Fisheries

Status of the Central Zone Greenlip Abalone Fishery in 2024

B. Stobart

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SARDI Aquatic and Livestock Sciences
PO Box 120 Henley Beach SA 5022

May 2026

Status Report for PIRSA Fisheries and Aquaculture

Government of South Australia
Department of Primary Industries and Regions

SARDI
SOUTH AUSTRALIAN RESEARCH AND DEVELOPMENT INSTITUTE

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We ensure the land, sea, water and sky are healthy for future generations and strive to better understand their spiritual and cultural significance for Aboriginal people across the state.

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We recognise and own a difficult past, and together we will walk forward.

We acknowledge the many Aboriginal people of this Country as the oldest continuous living culture in the world.

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1. ABBREVIATIONS

CPUE	Catch Per Unit Effort
CZ	Central Zone
EYP	East Yorke Peninsula
FIS	Fishery Independent Survey
GPS	Global Positioning System
HS	Harvest Strategy
KI	Kangaroo Island
NFSRF	National Fishery Status Reporting Framework
PI	Performance Indicator
PIRSA	Department of Primary Industries and Regions
SAAF	South Australian Abalone Fishery
SARDI	South Australian Research and Development Institute
SAU	Spatial Assessment Unit
TACC	Total Allowable Commercial Catch
WYP	West Yorke Peninsula
YP	Yorke Peninsula

2. EXECUTIVE SUMMARY

This report provides an assessment of stock status for Greenlip Abalone (*Haliotis laevigata*; hereafter referred to as 'greenlip') in the Central Zone (CZ) of the South Australian Abalone Fishery (SAAF) in 2024. The assessment includes application of the combination of zone score (proxy for biomass) and trend in zone score (proxy for fishing mortality), as described in the harvest strategy (HS) in the Management Plan for the South Australian Commercial Abalone Fishery (PIRSA 2021), to determine stock status. The zone score is derived from catch per unit effort (CPUE) and, where available, fishery-independent surveys (FIS) of legal sized abalone.

The assessment relies heavily on CPUE which, in abalone fisheries, is known to be subject to bias and to be hyperstable. In addition, changes in effective fishing effort have not been accounted for. Collectively, these may obscure important trends in CPUE and mean that increases in CPUE are likely to overestimate increases in stock abundance, and the converse. Furthermore, this report does not account for the potential effects that the widespread harmful algal bloom (HAB) of *Karenia spp.* affecting South Australian waters in 2025 may have had on these stocks in 2025. The HAB is known to have caused mortality in greenlip in the East Yorke Peninsula (EYP) and Kangaroo Island (KI) Spatial Assessment Units (SAUs) in 2025, the southern part of the West Yorke Peninsula (WYP) SAU in 2026, and has the potential to further impact stocks in the CZ, including elsewhere in the Spencer Gulf and off Kangaroo Island.

The total commercial catch for greenlip declined from 46.0 to 14.95 tonnes (t) meat weight between 2019 and 2024, with the latter consistent with the 14.96 t TACC in 2024. In 2024, there were again particularly low catches from the two key SAUs – Tiparra Reef and WYP – with the low catch from Tiparra Reef (1.9 t) about 8% of the post-TACC average of 25 t. These declines in catch are analogous with many other abalone fisheries across southern Australia that are currently impacted by ongoing low productivity and catch. Over the last two decades, greenlip CPUE in the CZ also declined persistently from 31 $kg.hr^{-1}$ in 2001 to lows of 19 – 20 $kg.hr^{-1}$ from 2019 to 2023. Subsequently, CPUE for the CZ increased to 21.7 $kg.hr^{-1}$ in 2024.

The CZ greenlip stock was classified as 'depleting' for 2023 using a weight-of-evidence assessment that relied heavily on CPUE in the absence of a recent FIS from Tiparra Reef. Since that assessment, there are now data to show that the lower catches from 2020 have allowed some stocks to recover. The strongest evidence of stock recovery is at Tiparra Reef, where greenlip catch has been reduced from 2010 and was very low from 2020 to 2024, allowing the legal density of greenlip to increase 180% since the last survey in 2021 to the

largest value on record in 2025. This change in legal density increases confidence that recent record high CPUE values for Tiparra Reef in 2023 and 2024, estimated from a low number of fishing events, reflected real increases in greenlip abundance. However, the sub-legal density of greenlip at Tiparra Reef remains similar to that in 2021, is well below historical levels, and indicative of relatively low recruitment.

There is weak evidence of stock increases in the WYP SAU, where legal and sub-legal density increased between the 2023 and 2025 surveys as also did legal biomass, although it remained below 2015 and 2017 levels.

For remaining SAUs, CPUE values show little change from 2023 to 2024 despite recent reductions in catch.

The catch-weighted, zone score from the HS for 2024 was 5.97 / 10. In combination with the zone trend score of 6.4 / 10 (reflecting an increasing trend), these define the zonal stock status for greenlip in the CZ in 2024 as **'sustainable'**.

The concurrent recent upward trend in the FIS greenlip density and CPUE in the Tiparra Reef and WYP SAUs increase confidence in the outcome of 'sustainable' from the HS. However, legal biomass at the WYP SAU remains low compared to that recorded in 2015 and 2017 and CPUE is low in both the Kangaroo Island and combined data limited SAUs. Furthermore, while CPUE in the EYP SAU is within the target band of the HS, recent large mortality events associated with the HAB within this SAU are not accounted for in this assessment, nor is the abalone mortality that has been reported for KI and southern WYP. The high zone score yields a recommended catch well above the current TACC. When setting the TACC, consideration should be given to the contrasting biomass between Tiparra Reef (high biomass) and the remaining SAUs (low biomass), the potential impact of the HAB, and the absence of increases in sublegal density at Tiparra Reef.

Key statistics for the CZ greenlip fishery from 2013 to 2024, including total allowable commercial catch (TACC), total commercial catch (TCC), catch per unit effort (CPUE), zone score, zone trend score and stock status using the national fishery status reporting framework (NFSRF) or Harvest Strategy. t = tonnes meat weight, $kg.hr^{-1}$ = kilograms per hour. **Indicates years when stock status was determined using the weight of evidence approach from the NFSRF (Piddocke et al. 2021).*

Greenlip							
Season	**TACC (t)**	**HS TACC (t)**	**TCC (t)**	**CPUE ($kg.hr^{-1}$)**	**Zone Score**	**Zone Trend Score**	**Stock Status**
2013	47.7	46.0	47.9	23.5	5.8	5.0	Depleting*
2014	47.7	46.0	47.5	24.3	6.8	6.0	Depleting*
2015	46.0	46.0	45.7	23.4	6.3	5.5	Depleting*
2016	46.0	46.0	46.0	23.7	6.1	5.0	Depleting*
2017	46.0	46.0	46.1	22.8	5.3	4.1	Sustainable*
2018	46.0	46.0	45.7	22.2	5.0	4.3	Sustainable*
2019	46.0	46.0	46.0	20.9	4.4	4.0	Depleting
2020	46.0	46.0	28.1	19.8	4.4	4.5	Depleting
2021	46.0	40.0	24.9	19.2	4.4	4.9	Depleting
2022	36.1	39.0	23.1	20.2	4.5	5.0	Sustainable
2023	36.1	41.0	22.9	19.7	3.6	4.7	Depleting *
2024	15.0	42.0	15.0	21.7	6.0	6.4	Sustainable

Keywords: Greenlip abalone, *Haliotis laevigata*, Stock status, Harvest Strategy, South Australia.

3. INTRODUCTION

The previous stock status of Greenlip Abalone (*Haliotis laevigata*; hereafter referred to as 'greenlip') in the Central Zone (CZ) of the South Australian Abalone Fishery was provided for 2023 (Stobart et al. 2025). Following the national fishery status reporting framework (NFSRF; Roelofs et al 2024; Table 1) and PIRSA (2021), this report assesses the status of greenlip in the CZ in the 2024 fishing season (calendar year) and forms part of the South Australian Research and Development Institute's (SARDI Aquatic and Livestock Sciences) ongoing assessment program for this fishery.

Table 1. Terminology for the status of key Australian fish stocks (from Piddocke et al. 2021).

	Stock status	Description	Potential implications for management of the stock
	Sustainable	Biomass (or biomass proxy) is at a level sufficient to ensure that, on average, future levels of recruitment are adequate (*i.e.,* recruitment is not impaired) and for which fishing mortality (or proxy) is adequately controlled to avoid the stock becoming recruitment impaired	Appropriate management is in place
	Depleting	Biomass (or proxy) is not yet depleted, and recruitment is not yet impaired, but fishing mortality (or proxy) is too high (overfishing is occurring) and moving the stock in the direction of becoming recruitment impaired	Management is needed to reduce fishing mortality and ensure that the biomass does not become depleted
	Recovering	Biomass (or proxy) is depleted, and recruitment is impaired, but management measures are in place to promote stock recovery, and recovery is occurring	Appropriate management is in place, and there is evidence that the biomass is recovering
	Depleted	Biomass (or proxy) has been reduced through catch and/or non-fishing effects, such that recruitment is impaired. 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 improvements	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
	Undefined	Not enough information exists to determine stock status	Data required to assess stock status are needed
	Negligible	Catches are so low as to be considered negligible and inadequate information exists to determine stock status	Assessment will not be conducted unless catches and information increase

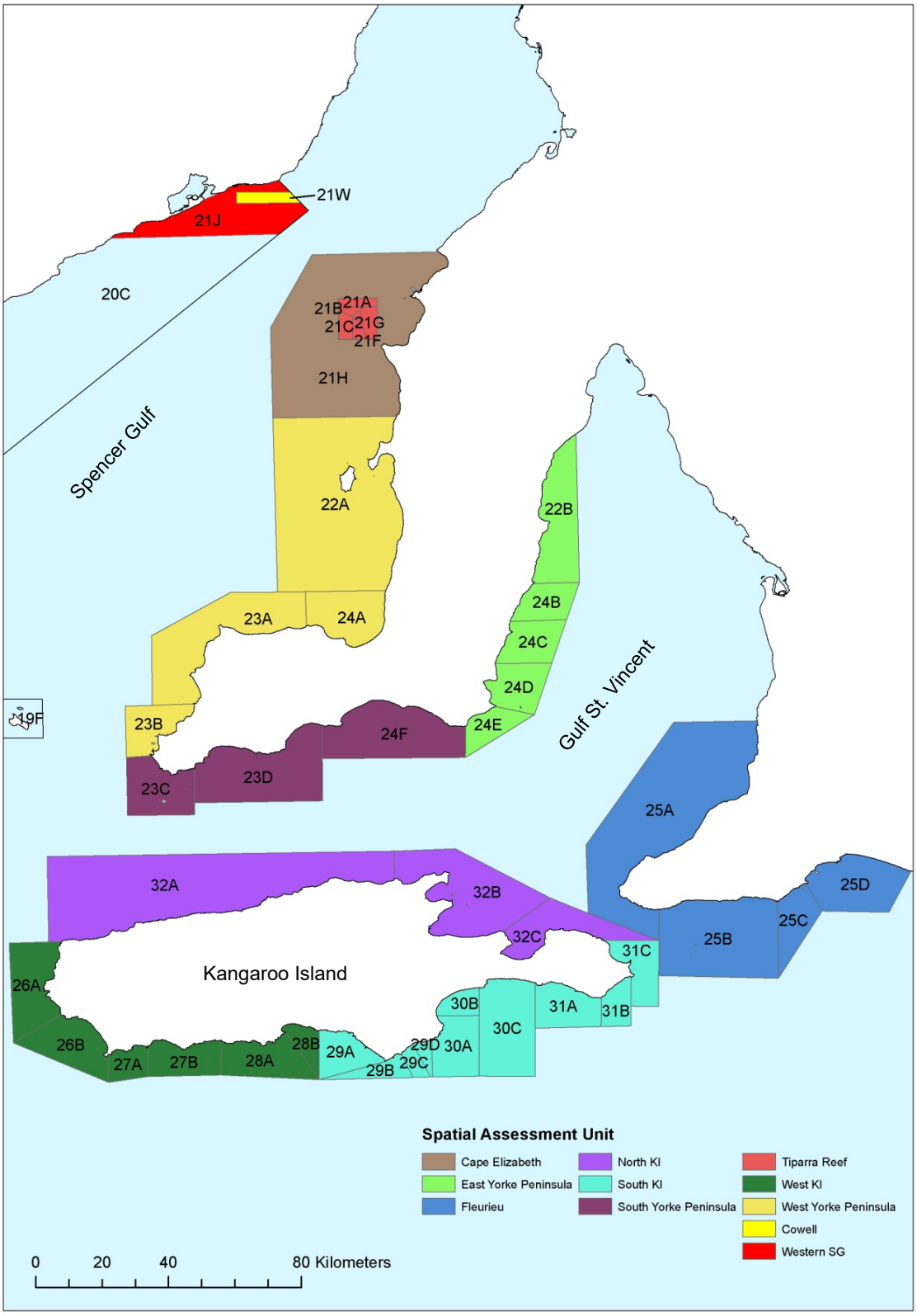

Figure 1. Spatial assessment units (SAUs; coloured blocks), fishing areas (numbered areas) and mapcodes (numbered and lettered areas) of the CZ of the South Australian Abalone Fishery.

4. METHODS

Fishery-dependent (FD) and fishery-independent (FI) methods are described briefly below, with more detail available in Burnell and Mayfield (2023). All data are presented by Spatial Assessment Unit (SAU), except for selected mapcodes in Appendices 1 and 2. FD and FI data are integrated in the harvest strategy (after PIRSA 2021).

4.1. Fishery-dependent data

Commercial catch and effort data have been collected since 1968 by fishers completing a research logbook for each fishing day. Catch (t, meat weight) was determined from all daily logbook returns. Catch-per-unit-effort (kg.hr^{-1}, meat weight) was estimated as the mean of daily CPUE weighted by the proportion of the target species in the catch. Due to the mixed nature of catches (greenlip and blacklip abalone), effort was split pro rata based on the proportion of each species in the daily catch. Estimates of CPUE (mean ± se) are not made where <10 fishing events are available at the relevant scale in a given year. Where this is the case, a running mean CPUE is estimated when there are ≥10 fishing events available across three consecutive years (with a minimum of 1 fishing event each year; after PIRSA 2021). These values may be identified in plots by the lack of standard error bars. Abalone mean lengths for each SAU from the commercial shell sampling program are also presented. The combined relative trend of CPUE and catch is also displayed as a time series of relative catch multiplied by relative CPUE, where the metric for each year is divided by that of 1979 prior to multiplication, as an approximation to a Kobe plot (Kell 2012).

4.2. Fishery-independent data

Fishery-independent surveys (FIS) for greenlip are typically undertaken biennially in two SAUs in the CZ (i.e., Tiparra Reef and West Yorke Peninsula – WYP). The current survey method (i.e. leaded-lines) involves counting and measuring all abalone within a 200 m^2 area at a series of consistent locations, to derive a time-series of mean density of legal (≥135 mm) and sub-legal sized (<135 mm) greenlip. For this report, new data were available from the WYP SAU and Tiparra Reef (Figure 1) that were resurveyed in 2025.

4.3. Harvestable Biomass

Harvestable biomass has been estimated biennially since 2013 and 2015 for Tiparra Reef (except for 2023) and WYP SAUs, respectively. Harvestable biomass estimates integrate (1) densities from the leaded-line surveys; (2) length-weight relationships of greenlip; and (3) reef area estimates from the GPS data. Estimates are reported for the (1) survey area; and (2) scaled to the entire SAU, including adjustment to pre-season levels in each SAU using year-to-date catch. Total annual catch and estimated SAU-level biomass estimates are then used to estimate the potential range of exploitation rates.

5. RESULTS

5.1. Central Zone

Total greenlip catches were consistent with the TACC from 1994 to 2019, but the TACC was not fully harvested from 2020 to 2023 and only fully harvested in 2024 after a 67% TACC reduction to 15 t (Figure 2a). Total annual catch decreased to 28.1 t in 2020, before further declines in 2021 (24.9 t harvested; 54% of TACC), 2022 (23.1 t harvested; 64% of TACC) and 2023 (22.9 t harvested; 63% of TACC). CPUE was relatively stable from 1985 to 1999 (average: 21 kg.hr^{-1}), before increasing to the highest recorded value of 31 kg.hr^{-1} in 2001. A decreasing trend was then evident for the next two decades, with CPUE falling to 19.2 kg.hr^{-1} by 2021, remaining relatively low until 2023 (20.2 kg.hr^{-1} in 2022 and 19.7 kg.hr^{-1} in 2023; Figure 2a, b) before increasing to 21.7 kg.hr^{-1} in 2024. Despite the recent modest increase in CPUE, for the fifth consecutive year, the 2024 value from the combined trend of relative catch and relative CPUE was the lowest value on record (Figure 2c).

Most greenlip catch (~73% of the CZ catch) is traditionally harvested from the Tiparra Reef and WYP SAUs (Figure 2d). For over a decade, decreasing catches from the Tiparra Reef SAU have coincided with higher catches harvested from the WYP SAU – but catches from both these key SAUs have decreased over the past few years. Smaller catches were typically harvested from the EYP, West KI, South KI and the data limited SAUs (0–3 t).

5.2. Spatial Assessment Units

Tiparra Reef

Following the introduction of the TACC in 1990, catches of greenlip from the Tiparra Reef SAU peaked at 45 t in 2001 (Figure 3a). Thereafter catches decreased, reaching a low of 1 t in 2022, before increasing to 1.9 t in 2023 and remaining the same in 2024. CPUE at Tiparra Reef declined from over 30.4 kg.hr^{-1} in 2014 to 20.8 kg.hr^{-1} in 2020 and 21.1 kg.hr^{-1} in 2021. CPUE estimates in 2022 (23.0 kg.hr^{-1}; n <10), 2023 (32.5 kg.hr^{-1}; n = 10) and 2024 (33.3 kg.hr^{-1}; n = 10) are derived from low numbers of fishing events compared with previous years and, thus, should be considered with caution as they are not likely to be directly comparable to CPUE estimates in the reference period that were derived from a much higher number of fishing events (range 311 to 539 fishing events). Greenlip legal density generally increased in recent years following low values from 2011 to 2013 but, in a historical context, remained relatively low from 2015 to 2021 (Figure 3c). However, legal density increased substantially (~180%) in 2025 to the highest value on record (0.20 greenlip.m^{-2}) and legal size has increased (Figure 3b,e). In contrast, the density of sub-legal greenlip in 2025 (0.12 greenlip.m^{-2}) remained the same as that recorded in 2021 and was below most estimates recorded during the 1990s and 2000s (Figure 3d). The length frequency of greenlip shows the

high proportion of legal-sized greenlip in 2025 and an even spread of sublegal-sized greenlip (Figure 3e).

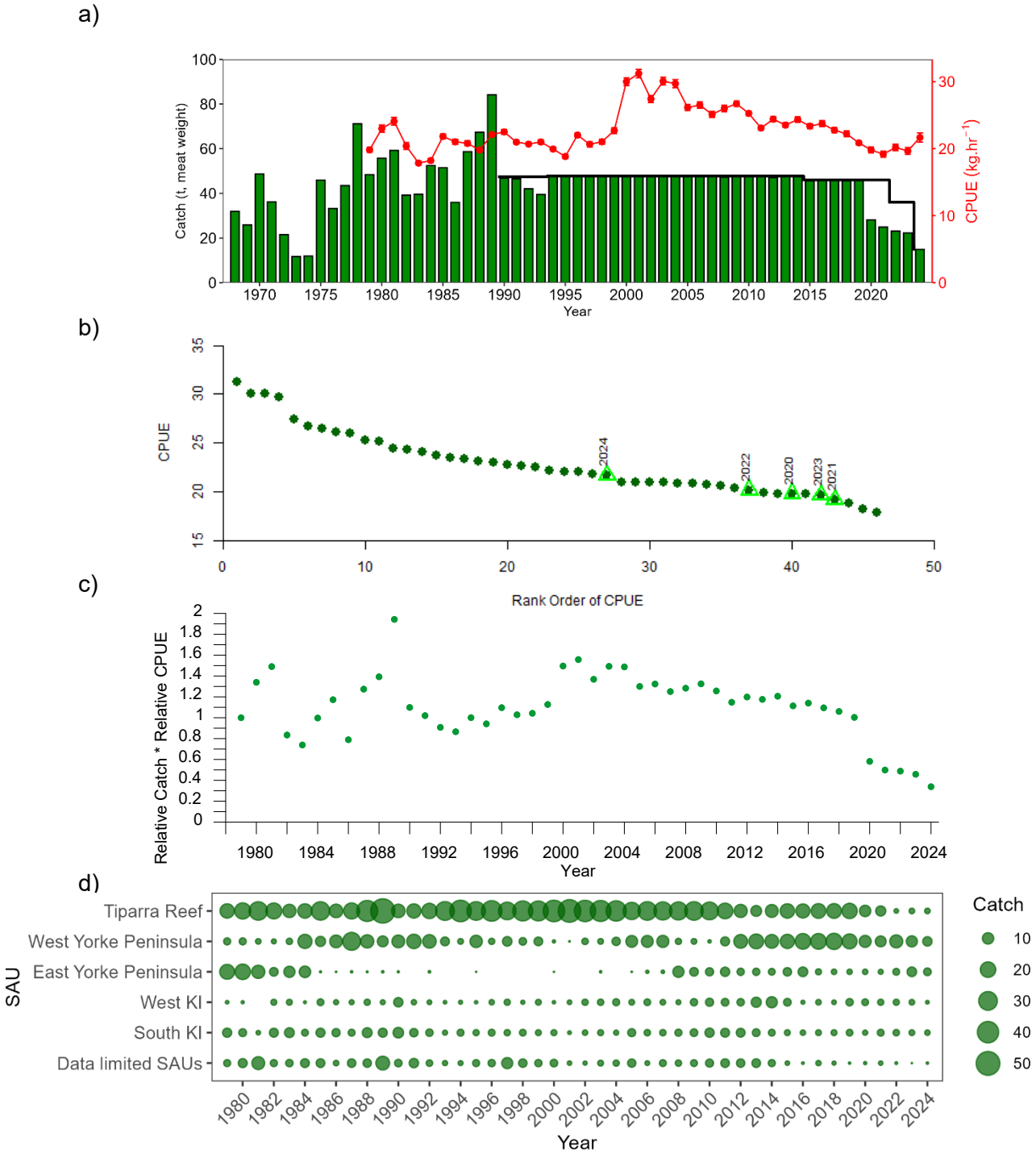

Figure 2. a) Total catch (green bars, tonnes), CPUE (red line) and TACC (black line) of greenlip in the CZ from 1968-2024, b) Rank order of CZ CPUE from 1979 to 2024. Last five years are marked with open triangle symbols, c) Combined trend of relative catch and relative CPUE from the Central Zone from 1979 to 2024, d) Bubble plot showing the spatial distribution of the greenlip catch (t, meat weight; green symbols) among each of the SAUs in the CZ from 1979 to 2024 (data limited SAUs from the HS are combined).

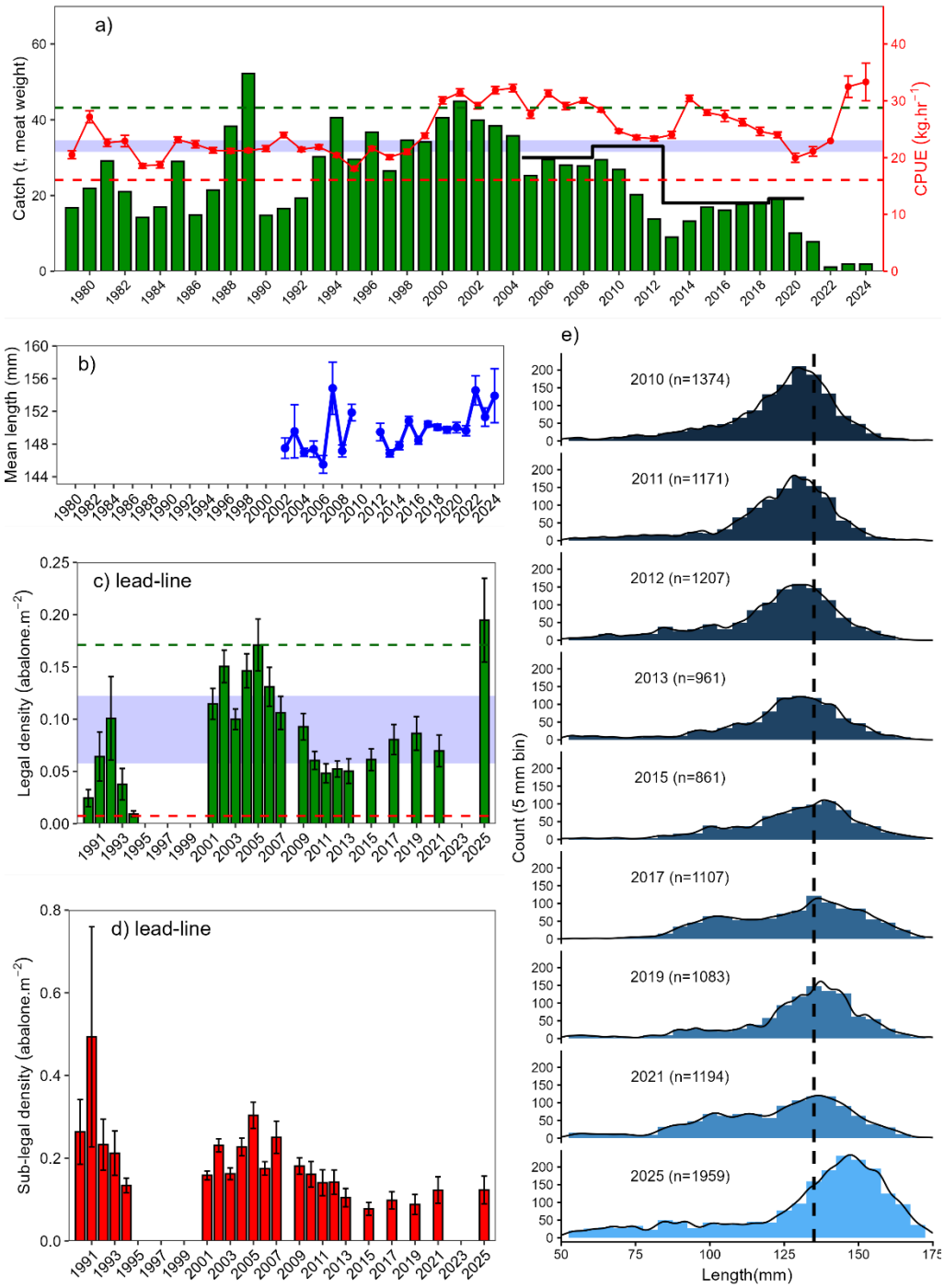

Figure 3. Tiparra Reef SAU from 1979 to 2024 (note 2025 FIS values are included): a) Catch (green bars, tonnes), CPUE (red solid line, note symbols with no error bar are calculated from a three year mean – see methods), historic catch-cap (black line), b) mean length from the commercial catch samples(blueline),c)legaldensityofgreenlip(i.e.,≥135 mm green bars) from lead-line surveys, d) sub-legal density of greenlip (i.e., <135 mm SL, red bars) from lead-line surveys, e) Length counts from FIS. Gaps in the time series indicate no data. Scoring from the harvest strategy is shown for panels a) and c): Target Range (score of 5, blue shading), upper limit (score of 10, green dashed line), lower limit (score of 0, red dashed line). Lead-line estimates prior to 2010 onward in panels c) and d) have been scaled from timed-swim data.

West Yorke Peninsula

In the WYP SAU, large greenlip catches were harvested between 2012 and 2019 (~18 $t.yr^{-1}$), reflecting the longest sustained period of high catches from this SAU (Figure 4a). Catches were lower from 2020 to 2023 (~10 $t.yr^{-1}$) and similar to the historical average of 9.4 t. However, catch decreased 32% from 2023 (9.6 t) to 2024 (6.5 t). CPUE was the second highest on record in 2012, before declining to a low of 18.5 $kg.hr^{-1}$ in 2019. Thereafter, except for 2023 (18.1.hr^{-1}), it remained within or close to the target reference band of the HS.

Within the WYP SAU, there is considerable variation in catch, CPUE and legal density among the three primary fishing grounds or 'mapcodes' (see Appendix 1). Except for 2015, relatively high levels of catch have been harvested from Hardwicke Bay from 2012 to 2022, consistent with the elevated catches from the WYP SAU. However, in 2023 and 2024, catch from this mapcode was among the lowest on record (0.2 t harvested). CPUE for Hardwicke Bay was inestimable in 2023 and 2024 due to insufficient records but was at the fourth lowest value on record in 2022 (16.9 $kg.hr^{-1}$). Relatively high catches have also been obtained from Corny Point between 2012 and 2024. CPUE declined from 32.7 $kg.hr^{-1}$ in 2012 to the lowest value on record in 2019 (18.5 $kg.hr^{-1}$) whereafter it stabilised and, in 2024, was 20.7$kg.hr^{-1}$. For Port Victoria, CPUE has been variable among years but, in 2023, was the lowest value on record (15.1 $kg.hr^{-1}$) and was not estimable in 2024.

Legal sized abalone density WYP SAU increased 64% from ~ 0.019 in 2023 to 0.032 in 2025 (Figure 4c). Sub-legal size also increased by 69% during the same period (Figure 4d). The density of legal-sized abalone increased at all three sites within the WYP SAU from 2023 to 2025 (see Appendix 1). Sub-legal density also increased in Hardwicke Bay and Corny Point over the same period, but there was a small decrease in Port Victoria.

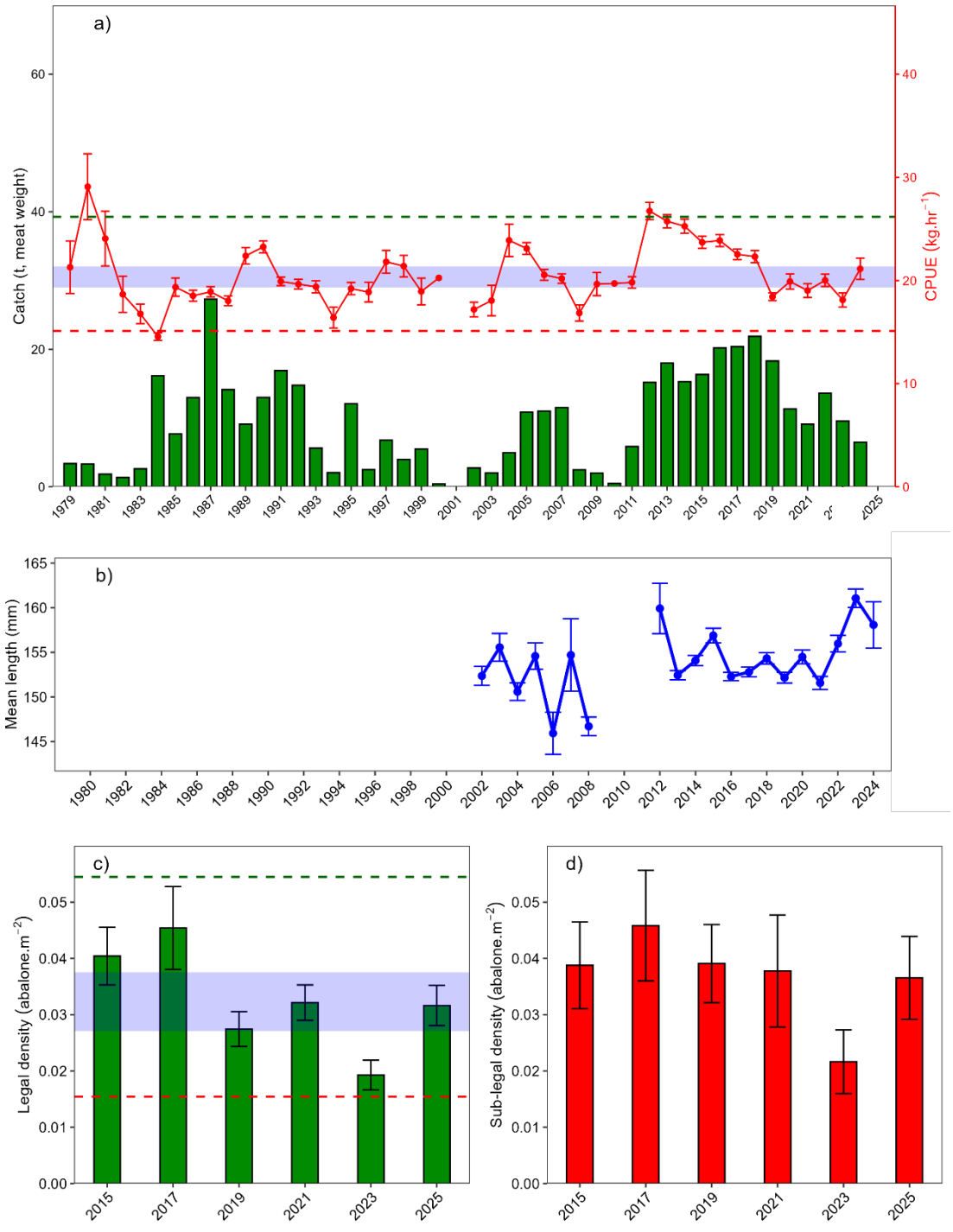

Figure 4. West Yorke Peninsula SAU data available from 1979 to 2024 (note 2025 for FIS): a) Catch (green bars, tonnes), CPUE (red line, note symbols with no error bar are calculated from a three year mean – see methods), b) mean length from the commercial catch samples (blue line), c) legal density of greenlip (i.e., ≥135 mm green bars) from lead-line surveys, and d) sub-legal density of greenlip (i.e., <135 mm SL, red bars) from lead-line surveys. Gaps in all-time series indicate no data. Scoring from the HS is shown for panels a) and c): Target Range (score of 5, blue shading), upper limit (score of 10, green dashed line), lower limit (score of 0, red dashed line).

Tiparra Reef and West Yorke Peninsula Biomass

Tiparra Reef

The stratified, median estimate of legal-sized-greenlip biomass in the Tiparra Reef survey area in October 2025 was 93.5 t bled-meat weight (BMW; Figure 5). The large increase in harvestable biomass since 2021 reflects an increase in the abundance and size of legal-sized greenlip encountered in 2025 (Appendix 2). When scaled to the Tiparra Reef SAU and adjusted for year-to-date catch, the harvestable biomass estimates for January 2021 were between 124.9 t and 230.5 t (Figure 5, Appendix 2), with the largest scaled harvestable biomass estimate from method 5. These estimates suggest that the harvest fraction (HF) at Tiparra Reef was between 2% and 3% in 2025, which was by far the lowest HF since biomass surveys commenced in 2013 (Appendix 2).

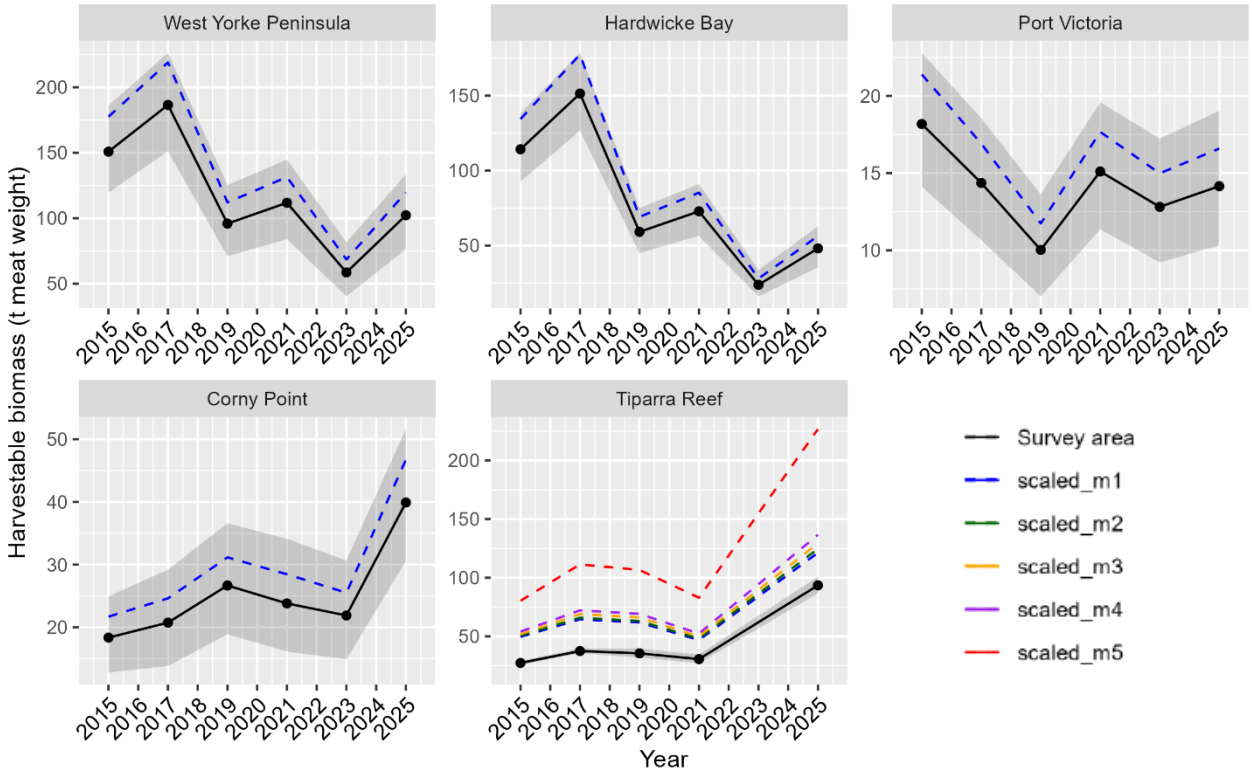

Figure 5. Harvestable biomass from West Yorke Peninsula and Tiparra Reef from 2015 to 2025, including estimates from the three independent fishing areas (i.e., Hardwicke Bay, Port Victoria & Corny Point) within West Yorke Peninsula (median ± 10%, 90% quantiles, black line ± grey shading). Blue dashed lines show estimates scaled to SAU or mapcodes and adjusted for year-to-date catch. Coloured dashed lines show estimates scaled to SUA and mapcodes and adjusted for year-to-date catch.

West Yorke Peninsula

The stratified median estimate of legal-sized-greenlip harvestable biomass in October 2025 in the survey area was 102.4 t (i.e., 39.9 t, 48.2 t and 14.2 t BMW for Corny Point, Hardwicke Bay and Port Victoria, respectively; Figure 5). When scaled to the West Yorke Peninsula SAU, and adjusted for year-to-date catch, the harvestable biomass estimates for January 2025 were between 114.1 and 125.7 t (Figure 5, Appendix 2). These estimates suggest that the harvest

fraction (HF) at West Yorke Peninsula was between 6.7% and 7.4% in 2025, which was similar to the HF in 2021 (Appendix 2). The spatially explicit HFs for the three mapcodes were 10%, 0.3% and 3% for Corny Point, Hardwicke Bay and Port Victoria, respectively (Appendix 2). The 2025 West Yorke Peninsula estimate reflects a 75% increase since 2023, but is similar to the estimates for 2019 and 2021 and lower than those recorded in 2015 and 2017. The greatest change in estimated biomass since 2023 occurred at Corny Point and reflects a greater number large greenlip in the FIS.

West KI

A recent sustained period of high catches between 2009 and 2015 coincided with decreasing CPUE from the second highest value on record in 2009 (32.4 $kg.hr^{-1}$) to the second lowest value on record in 2017 (16.74 $kg.hr^{-1}$; Figure 6a). Catch remained low from 2016 to 2024, when 0.6 t was harvested. Except for 2021, the lowest CPUE on record (16.73 $kg.hr^{-1}$), CPUE has generally increased since 2018 but has remained below the target range of the HS despite consistent, relatively low catch.

East Yorke Peninsula

High catches from 1979 to 1985 were followed by no fishing, or very low catches, from 1985 to 2007, after mortalities related to *Perkinsus olseni* in the mid-1980s. Catches increased in 2008 (9.6 t), then generally declined to 2021 (1.5 t). Catch from this SAU increased to 4.7 t between 2022 and 2024, higher than the average catch from 2008 to 2021 (4.1 t; Figure 6a). CPUE declined from a peak of 24.1 $kg.hr^{-1}$ in 2010 to reach one of the lowest values on record in 2017 (15.2 $kg.hr^{-1}$). CPUE then increased to 23.7 $kg.hr^{-1}$ in 2021 but has since decreased and, in 2024, was 20.0 $kg.hr^{-1}$ and above the target range of the HS.

South KI

The most recent peak in catches occurred in 2010 when 6.3 t was harvested but thereafter catches generally declined and stabilised averaging 2.2 $t.y^{-1}$ from 2015 to 2024 (Figure 6a). Over the last decade, CPUE has varied between 19 and 25 $kg.hr^{-1}$. In 2024, the CPUE of 20.0 $kg.hr^{-1}$ was below the target range of the HS.

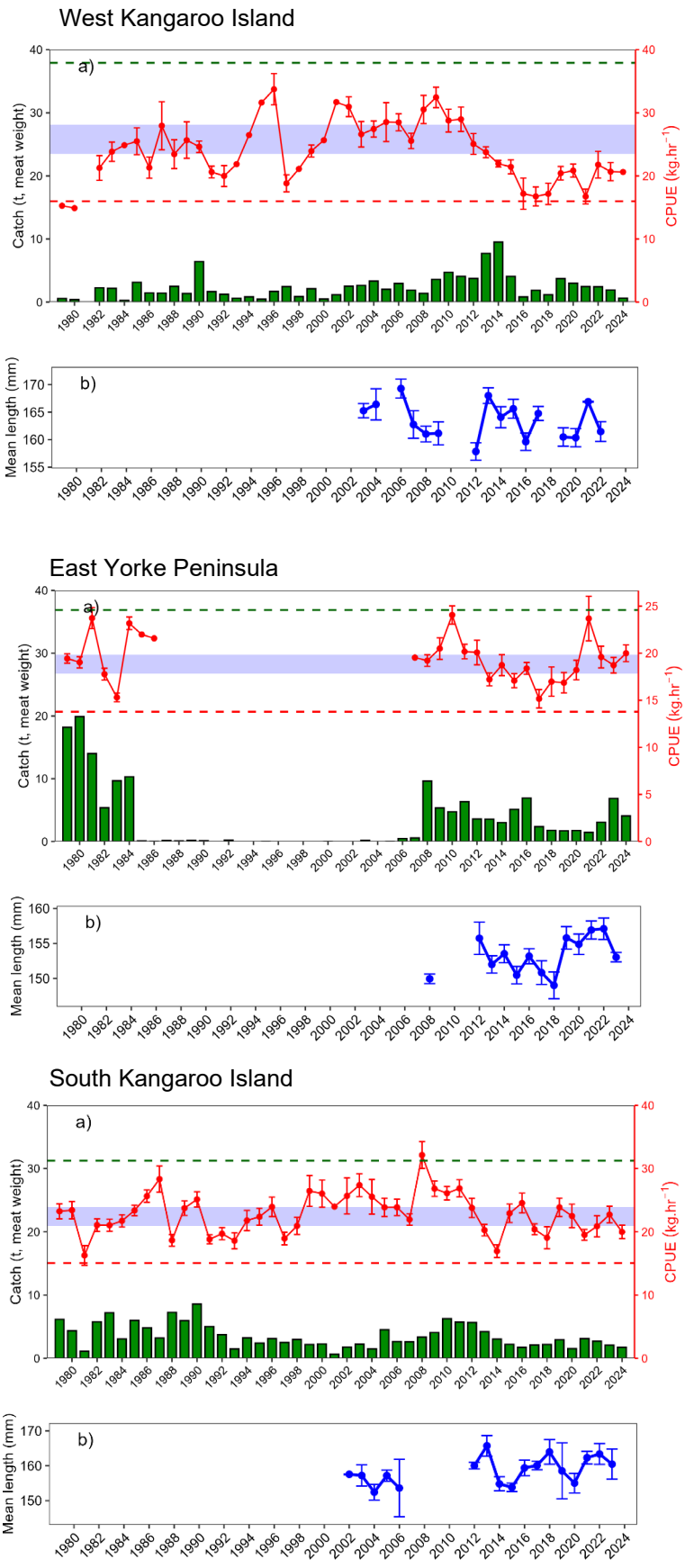

Figure 6. West Kangaroo Island, East Yorke Peninsula and South Kangaroo Island SAUs from 1979 to 2024: a) Catch (green bars, tonnes), CPUE (red line), CPUE Target Range (score of 5, blue shading), CPUE upper limit (score of 10, green dashed line), and CPUE lower limit (score of 0, red dashed line). b) mean length from the commercial catch samples (blue line). Gaps in all-time series indicate no data.

Data limited SAUs

In 2024, catch (173 kg) from the combined data limited SAUs was among the lowest levels on record, contributing less than 5% of the total catch harvested in the CZ (Figure 7). CPUE was below the limit reference point from 2020 to 2023 and could not be estimated in 2024.

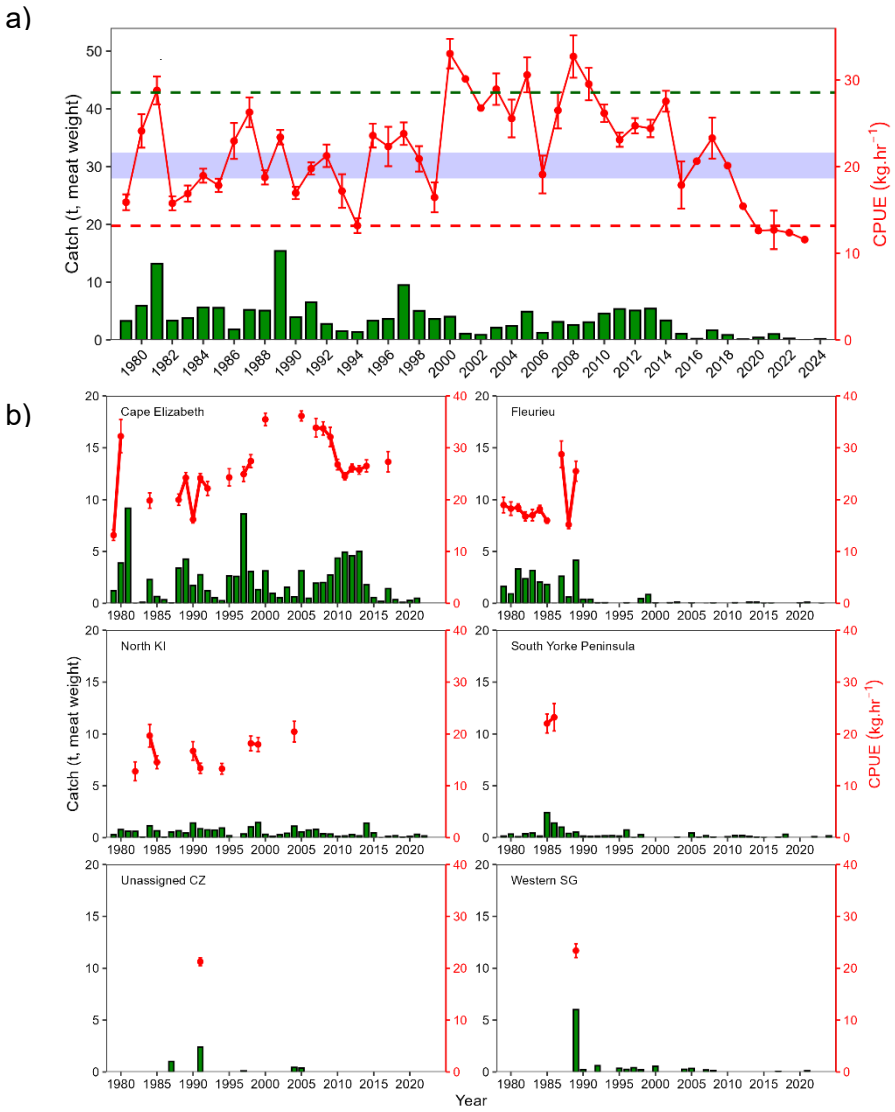

Figure 7. Data limited SAUs from 1979 to 2024: a) Combined data limited SAUs: Catch (green bars, tonnes), CPUE (red line, note symbols with no error bars are calculated from a three-year mean – see methods), CPUE Target Range (score of 5, blue shading), CPUE upper limit (score of 10, green dashed line), and CPUE lower limit (score of 0, red dashed line). b) Individual data limited SAUs from 1979 to 2023. Catch (green bars, tonnes), and CPUE (red line). Gaps in time series indicate no data.

Zone score and trend in Zone Score

The 2024 zone score was **5.97 / 10** and the trend in zone score was **6.4 / 10** (Table 2; Figure 8). Collectively, these define greenlip in CZ as 'sustainable' for 2024.

Table 2. Calculation of the Zone Score under the Harvest Strategy described in the Management Plan for CZ greenlip in 2024.

SAU	CPUE ($Kg.hr^{-1}$)	CPUE score	Legal Density ($abs.m^{-2}$)	Legal density score	Combined score	Catch (t)	Catch (proportion)	Weighted SAU score
West Yorke Peninsula	21.1	5.0	0.03	5.0	5.00	6.5	0.42	2.10
Tiparra Reef	33.3	10.0	0.19	10.0	10.00	1.9	0.28	2.75
East Yorke Peninsula	20.0	5.1			5.15	4.1	0.11	0.58
West KI	19.8	2.5			2.54	0.6	0.09	0.22
South KI	20.0	4.2			4.15	1.7	0.07	0.31
Data Limited SAU's					0.00	0.2	0.03	0.00
							Zone Score	**5.97**

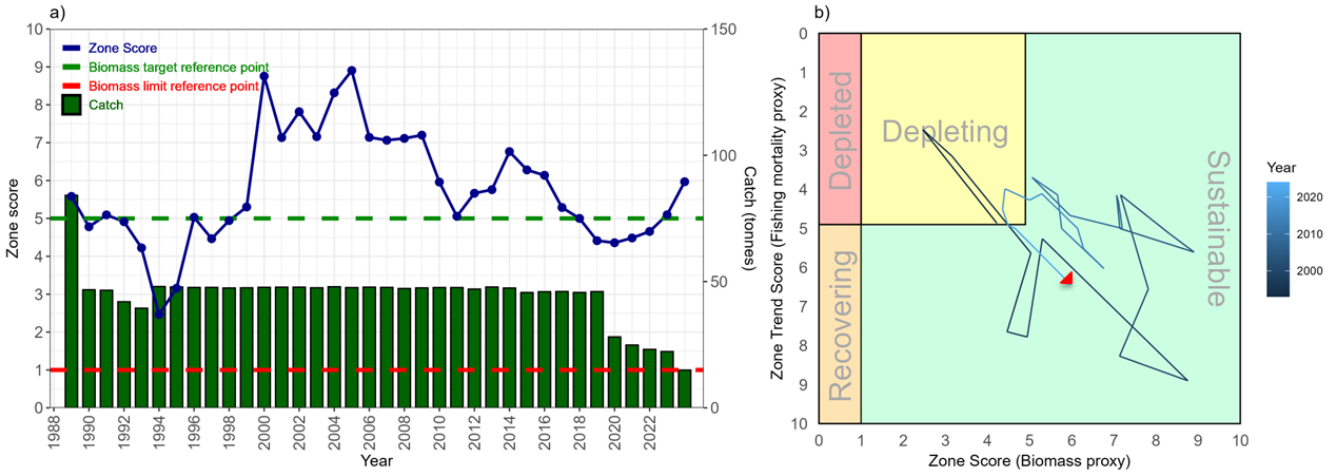

Figure 8. (a) Zone score plot for CZ greenlip between 1989 and 2024: Zone score (blue symbols and line), biomass target reference point (green line), biomass limit reference point (red line) and catch (green bars, tonnes). (b) Phase plot indicating changes in Central Zone greenlip stock status between 1993 and 2023. Red symbol indicates 2024 value.

6. DISCUSSION

6.1. Uncertainties in the assessment

This assessment is dependent on FIS and commercial data and, except for the WYP and Tiparra Reef SAUs where FIS are conducted, relies heavily on CPUE that is not standardised. This means neither expected increases in effective effort nor the hyperstability of this relative abundance index are accounted for. Thus, the observed small and recent CPUE reductions at some SAUs likely underestimate actual reductions in greenlip harvestable biomass. In addition, the assumed relationship between CPUE and abundance has likely been disrupted by the reduced catch in many SAUs and some redistribution of catch among mapcodes. The uncertainty in assessing stock status and suitable harvest levels using CPUE is partly offset by the recent surveys at WYP and Tiparra Reef that contribute a large proportion of the CZ catch. This increases confidence in the assessment of these two key SAUs.

The HS also has limitations. Zone Score used to allocate stock status is derived from two performance indicators for each Spatial Assessment Unit (SAU): 'raw' (or uncorrected) CPUE and, where available, legal density. The success of the HS relies on realistic zonal target catches paired with settings that deliver a zone score and recommended zonal catches that adequately reflect biomass, and that prevent overfishing and the stock becoming depleted. Given the settings in the calculation of Zone Score, limitations in the use of CPUE and the rarity of FIS, Zone Score values should be interpreted cautiously.

Furthermore, this report uses data to 31 December 2024 and, therefore, does not account for any potential effects of the widespread harmful algal bloom (HAB) of *Karenia* spp. on the CZ stocks in 2025. The HAB first occurred in coastal waters off the Fleurieu Peninsula in March 2025, and subsequently expanded to Investigator Strait, Gulf Saint Vincent (GSV) and Spencer Gulf (SG) during April–July 2025. The HAB is known to have caused mortality in greenlip near Stansbury and Edithburgh in the EYP SAU, on KI, the southern coastline of the WYP and has the potential to impact stocks elsewhere, including at other locations in Spencer Gulf and Kangaroo Island.

6.2. Greenlip Abalone status

The total commercial catch for greenlip in the South Australian CZ Fishery declined from 46.0 t to 15.0 t (meat weight) between 2019 and 2024, a reduction of more than 68% from the average catch of 47 t over the preceding three decades. From 2020, catches declined to under 30 t for the first time since 1974, consistent with industry decisions to catch less than the TACC due to concern for greenlip stocks (Burnell and Mayfield 2023, Burnell 2023). The TACC was then reduced to 14.96 t for 2024 resulting in lower catch from all SAUs, including the two

consistently highest yielding CZ SAUs – Tiparra Reef and West Yorke Peninsula - that have provided 73% of the CZAF catch throughout its recorded history. These reductions in catch are analogous with many other abalone fisheries across southern Australia which are currently characterised by ongoing low productivity and catch (Stobart and Mayfield 2021; Mundy and McAllister 2022; Roeloffs *et al.* 2024).

Following record high CPUEs in the early 2000s, over the last two decades the CZ catch-rate declined from 31 kg.hr^{-1} in 2001 to lows of 19 – 20 kg.hr^{-1} from 2019 to 2023. Subsequently, zone CPUE increased and was 21.7 kg.hr^{-1} in 2024 and close to the historic mid-range of CPUE values.

The previous 2023 classification – 'depleting' – was based on a weight of evidence evaluation (Stobart et al. 2025). There was higher uncertainty in that assessment because it relied heavily on CPUE, particularly in the absence of a recent FIS from Tiparra Reef. Available data at the time showed that abundance of greenlip was likely to be at the lowest level in the history of the CZAF (Stobart et al. 2025). The difference between the weight of evidence 2023 stock status of 'depleting' and that obtained from the Harvest Strategy highlighted the need for the latter to be reviewed. The implied low biomass and assignment of a 'depleting' status for 2023 was consistent with the TACC not being harvested from 2020 to 2023 due to industry harvesting less than the TACC (i.e. 'under-catch') out of concern for the stock. This concern led to industry requesting a TACC reduction to around 15 t in 2024. Industry also expressed concern that capping Tiparra Reef would put more pressure on other fishing grounds, noted that stocks at Hardwicke Bay were depleted and that recent checks in areas where little or no abalone have been harvested in the past ten or twenty years, including Cowell, were disappointing and not worth return visits (Letter to PIRSA from M. Tokley in email dated 08/12/2023).

The lower catches throughout the CZ at most SAUs since? 2020 have allowed some stocks to recover. This is particularly the case for the key Tiparra Reef SAU, where greenlip catch has been reduced to varying degrees from 2010 and has been very low from 2020 to 2024. This reduction in catch has likely facilitated the significant 180% increase in legal density observed between the 2021 and 2025 FIS. The observed change in legal density increases confidence that the recent record high CPUE values for Tiparra Reef in 2023 and 2024, estimated from a low number of fishing events (reducing confidence in the estimates), do reflect a true increase in the abundance of greenlip. In contrast, the sub-legal density at Tiparra Reef remains the same as it was during the previous survey in 2021. There is also evidence of modest recovery occurring in the WYP SAU where legal and sub-legal density increased between the 2023 and 2025 surveys, although the legal biomass remains below what it was

in 2015 and 2017. For remaining SAUs, CPUE values show little change from 2023 to 2024, despite recent reductions in catch.

The catch-weighted, zone score for 2024 was 5.97 / 10. In combination with the zone trend score of 6.4 / 10 (reflecting an increasing trend), these define the zonal stock status for greenlip in the CZ in 2024 as **'sustainable'**.

The concurrence of the recent upward trend in the FIS and CPUE at Tiparra Reef and WYP SAUs increases confidence in the classification of 'sustainable'. However, legal biomass at the WYP SAU remains low compared to that recorded in 2015 and 2017, and CPUE is low for both Kangaroo Island SAUs and the combined SAUs. Furthermore, while CPUE in the EYP SAU was within the target range in 2024, there have been recent large mortality events associated with the HAB within this SAU in 2025 that are not accounted for in this assessment. Similarly, the mortalities reported on KI and the southern part of the WYP SAU have also not been taken into account. The high zone score yields a recommended catch well above the current TACC. Consideration should also be given to the contrasting biomass among SAUs (i.e. the high biomass at Tiparra Reef and low biomass in most other SAUs), the potential impact of the HAB that occurred in 2025/26, and the absence of increases in sublegal density at Tiparra Reef (i.e. future recruits to the fishable stock) when setting the TACC.

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APPENDIX 1 - WEST YORKE PENINSULA SAU MAPCODES

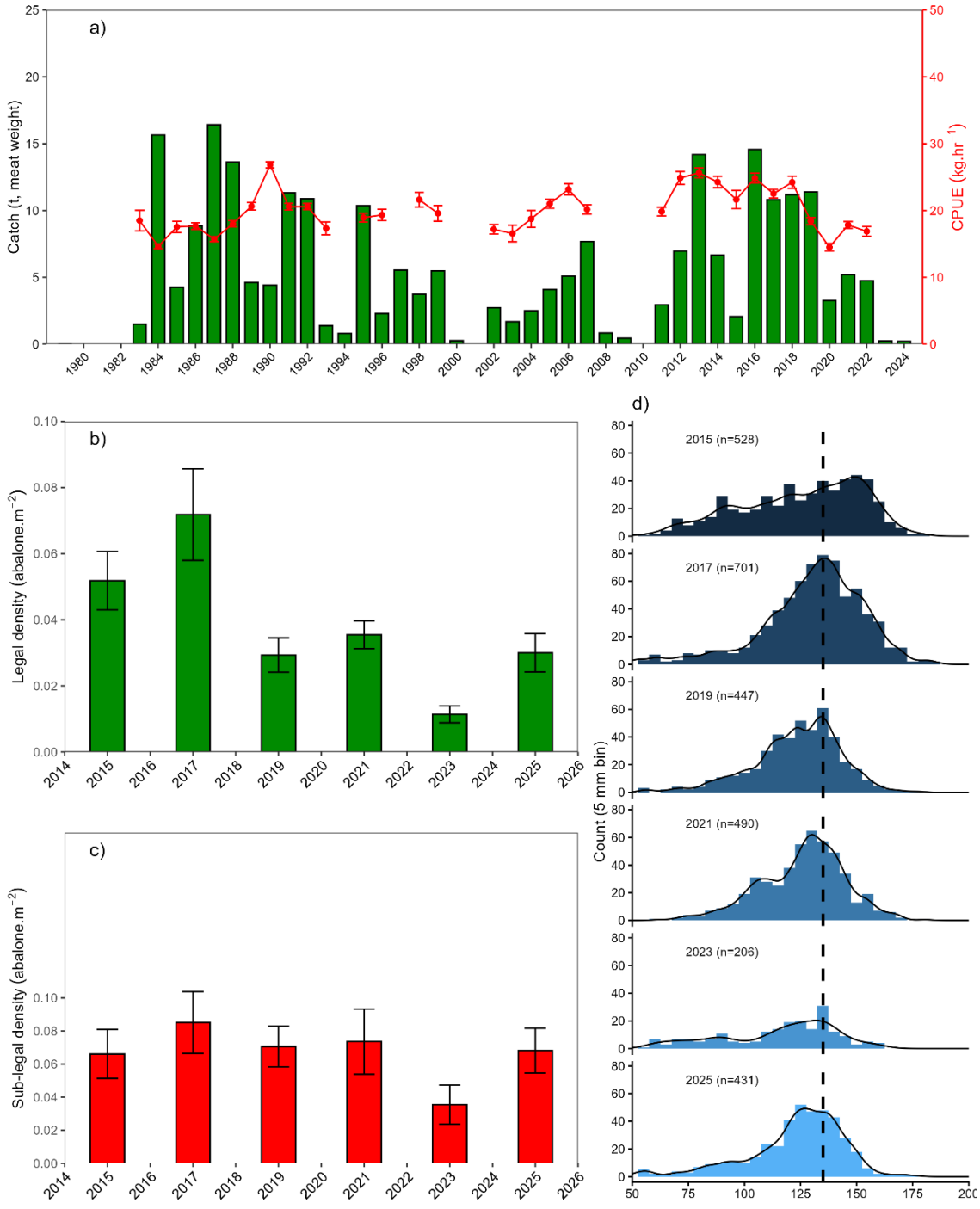

Figure 9. Fishery-dependent and fishery-independent data from mapcode 24A (Hardwicke Bay) from 1979 to 2024. a) Catch (green bars, tonnes) and CPUE (red line), b) Legal density of greenlip (i.e., ≥135mmgreenbars)fromexpandedfishery independent survey design, c) Sub-legal density (i.e., <135 mm red bars) from fishery independent expanded survey design, d) Length-count distributions of greenlip from the expanded FIS design. Gaps in all-time series indicate no data.

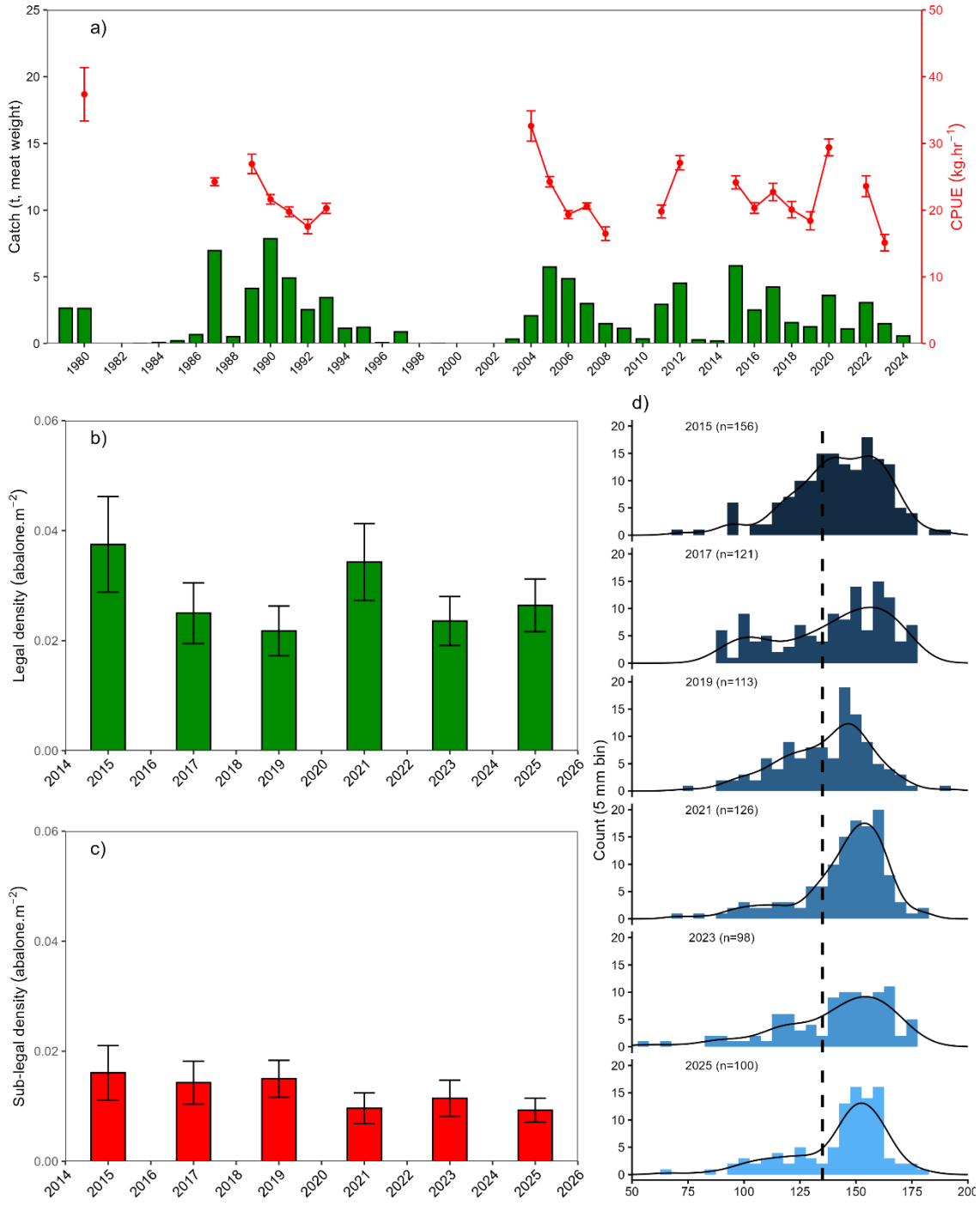

Figure 10. Fishery-dependent and fishery-independent data from mapcode 22A (Port Victoria) from 1979 to 2024. a) Catch (green bars, tonnes) and CPUE (red line), b) Legal density of greenlip (i.e., ≥135 mm green bars) from fishery independent expanded survey design, c) Sub-legal density (i.e., <135 mm red bars) from fishery independent expanded FIS design, d) Length-count distributions of greenlip from the expanded FIS design. Gaps in all time series indicate no data.

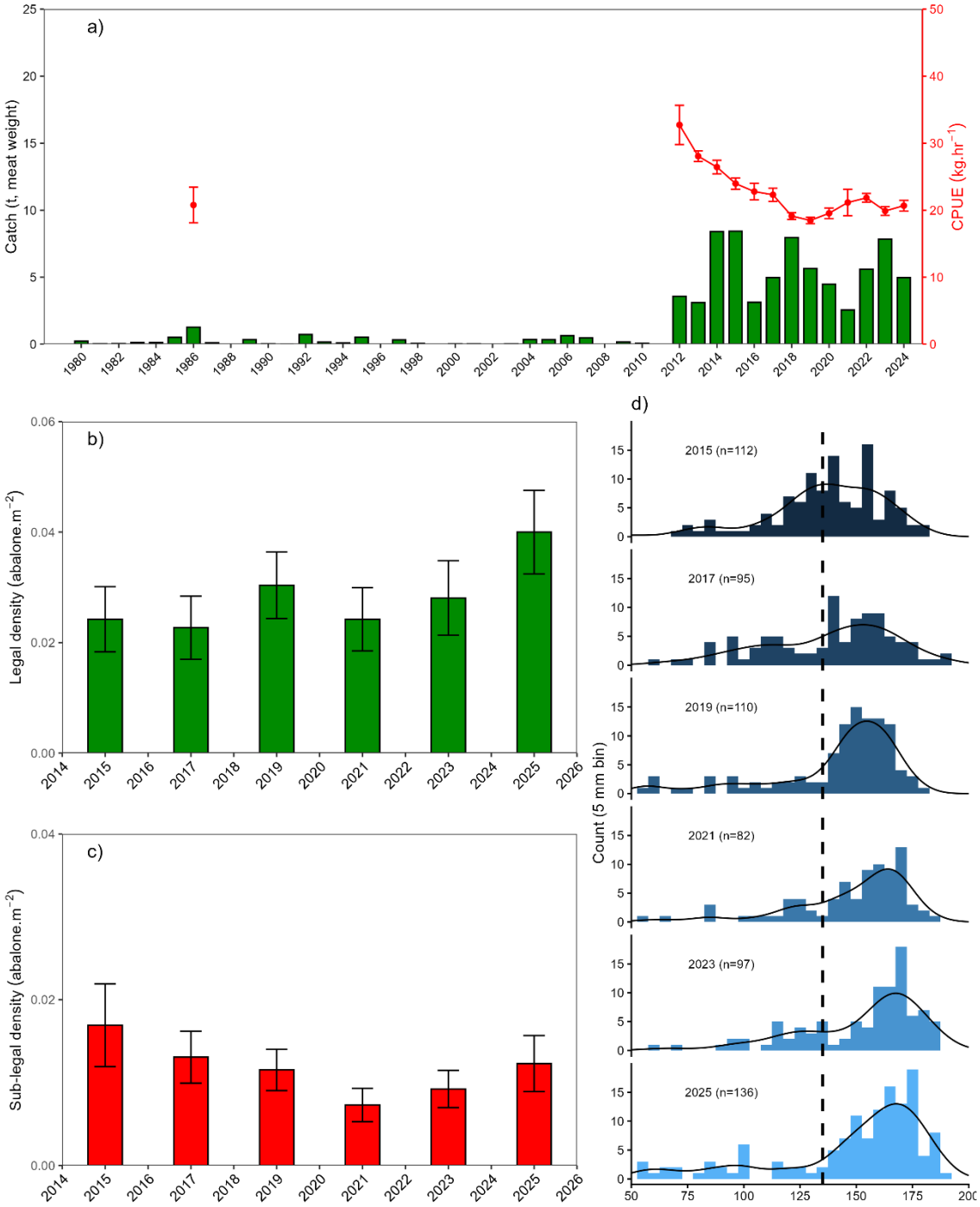

Figure 11. Fishery-dependent and fishery-independent data from mapcode 23A (Corny Point) from 1979 to 2024. a) Catch (green bars, tonnes) and CPUE (red line), b) Legal density of greenlip (i.e., ≥135 mm green bars) from fishery independent expanded survey design, c) Sub-legal density (i.e., <135 mm red bars) from fishery independent expanded survey design, d) Length-count distributions of greenlip from the expanded FIS design. Gaps in all time series indicate no data.

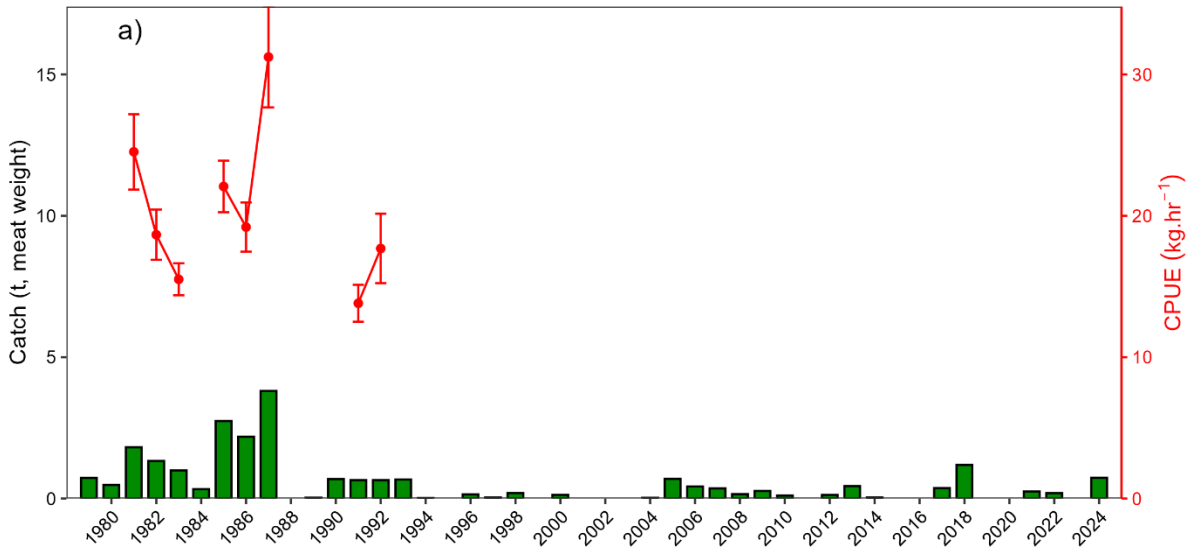

Figure 12. Catch (green bars, tonnes) and CPUE (red line) data from mapcode 23B (Royston Head) from 1979 to 2024.

APPENDIX 2. - HARVESTABLE BIOMASS CALCULATIONS

Table 3. Tiparra Reef and West Yorke Peninsula estimates of harvestable biomass (tonnes) and harvest fractions at the SAU scale from 2015 to 2025. West Yorke Peninsula mopcode-scale estimates are also provided. Harvestable biomass estimates are for the surveyed areas (± confidence estimates), unsurveyed areas and total harvestable biomass at the beginning of the fishing season (i.e., January).

Tiparra Reef		Season						
		2013	2015	2017	2019	2021	2023	2025
Biomass (t) - surveyed area		23.2	27.3	37.5	35.5	30.6		93.5
10% probabililty (≥)	survey strata 1-3	19.2	25.7	35.6	31.9	27.2		86.8
90% probabililty (≥)		27.6	29.1	39.5	39.6	34.4		100.9
Biomass (t) - unsurveyed area	method 1	6.9	8.1	11.1	10.5	9.1		27.8
	method 2	7.7	9.1	12.5	11.8	10.2		31.2
	method 3	10.4	10.4	15.6	14.8	12.1		35.8
	method 4	12.5	12.6	18.7	17.9	14.6		43.1
	method 5	38.7	38.8	58.0	55.3	45.2		133.3
Biomass (t) - surveyed + unsurveyed	method 1	30.1	35.4	48.6	46.0	39.7		121.27
	method 2	30.9	36.4	50.0	47.3	40.8		124.67
	method 3	33.7	37.7	53.1	50.3	42.7		129.33
	method 4	35.7	39.9	56.2	53.4	45.2		136.6
	method 5	61.9	66.1	95.4	90.8	75.7		226.81
Year-to-Date Catch (t) - survey midpoint		6.7	14.2	15.9	15.8	7.2		3.7
Total Biomass (t) - January	method 1	36.8	49.6	64.5	61.8	46.9		124.9
	method 2	37.6	50.6	65.9	63.1	48.0		128.3
	method 3	40.4	51.9	69.0	66.1	49.9		133.0
	method 4	42.4	54.0	72.1	69.2	52.4		140.3
	method 5	68.6	80.3	111.4	106.6	82.9		230.5
Total Catch (t) - season		9.0	16.9	17.7	19.3	7.7		3.7
Harvest Fraction (SAU)	method 1	0.24	0.34	0.27	0.31	0.17		0.03
	method 2	0.24	0.33	0.27	0.31	0.16		0.03
	method 3	0.22	0.33	0.26	0.29	0.16		0.03
	method 4	0.21	0.31	0.25	0.28	0.15		0.03
	method 5	0.13	0.21	0.16	0.18	0.09		0.02

West Yorke Peninsula		Season					
		2015	2017	2019	2021	2023	2025
Corny Point							
Biomass (t)	survey strata 1-3	18.6	21.0	26.5	24.3	21.8	39.9
10% probabililty (≥)		15.1	16.4	19.1	16.7	14.9	30.6
90% probabililty (≥)		22.6	26.6	36.0	34.6	30.6	51.8
Hardwicke Bay							
Biomass (t)	survey strata 1-3	114.9	151.6	59.1	72.8	23.9	48.2
10% probabililty (≥)		103.2	138.8	45.5	56.6	16.2	35.6
90% probabililty (≥)		127.4	165.2	75.3	90.9	33.7	62.9
Port Victoria							
Biomass (t)	survey strata 1-3	18.3	14.5	10.0	15.1	12.8	14.2
10% probabililty (≥)		15.8	12.3	7.1	11.3	9.2	10.3
90% probabililty (≥)		21.0	16.9	13.5	19.6	17.3	19.1
Biomass (t) - surveyed area		150.9	186.4	95.7	112.3	58.5	102.4
Biomass (t) - unsurveyed area	method 1	25.8	31.8	16.3	19.1	10.6	17.3
	method 2	8.9	9.6	5.8	6.1	4.9	5.7
Biomass (t)- survey + unsurveyed	method 1	177.5	219.0	112.1	131.4	69.2	119.7
	method 2	160.6	196.7	101.5	118.4	63.4	108.1
Year-to-Date Catch (t) - survey midpoint		10.9	15.6	14.3	6.6	8.3	6.1
Total Biomass (t) - January	method 1	188.4	234.5	126.4	138.0	77.5	125.7
	method 2	171.5	212.3	115.8	126.7	71.7	114.1
Total Catch (t) - season		16.3	20.4	18.3	8.8	9.6	8.4
Harvest Fraction (Site)							
Corny Point	method 1	0.33	0.17	0.16	0.08	0.24	0.10
Hardwicke Bay	method 1	0.02	0.06	0.15	0.06	0.01	0.00
Port Victoria	method 1	0.19	0.18	0.10	0.06	0.09	0.03
Harvest Fraction (SAU)	method 1	0.09	0.09	0.14	0.06	0.12	0.07
	method 2	0.10	0.10	0.16	0.07	0.13	0.07

APPENDIX 3 - SUMMARY TABLE

Table 4. Greenlip catch (t MW; pale green fill) and CPUE (kg.hr^{-1}; dark green fill) from CZ SAUs. Abbreviations for Yorke Peninsula (YP) and Kangaroo Island (KI).

SEASON	Cape Elizabeth	East YP	Fleurieu	North KI	South KI	South YP	Tiparra Reef	Unassigned CZ	West KI	West YP	Western SG	CAPE ELIZABETH	EAST YP	FLEURIEU	NORTH KI	SOUTH KI	SOUTH YP	TIPARRA REEF	UNASSIGNED CZ	WEST KI	WEST YP	WESTERN SG
1979	1.22	18.19	1.63	0.28	6.16	0.15	16.75		0.56	3.38		13.15	19.44	18.96		23.25		20.49			21.29	
1980	3.89	19.89	0.92	0.77	4.34	0.35	21.92		0.39	3.33		32.24	19.04	18.27		23.43		27.18			29.10	
1981	9.18	14.01	3.32	0.61	1.09	0.09	29.13			1.84		42.52	23.73	18.47		16.28		22.62			24.07	
1982	0.00	5.37	2.37	0.60	5.78	0.38	21.03		2.25	1.37			17.78	16.76	12.79	21.07		22.93		21.25	18.66	
1983	0.10	9.67	3.18	0.06	7.18	0.44	14.20		2.19	2.61			15.31	17.02		21.05		18.55		23.83	16.77	
1984	2.30	10.31	2.05	1.15	3.05	0.15	16.94		0.29	16.17		19.83	23.18	18.17	19.66	21.73		18.73			14.56	
1985	0.66	0.08	1.82	0.66	6.00	2.42	28.98		3.13	7.71				15.97	14.55	23.38	22.15	23.17		25.48	19.36	
1986	0.35	0.03		0.06	4.81	1.41	14.84		1.45	12.98						25.65	23.22	22.35		21.30	18.52	
1987	0.04	0.14	2.62	0.54	3.19	1.02	21.42	1.01	1.41	27.29				28.75		28.35		21.28		27.95	18.91	
1988	3.39	0.08	0.60	0.67	7.27	0.41	38.29		2.48	14.13		19.98		15.19		18.66		21.18		23.44	18.03	
1989	4.27	0.16	4.15	0.44	5.94	0.53	52.20		1.36	9.11	6.01	24.22		25.50		23.75		21.27		25.67	22.40	23.39
1990	1.73	0.10	0.40	1.42	8.57	0.16	14.75		6.41	13.00	0.23	16.17			16.72	25.13		21.61		24.62	23.26	
1991	2.76		0.40	0.86	5.02	0.10	16.50	2.40	1.65	16.89		24.15			13.39	18.82		23.97	21.27	20.61	19.91	
1992	1.22	0.19	0.06	0.75	3.75	0.15	19.29		1.23	14.77	0.60	22.16				19.70		21.44		19.98	19.65	
1993	0.54		0.07	0.74	1.46	0.18	30.23		0.60	5.65						18.59		21.87			19.39	
1994	0.26			0.93	3.22	0.19	40.56		0.83	2.05					13.28	21.80		20.44			16.41	
1995	2.65	0.01		0.18	2.40	0.16	29.57		0.47	12.09	0.35	24.29				22.39		18.06			19.22	
1996	2.60		0.05		3.13	0.75	36.71		1.69	2.50	0.24					23.95		21.61		33.73	18.88	
1997	8.62			0.36	2.52	0.02	26.45	0.09	2.45	6.78	0.41	24.91				18.95		20.08		18.82	21.82	
1998	3.07		0.46	1.03	2.96	0.27	34.61		0.88	3.98	0.21	27.44			18.18	20.94		21.02			21.40	
1999	1.32		0.85	1.46	2.17		34.12		2.12	5.49					17.97	26.46		23.86		23.93	18.94	
2000	3.13	0.00	0.04	0.32	2.28		40.52		0.50	0.41	0.54	35.47				26.05		30.09				
2001	0.95			0.12	0.65		44.89		1.15	0.03								31.48				
2002	0.55		0.07	0.27	1.77		39.89		2.51	2.73						25.69		29.13		30.96	17.19	
2003	1.55	0.17	0.11	0.42	2.23	0.03	38.38		2.63	2.03						27.39		31.86		26.60	18.06	
2004	0.64			1.11	1.49		35.75	0.44	3.33	4.95	0.25				20.44	25.54		32.25		27.43	23.89	
2005	3.14	0.02	0.03	0.56	4.53	0.45	25.29	0.38	2.02	10.85	0.34	36.14				23.87		27.64		28.53	23.11	
2006	0.49	0.46		0.74	2.65	0.03	29.47		2.96	11.01						23.88		31.30		28.49	20.55	
2007	1.95	0.55		0.80	2.60	0.19	28.02		1.88	11.51	0.19	33.87				21.95		29.06		25.55	20.19	
2008	2.01	9.63	0.03	0.37	3.35	0.04	27.82		1.38	2.48	0.13	33.74	19.22			32.14		30.07		30.52	16.85	
2009	2.74	5.34		0.35	4.05		29.43		3.59	2.00		32.09	20.49			26.83		28.42		32.44	19.66	
2010	4.36	4.73		0.13	6.27	0.09	26.86		4.70	0.50		26.77	24.07			26.11		24.66		28.76		
2011	4.94	6.35	0.07	0.17	5.74	0.20	20.21		4.08	5.87		24.49	20.17			26.88		23.56		28.98	19.82	
2012	4.59	3.58		0.30	5.66	0.20	13.77		3.74	15.20		26.09	20.08			23.78		23.35		25.05	26.74	
2013	4.99	3.55	0.13	0.17	4.20	0.13	8.98		7.71	17.99		25.75	17.21			20.27		24.02		23.75	25.75	
2014	1.80	3.00	0.11	1.41	3.04	0.06	13.23		9.50	15.30		26.49	18.73			16.95		30.44		21.93	25.27	
2015	0.57	5.11	0.02	0.46	2.19	0.02	16.90		4.07	16.33			17.08			22.93		27.93		21.43	23.71	
2016	0.19	6.93	0.02	0.00	1.73		16.09		0.82	20.21			18.39			24.56		27.33		17.17	23.88	
2017	1.42	2.36		0.13	2.09	0.06	17.69		1.86	20.38	0.06	27.29	15.16			20.40		26.23		16.74	22.54	
2018	0.36	1.77		0.18	2.18	0.33	17.82		1.16	21.90			16.98			19.07		24.61		17.15	22.31	
2019	0.10	1.70		0.04	2.92		19.26		3.72	18.30			16.87			23.88		24.02		20.42	18.43	
2020	0.27	1.74	0.04	0.10	1.53		10.06		3.00	11.34			18.21			22.51		19.96		20.83	19.91	
2021	0.49	1.44	0.10	0.32	3.12		7.75		2.45	9.09	0.12		23.69			19.52		21.09		16.73	19.03	
2022		3.07		0.17	2.69	0.09	1.10		2.42	13.61			19.60			20.88				21.77	20.02	
2023		6.85	0.01		2.06		1.90		1.92	9.57			18.72			22.72		32.48		20.67	18.12	
2024		4.07			1.75	0.17	1.86		0.62	6.47			19.99			19.99		33.33			21.14	