Southern Sand Flathead Assessment 2024

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This assessment of the Southern Sand Flathead Fishery is produced by the Institute for Marine and Antarctic Studies (IMAS) using a combination of data generated from fishery-independent surveys between 2012 and 2024 as well as commercial fishery data downloaded from the Department of Natural Resources and Environment, Tasmania (NRE Tas) Fisheries Integrated Licensing and Management System (FILMS) database. The commercial fishery data presented here includes all logbook returns up until the 2022/23 season.

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2 Executive summary

Stock status: **DEPLETED**

This report provides an assessment of the status of Southern Sand Flathead (*Platycephalus bassensis*) in Tasmania in 2023-2024. It includes a summary of key biological characteristics, management arrangements, trends in commercial catch and effort (2007/2008-2022/2023), and an analysis of data from fishery-independent surveys of age and length composition across the state (2012-2024).

Following the ban of commercial take in November 2023, harvest of Southern Sand Flathead in Tasmania is now exclusively driven by the recreational fishing sector. However, commercial catches were minor before the ban was implemented, with the most recent estimate representing only 1% of the combined total harvest.

A fishery-independent survey of Southern Sand Flathead populations in southeast Tasmania commenced in 2012 to support the assessment of this species. Initial survey results revealed a low relative abundance of legal-sized fish at survey sites in the D'Entrecasteaux Channel, Frederick Henry-Norfolk Bay, and Great Oyster Bay, suggesting that local populations of Southern Sand Flathead in these areas along the south and east coasts of Tasmania are heavily fished.

In late 2015, management changes were introduced to reduce fishing mortality, including: (1) an increase in the minimum size limit from 300 mm to 320 mm, and (2) a reduction of the daily bag limit from 30 to 20 fish per fisher. Initial subsequent analyses of fishery-independent data and associated estimates of fishing mortality suggested that these management measures might have supported stock recovery. However, more in-depth analyses, based on increasingly comprehensive survey data (with six additional sampling locations added from 2021), indicate the persistence of unsustainable levels of fishing mortality, specifically for female fish.

Notably, initial estimates of female biomass and spawning potential presented in assessment reports published from 2022 onwards indicate that Southern Sand Flathead have been depleted below critical levels. Additional regulations were implemented in 2023 and 2024 (see here) with the intention of supporting stock recovery over the coming years. The estimate of fishing mortality presented in this report indicates a minor decrease compared to 2022/23. However, the estimated level of fishing mortality remains above levels required for stock recovery and suggests continued biomass depletion in surveyed areas (except for Flinders Island). Thus, Southern Sand Flathead remains classified as ***Depleted***.

3 Introduction

Southern Sand Flathead (*Platycephalus bassensis*; hereafter Sand Flathead) is a bottom-dwelling species found in inlets, estuaries and coastal waters, generally at shallow depths (< 50 m), but occasionally down to around 100 m. Sand Flathead are endemic to southern Australia, including New South Wales, Victoria, Tasmania and the southern part of Western Australia (Edgar 2008; Gomon, Bray, and Kuiter 2008). The population structure of Sand Flathead is uncertain, which is why stocks are typically assessed at the state level (except for Port Phillip Bay in Victoria; see SAFS 2023). However, studies of movement, growth and reproductive biology show regional variability, indicating that population differentiation at finer scales might be common (Bani and Moltschaniwskyj 2008). A more detailed summary of key biological characteristics of Sand Flathead can be accessed here.

Sand Flathead is the dominant recreational fishery species in Tasmania, with approximately 300 t of catch per year in the early 2000s and almost 126 t estimated for the 2022/23 fishing season (Tracey and Stark 2024). In contrast, only 1.6 t of Sand Flathead was caught in the last financial year (2022/23) by the commercial sector before the fishery was closed in November 2023 (Sharples et al. 2024). Handline, Danish seine and beach seine were the primary commercial gears used for targeted Sand Flathead fishing.

The first stock assessment, conducted for the 2014/15 financial year, classified Sand Flathead as Depleting, reflecting estimates of fishing mortality that were considered too high for long-term sustainability. Based on spatially extended survey data up to 2022 (six regions across the state were added in 2021), Sand Flathead was classified as Depleted in the 2020/21 Tasmanian Scalefish Fishery assessment report (Fraser et al., 2022). This report, along with the first more comprehensive sand flathead assessment report in 2023 (Krueck et al., 2023), estimated that fishing mortality remains unsustainable and has likely resulted in the depletion of spawning biomass below critical levels in most regions.

Up until November 2023, when commercial fishing of Sand Flathead was banned, fishers required Scalefish and/or Danish seine licences with associated gear restrictions to target the species commercially. For the recreational sector, recently updated output controls include a statewide possession limit of 10 fish, a maximum bag limit of 10 fish (reduced to 5 fish in the Eastern Zone and 2 fish in some areas of southeast Tasmania, including the D'entrecasteaux Channel, Derwent River, Frederick Henry and Norfolk Bays), an increased minimum legal size of 35 cm, and a maximum legal size of 40 cm (except for King Island and the Furneaux Group, where there is no maximum size limit). The Department of Natural Resources and Environment (NRE) Tasmania plans to review these regulations from November 2025 against stock recovery targets developed under a dedicated rebuilding plan and associated Sand Flathead harvest strategy. More detailed information on Sand Flathead management is available from the NRE Tasmania website: click here.

4 Data analyses

This report provides a stock assessment for Sand Flathead in Tasmania. Stock status classification follows the national reporting scheme used in the Status of Australian Fish Stocks (SAFS) reports (https://www.fish.gov.au/). SAFS reports include four stock status classification categories: “Sustainable”, “Depleting”, “Depleted”, or “Recovering”. These four categories define the status of the stock exclusively in terms of likely recruitment impairment. Recruitment impairment occurs when the mature adult population (spawning biomass) is depleted to a level where it might no longer ensure the reproductive capacity for stock rebuilding. Stock status compared to potential target reference points (e.g., the biomass supporting maximum sustainable ecological or economic yield) is also considered but not included in the stock status classification scheme. For more detailed information on the framework for stock status classification, please refer to the TasFisheriesResearch webpage: stock classification. Historical stock status classifications for Sand Flathead are available in Appendix 2 of this report.

4.1 Analyses of fishery-dependent data

Commercial catches of Sand Flathead used to be managed under the Tasmanian Scalefish Fishery administered by NRE Tasmania. Trends in commercial catch and effort were analysed using data collected through compulsory logbook returns. Detailed fishery information including management objectives, assessment criteria, and analyses of catch and effort time series as presented below can be accessed online through the TasFisheriesResearch webpage. For the recreational sector, catch and effort is estimated from statewide surveys conducted every five years and published on the IMAS webpage.

Routine assessments of commercial scalefish fishery data are based on time series of catch, effort, and catch-per-unit-effort (CPUE). For Sand Flathead, effort and CPUE analyses are restricted to commercial data available from 1 July 2007 to 30 June 2023. A ‘fishing year’, running from 1 July to 30 June of the following year, is used for our annual commercial catch reporting. This decision is based on the understanding that reporting aligned with the financial year, as opposed to the calendar year, provides a more accurate representation of the seasonality of fisheries for most species, which are characterised by a concentration of catch (and effort) between late spring and early autumn. Moreover, the financial year reporting schedule better accommodates the biological processes of recruitment and growth for most species, including Sand Flathead.

Commercial catch and effort data were traditionally analysed and reported at the state level. However, more recent analyses as in this report include a regional breakdown into five fishing regions: the southeast coast (SEC), east coast (EC), northeast coast (NEC), northwest coast (NWC), and west coast (WC) (see Figure 1).

Commercial effort is expressed in numbers of days fished per gear type (almost exclusively handline). Examining effort in terms of days fished overcomes uncertainty about the reporting of effort units and provides consistency through time, assuming that there have been no major changes to fishing practices during that time (2007 - 2023).

Since CPUE data are typically log-normally distributed, the geometric mean rather than arithmetic mean of daily catch records has traditionally been calculated to generate CPUE statistics. The geometric mean is the n^{th} root of the product of individual CPUE values, which is equivalent to computing the arithmetic mean of the natural logarithm of each number, and then taking the exponent.

CPUE calculated using this method may differ slightly from the more simplistic approach of dividing total catch by total effort or using the arithmetic mean. The advantage of calculating the geometric mean is that results are less affected by relatively few, unusually high data points, which are characteristic of log-normally distributed data.

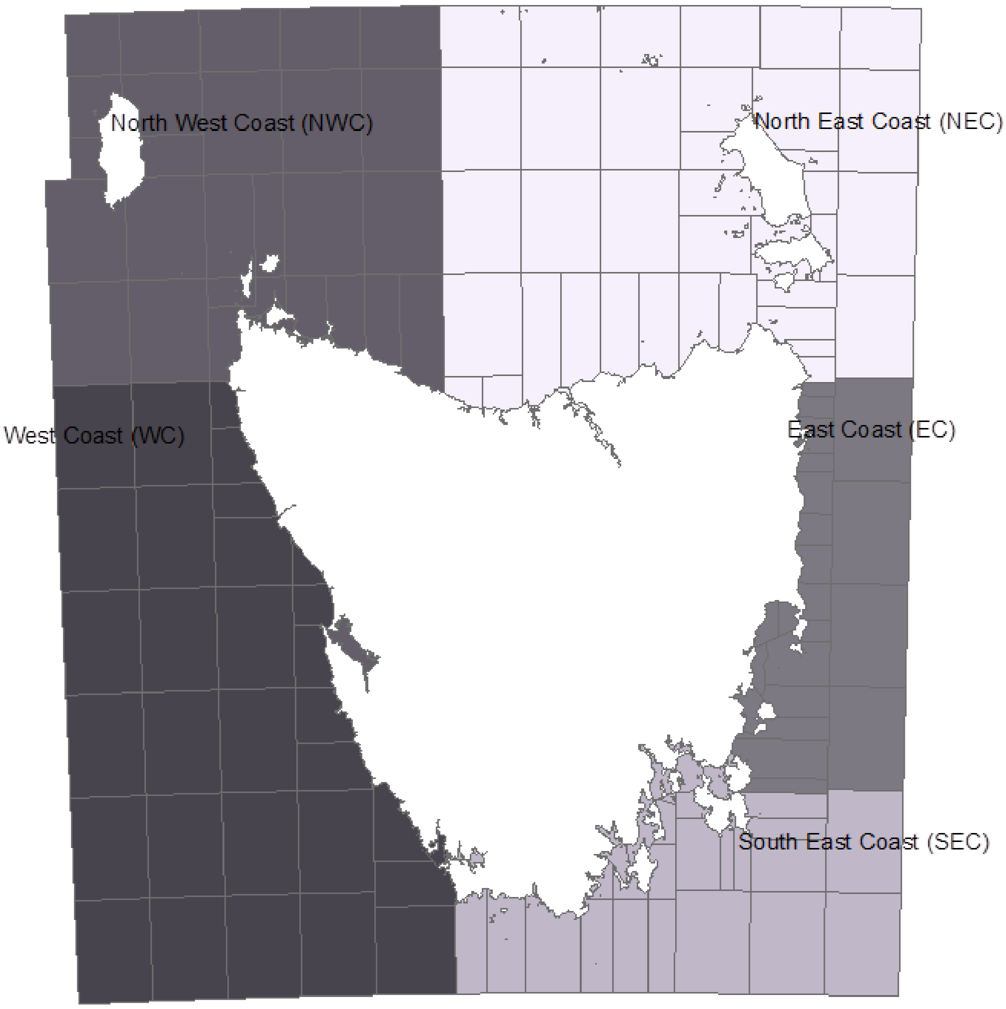


Figure 1: NRE fishing blocks and management regions (in grey) for the Tasmanian Scalefish Fishery.

4.2 Analyses of fishery-independent data

Concerns surrounding the abundance of legal-sized Sand Flathead led to the establishment of an annual fishery-independent survey in 2012 (Ewing, Lyle, and Mapleston 2014). The initial survey, using fishing gear and targeting practices typical of recreational fishers, covered three regions off the south and east coasts, but was extended in 2021 by adding five additional regions off the east and north coasts of Tasmania (Figure 2). Surveys are conducted annually from January to March, generally over three (not necessarily consecutive) days per region with 19-21 standard sites fished in each region (see maps here). These sampling sites represent a range of suitable habitats and depths for Sand Flathead, providing comprehensive coverage in each region. In addition to these routine sampling sites, Flinders Island was added as a survey region in 2023, with first samples collected in February 2023.

Sex-specific length and age frequencies from survey data inform Sand Flathead stock status assessments. Assessment approaches require estimates of key life history parameters for meaningful parameterisation, including the infinite or asymptotic length (*Linf*), the von Bertalanffy growth rate (*k*), the lengths at 50% and 95% maturity (*L50* and *L95*), the length at 50% and 95% gear selectivity (*SL50* and *SL95*), and the instantaneous rate of natural annual mortality (*M*). Most parameters have been estimated and presented in previous assessment reports (Krueck, Hartmann, and Lyle 2020; Fraser, Hartmann, and Krueck 2021; Fraser et al. 2022, Krueck et al. 2023). However, some parameters were re-estimated as presented below for the current assessment using the latest available survey data.

Following a widely applied approach parameterised according to a recent meta-analysis, the sex-specific instantaneous rate of natural mortality (*M*) was estimated by assuming 1.5% adult survival until the maximum observed age available from the flathead survey data (Dureuil and Froese 2021). *Linf*, *L50*, *L95*, *SL50*, and *SL95* were estimated using established methods as implemented in the “TropFishR” package in R (Mildenberger, Taylor, and Wolff 2017). *Linf* and *k* were also estimated using the “nls2” function in R to fit the standard von Bertalanffy growth function (VBGF) to survey data:

$$L = L_{inf}\left(1 - e^{-k_{(a-t_0)}}\right),$$

where *L* is length (reported in cm), *Linf* is the mean length of fully grown individuals, *k* is the growth coefficient, *a* is age, and *t0* is the theoretical age when length is equal to zero. The parameter space for VGBF fitting of *k* was determined by assuming credible *M*/*k* ranges between values of 1 and 2. The parameter space for *Linf* was determined based on prior *Linf* estimates using the “Powell-Wetherall” (PW) regression as implemented in the TropFishR package. Length thresholds for inclusion of data points in PW regressions were specified according to prior estimates of *SL95* (i.e., full gear selectivity). An *Linf* range between 0.5 and 2 times the PW estimate of *Linf* was then used for VGBF fitting. However, the survey data for most species was collected from key fishing grounds of the assessed species, which made VGBF estimates of *Linf* more sensitive to size and age-truncation than PW regressions. Thus, in case of notable underestimation of *Linf* values due to evident size and age truncation, the VGBF function was fitted by constraining *Linf* to the PW estimate. The parameter space for *t0* was restricted to values between 0 and -10% of *tmax*. If gear selectivity (*SL50*) indicated an introduction of bias in the length at age of young fishes available from the survey data, *t0* was fixed to 0.

TropFishR was further used to estimate the instantaneous rate of total annual mortality (*Z*) from catch curves, including 95% confidence intervals. Values of *Z* were then used to infer fishing mortality *F* (*F* = *Z* – *M*), and relative fishing mortality (*F*/*M*). An *F*/*M* value of 1, where fishing mortality equals natural mortality, is commonly used as a threshold for overfishing. However, lower *F*/*M* values of 0.87 and 0.5 have been recommended for teleosts to ensure that *F*/*M* does not exceed the fishing mortality supporting maximum sustainable yield and does not undermine the precautionary principle (Froese et al. 2016).

The life history and selectivity parameters described above were further used to run two alternative length-based stock assessment approaches. The first of these two approaches, which is founded on classic Beverton-Holt life history theory and empirical knowledge available from FishBase (Dureuil and Froese 2021), is the Length-based Bayesian Biomass (LBB) estimation approach. LBB requires a representative sample of length frequencies combined with an optional prior for *Linf* based on which it estimates relative fishing mortality (*F*/*M*) and relative biomass (*B*/*B0*); i.e., current (fished) biomass (*B*) relative to past unfished biomass (*B0*), including 95% credible intervals. Estimates of biomass depletion *B*/*B0* can be assessed against common target reference points of 0.4-0.5 *B*/*B0* (i.e., 40%-50% of unfished levels) to determine whether stocks are overfished and, thus, not supporting the maximum ecological or economic yield. Values of *B*/*B0* of 0.2 (20% of unfished levels) and below are commonly used to determine whether stocks are depleted, i.e., whether reproductive output and recruitment could be impaired to an extent that populations are unable to recover. We will refer to these biomass target and limit reference points for management throughout this report, because they have been adopted in fishery harvest strategy policies across Australia.

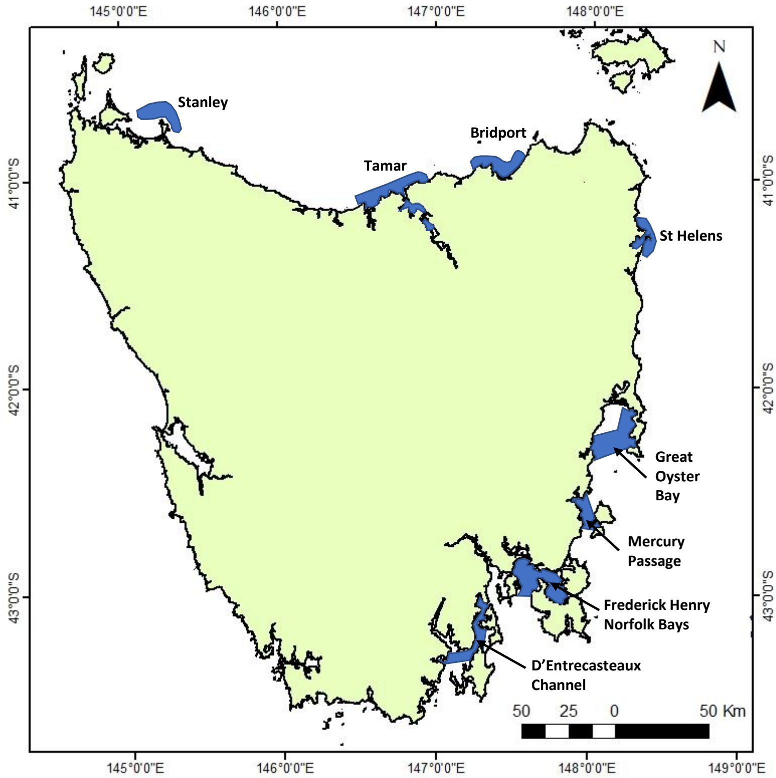


Figure 2: Map showing eight survey regions around Tasmania: (1) D'Entrecasteaux Channel, (2) Frederick Henry-Norfolk Bay, (3) Mercury Passage, (4) Great Oyster Bay, (5) St Helens, (6) Bridport, (7) Tamar Estuary, and (8) Stanley. Flinders Island off the northeast corner of the state was also surveyed for the first time in 2023 (see detailed maps here).

The second length-based stock assessment approach, which is also founded on classic fishery life history theory and now widely applied for data-poor fisheries management worldwide, is the Length-Based Spawning Potential Ratio (LBSPR) estimation approach (Hordyk et al. 2015a, Hordyk et al. 2015b). LBSPR requires estimates of *Linf*, *M*/*k*, *L50*, *L95*, *SL50*, and *SL95* as input parameters. LBSPR then calculates the relative fishing mortality (*F*/*M*) and the relative spawning potential ratio (*SPR*/*SPR0*), i.e., the current (fished) *SPR* relative to an expected unfished *SPR* (*SPR0*). The *SPR* is a term used synonymously to “spawning biomass per recruit” or the “fraction of lifetime egg production” (FLEP), which compare the average reproductive output of individuals in a fished population with the average level of reproductive output expected for an unfished population. A value of *SPR*/*SPR0* = 0.2 (i.e., 20% of unfished levels) is widely recognized as the ‘replacement level’, where fish populations might persist at current levels, but have little ability to rebuild, or decline over time. When the *SPR* reaches 10% of unfished levels (*SPR*/*SPR0* = 0.1), recruitment is expected to decline rapidly, eventually resulting in local extinction. The default target reference points for *SPR* are 40%-50% of unfished levels (*SPR*/*SPR0* = 0.4-0.5), where reproductive output and recruitment is expected to result in maximum sustainable ecological or economic returns.

The accuracy of outcomes from both length-based assessment approaches described above depends on representative length frequency samples and cannot readily be applied with confidence if sample sizes are smaller than 100. Ideally, sample sizes of n > 1000 are used. However, outcomes for pooled regions implicitly assume that fishing pressure is uniform across the state. This assumption was clearly violated. Thus, annual samples over the last three years were pooled to provide regional breakdowns with a similar level of confidence.

Outcomes from all length-based assessments represent female biomass and fishing mortality, because (1) female biomass is generally used to infer the reproductive potential (egg production capacity) of fish populations; (2) females grow to higher *L50* and *Linf*, which makes them more vulnerable to the impacts of fishing; and (3) females represent the majority of samples available from surveys.

4.3 Risk assessment of recruitment impairment

This report further includes a routine risk analysis for generally data-poor scalefish species that follows protocols of the Marine Stewardship Council (MSC) based on an approach established by the CSIRO (Hobday et al. 2011). The MSC is globally recognised and produces a widely used Fisheries Standard for assessing if a fishery is well managed and sustainable. The Risk-Based Framework (RBF) described within the MSC Standard is suitable for assessing fisheries with limited data and for which primary indicators may be unavailable or problematic. Although this is not the case for Sand Flathead, application of the RBF is straight-forward and provides an alternate perspective.

The RBF draws on information about the productivity of a target species and its susceptibility to fishery-related impacts (Productivity Susceptibility Analysis), as well as the consequence of fishing activity for the species (Consequence Analysis). Application of the RBF approach culminates in an overall score, which is indicative of the relative sustainability of the fishery. Scores > 80 are regarded as passing the assessment with a low risk of stock damage. Scores of 60 – 80 are also regarded as passing the assessment, but with a moderate risk of stock damage. Scores < 60 fail the assessment with a substantial risk of stock damage. We note that the RBF is precautionary and will likely result in a lower score than the default MSC assessment method.

Given the RBF is designed for data-poor fisheries, a cautious (worst-plausible) approach is recommended in the absence of credible information, meaning that limited species information likely results in a lower final score. The RBF approach assumes that fisheries operating at high levels of exploitation inherently pose a greater risk to target species and the associated ecosystem than under-utilised fisheries. Therefore, lower scores will be derived for highly utilised species unless credible information is available to indicate otherwise. More information, including details on the RBF scoring system, is available on the TasFisheriesResearch webpage.

5 Trends in catch and effort

Sand Flathead has been distinguished from Tiger Flathead in commercial fishery data since 2007/08. Previous stock assessment reports show back-calculated estimates of Sand Flathead catches up to almost 15 t (Krueck, Hartmann, and Lyle 2020; Fraser, Hartmann, and Krueck 2021).

The total commercial harvest for Sand Flathead in the 2022/23 financial year was 1.6 t (Sharples et al., 2024), which is a decrease from the previous season (3.8 t) (Sharples et al., 2023) and lower than peak Sand Flathead commercial harvest of 13 t reported in 2008/09 (Ziegler and Lyle, 2010). Before the commercial Sand Flathead fishery closed in November 2023, most commercial catch was taken by handline, Danish seine and beach seine. However, commercial harvest was minor relative to estimates of recreational catches available from statewide recreational fishing surveys conducted since 2000/01 (Lyle 2005; Lyle et al. 2009; Lyle, Stark, and Tracey 2014; Lyle et al. 2019; Tracey and Stark 2024). In 2022/23, the recreational harvest of Southern Sand Flathead was estimated at 125.8 t (Tracey and Stark 2024), which represents approximately 99% of the estimated total harvest (recreational and commercial combined) for that season (see Figure 3A).

The distribution of catch and effort is concentrated in the most populated regions across Tasmania. Before commercial Sand Flathead fishing was closed, most catch was taken off the east, southeast, and northwest coasts (Figure 4A). For the recreational fishery in 2017/18, just over half of the catch was from the southeast coast, with the central east (including Great Oyster Bay) and northwest coasts also representing important regions (Lyle et al. 2019). In 2022/23, again just over half (57%) of the total recreational catch was derived from south-eastern Tasmania (Tracey and Stark, 2024).

Although commercial catches were insignificant, it is worth noting that up until the closure, commercial handline CPUE showed a declining trend (Figure 3B and C). There was also a decline in commercial handline effort over the same period (Figure 3B). However, regional differences highlight that these trends could mask spatial heterogeneity in fishing activity or population trends (Figure 4 & 5).

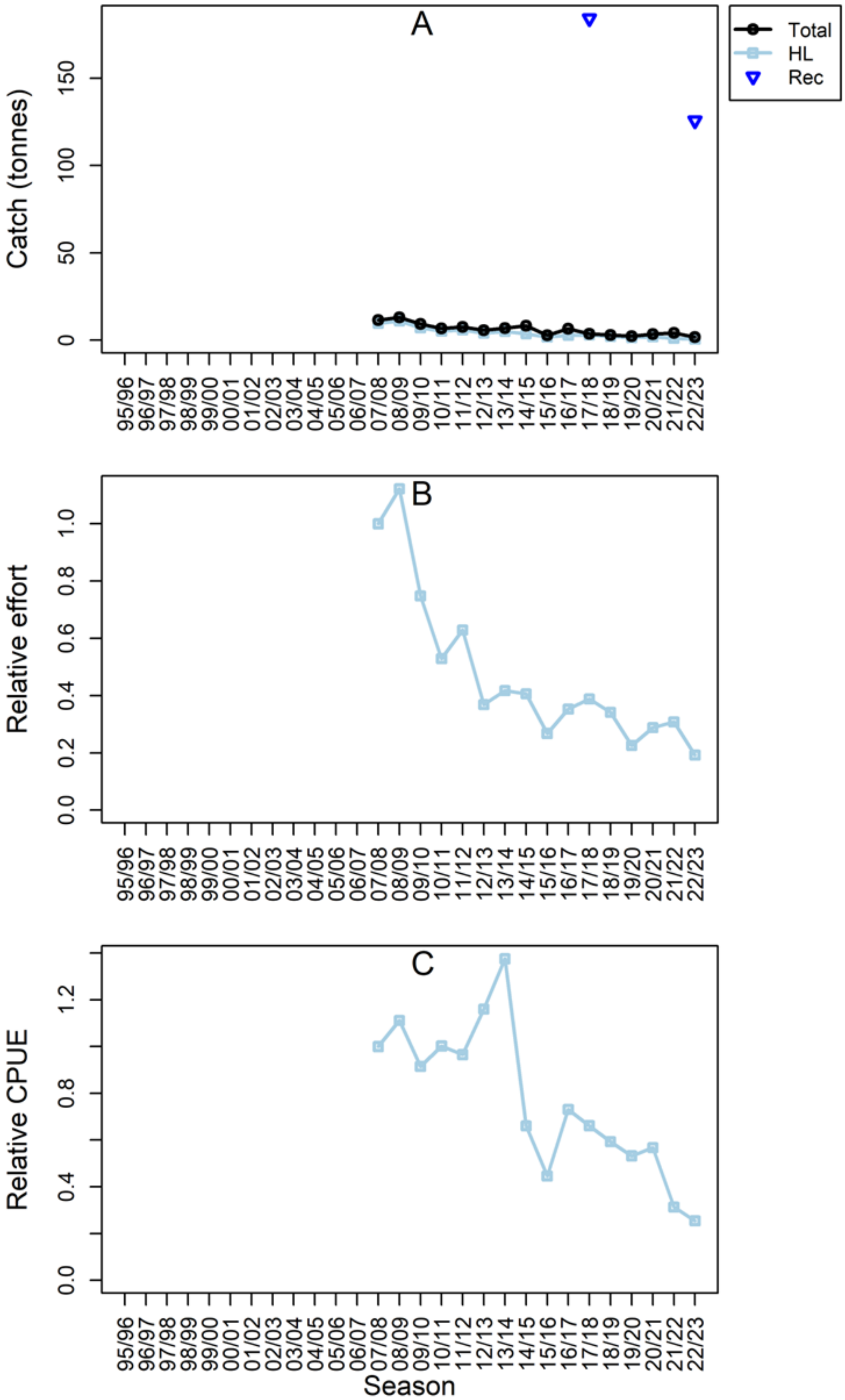


Figure 3: (A) Annual commercial Southern Sand Flathead catch (t) by gear, blue triangles represent recreational catch; (B) annual commercial effort for main gear type(s) based on days fished relative to 2007/08; (C) annual commercial catch per unit effort (CPUE) based on weight per days fished relative to 2007/08. HL = handline, Rec = estimated recreational catch.

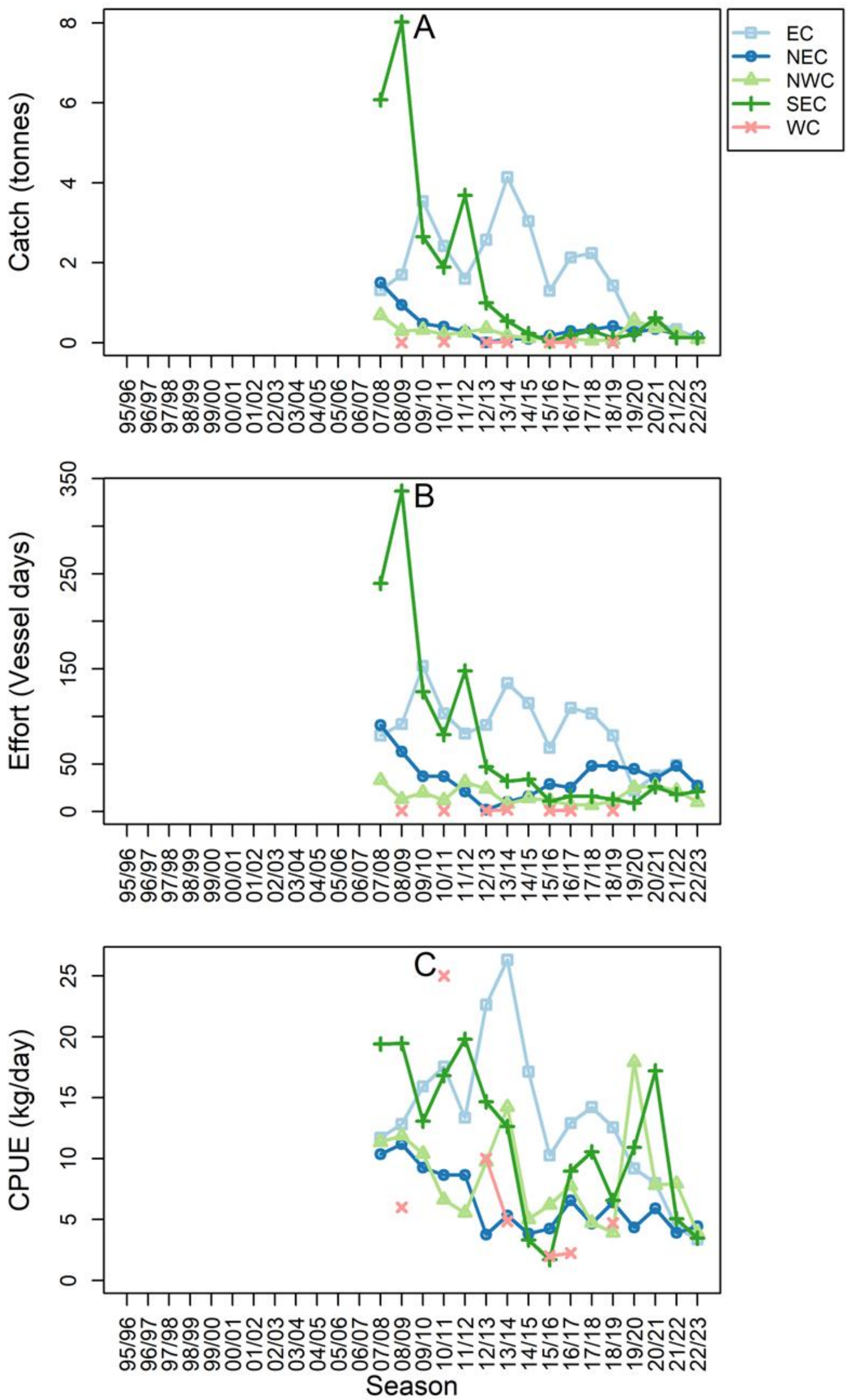


Figure 4: Regional commercial Southern Sand Flathead catch (A), effort (B), and catch per unit effort (CPUE) (C) recorded for hand line. EC = east coast, NEC = northeast coast, NWC = northwest coast, SEC = southeast coast, WC = west coast.

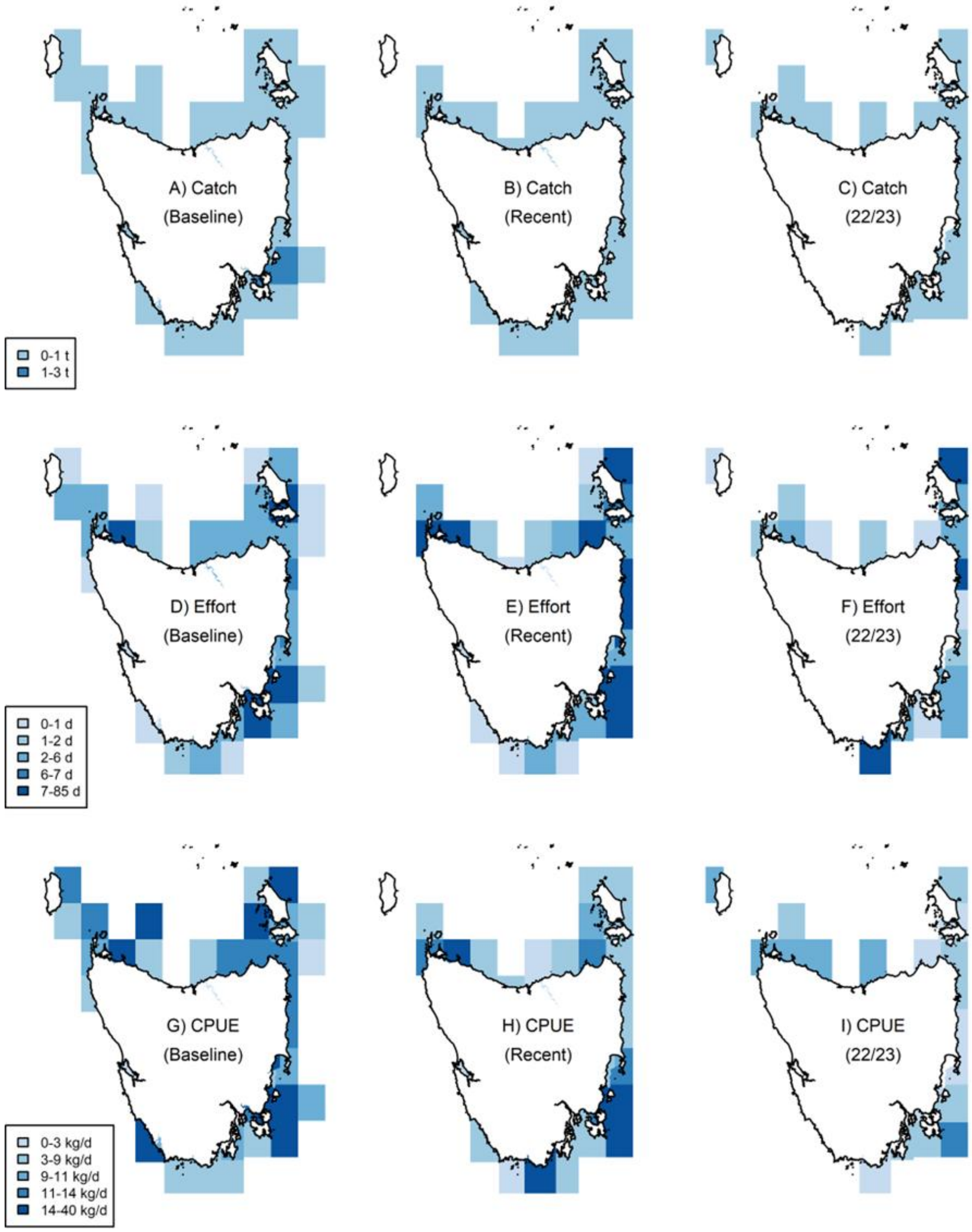


Figure 5: Southern Sand Flathead catches (t), effort (fishing days), and CPUE (kg/day) by fishing block for all main gear types combined. 'Baseline' data represent the average per fishing block across the ten-year period from the reference year (2007/08 to 2016/17 for this species). 'Recent' data represent the average per fishing block across the last five fishing seasons (2017/18 to 2021/22). '22/23' represent data from the 2022/23 fishing season.

6 Length- and age composition

Fishery-independent surveys provide length- and age frequency data for Sand Flathead which are used to analyse trends and assess stock status against management reference points. All length- and age-frequency data can be accessed on the Tas Fisheries research website.

Between January and April 2024, a total of 839 Sand Flathead were collected across nine locations within five regions, including Flinders Island (Table 1). Fish lengths ranged from a minimum of 200 mm (caught in the D'Entrecasteaux Channel) to a maximum of 546 mm (caught off Flinders Island) (Table 1).

Except for Flinders Island, the proportion of Sand Flathead caught below the minimum legal size (MLS) (350 mm) ranged between 75% and 99% (Table 2; Fig. 6). In contrast, only 40% of fish caught off Flinders Island were smaller than 350 mm. Catches of legal-sized fish were dominated by females. Females represented up to 100% of fish > 350 mm in the D'Entrecasteaux Channel and Norfolk-Frederick Henry Bays in the south-east coast (SEC) region. With the increase of the MLS to 350 mm in November 2023, most legal-sized fish are female, with the exception of the Tamar River where the only fish > 350 mm was a male (Table 2).

All 839 Sand Flathead caught in 2024 were aged. The youngest fish caught in all regions ranged from 2-3 years of age, while the oldest fish varied between 10 and 17 years old (Table 2). In the D'Entrecasteaux Channel and Norfolk-Frederick Henry Bays, 84-87% of fish were between 3 and 7 years of age (Figure 7). Similar proportions of fish were observed between 2 and 6 years of age in Mercury Passage, Great Oyster Bay and St Helens in the east coast region. The age composition of Sand Flathead from the north-east coast (Bridport and Tamar) region was dominated by fish ≤ 6 years old. While a 16-year-old fish was caught off Stanley in the north-west coast (NWC) region, the majority of fish caught were 2 - 3 years old (Fig. 7). Although there was a greater number of older fish (> 6 years) off Flinders Island, 5-year-old fish constituted more than one third of the catch. The oldest fish (17 years) was caught near Flinders Island.

Table 1: The total number (*n*), minimum (Min), maximum (Max) and mean total lengths (TL, mm) and ages (years) of Sand Flathead caught from nine locations within five regions around Tasmania in 2024.

Region	Location	*n*	Min TL	Max TL	Mean TL	Min Age	Max Age	Mean Age
SEC	D'Entrecasteaux Channel	83	200	362	274	2	10	5
	Nor-Fred	83	201	426	282	3	12	5
EC	Mercury	80	256	394	315	2	10	4
	GOB	100	211	388	304	2	10	4
	St Helens	92	244	389	317	3	13	4
NEC	Bridport	80	262	420	308	2	11	4
	Tamar	95	236	355	283	2	11	3
NWC	Stanley	80	228	435	292	3	16	4
FI	Flinders Is.	146	259	546	372	2	17	5

Table 2: The number (*n*) and percentage of Sand Flathead below and above the minimum size limit (MSL) of 320 mm (until May 2023) and 350 mm (from May-2023) caught at nine locations within five regions around Tasmania in 2024. %F denotes the percentage of females.

Region	Location	< 320 mm			> 320 mm			< 350 mm			> 350 mm		
		n	%	%F	n	%	%F	n	%	%F	n	%	%F
SEC	D'Entrecasteaux Channel	75	90	73	8	10	100	81	98	75	2	2	100
	Nor-Fred	70	84	56	13	16	100	79	95	61	4	5	100
EC	Mercury	48	60	69	32	40	88	66	87	73	14	18	93
	GOB	62	62	87	38	38	92	87	87	90	13	13	85
	St Helens	49	53	61	43	47	84	69	75	65	23	25	91
NC	Bridport	55	69	51	25	31	44	75	94	49	5	6	40
	Tamar	87	92	46	8	8	25	94	99	45	1	1	0
NWC	Stanley	63	79	57	17	21	71	70	88	56	10	13	90
FI	Flinders Is.	34	23	38	112	77	80	58	40	48	88	60	85

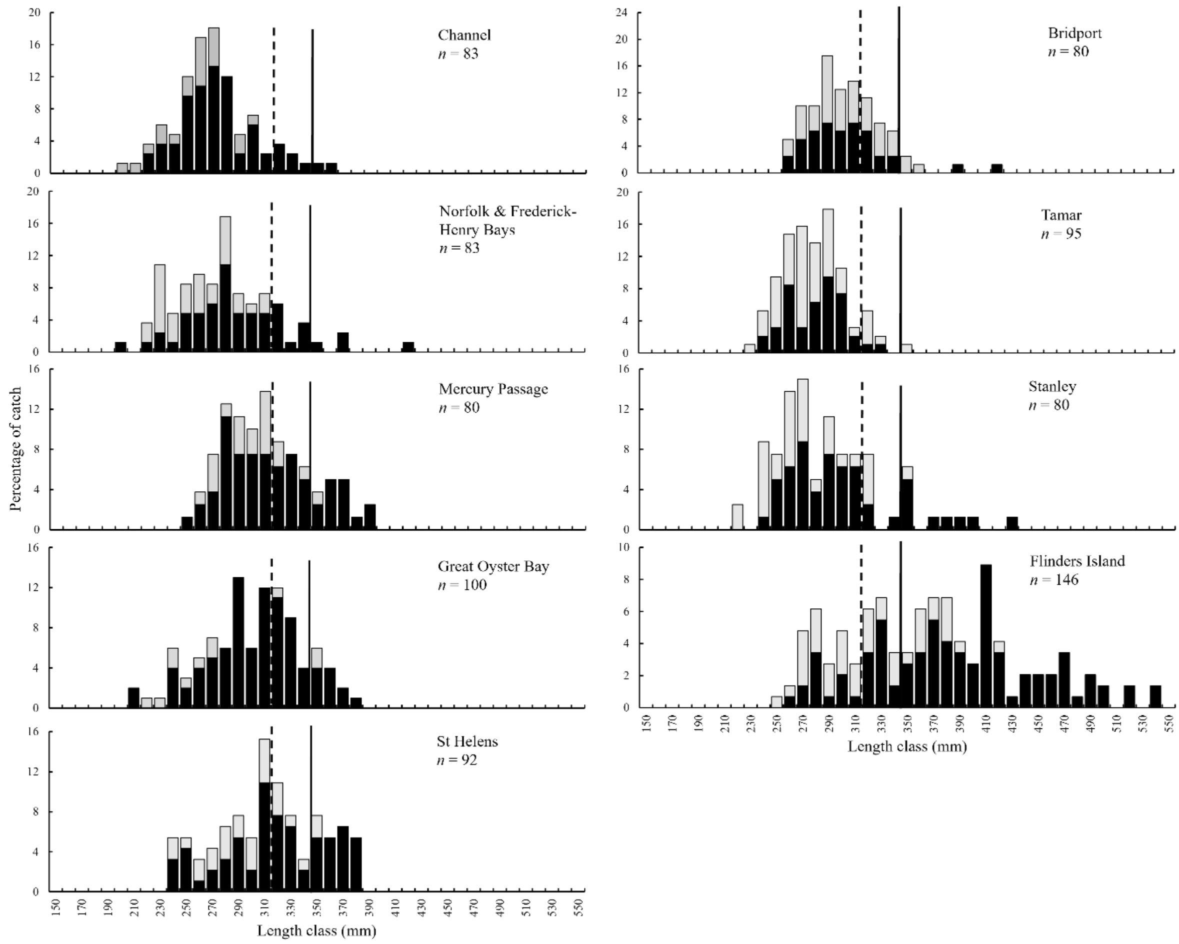


Figure 6**:** Length frequency distributions for female (black bars) and male (grey bars) Sand Flathead caught at nine locations around Tasmania in 2024. The dotted lines indicate the previous minimum size limit (MSL) of 320 mm, while the solid lines indicate the new MSL of 350 mm.

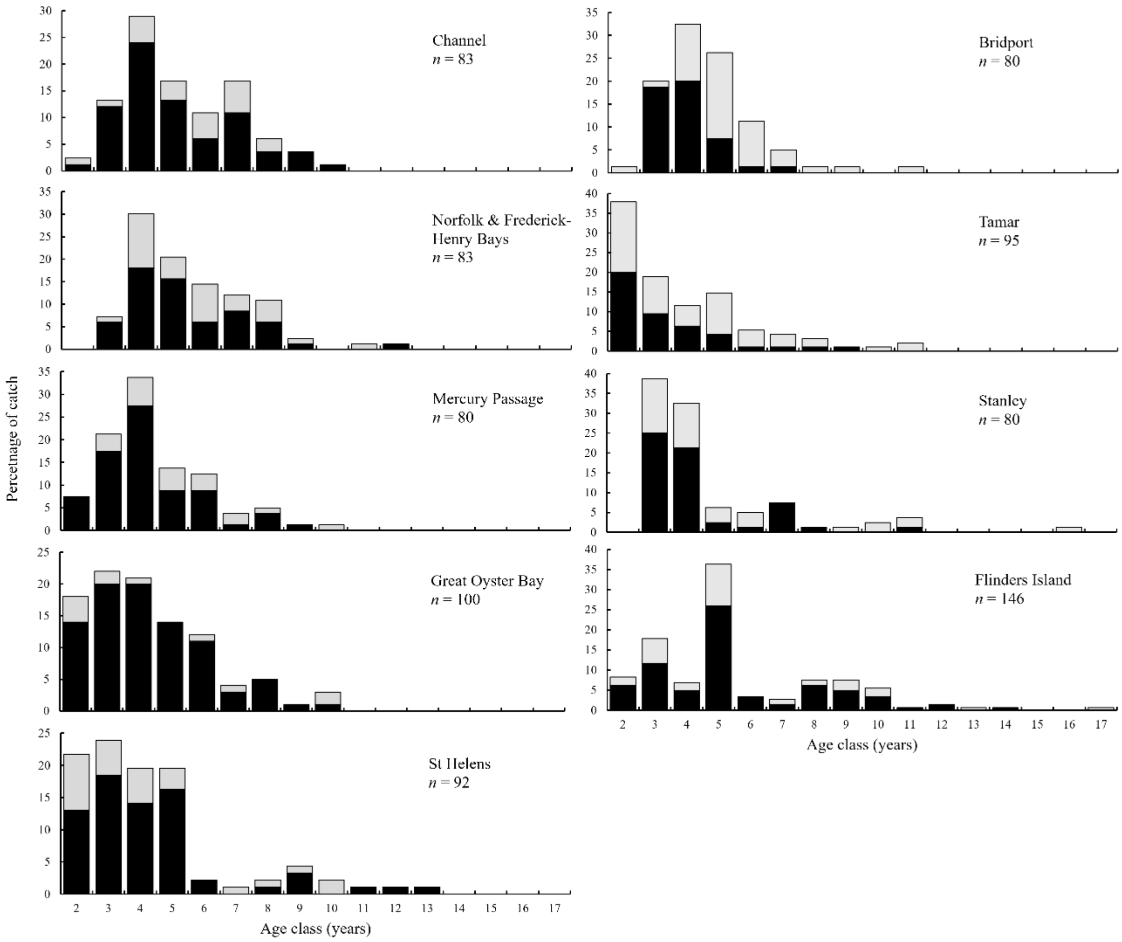


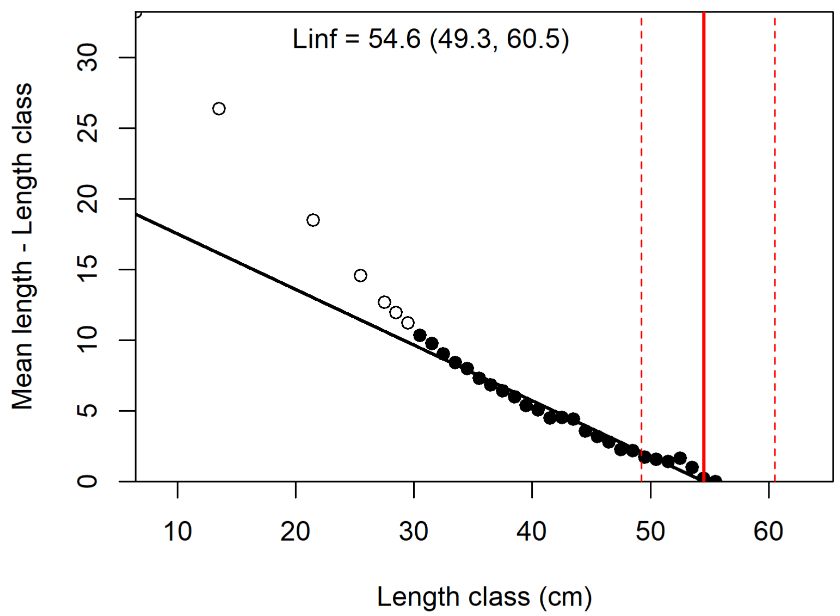
Figure 7: Age frequency distributions for female (black bars) and male (grey bars) Sand Flathead caught at nine locations around Tasmania in 2024.

7 Length-based assessments

Estimating representative life history parameters for length-based stock assessment from fishery-independent survey data was complicated by the size- and age-truncation of populations before surveys commenced in 2012. Consequently, infinite or asymptotic length (*Linf*), which is the mean length of fully grown adults if there was no fishing, could not reliably be inferred using standard fits of the von Bertalanffy growth function (VBGF). This is because fishing pressure in the past has led to the rarity or complete absence of the largest individuals in most regions across Tasmania, which in turn caused standard VBGF regression-based estimates of *Linf* to be closely aligned with the longer-term minimum size limits of 30-32 cm (the initial VGBF estimate of *Linf* for females at traditional south-east coast survey sites was 33 cm). Powell-Wetherall regressions were used as an alternative approach for *Linf* estimation in the last assessment as this approach was found to be less sensitive to the bias introduced by size truncation and gear selectivity.

In this assessment, *Linf* was re-estimated based on the extended survey dataset, which included more size and age frequency information from Flinders Island, where populations are lightly fished compared to other regions across Tasmania. Confirming this assumption and findings in the first independent assessment report (Krueck et al. 2023), Powell-Wetherall regressions revealed estimates of *Linf* for Flinders Island that were closely aligned with those from standard VBGF fits to the same data (54.6 cm vs 52.3 cm). These estimates were only slightly higher than last year's estimates (54.6 cm vs 53.9 cm). However, *Linf* estimates from both the last assessment report as well as VBGF fits to Flinders Island data were firmly within the confidence interval of those resulting from Powell-Wetherall regressions (49.3-60.5 cm). To capture this uncertainty range around *Linf* and around the associated growth rate *k*, we followed last year's approach to parameterise baseline conditions for an unfished female population of Sand Flathead for subsequent estimates of fishing mortality and biomass depletion by analysing three alternative scenarios: 1) the best "Estimate" scenario (default assumption: *Linf* = 54.6 cm; *k* = 0.19); 2) the "Fast growth" scenario (*Linf* = 49.3; *k* = 0.31); and 3) the "Slow growth" scenario (*Linf* = 60.5 cm; *k* = 0.15) (see Figure 8).

A)



B)

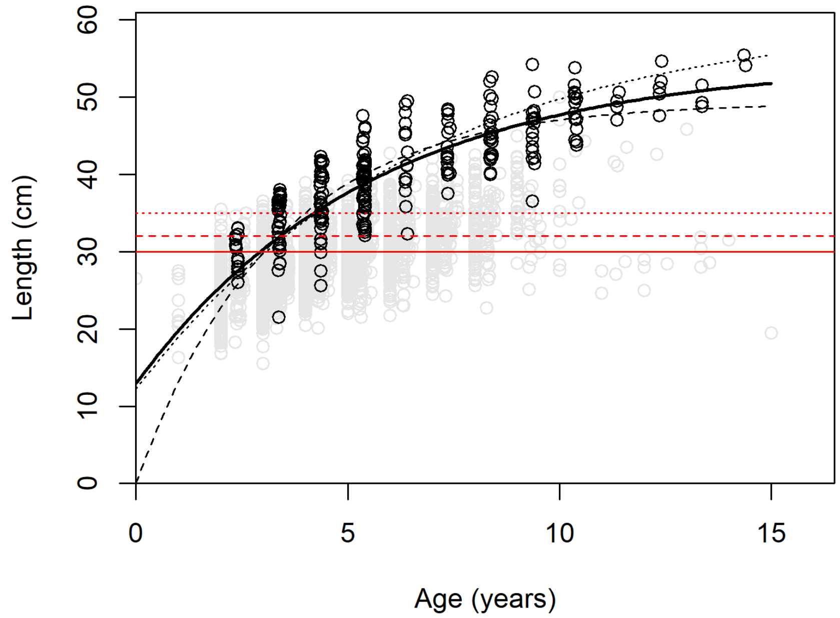


Figure 8: A) Powell-Wetherall regression to estimate the asymptotic length (*Linf*) of female Sand Flathead based on data from lightly fished survey sites on Flinders Island. Filled circles highlight data for individuals ≥30 cm in length, which was the estimated length of “full” gear selectivity (95% of individuals). Red vertical lines mark the estimate of *Linf* (solid) and associated confidence intervals (dashed). (B) Alternative fits of the von Bertalanffy model to estimate growth (*k*) of an unfished female population. The black solid line represents the best “estimate” scenario (default assumption) while the dashed and dotted black lines represent the alternative “fast growth” and “slow growth” scenarios, respectively. Black dots in B represent data from Flinders Island while grey dots represent data from other survey sites across the state where fishing has caused more substantial size truncation (see Figure 6 above). Red lines represent the long-term initial (solid: 30 cm), previous (dashed: 32 cm) and current (dotted: 35 cm) minimum size limit.

The growth rate *k* for the default scenario (0.19) is identical to last year's estimate and very close to that from the preceding year of 0.2. Similarly, the updated estimate of natural mortality of females was identical to last year, still revised down only slightly to a value of 0.28 compared to 0.3 in the first more comprehensive flathead assessment (Fraser et al. 2022). The value of *M* was estimated according to the unchanged maximum recorded age of 15 years for female fish in Tasmania. We note again that, in comparison, the oldest recorded age for males in Tasmania is now 22 years (revised upwards from 20.4 years), which results in a notably lower natural mortality estimate for male fish. It is possible that females reach a similar age, which would warrant additional sensitivity analyses in the future, considering that reduced mortality is generally associated with a higher sensitivity to fishing pressure, thus affecting estimates of fishing mortality as well as biomass depletion.

Plausible combinations of *Linf*, *k* and *M* captured by our three alternative growth scenarios (Table 3) were used (1) for estimates of mortality using length-based catch curve analyses and (2) to estimate spawning biomass depletion and relative fishing mortality (*F/M*) using both LBB and LBSPR. If not otherwise specified, results refer to the best estimate scenario, including an associated life history ratio *M/k* of 1.47 (0.28/0.19), which is closely aligned with assumptions according to classic life history theory (median *Mk* = 1.5).

Table 3: Key parameters used for length-based assessments of stock status and trends. *Linf*: infinite or asymptotic length; *k*: von Bertalanffy growth rate; *M*: instantaneous rate of natural mortality; *M/k*: the ratio between natural mortality and growth determines the shape of the estimated unfished length-frequency distribution. All results represent females only.

Scenario	***Linf***	***k***	***M***	**M/k**
"Estimate"	54.56 cm	0.19 (t0=-1.5)	0.28	1.47
"Fast growth"	49.26 cm	0.31 (t0 = 0)	0.28	0.90
"Slow growth"	60.50 cm	0.15 (t0=-1.5)	0.28	1.87

Outcomes from length-based catch curves revealed a high instantaneous rate of total annual mortality (*Z)* of 1.47 over recent years at the three survey locations in the southeast and east coast region that have been sampled from 2012 onwards (D'Entrecasteaux Channel, Frederick Henry and Norfolk Bays and Great Oyster Bay). This *Z* value translates to approximately 77% mortality of adults per year. The instantaneous rate of annual fishing mortality was estimated at 1.19, translating to an annual mortality of 70% (95% confidence interval: 59%-77%) caused by fishing alone (Table 4). In other words, fishing mortality was estimated to account for 90% of total annual deaths of adult females at traditionally surveyed locations in the south-east and east coast regions over recent years, which is very high even if slightly less than estimated last year. This estimated level of fishing mortality is substantial, as further highlighted again by the estimated ratio of fishing mortality relative to natural mortality (*F/M* = 4.25), which far exceeded putatively sustainable levels of *F/M* below 1. The inclusion of survey data from all additional sites on the east and north coasts, which have been sampled from 2021 onwards resulted in considerably reduced levels of estimated fishing mortality (18%) and *F/M* (0.71) for pooled data. However, these values for pooled data masked concerning levels of both fishing mortality and biomass depletion of females in all coastal waters of Tasmania except for Flinders Island, which became evident when Flinders Island samples were excluded (see Table 4). Flinders Island itself, where fishing pressure was expected to be very low, revealed an estimate of total mortality *Z* of only 0.33 (0.25-0.41). This value and associated uncertainty range was a close match to our independent age-based estimate of natural mortality *M* of 0.28, indicating that fishing pressure off Finders Island was indeed likely to be very low.

Table 4: Estimates of recent total mortality (*Z*), fishing mortality (*F* = *Z*-*M*), and fishing mortality relative to natural mortality (*F*/*M*) based on length-based catch curves using fishery-independent survey data between 2022 and 2024. Results for the southeast coast region represent females from three traditionally sampled survey sites (D'Entrecasteaux Channel, Frederick Henry and Norfolk Bays and Great Oyster Bay). All results state 95% confidence intervals in brackets.

Region	***Z***	***F***	***F*/*M*** (Target: 0.5-1)
Pooled	0.48 (0.42-0.54)	0.20 (0.14-0.26)	0.71 (0.50-0.93)
Pooled - Flinders excluded	1.26 (1.08-1.44)	0.98 (0.80-1.16)	3.5 (2.86-4.14)
Southeast coast traditional	1.47 (1.18-1.76)	1.19 (0.90-1.48)	4.25 (3.21-5.29)

Outcomes from the Length-based Bayesian Biomass (LBB) estimation approach corroborated the findings above by highlighting that relative fishing mortality in the south-east coast region might far exceed putatively sustainable levels (Table 4, Figure 9A). Moreover, LBB results indicate that substantial overfishing in the south-east coast region might have caused biomass depletion of female Southern Sand Flathead below putatively critical levels of 20% of the unfished biomass (Table 4, Figure 9B). These general findings were robust to alternative assumptions about growth and asymptotic lengths. Results for the best "estimate" and "slow growth" scenarios were almost identical while those for the "fast growth" scenario revealed slightly higher estimated depletion and relative fishing mortality.

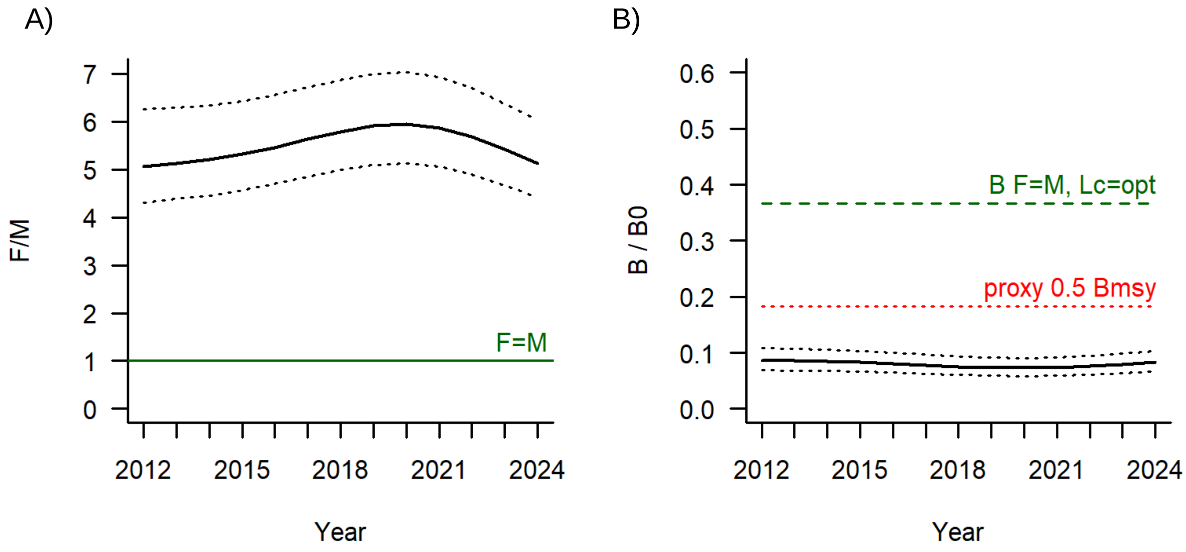


Figure 9: Smoothed trends in relative fishing mortality (A) and biomass depletion (B) for female Sand Flathead in the south-east coast region using the Length-based Bayesian Biomass (LBB) estimation approach. Fishing mortality relative to natural mortality (*F/M*) ratios of 1 are widely used as a threshold to identify unsustainable levels of fishing (solid line in A). LBB estimates a possible biomass target reference point where catch equals the maximum sustainable yield (Bmsy; i.e., *B* where *F* = *M* and mean length at first capture (*Lc*) is optimal) when *B/B0* = 0.37 (dashed black line in B). An estimated limit reference point for critical biomass depletion at 0.5 Bmsy is also highlighted (red dotted line in B).

Table 4: Estimates (and 95% CIs) of relative fishing mortality *F/M* and biomass depletion B/B0 (B) of female Sand Flathead at traditionally sampled sites in the south-east coast region using the Length-based Bayesian Biomass (LBB) estimation approach. See text above and Table 3 for details on scenarios.

Scenario	***F/M* in 2024**	***B/B0* in 2024**
Estimate	3.1 (2.6-3.6)	0.12 (0.09-0.15)
Fast growth	3.9 (3.1-4.9)	0.10 (0.07-0.13)
Slow growth	3.1 (2.8-3.6)	0.11 (0.09-0.13)

A regional breakdown of LBB outcomes, representing samples collected over the past three years from multiple additional locations on the east and north coast, indicated that current levels of population depletion and the risk of further depletion are high across Tasmania (Table 5). That is, in all but two regions (Flinders Island and Stanley), populations were estimated to be depleted below putatively critical levels of 20% of the unfished biomass. Similar outcomes were evident for estimated fishing mortality, with *F/M* exceeding values of 2 in most regions. Only Flinders Island, the wider St Helens region on the east coast and Stanley area on the north coast revealed *F/M* values less than twice the estimated natural mortality rate.

Table 5: Regional estimates of fishing mortality and biomass depletion for female Sand Flathead collected between 2022 and 2024.

Location	***Fishing mortality (F/M)***	***Female Biomass (B/B0)***
Bridport (NC)	Highly unsustainable (>2)	Below limit (<0.2)
D'Entrecasteaux Channel (SEC)	Highly unsustainable (>4)	Below limit (<0.1)
Flinders Island (FI)	Sustainable (<1)	Sustainable (>0.4)
Frederick Henry & Norfolk Bays (SEC)	Highly unsustainable (>3)	Below limit (<0.2)
Great Oyster Bay (SEC)	Highly unsustainable (>6)	Below limit (<0.1)
Mercury Passage (SEC)	Highly unsustainable (>3)	Below limit (<0.2)
Stanley (NC)	Unsustainable (1-2)	Above limit (>0.2)
St Helens (EC)	Unsustainable (1-2)	Below limit (<0.2)
Tamar (NC)	Highly unsustainable (>10)	Below limit (<0.1)

The Length-Based Spawning Potential Ratio (LBSPR) results were mostly consistent with LBB results even if slightly more pessimistic (Figure 10). That is, estimates of relative fishing mortality were even higher (Table 6) than estimates from length-based catch curve analysis and LBB.

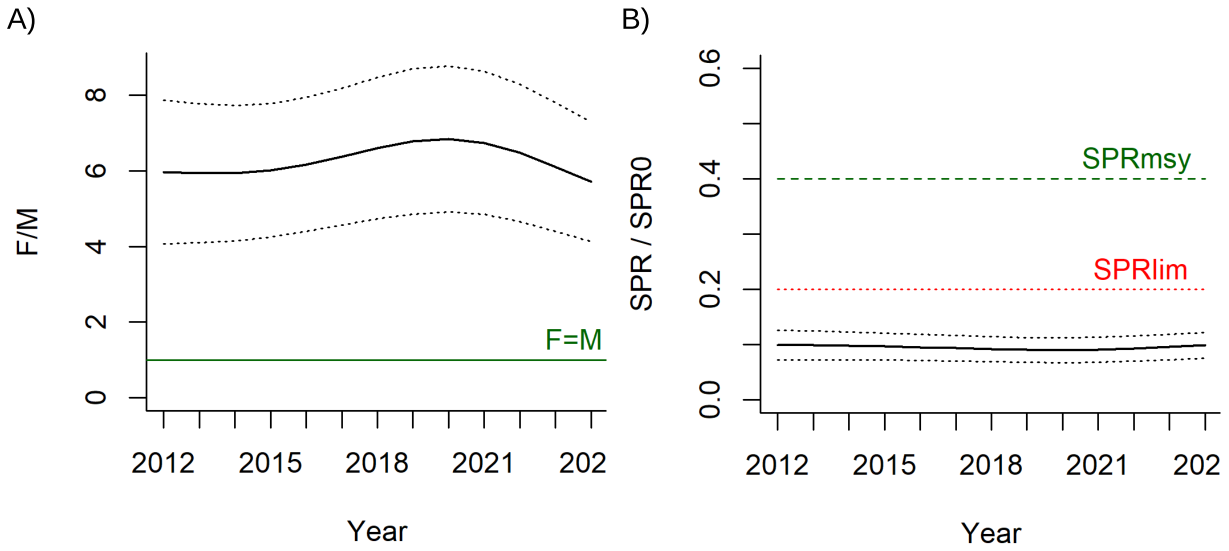


Figure 10: Smoothed trends in relative fishing mortality (A) and spawning potential (B) of female Sand Flathead in the south-east coast region using the Length-Based Spawning Potential (LBSPR) assessment approach. Fishing mortality relative to natural mortality (*F/M*) ratios > 1 are widely used to infer overfishing (solid line in A). Estimates of the current spawning potential ratio relative to unfished levels (*SPR/SPR0*) is assessed against an acceptable limit of 0.2 (20% of unfished levels) to infer depletion and against a desirable target of 0.4 (40% of unfished levels) to assess performance.

Table 6: Estimates of relative fishing mortality (*F/M*) and spawning potential (*SPR/SPR0*) of female Sand Flathead at traditional sampling areas in the south-east coast region using the Length-Based Spawning Potential Ratio (LBSPR) assessment approach. See text above and Table 3 for details on scenarios.

Scenario	***F/M* in 2024**	***SPR/SPR0* in 2024**
Estimate	4.68 (3.43-5.93)	0.11 (0.09-0.14)
Fast growth	5.95 (4.45-7.45)	0.09 (0.07-0.11)
Slow growth	4.71 (3.42-6)	0.11 (0.09-0.13)

A regional breakdown of LBSPR outcomes revealed that populations in all coastal regions across the state except for Flinders Island have likely been depleted below critical levels and that estimated levels of fishing mortality in all of these regions are likely to be highly unsustainable (Table 7). As expected, the spawning potential of females on Flinders Island was estimated to be closest to unfished conditions (76%). The spawning potential of females at all other sites was estimated to be below the putatively critical limit of 20% of unfished levels.

Table 7: Regional estimates of fishing mortality (*F/M*) and the spawning potential ratio (*SPR/SPR0*) for female Sand Flathead sampled between 2022 and 2024.

Region	**Fishing mortality *(F/M)***	**Spawning Potential *(SPR/SPR0)***
Bridport (NEC)	Highly unsustainable (>3)	Below limit (<0.2)
D'Entrecasteaux Channel (SEC)	Highly unsustainable (>4)	Below limit (<0.1)
Flinders Island (FI)	Sustainable (<1)	Sustainable (>0.4)
Frederick Henry & Norfolk Bays (SEC)	Highly unsustainable (>4)	Below limit (<0.2)
Great Oyster Bay (EC)	Highly unsustainable (>7)	Below limit (<0.2)
Mercury Passage (EC)	Highly unsustainable (>4)	Below limit (<0.2)
Stanley (NWC)	Highly unsustainable (>2)	Below limit (<0.2)
St Helens (EC)	Highly unsustainable (>3)	Below limit (<0.2)
Tamar (NEC)	Highly unsustainable (>7)	Below limit (<0.1)

8 General risk assessment

The Sand Flathead fishery scored < 60 in the risk analysis, failing assessment with a high risk of recruitment impairment and stock damage. The key reasons for this assessment outcome are that Sand Flathead is a moderately productive species, because individuals are relatively long lived (up to 20 years) (Bani 2005), mature early (Bani and Moltschaniwskyj 2008), and occupy a relatively high trophic level (Ayling, Wilson, and Ratkowsky 1975). Sand Flathead were not highly susceptible to capture by the commercial fishery in Tasmania, and since November 2023 commercial fishing has been closed. Thus, the past impact from this fishery is likely to be minor. In contrast, Sand Flathead are heavily targeted by the recreational fishery in their preferred habitat with evidence of depletion in age and size structure (Ewing and Lyle 2020), female biomass, and reproductive capacity (Fraser et al. 2022). Detailed information on the scoring that led to this outcome is available from the TasFisheriesResearch webpage.

9 References

Ayling, G. M., K. C. Wilson, and D. A. Ratkowsky. 1975. 'Sand Flathead (Platycephalus Bassensis), an Indicator Species for Mercury Pollution in Tasmanian Waters'. *Marine Pollution Bulletin* 6 (9): 142–44. https://doi.org/10.1016/0025-326X(75)90172-1.

Bani, A. 2005. 'Temporal and Spatial Variability of the Life History Characteristics of Sand Flathead, Platcyphalus Bassensis'. Phd, University of Tasmania. https://eprints.utas.edu.au/7568/.

Bani, A., and N. A. Moltschaniwskyj. 2008. 'Spatio-temporal Variability in Reproductive Ecology of Sand Flathead, *Platycephalus Bassensis*, in Three Tasmanian Inshore Habitats: Potential Implications for Management'. *Journal of Applied Ichthyology* 24 (5): 555–61. https://doi.org/10.1111/j.1439-0426.2008.01076.x.

Dureuil, Manuel, and Rainer Froese. 2021. 'A Natural Constant Predicts Survival to Maximum Age'. *Communications Biology* 4 (1): 1–6. https://doi.org/10.1038/s42003-021-02172-4.

Edgar, E. 2008. *Australian Marine Life: The Plants and Animals of Temperate Waters*. Sydney: New Holland Publishers.

Ewing, G., Jeremy Lyle, and A Mapleston. 2014. *DEVELOPING A LOW-COST MONITORING REGIME TO ASSESS RELATIVE ABUNDANCE AND POPULATION CHARACTERISTICS OF SAND FLATHEAD*. https://doi.org/10.13140/2.1.4434.8482.

Ewing, G. P., and J. M. Lyle. 2020. 'Fishery-Independent Monitoring of Sand Flathead Abundance and Population Characteristics, 2020 Update'. Hobart, Australia: Institute for Marine and Antarctic Studies, University of Tasmania.

Fraser, Kate, Klaas Hartmann, James Haddy, and Nils Krueck. 2022. 'Tasmanian Scalefish Fishery Assessment 2020/21'. https://www.imas.utas.edu.au/__data/assets/pdf_file/0005/1632515/Scalefish-Assessment_2020-21.pdf.

Fraser, Kate, Klaas Hartmann, and Nils Krueck. 2021. 'Tasmanian Scalefish Fishery Assessment 2019/20'. https://www.imas.utas.edu.au/__data/assets/pdf_file/0003/1543728/Scalefish-Assessment-2019-20_Final_Figures_Revised4.pdf.

Froese, R., and D. Pauly. 2023. FishBase (www.fishbase.org).

Froese, R., H. Winker, G. Coro, N. Demirel, A. C. Tsikliras, D. Dimarchopoulou, G. Scarcella, W. N. Probst, M. Dureuil, and D. Pauly. 2019. A new approach for estimating stock status from length frequency data. ICES Journal of Marine Science 76:350-351.

Froese, Rainer, Henning Winker, Didier Gascuel, U Rashid Sumaila, and Daniel Pauly. 2016. 'Minimizing the Impact of Fishing'. *Fish and Fisheries* 17 (3): 785–802. https://doi.org/10.1111/faf.12146.

Gomon, Martin F., Dianne J. Bray, and Rudie H. Kuiter. 2008. *Fishes of Australia's Southern Coast*. New Holland Chatswood, Australia. https://museumsvictoria.com.au/books/science/fishes-of-australias-southern-coast/.

Hobday, A. J., A. D. M. Smith, I. C. Stobutzki, C. Bulman, R. Daley, J. M. Dambacher, R. A. Deng, J. Dowdney, M. Fuller, D. Furlani, S. P. Griffiths, D. Johnson, R. Kenyon, I. A. Knuckey, S. D. Ling, R. Pitcher, K. J. Sainsbury, M. Sporcic, T. Smith, C. Turnbull, T. I. Walker, S. E. Wayte, H. Webb, A. Williams, B. S. Wise, and S. Zhou. 2011. Ecological risk assessment for the effects of fishing. Fisheries Research 108:372-384.

Hordyk, A., K. Ono, K. Sainsbury, N. Loneragan, and J. Prince. 2015a. Some explorations of the life history ratios to describe length composition, spawning-per-recruit, and the spawning potential ratio. ICES Journal of Marine Science 72:204-216.

Hordyk, A., K. Ono, S. Valencia, N. Loneragan, and J. Prince. 2015b. A novel length-based empirical estimation method of spawning potential ratio (SPR), and tests of its performance, for small-scale, data-poor fisheries. ICES Journal of Marine Science 72:217-231.

Krueck, N., Marshell, A., Coulson, P., Sharples, R., Cresswell, K., Tracey, S. 2023. Southern Sand Flathead Assessment 2023. Hobart, Australia: Institute for Marine and Antarctic Studies, University of Tasmania

Krueck, Nils, Klaas Hartmann, and Jeremy Lyle. 2020. 'Tasmanian Scalefish Fishery Assessment 2018/19'. Hobart, Australia: Institute for Marine and Antarctic Studies, University of Tasmania.

Lyle, J. M. 2005. '2000/01 Survey of Recreational Fishing in Tasmania'. Hobart, Tas.: Tasmanian Aquaculture and Fisheries Institute. https://stors.tas.gov.au/au-7-0095-02914$stream.

Lyle, J. M., K. E. Stark, G. P. Ewing, and S. R. Tracey. 2019. '2017-18 Survey of Recreational Fishing in Tasmania'. Hobart, Australia: Institute for Marine and Antactic Studies, University of Tasmania.

Lyle, J. M., S. Tracey, K. E. Stark, and S. Wotherspoon. 2009. '2007/08 Survey of Recreational Fishing in Tasmania'. http://www.imas.utas.edu.au/__data/assets/pdf_file/0004/68566/TAS_recsurvey0708report.pdf.

Lyle, Jeremy, Kathryn Stark, and Sean Tracey. 2014. '2012/13 Survey of Recreational Fishing in Tasmania'. https://doi.org/10.13140/2.1.1289.1204.

Mildenberger, Tobias Karl, Marc Hollis Taylor, and Matthias Wolff. 2017. 'TropFishR: An R Package for Fisheries Analysis with Length-Frequency Data'. *Methods in Ecology and Evolution* 8 (11): 1520–27. https://doi.org/10.1111/2041-210X.12791.

Sharples, Ruth, Katie Cresswell, Kate Fraser, Klaas Hartmaan and Nils Krueck. 2023. Tasmanian Scalefish Fishery Assessment 2021/22'. Hobart, Australia: Institute for Marine and Antarctic Studies, University of Tasmania

Sharples, Ruth, Sushmita Mukherji, Kate Fraser Klaas Hartmaan, Nils Krueck and Katie Cresswell. 2024. 'Tasmanian Scalefish Fishery Assessment 2022/23'. Hobart, Australia: Institute for Marine and Antarctic Studies, University of Tasmania

Tracey, S. R., and K. E. Stark. 2024. '2022/23 Survey of Recreational Fishing in Tasmania.' Hobart, Australia: Institute for Marine and Antarctic Studies, University of Tasmania

Ziegler, Philippe and Jeremy Lyle. 2010. Tasmanian Scalefish Fishery Assessment 2008/09'. Hobart, Australia: Tasmanian Aquaculture and Fisheries Institute.

10 Appendix 1: Data quality control

There have been multiple administrative changes that affected the collection of commercial catch and effort data from the scalefish fishery. The following restrictions and adjustments have been applied when analysing these data as an attempt to ensure comparability among years, especially when examining trends over time.

i) Correction of old logbook landed catch weights

Prior to 1995, catch returns were reported as monthly summaries of landings. With the introduction of a revised logbook in 1995, catch and effort was recorded daily for each method used. Since catch data reported in the old general fishing return represent landed catch, it has been assumed to represent processed weights. For example, where a fish is gilled and gutted, the reported landed weight will be the gilled and gutted and not the whole weight. In contrast, in the revised logbook all catches are reported in terms of weight and product form (whole, gilled and gutted, trunk, fillet, bait or live). If the catch of a species is reported as gilled and gutted, then the equivalent whole weight can be estimated based on a conversion factor[1].

Without correcting for product form, old logbook and revised logbook catch weights are not strictly compatible. In an attempt to correct for this issue and provide a ‘best estimate’, a correction factor was calculated using catch data from the revised logbook and applied to catches reported in the old logbook. A species-based ratio of the sum of estimated whole weights (adjusted for product form) to the sum of reported catch weights was used as the correction factor.

ii) Effort Problems

Records of effort (based on gear units) of zero or null, or appearing to be recorded incorrectly (implausible), were flagged. While catch can then still be included in catch summaries, such records need to be excluded from calculations of gear unit effort, complicating associated calculations of CPUE for most species. However, all records of effort can be considered in calculating daily CPUE.

iii) Vessel restrictions

In all analyses of catch and effort, past catches from six vessels (four Victorian based and two Tasmanian based) have been excluded from historic records. These vessels were known to have fished consistently in Commonwealth waters and their catches of species, such as Blue Warehou and Ling tended to significantly distort catch trends. In fact, all four Victorian vessels and one of the Tasmanian vessels ceased reporting on the General Fishing Returns in 1994. With the introduction of the South East Fishery Non-Trawl logbook (GN01) in 1997, the remaining Tasmanian vessel ceased reporting fishing activity in the Tasmanian logbook.

[1] Conversion factors to whole weights are 1.00 for whole, live or bait; 2.50 for fillet; 1.50 for trunk; and 1.18 for gilled and gutted.

11 Appendix 2: History of stock status classifications

Annual stock status classifications of Southern Sand Flathead. Terminology of status classifications has changed over time; however, colours represent equivalent classifications. Yellow: Depleting; Red: Depleted; NA indicates catch, effort, and CPUE data for the species were included in an assessment report, but no classification was conducted. Consideration of Sand Flathead data in Tasmanian Scalefish Fishery assessment reports started in 2011/2012. The first classification of Sand Flathead stock status was published for the 2014/2015 season. The first independent stock assessment report for Sand Flathead was published for 2023.

10/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	2023	2024
NA	NA	NA										