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Integrated Scientific Monitoring Program for the Southern and Eastern Scalefish and Shark Fishery - discards for 2020

Australian Fisheries Management Authority

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1 Executive Summary

This document presents estimates of discard weight, and proportion of total catch discarded for 46 species groups over 37 strata of the Southern and Eastern Scalefish and Shark Fishery (SESSF) in 2020. Discard estimates were calculated using data collected by fishery observers as part of the Integrated Scientific Monitoring Program (ISMP) and the SESSF fishery logbook data. It is an automated report presenting data tables, estimates of discards and descriptions of the methods used to derive estimates without commentary on the implications the estimates may have for stock assessment or management purposes.

This report continues a series of annual reports, commencing with Thomson (2017) that fully automates the calculation method underlying the results presented. Prior to Thomson (2017) some manual calculation and decisions were required in selecting the data and calculating discarded catches. The coverage of the 37 ISMP strata is presented in Table 1 using several metrics. Discard estimates and their associated CVs for 46 species groups were calculated using Method A of Bergh et al. (2009) with those used for assessment and management purposes presented in Table 2. For those species groups where discarded catch estimates are obtained from stock assessment models, Table 3 provides discard estimates calculated using the Bergh method for comparative purposes. For each species group, discard estimates are summarised by strata (Tables 4-49). Histograms of observed discarded catches are provided for each species group to assist in the identification of outliers in the data.

AFMA suspended the onboard observer program in March 2020 due to the risk of COVID-19. While the program returned to normal operation in October 2020, the collection of estimates of discarded weight has been impacted during this period, potentially affecting the discard estimates.

Following advice from SESSFRAG at its August 2020 Data Meeting, the discard calculation for 2020 now assumes that observer's estimates of discarded weight are unbiased, previously it was assumed that observers under-estimate discarded catch weight in the same way as that retained catch is underestimated in logbooks as compared with CDRs. This change is implemented by scaling the total logbook catch to Catch Disposal Record (CDR) catch in the discard proportion calculation. The scalar is calculated by comparing the CDR total for 2020, for each species group, to the total logbook catches that were under quota. Trip by trip comparison with CDRs will be investigated in future years.

A new species group "Orange Roughy Pedra" has been added. Orange Roughy catches from Pedra Branca are part of the southern Orange Roughy management southern zone, but are assessed as part of the eastern zone Orange Roughy stock (Burch and Osorio, 2021).

The ISMP has been operating using its current design, based on Bergh et al. (2009), from 1 July 2010 until the present. AFMA have chosen to implement the PROP design that requires observers be deployed in proportion to the number of fishing days in each stratum. Originally, observers were deployed throughout the SESSF for roughly 500 sea days per year, however, this has declined to around 300 days in recent years with the removal of observers from gillnet and line vessels. Note that below 500 fishing days per year, the PROP method is expected to perform poorly (Bergh et al. 2009).

2 Introduction

The SESSF is composed of the former South East Fishery (composed of the South East Trawl, SET, and SE Non-trawl, SENT, sectors), the Southern Shark Fishery (SSF), which primarily uses gillnets and line, the Great Australian Bight Trawl Fishery (GAB), and the East Coast Deepwater Trawl Fishery (ECDW). Note that earlier groupings of these entities were called the Commonwealth Trawl Sector, and the Gillnet, Hook and Trap fishery, GHAT.

The ISMP collects fishery independent data from across the SESSF including age, and length composition of commercial catches as well as the weight of the landed and discarded components of the catch. Catch weight information is collected for quota groups as well as a range of non-quota groups including Threatened, Endangered and Protected Species (TEPS). ISMP data collections provide (1) age and length composition information that are used in SESSF stock assessments; (2) information on species compositions of the catch; (3) information on the nature and frequency of interactions with wildlife; and (4) information that can be used to estimate the annual discarded tonnage, by species group, for the SESSF. It is point (4) that is the subject of this report.

The ISMP and its forerunners were originally designed to collect data for the South East Fishery, primarily a trawl fishery (Knuckey and Gason, 2001). By 2009 a number of changes had occurred to the fishery monitored by the ISMP, most notably (i) amalgamation with other fisheries not included in the original design, to form the SESSF, and (ii) a Structural Adjustment Package (SAP) that reduced the number of fishery vessels. Consequently, a new ISMP design was developed to better match the SESSF (Bergh et al., 2009). The new design was implemented from 1 July 2010. Note that some of the zones used to define ISMP strata, the 'SEF zones' have changed slightly over the years and it is the newer zone definitions that are used for this report. Thus zone definitions, but not zone names, have changed slightly throughout the history of the ISMP.

The estimates of discarding from all SESSF fishing, and non-SESSF fishing including State fishing that were presented in Appendix 4 (e.g Upston and Thomson, 2015) of earlier reports in this series, are now presented in a separate report along with more accompanying detail, as well as weighted 4 year averages of State catches and discards (Althaus et al., 2021).

The purpose of the redesign was to recommend coverage that would lead to statistically robust estimation of, amongst other quantities, estimated discards. To this end, target CVs of 20% for estimated discards were set for a range of species groups including quota and non-quota groups, as well as high risk groups (i.e. TEPS).

Bergh et al. (2009) examined five alternative methods for allocating sea days amongst ISMP strata in order to best match the target CVs for estimated discard tonnage. These methods adaptively allocated sea days in order, at each allocation step, to

1. VWCV: minimise value-weighted CV across species groups,
2. MinS: minimise CV across groups,
3. PROP: match the proportional coverage of the fishery,
4. CWCV-HR: minimise catch-weighted CV for high risk groups, and

5. MinS-HR: match the target CV for high risk species.

No particular method or level of sampling effort was recommended by Bergh et al. (2009). Their results showed a continuum of improved performance for sampling coverage of 250 up to 1,500 sea days. The best performing methods were PROP, which allocated observer effort in proportion to the distribution of fishing effort amongst strata (method 3, above), and MinS-HR, which allocated effort to best match CV for high risk species. Both methods performed poorly when only 250 sea days were observed. MinS-HR performed well given 500 or more sea days but the PROP method required more than 500 sea days (performing well for 750 or more days) when considering the high risk species groups. At 500 sea days, the PROP method performs slightly better than the MinS-HR method for non-high risk groups, but less well than the MinS-HR method at higher levels.

AFMA have chosen to implement the PROP design, deploying observers throughout the SESSF for roughly 500 sea days per year in the past, but only around 300 days per year since the removal of observers from gillnet and line vessels. Note that below 500 fishing days per year, the PROP method is expected to perform poorly (Bergh et al., 2009). The new design was implemented from 1 July 2010 so 2011 was the first full year of sampling.

This report presents estimated discard tonnage and discard proportion for species groups in the SESSF, along with estimated CVs for those quantities. The distribution of actual ISMP effort against that of fishing effort is also presented.

2.1 Changes made in 2021

We continue to apply the same changes made since 2018, i.e., strata where only one shot is observed are excluded from the calculation of discarded catch. The hit rate, the proportion of shots that encounter the species, has replaced the mean proportion discarded in the species specific summaries (Tables 4-49).

During the processing of the logbook data last year, CSIRO became aware that a number of vessels were reporting a single (invariant) depth in their e-log. Fishing depth is essential in the catch per unit of effort (CPUE) standardisations, SESSF Data Summary, Discard and Catch reports. In 2020, CSIRO undertook a correction of erroneous invariant depth records of shots reported between 2015 and 2019 inclusive, using shot location and bathymetry data as supported by SESSFrag out of session in July 2020. During 2021 CSIRO found that many vessels continued invariant depth reporting during 2020, many switching to a new invariant depth or switching back and forth between invariant depths. Using a new method for detecting invariant reporting, a small number of additional vessels were found to show a similar pattern of reporting invariant depth, and some pre-2015 invariant shots were identified. This, generally coincides with a move to e-logs. These were all corrected using the same methodology that was used in 2020.

AFMA suspended the onboard observer program in March 2020 due to the risk of COVID-19. While the program returned to normal operations in October 2020, the collection of estimates of discarded weight has been impacted during this period, potentially affecting the discard estimates.

This report differs from the 2020 report of Deng et al. (2020a) in that:

1. The modification of depth records has resulted in changes to the catches data selection for species groups for which depth is used (i.e. inshore and offshore Ocean Perch and Deepwater Sharks) and also for the strata dependent on depth (e.g. inshore and offshore NSW trawl).
2. Following advice from SESSFRAG at its August 2020 Data Meeting, discard estimates for 2020 now assume that observer's estimates of discarded weight are unbiased, previously it was assumed that observers under-estimate discarded catch weight in the same way as that retained catch is typically under-estimated in logbooks. This change is implemented by scaling the species total logbook catch to that in the Catch Disposal Record (CDR) catch in the discard proportion calculation (Equation 3).
3. The strata for Deepwater Shark ('TR_TAS_W_DWS,' 'TR_TAS_E_DWS') are not included. See the maps attached with this document.
4. Orange Roughy zones have been changed to more closely align with management boundaries, which will result in slight differences in the data presented in this report compared with other years.
5. One new species group has been added to this report in 2021: Orange Roughy Pedra has been separated from Orange Roughy South because catches from Pedra Branca are included in the stock assessment for Orange Roughy East (Burch and Osorio, 2021).
6. Research catch of Orange Roughy (180.1 t) during 2020 was added to the CDR catch of Western Orange Roughy. Future versions of this report will include catches of quota species taken under research permits.

3 Methods

3.1 Data

The data are held in an Oracle database (version 11g) at AFMA. A copy of the database was provided to CSIRO using DataPump Export version 11.2 and this is held by CSIRO in an Oracle 12c R2 database. A number of known errors, such as Danish seine vessels that were recorded as using trawl gear, have been corrected in the CSIRO copy of the database. Data from differing historical periods are sometimes stored in corresponding tables that differ in format. Procedures, implemented in using SQL Developer (version 3.2.20.10), dbVisualizer 9.5.7, Python and R perform the data corrections and integrate data that are distributed across tables. Microsoft Excel for Office 365 is used to aggregate the State data and undertaken checking of calculations performed using other software. The assignment of shots to ISMP strata and the bulk of the discard calculations were done using R. Version control of the R code base is implemented using a git repository hosted on the CSIRO Bitbucket server.

Observer data was extracted from the 'onboard weight' section of the CSIRO copy of the AFMA observer database. Onboard observers record the weights of both the retained and discarded components of observed fishing shots, along with species composition and associated information such as date, location, fishing gear, and weight type (whole or some form of processing). Commonwealth logbook data were extracted from the Daily Fishing Logs section of the CSIRO copy of the AFMA database.

3.2 Discard estimation

The calculations presented here follow the methodology presented by Bergh et al. (2009) whose sampling scheme was implemented by the ISMP from 1 July 2010. Since 2016, the calculation of discard rates and their uncertainty has been undertaken using routines written in R (R Core Team, 2020), replacing spreadsheet based calculations that were used previously. This change has permitted the development of clearly defined rules to select the data and calculate discard rates, removing some subjectivity in data selection of the spreadsheet based approach. While both approaches implement Bergh et al. (2009) there are some differences, mostly relating to data selection which are described below:

1. Shots are allocated to a single ISMP stratum.
2. All records of carcass weight are converted to whole weight (the old method ignored the process type field in the database; often, especially for discarded fish, the recorded weight type is whole weight, but sometimes, most often for retained fish, the process type can be e.g. headed and gutted).
3. The new software performs all the necessary steps that result in the estimates presented in this report, whereas the old software involved some spreadsheet manipulation by the user. The advantage of automation is that the calculations can be repeated quickly, easily, and without scope for untraceable human error.

4. In the past, somewhat subjective rules were applied to judge whether a discard rate was 'valid' (assessing the representativeness of the coverage of the data collection) and invalid rates were not reported. Quantifiable rules have now been selected and uniformly applied to the discard estimated for all species groups.
5. The allocation of shots to the "Unknown" stratum might have changed, see discussion in Section 5.5 below.

This report has applied the coverage criteria described in Section 5.3 to estimate discard rates and their associated uncertainty for 2020 data using method A of Bergh et al. (2009). A recalculation of discard rates for all years for which data are available will be presented in this report next year. The conceptual differences between Methods A and B of Bergh et al. (2009) are briefly described in Section 5.7, while an evaluation of Method B will be undertaken in a future version of this report.

3.3 Observer Coverage

Observer coverage has fallen from around 500 days per year to around 300 days per year since the removal of observers from gillnet and line vessels in mid-2015. In addition many species groups that previously estimated fishery wide discard rates have now been split into eastern and western components. While the decrease in sampling and the increase in the number of species groups would be expected to decrease the precision in the estimated discard rates, the performance is worse than indicated by Bergh et al. (2009) for 250 observed shots per annum. Further investigation is required to understand why the ISMP is underperforming in the precision of the estimated discard rates.

3.4 ISMP strata and species groups

Fishing shots are mapped to ISMP strata based on spatial location, depth, gear and in some cases, the species captured. Currently there are 39 ISMP strata used to estimate discard rates. These comprise 25 trawl strata (including the newly included strata for Orange Roughy hotspots and Deepwater Sharks strata and three depth defined strata in the GAB); six line (hook) strata, seven gillnet strata and one Danish seine stratum (off Lakes Entrance). Records that fall outside of these strata are assigned to the stratum 'Unknown.' Spatially, so called South East Trawl zones are used to define some of the trawl strata and shark zones are used to define the line and gillnet sectors (see Bergh et al., 2009 for rationale).

The AFMA Observers have slightly altered the original stratum design, in particular, but splitting the Danish Seine stratum off Lakes Entrance (DS_EDL) into two strata (corresponding to SET zones 20 and 60) as was done for the corresponding trawl strata (TR_EDL_IN and TR_EDL_OFF). An investigation by Deng et al. (2019a) failed to identify any records in the offshore depth range (200-1500m) and therefore a single Danish Seine stratum has been retained in this report and further consultation will be undertaken with AFMA to resolve the status of this strata.

The trawl strata encompass shots encoded on the logbook database as any of a number of trawl gear codes, these are encoded as 'OT' in the Observer database. Line gears are given as 'LL' or 'DL' in the Observer database.

The SESSF species groups encompass recognised species (e.g. Redfish, Blue Grenadier) and populations (e.g. Eastern Gemfish, Western Gemfish) as well as species clusters (e.g. Flathead which comprises five species, and Deepwater Shark, which comprises over 20 species, split into eastern and western groups). Consequently, the term ‘species group’ is used in this report instead of ‘species.’

Note that the abbreviated stratum names used by Bergh et al. (2009) for trawl strata and the Danish seine stratum have been renamed, moving the ‘TR’ component of the name to the beginning, for consistency, because all other strata have a gear code descriptor at the start of their name. The names for the GAB strata have been shortened.

3.5 Unknown stratum

There are two kinds of record that are not assigned to ISMP strata (a) records that clearly do not fall into any of the ISMP strata; and (b) records for which information are missing. Examples of the first kind are records that belong to a fishery that does not fall within the SESSF (such as the High Seas fishing, the small pelagic fishery or a tuna fishery); or records that fall outside of the specified depth range for the area in which they occur; or records that use a gear type for which no corresponding stratum exists in the location of fishing e.g. any Danish Seine fishing outside of the Eden-Lakes Entrance region. The second kind of record are those for which key information such as fishing location (lat-long) or depth are missing so that their stratum cannot be determined. Future versions of this report will investigate using bathymetry data to assign a depth to records with fishing location but no recorded depth.

Records belonging to the first category will not be recognised as belonging to an ISMP stratum regardless of whether they are logbook or observer records. Those belonging to the missing data class tend to be logbook records – observer records seldom if ever lack key information.

3.6 Commonwealth and State landings

Records of Commonwealth landings from Catch Disposal Records (CDR) and logbooks were reported in Appendix A4 of earlier reports (e.g. Upston and Thomson, 2015) in the series of which this report is the latest. The methods used in compiling those data have now been documented and the landings data are presented in a separate report (Althaus et al., 2021). That report also presents the estimated total discard tonnage, obtained by applying the discard proportion (also known as ‘discard rate’) presented in this report, to the estimated total landings. Consequently this report has no Appendix A4. This report presents an estimate of the discard tonnage for all shots reported in the logbooks that fall into ISMP strata (the vast majority) as well as the discard proportion (or rate).

3.7 Discard calculation

The Observer database does not currently include a key that permits observed shots to be paired with fishing shots from logbooks. Therefore, to match the observer and logbook data, a ‘shot’ has always been defined as a unique combination of the following fields from the database: Year, Month, Day, Latitude, Longitude, Gear, CallSign (vessel ID), Depth (min and max).

Bergh et al. (2009) proposed two methods for estimating discarded catch conditioned on shots which encounter the species of interest which are termed Method A and Method B. Both methods estimate the mean and variance of the discarded catch by stratum and aggregate over strata to obtain estimates for the fishery, they are briefly described below

1. Method A estimates the discarded catch per shot from the Observer data and multiplies it by the total number of logbook shots.
2. Method B estimates the ratio of discarded to retained catch from the Observer data and applies this to the total retained catch per stratum from the logbook data, corrected by the CDR.

This report applies Method A to estimate the mean and CV of the discarded catch for the species groups shown in Tables 4-49. Previous versions of this report have specified discard rate using a lower case d which is used to represent Method B in To remove any ambiguity, this report now conforms to the notation of using upper case D and V to represent the mean and variance of the discarded catch calculated from Method A. The estimation of discarded catch and its uncertainty for Method A is described below. Note that for clarity of notation, year subscripts are omitted throughout:

For each species group sp in each ISMP stratum st , the mean discarded catch weight $D_{H,st}^{sp}$ and its variance, $V(D_{H,st}^{sp})$ of shots that encounter that species group sp are

$$\bar{D}_{H,st}^{sp} = \frac{1}{n_{st}^{obs} h_{st}^{sp}} \sum_{i \in st} D_i^{sp},$$

$$V(D_{H,st}^{sp}) = \frac{1}{n_{st}^{obs} h_{st}^{sp}} \sum_{i \in st} (D_i^{sp} - \bar{D}_{H,st}^{sp})^2$$

where D_i^{sp} is the discarded catch for species sp in observed shot i , h_{st}^{sp} is the 'hit rate,' the proportion of observed shots in stratum st which encounter species sp and n_{st}^{obs} is the total number of observed shots in stratum st . Note that the hit rate can only be calculated from the observer data, not from the logbook data since logbooks do not accurately record discards. When a species is wholly discarded from a fishing shot, the logbook will contain no record that that species was encountered.

To account for all shots fired it is necessary to make an adjustment to $\bar{D}_{H,st}^{sp}$ based on the hit rate. Note the subscript H which represents observed shots which caught species sp is replaced by A which represents all observed shots in strata st .

$$\bar{D}_{A,st}^{sp} = h_{st}^{sp} \bar{D}_{H,st}^{sp}$$

and the variance of the mean adjusted discarded catch per shot is

$$V(\bar{D}_{A,st}^{sp}) = \frac{V(\bar{D}_{H,st}^{sp}) \omega_{st}^{sp}}{n_{st}^{obs}}$$

where ω_{st}^{sp} is the variance multiplier due to within trip correlation.

The estimate of the total discarded catch for species sp in stratum st is

$$\hat{D}_{st}^{sp} = n_{st}^F \bar{D}_{A,st}^{sp} \quad (1)$$

where n_{st}^F is the total number of logbook shots in the strata. The associated variance is

$$V(\widehat{D}_{st}^{sp}) = (n_{st}^F)^2 V(\bar{D}_{A,st}^{sp}).$$

The estimated SESSF-wide discard weight for species group sp , \widehat{D}^{sp} , is the sum of the \widehat{D}_{st}^{sp} (equation (1) across all relevant ISMP strata (st) (note that for most species groups this does not include the GAB strata):

$$\widehat{D}^{sp} = \sum_{\forall st} \widehat{D}_{st}^{sp} \quad (2)$$

with variance

$$V(\widehat{D}^{sp}) = \sum_{\forall st} V(\widehat{D}_{st}^{sp}).$$

The SESSF-wide CV for species sp is therefore

$$\left(\sum_{\forall st} V(\widehat{D}_{st}^{sp}) \right)^{1/2} / \sum_{\forall st} \widehat{D}_{st}^{sp}.$$

The ‘discard rate’ or proportion discarded for species group sp is the estimated discard weight divided by the estimated total catch (which is the sum of the landed L^{sp} , and discarded components of the catch):

$$p^{sp} = \frac{\widehat{D}^{sp}}{\sum_{i \in st} L_i^{sp} * F_i^{sp} + \widehat{D}^{sp}} \quad (3)$$

Note that L_i^{sp} is the landed catch as recorded in the logbooks per species per stratum, but that the weight recorded by the observers could have been used instead (assuming this is an independent measure, which it might not be). Therefore the logbook catch CDR scaling factor per species per stratum F_i^{sp} is introduced to adjust the logbook catch in the formula.

Note that the three GAB trawl strata are excluded from the sum in equation (2) for all groups except Bight Redfish, Deepwater Flathead.

Bergh et al. (2009) also describe a method of correcting the estimated variance for a lack of independence of errors within individual trips, however, this has not yet been implemented.

3.8 Coverage and validity of discard estimates

Sampling theory quantifies the performance of an estimator by its bias, the proximity to the true value and its precision, the level of uncertainty (Cochran, 1977). While stratified random sampling usually provides increased precision over simple random sampling for a given sample size, failure to adequately sample all strata in which a species is present in may lead to a biased estimate. While the CVs of the discard estimates provide a measure of their precision they do not measure the bias. Representative sampling is often used to reduce bias in surveys. To attempt to quantify whether the ISMP sampling is representative of the catch and fishing effort of each species group, decision rules were formulated by to identify whether there was adequate observer coverage (Klaer 2009, Upston and Klaer 2012):

1. more than 10 observed shots in the stratum that has the most shots, and
2. samples that are distributed in proportion to catches, and

3. if only one stratum is sampled then that stratum should represent at least 50% of the total catch, and
4. if there is any doubt, the fishery-wide discard rate should be broadly consistent with previous estimates (since 2005).

Unfortunately decision rules 2 and 4 are not quantified, allowing scope for subjectivity. Further, note that there is no decision rule to gauge whether sampling was seasonally representative of catches, unless rule 2 is interpreted as including seasonal spread of sampling. Rule 4 could be invoked when a real change in discard rates has occurred, making it impossible to detect such a change.

A sub-committee of the SESSFRAG met by conference telephone on 31 August 2017 (Sandy Morisson, George Day, Dan Corrie, Miriana Sporcic, Roy Deng, Franzis Althaus, Robin Thomson) and Ian Knuckey provided written comment. The group decided to address coverage by calculating the proportion of the reported landed catch, or logbook shots, that occurred in strata for which at least 5 observations were made. A decision rule that either one of these statistics must exceed 50%, was chosen. The group also recognised that investigation of the data is needed so that this rule should be regarded as a temporary measure until information is available for making a better informed decision.

At the August 2019 Data Meeting, SESSFRAG modified the criteria used to accept discarded catch estimates to reject any discard estimates with discard CV's greater than 100%. The validity rule has been expanded to reject discard estimates with discard CV's greater than 100%.

The issue of coverage and validity has been investigated in a separate analysis presented to the SESSFRAG Chairs meetings in March 2020 (Burch et al., 2020) which concluded that adequate rules would need to be formulated separately on a species-by-species basis. However, the overall conclusion was that a model-based approach would be best, which would obviate the need to formulate species-specific rules.

4 Results

4.1 Targets and coverage by stratum

Coverage by the ISMP is presented in Table 1 using several metrics:

ISMP Stratum: the stratum over which the metric are calculated.

Target days: the target number of sea days set by the Observer program before the start of fishing (obtained from Tamre Sarhan, AFMA, pers comm).

Prop days: a total of 317 sea days were distributed across strata in proportion to the average number of reported (logbook) sea days fished in each stratum over the most recent 5 years (reported sea days were derived from reported shots by assuming that Danish seine vessels make 5 shots per day and other gear make 2.5 shots per day). Results are rounded to the nearest day.

Prop shots: the number of fishing shots (rounded to the nearest shot) that corresponds to Prop days (Danish seine are assumed to make 5 shots per day and other gear 2.5 shots per day).

Match: The ratio of the proportion of shots that was observed per stratum (Obs shots '20 divided by its total), to the proportion of reported logbook shots per stratum (Log shots '20 divided by its total) as a measure of how successfully the proportional sample design has been followed. Ideally, all values in this column should be '1.'

Obs '18: The number of observed shots in the year 2018.

Obs '19: The number of observed shots in the year 2019.

Obs '20: The number of observed shots in the year 2020.

Log '20: The number of reported logbook shots in the year 2020.

Obs %: The percentage of the logbook shots that were observed shots in 2020.

Vess '20: The number of vessels which had observed shots in 2020 in this strata.

Mons '20: The number of months during which observations were made in 2020 in this strata.

4.2 Discard estimates and coverage by species

Table 2 and Table 3 show the estimated discards by species along with measures of coverage:

Disc %: the estimated proportion of the 2020 catch that is discarded (p^{sp} in equation (3) converted to a percentage (i.e. multiplied by 100).

Disc (t): the estimated tonnage discarded in 2020.

Disc CV %: the CV of the estimated 2020 discarded catch (*Disc (t)*) displayed as a percentage.

Tot CV %: the CV of the 2020 estimated total catch (estimated discards + landed catch taken from logbooks) displayed as a percentage. Note this quantity assumes the CV of the logbook catch is zero and hence may underestimate of the uncertainty in total catch.

% Obs: the percentage of the total shots in 2020 that caught this species that were observed.

Nshot obs: the number of observed shots in 2020 in which this species was caught.

Catch % (≥ 5): the percentage of the total 2020 catch for this species that was taken from strata that had at least 5 observed shots.

Shot % (≥ 5): the percentage of the total number of logbook shots in 2020 that caught this species that were taken in strata that had at least 5 observed shots. Note that this is an upper bound because unobserved logbook shots that discarded 100% of this species usually aren't recorded.

Valid?: a discard estimate will only be used in TAC calculations if it has at least 50% coverage for catches or shots (i.e. a value of 50% or greater in either the *Catch % (≥ 5)* or *Shot % (≥ 5)* columns).

Note that *% Obs*, *Catch % (≥ 5)* and *Shot % (≥ 5)* are upper bounds because unobserved logbook shots that discarded 100% of the catch of a particular species usually aren't recorded.

4.3 Discards and coverage by species and stratum

The quantities used to derive the discard estimates in Table 2 and Table 3 are shown, for each species group in Tables 4-49. Species groups are presented in the same order as the Data Summary report (Bessell-Browne et al., 2021).

The columns in Tables 4-49 are:

LANDINGS (T): The total landed catch for 2020 in each stratum from the logbook database. Note that landed catches in logbooks are often underestimated compared to CDR data.

NOBS: The number of fishing shots (gear deployments) for 2020 observed by the ISMP to have caught this species group. This is equal to the total number of observed shots per stratum multiplied by the hit rate for that species group.

NLOGSP: The number of logbook shots for 2020 in each stratum that reported catching this species.

% OBS: The percentage of logbook shots for 2020 in each stratum that reported catching this species that were observed. Note this quantity can be above 100% when the number of Observed shots reported in the ISMP data is greater than the number of shots reported in the logbook data.

NLOGSTRA The number of logbook shots for 2020 in each stratum.

DISC SHOT: The kilograms of the given species group observed to have been discarded per observed shot for each stratum, multiplied by the hit rate.

HIT RATE: The proportion of logbook shots for 2020 that report catching the species group.

DLOG (T): The estimated tonnage of the species group discarded by all (logbook) shots reported in the stratum for 2020. The sum of this column is total estimated discard 'Disc (t)' in Table 2 and Table 3.

DISC RATE The discard rate for 2020 in the stratum.

Note that the estimated total discard from these calculations (which relates to the estimated discards from all logbook shots that fall with ISMP strata) is not used when setting TACs for SESSF

species. Instead, the discard proportion (estimated using the discards from this report, and landed catches from the logbooks) is applied to an estimate of the total landings, taken from verified catch records (CDRs) and including logbook landings that are not included in ISMP strata ('Other' in this report) and those not reported in the logbooks at all (State catches). The estimated proportion discarded is applied to this overall landed catch to derive a new estimate of the total fishery-wide discard tonnage; this quantity is not reported here, but is reported in Althaus et al. (2021).

4.4 Figures

This report includes a figure for each species group that shows the retained and discarded catch, the CV of the discarded catch and the CV of the total catch (retained and discarded). The figure for each species group immediately follows the table for that species (Tables 4-49).

4.5 Maps

In addition to the information on discarded catches provided in Tables 4-49 maps that the discarded tonnage by species, gear type and strata are provide in a separate document. The maps use the following abbreviations

'*DR*' is the discard rate as a percentage by species and stratum per shot.

'*NST*' represents the number of shots per species per stratum from the observer data.

'*ST*' is the number of shots per species per stratum / total number of shots per stratum from the observer data, equivalent to the hit-rate.

'*Dcd*' is the discard per species per stratum in tonnes.

5 Tables and Figures

Table 1 2020 Target/observed days, shots, months or vessels; 500 days/1250 shots distributed in proportion to mean shots over last 5 years (see text for details).

ISMP STRATUM	TARGET DAYS	PROP DAYS	PROP SHOTS	MATCH	OBS '18	OBS '19	OBS '20	LOG '20	OBS %	VESS '20	MONS '20
TR_NSW_GEM	20	2	5		6	6		35			
TR_NSW_IN	19	22	55	0.3	46	104	17	1571	1.1	4	1
TR_NSW_OFF	13	6	16	0.1	27	19	2	414	0.5	1	1
TR_NSW_RRP	4	1	4	0.4	11	2	2	122	1.6	1	1
TR_SW_BGS		2	5		6	21		166			
TR_SW_ORO		0	1	0.4			1	58	1.7	1	1
TR_SW	25	13	31	0.3	34	103	22	1718	1.3	4	4
DS_EDL	40	21	52	0.1	78	114	50	10355	0.5	5	5
TR_EDL_IN	45	18	46	0.3	94	91	47	3511	1.3	5	5
TR_EDL_OFF	20	8	19	0.3	33	43	21	1560	1.3	3	4
TR_TAS_BGS	20	32	80	16.6	48	186	402	615	65.4	5	3
TR_TAS_E	29	37	93	2.7	109	254	206	1965	10.5	6	5
TR_TAS_ORO	65	3	7	25.4	9	13	30	30	100	5	2
TR_TAS_W	17	33	82	9.3	65	182	406	1107	36.7	5	6
TR_BS_IN		2	5	16.9	19		2	3	66.7	2	2
GAB_Inshore		18	46	0.4	91		43	2548	1.7	1	1
GAB_Midshore		1	2	0.2	6		1	122	0.8	1	1
GAB_Offshore								6			
TR_ECDW	0	3	7			29		1			
AL_CSA		6	14		26			1820			
AL_ESA		5	12		21			536			

ISMP STRATUM	TARGET DAYS	PROP DAYS	PROP SHOTS	MATCH	OBS '18	OBS '19	OBS '20	LOG '20	OBS %	VESS '20	MONS '20
AL_WBS_SAV								368			
AL_EBS_NSW		36	91		179	130		405			
AL_ET_WT		9	24			31		683			
AL_WSA_WA								524			
GN_CSA		3	8		15			380			
GN_ESA								170			
GN_SAV		1	3		8			288			
GN_WBS		2	6		6			1760			
GN_EBS_NSW		2	5		6			3173			
GN_ET_WT		2	6					381			
GN_WA_WSA											
TR_CAS_ORO		10	25	23.6		18	68	73	93.2	2	2
TR_MAA_ORO											
TR_PED_ORO								4			
TR_SHH_ORO		13	33	17.9	65	69	96	136	70.6	5	3
TR_SPH_ORO		3	8	32.3		12	28	22	127.3	4	2
Unk		0	1	1.5	1		2	33	6.1	2	1
Total	317	314	792	-	1009	1427	1446	36663	-	-	-

Table 2 Estimated percentage of catch discarded during 2020, discard tonnage with CV, validity based on coverage (see Section 3.8 for details). Blanks indicate that no observer data available.

SPECIES GROUP	DISC %	DISC (T)	DISC CV %	TOT CV %	% OBS	NSHOT OBS	CATCH % (>=5)	SHOT % (>=5)	VALID?
Alfonsino	17	0.5	185.3	31.5	30	85	41	10	Fail
John Dory	0.7	0.4	142.4	1	1	66	92	93	Fail
King Dory	1.6	1.5	107.8	1.7	3	40	87	62	Fail
Mirror Dory East	7.2	3.2	95.6	6.9	2	30	48	61	Pass
Mirror Dory West	10.1	3.8	102.8	10.3	22	111	100	100	Fail
Smooth Oreo Non-Cascade	1.4	0.8	10.1	0.1	12	7	0	0	Fail
Smooth Oreo Cascade									
Frostfish	19.1	32.9	78.5	15	53	236	74	79	Pass
Gemfish East	37.7	25.1	63.1	23.8	21	266	65	73	Pass
Gemfish GAB									
Gemfish West	23.8	23.2	56.7	13.5	4	18	99	94	Pass
Ocean Jackets	51.7	171.3	50.2	25.9	3	46	98	90	Pass
Latchet	12.7	16.6	44.6	5.7	2	96	78	77	Pass
Pink Ling East	1.9	5.7	88	1.7	2	59	66	69	Pass
Pink Ling West	0.7	2.1	46.9	0.3	8	147	62	84	Pass
Orange Roughy Cascade	0	0		0	86	86	100	100	
Oreos	23.6	42.1	49.6	11.7	24	165	68	50	Pass
Orange Roughy East	1.1	14	69.7	0.7	77	155	100	100	Pass
Orange Roughy GAB									
Orange Roughy Pedra									
Orange Roughy South	11.8	2.8	435.1	51.4	20	5	54	88	Fail
Orange Roughy West	15.2	30.6	22.5	3.4	1	4	0	0	Fail
Royal Red Prawn	0	0		0	1	2	0	0	Fail
Ribaldo	8.4	5.5	148.4	12.4	9	92	41	54	Fail
Ocean Perch Inshore	89.2	37.1	52.7	47	12	25	95	81	Pass
Ocean Perch Offshore	20.6	35.9	29.9	6.1	2	46	59	59	Pass
Elephantfish	9.8	1.4	277.6	27.2	1	22	10	5	Fail
Gummy Shark	3.9	3.5	107.3	4.1	0	59	4	27	Fail
Deepwater Shark East	69.2	34.7	164.9	114.1	133	77	51	22	Fail
Deepwater Shark West	37.9	60.7	18.4	7	3	16	62	56	Pass
School Shark	21.7	4.7	42.5	9.2	1	50	3	2	Fail
Sawshark	9.4	5.7	46.2	4.3	1	42	23	34	Fail
Squid	7.6	32.3	46.6	3.5	7	405	99	98	Pass
Blue-eye Trevalla	50.1	6	123.3	61.8	7	46	1	12	Fail
Silver Trevally	79.8	0.3	0	0	1	1	0	0	Fail
Blue Warehou East	97.1	20.5	95.4	92.6	14	15	29	35	Fail
Blue Warehou West	0	0		0	9	2	0	0	Fail

Table 3 Estimated percentage of catch discarded during 2020, calculated using the Bergh method, discard tonnage with CV, validity based on coverage (see Section 3.8 for details). Blanks indicate that no observer data were available. [1]

SPECIES GROUP	DISC %	DISC (T)	DISC CV %	TOT CV %	% OBS	NSHOT OBS	CATCH % (>=5)	SHOT % (>=5)	VALID?
Deepwater Flathead									
Flathead	4.9	106.2	42.6	2.1	1	151	97	95	Pass
Blue Grenadier	4.4	547.2	26	1.1	13	463	99	86	Pass
Jackass Morwong East	32.4	38.5	73.7	23.9	3	61	94	91	Pass
Jackass Morwong West	0.7	0.1	159.1	1.2	8	17	98	71	Fail
Bight Redfish									
Redfish	20.1	6.2	113.7	22.9	4	24	92	81	Fail
Silver Warehou	31.3	133.3	33.9	10.6	17	381	98	95	Pass
School Whiting	8.7	45.9	83.2	7.2	1	20	88	87	Pass

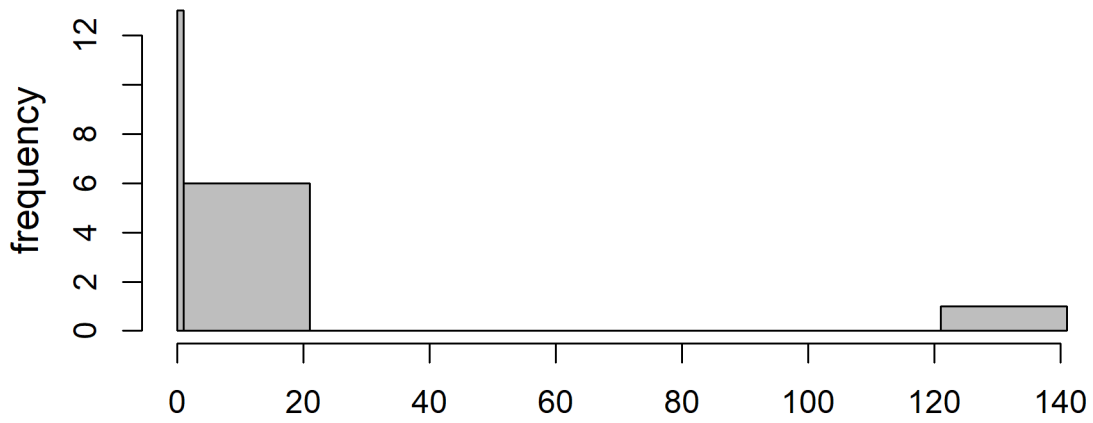
[1] Note that for these species groups, the discarded catch estimates used for assessment and management purposes are obtained from the relevant stock assessment model. These estimates, calculated using the Bergh method, are presented for comparative purposes only.

Table 4 Alfonsino: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN					1571				
TR_NSW_OFF					414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW	1.3	5	9	55.56	1718	0	0.23	0	0
DS_EDL					10355				
TR_EDL_IN	0.26		1		3511				
TR_EDL_OFF	0.04	1	24	4.17	1560	0	0.05	0	0
TR_TAS_BGS					615				
TR_TAS_E	0.59	3	59	5.08	1965	0	0.01	0	0
TR_TAS_ORO					30				
TR_TAS_W	0.39	76	20	380	1107	2.29	0.19	0.47	0.55
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA	0.04		5		1820				
AL_ESA	0.35		5		536				
AL_WBS_SAV	0.03		10		368				
AL_EBS_NSW	0.02		7		405				
AL_ET_WT	1.13		142		683				
AL_WSA_WA	0.01		5		524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	4.16	85	0		33954			0.47	0.17

Alfonsino

Observed discarded catches (kg)



Observed retained catches (kg)

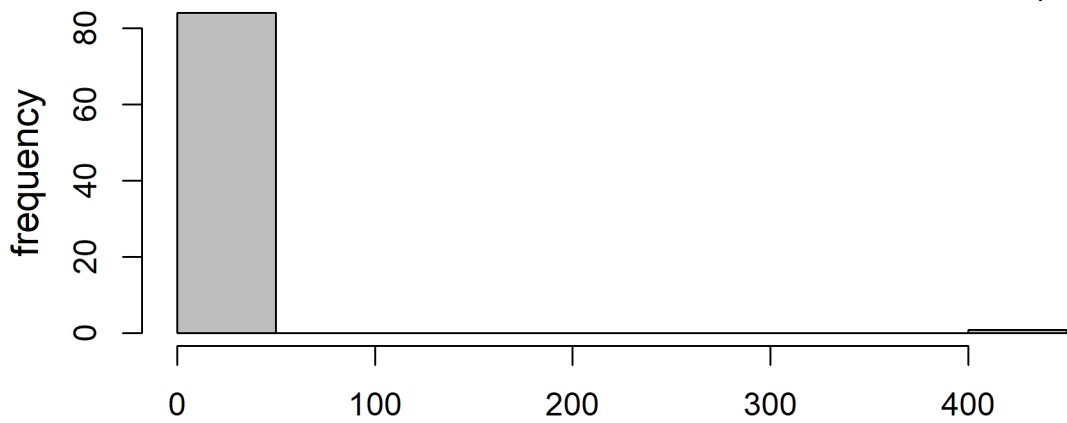


Figure 1 Histograms of observed discarded (top) and retained (bottom) catch weights for Alfonsino in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 5 Flathead: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN	144.96	11	1491	0.74	1571	0	0.65	0	0
TR_NSW_OFF	13.88	2	66	3.03	414	0	1	0	0
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW	1.93	11	24	45.83	1718	11.74	0.5	10.08	0.84
DS_EDL	970	50	9797	0.51	10355	8.06	1	83.48	0.08
TR_EDL_IN	621.83	47	3381	1.39	3511	3.58	1	12.56	0.02
TR_EDL_OFF	45.33	2	340	0.59	1560	0	0.1	0	0
TR_TAS_BGS					615				
TR_TAS_E	274.94	23	1340	1.72	1965	0	0.11	0	0
TR_TAS_ORO					30				
TR_TAS_W	0.47	3	11	27.27	1107	10.73	0.01	0.09	0.16
TR_BS_IN	0.4	2	2	100	3	0	1	0	0
TR_ECDW	0.02		1		1				
AL_CSA	0.51		83		1820				
AL_ESA	0.02		3		536				
AL_WBS_SAV	0.14		23		368				
AL_EBS_NSW	0.56		32		405				
AL_ET_WT	0.03		14		683				
AL_WSA_WA					524				
GN_CSA	0.01		4		380				
GN_ESA	0		1		170				
GN_SAV	0.01		4		288				
GN_WBS	0.04		21		1760				
GN_EBS_NSW	0.4		206		3173				
GN_ET_WT	0.04		29		381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	2075.52	151	0		33954			106.21	0.05

Flathead

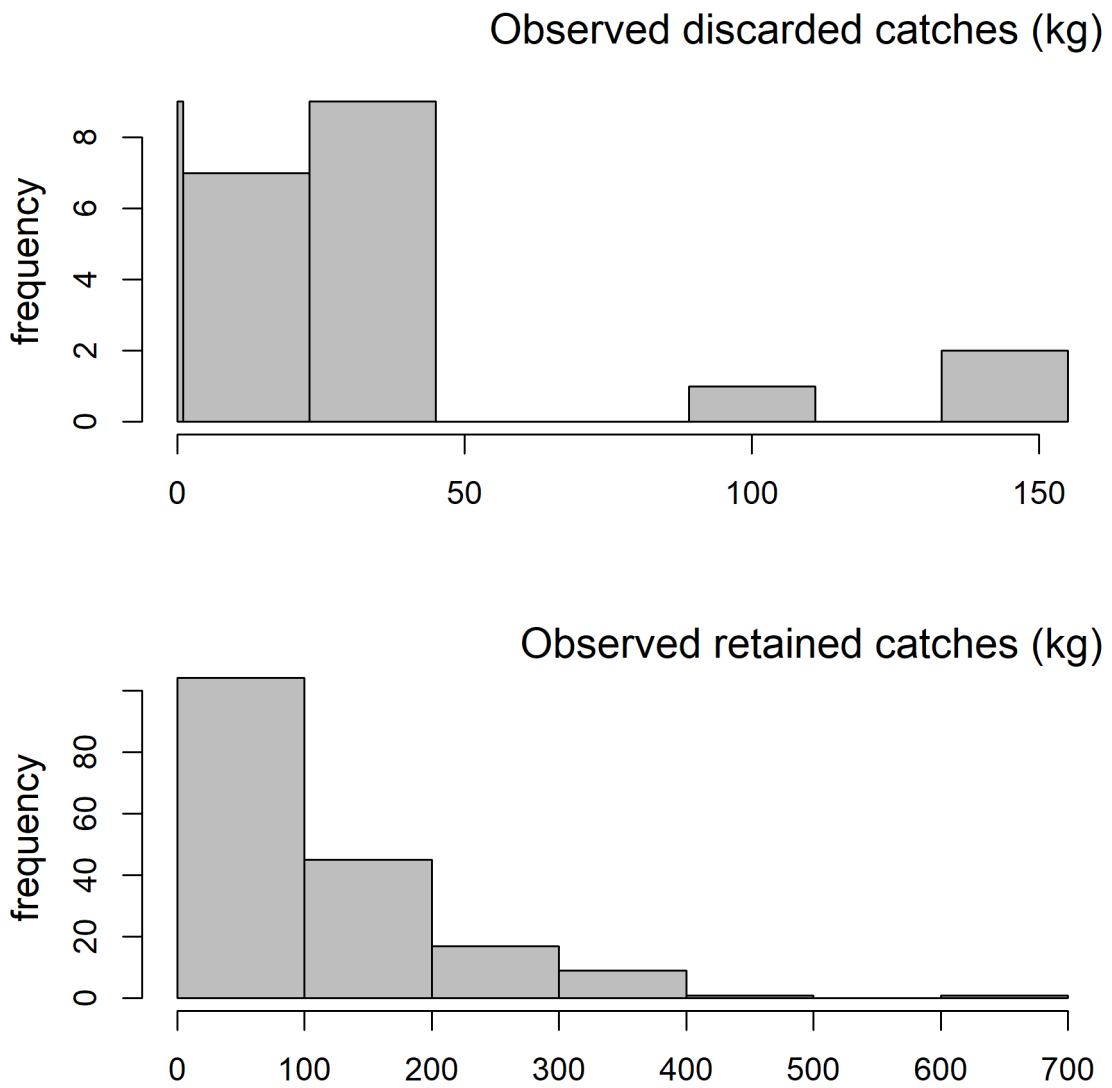


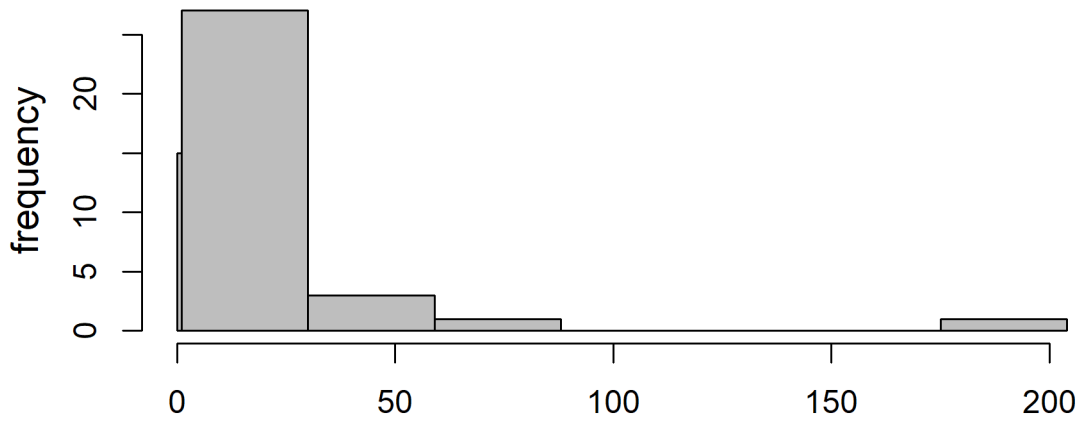
Figure 2 Histograms of observed discarded (top) and retained (bottom) catch weights for Flathead in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 6 Jackass Morwong East: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN	4.59		113		1571				
TR_NSW_OFF	0.19		6		414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW					1718				
DS_EDL	3.8	14	399	3.51	10355	3.26	0.28	9.45	0.71
TR_EDL_IN	41.87	17	865	1.97	3511	21.65	0.36	27.5	0.4
TR_EDL_OFF	8.5	7	163	4.29	1560	0	0.33	0	0
TR_TAS_BGS					615				
TR_TAS_E	26.03	21	406	5.17	1965	7.73	0.1	1.55	0.06
TR_TAS_ORO					30				
TR_TAS_W					1107				
TR_BS_IN	0.03	2	1	200	3	0	1	0	0
TR_ECDW					1				
AL_CSA					1820				
AL_ESA					536				
AL_WBS_SAV					368				
AL_EBS_NSW	0.41		24		405				
AL_ET_WT	0.1		26		683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW	0.02		12		3173				
GN_ET_WT	0.01		5		381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	85.55	61	0		33954			38.5	0.32

Jackass Morwong East

Observed discarded catches (kg)



Observed retained catches (kg)

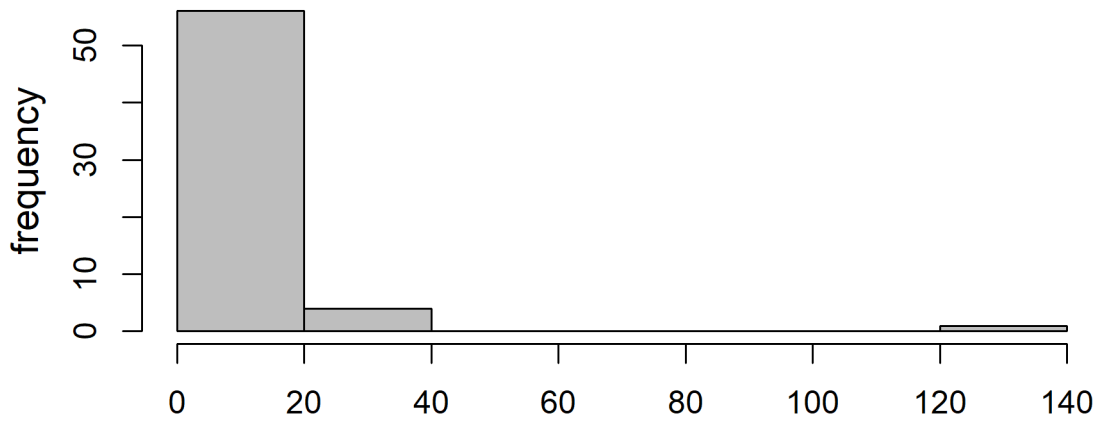


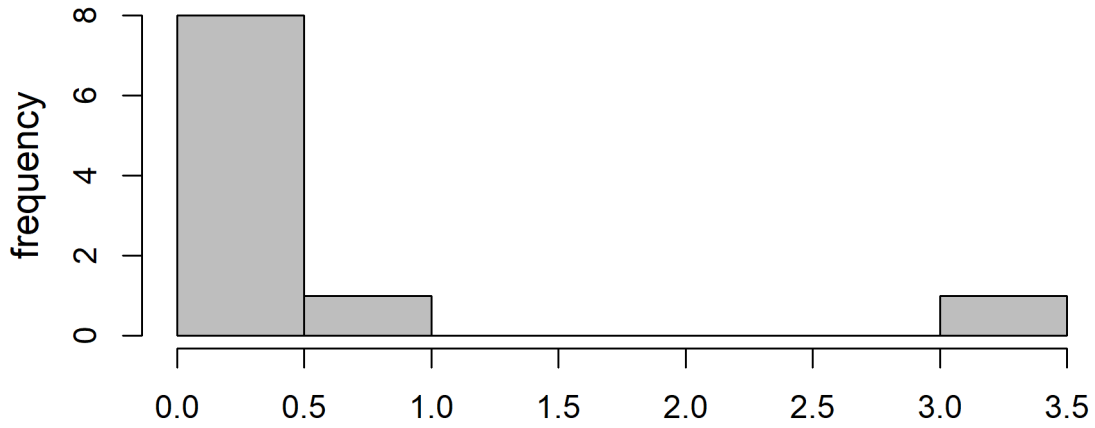
Figure 3 Histograms of observed discarded (top) and retained (bottom) catch weights for Jackass Morwong East in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 7 Jackass Morwong West: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN					1571				
TR_NSW_OFF					414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW	6.59	11	131	8.4	1718	0.08	0.5	0.07	0.01
DS_EDL	0.01		3		10355				
TR_EDL_IN					3511				
TR_EDL_OFF					1560				
TR_TAS_BGS					615				
TR_TAS_E					1965				
TR_TAS_ORO					30				
TR_TAS_W	4.52	6	25	24	1107	0.52	0.01	0.01	0
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA	0		1		1820				
AL_ESA	0.03		4		536				
AL_WBS_SAV	0.1		34		368				
AL_EBS_NSW					405				
AL_ET_WT	0.09		9		683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS	0.03		12		1760				
GN_EBS_NSW	0		2		3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	11.37	17	0		33954			0.08	0.01

Jackass Morwong West

Observed discarded catches (kg)



Observed retained catches (kg)

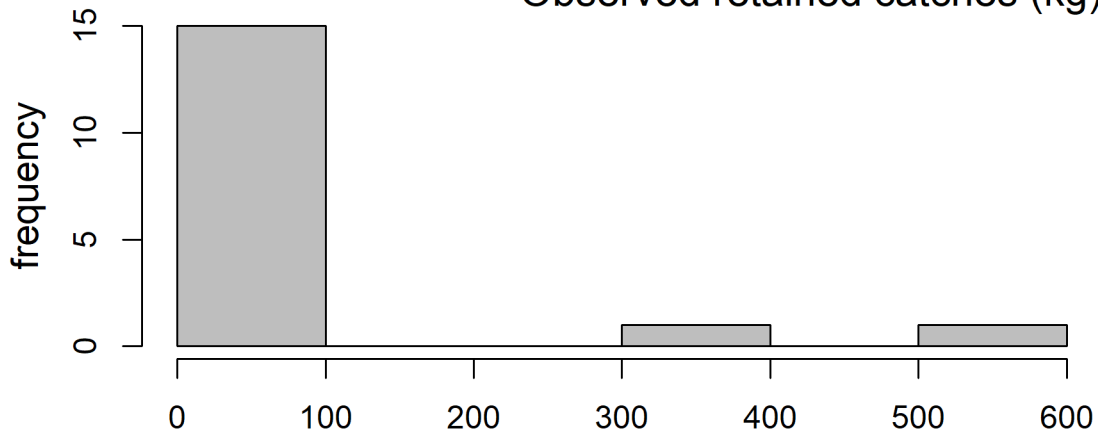


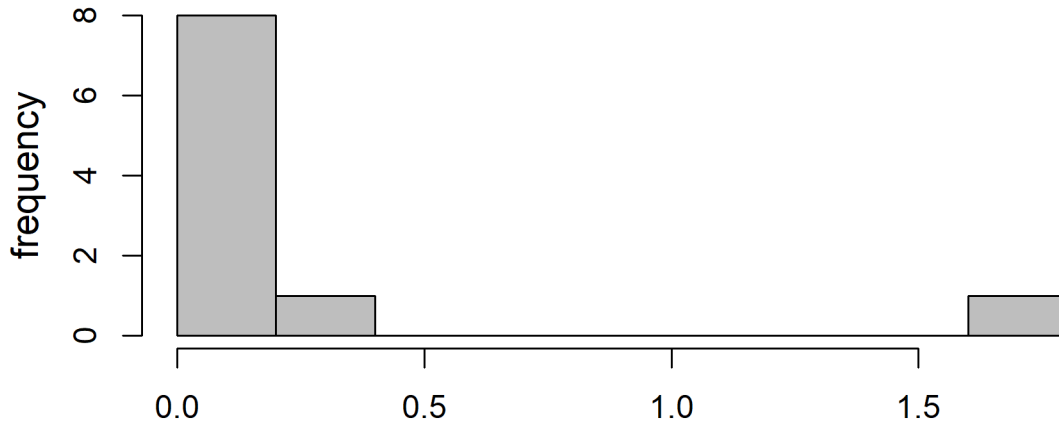
Figure 4 Histograms of observed discarded (top) and retained (bottom) catch weights for Jackass Morwong West in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 8 John Dory: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN	2.91	9	292	3.08	1571	0	0.53	0	0
TR_NSW_OFF	0.03	1	3	33.33	414	0	0.5	0	0
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW					1718				
DS_EDL	22.07	18	2998	0.6	10355	0.11	0.36	0.43	0.02
TR_EDL_IN	38.14	37	1111	3.33	3511	0	0.79	0	0
TR_EDL_OFF	0.5		30		1560				
TR_TAS_BGS					615				
TR_TAS_E	4.79		171		1965				
TR_TAS_ORO					30				
TR_TAS_W	0		1		1107				
TR_BS_IN	0.04	1	1	100	3	0	0.5	0	0
TR_ECDW					1				
AL_CSA					1820				
AL_ESA					536				
AL_WBS_SAV					368				
AL_EBS_NSW					405				
AL_ET_WT					683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS	0.11		40		1760				
GN_EBS_NSW	0.1		60		3173				
GN_ET_WT	0.01		4		381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	68.7	66	0		33954			0.43	0.01

John Dory

Observed discarded catches (kg)



Observed retained catches (kg)

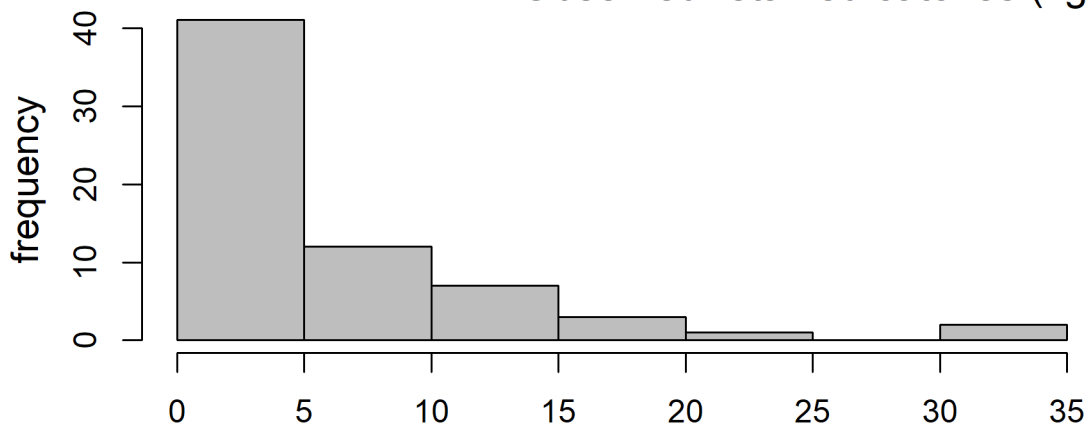


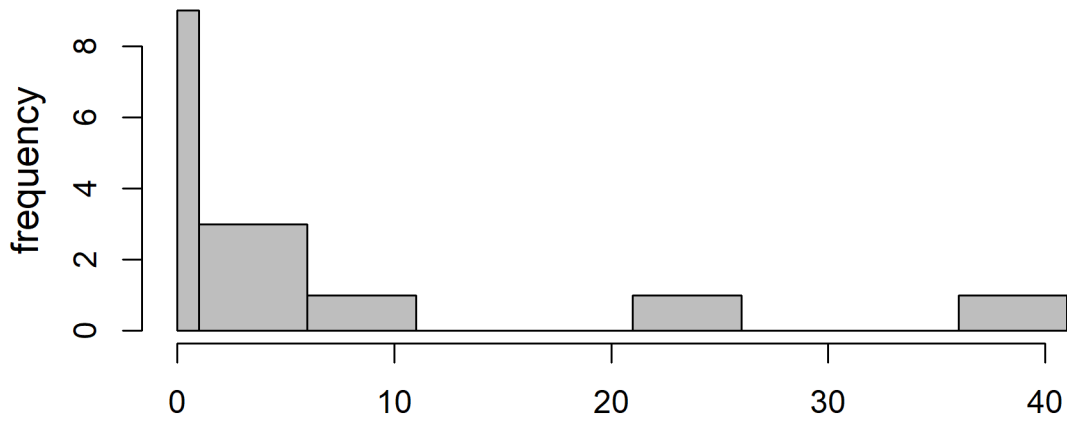
Figure 5 Histograms of observed discarded (top) and retained (bottom) catch weights for John Dory in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 9 Redfish: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN	20.11	11	329	3.34	1571	2.03	0.65	2.06	0.09
TR_NSW_OFF	0.48	1	14	7.14	414	0	0.5	0	0
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW	0.07		2		1718				
DS_EDL	0.56	1	58	1.72	10355	0.87	0.02	0.18	0.24
TR_EDL_IN	2.64	9	173	5.2	3511	5.89	0.19	3.96	0.6
TR_EDL_OFF	0.81	1	44	2.27	1560	0	0.05	0	0
TR_TAS_BGS					615				
TR_TAS_E					1965				
TR_TAS_ORO					30				
TR_TAS_W					1107				
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA	0		1		1820				
AL_ESA	0.01		1		536				
AL_WBS_SAV					368				
AL_EBS_NSW					405				
AL_ET_WT					683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	24.68	23	0		33954			6.2	0.2

Redfish

Observed discarded catches (kg)



Observed retained catches (kg)

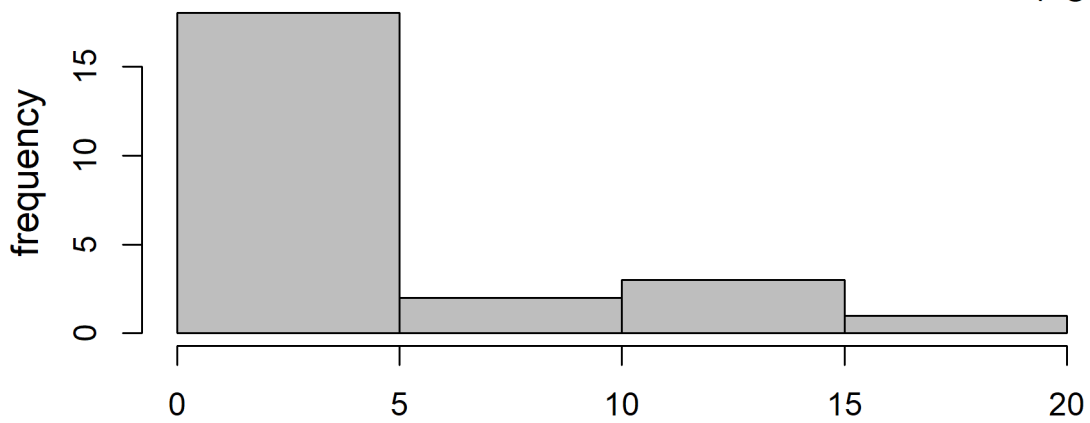


Figure 6 Histograms of observed discarded (top) and retained (bottom) catch weights for Redfish in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 10 Royal Red Prawn: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN					1571				
TR_NSW_OFF	0.31		16		414				
TR_NSW_RRP	95.52	2	122	1.64	122	0	1	0	0
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW					1718				
DS_EDL					10355				
TR_EDL_IN					3511				
TR_EDL_OFF					1560				
TR_TAS_BGS					615				
TR_TAS_E					1965				
TR_TAS_ORO					30				
TR_TAS_W					1107				
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA					1820				
AL_ESA					536				
AL_WBS_SAV					368				
AL_EBS_NSW					405				
AL_ET_WT					683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	95.83	2	0		33954			0	0

Royal Red Prawn

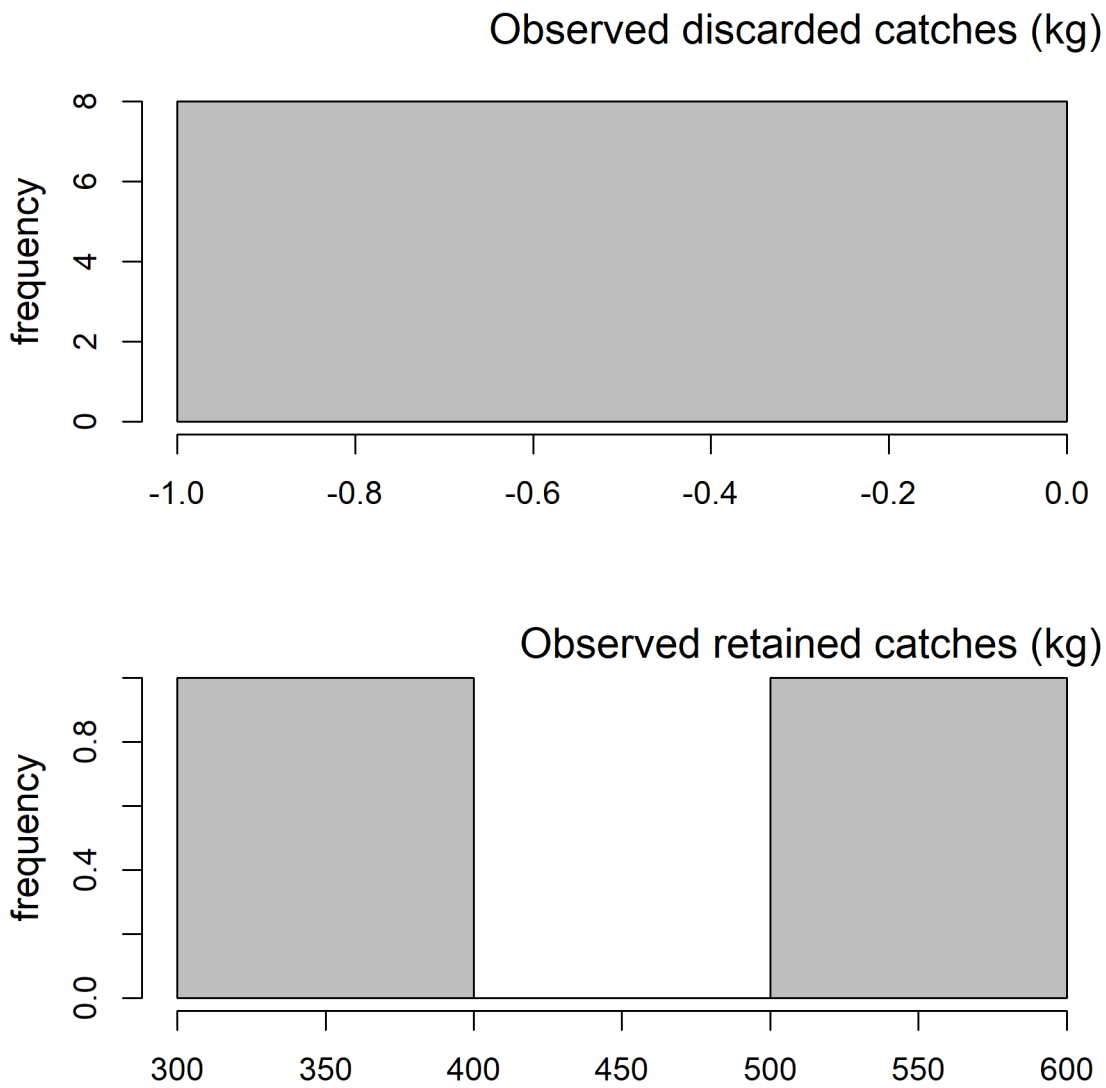


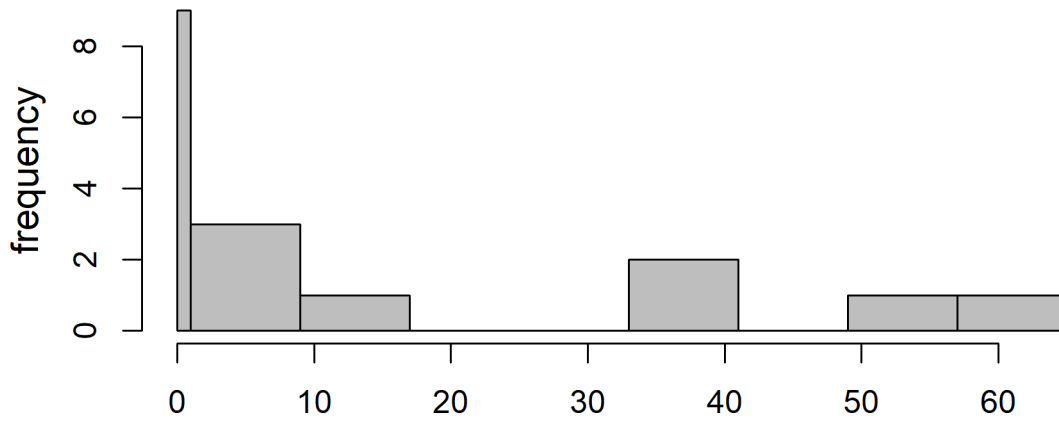
Figure 7 Histograms of observed discarded (top) and retained (bottom) catch weights for Royal Red Prawn in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 11 School Whiting: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN	66.8		404		1571				
TR_NSW_OFF					414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW					1718				
DS_EDL	482.8	13	2670	0.49	10355	17.05	0.26	45.9	0.09
TR_EDL_IN	0.73	7	21	33.33	3511	0	0.15	0	0
TR_EDL_OFF					1560				
TR_TAS_BGS					615				
TR_TAS_E					1965				
TR_TAS_ORO					30				
TR_TAS_W					1107				
TR_BS_IN					3				
TR_ECDW	0.01		1		1				
AL_CSA					1820				
AL_ESA					536				
AL_WBS_SAV					368				
AL_EBS_NSW					405				
AL_ET_WT					683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	550.34	20	0		33954			45.9	0.09

School Whiting

Observed discarded catches (kg)



Observed retained catches (kg)

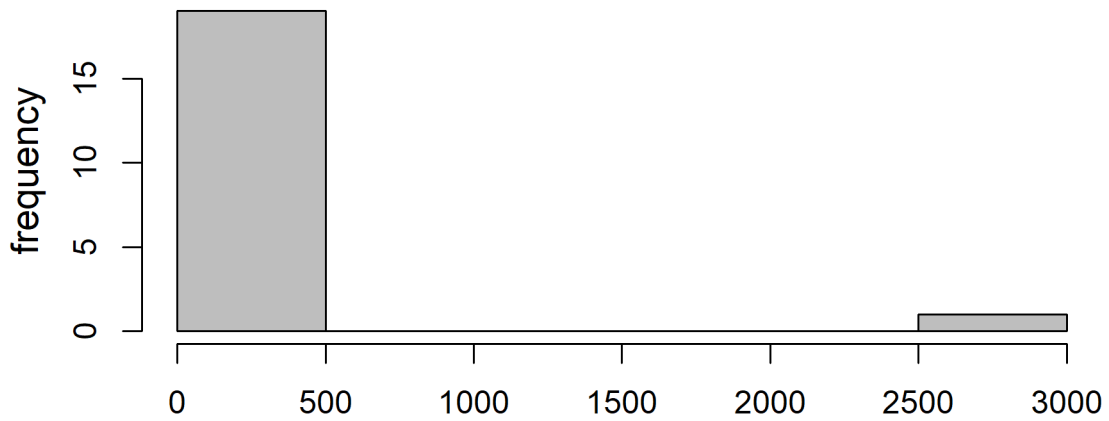


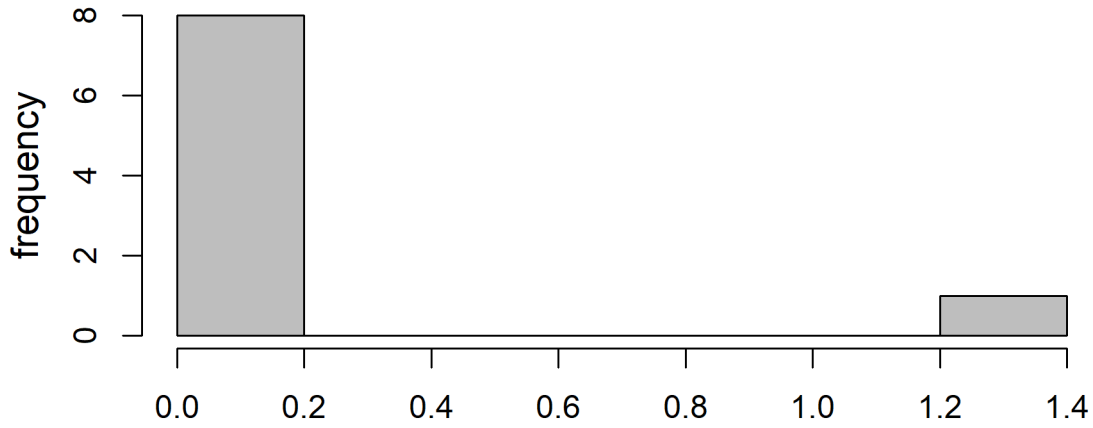
Figure 8 Histograms of observed discarded (top) and retained (bottom) catch weights for School Whiting in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 12 Silver Trevally: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN	35.4		132		1571				
TR_NSW_OFF					414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW	0.35		5		1718				
DS_EDL	0.07	1	20	5	10355	1.3	0.02	0.27	0.79
TR_EDL_IN	0.51		24		3511				
TR_EDL_OFF					1560				
TR_TAS_BGS					615				
TR_TAS_E					1965				
TR_TAS_ORO					30				
TR_TAS_W					1107				
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA					1820				
AL_ESA					536				
AL_WBS_SAV					368				
AL_EBS_NSW					405				
AL_ET_WT	0.01		6		683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV	0		1		288				
GN_WBS					1760				
GN_EBS_NSW	0		3		3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	36.34	1	0		33954			0.27	0.79

Silver Trevally

Observed discarded catches (kg)



Observed retained catches (kg)

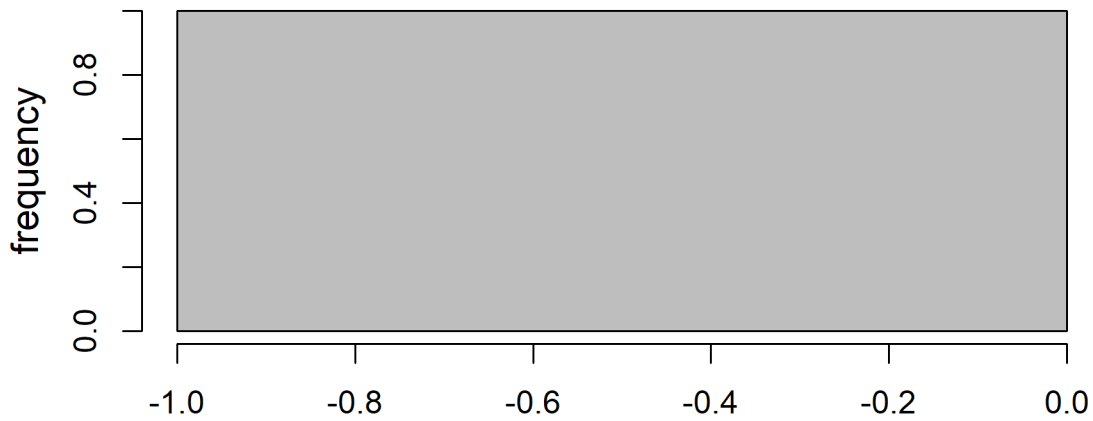


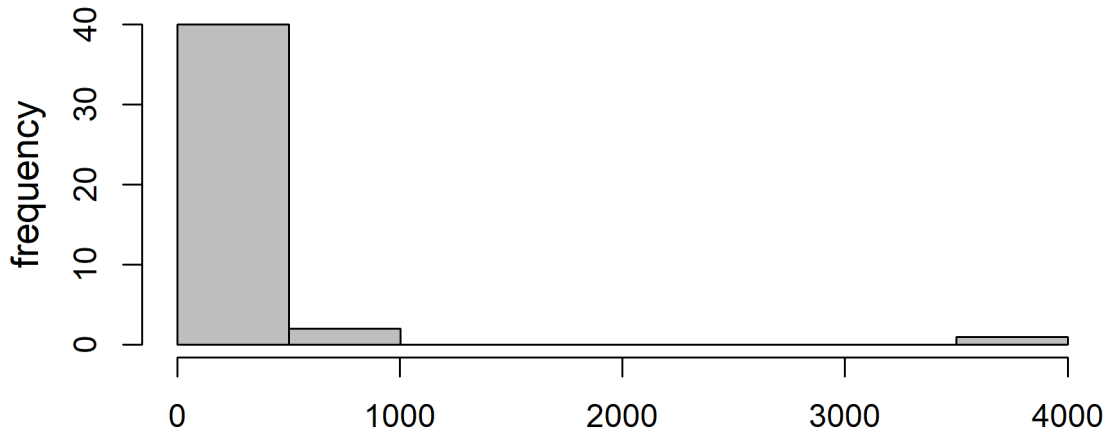
Figure 9 Histograms of observed discarded (top) and retained (bottom) catch weights for Silver Trevally in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 13 Ocean Jackets: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN	69.48	12	645	1.86	1571	46.65	0.71	51.73	0.43
TR_NSW_OFF	0.17	2	5	40	414	0	1	0	0
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW	0.31		7		1718				
DS_EDL	1.08		120		10355				
TR_EDL_IN	90.23	31	897	3.46	3511	51.61	0.66	119.52	0.57
TR_EDL_OFF	2		16		1560				
TR_TAS_BGS					615				
TR_TAS_E	0.01		3		1965				
TR_TAS_ORO					30				
TR_TAS_W					1107				
TR_BS_IN					3				
TR_ECDW	0.03		1		1				
AL_CSA	0.02		7		1820				
AL_ESA	0.01		4		536				
AL_WBS_SAV					368				
AL_EBS_NSW					405				
AL_ET_WT					683				
AL_WSA_WA					524				
GN_CSA	0.01		4		380				
GN_ESA	0		1		170				
GN_SAV					288				
GN_WBS	0.01		6		1760				
GN_EBS_NSW	0.01		4		3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	163.37	45	0		33954			171.25	0.52

Ocean Jackets

Observed discarded catches (kg)



Observed retained catches (kg)

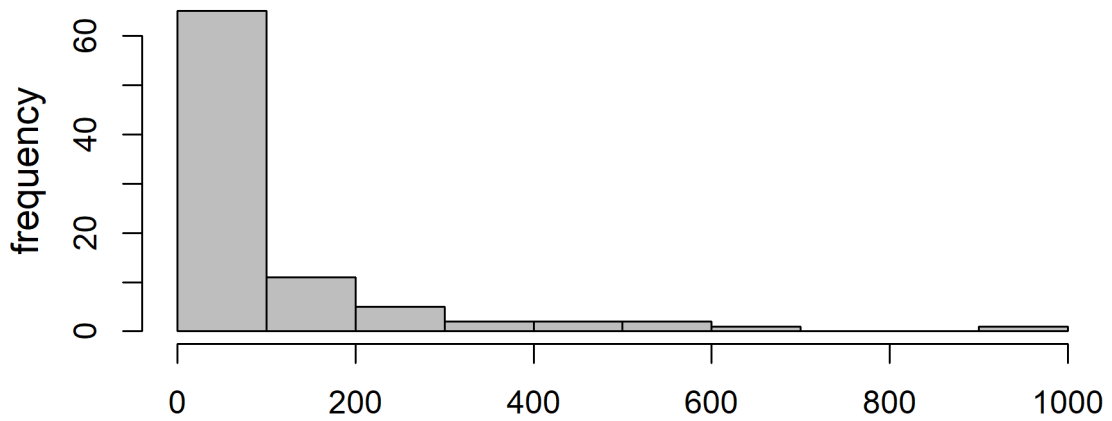


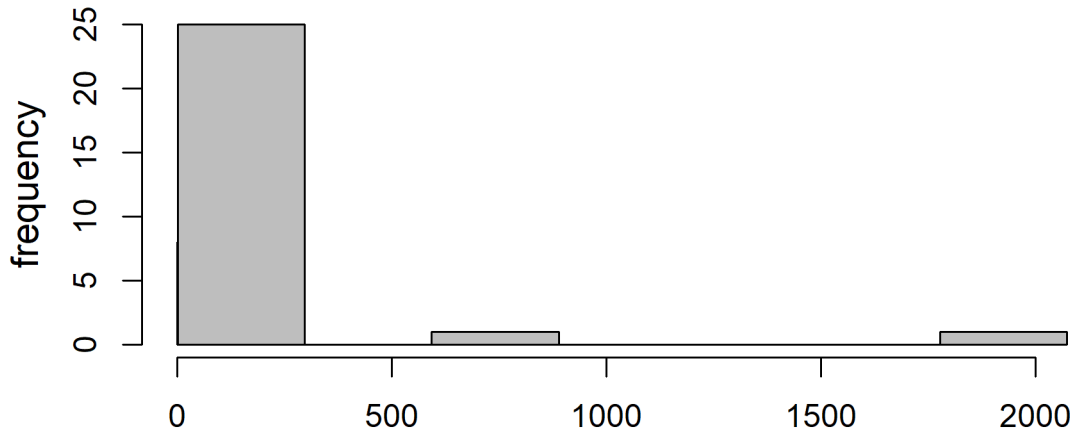
Figure 10 Histograms of observed discarded (top) and retained (bottom) catch weights for Ocean Jackets in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 14 Frostfish: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN					1571				
TR_NSW_OFF	2.12		7		414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW	22.3	8	107	7.48	1718	34.1	0.36	21.3	0.49
DS_EDL					10355				
TR_EDL_IN	1.05		9		3511				
TR_EDL_OFF	33.41	1	77	1.3	1560	0	0.05	0	0
TR_TAS_BGS					615				
TR_TAS_E	66.93	9	78	11.54	1965	4.55	0.04	0.39	0.01
TR_TAS_ORO					30				
TR_TAS_W	16.41	218	168	129.76	1107	18.87	0.54	11.22	0.41
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA					1820				
AL_ESA					536				
AL_WBS_SAV					368				
AL_EBS_NSW					405				
AL_ET_WT					683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	142.22	236	0		33954			32.91	0.19

Frostfish

Observed discarded catches (kg)



Observed retained catches (kg)

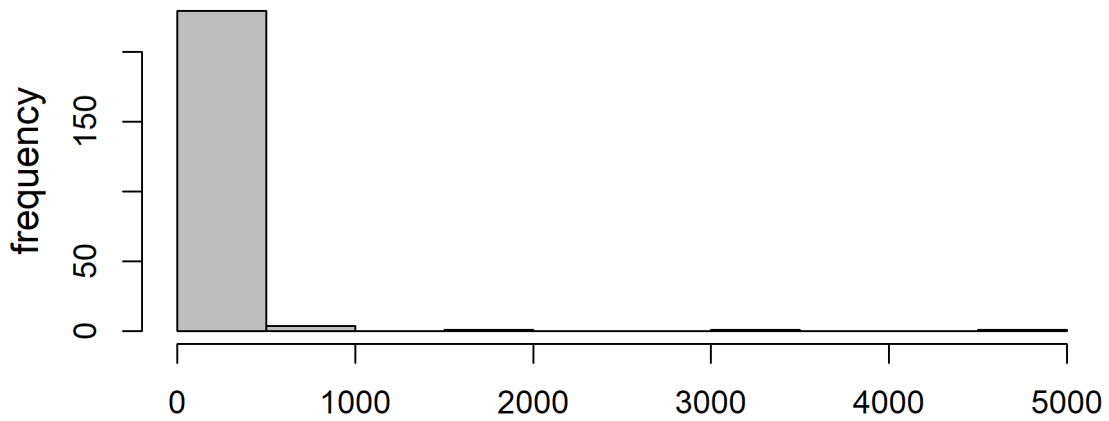


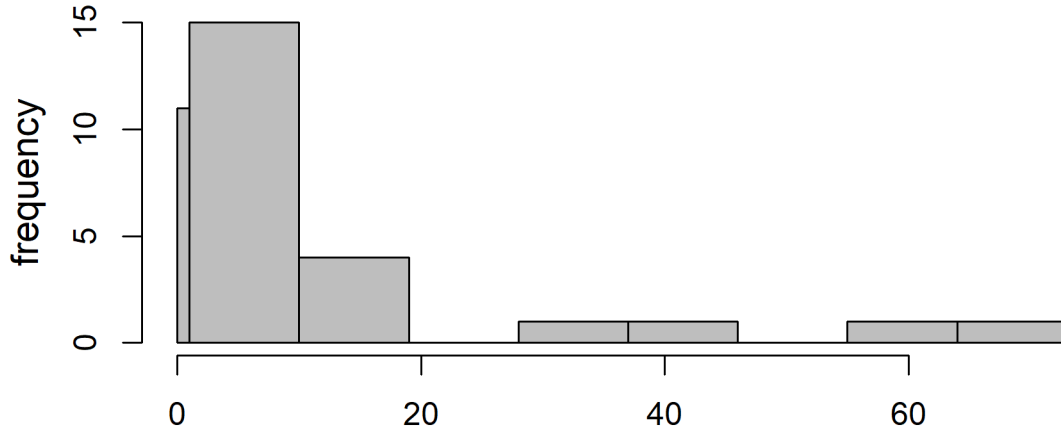
Figure 11 Histograms of observed discarded (top) and retained (bottom) catch weights for Frostfish in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 15 King Dory: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN	0		1		1571				
TR_NSW_OFF	0.06		3		414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW	44.55	6	399	1.5	1718	1.04	0.27	0.49	0.01
DS_EDL	0		2		10355				
TR_EDL_IN	0.15	2	10	20	3511	0	0.04	0	0
TR_EDL_OFF	6.9	3	329	0.91	1560	1.35	0.14	0.3	0.04
TR_TAS_BGS					615				
TR_TAS_E	5.25	3	165	1.82	1965	0	0.01	0	0
TR_TAS_ORO					30				
TR_TAS_W	37.09	26	437	5.95	1107	9.95	0.06	0.71	0.02
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA					1820				
AL_ESA					536				
AL_WBS_SAV					368				
AL_EBS_NSW					405				
AL_ET_WT					683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW	0		1		3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	94	40	0		33954			1.5	0.02

King Dory

Observed discarded catches (kg)



Observed retained catches (kg)

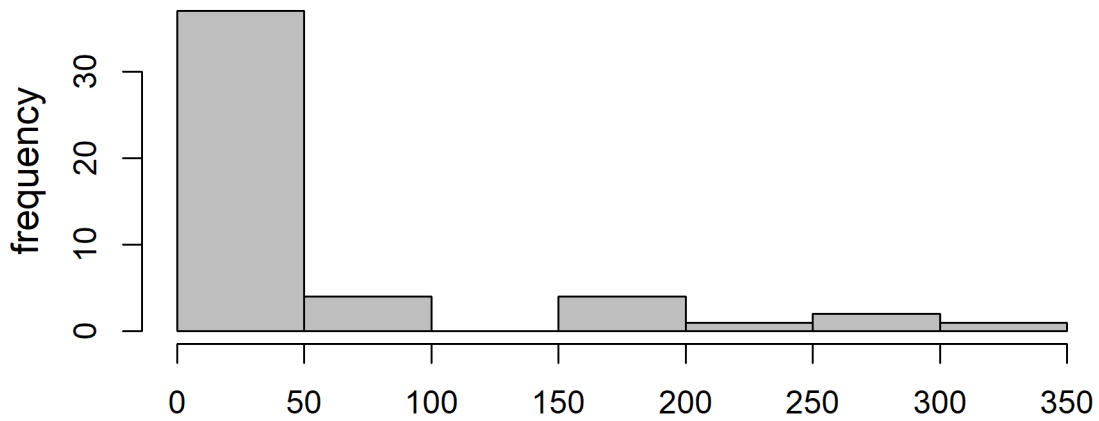


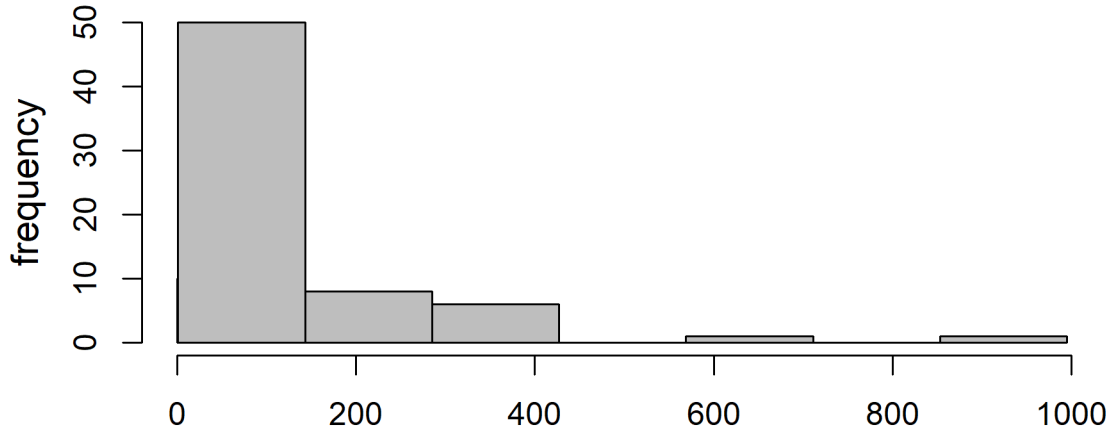
Figure 12 Histograms of observed discarded (top) and retained (bottom) catch weights for King Dory in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 16 Latchet: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN	24.38		501		1571				
TR_NSW_OFF	3.54		60		414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW	43.26	12	325	3.69	1718	6.82	0.55	6.39	0.13
DS_EDL	16.63	14	1198	1.17	10355	0.35	0.28	1.01	0.06
TR_EDL_IN	25.28	26	1025	2.54	3511	4.14	0.55	8.05	0.24
TR_EDL_OFF	2.87	2	160	1.25	1560	0.52	0.1	0.08	0.03
TR_TAS_BGS					615				
TR_TAS_E	19.68	21	611	3.44	1965	2.29	0.1	0.46	0.02
TR_TAS_ORO					30				
TR_TAS_W	6.49	20	42	47.62	1107	10.77	0.05	0.59	0.08
TR_BS_IN	0.03	1	1	100	3	0	0.5	0	0
TR_ECDW					1				
AL_CSA	0.01		7		1820				
AL_ESA	0.01		6		536				
AL_WBS_SAV	0.2		62		368				
AL_EBS_NSW					405				
AL_ET_WT	0.13		35		683				
AL_WSA_WA	0.04		17		524				
GN_CSA					380				
GN_ESA					170				
GN_SAV	0.03		10		288				
GN_WBS	0.08		31		1760				
GN_EBS_NSW	0.07		27		3173				
GN_ET_WT	0.04		10		381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	142.77	96	0		33954			16.58	0.13

Latchet

Observed discarded catches (kg)



Observed retained catches (kg)

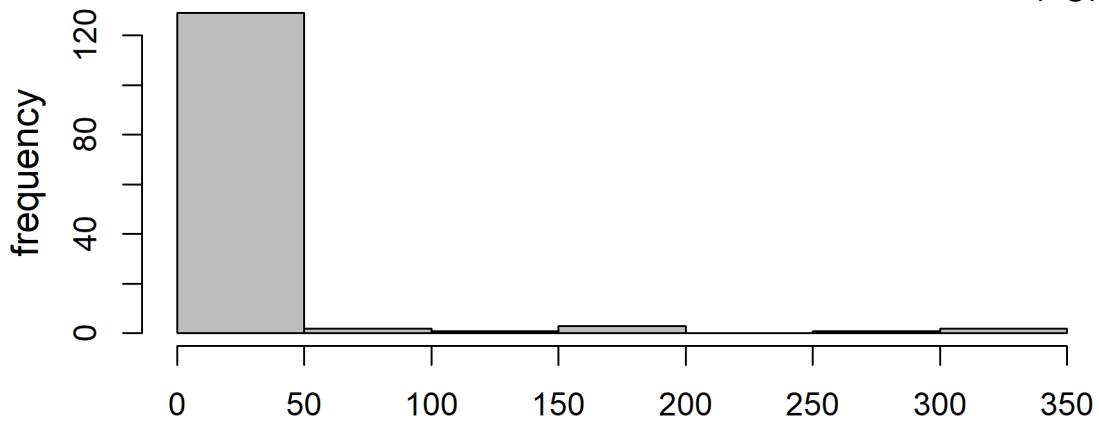


Figure 13 Histograms of observed discarded (top) and retained (bottom) catch weights for Latchet in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 17 Squid: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN	13.56	8	285	2.81	1571	3.53	0.47	2.61	0.16
TR_NSW_OFF	3.47	1	93	1.08	414	0	0.5	0	0
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW	240.22	20	981	2.04	1718	2.82	0.91	4.4	0.02
DS_EDL	7.69	15	1213	1.24	10355	0.29	0.3	0.91	0.11
TR_EDL_IN	42.93	39	1168	3.34	3511	1.12	0.83	3.26	0.07
TR_EDL_OFF	30.44	15	552	2.72	1560	15.7	0.71	17.49	0.36
TR_TAS_BGS					615				
TR_TAS_E	44.36	51	764	6.68	1965	2.05	0.25	1	0.02
TR_TAS_ORO					30				
TR_TAS_W	12.7	254	357	71.15	1107	3.85	0.63	2.66	0.17
TR_BS_IN	0.3	2	2	100	3	0	1	0	0
TR_ECDW					1				
AL_CSA					1820				
AL_ESA	0.01		1		536				
AL_WBS_SAV					368				
AL_EBS_NSW					405				
AL_ET_WT					683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	395.68	405	0		33954			32.33	0.08

Squid

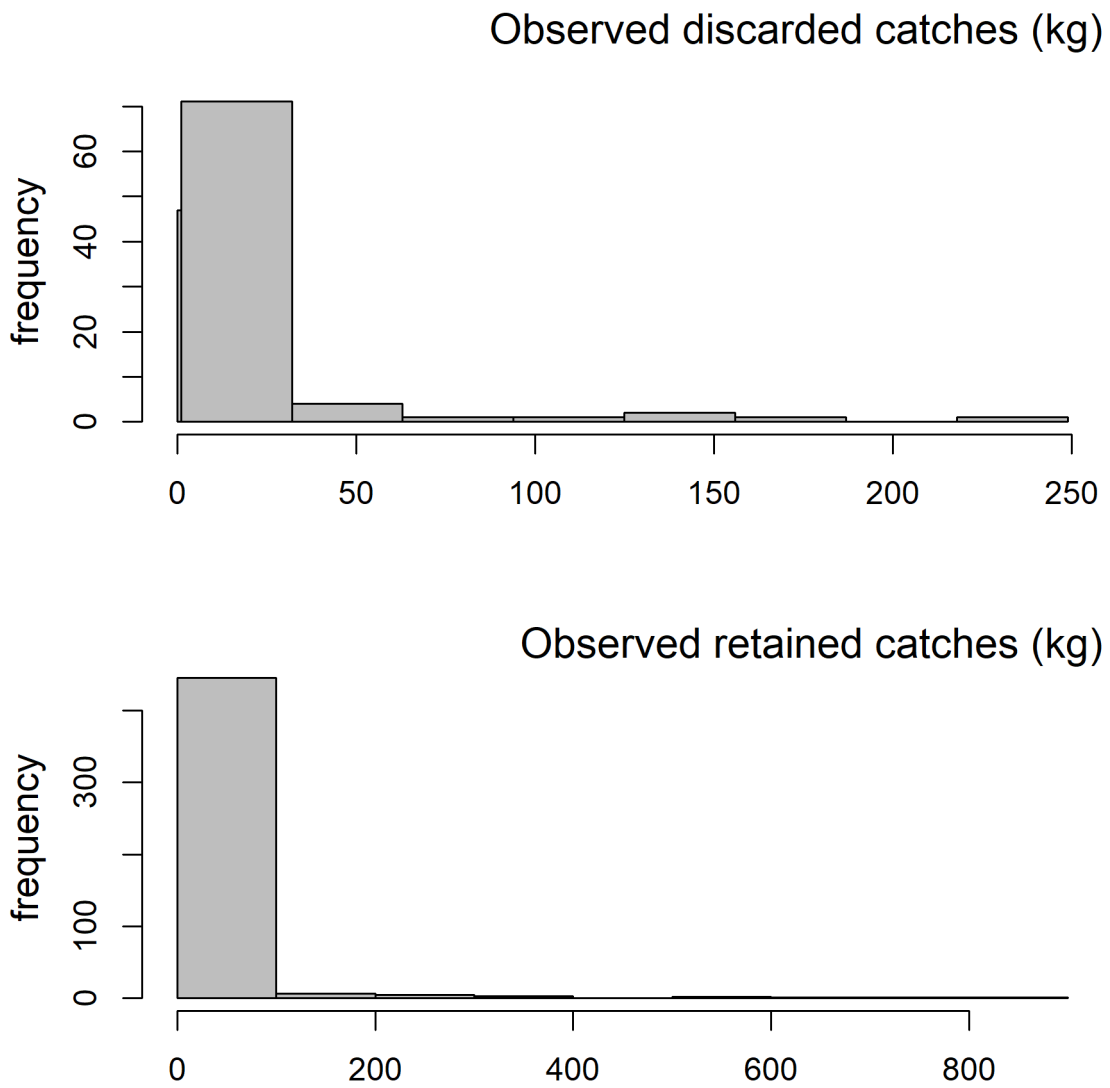


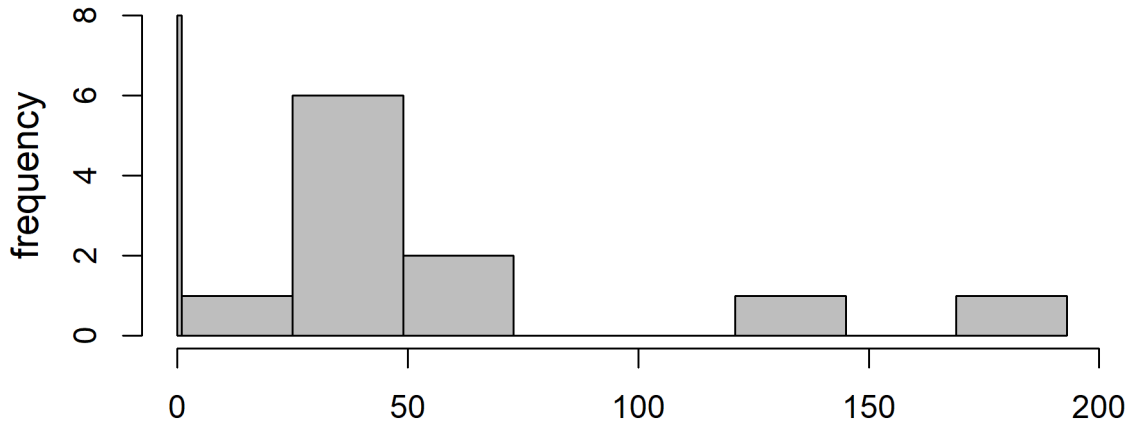
Figure 14 Histograms of observed discarded (top) and retained (bottom) catch weights for Squid in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 18 Blue-eye Trevalla: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN					1571				
TR_NSW_OFF	0.13		3		414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW	2.64	3	43	6.98	1718	0	0.14	0	0
DS_EDL					10355				
TR_EDL_IN	0.04		1		3511				
TR_EDL_OFF	0.6	1	42	2.38	1560	0	0.05	0	0
TR_TAS_BGS					615				
TR_TAS_E	1.5	21	54	38.89	1965	29.9	0.1	5.99	0.8
TR_TAS_ORO					30				
TR_TAS_W	1.26	21	28	75	1107	0.76	0.05	0.04	0.03
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA	21.59		61		1820				
AL_ESA	15.02		23		536				
AL_WBS_SAV	16.47		60		368				
AL_EBS_NSW	11.53		56		405				
AL_ET_WT	103.61		279		683				
AL_WSA_WA	44.63		48		524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	219.02	46	0		33954			6.03	0.5

Blue-eye Trevalla

Observed discarded catches (kg)



Observed retained catches (kg)

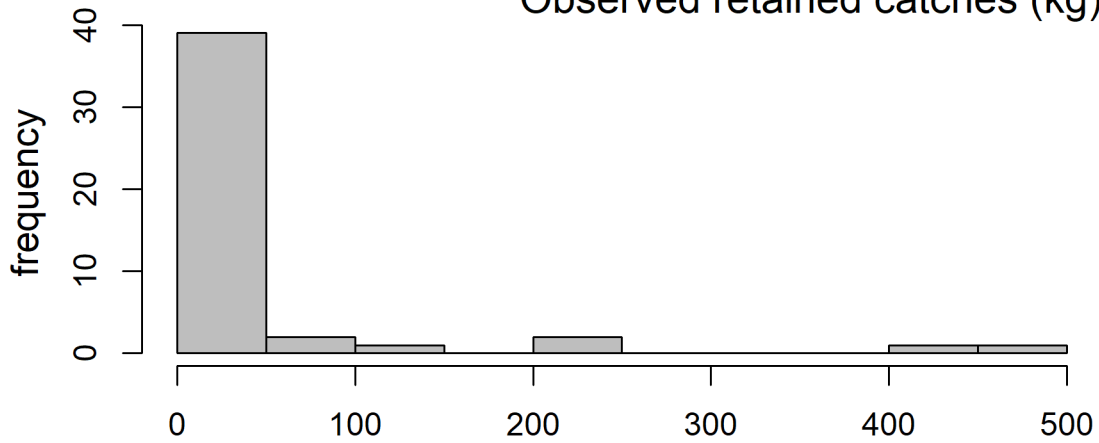


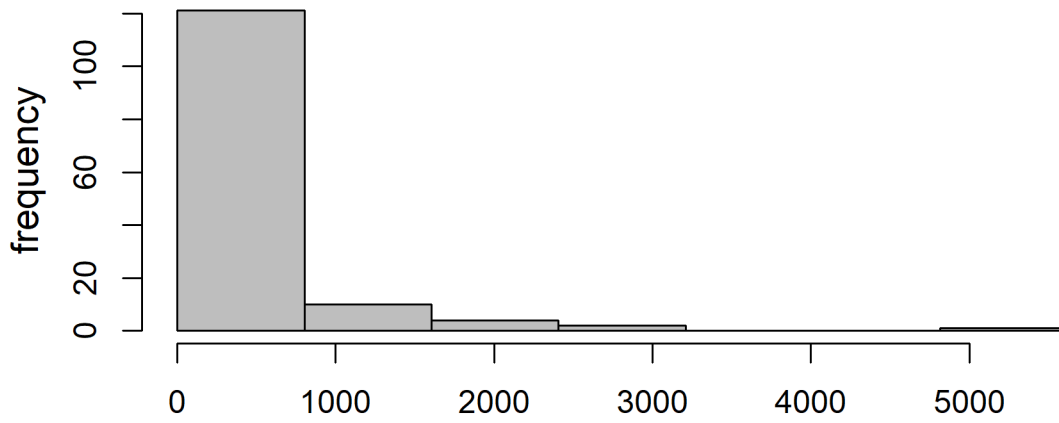
Figure 15 Histograms of observed discarded (top) and retained (bottom) catch weights for Blue-eye Trevalla in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 19 Blue Grenadier: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN	0.24		3		1571				
TR_NSW_OFF	0.54		15		414				
TR_NSW_RRP					122				
TR_SW_BGS	72.01		166		166				
TR_SW_ORO					58				
TR_SW	576.21	17	866	1.96	1718	217.64	0.77	288.92	0.33
DS_EDL					10355				
TR_EDL_IN	2.15		25		3511				
TR_EDL_OFF	386.97	19	860	2.21	1560	124.36	0.9	175.52	0.31
TR_TAS_BGS	10429.6	402	615	65.37	615	110.54	1	67.98	0.01
TR_TAS_E	342.48	6	358	1.68	1965	6.58	0.03	0.38	0
TR_TAS_ORO					30				
TR_TAS_W	283.23	19	441	4.31	1107	277.56	0.05	14.38	0.05
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA	0.12		23		1820				
AL_ESA	1.53		10		536				
AL_WBS_SAV	0.77		24		368				
AL_EBS_NSW	0.58		19		405				
AL_ET_WT	7.48		222		683				
AL_WSA_WA	0.06		11		524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	12103.97	463	0		33954			547.18	0.04

Blue Grenadier

Observed discarded catches (kg)



Observed retained catches (kg)

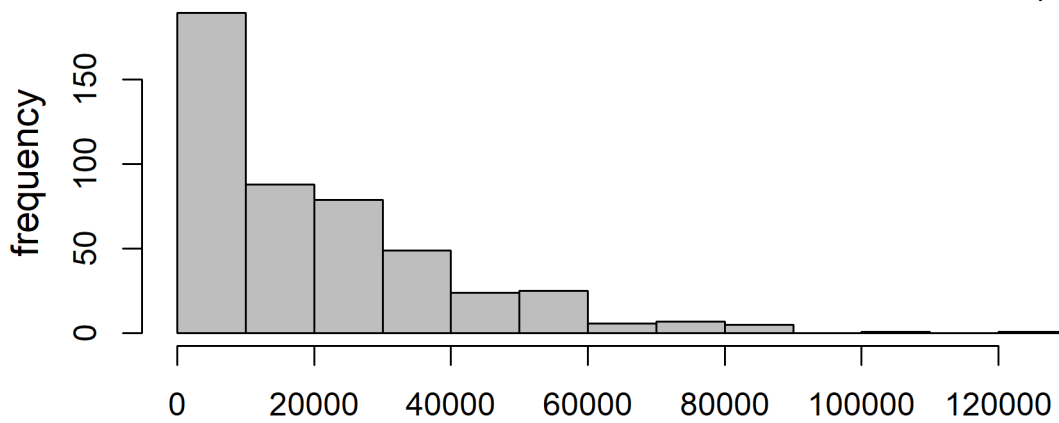


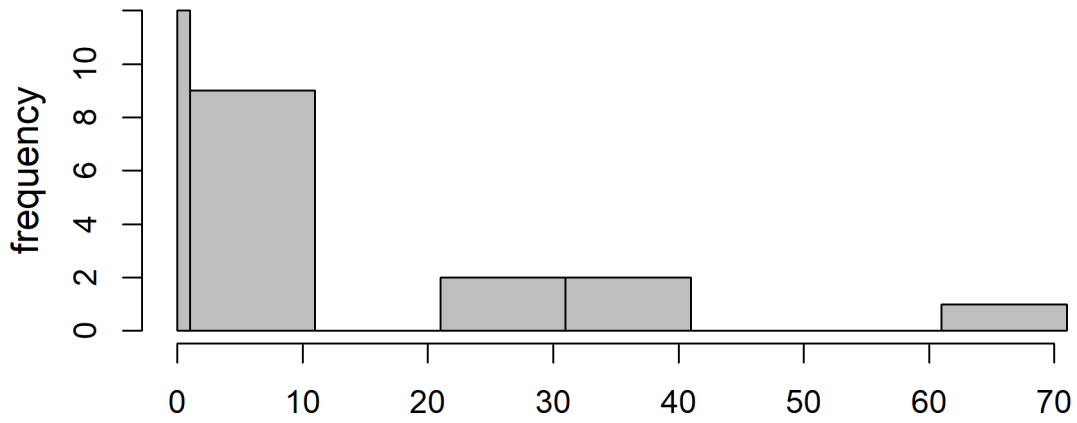
Figure 16 Histograms of observed discarded (top) and retained (bottom) catch weights for Blue Grenadier in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 20 Blue Warehou East: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN	0.13	4	5	80	1571	36.65	0.24	13.55	0.99
TR_NSW_OFF					414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW					1718				
DS_EDL	0.37	9	37	24.32	10355	2.7	0.18	5.03	0.93
TR_EDL_IN	0.12	2	24	8.33	3511	12.7	0.04	1.9	0.94
TR_EDL_OFF	0.05		4		1560				
TR_TAS_BGS					615				
TR_TAS_E	0.22		26		1965				
TR_TAS_ORO					30				
TR_TAS_W					1107				
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA					1820				
AL_ESA					536				
AL_WBS_SAV					368				
AL_EBS_NSW					405				
AL_ET_WT					683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW	0.4		9		3173				
GN_ET_WT	0		1		381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	1.29	15	0		33954			20.48	0.97

Blue Warehouse East

Observed discarded catches (kg)



Observed retained catches (kg)

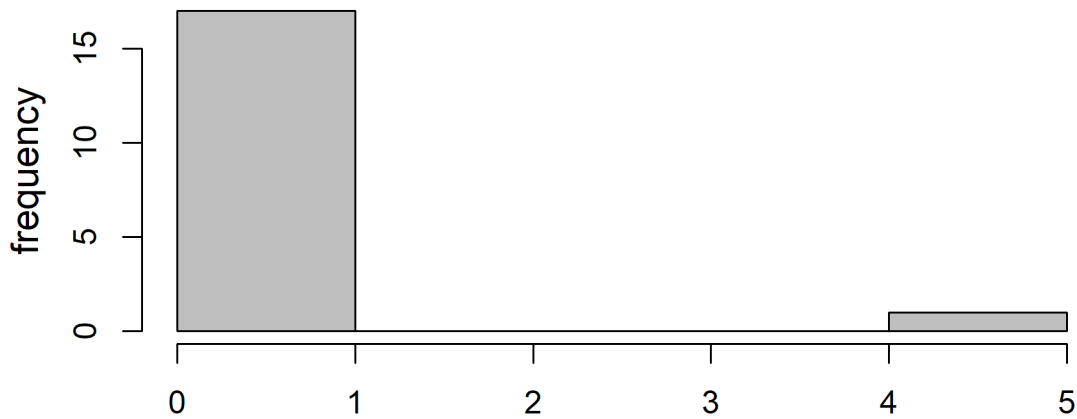


Figure 17 Histograms of observed discarded (top) and retained (bottom) catch weights for Blue Warehouse East in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 21 Blue Warehou West: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN					1571				
TR_NSW_OFF					414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW	0.97	2	18	11.11	1718	0	0.09	0	0
DS_EDL					10355				
TR_EDL_IN					3511				
TR_EDL_OFF					1560				
TR_TAS_BGS					615				
TR_TAS_E					1965				
TR_TAS_ORO					30				
TR_TAS_W	0.32		5		1107				
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA					1820				
AL_ESA					536				
AL_WBS_SAV					368				
AL_EBS_NSW					405				
AL_ET_WT					683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	1.29	2	0		33954			0	0

Blue Warehouse West

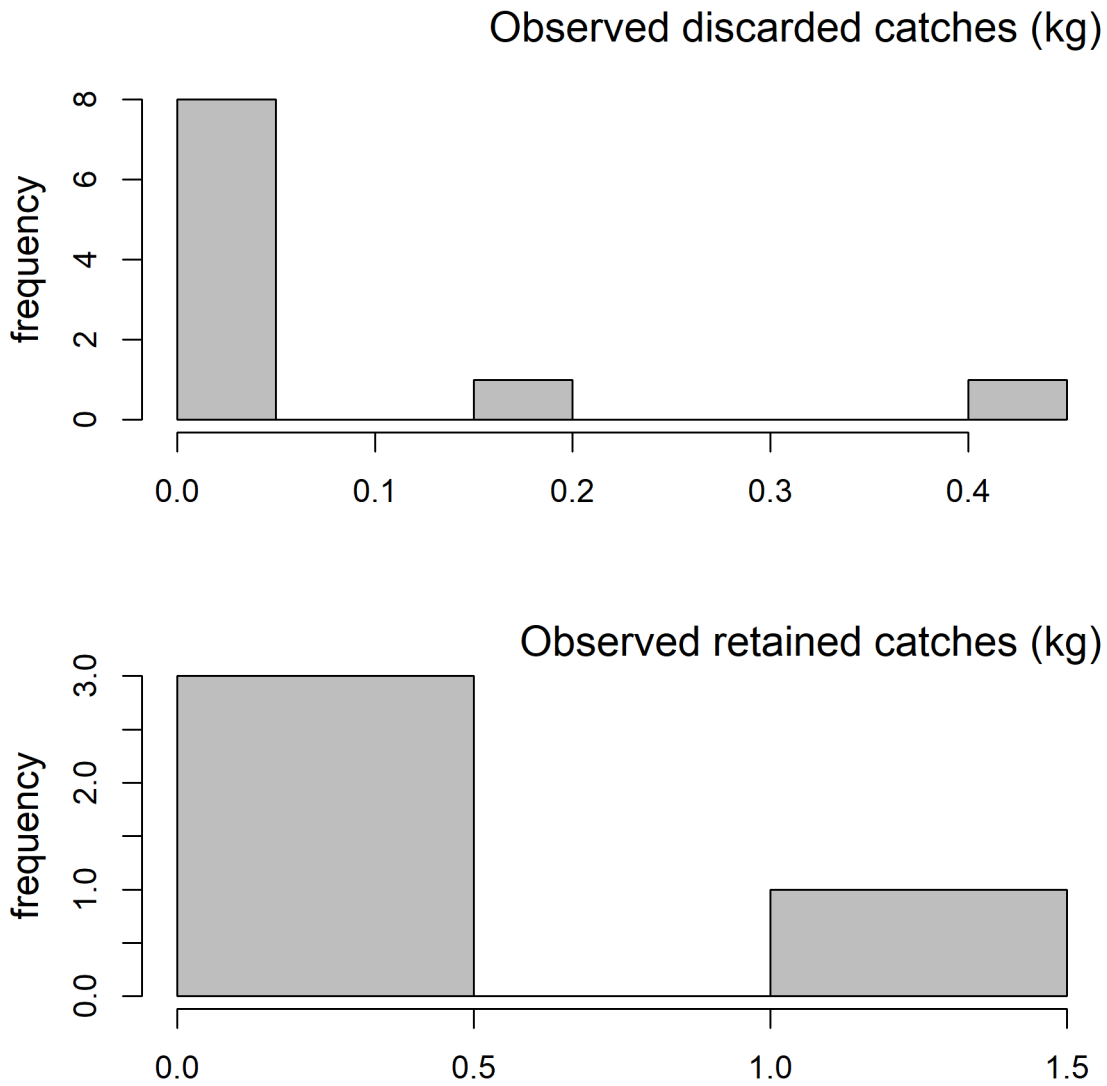


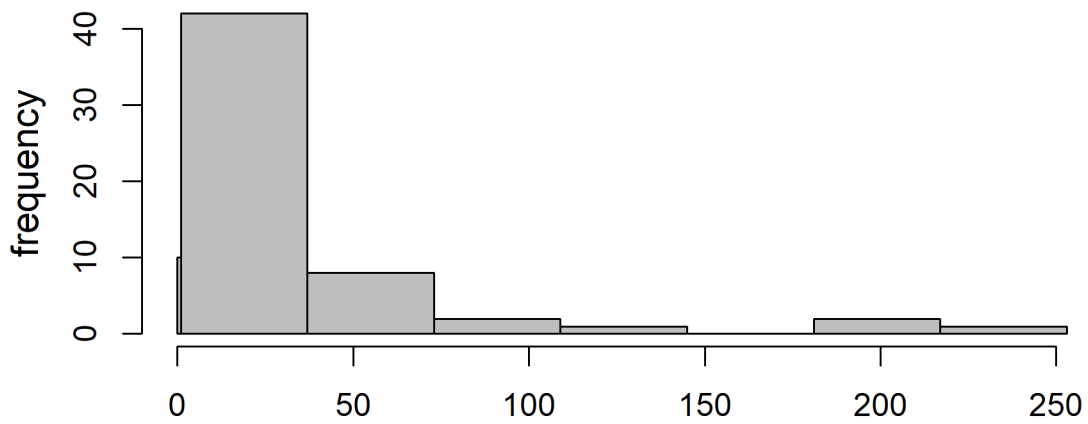
Figure 18 Histograms of observed discarded (top) and retained (bottom) catch weights for Blue Warehouse West in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 22 Gemfish East: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM	0.97		35		35				
TR_NSW_IN	0.03	5	2	250	1571	18.53	0.29	8.56	1
TR_NSW_OFF	0.04		5		414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW					1718				
DS_EDL					10355				
TR_EDL_IN	1.12	4	56	7.14	3511	8.24	0.09	2.46	0.69
TR_EDL_OFF	13.31	11	415	2.65	1560	10.39	0.52	8.49	0.39
TR_TAS_BGS					615				
TR_TAS_E	13.42	7	211	3.32	1965	23.8	0.03	1.59	0.11
TR_TAS_ORO					30				
TR_TAS_W	13.5	239	292	81.85	1107	6.07	0.59	3.96	0.23
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA					1820				
AL_ESA					536				
AL_WBS_SAV	0.02		5		368				
AL_EBS_NSW	0.07		7		405				
AL_ET_WT	18.98		232		683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	61.46	266	0		33954			25.06	0.38

Gemfish East

Observed discarded catches (kg)



Observed retained catches (kg)

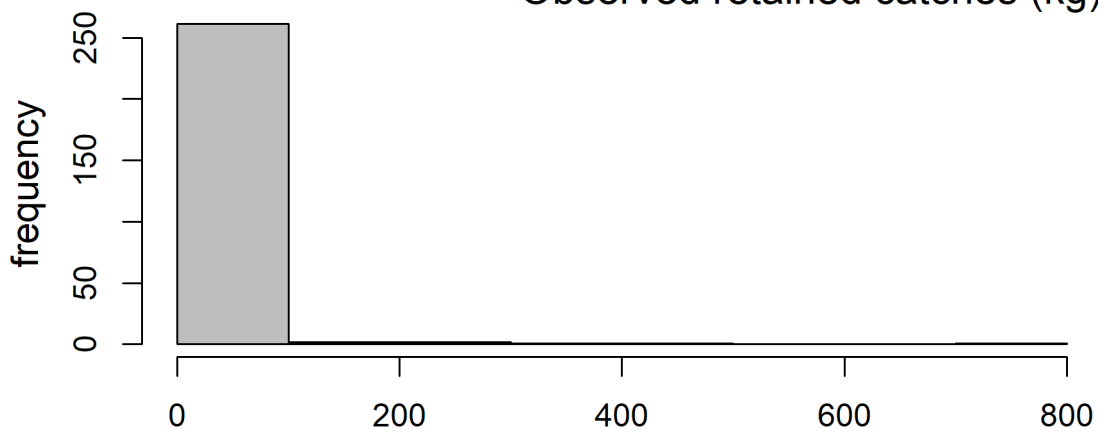


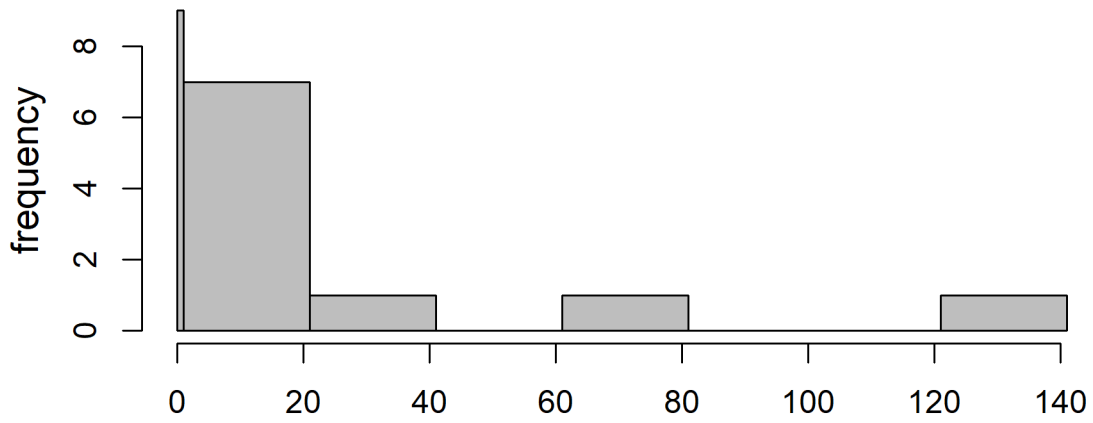
Figure 19 Histograms of observed discarded (top) and retained (bottom) catch weights for Gemfish East in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 23 Gemfish West: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN					1571				
TR_NSW_OFF					414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW	74.1	18	481	3.74	1718	16.5	0.82	23.19	0.24
DS_EDL					10355				
TR_EDL_IN					3511				
TR_EDL_OFF					1560				
TR_TAS_BGS					615				
TR_TAS_E					1965				
TR_TAS_ORO					30				
TR_TAS_W					1107				
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA	0.01		2		1820				
AL_ESA	0.64		13		536				
AL_WBS_SAV	0.46		16		368				
AL_EBS_NSW					405				
AL_ET_WT					683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	75.21	18	0		33954			23.19	0.24

Gemfish West

Observed discarded catches (kg)



Observed retained catches (kg)

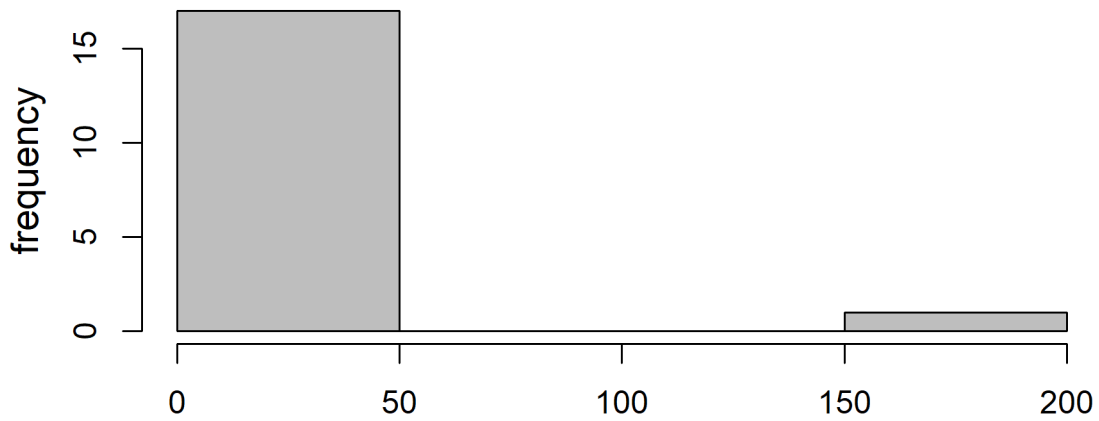


Figure 20 Histograms of observed discarded (top) and retained (bottom) catch weights for Gemfish West in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

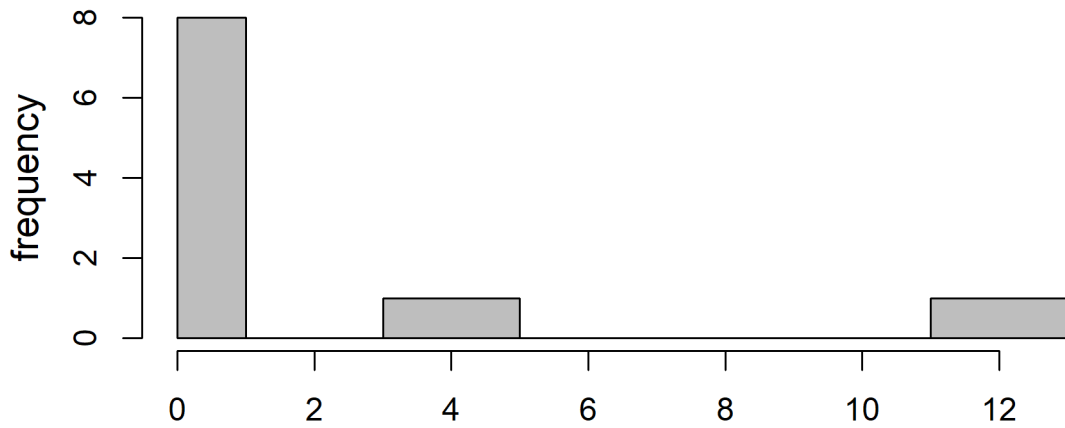
Table 24 Gemfish GAB: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN					1571				
TR_NSW_OFF					414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW					1718				
DS_EDL					10355				
TR_EDL_IN					3511				
TR_EDL_OFF					1560				
TR_TAS_BGS					615				
TR_TAS_E					1965				
TR_TAS_ORO					30				
TR_TAS_W					1107				
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA	0.05		14		1820				
AL_ESA					536				
AL_WBS_SAV					368				
AL_EBS_NSW					405				
AL_ET_WT					683				
AL_WSA_WA	0.31		24		524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
Total	0.36	0	0		33954			0	

Gemfish GAB

Observed discarded catches (kg)



Observed retained catches (kg)

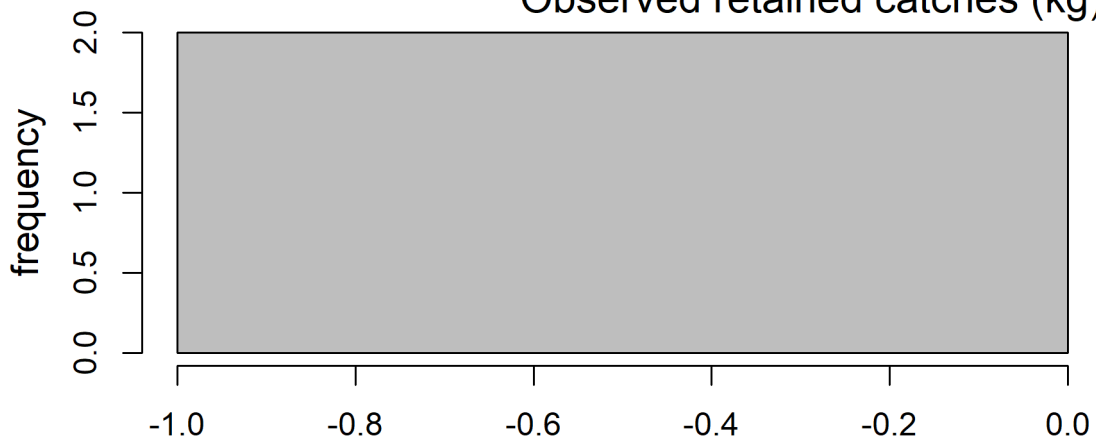


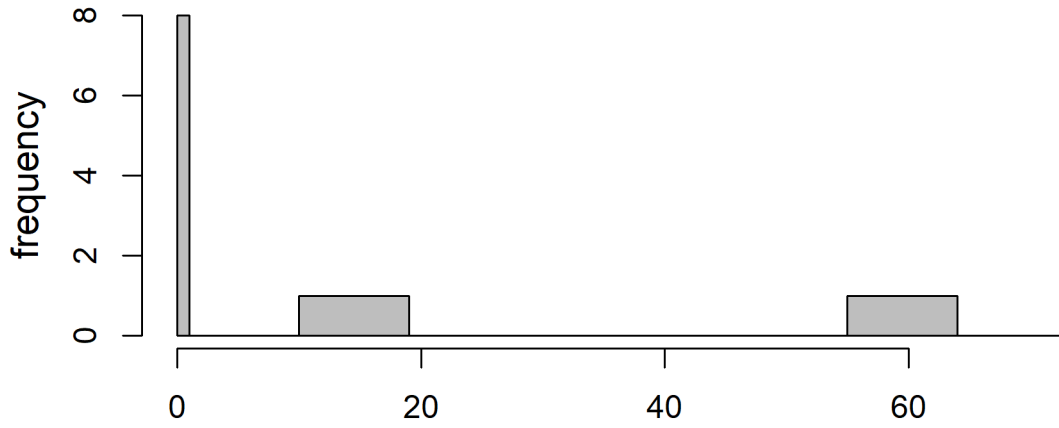
Figure 21 Histograms of observed discarded (top) and retained (bottom) catch weights for Gemfish GAB in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 25 Pink Ling East: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN	0.88	6	34	17.65	1571	0	0.35	0	0
TR_NSW_OFF	25.67	2	285	0.7	414	0	1	0	0
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW					1718				
DS_EDL	1.64	2	392	0.51	10355	0	0.04	0	0
TR_EDL_IN	13.65	19	545	3.49	3511	0	0.4	0	0
TR_EDL_OFF	225.91	19	1092	1.74	1560	4.07	0.9	5.75	0.02
TR_TAS_BGS					615				
TR_TAS_E	22.9	10	231	4.33	1965	0	0.05	0	0
TR_TAS_ORO					30				
TR_TAS_W					1107				
TR_BS_IN	0.03	1	1	100	3	0	0.5	0	0
TR_ECDW					1				
AL_CSA					1820				
AL_ESA					536				
AL_WBS_SAV					368				
AL_EBS_NSW	53.4		40		405				
AL_ET_WT	57.84		143		683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW	0.04		7		3173				
GN_ET_WT	0.01		1		381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	401.97	59	0		33954			5.75	0.02

Pink Ling East

Observed discarded catches (kg)



Observed retained catches (kg)

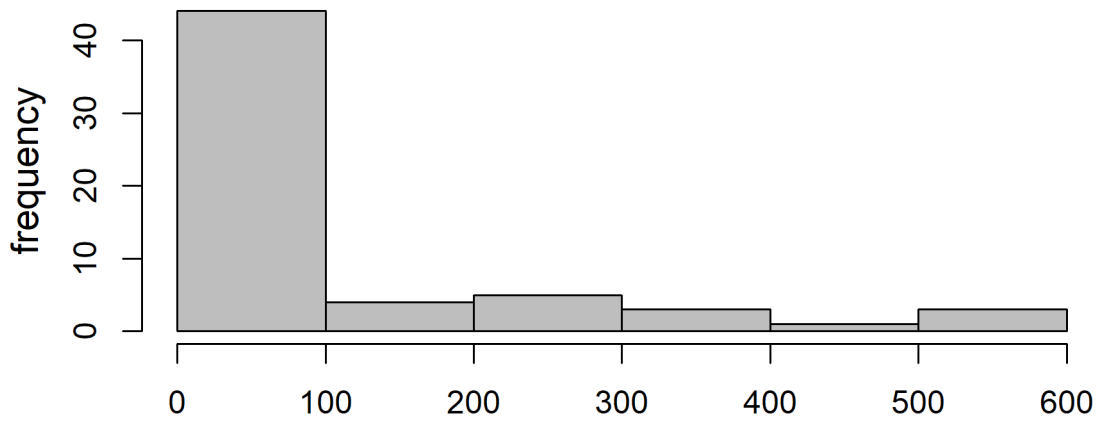


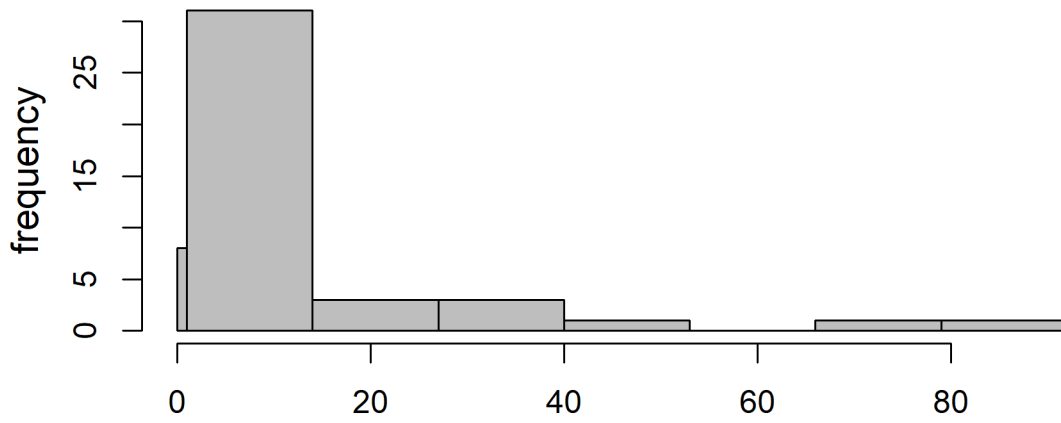
Figure 22 Histograms of observed discarded (top) and retained (bottom) catch weights for Pink Ling East in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 26 Pink Ling West: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN					1571				
TR_NSW_OFF					414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW	154.82	17	910	1.87	1718	0.46	0.77	0.61	0
DS_EDL	0.12		21		10355				
TR_EDL_IN					3511				
TR_EDL_OFF					1560				
TR_TAS_BGS					615				
TR_TAS_E					1965				
TR_TAS_ORO					30				
TR_TAS_W	157.89	130	623	20.87	1107	4.15	0.32	1.47	0.01
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA	1.88		4		1820				
AL_ESA	11.26		22		536				
AL_WBS_SAV	21.97		37		368				
AL_EBS_NSW					405				
AL_ET_WT	155.33		147		683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA	0.06		4		170				
GN_SAV	0.13		19		288				
GN_WBS	0.1		30		1760				
GN_EBS_NSW	0.02		6		3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	503.58	147	0		33954			2.08	0.01

Pink Ling West

Observed discarded catches (kg)



Observed retained catches (kg)

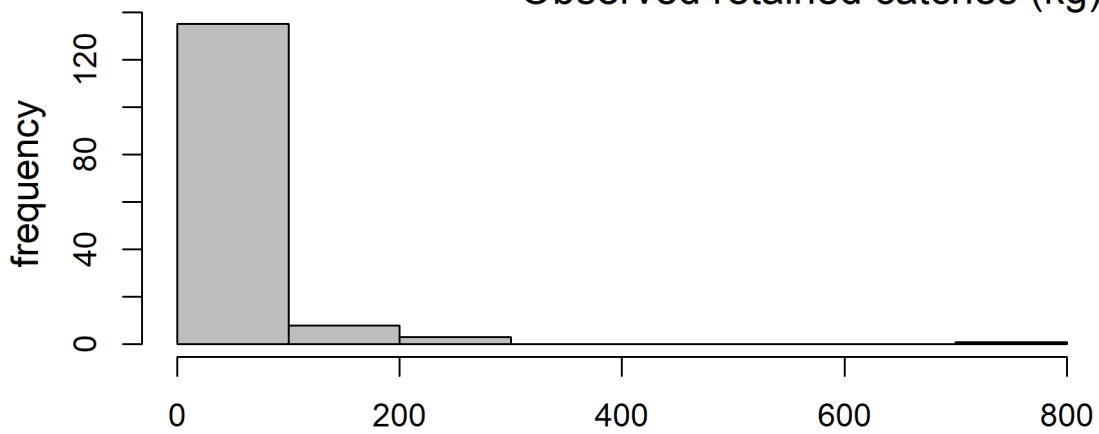


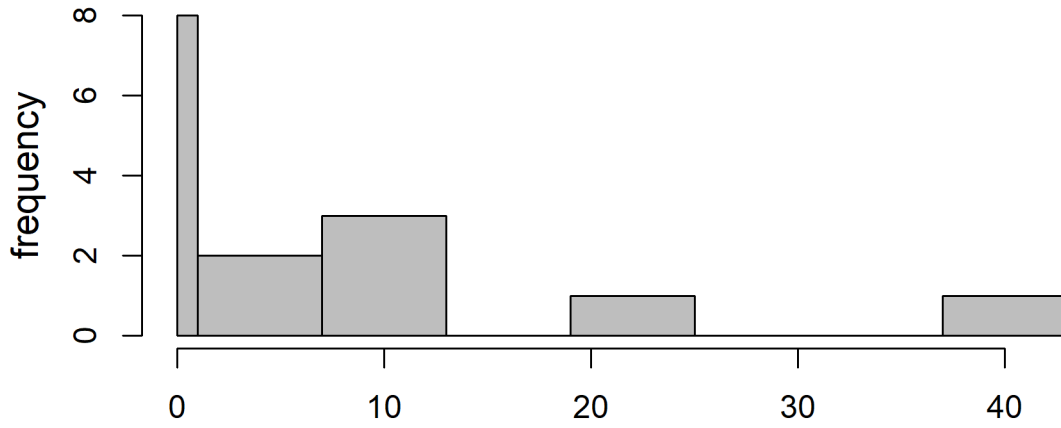
Figure 23 Histograms of observed discarded (top) and retained (bottom) catch weights for Pink Ling West in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 27 Mirror Dory East: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN	0.21		6		1571				
TR_NSW_OFF	25.5		172		414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW					1718				
DS_EDL	3.84		166		10355				
TR_EDL_IN	7.42	4	279	1.43	3511	0.81	0.09	0.24	0.03
TR_EDL_OFF	25.06	18	597	3.02	1560	1.74	0.86	2.32	0.08
TR_TAS_BGS					615				
TR_TAS_E	8.42	8	361	2.22	1965	8.3	0.04	0.63	0.07
TR_TAS_ORO					30				
TR_TAS_W					1107				
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA					1820				
AL_ESA					536				
AL_WBS_SAV					368				
AL_EBS_NSW					405				
AL_ET_WT					683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW	0		1		3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	70.45	30	0		33954			3.19	0.07

Mirror Dory East

Observed discarded catches (kg)



Observed retained catches (kg)

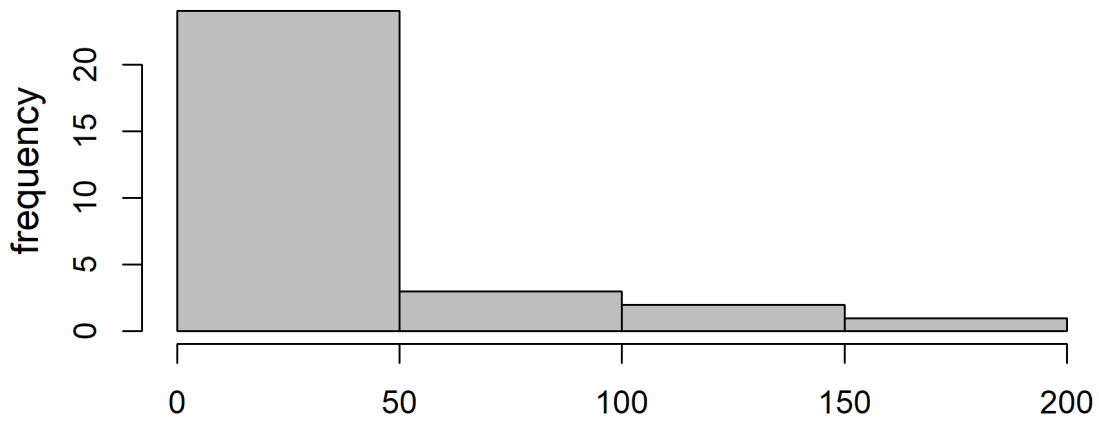


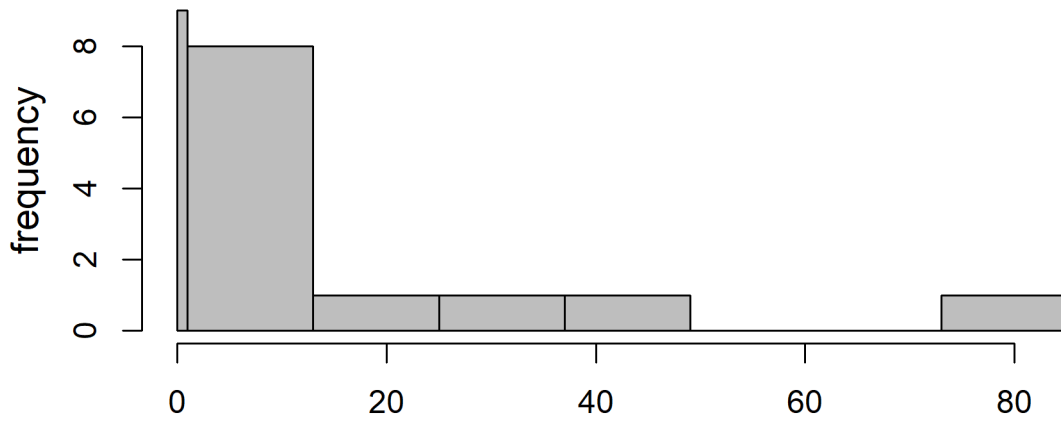
Figure 24 Histograms of observed discarded (top) and retained (bottom) catch weights for Mirror Dory East in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 28 Mirror Dory West: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN					1571				
TR_NSW_OFF					414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW	24.04	16	366	4.37	1718	2.61	0.73	3.27	0.12
DS_EDL	0.01		1		10355				
TR_EDL_IN					3511				
TR_EDL_OFF					1560				
TR_TAS_BGS					615				
TR_TAS_E					1965				
TR_TAS_ORO					30				
TR_TAS_W	9.88	95	146	65.07	1107	2.02	0.23	0.52	0.05
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA					1820				
AL_ESA					536				
AL_WBS_SAV					368				
AL_EBS_NSW					405				
AL_ET_WT					683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS	0		1		1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	33.93	111	0		33954			3.79	0.1

Mirror Dory West

Observed discarded catches (kg)



Observed retained catches (kg)

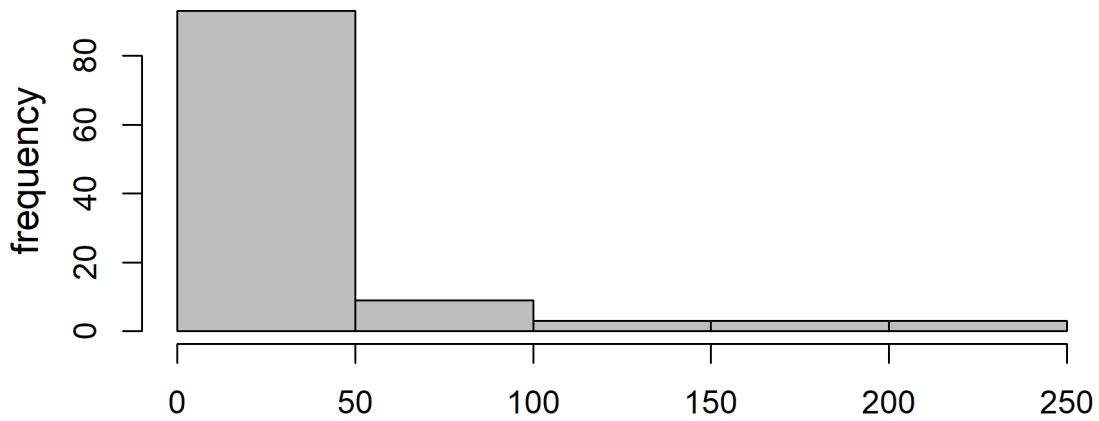


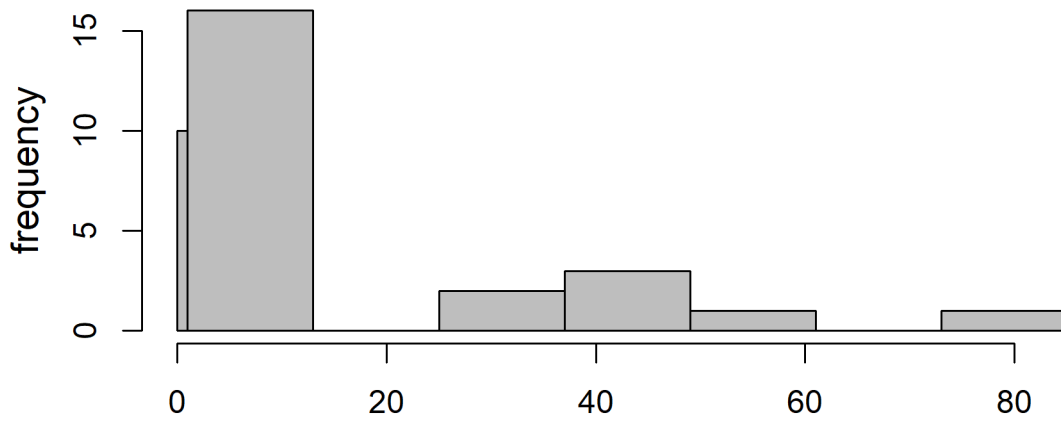
Figure 25 Histograms of observed discarded (top) and retained (bottom) catch weights for Mirror Dory West in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 29 Ocean Perch Inshore: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN	2.01	9	64	14.06	1571	30.69	0.53	25.53	0.93
TR_NSW_OFF					414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW	0.03		1		1718				
DS_EDL	0.04	3	14	21.43	10355	6.31	0.06	3.92	0.99
TR_EDL_IN	2.27	8	89	8.99	3511	12.32	0.17	7.36	0.76
TR_EDL_OFF					1560				
TR_TAS_BGS					615				
TR_TAS_E	0.18	5	19	26.32	1965	7.01	0.02	0.33	0.65
TR_TAS_ORO					30				
TR_TAS_W	0.03		3		1107				
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA					1820				
AL_ESA	0.03		7		536				
AL_WBS_SAV	0.04		9		368				
AL_EBS_NSW					405				
AL_ET_WT	0.07		5		683				
AL_WSA_WA					524				
GN_CSA	0		1		380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	4.7	25	0		33954			37.14	0.89

Ocean Perch Inshore

Observed discarded catches (kg)



Observed retained catches (kg)

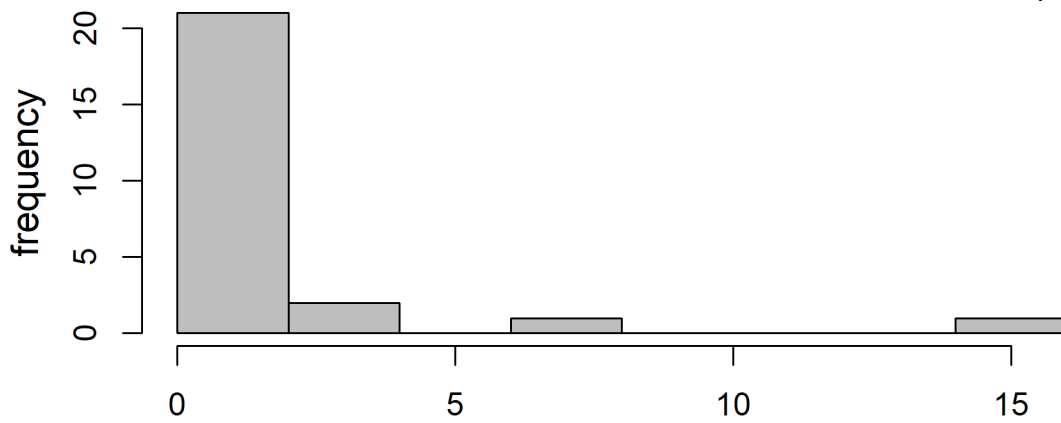


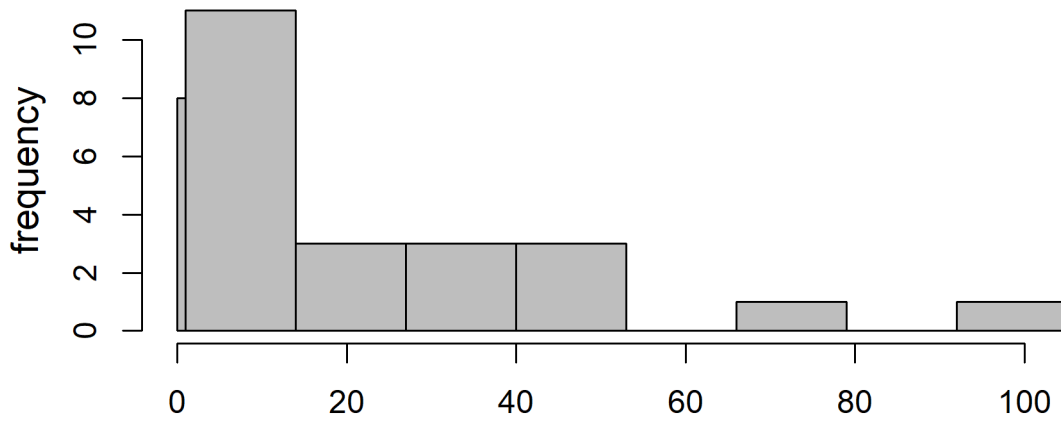
Figure 26 Histograms of observed discarded (top) and retained (bottom) catch weights for Ocean Perch Inshore in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 30 Ocean Perch Offshore: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN					1571				
TR_NSW_OFF	37.15	2	288	0.69	414	8.27	1	3.42	0.08
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW	7.81	8	169	4.73	1718	7.55	0.36	4.72	0.38
DS_EDL	0.01		4		10355				
TR_EDL_IN					3511				
TR_EDL_OFF	84.81	19	1016	1.87	1560	19.54	0.9	27.58	0.25
TR_TAS_BGS					615				
TR_TAS_E	4.39	3	151	1.99	1965	0	0.01	0	0
TR_TAS_ORO					30				
TR_TAS_W	4.5	14	93	15.05	1107	5.93	0.03	0.23	0.05
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA	1.72		31		1820				
AL_ESA	1.31		16		536				
AL_WBS_SAV	1.77		42		368				
AL_EBS_NSW	10.99		41		405				
AL_ET_WT	7.85		257		683				
AL_WSA_WA	1.18		45		524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	163.49	46	0		33954			35.95	0.21

Ocean Perch Offshore

Observed discarded catches (kg)



Observed retained catches (kg)

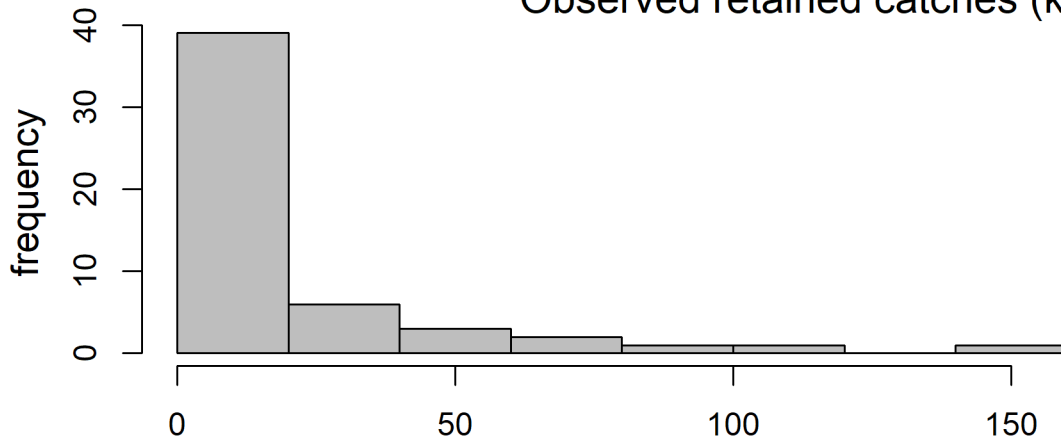


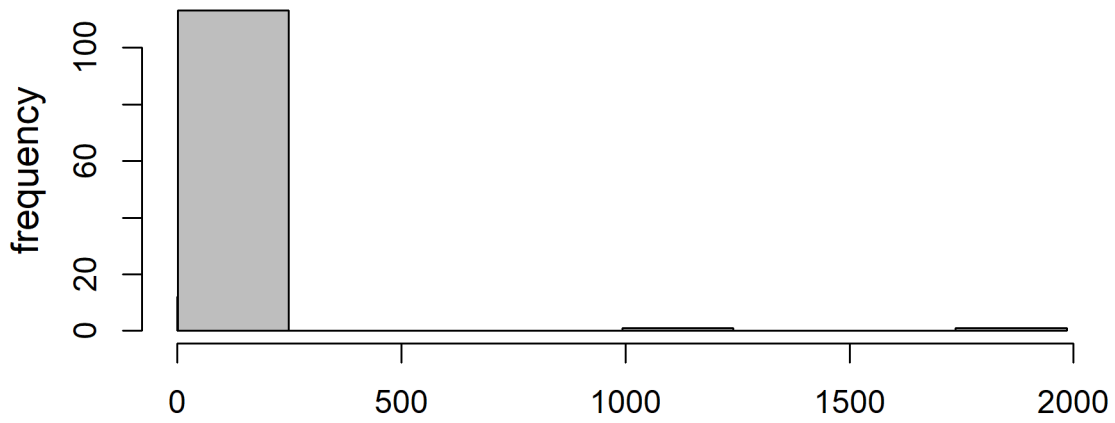
Figure 27 Histograms of observed discarded (top) and retained (bottom) catch weights for Ocean Perch Offshore in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 31 Silver Warehou: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN	3.04		38		1571				
TR_NSW_OFF	1.68		48		414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW	105.77	16	631	2.54	1718	0	0.73	0	0
DS_EDL	0.42	4	20	20	10355	1.45	0.08	1.2	0.74
TR_EDL_IN	6.85	23	122	18.85	3511	35.39	0.49	60.81	0.9
TR_EDL_OFF	81.36	16	721	2.22	1560	28.97	0.76	34.43	0.3
TR_TAS_BGS					615				
TR_TAS_E	13.42	23	183	12.57	1965	121.48	0.11	26.65	0.67
TR_TAS_ORO					30				
TR_TAS_W	84.43	298	514	57.98	1107	12.21	0.73	9.92	0.11
TR_BS_IN	0.24	1	2	50	3	183.3	0.5	0.27	0.53
TR_ECDW					1				
AL_CSA	0		1		1820				
AL_ESA	0.02		3		536				
AL_WBS_SAV	0		1		368				
AL_EBS_NSW	0.01		1		405				
AL_ET_WT	0.08		12		683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	297.32	381	0		33954			133.28	0.31

Silver Warehou

Observed discarded catches (kg)



Observed retained catches (kg)

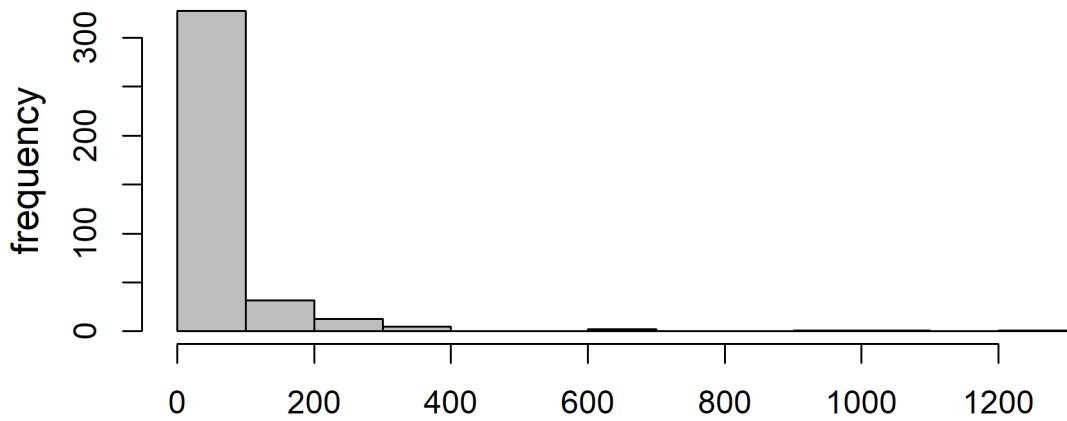


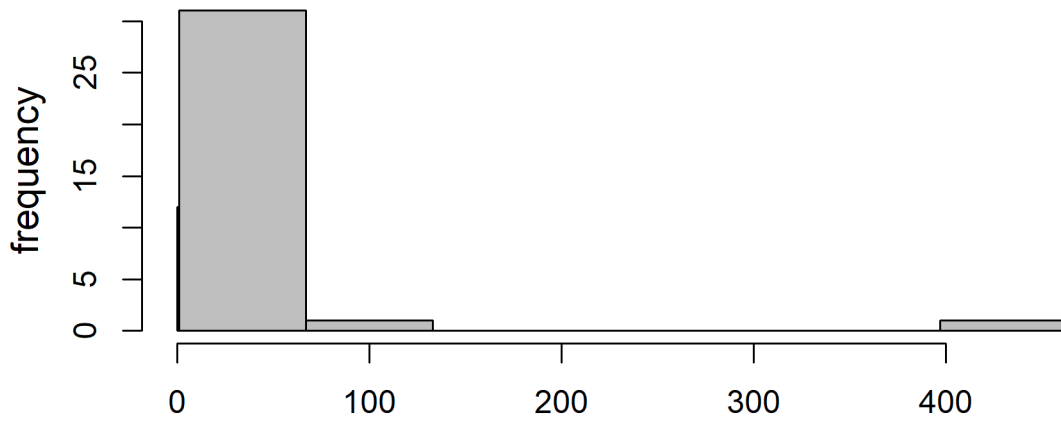
Figure 28 Histograms of observed discarded (top) and retained (bottom) catch weights for Silver Warehou in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 32 Ribaldo: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN					1571				
TR_NSW_OFF					414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW	13.76	8	185	4.32	1718	0.25	0.36	0.16	0.01
DS_EDL					10355				
TR_EDL_IN	0.01		2		3511				
TR_EDL_OFF	5.43	3	137	2.19	1560	11.61	0.14	2.59	0.32
TR_TAS_BGS					615				
TR_TAS_E	5.71	39	93	41.94	1965	3.14	0.19	1.17	0.17
TR_TAS_ORO					30				
TR_TAS_W	35.84	42	271	15.5	1107	14.23	0.1	1.63	0.04
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA	1.22		2		1820				
AL_ESA	2.22		16		536				
AL_WBS_SAV	9.58		35		368				
AL_EBS_NSW	8.91		32		405				
AL_ET_WT	53.43		244		683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	136.11	92	0		33954			5.55	0.08

Ribaldo

Observed discarded catches (kg)



Observed retained catches (kg)

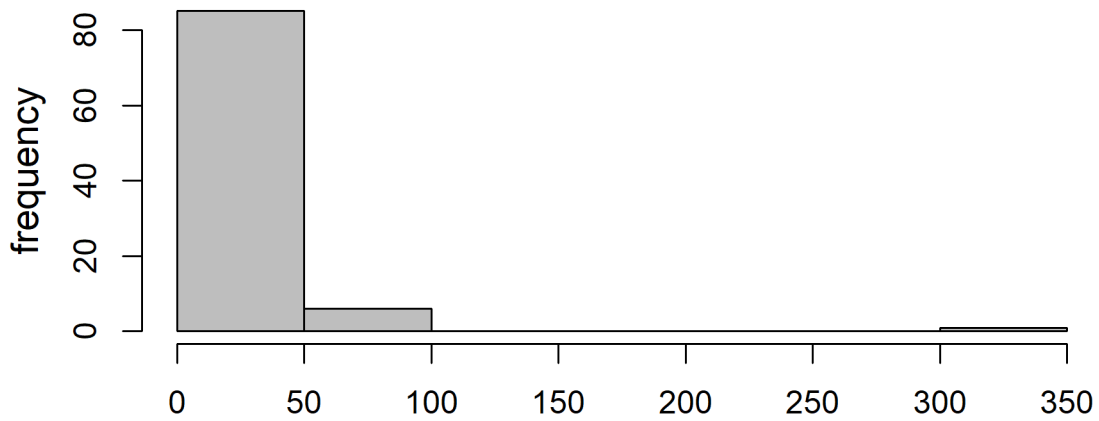


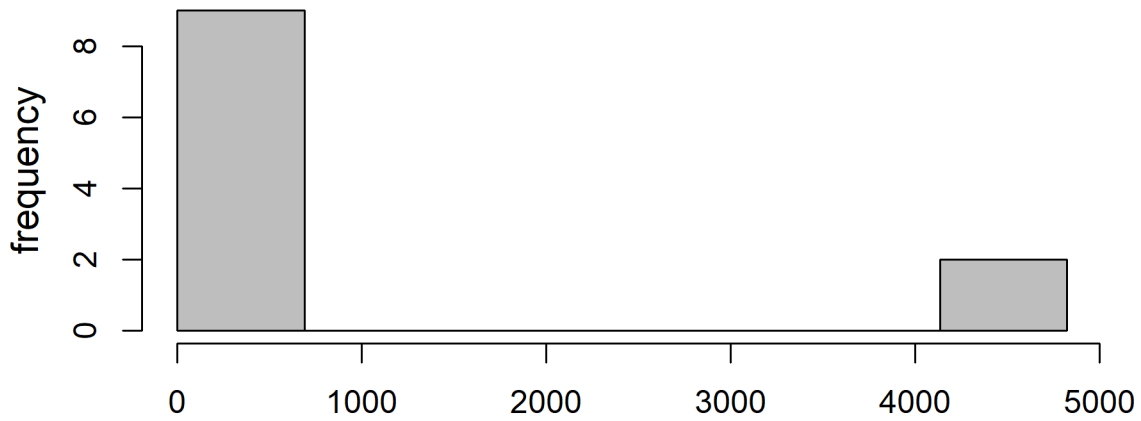
Figure 29 Histograms of observed discarded (top) and retained (bottom) catch weights for Ribaldo in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 33 Orange Roughy East: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN					1571				
TR_NSW_OFF					414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW					1718				
DS_EDL					10355				
TR_EDL_IN					3511				
TR_EDL_OFF					1560				
TR_TAS_BGS					615				
TR_TAS_E	18.43	6	28	21.43	1965	6.58	0.03	0.38	0.02
TR_TAS_ORO	28.61	25	15	166.67	30	0.28	0.83	0.01	0
TR_TAS_W					1107				
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA					1820				
AL_ESA					536				
AL_WBS_SAV					368				
AL_EBS_NSW					405				
AL_ET_WT					683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO	1100.92	96	136	70.59	136	100.32	1	13.64	0.01
TR_SPH_ORO	171.95	28	22	127.27	22	0.67	1	0.01	0
Total	1319.91	155	0		33954			14.04	0.01

Orange Roughy East

Observed discarded catches (kg)



Observed retained catches (kg)

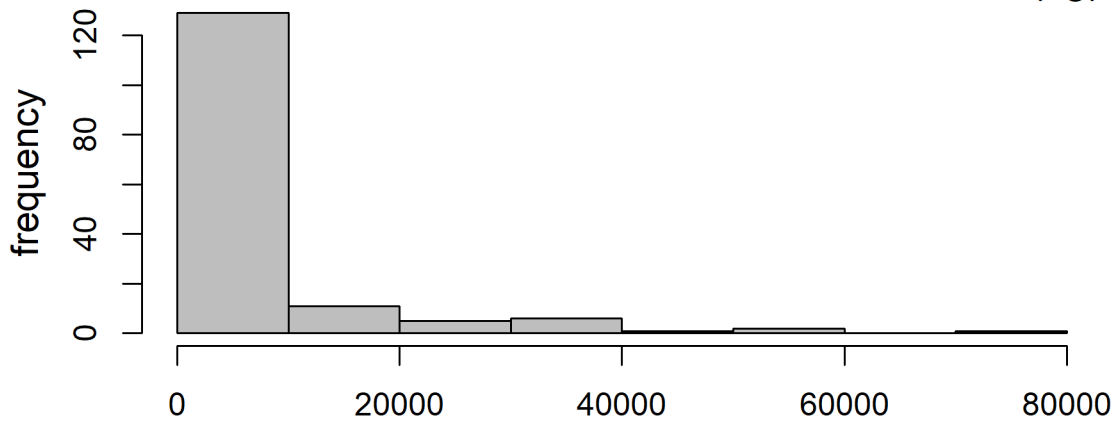


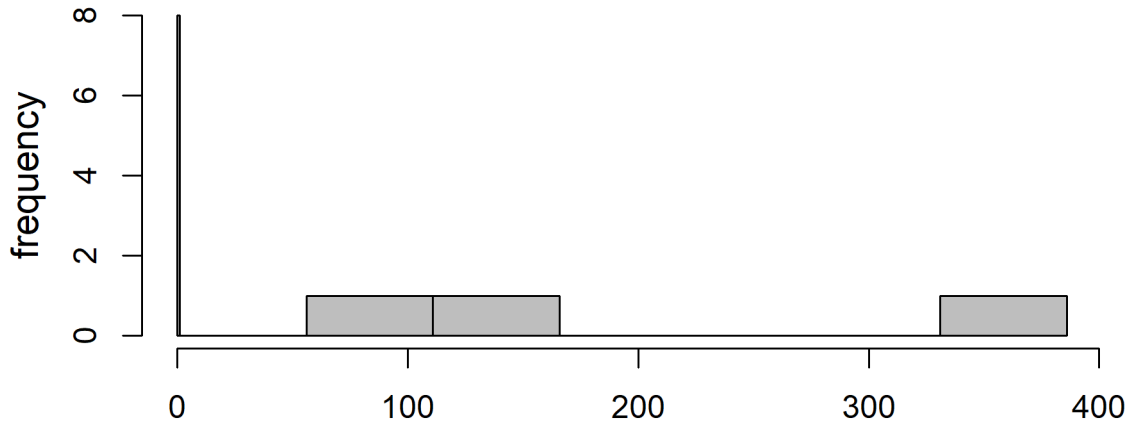
Figure 30 Histograms of observed discarded (top) and retained (bottom) catch weights for Orange Roughy East in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 34 Orange Roughy West: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN					1571				
TR_NSW_OFF					414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO	65.06	1	58	1.72	58	0	1	0	0
TR_SW	75.75	1	156	0.64	1718	384.1	0.05	29.99	0.28
DS_EDL					10355				
TR_EDL_IN					3511				
TR_EDL_OFF					1560				
TR_TAS_BGS					615				
TR_TAS_E					1965				
TR_TAS_ORO	17.57		8		30				
TR_TAS_W	29.45	2	76	2.63	1107	105.26	0	0.57	0.02
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA					1820				
AL_ESA					536				
AL_WBS_SAV					368				
AL_EBS_NSW					405				
AL_ET_WT					683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	187.83	4	0		33954			30.56	0.15

Orange Roughy West

Observed discarded catches (kg)



Observed retained catches (kg)

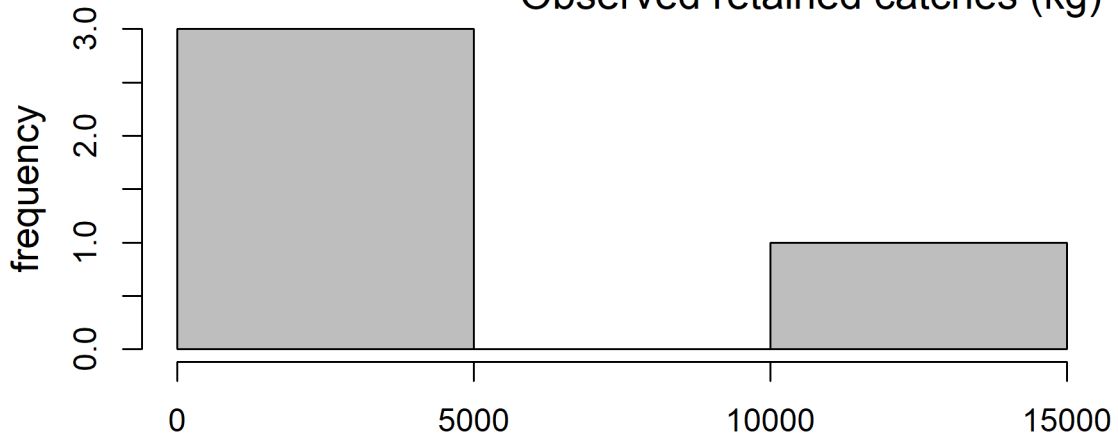


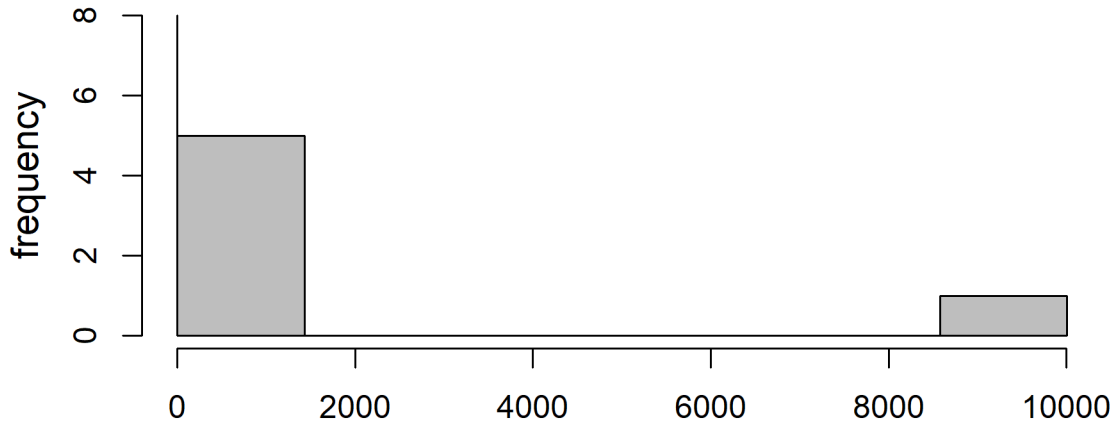
Figure 31 Histograms of observed discarded (top) and retained (bottom) catch weights for Orange Roughy West in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 35 Orange Roughy South: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN					1571				
TR_NSW_OFF					414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW					1718				
DS_EDL					10355				
TR_EDL_IN					3511				
TR_EDL_OFF					1560				
TR_TAS_BGS					615				
TR_TAS_E					1965				
TR_TAS_ORO	18.1		3		30				
TR_TAS_W	20.87	5	22	22.73	1107	205.14	0.01	2.8	0.12
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA					1820				
AL_ESA					536				
AL_WBS_SAV					368				
AL_EBS_NSW					405				
AL_ET_WT					683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	38.97	5	0		33954			2.8	0.12

Orange Roughy South

Observed discarded catches (kg)



Observed retained catches (kg)

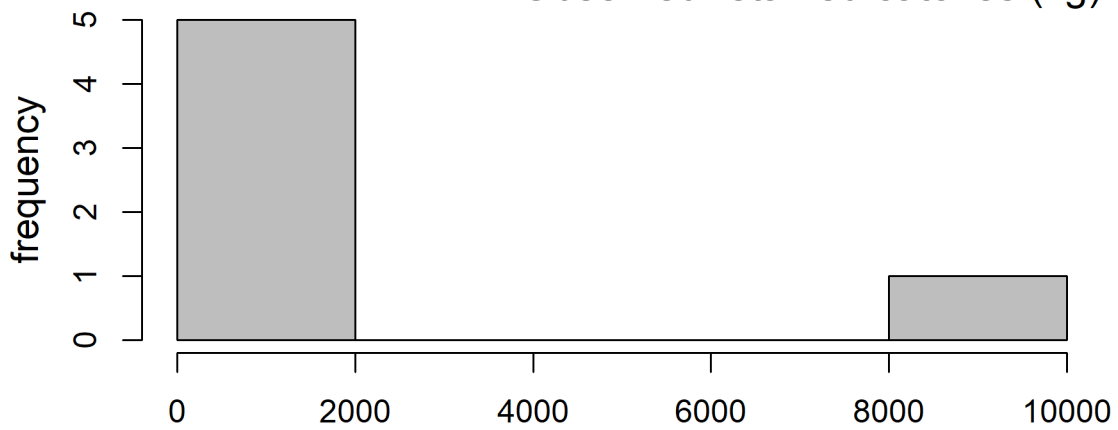


Figure 32 Histograms of observed discarded (top) and retained (bottom) catch weights for Orange Roughy South in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 36 Orange Roughy Cascade: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN					1571				
TR_NSW_OFF					414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW					1718				
DS_EDL					10355				
TR_EDL_IN					3511				
TR_EDL_OFF					1560				
TR_TAS_BGS					615				
TR_TAS_E	2.34	13	23	56.52	1965	0	0.06	0	0
TR_TAS_ORO	41.26	5	4	125	30	0	0.17	0	0
TR_TAS_W					1107				
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA					1820				
AL_ESA					536				
AL_WBS_SAV					368				
AL_EBS_NSW					405				
AL_ET_WT					683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO	168.1	68	73	93.15	73	0	1	0	0
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	211.7	86	0		33954			0	0

Orange Roughy Cascade

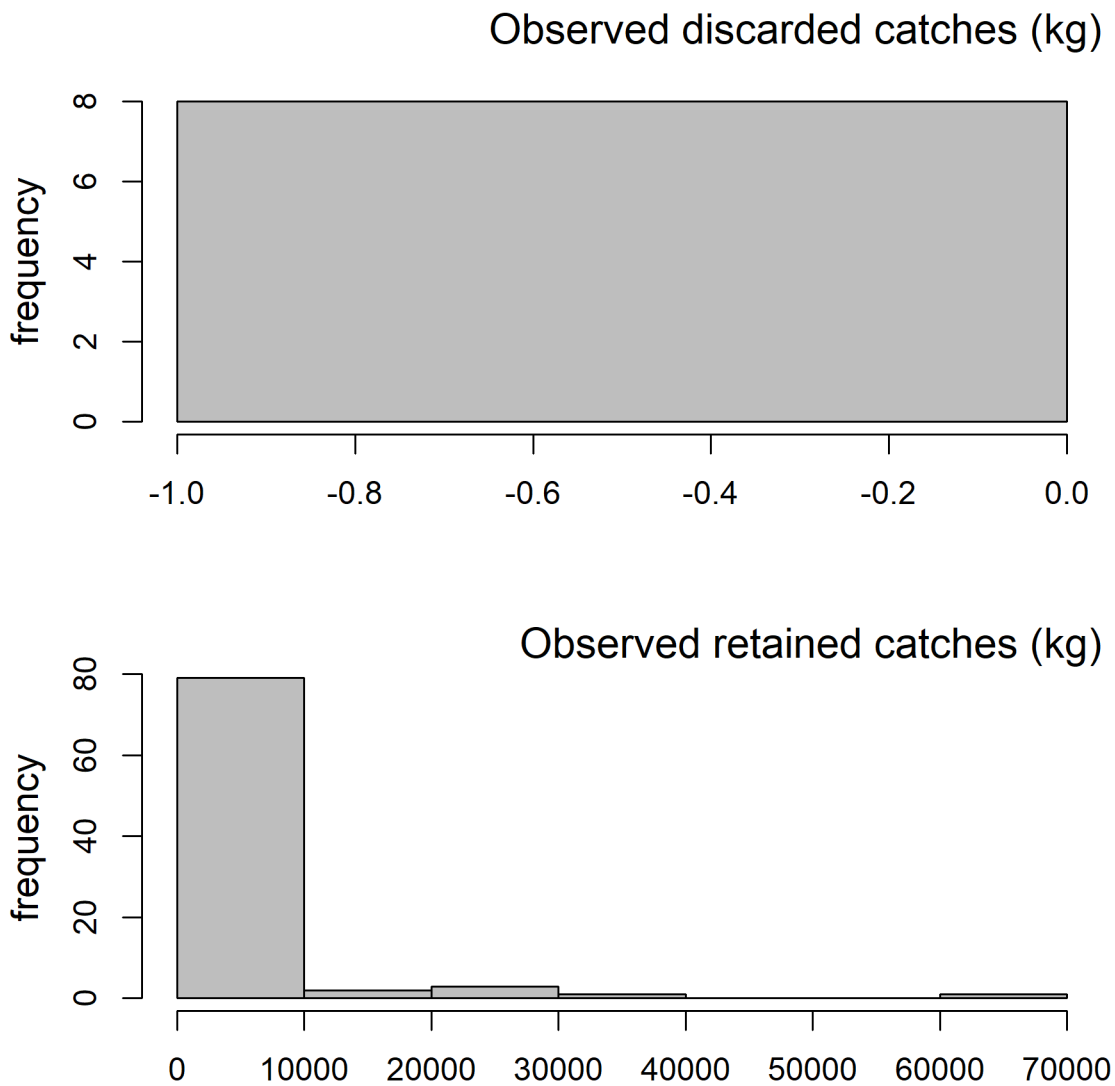


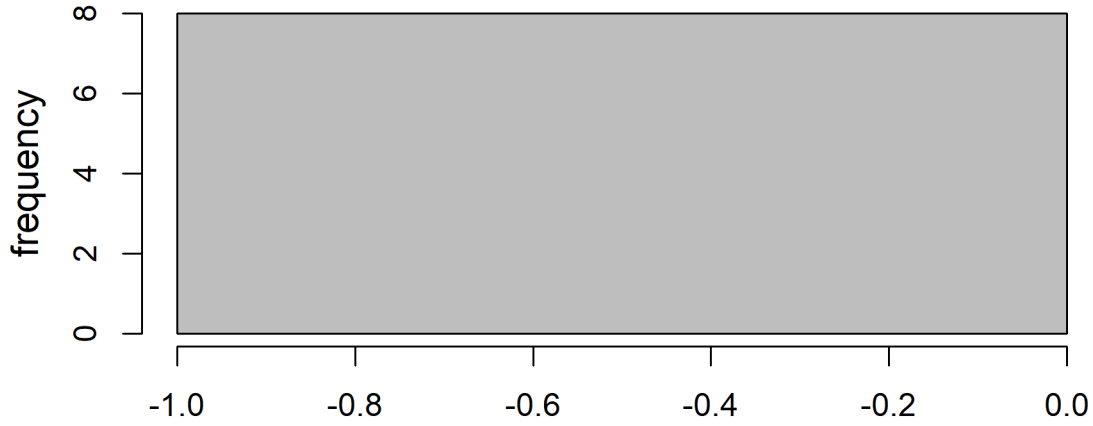
Figure 33 Histograms of observed discarded (top) and retained (bottom) catch weights for Orange Roughy Cascade in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 37 Orange Roughy GAB: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN					1571				
TR_NSW_OFF					414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW					1718				
DS_EDL					10355				
TR_EDL_IN					3511				
TR_EDL_OFF					1560				
TR_TAS_BGS					615				
TR_TAS_E					1965				
TR_TAS_ORO					30				
TR_TAS_W					1107				
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA					1820				
AL_ESA					536				
AL_WBS_SAV					368				
AL_EBS_NSW					405				
AL_ET_WT					683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	0	0	0		33954			0	

Orange Roughy GAB

Observed discarded catches (kg)



Observed retained catches (kg)

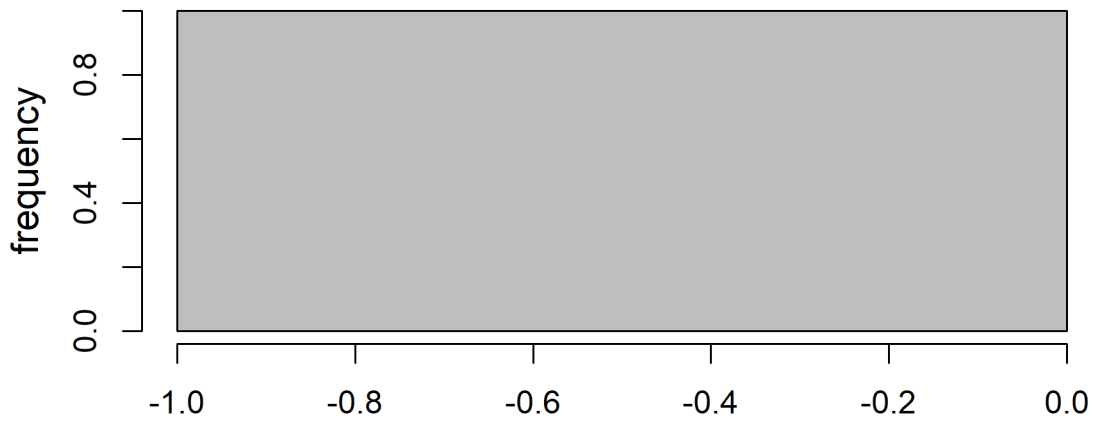


Figure 34 Histograms of observed discarded (top) and retained (bottom) catch weights for Orange Roughy GAB in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 38 Orange Roughy Pedra: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN					1571				
TR_NSW_OFF					414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW					1718				
DS_EDL					10355				
TR_EDL_IN					3511				
TR_EDL_OFF					1560				
TR_TAS_BGS					615				
TR_TAS_E	45.79		34		1965				
TR_TAS_ORO					30				
TR_TAS_W	12.72		8		1107				
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA					1820				
AL_ESA					536				
AL_WBS_SAV					368				
AL_EBS_NSW					405				
AL_ET_WT					683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO	2.49		4		4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	61	0	0		33954			0	

Orange Roughy Pedra

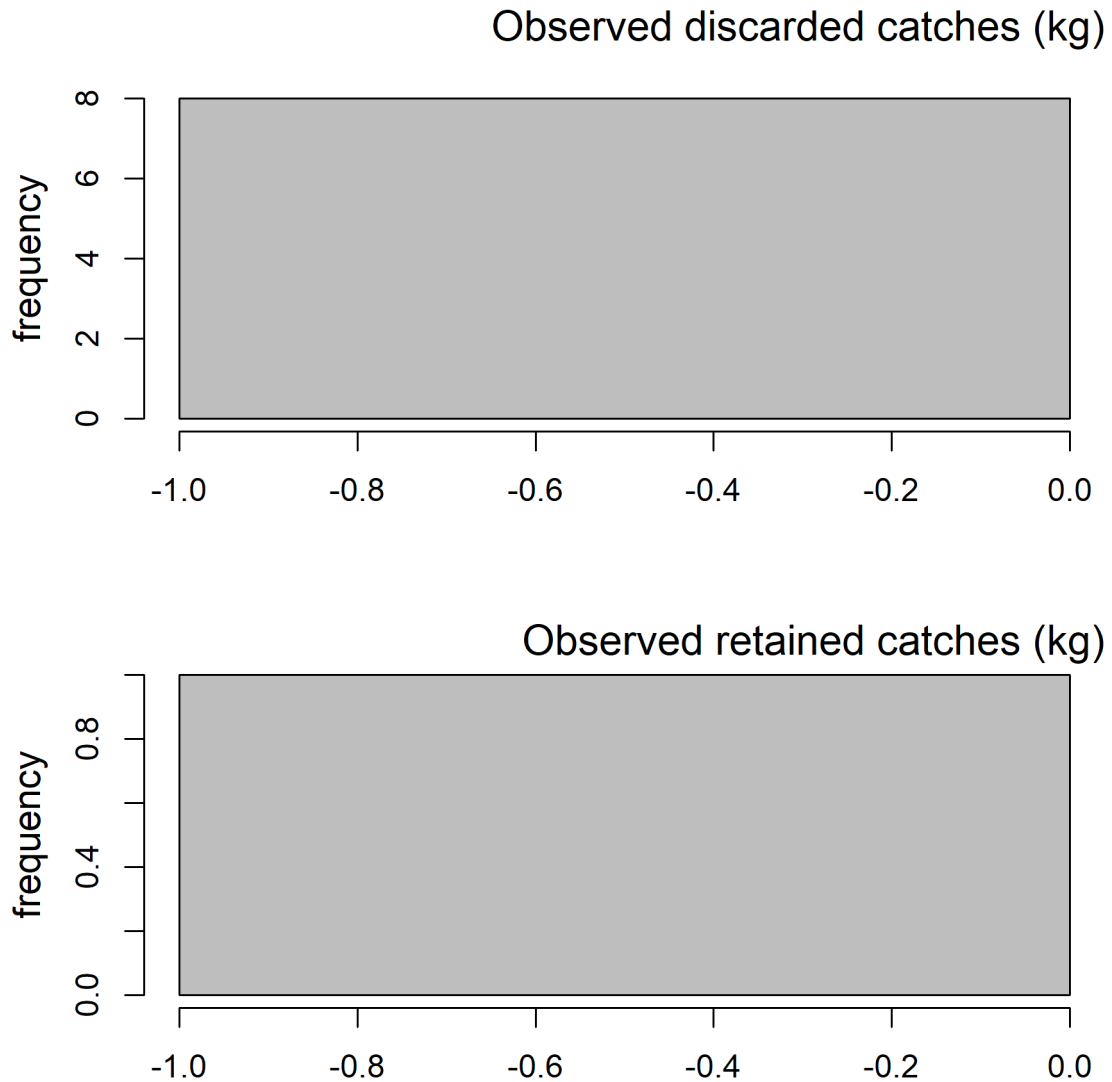


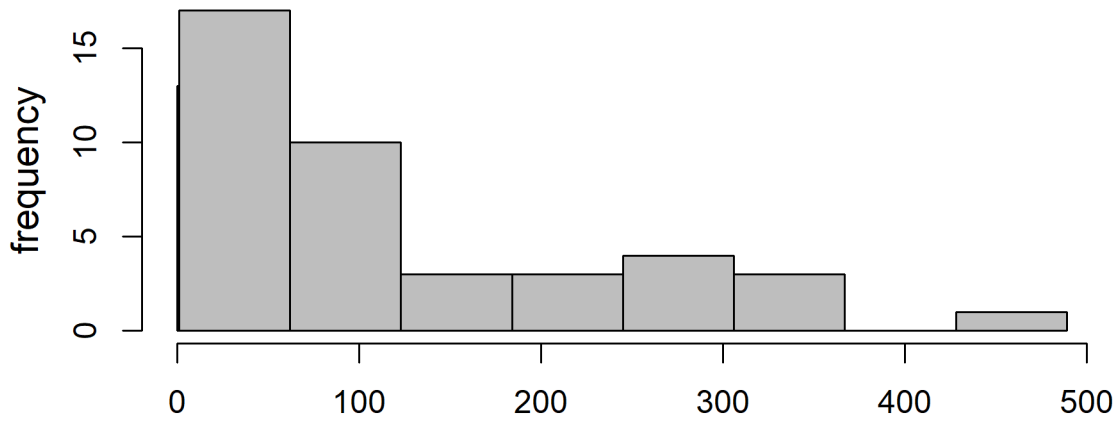
Figure 35 Histograms of observed discarded (top) and retained (bottom) catch weights for Orange Roughy Pedra in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 39 Oreos: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN					1571				
TR_NSW_OFF	0.24		5		414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW	38.83	3	166	1.81	1718	28.65	0.14	6.71	0.15
DS_EDL					10355				
TR_EDL_IN					3511				
TR_EDL_OFF	2.3	2	38	5.26	1560	0.87	0.1	0.13	0.05
TR_TAS_BGS					615				
TR_TAS_E	36.09	133	122	109.02	1965	24.12	0.65	30.6	0.46
TR_TAS_ORO					30				
TR_TAS_W	59.01	27	220	12.27	1107	63.95	0.07	4.71	0.07
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA	0		1		1820				
AL_ESA					536				
AL_WBS_SAV	0.14		14		368				
AL_EBS_NSW	0.01		4		405				
AL_ET_WT	2.25		108		683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	138.87	165	0		33954			42.15	0.24

Oreos

Observed discarded catches (kg)



Observed retained catches (kg)

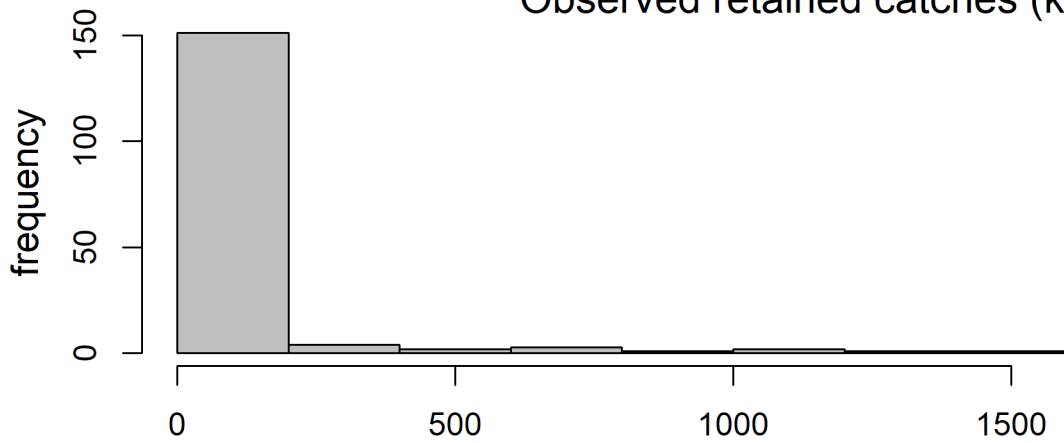


Figure 36 Histograms of observed discarded (top) and retained (bottom) catch weights for Oreos in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 40 Smooth Oreo Cascade: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN					1571				
TR_NSW_OFF					414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW					1718				
DS_EDL					10355				
TR_EDL_IN					3511				
TR_EDL_OFF					1560				
TR_TAS_BGS					615				
TR_TAS_E					1965				
TR_TAS_ORO					30				
TR_TAS_W					1107				
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA					1820				
AL_ESA					536				
AL_WBS_SAV					368				
AL_EBS_NSW					405				
AL_ET_WT					683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	0	0	0		33954			0	

Smooth Oreo Cascade

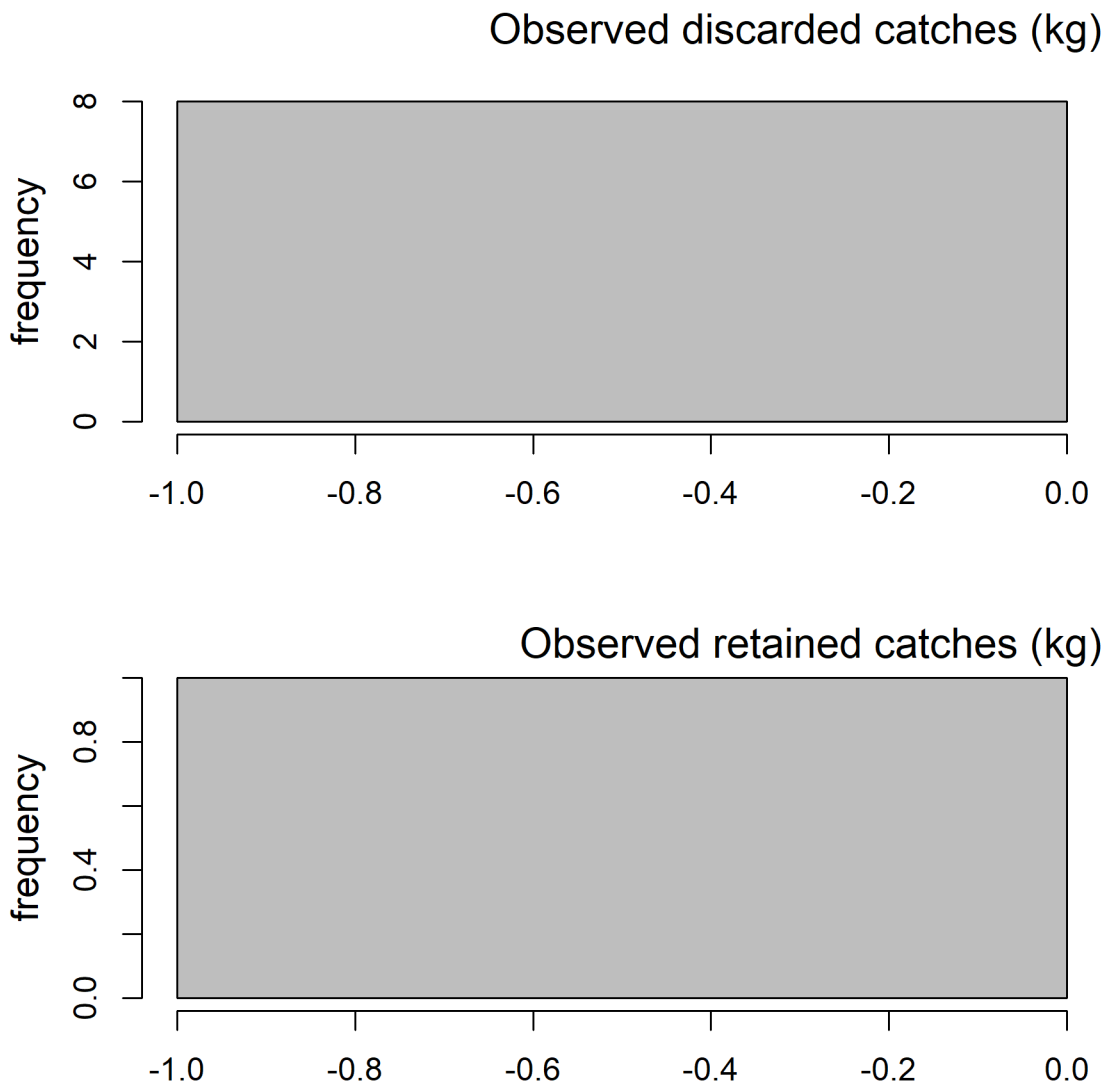


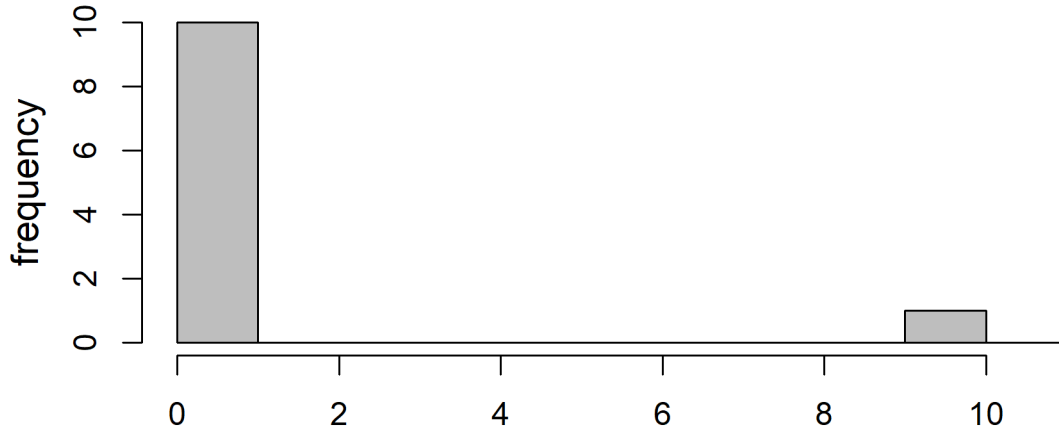
Figure 37 Histograms of observed discarded (top) and retained (bottom) catch weights for Smooth Oreo Cascade in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 41 Smooth Oreo Non-Cascade: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN					1571				
TR_NSW_OFF	0.33		4		414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW	3.59	1	15	6.67	1718	9.6	0.05	0.75	0.17
DS_EDL					10355				
TR_EDL_IN					3511				
TR_EDL_OFF					1560				
TR_TAS_BGS					615				
TR_TAS_E	37.32	3	26	11.54	1965	0.4	0.01	0.01	0
TR_TAS_ORO					30				
TR_TAS_W	12.12	3	13	23.08	1107	0	0.01	0	0
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA					1820				
AL_ESA					536				
AL_WBS_SAV					368				
AL_EBS_NSW					405				
AL_ET_WT					683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	53.36	7	0		33954			0.76	0.01

Smooth Oreo Non-Cascade

Observed discarded catches (kg)



Observed retained catches (kg)

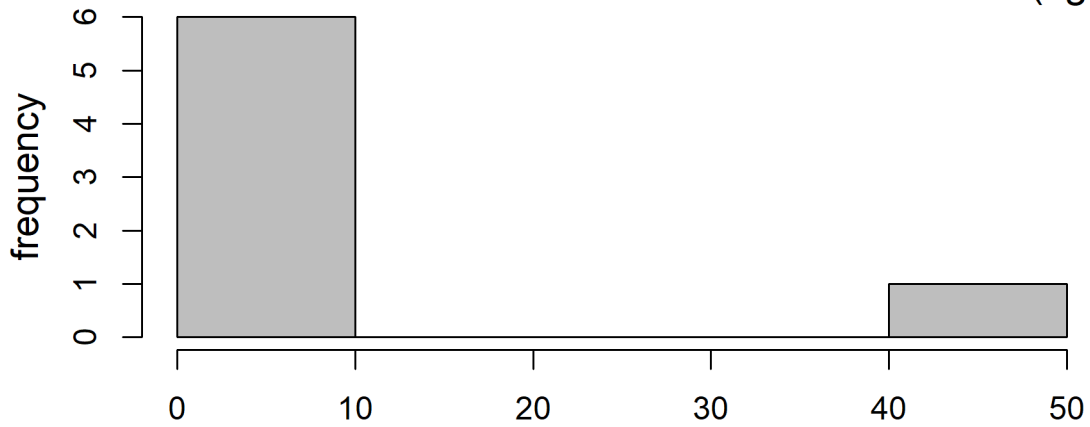


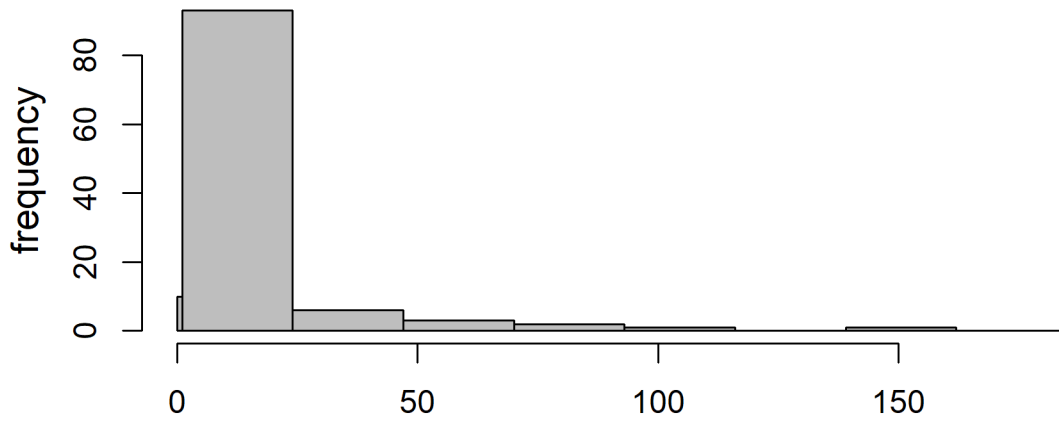
Figure 38 Histograms of observed discarded (top) and retained (bottom) catch weights for Smooth Oreo Non-Cascade in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 42 Deepwater Shark East: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN					1571				
TR_NSW_OFF					414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW					1718				
DS_EDL					10355				
TR_EDL_IN					3511				
TR_EDL_OFF	7.59	3	45	6.67	1560	108.31	0.14	24.14	0.76
TR_TAS_BGS					615				
TR_TAS_E	7.87	74	13	569.23	1965	14.9	0.36	10.52	0.57
TR_TAS_ORO					30				
TR_TAS_W					1107				
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA					1820				
AL_ESA					536				
AL_WBS_SAV					368				
AL_EBS_NSW					405				
AL_ET_WT					683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	15.46	77	0		33954			34.66	0.69

Deepwater Shark East

Observed discarded catches (kg)



Observed retained catches (kg)

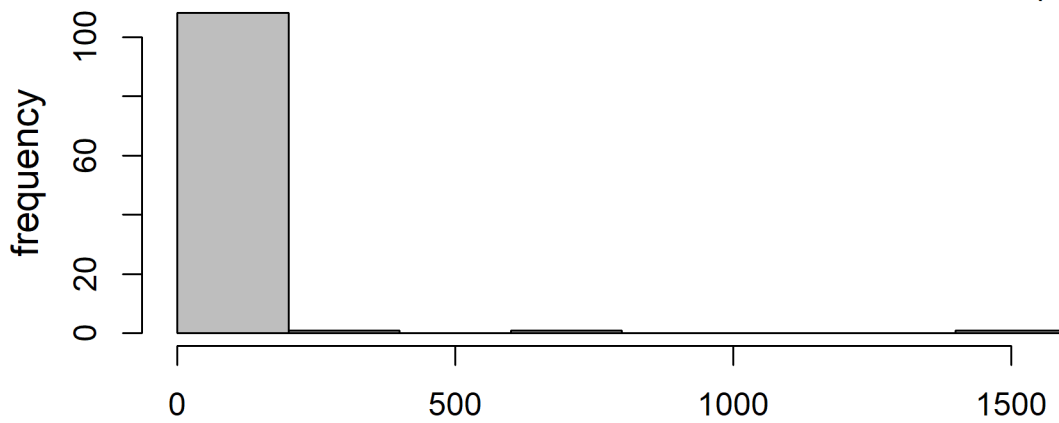


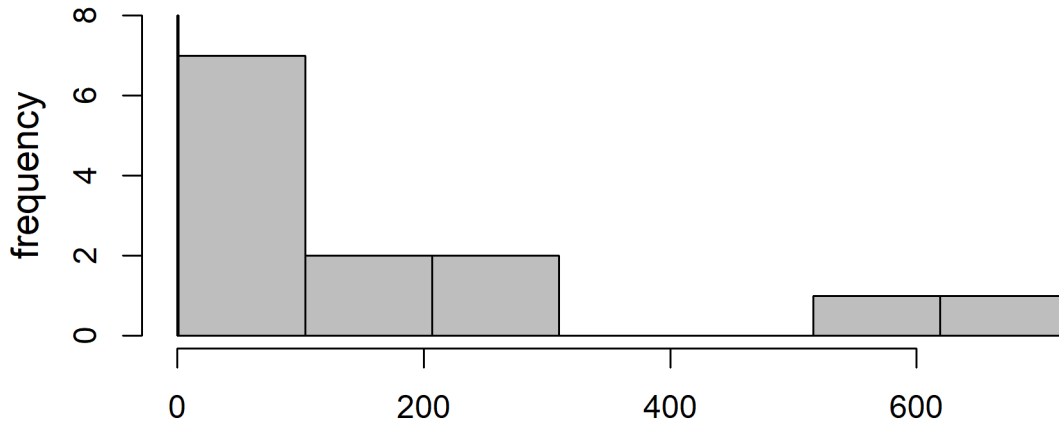
Figure 39 Histograms of observed discarded (top) and retained (bottom) catch weights for Deepwater Shark East in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 43 Deepwater Shark West: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN					1571				
TR_NSW_OFF					414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW	37.35	1	249	0.4	1718	720.1	0.05	56.23	0.6
DS_EDL					10355				
TR_EDL_IN					3511				
TR_EDL_OFF					1560				
TR_TAS_BGS					615				
TR_TAS_E					1965				
TR_TAS_ORO					30				
TR_TAS_W	62.06	15	313	4.79	1107	110.36	0.04	4.51	0.07
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA					1820				
AL_ESA					536				
AL_WBS_SAV	0		1		368				
AL_EBS_NSW					405				
AL_ET_WT					683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	99.41	16	0		33954			60.74	0.38

Deepwater Shark West

Observed discarded catches (kg)



Observed retained catches (kg)

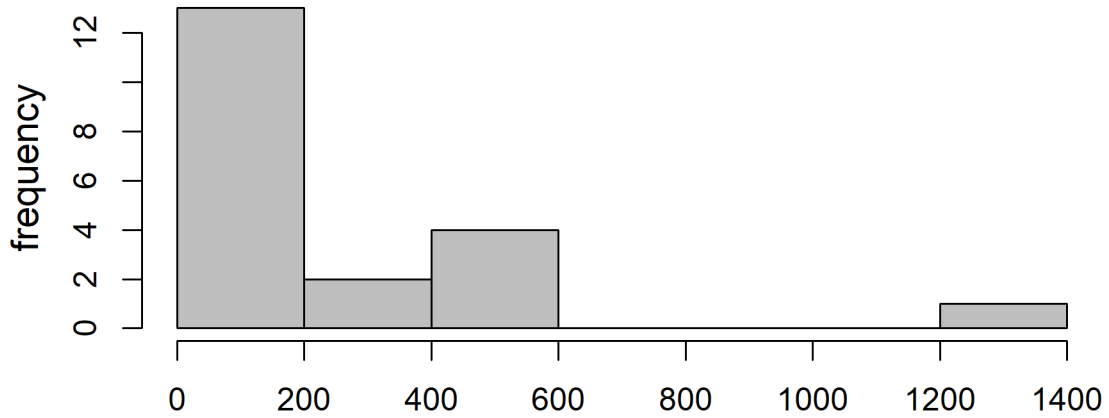


Figure 40 Histograms of observed discarded (top) and retained (bottom) catch weights for Deepwater Shark West in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

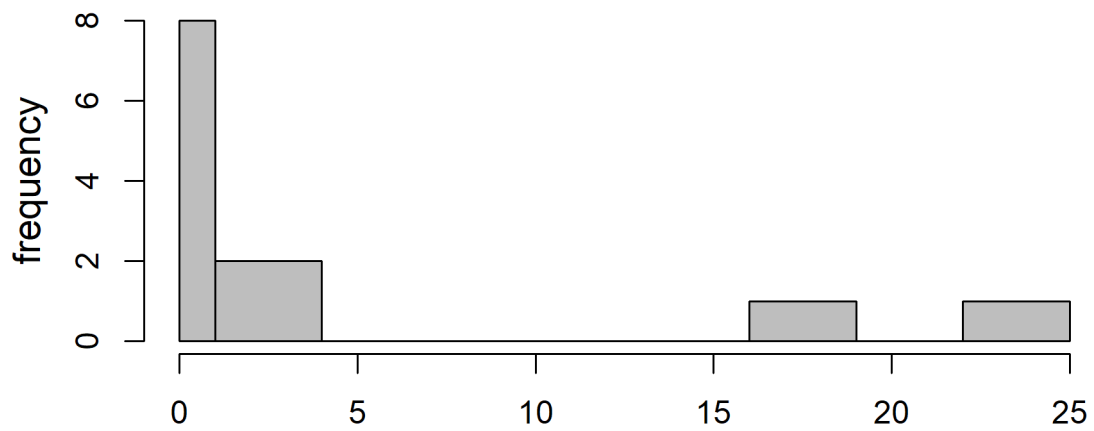
Table 44 Bight Redfish: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN					1571				
TR_NSW_OFF					414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW					1718				
DS_EDL					10355				
TR_EDL_IN					3511				
TR_EDL_OFF					1560				
TR_TAS_BGS					615				
TR_TAS_E					1965				
TR_TAS_ORO					30				
TR_TAS_W					1107				
TR_BS_IN					3				
TR_GAB_In	208.26		431		2548				
TR_GAB_Mid	0.13		2		122				
TR_GAB_Off					6				
TR_ECDW					1				
AL_CSA	0.58		67		1820				
AL_ESA					536				
AL_WBS_SAV					368				
AL_EBS_NSW					405				
AL_ET_WT					683				
AL_WSA_WA	0.21		20		524				
GN_CSA	0.05				380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	209.23	0	0		36630			0	

Bight Redfish

Observed discarded catches (kg)



Observed retained catches (kg)

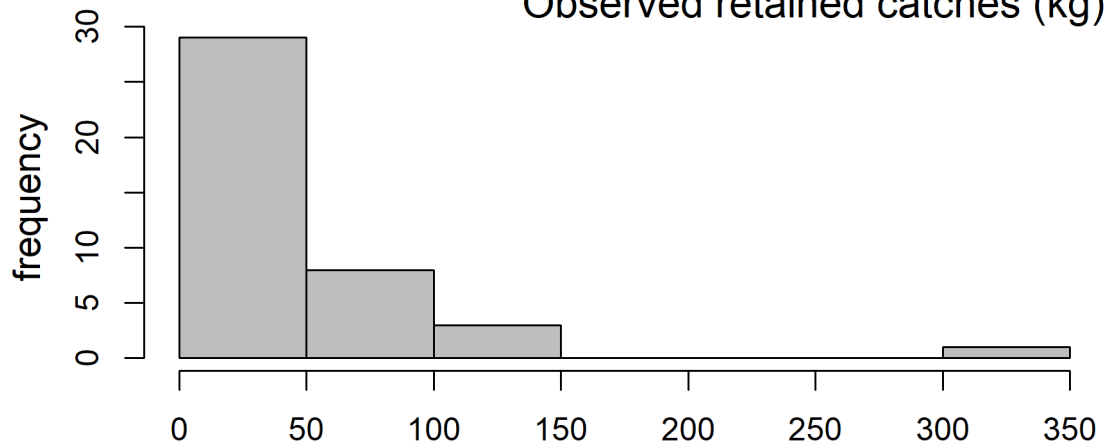


Figure 41 Histograms of observed discarded (top) and retained (bottom) catch weights for Bight Redfish in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 45 Deepwater Flathead: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN					1571				
TR_NSW_OFF					414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW					1718				
DS_EDL					10355				
TR_EDL_IN					3511				
TR_EDL_OFF					1560				
TR_TAS_BGS					615				
TR_TAS_E					1965				
TR_TAS_ORO					30				
TR_TAS_W					1107				
TR_BS_IN					3				
TR_GAB_In	560.47		848		2548				
TR_GAB_Mid	11.45		22		122				
TR_GAB_Off					6				
TR_ECDW					1				
AL_CSA					1820				
AL_ESA					536				
AL_WBS_SAV					368				
AL_EBS_NSW					405				
AL_ET_WT					683				
AL_WSA_WA					524				
GN_CSA					380				
GN_ESA					170				
GN_SAV					288				
GN_WBS					1760				
GN_EBS_NSW					3173				
GN_ET_WT					381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	571.92	0	0		36630			0	

Deepwater Flathead

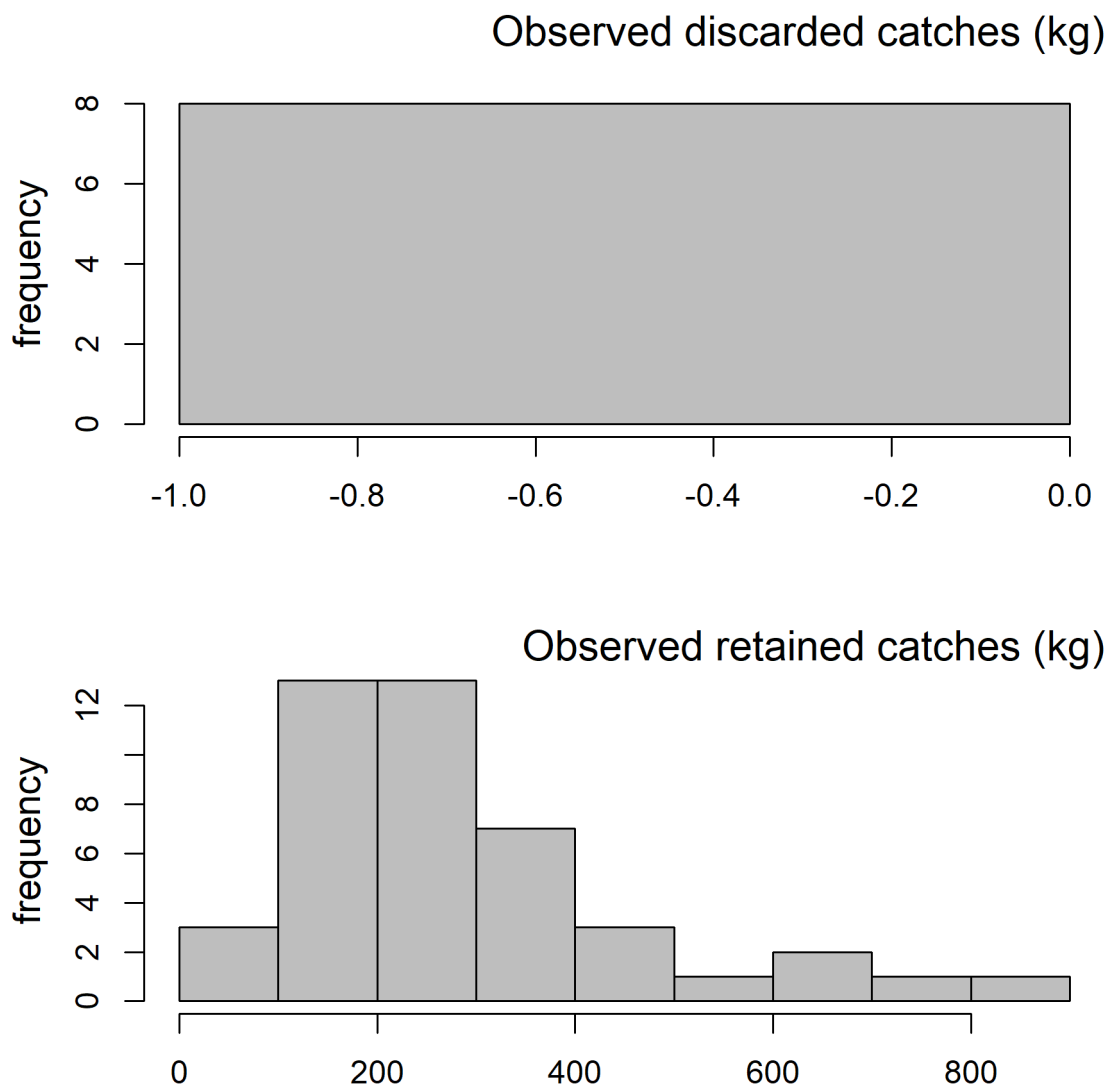


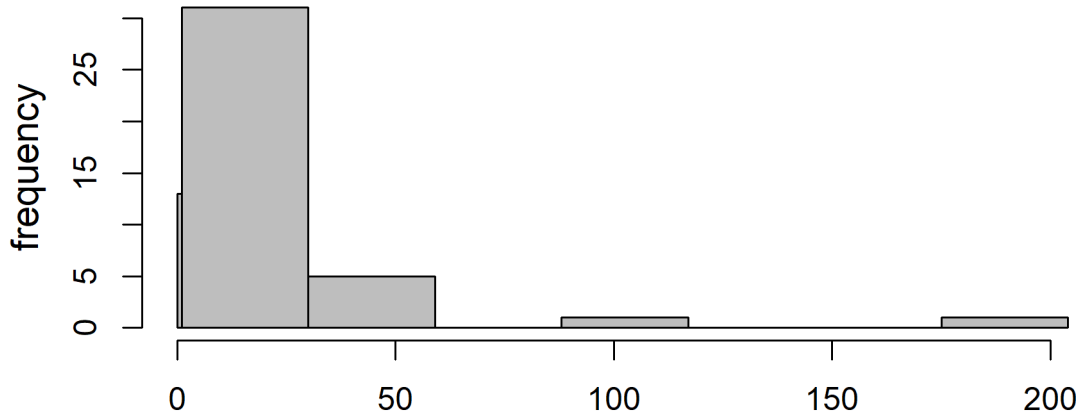
Figure 42 Histograms of observed discarded (top) and retained (bottom) catch weights for Deepwater Flathead in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 46 School Shark: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN					1571				
TR_NSW_OFF					414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW	11.54	3	209	1.44	1718	0	0.14	0	0
DS_EDL	0.17		18		10355				
TR_EDL_IN	1.09	1	57	1.75	3511	35.72	0.02	2.67	0.71
TR_EDL_OFF	1		46		1560				
TR_TAS_BGS					615				
TR_TAS_E	0.92		47		1965				
TR_TAS_ORO					30				
TR_TAS_W	4.48	46	61	75.41	1107	16.51	0.11	2.07	0.32
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA	23.23		595		1820				
AL_ESA	6.7		126		536				
AL_WBS_SAV	3.66		94		368				
AL_EBS_NSW	0.27		21		405				
AL_ET_WT	6.44		204		683				
AL_WSA_WA	4.59		190		524				
GN_CSA	4.12		163		380				
GN_ESA	2.71		76		170				
GN_SAV	8.3		89		288				
GN_WBS	32.95		630		1760				
GN_EBS_NSW	15.51		686		3173				
GN_ET_WT	6.02		133		381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	133.7	50	0		33954			4.74	0.22

School Shark

Observed discarded catches (kg)



Observed retained catches (kg)

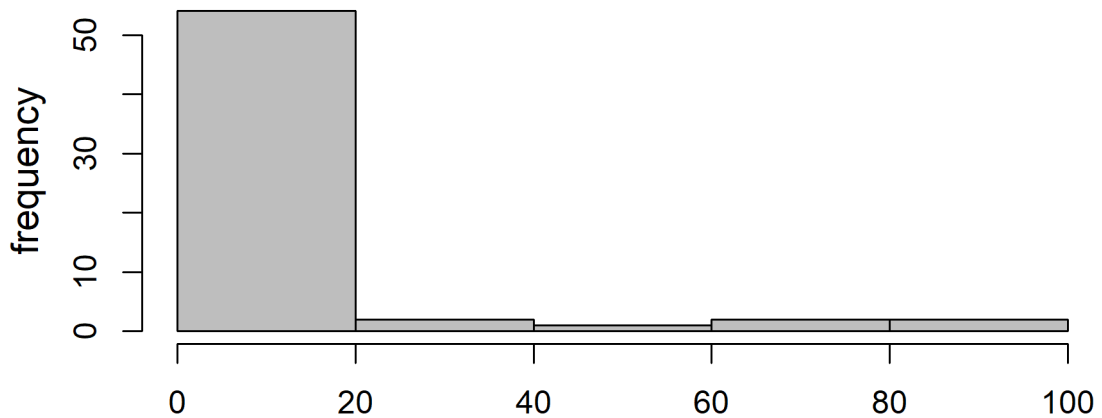


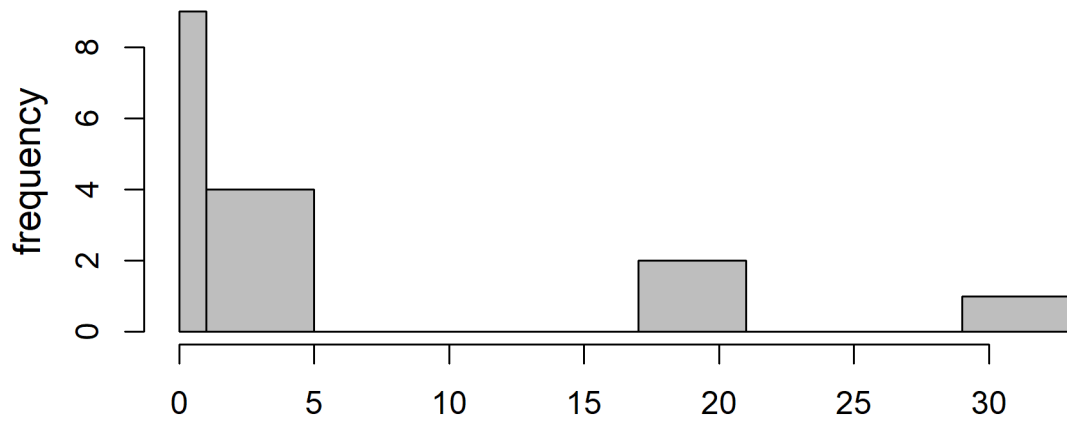
Figure 43 Histograms of observed discarded (top) and retained (bottom) catch weights for School Shark in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 47 Gummy Shark: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN	4.3		170		1571				
TR_NSW_OFF	1.17		21		414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW	11.8	2	237	0.84	1718	0	0.09	0	0
DS_EDL	31.85	20	2416	0.83	10355	0.24	0.4	0.99	0.03
TR_EDL_IN	27.79	19	1042	1.82	3511	1.74	0.4	2.46	0.08
TR_EDL_OFF	14.24		282		1560				
TR_TAS_BGS					615				
TR_TAS_E	13.49	14	507	2.76	1965	0	0.07	0	0
TR_TAS_ORO					30				
TR_TAS_W	1.14	4	36	11.11	1107	0	0.01	0	0
TR_BS_IN	0.06		2		3				
TR_ECDW					1				
AL_CSA	281.13		1695		1820				
AL_ESA	49.44		499		536				
AL_WBS_SAV	37.41		313		368				
AL_EBS_NSW	53.06		352		405				
AL_ET_WT	38.87		421		683				
AL_WSA_WA	98.42		472		524				
GN_CSA	23.94		363		380				
GN_ESA	18.06		161		170				
GN_SAV	26.52		288		288				
GN_WBS	443.66		1731		1760				
GN_EBS_NSW	634.85		3128		3173				
GN_ET_WT	82.66		378		381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	1893.86	59	0		33954			3.45	0.04

Gummy Shark

Observed discarded catches (kg)



Observed retained catches (kg)

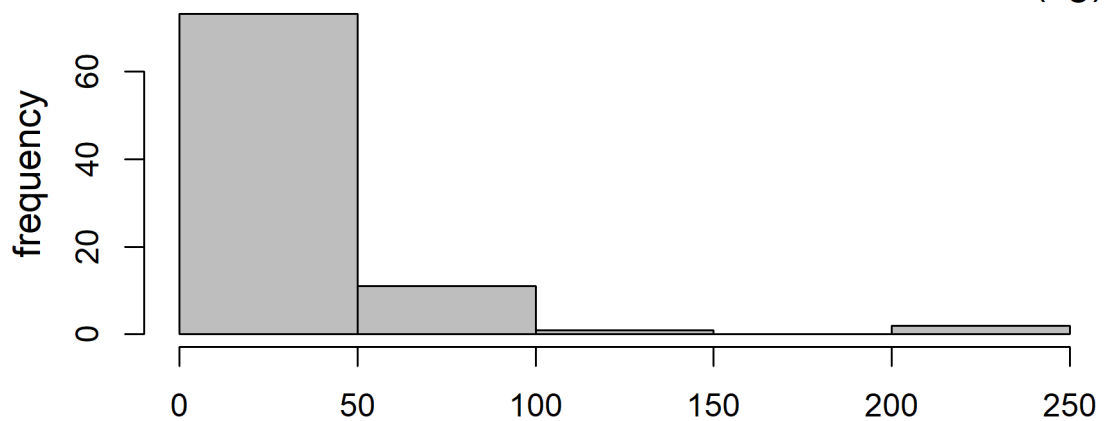


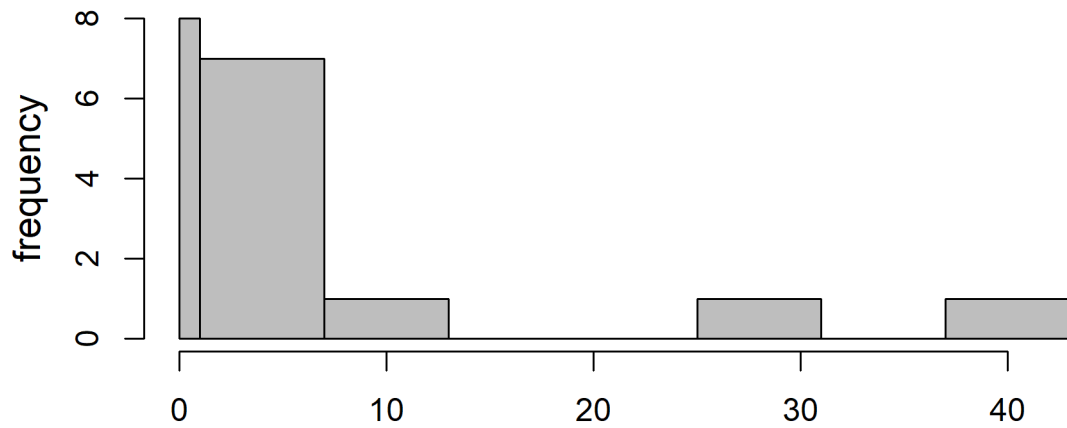
Figure 44 Histograms of observed discarded (top) and retained (bottom) catch weights for Gummy Shark in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 48 Sawshark: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN	11.01	5	394	1.27	1571	0	0.29	0	0
TR_NSW_OFF	1.5	2	22	9.09	414	0	1	0	0
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW	11.43	1	169	0.59	1718	0	0.05	0	0
DS_EDL	18.54	13	1642	0.79	10355	0.92	0.26	2.46	0.12
TR_EDL_IN	8.96	18	585	3.08	3511	0.26	0.38	0.35	0.04
TR_EDL_OFF	1.54	1	76	1.32	1560	38.56	0.05	2.86	0.65
TR_TAS_BGS					615				
TR_TAS_E	1.3	1	135	0.74	1965	0	0	0	0
TR_TAS_ORO					30				
TR_TAS_W	0.53		10		1107				
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA	0.85		176		1820				
AL_ESA	0.59		32		536				
AL_WBS_SAV	0.06		27		368				
AL_EBS_NSW	0.07		12		405				
AL_ET_WT	0.01		4		683				
AL_WSA_WA	0.09		23		524				
GN_CSA	1.07		156		380				
GN_ESA	0.85		43		170				
GN_SAV	8.57		240		288				
GN_WBS	45.6		1341		1760				
GN_EBS_NSW	54.64		2329		3173				
GN_ET_WT	1.68		206		381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	168.89	41	0		33954			5.67	0.09

Sawshark

Observed discarded catches (kg)



Observed retained catches (kg)

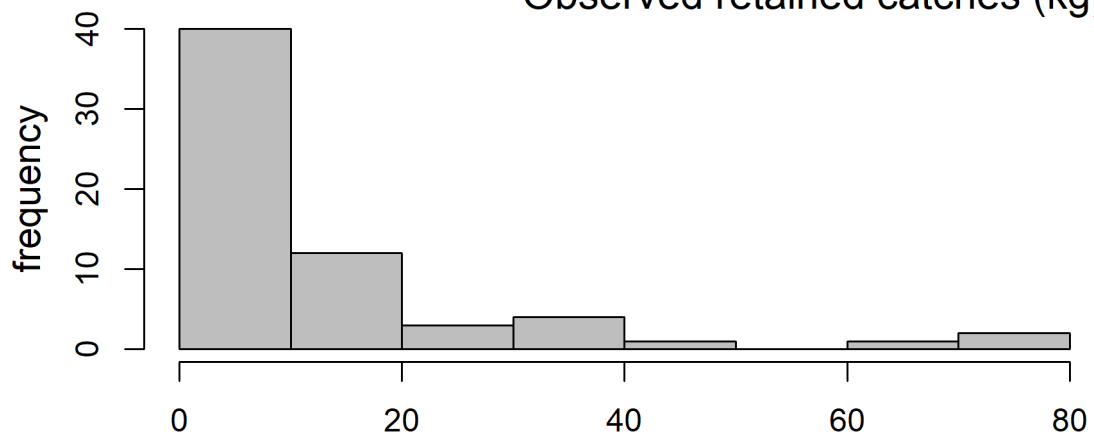


Figure 45 Histograms of observed discarded (top) and retained (bottom) catch weights for Sawshark in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

Table 49 Elephantfish: 2020 logbook landings (LANDINGS), numbers of observed shots (NOBS), numbers of logbook shots per species (NLOGSP) and per strata (NLOGSTRA), percent observed (% OBS), hit rate (HIT RATE), mean discard per shot (DISC SHOT), estimated discarded tons (DLOG) and discard rate (DISC RATE).

STRATUM	LANDINGS..T.	NOBS	NLOGSP	OBS.PERC	NLOGSTRA	D.SHOT..KG.	HIT.RATE	DLOG..T.	DISC.RATE
TR_NSW_GEM					35				
TR_NSW_IN					1571				
TR_NSW_OFF					414				
TR_NSW_RRP					122				
TR_SW_BGS					166				
TR_SW_ORO					58				
TR_SW	0.35		6		1718				
DS_EDL	6.98	1	546	0.18	10355	2	0.02	0.41	0.06
TR_EDL_IN	4.12	15	136	11.03	3511	0	0.32	0	0
TR_EDL_OFF	0.04	2	4	50	1560	6.85	0.1	1.02	0.96
TR_TAS_BGS					615				
TR_TAS_E	1.66	3	98	3.06	1965	0	0.01	0	0
TR_TAS_ORO					30				
TR_TAS_W	0.38	1	11	9.09	1107	0	0	0	0
TR_BS_IN					3				
TR_ECDW					1				
AL_CSA					1820				
AL_ESA					536				
AL_WBS_SAV					368				
AL_EBS_NSW	0		2		405				
AL_ET_WT	0.02		7		683				
AL_WSA_WA					524				
GN_CSA	0.09		18		380				
GN_ESA	0		1		170				
GN_SAV	0.72		108		288				
GN_WBS	10.01		631		1760				
GN_EBS_NSW	16.23		936		3173				
GN_ET_WT	1.59		48		381				
GN_WA_WSA									
TR_CAS_ORO					73				
TR_MAA_ORO									
TR_PED_ORO					4				
TR_SHH_ORO					136				
TR_SPH_ORO					22				
Total	42.19	22	0		33954			1.43	0.1

Elephantfish

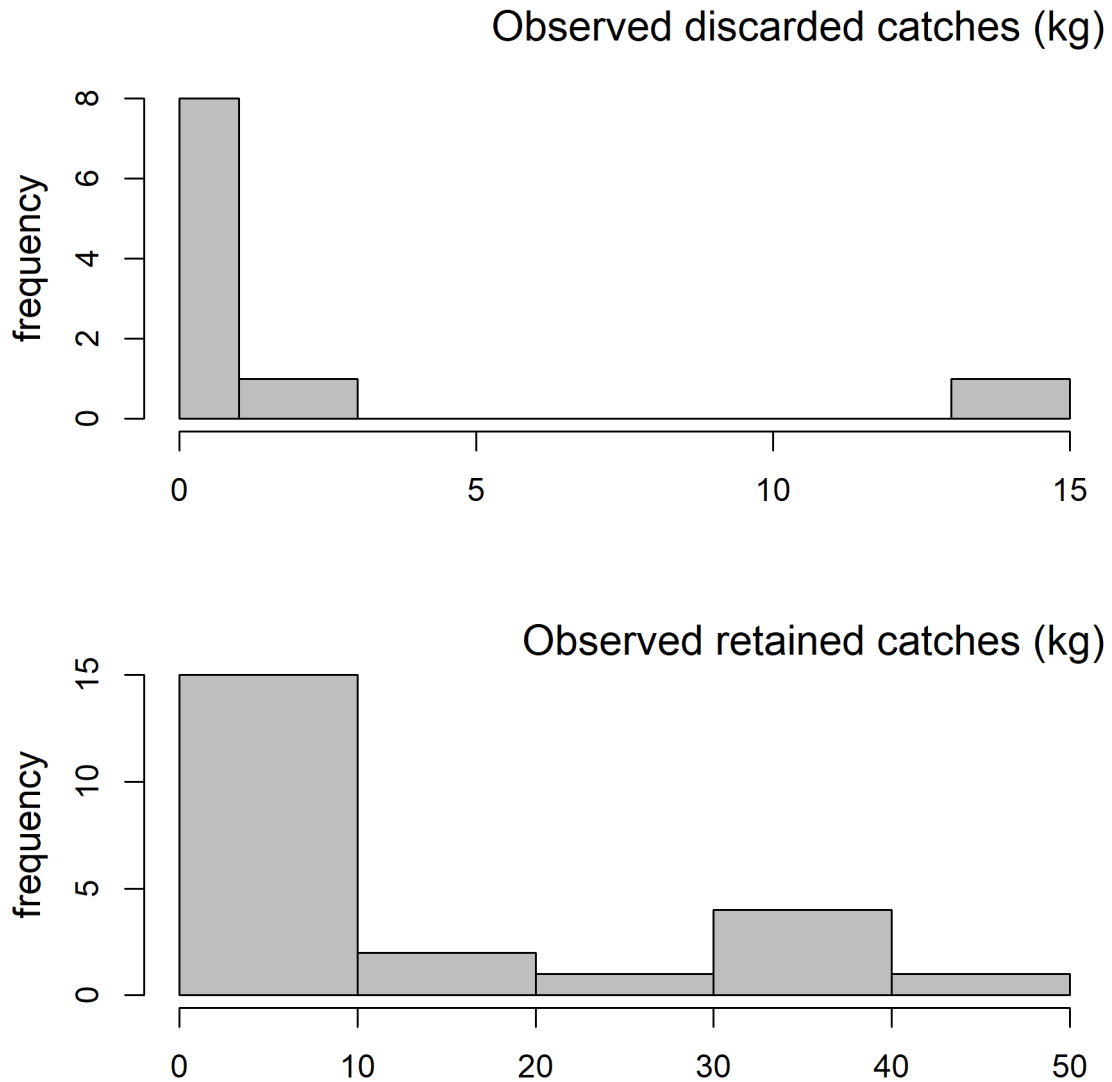


Figure 46 Histograms of observed discarded (top) and retained (bottom) catch weights for Elephantfish in 2020. The narrow bar at zero indicates frequency of shots without the catch. For more information contact AFMA on (02) 6225 5555.

6 Discussion

Eight full years of data have now been collected under the current ISMP design (although adherence to the PROP design has not always been good). The robustness of discard estimates using the current design design-based approach (Bergh et al., 2009) are dependent on good adherence to the sampling plan. A model-based approach to estimating discarded catch may be preferable due to its potential to fill in gaps in the sampling for individual years. It is recommended that SESSFRAG consider funding work towards such an approach because sampling rates are currently lower than required to achieve good discard estimates using the existing approach, and there is no prospect of increased sampling rates.

AFMA advised that a discard catch of 10,000 kg and retained catch of 10,000 kg of Orange Roughy South (ORS) happened in one shot observed in March 2020. However, no corresponding record was found in the logbook for that stratum, therefore the observation did not contribute to the discard estimation for ORS which was therefore not impacted by this single shot observation.

Appendix A Changes prior to 2020

This appendix describes the changes made to the Discard report in 2018, 2019 and 2020.

A.1 Changes in December 2020

The December version of this report added machine readable captions to the plots of observed discard weights so that the report can comply with AFMA's accessibility requirements. There were no other changes to this report.

A.2 Changes in October 2020

This report updates the August 2020 version (Deng et al., 2020b) with the following changes:

1. Discarded catch estimates for Alfonsino, Blue-eye Trevalla, Blue Grenadier, Frostfish, Gemfish East, Mirror Dory West, Pink Ling West, Ribaldo, School Shark and Silver Warehouse were corrected due to errors in the onboard observer weight data.
2. Discarded catch estimates obtained using the Bergh method are separated into species groups where they are used for assessment and management purposes (Table 2) and those where discarded catch estimates are obtained from the relevant stock assessment model and the discard estimates calculated using the Bergh method for comparison purposes only (Table 3).
3. Discard estimates that fail the validity criteria are now labeled 'Fail' in the last column of Table 2 and Table 3, where previously this column was blank.

A.3 Changes in August 2020

During the processing of the logbook data this year, CSIRO became aware that a number of vessels were reporting a single (invariant) depth in their e-log. Given the importance of fishing depth in the 2020 catch per unit of effort (CPUE) standardisations, SESSF Data Summary, ISMP strata allocation, Discard and Catch reports, CSIRO requested that SESSFRAG provide out of session advice on this issue. SESSFRAG agreed out of session to the following actions:

4. CSIRO undertake a correction for depth records in 2020 (data up to 2019), where shot location and GIS bathymetry data are used to establish the depth of fishing operations for vessels that have reported invariant depth records.
5. SESSFRAG discuss the matter in more detail at the SESSFRAG data meeting in August 2020 to determine the best approach for 2021 onwards. With particular emphasis on exploring the benefits of using the start position as a proxy for depth.

This report differs from the 2019 report of Deng et al. (2019a) in that: 1. The modification of depth records has resulted in changes to the catches of species for which depth is used in separating

species groups (e.g. inshore and offshore Ocean Perch and Deepwater Sharks) and also for the strata dependent on depth (e.g. inshore and offshore NSW trawl).

2. Data for 2019 have been added (along with a small amount of additional 2018 data that had not yet been entered into the AFMA database prior to the 2018 summary).
3. Additional strata were created for Deepwater Shark and Orange Roughy to better represent the fishing grounds for these species. These strata are 'TR_TAS_W_DWS,' 'TR_TAS_E_DWS' for Deepwater Shark; 'TR_PED_ORO,' 'TR_SPH_ORO,' 'TR_SHH_ORO,' 'TR_CAS_ORO,' 'TR_MAA_ORO' for Orange Roughy. See the maps attached with this document.
4. Four new species groups have been added to this report in 2020: Squid (CAAB 23 636004 and 23 615000), Frostfishes (CAAB 37 440002 and 37 440000), Latchets (CAAB 37 288006), King Dory (CAAB 37 264001). These species are not under quota in the SESSF.
5. An error has been corrected where observer records with zero discards were excluded before estimating discarded catches. This error occurred when records of discarded and retained catch of a species in a shot were merged using an Outer Join. For records where a species is only retained, there is no record in the database of zero kilograms discarded so the Outer Join produces a missing (NA) value for discarded kilograms of this species in this shot. These missing (NA) values should have been converted to zero kilograms discarded. This correction has been applied retrospectively to discard estimates for 2016 - 2018 presented in Althaus et al. (2020).

A.4 Changes made in 2019

The following changes have been made in Deng et al. (2019b) compared with the 2018 version Burch et al. (2018).

1. Strata where only one shot is observed are excluded from the calculation of discarded catch. This was done because when only one shot is observed the variance is undefined and it was desirable to use the same data for the discard estimate and its variance.
2. The hit rate, the proportion of shots that encounter the species, has replaced the mean proportion discarded in the species specific summaries (Tables 4-49). These tables have new columns that show the number of logbook shots pre stratum and the discard rate.
3. Histograms of observed discarded catches are provided for each species group to assist in the identification of outliers. These histograms also include the number of observed shots with zero discards.
4. The validity rule has been expanded to reject discard estimates with discard CV's greater than 100% (recommendation of the August 2019 SESSFrag Data Meeting).

The 2019 report investigated the calculation of discard rates and CVs and the data selection rules. The main difference between the 2018 report (Burch et al., 2018) and 2017 report (Thomson et al., 2018) is the inclusion of both the CVs for the total and discarded catch provided in Table 2 and Table 3 of this report.

In addition to the change described above two other changes were made to this report in 2018, some of which resulted in minor changes in discard rate estimates compared with Thomson et al. (2018), these are outlined below.

1. AFMA have made substantial corrections to several years of the observer data used in estimating discard rates.
2. The percentage of logbook shots that caught the species of interest that were taken in strata that had at least 5 observed shots (Shot % (≥ 5)) Table 2 and Table 3 now, more correctly, uses total logbook shots in the denominator, whereas last years report used logbook shots in only those strata which had been observed. This change resulted in reductions to Shot % (≥ 5), however, most species groups remain above 50%.

A.5 Changes made in 2018

The following changes were made in the 2017 version of this report and have been retained in subsequent reports.

1. During 2017 it became apparent that separate Tier 4 analyses are applied to eastern and western components of some species that have previously been lumped for both discards and catch calculations. To aid in the smooth automation of Tier 4 calculations, discards for Jackass Morwong, Blue Warehou, Pink Ling, Mirror Dory and Deepwater shark are presented separately for those east and west of 147 longitude. A consequence of this is that the CVs for these species are all above 40%.
2. Discards in the Great Australian Bight (GAB) strata are now excluded from the estimation of discards except for Bight Redfish, Deepwater Flathead and GAB Orange Roughy.
3. The VIT (Victorian Inshore Trawl) stratum has been removed from the tables because AFMA observers no longer use it in reporting ISMP data (Nick Mammides pers. comm.).
4. The decision was made during the 2017 SESSFRAG Data meeting to slightly alter the stratum definitions used in the discard calculations to match those used by the ISMP when setting target sea days. Consequently a new stratum (TR_NSW_GEM) has been added to account for New South Wales Gemfish trawl observations.

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