

## Status of the Southern Zone Blacklip (*Haliotis rubra*) and Greenlip (*H. laevigata*) Abalone Fisheries in 2014/15



**G. Ferguson, S. Mayfield, J. Carroll and A. Hogg**

**SARDI Publication No. F2014/000359-2  
SARDI Research Report Series No. 902**

SARDI Aquatics Sciences  
PO Box 120 Henley Beach SA 5022

**June 2016**

Report for PIRSA Fisheries and Aquaculture

**Status of the Southern Zone Blacklip  
(*Haliotis rubra*) and Greenlip (*H. laevigata*) Abalone  
Fisheries in 2014/15**

**Report for PIRSA Fisheries and Aquaculture**

**G. Ferguson, S. Mayfield, J. Carroll and A. Hogg**

**SARDI Publication No. F2014/000359-2  
SARDI Research Report Series No. 902**

**June 2016**

This publication may be cited as:

Ferguson, G., Mayfield, S., Carroll, J. and Hogg, A. (2016). Status of the Southern Zone Blacklip (*Haliotis rubra*) and Greenlip (*H. laevigata*) Abalone Fisheries in 2014/15. Report for PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No. F2014/000359-2. SARDI Research Report Series No. 902. 15pp.

### **South Australian Research and Development Institute**

SARDI Aquatic Sciences

2 Hamra Avenue

West Beach SA 5024

Telephone: (08) 8207 5400

Facsimile: (08) 8207 5406

<http://www.pir.sa.gov.au/research>

### **DISCLAIMER**

The authors warrant that they have taken all reasonable care in producing this report. The report has been through the SARDI internal review process, and has been formally approved for release by the Research Chief, Aquatic Sciences. Although all reasonable efforts have been made to ensure quality, SARDI does not warrant that the information in this report is free from errors or omissions. SARDI does not accept any liability for the contents of this report or for any consequences arising from its use or any reliance placed upon it. The SARDI Report Series is an Administrative Report Series which has not been reviewed outside the department and is not considered peer-reviewed literature. Material presented in these Administrative Reports may later be published in formal peer-reviewed scientific literature.

### **© 2016 SARDI**

This work is copyright. Apart from any use as permitted under the *Copyright Act* 1968 (Cth), no part may be reproduced by any process, electronic or otherwise, without the specific written permission of the copyright owner. Neither may information be stored electronically in any form whatsoever without such permission.

Printed in Adelaide: June 2016


SARDI Publication No. F2014/000359-2

SARDI Research Report Series No. 902

Author(s): G. Ferguson, S. Mayfield, J. Carroll and A. Hogg

Reviewer(s): G. Grammer, C. Beckmann (SARDI) and B. McGrath-Steer (PIRSA)

Approved by: J. Tanner  
Science Leader – Marine Ecosystems

Signed: 

Date: 29 June 2016

Distribution: PIRSA Fisheries and Aquaculture, SAASC Library, SARDI Waite Executive Library, Parliamentary Library, State Library and National Library

Circulation: Public Domain

## TABLE OF CONTENTS

ACKNOWLEDGEMENTS .....	VI
EXECUTIVE SUMMARY .....	1
1. INTRODUCTION .....	2
2. METHODS.....	2
3. RESULTS .....	3
4. SUMMARY .....	10
5. REFERENCES .....	11
6. APPENDIX 1 - HARVEST STRATEGY PLOTS AND PI SCORES.....	12

## LIST OF FIGURES

<b>Figure 3-1.</b> Total reported catch (black bars, t), effort (red line, hr) and CPUE $\pm$ SE (blue line, kg.hr <sup>-1</sup> ) on blacklip in the SZ from 1968/69 (denoted 1968) to 2014/05.....	5
<b>Figure 3-2.</b> Proportional contribution by SAU to total blacklip catches in the SZ from 1979/80 (denoted 1979) to 2014/15. ....	5
<b>Figure 3-3.</b> Reported catch (black bars, t) and CPUE $\pm$ SE (blue lines, kg.hr <sup>-1</sup> ) for high importance SAUs in 2014/15: Middle Point, Gerloffs Bay and Number 2 Rocks, from 1979/80 (denoted 1979) to 2014/15. ....	6
<b>Figure 3-4.</b> Reported catch (black bars, t) and CPUE $\pm$ SE (blue lines, kg.hr <sup>-1</sup> ) for medium importance SAUs in 2014/15: Rivoli Bay, Admella, Carpenters Rocks, and Port MacDonnell, from 1979/80 (denoted 1979) to 2014/15. ....	7
<b>Figure 3-5.</b> Reported catch (black bars, t) and CPUE $\pm$ SE (blue line, kg.hr <sup>-1</sup> ) on blacklip for low importance SAUs: Beachport, South End, Nora Creina, Blackfellowes Caves, Cape Jaffa, and East Port MacDonnell, from 1979/80 (denoted 1979) to 2014/15. ....	8

## LIST OF TABLES

<b>Table 3-1.</b> Outcome from application of the harvest strategy described in the Management Plan for the South Australian Commercial Abalone Fishery against the blacklip fishery in the SZ. Grey shading identifies the performance indicators and their respective scores. Colours identify risk of overfishing, ordered from highest to lowest risk: red (-2), yellow (-1), green (0), blue (+1), and to light blue (lowest).....	9
---	---

## **ACKNOWLEDGEMENTS**

Funds for this research were provided by PIRSA Fisheries and Aquaculture (PIRSA), obtained through licence fees. The South Australian Research and Development Institute (SARDI Aquatic Sciences) provided substantial in-kind support. We thank the Southern Zone licence holders and fishers for providing abalone shells that were used for length measurements and for their contribution to our understanding of the information presented in this report. We are grateful to Brian Foureur, Peter Hawthorne, Kylie Howard and Damian Matthews, and other SARDI divers, past and present, for assistance with diving and the collection and management of data. We thank Angelo Tsolos and Millie Boyle for statistical support. This report was formally reviewed by Dr Belinda McGrath-Steer (PIRSA – Fisheries and Aquaculture), Drs Gretchen Grammer and Crystal Beckman (SARDI Aquatic Sciences) and Professor Gavin Begg (Research Chief, SARDI Aquatic Sciences). The report was formally approved for release by Associate Professor Jason Tanner, (Science Leader, Marine Ecosystems, SARDI Aquatic Sciences).

## EXECUTIVE SUMMARY

This report provides an assessment of the current stock status of *Haliotis rubra* (hereafter referred to as blacklip) and *H. laevigata* (hereafter referred to as greenlip) in the Southern Zone (SZ) of the South Australian Abalone Fishery.

The assessment is required under the Management Plan for the South Australian Commercial Abalone Fishery which specifies the need for annual application of the harvest strategy to determine stock status and review the Total Allowable Commercial Catch (TACC). The 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).

The catch-weighted, zonal stock status score for blacklip from the harvest strategy was -0.40, defining this species in the SZ as 'sustainably fished' in 2014/15. This zonal stock status score was substantially lower than that in 2013/14 (-0.12). The 'sustainably fished' outcome from the harvest strategy in 2013/14 and 2014/15 differed from that obtained using the traditional, weight-of-evidence analysis.

The data contributing to the weight-of-evidence analysis included: (1) total annual blacklip catches below the TACC in 2013/14 (17%) and 2014/15 (11%); (2) a 16% decline in the mean annual CPUE on blacklip across the SZ between 2010/11 and 2014/15. The CPUE in 2010/11 was the maximum recorded. The CPUE in 2014/15 was the lowest since 2001/02 and 4% below the mean CPUE from the most recent 20-year period; (3) low and/or declining mean annual CPUE in the three high importance spatial assessment units (SAUs) of Middle Point, Gerloffs Bay and Number 2 Rocks; (4) recent redistribution of catches among high importance SAUs with declining contributions from Gerloffs Bay and Number 2 Rocks and increasing contributions from Middle Point; and (5) low proportions of large blacklip in the commercial catch.

Collectively, this evidence suggests that fishing pressure is too high and moving the stock in the direction of becoming recruitment overfished. Consequently, the SZ blacklip fishery is classified as '**transitional depleting**' under the NFSRF. This was consistent with the weight-of-evidence based classification for this stock in 2013/14 (Mayfield *et al.* 2015; Flood *et al.* 2014).

The low catch and limited data on greenlip in the SZ prevents determination of stock status. Consequently, the greenlip stock status in this zone is classified as '**undefined**'. This was the same classification as in previous years.

## 1. INTRODUCTION

The Management Plan for the South Australian Commercial Abalone Fishery (PIRSA 2012) specifies annual application of the harvest strategy to determine stock status and review the total allowable commercial catch (TACC). The stock status of blacklip abalone (hereafter termed 'blacklip') and greenlip abalone (hereafter termed 'greenlip') in the Southern Zone Abalone Fishery (SZ) in 2013/14 was provided in the most recent stock assessment report for the fishery (Mayfield *et al.* 2015) and will be updated in future, scheduled, stock assessment (2017) and status (2018) reports. These reports form part of the South Australian Research and Development Institute's (SARDI Aquatic Sciences) ongoing assessment program for this fishery. The stock status outcome from the harvest strategy for blacklip was compared to the traditional, weight-of-evidence analysis using the National Fishery Status Reporting Framework (NFSRF, Flood *et al.* 2014). For greenlip, which comprises less than 5% of the catch and is generally not targeted there are insufficient data for either application of the harvest strategy or a weight-of-evidence assessment of stock status. Consequently, as in previous years, there was no analysis of greenlip abalone data in this report.

## 2. METHODS

Methods used to apply the harvest strategy and undertake the weight of evidence assessment are described in PIRSA (2012) and Mayfield *et al.* (2014, 2015). Briefly, the status of blacklip in the SZ is derived from a combination of the (1) risk-of-overfishing category for each spatial assessment unit (SAU) and (2) importance of that SAU, by catch, to the zone. The risk-of-overfishing category for each SAU is derived from the scoring of three (high importance SAUs) and four (medium importance SAUs) performance indicators against reference points from the 20-year reference period (1990/91–2009/10). To determine the zonal stock status, the risk-of-overfishing score (-2 to +2) for each SAU is multiplied by its proportional contribution to the combined catch, with these values summed. Total zone status scores range between -2 and +2 and are allocated into one of five categories. These are defined as depleted (score  $\leq -1.5$ ), overfished ( $>-1.5$  score  $\leq -0.5$ ), sustainably fished ( $>-0.5$  > score  $\leq 0.5$ ), under fished ( $>0.5$  score  $\leq 1.5$ ) and lightly fished (score  $\geq 1.5$ ).

Similarly to Mayfield *et al.* (2015), recent apparent changes in effective effort have not been quantified or accounted for in this assessment. Consequently, the rate and extent of the decline in abundance indicated by the reducing CPUEs (SZ and SAUs) is likely underestimated.



### 3. RESULTS

#### Blacklip

##### *Spatial and temporal patterns in catch, effort and CPUE*

Annual blacklip catches from the SZ were stable from 1994/95 to 2012/13 ( $145 \pm 0.54 \text{ t.y}^{-1}$  [mean  $\pm$  SE]; range 142–151 t) and were approximately 15% greater than those during the previous 25 years comprising the early, formative years of the fishery (Figure 3-1). The catch of 149.4 t in 2012/13 was among the highest on record, whilst effort was relatively low. In 2013/14, catch declined to 126 t and in 2014/15 it was 135 t, from a TACC of 151.5 t. Mean annual CPUE increased from 1994/95 ( $79.9 \text{ kg.hr}^{-1}$ ) to a historically high value in 2010/11 ( $107.8 \text{ kg.hr}^{-1}$ ; Linear regression, LR:  $r^2=0.79$ ,  $P<0.05$ ). Whilst remaining among historically high levels, mean annual CPUE declined each year after 2010/11 to  $90.2 \text{ kg.hr}^{-1}$  in 2014/15. The largest decrease (9%) was between 2011/12 and 2012/13. This value was 16% below that in 2010/11, the lowest value since 2001/02 and 4% below the mean CPUE from the most recent 20-year period (i.e. 1995/96 to 2014/15; Figure 3-1).

From 2005/06 to 2014/15, most of the annual catch was harvested from the high importance SAUs Middle Point (22%), Gerloffs Bay (16%) and Number 2 Rocks (16%), with low importance SAUs contributing minimal catches (<5%, range 0–7 t; Table 3-1; Figure 3-2). Among the high importance SAUs, contributions to the annual catch from Middle Point increased after 2012/13, whilst those from Gerloffs Bay and Number 2 Rocks decreased. For the medium importance SAUs, contributions from Port MacDonnell, Admella, and Carpenters Rocks increased after 2012/13 whilst those from Rivoli Bay decreased.

Temporal trends in annual catches varied among SAUs. Annual catches from Middle Point increased (25%) from 2009/10 to 2014/15 whilst those from Number 2 Rocks declined (29%) during this period (Figure 3-3). Catches from Gerloffs Bay were stable from 2009/10 to 2012/13 then declined sharply (66%) between 2012/13 and 2013/14. Catches remained low in a historical context in 2014/15. For the medium importance SAUs, catches were variable among years after 2009/10. Catches from Rivoli Bay declined (57%) from 2012/13 to 2013/14 and remained low in 2014/15. In contrast, catches from Carpenters Rocks (33%) and Admella (154%) increased. Recent catches (2012/13 to 2014/15) from Port MacDonnell were among the highest on record.

The decline in zonal CPUE from 2010/11 reflected similar declines in all of the high importance SAUs (Middle Point, Gerloffs Bay and Number 2 Rocks; Figure 3-3). For medium importance

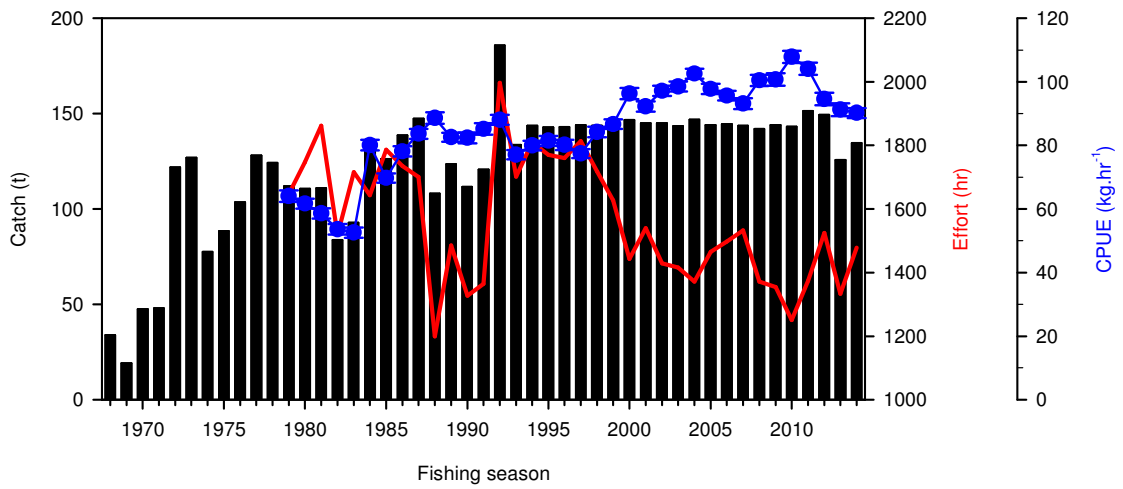
SAUs where recent CPUE estimates were available (Admella, Carpenters Rocks and Port MacDonnell), CPUE was stable from 2012/13 to 2014/15. It was not possible to estimate CPUE in recent years for one medium importance SAU (Rivoli Bay) and in most years for Port MacDonnell and the low importance SAUs (Figure 3-4; Figure 3-5).

Relative to historical values, and indicative of increased exploitation rates, proportions of large blacklip in commercial catches were at low levels in the three high importance SAUs in 2013/14 and 2014/15 (Appendix 1). This pattern was also evident in three of the medium importance SAUs (Rivoli Bay, Admella and Carpenters Rocks). The opposite pattern was observed in the Port MacDonnell SAU.

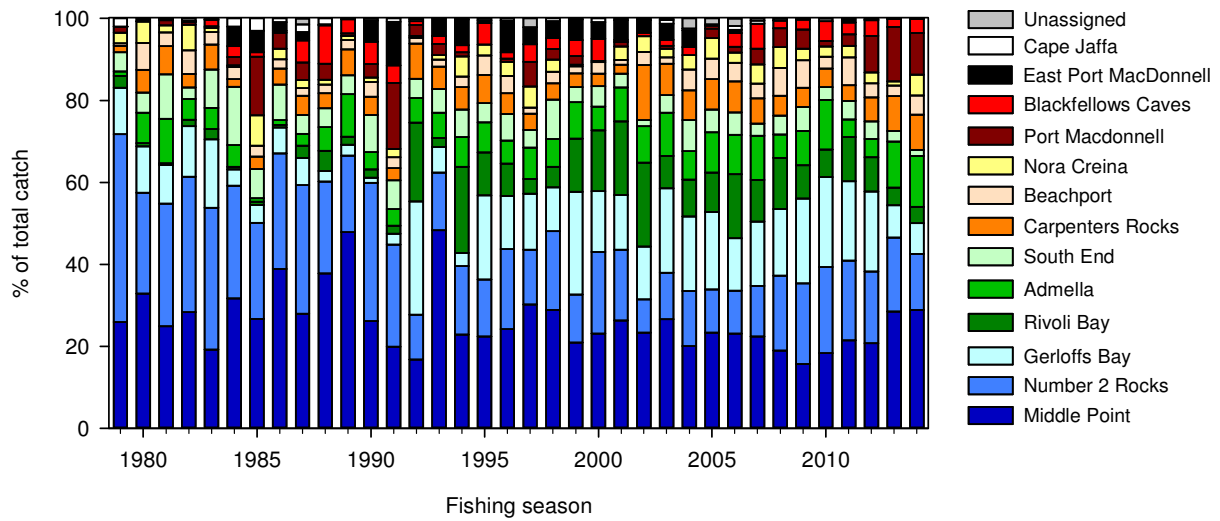
#### *Risk of overfishing in SAUs and zonal stock status*

For blacklip in 2014/15, there were three high importance (Middle Point, Gerloffs Bay and Number Two Rocks), four medium importance (Rivoli Bay, Admella, Carpenters Rocks and Port MacDonnell) and six low importance SAUs (Beachport, South End, Nora Creina, Blackfellowes Caves, Cape Jaffa and East Port MacDonnell) (Table 3-1; Appendix 1). It was possible to determine the risk-of-overfishing for all high importance SAUs and two medium importance SAUs (Admella and Carpenters Rocks). Lack of data, and the inability to calculate recent (Rivoli Bay) or historical (Port MacDonnell) CPUE resulted in these two SAUs being categorised as 'uncertain'. The remaining SAUs (Beachport, South End, Nora Creina, Blackfellowes Caves, Cape Jaffa, East Port MacDonnell) were all of low importance and were not assigned to a risk-of-overfishing category.

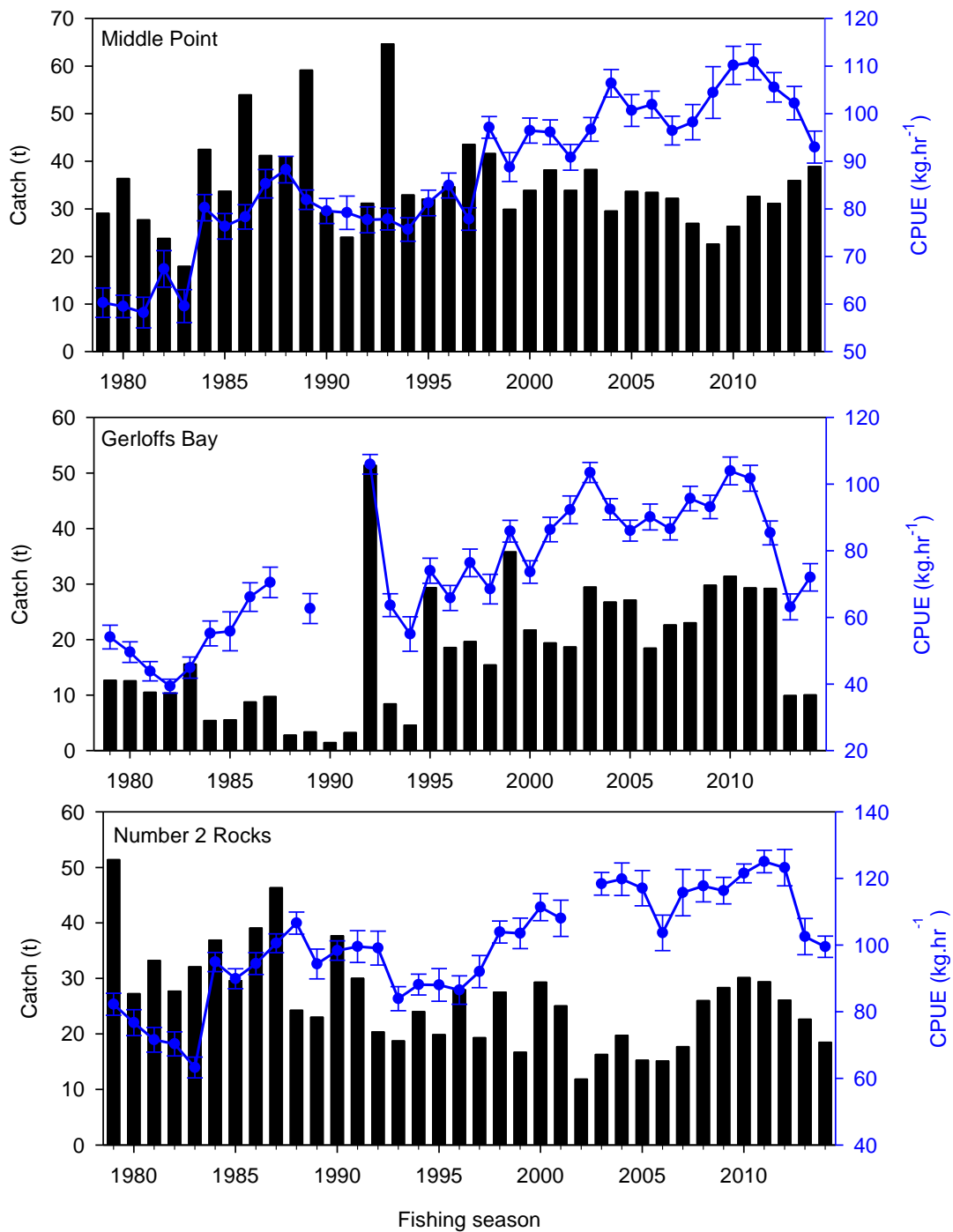
The Middle Point, Gerloffs Bay and Number 2 Rocks SAUs were assigned 'green', 'red' (highest risk) and 'yellow' risk-of-overfishing categories, respectively (Table 3-1). Both of the assessed medium importance SAUs (Admella and Carpenters Rocks) were assigned to the 'green' risk-of-overfishing category (Table 3-1). The catch-weighted, zonal stock status score was -0.40, defining blacklip in the SZ as '**sustainably fished**'.



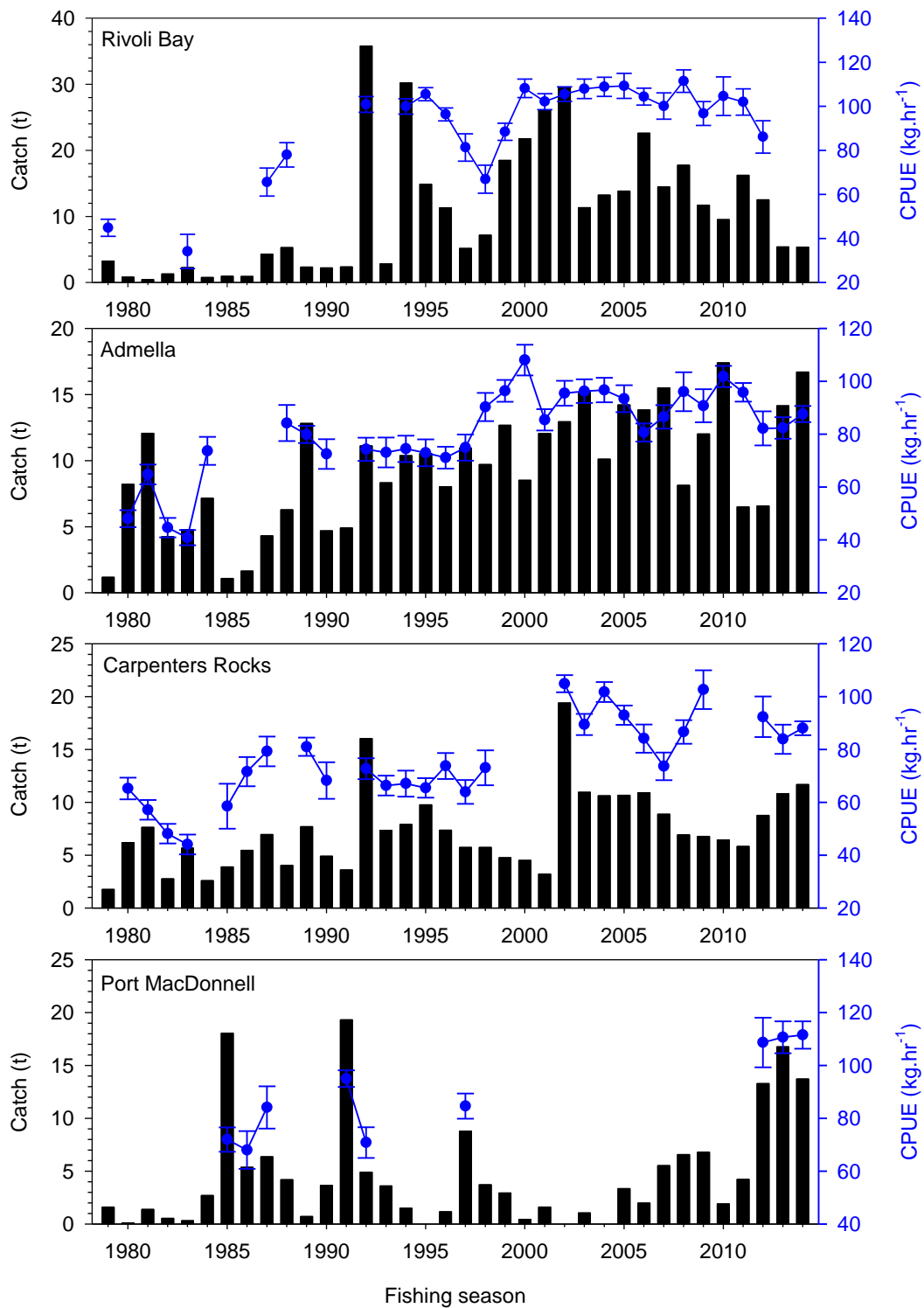
**Figure 3-1.** Total reported catch (black bars, t), effort (red line, hr) and CPUE  $\pm$  SE (blue line, kg.hr<sup>-1</sup>) on blacklip in the SZ from 1968/69 (denoted 1968) to 2014/05.



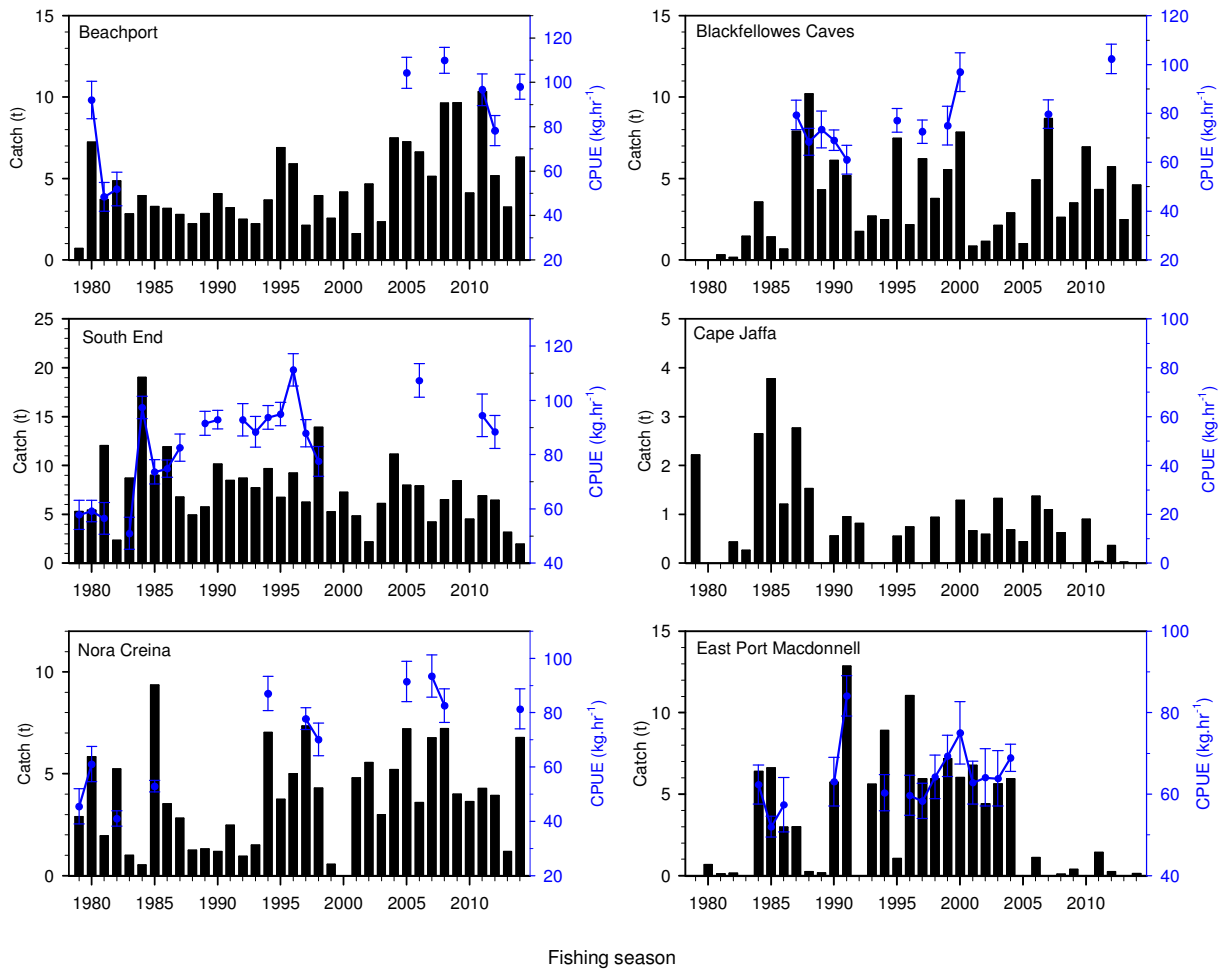
**Figure 3-2.** Proportional contribution by SAU to total blacklip catches in the SZ from 1979/80 (denoted 1979) to 2014/15.



**Figure 3-3.** Reported catch (black bars, t) and CPUE ± SE (blue lines, kg.hr<sup>-1</sup>) for high importance SAUs in 2014/15: Middle Point, Gerloffs Bay and Number 2 Rocks, from 1979/80 (denoted 1979) to 2014/15.



**Figure 3-4.** Reported catch (black bars, t) and CPUE  $\pm$  SE (blue lines, kg.hr<sup>-1</sup>) for medium importance SAUs in 2014/15: Rivoli Bay, Admella, Carpenters Rocks, and Port MacDonnell, from 1979/80 (denoted 1979) to 2014/15.



**Figure 3-5.** Reported catch (black bars, t) and CPUE ± SE (blue line, kg.hr<sup>-1</sup>) on blacklip for low importance SAUs: Beachport, South End, Nora Creina, Blackfellowes Caves, Cape Jaffa, and East Port MacDonnell, from 1979/80 (denoted 1979) to 2014/15.

**Table 3-1.** Outcome from application of the harvest strategy described in the Management Plan for the South Australian Commercial Abalone Fishery against the blacklip fishery in the SZ. Grey shading identifies the performance indicators and their respective scores. Colours identify risk of overfishing, ordered from highest to lowest risk: red (-2), yellow (-1), green (0), blue (+1), and light blue (+2).

Spatial assessment unit	%Contribution to mean total catch (SZ) over last 10 years (2005/06-2014/15)	Importance	%Contribution to catch from high & medium SAU in 2014/15	CPUE	%TACC	%Large	Pre-recruit density	Legal density	Mortality	Combined PI score	Risk of overfishing	Catch-weighted contribution to zonal score
Middle Point	21.2	High	40.6	0	0	-4	3	0	0	-1	0	0.00
Gerloffs Bay	15.6	High	10.5	-3	-2	-5	-2	-2	0	-14	-2	-0.21
Number 2 Rocks	15.5	High	19.3	0	0	-5	-	-	-	-5	-1	-0.19
Rivoli Bay	8.8	Medium	-	ND	-2	-2	-	-	-	Uncertain	Not assigned	-
Admella	8.4	Medium	17.4	0	3	-4	-	-	-	-1	0	0.00
Carpenters Rocks	5.9	Medium	12.2	0	2	-3	-	-	-	-1	0	0.00
Port MacDonnell	5.0	Medium	-	ND	6	-	-	-	-	Uncertain	Not assigned	-
Beachport	4.6	Low	-	-	-	-	-	-	-	-	Not assessed	-
South End	3.9	Low	-	-	-	-	-	-	-	-	Not assessed	-
Nora Creina	3.3	Low	-	-	-	-	-	-	-	-	Not assessed	-
Blackfellows Caves	3.0	Low	-	-	-	-	-	-	-	-	Not assessed	-
<b>Sum</b>	<b>95.2</b>		<b>100.0</b>									
											<b>Zonal stock status</b>	<b>-0.40</b>

## 4. SUMMARY

The harvest strategy for the South Australian Abalone Fishery (PIRSA 2012) is the current tool for setting TACCs in this fishery. This harvest strategy is designed to monitor abalone stocks using biological performance indicators (PIs) in SAUs of high and medium importance, assess the risk of overfishing in each SAU in relation to their overall fishery importance to determine a stock status for the zone and adjust TACCs in response to changing abalone populations. In 2014/15, application of the harvest strategy to determine stock status for blacklip in the SZ was based on three high importance and three medium importance SAUs. The stock status outcome from the harvest strategy was compared to the traditional, weight-of-evidence analysis using the NFSRF (Flood *et al.* 2014). This will also inform the current harvest strategy review.

Blacklip comprise the largest and most important abalone stock in the SZ as the 2014/15 TACC for this species was 151.5 t, which represented 96% of the combined greenlip and blacklip TACC for this zone (158.7 t). The low catch and limited data on greenlip in the SZ prevents determination of stock status using either the harvest strategy or the traditional weight-of-evidence approach. Consequently, the SZ Greenlip Abalone Fishery is classified as '**undefined**'.

The zonal stock status score for blacklip from the harvest strategy was -0.40, defining this species in the SZ as 'sustainably fished'. This was lower than the zonal stock status score from the harvest strategy in 2013/14 (-0.12), which also defined the fishery as 'sustainably fished' (Mayfield *et al.* 2015).

The outcome from the harvest strategy ('sustainably fished') was inconsistent with much of the available data. These data include the: (1) total blacklip catches of 126 t in 2013/14 and 135 t in 2014/15 being 17% and 11%, respectively, below the TACC of 151.5 t; (2) 16% decline in the mean annual CPUE – the primary index of relative abundance for abalone – on blacklip across the SZ from the historical maximum in 2010/11 to 2014/15. The CPUE in 2014/15 was the lowest since 2001/02 and 4% below the mean CPUE from the most recent 20-year period; (3) low and/or declining mean annual CPUE in the three high importance SAUs of Middle Point, Gerloffs Bay and Number 2 Rocks, from which 54% of the blacklip catch was harvested since 2005/06; (4) recent redistribution of catches among high importance SAUs with declining contributions from Gerloffs Bay and Number 2 Rocks and increasing contributions from Middle Point; and (5) low proportions of large blacklip in the commercial catch, indicating increased exploitation rates. Collectively, this evidence suggests that fishing pressure is too high and moving the stock in the direction of becoming recruitment overfished. Consequently, the SZ Blacklip Abalone Fishery is classified as '**transitional depleting**' under the NFSRF (Flood *et al.* 2014).



## 5. REFERENCES

Flood, M, Stobutzki, I, Andrews, J, Ashby, C, Begg, G, Fletcher, R, Gardner, C, Georgeson, L, Hansen, S, Hartmann, K, Hone, P, Horvat, P, Maloney, L, McDonald, B, Moore, A, Roelofs, A, Sainsbury, K, Saunders, T, Smith, T, Stewardson, C, Stewart, J & Wise, B (eds) (2014). Status of key Australian fish stocks reports 2014, Fisheries Research and Development Corporation, Canberra. 620 pp.

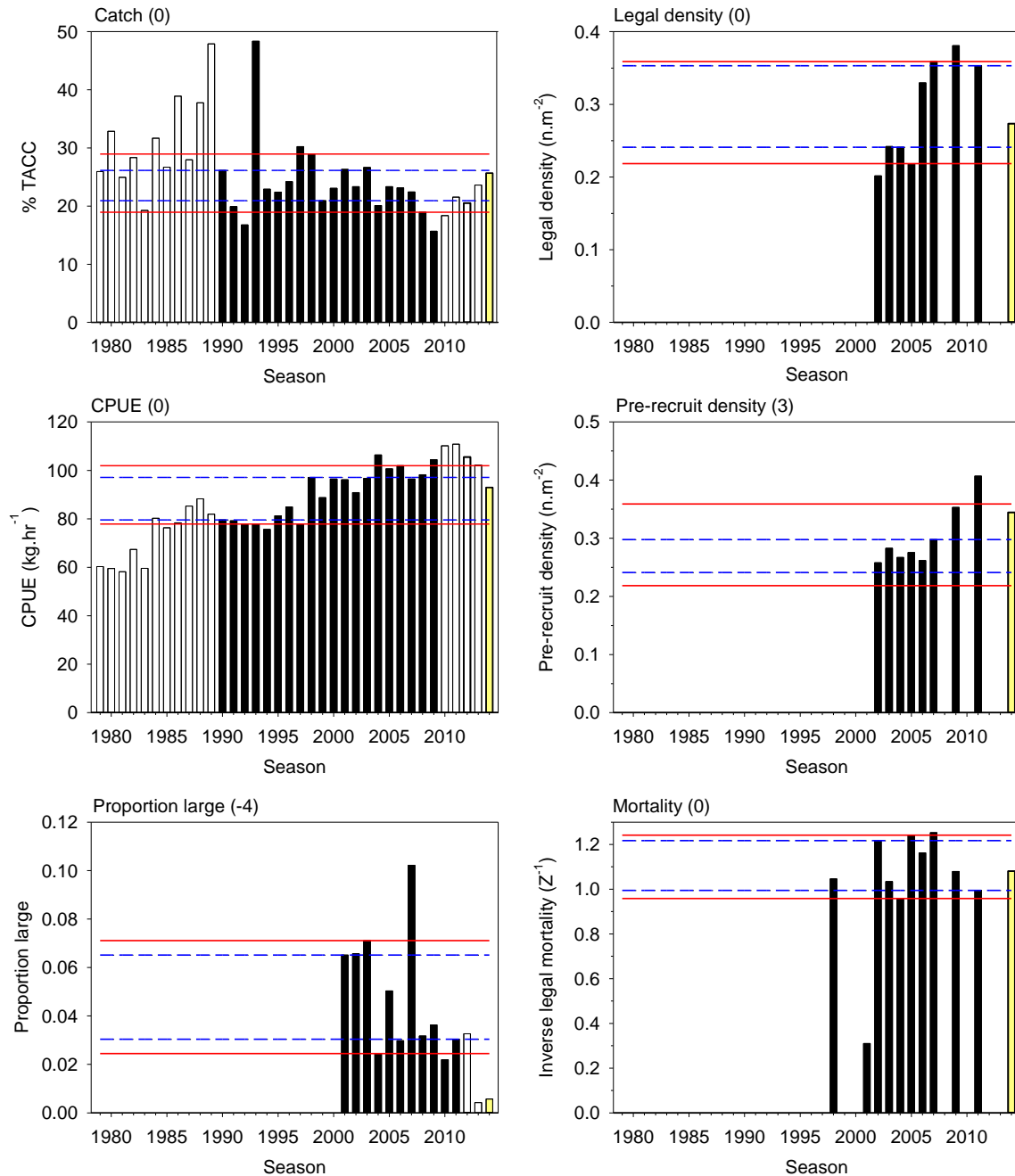
Mayfield, S., Ferguson, G., Carroll, J. and Dent, J. (2014). Central Zone Abalone (*Haliotis laevis* and *H. rubra*) Fishery. Fishery Assessment Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Research Report Series No. 810, Publication No. F2007/000611-5. Adelaide. 67pp.

Mayfield S., G. Ferguson G, A. Hogg A, and Carroll, J. (2015). Southern Zone Abalone (*Haliotis rubra* & *H. laevis*) Fishery. Fishery Assessment Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic Sciences), SARDI Research Report Series No. 850, Publication No. F2007/000552-5. Adelaide. 57pp.

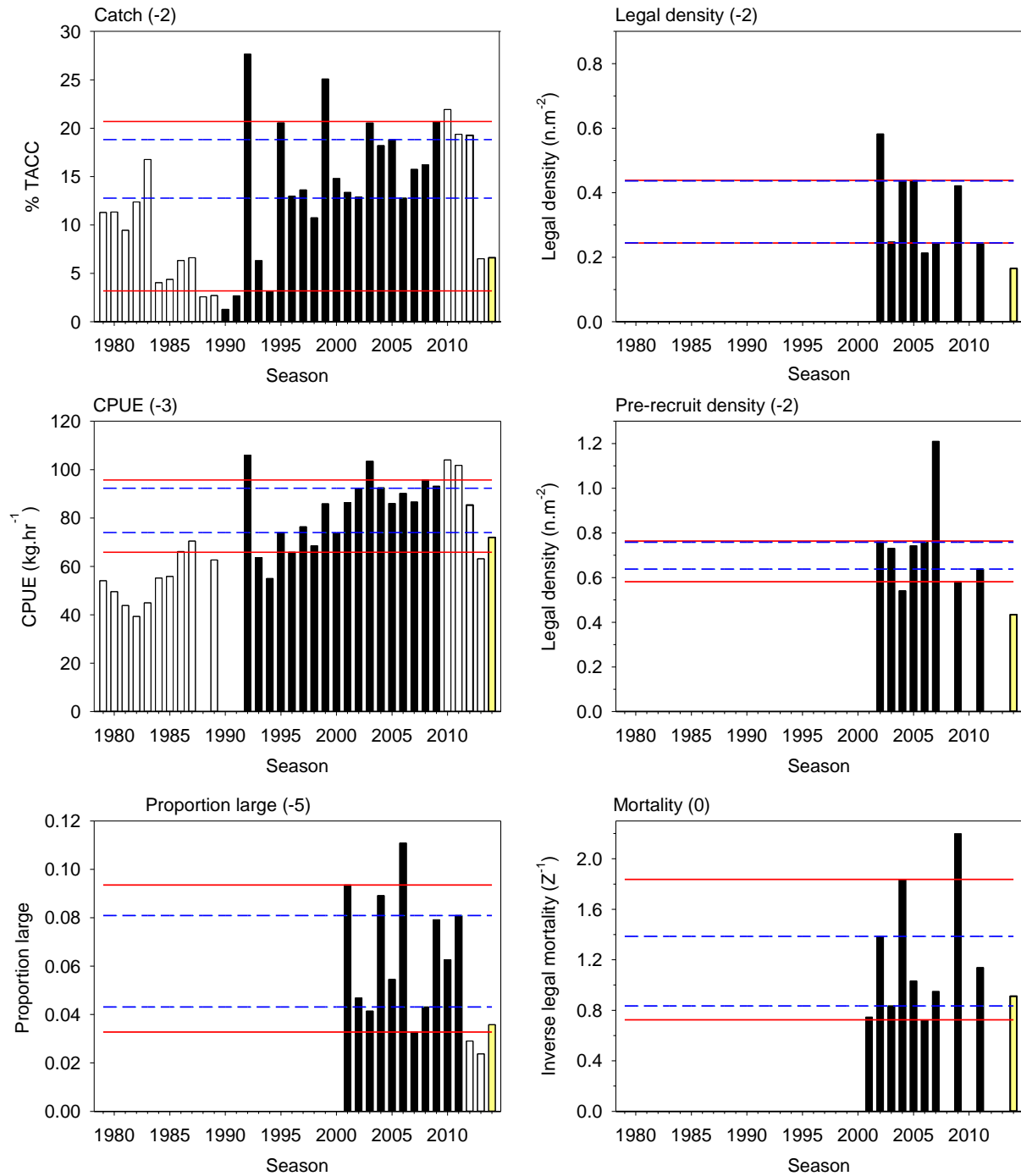
PIRSA (2012). Management Plan for the South Australian Commercial Abalone Fishery. Adelaide. Primary industries and Regions South Australia Fisheries and Aquaculture, 85pp. [http://www.pir.sa.gov.au/fisheries/commercial\\_fishing/fisheries\\_management/management\\_plan](http://www.pir.sa.gov.au/fisheries/commercial_fishing/fisheries_management/management_plan)

## 6. APPENDIX 1 - HARVEST STRATEGY PLOTS AND PI SCORES

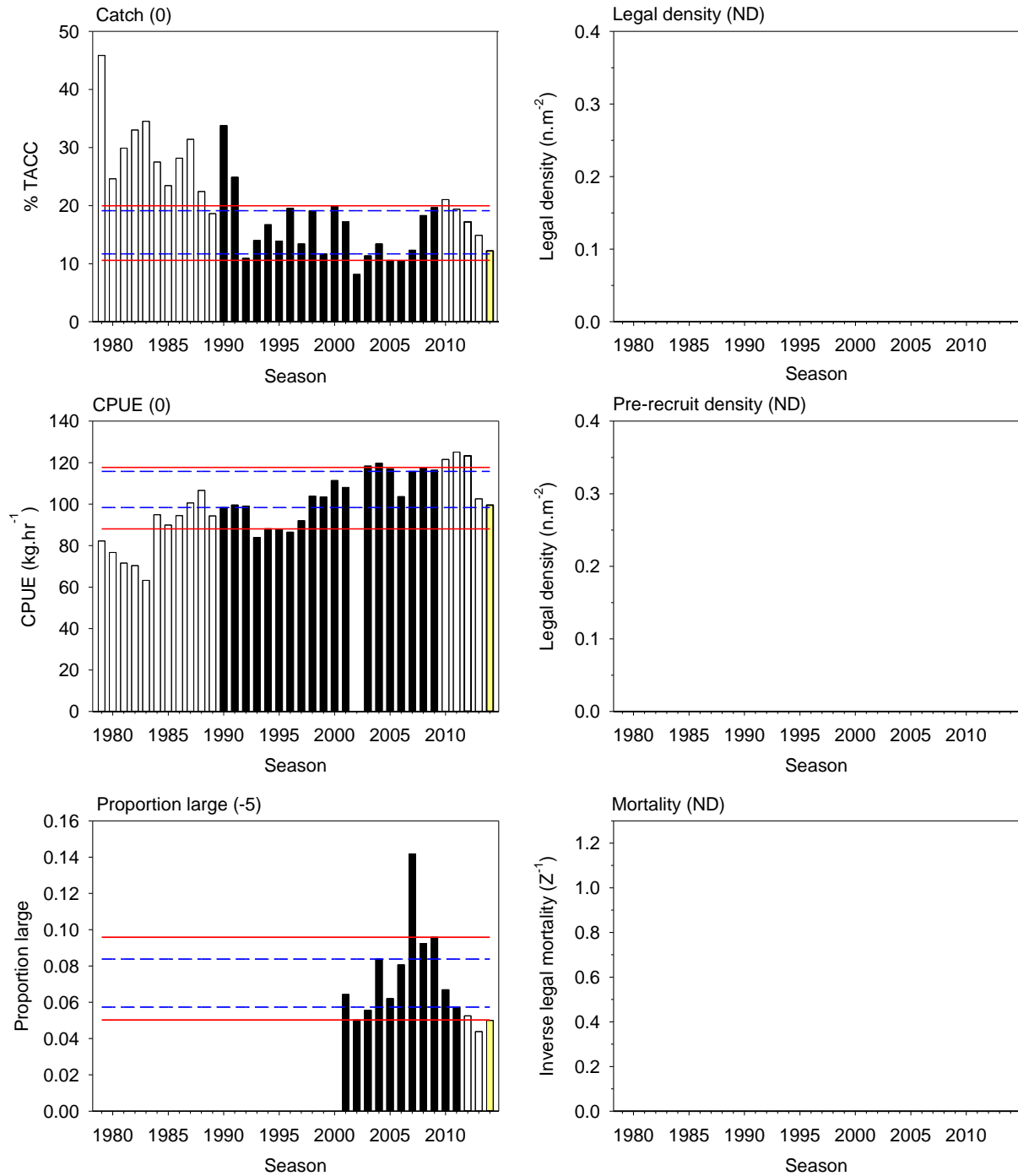
### Middle Point



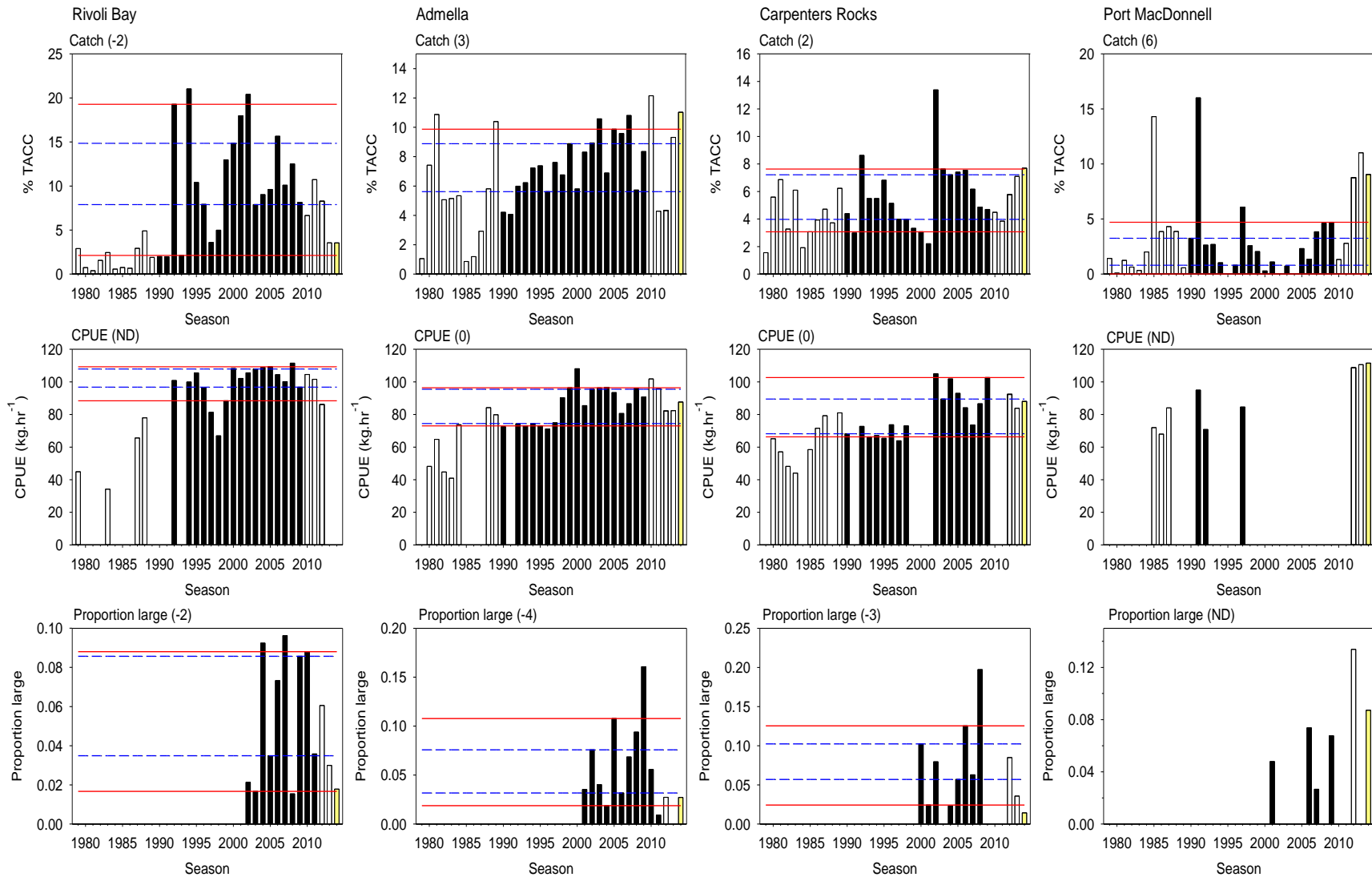
**Figure A1.1.** Middle Point SAU (high importance). Performance indicators (and scores from the harvest strategy to determine the risk of being overfished) and upper and lower target (red lines) and limit (blue dashed lines) reference points. Black bars show the data and time over which the reference points were calculated. Open bars describe measures of the PI outside of the reference period. Yellow bars indicate the data and year subject to assessment for each PI i.e. the score-year.



**Figure A1.2.** Gerloffs Bay SAU (high importance). Performance indicators (and scores from the harvest strategy to determine the risk of being overfished) and upper and lower target (red lines) and limit (blue dashed lines) reference points. Black bars show the data and time over which the reference points were calculated. Open bars describe measures of the PI outside of the reference period. Yellow bars indicate the data and year subject to assessment for each PI i.e. the score-year.



**Figure A1.3.** Number 2 Rocks SAU (high importance). Performance indicators (and scores from the harvest strategy to determine the risk of being overfished) and upper and lower target (red lines) and limit (blue dashed lines) reference points. Black bars show the data and time over which the reference points were calculated. Open bars describe measures of the PI outside of the reference period. Yellow bars indicate the data and year subject to assessment for each PI i.e. the score-year.



**Figure A1.4.** Rivoli Bay, Admella, Carpenters Rocks and Port MacDonnell SAUs (medium importance). Performance indicators (and scores from the harvest strategy to determine the risk of being overfished) and upper and lower target (red lines) and limit (blue dashed lines) reference points. Black bars show the data and time over which the reference points were calculated. Open bars describe measures of the PI outside of the reference period. Yellow bars indicate the data and year subject to assessment for each PI i.e. the score-year.