Department of Primary Industries
Department of Regional NSW

NSW Stock Status Summary – 2023/24

Yellowfin Bream (*Acanthopagrus australis*)

Assessment Authors and Year

Helidoniotis, F., and Schilling, H., 2024. Stock assessment report 2024/25 – Yellowfin Bream (*Acanthopagrus australis*). NSW Department of Primary Industries - Fisheries: 36 pp.

Stock Status

Current stock status	On the basis of the evidence contained within this assessment, Yellowfin Bream are currently assessed as **sustainable**

Stock structure & distribution

Yellowfin Bream occur through south-eastern Australia. The species resides primarily in estuaries, but at times can be found in good numbers on inshore reefs and ocean beaches. Within estuaries, the species is found throughout the entire brackish water range, but following periods of heavy rainfall and inflow they can migrate to sea or seek refuge (from fresh water) in deeper estuarine waters (Payne et al. 2013). While animals are thought to spawn near the mouths of estuaries (Kailola et al. 1992), recent work has suggested that spawning animals can remain well within the estuary, and there are no synchronised downstream migrations to a common spawning location (van der Meulen et al. 2023).

The stock structure of Yellowfin Bream has been examined using microsatellite markers. This work showed that there was no differentiation across the distributional range of the species, suggesting a panmictic stock structure (Roberts and Ayre 2010). In the south of the species range, Yellowfin Bream are known to hybridise with congener Black Bream (Acanthopagrus butcheri). Hybridisation is especially prevalent in estuaries that are typically closed to the ocean, but also occurs in open estuaries (Roberts and Ayre. 2010, Roberts et al 2010). Acanthopagrus hybrids, however, display similar migratory behaviour to Acanthopagrus australis (van der Meulen et al. 2023).

Scope of this assessment

Yellowfin Bream are predominantly caught in two commercial fisheries within NSW; the Estuary General Fishery (EGF) and the Ocean Hauling Fishery (OHF). This report is focused on the whole of New South Wales.

The most recent stock assessment for Yellowfin Bream was in 2024 (Helidoniotis and Schilling 2024). The assessment was conducted to inform the population status of Yellowfin Bream in New South Wales.

The scope of the current report is to conduct a stock status informed by trends in length frequency data, age composition data, catch-rate (with catch and effort data up to July 2023) and catch curve analysis.

This formed that basis for weight-of-evidence determination of Yellowfin Bream status for Financial Year (FY) 2024.

Biology

Animals are generally mature by 2 years of age, but the species is known to display protandrous sex inversion (Pollock 1985). The current legal length for the species is 25 cm Total Length (NSW Fisheries 2003, New South Wales 2023) which converts to approx. 22 cm Fork length. The maximum age ranged from 14 years in NSW (Ochwada et al. 2008) to 22 years (Gray et al. 2000). Maximum weight for the species has been reported to be 4 kg and the maximum length reported to be 60 cm (https://www.dpi.nsw.gov.au/fishing/fish-species/species-list/yellowfin-bream).

FISHERY STATISTICS

Catch

Commercial

Yellowfin Bream are predominantly caught in two commercial fisheries within NSW; the Estuary General Fishery (EGF) and the Ocean Hauling Fishery (OHF). The majority of the catch (inter-annual range: 66 – 95%) is from the EGF (Figure 1). Since 1998 the highest landings in the EGF occurred in 1998 and 2007 (352 t and 340 t respectively). After 2008 catches declined to 200 – 250t and remained within that range. The EGF has nine endorsements, three of which consist of bream catches; Meshing endorsement (meshing net and flathead net), Trapping endorsement, and Category one hauling endorsement (hauling net - general purpose). The most frequently used fishing methods for Yellowfin Bream in the (EGF) are mesh netting (inter-annual range was predominantly 48-78% of the catch), haul netting (inter-annual range was predominantly 7 – 28% of the catch) and fishtrap (inter-annual range was predominantly 4 – 28% of the catch) (Figure 2). Yellowfin bream hybridises with Black Bream. It is speculated whether Yellowfin Bream catches may have also consisted of hybrids. The lowest reported catch since 1998 occurred in 2023. Catches have been declining in the last 3 years since 2021. Historically commercial catches gradually increased from approximately 250 t in 1956 to approximately 510 t by 1993 and remained above 500 t until 1998 before decreasing and remaining below 250 t since 2021 (Figure 3).

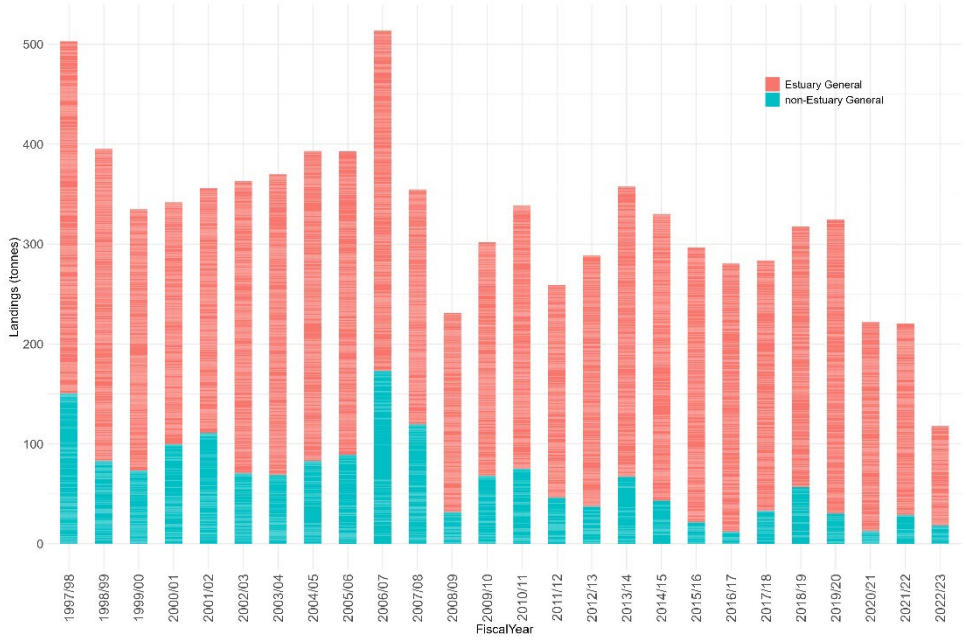

Figure 1 Annual reported commercial landings (t) of Yellowfin Bream in New South Wales from 1998 to 2023.

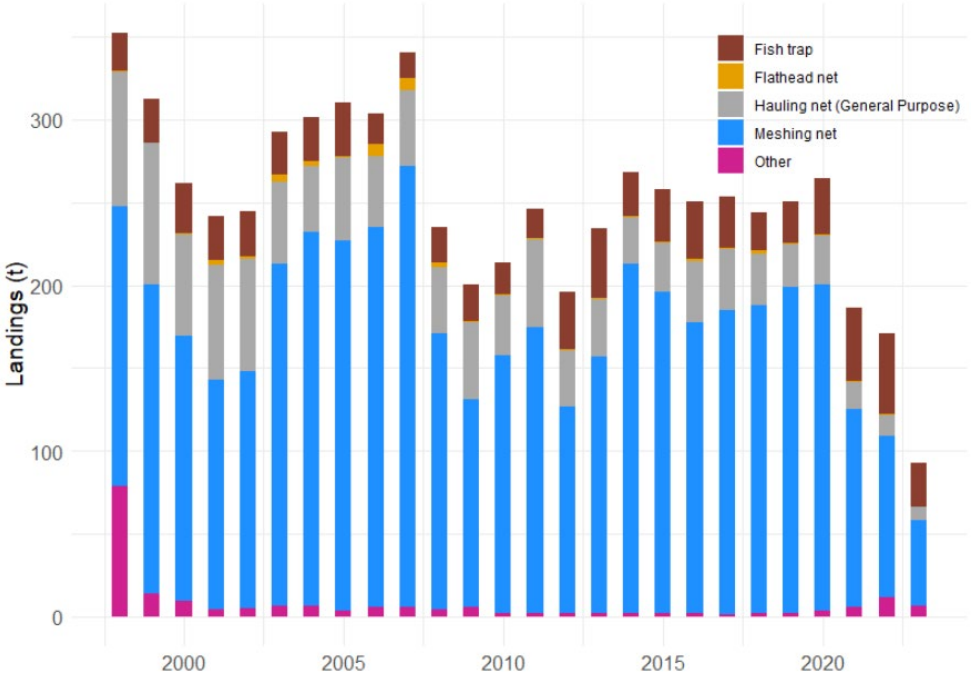

Figure 2 Annual catch (t) of Yellowfin Bream from NSW Estuary General Fishery from 1998 to 2023 in different fishing methods.

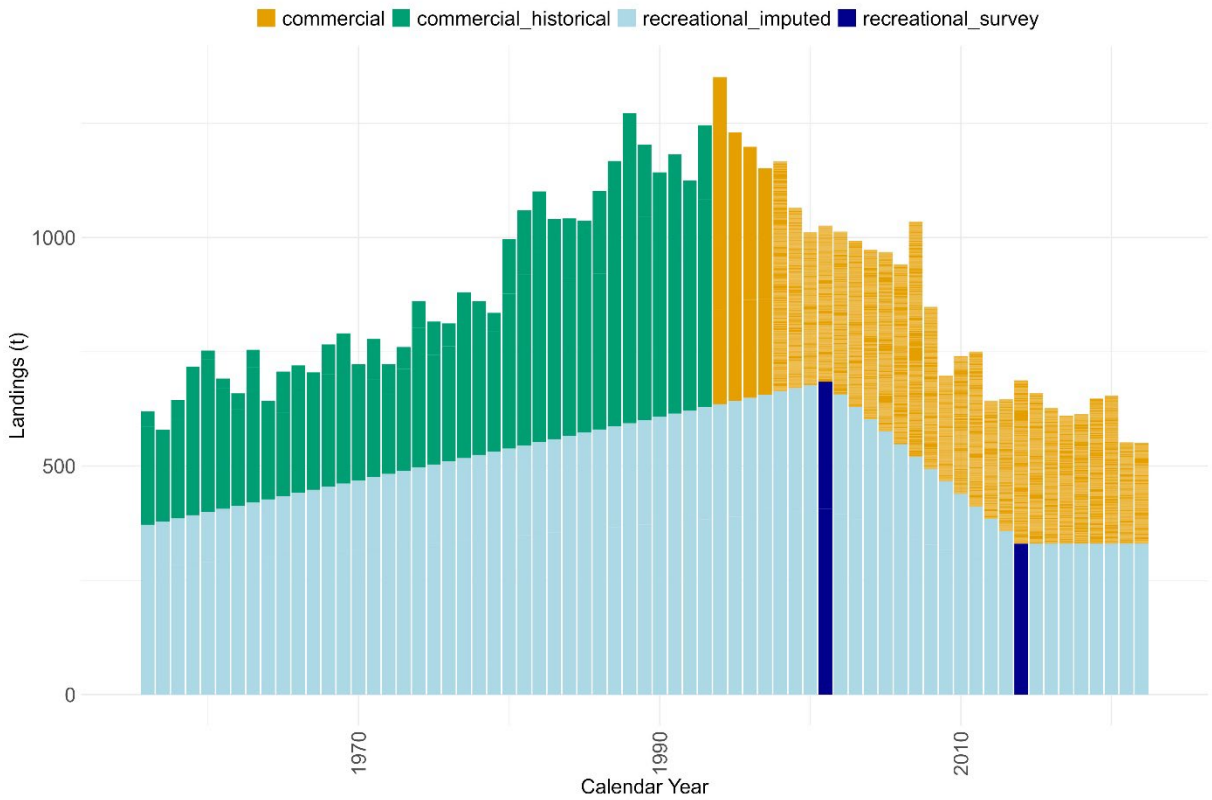

Figure 3 Total landings of Yellowfin Bream, including historical commercial landings, logbook commercial landings and recreational landings.

Recreational & Charter boat

This species is harvested by the recreational sector in New South Wales. The proportion of recreational catch to total catch is 42% – 62% (Figure 3). Details about the data and the sampling frame of the recreational survey are reported in Helidoniotis & Schilling (2024) and Murphy, et al. (2020, 2022).

Indigenous

There is no information available on the take of Yellowfin Bream by the New South Wales Aboriginal cultural fishery.

Illegal, Unregulated and Unreported

There is no information available on the Illegal, unregulated and unreported take of Yellowfin Bream in New South Wales.

Effort

Fishing effort (days) was variable during 2010-2023, with a gradual decline to 2580 days in 2023 (Figure 4). The trend in number of days fished between 2010 and 2022, was derived from summing the number of fishing events for the target species. In the logbook records prior to 2010, effort was recorded as days fished per month however following reporting changes implemented in 2009, effort was also reported in

terms of gear used. For Yellowfin Bream the unit of effort since 2010 was 'number of shots' for the hauling endorsement, 'length of net' for meshing endorsement and number of traps lifted. Nominal effort in 2022 (number of fisher-days) in the Estuarine General Fishery (was approximately 11 059 days, summed across methods). Nominal effort in 2022 (number of fisher-days) in NSW was 121018 days (summed across methods).

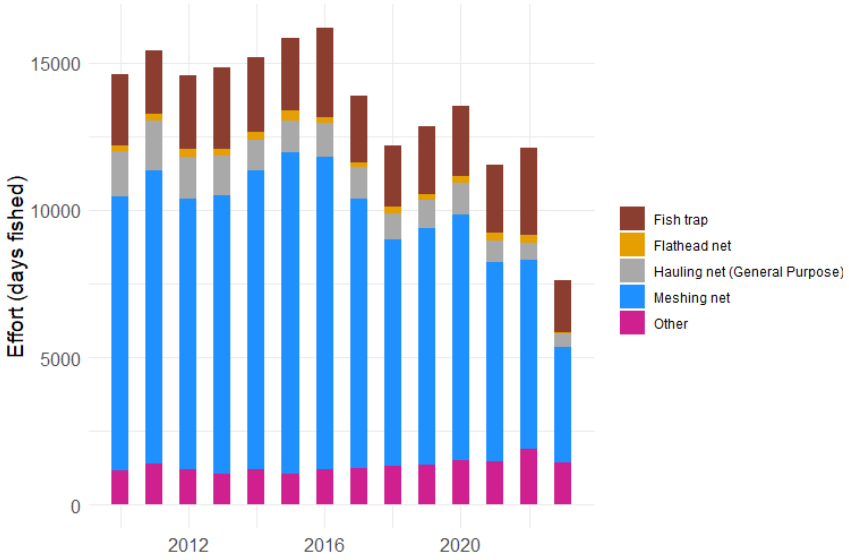

Figure 4 Annual effort (days fished) between different fishing methods of Yellowfin Bream from the NSW Estuary General Fishery from 2010 to 2023.

Catch rate

The data was separated into the three main fishing methods: meshing, haul and trap. Standardised catch rates were prepared for each fishing method separately. Overall the catch rate standardisation indicated that catch rates decreased from 2020 in haul and meshing and increased for trap (Figure 5, Figure 6, Figure 7). The catches were decreased in haul and meshing and remained constant for trap. These trends coupled with the trend in catch rates in each gear type, indicate that the stock is sustainable.

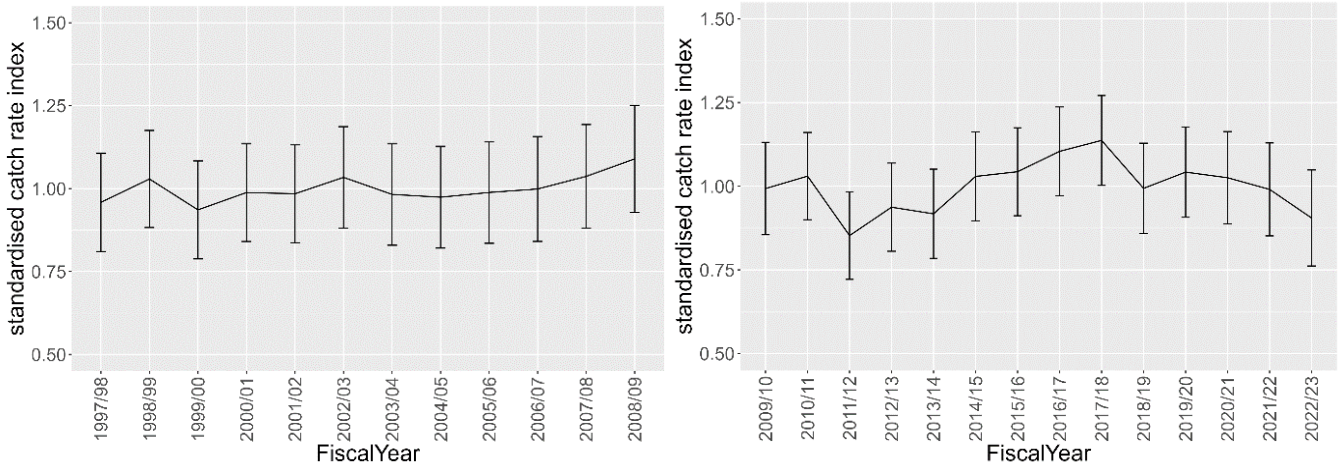

Figure 5 Catch rate standardisation (scaled to 1) for Yellowfin Bream in the Estuary General Fishery for haul. The left plot is CommCatch data (monthly records) and the right plot is FishOnline logbook data (daily records)

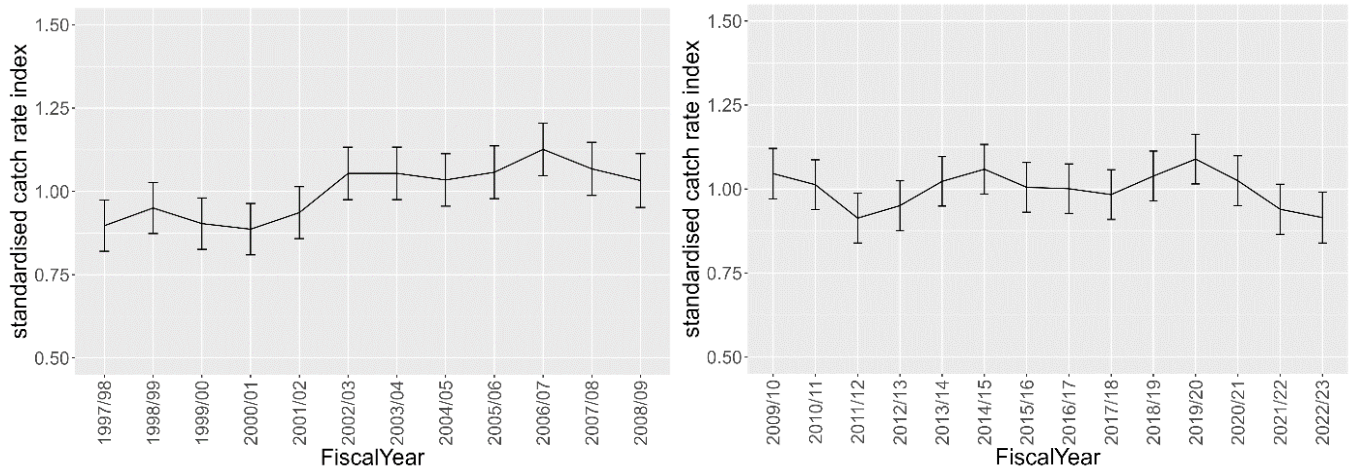

Figure 6 Catch rate standardisation (scaled to 1) for Yellowfin Bream in the Estuary General Fishery for meshing. The left plot is CommCatch data (monthly records) and the right plot is FishOnline logbook data (daily records)

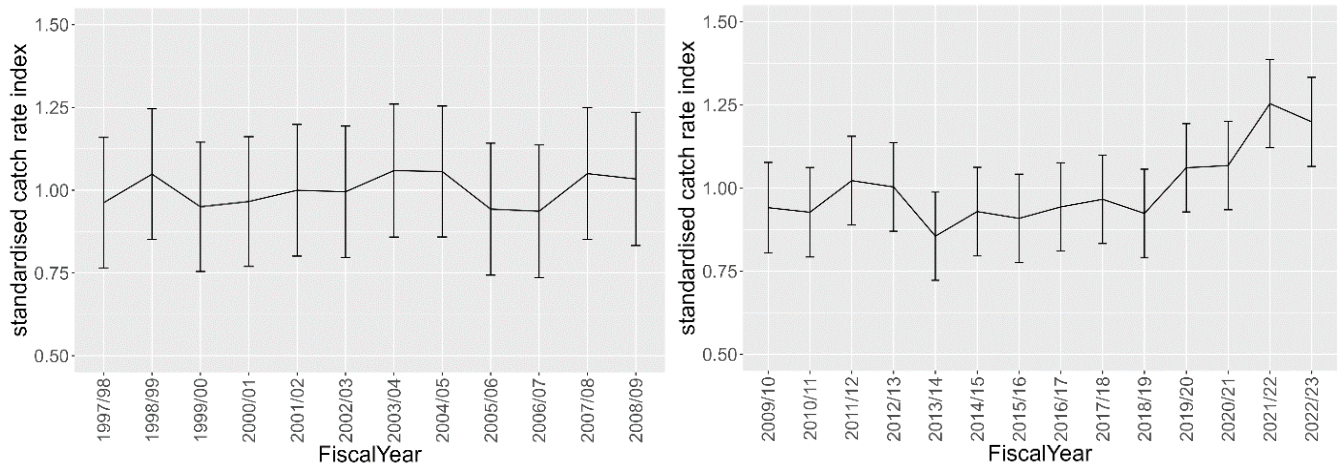

Figure 7 Catch rate standardisation (scaled to 1) for Yellowfin Bream in the Estuary General Fishery for trap. The left plot is CommCatch data (monthly records) and the right plot is FishOnline logbook data (daily records)

STOCK ASSESSMENT

Method

Year of most recent assessment:

2024 (using data to June 23)

Data inputs

The data sources used in the status determination included log-book data, and fishery dependant age and length data. The logbook data was used to determine catch rates, and to create total annual harvests. The time series of data varied between different data sources. Harvest data had the longest time series of 73 years from 1950 to current year and the catch and effort data spanned 35 years.

The data sources used in the catch rate analysis included records in the ComCatch database for FY1985 – FY2009, and FishOnline database from FY2010 – FY2023 (Table 1). Standardised catch rate was calculated for two time periods 1985 – 2010 based on ComCatch database and 2010 – 2023 based on FishOnline database. The ComCatch database were monthly aggregates of catch and effort (in days) for specific fishing methods following 1997/98, with previous data not specific to a particular method. The FishOnline database were daily records consisting of daily catch and effort data.

Table 1. Summary of the main data sources of commercial fishery records and changes to fisher reporting requirements through time

Time period	Data source	Reporting requirements
Pre-1984	HCatch	Catch unit – kg per month No fisher, vessel or effort information available Spatial scale – 3 broad ocean zones
July 1984 – June 1997	ComCatch	Catch unit – kg per month Effort unit – days fished per month Catch data not linked to individual methods, therefore, effort only assigned to catches when a single method was used in a given month
July 1997 – June 2009	ComCatch	Catch unit – kg per month Effort unit – days fished per month Catch data provided for each method used
July 2009 – present	FishOnline	Catch unit – kg per fishing event (daily records) Effort unit – various, one per method; hours fished, net length or number of shots, hooks, lures or traps; hours trawled per day Catch data provided for each method used Spatial scale – individual estuaries, 7 broad regions; 0.1º x 0.1º C-square grid Voluntary E-reporting of catch records since 2011 Compulsory E-reporting for quota reconciliation since 2019

Assessment method

A weight-of-evidence approach has been used to classify the biological status of the New South Wales Yellowfin Bream stock based on:

1) standardised catch rates: Modelling of a standardised catch rate time series for three different fishing methods used; meshnet, haulnet and trap, and
2) length composition data
3) age composition data
4) catch curve analysis

Year of most recent assessment	2024 No quantitative joint stock assessment of the entire biological stock is undertaken.
Assessment method	A weight-of-evidence approach was used for this stock status assessment of Yellowfin Bream in NSW waters. It relies on analyses of length composition data, age composition data, catch curve analysis and standardised catch rates for the two main commercial fishing sectors, mesh netting and hauling in the EGF, pooled across all estuaries.
Main data inputs	Commercial catch and effort data – for all NSW commercial fisheries by fiscal years (1952/53–2022/23).

	Recreational catches – estimated annual catches from three periods – national recreational and indigenous fishing survey (2000/01) and NSW recreational fishing surveys (2013/14 and 2017/18). Commercial catch rates historical – reported annual CPUE data for the hauling and mesh netting sectors of the EGF by calendar years in kg per boat day (1985–2019) from monthly records – standardised. Commercial catch rates recent – reported annual CPUE data for the hauling and mesh netting sectors of the EGF by calendar years in kg per boat day, (2009/10– 2022/23) from daily records – standardised.
Key model structure and assumptions	catch rates are a relative index of abundance and are not unduly influenced by other factors that are not accounted for through standardisation. Catch rates were standardised for the influences of different months, estuary regions, authorised fishers and net length (mesh netting records only). Using fishing effort as an indicator of relative fishing pressure assumes that fish catchability and fishing power have not changed significantly over the monitoring period.
Sources of uncertainty evaluated	Changes in fishing effort distribution following catch reporting changes from monthly to daily event reporting in July 2009

Status Indicators - Limit & Target Reference Levels

Biomass indicator or proxy	None specified in a formal harvest strategy. In the interim, for the purposes of this assessment the trend in commercial catch rates of the hauling, mesh netting and trap sectors of the EGF were selected as indices of relative abundance.
Biomass Limit Reference Point	None specified in a formal harvest strategy. In the interim, for the purposes of this stock assessment current catch rates were assessed relative to long-term averages of each time series.
Biomass Target Reference Point	NA
Fishing mortality indicator or proxy	None specified in a formal harvest strategy. In the interim, for the purposes of this stock assessment, estimates of fishing mortality (F) relative to natural mortality (M) were made from catch curve analyses
Fishing mortality Limit Reference Point	NA
Fishing Mortality Target Reference Point	None specified in a formal harvest strategy. For the purposes of this stock assessment, F = M (approx.) was assumed to represent an acceptable level of F.

Results and Discussion

Yellowfin Bream has a long history of commercial harvest in the State. Historical records indicate that commercial fishing for bream in New South Wales dates as far back 1895, although the records do not distinguish between different species of bream. Landings of Yellowfin Bream in the EGF varied considerably among estuaries during 2018-2023, with the greatest volume of catch throughout the 5

year period being taken from Tuggerah Lakes and Wallis Lake (Estuary Region 4) and Clarence River (Estuary Region 6).

The trends in catch rate standardisations for the most recent three years (FY 2021 – 2023) were within the interannual range of the timeseries (Figure 5, Figure 6, Figure 7).

The proportion of catch of Yellowfin Bream in the catch was highest in trap between 0.38 – 0.81 (38 – 81 %) consistently 0.1-0.2 (10-20%) in meshing and was variable 0.1-0.35 (10 – 35 %) in haul (Figure 8).

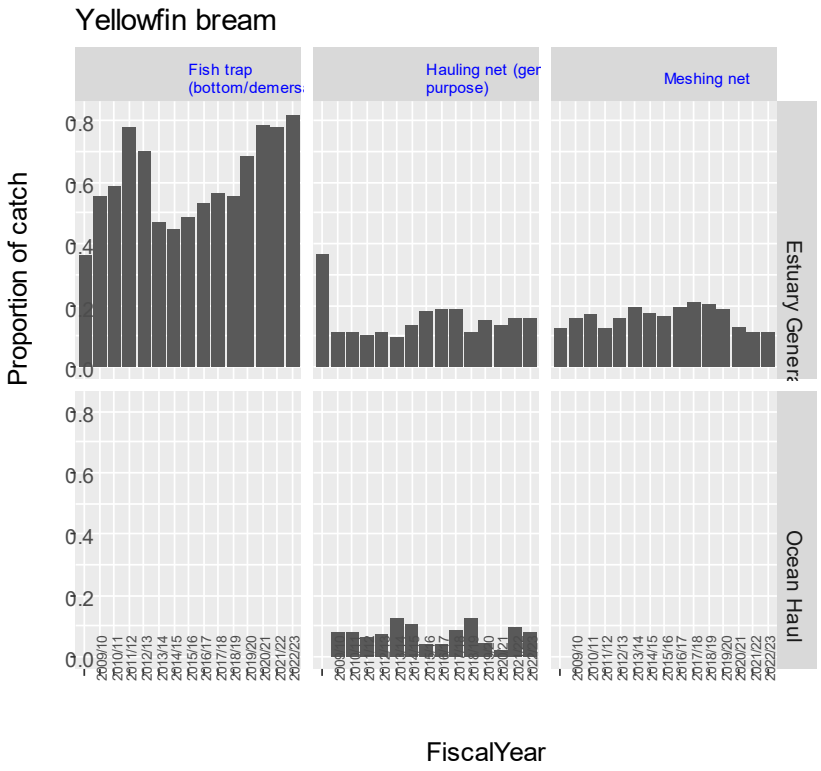

Figure 8. Proportion of Yellowfin in the catch based on logbook data that consisted of fishing events where Yellowfin Bream occurred.

The change in targeting behaviour of commercial fishers may affect the catch rate time series. Daily changes in targeting behaviour are market driven and may influence the proportion of bream caught in each unit of effort. Further work is required to determine if and how this can be addressed in the catch rate standardisation.

Length frequency distributions were prepared from fishery dependant data for three different gears: mesh, haul and trap. The length frequencies were above the size at maturity at approx. 18 cm FL. There were higher proportion of larger sizes in the trap gear than in the mesh or haul gears (Figure 9). Recent size compositions in landings suggest no large changes in the stock. The minimum legal commercial and recreational length in New South Wales (25 cm total length, NSW Fisheries 2003, approx. 22 cm FL) provides an opportunity for Yellowfin Bream to spawn before recruiting to the fishery.

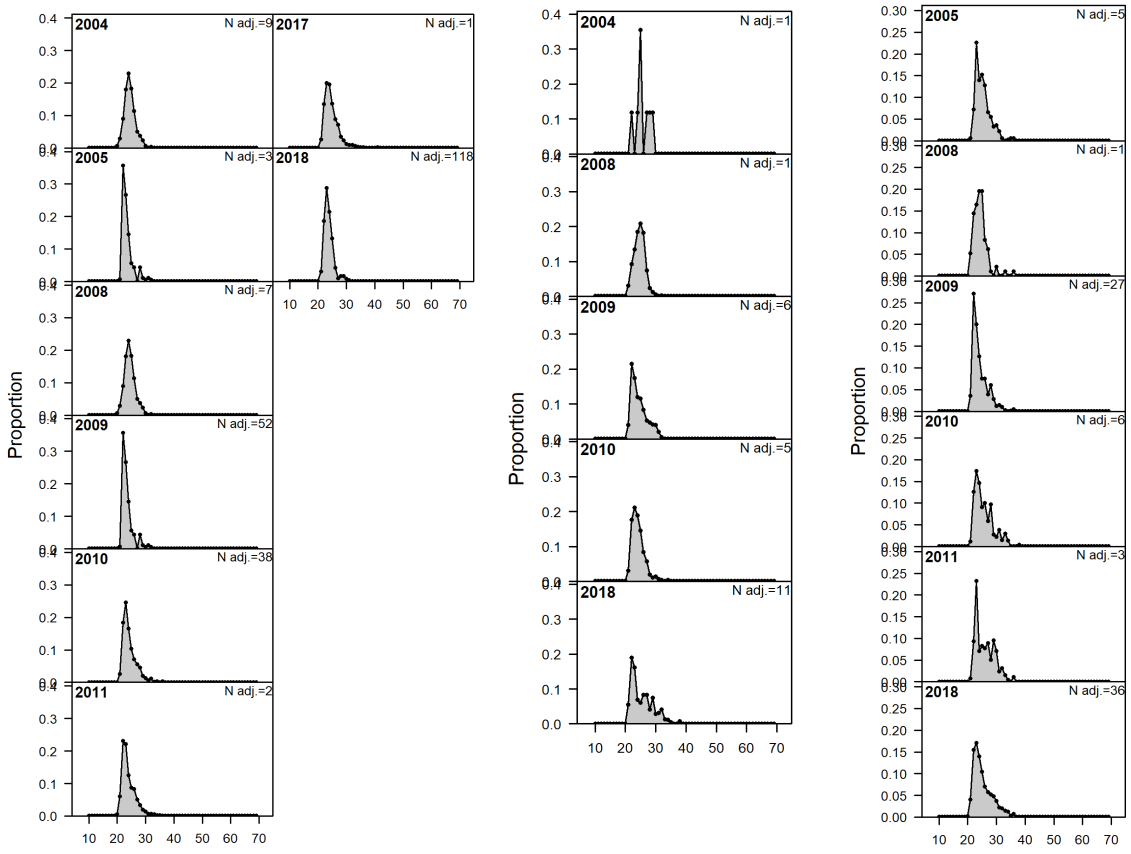

Figure 9. Length composition for Yellowfin Bream in the Estuary General fishery for mesh (left plot), haul (middle plot) and trap (right plot)

Age composition data were prepared from fishery dependant data for four different gears: mesh, haul, trap and all other gears combined. The age data were above the age at maturity at approx. 2 years. There seemed to be higher proportion of larger ages in the trap and haul gears than in the mesh gear (Figure 10), however result based on proportions can be misleading. The frequency plots in Figure 11 show that there were very low sample sizes for haul and higher sample size for meshing and there was stronger evidence of large size individuals in meshing rather than haul.

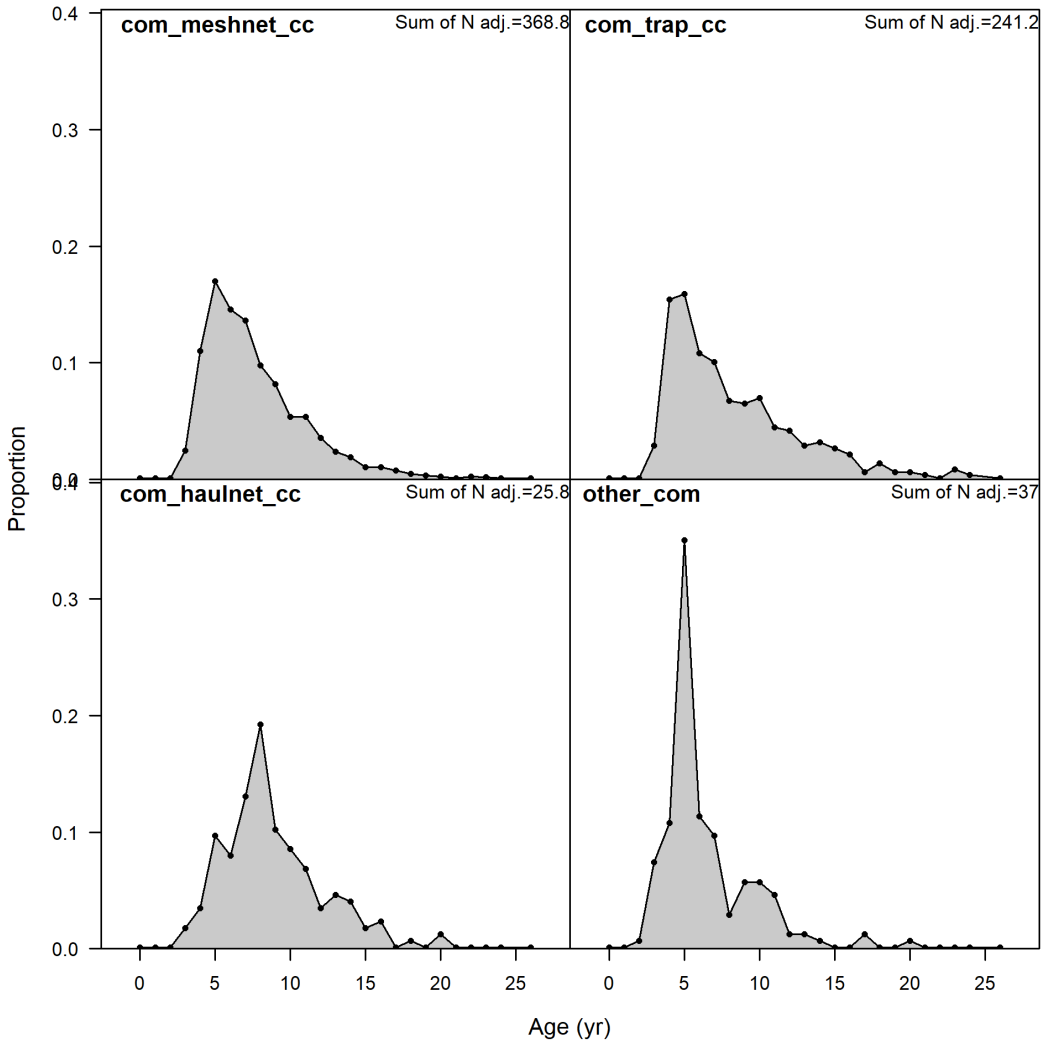

Figure 10. Proportional age composition data for yellowfin Bream in the commercial Estuary General Fishery for the different gears (meshnet, trap haul and all other gears combined), for all years combined.

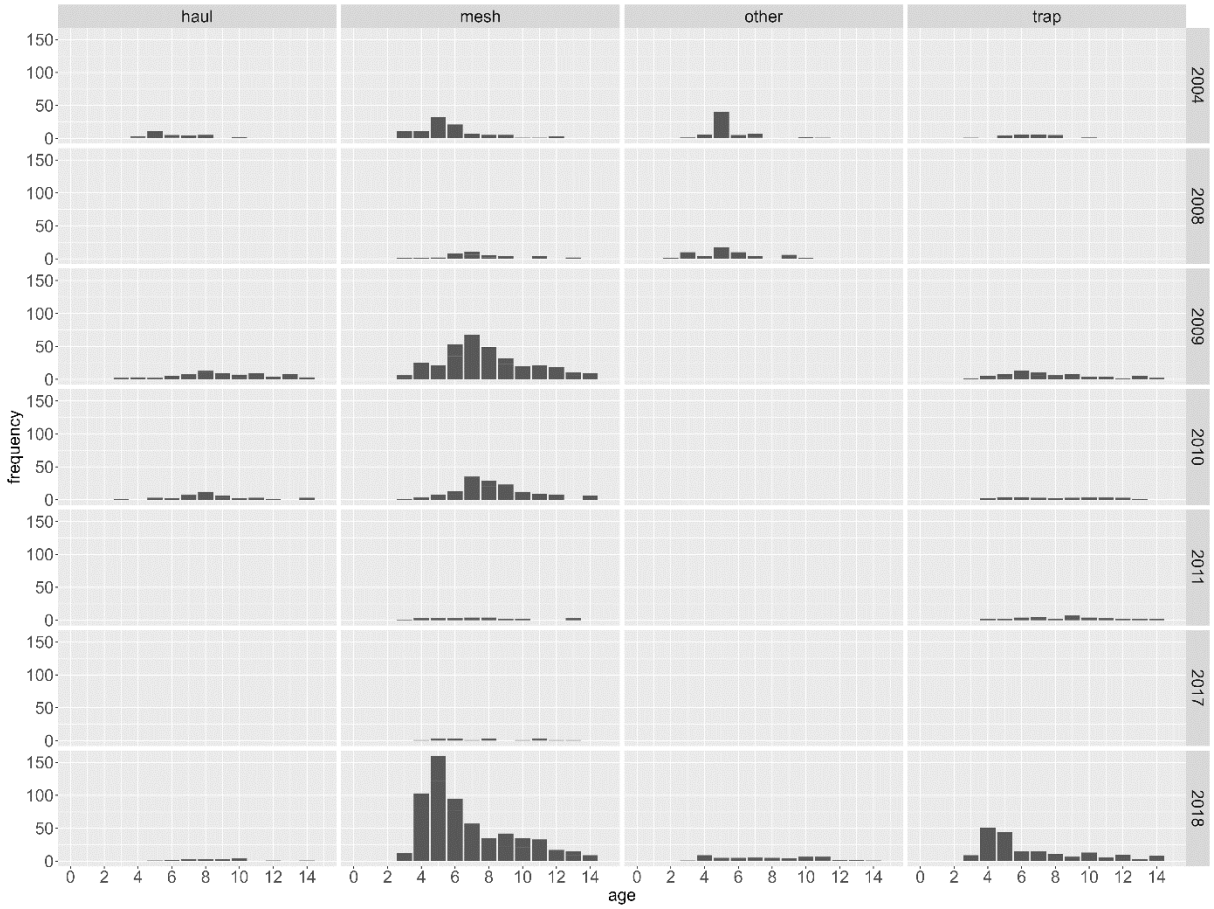

Figure 11. Age composition data (raw data) for Yellowfin Bream in the commercial Estuary General Fishery for the different gears (meshnet, trap haul and all other gears combined), across separate years.

Total mortality (Z) was calculated from a catch curve analysis based on the most recent age composition data for commercial hauling landings in 2017/2018 (Figure 12). The estimate of Z (2017/18) was 0.328 (0.025 SE). Natural mortality (M) was estimated to be 0.21, which was based on a rule of thumb approach of an M which results in 1% survival at a maximum age of 22 years as reported in Gray et al. (2000). The estimated fishing mortality (F) was therefore 0.12 (Z-M) which was lower than the estimated M of 0.21.

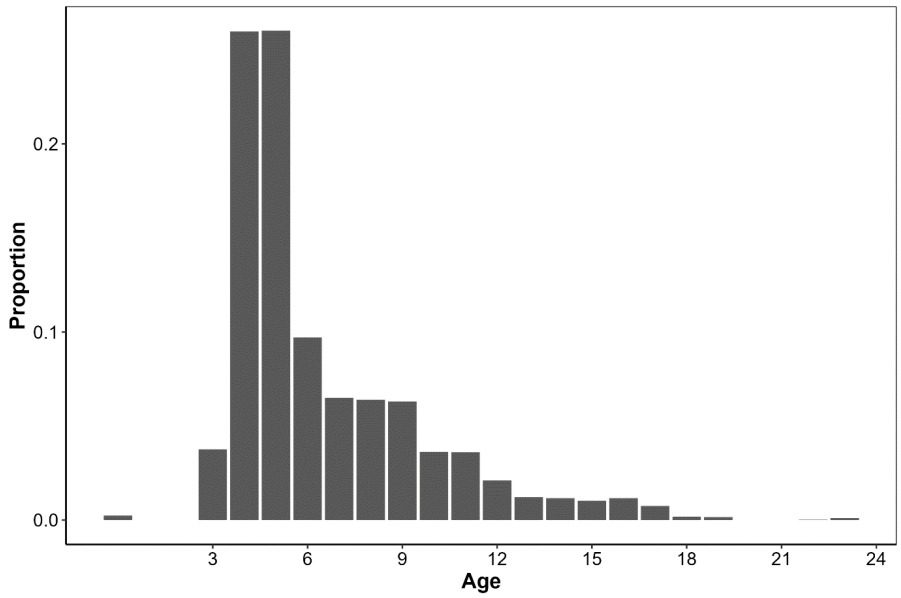

Figure 12. Proportional age composition data constructed from an age-length key for Yellowfin Bream in the commercial meshing landings in 2017/18.

Stock Assessment Result Summary

Biomass status in relation to Limit	Trends in catch rates stable around long-term (1998 – 2023) averages
Biomass status in relation to Target	NA
Fishing mortality in relation to Limit	NA
Fishing mortality in relation to Target	F (0.12) < M (0.21) based on estimated Z (0.328 in 2017-18).
Current stock status	Sustainable (New South Wales)
SAFS stock status	SAFS (2020): Sustainable

Total mortality (Z) was calculated from a catch curve analysis based on the most recent age composition data for commercial hauling landings in 2017/2018 (Figure 12). The estimate of Z (2017/18) was 0.328 (0.025 SE). Natural mortality (M) was estimated to be 0.21, which was based on a rule of thumb approach of an M which results in 1% survival at a maximum age of 22 years as reported in Gray et al. (2000). The estimated fishing mortality (F) was therefore 0.12 (Z-M) which was lower than the estimated M of 0.21

Assumptions

The assumption in the standardised catch rate is that there is a linear relationship between catch rate and exploitable biomass. However, this might not be valid. For example, hyperstability may be occurring (catch rate remain stable while the stock size changes) or hyper-depletion (catch rates decline much faster than stock size changes) may occur. The purpose of standardization is to account for variation in the data that is not attributable to changes in abundance. However, the standardisation might not successfully account for all of this variation. The availability of the fish to the gear is another source of uncertainty that may influence the catch rate. Availability can be the result of aggregating behaviour;

increasing catchability or efficiency of a fishing method through time. Another source of uncertainty is the model structure used in the linear regression. Some jurisdictions use effort as an offset (where the response variable is catch /effort) while other jurisdiction use effort as a term (where catch is the response term). Future work is recommended to the explore the difference in trends due to the model structure and different linear regression models (i.e between REML and glm).

Uncertainty

Results from catch rate standardisation must be interpreted with caution, given limited information used to derive population parameters and stock status. An important consideration is the variability and inconsistency in effort reporting, particularly for the meshnet fishery. For example, in the meshnet fishery, the unit of effort in a given fishing event may have been reported as 750 m (net mesh length). However, if the net was deployed multiple times in that single fishing event, the total units should be reported as the mesh length (750 m) multiplied by the number of times it was deployed, however it still may have been reported as 750 m. Another source of uncertainty is that New South Wales catch and effort logbook data for bream consists of other species that were caught simultaneously. The change in targeting behaviour of commercial fishers may affect the catch rate time series. Daily changes in targeting behaviour are market driven and may influence the proportion of bream caught in each unit of effort. Further work is required to determine if and how this can be addressed in the catch rate standardisation or whether there are other methods that can be used as an index of abundance such as fishery independent surveys.

Factors other than fishing, including environmental factors, may affect abundance and biological functioning of fish stocks through time. Temporal and spatial variations in estuarine conditions may influence available trophic resources, growth, population connectivity and ultimately recruitment. Knowledge of the interaction of these factors with fishing activity will be important for isolating the role of fishing on changes in the biomass of Yellowfin Bream.

Fishery interactions

The majority of Yellowfin Bream catch is taken within estuaries and the proportion of bream to other species is between 10 – 30 %. Bycatch and impacts on non-target species may be likely, and diverse assemblages are often captured. interactions with threatened and protected species were believed to be low.

Stakeholder engagement

Fishery shareholders, fishers and/or their representatives were invited to participate in online presentations of the assessments of the key species in the Estuary General Fishery including Yellowfin Bream. The meetings were held on the 4th March for the Category 1 and Category 2 Hauling and 6th March for Estuarine General meshing. A meeting with the Total Allowable Fishing Committee was held on the 16th April 2024. The meetings provided an opportunity to exchange commentary on the assessments and raise any other relevant information. No major issues or points of discussion were raised.

Qualifying Comments

New South Wales catch and effort logbook data vary spatially and temporally across different eras, delineated by changes in fisher reporting requirements and other management changes. The change in the method of effort reporting during 2009/10 limits the certainty with which conclusions can be made regarding shifts in effort and catch rates around that time.

Results from catch rate standardisation methods must be interpreted with caution, given the limited information used to derive population parameters and stock status.

Factors other than fishing, including climate change and other environmental processes, may affect changes in the abundance and biological functioning of the Yellowfin Bream stock through time.

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