



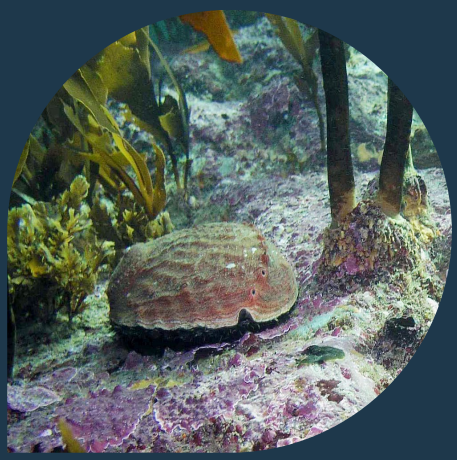

Tasmanian Abalone Fishery

DRAFT SUSTAINABLE HARVEST STRATEGY 2024

Department of Natural Resources and Environment Tasmania

Tasmanian Government

Have your say

This document, the DRAFT Tasmanian Abalone Fishery Sustainable Harvest Strategy 2024 (the Strategy), is subject to public consultation.

All written submissions must be received by **11:59pm 10 October 2024**. Submissions can be forwarded to:

Email: harvest.strategies@nre.tas.gov.au

or

Mail: "Wild Fisheries Harvest Strategy Management"
GPO Box 44
Hobart TAS 7001

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Contents

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Introduction

What is a harvest strategy?

A harvest strategy forms part of the management framework for a fishery. The key components of a harvest strategy are tabled below (Table 1).

Table 1: Description of the key components of a harvest strategy

Objectives	A harvest strategy typically includes a tiered system of objectives. • Strategy objectives are derived from objectives of overarching legislation. They are the high-level aim(s) outlining what the strategy is trying to achieve. • Fishery objectives translate the broad, general strategy objectives into objectives to suit the unique characteristics of the fishery. • Operational objectives translate fishery objectives into specific and measurable objectives.
Performance measures	Data which can be used to monitor fishery performance against stated objectives over time.
Reference points	Benchmarks to assess performance measures against. Target reference points represent desirable performance, and limit reference points represent undesirable performance. Trigger reference points may also be established to represent intermediate performance or over performance.
Decision rules	Management actions or responses that are to occur when a performance measure reaches a given reference point. Clearly defined decision rules that apply at these reference points allow for transparent, efficient, and proactive decision making in the face of the uncertainty, which is inherent in fisheries management.
Meta rules	Modifications to the decision rules to account for extraneous factors.

Scope

This proposed Strategy applies to commercial and non-commercial wild harvest of greenlip and blacklip abalone in State managed waters. The commercial fishery includes people engaging in commercial activities. The non-commercial fishery includes recreational, charter and Aboriginal cultural fishing activities. Abalone aquaculture activities are not within the scope of this Strategy.

The Strategy provides clear guidance to inform decision making, including setting Total Allowable Commercial Catch (TACC) and size limits however this Strategy does not have any status under the *Living Marine Resources Management Act 1995* (the Act) and it cannot be derogate from, or limit the exercise of discretion of the decision-maker (or their delegate) as they seek to fulfil the objectives of the Act.

History of harvest strategy management

In 2014–15, an empirical harvest strategy for the Tasmanian abalone fishery was developed and tested by Management Strategy Evaluation (MSE). It was reviewed (Buxton et. al 2015) and first trialled in 2017. In 2018, following public consultation, and advice of the Abalone Fishery Advisory Committee (AbFAC) and the Recreational Fishing Advisory Committee (RecFAC), the then Minister of Primary Industries and Water approved the use of a harvest strategy to guide management of the Tasmanian abalone fishery. The strategy was again reviewed in 2019 (Mayfield 2019), and most recently by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in 2021 (Little 2021).

This document is the second iteration of the Tasmanian Abalone Fishery Sustainable Harvest Strategy and has been developed considering review recommendations and enhanced by improvements to data collection, scientific understanding and changing social expectations of fishery management. This Strategy has been developed with consideration of historical harvest levels (Appendix 1), and characteristics of the fishery including abalone biology and ecology (Appendix 2).

This Strategy will provide a formal framework for harvest-related management decisions for commercial and non-commercial activities in the abalone fishery. A formal and comprehensive review of this Strategy should be conducted five years after implementation. It is expected that this Strategy will remain effective until such time, however, modifications may be made if necessary.

The Wild Fisheries Management Branch of the Department of Natural Resources and Environment Tasmania (the Department) would like to thank attendees of the abalone harvest strategy workshop and members of the Tasmanian Aboriginal Centre, Seafood Industry Tasmania, Tasmanian Abalone Council, Interim Abalone Fishery Core Group, RecFAC, the Institute of Marine and Antarctic Studies (IMAS) and the CSIRO for their involvement and effort in developing this Strategy and to all members of the community who provided input.

Fishery overview

The Tasmanian abalone fishery is the world's largest wild catch abalone fishery and has been one of the most profitable Tasmanian wild fisheries over the last fifty years.

Two species are found and harvested in Tasmania; blacklip abalone (*Haliotis rubra*) (Image 1), and greenlip abalone (*Haliotis laevigata*) (Image 2), or in palawa kani, the language of Tasmanian Aborigines, nitipa and makarina.

Blacklip abalone are found and harvested state-wide, accounting for appropriately 90 per cent of wild harvest, while greenlip abalone are typically found on northern coastlines and around the Bass Strait islands. The abalone fishery can be broadly categorised as commercial and non-commercial. Refer to Table 2 for a summary of the main input and output controls that apply for commercial and non-commercial fishing activities.

Image 1(left): Posterior and anterior drawing (top) and photo of blacklip abalone (bottom). Image 2 (right): posterior and anterior drawing (top) and photo of greenlip abalone (bottom).

Commercial fishery

The commercial abalone fishery is a limited-entry quota managed fishery. A TACC is determined for each quota zone (referred to as a part under the Act) annually as the sum of TACC adjustments that occur at the Spatial Assessment Unit (SAU) level based on assessment of commercial catch and effort data that is collected at the block or sub-block level. Refer to Appendix 3 for further detail on zones, SAU, blocks and subblocks.

The TACC is evenly distributed to quota unit holders (also known as deed holders) for each zone of the fishery proportionate to their unit holdings each year. Unfished quota cannot be transferred

between zones or carried forward to future fishing years. Quota is fished by the holder of a Fishing Licence (Abalone Dive) (FLAD) through private arrangements with quota holders. In some instances, quota holders can also be a FLAD holder. There is a cap on the number of FLAD's that can be issued, however, not all FLAD holders actively fish in any given year. To be eligible to commercially harvest abalone from Tasmanian waters the individual fisher must also hold also hold a Fishing Licence Personal (FLP). The vessel being used must be licenced with a Fishing Licence (Vessel) (FLV).

Non-commercial fishery

Non-commercial fishing activity is primarily managed by size, daily bag and possession limits. Non-commercial fishery includes recreational fishing and cultural fishing activities.

Entry to the recreational fishery is not restricted, but recreational fishers must be licensed. There are approximately 11,000 licensed recreational fishers. Fishing for abalone is a part of the social fabric of many Tasmanian communities and fishers make a significant contribution to Tasmania's economy with spending on boating, fuel and other equipment. The 2017-18 survey of recreational fishing in Tasmania estimates recreational fishers spent $161 million on goods and services across all fisheries during 2017-18, equivalent to almost $1,800 per annum per active fisher.

Cultural fishing is a distinct activity from recreational fishing, encompassing longevity of customary practice and spiritual dimensions of connection to Sea Country. Abalone is a species of high cultural significance to many Aboriginal people which is harvested as a food source and for traditional uses. Aboriginal activities are defined in the Act.

Table 2: Summary of the main management arrangements for the Tasmanian abalone fishery as of March 2024.

		Commercial	Non-commercial	
WHO?			**Recreational**	**Aboriginal**
Licensing requirement		Entrants must hold a FLAD and FLP	Entrants must hold a Recreational Fishing Licence (Recreational Abalone)	Unlicensed
Licence caps		Entry limited to 121 FLADs and 3500 quota unit holders	Unlimited entry	Entry limited to Aboriginal people as defined by the *Aboriginal Lands Act 1995*
HOW?				
Access to fishery		Sunrise to sunset only	Sunrise to sunset only	Sunrise to sunset only
Gear		Free dive, SCUBA or Hookah	Free dive, SCUBA or Hookah	Free dive, SCUBA or Hookah
Fishing method		Hand gathering with commercially manufactured knife or abalone iron only*	Hand gathering with commercially manufactured knife or abalone iron only*	Hand gathering
Measuring devices		Vernier calliper or gauge, knife or iron with prominent markings or extended prongs	Vernier calliper or gauge, knife or iron with prominent markings or extended prongs	Vernier calliper or gauge, knife or iron with prominent markings or extended prongs
Primary controls		Size limits, annual TAC, catch cap closures	Size limits, daily bag and possession limits	Size limits, daily bag and possession limits
WHEN?				
Fishing year		1 January to 31 December	1 November to 31 October	N/A
WHERE?				
Blacklip	**Quota/bag limit zones**	4 regional zones	1 state-wide zone	1 state-wide zone
	Size limit zones	8 regional zones	2 regional zones	2 regional zones
Greenlip	**Quota/bag limit zones**	1 state-wide zone	1 state-wide zone	1 state-wide zone
	Size limit zones	3 regional zones	2 regional zones	2 regional zones
WHY?				
Relevant state legislation		*Living Marine Resources Management Act (1995), Fisheries (Abalone) Rules 2017, Fisheries Rules 2019, Fisheries (General and Fees) Regulations 2016,* and *Fisheries (Processing and Handling) Rules 2010*		

* A commercially manufactured knife with a blade not less than 18mm wide excluding that part of the blade that is within 50mm of the tip; or an abalone iron that is a broadly flat-bladed, chisel-like lever not less than 18mm in width.

Objectives

In administrating this strategy, the Department will practice good governance to ensure abalone are sustainably harvested to provide ongoing social, cultural, and economic benefits to Tasmanian communities.

Fishery objectives

Rebuild and maintain stocks at the **Maximum Sustainable Yield (MSY)** within each Spatial Assessment Unit (SAU) to:

1. Maintain, and where possible, increase the scope for economic profitably of the commercial fishery and consequent flow-on economic benefits to all Tasmanian communities; and
2. Maintaining, and where possible, increase fisher satisfaction by supporting recreational and cultural fishers to retain the benefits of fishing.

Performance measure

The primary performance measure is the current commercial catch allocation relative to estimated MSY.

MSY is a hypothetical equilibrium state representing the level of catch that can be continually harvested without reducing the population over time.

Where data permits, a MSY estimate is modelled for each SAU. Where MSY can't be reliably determined a predictive model of MSY based on the relationship between modelled MSY and historic catch means can be used to estimate an MSY-proxy. The current allocation relative to MSY (or suitable proxy) is to be reported annually as part of the annual fishery assessment.

Reference points and decision rules

Reference level		Decision rule
Target	MSY (or proxy)	Maintain application of Harvest Strategy - Harvest Control Rules (HCR)
Limit	<0.5 MSY (or proxy)	Harvest Strategy enters recovery plan which involves adjusting HCR that apply to TACC setting and reviewing management settings (including size limits and bag and possession limits) with changes implemented if required.

Meta-rules

Management decisions will be guided by the best available scientific advice and will consider the social, economic or cultural impacts of such decisions.

Secondary performance measures can inform management arrangements but are not explicitly linked to decision rules on harvest levels under this Strategy. Substantial or unusual changes in these indicators may trigger a review of this strategy and/or a departure, or suspension of the normal application of this strategy.

Economic indicators

Measures such as gross value of production (GVP), gross value added (GVA) and beach price give an indication of how the commercial fishery is performing economically.

Large size is a defining factor in the market for wild abalone as small size is associated with farmed abalone, however, farmed abalone are growing faster over time due to generational domestication of stock and improved husbandry. Farmed abalone are likely to contribute more to market share over time. The commercial fishery, driven to maximise economic returns, may selectively target a particular size or area to meet market demands and management settings should consider this.

The value of the fishery is also affected, in part, by quality of the product which varies regionally and seasonally. Within Australia, beach prices are affected by seasonal quality factors and pulses in local supply. The average beach price ranges from over $70/kg for live product compared with $25/kg for canning-quality abalone. Beach prices for abalone are affected by supply-and-demand and a complex array of factors including competition from Asian aquaculture product, exchange rates, politically determined austerity or anti-corruption initiatives in China, tariffs and import restriction in China, and structural changes in the market. The pressures from the COVID-19 pandemic and associated disruptions of global trade including seafood exports to China and is an example of unprecedented challenges to the abalone fishery.

Market preference for certain sizes and condition of abalone have flow-on effects for the management of the fishery since industry will tend to seek to maximise the value of quota through selective fishing.

Recreational catch and effort data

Recreational fishing information is collected and reported annually through a long-standing survey program. The annual recreational fishing surveys capture data including the number of active fishers (as a subset of all licensed fishers) and estimated number of days fished which underpin estimates of recreational catch and effort.

Social indicators

While fishery value is mainly expressed as economic benefits to the commercial fishery, value for the non-commercial fishery is more nuanced and harder to measure. Recreational catch and effort data can be used as a proxy measure of recreational satisfaction (i.e., based on the assumption that high participation rates reflect high satisfaction). Annual recreational surveys also seek to quantify fisher satisfaction. Satisfaction with the quality of the abalone fishing experience may provide an indication of the value of the resource to non-commercial fishers. Limited information is available to demonstrate key satisfaction determinants of the Tasmanian abalone fishing experience. However, the broader body of literature indicates that catch rates (which, are in part, driven by resource

abundance) are very important satisfaction determinants in consumptive fisheries, including abalone.

Cultural indicators

Aboriginal people have a strong connection to Country and water that is central to their identity and culture. Abalone is intrinsically linked with Aboriginal people's identity with Sea Country. Many Aboriginal people have a desire to teach their children to grow up with an understanding of, and knowing, abalone as a food resource and as a part of who they are and their relationship to Sea Country.

Environmental indicators

Environmental indicators include the intensity and frequency of marine heat waves, biosecurity incursions and changes to reef habitat.

Operational objectives

To delivery this Strategy's fishery objective, the abalone fishery will be managed to maintain and increase recruitment; rebuild and maintain biomass and avoid localised depletion with the following operational objectives:

1. Setting TACC based on Multi Criteria Decision Analysis (MCDA) score, and
2. Spatially manage commercial fishing effort, and
3. Setting size limits to protect at least 20 per cent of mature spawning stock biomass (SSB).

Operational objective 1

Performance measure

A MCDA score is calculated for each SAU annually as the sum of:

a) Commercial catch per unit effort (CPUE) target score
The current CPUE compared to a target CPUE. The CPUE target is 55 per cent of the mean annual CPUE from a fixed reference period. The reference period is 2000-2019 for all zones except Bass Strait where the reference period is 2010 -2019.

b) CPUE gradient 4 score
The change in CPUE in the past four years up to and including the current year to date. The target gradient is zero (i.e. no change).

c) CPUE gradient 1 score
The change in CPUE between the current year to data and the previous year. The target gradient is zero (i.e. no change)

d) Commercial catch per unit area (CPUA) target score
The current CPUA compared to a target CPUA. The target CPUA is derived from the target CPUE.

A scoring function converts the observed trends in commercial catch rate data into a score between zero and ten for each of the above MCDA components. A score of five is desirable performance, a score less than five is undesirable and a score over six indicates the overperformance (See Figure 1). The range of each is determined over the reference period and extended by 5 per cent in either direction.

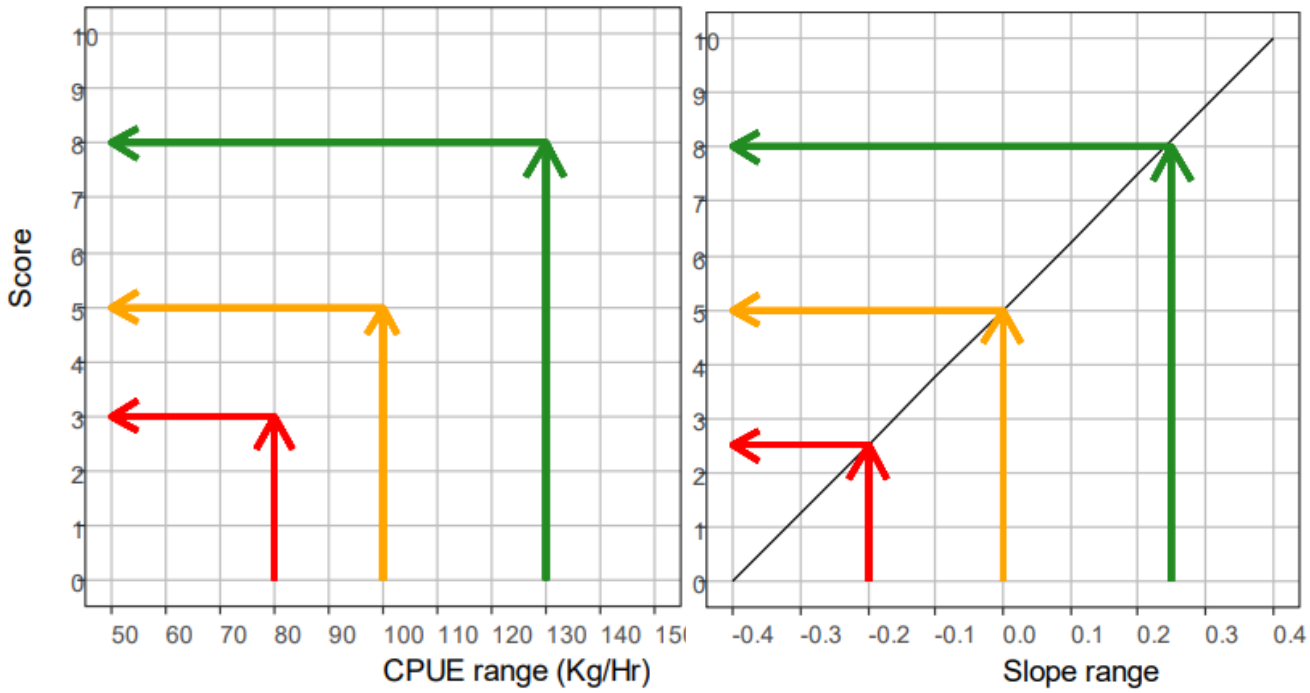

Figure 1: Illustration of the scoring system to convert observed catch rate trend into numerical score for Target CPUE and Target CPUA scores (left) and CPUE Gradient 1 and CPUE Gradient 4 scores (right).

Each of the four scores (a-d) are then weighted; a process which assigns a level of importance to each component (Table 3). The weighted scores are then added together resulting in a combined indexed MCDA Score as a numerical value between zero and ten.

Table 3: Example of weightings applied to each component of the MCDA Score

	CPUE Target	CPUE Gradient 4	CPUE Gradient 1	CPUA Target
Score	a	b	c	d
Weighting	0.60	0.15	0.05	0.20
Weighted score	a x 0.60	b x 0.15	c x 0.05	d x 0.20
MCDA combined index score =	(a x 0.60) + (b x 0.15) + (c x 0.05) + (d x 0.20)			

Note: *CPUE and CPUA scores are calculated from commercial catch rate data only. Catch reporting is not mandatory in the recreational fishery. Recreational catch per unit effort data is considered in annual fishery assessment but recreational catch rates (or changes in those catch rates) are not directly linked to decision rules on harvest settings given the proportion it contributes to total harvest and spatial resolution of such data.*

Commercial CPUE: Daily reporting has been a requirement since 1992 with reporting at the block/sub-block level a requirement since 2000. CPUE time-series data span periods with multiple changes, including management settings, fleet movements, market preferences and environmental change. To remove the effect of these sources of variation on CPUE, the data is filtered and standardised. CPUE standardisation also accounts for differences between diver experience, team diving, and mixed species fishing. Use of statistical standardisation of CPUE has been in place since 2017. Climate effects (e.g. temperature and swell) on CPUE have been explored to better estimate inter-annual variation and will be incorporated into the Strategy over time, where they are found to be an important influence on catch rate. For further details on standardisation of catch rates refer to the most recent annual fishery assessment published on the IMAS website.

Commercial CPUA: The measure of CPUA augments the longer time series of CPUE. Since 2012 commercial fishers have been required to wear electronic dive loggers which provide high resolution geo-spatial information of fishing activity. There is now sufficient diver logger data (over 10 years) to enable fishery assessments to incorporate spatial indicator data in the form of CPUA which provides a more accurate measurement of abalone fishery performance. For further details on CPUA refer to the most recent annual fishery assessment published on the IMAS website.

Reference points and harvest control rule (HCR)

This Strategy employs an asymmetrical graded approach of TACC adjustments based on MCDA score at each SAU (Refer to Table 4). For consistency with the national approach, the MCDA score (as calculated as a numerical value) has been categorised as limit, trigger and target reference points.

Table 4: HCR for TACC adjustments which apply at a given combined index MCDA score.

Reference point	Limit		Trigger			Target		Trigger		
Combined index MCDA score	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	>9
Annual TACC adjustment	-75%	-25%	-20%	-15%	-10%	No Change	+5%	+10%	+15%	+20%

Asymmetry above and below the target MCDA score accounts for known hyperstability in CPUE (i.e., where CPUE under-estimates the true change in abundance).

Where a MCDA score above six is achieved (i.e. above the target reference point) a slight increase in TACC will be recommended to realise the economic benefits of the resource. Conversely, a TACC reduction is recommended if the MCDA score is less than five. The magnitude of adjustment required varies depending on the score. The intent of a graded response is to ensure that TACC adjustments are taken in an orderly way and avoid the need for more substantial intervention.

The limit reference point (i.e. MCDA score less than one) is where fishery performance has been reduced to an unacceptable level through catch and/or non-fishing effects, such that recruitment may be impaired and substantial TACC reduction is required to protect stocks. **A minimum reduction of 75 per cent is recommended.**

The recommended quota adjustments are provided for each SAU however TACC is assigned at a broader spatial scale, to the five parts of the fishery. TACC for each part of the fishery is evenly

distributed between each of the 3,500 quota holders, with quota allocations rounded to the nearest whole kilogram. Therefore, the minimum increment of TACC adjustment for any part of the fishery is 3.5 tonnes (i.e. one kilogram per quota unit). For the purposes of future stock assessments, when quota adjustment for a given SAU is rounded to accommodate even distribution between each of the 3,500 quota units the balance will be deducted from, or added to, the most productive SAU in that part of the fishery.

Meta-rules

Default HCR meta rules which alter the TACC recommendation associated with a given MCDA score are listed below.

1. If HCR recommends TACC increase but CPUE has not been above the target CPUE for the past two consecutive years, no increase is to occur.
2. If HCR recommends TACC decrease and CPUE is below the target CPUE, but has increased for two consecutive years, no decrease is to occur.
3. If HCR recommends a TACC increase but catch is below SAU catch cap (aka under caught) by 50 per cent or more, no increase will occur. (Refer to operational objective 2).
4. If the catch allocation is <0.5MSY (or suitable proxy) refer to TACC setting under a recovery plan.

Where the MCDA score recommends a TACC decrease, the HCR (Table 4) specifies the minimum reduction. A further reduction may be needed if other factors warrant extra precaution. Where the MCDA score recommends a TACC increase, the HCR (Table 4) specifies the maximum increase. The recommended TACC increase associated with a given MCDA score may not occur if arguments can be rationalised to support the status quo. Supporting this approach is a recognition that for long-lived species such as abalone where adult natural mortality is relatively low, from a biology standpoint there is little to be lost in delaying a TACC increase by 12 months.

An alternate course of action may also be warranted if justification can be made that the MCDA score is based on data that is not representative of stock status in a SAU but rather an external economic, social or environmental impact such as disease outbreak, transport logistics or market dynamics.

Other factors to consider include changes to size limits or other fishery independent data (climatic or oceanography data etc.). Extra precaution may also be required as the fishery could be directly (e.g. mortality) or indirectly (e.g. impaired recruitment) impacted by the effects of climate change such as warming waters, changing ocean chemistry and increased frequency and intensity of marine heat waves (MHW). Typically, it is expected the effects of a MHW event will manifest both in the year of the event, and six to eight years later in the exploitable biomass as a recruitment gap associated with that year class entering the fishery.

The TACC setting process will be guided by scientific advice based on the best-available data and may evolve over time to account for unexpected or yet unknown factors. Readers are encouraged to refer to the annual stock assessments on the IMAS website for the most recent information regarding MCDA calculations and contributing factors which may warrant an alternate course of action to what is presented in this harvest strategy.

TACC setting process

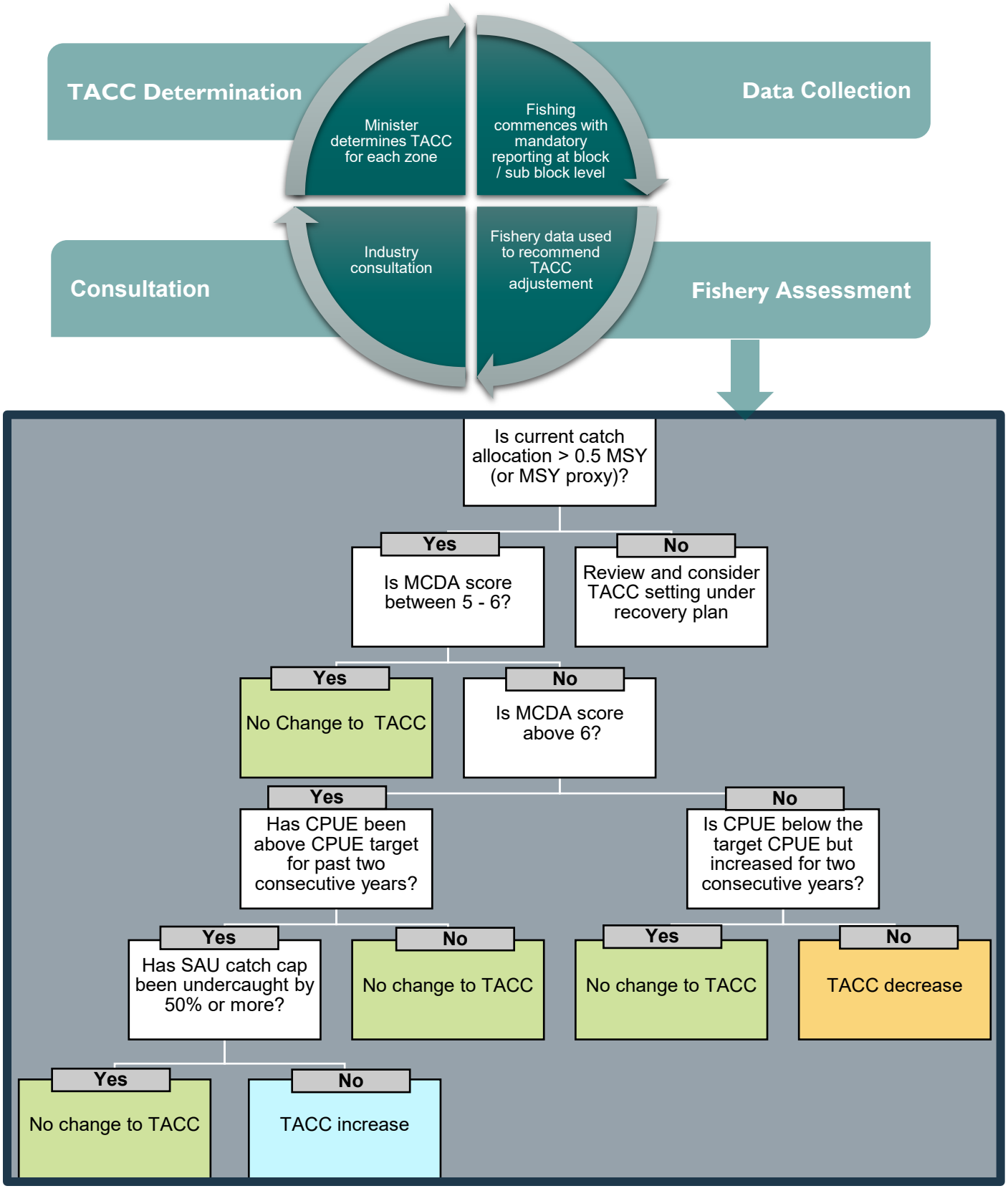

Figure 2: Summary of TACC setting process including decision tree for recommending TACC adjustments using HCR with meta rules.

Operational objective 2

Abalone are susceptible to localised overfishing due to limited dispersal of larvae and low adult migration. SAU catch caps are established for the commercial fishery at the start of the commercial fishing season to spatially distribute fishing effort across quota zones. Catch caps work in conjunction with setting appropriate size limits to minimise the risk of localised depletion.

Spatial distribution of recreational fishing effort is not directly regulated in the same manner as commercial fishing. For the recreational fishery the application of size limits is the main management tool used to avoid localised depletion.

Performance measure

The percentage of annual commercial allocation caught in each SAU relative to the annual SAU catch cap.

Reference points and decision rules

	Limit	Target	Trigger
SAU catch cap	<50%	100%	>100%
Annual TACC adjustment	No TACC increase	In-season commercial closure of SAU	Review and implement corrective measures, if appropriate

The target reference point is when commercial catch reaches 100 per cent of the pre-determined annual SAU catch cap. At this point, that SAU is closed to commercial fishing for the remainder of the fishing season to distribute effort to other SAUs with the quota zone.

When the SAU catch cap remains under caught by 50 per cent or more at the end of the fishing season any HCR recommended TACC increase for the future fishing year is to be waived.

The trigger reference point is when a SAU catch cap is overcaught. A review of the current spatial management approach is recommended at the trigger reference point to investigate cause with appropriate corrective measures implemented to prevent repeated over catch. For example, if over caught very rapidly, it may be that decision rule at the target reference point (i.e. commercial SAU closure) was not enacted fast enough to operate as intended (i.e., prevent an overcatch) and an alternate approach is required. If overcaught and there are sustainability concerns through diver observation and/or fisheries independent data, management actions to spatial distribute fishing effort may include delayed season opens (i.e. SAUs closed at start of the season) or other suitable initiatives, including voluntary industry arrangements.

Meta-rules

For over catch: Intentional exceedance of the catch cap may occur to relieve pressure on other SAUs, for example following storm or Marine Heat Wave (MHW) events.

For under catch: The decision rule to waive recommended TACC increase at the limit reference point may not be taken if SAU catch cap is under caught due to unusual disruptions to market dynamics which have a direct impact on commercial operations resulting in inability to meet catch

cap, or fishery closure associated with disease or algal outbreak resulting in inability to meet catch cap.

Operational objective 3

Sustainable harvest can be achieved by ensuring abalone are provided some post maturity growth protection from harvest. To ensure abalone are sustainably harvested size limits should be set to protect at least 20 per cent of the SSB. This level of protection can increase stock resilience to both fishing and non-fishing impacts.

Appropriate size limits across different regions of the state are fundamental to maintaining adequate recruitment levels in abalone populations and is especially important to preventing localised depletion given population connectivity (or lack thereof). The setting of size limits across both the commercial and non-commercial fishery is the main management lever to maintain recruitment into the fishery and are established to reflect the biological features of the fishery. Growth rates and size of maturation vary latitudinally, influenced by food, wave energy and temperature. At finer spatial scales growth and maturity may also vary as growth and size at maturity can be influenced by localised environmental conditions. However, it is impractical to develop different size limits that accommodate all the combinations of growth and size at maturity exhibited by populations within a region; management aims to achieve the best compromise.

Size limit zones are also established with consideration to compliance and administrative logistics, hence size limits zones differ to quota management zones and in some instances, commercial size limit zones differ to non-commercial zones.

Performance measures

The percentage of spawning biomass protected at various size limits can be estimated with size structured population dynamics modelling, using biological data and/or defendable assumptions on population biology parameters.

Size structure of the abalone population can be informed by fishery dependent data such as catch length-frequency data from measuring boards, and fishery independent data, such as pre-recruitment surveys. Abalone populations around the coast are regularly sampled by IMAS to estimate their median size at maturity. In addition, abalone growth is measured through tagging programs in key parts of the fishery. These maturity and growth studies have been in place since the late 1980s and are ongoing.

For further details on length-frequency data collection, data filtering and interpretation of results refer to the annual stock assessment on the IMAS website.

Reference points and decision rules

Size limits will be set to achieve the target level of protection of over 20 per cent of the SSB. Different size limits will be required in different parts of the fishery, a lower size limit will achieve the same level of protection for populations with slower grow rates. Conversely, fast growing populations will require a higher size limit.

- **Blacklip abalone**
  The previous iteration of this Strategy recommended that size limits should provide abalone three years post-maturity growth protection from exploitation. New size limits for the commercial fishery based on this principle, coined 'the three-year rule' are being progressively introduced to different parts of the fishery until 2025. A staggered transition from 2023-2025 balances biological objectives with economic impacts to the commercial fishing industry and compliance requirements. Implementation of this decision rule to the non-commercial fishery will be progressed with consideration of the differences in use of the resource and associated management, monitoring and enforcement arrangements.

- **Greenlip abalone**
  Due to greater variation in size at maturity, with some greenlip abalone maturing as small as 70 mm shell length, the three-year rule is not readily applicable. Instead, ensuring adequate egg production is achieved by setting size limits with reference to greenlip abalone research in South Australia. This research proposes a 50 per cent egg-per-recruit threshold for intermediate sized meta-populations and 40 per cent for large meta-populations.

Setting appropriate size limits continues to be an integral component of this Strategy and the current approach should be assessed to determine its effectiveness in protecting 20 per cent of the SSB. The limit reference point is when less than 20 per cent of the SSB is protected under the current legal minimum length (LML) settings. At the limit, any required LML adjustments should be consulted and implemented on an appropriate spatial scale. In general, the commercial fishery is managed at a finer spatial scale than the non-commercial fishery. Management arrangements may differ for commercial and non-commercial activities due to differences in use of the resource, logistics, administration and compliance.

Meta-rules

If a shift in population size structure can be confidently attributed to an episodic recruitment gap that is expected to self-correct with appropriate short-term management of fishing effort (such as temporary closure, or reduced or delayed TACC increases, or bag limit adjustments) adjustments to size limits may not be taken.

Although this Strategy establishes a recruitment target (>20 per cent SSB) with the associated decision rule being a size limit adjustment, size limits should work in harmony with other management levers such as appropriate TACC and bag/possession limits to seek to achieve the overarching aim of ensuring abalone are sustainably harvested to provide ongoing benefits to community. In some instances, size limit adjustments may be preferable to bag and possession limit adjustments for the recreational fishery to support continued access. Social and economic impacts of size limit adjustments should inform decision making. The staggered, incremental transition to new size limits for the commercial fishery is a prime example of this. Other factors which may precipitate a reconsideration of size limits include consideration of cultural practices.

Recovery plan

If the MSY (or MSY proxy) limit reference point is breached the Strategy will transition into a recovery plan. A recovery plan will be developed as needed to rebuild stocks to above the limit reference point (0.5 MSY (or proxy)). This will involve reviewing the existing commercial and non-commercial arrangements with a view to introducing changes to facilitate recovery.

- **Commercial fishery**
  Typically, a recovery plan will involve adjusting the HCR to apply more precaution to prevent further decline (for example CPUE target increases from 55 per cent to 65 per cent) and introducing measures to accelerate TACC increases when there is evidence of recovery (for example greater weighting placed on CPUE target when CPUE is above CPUE target for four consecutive years).

- **Non-commercial fishery**
  Any changes to bag and possession limits to promote recovery will take into consideration the associated logistics, compliance and administration of those arrangements. The bag and possession limit changes may be supported and/or supplemented by size limits adjustments, seasonal closures or delayed season openings.

Fishery closure

Although this Strategy is designed to rebuild and maintain stocks at MSY, in some instances a fishery closure may be recommended in lieu of a TACC reduction, particularly when reduction results in relatively very low tonnage for the SAU. In some instances, a localised recreational closure may be preferrable to a state-wide bag/possession limit reduction to reduce non-commercial fishing pressure to rebuild stocks.

If in the exceptional circumstance that a fishery closure occurs, a revised monitoring program may be required due to the loss of fishery dependent data. The requirement to obtain fisheries independent data to monitor recovery will be assessed on a case-by-case bases noting the risk-cost-catch trade-off (i.e., data collection in low value (economic or social value) SAUs or remote SAUs may not occur).

Re-opening a closed fishery

If a fishery closure occurs, the closure will be for a minimum of eight years in the absence of fisheries independent data, or for a period less than eight years, if fisheries independent data and associated scientific advice supports re-opening. Criteria considered in re-opening a closed fishery includes:

- **Population density**
  - Evidence of abundance densities above a minimum threshold
- **Size structure**
  - Evidence of multiple age classes above the LML and the median of the mean size per site above that observed in the baseline
- **Distribution and patchiness**

- Evidence of SAU-wide recovery. Abalone populations meet density and size structure criteria in a high proportion of survey sites (i.e. not driven by a small number of sites showing high abundance).

Monitoring and Assessment

A vital component in the management of any fishery is the collection and analysis of fishing data. The abalone fishery has a comprehensive data collection program. Fishery information is collected through commercial fishing logbooks and electronic dive loggers, information from food processors, vessel monitoring systems and recreational fishing surveys.

Annual fishery assessments and reports of recreational fishing activity are conducted by IMAS as part of the Sustainable Marine Research Collaboration Agreement (SMCRA) between the University of Tasmania and the Department.

Annual fishery assessments generally rely upon a combination of fishery dependent and fishery independent data. Commercial fishing catch and effort data is assessed at the SAU level. SAUs typically comprises multiple blocks or sub-blocks that reflect the intensity of fishing in an area while maintaining cost-effective governance. For example, finer spatial management is employed in highly productive areas or highly vulnerable areas. Over time, a SAU may be separated into multiple SAUs if block or sub-block data within the SAU is highly variable or divergent. Alternatively, blocks or sub-blocks with low level catch may be aggregated into a larger SAUs to ensure sufficient data is obtained for assessment. SAUs may also change as new technology and processes allow for more practical or cost-effective management at different spatial scales.

This document should be read in conjunction with the most recent annual fishery assessment which can be viewed on the IMAS website.

Status of Australian Fish Stocks (SAFS) assessment

This Strategy includes guidance for linking the Tasmanian abalone fishery annual stock assessments at each SAU to the national FRDC Status of Australian Fish Stocks (SAFS) reporting system on a zonal level (Table 5). The zone status is determined using catch-weighted MCDA component scores from each SAU. Annual assessments of Tasmanian abalone stocks use commercial catch rate data to produce phase plots to visually display the trajectory of stock status over time. These phase plots use the CPUE Gradient 4 score as a proxy for fishing mortality (F Proxy) and the CPUE Target Score as a proxy for fish biomass depletion (B Proxy). In MCDA calculations the Gradient 4 score is a numerical value between 0 and 10, however as typical phase plot expresses fishing mortality in the range 0 to 1, with a limit reference point of around 0.2 (fishery dependent), the CPUE Gradient 4 score is rescaled between -5 and 5, with 0 being the limit.

Table 5: Conversion guide for Tasmanian Abalone Fishery Assessment plot data into national SAFS definitions.

Plot data	SAFS Definition
B proxy above 1, and F proxy above 0	Sustainable
B proxy above 1, and F Proxy less than 0 but trending towards 0	Recovering
B proxy above 1, and F Proxy less than 0	Depleting

B proxy less than 1	Depleted
CPUE data not available	Unknown/Informed by other data

Risk-cost-catch

Intervention options quickly reduce when stocks are depleted. Once an abalone population becomes vulnerable to extinction it is very difficult to rebuild the stock as larval dispersal is limited to the spawning area and adult abalone are not likely to migrate far. The decision rules in this Strategy have been developed with consideration to the cost associated with monitoring, enforcing and managing the fishery. Overfished stocks may require additional management and intense monitoring which results in increased costs. Setting appropriate size limits to maintain recruitment into the fishery and a precautionary approach of asymmetrical graded TACC adjustments has been established to minimise the risk of a full fishery closure which comes at a high social and economic cost.

Acceptable levels of risk

Typically harvest strategies that use model-based assessment methods report acceptable levels of risk as probability or confidence levels, however this is an empirical harvest strategy that relies upon fishery dependant data. This Strategy has been established with an understanding that some performance measures are lag indicators. It is acknowledged that CPUE includes the propensity of the index to be hyper stable, which means that CPUE is unlikely to reflect declines in abundance until they are of a magnitude that divers can no longer adjust their fishing behaviour to maintain catch rates.

The performance indicators, reference points and decision rules adopted under this Strategy have been selected according to the precautionary principle of the *Harvest Strategy Policy for Tasmanian Wild Fisheries* (2023). This Strategy sets out the minimum requirements, a more precautionary approach should be adopted where uncertainty exists, particularly in the assessment of biological stock status.

Management Strategy Evaluation (MSE)

MSE can forecast fishery dynamics such as biomass, catch and catch rates in different scenarios, under different management settings. Refer to the *IMAS response to Little (2021) review of the Tasmanian Abalone Harvest Strategy* (Mundy and Haddon 2024) for detail on MSE.

Harvest Strategy Review

It is intended that this Strategy remain operational for five years, at which point a robust and comprehensive review is to occur. Outside formal review periods, ongoing monitoring of the Strategy is also to occur to ensure it does not result in unintended or detrimental outcomes. The Strategy may be subject to amendment as appropriate within the five-year period if it is clear the Strategy is not working effectively, the objectives are not being met, or if new or improved performance indicators become available. Performance indicators linked to explicit decision rules on harvest levels should be subject to assessment, such as MSE or retrospective analysis, before being

incorporated into this Strategy. Alternate or additional performance indicators should only be incorporated in the future if data collection and assessment of those indicators prove to be economically feasible, reliable, and repeatable.

Resource sharing

This Strategy does not establish allocations to different fisheries.

Commercial quota holders hold access rights via a Deed of Agreement with a TAC for the commercial fishery (i.e. TACC) set annually, while access in the non-commercial fishery is managed through licences, which are not limited, and bag and possession limits.

The most recent survey of recreational abalone fishing catch was undertaken for the 2022-23 season which estimated that 23.8 tonnes of abalone (blacklip and greenlip) equivalent to approximately three percent of the total Tasmanian commercial abalone catch, was taken by recreational fishers (Tracey et. al 2023). However, in comparing the proportions of recreational and commercial catch it is important to note that recreational catch estimates are likely to be less accurate as mandatory reporting requirements to do not apply to the recreational fishery. It is also notable that the commercial fishery operates on calendar years, while the recreational fishing season is from 1 November to 31 October and the IMAS survey collects recreational fishing data from a subset of recreational fishers from 1 November to 30 April and scales those figures to estimate annual figures for the fishery. Regardless, the portion of catch retained by each fishery is not necessarily representative of the importance of the species to each fishery, nor the weight given to their aspirations and desired use of the abalone resource.

Acronyms

AbFAC	Abalone Fishery Advisory Committee
CPUA	Catch Per Unit Area
CPUE	Catch Per Unit Effort
CSIRO	Commonwealth Scientific and Industrial Research Organisation
FLAD	Fishing Licence (Abalone Dive)
FLP	Fishing Licence Personal
FLV	Fishing Licence (Vessel)
GVA	Gross Value Added
GVP	Gross Value Production
HCR	Harvest Control Rule
IMAS	Institute of Marine and Antarctic Studies
IUCN	International Union for Conservation of Nature
LML	Legal Minimum Legal
MCDA	Multi Criteria Decision Analysis
MHW	Marine Heat Wave
MSE	Management Strategy Evaluation
MSY	Maximum Sustainable Yield
RecFAC	Recreational Fishery Advisory Committee
SAFS	Status of Australian Fish Stocks
SAU	Spatial Assessment Unit
SCUBA	Self-Contained Underwater Breathing Apparatus
SMRCA	Sustainable Marine Research Collaboration Agreement
SSB	Spawning Stock Biomass
TACC	Total Allowable Commercial Catch

Glossary

Beach price	The reported economic value of commercially landed fish.
Brood stock	Reproductively mature adults that breed or spawn
GVA	A measure of fishery gross margin, excluding labour cost. Standardised GVA is a combination of the state-wide total harvest and the state-wide catch weighted nominal CPUE, using a standardised price and cost.
GVP	An estimation of the activity level, in monetary terms. GVP is calculated by multiplying the landed weight by the beach price.
Hookah	A method of diving using surface supplied air via a hose.
Linear regression	A data analysis technique to predict the value a variable based on the value of another variable. Often used to model the relationship between a known and unknown variable.
MSY	A hypothetical equilibrium state. The greatest (maximum) catch taken (yield) that can be sustained over time.
Recruitment impaired	A reduction in reproductive output resulting in a significant reduction in recruits.
Sexual maturity (or size at maturity)	Taken to be the length at which 50% of fish (abalone) in an area have reached maturity.
SSB	The (estimated) total weight of all sexually mature fish in the stock.

Appendix

Appendix 1: Historic TAC

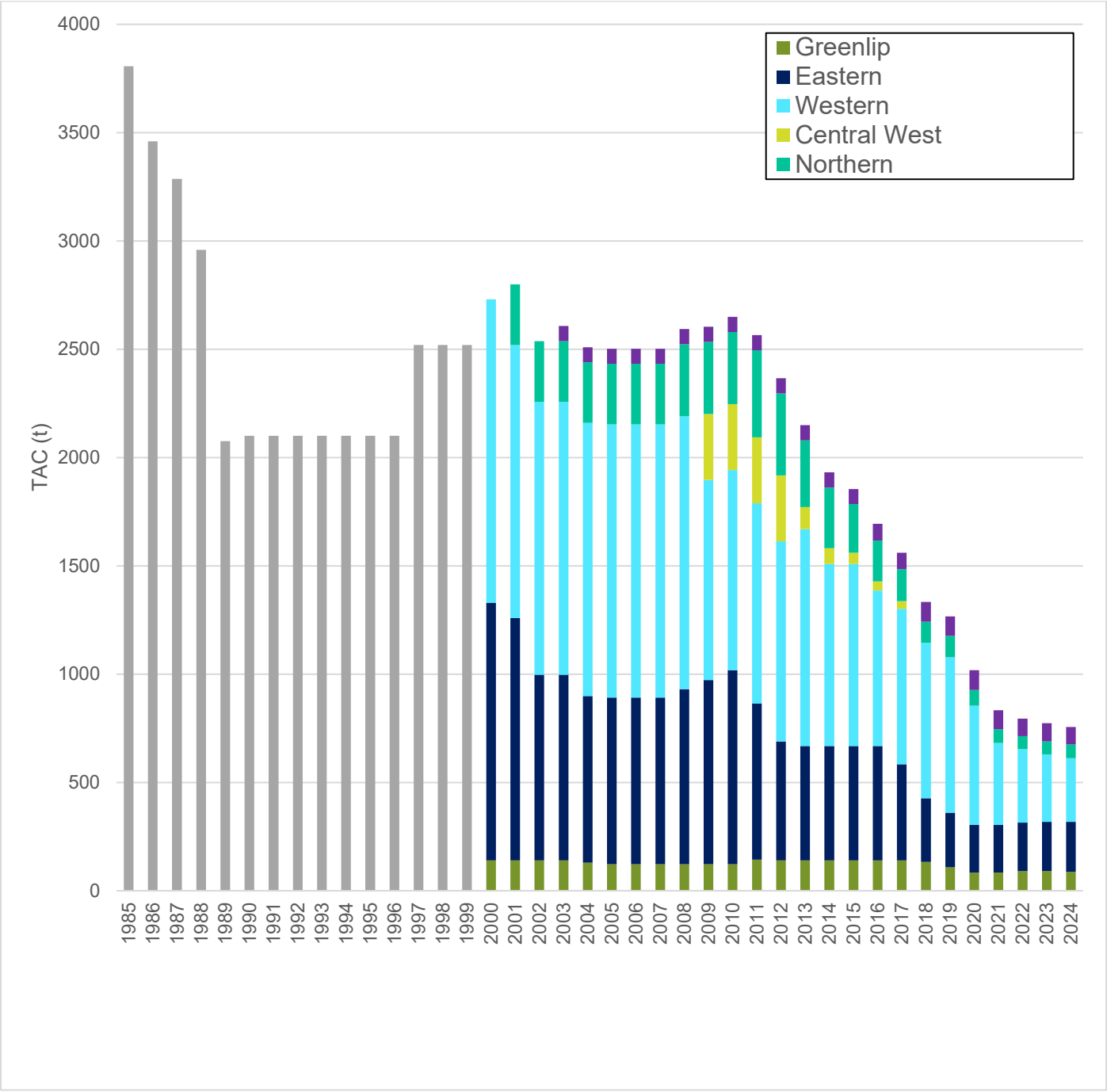

Figure 3: Annual TAC (in tonnes) for the abalone fishery since the introduction of a TAC in 1985 - which has been assigned to parts (also called zones) of the fishery since 2000.

Appendix 2: Key features of the Tasmanian Abalone Fishery

Targeted species:	Blacklip abalone	Greenlip abalone
Proportion of total harvest:	~ 90%	~ 10%
Taxonomy:	Phylum: Mollusca Class: Gastropod Family: Haliottidae Genus: Haliotis Species: *Haliotis rubra*	Phylum: Mollusca Class: Gastropod Family: Haliottidae Genus: Haliotis Species: *Haliotis laevigata*
Common description:	marine snails	
Lifespan:	~ 50 years	~ 50 years
Age at sexual maturity:	~ 5 years	~ 2-3 years
Average size at maturity:	80-130 mm	70-120mm
Growth rates:	**Variable.** Generally, abalone in northern Tasmania grow slower and to a smaller maximum size, and become sexually mature at a smaller size, than abalone in the south. On a smaller scale, and primarily in the northern regions, there may be variation in growth and maturity between local populations.	
Distribution:	state-wide	North coast and Bass Strait Islands
Habitat:	Rocky substrate from shallows to depths of up to 50 metres, although most commonly found at depths less than 30 metres.	
Behaviour:	Bottom dwelling grazers. Juveniles are nocturnal and hide under rocks during the day then emerge at night to feed. Sexually mature animals do not exhibit nocturnal behaviour.	
Diet:	Drift seaweeds and algae on rock surfaces.	
Reproduction:	**Highly variable in time and space** • Broadcast spawners (i.e., Release large numbers of eggs and sperm into the water where fertilisation occurs) • Embryos hatch within 24 hours of fertilisation • Brief pelagic larval stage (usually 4-5 days but up to 14 days in cooler waters)	

Peak spawning season:	There is limited evidence of a peak reproduction season for blacklip abalone while greenlip abalone typically spawn in mid-late spring.
Adult migration:	Abalone do not migrate seasonally. Adult migration is generally less than 100 metres.
Natural predators:	Research suggests natural mortality appears to be very low with few significant predators of adult abalone. Predation of juveniles is unknown but assumed to be higher than for adult abalone.
Main threats:	• Overfishing • Habitat loss • Altered ocean chemistry • Increased intensity and frequencies of MHW • Invasive, pest and range extending species • Biosecurity incursions • Anthropogenic pollution
Current status:	Refer to the latest Status of Australian Fish Stocks (SAFS) Report.

Species	Zone	SAFS Status	
		2020	2023
Blacklip abalone	Western zone	Depleted	Sustainable
Blacklip abalone	Northern zone	Sustainable	Sustainable
Blacklip abalone	Bass Strait zone	Sustainable	Sustainable
Blacklip abalone	Eastern zone	Sustainable	Sustainable
Greenlip abalone	State-wide	Depleting	Sustainable

In 2021, the International Union for Conservation of Nature's (IUCN) Red List of Threatened Species reported both blacklip abalone and greenlip abalone as vulnerable. It is important to note the IUCN Red List assessment occurs at the national level across multiple jurisdictions.

Appendix 3: Fishery parts (or zones), Spatial Assessment Units (SAUs), blocks and subblocks

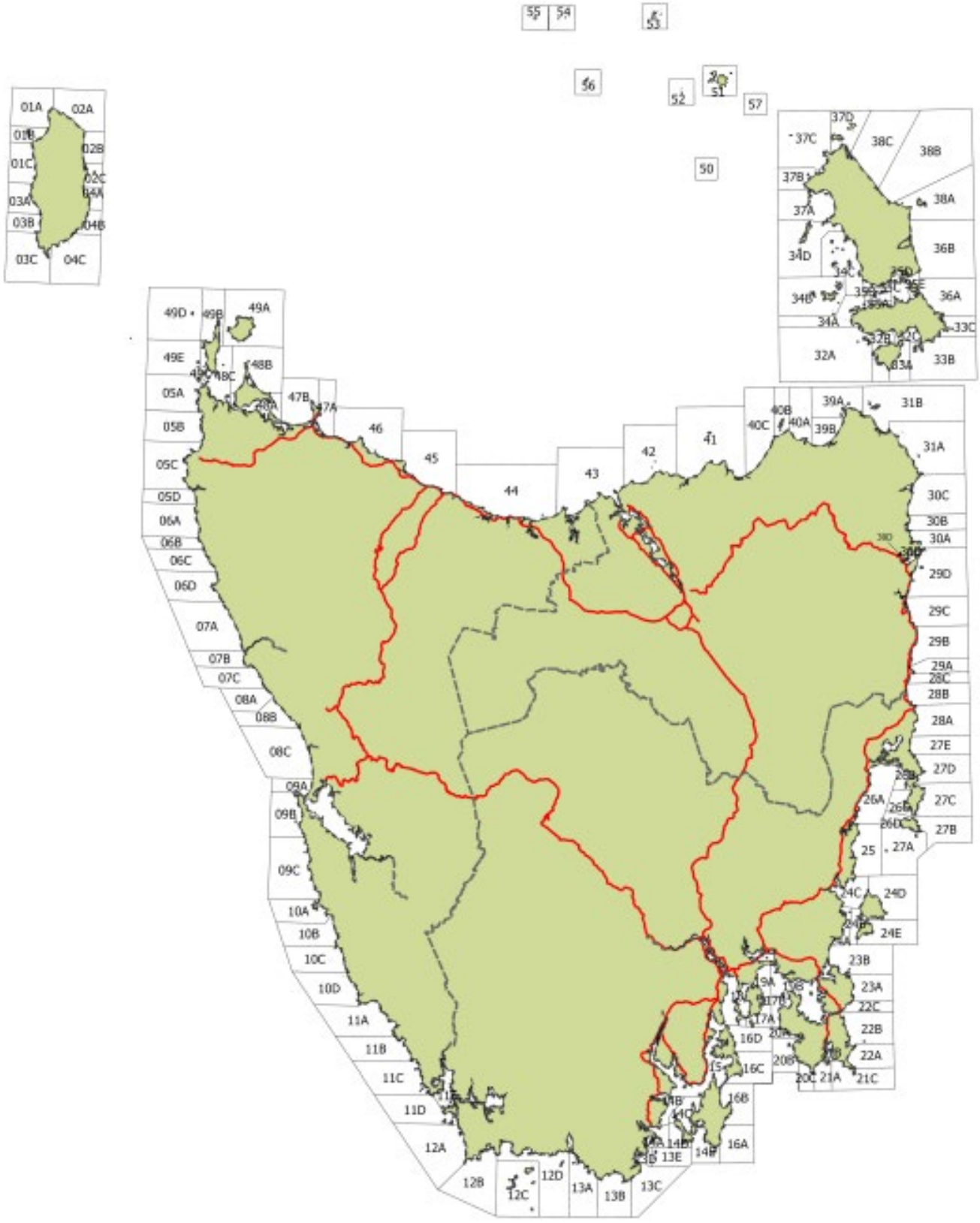

Figure 4: 2024 sub-block map for the Tasmanian Abalone Fishery

Table 6: Sub-blocks (or blocks) within each SAU for each part of the Tasmanian Abalone Fishery for 2024		
Part of the fishery (zone)	**Spatial Assessment Unit (SAU)**	**Block(s)/Sub-block(s)**
Blacklip		
Northern	SAU 3	1a, 1b, 1c, 2a, 2b. 2c, 3a, 3b, 3c, 4a, 4b, 4c
	SAU 5	5a, 5b, 5c, 5d, 6a, 6b, 6c
	SAU 31 B	31b
	SAU 39	39a, 39b, 40a, 40b, 40c
	SAU 49 D	49d, 49e
Western	SAU 7	6d, 7a, 7b, 7c, 8a, 8b, 8c
	SAU 9	9a, 9b, 9c
	SAU 10	10a, 10b,10c, 10d
	SAU 11	11a, 11b, 11c, 11d, 11e
	SAU 12 IN	12a, 12b, 12d, 13a, 13b
	SAU 12 ISL	12c
Eastern	SAU 13 E	13e
	SAU 13 IN	13c, 13d
	SAU 14 A	14a, 14b, 14c
	SAU 14 D	14d, 14e
	SAU 16	16a, 16b, 16c, 16d
	SAU 17	17a, 17b, 19a, 19b
	SAU 18	15, 18
	SAU 20	20a, 20b, 20c
	SAU 21	21a, 21b, 21c
	SAU 22	22a, 22b, 22c, 23a
	SAU 23	23b, 24a, 24b, 24c
	SAU 24	24d, 24e
	SAU 25	25, 26a, 26b, 26c, 26d
	SAU 27	27a, 27b, 27c, 27d, 27e
	SAU 28	28a, 28b, 28c
	SAU 29	29a, 29b, 29c, 29d
	SAU 30 D	30d
	SAU 30	30a, 30b, 30c
	SAU 31 A	31a
Bass Strait	SAU 33	32a, 32b, 32c, 33a, 33b, 33c
	SAU 34	34a, 34b, 34c, 34d, 35a, 35b, 35c, 35d, 35e, 36a, 36b, 37a, 37b, 37c, 37d
	SAU 38	38a, 38b, 38c
	SAU 41	41, 42, 43
	SAU 44	44, 45, 46, 47a, 47b
	SAU 49	48a, 48b, 48c, 49a, 49b, 49c
	SAU 53	50, 51, 52, 53, 54, 55, 56, 57
Greenlip		
Greenlip (state-wide)	King Island	1a, 1b, 1c, 2a, 2b. 2c, 3a, 3b, 3c, 4a, 4b, 4c
	Northwest	48b, 48c, 49a, 49b, 49c, 49d, 49e, 5a, 5b, 5c, 5d
	Bass Strait Islands	50, 51, 52, 53, 54, 55, 56, 57
	Perkins Bay	48a
	Central North	40a, 40b, 40c, 41, 42 ,4 3, 44, 45, 46, 47a, 47b
	North East	30a, 30b, 30c, 30d, 31a, 31b, 39a, 39b,
	Furneaux	32a, 32b, 32c, 33a, 33b, 33c, 34a, 34b, 34c, 34d, 35a, 35b, 35c, 35d, 35e, 36a, 36b, 37a, 37b, 37c, 37d,38a, 38b, 38c
Part of the fishery (or zone) = Scale of quota allocation SAU = Scale of assessment (TACC adjustments) and catch caps Blocks and sub-blocks = Scale of commercial catch reporting		

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