

Assessment Authors and Year

Fowler, A. M. and R. C. Chick. 2021. Stock assessment report 2021/22 – Ocean Trap and Line Fishery (Line Fishing – Eastern Zone) – Bass Groper (*Polyprion americanus*). NSW Department of Primary Industries, Fisheries: 8 pp.

Stock Status

Current stock status	On the basis of the evidence contained within this assessment, Bass Groper is currently assessed as undefined .
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Stock structure & distribution

Bass Groper (*Polyprion americanus*) has a global anti-tropical distribution and occurs throughout NSW (Ball et al. 2000; Wakefield et al. 2013).

Stock structure of Bass Groper in NSW is unknown, with no genetic analyses or comparative demographic investigations conducted to date. Genetic panmixia is expected, given the extended pelagic phase and exposure to strong surface currents through association with floating objects during this period that likely result in broad-scale dispersal (Roberts 1989; Machias et al. 2003). Panmixia of Bass Groper at regional scales is supported by genetic analyses conducted in other regions (microsatellite and mtDNA, Sedberry et al. 1996; Ball et al. 2000).

This report summarises a stock assessment conducted on the NSW component of the stock in 2021/22 (includes data to end of June 2021).

Biology

Bass Groper (*Polyprion americanus*) is a large demersal perciform typically inhabiting depths exceeding 300 m. The species also associates with seamounts (Sedberry et al. 1999). Bass Groper are gonochoristic and spawn pelagic eggs, with reproduction occurring between autumn and spring depending on region (Peres and Klippel 2003; Sedberry et al. 2006; Wakefield et al. 2013). The species is expected to form spawning aggregations (Sadovy 2003); however, direct observation of this phenomenon is lacking. Larvae and juveniles spend 1–7 years in surface waters before settling to adult demersal habitat on continental shelves and slopes (Sedberry et al. 1996).

No demographic information is available for Bass Groper in NSW. Investigations in other regions, including Western Australia, indicate that the species attains a large size (up to 200 cm total length, TL; Roberts 1989) and weight (up to 100 kg; Roberts 1989), is long-lived (up to 78 years; Wakefield et al. 2013), and late maturing (11–14 years; Wakefield et al. 2013). Growth differs between sexes, with females growing faster and achieving a larger size than males (Wakefield et al. 2013). Fecundity has not been examined. Internationally, Bass Groper have been assessed as 'Data deficient' in the Red List published by the International Union for the Conservation of Nature (IUCN) (Sadovy 2003)

Length samples (n = 354) obtained from the commercial fishing sector in NSW during the 1990s indicated a high proportion of large (>100 cm TL) individuals.

FISHERY STATISTICS

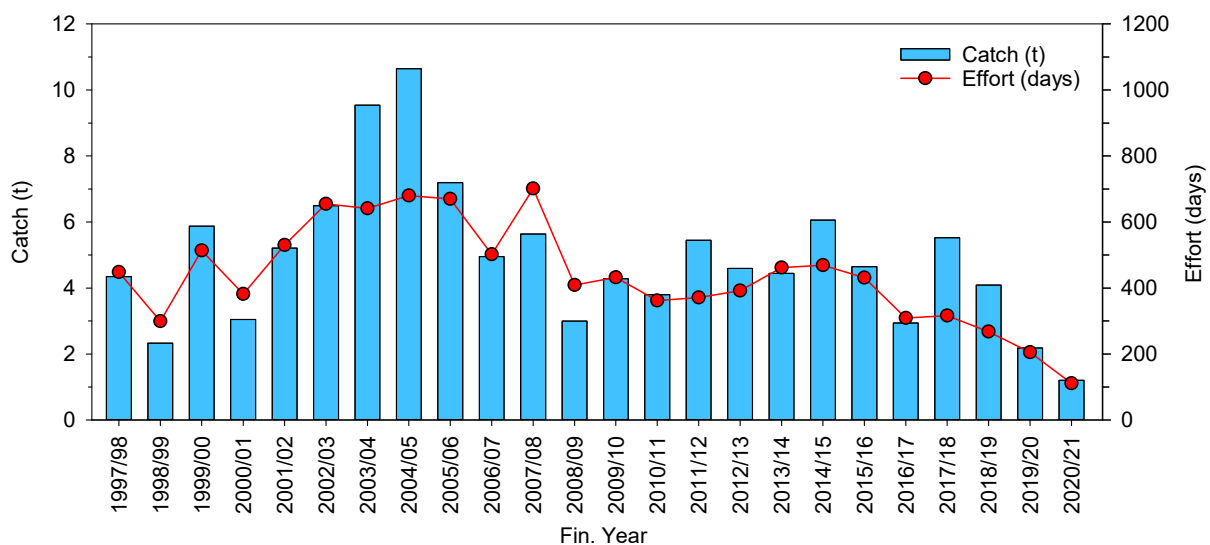
Catch information

Commercial

Since 2012/13, Bass Groper have been exclusively caught in the OTL Fishery (100% of total reported catch). Prior to 2012/13, minor catches (0-13% of total annual catch) were reported in the Ocean Fish Trawl and Ocean Prawn Trawl Fisheries. Most of the catch prior to 2011/12 was taken using dropline (mean: 87%, range: 52–98%), while the majority of catch after 2011/12 has been taken using handline (mean 69%, range: 44–87%).

Total annual reported commercial catch of Bass Groper is low (< 10 t since 2005/06; Figure 1). Catch increased from 2.3 t during 1998/99 to 10.6 t during 2004/05, after which catch decreased to 3.0 t during 2008/09. Catch remained relatively stable between 2008/09 and 2017/18, after which catch declined to the lowest value during most recent complete reporting year (2020/21). Larger catches (up to 136 t) have been reported historically; however, these records include unknown components of *P. oxygeneios* and catches taken from seamounts outside of NSW jurisdiction.

Figure 1 All fishing methods and fisheries combined – Total catch (t) of Bass Groper and total effort (days) from 1997/98 to 2020/21. Note: effort (days) from 2009/10 are days fished per month irrespective of species reported to be consistent with effort reported from 1997/98 to 2008/09.



Recreational & Charter boat

Recreational catches of Bass Groper are uncertain. Bass Groper, like congener Hapuku, are highly valued by recreational anglers in Australia (Wakefield et al. 2013), and recreational catch may comprise a substantial proportion of the total catch in NSW.

al. 2015). A catch of 350 individuals was estimated from a similar survey of recreational fishers during 2017/18 (Murphy et al. 2020); however, relative standard error was 100% and fewer than 30 respondents reported catches of the species. Anecdotal evidence, including social media reports of catches of Bass Groper and Hapuku, suggests the NSW recreational catch of these species in some years may equate to a substantial proportion (>15%) of the commercial catch.

Indigenous

Aboriginal cultural catches are unknown.

Illegal, Unregulated and Unreported

The level of Illegal Unregulated and Unreported (IUU) fishing has not been quantified.

Fishing effort information

The trend in total annual commercial effort was similar to that for total catch, with an increase from 299 days during 1998/99 to 701 days during 2007/08, followed by a decrease to 362 days by 2010/11 (Figure 1). Effort then remained relatively steady until 2017/18, after which it declined to the most recent complete reporting year (111 days, 2020/21).

Catch Rate information

Standardised catch rates ($CPUE_{dy}$, $kg.day^{-1}$) for droplining showed no clear trend over the available reporting period (1997/98–2020/21, Figure 2), with high variance from 2016. A peak in $CPUE_{dy}$ was observed during 2003/04; however, the 95% confidence interval surrounding this value overlapped with those from other years.

Too few handline catches occurred prior to 2009/10 to allow meaningful standardisation of catch rates. Median handline $CPUE_{dy}$ showed no clear trend over the available reporting period (1997/98–2020/21, Figure 3). Peaks in $CPUE_{dy}$ were observed during 2000/01 and 2010/11, with the 95% confidence interval surrounding the latter value not overlapping with those from some preceding years. The latter peak in CPUE followed a major change in reporting of fishing effort that occurred during 2009/10.

Figure 2 Standardised CPUE_{dy} (black line, kg.day⁻¹) for dropline method for Bass Groper from 1998/99 to 2020/21. Error bars represent 95% confidence intervals. Dashed line indicates the geometric mean CPUE.

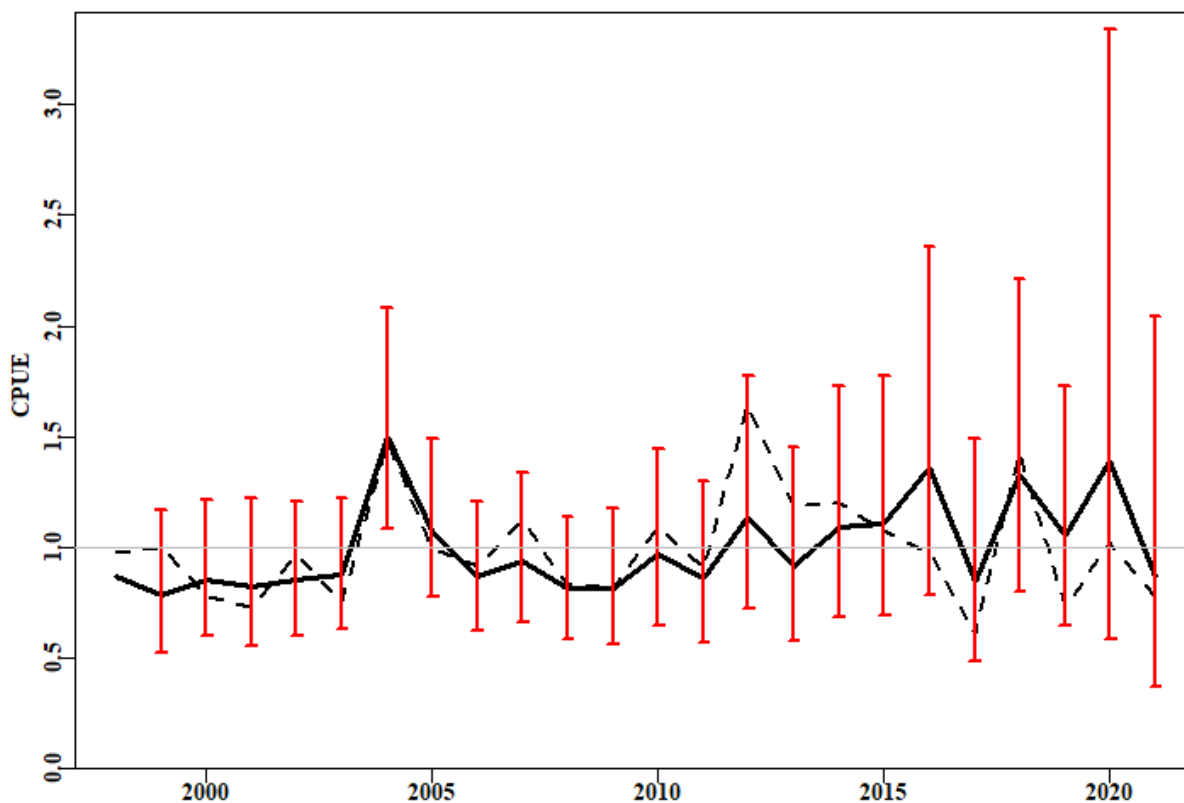


Figure 3 Median nominal CPUE_{dy} (kg.day⁻¹) for handlining method for Bass Groper from 1997/98 to 2020/21. Error bars represent interquartile ranges.

STOCK ASSESSMENT

Stock Assessment Methodology

Year of most recent assessment:

2021/22 (using data to end of June 2021)

Assessment method:

A review of indicators (weight-of-evidence approach) was used to assess the status of the NSW Bass Groper stock. There are insufficient data available to support more quantitative stock assessment methods.

Main data inputs:

Commercial catch from the NSW OTLLE Fishery from 1997/98 to 2020/21.

Commercial fishery OTLLE – dropline standardised catch rate ($CPUE_{dy}$) from 1997/98 to 2020/21.

Commercial fishery OTLLE – handline nominal catch rate ($CPUE_{dy}$) from 1997/98 to 2020/21.

Key model structure & assumptions:

NA – no model-based quantitative assessment approach was used.

Sources of uncertainty evaluated:

General data limitations and uncertainty was considered in the weight-of-evidence approach.

Status Indicators - Limit & Target Reference Levels

Biomass indicator or proxy	Standardised dropline $CPUE_{dy}$ Nominal handline $CPUE_{dy}$
Biomass Limit Reference Point	B_{20} (20% of unfished biomass), through adoption of the Australian standard in national SAFS reporting
Biomass Target Reference Point	NA – no biomass targets have been set
Fishing mortality indicator or proxy	NA – no fishing mortality reference points have been set
Fishing mortality Limit Reference Point	NA – no fishing mortality limit has been set
Fishing Mortality Target Reference Point	NA – no fishing mortality target has been set

Stock Assessment Results

The status of the NSW Bass Groper stock is classified as **undefined**.

A weight-of-evidence assessment approach was used as insufficient data are available to support a more quantitative stock assessment. Uncertainty regarding Bass Groper stock structure, biology and recreational catch, decreasing and low levels of commercial catch and effort (days), and low and variable catches and effort between different commercial fishing methods that exacerbate uncertainty surrounding estimates of standardised and nominal catch rates, provide insufficient information with which to reliably determine a stock status. It is also not known what impacts management of COVID-19 has had on recent patterns of fishing.

Stock Assessment Result Summary

Biomass status in relation to Limit	Undefined
Biomass status in relation to Target	NA
Fishing mortality in relation to Limit	NA
Fishing mortality in relation to Target	NA
Current SAFS stock status	Not assessed
Current Commonwealth stock status	Not assessed

Fishery interactions

Bass Groper are primarily caught as bycatch when droplining for Blue-eye Trevalla (*Hyperoglyphe antartica*). Catches of Bass Groper and associated fishery statistics may therefore be influenced by changes in the Blue-eye fishery.

Bass Groper are landed in Australian Commonwealth fisheries, off the east coast of Australia, including waters east of NSW jurisdictional management. Reporting of Commonwealth catches for Bass Groper is combined with those for congener *P. oxygeneios*; however, catches for this group have been low and similar to those from NSW.

Qualifying Comments

Although commercial catches are low, the impact of fishing on the Bass Groper stock in NSW remains uncertain. First, recreational catch is potentially substantial relative to commercial catch, and likely increasing through time, due to desirability of the species and technological improvements that facilitate angling in deep water. Secondly, the demographic characteristics of late maturity, slow growth in later life and extended longevity reported from other regions suggest the NSW stock may be vulnerable to exploitation (Sedberry et al. 1999; Peres and Haimovici 2004; Wakefield et al. 2013). Finally, population structure and extent of connectivity of Bass Groper remains unknown in NSW. Although genetic homogeneity is expected across the region, potential restriction in post-settlement movement may still result in localised depletions or demographic

shifts, particularly given the likelihood that the species aggregates to spawn (Sadovy 2003; Wakefield et al. 2013).

NSW catch and effort logbook data vary spatially and temporally across different eras, delineated by changes in fisher reporting requirements and other management changes. Changes in dropline CPUE_{dy} over the available reporting period did not appear to coincide with reporting changes; however, the increase in handline CPUE_{dy} during 2010/11 immediately followed the major reporting change that occurred in 2009/10. Further, commercial fishers have indicated that recent reduced levels of fishing activity have been exacerbated by constraints to fishing associated with the market for quota and challenges in accessing adequate quota to ensure fishing is operationally and economically viable.

Factors other than fishing, including climate change and other environmental processes, may affect changes in the abundance and biological functioning of the NSW Bass Groper stock(s) through time. Temporal and spatial variations in oceanographic conditions, including temperature change, may influence available trophic resources, growth, population connectivity and ultimately recruitment.

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