Summary

For this assessment the status of the sand crab biomass was evaluated using standardised CPUE trends for the commercial inshore trawl fishery. The performance of the CPUE biomass proxy was assessed in relation the specified reference level and limit points using the reference period of 1998–2015. The impact of fishing pressure was assessed using time series of commercial catch and effort.

This assessment found:

- *Biomass* — CPUE for the commercial fishery has recently shown a major increase and has been variable above the long-term average since 2013–14 (Figure 120).
- *Fishing pressure* — total catches of sand crab were low (< 20 t) from 2002 to 2012 and increased from 30 to100 tonnes from 2013 to 2015 (Figure 121). Annual inshore trawl effort has steadily increased from about 2,000 shots in 2004 to just under 4,000 shots in 2015 (Figure 122).

On the basis of the evidence provided, the Victorian component of the sand crab population is classified as an **undefined stock**.

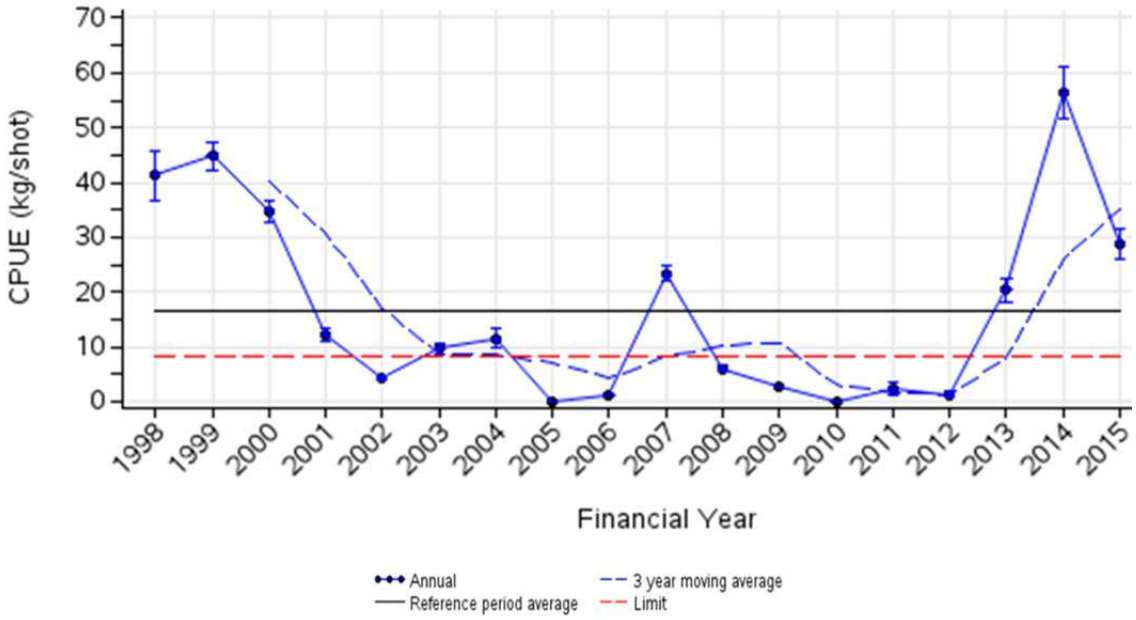


Figure 120. CPUE (±95% CL) of sand crab for the commercial inshore trawl fishery (1998–2015).

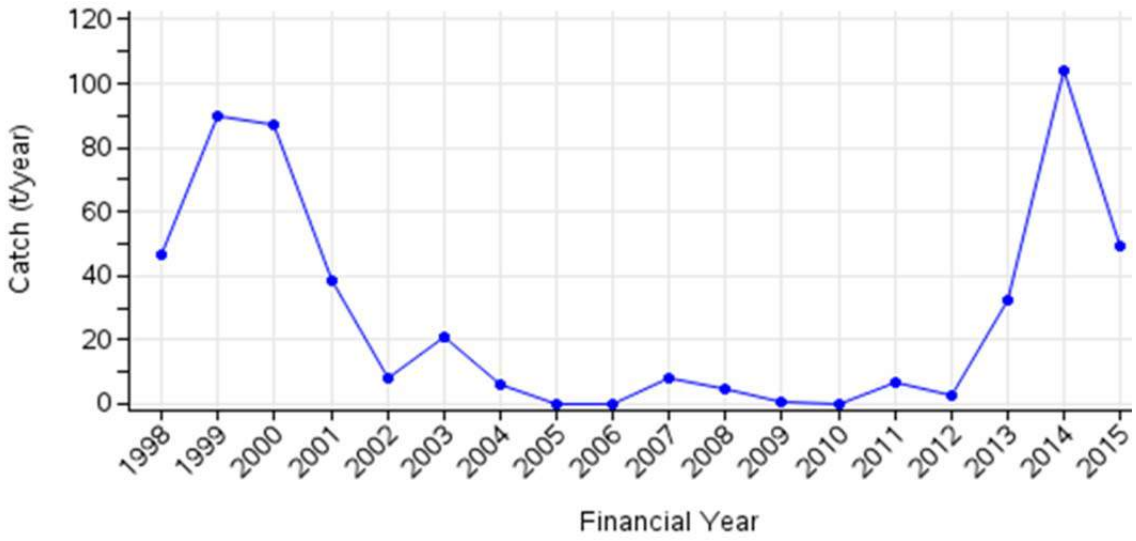


Figure 121. Total catch of sand crab by the commercial inshore trawl fishery (1998–2015).

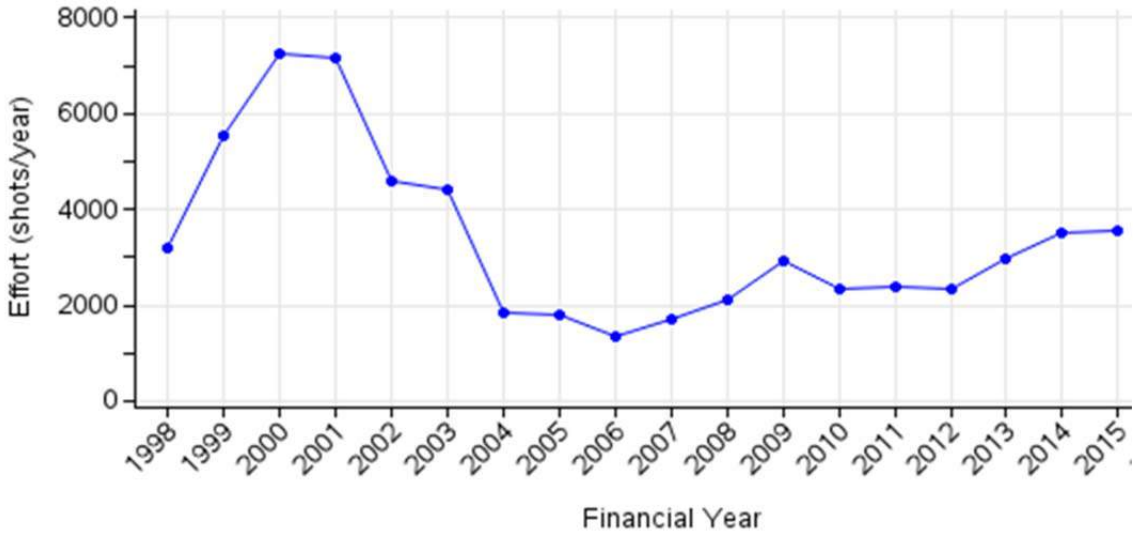


Figure 122. Fishing effort for sand crab by the commercial inshore trawl fishery (1998–2015).

Australian Salmon (*Arripis trutta, A. truttaceus*): Eastern and Western Victorian Stocks

Stock Structure and Biology

In Victorian waters there are straddling stocks of eastern and western Australian salmon. Western and eastern Australian salmon can live to at least 12 years of age and reach 81 cm fork length (FL). Eastern Australian salmon mature (50 per cent) at 2–4 years (30–40 cm FL). Western Australian salmon mature (50 per cent) at 3–5 years (60–65 cm FL). The main spawning period for eastern Australian salmon occurs from November to February along the east coast of Australia in coastal waters. Western Australian salmon migrate from Victorian waters back to western Australian waters, where spawning occurs in coastal waters in April–May.

Management / Assessment Unit

The Victorian component of the Australian salmons stocks support commercial fisheries in Corner Inlet, Port Phillip Bay and a commercial purse seine ocean fishery, mostly off eastern Victoria. Recreational fisheries occur in Port Phillip Bay, Western Port and Corner Inlet and along coastal beaches. This report considers populations of western and eastern Australian salmon in Victorian waters as separate management units (Figure 123).

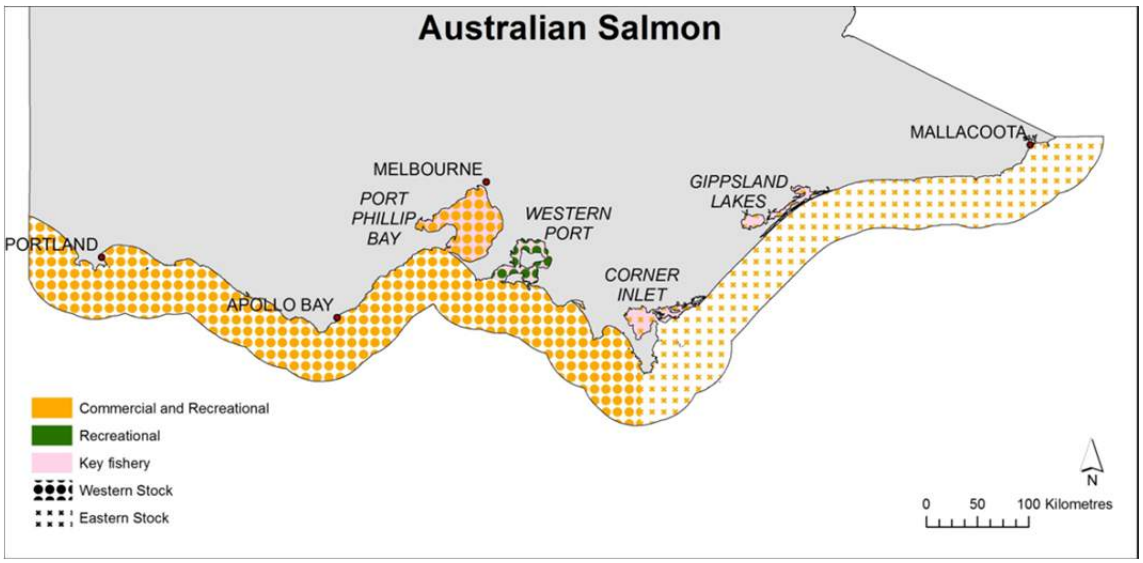


Figure 123. Eastern and western stock/spatial management units for the Victorian Australian salmons fishery.

Assessment Summary

Western stock

For this assessment the status of the western Australian salmon stock was evaluated using nominal CPUE trends for the Port Phillip Bay commercial haul seine fishery. The performance of the CPUE biomass proxy was assessed in relation to the specified reference level and limit points using the reference period of 1978–2015. The impact of fishing pressure was assessed using time series of commercial catch and effort.

This assessment found:

- *Biomass* — CPUE for the Port Phillip Bay commercial haul seine fishery is variable and below the reference level but above the limit point (Figure 124).
- *Fishing pressure* — total catches of western Australian salmon in the Port Phillip Bay commercial haul seine fishery have ranged from 20 to 40 tonnes per year over the last 20 years (Figure 125). There has been a long-term decline in haul seine effort in Port Phillip Bay from peaks of about 4,000 shots in the late 1970s and mid-1980s to 1,500 shots in 2015 (Figure 126).

On the basis of the evidence provided, the Victorian component of the western Australian salmon stock is classified as **sustainable** (Table 1).

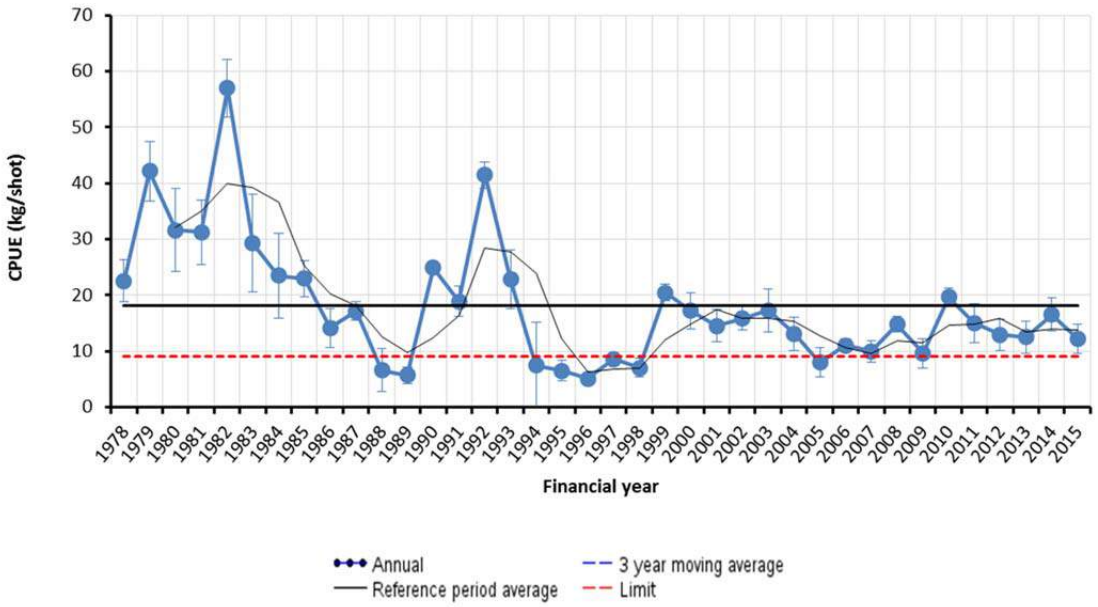


Figure 124. CPUE (±95% CL) of catches of western Australian salmon from the Port Phillip Bay commercial haul seine fishery (1978–2015).

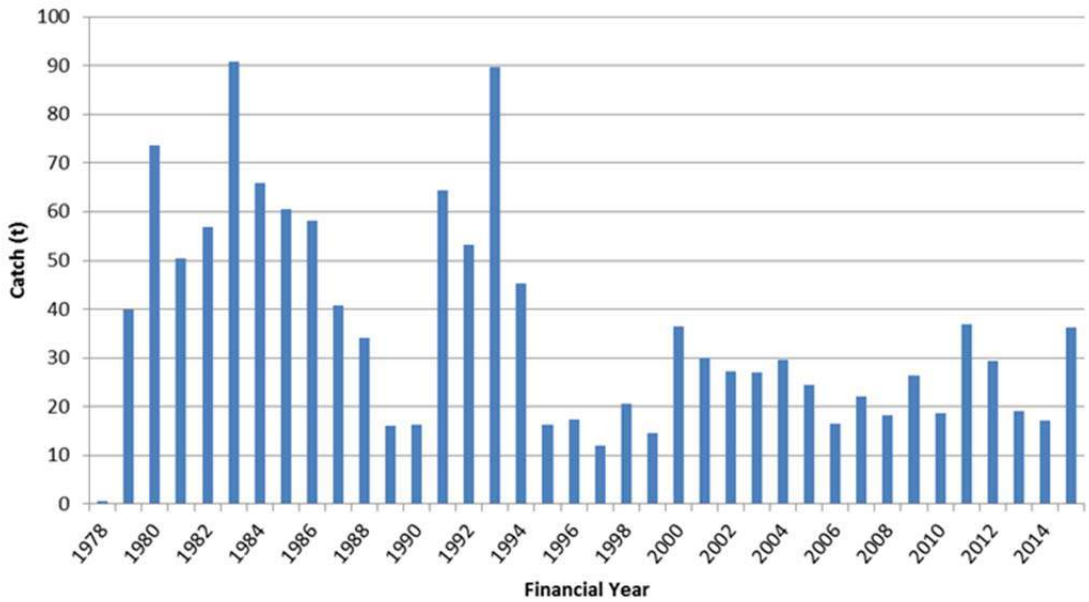


Figure 125. Total catch of western Australian salmon from the Port Phillip Bay commercial haul seine fishery (1978–2015).

Figure 126. Annual fishing effort for the Port Phillip Bay commercial haul seine western Australian salmon fishery (1978–2015).

Eastern stock

For this assessment the status of the eastern Australia salmon stock was evaluated using nominal CPUE trends for the commercial purse seine ocean fishery off eastern Victoria. The performance of the CPUE biomass proxies was assessed in relation to the specified reference level and limit points using the reference period of 1997–2015. The impact of fishing pressure was assessed using time series of commercial catch and effort.

This assessment found:

- *Biomass* — CPUE for the commercial fishery has been variable since 1997, and since 2007 has shown a sustained high level, well above the reference level (Figure 127).
- *Fishing pressure* — over the last 10 years catches of eastern Australian salmon have varied between 100 and 800 tonnes and show no long-term trends (Figure 128). Annual purse seine fishing effort in recent years has consistently averaged about 40 shots per year, and has been considerably lower than peaks of over 120 shots per year in the mid 2000s (Figure 129 and Figure 126).

On the basis of the evidence provided, the Victorian component of the eastern Australian salmon stock is classified as **sustainable** (Table 1).

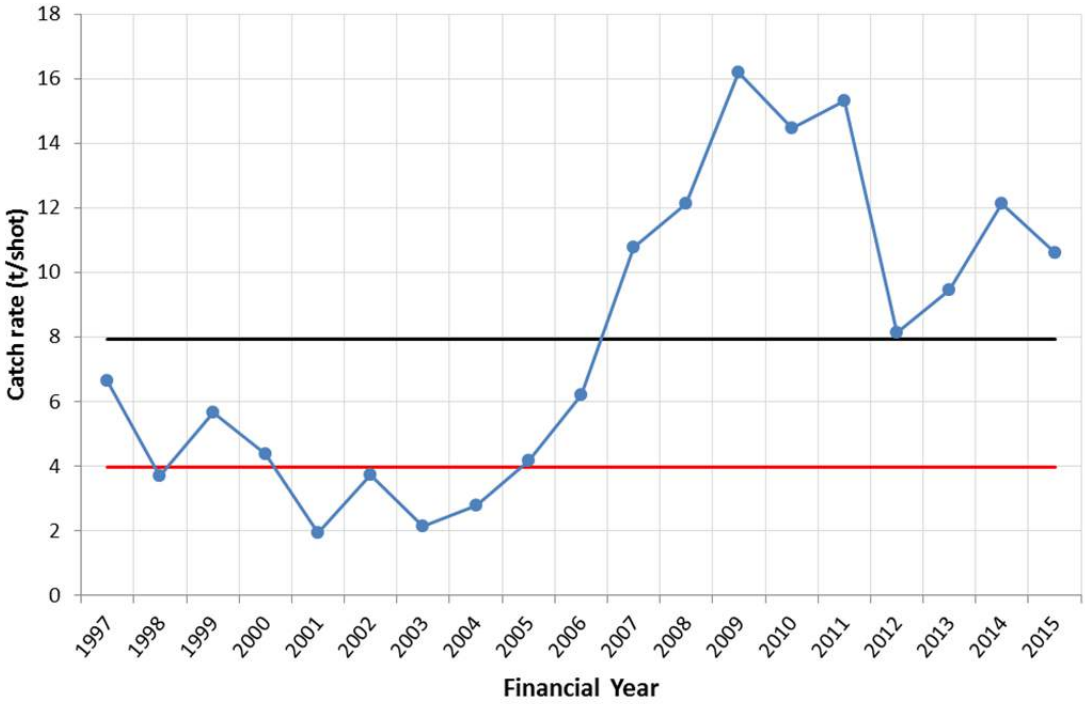


Figure 127. CPUE (±95% CL) of catches of eastern Australian salmon for the commercial purse seine ocean fishery (1997–2015).

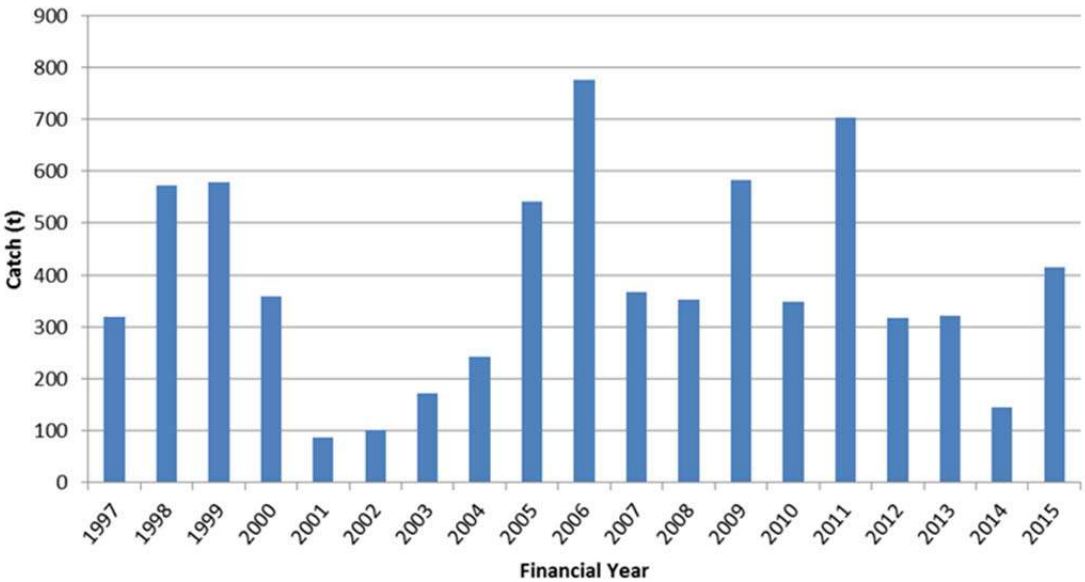


Figure 128. Total catch of eastern Australian salmon from the ocean purse seine licenced commercial fishery (1978–2015).

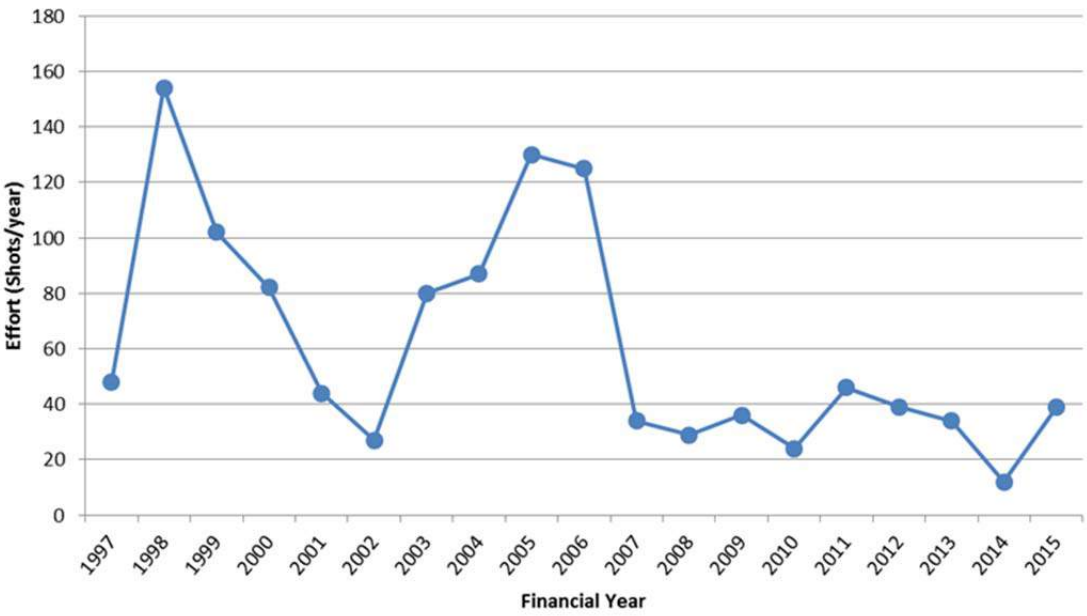


Figure 129. Annual fishing effort for eastern Australian salmon by the ocean purse seine licenced commercial fishery (1978–2015).

Tailor (*Pomatomus saltatrix*): Gippsland Lakes

Stock Structure and Biology

Information about the stock structure of tailor populations is limited, although there is considerable genetic divergence between eastern and western Australian populations. In the Gippsland Lakes tailor is considered to be part of a straddling, south-eastern Australian stock shared with New South Wales and Queensland. Tailor can live to 11–13 years of age and reach 120 cm TL. Tailor mature (50 per cent) at 1–2 years of age (males 29 cm TL; females 31 cm TL) and are highly fecund and are fast growers. The main spawning period for the south-eastern Australian tailor stock occurs in winter/spring in coastal waters.

Management / Assessment Unit

The Victorian component of the south-eastern Australian stock supports a commercial fishery in the Gippsland Lakes, and a small recreational fishery in the Gippsland Lakes. This report considers populations in the Gippsland Lakes as a single management unit (Figure 130). It is important to note that commercial catches of tailor are an order of magnitude higher in New South Wales and Queensland compared to the Gippsland Lakes fishery, and the fishery in Gippsland Lakes is thus likely to have negligible influence on overall stock status.

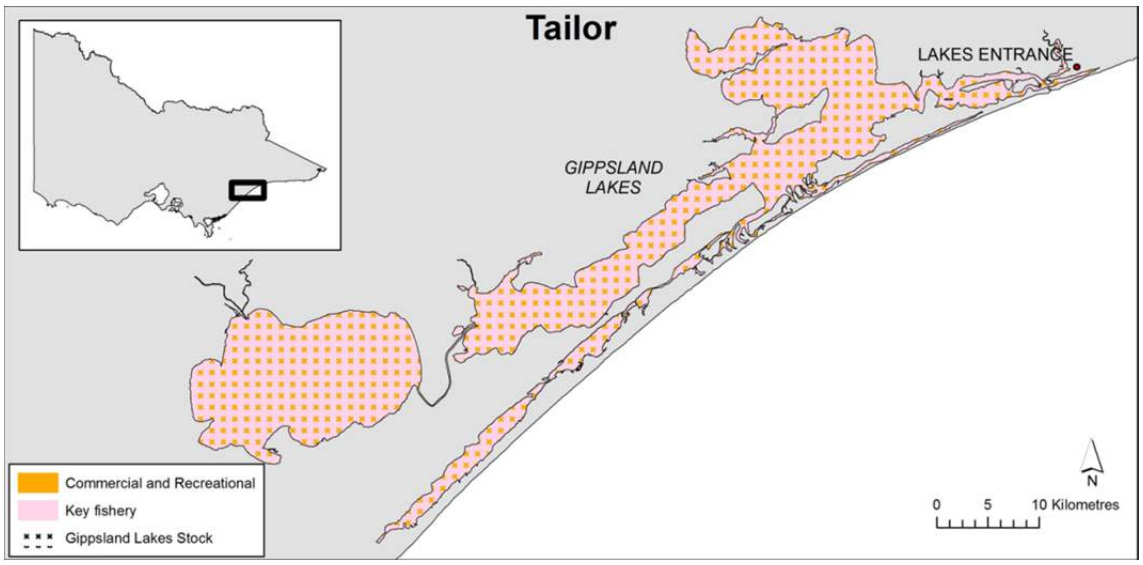


Figure 130. Stock/spatial management units for the Gippsland Lakes tailor fishery.

Assessment Summary

For this assessment the status of tailor in the Gippsland Lakes was evaluated using nominal CPUE for the commercial mesh-net fishery. The performance of the CPUE biomass proxy was assessed in relation to the specified reference level and limit points using the reference period of 1978–2015. The impact of fishing pressure was assessed using time series of commercial catch and effort.

This assessment found:

- *Biomass* — CPUE for the commercial fisheries over the last decade has been variable and mostly above the reference level since 2000 (Figure 131).
- *Fishing pressure* — total catches of tailor have been between 10 and 30 tonnes over the last 10 years (Figure 132 and Figure 125). Commercial effort increased from 2009 to 2014, but decreased in 2015, and was well below historical peaks in the late 1980s and early 1990s (Figure 133).

On the basis of the evidence provided, the Gippsland Lakes component of the south-eastern Australian tailor stock is classified as **sustainable** (Table 1).

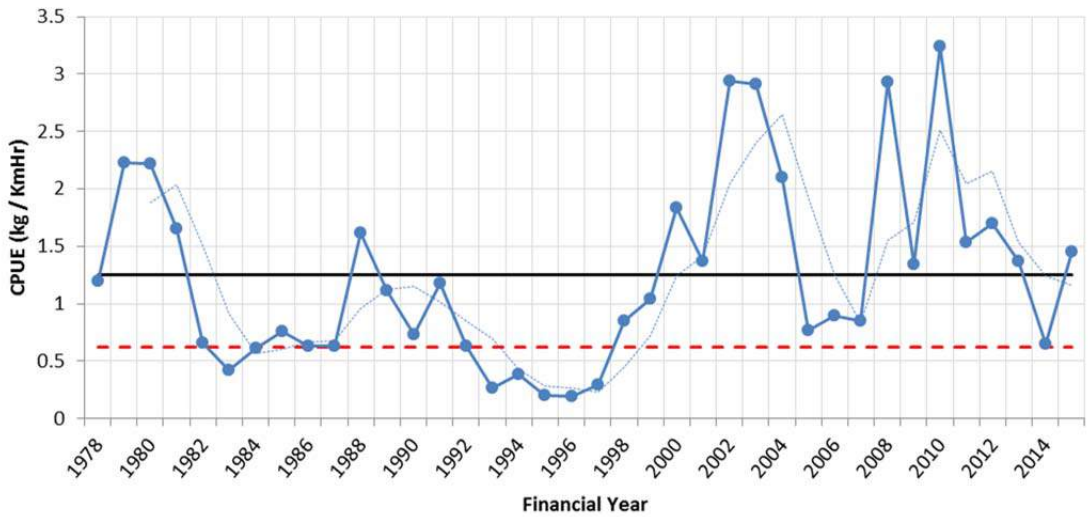


Figure 131. CPUE for the Gippsland Lakes commercial mesh-net tailor fishery (1978–2015).

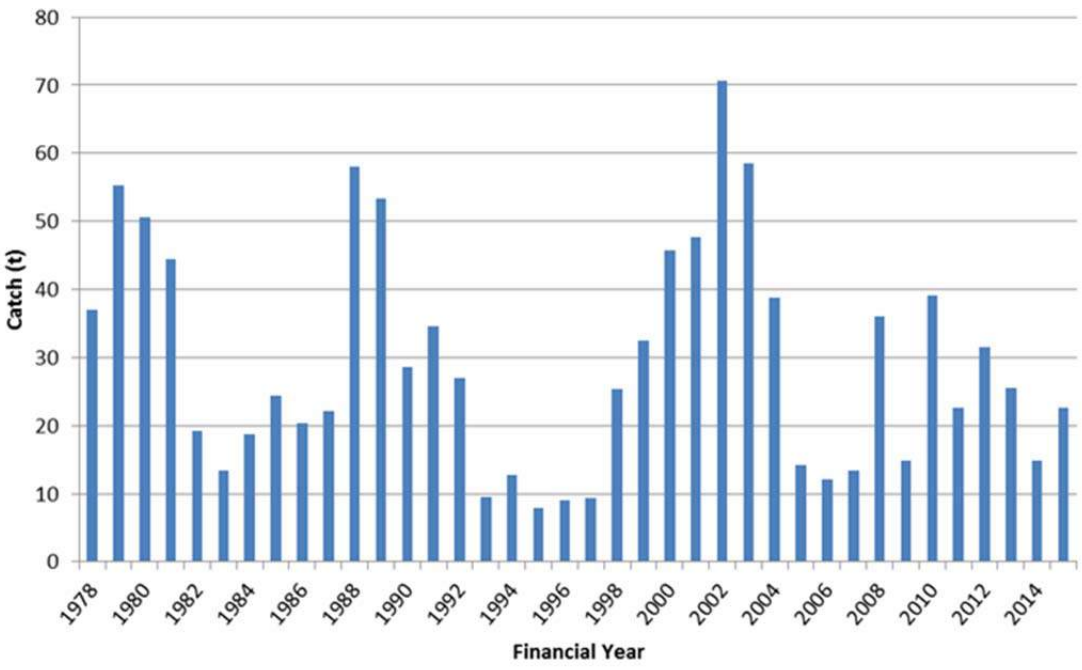


Figure 132. Total catch of tailor by the Gippsland Lakes commercial mesh-net fishery (1978–2015).

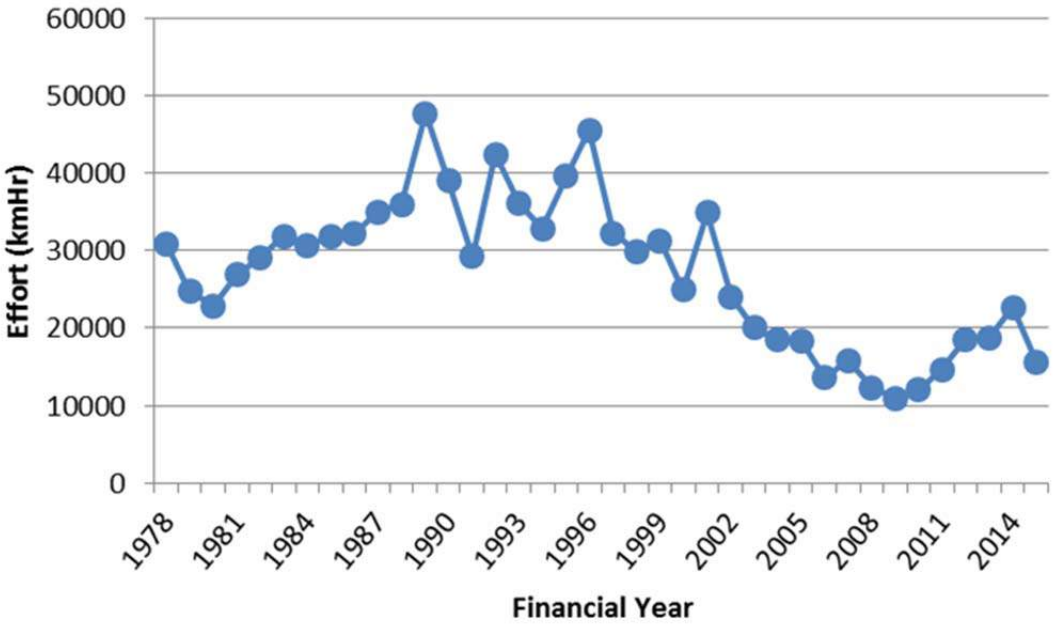


Figure 133. Fishing effort for tailor by the Gippsland Lakes commercial mesh-net fishery (1978–2015).

Discussion

The principle objective of this review was to provide information on the status of stocks to assist Fisheries Managers to prevent fish stocks from becoming overfished or moving towards a higher risk of over fishing. Of the 28 species/stocks or management units reviewed:

- fifteen were assessed as "Sustainable" and at low risk of being overfished
- two were assessed as "Overfished" (greenlip abalone — central zone and greenlip abalone — western zone);
- four were assessed as "Transitional depleting" and at higher risk of being overfished (blacklip abalone — central zone, blacklip abalone — eastern zone, southern rock lobster — eastern zone and southern sea garfish — state-wide);
- one was assessed to be "Environmentally limited" (sand flathead — Port Phillip Bay)
- four were found to have insufficient information available to determine their respective exploitation or stock status ("Undefined") and the risk of over fishing of these is uncertain (giant crab, pipi, yellow-eye mullet and sand crab).

Determination of the status of 24 of the 28 priority Victorian fish stocks was facilitated by the availability of extended time series CPUE data from commercial and recreational fisheries on which trends in stock biomass were assessed. The review also included analysis of total catch and effort data for commercial fisheries (for 26 stocks), recreational fishing effort (for 4 stocks), recreational and commercial fishery size composition (for 14 stocks) and stock abundance from fishery independent surveys (for 8 stocks). The current monitoring and assessment strategy whereby multiple lines of evidence are used to determine the impacts of fishing and stock productivity for key species provides a more robust approach to assessment of the fisheries.

CPUE is the primary indicator of status/changes in biomass but can, particularly for less valuable species in multi-species fisheries, vary in response to changes in fishing practices, efficiency and areas and targeting/economic drivers. These changes in CPUE may be unrelated to biomass and not be accounted for by standardisation procedures. The resulting uncertainty in interpreting CPUE was identified as a limiting factor in the reviews of some species.

CPUE, catch and effort data series for some species showed step changes, or longer-term trends with no prolonged periods of stability, or high variability over short time frames due to episodic recruitment or environmental influences. Setting reference levels based on a stable reference period approach or a simple long-term average approach may not be appropriate for such stocks. For that reason and to improve the assessment, development of CPUE reference levels tailored to the characteristics of individual Victorian fisheries will be the focus of significant effort in 2017-18.

Commercial catch end effort data will become less available for a number of species in the Port Phillip Bay fishery due to the removal of the net fishery by 2022. Recreational monitoring and fishery independent surveys are now well established for key species in this fishery.

Abalone, rock lobster and giant crab fisheries are quota managed and undergo annual stock assessments based on information available from monitoring programs, assessment models, catch and effort data, advice from commercial fishers and other relevant information from stakeholder groups including government, non-government organisations and external scientists. Recommendations relating to future management options and additional information needs are also discussed and put forward as part of these assessments. While the results of this review further support the stock status outcomes of these annual assessments, little additional information was presented at the workshop and given limited resources, it is suggested that these stocks not be included in the next year's assessment.

The sand flathead CPUE data presented in this review for recreational and commercial fisheries in Port Phillip Bay showed that the stock has now stabilised at a historic low level. Sand flathead stocks were last assessed in 2015 (Hamer *et al.* 2016) with the evidence suggesting the stock is environmentally limited as a result of a reduction in optimal Yarra River flows. Workshop participants suggested that future management options could include either accepting that the fishery is now at a low level or making changes and setting catch limits to rebuild the stock. Fisheries Managers indicated that further efforts related to managing sand flathead are expected in 2017-18.

Victorian southern sea garfish stocks were last assessed in 2009 (Morris *et al.* 2011) but CPUE trends for commercial net fisheries have been reported in subsequent fishery assessments for Corner Inlet (Conron *et al.* 2016), Port Phillip Bay (Hamer *et al.* 2016) and the Gippsland Lakes (Conron *et al.* 2016). Of note is that in the workshop discussion it was reported that the abundance of garfish stocks in South Australia has also declined in recent years, raising the possibility of a larger environmental cyclic process effecting stock productivity. Concern was expressed in determining the status of

a stock primarily on CPUE data given that the pelagic fishery is complex. It is suggested that further consideration of how to improve the assessment for garfish be undertaken.

Yellow-eye mullet CPUE trends had also been assessed as part of the recent Port Phillip Bay, Corner Inlet and Gippsland Lakes fishery assessments but a comprehensive Victorian stock assessment has not been undertaken. Given the availability of 30 years of Victorian commercial catch and effort records, combined with information from the recreational fishery, stock assessments by other state fisheries agencies and local fisher knowledge, it is likely that a formal stock assessment would change the “Undefined” stock status for this species.

The key factor in the “Undefined” status for the pipi and sand crab stocks is the limited temporal and spatial coverage of the CPUE data. Limitations of CPUE data and lack of other data will limit the benefits of formal stock assessments for these species. The Victorian Fisheries Authority is developing a pipi fishery management plan which will outline how the biological sustainability of pipi stocks will be assessed. Consideration of the need and timing of a pipi stock assessment is expected to be taken into account by this management plan.

At the end of the workshop, participants were given the opportunity to provide feedback to improve the process. This has been considered in this report in terms of refining future workshops. Approximately one third of the more than 90 fishery stocks/species managed by the VFA were considered in this review. There are a number of ways that the coverage could be increased and the discussions better informed:

- exclude abalone, rock lobster and giant crab from the scope of the review as each has a separate annual assessment process; replace them with additional stocks/species
- pre-assess and report on an increased number of stocks/species prior to the workshop and select a subset for review,
- limit bias by not presenting the VFA suggested classification as part of the presentation of information
- rotate the selected species/stocks on a bi- or tri-annual or risk basis
- improve the efficiency of data extraction, quality assurance, analysis and the reporting process/formats
- include catch curve mortality estimates based on length/age data
- include expert knowledge from the VFA Enforcement and Education Branch, particularly for data poor species
- Involve recreational and commercial fishers by local knowledge provision prior to the review being undertaken
- Allow more time for discussion to better inform the classification outcome as well as additional discussion time to attempt to reach consensus on classification.

Conclusions and Recommendations

The Status of Key Victorian Fish Stocks 2017 workshop that took place in April 2017 was a constructive exercise that benefitted from the input of fisheries managers and scientists from interstate as well as involvement of VFA staff from various parts of the organisation. The objective of the workshop to provide advice to the fisheries managers on the status of the stocks and/or species was met with the majority of the stocks in Victoria being assessed as sustainable. This is a positive outcome to support harvest opportunities for recreational, commercial and indigenous fishers in Victoria.

For those stocks that were not sustainable, fisheries management will consider how to respond to this information in helping to manage these stocks to improve their status for future assessments. In particular, the following stocks were suggested for further work:

- pipi (state-wide)
- sand crab (state-wide)
- sand flathead (Port Phillip Bay)
- southern garfish (state-wide)
- yellow-eye mullet (state-wide).

As the VFA is responsible for managing the impacts of fishing for over 90 stocks/fisheries. Increasing the number of stocks assessed is important to provide information to support decisions on allocation of management and assessment resources. This could be achieved by:

- excluding abalone, rock lobster and giant crab from the scope of the review thus freeing up resources to review the status of other stocks
- rotating the selected stocks, on a bi- or tri-annual basis and considered this on a risk basis
- pre-assessing an increased number (more than 28) of stocks and selecting a subset for review at the workshop
- improving the efficiency of data extraction, processing, analysis and presentation.

Improving the approaches to informing the exploitation status of fisheries is warranted. Improvements should consider more formal approaches for defining reference levels for CPUE time series and, analysis of length/age composition data and the inclusion of mortality estimates based on the analysis of length/age composition data where available. Development of formal management objectives and reference points in 2017-18 will improve the process for future workshops.

It is anticipated that the results of this work will be shared with stakeholders through regional workshops to meet cost recovery obligations as well as improve engagement and provide the opportunity for stakeholder input into the process. Further consideration will be given to timing of these stakeholder meetings and refinements to the process.

While the work to prepare for the workshop was substantial, it is expected to reduce work for future reporting through SAFS and other State and Commonwealth needs. On-going assessment as to the efficacy of this approach versus other methods needs to be undertaken to maximise the use of resources and ensure the highest quality assessment of Victoria's fisheries resources.

Acknowledgements

Gratitude is extended to the following people for their valuable input into this stock status review:

Anthony Roelofs (Queensland Department of Agriculture and Fisheries)

Sean Tracey (University of Tasmania)

Stephen Mayfield (South Australian Research and Development Institute)

Grant Pullen (Tasmanian Department of Primary Industries)

John Stewart (New South Wales Department of Primary Industries)

Klaas Hartmann (University of Tasmania)

Allison Webb (Victorian Fisheries Authority)

Bill Lussier (Victorian Fisheries Authority)

Brett Ingram (Victorian Fisheries Authority)

Harry Gorfine (Victorian Fisheries Authority)

James Andrews (Victorian Fisheries Authority)

Kate Simpson (Victorian Fisheries Authority)

Allister Coots (Victorian Fisheries Authority)

Monica West (Victorian Fisheries Authority)

Pam Oliveiro (Victorian Fisheries Authority)

Melissa Schubert (Victorian Fisheries Authority)

Paul Hamer (Victorian Fisheries Authority)

Simon Conron (Victorian Fisheries Authority)

Taylor Hunt (Victorian Fisheries Authority)

Toby Jeavons (Victorian Fisheries Authority)

Kylie Hall (Victorian Fisheries Authority)

Corey Green (Victorian Fisheries Authority)

Paula Baker (Victorian Fisheries Authority)

Monique Nelis (Victorian Fisheries Authority)

Phillip Travis (Victorian Fisheries Authority)

David Reilly (Victorian Fisheries Authority)

Monique Leane (Victorian Fisheries Authority)

Brett Matthews (Victorian Fisheries Authority)

Jeanne Cinel (Victorian Fisheries Authority)

Brent Womersley (Victorian Fisheries Authority)

Additionally appreciation is expressed to New South Wales and Queensland colleagues whose processes on which this workshop was modelled.

References

Australian Government (1995). Commonwealth Fisheries Harvest Strategy. Australian Government Department of Agriculture, Fisheries and Forestry, Canberra, Australia.

Conron S, Giri K, Hall K and Hamer P. (2016). Gippsland Lakes Fisheries Assessment 2016. Fisheries Victoria Science Report Series No. 14, Fisheries Victoria, Queenscliff.

Conron S, Green C, Hamer P, Giri K and Hall K (2016). Corner Inlet-Nooramunga Fishery Assessment 2016. Fisheries Victoria Science Report Series No. 11, Fisheries Victoria, Queenscliff.

Department of Primary Industries (2009). Victorian Rock Lobster Fishery Management Plan. Second edition. Fisheries Victoria Management Report Series No. 70, Fisheries Victoria, Queenscliff.

Department of Environment and Water Resources.(2007). Guidelines for the Ecologically Sustainable Management of Fisheries. http://www.environment.gov.au/marine/publications/guidelines-ecologically-sustainable-management-fisheries.

Department of Primary Industries (2010). Victorian Giant Crab Fishery Management Plan. Second edition. Fisheries Victoria Management Report Series No. 79, Fisheries Victoria, Queenscliff.

Hamer P and Giri K (2016). Port Phillip Bay Commercial Fishery Assessment 2016. Fisheries Victoria Science Report Series No. 9, Fisheries Victoria, Queenscliff.

Hamer P, Conron S, Hirst A and Kemp J (2016). Sand Flathead Stock Assessment 2015. Fisheries Victoria Science Report Series No. 13, Fisheries Victoria, Queenscliff.

Morris L, Brown L, Kemp J, Bruce T, Ryan KL and Conron S (2009). Victorian Garfish Bay and Inlet Stock Assessment . Fisheries Victoria Assessment Report No. 34

Stewardson C, Andrews J, Ashby C, Haddon M, Hartmann K, Hone P, Horvat P, Mayfield S, Roelofs A, Sainsbury K, Saunders T, Stewart J, Stobutzki I and Wise B (eds) (2017). Status of Australian fish stocks reports 2016, Fisheries Research and Development Corporation, Canberra.

Appendix 1

Species/stock	Management Unit	Priority Score
Bream, black	Gippsland Lakes	8
Snapper	Western stock	8
Snapper	Eastern stock	8
Abalone, blacklip	Eastern zone	7
Abalone, blacklip	Central zone	7
Abalone, blacklip	Western zone	7
Abalone, greenlip	Central zone	7
Abalone, greenlip	Western zone	7
Bream, black	Port Phillip Bay	7
Flathead, southern sand	Port Phillip Bay	7
Garfish, southern	State-wide	7
Mullet, yellow-eye	State-wide	7
Rock Lobster, Southern	Eastern zone	7
Rock Lobster, Southern	Western zone	7
Shark, Gummy	State-wide	7
Whiting, King George	State wide	7
Australian salmon	Eastern Victoria	6
Australian salmon	Western Victoria	6
Calamari, Southern (squid)	State-wide	6
Flathead, rock	Corner Inlet-Nooramunga	6
Wrasse (blue throat and purple)	Coastal waters	6
Bream, black	Eastern estuaries	5
Bream, black	Western estuaries	5
Crab, Sand	State-wide	5
Eel, longfin	Rivers and streams	5
Eel, southern shortfin	Rivers and streams	5
Flathead, dusky	Gippsland Lakes	5
Flathead, rock	Port Phillip Bay	5
Flathead, southern sand	Corner Inlet-Nooramunga	5
Shark, School	Coastal waters	5
Snook/pike	Port Phillip Bay	5
Tailor	Gippsland Lakes	5
Trevally, silver	State-wide	5
Flathead, southern bluespotted	State-wide	4
Tuna, Southern bluefin	Coastal waters	4
Anchovy, Australian	Coastal waters	4

Species/stock	Management Unit	Priority Score
Anchovy, Australian	Gippsland Lakes	4
Anchovy, Australian	Port Phillip Bay	4
Australian bass	Rivers and streams	4
Blackfish, river	Rivers and streams	4
Crab, Giant	Coastal waters	4
Elephant fish	Western Port	4
Flathead, southern bluespotted	Western Port	4
Flathead, southern sand	Western Port	4
Mackerel, jack	State-wide	4
Mulloway	Western estuaries	4
Perch, Macquarie	Rivers and streams	4
Pipis	Coastal waters	4
Prawn, Eastern king	State-wide	4
Sardine, Australian (pilchard)	State-wide	4
Yabby (freshwater)	State-wide	4
Cod, Murray	Lakes and impoundments	3
Bug (shovelnose lobster)	State-wide	3
Carp, European	Lakes and impoundments	3
Cockle, blood	Coastal waters	3
Flathead, dusky	Eastern estuaries	3
Flounder, greenback	State-wide	3
Kingfish, yellowtail	Coastal waters	3
Leatherjackets	State-wide	3
Luderick	Gippsland Lakes	3
Mullet, sea	State-wide	3
Perch, estuary	Eastern estuaries	3
Perch, estuary	Western estuaries	3
Perch, estuary	Gippsland Lakes	3
Perch, golden	Lakes and impoundments	3
Perch, redfin	Rivers and streams	3
Perch, redfin	Lakes and impoundments	3
Prawn, school	State-wide	3
Rays	State-wide	3
Sandworms	State-wide	3
Scallop, commercial	Bass Strait	3
Scallop, commercial	Port Phillip Bay	3
Shrimp, ghost	State-wide	3
Trout, brown	Lakes and impoundments	3
Trout, rainbow	Lakes and impoundments	3

Species/stock	Management Unit	Priority Score
Whiting, blue weed	State-wide	3
Australian bass	Lakes and impoundments	2
Barracouta	State-wide	2
Carp, European	Rivers and streams	2
Flathead, tiger	State-wide	2
Morwong, banded	Eastern Victoria	2
Morwong, dusky	State-wide	2
Octopuses	State-wide	2
Salmon, Atlantic	Lakes and impoundments	2
Salmon, Chinook	Lakes and impoundments	2
Shark, mako	Coastal waters	2
Shark, thresher	Coastal waters	2
Shellbait	State-wide	2
Shrimp bait	State-wide	2
Cod, trout	Lakes and impoundments	1
Blackfish, river	Lakes and impoundments	1
Perch, estuary	Lakes and impoundments	1
Roach	Lakes and impoundments	1
Sea urchin, black	Eastern Victoria	1
Sea urchin, white	State-wide	1

Appendix 2

Stock/ species	Review scale	Page	Commercial Fishery Access Licence	Management controls	Main commercial gear	Size limit (Minimum total length unless stated)
Crustaceans						
Southern rock lobster	Eastern Zone Western Zone	6	Rock Lobster	Quota managed Temporal closures – 1 June to 15 November — Females – 15 September to 15 November — Males Return berried females No fishing in bays and inlets	Rock lobster pots	Minimum carapace length 11 cm (male) 10.5 cm (female)
Giant crab	Eastern Zone	13	Giant Crab			15 cm (male and female)
Sand crab	Trawl (Inshore)	80	Trawl (Inshore) Gippsland Lakes Corner Inlet		Trawl net Mesh-net	none
Mollusc						
Abalone (Blacklip and greenlip)	Eastern Zone Central Zone Western Zone	20, 26	Abalone	Quota managed	Underwater breathing apparatus Harvest tool	Minimum sizes ranging 10–15 cm depending on the section of coast
Pipi	Discovery Bay	52	Ocean General Bait (General) Fishery Gippsland Lake Fishery (Bait) Lake Tyers Fishery (Bait) Mallacoota Lower Lake Fishery (Bait) Snowy River Fishery (Bait) Sydenham Inlet Fishery (Bait)	Legal minimum length (commercial only)	Hand harvest	3.5 cm (commercial fishery only)
Southern calamari	Port Phillip Bay Corner Inlet	64	Western Port/Port Phillip Bay Corner Inlet Gippsland Lakes		Haul Seine Squid jigs Trawl	none
Finfish						
Snapper	Eastern Stock Western Stock	15	Ocean General Trawl (Inshore) Western Port/ Port Phillip Bay	Legal minimum length	Longline Seine and mesh-netting Hook and line	28 cm
King George whiting		29	Western Port/ Port Phillip Bay Corner Inlet Gippsland Lakes			
Southern sand flathead	Port Phillip Bay	36				27 cm
Black bream	Gippsland Lakes	41	Gippsland Lakes	Legal minimum length	Seine and mesh-netting	28 cm
Tailor		87				25 cm (commercial) 23 cm (recreational)
Silver trevally	Corner Inlet Gippsland Lakes	75	Western Port/ Port Phillip Bay Gippsland Lakes Corner Inlet	Legal minimum length		20 cm

Stock/ species	Review scale	Page	Commercial Fishery Access Licence	Management controls	Main commercial gear	Size limit (Minimum total length unless stated)
			Ocean General			
Southern garfish	Corner Inlet Port Phillip Bay	47	Western Port/ Port Phillip Bay Gippsland Lakes Corner Inlet Ocean General		Seine and mesh-netting Hook and line	None
Yellow-eye mullet	Port Phillip Bay Corner Inlet Gippsland Lakes	54	Western Port/Port Phillip Bay Corner Inlet Gippsland Lakes	Legal minimum length (commercial only)		24 cm (commercial only)
Rock flathead	Corner Inlet	61	Corner Inlet Western Port/Port Phillip Bay	Legal minimum length		27 cm
Bluespotted flathead	Corner Inlet Port Phillip Bay	77	Port Phillip Bay/Western Port Corner Inlet Ocean Fishery Access	Legal minimum length		27 cm
Wrasse	Eastern Zone Central Zone Western Zone	64	Ocean Wrasse Rock Lobster	Legal minimum length	Hook and line Rock lobster pots	27 cm
Gummy shark	Port Phillip Bay Western Port Corner Inlet	71	Port Phillip Bay/Western Port Corner Inlet Ocean Fishery Access	Legal minimum length	Seine and mesh-netting Longline	45 cm (partial length)
Australian salmon	Western Stock Eastern Stock	82	Ocean Purse Seine Port Phillip Bay/ Western Port Corner Inlet Gippsland Lakes Ocean Fishery Access	Legal minimum length	Seine and mesh-netting Hook and line	21 cm

Customer Service Centre **136 186**

vfa.vic.gov.au