SUMMARY VERSION - DRAFT STOCK ASSESSMENT FOR THE CENTRAL ZONE OF THE VICTORIAN ABALONE FISHERY 2022/2023

C. Dixon and J. Lowe

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2/29 Woodstock Rd	PO Box 732	P: +61 7 3371 1500
Toowong Qld 4066	Toowong Qld 4066	F: +61 7 3100 8035
Australia	Australia	E: info@mragasiapacific.com.au

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1. Executive Summary

This report summarises the 2022/23 stock assessment for the Victorian Central Zone Abalone Fishery. The information that underpins this Executive Summary can be read in detail in the full Central Zone Stock Assessment Report 2024.

The commercial catch in the Central Zone for 2022/23 was 252.5 t, which was close to 100% of the TACC including carryover. The current zonal CPUE of 79.5 kg/h is 18% lower than it was in 2003/04, 10% lower than it was in 2009/10 but 10% higher than it was in 2019/20. CPUE was relatively stable between 2013/14 and 2020/21 but has increased substantially in recent years and is currently around 2010/11 levels. Mean daily catch in 2022/23 was 448 kg/day and has increased substantially since 2013/14.

The "Top 15" FIS sites were surveyed in July 2023. Across the Central Zone, recruit abundances at the Top 15 sites declined from 2003 to 2018 but have increased by 25% thereafter. Pre-recruit abundance declined substantially and consistently from 2003 to 2021, however increased by 87% in 2023 and was the highest observed since 2008.

Standardised average length of the commercial catch demonstrated consecutive increases in the mean size of abalone harvested at 7 of 10 SMUs since 2016/17. This included the four most important SMU contributors toward total catch: Cape Otway, Back Beaches, Phillip Island, and Shipwreck Coast. These size increases were over and above LML increases that had been implemented at the SMU level in Apil 2021. Average length at most other SMUs were stable over time. Given the concurrent increase in pre-recruit abundance observed on FIS across the Central zone, increases in the size of abalone caught likely reflect reduced fishing mortality and improving stock status.

In recent years, the assessment of stock status has been based on two primary sources of data, CPUE and FIS abundance, that are positively and negatively biased, respectively. The uncertainty in these data sources has resulted in a necessarily precautionary approach to the assessment of stock status and subsequent recommendations. The inclusion of data on average length of the commercial catch and mean catch per day greatly enhances the assessment this year.

At the zonal scale all four measures - CPUE (kg/h), mean daily catch (kg/day), FIS abundance (recruit and pre-recruit) and average length from the commercial catch - are currently trending positively, which provides much greater confidence in the outcomes of the weight of evidence assessment. While some measures have only recently improved (e.g. FIS pre-recruit abundance), most have been trending positively for several years.

It is unequivocal that the spatial extent of the fishery has contracted substantially in the last two decades, and the fishery now concentrates heavily on shallow water, high catch-rate reefs. Until this report, the status of stocks on these reefs was highly uncertain. Although uncertainty in individual measures remain, the positive trends observed in all indicators over recent years suggests that the decline in zonal biomass has stabilised and is likely increasing. Nevertheless, it's essential to recognise that this is the first year of consistently positive results across all stock status measures, and confidence in the assessment will improve if the upward trends persist. On this basis, a prudent approach to management would be to continue to invest in potential stock recovery by maintaining the TACC at current levels while continuing to monitor and improve biomass indicators, and the stock assessment approach.

2. Summary of key outcomes

This Summary Version of the Draft Stock Assessment Report for the central Zone Abalone Fishery aims to document the key results for the Zone and SMU scales, and the key conclusions from the assessment. Catch, effort and fishery independent survey (FIS) abundance data are presented. Additional data and analyses are provided in the full stock assessment report, along with rationales for key conclusions.

Performance Indicators are presented in Appendix 1. Draft Harvest Strategy results are presented in Appendix 2. A summary of LML changes in presented in Appendix 3.

2.1. Analytical approaches to stock assessment

There are three primary analytical approaches used in the assessment of stock status to inform TACC decision making: (i) a weight of evidence assessment, (ii) analysis of trends against performance measures and (iii) assessment of the fishery against the Draft Harvest Strategy. There are substantial uncertainties associated with the two primary sources of data for these assessment approaches. CPUE data are positively biased due to hyperstability, and therefore present an overly optimistic assessment of stock status. FIS data are negatively biased because FIS site locations are not representative of the entire stock, and thus they represent an overly pessimistic assessment of stock status. It is important to understand that the issues with the current stock assessment relate to the data that underpins it rather than the assessment approaches themselves. As a result, in recent years VFA have requested reviews of the current CPUE standardisation approach (Dichmont et al 2022) and the FIS approach (Dixon 2023). Reviews of other components of the management framework are also planned (e.g. Performance Indicators, Harvest Strategy, Management Plan).

This year's full Stock Assessment Report is the first to present length data from the commercial catch since 2021. Figures of standardised mean length from key SMUs is presented in Appendix 4 and observations from these data are included in SMU summaries. The inclusion of these data has improved the weight of evidence assessment in the year's report substantially. Formal approaches to better integrate these data into future stock assessments need to be developed.

2.2. Performance Indicators

Tables of Performance Indicator outcomes at the Zone and SMU spatial scales are provided in Appendix 1. The Performance Indicators for CPUE were assessed at the long-term (since 2003/04) and short-term (since 2009/10) scales following VFA (2018). In this report, an assessment over the last 4 years is also provided to demonstrate changes over a shorter temporal scale. For the Fishery Independent Survey (FIS) data, only the Top 15 sites (see Dixon 2023) were surveyed in 2023. Analysis from the FIS review (Dixon 2023) suggest that these data remain representative of the historic survey locations at the zone scale but not at the SMU scale and this is reflected in the FIS Performance Indicators.

The catch in 2022/23 was 252.5 t, which was 100% the TACC. Catch has declined by 61% in the long term (2003/04), 41% in the short-term (2009/10) but increased by 8% in the last 4 years (2019/20). Mean daily catch in 2022/23 was 448.2 kg/h, which was 6% lower than the long-term, 10% higher than the short-term, and 1% higher than 4 years ago. CPUE in 2022/23 was 79.5 kg/h, which was 18% lower than the long-term, 10% lower than the short-term, but 10% higher than 4 years ago. Recruit abundance at the Top 15 sites has declined by 26% in the long-term but was 13% higher than the short-term and 16% than 4 years ago. In 2022/23, pre-recruit abundance was only 6% lower than the long-term, was 22% higher than the short-term and 37% higher than 4 years ago.

At the SMU scale, the catch was harvested close to their OT at most SMUs, except Cliffy Group where only 42% of the OT was caught and Prom Westside where the OT was exceeded by 27%.

Long-term and short-term declines in CPUE have been observed at almost all spatial scales. However , in the last 4 years increases in CPUE have been observed at all SMUs except Cape Otway (2% decrease).

2.3. Weight of evidence assessment

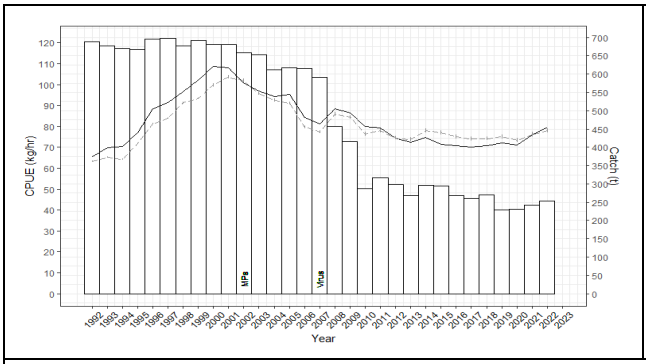
All available data for the weight of evidence in the Stock Assessment Report look optimistic for the fishery. At the zonal scale all four measures of CPUE (kg/h), mean daily catch (kg/day), FIS abundance (recruit and pre-recruit) and average length from the commercial catch are currently trending positively. Compared to 2018/19, CPUE has increased by 10%, mean daily catch is stable (1% increase), recruit abundance at Top 15 sites has increased by 16% and pre-recruit abundance by 37%, and average length from the commercial catch has increased substantially at 7 of the 10 SMUs from which data are available (representing 83% of the 2022/23 total catch). For several of these indicators, the increases have occurred over longer time scales than just the last four years.

2.4. Assessment of stock status

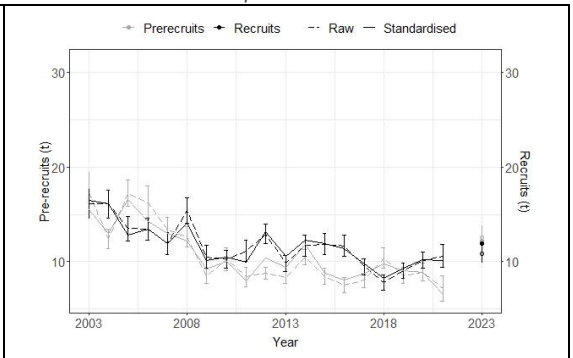
It is unequivocal that the spatial extent of the fishery has contracted substantially in the last two decades, and now concentrates heavily on shallow water reefs. In recent stock assessment reports, uncertainty in the status of these shallow water stocks has required precautionary advice to be provided. The 2022/23 stock assessment has stronger measures to underpin the weight of evidence assessment than previous reports, particularly at the zone scale. While there remains uncertainty in each measure, the fact that all indicators provide positive trends in recent years indicates that the decline in biomass has halted and has likely been increasing. However, this is only the first year that this assessment has provided such positive views, and this position will be strengthened if the increasing trends in biomass indicators continue. On this basis, a prudent approach to management would be to continue to invest in potential stock recovery by maintaining the TACC at current levels while continuing to monitor and improve biomass indicators, and the stock assessment approach.

3. Central Zone

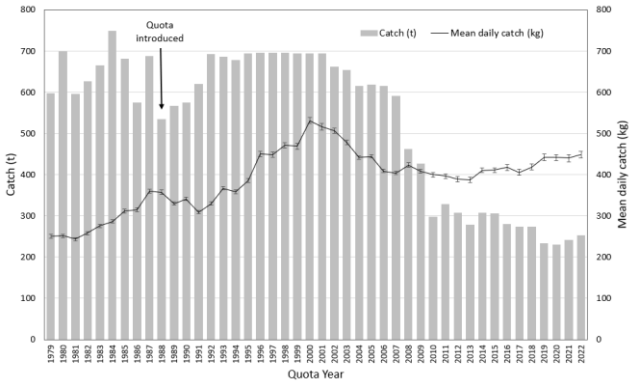
Catch and CPUE 1992 - 2023



FIS recruits and pre-recruits 2003 – 2023



Mean daily catch 1979-2023

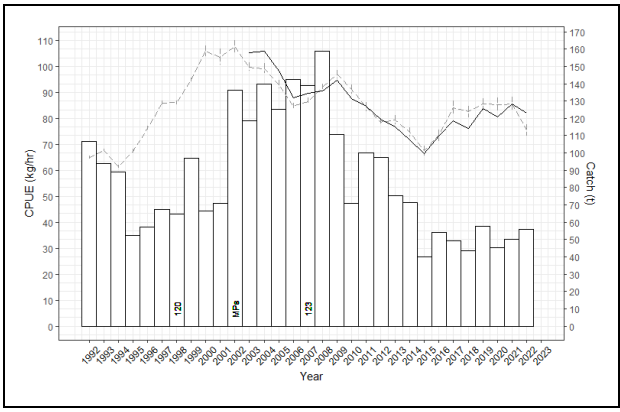


- The commercial catch for 2022/23 was 252.5 t, which was 100% of the TACC. Catches have been reduced substantially over time, with the 2022/23 catch being only 39% of that harvested in 20023/04. Annual catches have stabilised over the last four years at around 220 – 250 t.
- Standardised CPUE increased consistently and significantly from 1992 to 2000, declined from 2000 to around 2012, was stable for the next decade and has increased in recent years.
- Recruit abundance at the Top 15 sites declined substantially from 2003 to 2009, then was relatively stable between 2009 and 2016 before declining to historic low levels in 2018. Recruit abundance has increased thereafter and in 2023 was around the 2009 levels.
- Pre-recruit abundance at the Top 15 sites declined consistently from 2003 to 2008, was relatively stable from 2008 to 2020 before declining to a historic low in 2021. Surveys were not conducted in 2022 but in 2023 pre-recruit abundance increased by 87% in 2023 and was the highest observed since 2008.
- Mean daily catch steadily increased from 250 kg per day in 1979 to 531 kg per day in 2000 (Figure 3). Mean daily catch slowly declined to 387 kg per day in 2013 and has slowly but steadily increased thereafter, reaching 448 kg per day in 2022.

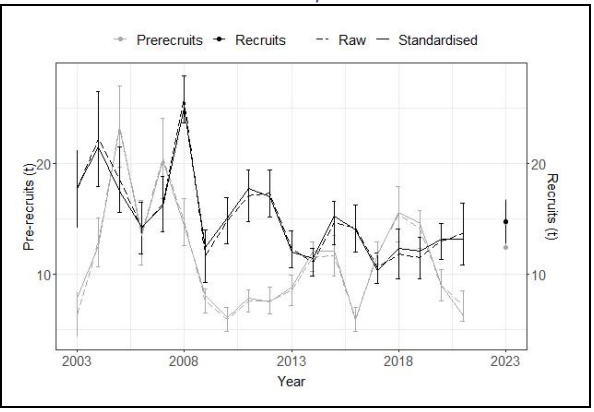
4. Cape Otway

Catch					CPUE Performance Indicators (%change)		
2022/23		OT + carryover* (t)			Long-term	Short-term	Last 4 years
(t)	(%)	21/22	22/23	23/24	2003/04 – 2022/23	2009/10 – 2022/23	2018/19 – 2022/23
55.8	22.1	58.3*	57.9*	49.0*	-22	-13	-2
LML 2022/23 = 125 mm					Mean daily catch 2022/23 = 457 kg		

Catch and CPUE



FIS recruits and pre-recruits



Reefcode catches for the Cape Otway SMU from 2017/18 to 22/23 and five-year average 2017/18 to 21/22.

Reefcode	2017/18	2018/19	2019/20	2020/21	2021/22	5-yr average	2022/23
6.02	6331	8325	15648	20397	11511	12442	11674
6.01	14088	9500	10670	9959	12441	11332	12348
6.03	7783	6742	9951	10111	9765	8870	4978
7.08	7162	10599	14351	1586	6111	7962	11993
7.07	8658	4828	5070	2851	8642	6010	8501
7.05	2729	1891	437	282	1119	1292	1347
7.03	929	286	682	278	274	490	1733
7.06	1096	1000	0	0	331	485	2094
7.04	397	187	828	0	88	300	1103
8.01	66	0	0	0	0	13	0
Totals	49239	43358	57638	45464	50283	49196	55771

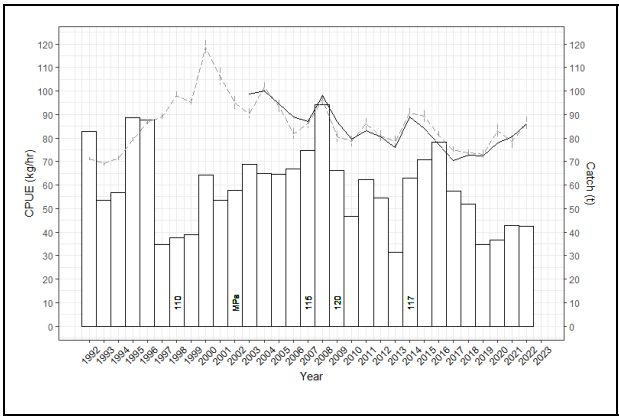
- A peak catch of 159 t was harvested from the Cape Otway SMU during 2008. Catches have generally declined thereafter, reaching a low of 40 t in 2015. Catch in 2022/23 was 55.8 t.
- The size limit was increased from 123 to 125 mm on 1 April 2021.
- CPUE declined between years but has generally increased since 2015.
- Mean size of the commercial catch has steadily increased for the last six years.
- Catches from most reefcodes were within their recent historical bounds.
- Recruit abundance from four Top 15 FIS sites has fluctuated without clear for the last 15 years. Pre-recruit abundance is highly variable but more than doubled between 2021 and 2023.
- The Draft Harvest Strategy result was Decreasing, suggesting an OT of 41.7–46.6 t.

Following reduced catches in 2015, standardised CPUE has generally increased. At the four Top 15 FIS sites, recruit abundance is stable and pre-recruit abundance was high in 2023 in historical terms. The standardised average size of the commercial catch has steadily increased for the last six years. The Draft Harvest Strategy suggests a decrease in OT due to a drop in CPUE from 2021/22 to 2022/23. It is noted that in 2023/24 the base OT was reduced to 49.0 t with carry-over. The weight of evidence suggests that the stock appears relatively stable, but a conservative OT as suggested by the Draft Harvest Strategy may promote recovery.

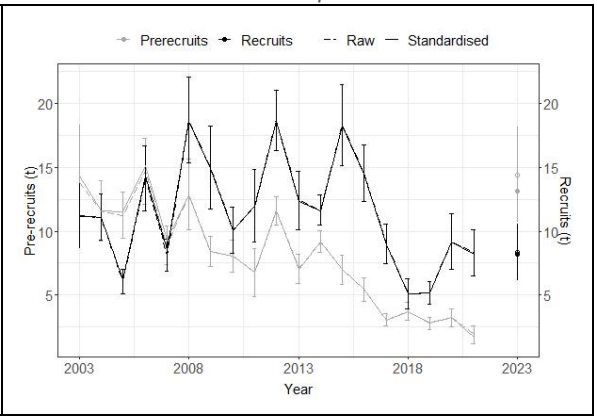
5. Back Beaches

Catch					CPUE Performance Indicators		
2022/23		OT + carryover* (t)			Long-term	Short-term	Last 4 years
(t)	(%)	21/22	22/23	23/24	2003/04 – 2022/23	2009/10 – 2022/23	2018/19 – 2022/23
42.5	16.8	40	40	40	-13	-1	19
LML 2022/23 = 119 mm					Mean daily catch 2022/23 = 506 kg		

Catch and CPUE



FIS recruits and pre-recruits



Reefcode catches for the Back Beaches SMU from 2017/18 to 22/23 and five-year average 2017/18 to 21/22.

Reefcode	2017/18	2018/19	2019/20	2020/21	2021/22	5-yr average	2022/23
12.03	24908	26917	12121	14689	20039	19735	19028
12.02	15305	12626	10938	10004	11365	12048	10811
12.05	9655	6262	8218	5494	4993	6924	6883
12.04	8529	6468	3277	6293	6267	6167	5798
12.01	0	0	0	0	0	0	0
Totals	58397	52273	34554	36480	42665	44874	42520

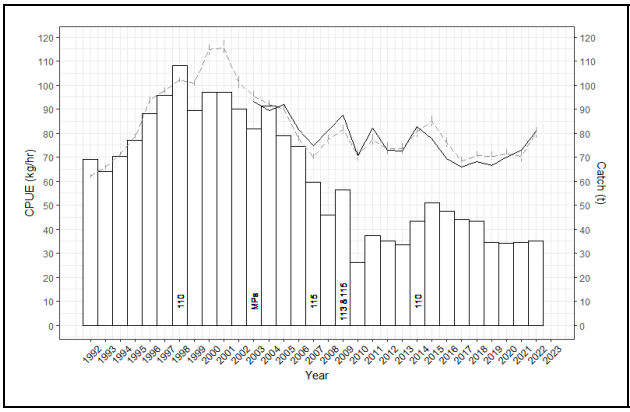
- Catches have been highly variable at the Back Beaches SMU. Catches declined from around 80 t in 2016 to around 36 t in 2019 and 2020. Catches have been stable able 42 t in the last two years.
- Reduced catches in recent years has seen CPUE increase and it is now around 2008 levels.
- Mean catch per day has increased substantially in the last three years.
- The distribution of catches by reefcode is stable.
- The mean length of the commercial catch has increased substantially since 2019/20.
- At the three Top 15 FIS sites, recruit abundance remains low in a historical context but is almost twice as high as it was in 2017 and 2018. The abundance of pre-recruits increased dramatically in 2023 to be the equal highest observed in 2006.
- The Draft Harvest Strategy result was Increasing, suggesting an OT of 40.0 to 50.0 t.

All available evidence suggests that stock indicators have responded positively to the reduced catches over the last four years. CPUE and mean daily catch have increased, as has the average size of the commercial catch. Top 15 FIS recruit abundance is low but stable however pre-recruit abundance in 2023 increased dramatically and was at equal record levels. The Draft Harvest Strategy suggests and increase in OT can be considered, however if this is the case then any increase should be very modest and it should consider that the stock will likely be fished to its upper limit as it has in the last two years.

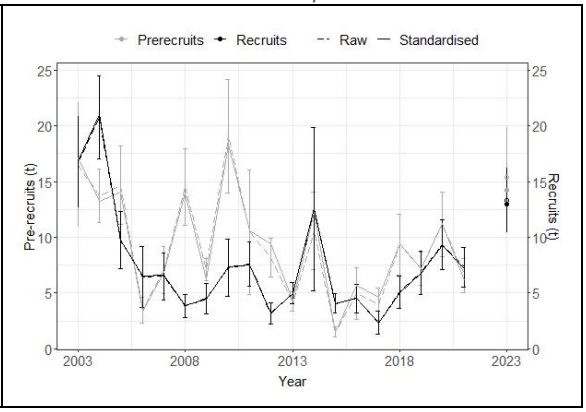
6. Phillip Island

Catch					CPUE Performance Indicators		
2022/23		OT + carryover* (t)			Long-term	Short-term	Last 4 years
(t)	(%)	21/22	22/23	23/24	2003/04 – 2022/23	2009/10 – 2022/23	2018/19 – 2022/23
35.0	13.9	34.0	34.0	32.3	-13	-8	22
LML 2022/23 = 112 mm					Mean daily catch 2022/23 = 473 kg		

Catch and CPUE



FIS recruits and pre-recruits



Reefcode catches for the Phillip Island SMU from 2017/18 to 22/23 and five-year average 2017/18 to 21/22.

Reefcode	2017/18	2018/19	2019/20	2020/21	2021/22	5-yr average	2022/23
14.03	15651	13533	9327	10817	12412	12348	8752
14.02	13613	11969	10474	8841	11001	11180	9585
14.04	5838	7009	4584	5567	3777	5355	6310
14.09	6599	6187	4458	4042	3218	4901	3476
14.11	2667	3591	2819	1200	294	2114	2146
14.06	1212	1192	2351	1596	1369	1544	1301
14.05	2047	332	1318	280	1157	1027	680
14.01	632	232	73	810	558	461	259
14.10	420	496	767	419	0	420	700
14.07	30	833	392	542	291	418	1831
14.08	30	672	0	90	489	256	0
Totals	48738	46047	36563	34203	34567	40024	35039

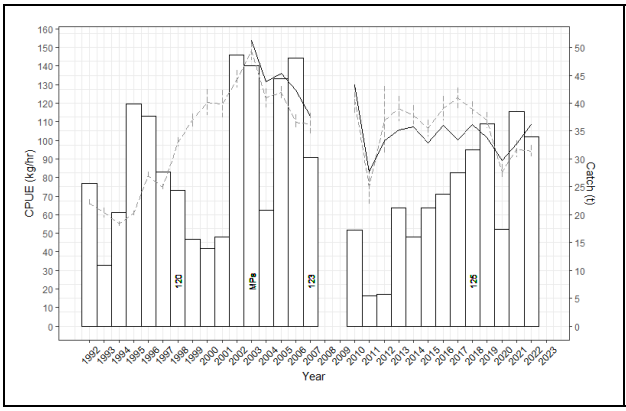
- Following a peak catch of 121 t in 1998, catches generally declined reaching a low catch of 26 t in 2010. Catches ranged from 33 to 51 t between 2011 and 2018 but have stabilised in the last 4 years under a catch cap of 34 t.
- During the last few years of stable catches, CPUE, mean daily catch and average length of the commercial catch have all increased.
- Recruit abundance at the two Top 15 FIS sites had declined substantially between 2003 and 2017 but has increased thereafter, with 2023 levels amongst the highest recorded. Similar trends have occurred for pre-recruit abundance, with 2023 levels close to the historic high.
- The Draft Harvest Strategy result was Increasing, suggesting an OT of 32.3 t up to 40.4 t.

After four years of a stable, relatively low catch in historic terms, all available indicators appear positive for the Phillip Island SMU. It is noted that the OT was reduced slightly for 2023/24. Given these positive indicators and the Draft Harvest Strategy outcomes, an OT closer to the previous years (i.e. 34.0 t) would appear sustainable and may continue to promote stock recovery.

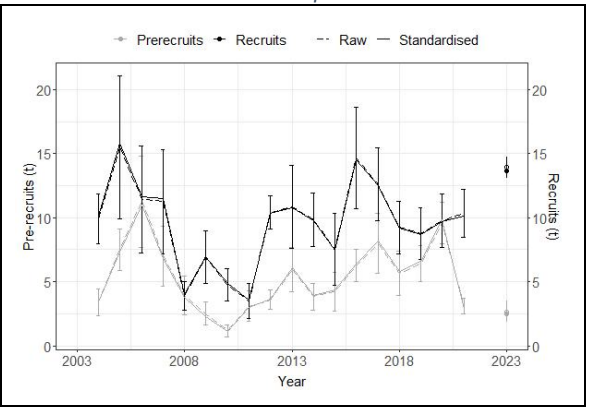
7. Shipwreck Coast

Catch					CPUE Performance Indicators		
2022/23		OT + carryover* (t)			Long-term	Short-term	Last 4 years
(t)	(%)	21/22	22/23	23/24	2003/04 – 2022/23	2009/10 – 2022/23	2018/19 – 2022/23
33.9	13.4	36.2*	34.3*	29.2*	-18	-16	7
LML 2022/23 = 130 mm					Mean daily catch 2022/23 = 566 kg		

Catch and CPUE



FIS recruits and pre-recruits



Reefcode catches for the Shipwreck Coast SMU from 2017/18 to 22/23 and five-year average 2017/18 to 21/22.

Reefcode	2017/18	2018/19	2019/20	2020/21	2021/22	5-yr average	2022/23
4.02	12128	16947	15863	8064	11812	12963	13161
4.01	4121	5901	6074	3730	12363	6438	7362
5.02	3947	2883	5682	4010	7766	4858	3959
5.03	4895	4446	5363	1047	5740	4298	4151
5.01	2474	1458	3283	535	768	1703	5311
Totals	27565	31635	36265	17386	38448	30260	33944

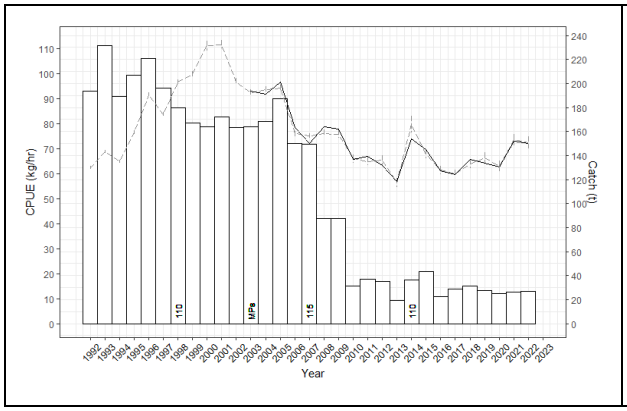
- The Shipwreck Coast SMU was severely affected by the abalone virus in 2007 (VFA 2018) and there was no fishing in 2008 and 2009. Catches have recovered substantially since with the 2022/23 catch (33.9 t) well above the long-term average (24 t). Catches at the reefcode scale tend to be variable.
- The LML was increased from 125 to 130 mm on 1 April 2021.
- CPUE is stable and average size of commercial catch has increased despite the increase in LML.
- Following the virus outbreak, both recruit and pre-recruit abundance increased significantly up to 2016 and have fluctuated thereafter.
- The Draft Harvest Strategy result was Stable, suggesting an OT of 27.7 to 30.7 t.

Catches in recent years have been above the historic average for the fishery, however given its history of being virus infected it remains difficult to determine whether such catches are sustainable in the long-term. Further, the large increase in LML from 125 to 130 mm has impacted some of the indicators in recent years. The Draft Harvest Strategy suggests maintaining a stable catch and given the reduction in OT for 2023/24 it seems appropriate to maintain this strategy for 2024/25.

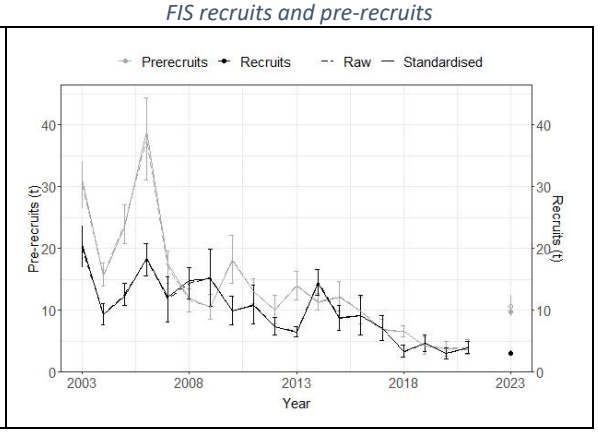
8. Flinders

Catch					CPUE Performance Indicators		
2022/23		OT + carryover* (t)			Long-term	Short-term	Last 4 years
(t)	(%)	21/22	22/23	23/24	2003/04 – 2022/23	2009/10 – 2022/23	2018/19 – 2022/23
26.7	10.6	24.2*	24.2	20.5	-22	-7	12
LML 2022/23 = 114 mm					Mean daily catch 2022/23 = 405 kg		

Catch and CPUE



FIS recruits and pre-recruits



Reefcode catches for the Flinders SMU from 2017/18 to 22/23 and five-year average 2017/18 to 21/22.

Reefcode	2017/18	2018/19	2019/20	2020/21	2021/22	5-yr average	2022/23
12.06	11669	14953	10120	9604	11554	11587	11970
13.01	5355	5518	4233	4343	3676	4862	3541
13.02	5413	3544	3920	3341	3052	4055	2529
13.03	2582	4247	3203	1717	1211	2937	1655
13.04	882	2338	3633	2798	4181	2413	3129
13.05	933	207	2056	1886	2382	1271	3049
13.07	2203	988	338	0	0	882	651
13.06	887	554	455	1463	233	840	205
Totals	29924	32349	27957	25151	26288	28846	26729

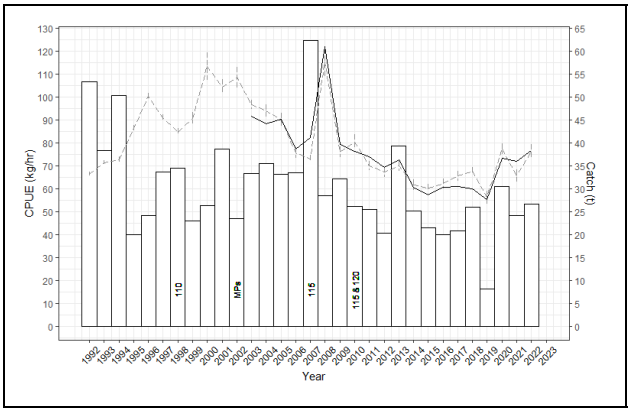
- The Flinders SMU has been the most important historically, with an average catch of 125 t (since 1992) and a peak catch of 231 t (1993). A catch of 88 t was harvested in both 2008 and 2009 and catches have ranged from 20-44 t per year since.
- The size limit was increased incrementally from 110 to 112 to 114 mm in 2020 and 2021.
- Standardised CPUE declined from 2003 to 2017 but has increased thereafter.
- The average length of the commercial catch has increased by 7 mm since 2016/17.
- The abundance of FIS recruits declined substantially from 2003 and remains low. Pre-recruit abundance has also declined, before increasing substantially to 2016 levels in 2023.
- The Draft Harvest Strategy result was Stable, suggesting an OT of 20.5 t and 23.6 t.

The once productive deeper water reefs of the Flinders SMU have declined substantially, and the fishery currently relies primarily on inshore shallow reefs. While most indicators remain poor relative to the long-term, the short-term outlook is more positive. CPUE and mean catch per day have increased in the last five years, as has the average length of the commercial catch. During this period the LML has increased from 110 to 114 mm. In 2023, FIS pre-recruit abundance increased substantially. In 2023/24, the OT was reduced to 20.5 t. The Draft Harvest Strategy suggests that an increase in OT can be considered, however maintaining the lower OT is likely to further build on the positive indicators from recent years.

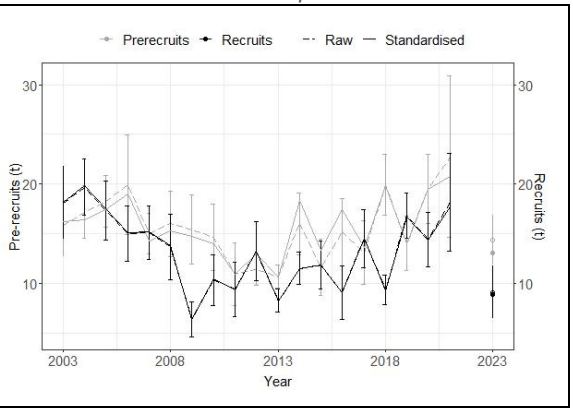
9. Prom Westside

Catch					CPUE Performance Indicators		
2022/23		OT + carryover* (t)			Long-term	Short-term	Last 4 years
(t)	(%)	21/22	22/23	23/24	2003/04 – 2022/23	2009/10 – 2022/23	2018/19 – 2022/23
26.7	10.6	21.0	21.0	21.0	-16	-3	39
LML 2022/23 = 115 / 120 mm					Mean daily catch 2022/23 = 468 kg		

Catch and CPUE



FIS recruits and pre-recruits



Reefcode catches for the Prom Westside SMU from 2017/18 to 22/23 and five-year average 2017/18 to 21/22.

Reefcode	2017/18	2018/19	2019/20	2020/21	2021/22	5-yr average	2022/23
17.02	9248	7700	1808	13950	7049	7951	8269
17.10	4067	5885	2542	4462	7683	4928	6109
17.04	2288	3035	413	3856	3359	2590	1645
17.03	1415	2557	1436	2531	3328	2253	2661
17.05	2368	3257	142	2429	570	1753	4551
17.11	550	1414	220	1102	793	816	1643
17.01	504	810	973	636	901	765	685
17.12	666	846	387	678	114	538	735
17.13	447	450	224	378	49	310	151
16.07	0	0	0	405	368	155	207
Totals	21552	25954	8146	30426	24216	22059	26655

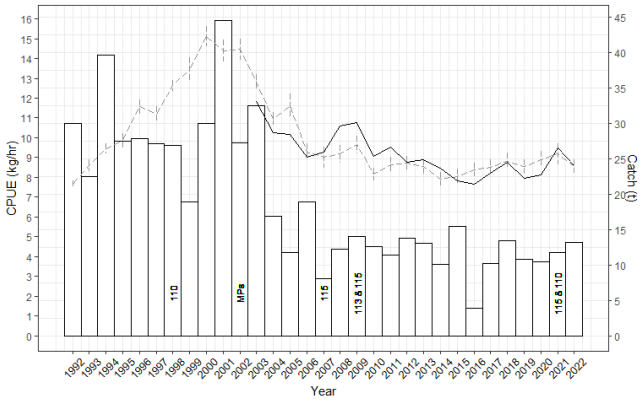
- A peak catch of 62 t was harvested from the Prom West SMU in 2007, with catches generally ranging from 20-40 t per quota year in most other years except for the low catch in 2019.
- Standardised CPUE declined from 2003 to 2019 but has increased thereafter.
- The average length of the commercial catch has been relatively stable over time, but interpretation is complicated by multiple size limits in this SMU.
- The abundance of recruit and pre-recruit sized abalone at the two Top 15 FIS sites had shown increasing trends since around 2010, however both measures declined substantially in 2023.
- The Draft Harvest Strategy result was Increasing, suggesting an OT of 21.0 and 26.2 t.

Acknowledging the low catch in 2019, the three subsequent years catches were well above the OT. While CPUE indicators are positive, which has driven an Increasing Draft Harvest Strategy outcome, mean size of the commercial catch has not increased at Prom Westside as it has at most other SMUs. Also, recruit and pre-recruit abundance at Top 15 FIS sites declined substantially in 2023. Given catches at the Prom Westside SMU have been historically variable, stabilising catches at the OT may improve the stock indicators as it has for other important SMUs. On this basis, maintaining and not exceeding the current OT appears to be an appropriate strategy.

10. Kilcunda

Catch					CPUE Performance Indicators		
2022/23		OT + carryover* (t)			Long-term	Short-term	Last 4 years
(t)	(%)	21/22	22/23	23/24	2003/04 – 2022/23	2009/10 – 2022/23	2018/19 – 2022/23
13.3	5.3	13.7*	11.8*	10.3*	-27	-20	8
LML 2022/23 = 110/115 mm					Mean daily catch 2022/23 = 368 kg		

Catch and CPUE



Reefcode catches for the Kilcunda SMU from 2017/18 to 22/23 and five-year average 2017/18 to 21/22.

Reefcode	2017/18	2018/19	2019/20	2020/21	2021/22	5-yr average	2022/23
15.01	9283	10906	8135	9652	9612	9518	10726
15.05	3555	1783	1585	0	1764	1737	1339
15.03	1536	852	1384	0	367	828	443
15.02	364	509	0	744	62	336	743
15.04	129	0	157	0	0	57	0
Totals	14866	14050	11261	10396	11805	12476	13252

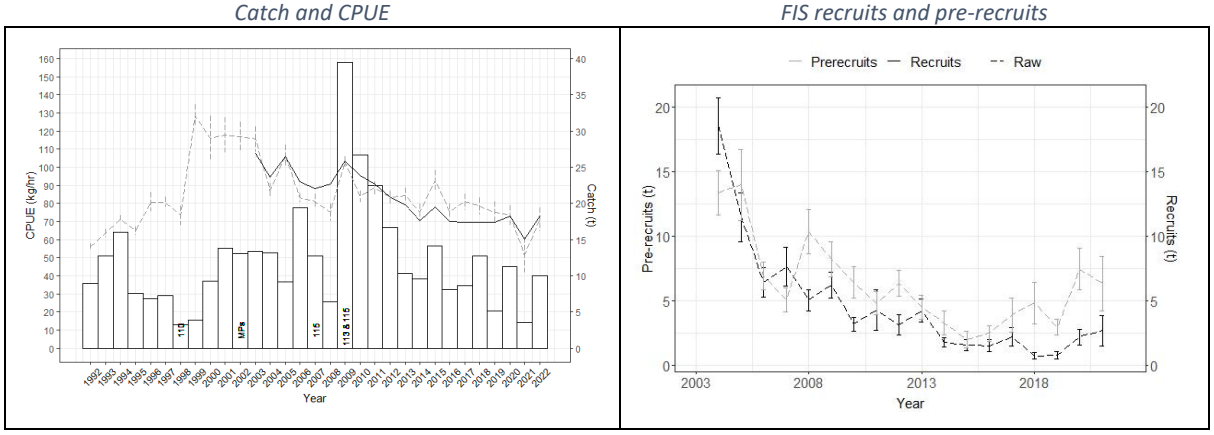
- The Kilcunda SMU had a period of high catches from 1992 to 2003 where an average of 30 t per year was maintained, however since 2004 average catches have been less than half of this level (13 t).
- Whilst CPUE has declined significantly since 2003, both catch and CPUE trends in recent years suggest the stock has stabilised at these lower levels.
- Mean daily catch has been stable in recent years.
- The average length of the commercial catch has been relatively stable since 2016/17.
- There is no FIS data for the Kilcunda SMU.
- The Draft Harvest Strategy result was Decreasing, suggesting an OT of 7.9 to 8.8 t.

The indicators for CPUE, mean daily catch and average commercial length have all been relatively stable in recent years. However, the Draft Harvest Strategy suggests a further reduction in OT based on a decline in CPUE between years. The Kilcunda SMU has not shown the positive increases in stock indicators that other SMUs have in this assessment, and therefore continuing with more conservative OTs appears to be an appropriate strategy if the objective is to improve stock performance.

11. Cape Liptrap

Catch					CPUE Performance Indicators		
2022/23		OT + carryover* (t)			Long-term	Short-term	Last 4 years
(t)	(%)	21/22	22/23	23/24	2003/04 – 2022/23	2009/10 – 2022/23	2018/19 – 2022/23
10.0	4.0	11.8*	12.1*	9.4*	-32	-30	4
LML 2022/23 = 110 mm					Mean daily catch 2022/23 = 354 kg		

Catch and CPUE *FIS recruits and pre-recruits*



Reefcode catches for the Cape Liptrap SMU from 2017/18 to 22/23 and five-year average 2017/18 to 21/22.

Reefcode	2017/18	2018/19	2019/20	2020/21	2021/22	5-yr average	2022/23
16.04	2594	4402	0	4413	804	2443	2832
16.03	3563	2678	2513	2369	821	2389	2586
16.06	2532	2989	1385	3513	1086	2301	2903
16.05	43	2170	449	999	108	754	621
16.02	1448	609	874	0	755	737	1072
Totals	10180	12849	5221	11295	3574	8624	10013

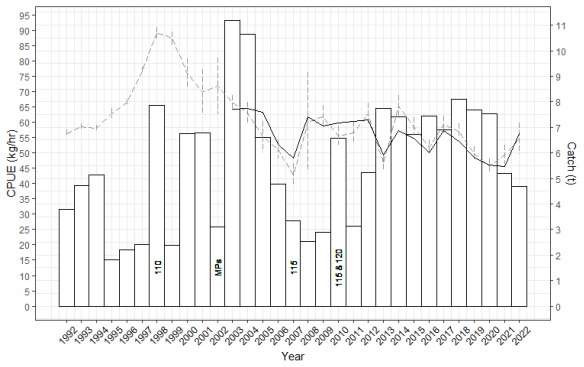
- The Cape Liptrap SMU produced consistent, low catches from 1992 to 2008. Catches peaked in 2009 resulting from a decrease in size limit. Catch in the last 4 years has averaged 7.5 t which is well below historical levels.
- Standardised CPUE declined from 2003 to 2013 but has been relatively stable since.
- Mean daily catch in the last three years has been at its lowest levels since 1992.
- The average length of the commercial catch has increased since 2016/17.
- However, interpretation of all indicators is complicated by an increase in size limit during 2020.
- There are no Top 15 FIS sites at Cape Liptrap (historic FIS data shown in graph).
- The Draft Harvest Strategy result was Stable, suggesting an OT of 8.9 to 9.9 t.

Indicators of stock status provide varying signals for the Cape Liptrap SMU. While CPUE has been relatively stable for a number of years, mean daily catch has been very low in the last three years. On a positive note, the average length of the commercial catch has increased over time despite an increase in LML. Also, the average catch in the last four years has been low relative to historic levels. The OT was reduced in 2023/24, and it seems that maintaining this lower OT is an appropriate strategy if the objective is to achieve an increase in the performance of stock indicators.

12. Prom Eastside

Catch					CPUE Performance Indicators		
2022/23		OT + carryover* (t)			Long-term	Short-term	Last 4 years
(t)	(%)	21/22	22/23	23/24	2003/04 – 2022/23	2009/10 – 2022/23	2018/19 – 2022/23
4.7	1.9	5.7	5.7	4.8	-12	-4	16
LML 2022/23 = 110 mm					Mean daily catch 2022/23 = 304 kg		

Catch and CPUE



Reefcode catches for the Prom Eastside SMU from 2017/18 to 22/23 and five-year average 2017/18 to 21/22.

Reefcode	2017/18	2018/19	2019/20	2020/21	2021/22	5-yr average	2022/23
18.04	3386	2635	3162	3115	2250	2910	1660
18.03	2076	3992	3310	3002	2052	2886	2265
18.06	1080	479	578	1107	555	760	220
18.05	369	991	625	299	326	522	540
18.07	0	0	0	0	0	0	0
Totals	6911	8097	7675	7522	5182	7077	4685

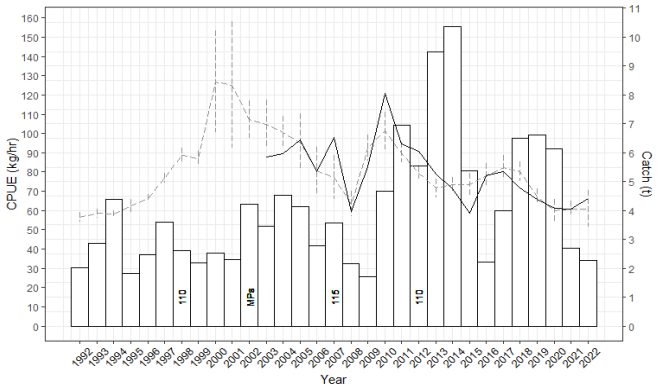
- The Prom Eastside SMU had produced only variable catches until consistent catches were harvested from 2013 to 2020. In the last two years catches have been considerably lower.
- Standardised CPUE had been in recent decline but with the two low catches CPUE returned to recent levels in 2022/23.
- Mean daily catch has been stable.
- The average length of the commercial catch has increased since 2016/17.
- There is no FIS data for the Prom Eastside SMU.
- The Draft Harvest Strategy result was Stable, suggesting an OT of 4.6 to 5.0 t.

The OT was reduced for 2023/24 on the back of declining CPUE over a four-year period. CPUE increased considerably in 2022/23 to return to recent average levels. Mean daily catch has been stable in recent years, while commercial length data suggest that the average size harvested has been increasing. Current catches are well below recent historical levels, so maintaining the current OT as suggested by the Draft Harvest Strategy may result in improved stock indicators in the next few years.

13. Cliffy Group

Catch					CPUE Performance Indicators		
2022/23		OT + carryover* (t)			Long-term	Short-term	Last 4 years
(t)	(%)	21/22	22/23	23/24	2003/04 – 2022/23	2009/10 – 2022/23	2018/19 – 2022/23
2.3	0.9	5.5	5.5	4.7	-25	-20	1
LML 2022/23 = 110 mm					Mean daily catch 2022/23 = 385 kg		

Catch and CPUE



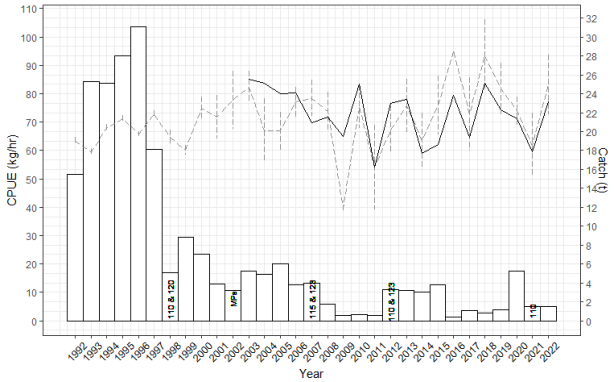
- There is only one reefcode for the Cliffy Group SMU.
- The total catch in the Cliffy Group SMU of 2.3 t was less than half of the OT (5.5 t).
- The Cliffy Group SMU produced much higher than long-term average catches from 2010 to 2020 but catches have been low for the last two years.
- Standardised CPUE declined from 2017 to 2021 but showed a slight increase in 2022 following two years of lower catch.
- Mean daily catch data are limited and variable.
- The standardised average size of the commercial catch was stable from 2017/18 to 2019/20 before declining in 2020/21 and again in 2021/22. No data have been collected since.
- There is no FIS data for the Cliffy Group SMU.
- The Draft Harvest Strategy result was Stable, suggesting an OT of 4.5 to 4.9 t.

Given less than 50% of the OT was caught in the last two years, the declines in CPUE and mean average length of the commercial catch likely reflect poor performance of the stock. On this basis, further reductions in OT could be considered to aid improvement in the stock indicators.

14. Surf Coast

.Catch					CPUE Performance Indicators		
2022/23		OT + carryover* (t)			Long-term	Short-term	Last 4 years
(t)	(%)	21/22	22/23	23/24	2003/04 – 2022/23	2009/10 – 2022/23	2018/19 – 2022/23
1.5	0.6	3	2	1.7	-9	19	4
LML 2022/23 = 110 mm					Mean daily catch 2022/23 = 295 kg		

Catch and CPUE



Reefcode catches for the Surf Coast SMU from 2017/18 to 22/23 and five-year average 2017/18 to 21/22.

Reefcode	2017/18	2018/19	2019/20	2020/21	2021/22	5-yr average	2022/23
10.02	0	684	1183	4143	1152	1432	1475
10.01	689	143	0	614	35	296	0
8.02	510	0	0	0	0	102	0
10.03	0	0	0	509	0	102	0
10.04	85	0	0	0	341	85	0
10.05	53	0	0	0	0	11	0
9.01	0	0	0	0	0	0	0
Totals	1337	827	1183	5266	1528	2028	1475

- The Surf Coast SMU averaged catches in excess of 25 t from 1992 to 1997, however catches declined rapidly thereafter. With eth exception of 2020, all annual catches since 2016 have been amongst the lowest recorded.
- Most of the catch was harvested from reefcode 10.02 in recent years.
- Mean daily catch data have generally ranged without trend from 200 – 400 kg/day.
- No commercial length frequency data are presented for the Surfcoast SMU.
- There are no FIS data for the Surf Coast SMU.
- The Draft Harvest Strategy result was Stable, suggesting an OT of 1.6 to 1.8 t.

Recent catches from the Surf Coast SMU have been well below historic levels. Annual catches generally come from the one reefcode, with small catches from others in some years. Maintaining the current OT seems an appropriate strategy.

6. References

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VFA. 2019a. "Victorian Abalone - Methods used for fishery assessment, Version 1.4 30 June 2019."

VFA. 2019b. "Draft Harvest Strategy Victorian Central and Eastern Zone Blacklip Abalone Fishery. Draft Version 2. VFA, February 2019."

Appendix 1: Summary of performance measures

Tables 1 and 2 summarise performance measures for the Central Zone overall and for all SMUs. Recruit and pre-recruit abundance are for the Top 15 sites only (see Dixon 2023). Mean daily catch and total catches are also provided as additional performance measures.

Table 2: Performance measures used in the assessment of the Central Zone abalone fishery.

Measure	2022/23	Long term (since 2003/04)	Short term (since 2009/10)	Last 4 years (since 2018/19)
CPUE (kg/h)	79.5	97.0 (↓18%)	86.5 (↓10%)	72.2 (↑10%)
Mean daily catch (kg/day)	448.2	478.1 (↓6%)	408.4 (↑10%)	445.7 (↑1%)
Recruit abundance (Top 15 n/transect)	11.9	16.1 (↓26%)	10.5 (↑13%)	10.2 (↑16%)
Pre-recruit abundance (Top 15 n/transect)	12.2	13.0 (↓6%)	10.0 (↑22%)	8.9 (↑37%)
Catch (t)	252.5	654.4 (↓61%)	426.2 (↓41%)	233.1 (↑8%)
2022/23 TACC (t, %)	252.5 t, 100.0%			

Table 3: Performance measures used in the assessment of the Central Zone abalone fishery at the SMU scale (Zone totals repeated for reference). OTs include carry-over TACC.

Spatial Management Unit (SMU)	Catch				CPUE		
	Total Catch 2022/23		OT (t)	SMU Category	Long-term (2003/04)	Short-term (2009/10)	4 years (2019/20)
	(t)	(%) TACC					
Cape Otway	55.8	22.1%	57.9	L	-22	-13	-2
Back Beaches	42.5	16.8%	40	L	-13	-1	19
Phillip Island	35.0	13.9%	34	M	-13	-8	22
Shipwreck Coast	33.9	13.4%	34.3	M	-18	-16	7
Flinders	26.7	10.6%	24.2	M	-22	-7	12
Prom West	26.7	10.6%	21	M	-16	-3	39
Kilcunda	13.3	5.3%	11.8	S	-27	-20	8
Cape Liptrap	10.0	4.0%	12.1	S	-32	-30	4
Prom East	4.7	1.9%	5.7	S	-12	-4	16
Cliffy Group	2.3	0.9%	5.5	S	-25	-20	1
Surfcoast	1.5	0.6%	2	S	-9	19	4
PPB	0.1	0.0%		S			
Central Zone	252.5	100.0%	252.57*		-18	-8	10

** The TACC was 252.57t but this is not the sum of OTs as there was post TACC setting carry-over catch applied.*

Notes: Coloured shading indicates whether catch has been caught within the OT, Threshold or exceeded the Limit. Green (within OT range) indicates catch was <±15% of the OT, Yellow (within threshold range) indicates catch was ±15-30% OT, Red (exceeding limit range) indicates catch was >±30% of the OT for the 2018/19 quota year. SMU catch categories (% of zone catch): Large ≥ 15%, Medium 10-15%, Small < 10%.

Appendix 2: Summary of Draft Harvest Strategy results

Table 17: Reference points for Central Zone SMUs, mean annual CPUE from 2017 - 2022 and applicable catch control rules (CCR).

SMU	Limit RP	Threshold RP	Target RP	2017	2018	2019	2020	2021	2022	Current Status	Years at Status	CCR
Cape Otway	50	70	110	77.4	74.5	83.0	79.1	85.1	80.4	Above Threshold	7	1
Back Beaches	50	70	100	69.7	72.0	71.4	75.9	79.3	85.5	Above Threshold	5	1 - 125%
Phillip Island	50	70	100	67.4	69.2	66.8	71.0	73.9	81.4	Above Threshold	3	1 - 125%
Shipwreck Coast	50	70	130	91.3	99.2	93.3	81.1	89.5	99.6	Above Threshold	13	1
Flinders	50	70	100	60.7	66.6	64.6	62.0	73.7	72.6	Above Threshold	2	1
Prom West	50	70	100	63.1	62.1	57.7	77.0	77.4	79.1	Above Threshold	3	1 - 125%
Kilcunda	50	70	100	64.7	67.9	62.0	62.7	75.4	67.8	Limit to Threshold	1	1
Prom East	40	60	80	62.7	57.5	52.8	50.1	49.6	59.1	Limit to Threshold	5	1
Cape Liptrap	40	60	100	68.1	69.3	69.0	72.6	59.9	72.3	Above Threshold	1	1
Cliffy Group	40	60	100	87.8	76.8	72.0	65.6	66.0	69.8	Above Threshold	27	1
Surfcoast	50	70	80	62.4	81.6	69.6	67.3	56.6	72.9	Above Threshold	1	1

Table 18: Harvest Strategy results for Central Zone SMUs, with suggested target catch ranges

SMU	4yr gradient	Primary Indicator	2yr ratio (% change)	Secondary Indicator	Primary Category	Tertiary Indicator	Final Category	2023/24 Target Catch (OT, t)	Total catch, Lower (t)	Total catch, Upper (t)
Cape Otway	-0.22	Stable	-5.6	Decreasing	Decreasing	NA	Decreasing	49	41.7	46.6
Back Beaches	6.44	Increasing	7.7	Increasing	Increasing	NA	Increasing	40	40, 42	46, 50
Phillip Island	7.01	Increasing	10.2	Increasing	Increasing	NA	Increasing	32.3	32.3, 33.9	37.1, 40.4
Shipwreck Coast	3.17	Stable	11.3	Increasing	Stable	NA	Stable	29.2	27.7	30.7
Flinders	5.70	Increasing	-1.4	Stable	Increasing	NA	Increasing	20.5	20.5, 21.5	23.6
Prom West	10.23	Increasing	2.1	Stable	Increasing	NA	Increasing	21	21, 22	24.1, 26.2
Kilcunda	4.81	Stable	-10.0	Decreasing	Decreasing	NA	Decreasing	10.3	8.8	9.8
Prom East	3.70	Stable	19.3	Increasing	Stable	NA	Stable	4.8	4.6	5
Cape Liptrap	-0.39	Stable	20.8	Increasing	Stable	NA	Stable	9.4	8.9	9.9
Cliffy Group	-0.90	Stable	5.8	Increasing	Stable	NA	Stable	4.7	4.5	4.9
Surfcoast	-0.08	Stable	28.9	Increasing	Stable	NA	Stable	1.7	1.6	1.8
Total								222.9	211.6, 217.2	239.5, 248.9

Appendix 3: Summary of LML changes

Table 19: Summary of changes in LML for the Central Zone. All measurements are in millimetres. Multiple LMLs indicate different LMLs for reefcodes within an SMU.

Date from	Shipwreck Coast	Cape Otway	Surf Coast	PPB	Back Beaches	Flinders	Phillip Island	Kilcunda	Cape Liptrap	Prom Westside	Prom Eastside	Cliffy Group
1 Apr 1998	120	120	110 & 120	100	110	110	110	110	110	110	110	110
1 Feb 2007	123	123	115 & 123	100	115	115	115	115	115	115	115	115
5 Mar 2009	123	123	115 & 123	105	120	115	113 & 115	113 & 115	105	115	115	115
1 Apr 2010	123	123	115 & 123	105	120	115	113 & 115	110 & 115	105 & 110	115 & 120	115	115
1 Apr 2012	123	123	110 & 123	105	120	115	113 & 115	110 & 115	105 & 110	115 & 120	115	110
1 Apr 2014	123	123	110 & 123	105	117	110	110	110 & 115	105 & 110	115 & 120	110	110
1 Apr 2016	123	123	110 & 123	105	117	110	110	110 & 115	105 & 110	115 & 120	110	110
1 Apr 2017	125	123	110 & 123	105	117	110	110	110 & 115	105 & 110	115 & 120	110	110
1 Apr 2018	125	123	110 & 123	105	117	110	110	110 & 115	105 & 110	115 & 120	110	110
1 Apr 2019	125	123	110 & 123	105	117	110	110	110 & 115	105 & 110	120	110	110
1 Apr 2020	130	125	110 & 123	105	119	112	112	115	110	115 & 120	110	110
1 July 2021	130	125	110	105	119	114	112	110 & 115	110	115 & 120	110	110

Appendix 4: Summary of abalone length measuring in CZ updated to December 2023.

Prepared by Dr Duncan Worthington, 31 January 2024. Full details provided in the 2024 Central Zone Stock Assessment Report.