

## Status of the Western Zone Blacklip Abalone (*Haliotis rubra*) Fishery in 2015



**B. Stobart and S. Mayfield**

**SARDI Publication No. F2014/000361-2  
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**SARDI Aquatics Sciences  
PO Box 120 Henley Beach SA 5022**

**September 2016**

**Report to PIRSA Fisheries and Aquaculture**

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## EXECUTIVE SUMMARY

This report provides assessment of the current stock status of *Haliotis rubra* (blacklip abalone; hereafter termed blacklip) in the Western Zone (WZ) of the South Australian Abalone Fishery.

The assessment is required under the Management Plan for the South Australian Abalone Fishery, which specifies the need for annual application of the harvest strategy to determine stock status and review the total allowable commercial catch.

The harvest strategy is relatively new and several limitations have been identified, including stock status classifications which are considered over-optimistic (Stobart *et al.* 2014; Stobart *et al.* 2015b). The stock status outcome from the harvest strategy was compared to the traditional, weight-of-evidence analysis using the National Fishery Status Reporting Framework (NFSRF; Flood *et al.* 2014) framework.

In 2015, there was a 21% voluntary reduction in catch by the commercial sector. The harvest strategy classified the zonal stock status for WZ blacklip in 2015 as 'over fished' when applied using the legislated total allowable commercial catch (TACC; 84.1 t) and 'sustainably fished' when the voluntary catch limit (66.4 t) was used. The classification using the harvest strategy for the previous assessment in 2014 was 'sustainably fished'.

Much of the data available for the fishery suggests blacklip stocks are at their weakest position in over 25 years. These data include: (1) a 36% decrease in catch between 2010 and 2015; (2) the zonal catch per unit effort (CPUE) decreasing 25% between 2003 and 2015, with values in 2014 and 2015 the lowest since 1989; (3) CPUE in most high and medium SAUs in 2015 being below the lower limit reference point, which is used in the harvest strategy to score this Performance Indicator; (4) continuing decline in CPUE at Avoid Bay, and no evidence of significant recovery at any of the remaining seven high importance spatial assessment units (SAUs); (5) no evidence of stock recovery in several historically-important SAUs despite low recent catches; and (6) a large proportion (60%) of high and medium-importance SAUs being assigned higher (i.e. 'red' or 'yellow') risk-of-overfishing categories.

Collectively, this evidence demonstrates that this is a deteriorating stock. Fishing pressure is too high and moving the stock in the direction of becoming recruitment overfished. Consequently, the WZ blacklip fishery is classified as '**transitional depleting**' under the NFSRF (Flood *et al.* 2014). This classification remained unchanged from the last assessment in 2014.

Key WZ blacklip statistics from 2014, following the merger of regions A and B, are summarised in Table 1.

Key statistics for the WZ blacklip fishery from 2014 including number of licences (No. licences), total allowable commercial catch (TACC), voluntary catch limit (VCL), total commercial catch (TCC), catch per unit effort (CPUE), harvest strategy (HS) stock status and national fishery status reporting framework (NFSRF) weight of evidence (WOE) stock status. tmw = tonnes meat weight, kg.hr<sup>-1</sup> = kilograms per hour, na = not applicable.

Season	No. licences	TACC (tmw)	VCL (tmw)	TCC (tmw)	CPUE (kg.hr <sup>-1</sup> )	HS Stock Status (TACC)	HS Stock Status (VCL)	NFSRF WOE Stock Status
2014	22	84.08	na	82.41	19.28	Sustainably fished	na	Transitional depleting
2015	22	84.08	66.38	65.85	19.48	Over fished	Sustainably fished	Transitional depleting

## 1. INTRODUCTION

This status report forms part of the South Australian Research and Development Institute's (SARDI – Aquatic Sciences) ongoing assessment program for this fishery. The Management Plan for the South Australian Abalone Fishery (PIRSA 2012) requires annual application of the harvest strategy to determine stock status and review the total allowable commercial catch (TACC). The most recent zonal stock status and information on the fishery was provided in the stock assessment of blacklip abalone (*Haliotis rubra*, hereafter referred to as blacklip) in the Western Zone Abalone Fishery (WZAF) by Stobart *et al.* (2015a). Future reports for blacklip are scheduled via a stock assessment in 2017 and a status report in 2018.

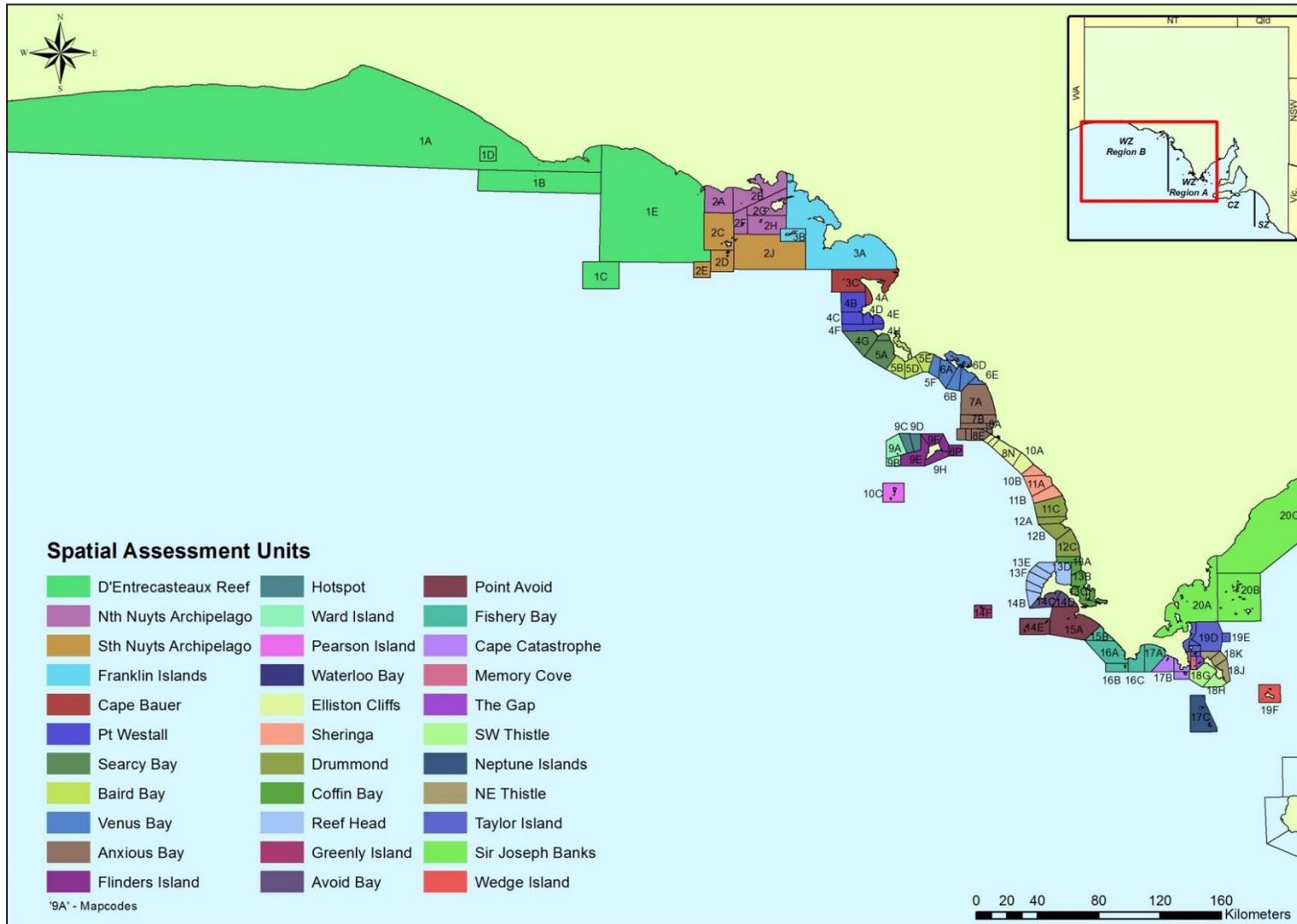
The harvest strategy for the South Australian Abalone Fishery (PIRSA 2012) is the current tool for setting TACCs in this fishery. It is designed to monitor abalone stocks using biological performance indicators (PIs; Stobart *et al.* 2015a) in spatial assessment units (SAUs) of high and medium importance, assess the risk of overfishing in each SAU in relation to their importance and use these to determine a stock status for the zone and adjust TACCs in response to changing abalone populations. However, this relatively new harvest strategy has several limitations including stock status classifications which are considered over-optimistic (e.g. Stobart *et al.* 2014) and the absence of an agreed limit reference point for determining whether the stocks are recruitment overfished that would link the harvest strategy to the National Fishery Status Reporting Framework (NFSRF; Flood *et al.* 2014). These issues are being addressed in the harvest strategy review currently underway. The stock status classification from the harvest strategy for the year ending 31 December 2015 was compared to the traditional, weight-of-evidence approach using the NFSRF.

Application of the harvest strategy was complicated because the legislated TACC and the catch limit agreed among the licence holders differ substantially. This is because the commercial sector unanimously agreed to voluntarily under-catch the TACC by 21% in 2015 in response to low and declining stock abundance that was poorly reflected by the harvest strategy. The reduction in catch influences scoring of a key performance indicator (PI) – 'proportion of TACC' – if the voluntary reduction is not accounted for. Consequently, in this status report, outcomes from application of the harvest strategy using both the legislated TACC and the voluntary catch limit are provided.

## 2. METHODS

Methods used to apply the harvest strategy and undertake the weight-of-evidence assessment are described in Stobart *et al.* (2012) and PIRSA (2012). Briefly, determination of the status of blacklip in the WZAF involves: (1) determination of the importance of spatial assessment units (single or multiple mapcodes intended to reflect abalone meta-populations; SAUs); (2) assigning each SAU (Figure 2.1) to one of five risk-of-overfishing, color-coded, categories where the risk-of-overfishing category for each SAU is derived from the scoring of six PIs in high importance SAUs or three PIs in medium importance SAUs, using prescribed reference points calculated from a 20-year reference period (1990-2009); and (3) the resulting risk-of-overfishing colour coded category for each SAU is linked to a score (range -2 to +2) and multiplied by the proportional contribution of that SAU to the combined catch, with the resulting values for all SAUs summed to determine the zonal stock status. The zonal status score ranges between -2 and +2 and is allocated to one of five categories: 1) depleted ( $\text{score} \leq -1.5$ ); 2) overfished ( $-1.5 < \text{score} \leq -0.5$ ); 3) sustainably fished ( $-0.5 < \text{score} \leq +0.5$ ); 4) under fished ( $+0.5 \leq \text{score} \leq +1.5$ ); and 5) lightly fished ( $\text{score} \geq +1.5$ ).

There was a key difference between application of the harvest strategy in this report compared with the previous assessment and status report. This is because two outcomes are provided based on differing values from the scoring of the “proportion of TACC” PI. Thus, application of the harvest strategy to determine the zonal stock status was carried out using both the legislated TACC (84.1 t) and voluntary (66.4 t) catch limit. This reflects the commercial sector unanimously agreeing to voluntarily under-catch the TACC by 21% in 2015.



**Figure 2.1.** Spatial assessment units (SAUs) and map codes of the Western Zone South Australian Abalone Fishery.

### **3. RESULTS**

#### **3.1. Temporal patterns in catch and CPUE**

##### **Western Zone**

Total catches were relatively stable from 1981 to 2009 (Figure 3.1). From 2009 to 2015, there has been a 36% reduction to the WZAF blacklip catch. This was due to the combined effects of reductions to the Region A TACC in 2010 (92.0 t) and 2013 (87.4 t) and Region B in 2011 (9.2 t) and 2012 (6.9 t), the removal of one licence from the WZ in 2014 and the 21% voluntary catch reduction of the TACC in 2015 (84.1 t). With the exception of 2006, catch per unit effort (CPUE) declined consistently between 2003 and 2014 (25%), to the lowest level since 1989. In 2015, CPUE remained low and 15% below the mean CPUE from 1990-2009 (CPUE<sub>90-09</sub>; the 20-year reference period from which the PIs are scored).

#### **3.2. Spatial assessment units**

The distribution of catch among SAUs remained similar between 2014 and 2015 (Figure 3.2), but there were decreases in the percentage of catch from the Point Westall, Cape Bauer, South Nuyts Archipelago and Franklin Islands SAUs. Catch increased in the Reef Head and North Nuyts Archipelago SAUs. In 2015, SAU importance remained the same as 2014, with the exception of Baird Bay that went from medium importance in 2014 to low importance in 2015. The recent decline in zonal CPUE was evident in the Drummond, Sheringa, Avoid Bay, and Flinders Island SAUs. Between 2014 and 2015, CPUE increased moderately in the high importance SAUs of Point Westall, Reef Head, Searcy Bay, Anxious Bay and Ward Island and the medium importance SAUs of Venus Bay and Point Avoid (Figures 3.3-3.11). However, with the exception of Point Westall, the 2015 CPUE estimates for these SAUs remained lower than CPUE<sub>90-09</sub>. In addition, with the exception of Point Westall and Anxious Bay, CPUE in all of these SAUs was also below the lower limit reference point.

#### **3.3. Risk of overfishing in SAUs and zonal stock status**

In 2015, application of the harvest strategy to determine stock status for blacklip in the WZ was based on 12 SAUs, providing a broad representation of fished stocks. There were eight high- (Drummond, Sheringa, Point Westall, Avoid Bay, Reef Head, Searcy Bay, Anxious Bay and Ward Island) and four medium-importance SAUs (Venus Bay, Point Avoid, Hotspot and Flinders Island; Tables 3.1 - 3.2; Figures 3.2 – 3.11) for blacklip. Remaining SAUs were of low importance (Tables 3.1 - 3.2; Figures 3.11 – 3.13). The risk-of-overfishing category could be determined for 10 (83%)

of the 12 high and medium importance SAUs (Tables 3.1 - 3.2). Limited data for estimating CPUE in two medium-importance SAUs in 2015 (Hotspot and Flinders Island) resulted in the blacklip stocks in these SAU being categorised as uncertain (Tables 3.1 - 3.2).

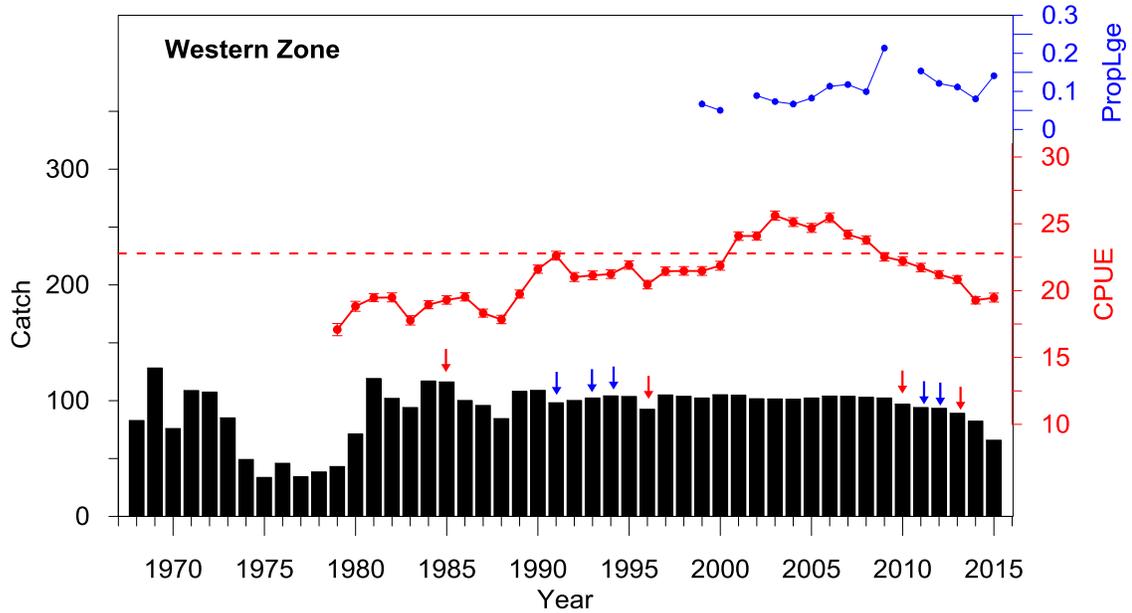
Use of the two alternate TACC values for scoring the “proportion of TACC” PI yielded several differing results, namely: (1) “proportion of TACC” PI scores for five of the twelve SAUs were lower when the legislated TACC was used (Table 3.1; largest differences were -2 for Anxious Bay and Avoid Bay); (2) the risk-of-overfishing category for one SAU – Reef Head – differed (yellow using the voluntary TACC, red using the legislated TACC); and (3) the catch-weighted, zonal stock status score was -0.53 (over-fished) and -0.42 (sustainably fished) when using the legislated (Table 3.1) and voluntary TACCs (Table 3.2), respectively.

**Table 3.1.** Outcome from application of the harvest strategy described in the Management Plan for the South Australian Abalone Fishery against the blacklip fishery in the Western Zone. Scoring of the “proportion of TACC” PI was against the legislated TACC. Grey shading identifies the performance indicators and their respective scores. ND indicates no data.

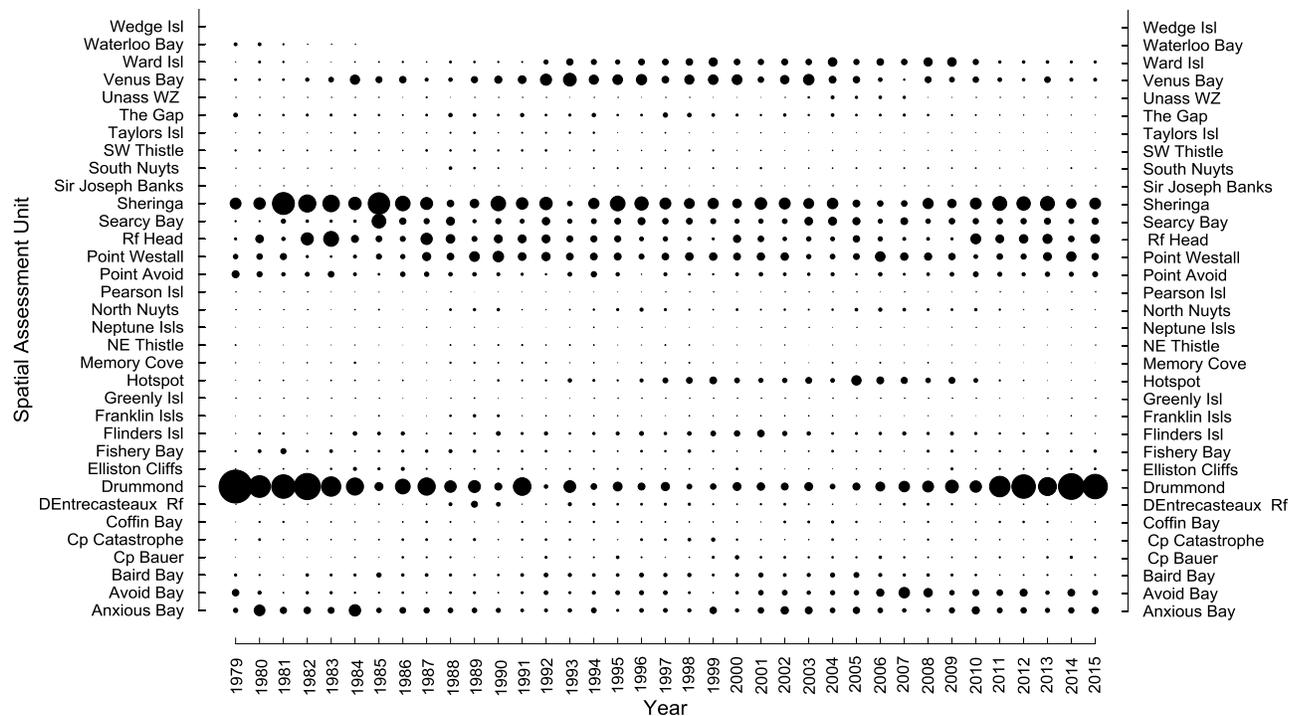
Spatial assessment unit	% contribution to mean total catch (WZ) over the last 10 years (06-15)	Importance	% contribution to catch from high & medium SAU in 2015	CPUE	Proportion TACC	PropLge	Pre-recruit Density	Legal Density	Mortality	Combined PI score	Risk of overfishing	Catch-weighted contribution to zonal score
Drummond	10.0	High	31.37	-7	8	2	-2	1	2	4	1	0.31
Sheringa	6.3	High	13.92	-8	-1	-1	0	-1	0	-11	-2	-0.28
Point_Westall	4.3	High	8.22	0	-2	1	-4	0	3	-2	0	0.00
Avoid_Bay	4.1	High	6.29	-4	0	-1	-2	-2	0	-9	-2	-0.13
Reef_Head	3.7	High	11.13	-8	1	1	ND	ND	ND	-6	-2	-0.22
Searcy_Bay	3.4	High	7.98	-6	0	1	ND	ND	ND	-5	-1	-0.08
Anxious_Bay	3.1	High	8.04	0	0	-1	ND	ND	ND	-1	0	0.00
Ward_Island	3.0	High	2.88	-8	-8	0	0	0	-2	-18	-2	-0.06
Venus_Bay	2.5	Medium	3.81	-7	-7	-1				-15	-2	-0.08
Point_Avoid	2.3	Medium	6.37	-7	6	3				2	0	0.00
Hotspot	2.0	Medium	-	ND	-8	-1				Uncertain	Not assigned	-
Flinders_Island	1.3	Medium	-	ND	-8	-1				Uncertain	Not assigned	-
Baird_Bay	1.1	Low		-	-	-	-	-	-	-	Not assessed	
North_Nuyts_Archipelago	1.0	Low		-	-	-	-	-	-	-	Not assessed	
Fishery_Bay	1.0	Low		-	-	-	-	-	-	-	Not assessed	
Cape_Bauer	0.9	Low		-	-	-	-	-	-	-	Not assessed	
The_Gap	0.7	Low		-	-	-	-	-	-	-	Not assessed	
Elliston_Cliffs	0.6	Low		-	-	-	-	-	-	-	Not assessed	
DEntrecasteaux_Reef	0.6	Low		-	-	-	-	-	-	-	Not assessed	
Coffin_Bay	0.6	Low		-	-	-	-	-	-	-	Not assessed	
Waterloo_Bay	0.5	Low		-	-	-	-	-	-	-	Not assessed	
Cape_Catastrophe	0.5	Low		-	-	-	-	-	-	-	Not assessed	
South_Nuyts_Archipelago	0.4	Low		-	-	-	-	-	-	-	Not assessed	
Unassigned_WZ_RG_A	0.4	Low		-	-	-	-	-	-	-	Not assessed	
Memory_Cove	0.2	Low		-	-	-	-	-	-	-	Not assessed	
SW_Thistle	0.2	Low		-	-	-	-	-	-	-	Not assessed	
Franklin_Islands	0.2	Low		-	-	-	-	-	-	-	Not assessed	
Taylor_Island	0.1	Low		-	-	-	-	-	-	-	Not assessed	
NE_Thistle	0.1	Low		-	-	-	-	-	-	-	Not assessed	
Neptune_Islands	0.1	Low		-	-	-	-	-	-	-	Not assessed	
Wedge_Island	0.0	Low		-	-	-	-	-	-	-	Not assessed	
Pearson_Island	0.0	Low		-	-	-	-	-	-	-	Not assessed	
Greenly_Island	0.0	Low		-	-	-	-	-	-	-	Not assessed	
Unassigned_WZ_RG_B	0.0	Low		-	-	-	-	-	-	-	Not assessed	
Sir_Joseph_Banks	0.0	Low		-	-	-	-	-	-	-	Not assessed	
<b>Sum</b>	<b>54.8</b>		<b>100.0</b>									
											<b>Zonal Stock Status</b>	<b>-0.53</b>

**Table 3.2.** Outcome from application of the harvest strategy described in the Management Plan for the South Australian Abalone Fishery against the blacklip fishery in the Western Zone. Scoring of the “proportion of TACC” PI was against the voluntary catch limit (i.e. 21% below the TACC). Grey shading identifies the performance indicators and their respective scores. ND indicates no data.

Spatial assessment unit	% contribution to mean total catch (WZ) over the last 10 years (06-15)	Importance	% contribution to catch from high & medium SAU in 2015	CPUE	Proportion TACC	PropLge	Pre-recruit Density	Legal Density	Mortality	Combined PI score	Risk of overfishing	Catch-weighted contribution to zonal score
Drummond	10.0	High	31.37	-7	8	2	-2	1	2	4	1	0.31
Sheringa	6.3	High	13.92	-8	0	-1	0	-1	0	-10	-2	-0.28
Point_Westall	4.3	High	8.22	0	-1	1	-4	0	3	-1	0	0.00
Avoid_Bay	4.1	High	6.29	-4	2	-1	-2	-2	0	-7	-2	-0.13
Reef_Head	3.7	High	11.13	-8	2	1	ND	ND	ND	-5	-1	-0.11
Searcy_Bay	3.4	High	7.98	-6	0	1	ND	ND	ND	-5	-1	-0.08
Anxious_Bay	3.1	High	8.04	0	2	-1	ND	ND	ND	1	0	0.00
Ward_Island	3.0	High	2.88	-8	-8	0	0	0	-2	-18	-2	-0.06
Venus_Bay	2.5	Medium	3.81	-7	-7	-1				-15	-2	-0.08
Point_Avoid	2.3	Medium	6.37	-7	6	3				2	0	0.00
Hotspot	2.0	Medium	-	ND	-8	-1				Uncertain	Not assigned	-
Flinders_Island	1.3	Medium	-	ND	-8	-1				Uncertain	Not assigned	-
Baird_Bay	1.1	Low		-	-	-	-	-	-	-	Not assessed	
North_Nuyts_Archipelago	1.0	Low		-	-	-	-	-	-	-	Not assessed	
Fishery_Bay	1.0	Low		-	-	-	-	-	-	-	Not assessed	
Cape_Bauer	0.9	Low		-	-	-	-	-	-	-	Not assessed	
The_Gap	0.7	Low		-	-	-	-	-	-	-	Not assessed	
Elliston_Cliffs	0.6	Low		-	-	-	-	-	-	-	Not assessed	
DEntrecasteaux_Reef	0.6	Low		-	-	-	-	-	-	-	Not assessed	
Coffin_Bay	0.6	Low		-	-	-	-	-	-	-	Not assessed	
Waterloo_Bay	0.5	Low		-	-	-	-	-	-	-	Not assessed	
Cape_Catastrophe	0.5	Low		-	-	-	-	-	-	-	Not assessed	
South_Nuyts_Archipelago	0.4	Low		-	-	-	-	-	-	-	Not assessed	
Unassigned_WZ_RG_A	0.4	Low		-	-	-	-	-	-	-	Not assessed	
Memory_Cove	0.2	Low		-	-	-	-	-	-	-	Not assessed	
SW_Thistle	0.2	Low		-	-	-	-	-	-	-	Not assessed	
Franklin_Islands	0.2	Low		-	-	-	-	-	-	-	Not assessed	
Taylor_Island	0.1	Low		-	-	-	-	-	-	-	Not assessed	
NE_Thistle	0.1	Low		-	-	-	-	-	-	-	Not assessed	
Neptune_Islands	0.1	Low		-	-	-	-	-	-	-	Not assessed	
Wedge_Island	0.0	Low		-	-	-	-	-	-	-	Not assessed	
Pearson_Island	0.0	Low		-	-	-	-	-	-	-	Not assessed	
Greenly_Island	0.0	Low		-	-	-	-	-	-	-	Not assessed	
Unassigned_WZ_RG_B	0.0	Low		-	-	-	-	-	-	-	Not assessed	
Sir_Joseph_Banks	0.0	Low		-	-	-	-	-	-	-	Not assessed	
<b>Sum</b>	<b>54.8</b>		<b>100.0</b>									
											<b>Zonal Stock Status</b>	<b>-0.42</b>

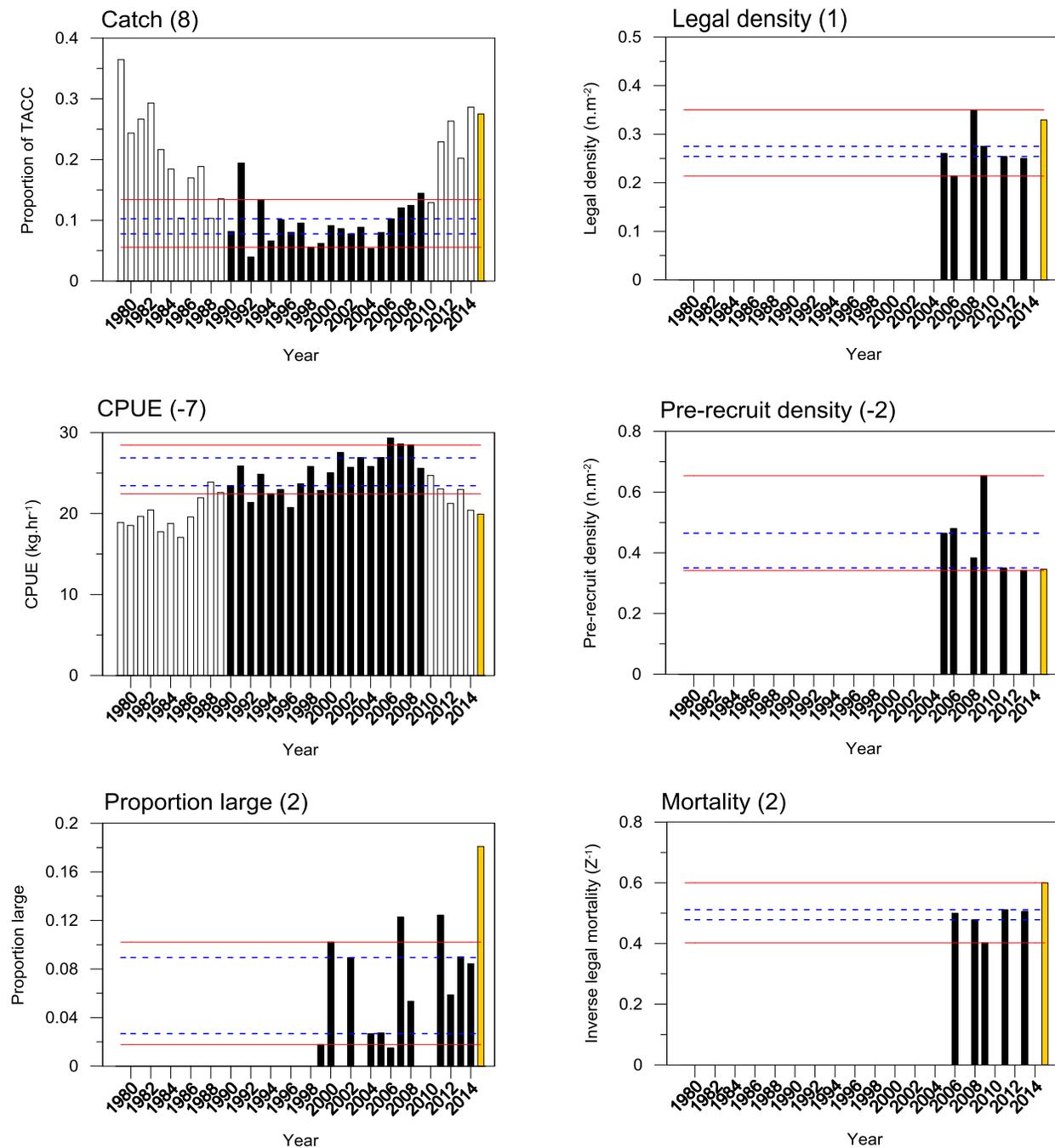


**Figure 3.1.** Catch (t, meat weight; black bars) of blacklip from the Western Zone from 1968 to 2015. Mean CPUE ± se (kg.hr<sup>-1</sup>) and PropLge are shown in red and blue lines, respectively. Red dashed line is CPUE<sub>90-09</sub>. Red arrows indicate implementation (1985) and amendment (1996, 2010 and 2013) of the TACC in Region A, blue arrows indicate implementation (1991) and amendment (1993, 1994, 2011 and 2012) of the TACC in Region B.



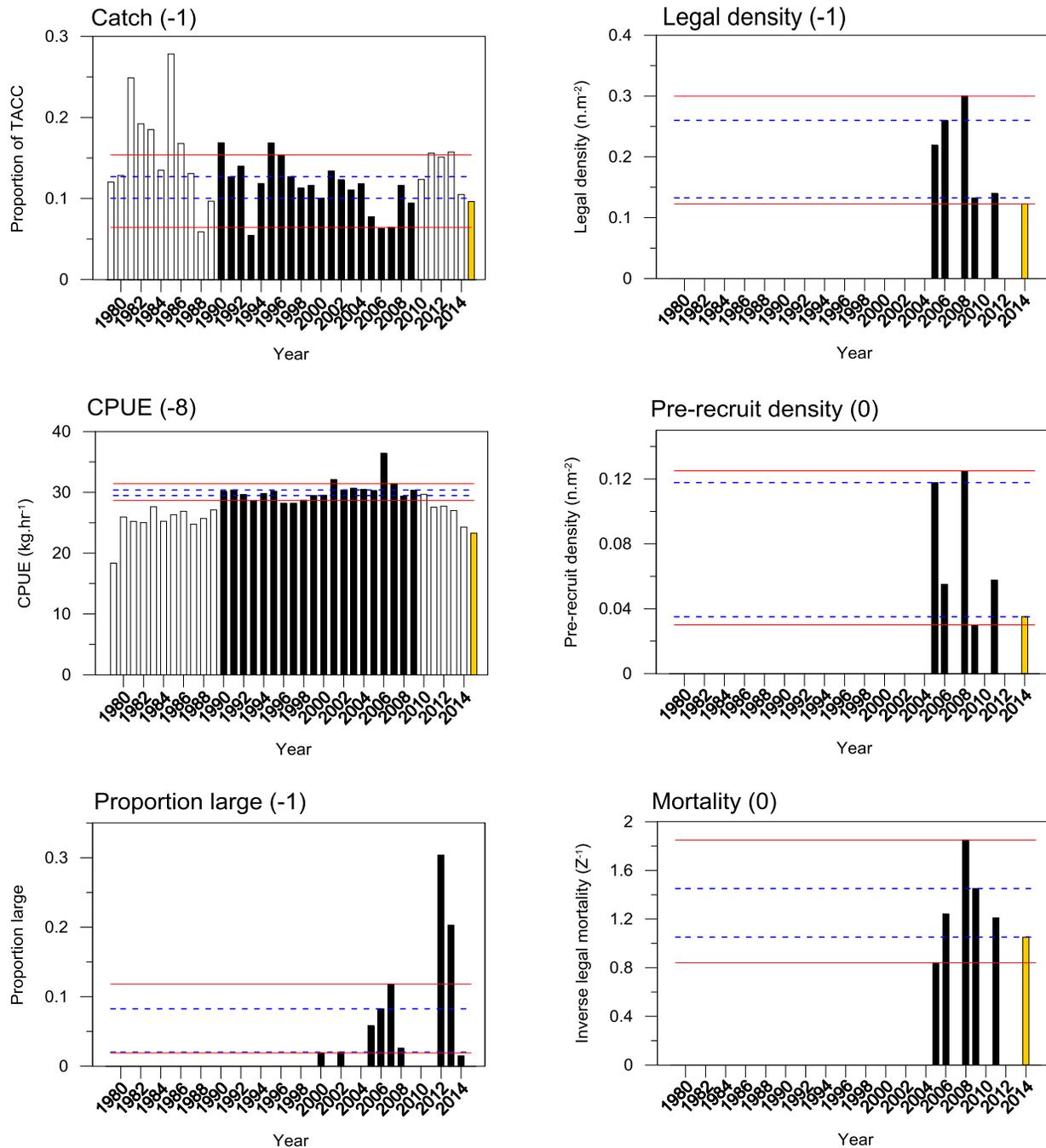
**Figure 3.2.** Bubble plot showing the spatial distribution of the blacklip catch (% of total catch) among the SAUs in the WZ from 1979 to 2015. Note abbreviations for Cape (Cp), island (Isl), reef (Rf) north east (NE), south west (SW), unassigned (Unass).

Drummond



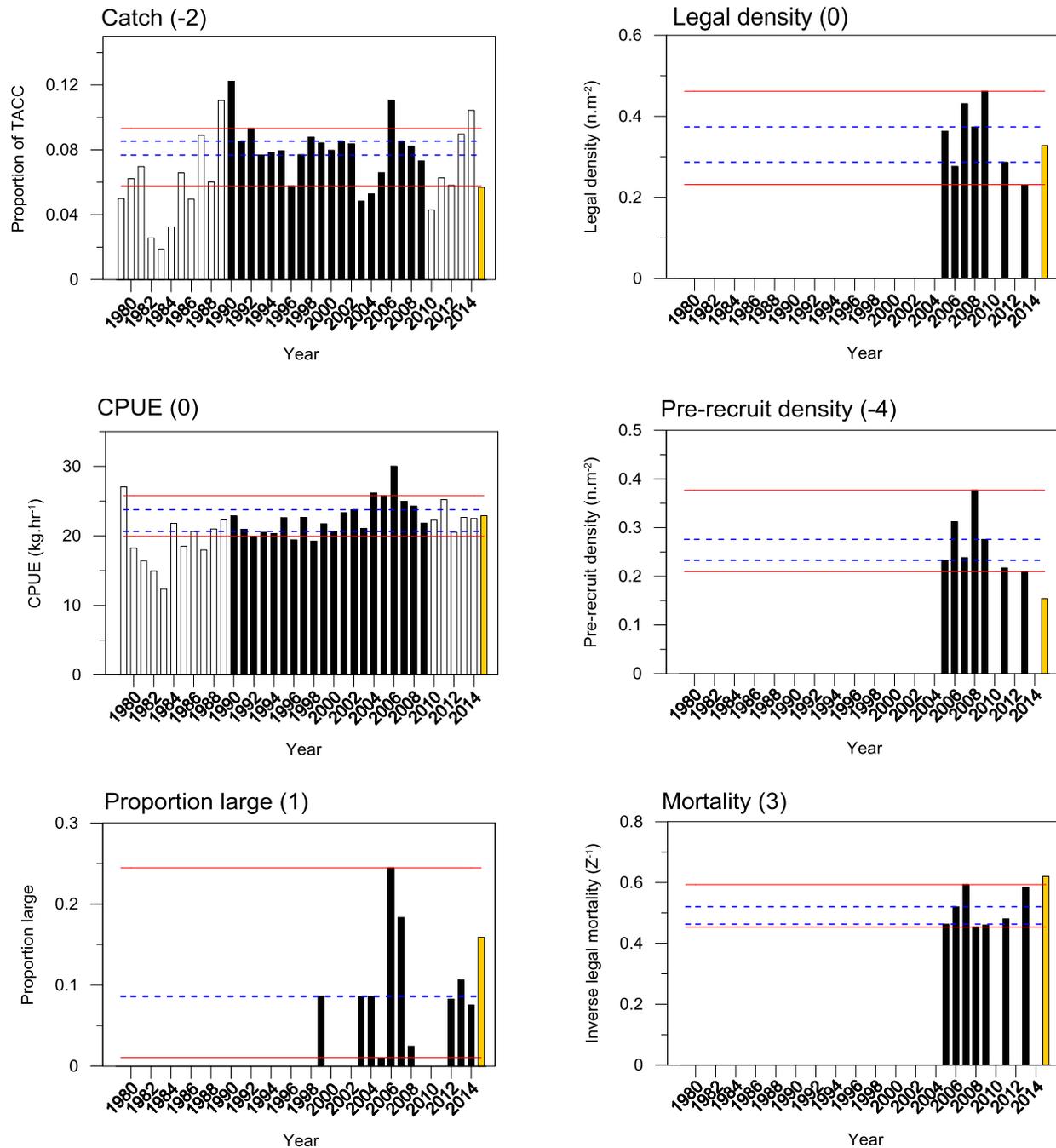
**Figure 3.3.** Drummond (high importance). Performance indicators catch (Proportion of legislated TACC), CPUE (kg.hr<sup>-1</sup>), PropLge, legal density (n.m<sup>-2</sup>), pre-recruit density (n.m<sup>-2</sup>), mortality (Z) and scores from the harvest strategy in brackets. Red and blue lines are upper and lower limit and target reference points, respectively. Black bars describe the data and time over which the reference points were calculated, open bars describe the measures of the PI outside the reference period and yellow bars the data and year subject to assessment for each PI, i.e. the score-year.

Sheringa



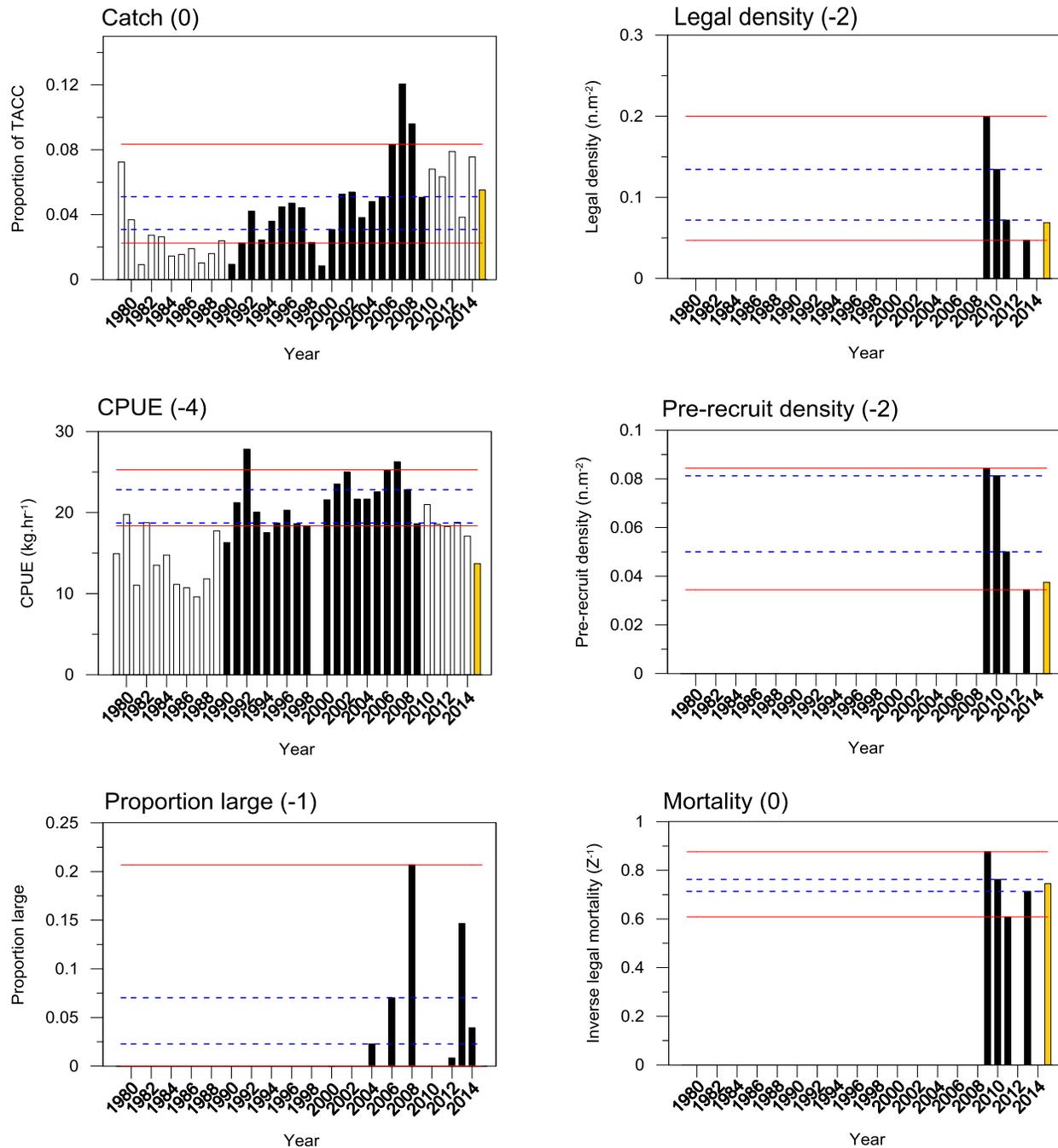
**Figure 3.4.** Sheringa (high importance). Performance indicators catch (Proportion of legislated TACC), CPUE (kg.hr<sup>-1</sup>), PropLge, legal density (n.m<sup>-2</sup>), pre-recruit density (n.m<sup>-2</sup>), mortality (Z) and scores from the harvest strategy in brackets. Red and blue lines are upper and lower limit and target reference points, respectively. Black bars describe the data and time over which the reference points were calculated, open bars describe the measures of the PI outside the reference period and yellow bars the data and year subject to assessment for each PI, i.e. the score-year.

Point Westall



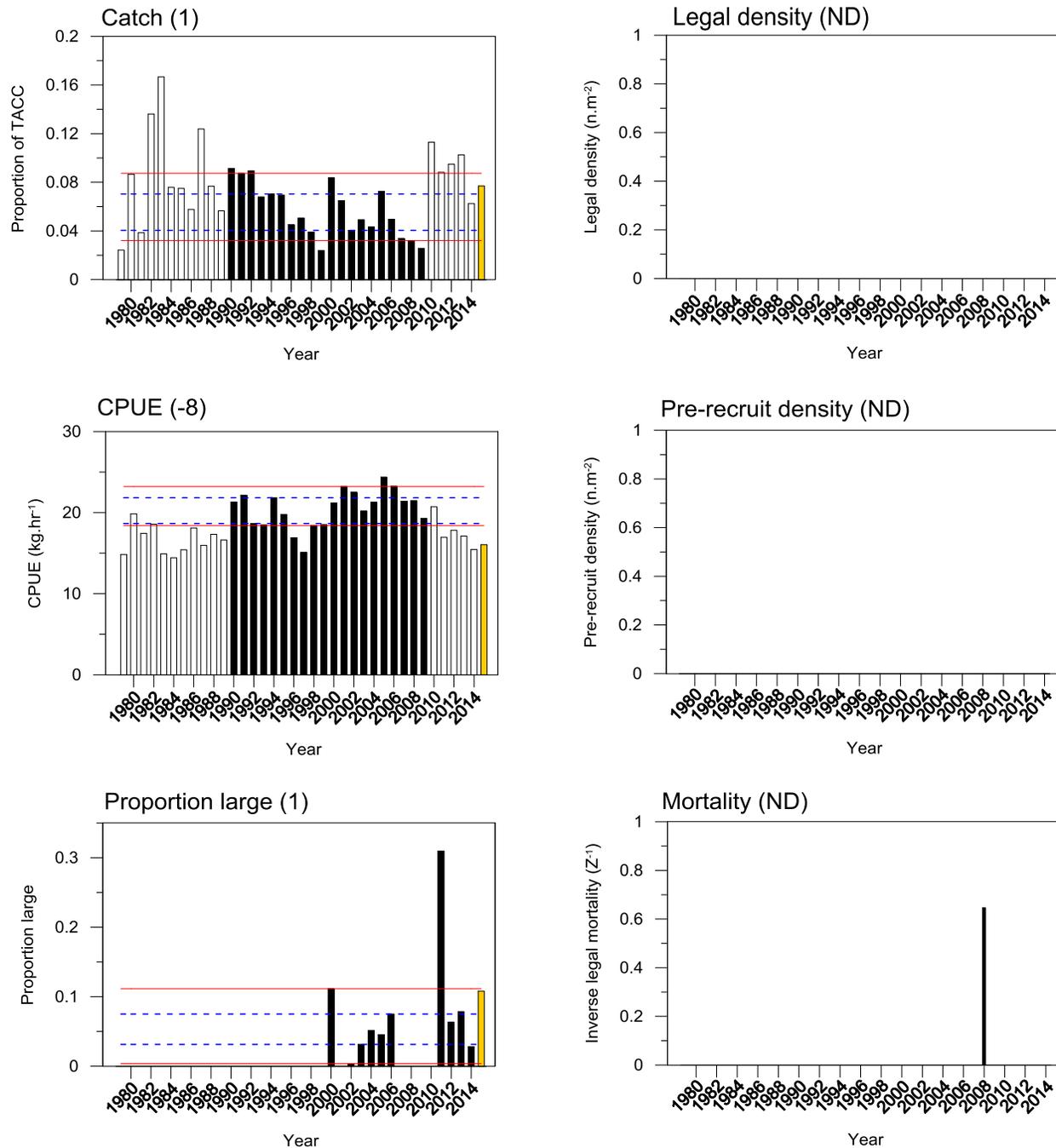
**Figure 3.5.** Point Westall (high importance). Performance indicators catch (Proportion of legislated TACC), CPUE (kg.hr<sup>-1</sup>), PropLge, legal density (n.m<sup>-2</sup>), pre-recruit density (n.m<sup>-2</sup>), mortality (Z) and scores from the harvest strategy in brackets. Red and blue lines are upper and lower limit and target reference points, respectively. Black bars describe the data and time over which the reference points were calculated, open bars describe the measures of the PI outside the reference period and yellow bars the data and year subject to assessment for each PI, i.e. the score-year.

Avoid Bay



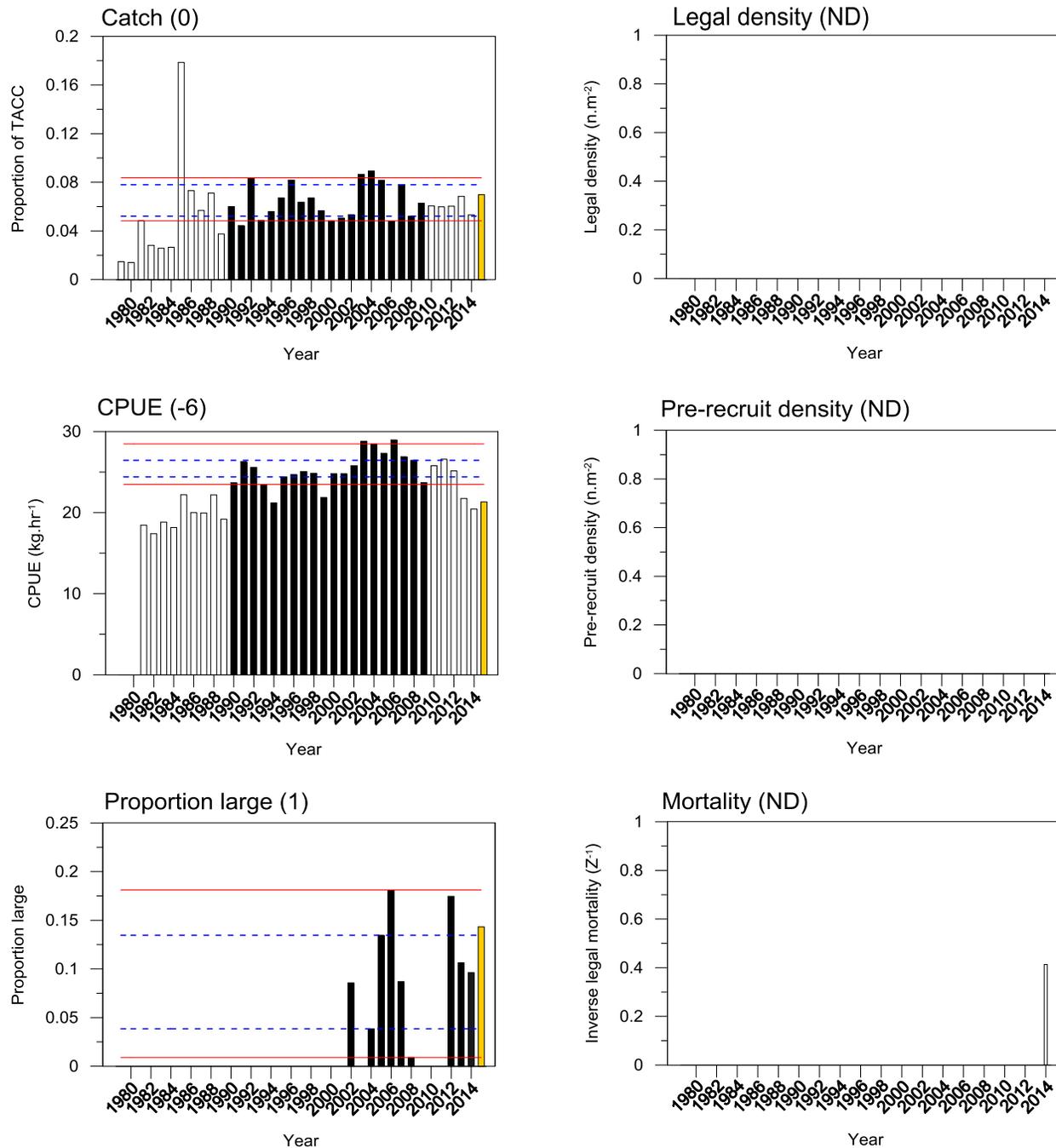
**Figure 3.6.** Avoid Bay (high importance). Performance indicators catch (Proportion of legislated TACC), CPUE (kg.hr<sup>-1</sup>), PropLge, legal density (n.m<sup>-2</sup>), pre-recruit density (n.m<sup>-2</sup>), mortality (Z) and scores from the harvest strategy in brackets. Red and blue lines are upper and lower limit and target reference points, respectively. Black bars describe the data and time over which the reference points were calculated, open bars describe the measures of the PI outside the reference period and yellow bars the data and year subject to assessment for each PI, i.e. the score-year.

Reef Head



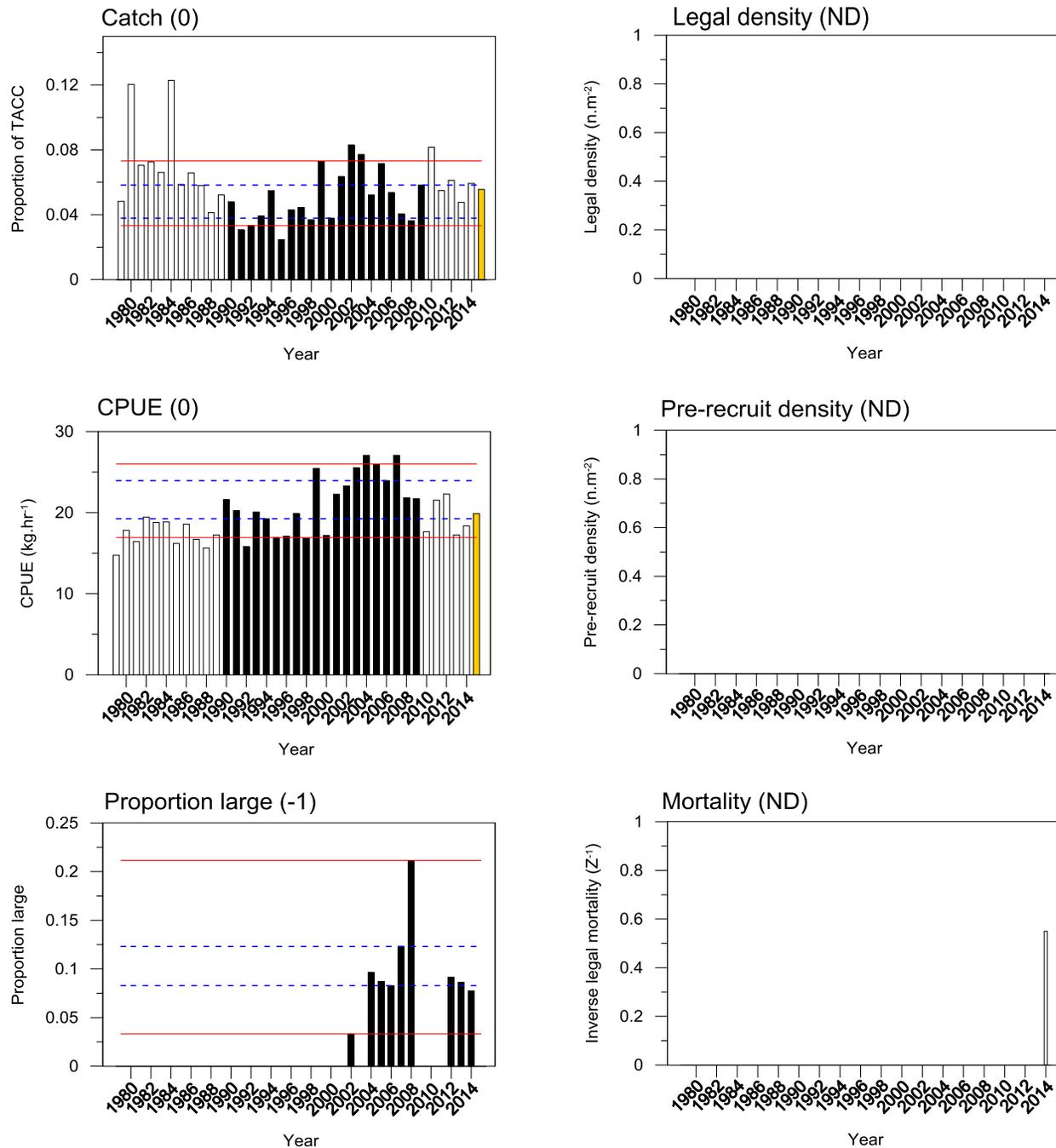
**Figure 3.7.** Reef Head (high importance). Performance indicators catch (Proportion of legislated TACC), CPUE (kg.hr<sup>-1</sup>), PropLge, legal density (n.m<sup>-2</sup>), pre-recruit density (n.m<sup>-2</sup>), mortality (Z) and scores from the harvest strategy in brackets. Red and blue lines are upper and lower limit and target reference points, respectively. Black bars describe the data and time over which the reference points were calculated, open bars describe the measures of the PI outside the reference period and yellow bars the data and year subject to assessment for each PI, i.e. the score-year.

Searcy Bay



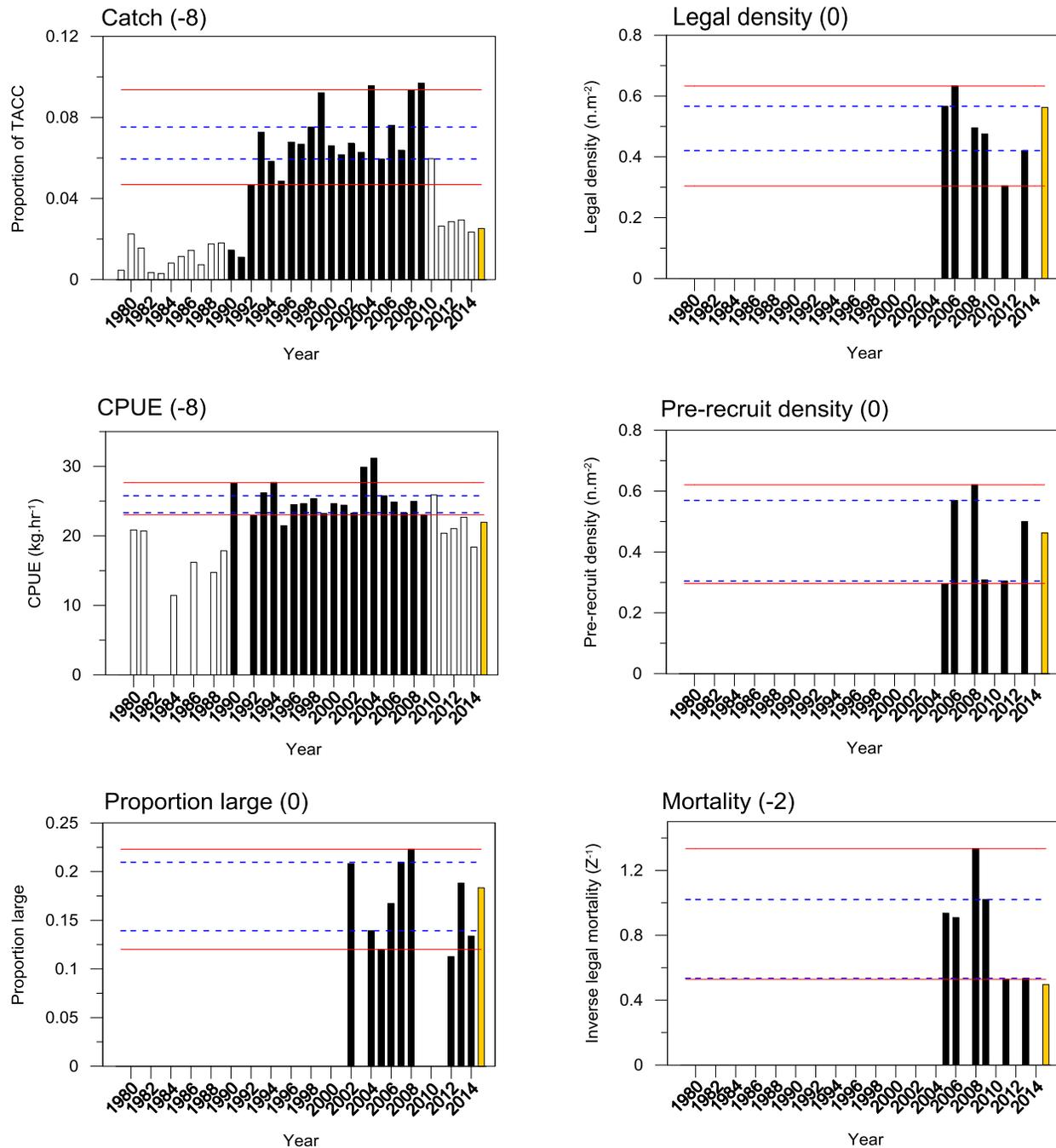
**Figure 3.8.** Searcy Bay (high importance). Performance indicators catch (Proportion of legislated TACC), CPUE (kg.hr<sup>-1</sup>), PropLge, legal density (n.m<sup>-2</sup>), pre-recruit density (n.m<sup>-2</sup>), mortality (Z) and scores from the harvest strategy in brackets. Red and blue lines are upper and lower limit and target reference points, respectively. Black bars describe the data and time over which the reference points were calculated, open bars describe the measures of the PI outside the reference period and yellow bars the data and year subject to assessment for each PI, i.e. the score-year.

Anxious Bay

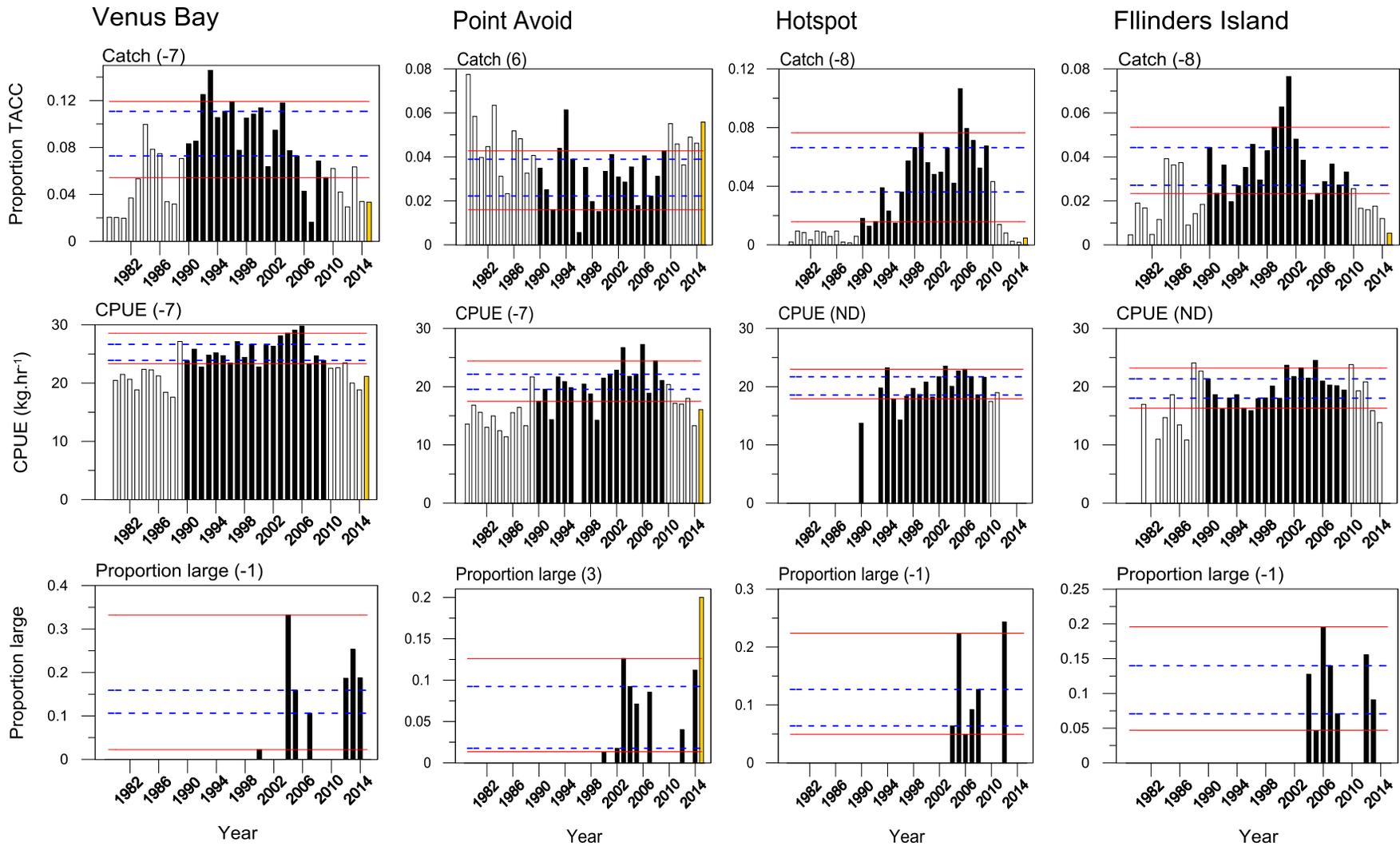


**Figure 3.9.** Anxious Bay (high importance). Performance indicators catch (Proportion of legislated TACC), CPUE (kg.hr<sup>-1</sup>), PropLge, legal density (n.m<sup>-2</sup>), pre-recruit density (n.m<sup>-2</sup>), mortality (Z) and scores from the harvest strategy in brackets. Red and blue lines are upper and lower limit and target reference points, respectively. Black bars describe the data and time over which the reference points were calculated, open bars describe the measures of the PI outside the reference period and yellow bars the data and year subject to assessment for each PI, i.e. the score-year.

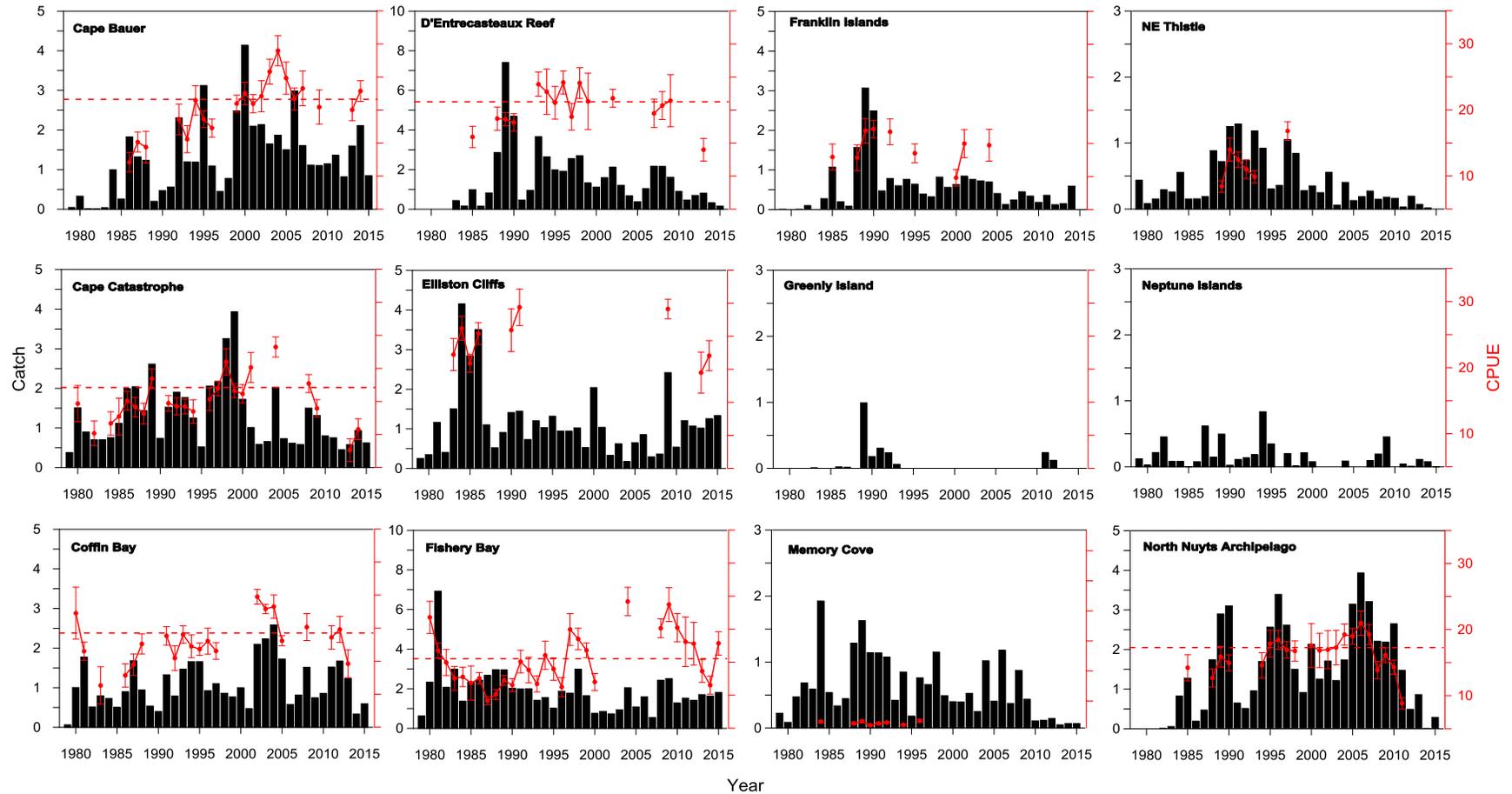
Ward Island



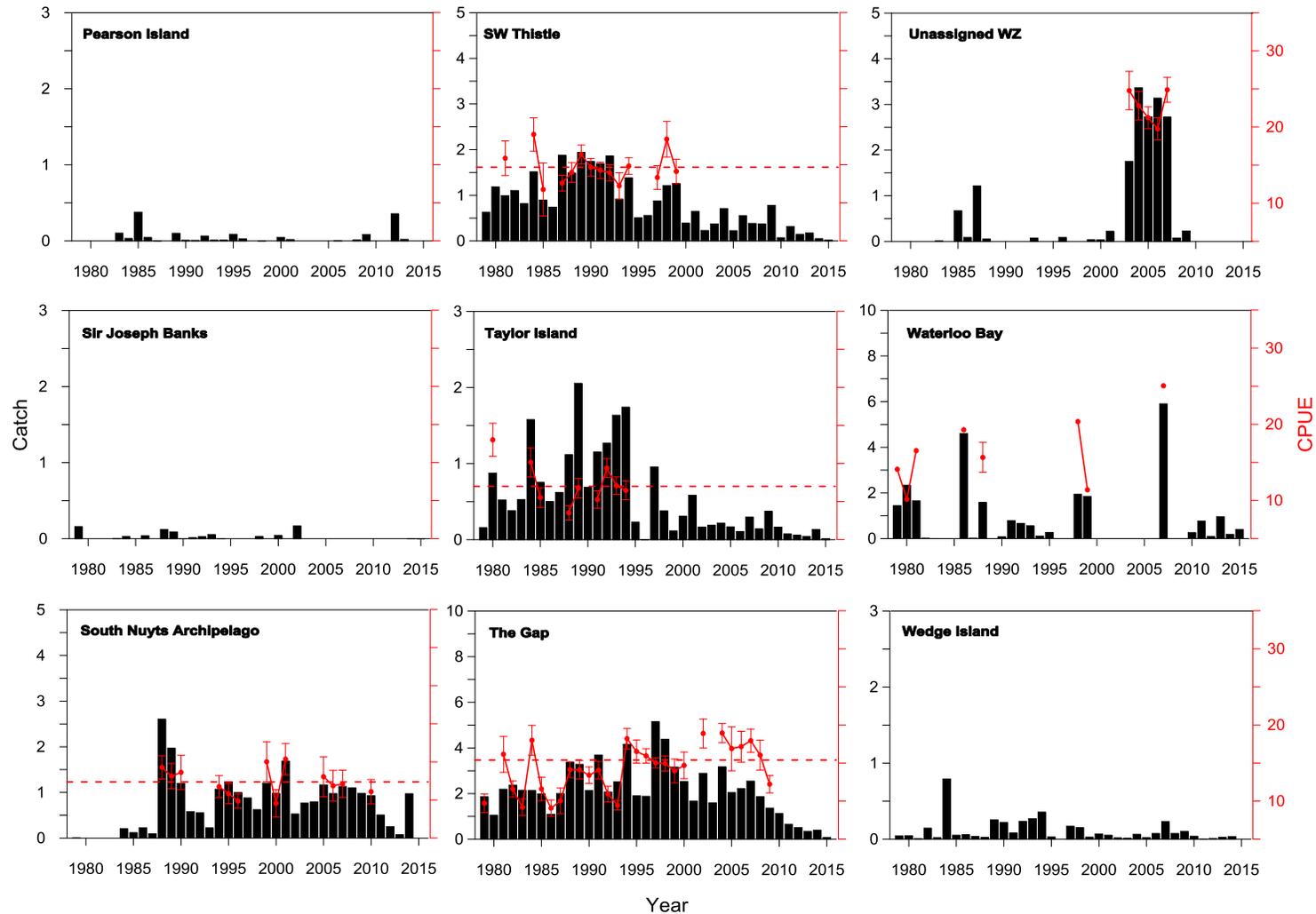
**Figure 3.10.** Ward Island (high importance). Performance indicators catch (Proportion of legislated TACC), CPUE (kg.hr<sup>-1</sup>), PropLge, legal density (n.m<sup>-2</sup>), pre-recruit density (n.m<sup>-2</sup>), mortality (Z) and scores from the harvest strategy in brackets. Red and blue lines are upper and lower limit and target reference points, respectively. Black bars describe the data and time over which the reference points were calculated, open bars describe the measures of the PI outside the reference period and yellow bars the data and year subject to assessment for each PI, i.e. the score-year.



**Figure 3.11.** Venus Bay, Point Avoid, Hotspot and Flinders Island SAUs (medium importance). Performance indicators catch (Proportion of legislated TACC), CPUE (kg.hr<sup>-1</sup>), PropLge and scores from the harvest strategy in brackets. Red and blue lines are upper and lower limit and target reference points, respectively. Black bars describe the data and time over which the reference points were calculated, open bars describe the measures of the PI outside the reference period and orange bars the data and year subject to assessment for each PI, *i.e.* the score-year.



**Figure 3.13.** Catch (t, meat weight; black bars) and CPUE  $\pm$  se (kg.hr<sup>-1</sup>) of blacklip from low importance SAUs Cape Bauer, Cape Catastrophe, Coffin Bay, D'Entrecasteaux Reef, Elliston Cliffs, Fishery Bay, Franklin Islands, Greenly Island, Memory Cove, NE Thistle, Neptune Islands and North Nuyts Archipelago from 1979 to 2015. CPUE is shown in red. Red dashed lines show CPUE<sub>90-09</sub> where applicable. Note catch scales vary among graphs.



**Figure 3.14.** Catch (t, meat weight; black bars) and CPUE  $\pm$  se (kg.hr<sup>-1</sup>) of blacklip from low importance SAUs Pearson Island, Sir Joseph Banks, South Nuyts Archipelago, SW Thistle, Taylor Island, The Gap, Unassigned WZ, Waterloo Bay and Wedge Island from 1979 to 2015. CPUE is shown in red. Red dashed lines show CPUE<sub>90-09</sub> where applicable. Note catch scales vary among graphs.

## 4. SUMMARY

The zonal stock status score from the harvest strategy based on the legislated TACC was -0.53, classifying the fishery as 'over fished'. This contrasts with that obtained using the voluntary TACC (-0.42, 'sustainably fished'). The difference was due to the PI 'proportion of TACC' generally scoring lower when the agreed voluntary reduction in catch was not taken into account.

Much of the data available for the fishery suggest blacklip stocks are at their weakest position in over 25 years. This is because: (1) there has been a 18% decrease in TACC and a 36% decrease in catch (includes agreed voluntary reduction) between 2009 and 2015; (2) although zonal CPUE was unchanged between 2014 and 2015, this metric has decreased 25% since 2003, and the 2014 and 2015 estimates were the lowest since 1989; (3) in 2015, available CPUE estimates were below the lower limit reference points (LLRP), used in the harvest strategy to score this PI, at all high and medium SAUs with the exception of Point Westall and Anxious Bay. In many cases, CPUE was below the LLRP for several years (e.g. Drummond, Ward Island); (4) CPUE in 2015 could not be determined for Hotspot and Flinders Island – both medium-importance SAUs for blacklip – due to very low catches and limited data; (5) between 2014 and 2015 CPUE continued to decline in Avoid Bay, and there was no evidence of significant recovery at any of the remaining seven high-importance SAUs; (6) 60% of the high and medium-importance SAUs were assigned either a 'red' or 'yellow' risk-of-overfishing category when using either the legislated TACC or voluntary catch limit; and (5) Ward Island, Flinders Island and Hotspot lack evidence of stock recovery despite minimal recent catches. We note that the declines in CPUE across the WZ are likely underestimating the reductions in harvestable biomass (Stobart *et al.* 2015a). There is no evidence that catch can be redistributed to facilitate recovery in those SAUs where stock abundance reductions have been the greatest.

Collectively, this evidence demonstrates that fishing pressure is too high and moving the stock in the direction of becoming recruitment overfished. Consequently, the WZ Blacklip Abalone Fishery is classified as 'transitional depleting' under the NFSRF. This was the same classification given to these stocks in 2014, and reflects the recent widespread deterioration in stock abundance that remains low in 2015.

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