Stock Status Summary – 2021

NSW Stock Status Summary – Blue eye Trevalla
(Hyperoglyphe antarctica)

Assessment Authors and Year

Smoothey A. F. 2021. NSW Stock Status Summary 2020/21 – Blue eye Trevalla (*Hyperoglyphe antarctica*). NSW Department of Primary Industries. Fisheries. 13 pp

Stock Status

Current stock status	On the basis of the evidence contained within this assessment, Blue eye Trevalla are currently assessed as **sustainable** for the NSW component of the stock.

Stock Status Summary

The fishery scientific assessment summarised in this report and considered adequate to meet the legislative requirements for supporting a Total Allowable Catch (TAC) determination for NSW Blue eye Trevalla is that done by the CSIRO, commissioned by the Australian Fisheries Management Authority (AFMA) and published as 'Blue eye Trevalla (*Hyperoglyphe antarctica*)' by the Australian Bureau of Agricultural and Resource Economics and Sciences (Patterson et al. 2020; hereinafter referred to as the Commonwealth assessment).

Supplementary information, describing uncertainty associated with the scientific assessment and NSW fishery data for Blue eye Trevalla, for consideration in the TAC determination are provided within this document.

The structure of this stock status summary is consistent with a format to inform a species status determination against criteria for the Status of Australian Fish Stocks (SAFS; www.fish.gov.au). It does not attempt to replicate the detail of the Commonwealth assessment but sources and cites key information from that assessment.

Biology and stock structure

Blue eye Trevalla (*Hyperoglyphe antarctica*) are distributed in continental slope waters off South America, South Africa, New Zealand and Australia. Their Australian distribution stretches along the southern continental margin in waters from Moreton Island in Queensland to 30°S in Western Australia. Blue eye Trevalla also occur on the seamounts off eastern Australia and south of Tasmania, Lord Howe Island and Norfolk Island.

Adults and sub-adults occur in mid-water at depths of around 500 m and are associated with rocky ground on the continental slope where the majority of fish are found between 200 and 600 m, but a small number have been reported to occur at depths of up to 900 m.

Analysis of Blue eye Trevalla samples from Tasmania found that 72 cm fork length (FL) is the average size at maturity for females (corresponding to about 11–12 years of age) and for males the average is 62 cm FL (8–9 years of age).

Within the Commonwealth, Blue eye Trevalla is managed as a single biological stock in the Southern and Eastern Scalefish and Shark Fishery (SESSF; Patterson et al. 2020), however, in recent years, stock structuring has been reported based on phenotypic variation in age and growth, otolith chemistry and potential larval dispersal between regions around south-eastern Australia (Williams et al. 2017). Blue eye Trevalla stock areas do not reflect truly separated biological stocks because there is some exchange between them during pelagic early life history. However, local-scale residency by adults implies there are discrete adult populations on the continental slope and

seamounts and that there is not extensive migration between them. Consequently, these findings led to separate RBCs being determined for the slope and seamount stocks, but a global TAC applied (AFMA 2018c) and catch restrictions introduced for the seamount stock for the 2019–20 fishing season.

Stock Status and assessment method

The management of the stock for the 2019–20 fishing season was based on analyses done by Sporcic (2018) and Haddon and Sporcic (2018a, b) and summarised from Patterson et al. (2020). Based on the recent evidence of stock structuring (Williams et al. 2017), the 2018 analysis split the stock into two regions (slope and seamount populations) for the first time, with each analysed separately to inform the determination of an RBC for the 2019–20 fishing season. The Commonwealth assessment for Blue eye Trevalla is a Tier 4 and 5 stock under the SESSF HSF assessment. A tier 4 analysis was completed for the slope stock and a tier 5 analysis for the seamount stock (due to unreliable catch-per-unit-effort [CPUE] data) (AFMA 2018b).

The tier 4 slope analysis (Sporcic 2018) suggested that the previous steep decline in CPUE (2013 to 2016) had levelled out and remained between the target and limit reference points as defined by the SESSF HSF (AFMA 2017a).

The tier 5 age-structured stock reduction analysis of the seamount population predicted that constant catches of around 25 t for lower productivity scenarios and 48 t for higher productivity scenarios would lead to relative stability in depletion (Haddon & Sporcic 2018b). Although highly uncertain, a maximum sustainable yield (MSY) analysis of the seamount catch generated an MSY of about 46–50 t, with a depletion estimate of about 33% of the unfished biomass (0.33B0) (Haddon & Sporcic 2018a). It was predicted, based on the catch MSY, that constant catches of 40 t or less would lead to relative stability in depletion (AFMA 2018c, d).

The application of the SESSF tier 4 harvest control rule to the outputs of the standardised CPUE series for the slope stock generated a single-year RBC of 439 t. The South East Resource Assessment Group (SERAG) agreed to an RBC of 36 t for the seamount stock, based on the output of the age-structured stock reduction analysis and catch-MSY analysis for the 2019–20 fishing season (AFMA 2018c, d).

For the 2019/20 fishing season, the agreed TAC was 458 t, and the recommended biological catch (RBC) for the slope stock was 439 t, while the RBC for the seamount was 36 t. The catch and discards combined were estimated to be 243 t (92.8% from SSH; 7.2% CHS), which is below the combined RBC of 475 t (Figure 1). This suggests that the fishing mortality in 2019–20 would be unlikely to deplete the stock to a level below its biomass limit reference point. The stock is therefore classified as **not subject to overfishing**.

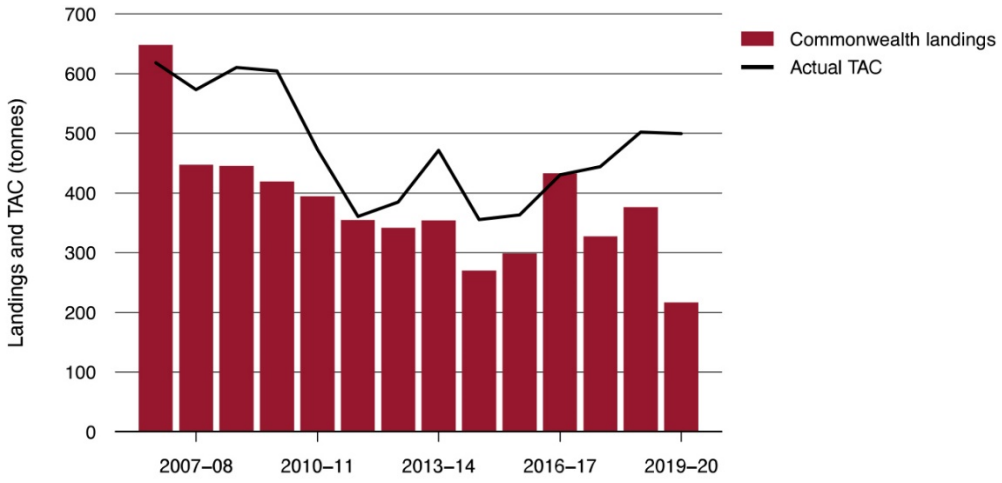
The 2018 analyses (Haddon & Sporcic 2018a, b; Sporcic 2018) estimated that the recent average standardised CPUE was between the target and limit reference points for the slope stock and that constant catches of 40 t or less would see biomass maintained at around 0.33B0 for the seamount stock (Figure 2). The Blue eye Trevalla stock is, therefore, classified as **not overfished**.

The status of the eastern Australian stock of Blue eye Trevalla was defined as **sustainable**, under the criteria for SAFS in 2016 (the first year of SAFS assessment; Georgeson et al. 2016) and 2018. At the time of this report the 2020 status determination had not been published.

Catch Information

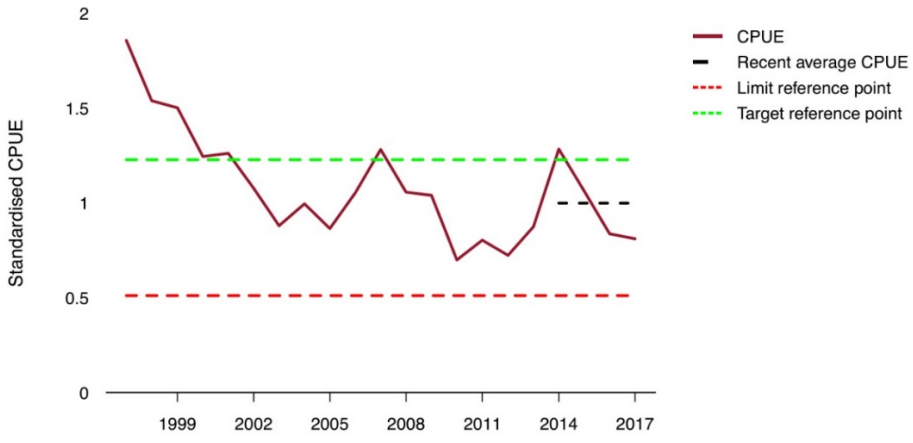
The description of catch information below is summarised from Paterson et al. (2020).

Blue eye Trevalla catch peaked at over 800 t in 1997 (Figure 1). Commonwealth landed catch in the 2016/17 fishing season was 432 t and in 2019-20 was 215.5 t. The weighted average discards and state catches between 2015 and 2018 were 0.1 t and 27.4 t, respectively (Burch et al. 2019). Commonwealth catches have varied in response to changes in the TAC, but in some years there has been uncaught quota.



Note: **TAC** total allowable catch.
Source: AFMA catch disposal records

Figure 1 Blue eye Trevalla annual catches (CTS, SHS and states) and fishing season TACs, 2006-07 to 2019-20 (from Patterson et al. 2020).



Note: **CPUE** Catch-per-unit-effort.
Source: Sporcic 2018

Figure 2 Standardised auto-longline and dropline CPUE index for Blue eye Trevalla to the east and west of Tasmania, 1997 to 2017 (Source: Sporcic 2018, cited in Patterson et al. 2020).

Recreational and Indigenous

Recreational catches have not been accounted for in the Commonwealth assessment of Blue eye Trevalla. Accounting for recreational catch has been raised as an issue for consideration in Commonwealth assessments (SESSF RAG 2017).

Illegal Unregulated and Unreported

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

Stock assessment method

Year of most recent assessment	2018 (Haddon and Sporcic 2018a, b; Sporcic 2018)
Assessment method	Commonwealth Tier 4 - slope population - standardised CPUE (including discards) Commonwealth Tier 5 - seamount population - catch at maximum sustainable yield (MSY) and age-structured stock reduction analysis approaches.
Main data inputs	
Main data inputs (rank)†	CPUE (Commonwealth Dropline (1997–2006) and Autoline (2002–2015); Zones 20–50; Depth 200–600)[1] Catch (Total) is the sum of Discards, State (Vic, Tas and NSW), Non Trawl and SEF2 catches (Haddon and Sporcic 2018a, b; Burch et al. 2019)[1]
Key model structure and assumptions	Tier 4 – Standardised CPUE (Commonwealth harvest strategy policy); Commonwealth of Australia 2007, 2017 Assumptions (see Haddon 2016): catch rate provides a relative index of abundance (not subject to hyper-stability or hyper-depletion and not unduly influenced by other factors not accounted for through standardisation); the reference period provides a good estimate of the stock when at a depletion level of $0.48B_0$; estimates of catch during the target period are accurate.
Sources of uncertainty evaluated	Uncertainty associated with Tier 4 assessment (see Haddon 2016); factors considered in the CPUE standardisation: Year, Vessel, Month, Zone, Depth category and Month:Zone; investigation of additional zones (84 and 85). Two factors that could influence catch rates and fishing behaviour, resulting in a low bias for CPUE, include the presence of killer whales

	(orcas—*Orcinus orca*) and Commonwealth fishery closures implemented to rebuild gulper shark stocks. The previous analysis by Haddon (2016) did not detect large effects on CPUE due to the closures, but uncertainty remains about the effect of killer whale depredation on CPUE (Patterson et al. 2020).

† Main data inputs (rank)

1 – High quality: data have been subjected to documented quality assurance and peer review processes, are considered representative and robust and provide a high level of confidence to support fisheries management decisions.

2 – Medium quality: data have been subjected to some internal quality assurance processes, have some documented limitations, but are still considered sufficiently accurate and informative to be useful to inform management decisions with some caveats.

3 – Low quality: data have been subjected to limited or no quality assurance processes, may be compromised by unknown or documented limitations that have not been fully explored, but are considered the best available information and require a high level of precaution to be exercised when interpreted to inform management decisions.

Status indicators and limits - reference levels

Biomass indicator or proxy	Standardised CPUE (AFMA 2017)
Biomass limit reference level	Standardised CPUE (AFMA 2017 – proxy $0.2B_0$) $0.2/0.48$ * $Cath_{Target}$; $CPUE_{Target}$ (Ref Yr 1997–2006) (Haddon 2016, Sporcic 2018)
Fishing mortality indicator or proxy	NA Implied from Patterson et al. (2020). Catch (including discards) as a proportion of RBC. Note, the RBC calculation does not account for predicted discards of predicted State catches. Trend in CPUE
Fishing mortality limit reference level	Implied from Patterson et al. (2020). Catch (plus discards) as a proportion of RBC is <1
Target reference level	Standardised CPUE at $0.48B_0$ = $CPUE_{Target}$ (Ref Yr: 1997–2006) (Haddon 2016, Sporcic 2018)

Stock Assessment Results

Biomass status in relation to limit	Recent average standardised CPUE (B proxy) is between the target and limit reference (Patterson et al. 2020, Sporcic 2018)
Fishing mortality in relation to limit	Not subject to overfishing (Patterson et al. 2020)
Previous SAFS stock status	2016: Sustainable (first year of SAFS assessment)
Current SAFS stock status	2018: Sustainable

Fishery interactions

Interactions between the Commonwealth Trawl and Auto-longlining Fisheries are described by Haddon and Sporcic (2018a, b), who associate declines in the trawl sector since the mid-2000s with increased catches in the auto-longlining sector.

Commonwealth fisheries interact with other commercial and non-commercial bycatch and discard marine species, a range of endangered threatened and/or protected species and marine habitats (AFMA 2014, Wayte et al. 2007).

NSW Fishery information

Information presented in figures and tables below is summarised by fiscal year (July to June).

Commercial fishery data presented in this section is limited to data from the Ocean Trap and Line Fishery from 2009/10, as contemporary supplementary information to the assessment and to inform NSW TAC determinations. The exception to this the reported total catches of Blue eye Trevalla from all fishing methods from 1998/99. Data reporting total catch and catch of different gear types within the OTLLE endorsement from 2009/10 have been sourced from the NSW DPI database FishOnline.

NSW commercial fishery records have not been consistently reported throughout the history of the fishery. Notably, between 1997/98 and 2008/09 (inclusive), fishers reported monthly catch and effort (in days) for each fishing method (gear type). From 2009/10, monthly reports of daily catch and effort (hours) and fishing method have been required. To construct a longer time series of data (from 1997/98 to present), daily records from 2009/10 are re-aggregated into monthly catches (kg) by fisher and gear type, with effort in days per month estimated from the number of distinct fishing dates in each month where the method was reported and where there was a reported landing of the species of interest in that month, irrespective of whether the species was reported on each of the days, to be consistent with earlier reporting.

State-wide fisheries catch

Annual catches of Blue eye Trevalla have generally declined over the last two decades, from over 100 t in the late 1990s to <20 t in the last two years (Figure 3). In 2019/20, the total catch of Blue eye Trevalla was 6.6 t, the lowest level recorded (Figure 3). Annual catches are dominated, almost exclusively (≥94%) by those from the NSW OTLLE endorsement (Figure 4). In the 2019/20 season, total landings of Blue eye Trevalla in NSW were 3.8% of the total commercial landings from the Commonwealth fisheries (Southern and Eastern Scalefish and Shark Fishery (SESSF)).

Ocean Trap and Line Fishery Catch and catch rate

Within the OTLLE fishery, Blue eye Trevalla are caught predominantly using dropline, handline and setline fishing methods (Figure 6). Dropline dominates the catch (2009/10-2019/20; range 2.7–38.6 $t.yr^{-1}$) followed by handline (2009/10-2019/20; 5.87 $t.yr^{-1}$). Since 2009/10, setline gear has averaged about 2.7 $t.yr^{-1}$, equating to about 11% of the total OTLLE catch (Figure 6). Within the general setline gear, setline demersal (STD) is responsible for most of the catch (range 1.0–5.3 $t.yr^{-1}$), with catch by trotline gear in 2009 recorded as 2.3 t, although this is likely to be associated with misreporting of method from one fisher.

Levels of catch and effort (days), where a consistent effort series is available, have been declining since at least the late 1990s (Figure 7). Prior to 2008/09, annual catches exceed 40 $t.yr^{-1}$ (range 41–118 $t.yr^{-1}$) and effort (days) exceed 700 $days.yr^{-1}$ (range 775–1538 $days.yr^{-1}$). Since 2009/10, catches have declined from >30 $t.yr^{-1}$ to <10 $t.yr^{-1}$. In 2016/17 catch and effort (days) was 8 t and 167 days, respectively and the lowest recorded levels in the history of the fishery (Figure 8). Commensurate declines in catch and effort through time have resulted in a generally stable time series of CPUE ($kg.day^{-1}$), although a substantial decline reported between 2012/13 and 2013/14, and relatively low levels of CPUE in recent years suggest stocks may be less stable and/or fleet behaviour and dynamics has changed.

Macbeth and Gray (2015), from fishery-dependent observer days, reported Blue eye Trevalla comprised the greatest proportion of dropline catch in the NSW OTL Fishery (23.4% of the catch by number) and in the northern region (19.9% of the catch by number), with >99% of the dropline catch of Blue eye Trevalla being retained. The catch rate (fish per dropline day) of Blue eye Trevalla reported by Macbeth and Gray (2015) ranged between 12.5–20.5 fish per dropline day in the south region, and 2.8–7.3 fish per dropline day in the north region. In addition, size-class frequency distributions of Blue eye Trevalla from observed dropline days fished, indicate substantially larger and fewer fish in the north and central regions of the state (modal size class 75–79 cm FL) compared with smaller but more frequent fish in the south region (50–54 cm FL) (Macbeth and Gray 2015).

Recreational and Indigenous

Recreational and Indigenous catches of Blue eye Trevalla in New South Wales are unknown. Surveys of recreational and Indigenous catches have either not specified catches of Blue eye Trevalla (West et al. 2015, Murphy et al. 2020) or reported them into a broader ‘finfish - other’ category (Henry and Lyle 2003).

There is a combined recreational bag limit of five Hapuku, Banded Rockcod, Bass Groper, Gemfish and Blue eye Trevalla.

Illegal Unregulated and Unreported

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

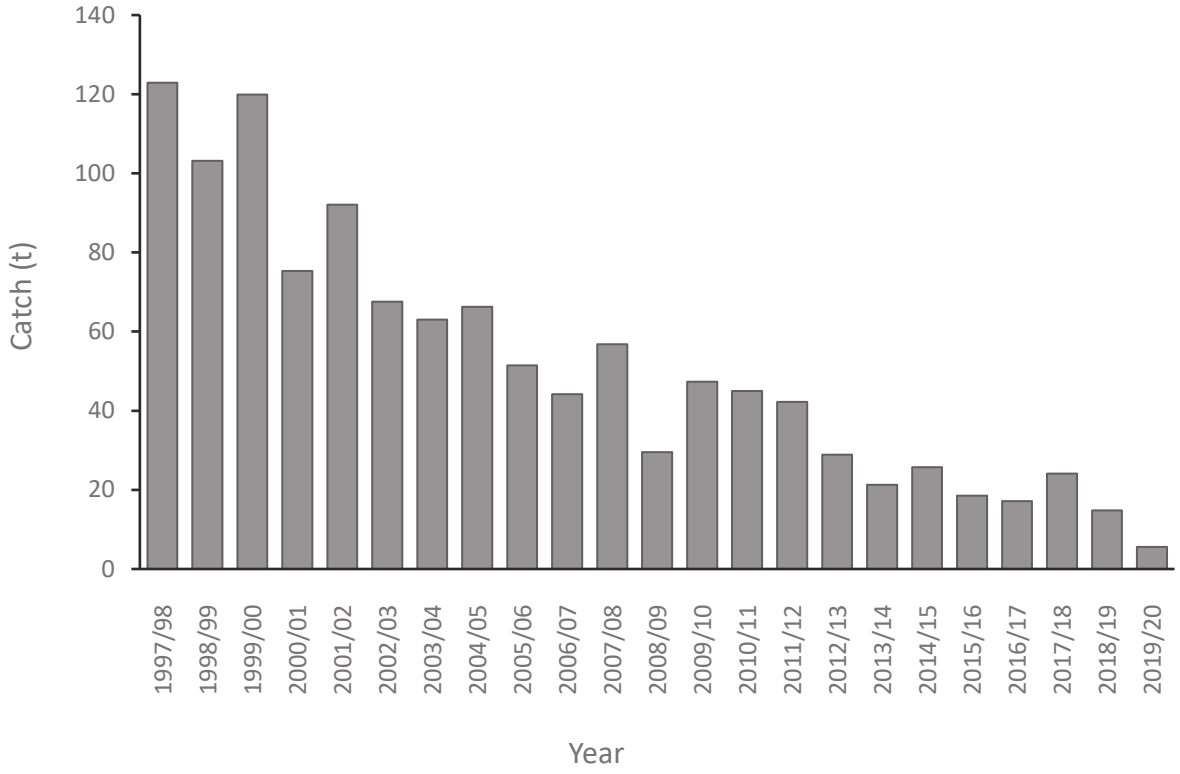


Figure 3. Annual catch (t) of Blue eye Trevalla from all fishing methods reported to NSW from 1988/89 to 2019/20.

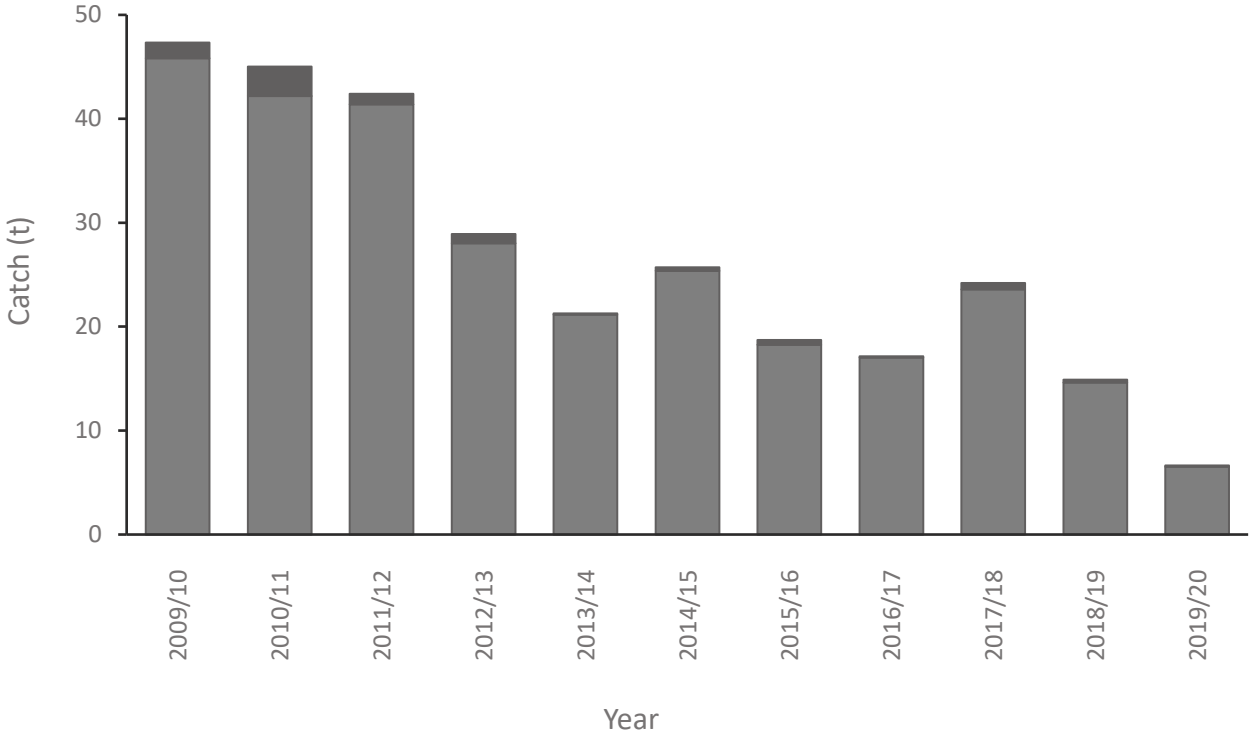


Figure 4 Annual catch (t) of Blue eye Trevalla from NSW Ocean Trap and Line – Line East (grey; OTLLE) and all other endorsement codes (black, OTHER) from 2009/10 to 2019/20.

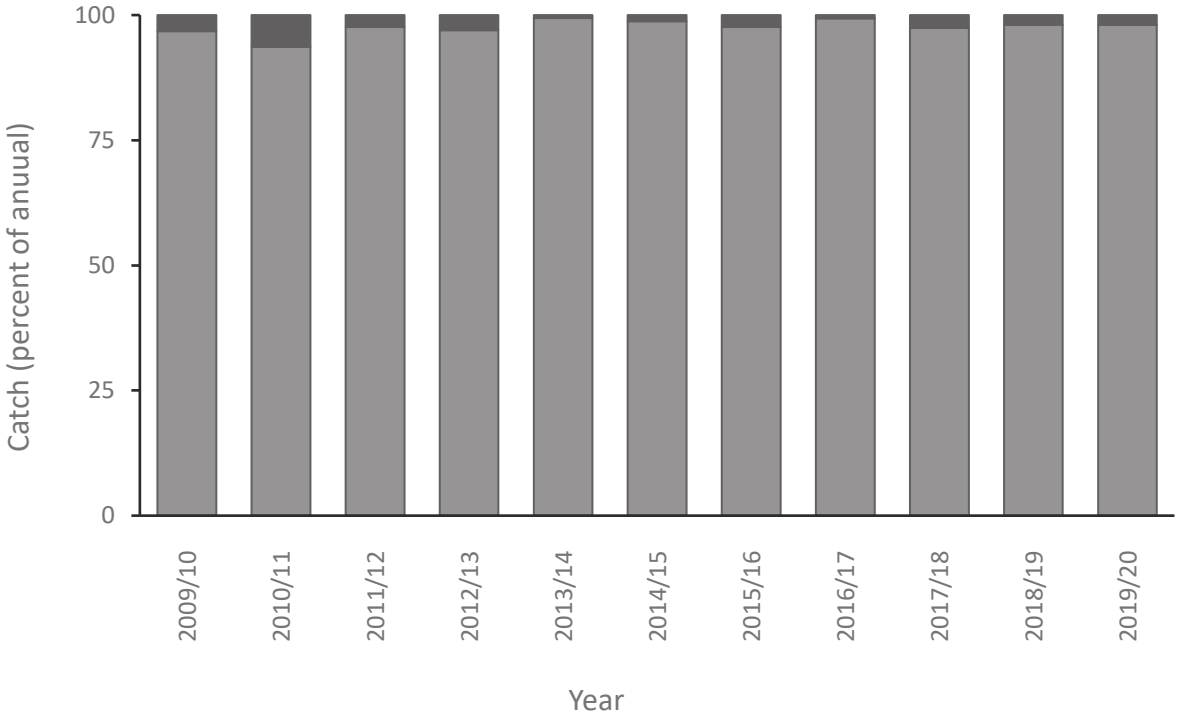


Figure 5 Annual catch of Blue eye Trevalla as a percentage of total catch from the NSW Ocean Trap and Line Line East (grey; OTLLE) and all other endorsement codes (black, OTHER) from 2009/10 to 2019/20.

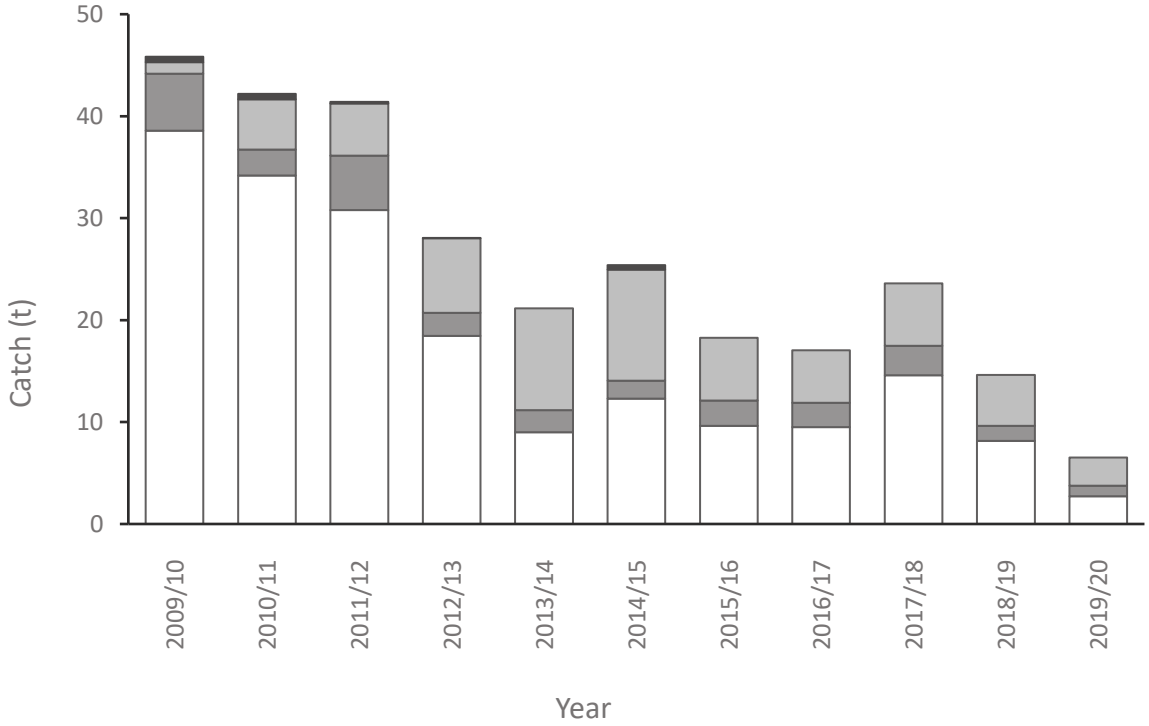


Figure 6 Annual catch of Blue eye Trevalla from NSW Ocean Trap and Line - Line East (OTLLE) – Dropline (dark grey; DPL), Setline (white; demersal, trotline and unspecified setline), Handline (light grey) and all other methods (black) from 2009/10 to 2019/20.

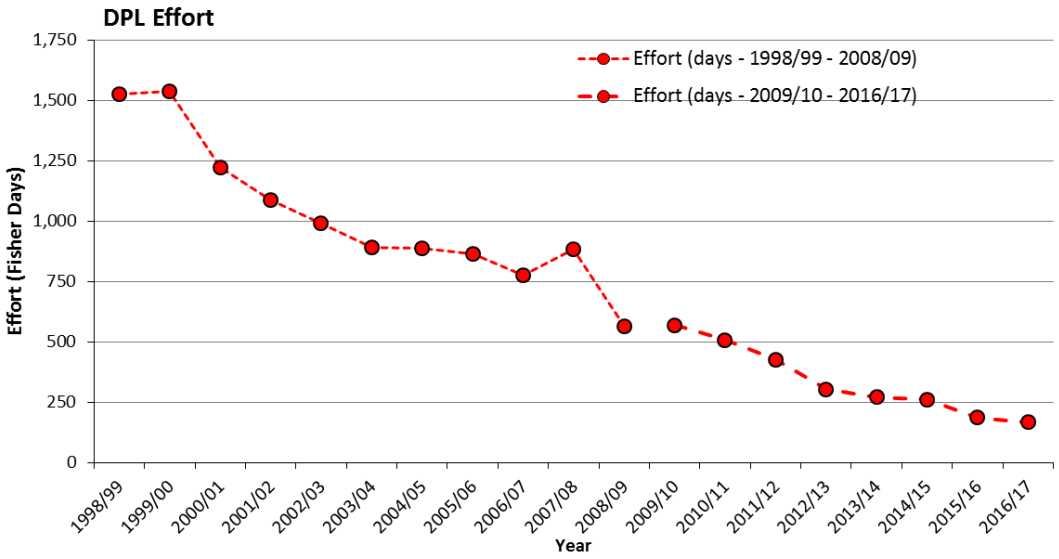


Figure 7 Dropline only - Annual effort (days) using dropline in the OTLLE from 1988/89 to 2016/17.

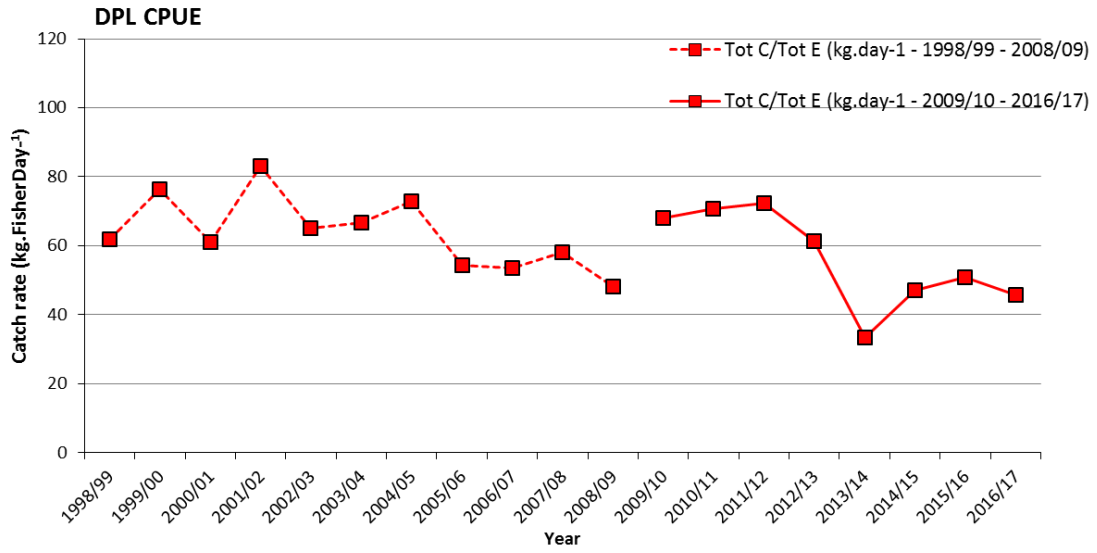


Figure 8 Dropline only - Annual CPUE (kg.day^{-1}) using dropline in the OTLLE from 1988/89 to 2016/17.

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Appendix 1 – additional information relevant to TAC setting in NSW

1. The Blue eye Trevalla TAC for the May 2018-April 2019 fishing season was set at the 5-year maximum catch of 30.0 tonnes (BN18/5302).
2. The IAP recommended that the initial allocation of quota shares for Blue Eye Trevalla be calculated based on 20% on the proportion of access shares held + 80% on recorded landings for an individual fishing business in the Ocean Trap & Line – Line East Share Class over the selected criteria period 2009/2010 to 2016/2017 (inclusive), but with the "worst catch year" for each business removed (https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0009/832464/Ocean-Trap-and-Line-IAP-Final-Report.pdf).
3. Statistics describing landings of Blue Eye Trevalla from NSW commercial fisheries may inform determination of a NSW TAC that is consistent with the development an inter-jurisdictional resource sharing policy.
4. Landings (quota usage) of 8.42 t were reported against a TAC of 30.0 t in 2019/20 which suggests that the current TAC was not constraining total catches. Nil FBs reported landings greater than initial quota allocations.
5. 7.44 t (24.8%) of the 2020-21 Blue Eye Trevalla TAC (30.0 t) was taken at 16th November 2020 (55% of season complete).
6. SESSF TAC recommendation for Blue eye for 2021-22 was 241 t, which was a 207 t reduction on the 2020-21 TAC (448 t, https://www.afma.gov.au/sites/default/files/sessf_tac_recommendations_2021-22_-_for_concession_holders.pdf).