

# Integrated Scientific Monitoring Program for the Southern and Eastern Scalefish and Shark Fishery - discards for 2018

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# 1 Executive Summary

This report provides estimates of discard weight, and proportion of total catch discarded for the Southern and Eastern Scalefish and Shark Fishery (SESSF), calculated using data collected by fishery observers as part of the Integrated Scientific Monitoring Program (ISMP). Discards were calculated for fishing conducted during the 2018 calendar year. Discard estimates in 2018 and their associated CVs for 40 species groups (Table 2) over 32 strata (Table 1) were calculated using Method A of Bergh et al. (2009). This report also includes maps that graphically present the discard estimates and associated metrics, by stratum.

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 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 strata. Originally observers were deployed throughout the SESSF for roughly 500 sea days per year, however, this has declined to 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).

In the August 2019 version of this report the following minor changes, compared with the 2018 version of this report (Burch et al., 2018), were made. 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 3-42). Histograms of observed discarded catches are provided for each species group to assist in the identification of outliers.

This report updates the August 2019 version (Deng et al., 2019) to include columns of the number of logbook shots pre stratum and the discard rate in the species specific summaries (Tables 3-42). Histograms of observed discarded catches now include the number of observed shots with zero discards. 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). For deepwater sharks, the implications of rejecting discard estimates with discard CV's greater than 100% is that if this decision were applied to discard estimates in years prior to 2018 we would reject all our discard estimates. This likely invalidates current assessments for deepwater sharks.

For blue warehou in the east, the estimated proportion of the catch that is discarded is unreliable because the reported logbook catch of 7.3 tonnes is around half the catch reported in CDRs (14.9 t). The estimated discarded catch of blue warehou in the east of 19.57 tonnes is unaffected by the inconsistency in logbook and CDR catches because estimated discards are scaled to the number of logbook shots, not catches. The under reporting of blue warehou in logbooks appears to be due to operators recording 'black trevally' (a tropical species) in e-Logs. AFMA are investigating this issue and will endeavour to correct data records and recording practices.

In 2018 SESSFRAG requested additional work be undertaken around the allocation of observers to vessels, the method used to estimate discarded catches and their uncertainty and when a discard estimate was suitable to be used in the provision of management advice. This work will



be presented to the SESSFRAG Chairs meeting in March 2020.

## 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 used gillnets, 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. Collections include age, and length composition of commercial catches as well as 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 (Burch et al., 2019).

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 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 quota groups in the SESSF (as well as ocean jackets, which will hereafter be referred to as a quota group, although they are not under quota), along with estimated CVs for those quantities. The distribution of actual ISMP effort against that of fishing effort is also presented.

## 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, 2018), 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 (the old method allocated some shots to more than one stratum, for example, a trawl shot that caught both blue grenadier and silver warehou that took place in winter in zone 40 was allocated to the blue grenadier spawning fishery stratum when calculating grenadier discards, and also to the western Tasmanian trawl stratum when calculating warehou discards).
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 3.8 below.

This report has applied the coverage criteria described in Section 3.11 to estimate discard rates and their associated uncertainty for 2018 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 3.10, while an evaluation of Method B will be undertaken in a future version of this report.

### **3.3 Changes made in 2019**

The following changes have been made in this report 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 3-42). 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).

### **3.4 Changes made in 2018**

The 2018 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., 2018a) is the inclusion of both the CVs for the total and discarded catch provided in Table 2 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. (2018a), these are outlined below.

- AFMA have made substantial corrections to several years of the observer data used in estimating discard rates.
- The percentage of logbook shots that caught the species of interest that were taken in strata that had at least 5 observed shots (Shot % ( $\geq 5$ ) Table 2) 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 % ( $\geq 5$ ), however, most species groups remain above 50%.

### **3.5 Changes made in 2017**

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

- 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%.
- 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.
- 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.).
- 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.

### 3.6 Observer Coverage

Observer coverage has fallen from around 500 days per year to less than 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.

### 3.7 ISMP strata and quota groups

Fishing shots are mapped to ISMP strata based on spatial location, depth, gear and in some cases, the species captured. Currently there are 32 ISMP strata used to estimate discard rates. These comprise 18 trawl strata (including the newly included NSW Gemfish strata and three depth defined strata in the GAB); six line (hook) strata, seven gillnet strata and one Danish seine stratum (off Lakes Entrance). 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 this year 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 quota 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 5 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.

### **3.8 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.

It is not clear whether both types of record have been included in the ‘Unknown’ stratum in the recent past, or whether only one category of record was included. It is clear that the original intent of the ISMP design (Bergh et al., 2009) was to calculate the SESSF discard rates using only the ISMP strata, not using the ‘Unknown’ stratum as has been done in the recent past. While this stratum has not been used in the calculation of discard rates and tonnages, ‘Unknown’ shots are used in calculating the Total logbook shots which is denominator in Shot % ( $\geq 5$ ) in Table 2.

### **3.9 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 (Burch et al., 2019). 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).

### **3.10 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

- Method A estimates the discarded catch per shot from the Observer data and multiplies it by the total number of logbook shots.
- 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 3-42. Previous versions of this report have specified discard rate using a lower case  $d$  which is used to represent Method B in Bergh et al. (2009) To remove any ambiguity, this report now conforms to the notation of Bergh et al. (2009) 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

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

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

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  $st$ .

$$\bar{D}_{A,st}^{sp} = h_{st}^{sp} \bar{D}_{H,st}^{sp} \quad (3)$$

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

$$V(\bar{D}_{A,st}^{sp}) = \frac{V(\bar{D}_{H,st}^{sp}) \omega_{st}^{sp}}{n_{st}^{obs}} \quad (4)$$

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

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

$$\hat{D}_{st}^{sp} = n_{st}^F \bar{D}_{A,st}^{sp} \quad (5)$$



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

$$V(\hat{D}_{st}^{sp}) = (n_{st}^F)^2 V(\bar{D}_{A,st}^{sp}). \quad (6)$$

The estimated SESSF-wide discard weight for species group  $sp$ ,  $\hat{D}^{sp}$ , is the sum of the  $\hat{D}_{st}^{sp}$  (equation 5) across all relevant ISMP strata ( $st$ ) (note that for most species groups this does not include the GAB strata):

$$\hat{D}^{sp} = \sum_{\forall st} \hat{D}_{st}^{sp} \quad (7)$$

with variance

$$V(\hat{D}^{sp}) = \sum_{\forall st} V(\hat{D}_{st}^{sp}). \quad (8)$$

The SESSF-wide CV for species  $sp$  is therefore

$$\left( \sum_{\forall st} V(\hat{D}_{st}^{sp}) \right)^{1/2} / \sum_{\forall st} \hat{D}_{st}^{sp}. \quad (9)$$

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):

$$p^{sp} = \frac{\hat{D}^{sp}}{L^{sp} + \hat{D}^{sp}} \quad (10)$$

Note that  $L^{sp}$  is the landed catch as recorded in the logbooks, but that the weight recorded by the observers could have been used instead (assuming this is an independent measure, which it might not be).

Note that the three GAB trawl strata are excluded from the sum in equation 7 for all groups except Bight Redfish, Deepwater Flathead and Orange Roughy GAB.

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.

### 3.11 Adequate coverage

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 a species is present in may lead 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.

The issue of coverage will be investigated in a separate analysis to be presented to the SESSFRAG Chairs meetings in March 2020.

## 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 300 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 '18 divided by its total), to the proportion of reported logbook shots per stratum (Log shots '18 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 'xx*: The number of observed shots in the year 20xx.

*Log '18*: The number of reported logbook shots in the year 2018.

*Obs %*: The percentage of the logbook shots that were observed shots in 2018.

*Vess '18*: The number of vessels which had observed shots in 2018 in this strata.

*Mons '18*: The number of months during which observations were made in 2018 in this strata.

### 4.2 Discard estimates and coverage by species

Table 2 shows the estimated discards by species along with measures of coverage:

*Disc %*: the estimated proportion of the catch that is discarded ( $p^{sp}$  in equation 10) converted to a percentage (i.e. multiplied by 100).

*Disc (t)*: the estimated tonnage discarded.

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

*Tot CV %*: the CV of the estimated total catch (estimated discards + logbook catch) displayed as a percentage. Note this quantity assumes the CV of the logbook catch is zero and hence is an underestimate of the uncertainty in total catch.

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

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

*Catch % ( $\geq 5$ )*: the percentage of the total 2018 catch for this species that was taken from strata that had at least 5 observed shots.

*Shot % ( $\geq 5$ )*: the percentage of the total number of logbook shots in 2018 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 % ( $\geq 5$ ) or Shots % ( $\geq 5$ ) columns).

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

The field *Max shot* that was included in previous versions of this report has been omitted as it is no longer used.

### 4.3 Discards and coverage by species and stratum

The quantities used to derive the discard estimates in Table 2 are shown, for each species group in Tables 3-42. Species groups are presented in the same order as the Data Summary report (Thomson et al., 2018b).

The columns in Tables 3-42 are:

*Landings (t)*: The total landed catch 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) observed by the ISMP to have caught this species (or quota group). This is equal to the total number of observed shots per stratum multiplied by the hit rate for that species group.

*Nlog*: The number of logbook shots in each stratum that reported catching this species.

*Obs %*: The percentage of logbook shots 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.

*D/shot (kg)* The kilograms of the given quota group observed to have been discarded per observed shot for each stratum, multiplied by the hit rate.

*NlogStra* The number of logbook shots in each stratum.

*Hit rate*: The proportion of logbook shots that report catching the quota group.

*Dlog (t)* The estimated tonnage of the species group discarded by all (logbook) shots reported in the stratum. The sum of this column is total estimated discard "Disc (t)" in Table 2.

*Disc rate* The discard rate for 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 Burch et al. (2019).

#### **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 3-42).

#### **4.5 Maps**

The maps which follow Table 42 show the discarded tonnage by species, gear type and strata. The following abbreviations are used

“*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.

Table 1: 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 '16	Obs '17	Obs '18	Log '18	Obs %	Vess '18	Mons '18
TR.NSW.GEM	26	3	7	4.8	10	12	6	46	13	2	2
TR.NSW.IN	30	25	62	1.5	221	96	44	1079	4.1	5	9
TR.NSW.OFF	17	9	23	0.9	49	41	27	1141	2.4	6	8
TR.NSW.RRP	4	1	2		4	5		250			
TR.SW.BGS	0	2	4	1.6	3	3	6	139	4.3	1	1
TR.SW.ORO								2			
TR.SW	30	12	29	0.8	59	58	34	1659	2	5	3
DS.EDL	43	23	58	0.3	131	87	78	9013	0.9	9	4
TR.EDL.IN	44	20	49	0.9	89	85	95	4064	2.3	11	8
TR.EDL.OFF	25	7	18	0.9	41	33	33	1408	2.3	8	6
TR.TAS.BGS	10	8	20	8.1	15	52	48	217	22.1	5	3
TR.TAS.E	22	27	68	2.3	117	135	124	1954	6.3	4	5
TR.TAS.ORO	28	2	4	1.3	5	11	5	146	3.4	2	2
TR.TAS.W	18	12	30	1.8	19	50	65	1343	4.8	4	5
TR.BS.IN		3	6	233	7	7	19	3	633.3	4	1
TR.GAB.In		26	66	1.3	187	1	91	2606	3.5	3	5
TR.GAB.Mid		1	2	2.9	4		6	75	8	2	2
TR.GAB.Off		5	11					1			
TR.ECDW		1	3		1	6					
AL.CSA		11	29	1.1	24		26	875	3	1	1
AL.ESA		4	9	2			21	389	5.4	2	3
AL.WBS.SAV		5	13					382			
AL.EBS.NSW		34	84	19.4	66	264	179	339	52.8	3	5
AL.ET.WT		15	38			52		383			
AL.WSA.WA		6	14					111			
GN.CSA		5	11	0.9		14	15	618	2.4	1	2
GN.ESA		7	17					183			
GN.SAV		2	6	0.5		4	8	583	1.4	1	1
GN.WBS		4	11	0.1		14	6	1636	0.4	1	1
GN.EBS.NSW		16	40	0.1		12	6	3715	0.2	1	1
GN.ET.WT		3	9			10		290			
GN.WA.WSA		2	5								
UNKNOWN								10			
Total	297	301	748	-	1052	1052	942	34660	-	-	-

Table 2: Estimated percentage of catch discarded, discard tonnage with CV, validity based on coverage (see Section 3.11 for details) in 2018. \*

Quota group	Disc %	Disc (t)	Disc CV %	Tot CV %	% Obs	Nshot obs	Catch % (>=5)	Shot % (>=5)	Valid?
Alfonsino									
Flathead	2.4	46.4	20.1	0.5	2	254	100	98	Pass
Jackass Morwong East	9.7	11.7	65.3	6.3	6	156	94	78	Pass
Jackass Morwong West	0.1	0	0	0	0	1	0	0	
John Dory	1.7	0.8	99.7	1.7	2	115	94	93	Pass
Redfish	25.5	10	201.4	51.4	5	41	44	63	
Royal Red Prawn	98.4	75.1	111	109.2	5	17	1	18	
School Whiting	11.7	74.4	59.2	6.9	2	52	95	87	Pass
Silver Trevally	62.8	3.1	249.9	156.9	3	8	0	0	
Ocean Jackets	29.7	63.1	37.6	11.2	4	75	76	82	Pass
Blue eye Trevalla	0.1	0.1	117.8	0.2	14	104	47	58	
Blue Grenadier	19.5	317.1	35.8	7	5	172	99	93	Pass
Blue Warehou East	72.9	19.6	62.7	45.7	9	33	65	57	Pass
Blue Warehou West	0	0		0	1	1	0	0	
Gemfish East	63.6	40.2	83.3	53	10	84	89	88	Pass
Gemfish West	11.3	5.6	69.9	7.9	7	43	99	97	Pass
Pink Ling East	2.4	7.1	41.8	1	4	128	89	85	Pass
Pink Ling West	3.1	10.3	39.7	1.2	7	124	92	93	Pass
Mirror Dory East	12.2	8.2	188.7	23	5	62	99	99	
Mirror Dory West	5.1	0.5	33.4	1.7	6	31	31	37	
Ocean Perch Inshore	66.1	36.3	63.5	41.9	27	74	62	56	Pass
Ocean Perch Offshore	15.4	19.1	25.8	4	6	104	96	91	Pass
Silver Warehou	15.5	64.9	44.3	6.9	7	163	98	95	Pass
Ribaldo	4.6	2.4	83.9	3.9	9	75	75	83	Pass
Orange Roughy East	0.3	2.3	35.1	0.1	38	81	100	100	Pass
Orange Roughy West	61.4	13.1	122.5	75.2	11	8	33	46	
Orange Roughy South	3	1.3	208.9	6.4	8	6	16	53	
Orange Roughy Cascade									
Orange Roughy GAB									
Oreos	37.8	50.2	50.5	19.1	18	81	89	67	Pass
Smooth Oreo Cascade									
Smooth Oreo Non-Cascade	0	0	961.8	0.3	4	2	0	0	
Deepwater Shark East	37.5	18.4	138.5	52	22	53	80	50	
Deepwater Shark West	24.6	16.5	138.2	34	4	10	41	44	
Bight Redfish	0	0		0	3	43	100	97	Pass
Deepwater Flathead	0.2	0.9	35.6	0.1	4	91	99	99	Pass
School Shark	18.6	23.6	46.2	8.6	2	69	48	42	
Gummy Shark	3.9	49.5	43.7	1.7	1	141	74	81	Pass
Saw Shark	11.9	20.8	38.3	4.5	1	110	96	96	Pass
Elephantfish	70.9	99.8	25.3	18	2	52	93	94	Pass

\* Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et al. (2019) which are scaled to the CDR catch.

Table 3: Alfonsino: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

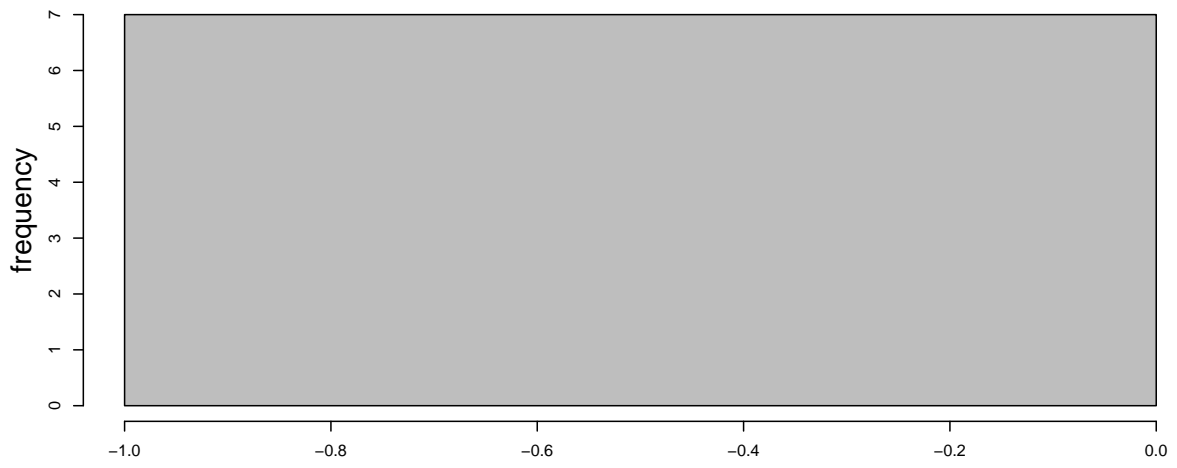
Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN					1079				
TR_NSW_OFF					1141				
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW					1659				
DS_EDL					9013				
TR_EDL_IN					4064				
TR_EDL_OFF					1408				
TR_TAS_BGS					217				
TR_TAS_E					1954				
TR_TAS_ORO					146				
TR_TAS_W					1343				
TR_BS_IN					3				
TR_ECDW									
AL_CSA					875				
AL_ESA					389				
AL_WBS_SAV					382				
AL_EBS_NSW					339				
AL_ET_WT					383				
AL_WSA_WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS					1636				
GN_EBS_NSW					3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN					10				
Total	0	0	0		31978			0	

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."



# Alfonsino

Observed discarded catches (kg)



Observed retained catches (kg)

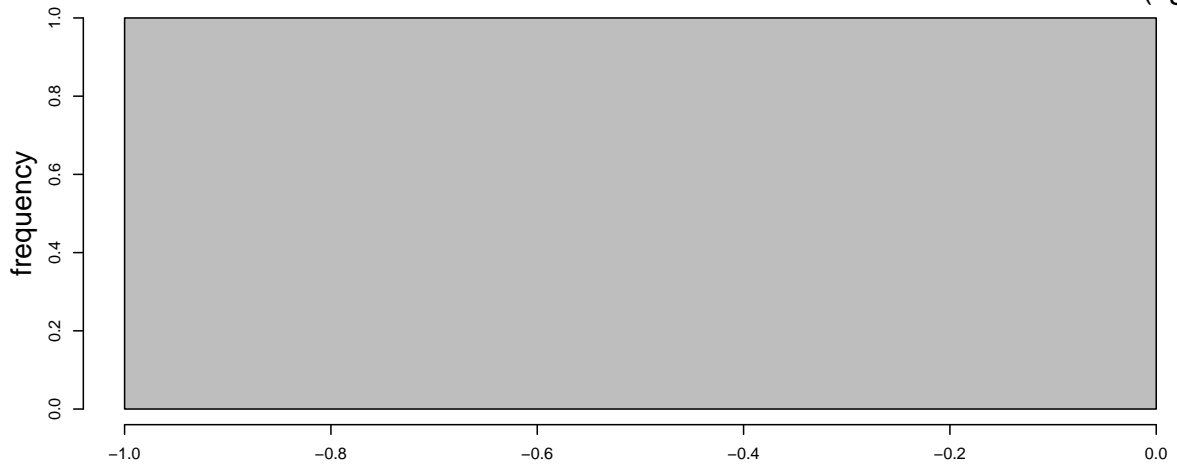


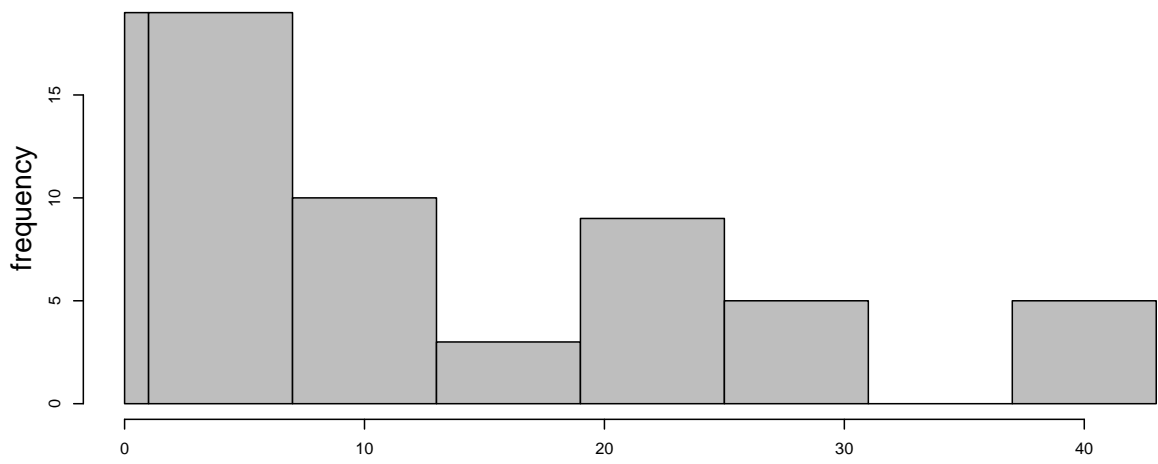
Table 4: Flathead: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN	84.99	15	1019	1.47	1079	5.68	0.34	2.09	0.02
TR_NSW_OFF	56.46	7	636	1.1	1141	5.16	0.26	1.53	0.03
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW	3.76	1	52	1.92	1659	3.24	0.03	0.16	0.04
DS_EDL	890.76	77	8543	0.9	9013	3.31	0.99	29.41	0.03
TR_EDL_IN	590.02	89	3840	2.32	4064	2.46	0.94	9.38	0.02
TR_EDL_OFF	26.59	14	275	5.09	1408	2.81	0.42	1.68	0.06
TR_TAS_BGS					217				
TR_TAS_E	213.97	25	1204	2.08	1954	4.6	0.2	1.81	0.01
TR_TAS_ORO					146				
TR_TAS_W	2.21	2	30	6.67	1343	0	0.03	0	0
TR_BS_IN	0.2	18	2	900	3	0	0.95	0	0
TR_ECDW									
AL_CSA	0.15		22		875				
AL_ESA	0.02		4		389				
AL_WBS_SAV	0.05		8		382				
AL_EBS_NSW	0.02		4		339				
AL_ET_WT	0		1		383				
AL_WSA_WA					111				
GN_CSA	0	3	2	150	618	0.67	0.2	0.08	1
GN_ESA	0.01		2		183				
GN_SAV	0.03		11		583				
GN_WBS	0.07	2	44	4.55	1636	0.5	0.33	0.27	0.79
GN_EBS_NSW	0.22	1	136	0.74	3715	0	0.17	0	0
GN_ET_WT	0.03		11		290				
GN_WA_WSA									
UNKNOWN					10				
Total	1869.56	254	0		31978			46.41	0.02

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# Flathead

Observed discarded catches (kg)



Observed retained catches (kg)

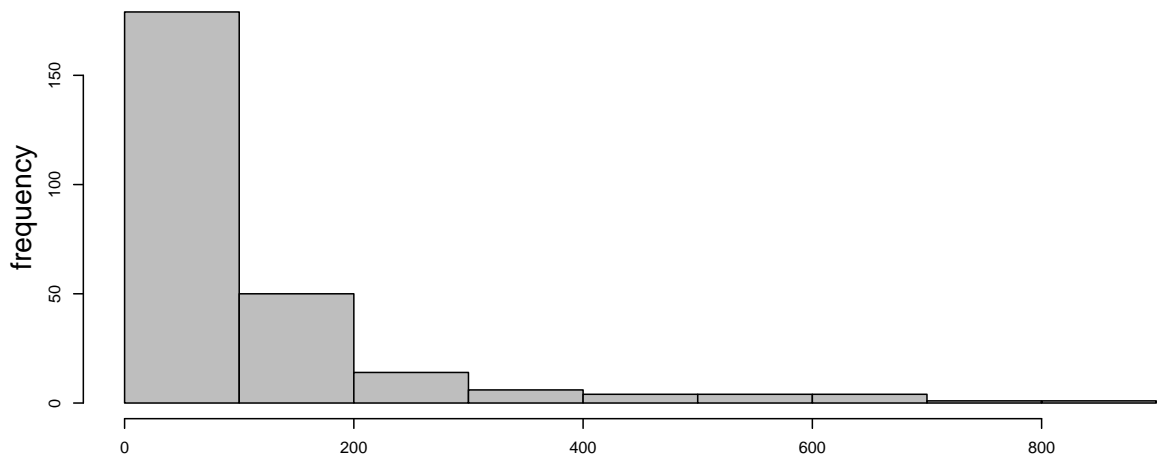


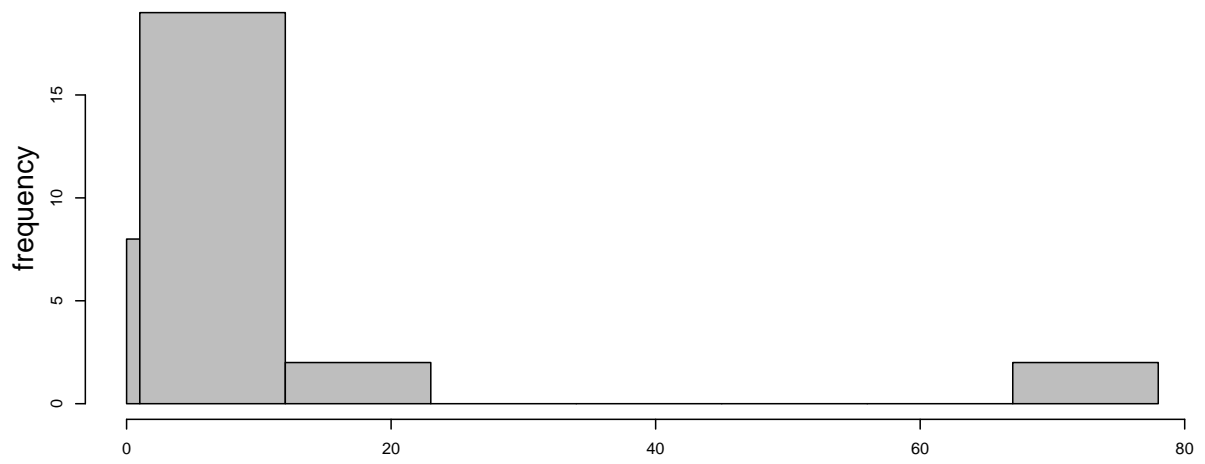
Table 5: Jackass Morwong East: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN	1.25	2	40	5	1079	0	0.05	0	0
TR_NSW_OFF	0.76		36		1141				
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW					1659				
DS_EDL	4.19	4	428	0.93	9013	2.05	0.05	0.95	0.18
TR_EDL_IN	70.97	40	1214	3.29	4064	6.04	0.42	10.34	0.13
TR_EDL_OFF	5.93	5	175	2.86	1408	1.72	0.15	0.37	0.06
TR_TAS_BGS					217				
TR_TAS_E	26.64	14	477	2.94	1954	0.21	0.11	0.05	0
TR_TAS_ORO					146				
TR_TAS_W					1343				
TR_BS_IN	0.17		1		3				
TR_ECDW									
AL_CSA					875				
AL_ESA					389				
AL_WBS_SAV					382				
AL_EBS_NSW	0.32	91	11	827.27	339	0	0.51	0	0
AL_ET_WT	0.08		11		383				
AL_WSA_WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS					1636				
GN_EBS_NSW	0.01		6		3715				
GN_ET_WT	0.01		1		290				
GN_WA_WSA									
UNKNOWN					10				
Total	110.33	156	0		31978			11.71	0.1

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# Jackass Morwong East

Observed discarded catches (kg)



Observed retained catches (kg)

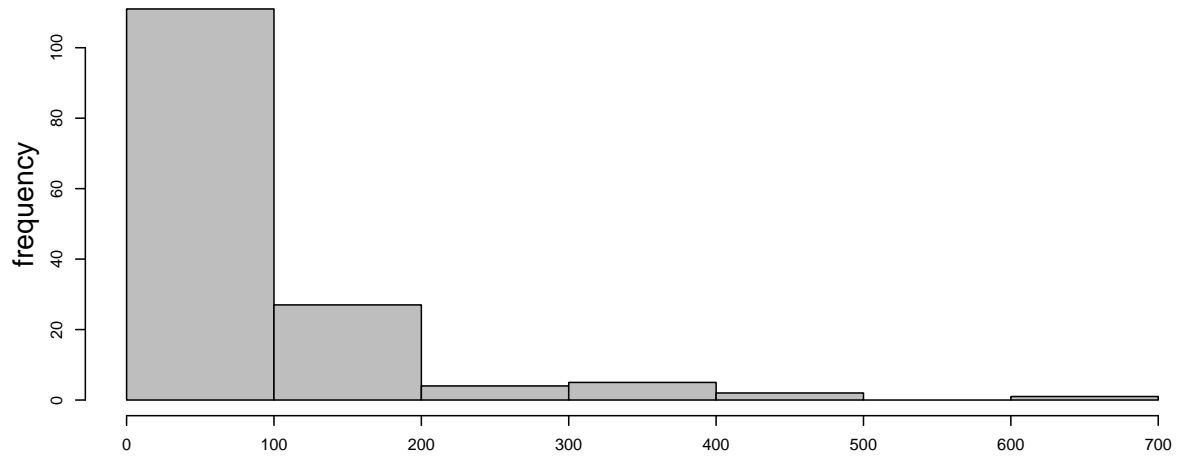


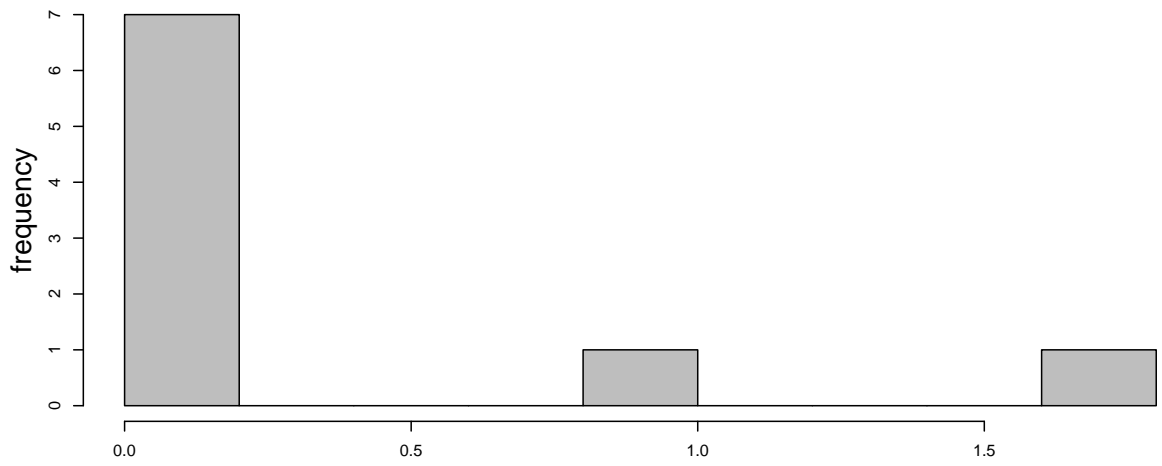
Table 6: Jackass Morwong West: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN					1079				
TR_NSW_OFF					1141				
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW	17.34		170		1659				
DS_EDL	0		1		9013				
TR_EDL_IN					4064				
TR_EDL_OFF					1408				
TR_TAS_BGS					217				
TR_TAS_E					1954				
TR_TAS_ORO					146				
TR_TAS_W	27.6	1	68	1.47	1343	1.8	0.02	0.04	0
TR_BS_IN					3				
TR_ECDW									
AL_CSA	0.01		3		875				
AL_ESA	0.16		9		389				
AL_WBS_SAV	0.02		10		382				
AL_EBS_NSW					339				
AL_ET_WT	0.01		3		383				
AL_WSA_WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS	0.02		7		1636				
GN_EBS_NSW					3715				
GN_ET_WT	0.01		5		290				
GN_WA_WSA									
UNKNOWN					10				
Total	45.17	1	0		31978			0.04	0

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# Jackass Morwong West

Observed discarded catches (kg)



Observed retained catches (kg)

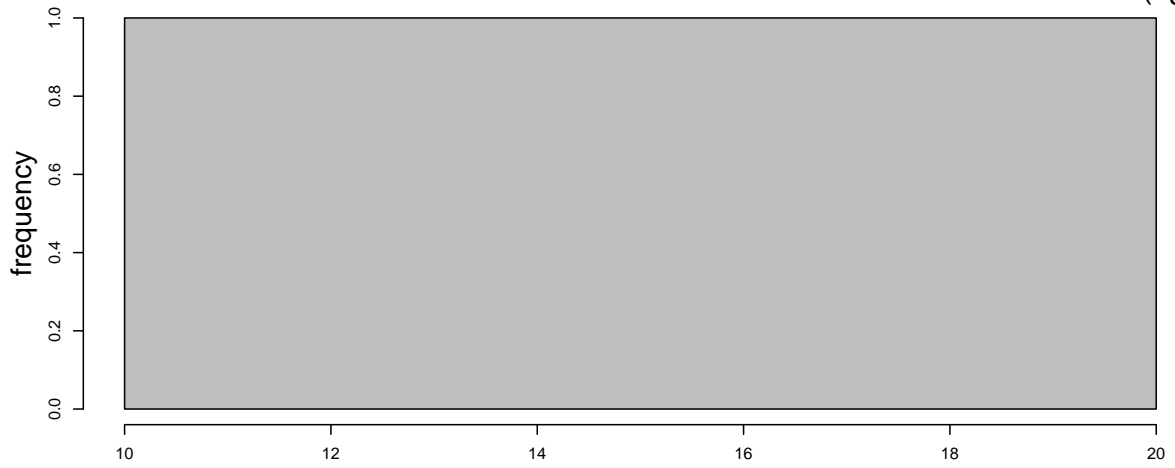


Table 7: John Dory: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

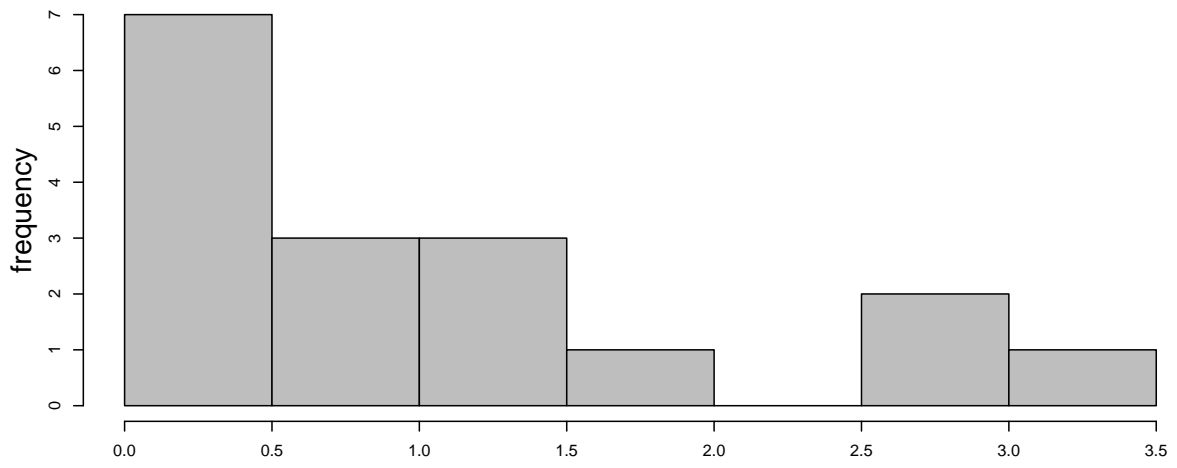
Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN	3.5	8	324	2.47	1079	0	0.18	0	0
TR_NSW_OFF	2.78		229		1141				
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW	0.08		2		1659				
DS_EDL	13.95	24	2573	0.93	9013	0.26	0.31	0.73	0.05
TR_EDL_IN	27.07	59	1458	4.05	4064	0.04	0.62	0.1	0
TR_EDL_OFF	0.27	3	23	13.04	1408	0	0.09	0	0
TR_TAS_BGS					217				
TR_TAS_E	2.67	11	161	6.83	1954	0	0.09	0	0
TR_TAS_ORO					146				
TR_TAS_W	0.04		2		1343				
TR_BS_IN	0.03	9	1	900	3	0.97	0.47	0	0
TR_ECDW									
AL_CSA					875				
AL_ESA					389				
AL_WBS_SAV					382				
AL_EBS_NSW					339				
AL_ET_WT					383				
AL_WSA_WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS	0.01	1	7	14.29	1636	0	0.17	0	0
GN_EBS_NSW	0.1		62		3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN					10				
Total	50.5	115	0		31978			0.83	0.02

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."



# John Dory

Observed discarded catches (kg)



Observed retained catches (kg)

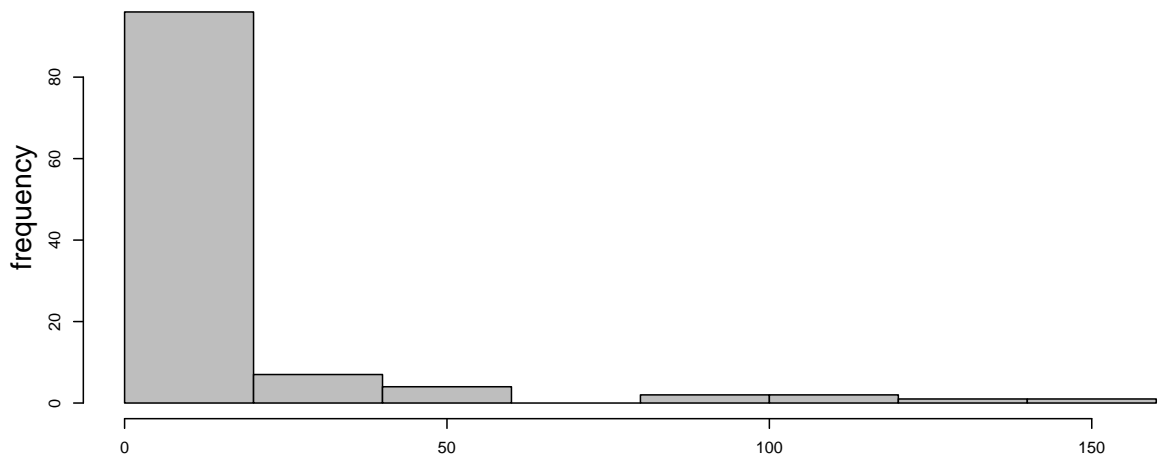


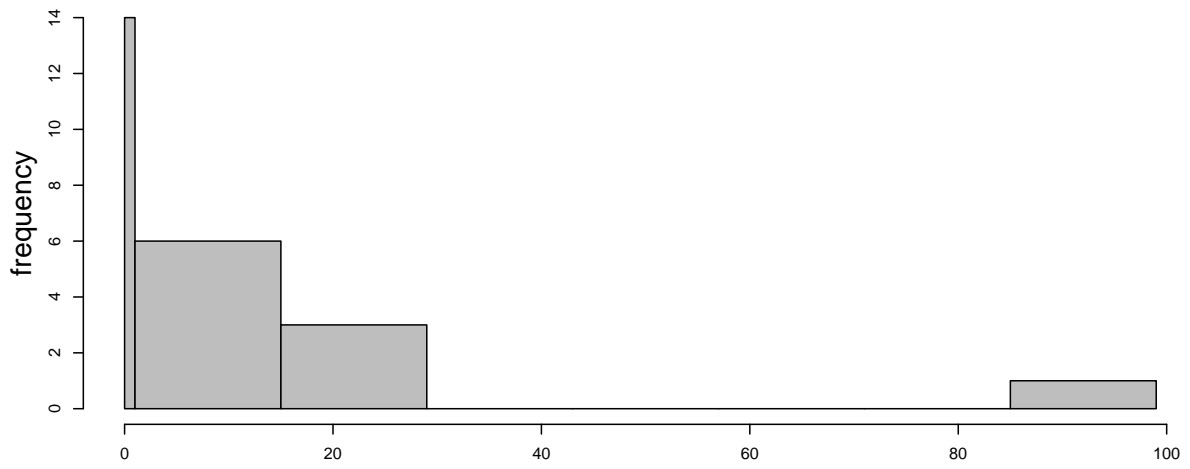
Table 8: Redfish: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN	6.84	13	197	6.6	1079	3.02	0.3	0.96	0.12
TR_NSW_OFF	14.98	1	219	0.46	1141	0	0.04	0	0
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW	0.16		2		1659				
DS_EDL	0.08	2	22	9.09	9013	15.24	0.03	3.52	0.98
TR_EDL_IN	5.32	17	304	5.59	4064	7.51	0.18	5.46	0.51
TR_EDL_OFF	1.19	1	41	2.44	1408	0.7	0.03	0.03	0.02
TR_TAS_BGS					217				
TR_TAS_E	0.02	1	1	100	1954	0	0.01	0	0
TR_TAS_ORO					146				
TR_TAS_W	0.68	6	8	75	1343	0	0.09	0	0
TR_BS_IN					3				
TR_ECDW									
AL_CSA					875				
AL_ESA	0		1		389				
AL_WBS_SAV					382				
AL_EBS_NSW					339				
AL_ET_WT					383				
AL_WSA_WA					111				
GN_CSA	0.03		5		618				
GN_ESA	0.01		1		183				
GN_SAV					583				
GN_WBS					1636				
GN_EBS_NSW					3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN	0.04		2		10				
Total	29.35	41	0		31978			9.97	0.26

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# Redfish

Observed discarded catches (kg)



Observed retained catches (kg)

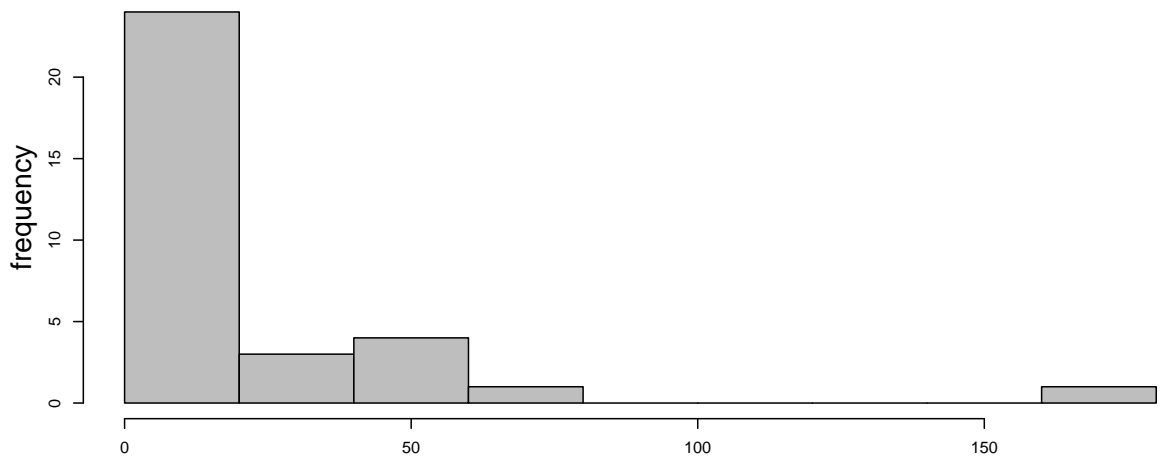


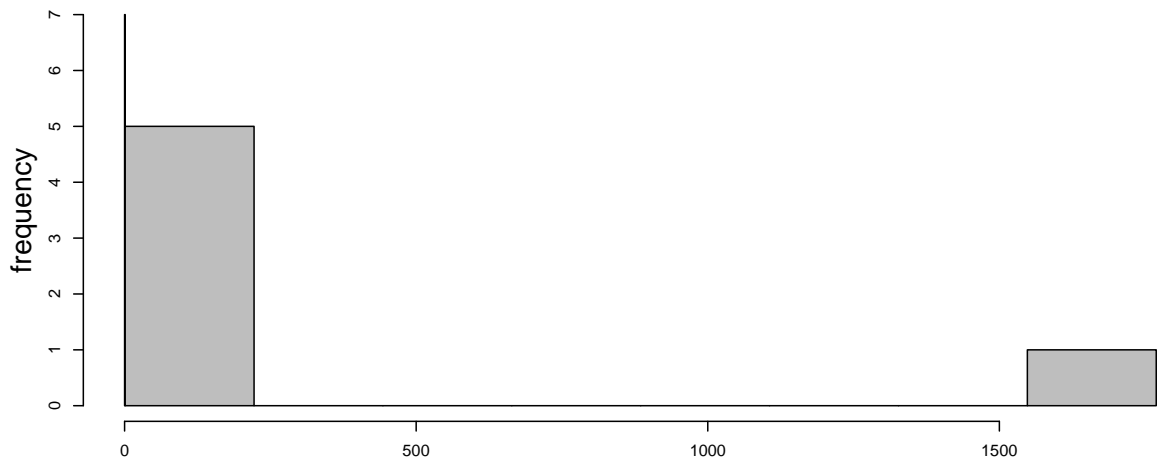
Table 9: Royal Red Prawn: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN	0		1		1079				
TR_NSW_OFF	1.25	17	55	30.91	1141	104.59	0.63	75.14	0.98
TR_NSW_RRP	159.89		250		250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW					1659				
DS_EDL					9013				
TR_EDL_IN					4064				
TR_EDL_OFF	0.15		5		1408				
TR_TAS_BGS					217				
TR_TAS_E					1954				
TR_TAS_ORO					146				
TR_TAS_W					1343				
TR_BS_IN					3				
TR_ECDW									
AL_CSA					875				
AL_ESA					389				
AL_WBS_SAV					382				
AL_EBS_NSW					339				
AL_ET_WT					383				
AL_WSA_WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS					1636				
GN_EBS_NSW					3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN					10				
Total	161.29	17	0		31978			75.14	0.98

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# Royal Red Prawn

Observed discarded catches (kg)



Observed retained catches (kg)

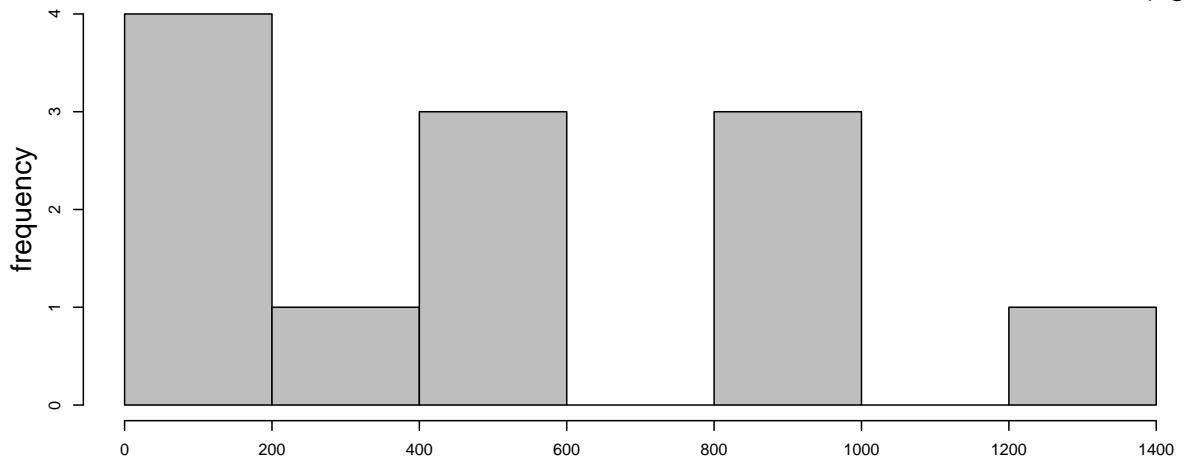


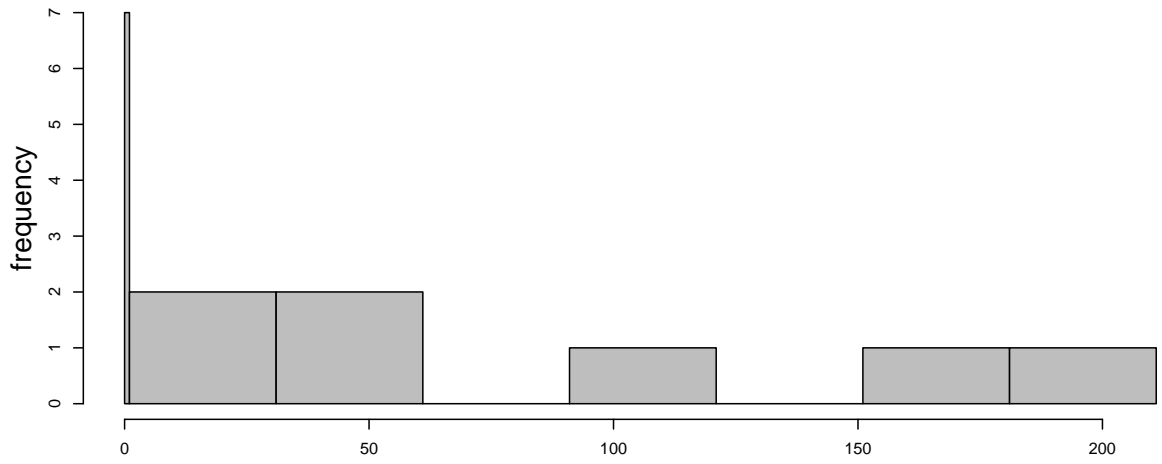
Table 10: School Whiting: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN	22.53	1	261	0.38	1079	0	0.02	0	0
TR_NSW_OFF	5.78	3	131	2.29	1141	0	0.11	0	0
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW					1659				
DS_EDL	532.7	46	2867	1.6	9013	13.99	0.59	74.39	0.12
TR_EDL.IN	0.46	1	16	6.25	4064	0	0.01	0	0
TR_EDL.OFF	0.56	1	7	14.29	1408	0	0.03	0	0
TR_TAS.BGS					217				
TR_TAS.E					1954				
TR_TAS.ORO					146				
TR_TAS.W					1343				
TR_BS.IN					3				
TR_ECDW									
AL_CSA					875				
AL_ESA					389				
AL_WBS_SAV					382				
AL_EBS.NSW					339				
AL_ET.WT					383				
AL_WSA.WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS					1636				
GN_EBS.NSW					3715				
GN_ET.WT					290				
GN_WA.WSA									
UNKNOWN					10				
Total	562.03	52	0		31978			74.39	0.12

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# School Whiting

Observed discarded catches (kg)



Observed retained catches (kg)

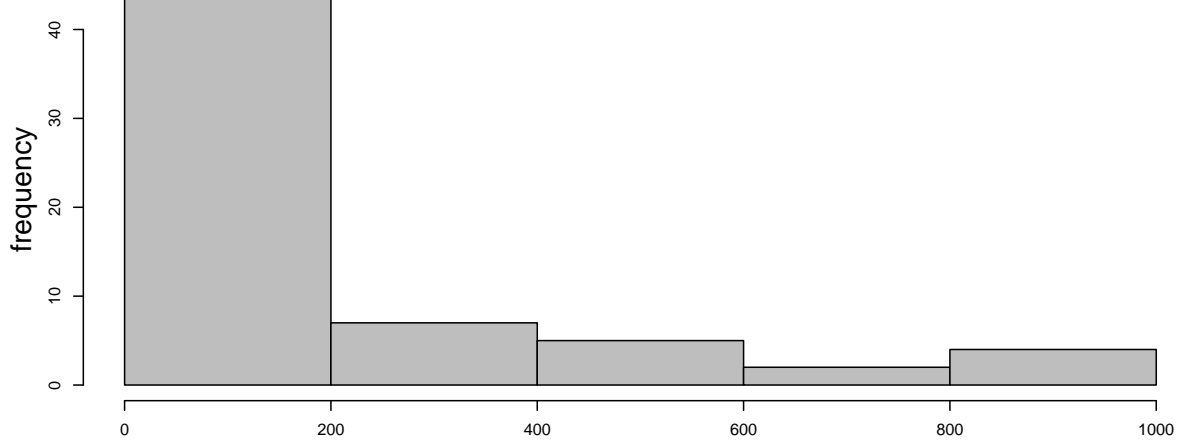


Table 11: Silver Trevally: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

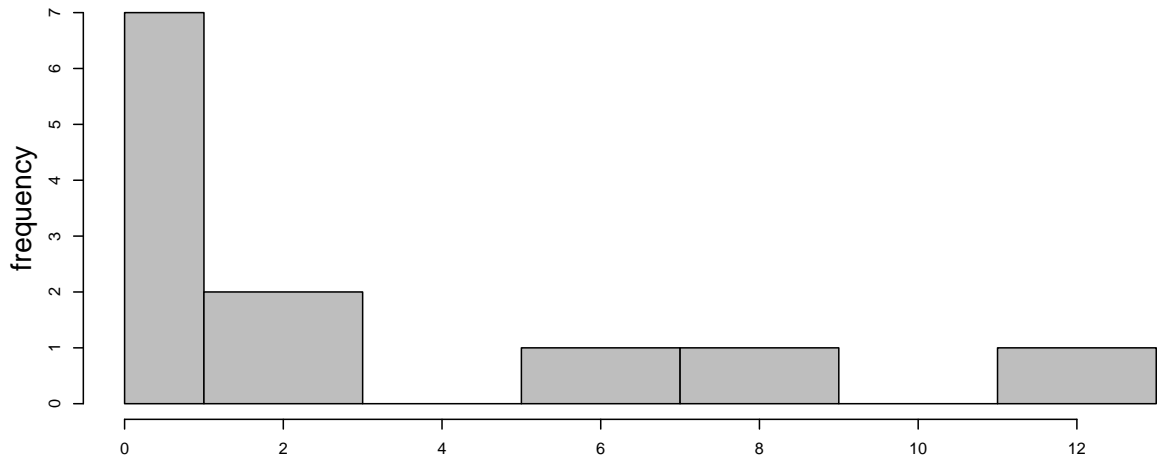
Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN	28.92		168		1079				
TR_NSW_OFF	0.75		15		1141				
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW	0.35		6		1659				
DS_EDL	0.01	4	7	57.14	9013	6.79	0.05	3.14	1
TR_EDL_IN	1.73	3	42	7.14	4064	0	0.03	0	0
TR_EDL_OFF	0.11	1	1	100	1408	0	0.03	0	0
TR_TAS_BGS					217				
TR_TAS_E	0.05		2		1954				
TR_TAS_ORO					146				
TR_TAS_W	0.62		4		1343				
TR_BS_IN					3				
TR_ECDW									
AL_CSA					875				
AL_ESA					389				
AL_WBS_SAV					382				
AL_EBS_NSW					339				
AL_ET_WT					383				
AL_WSA_WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV	0		1		583				
GN_WBS					1636				
GN_EBS_NSW	0		2		3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN					10				
Total	32.54	8	0		31978			3.14	0.63

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."



# Silver Trevally

Observed discarded catches (kg)



Observed retained catches (kg)

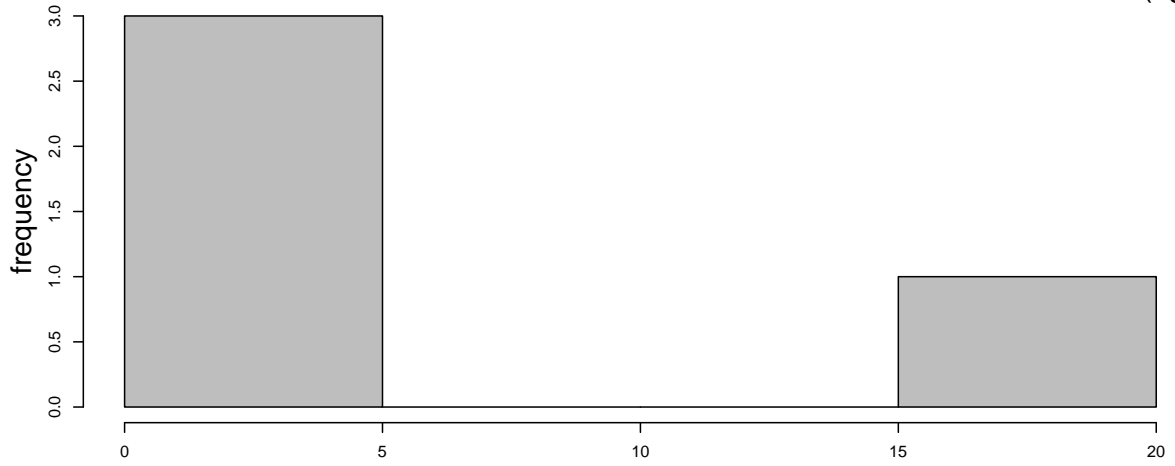


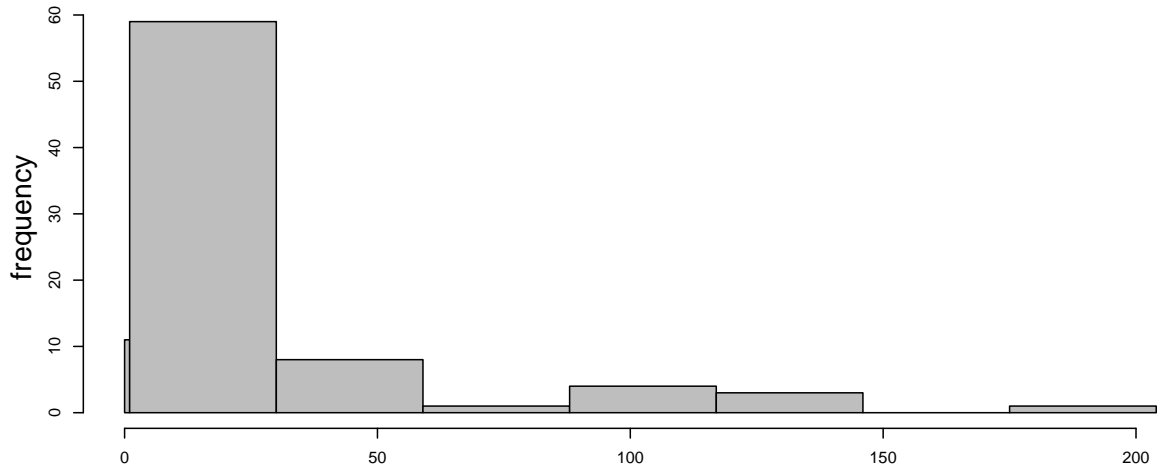
Table 12: Ocean Jackets: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN	48.08	17	382	4.45	1079	3.33	0.39	1.39	0.03
TR_NSW_OFF	33.99	2	291	0.69	1141	0	0.07	0	0
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW	1.04		24		1659				
DS_EDL	2.23	10	228	4.39	9013	7.15	0.13	8.26	0.79
TR_EDL_IN	64.24	43	947	4.54	4064	27.9	0.45	51.32	0.44
TR_EDL_OFF	0.58	3	8	37.5	1408	16.27	0.09	2.08	0.78
TR_TAS_BGS					217				
TR_TAS_E	0.04		5		1954				
TR_TAS_ORO					146				
TR_TAS_W					1343				
TR_BS_IN	0.08		1		3				
TR_ECDW									
AL_CSA	0.01		2		875				
AL_ESA	0		1		389				
AL_WBS_SAV					382				
AL_EBS_NSW					339				
AL_ET_WT					383				
AL_WSA_WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV	0.01		3		583				
GN_WBS	0.01		4		1636				
GN_EBS_NSW	0.01		5		3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN					10				
Total	150.32	75	0		31978			63.05	0.3

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# Ocean Jackets

Observed discarded catches (kg)



Observed retained catches (kg)

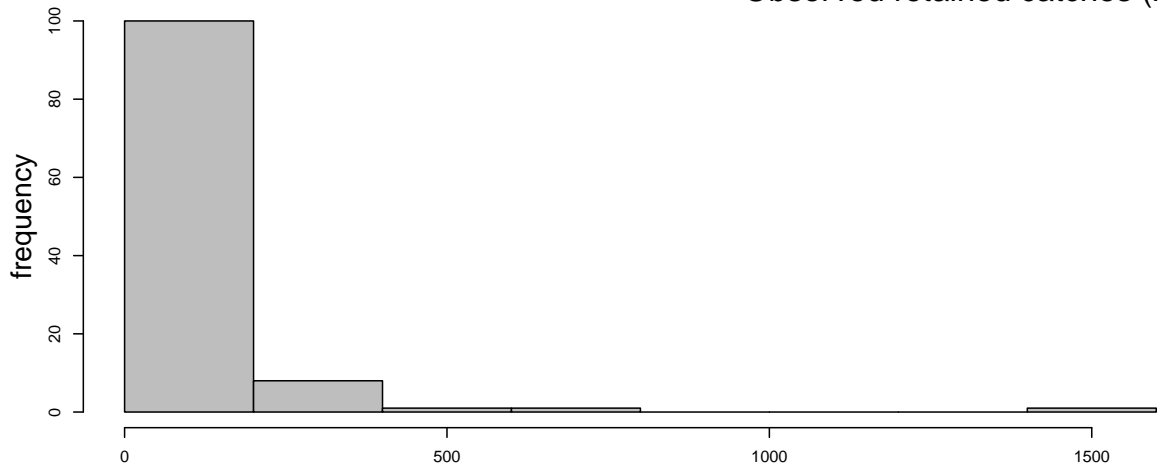


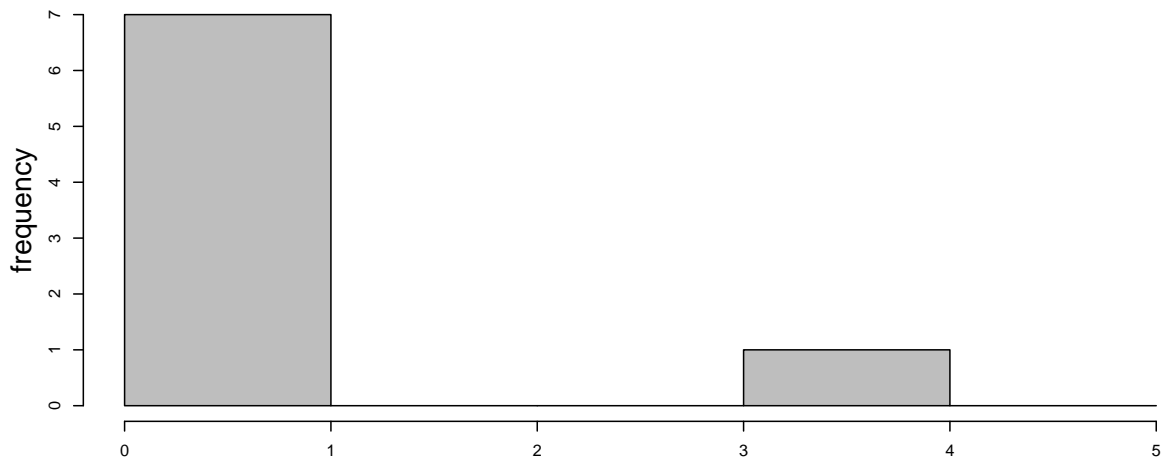
Table 13: Blue eye Trevalla: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN					1079				
TR_NSW_OFF					1141				
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW	6.65	6	96	6.25	1659	0	0.18	0	0
DS_EDL					9013				
TR_EDL_IN	0.08		2		4064				
TR_EDL_OFF	0.71	1	65	1.54	1408	0	0.03	0	0
TR_TAS_BGS					217				
TR_TAS_E	33.12	12	123	9.76	1954	0	0.1	0	0
TR_TAS_ORO					146				
TR_TAS_W	1.89	14	99	14.14	1343	0	0.22	0	0
TR_BS_IN					3				
TR_ECDW									
AL_CSA	15.21	19	13	146.15	875	0.21	0.73	0.13	0.01
AL_ESA	9.08	18	14	128.57	389	0	0.86	0	0
AL_WBS_SAV	13.44		84		382				
AL_EBS_NSW	30.08	34	95	35.79	339	0	0.19	0	0
AL_ET_WT	89.7		171		383				
AL_WSA_WA	5.45		3		111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS					1636				
GN_EBS_NSW					3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN					10				
Total	205.41	104	0		31978			0.13	0

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# Blue eye Trevalla

Observed discarded catches (kg)



Observed retained catches (kg)

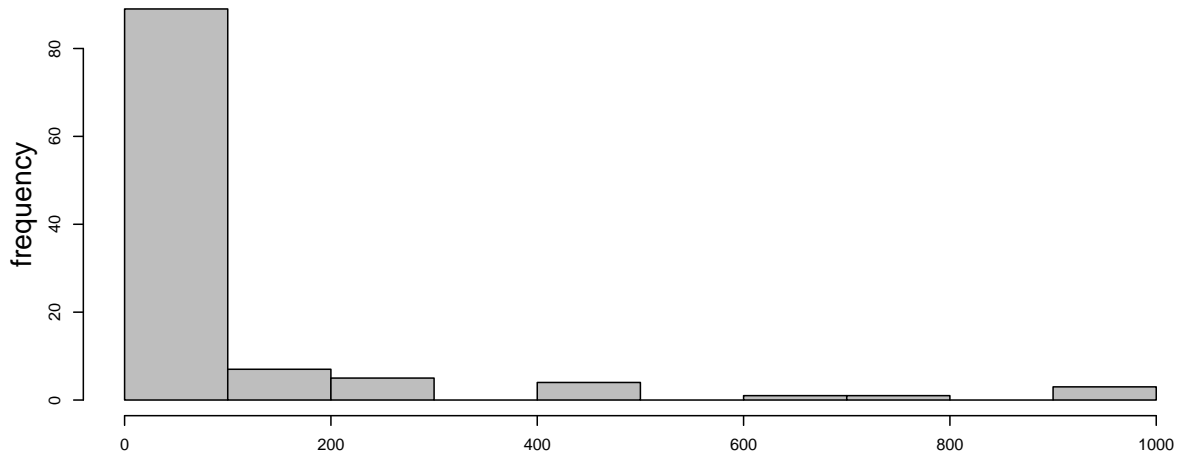


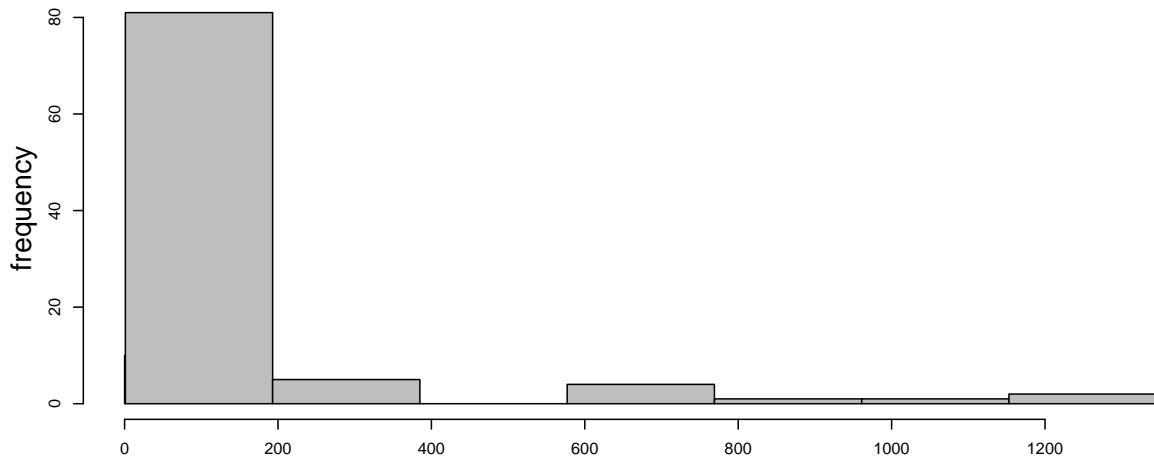
Table 14: Blue Grenadier: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN	0		1		1079				
TR_NSW_OFF	3.98	7	69	10.14	1141	12.31	0.26	3.64	0.48
TR_NSW_RRP					250				
TR_SW_BGS	45.67	6	139	4.32	139	5.17	1	0.72	0.02
TR_SW_ORO					2				
TR_SW	278.39	24	842	2.85	1659	15.46	0.71	18.1	0.06
DS_EDL					9013				
TR_EDL_IN	6.63	3	84	3.57	4064	144.99	0.03	18.61	0.74
TR_EDL_OFF	67.3	20	557	3.59	1408	164.54	0.61	140.41	0.68
TR_TAS_BGS	258.46	48	217	22.12	217	32.06	1	6.96	0.03
TR_TAS_E	203.1	6	321	1.87	1954	6.34	0.05	0.6	0
TR_TAS_ORO					146				
TR_TAS_W	444.99	57	795	7.17	1343	108.71	0.88	128.02	0.22
TR_BS_IN					3				
TR_ECDW									
AL_CSA					875				
AL_ESA	0.03	1	3	33.33	389	4.8	0.05	0.09	0.75
AL_WBS_SAV	0.04		7		382				
AL_EBS_NSW	0.4		20		339				
AL_ET_WT	2.73		107		383				
AL_WSA_WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS					1636				
GN_EBS_NSW					3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN					10				
Total	1311.72	172	0		31978			317.15	0.2

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# Blue Grenadier

Observed discarded catches (kg)



Observed retained catches (kg)

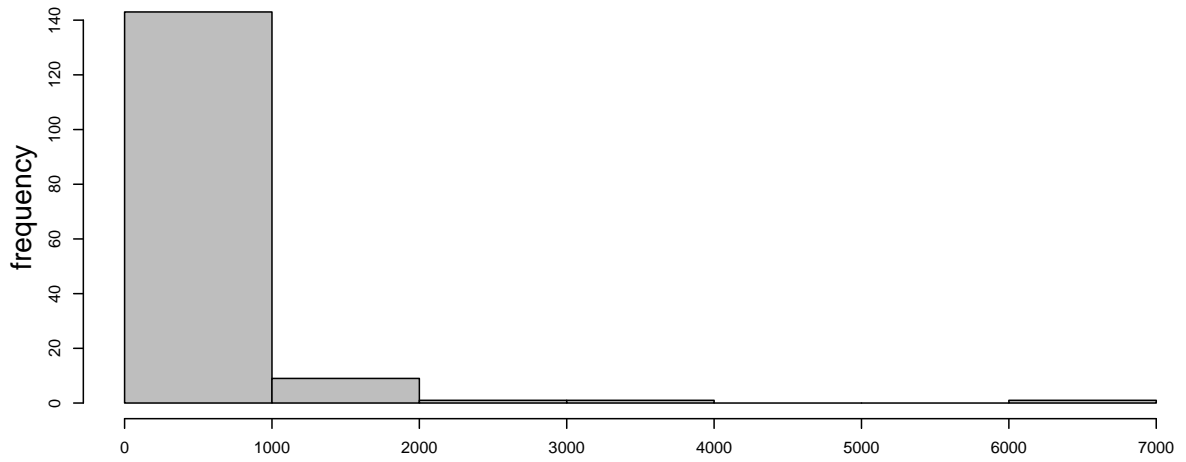


Table 15: Blue Warehou East: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

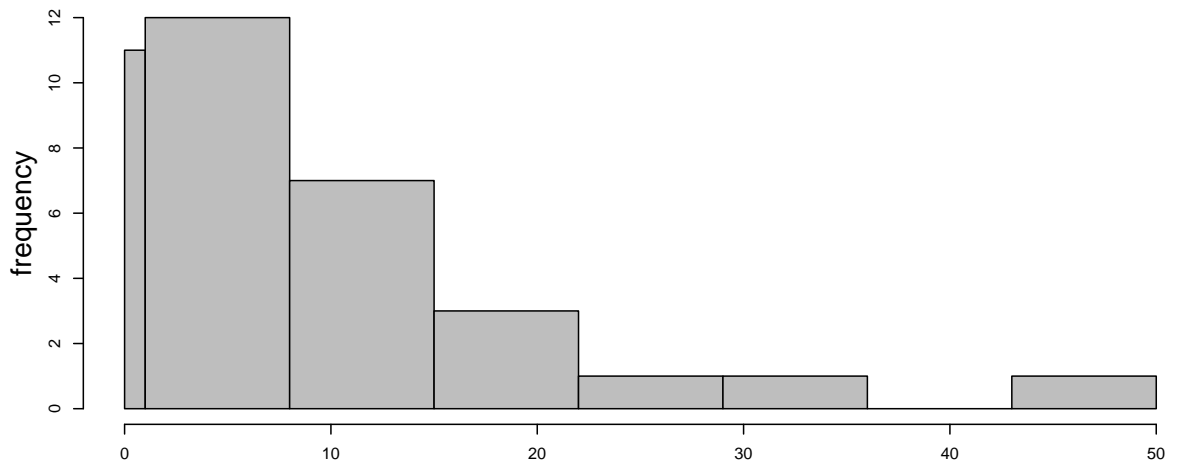
Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN	0.15	2	4	50	1079	3.49	0.05	0.17	0.53
TR_NSW_OFF	0		1		1141				
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW					1659				
DS_EDL	3.29	15	132	11.36	9013	7.13	0.19	12.35	0.79
TR_EDL.IN	1.47	12	82	14.63	4064	11.56	0.13	5.93	0.8
TR_EDL.OFF	0.11	1	7	14.29	1408	26.3	0.03	1.12	0.91
TR_TAS.BGS					217				
TR_TAS.E	2.25	3	141	2.13	1954	0	0.02	0	0
TR_TAS.ORO					146				
TR_TAS.W					1343				
TR_BS.IN					3				
TR_ECDW									
AL_CSA					875				
AL_ESA					389				
AL_WBS_SAV					382				
AL_EBS.NSW	0		1		339				
AL_ET.WT					383				
AL_WSA.WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS					1636				
GN_EBS.NSW	0.02		7		3715				
GN_ET.WT					290				
GN_WA.WSA									
UNKNOWN					10				
Total	7.29	33	0		31978			19.57	0.73

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."



# Blue Warehou East

Observed discarded catches (kg)



Observed retained catches (kg)

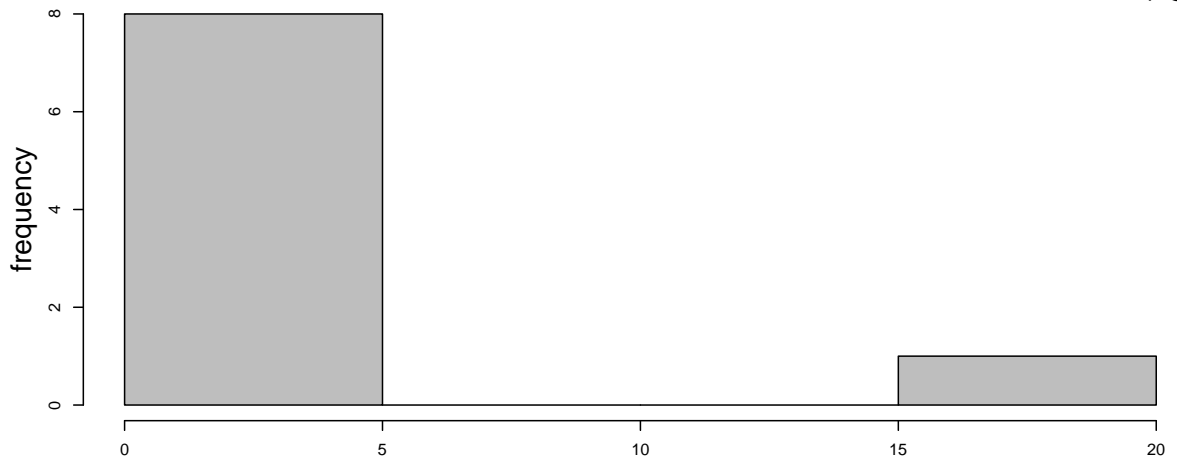


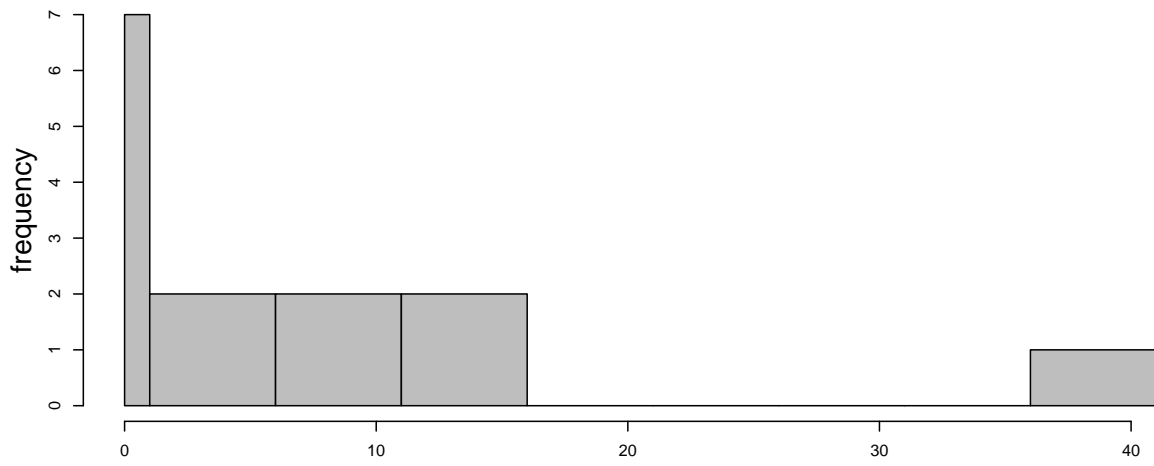
Table 16: Blue Warehou West: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN					1079				
TR_NSW_OFF					1141				
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW	24.35	1	150	0.67	1659	0	0.03	0	0
DS_EDL					9013				
TR_EDL_IN					4064				
TR_EDL_OFF					1408				
TR_TAS_BGS					217				
TR_TAS_E					1954				
TR_TAS_ORO					146				
TR_TAS_W	0.92		16		1343				
TR_BS_IN					3				
TR_ECDW									
AL_CSA					875				
AL_ESA	0		1		389				
AL_WBS_SAV					382				
AL_EBS_NSW					339				
AL_ET_WT	0.02		3		383				
AL_WSA_WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV	0		1		583				
GN_WBS	0.04		6		1636				
GN_EBS_NSW	0		1		3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN					10				
<b>Total</b>	<b>25.33</b>	<b>1</b>	<b>0</b>		<b>31978</b>			<b>0</b>	<b>0</b>

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# Blue Warehou West

Observed discarded catches (kg)



Observed retained catches (kg)

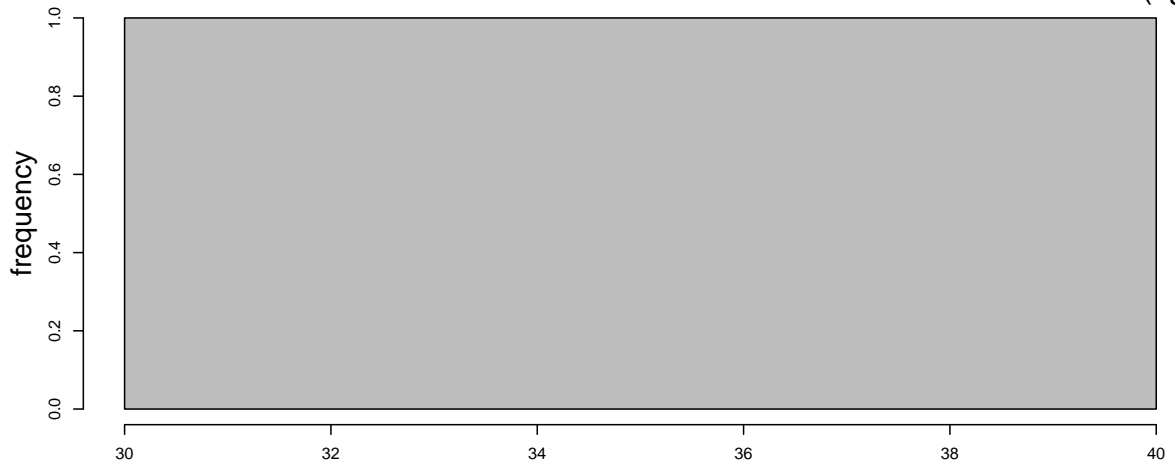


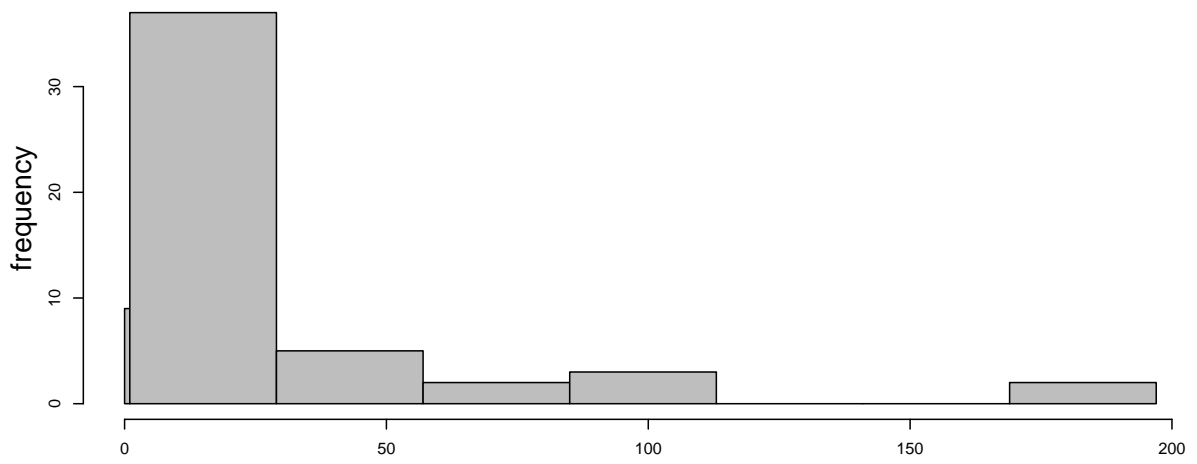
Table 17: Gemfish East: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM	2.09	6	46	13.04	46	51.6	1	2.37	0.53
TR_NSW_IN	0.08	3	6	50	1079	20.63	0.07	1.52	0.95
TR_NSW_OFF	3.08	8	31	25.81	1141	5.54	0.3	1.87	0.38
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW					1659				
DS_EDL	0		2		9013				
TR_EDL.IN	2.79	8	106	7.55	4064	43.24	0.08	14.8	0.84
TR_EDL.OFF	4.84	17	253	6.72	1408	25.77	0.52	18.69	0.79
TR_TAS.BGS					217				
TR_TAS.E	7.81	18	214	8.41	1954	2.3	0.15	0.65	0.08
TR_TAS.ORO					146				
TR_TAS.W	2.11	11	79	13.92	1343	0	0.17	0	0
TR_BS.IN					3				
TR_ECDW									
AL_CSA					875				
AL_ESA					389				
AL_WBS_SAV					382				
AL_EBS.NSW	0.14	13	8	162.5	339	10.44	0.07	0.26	0.65
AL_ET.WT	2.7		95		383				
AL_WSA.WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS					1636				
GN_EBS.NSW					3715				
GN_ET.WT					290				
GN_WA.WSA									
UNKNOWN					10				
Total	25.64	84	0		31978			40.16	0.64

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# Gemfish East

Observed discarded catches (kg)



Observed retained catches (kg)

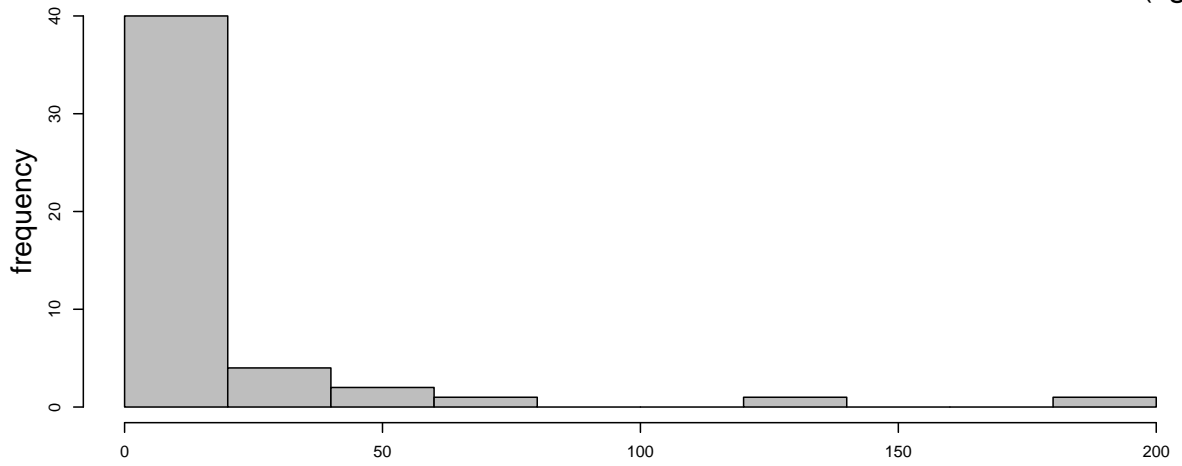


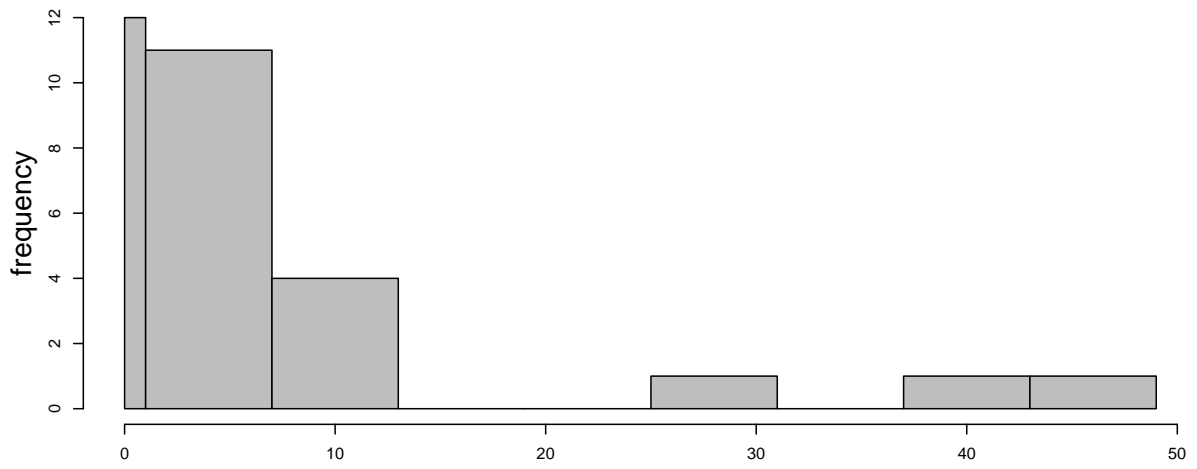
Table 18: Gemfish West: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN					1079				
TR_NSW_OFF					1141				
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW	36.39	14	393	3.56	1659	5.01	0.41	3.43	0.09
DS_EDL					9013				
TR_EDL_IN					4064				
TR_EDL_OFF					1408				
TR_TAS_BGS					217				
TR_TAS_E					1954				
TR_TAS_ORO					146				
TR_TAS_W	7.63	28	233	12.02	1343	3.8	0.43	2.2	0.22
TR_BS_IN					3				
TR_ECDW									
AL_CSA	0.1	1	11	9.09	875	0	0.04	0	0
AL_ESA	0.11		5		389				
AL_WBS_SAV	0		1		382				
AL_EBS_NSW					339				
AL_ET_WT	0.02		1		383				
AL_WSA_WA	0.04		3		111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS					1636				
GN_EBS_NSW					3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN					10				
Total	44.29	43	0		31978			5.63	0.11

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# Gemfish West

Observed discarded catches (kg)



Observed retained catches (kg)

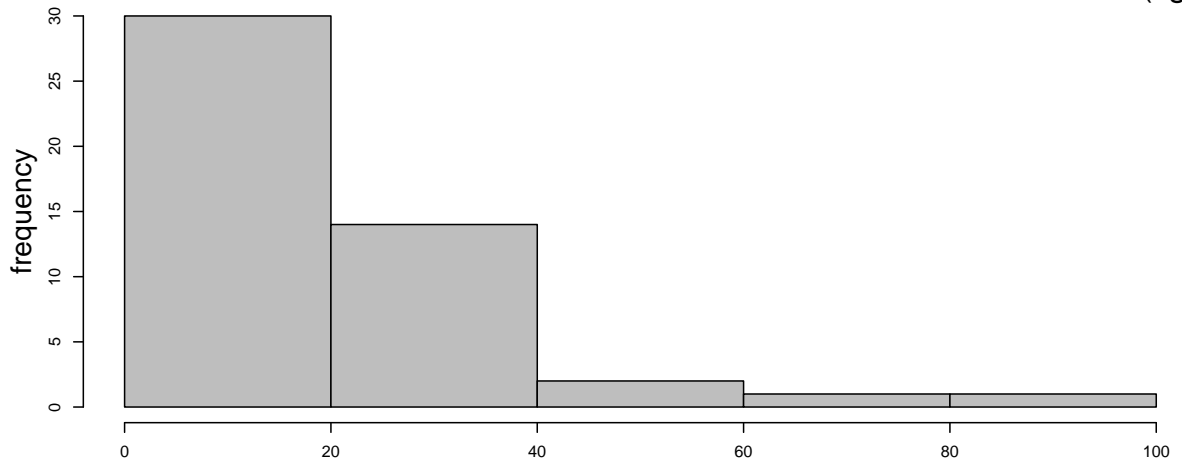


Table 19: Pink Ling East: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

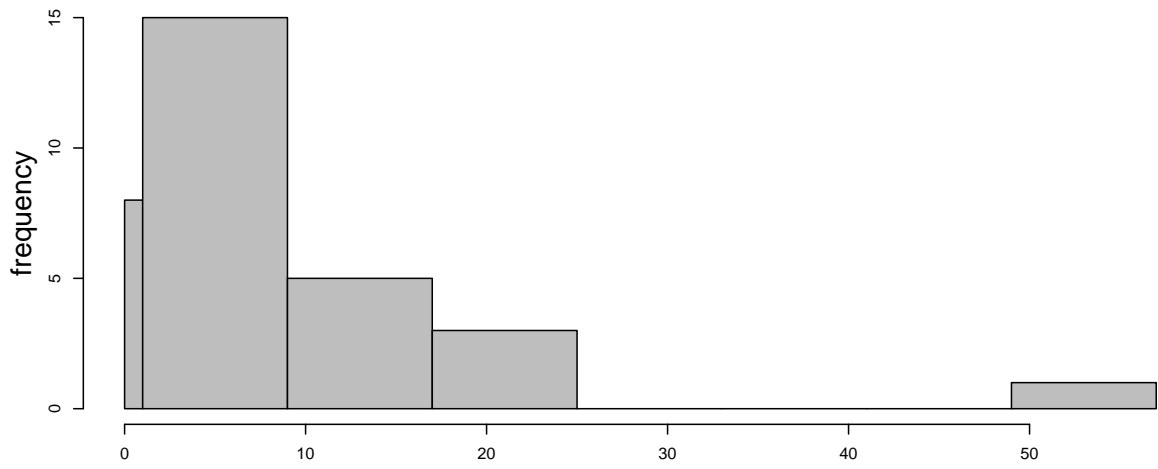
Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN	2.99	1	43	2.33	1079	4.9	0.02	0.12	0.04
TR_NSW_OFF	29.16	16	375	4.27	1141	0	0.59	0	0
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW					1659				
DS_EDL	1.12	4	348	1.15	9013	0.25	0.05	0.12	0.1
TR_EDL_IN	31.68	45	877	5.13	4064	3.38	0.47	6.5	0.17
TR_EDL_OFF	161.48	26	1066	2.44	1408	0.17	0.79	0.19	0
TR_TAS_BGS					217				
TR_TAS_E	25.64	25	274	9.12	1954	0.06	0.2	0.02	0
TR_TAS_ORO					146				
TR_TAS_W					1343				
TR_BS_IN					3				
TR_ECDW									
AL_CSA					875				
AL_ESA					389				
AL_WBS_SAV					382				
AL_EBS_NSW	32.96	11	52	21.15	339	7	0.06	0.15	0
AL_ET_WT	30.69		72		383				
AL_WSA_WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS					1636				
GN_EBS_NSW	0.01		5		3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN					10				
Total	315.73	128	0		31978			7.1	0.02

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."



# Pink Ling East

Observed discarded catches (kg)



Observed retained catches (kg)

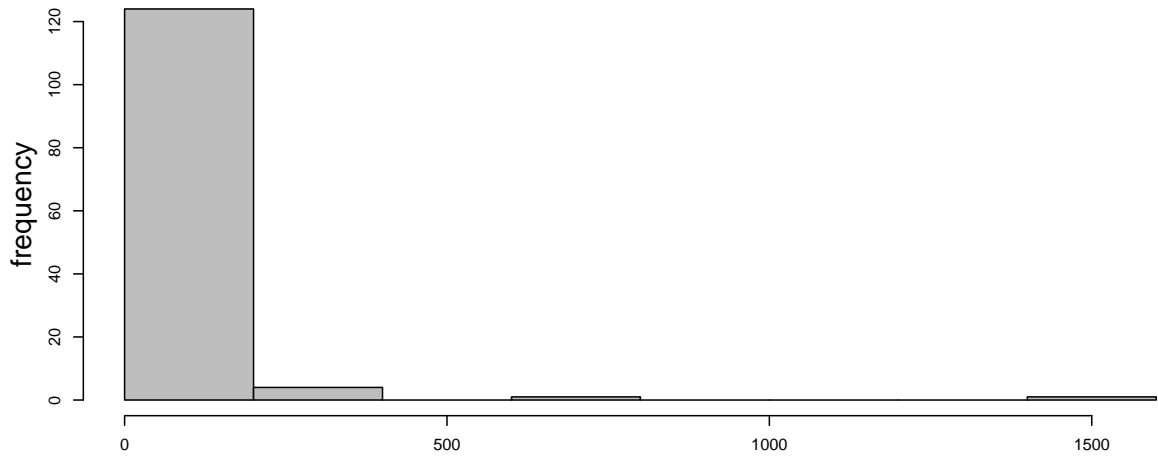


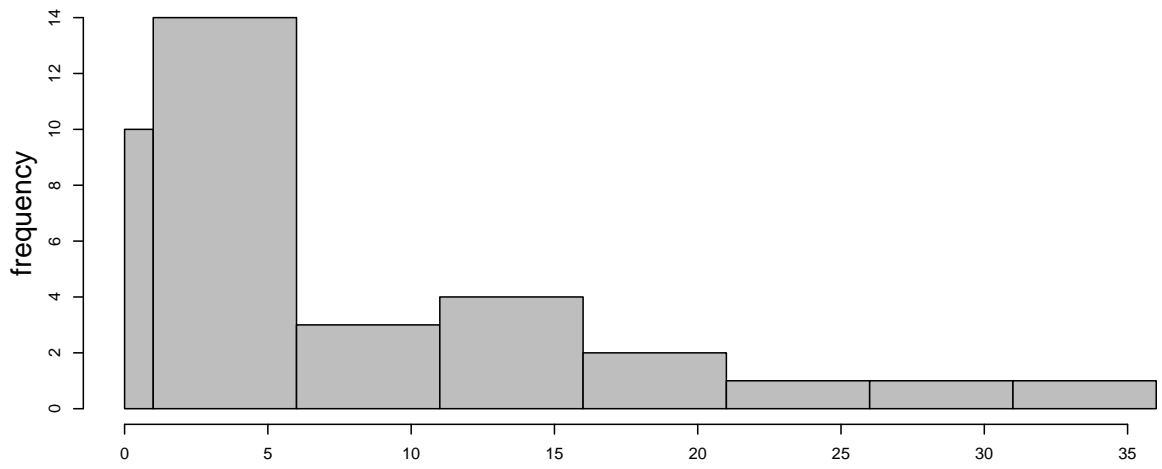
Table 20: Pink Ling West: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN					1079				
TR_NSW_OFF					1141				
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW	84.32	24	754	3.18	1659	4.49	0.71	5.26	0.06
DS_EDL	0.05	2	10	20	9013	1.65	0.03	0.38	0.88
TR_EDL_IN					4064				
TR_EDL_OFF					1408				
TR_TAS_BGS					217				
TR_TAS_E					1954				
TR_TAS_ORO					146				
TR_TAS_W	237	59	980	6.02	1343	0.21	0.91	0.26	0
TR_BS_IN					3				
TR_ECDW									
AL_CSA	3.93	25	13	192.31	875	4.49	0.96	3.78	0.49
AL_ESA	2.31	12	8	150	389	0	0.57	0	0
AL_WBS_SAV	4.39		34		382				
AL_EBS_NSW					339				
AL_ET_WT	25.11		55		383				
AL_WSA_WA	0.25		3		111				
GN_CSA	0.01	1	2	50	618	3	0.07	0.12	0.92
GN_ESA	0.04		10		183				
GN_SAV	0.02		7		583				
GN_WBS	0.02	1	6	16.67	1636	2	0.17	0.55	0.96
GN_EBS_NSW	0.01		1		3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN					10				
Total	357.46	124	0		31978			10.35	0.03

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# Pink Ling West

Observed discarded catches (kg)



Observed retained catches (kg)

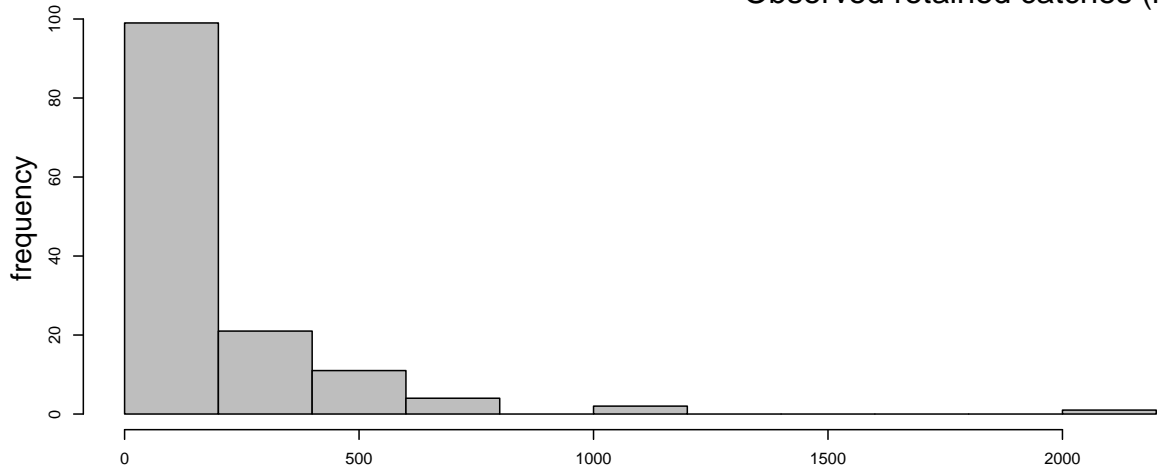


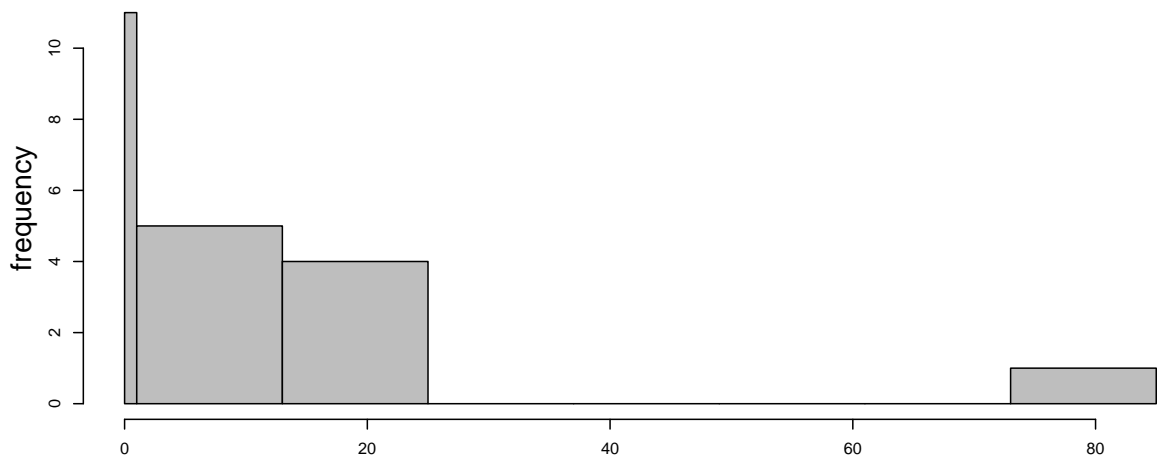
Table 21: Mirror Dory East: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN	0.58	1	13	7.69	1079	0	0.02	0	0
TR_NSW_OFF	23.71	18	288	6.25	1141	2.8	0.67	2.13	0.08
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW					1659				
DS_EDL	0.74	7	92	7.61	9013	0	0.09	0	0
TR_EDL_IN	6.22	6	274	2.19	4064	13.88	0.06	3.56	0.36
TR_EDL_OFF	22.32	14	478	2.93	1408	4.12	0.42	2.46	0.1
TR_TAS_BGS					217				
TR_TAS_E	5.37	16	170	9.41	1954	0.02	0.13	0.01	0
TR_TAS_ORO					146				
TR_TAS_W					1343				
TR_BS_IN					3				
TR_ECDW									
AL_CSA					875				
AL_ESA					389				
AL_WBS_SAV					382				
AL_EBS_NSW					339				
AL_ET_WT					383				
AL_WSA_WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS					1636				
GN_EBS_NSW					3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN					10				
Total	58.94	62	0		31978			8.16	0.12

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# Mirror Dory East

Observed discarded catches (kg)



Observed retained catches (kg)

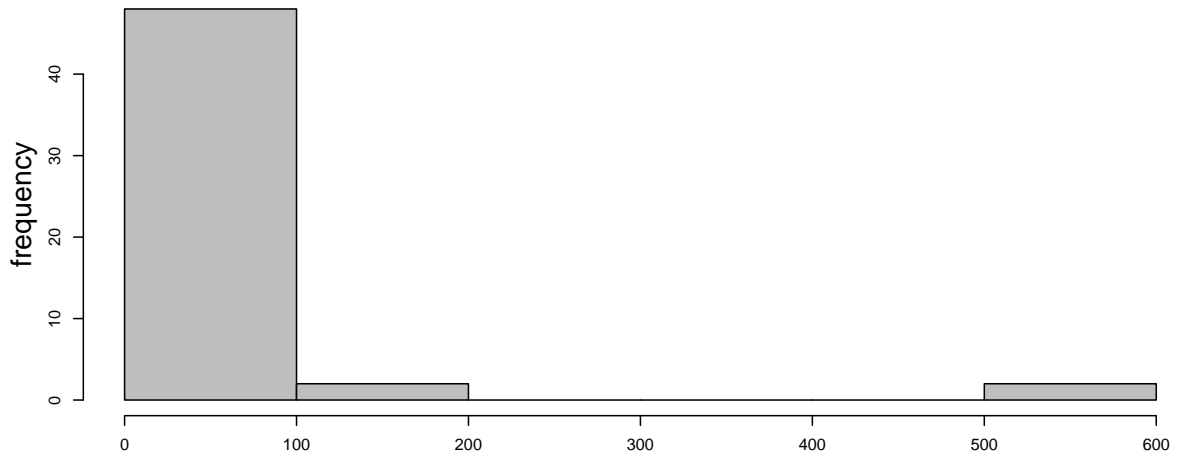


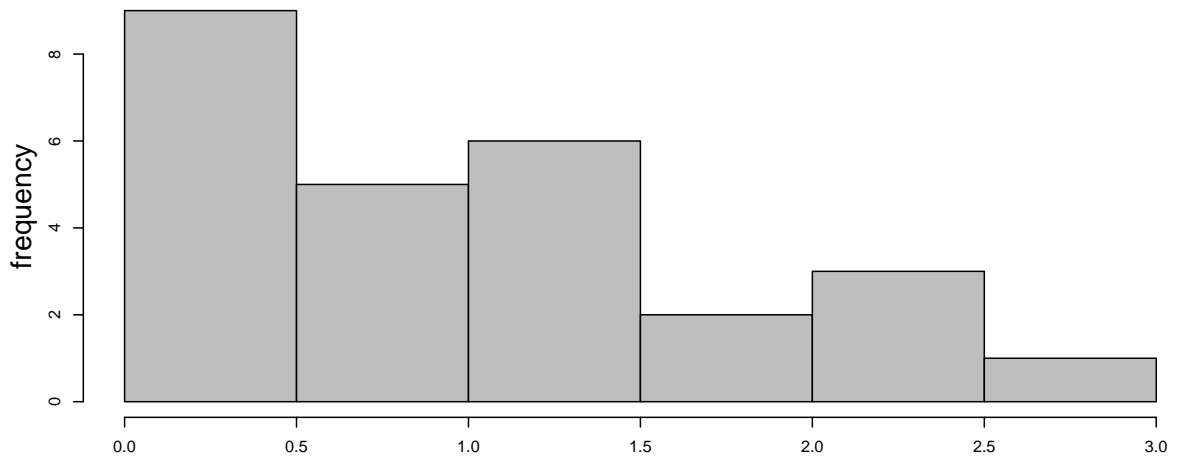
Table 22: Mirror Dory West: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN					1079				
TR_NSW_OFF					1141				
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW	21.31		333		1659				
DS_EDL	0.02		3		9013				
TR_EDL_IN					4064				
TR_EDL_OFF					1408				
TR_TAS_BGS					217				
TR_TAS_E					1954				
TR_TAS_ORO					146				
TR_TAS_W	9.77	31	200	15.5	1343	0.82	0.48	0.52	0.05
TR_BS_IN					3				
TR_ECDW									
AL_CSA					875				
AL_ESA					389				
AL_WBS_SAV					382				
AL_EBS_NSW					339				
AL_ET_WT					383				
AL_WSA_WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS					1636				
GN_EBS_NSW					3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN					10				
Total	31.1	31	0		31978			0.52	0.05

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# Mirror Dory West

Observed discarded catches (kg)



Observed retained catches (kg)

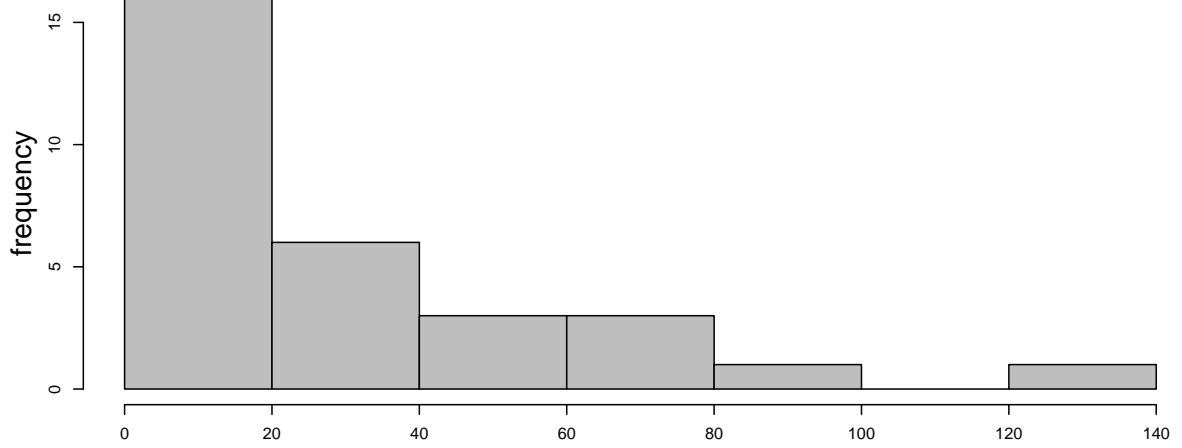


Table 23: Ocean Perch Inshore: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

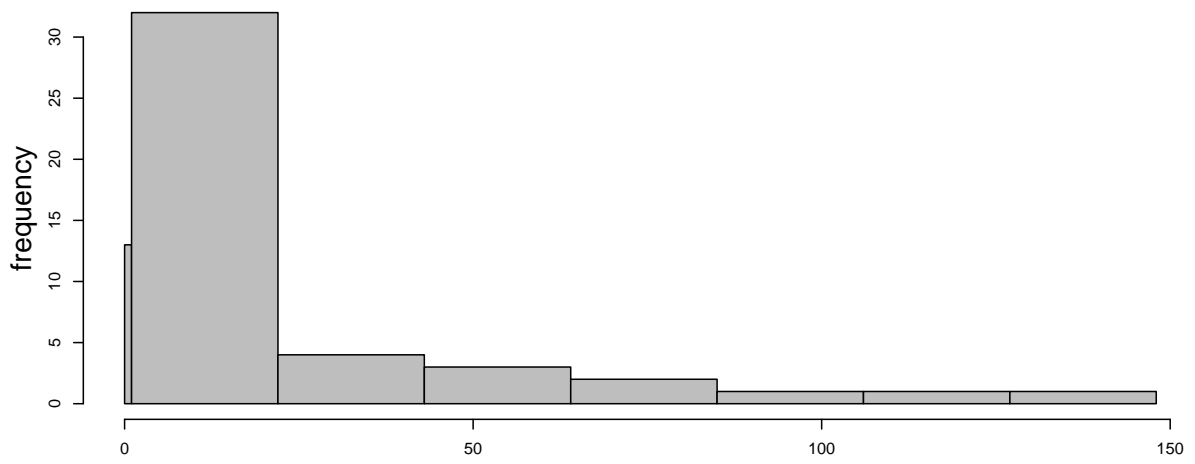
Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN	6.42	4	36	11.11	1079	92.52	0.09	9.08	0.59
TR_NSW_OFF					1141				
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW	0.15	1	3	33.33	1659	0	0.03	0	0
DS_EDL	0.42	4	50	8	9013	3.98	0.05	1.84	0.81
TR_EDL_IN	11.55	35	151	23.18	4064	16.36	0.37	24.49	0.68
TR_EDL_OFF					1408				
TR_TAS_BGS					217				
TR_TAS_E	0.06	2	7	28.57	1954	26.85	0.02	0.85	0.93
TR_TAS_ORO					146				
TR_TAS_W					1343				
TR_BS_IN					3				
TR_ECDW									
AL_CSA	0		1		875				
AL_ESA	0		2		389				
AL_WBS_SAV	0.09		19		382				
AL_EBS_NSW	0.02	28	1	2800	339	0.05	0.16	0	0
AL_ET_WT					383				
AL_WSA_WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS					1636				
GN_EBS_NSW					3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN					10				
Total	18.71	74	0		31978			36.26	0.66

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."



# Ocean Perch Inshore

Observed discarded catches (kg)



Observed retained catches (kg)

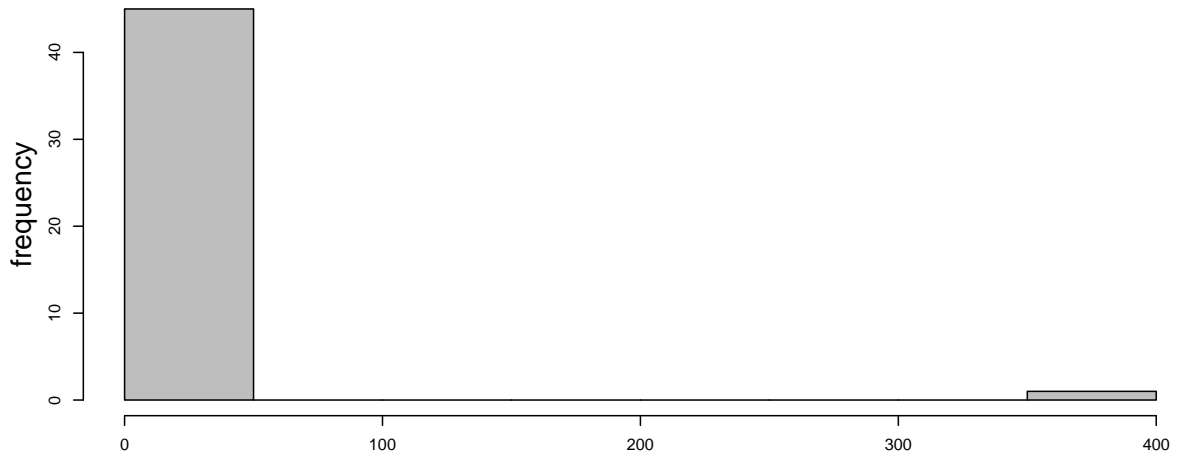


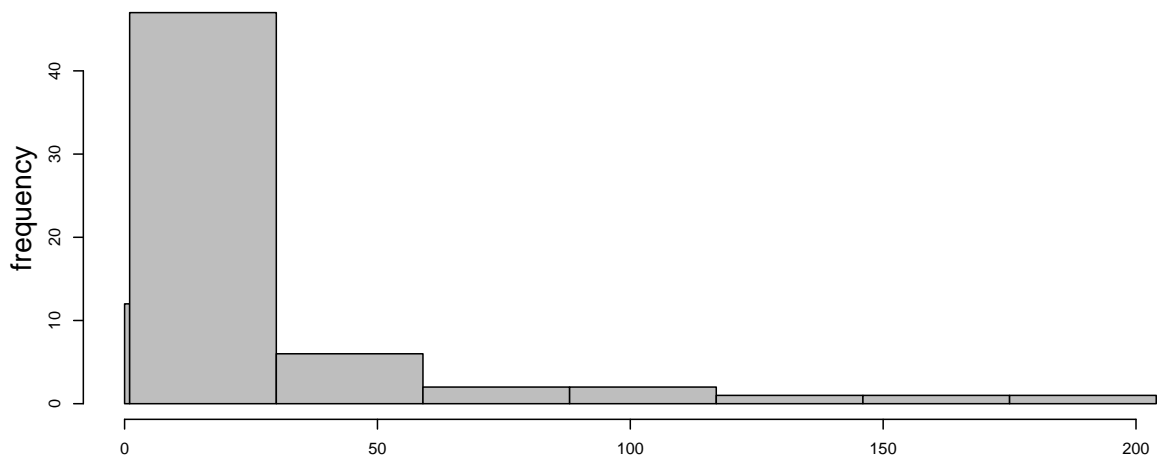
Table 24: Ocean Perch Offshore: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN	0.06		3		1079				
TR_NSW_OFF	33.78	18	393	4.58	1141	1.37	0.67	1.04	0.03
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW	4.88	8	136	5.88	1659	2.45	0.24	0.96	0.16
DS_EDL	0		2		9013				
TR_EDL_IN					4064				
TR_EDL_OFF	55.66	27	815	3.31	1408	10.7	0.82	12.33	0.18
TR_TAS_BGS					217				
TR_TAS_E	2.74	10	99	10.1	1954	0	0.08	0	0
TR_TAS_ORO					146				
TR_TAS_W	3.11	21	116	18.1	1343	6.79	0.32	2.95	0.49
TR_BS_IN					3				
TR_ECDW									
AL_CSA					875				
AL_ESA	0.34		9		389				
AL_WBS_SAV	0.62		30		382				
AL_EBS_NSW	4.94	20	42	47.62	339	49.3	0.11	1.87	0.27
AL_ET_WT	3.91		118		383				
AL_WSA_WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS					1636				
GN_EBS_NSW					3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN					10				
Total	110.04	104	0		31978			19.15	0.15

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# Ocean Perch Offshore

Observed discarded catches (kg)



Observed retained catches (kg)

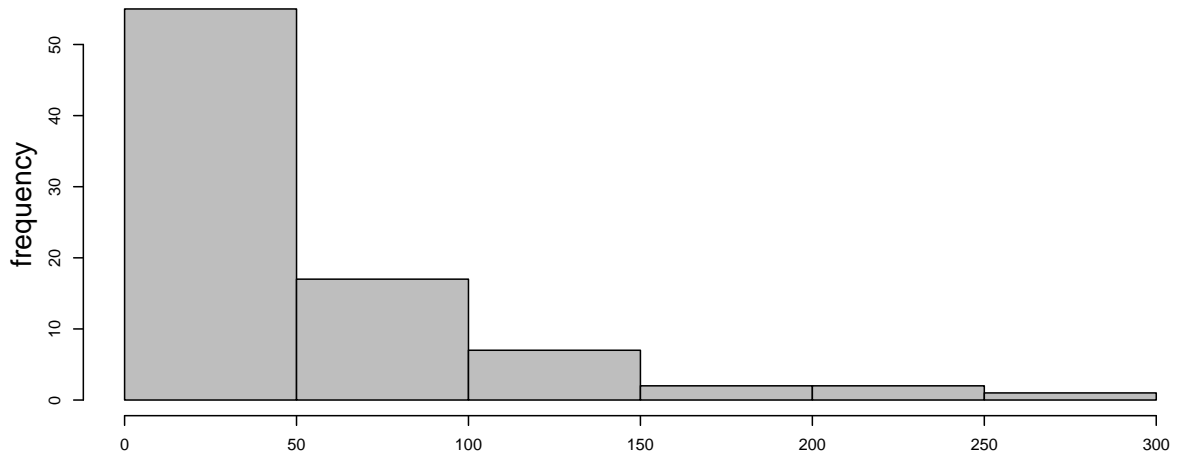


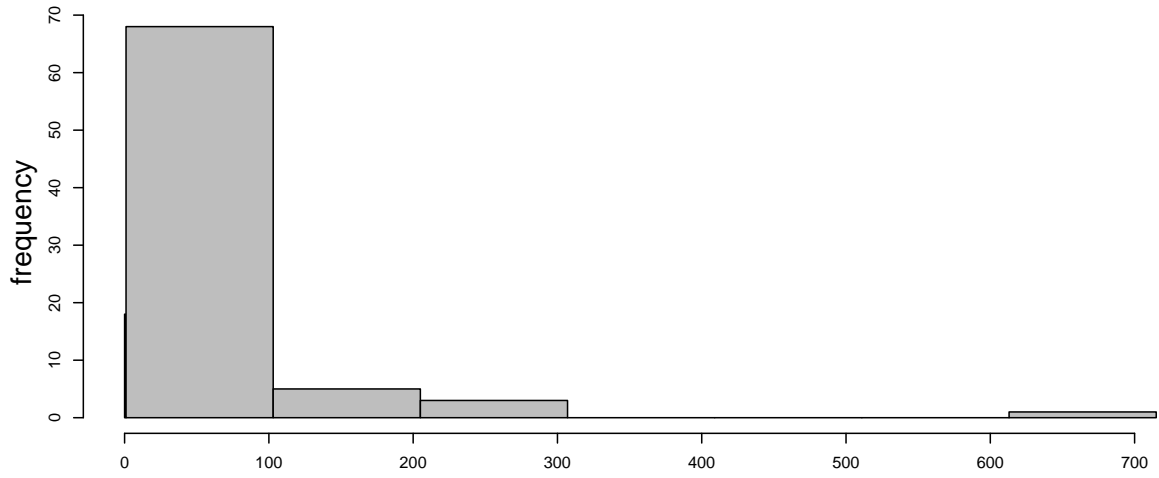
Table 25: Silver Warehou: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN	1.58		31		1079				
TR_NSW_OFF	3.41	3	78	3.85	1141	0.33	0.11	0.04	0.01
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW	92.4	16	517	3.09	1659	1.48	0.47	1.16	0.01
DS_EDL	0.37	10	27	37.04	9013	2.61	0.13	3.01	0.89
TR_EDL_IN	12.77	37	247	14.98	4064	7	0.39	11.08	0.46
TR_EDL_OFF	51.3	16	617	2.59	1408	8.43	0.48	5.75	0.1
TR_TAS_BGS					217				
TR_TAS_E	15.65	31	221	14.03	1954	88.42	0.25	43.19	0.73
TR_TAS_ORO					146				
TR_TAS_W	176.6	50	742	6.74	1343	0.61	0.77	0.64	0
TR_BS_IN	0.03		1		3				
TR_ECDW									
AL_CSA					875				
AL_ESA					389				
AL_WBS_SAV					382				
AL_EBS_NSW					339				
AL_ET_WT	0.07		14		383				
AL_WSA_WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS					1636				
GN_EBS_NSW					3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN	0.26		2		10				
Total	354.44	163	0		31978			64.87	0.16

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# Silver Warehou

Observed discarded catches (kg)



Observed retained catches (kg)

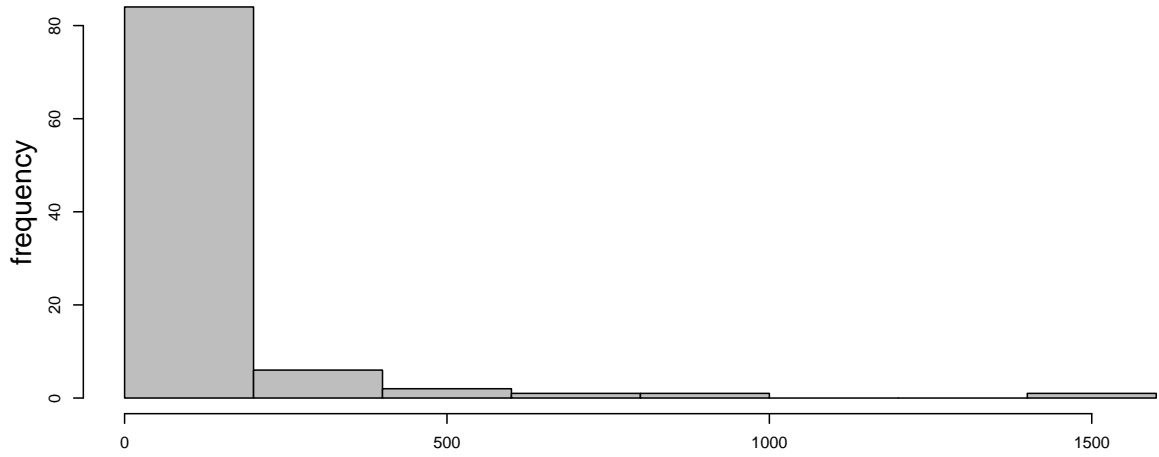


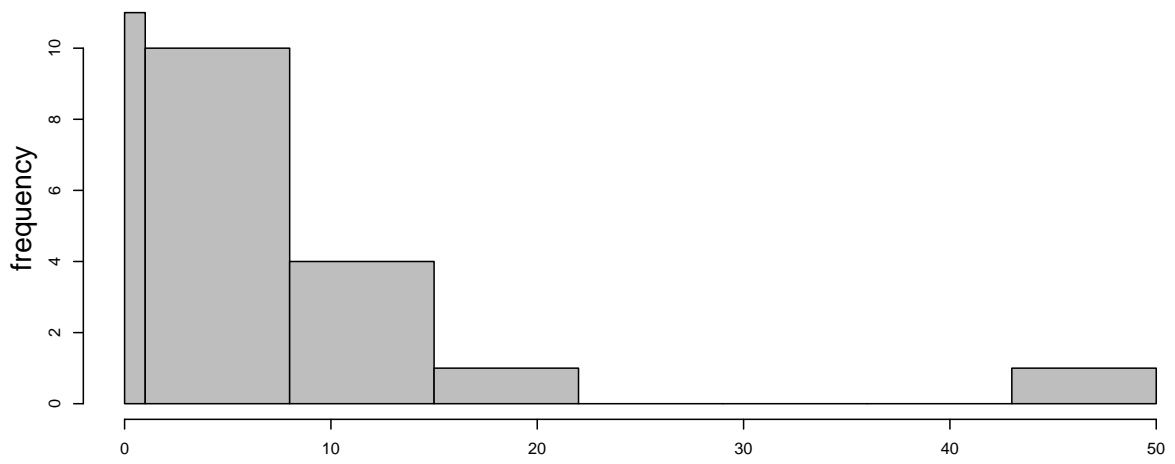
Table 26: Ribaldo: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN					1079				
TR_NSW_OFF	0.03		2		1141				
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW	8.96	12	126	9.52	1659	0.17	0.35	0.1	0.01
DS_EDL					9013				
TR_EDL_IN	0.22		13		4064				
TR_EDL_OFF	5.07	9	144	6.25	1408	0.3	0.27	0.12	0.02
TR_TAS_BGS					217				
TR_TAS_E	4.61	23	82	28.05	1954	0.13	0.19	0.05	0.01
TR_TAS_ORO					146				
TR_TAS_W	25.29	23	272	8.46	1343	4.03	0.35	1.92	0.07
TR_BS_IN					3				
TR_ECDW									
AL_CSA					875				
AL_ESA	0.01	3	3	100	389	2.8	0.14	0.16	0.94
AL_WBS_SAV	1.34		19		382				
AL_EBS_NSW	5.25	5	32	15.62	339	5.2	0.03	0.05	0.01
AL_ET_WT	14.82		102		383				
AL_WSA_WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS					1636				
GN_EBS_NSW					3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN					10				
Total	65.6	75	0		31978			2.4	0.05

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# Ribaldo

Observed discarded catches (kg)



Observed retained catches (kg)

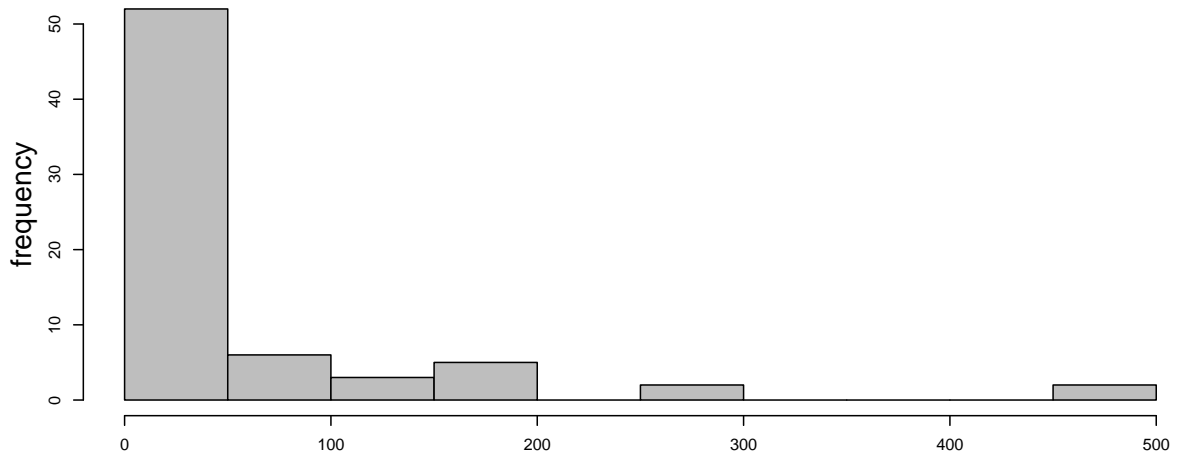


Table 27: Orange Roughy East: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

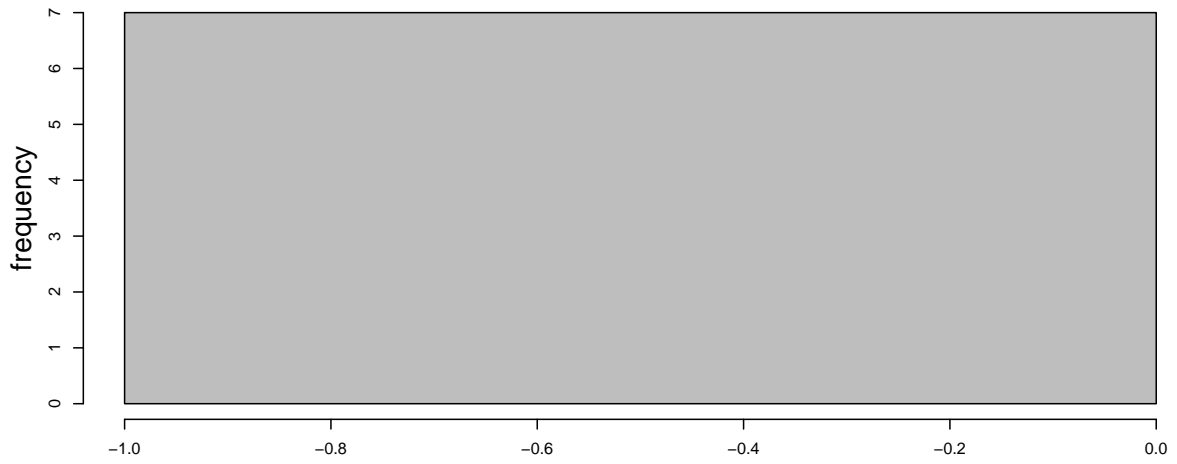
Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN					1079				
TR_NSW_OFF					1141				
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW					1659				
DS_EDL					9013				
TR_EDL_IN					4064				
TR_EDL_OFF	0		1		1408				
TR_TAS_BGS					217				
TR_TAS_E	90.87	76	71	107.04	1954	0.14	0.61	0.17	0
TR_TAS_ORO	760.09	5	140	3.57	146	14.72	1	2.15	0
TR_TAS_W					1343				
TR_BS_IN					3				
TR_ECDW									
AL_CSA					875				
AL_ESA					389				
AL_WBS_SAV					382				
AL_EBS_NSW					339				
AL_ET_WT					383				
AL_WSA_WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS					1636				
GN_EBS_NSW					3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN					10				
Total	850.96	81	0		31978			2.32	0

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."



# Orange Roughy East

Observed discarded catches (kg)



Observed retained catches (kg)

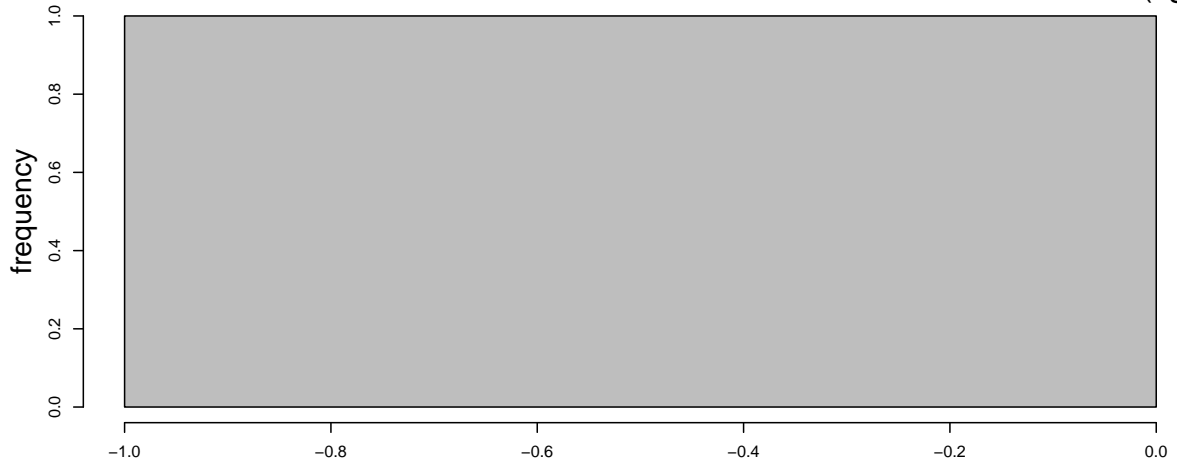


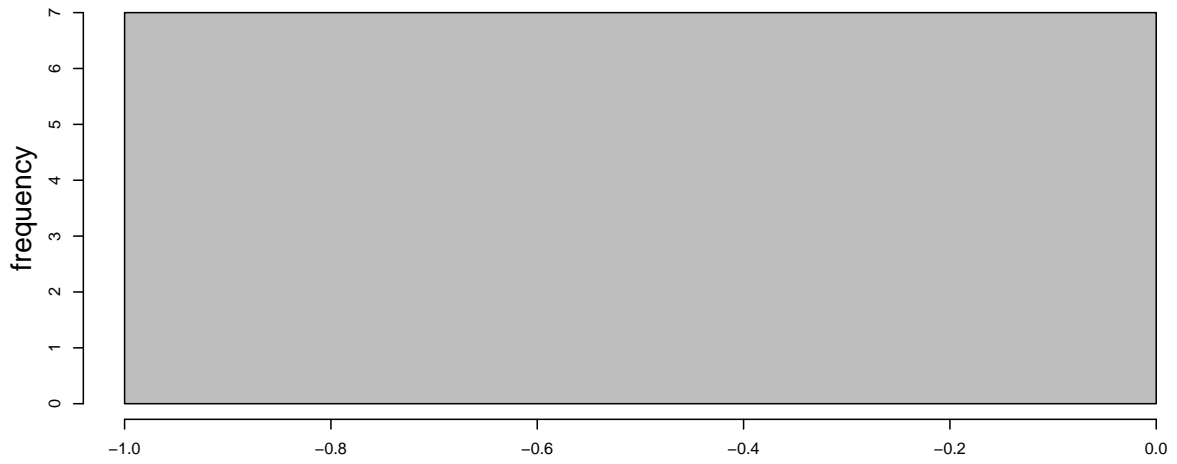
Table 28: Orange Roughy West: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN					1079				
TR_NSW_OFF					1141				
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO	1.15		2		2				
TR_SW	4.04	6	33	18.18	1659	41.52	0.18	12.16	0.75
DS_EDL					9013				
TR_EDL_IN					4064				
TR_EDL_OFF					1408				
TR_TAS_BGS					217				
TR_TAS_E					1954				
TR_TAS_ORO	2.75		4		146				
TR_TAS_W	4.2	2	32	6.25	1343	22.77	0.03	0.94	0.18
TR_BS_IN					3				
TR_ECDW									
AL_CSA					875				
AL_ESA					389				
AL_WBS_SAV					382				
AL_EBS_NSW					339				
AL_ET_WT					383				
AL_WSA_WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS					1636				
GN_EBS_NSW					3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN					10				
Total	12.14	8	0		31978			13.1	0.61

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# Orange Roughy West

Observed discarded catches (kg)



Observed retained catches (kg)

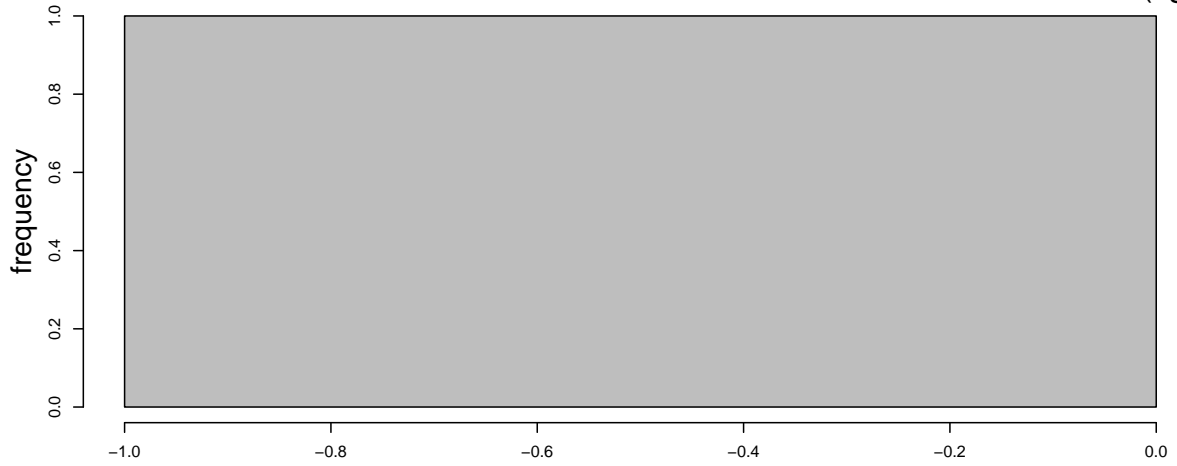


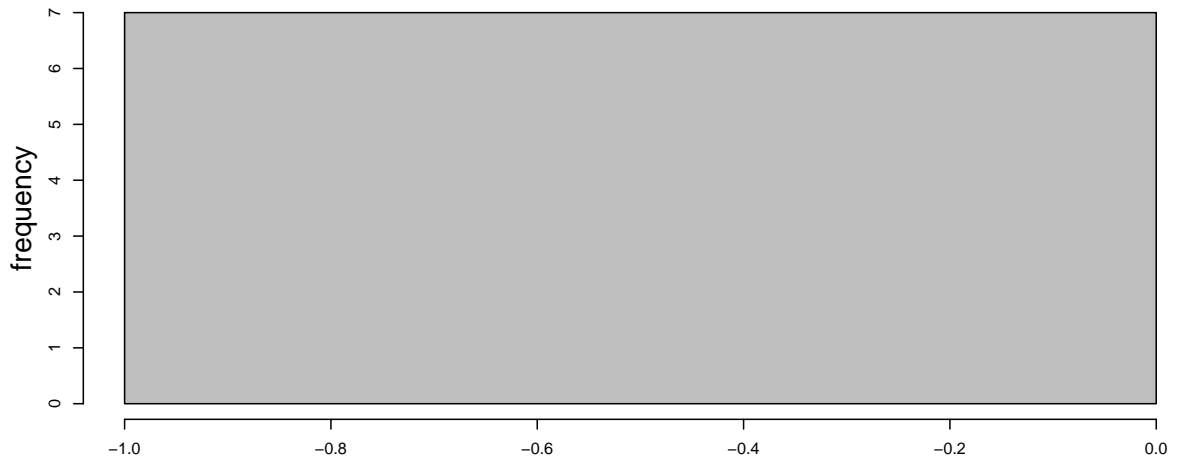
Table 29: Orange Roughy South: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN					1079				
TR_NSW_OFF					1141				
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW					1659				
DS_EDL					9013				
TR_EDL_IN					4064				
TR_EDL_OFF					1408				
TR_TAS_BGS					217				
TR_TAS_E	31.09	1	32	3.12	1954	0	0.01	0	0
TR_TAS_ORO	19.45		2		146				
TR_TAS_W	9.79	5	38	13.16	1343	12.42	0.08	1.28	0.12
TR_BS_IN					3				
TR_ECDW									
AL_CSA					875				
AL_ESA					389				
AL_WBS_SAV					382				
AL_EBS_NSW					339				
AL_ET_WT					383				
AL_WSA_WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS					1636				
GN_EBS_NSW					3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN					10				
Total	60.33	6	0		31978			1.28	0.03

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# Orange Roughy South

Observed discarded catches (kg)



Observed retained catches (kg)

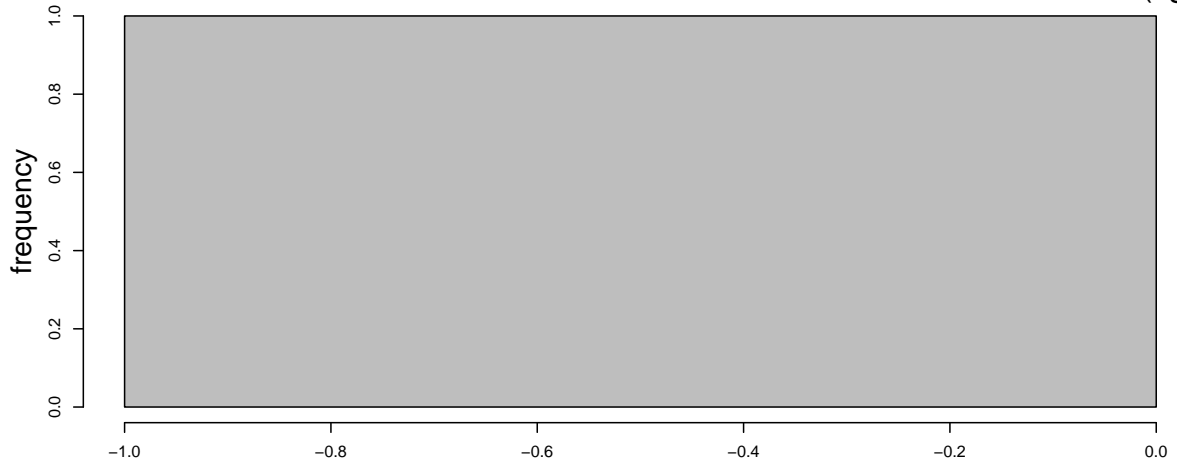


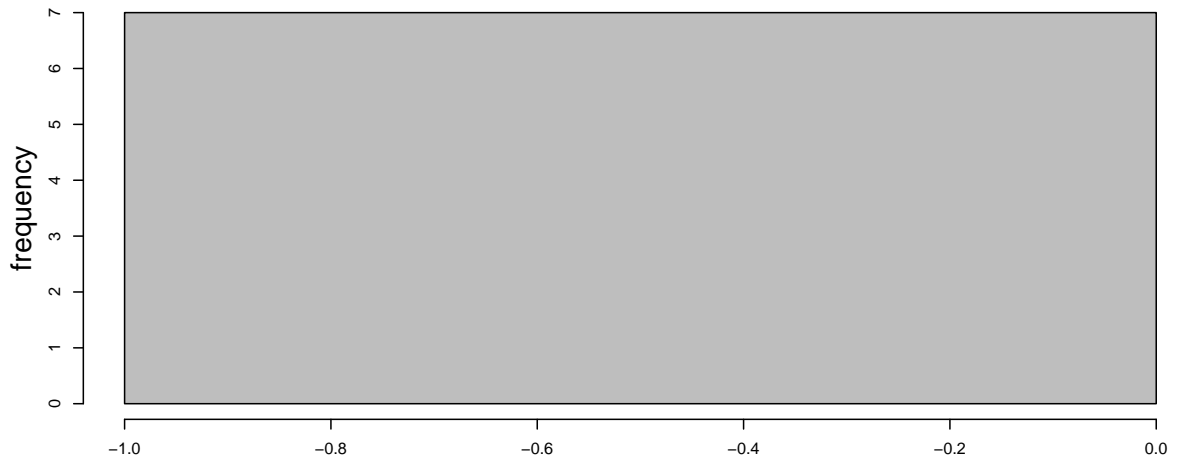
Table 30: Orange Roughy Cascade: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN					1079				
TR_NSW_OFF					1141				
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW					1659				
DS_EDL					9013				
TR_EDL_IN					4064				
TR_EDL_OFF					1408				
TR_TAS_BGS					217				
TR_TAS_E					1954				
TR_TAS_ORO					146				
TR_TAS_W					1343				
TR_BS_IN					3				
TR_ECDW									
AL_CSA					875				
AL_ESA					389				
AL_WBS_SAV					382				
AL_EBS_NSW					339				
AL_ET_WT					383				
AL_WSA_WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS					1636				
GN_EBS_NSW					3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN					10				
Total	0	0	0		31978			0	

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# Orange Roughy Cascade

Observed discarded catches (kg)



Observed retained catches (kg)

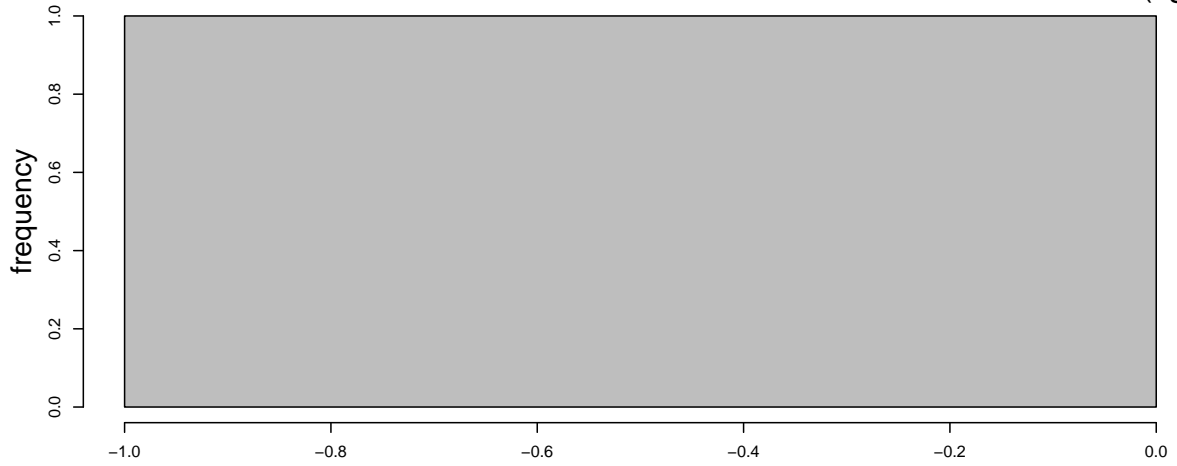


Table 31: Orange Roughy GAB: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

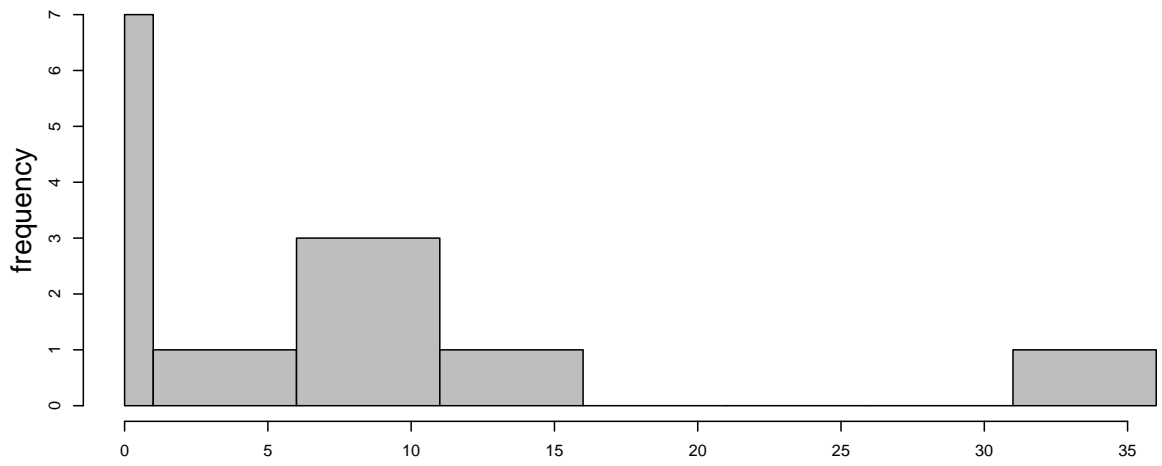
Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN					1079				
TR_NSW_OFF					1141				
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW					1659				
DS_EDL					9013				
TR_EDL_IN					4064				
TR_EDL_OFF					1408				
TR_TAS_BGS					217				
TR_TAS_E					1954				
TR_TAS_ORO					146				
TR_TAS_W					1343				
TR_BS_IN					3				
TR_GAB_In					2606				
TR_GAB_Mid					75				
TR_GAB_Off					1				
TR_ECDW									
AL_CSA					875				
AL_ESA					389				
AL_WBS_SAV					382				
AL_EBS_NSW					339				
AL_ET_WT					383				
AL_WSA_WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS					1636				
GN_EBS_NSW					3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN					10				
Total	0	0	0		34660			0	

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."



# Orange Roughy GAB

Observed discarded catches (kg)



Observed retained catches (kg)

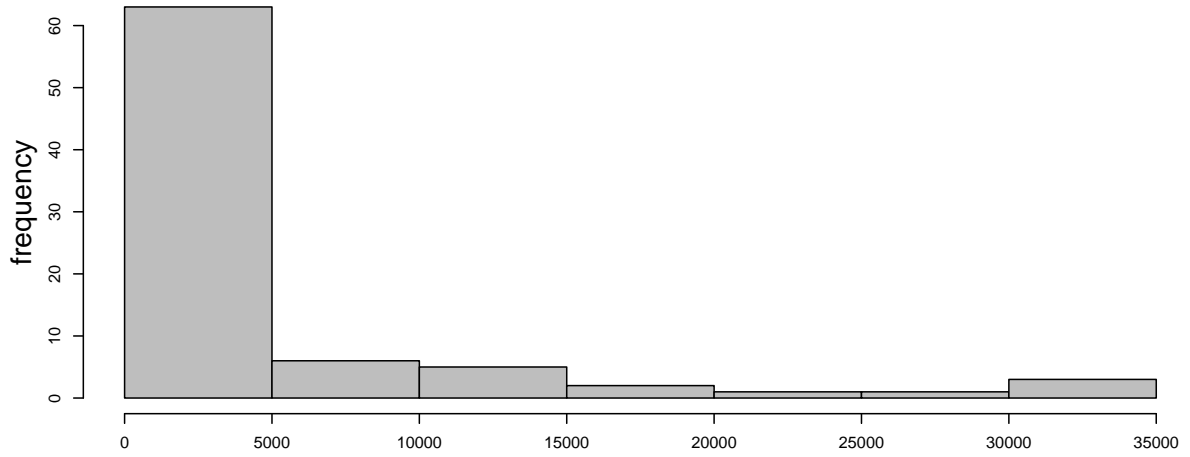


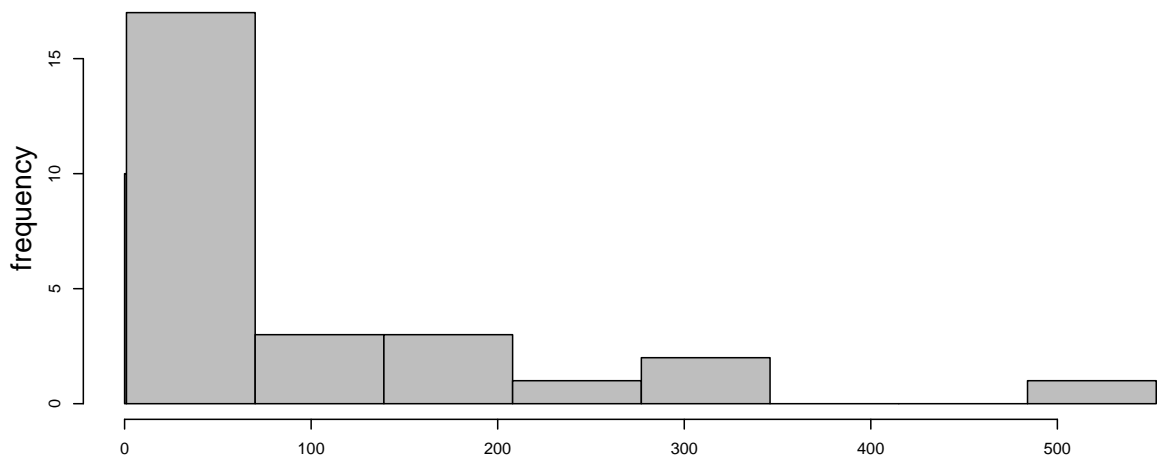
Table 32: Oreos: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN					1079				
TR_NSW_OFF					1141				
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW	7.66	3	84	3.57	1659	4.83	0.09	0.71	0.08
DS_EDL					9013				
TR_EDL_IN					4064				
TR_EDL_OFF	1.04	1	46	2.17	1408	0	0.03	0	0
TR_TAS_BGS					217				
TR_TAS_E	23.27	54	120	45	1954	6.68	0.44	5.69	0.2
TR_TAS_ORO					146				
TR_TAS_W	50.8	22	181	12.15	1343	96.44	0.34	43.84	0.46
TR_BS_IN					3				
TR_ECDW									
AL_CSA					875				
AL_ESA					389				
AL_WBS_SAV	0.06		3		382				
AL_EBS_NSW	0	1	1	100	339	0	0.01	0	NaN
AL_ET_WT	0.28		17		383				
AL_WSA_WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS					1636				
GN_EBS_NSW					3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN					10				
Total	83.11	81	0		31978			50.24	0.38

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# Oreos

Observed discarded catches (kg)



Observed retained catches (kg)

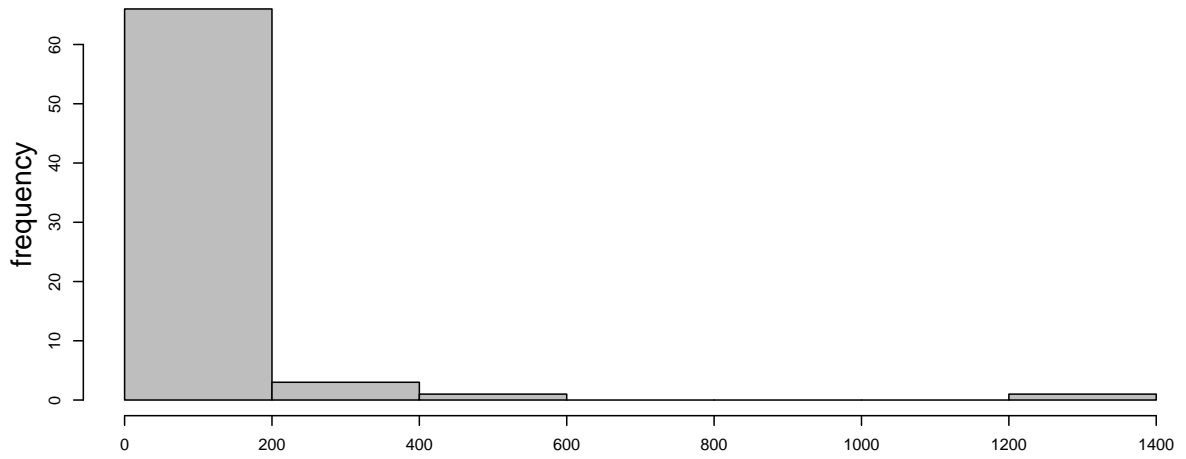


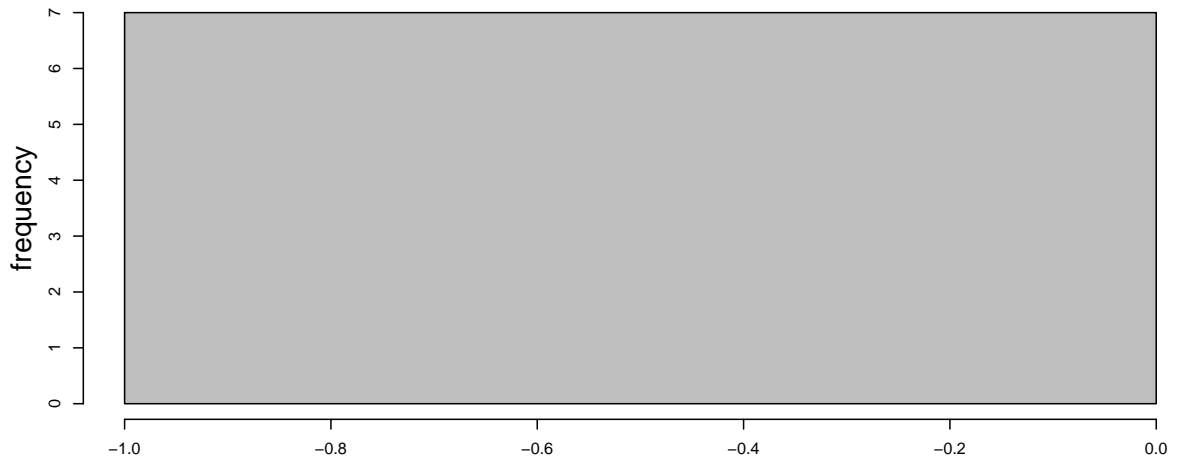
Table 33: Smooth Oreo Cascade: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN					1079				
TR_NSW_OFF					1141				
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW					1659				
DS_EDL					9013				
TR_EDL_IN					4064				
TR_EDL_OFF					1408				
TR_TAS_BGS					217				
TR_TAS_E					1954				
TR_TAS_ORO					146				
TR_TAS_W					1343				
TR_BS_IN					3				
TR_ECDW									
AL_CSA					875				
AL_ESA					389				
AL_WBS_SAV					382				
AL_EBS_NSW					339				
AL_ET_WT					383				
AL_WSA_WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS					1636				
GN_EBS_NSW					3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN					10				
Total	0	0	0		31978			0	

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# Smooth Oreo Cascade

Observed discarded catches (kg)



Observed retained catches (kg)

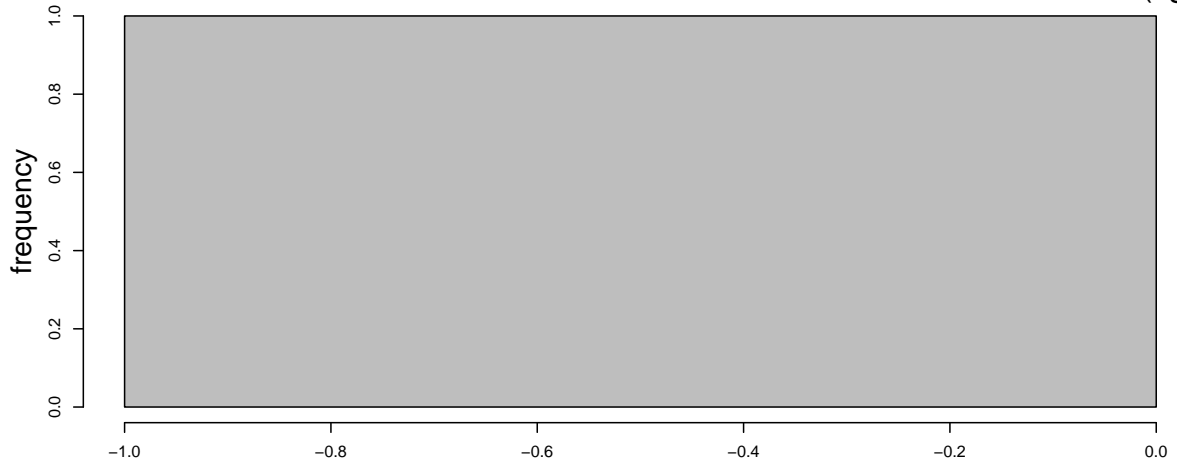


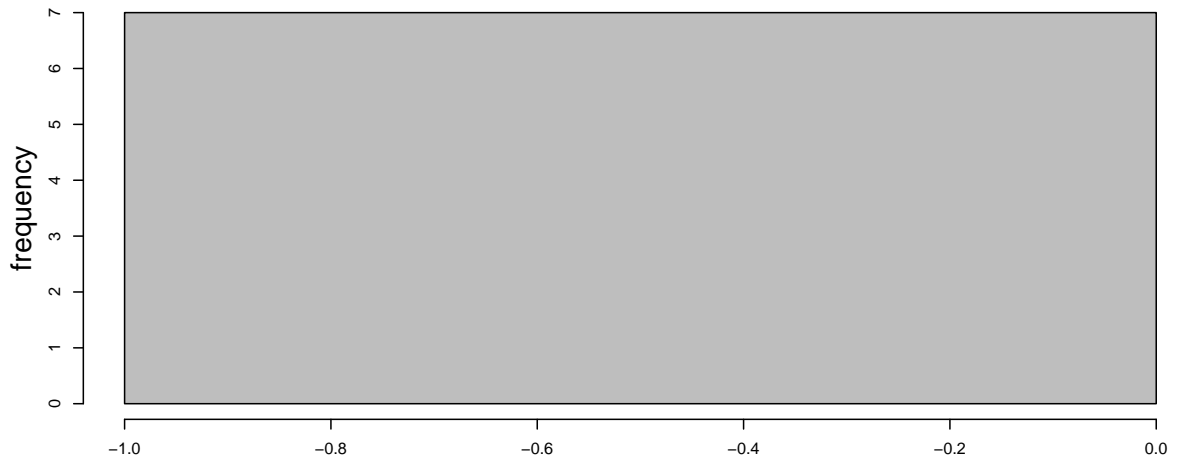
Table 34: Smooth Oreo Non-Cascade: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN					1079				
TR_NSW_OFF					1141				
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW					1659				
DS_EDL					9013				
TR_EDL_IN					4064				
TR_EDL_OFF	0.06		5		1408				
TR_TAS_BGS					217				
TR_TAS_E	53	2	42	4.76	1954	0.5	0.02	0.02	0
TR_TAS_ORO					146				
TR_TAS_W	1.66		5		1343				
TR_BS_IN					3				
TR_ECDW									
AL_CSA					875				
AL_ESA					389				
AL_WBS_SAV					382				
AL_EBS_NSW					339				
AL_ET_WT					383				
AL_WSA_WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS					1636				
GN_EBS_NSW					3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN					10				
Total	54.72	2	0		31978			0.02	0

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# Smooth Oreo Non-Cascade

Observed discarded catches (kg)



Observed retained catches (kg)

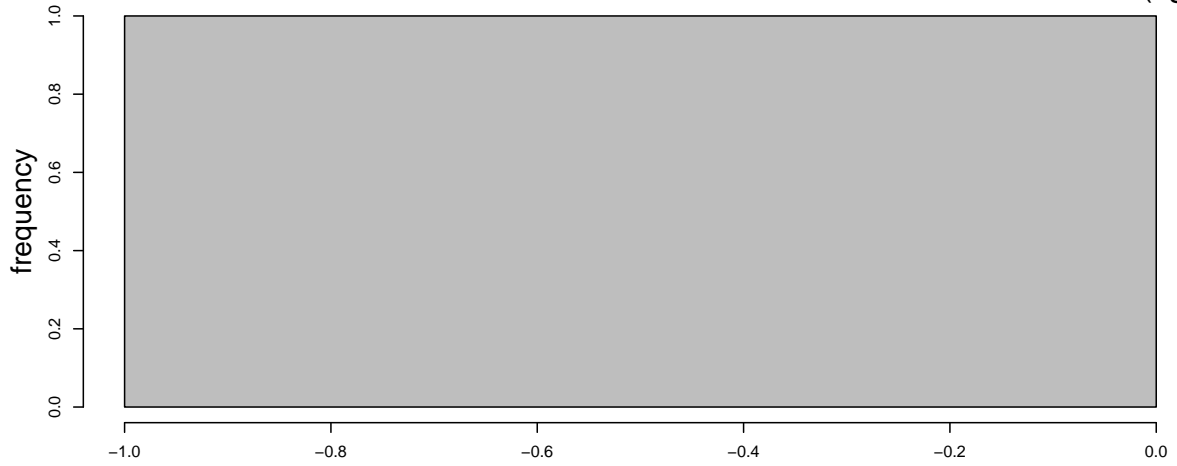


Table 35: Deepwater Shark East: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

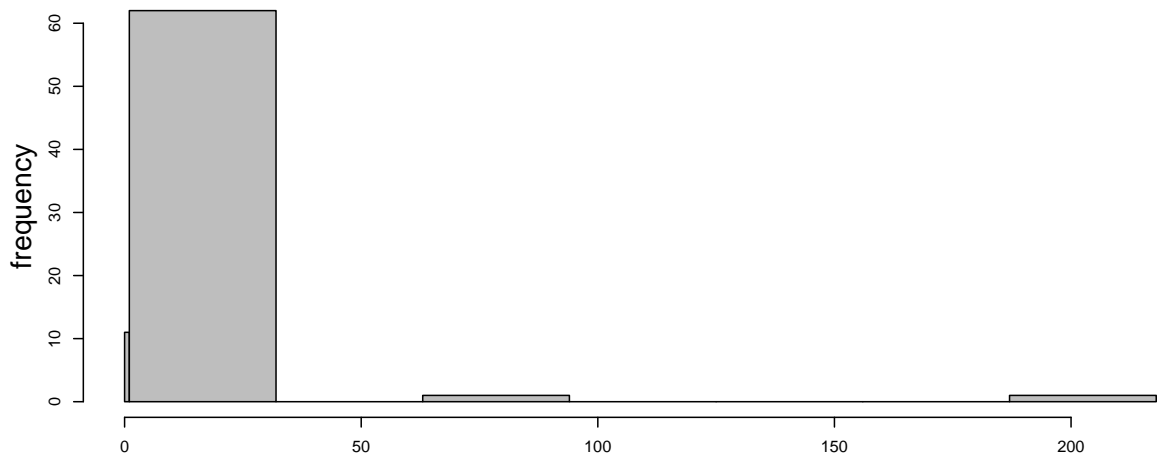
Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN					1079				
TR_NSW_OFF	0.2	2	5	40	1141	53.3	0.07	4.5	0.96
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW					1659				
DS_EDL					9013				
TR_EDL_IN					4064				
TR_EDL_OFF	6.04	2	118	1.69	1408	24.55	0.06	2.09	0.26
TR_TAS_BGS					217				
TR_TAS_E	6.02	43	28	153.57	1954	9.01	0.35	6.1	0.5
TR_TAS_ORO					146				
TR_TAS_W	18.31	6	94	6.38	1343	45.65	0.09	5.66	0.24
TR_BS_IN					3				
TR_ECDW									
AL_CSA					875				
AL_ESA					389				
AL_WBS_SAV					382				
AL_EBS_NSW					339				
AL_ET_WT					383				
AL_WSA_WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS					1636				
GN_EBS_NSW					3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN					10				
Total	30.57	53	0		31978			18.35	0.38

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."



# Deepwater Shark East

Observed discarded catches (kg)



Observed retained catches (kg)

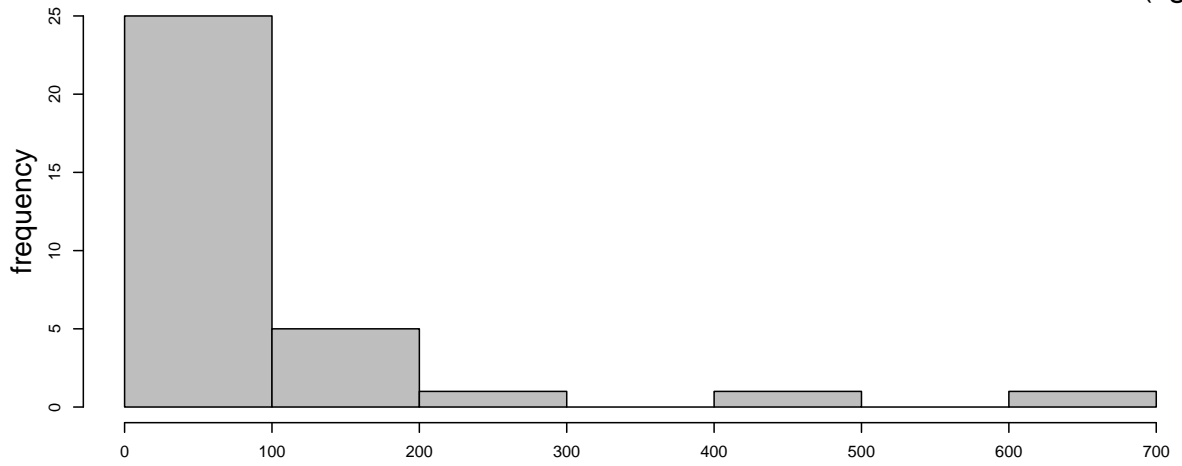


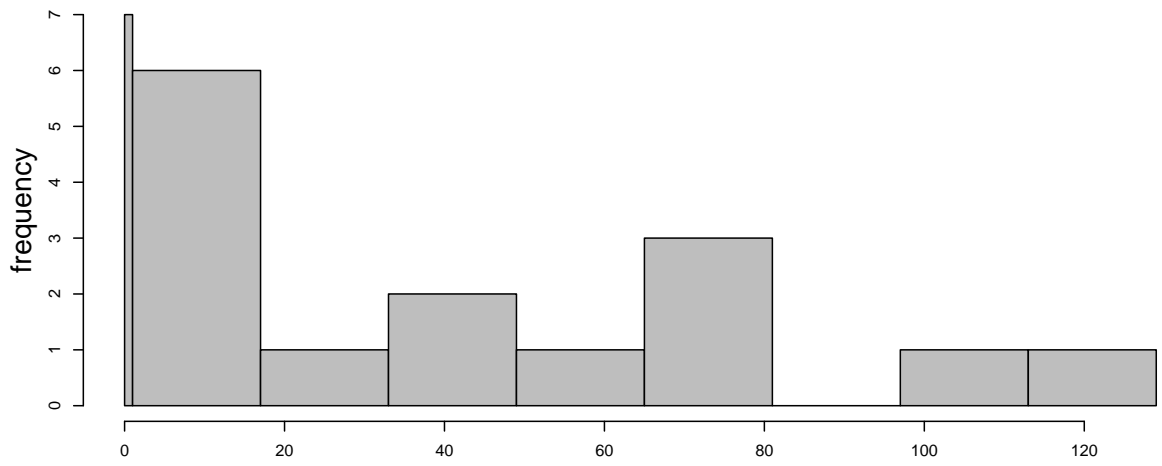
Table 36: Deepwater Shark West: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN					1079				
TR_NSW_OFF					1141				
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW	20.51	6	117	5.13	1659	34.08	0.18	9.98	0.33
DS_EDL					9013				
TR_EDL_IN					4064				
TR_EDL_OFF					1408				
TR_TAS_BGS					217				
TR_TAS_E					1954				
TR_TAS_ORO					146				
TR_TAS_W	30.05	4	149	2.68	1343	78.69	0.06	6.5	0.18
TR_BS_IN					3				
TR_ECDW									
AL_CSA					875				
AL_ESA					389				
AL_WBS_SAV					382				
AL_EBS_NSW					339				
AL_ET_WT					383				
AL_WSA_WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS					1636				
GN_EBS_NSW					3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN					10				
Total	50.56	10	0		31978			16.48	0.25

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# Deepwater Shark West

Observed discarded catches (kg)



Observed retained catches (kg)

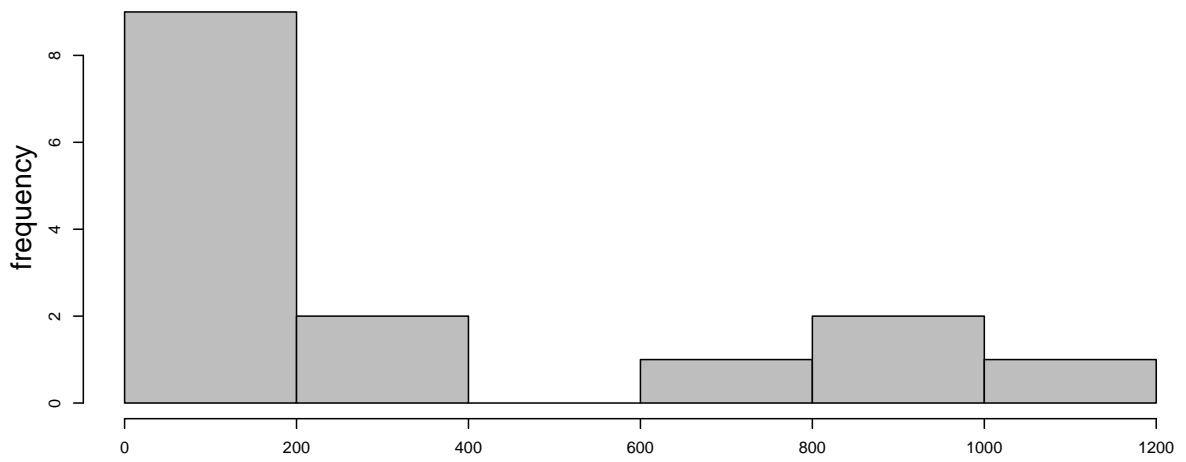


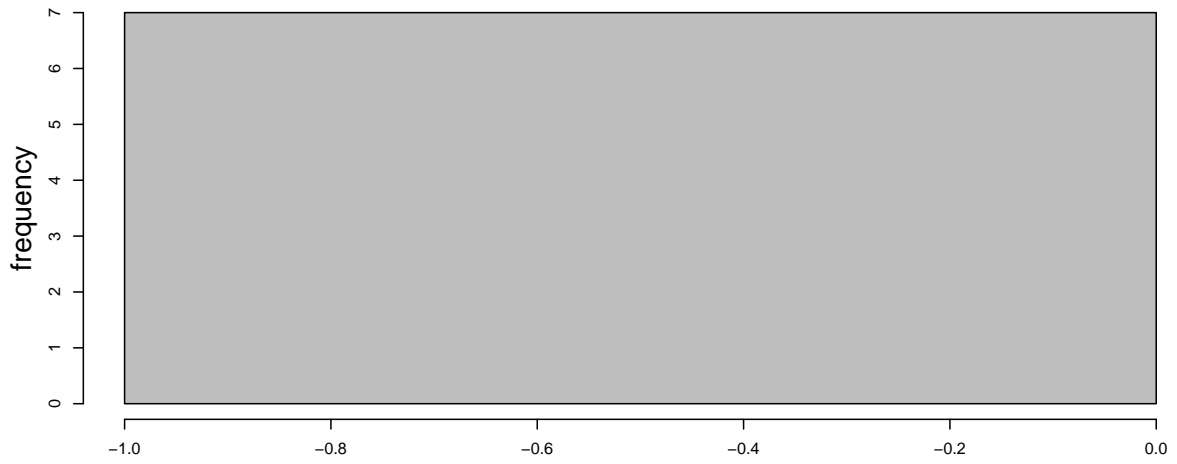
Table 37: Bight Redfish: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN					1079				
TR_NSW_OFF					1141				
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW					1659				
DS_EDL					9013				
TR_EDL_IN					4064				
TR_EDL_OFF					1408				
TR_TAS_BGS					217				
TR_TAS_E					1954				
TR_TAS_ORO					146				
TR_TAS_W					1343				
TR_BS_IN					3				
TR_GAB_In	294.81	43	1445	2.98	2606	0	0.47	0	0
TR_GAB_Mid	1.07		4		75				
TR_GAB_Off					1				
TR_ECDW									
AL_CSA	0.16		32		875				
AL_ESA					389				
AL_WBS_SAV					382				
AL_EBS_NSW					339				
AL_ET_WT					383				
AL_WSA_WA	0.05		7		111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS					1636				
GN_EBS_NSW					3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN					10				
Total	296.09	43	0		34660			0	0

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# Bight Redfish

Observed discarded catches (kg)



Observed retained catches (kg)

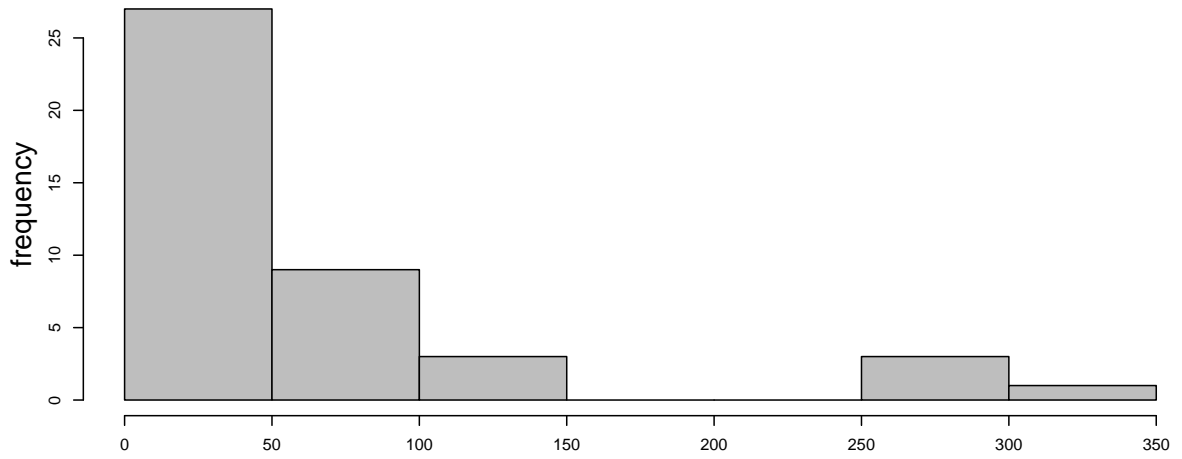


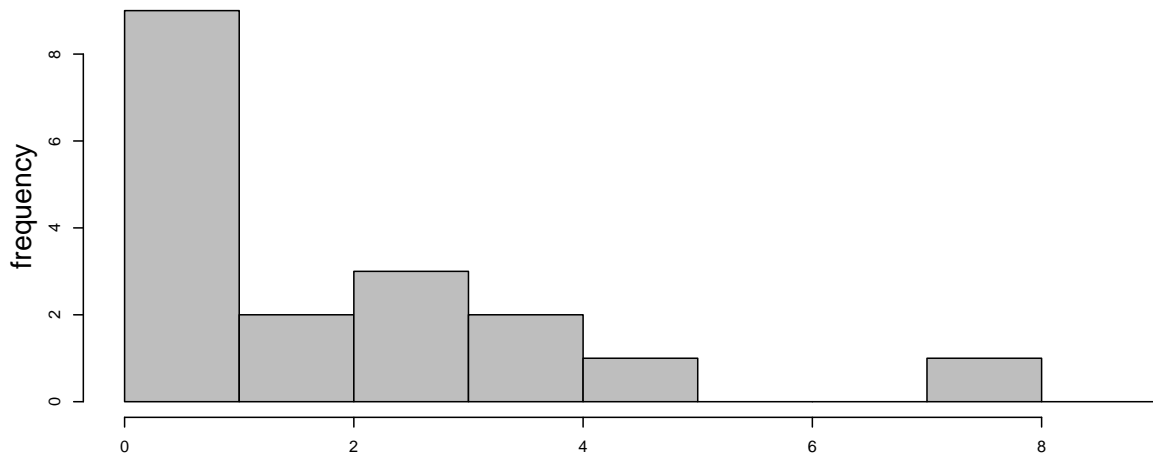
Table 38: Deepwater Flathead: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN					1079				
TR_NSW_OFF					1141				
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW					1659				
DS_EDL					9013				
TR_EDL_IN					4064				
TR_EDL_OFF					1408				
TR_TAS_BGS					217				
TR_TAS_E					1954				
TR_TAS_ORO					146				
TR_TAS_W					1343				
TR_BS_IN					3				
TR_GAB_In	389.52	90	2511	3.58	2606	0.34	0.99	0.88	0
TR_GAB_Mid	4.34	1	20	5	75	0	0.17	0	0
TR_GAB_Off					1				
TR_ECDW									
AL_CSA					875				
AL_ESA					389				
AL_WBS_SAV					382				
AL_EBS_NSW					339				
AL_ET_WT					383				
AL_WSA_WA					111				
GN_CSA					618				
GN_ESA					183				
GN_SAV					583				
GN_WBS					1636				
GN_EBS_NSW					3715				
GN_ET_WT					290				
GN_WA_WSA									
UNKNOWN					10				
Total	393.86	91	0		34660			0.88	0

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# Deepwater Flathead

Observed discarded catches (kg)



Observed retained catches (kg)

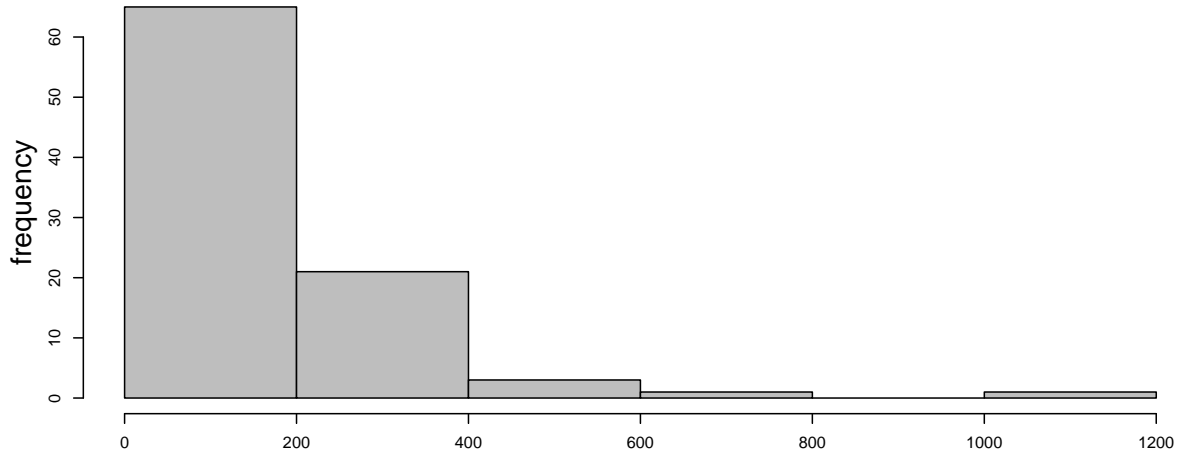


Table 39: School Shark: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

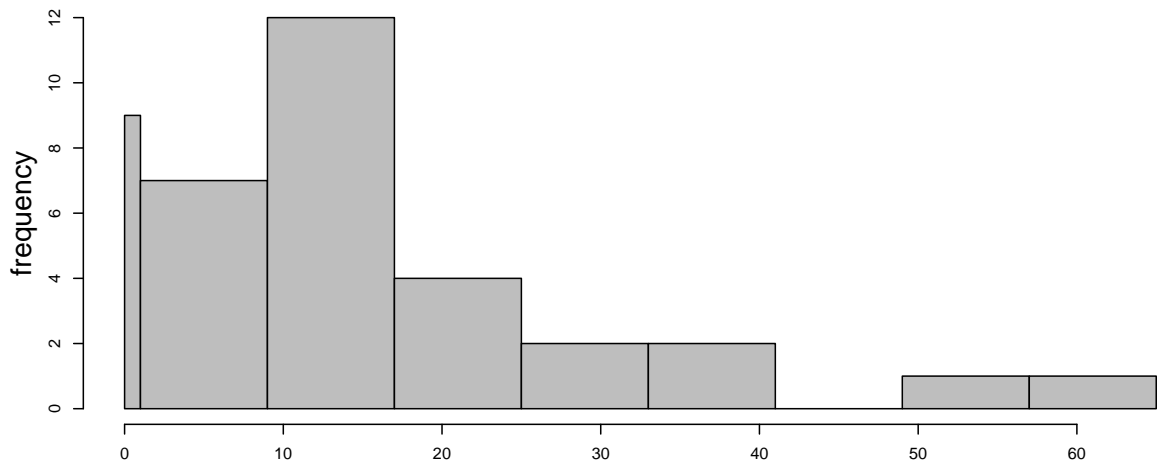
Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN	0.11		9		1079				
TR_NSW_OFF	0.04	2	2	100	1141	11	0.07	0.93	0.96
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW	7.67	13	198	6.57	1659	11.54	0.38	7.32	0.49
DS_EDL	0.07	3	15	20	9013	4.67	0.04	1.62	0.96
TR_EDL_IN	0.19	1	26	3.85	4064	29.2	0.01	1.25	0.87
TR_EDL_OFF	0.09	1	12	8.33	1408	12.8	0.03	0.55	0.86
TR_TAS_BGS					217				
TR_TAS_E	0.84	5	51	9.8	1954	0	0.04	0	0
TR_TAS_ORO					146				
TR_TAS_W	12.6	5	133	3.76	1343	0.97	0.08	0.1	0.01
TR_BS_IN					3				
TR_ECDW									
AL_CSA	19.93	6	308	1.95	875	16	0.23	3.23	0.14
AL_ESA	2.86	7	91	7.69	389	2	0.33	0.26	0.08
AL_WBS_SAV	2.9		50		382				
AL_EBS_NSW	0.3		10		339				
AL_ET_WT	4.93		88		383				
AL_WSA_WA	6.01		81		111				
GN_CSA	7.17	14	278	5.04	618	10.07	0.93	5.81	0.45
GN_ESA	5.57		114		183				
GN_SAV	11.88	5	263	1.9	583	0.2	0.62	0.07	0.01
GN_WBS	23.08	3	530	0.57	1636	0	0.5	0	0
GN_EBS_NSW	17.18	4	773	0.52	3715	1	0.67	2.48	0.13
GN_ET_WT	8.52		83		290				
GN_WA_WSA									
UNKNOWN	0.02		1		10				
Total	131.96	69	0		31978			23.62	0.19

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."



# School Shark

Observed discarded catches (kg)



Observed retained catches (kg)

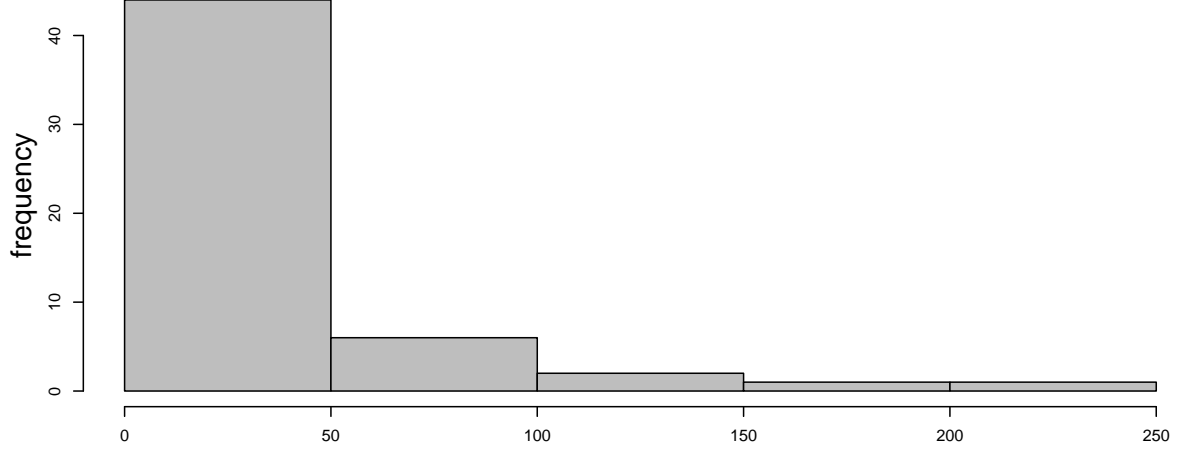


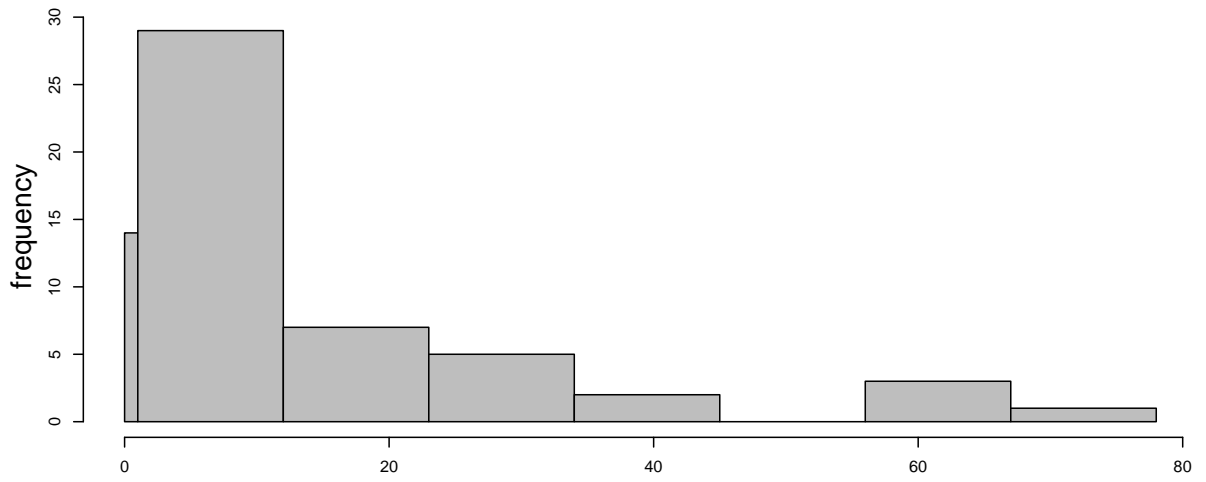
Table 40: Gummy Shark: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN	0.77	2	65	3.08	1079	0	0.05	0	0
TR_NSW_OFF	0.88		60		1141				
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW	10.19	11	213	5.16	1659	6.9	0.32	3.7	0.27
DS_EDL	20.45	15	1843	0.81	9013	11.64	0.19	20.18	0.5
TR_EDL_IN	19.95	29	799	3.63	4064	8.28	0.31	10.27	0.34
TR_EDL_OFF	7.11	9	183	4.92	1408	7.61	0.27	2.92	0.29
TR_TAS_BGS					217				
TR_TAS_E	11.29	18	470	3.83	1954	0	0.15	0	0
TR_TAS_ORO					146				
TR_TAS_W	2.13	7	67	10.45	1343	13.59	0.11	1.97	0.48
TR_BS_IN					3				
TR_ECDW									
AL_CSA	152.36	4	852	0.47	875	0	0.15	0	0
AL_ESA	31.26	2	359	0.56	389	1	0.1	0.04	0
AL_WBS_SAV	29.66		287		382				
AL_EBS_NSW	33.93	10	230	4.35	339	0.55	0.06	0.01	0
AL_ET_WT	33.27		192		383				
AL_WSA_WA	34.45		105		111				
GN_CSA	70.53	15	616	2.44	618	0.8	1	0.49	0.01
GN_ESA	27.19		180		183				
GN_SAV	43.91	8	574	1.39	583	4.25	1	2.48	0.05
GN_WBS	224.68	5	1599	0.31	1636	1.8	0.83	2.45	0.01
GN_EBS_NSW	575.02	6	3643	0.16	3715	1.33	1	4.95	0.01
GN_ET_WT	40.44		289		290				
GN_WA_WSA									
UNKNOWN					10				
Total	1369.47	141	0		31978			49.46	0.04

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# Gummy Shark

Observed discarded catches (kg)



Observed retained catches (kg)

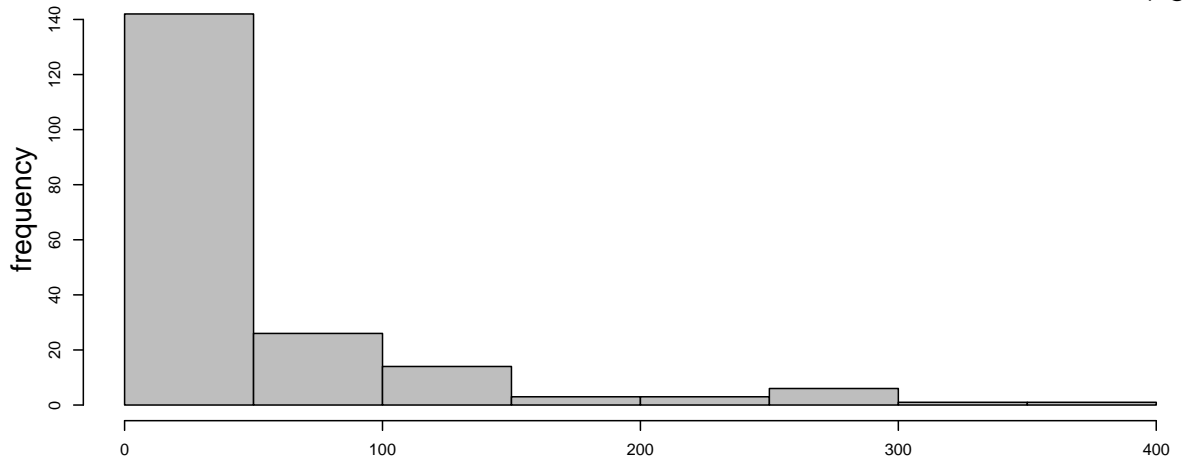


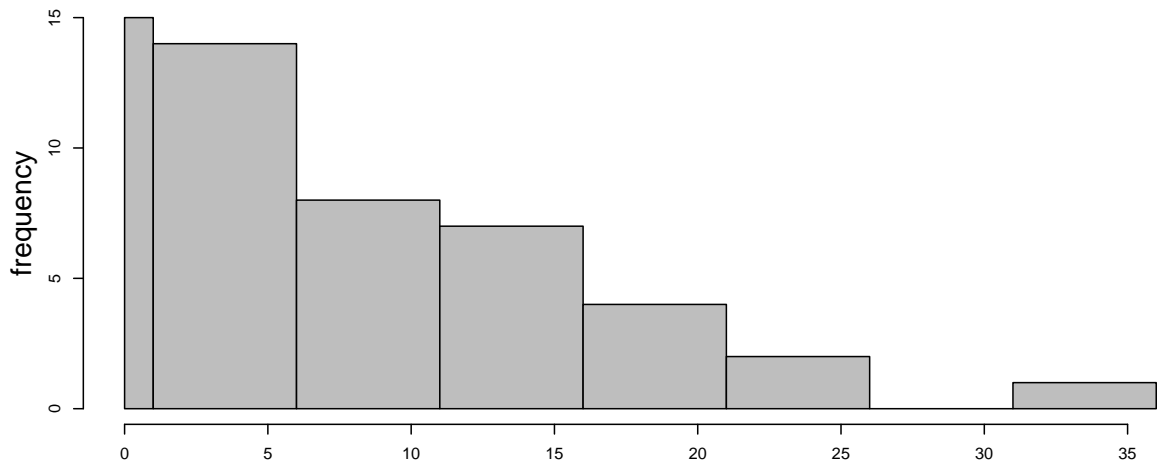
Table 41: Saw Shark: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN	5.9	6	199	3.02	1079	2.05	0.14	0.3	0.05
TR_NSW_OFF	11.77	6	358	1.68	1141	0.4	0.22	0.1	0.01
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW	13.66	12	221	5.43	1659	0	0.35	0	0
DS_EDL	20.18	19	1896	1	9013	1.04	0.24	2.29	0.1
TR_EDL_IN	15.16	24	822	2.92	4064	0	0.25	0	0
TR_EDL_OFF	1.48	8	84	9.52	1408	0	0.24	0	0
TR_TAS_BGS					217				
TR_TAS_E	1.41	6	130	4.62	1954	0	0.05	0	0
TR_TAS_ORO					146				
TR_TAS_W	0.57	1	20	5	1343	0	0.02	0	0
TR_BS_IN					3				
TR_ECDW									
AL_CSA	0.76		33		875				
AL_ESA	0.11		13		389				
AL_WBS_SAV	0.11		29		382				
AL_EBS_NSW	1.06	2	5	40	339	0.3	0.01	0	0
AL_ET_WT	0.02		4		383				
AL_WSA_WA	0.01		3		111				
GN_CSA	2.16	7	294	2.38	618	3.57	0.47	1.03	0.32
GN_ESA	1.61		98		183				
GN_SAV	11.68	7	460	1.52	583	3.57	0.88	1.82	0.13
GN_WBS	22.97	6	1159	0.52	1636	4	1	6.54	0.22
GN_EBS_NSW	46.21	6	2471	0.24	3715	2.33	1	8.67	0.16
GN_ET_WT	1.48		145		290				
GN_WA_WSA									
UNKNOWN	0.23		2		10				
Total	158.54	110	0		31978			20.75	0.12

[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# Saw Shark

Observed discarded catches (kg)



Observed retained catches (kg)

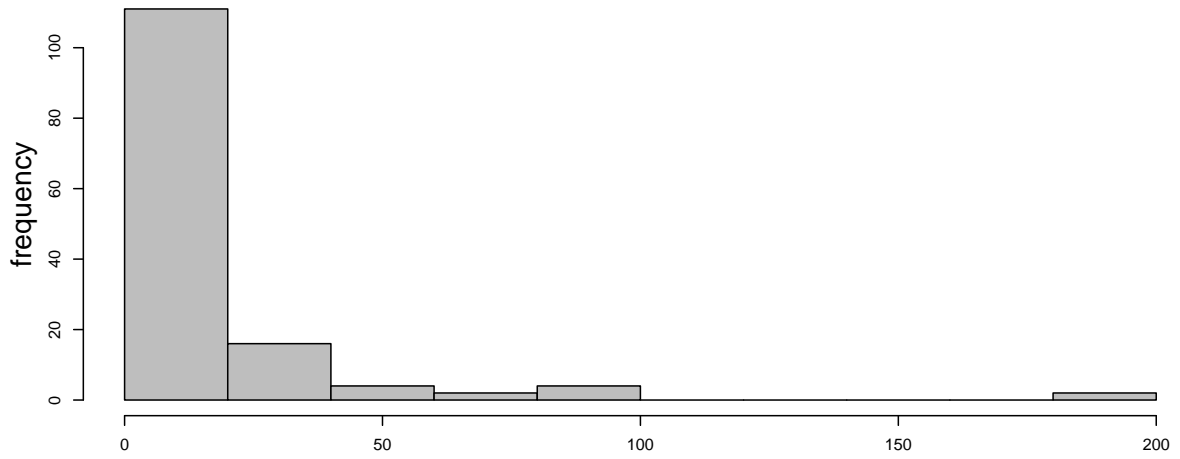


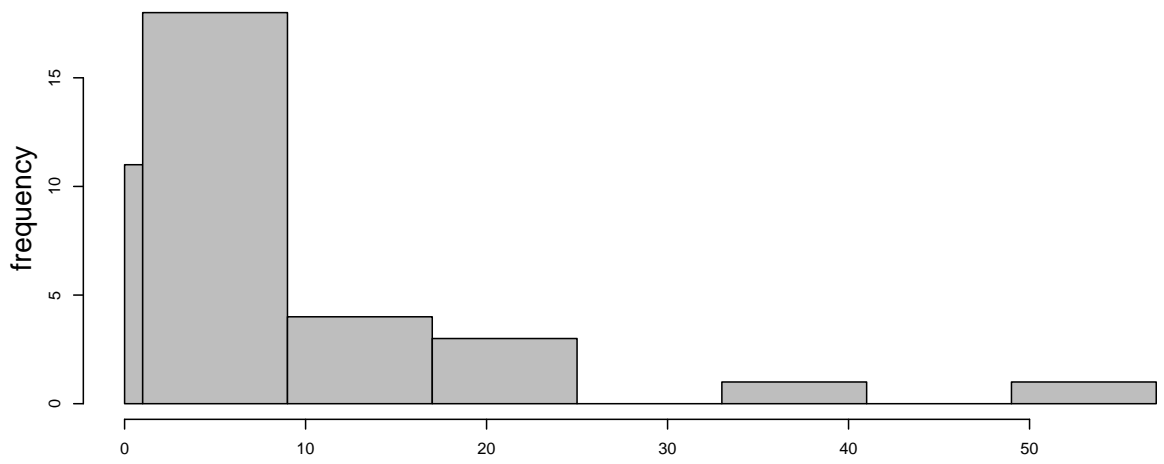
Table 42: Elephantfish: 2018 logbook landings, numbers of observed shots (Nobs) , numbers of logbook shots per species (NlogSp) and per strata (NlogStra), percent observed (Obs discard per shot (D/shot), estimated discarded tons (Dlog) and discard rate (Disc rate).

Stratum	Landings (t)	Nobs	NlogSp	Obs %	NlogStra	D/shot (kg)	Hit rate	Dlog (t)	Disc rate
TR_NSW_GEM					46				
TR_NSW_IN	0		1		1079				
TR_NSW_OFF	0.07		2		1141				
TR_NSW_RRP					250				
TR_SW_BGS					139				
TR_SW_ORO					2				
TR_SW	0.64		21		1659				
DS_EDL	9.14	7	802	0.87	9013	0.71	0.09	0.58	0.06
TR_EDL_IN	3.49	9	176	5.11	4064	1.42	0.09	0.55	0.14
TR_EDL_OFF	0.2	3	8	37.5	1408	0	0.09	0	0
TR_TAS_BGS					217				
TR_TAS_E	1.81	6	66	9.09	1954	0	0.05	0	0
TR_TAS_ORO					146				
TR_TAS_W	0.76	2	26	7.69	1343	0	0.03	0	0
TR_BS_IN					3				
TR_ECDW									
AL_CSA					875				
AL_ESA					389				
AL_WBS_SAV	0		1		382				
AL_EBS_NSW	0	6	1	600	339	4.62	0.03	0.05	1
AL_ET_WT					383				
AL_WSA_WA					111				
GN_CSA	0.04	1	12	8.33	618	1	0.07	0.04	0.5
GN_ESA	0.17		44		183				
GN_SAV	0.27	6	71	8.45	583	0.33	0.75	0.15	0.36
GN_WBS	5.41	6	443	1.35	1636	1.5	1	2.45	0.31
GN_EBS_NSW	19.75	6	1369	0.44	3715	25.83	1	95.97	0.83
GN_ET_WT	1.03		61		290				
GN_WA_WSA									
UNKNOWN	0.03		1		10				
Total	42.81	52	0		31978			99.79	0.71

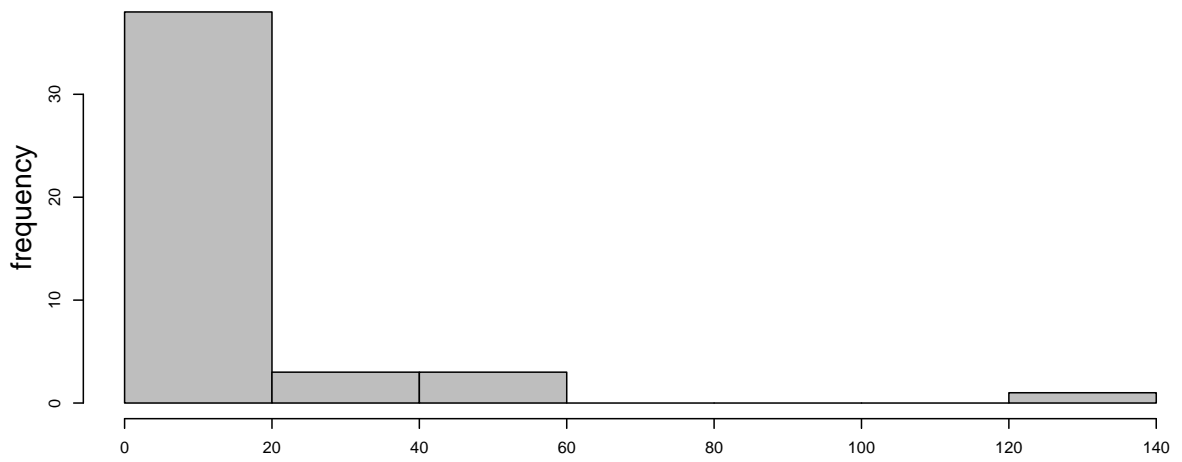
[1] "Note that the estimated discarded catch weights presented in this report are calculated from logbook catch estimates and therefore do not match those provided in Burch et. al. (2019a) which are scaled to the CDR catch."

# Elephantfish

Observed discarded catches (kg)



Observed retained catches (kg)



## **5 Discussion**

In addition to the work requested by SESSFRAG in 2018 there are now 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 based approach (Bergh et al., 2009) 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.

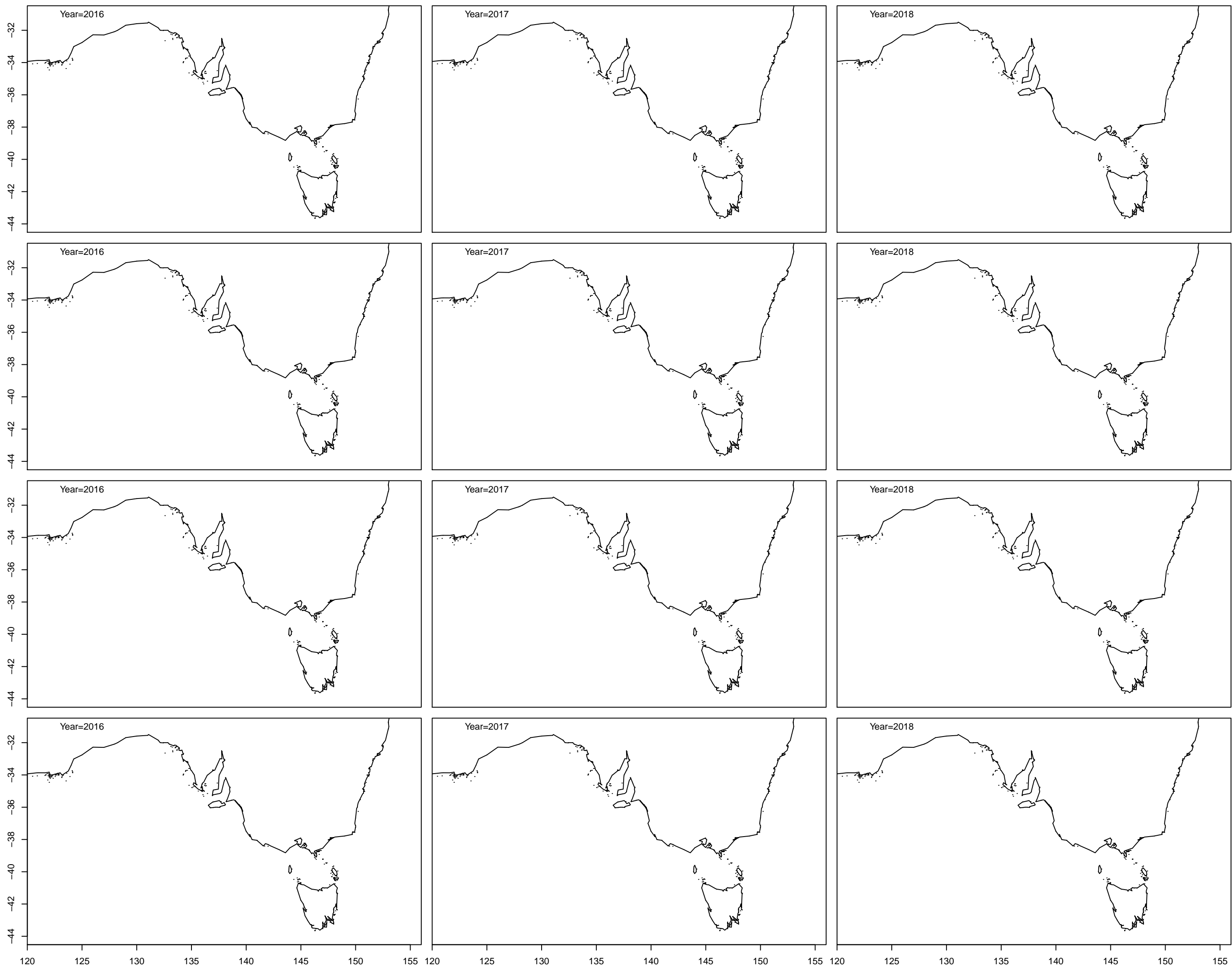


## References

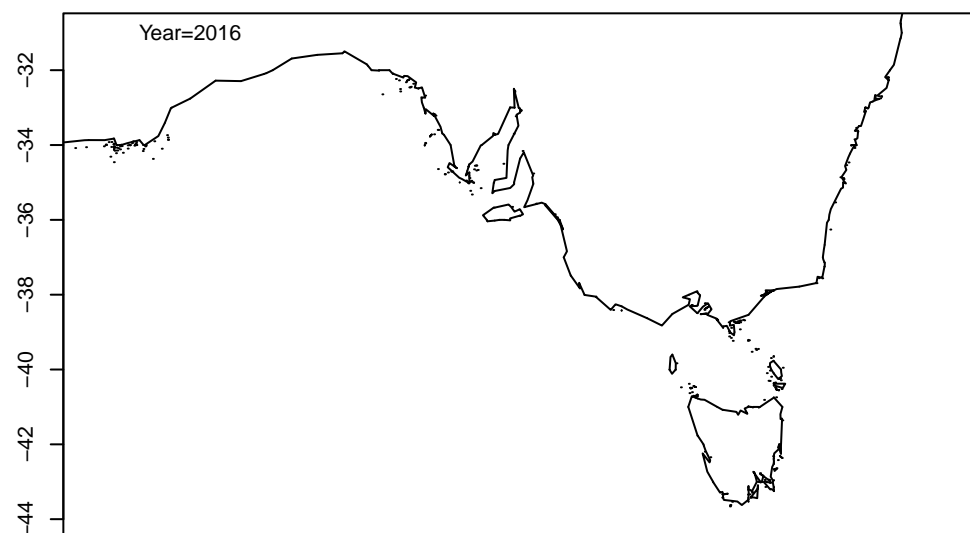
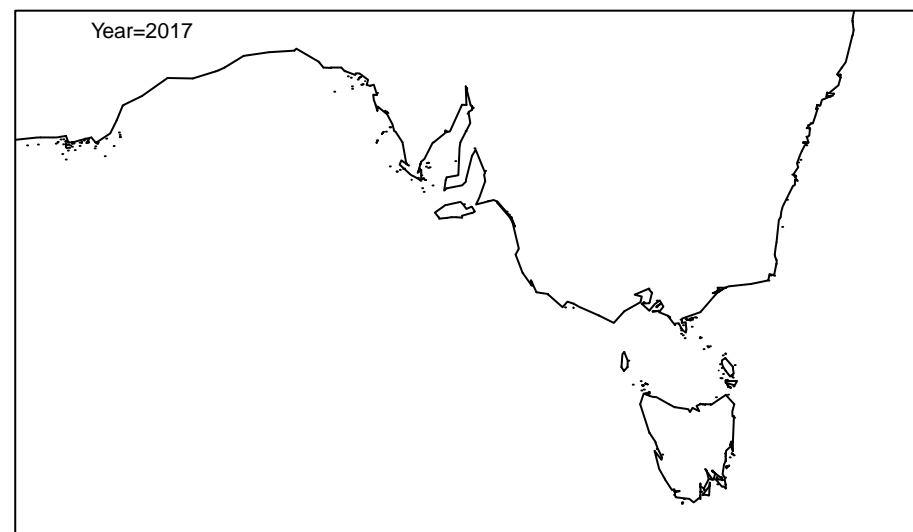
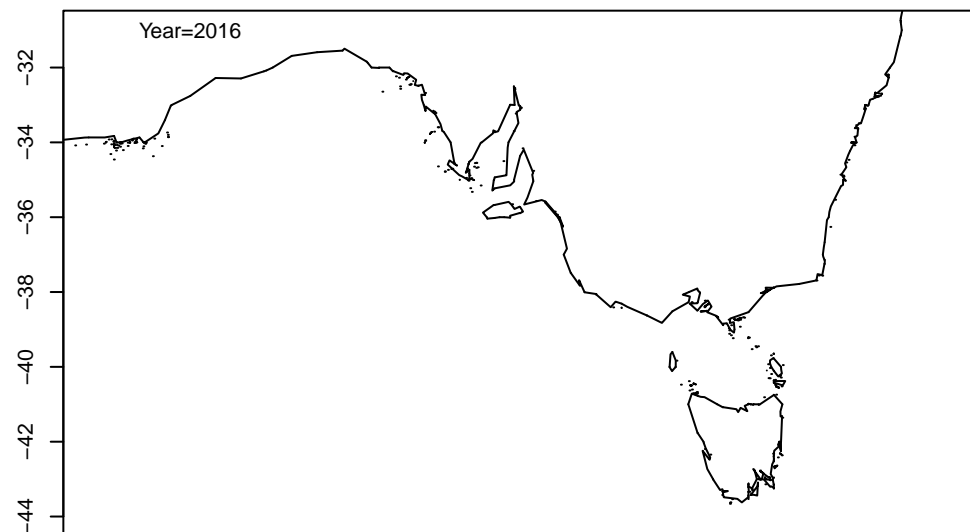
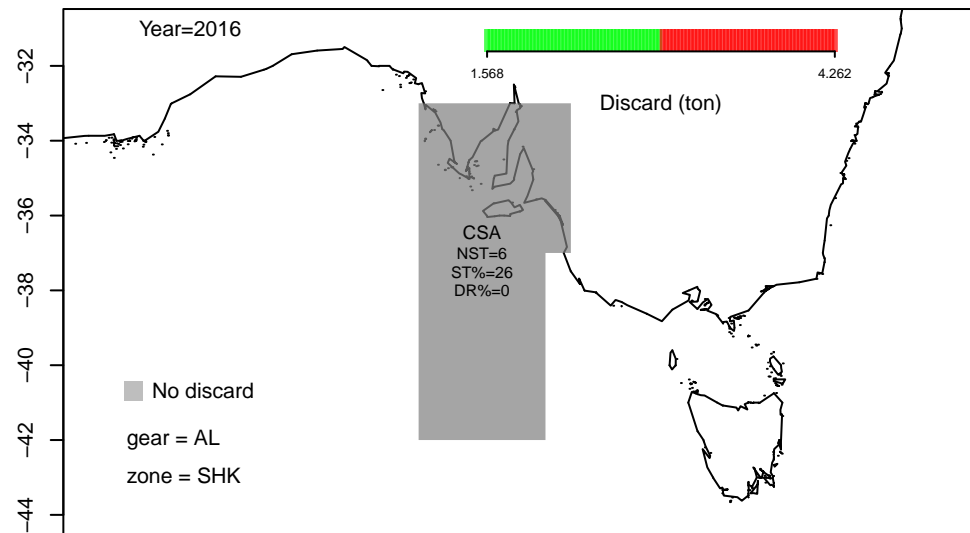
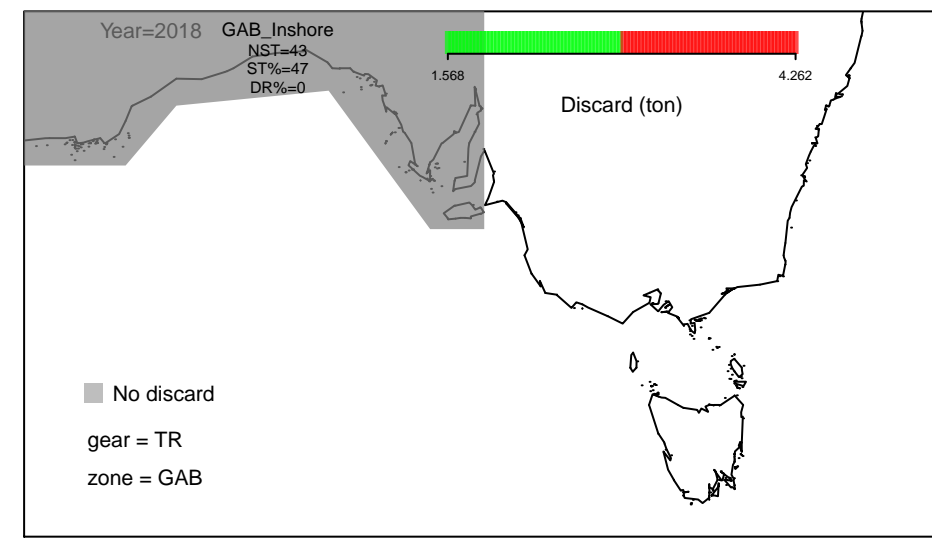
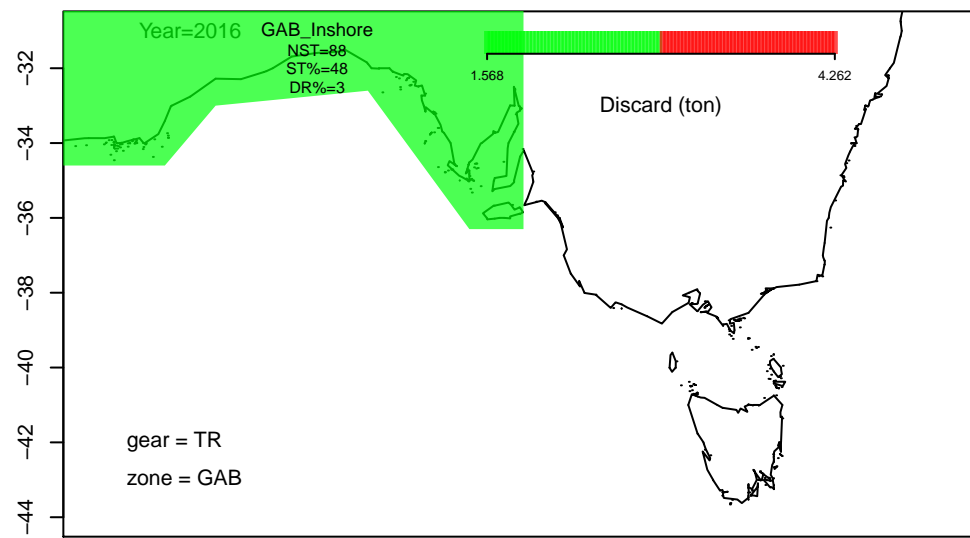
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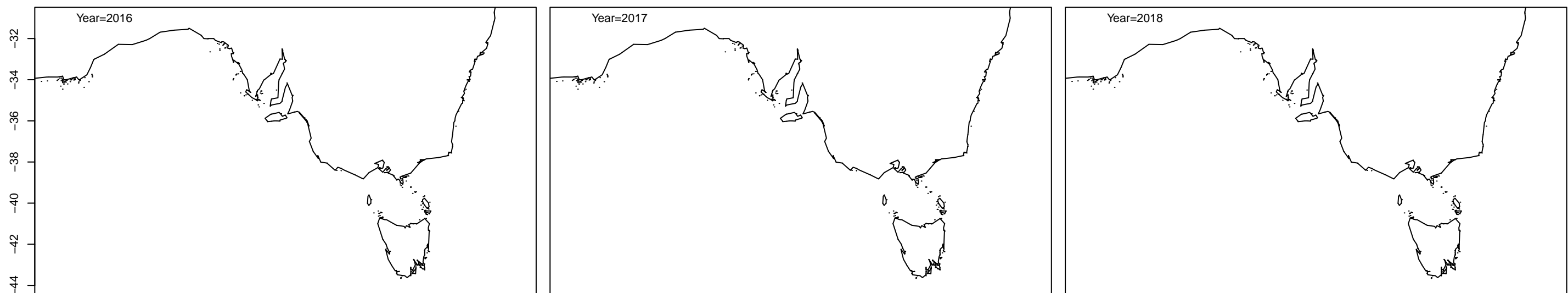
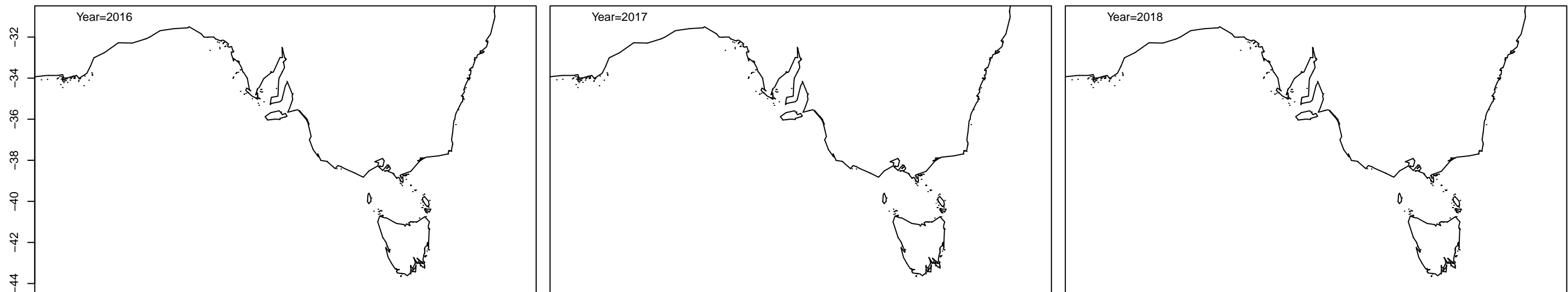
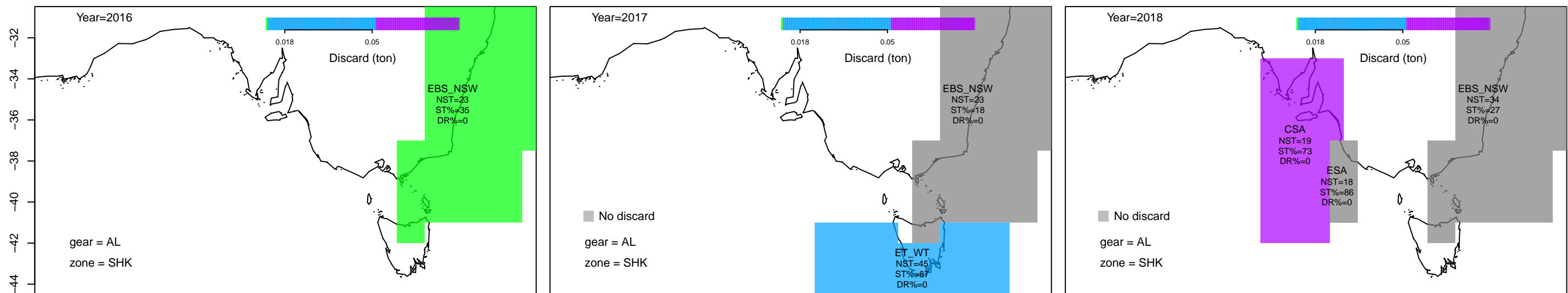
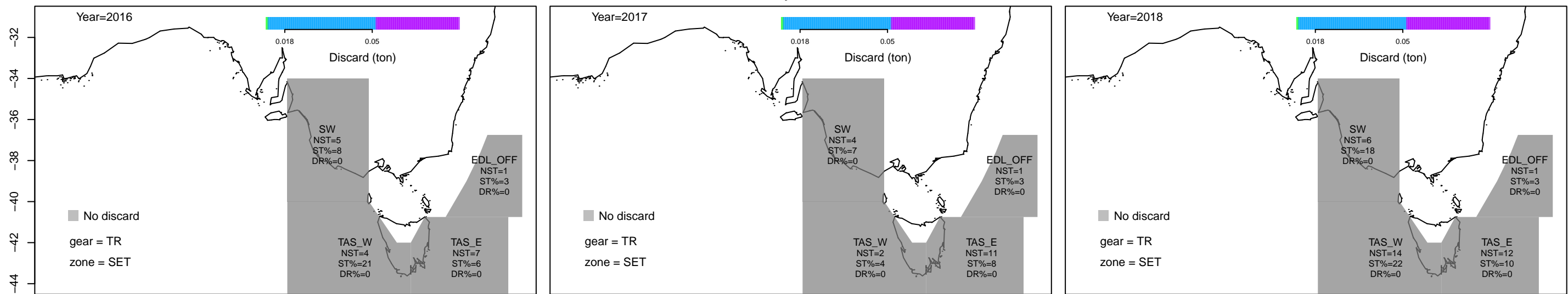
# Alfonsino



# Bight Redfish

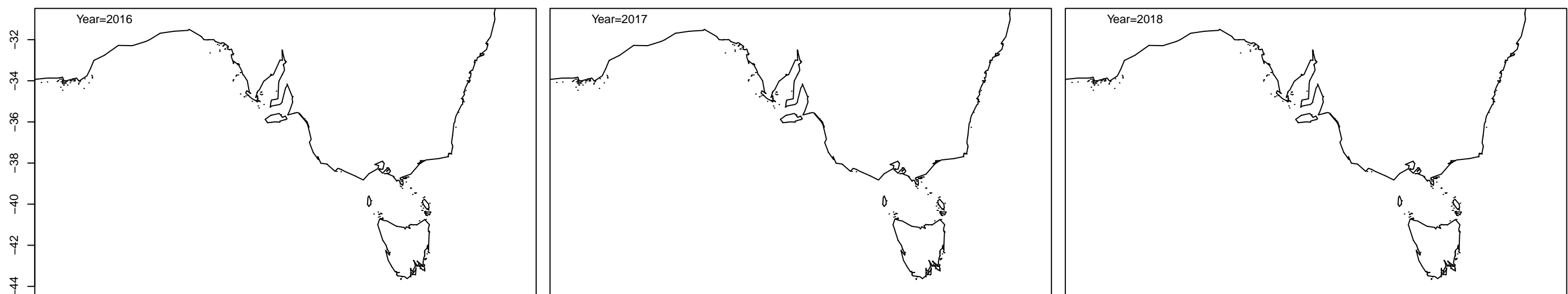
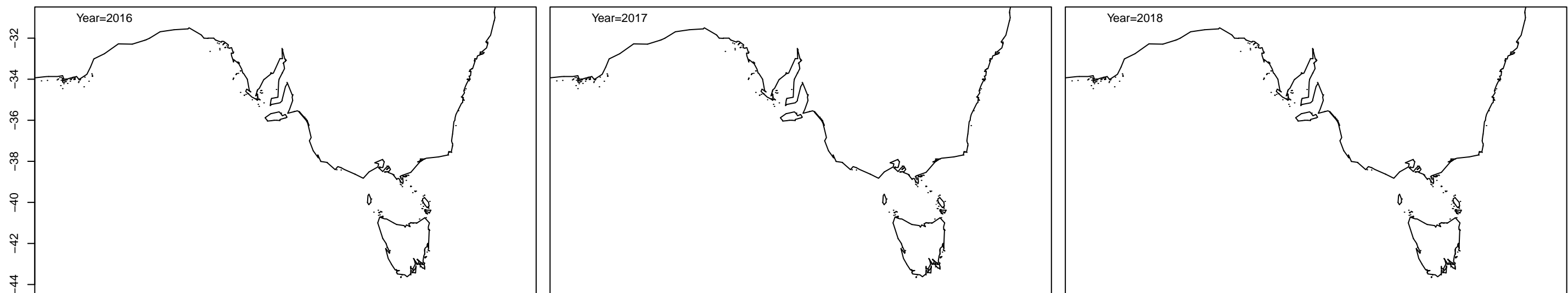
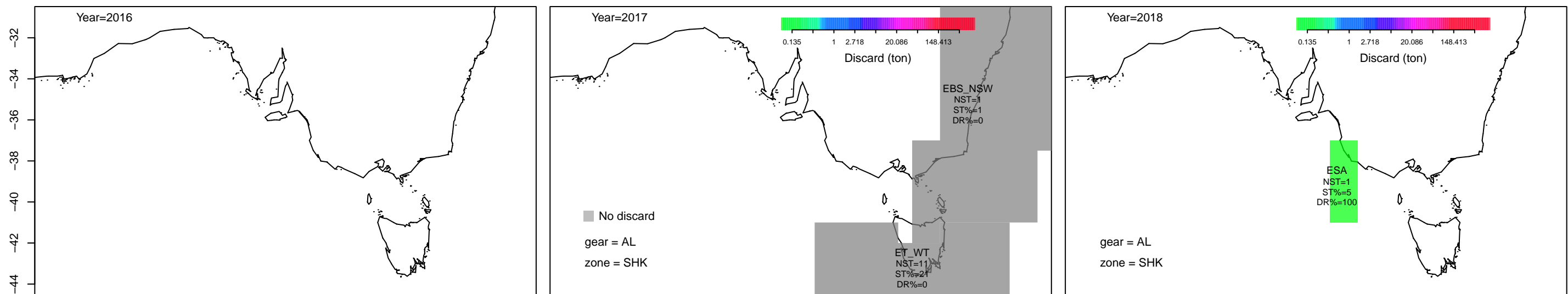
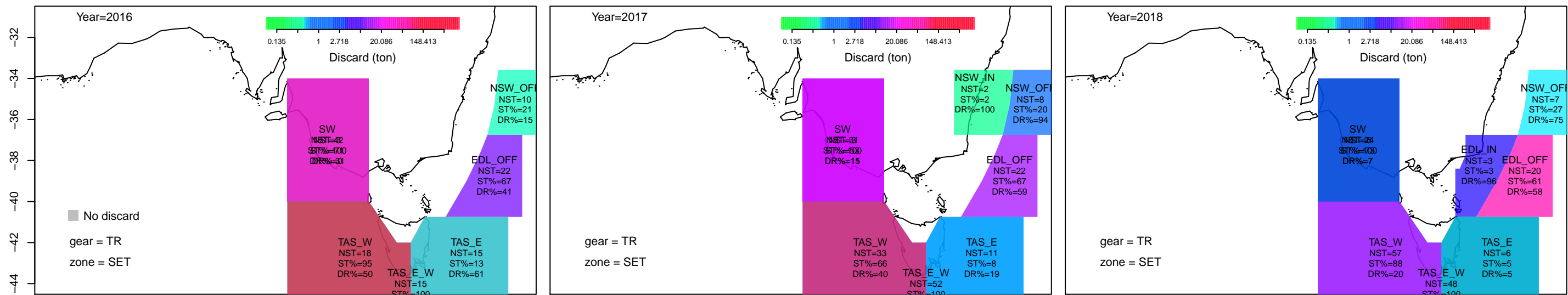


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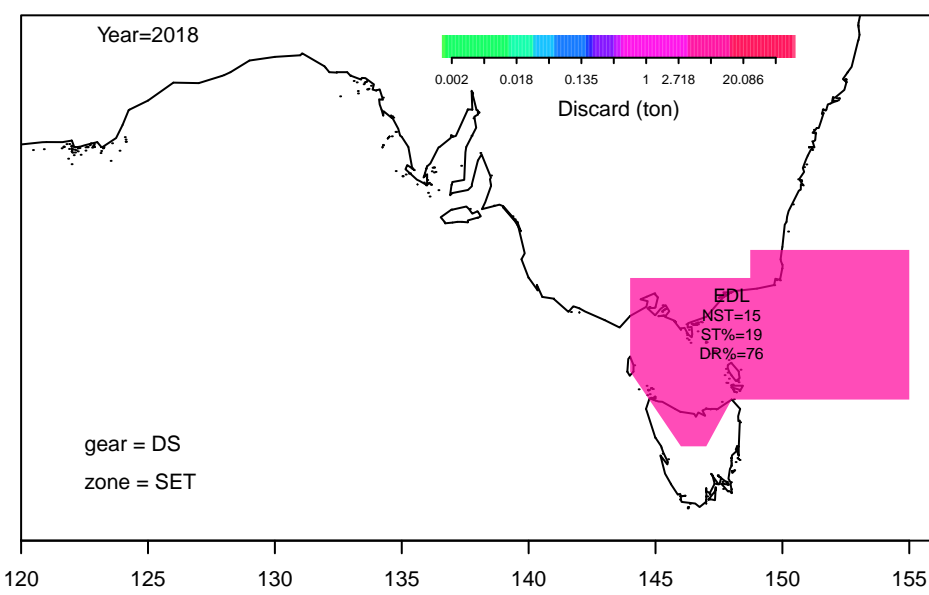
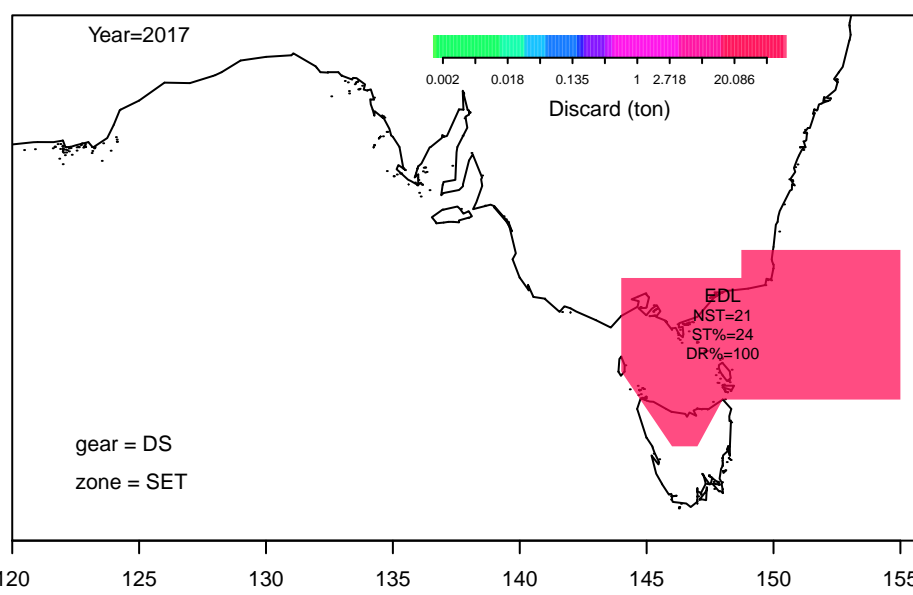
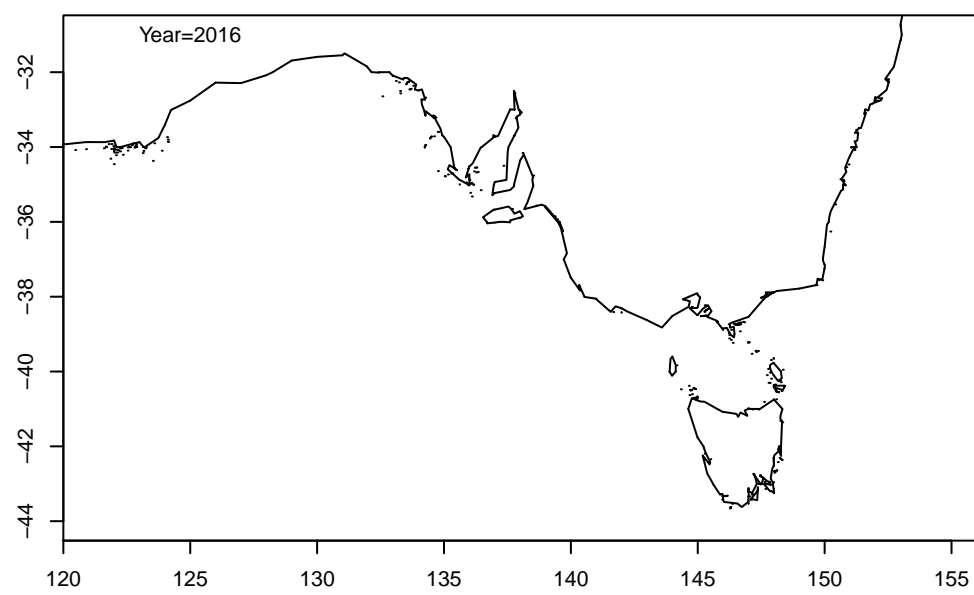
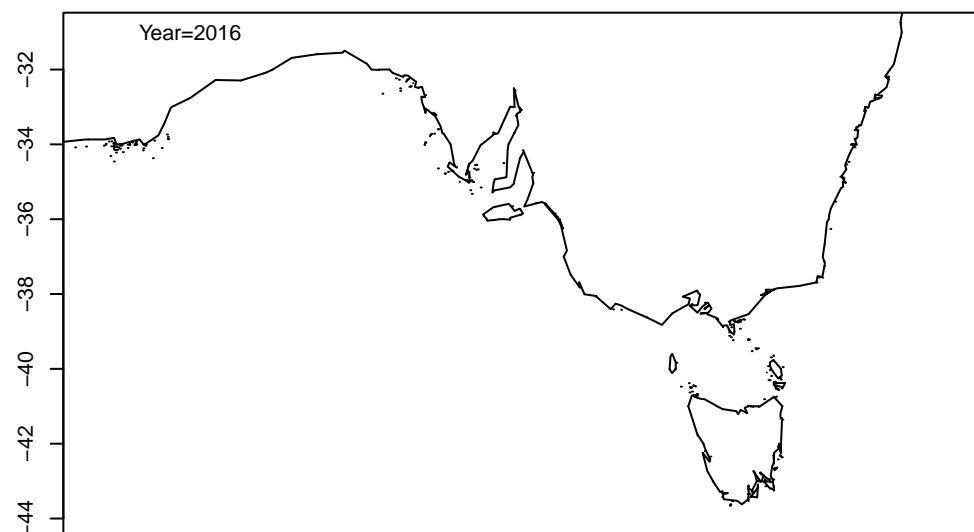
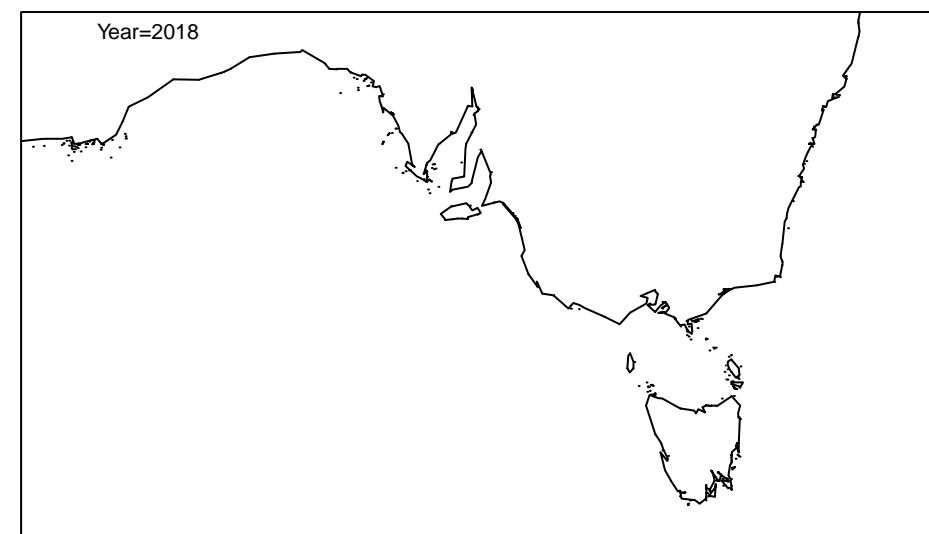
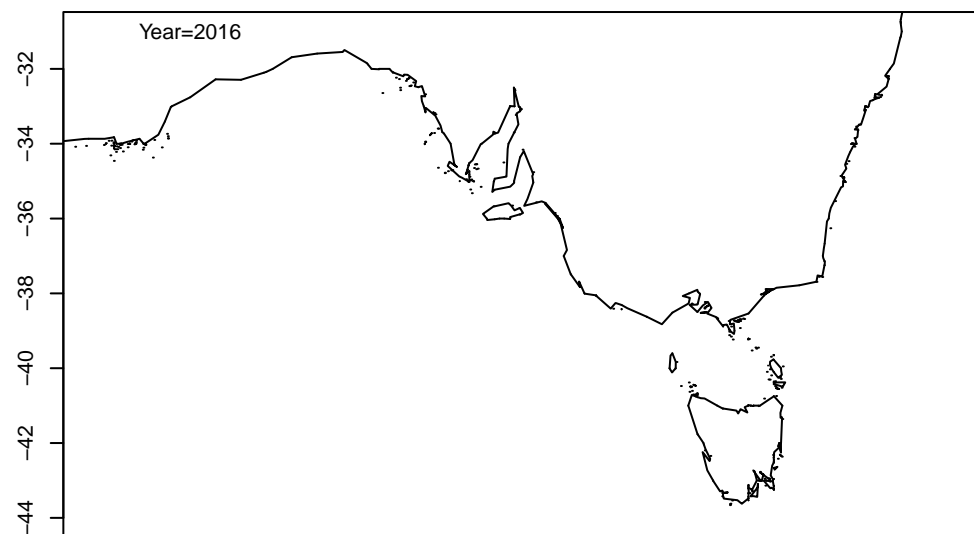
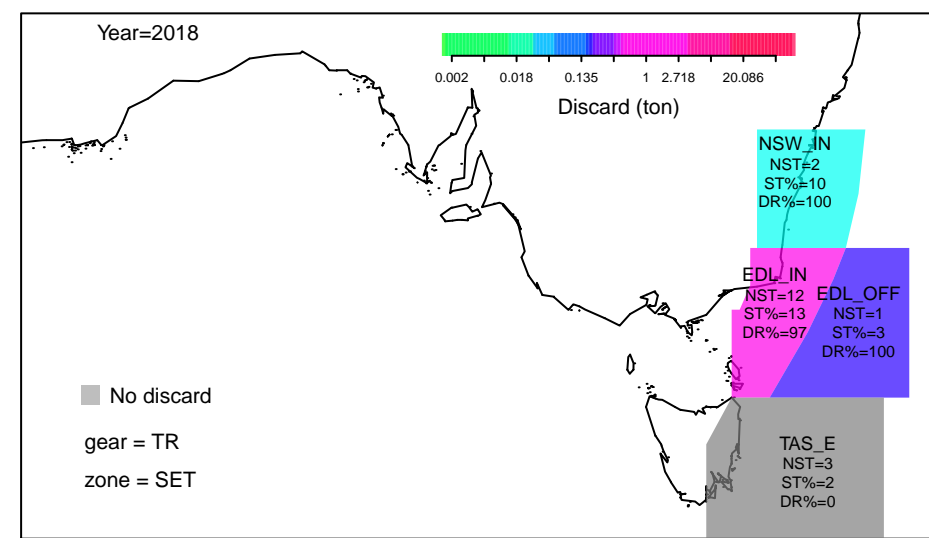
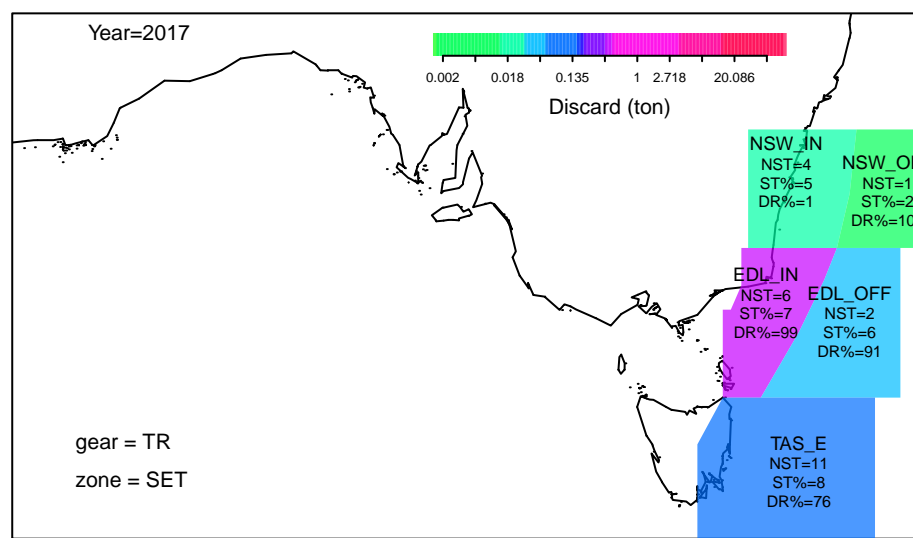
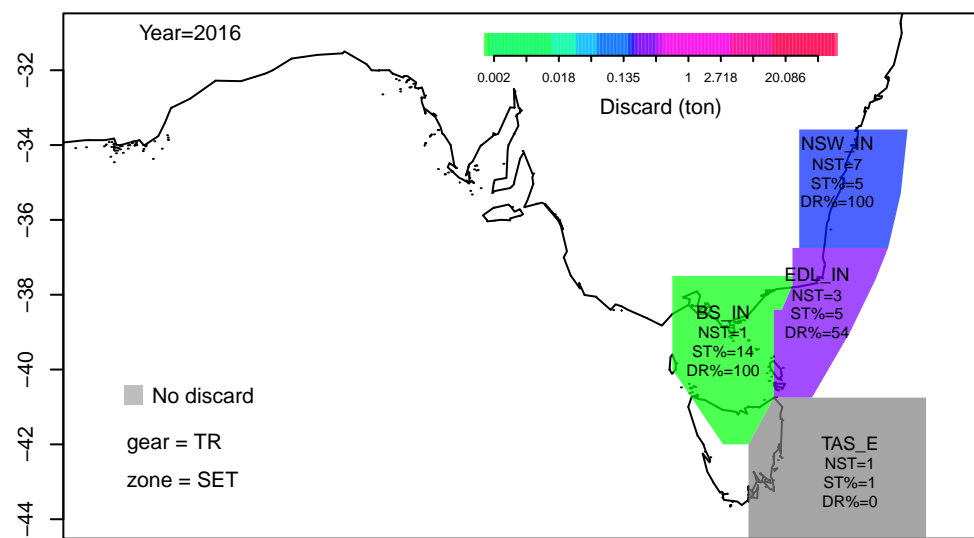
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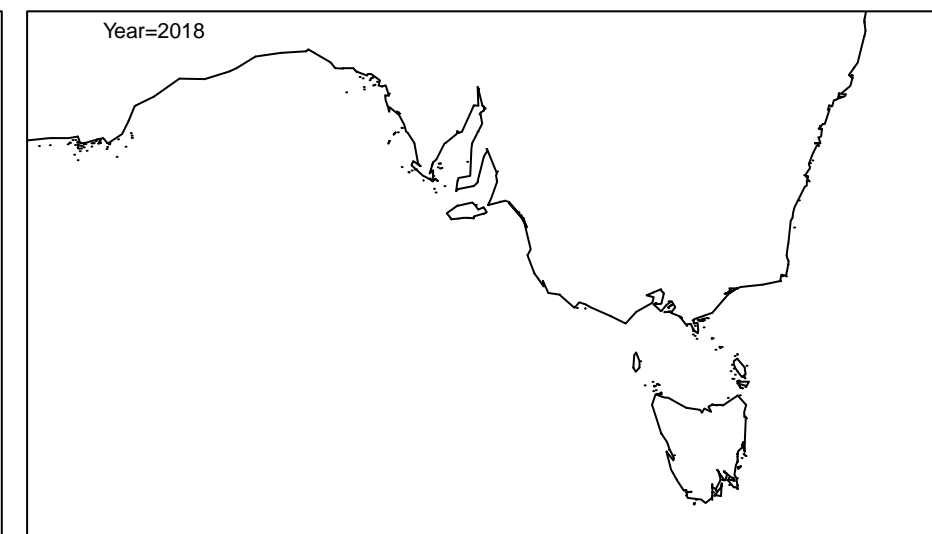
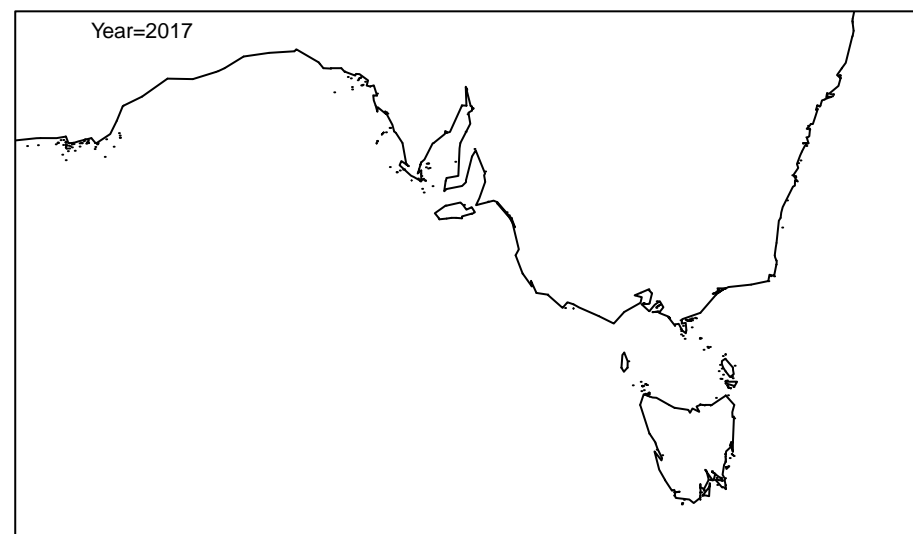
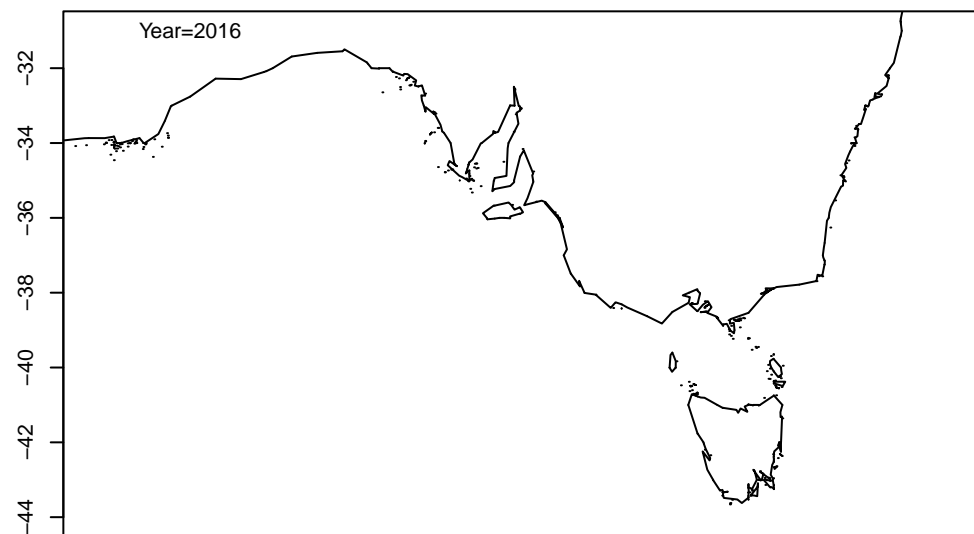
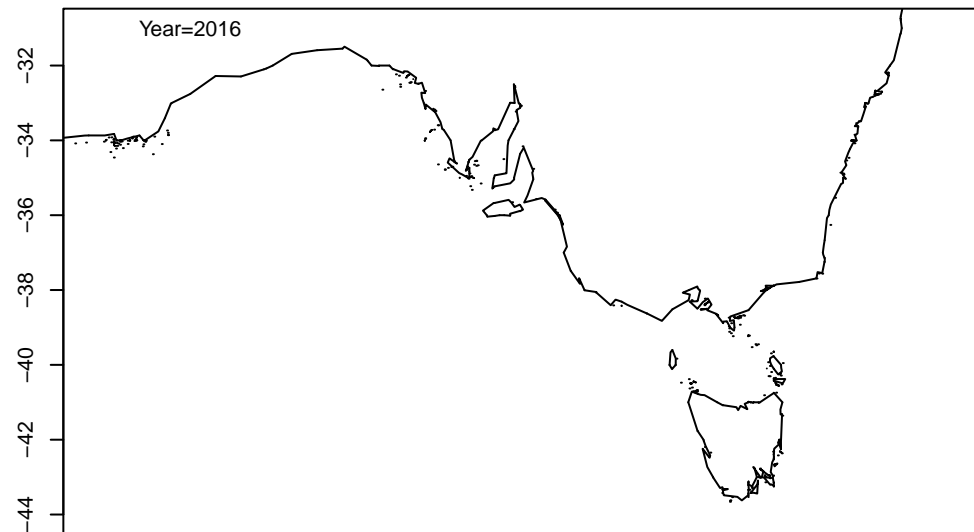
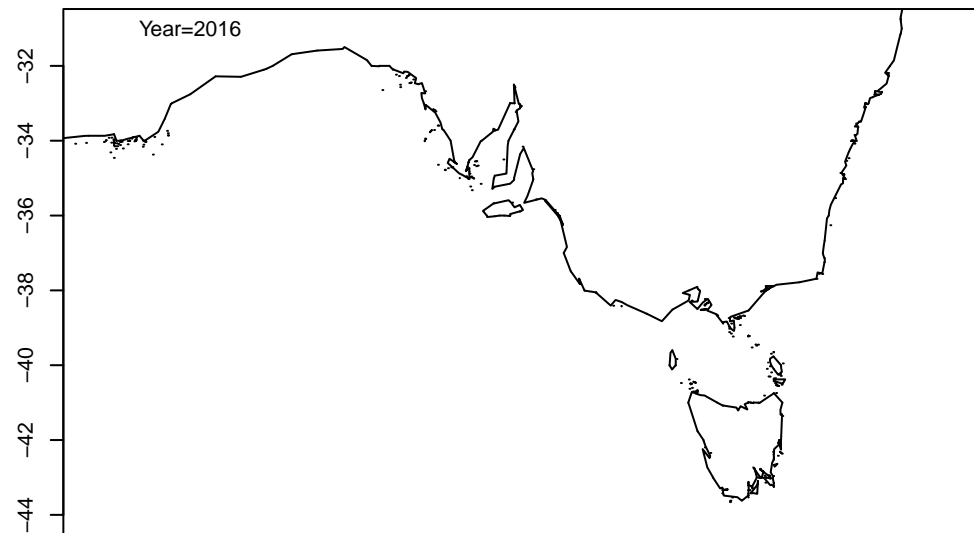
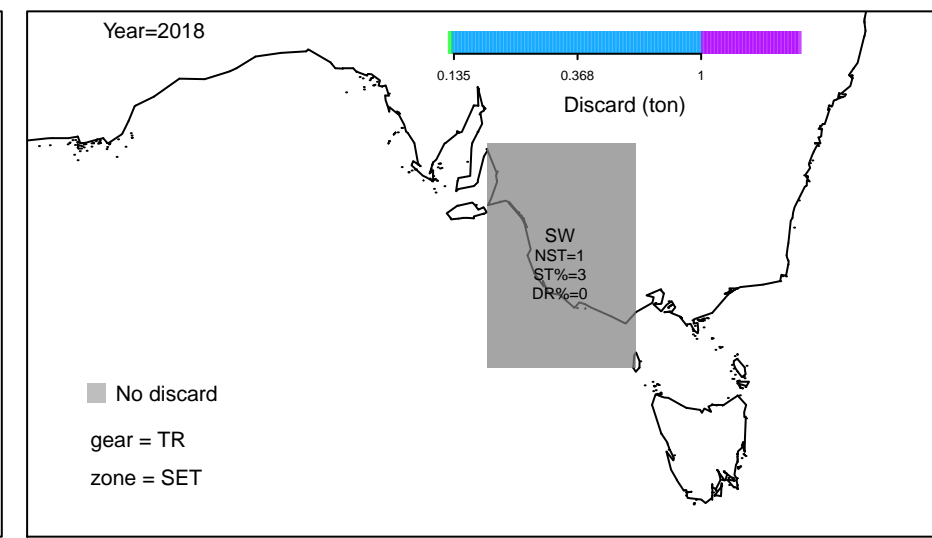
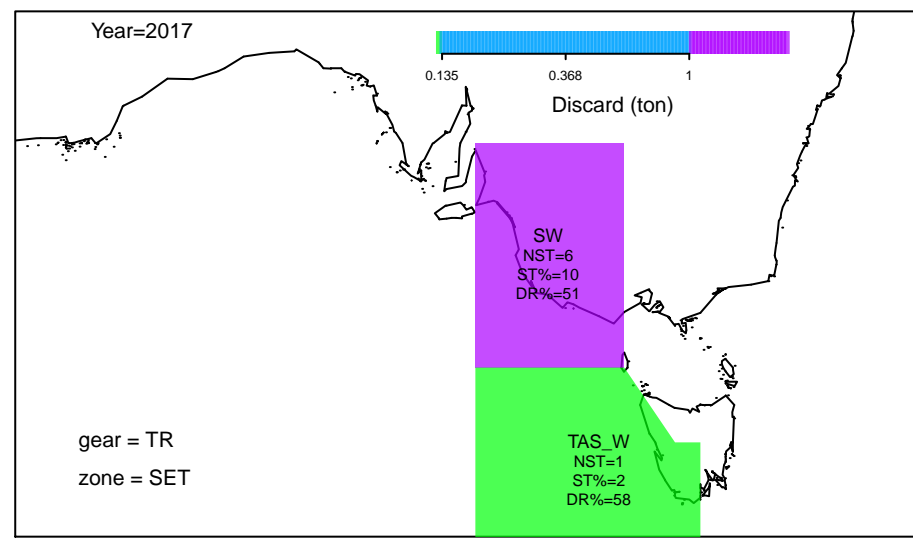
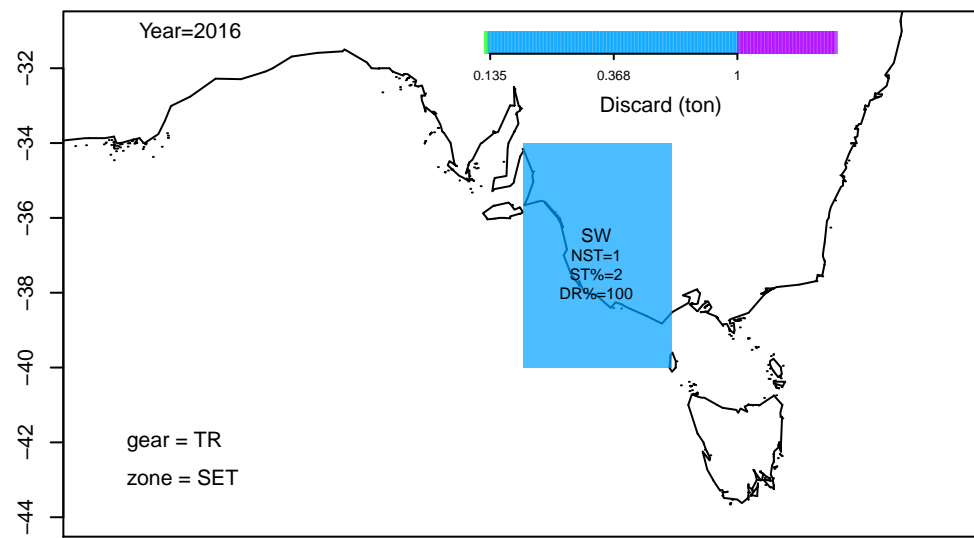


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# Blue Warehouse East



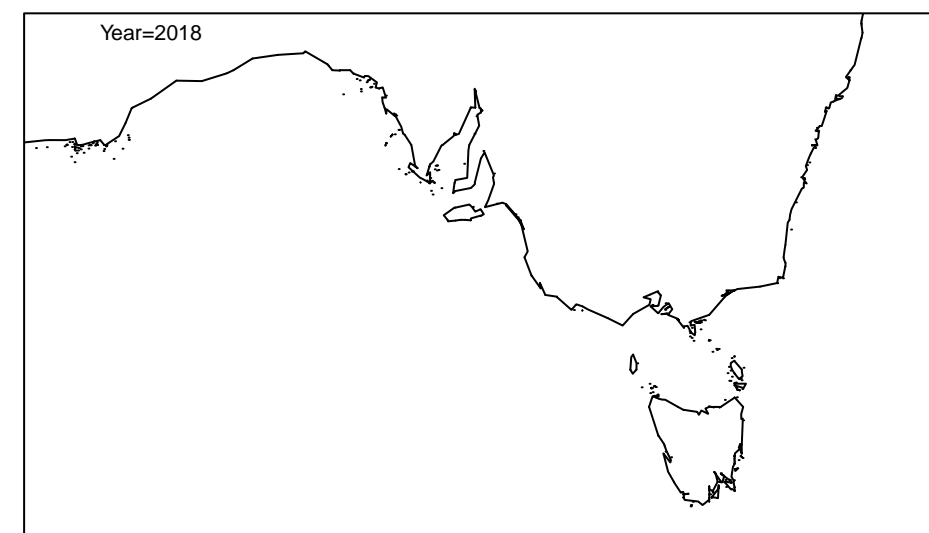
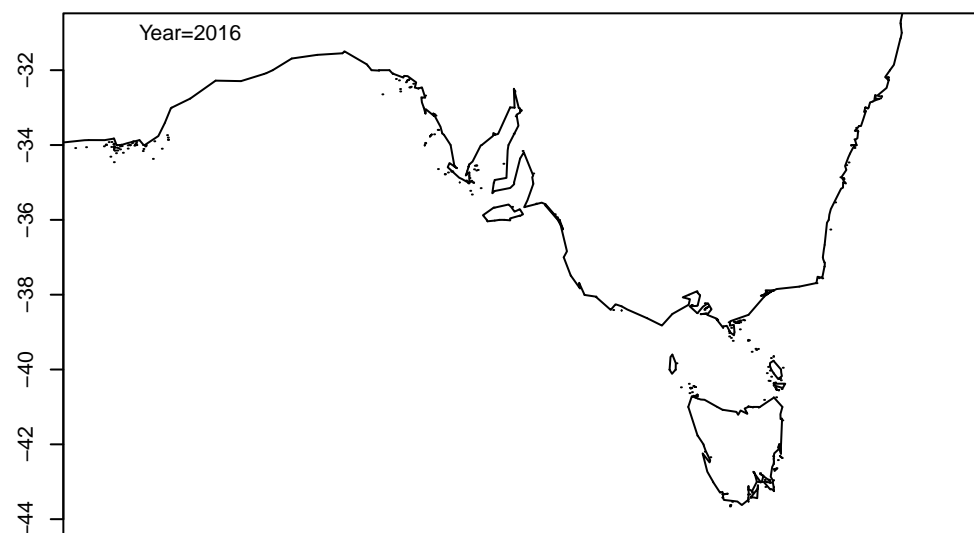
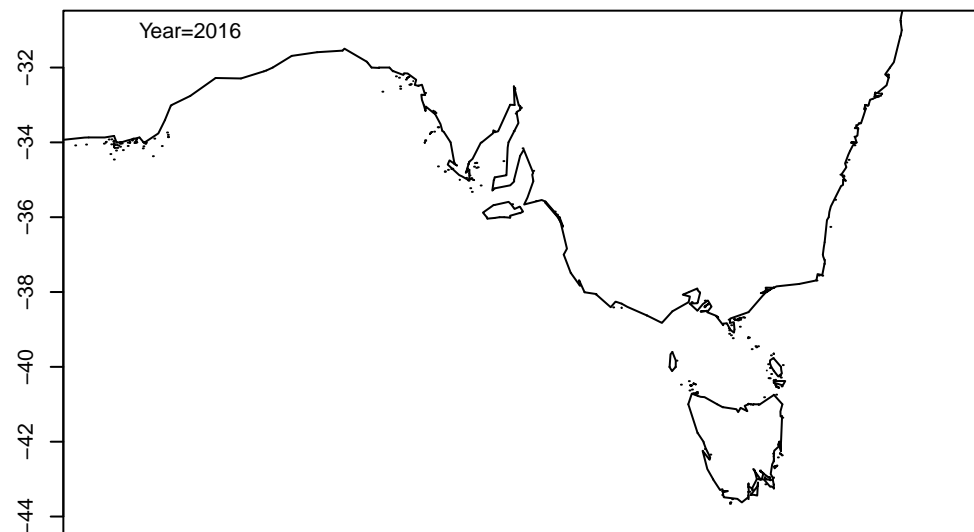
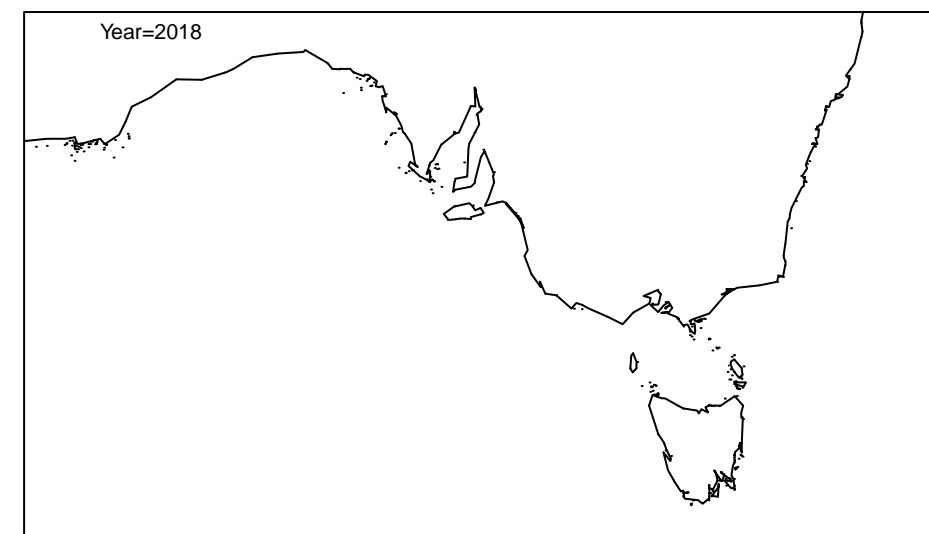
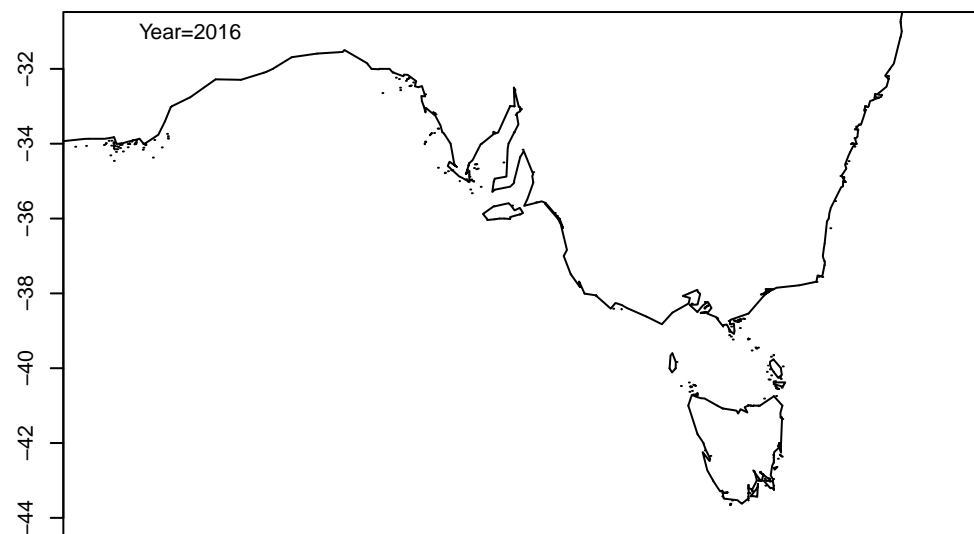
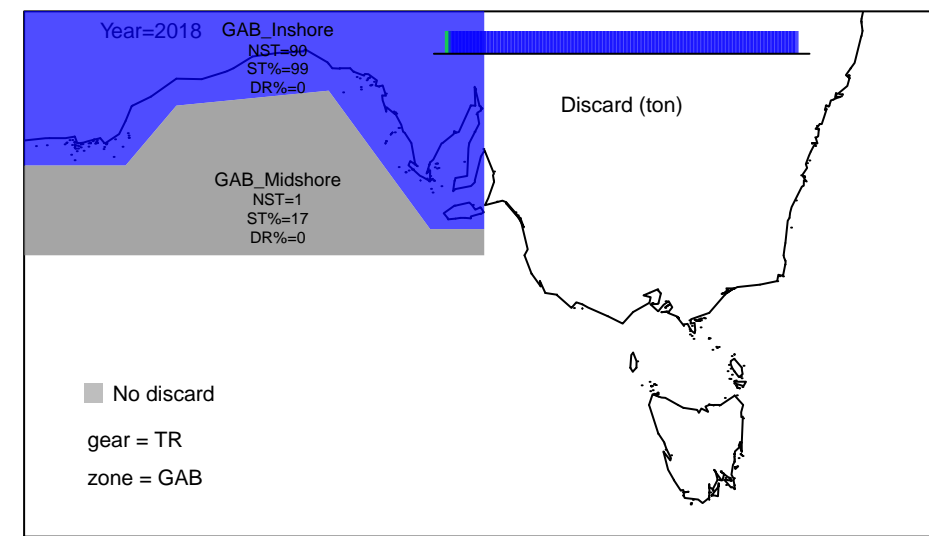
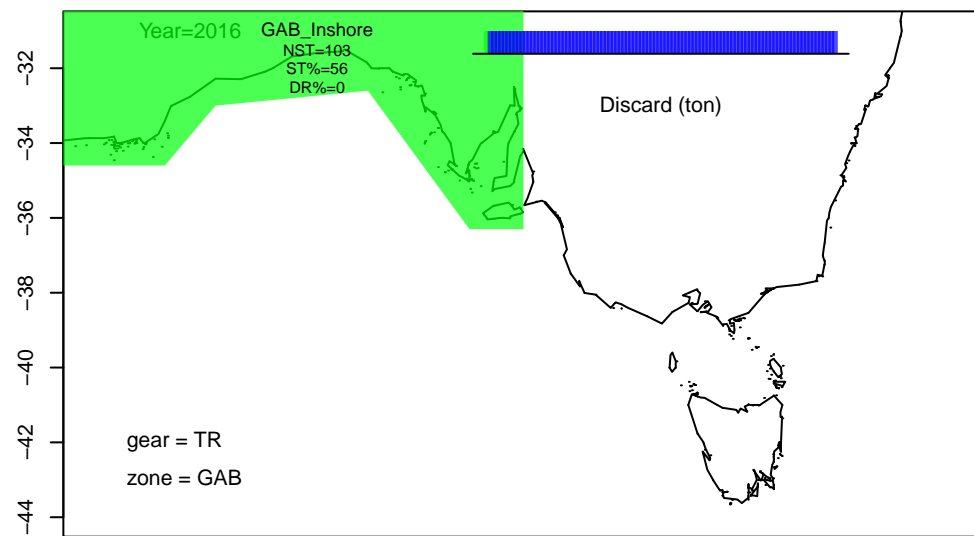
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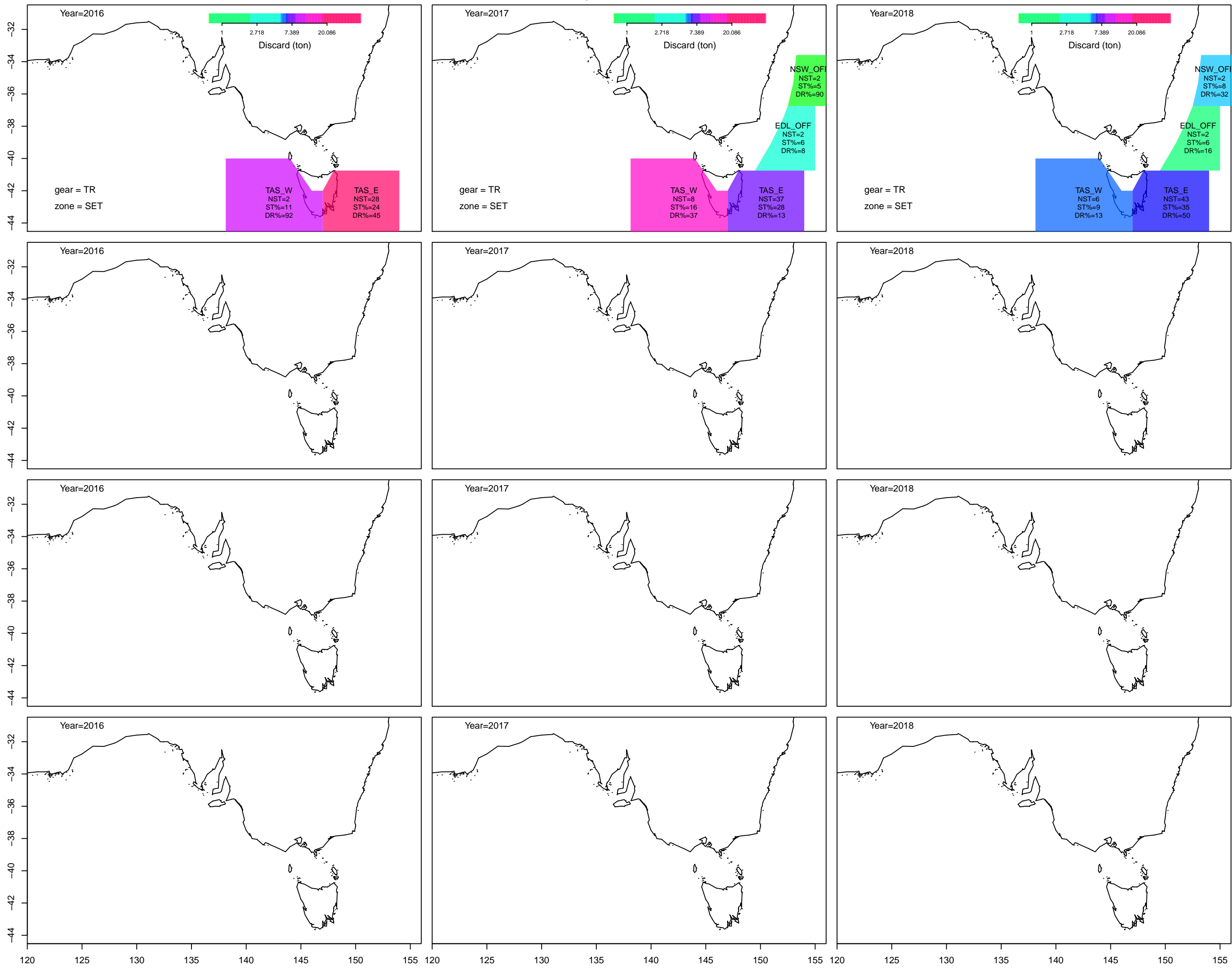


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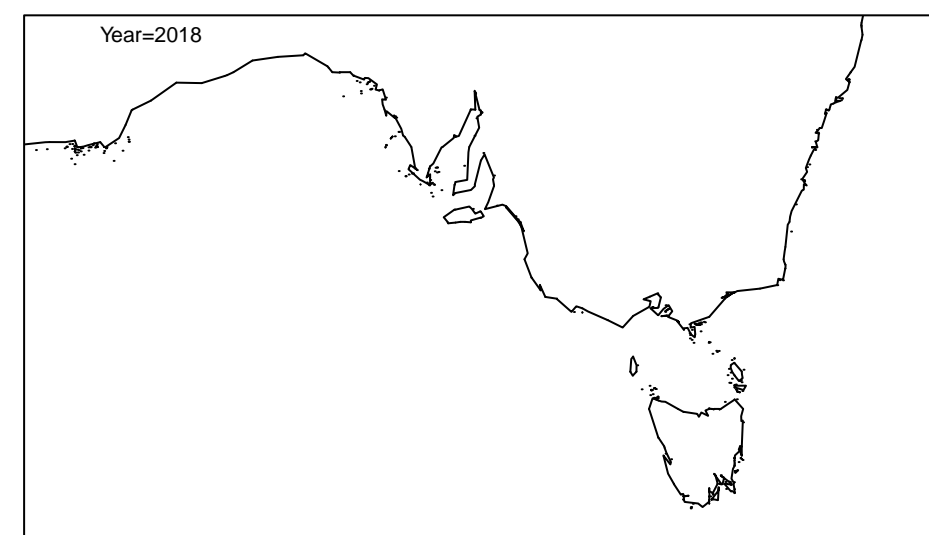
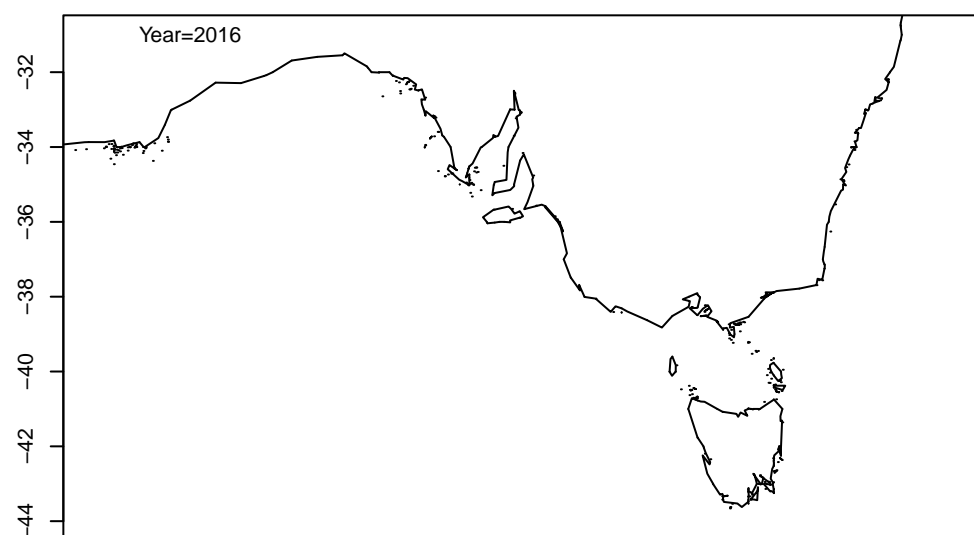
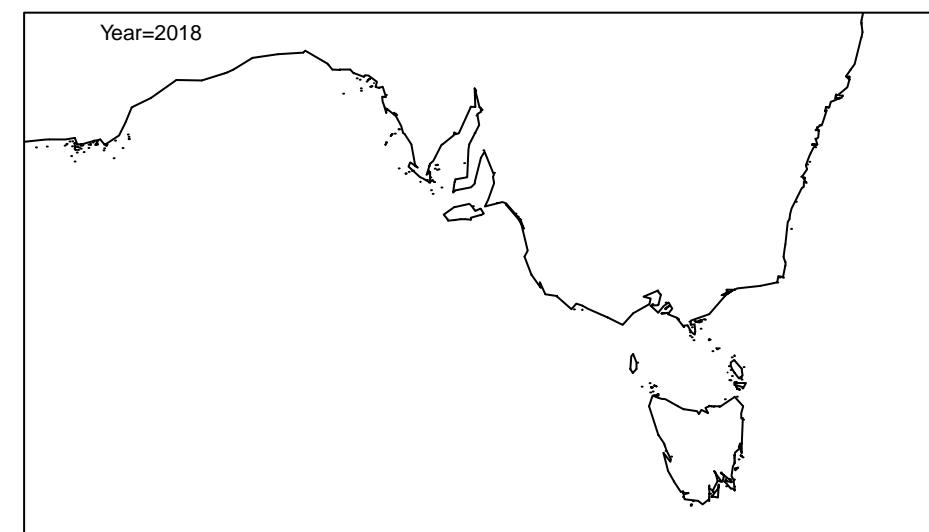
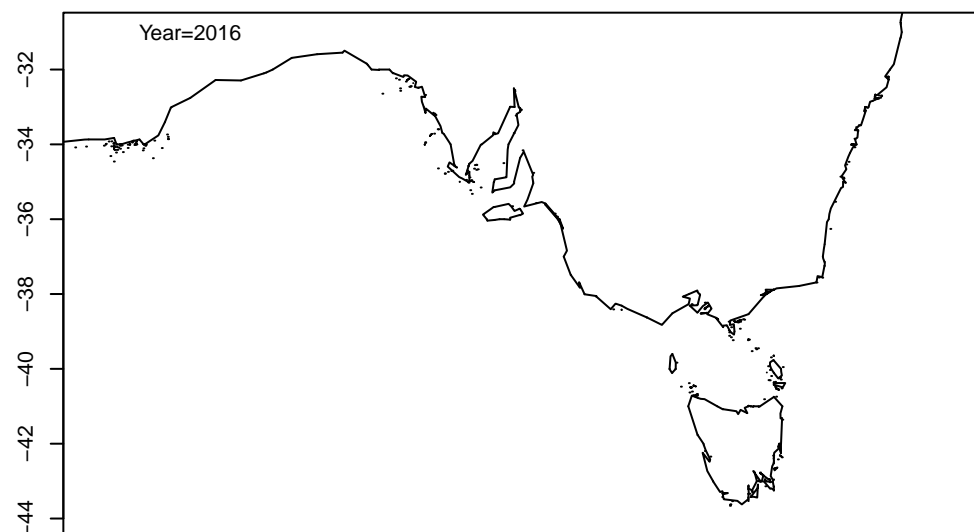
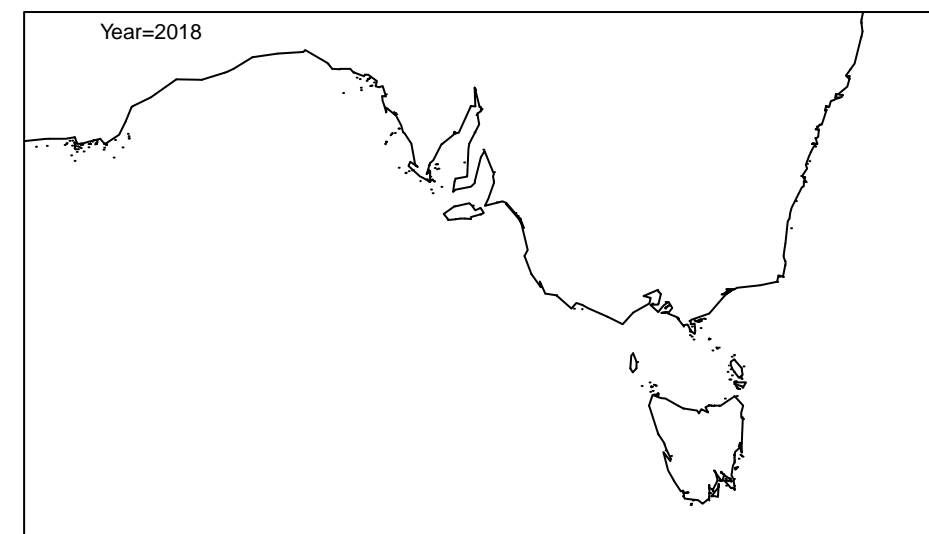
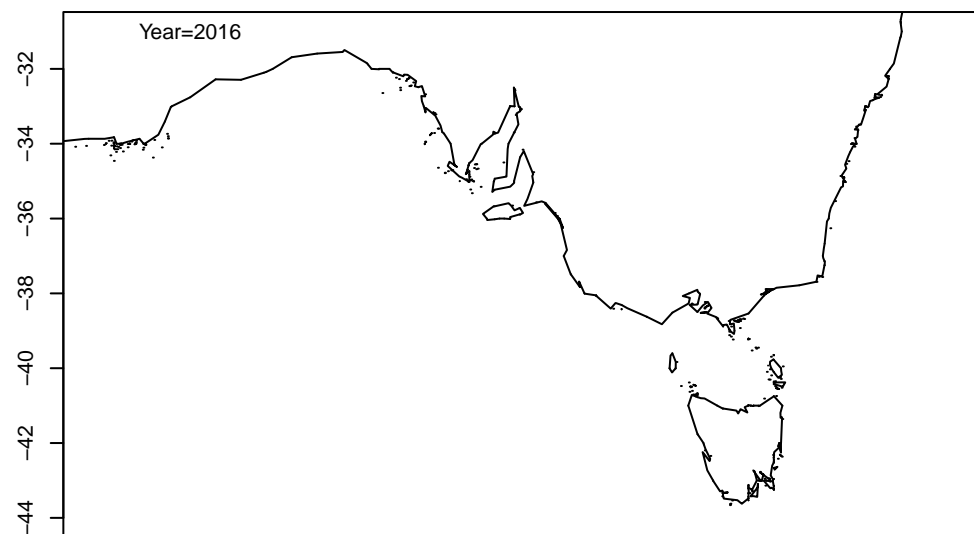
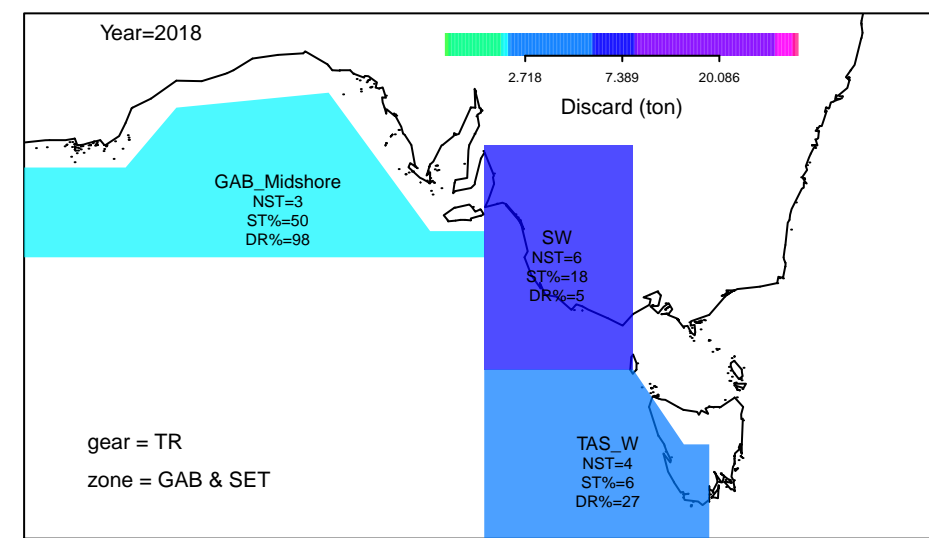
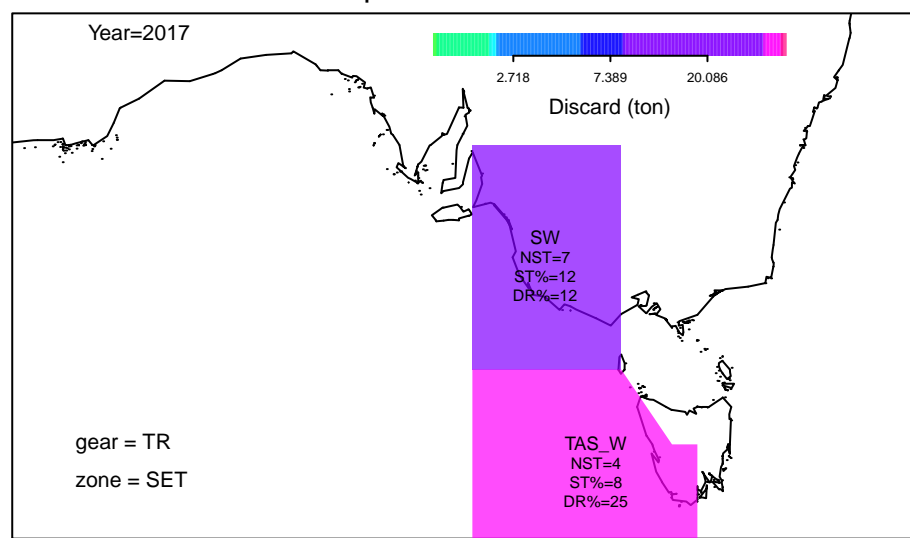
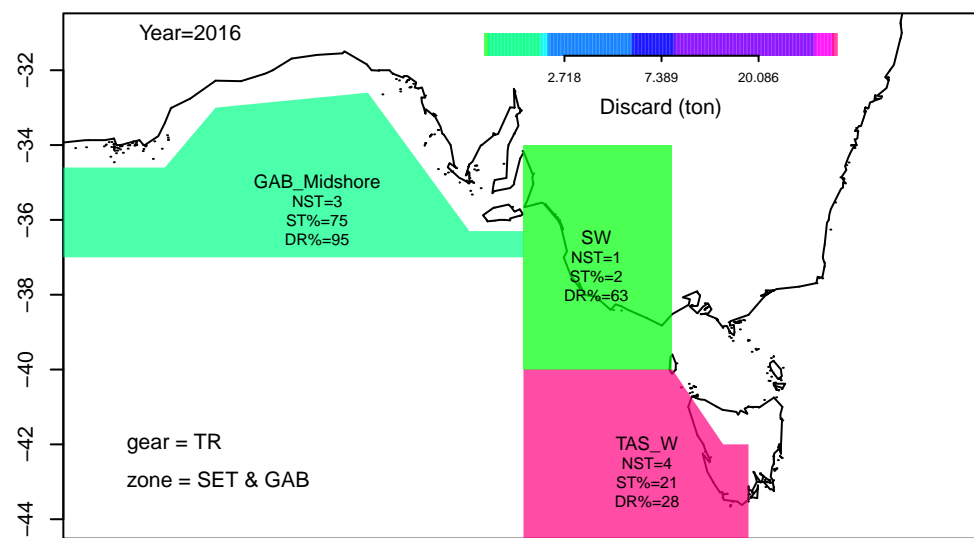


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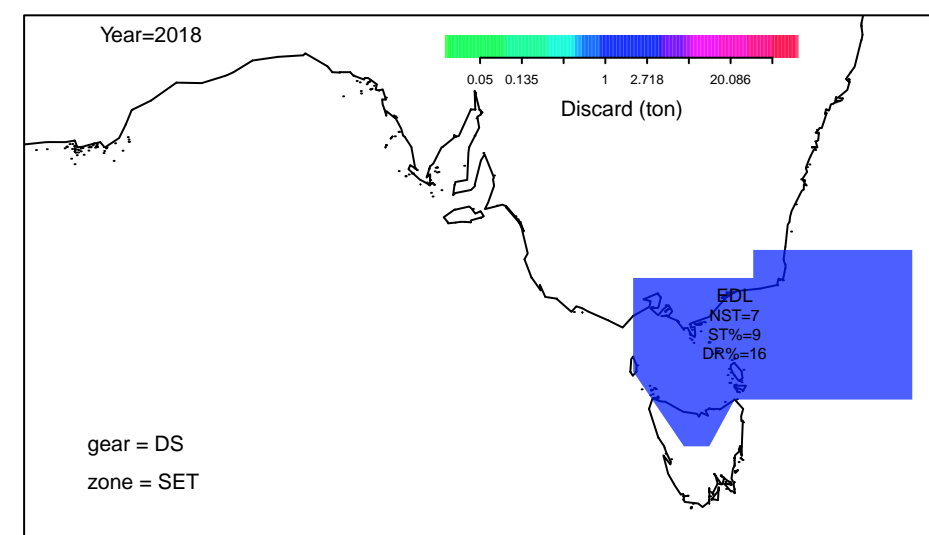
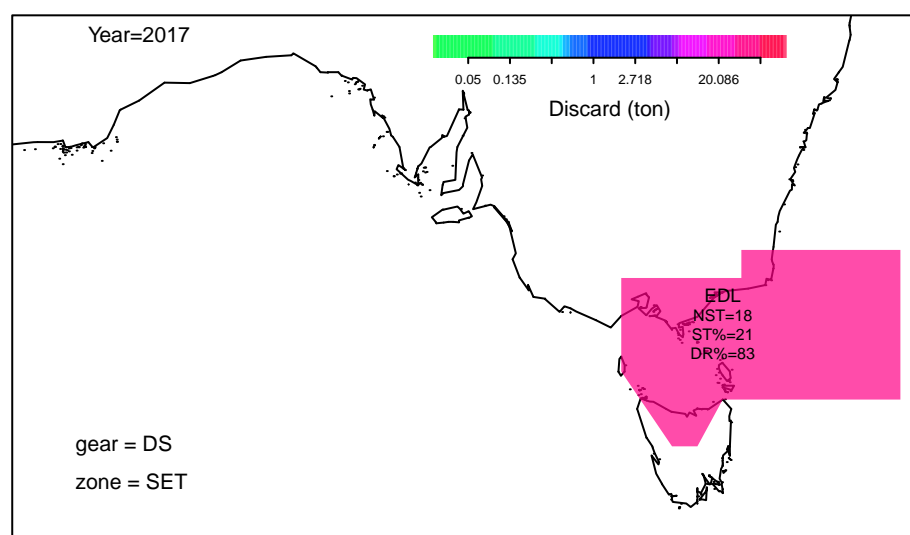
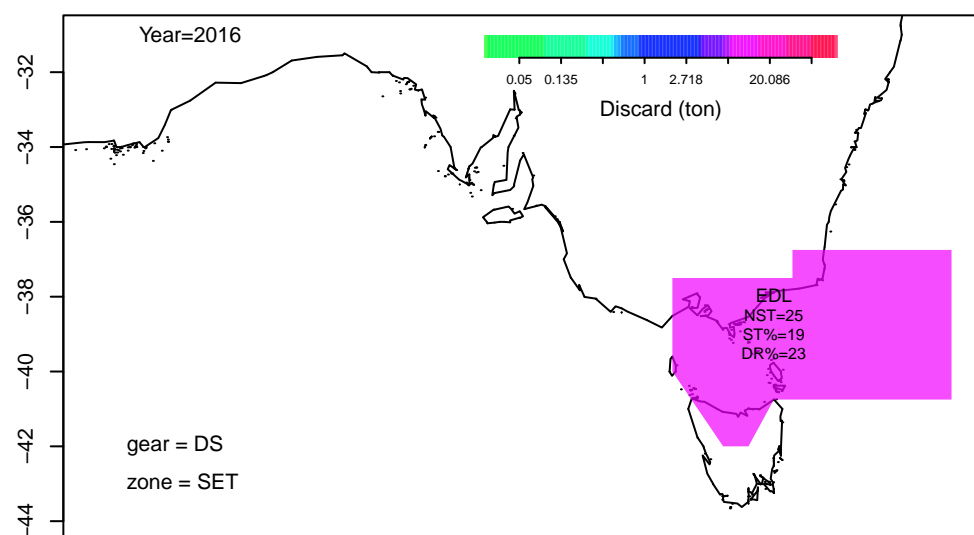
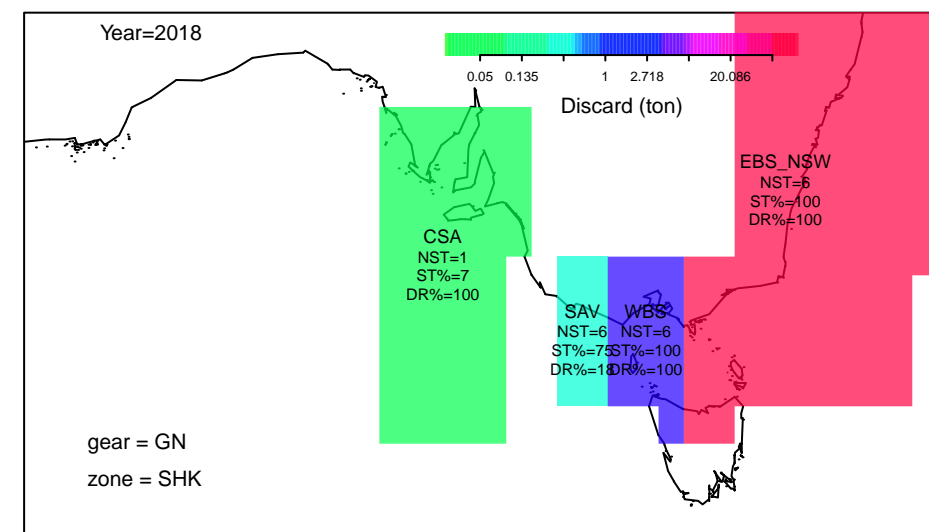
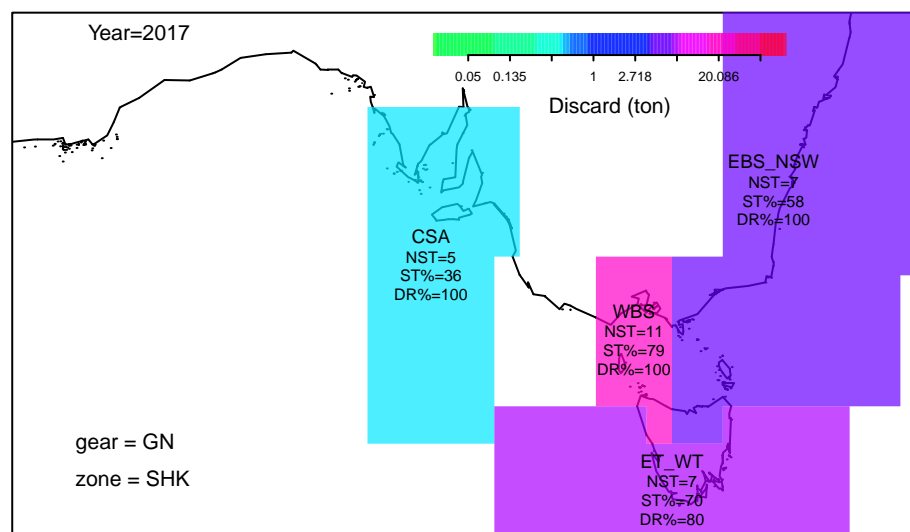
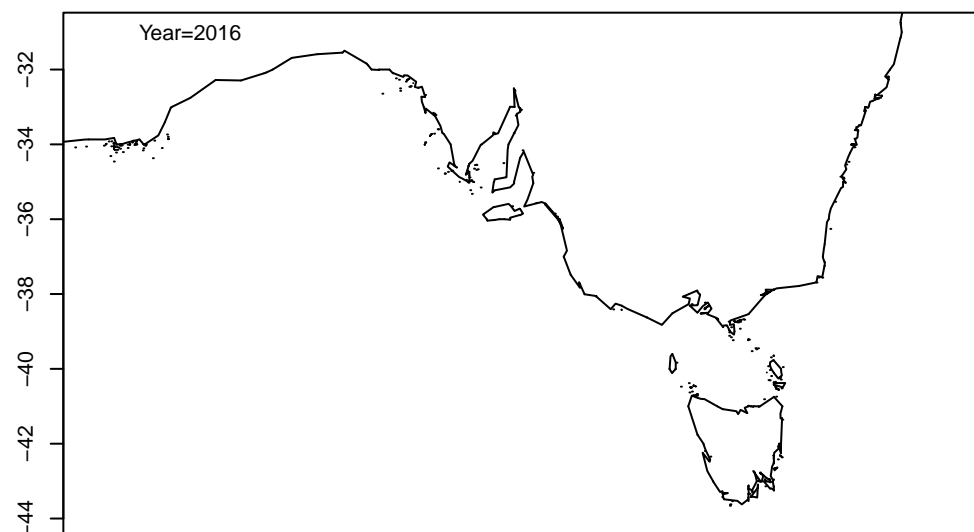
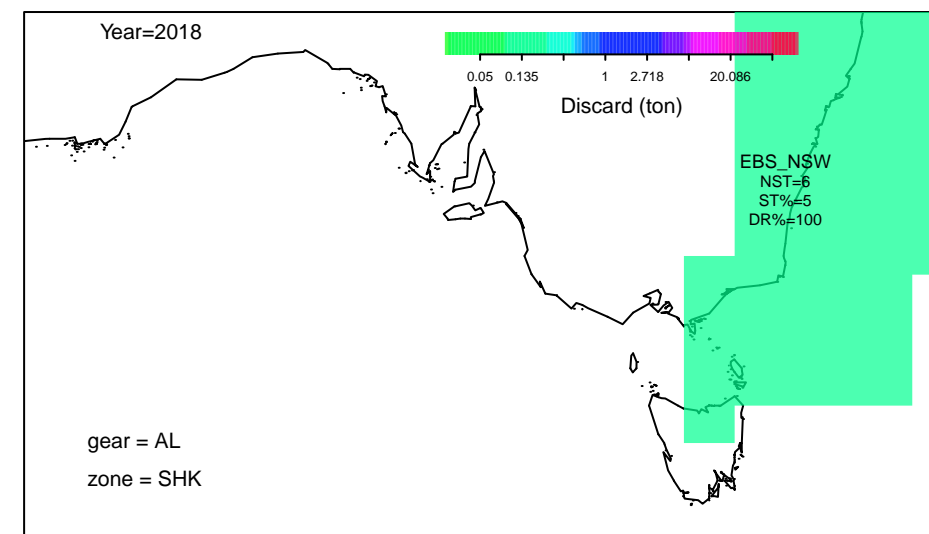
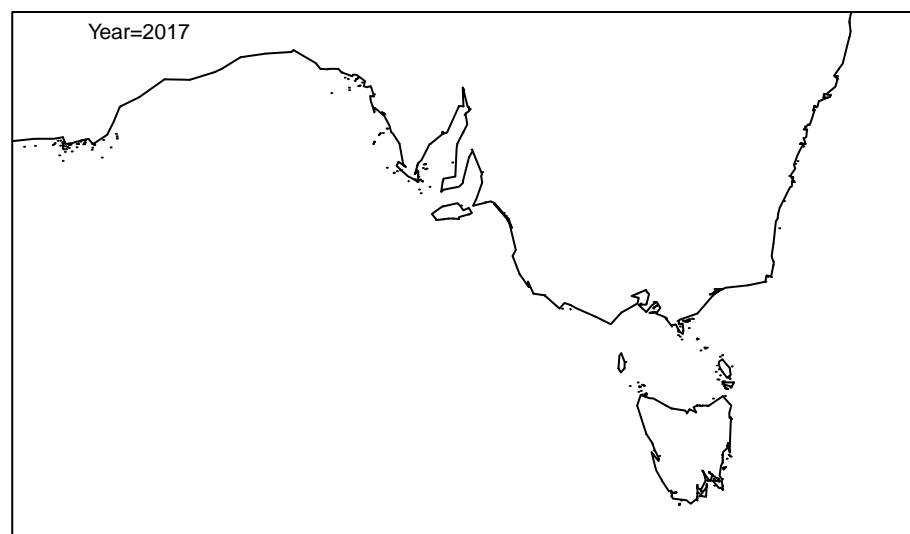
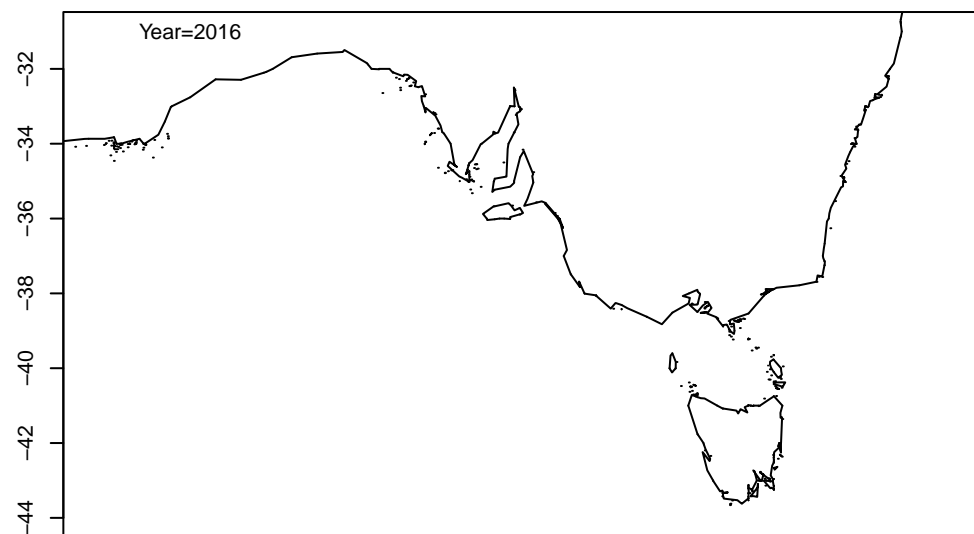
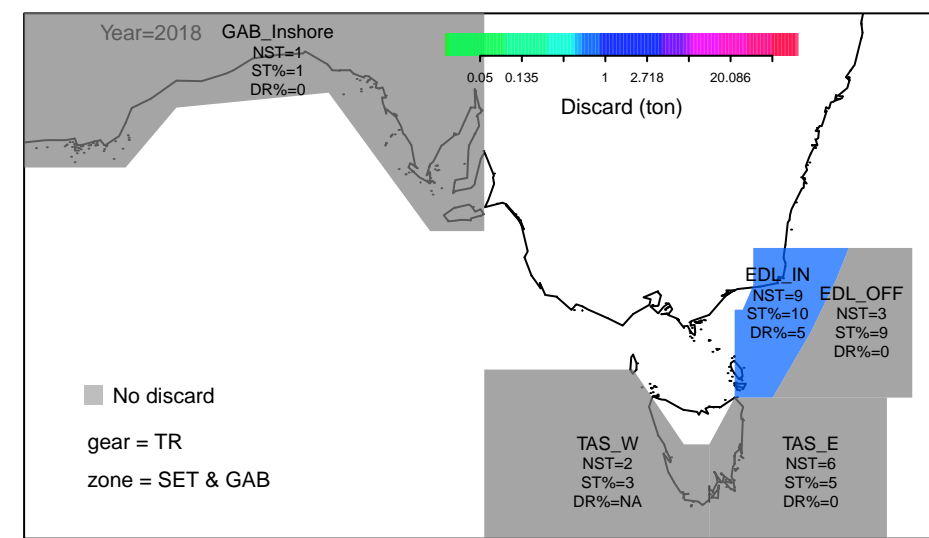
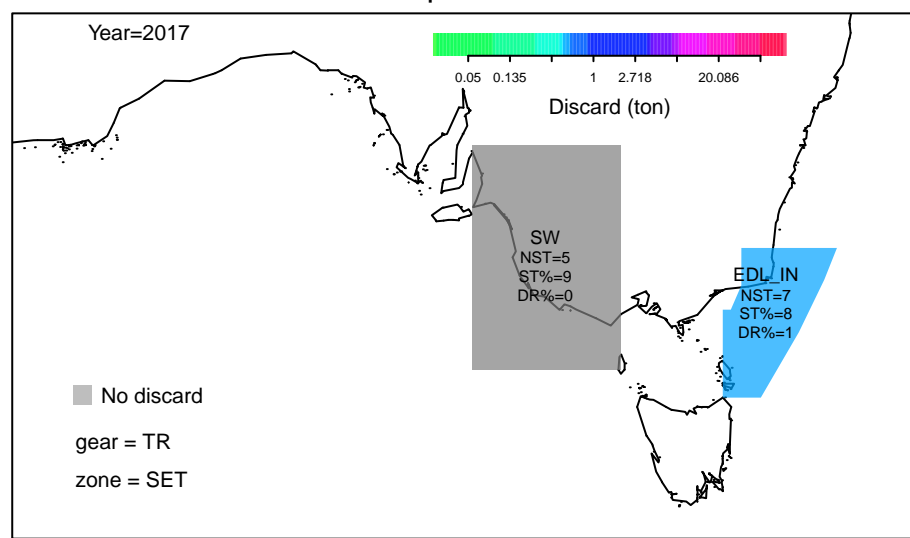
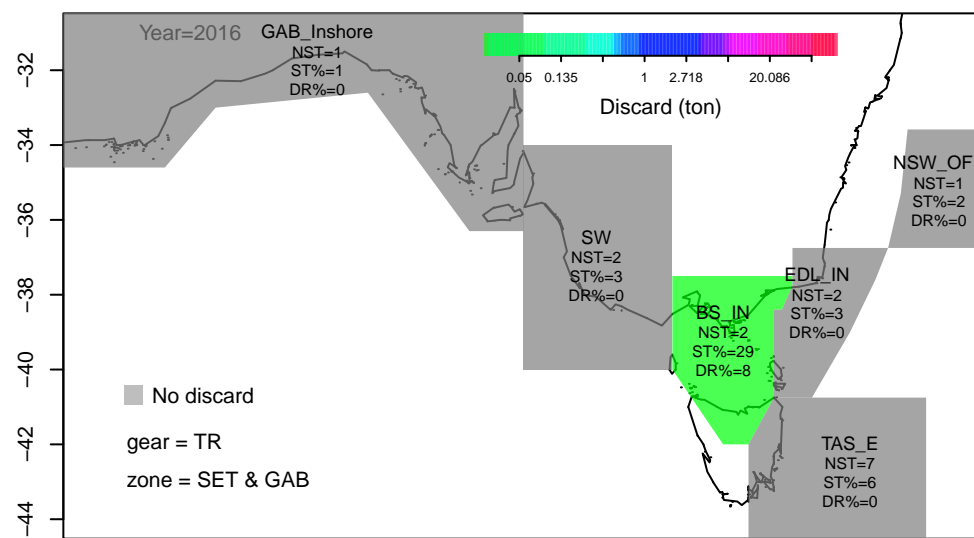


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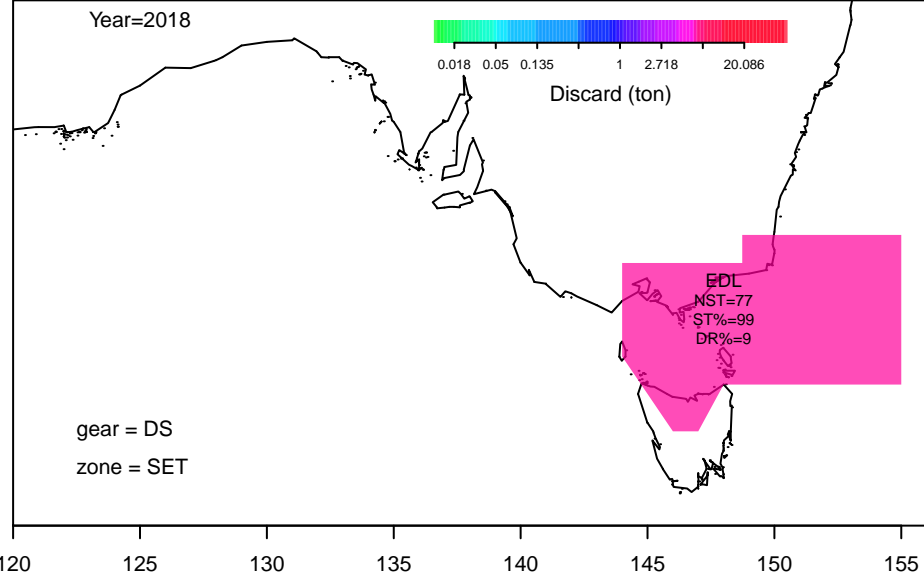
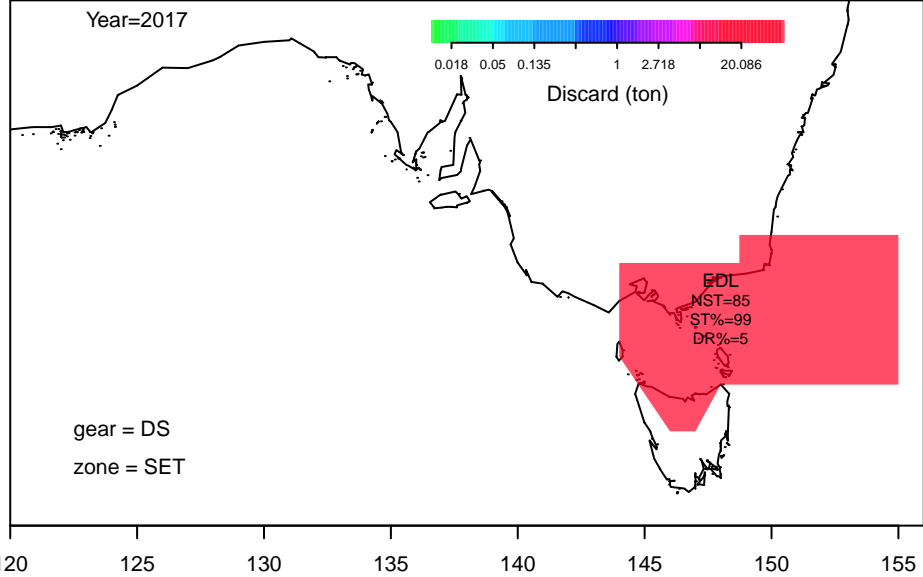
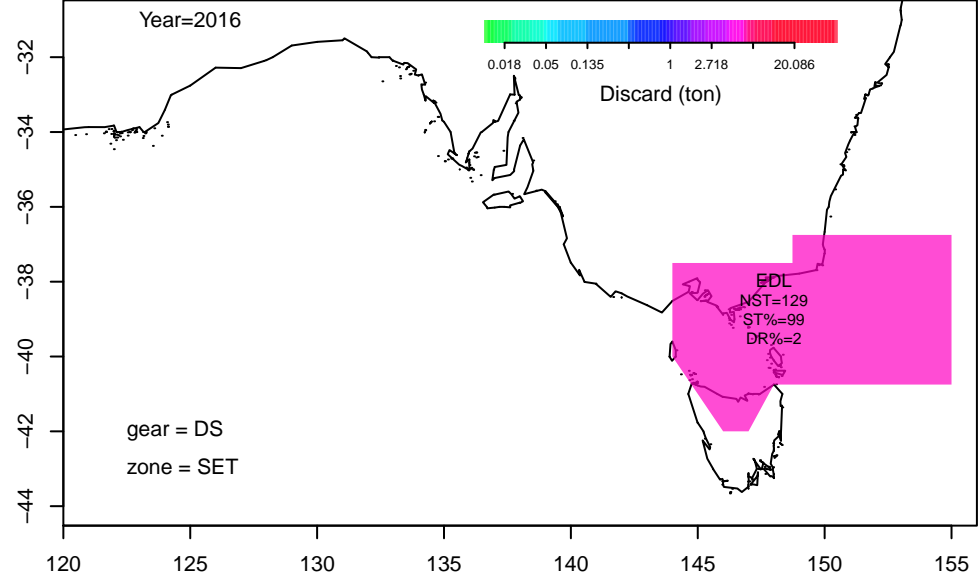
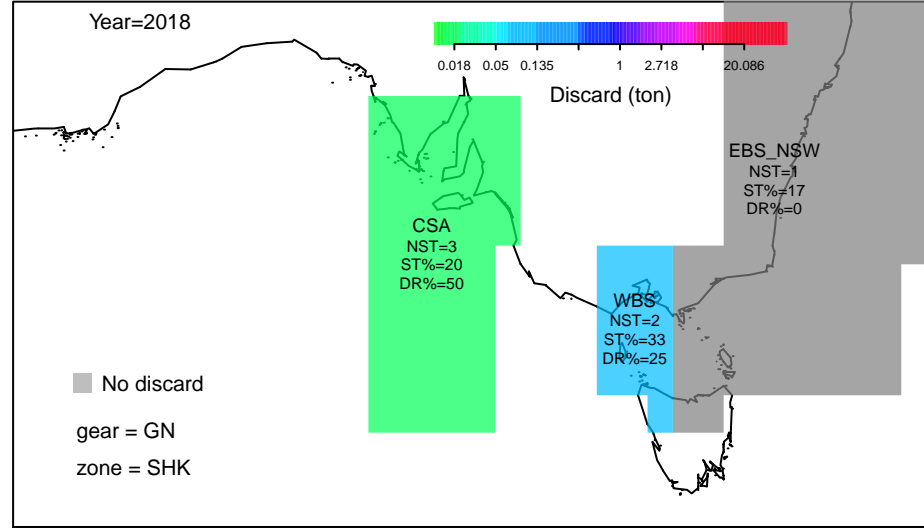
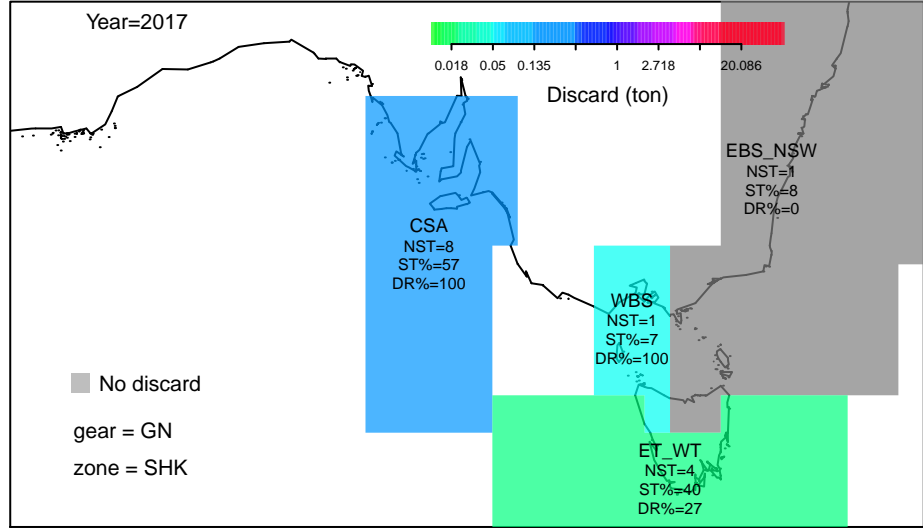
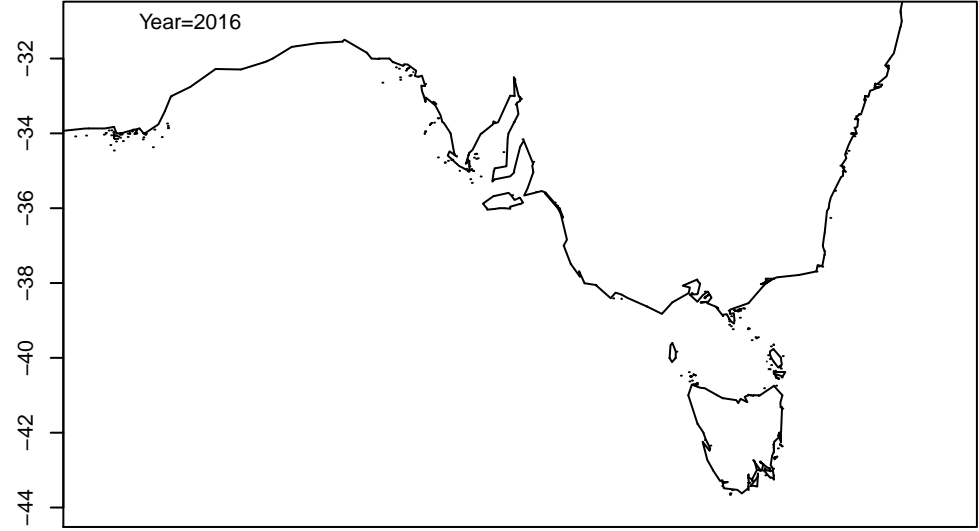
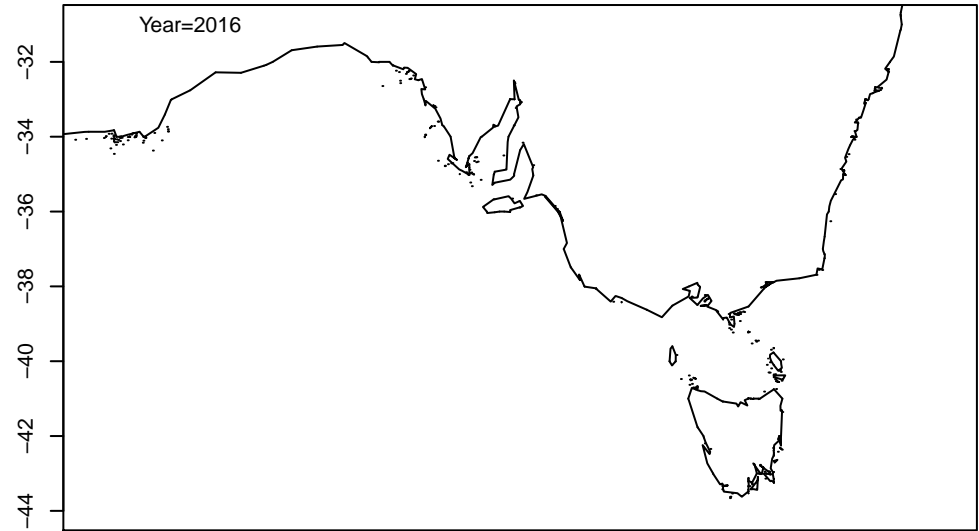
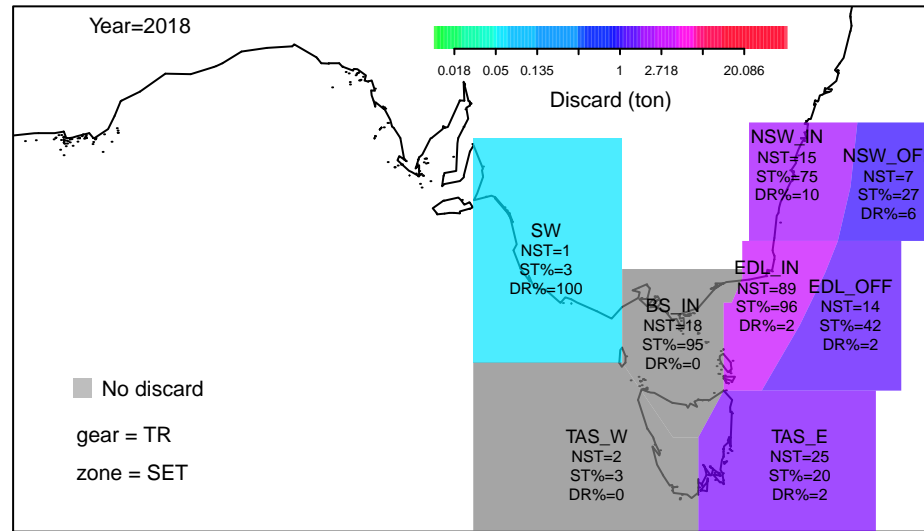
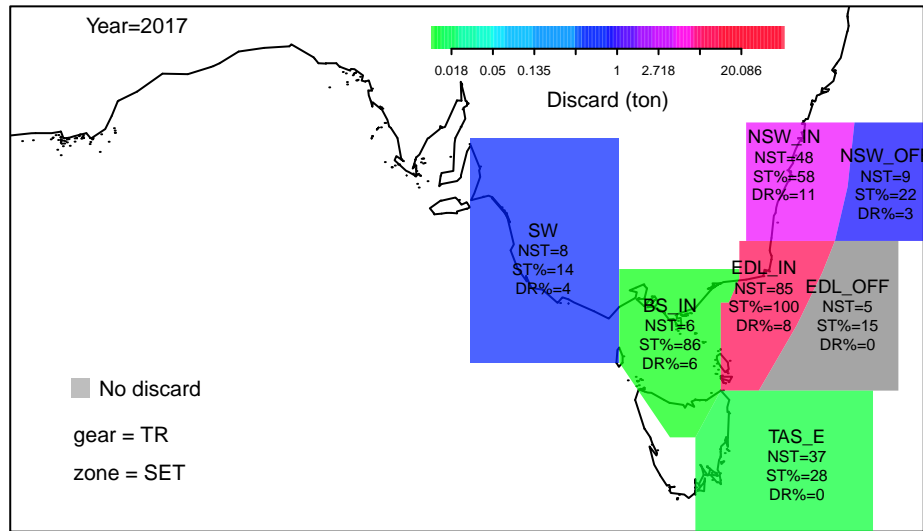
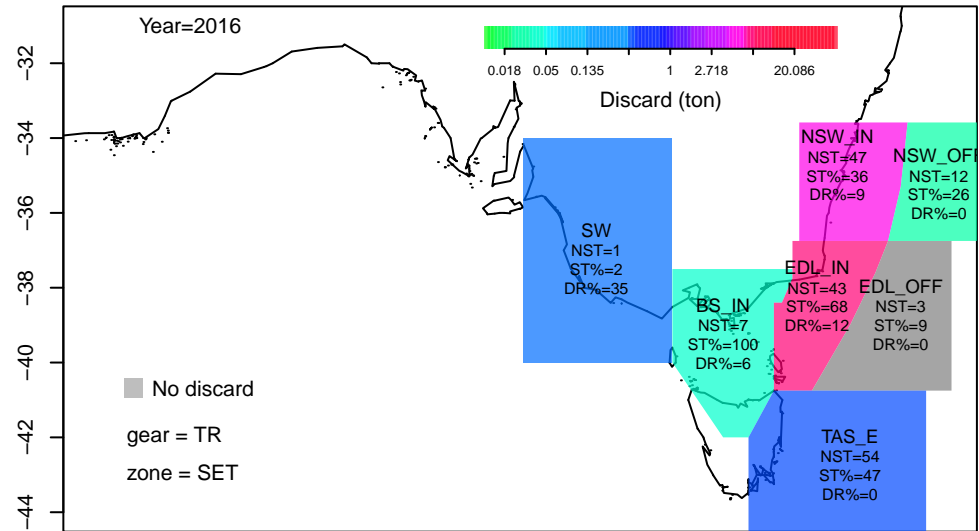
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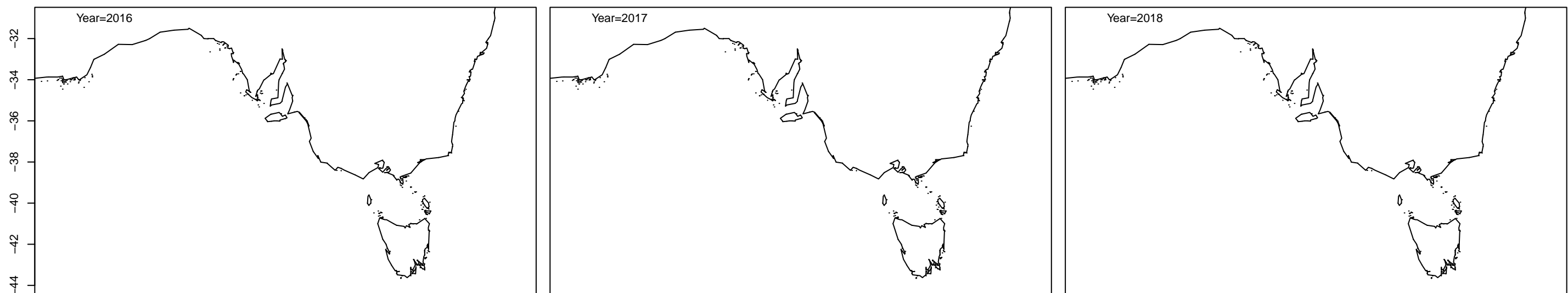
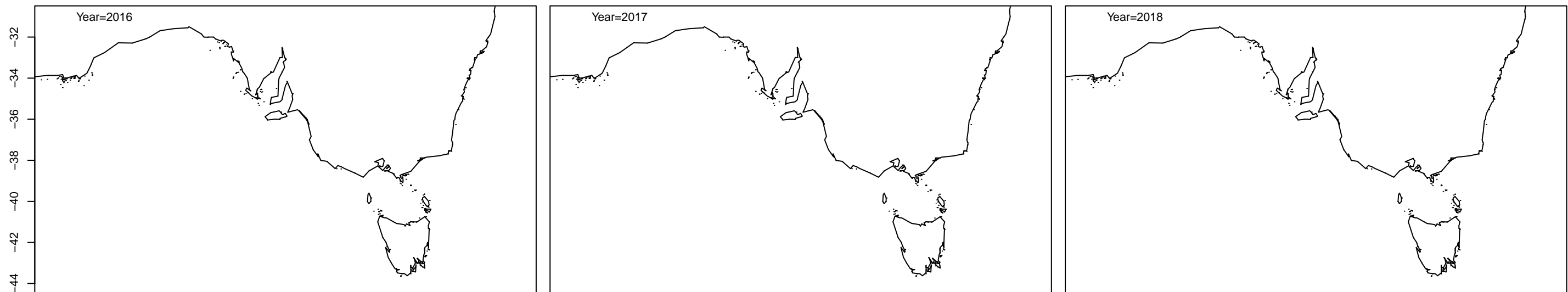
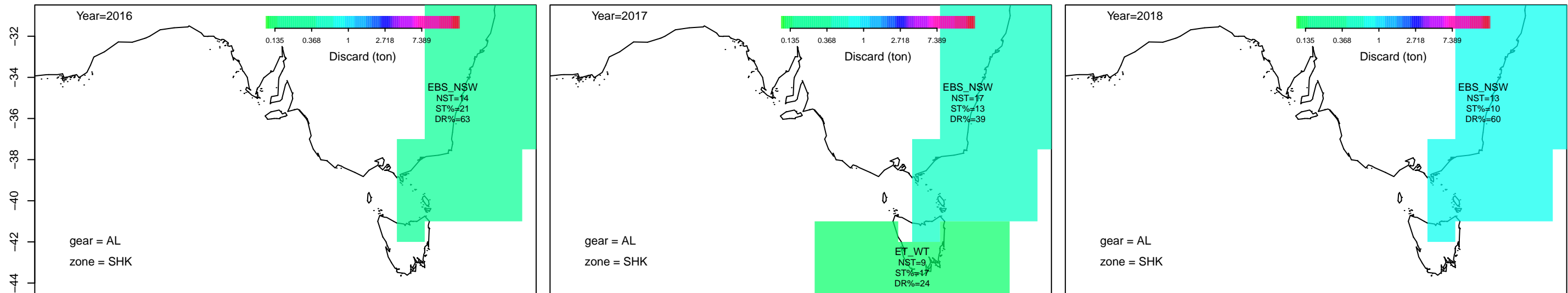
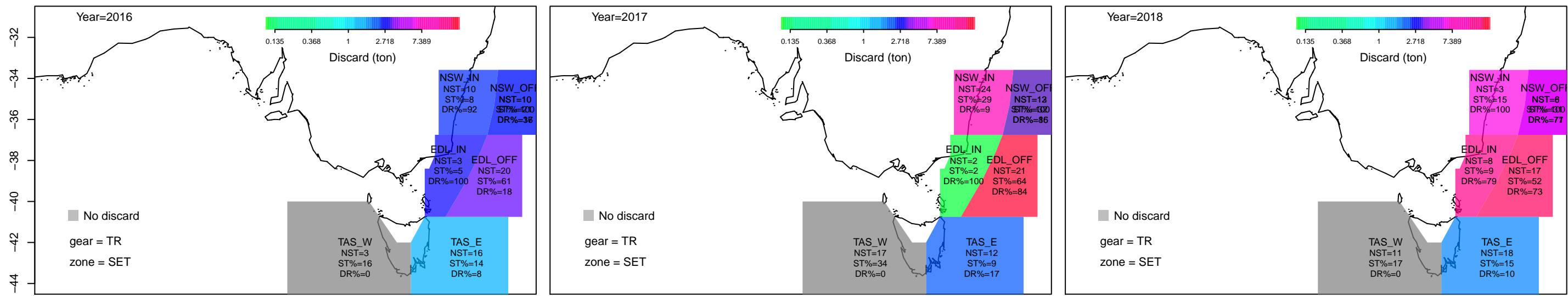


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# Flathead

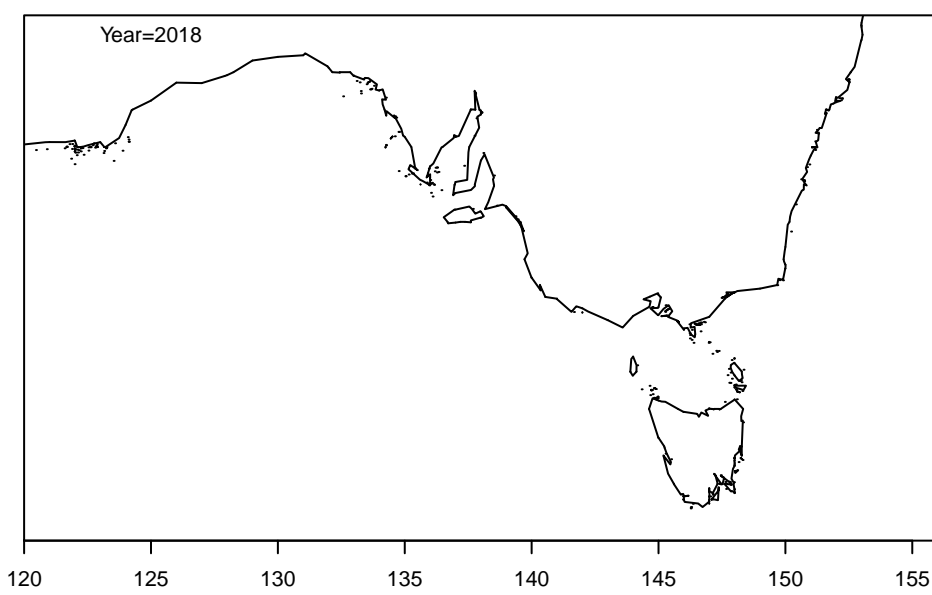
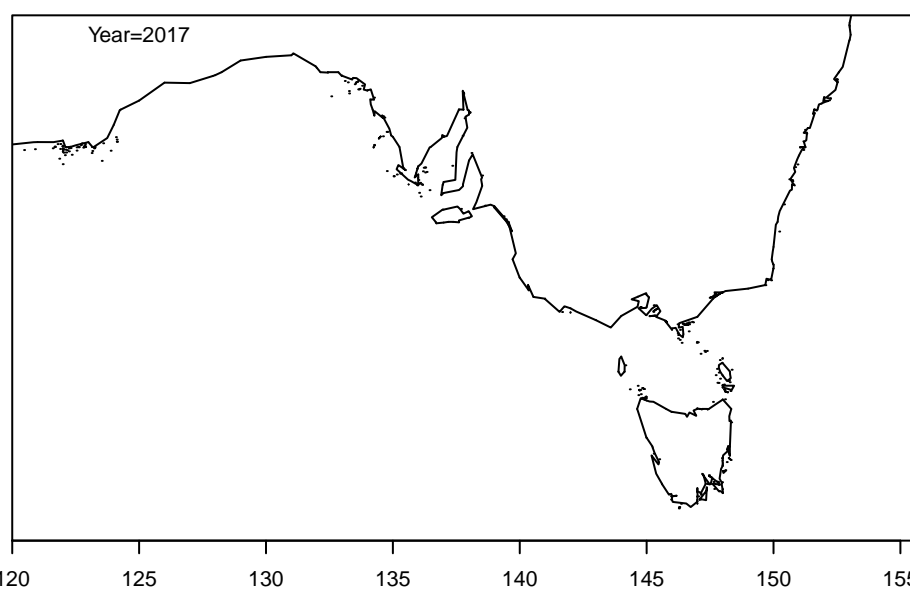
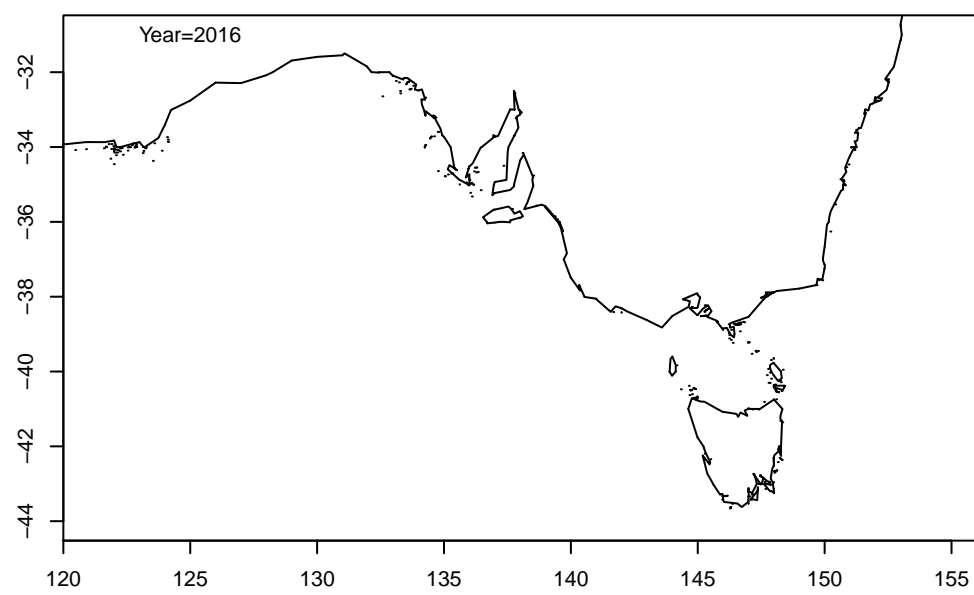
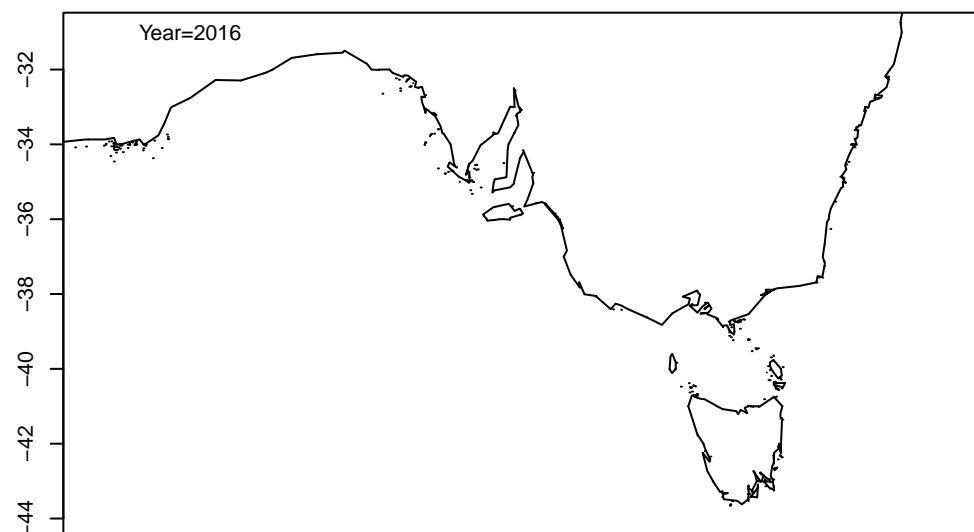
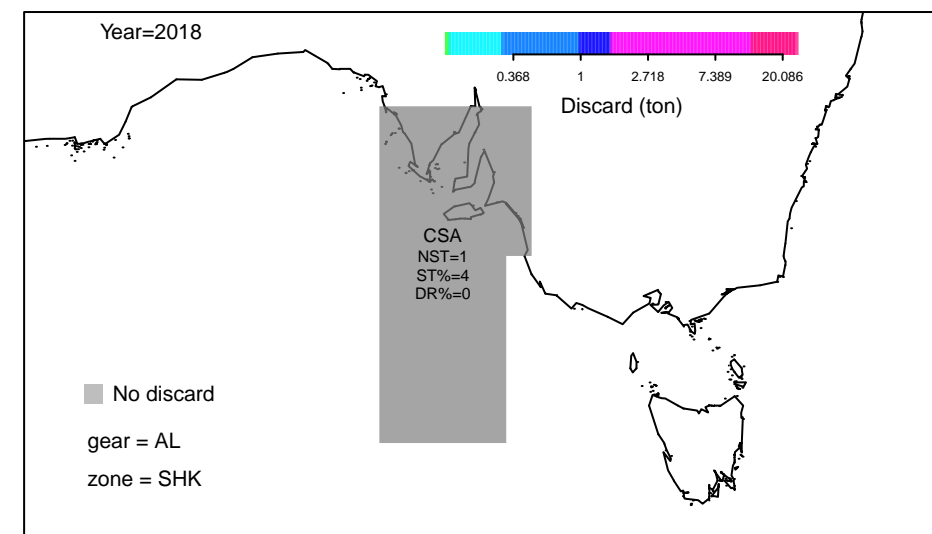
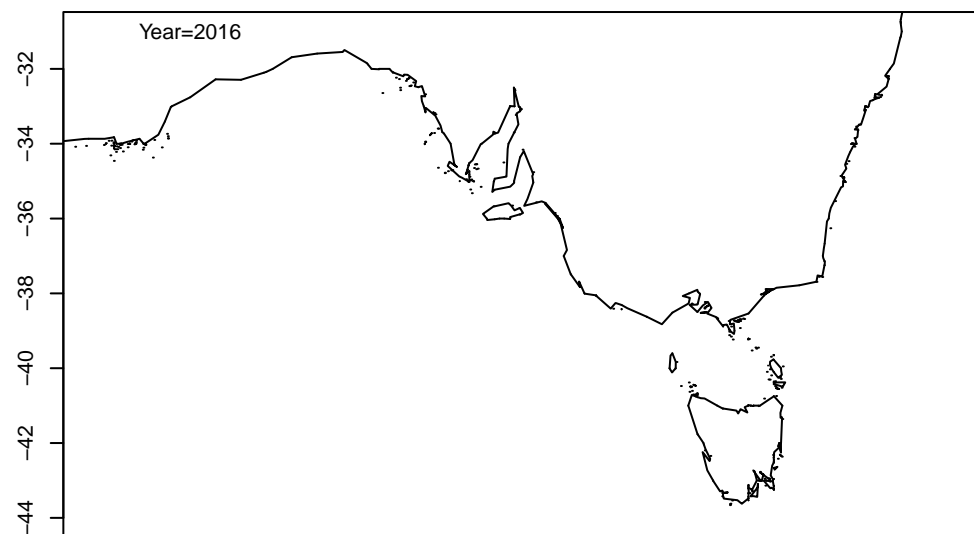
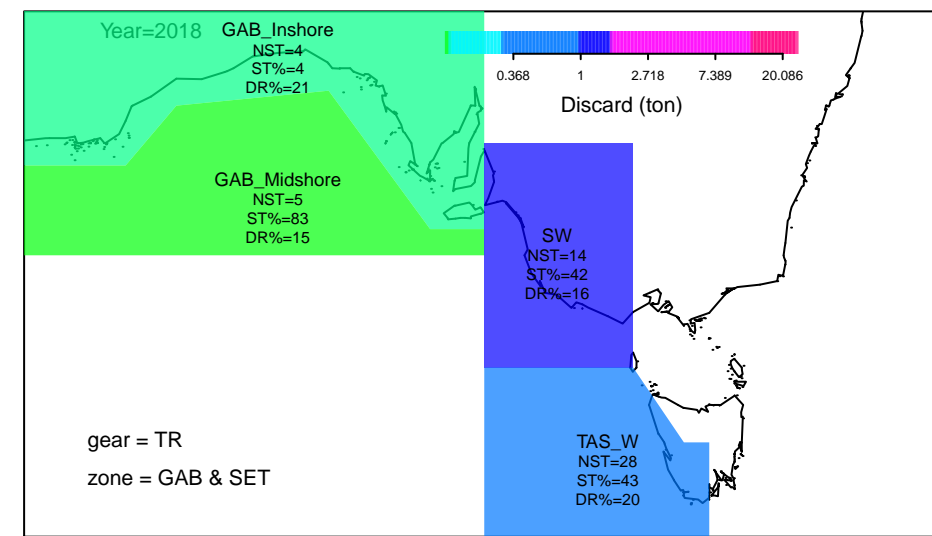
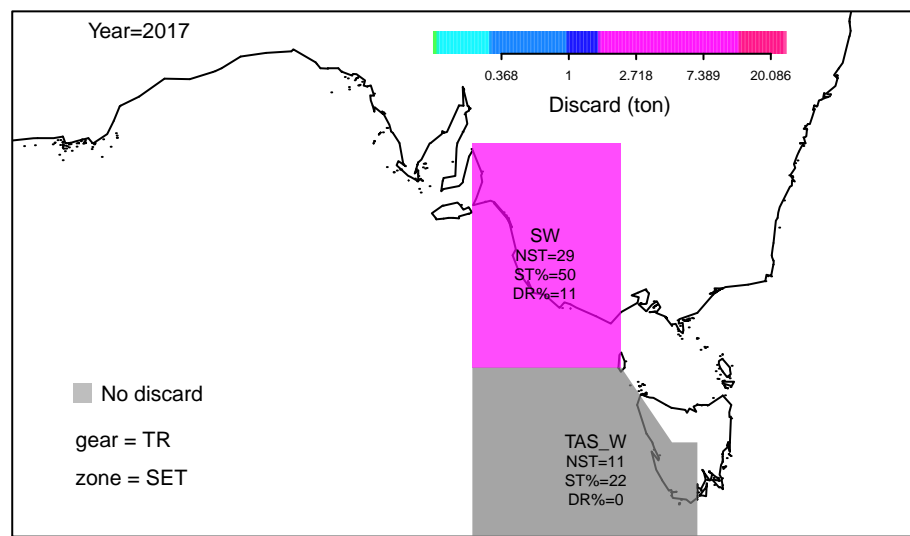
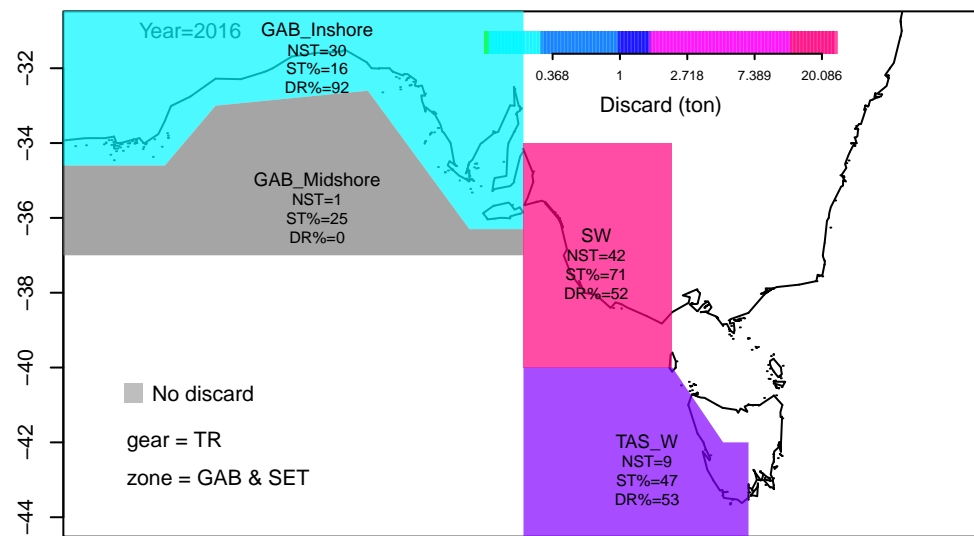


# Gemfish East

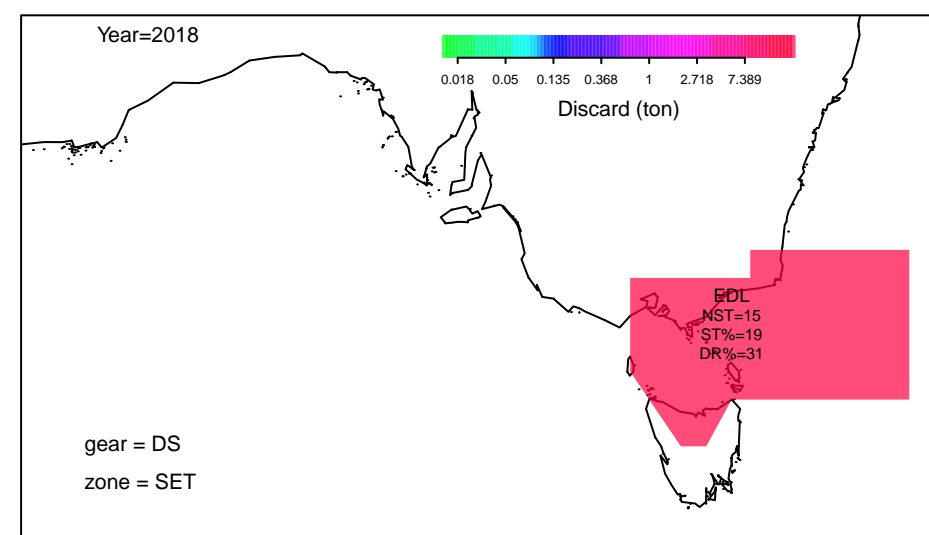
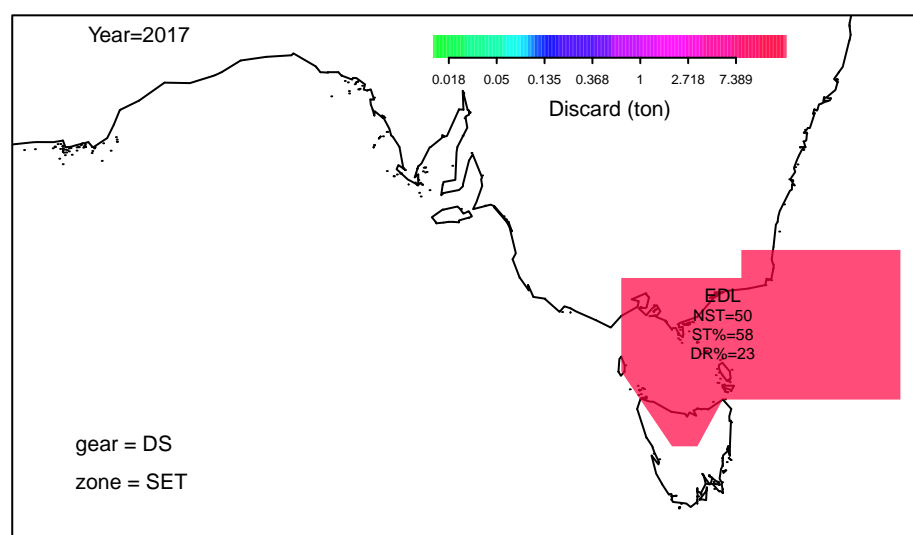
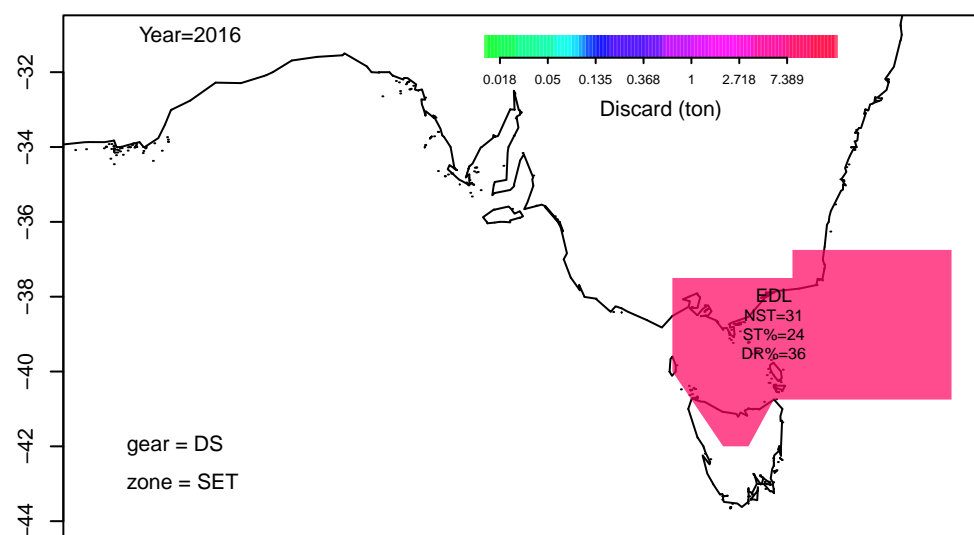
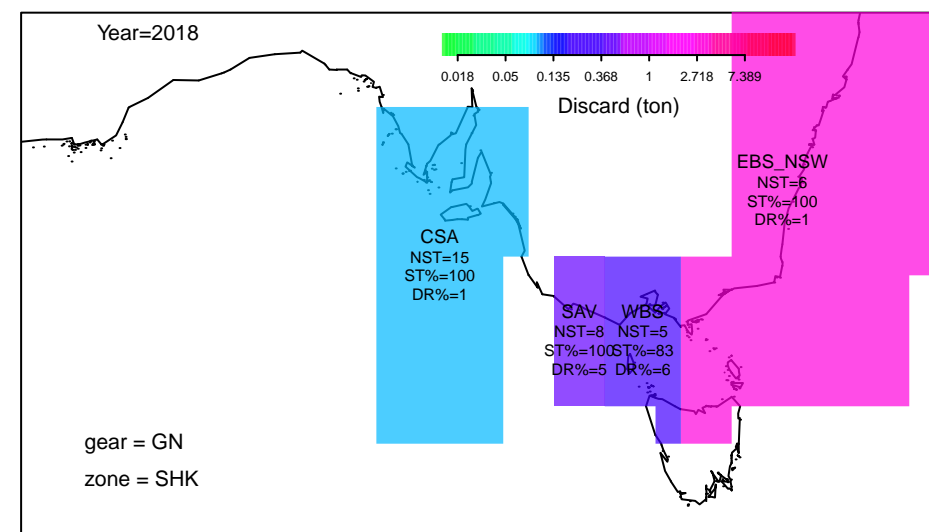
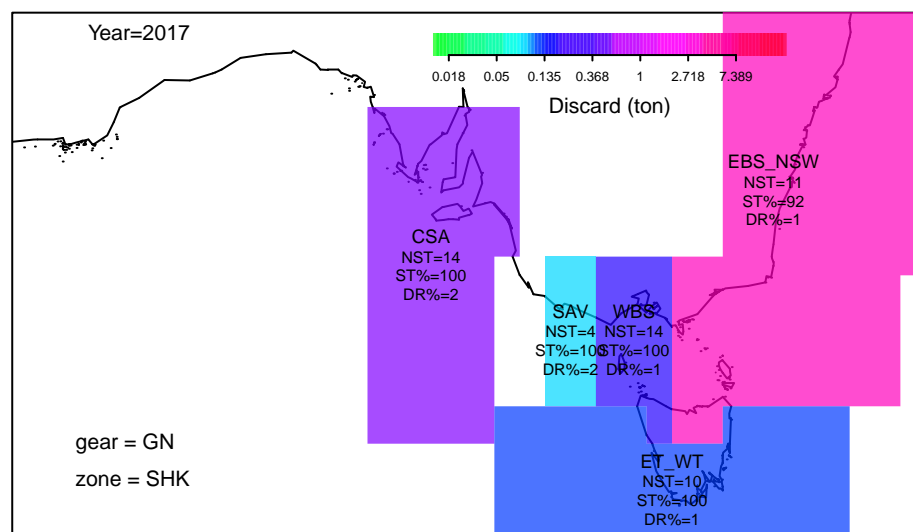
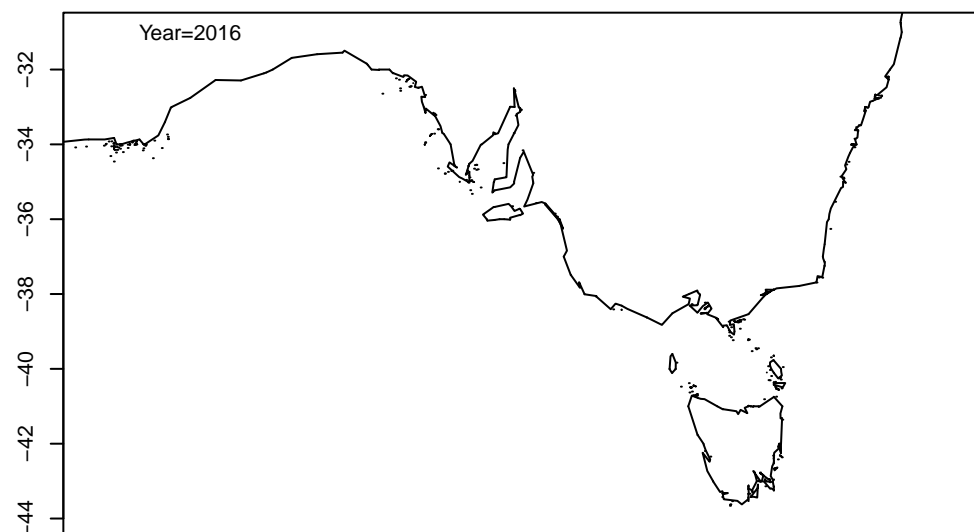
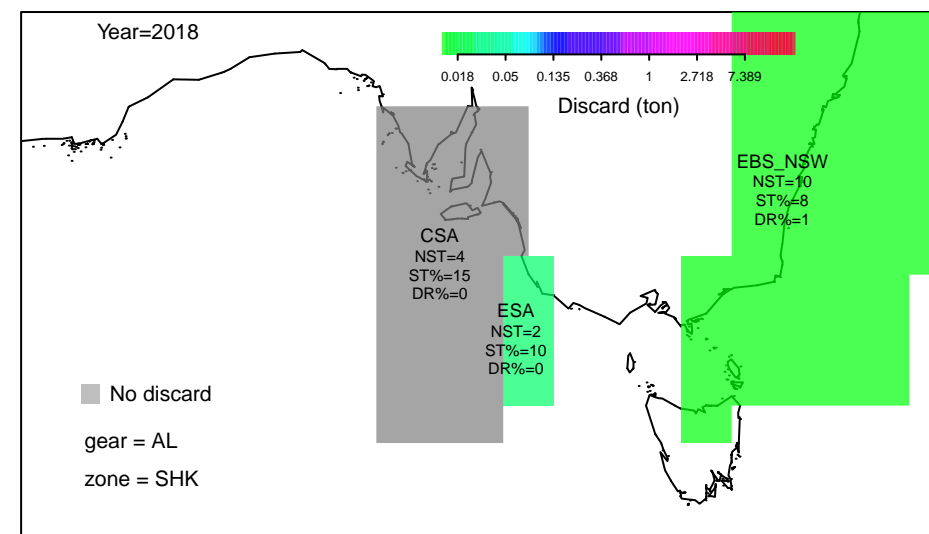
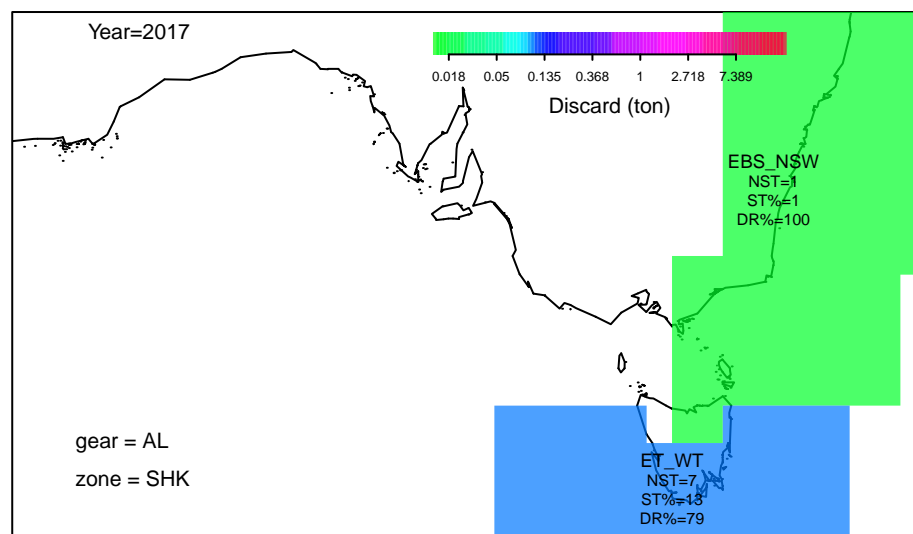
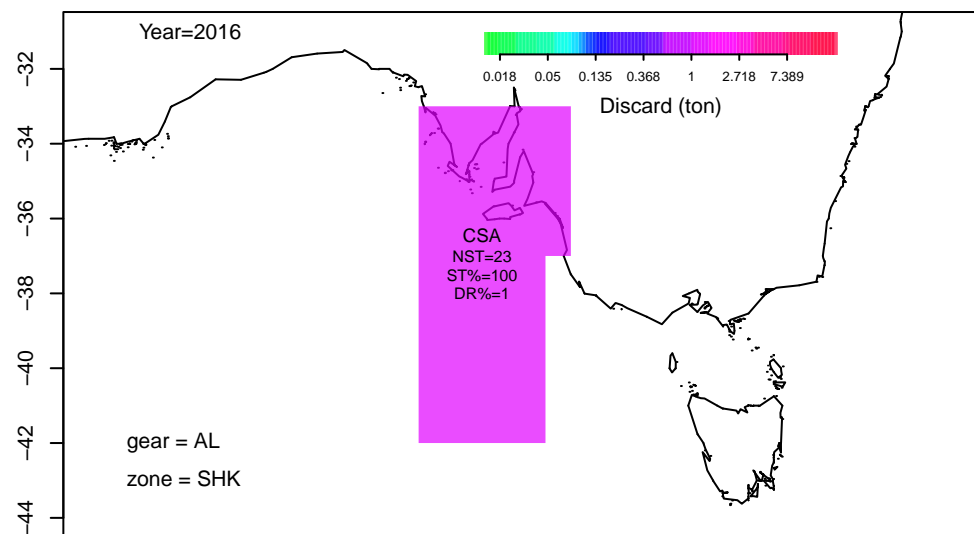
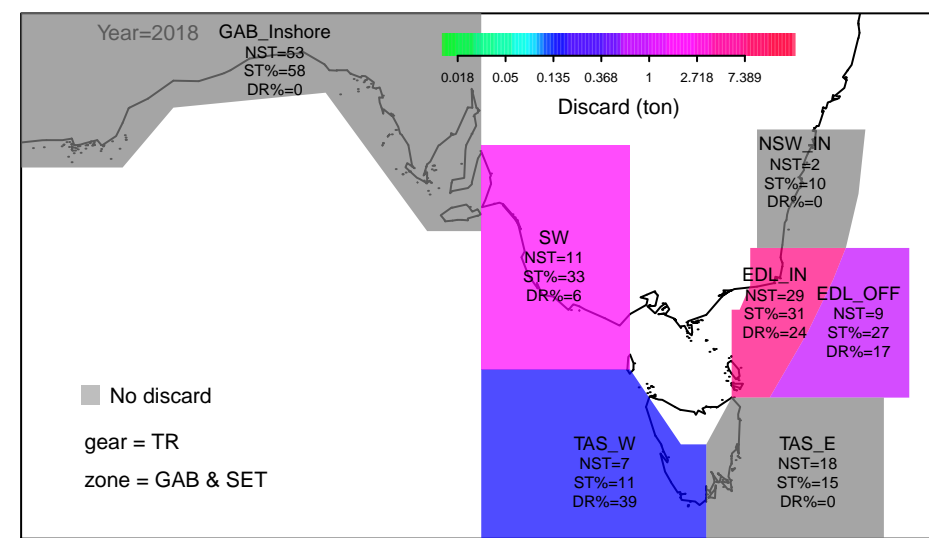
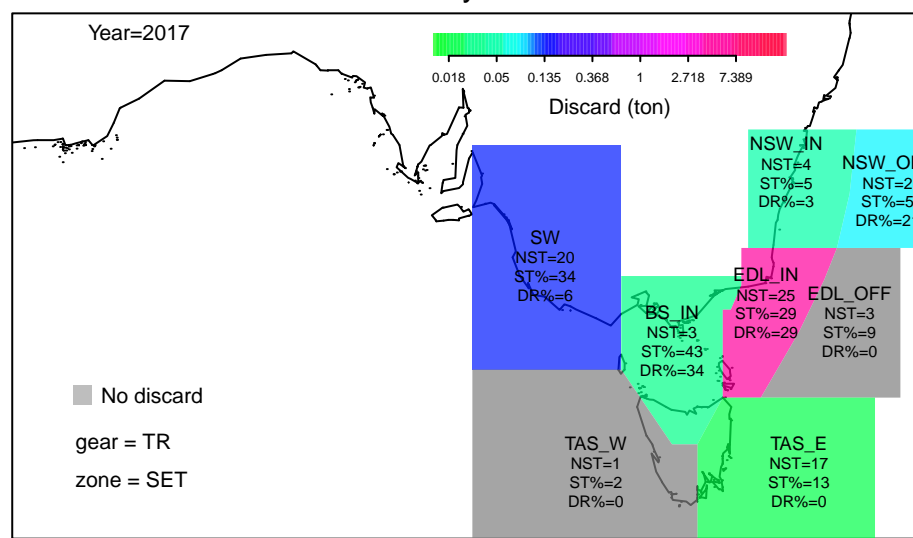
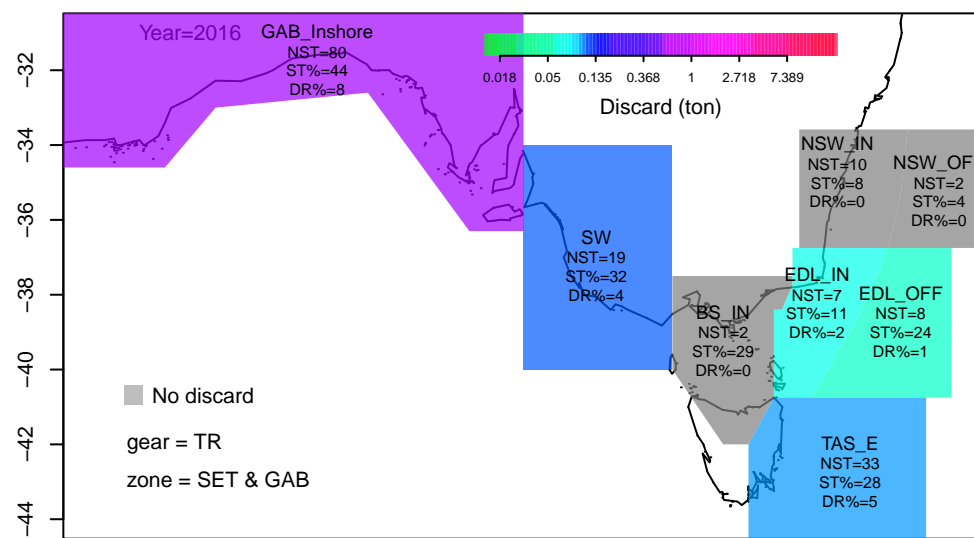


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# Gemfish West

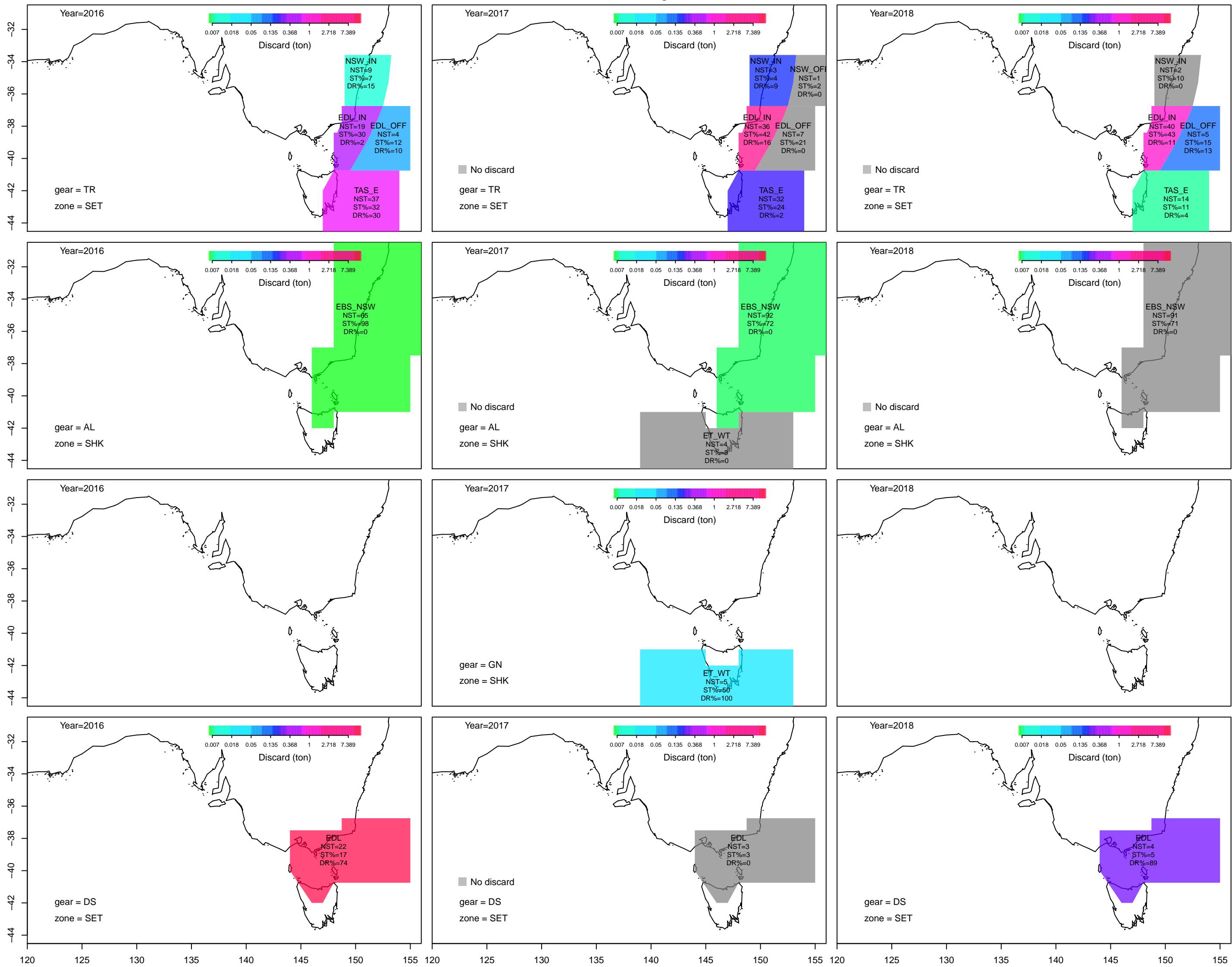


# Gummy Shark

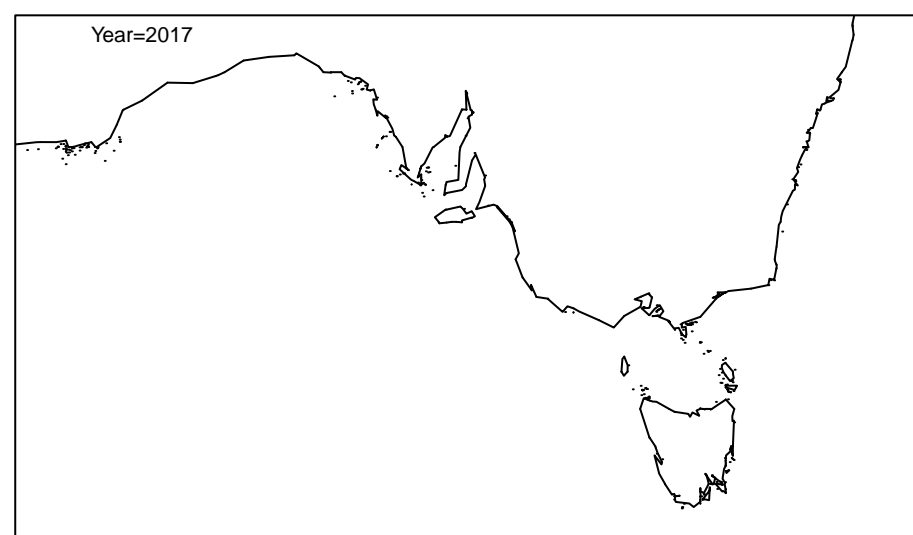
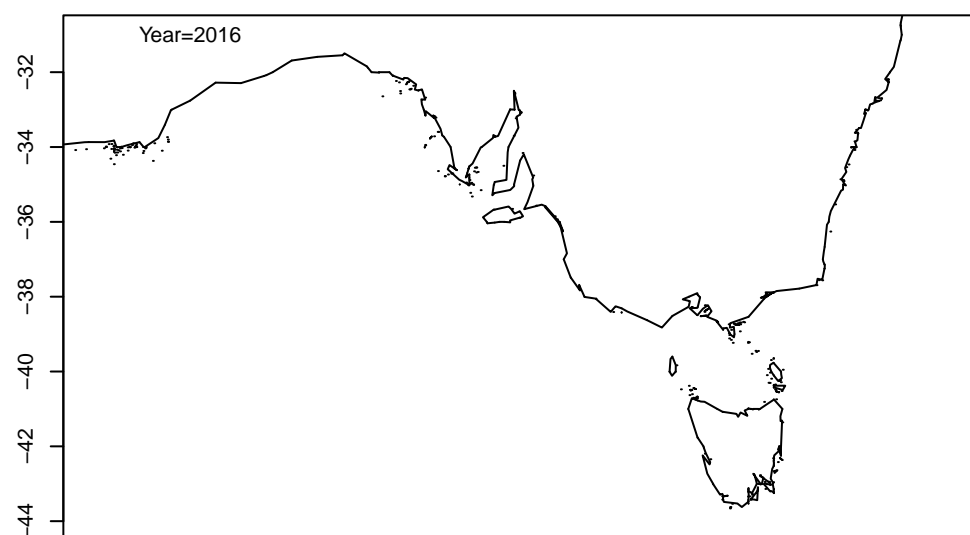
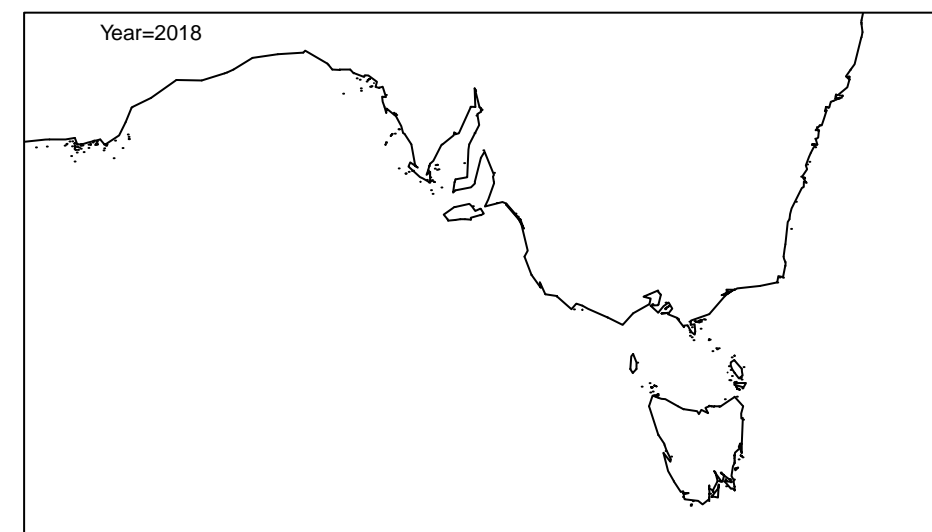
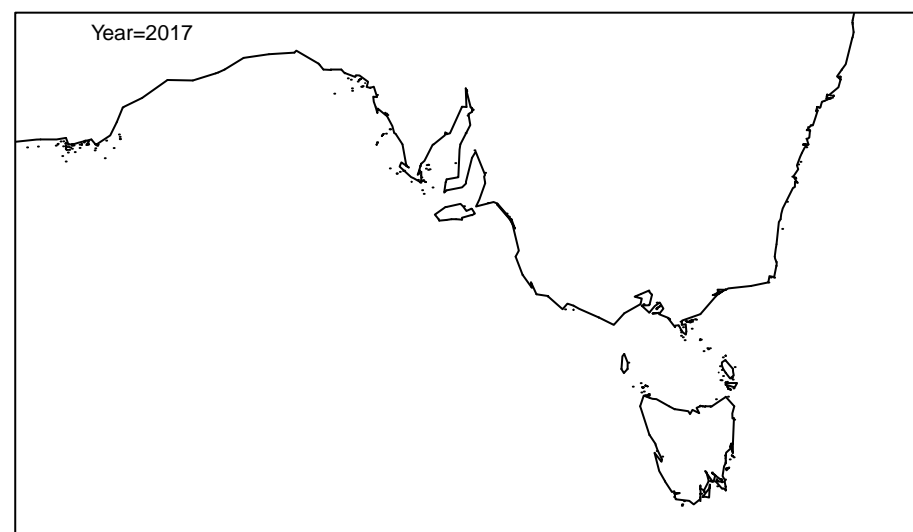
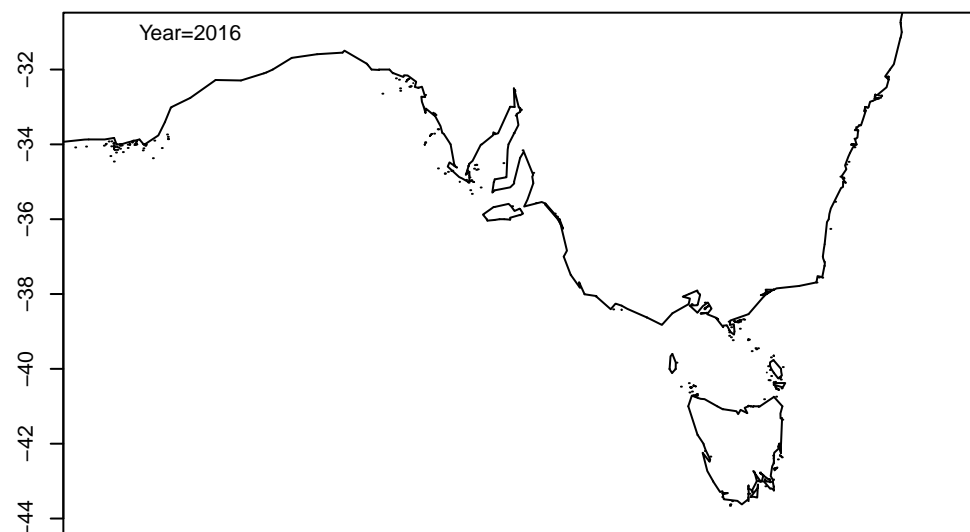
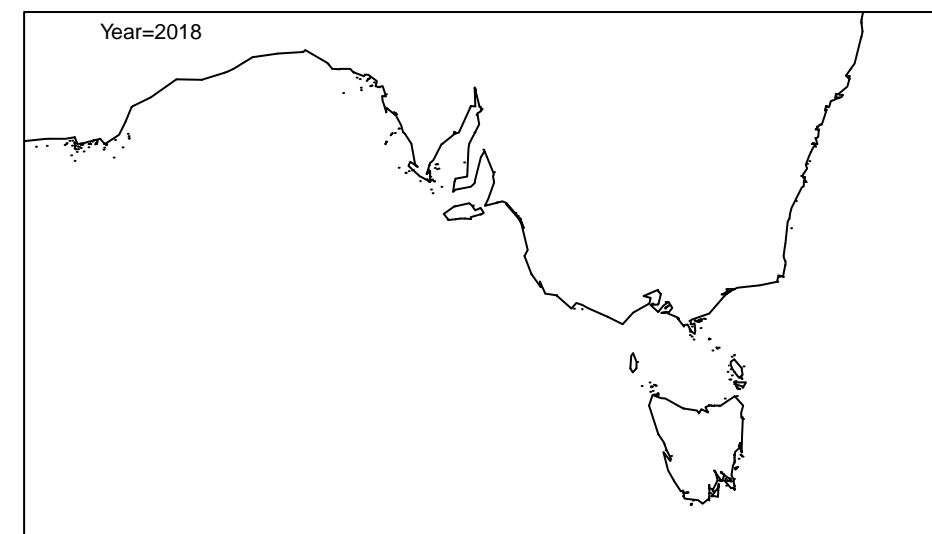
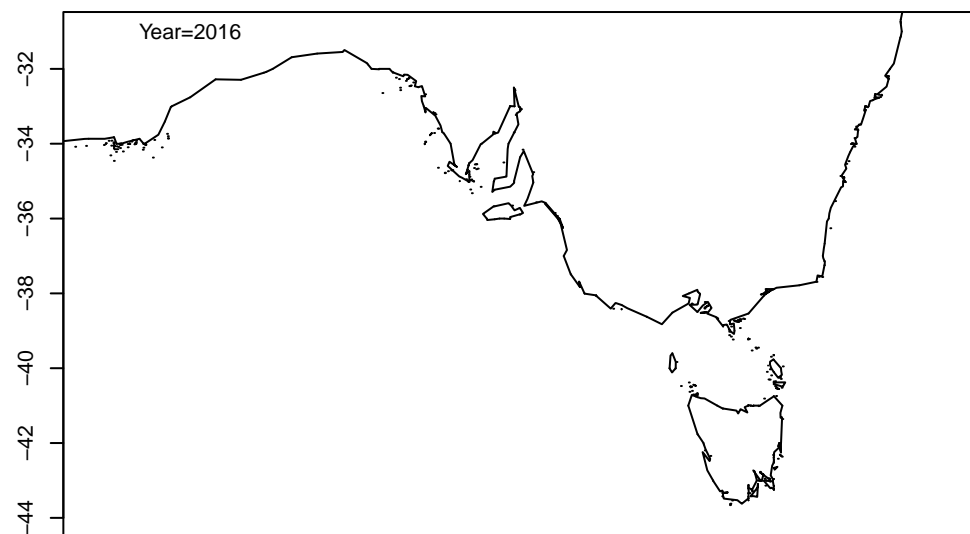
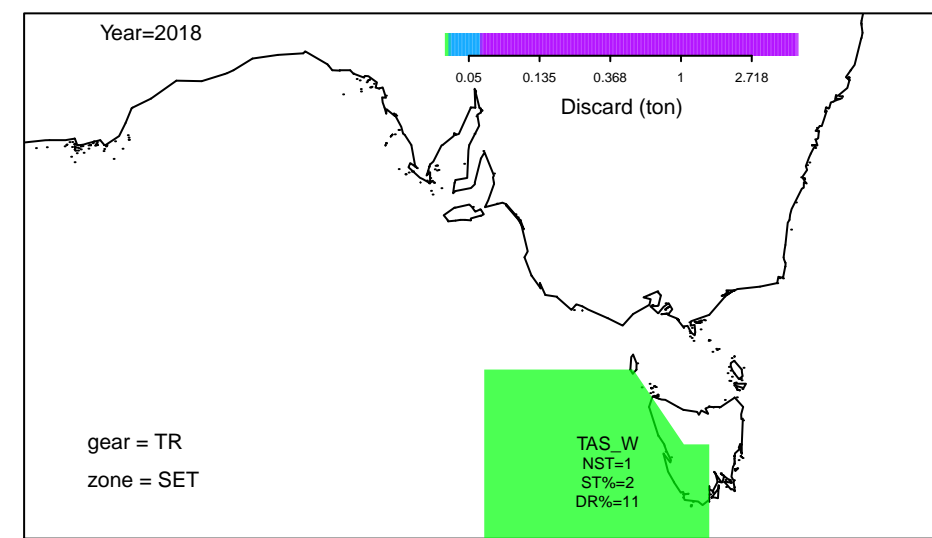
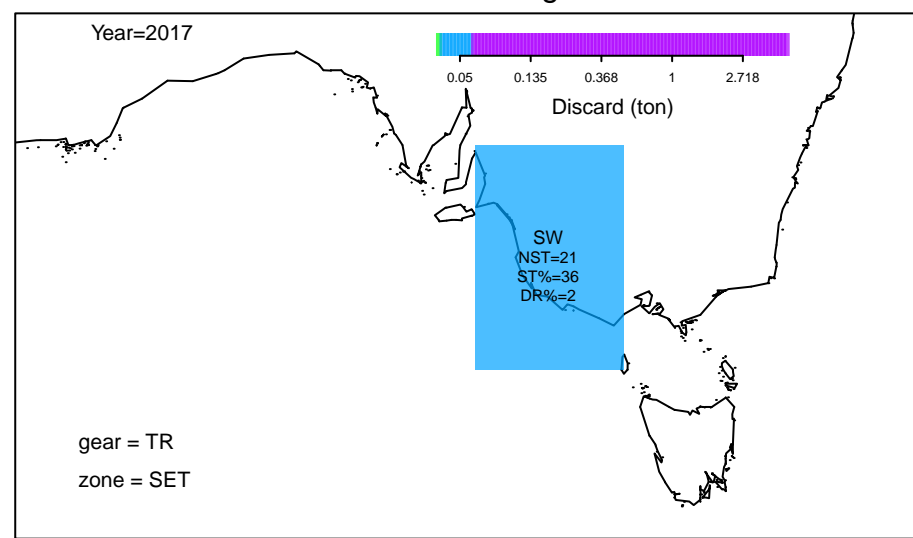
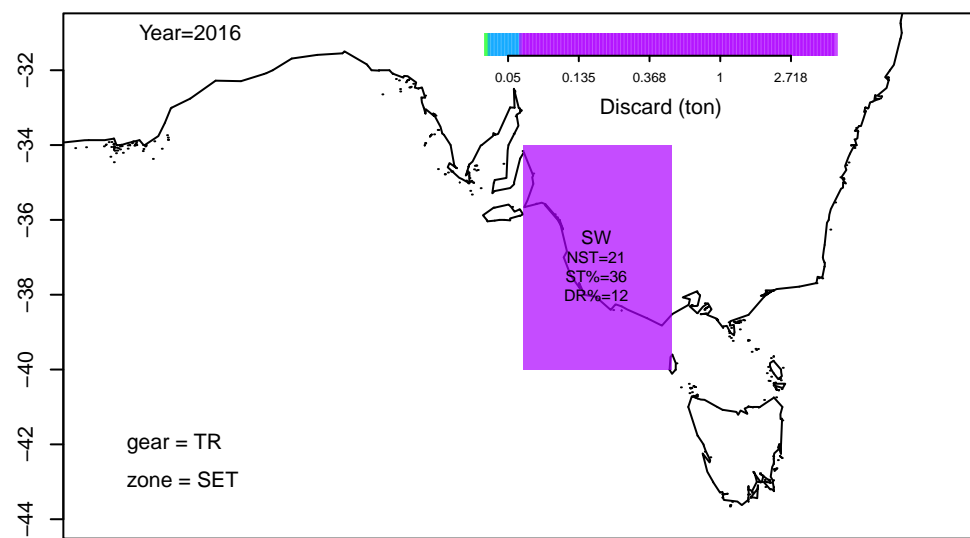




# Jackass Morwong East

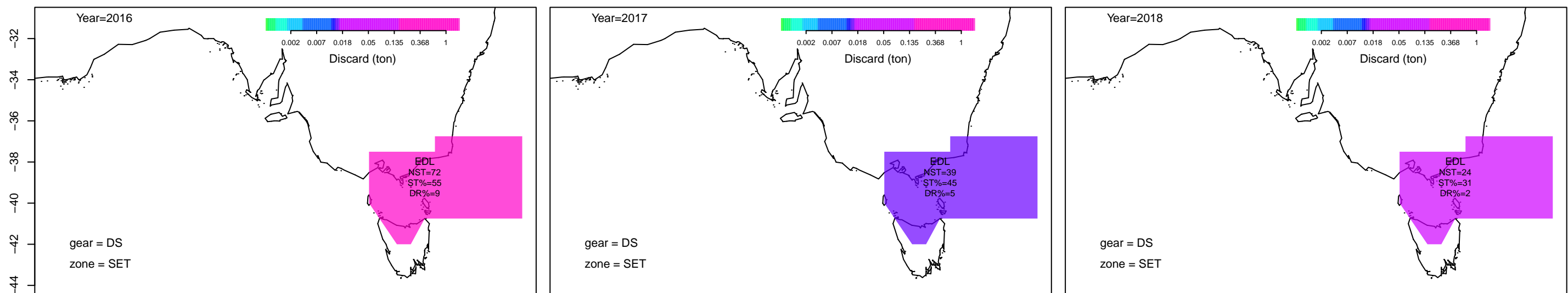
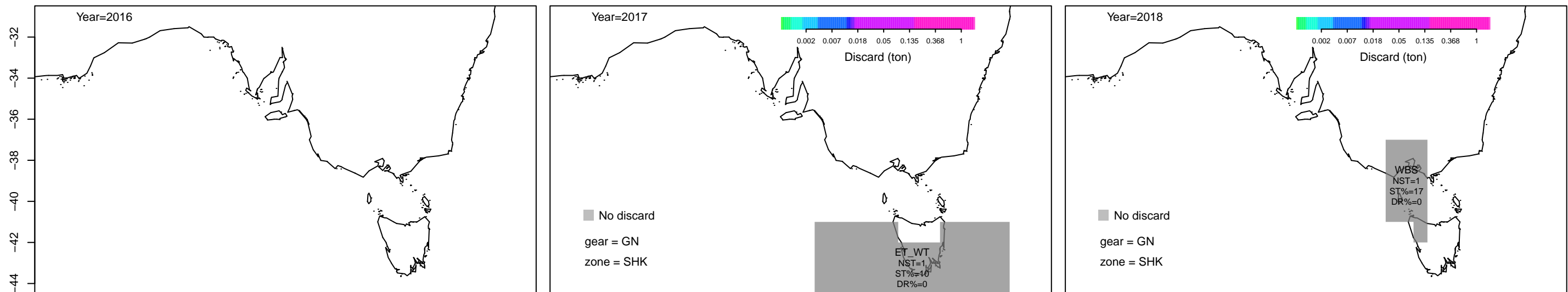
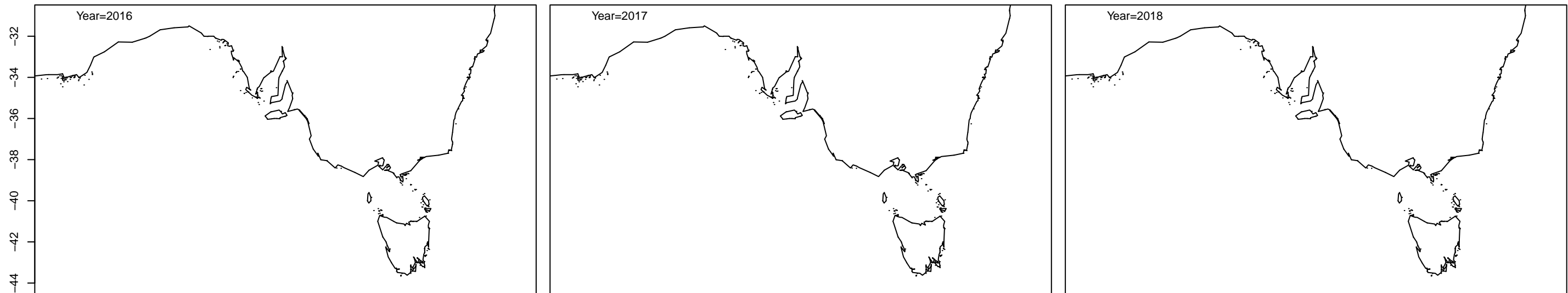
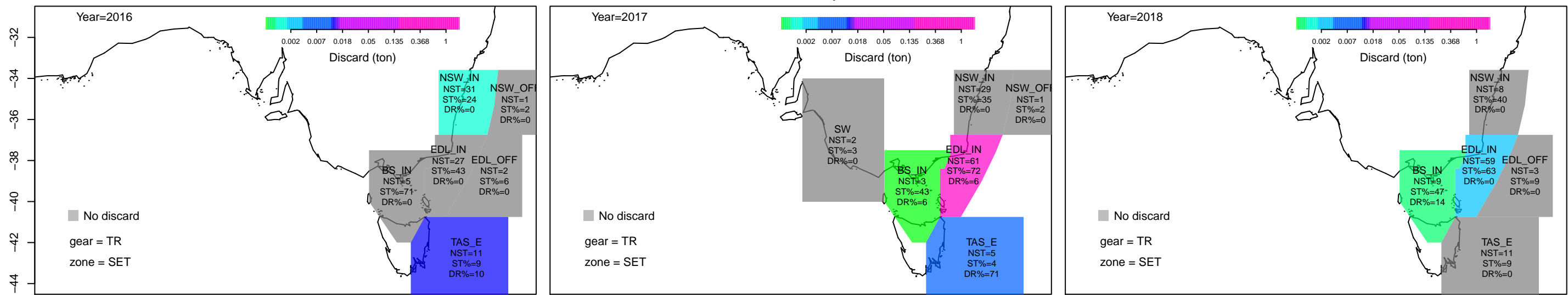


# Jackass Morwong West



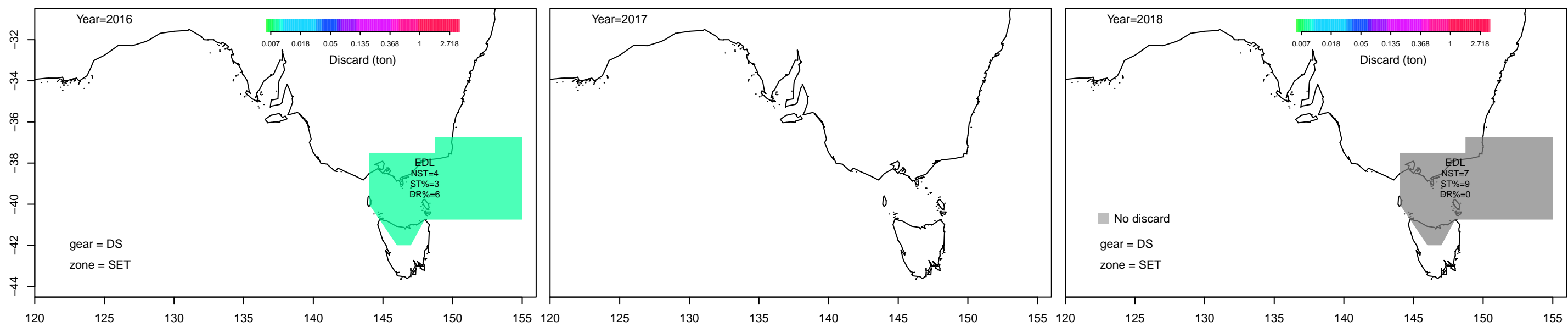
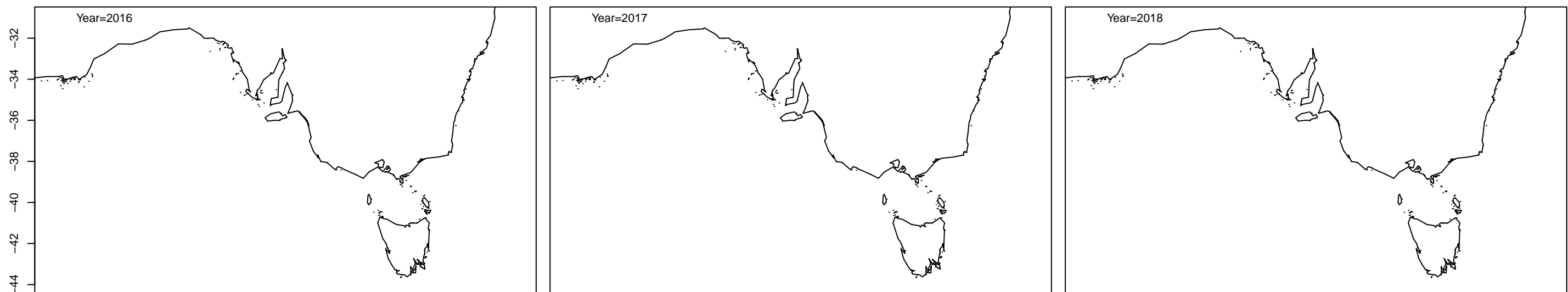
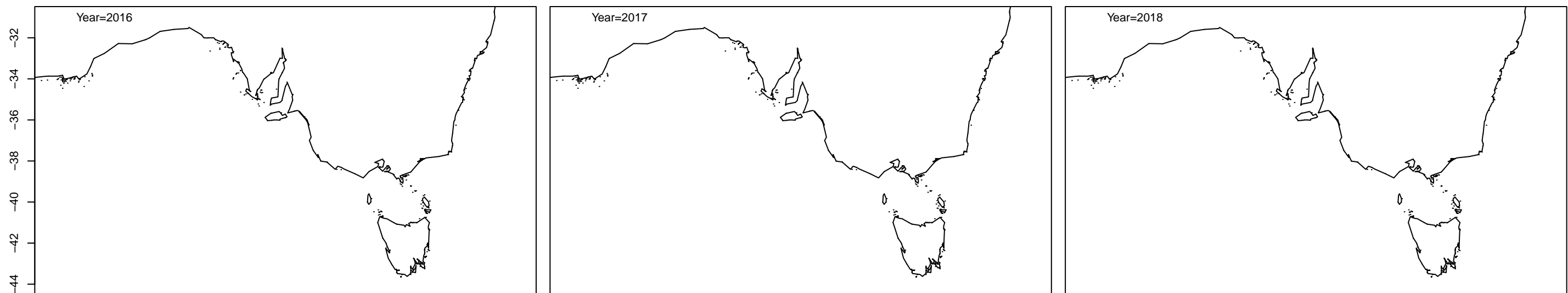
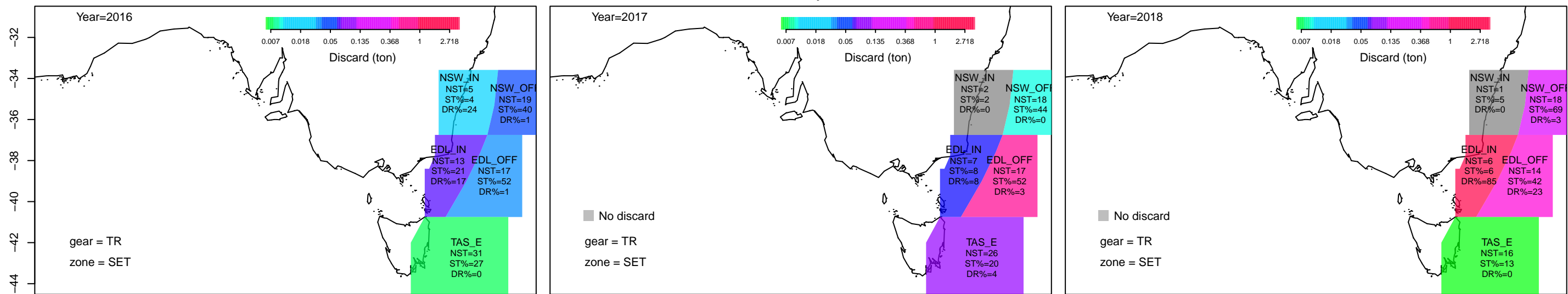
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# John Dory

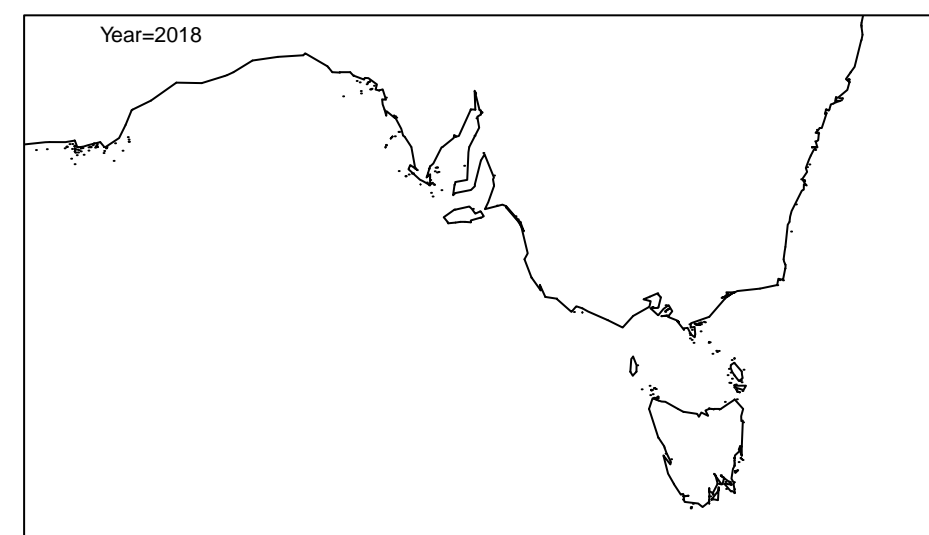
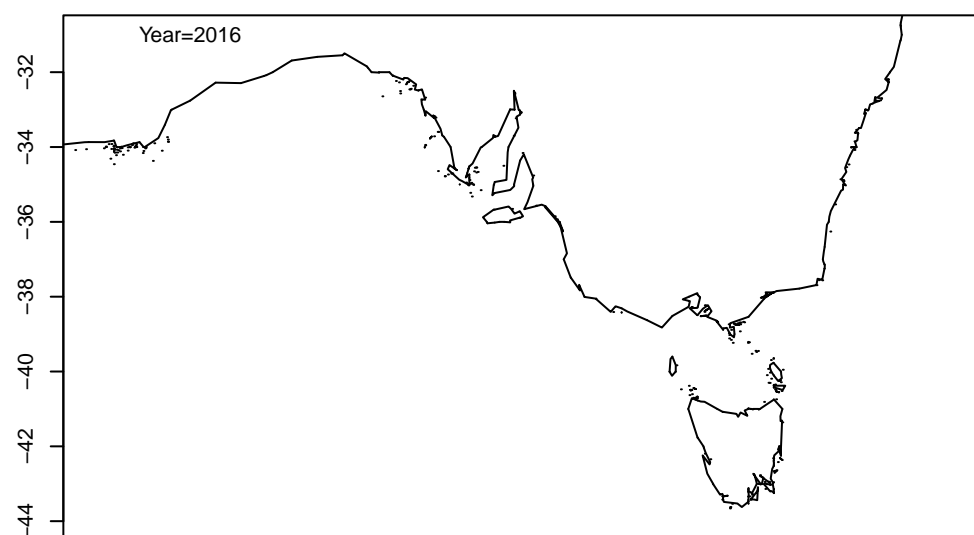
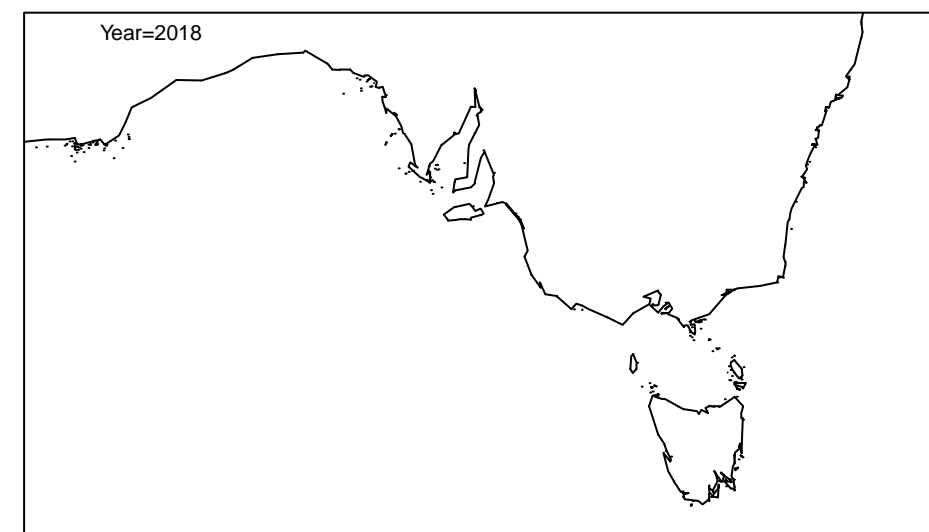
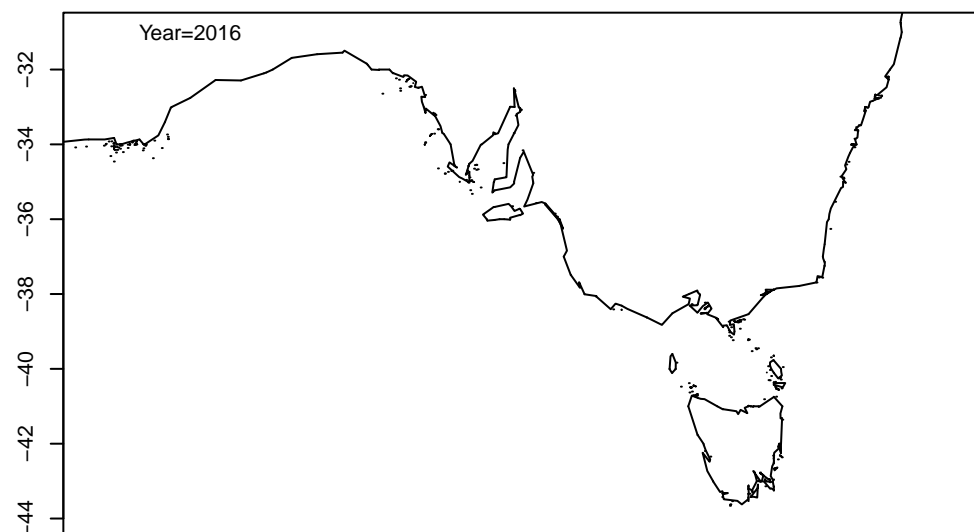
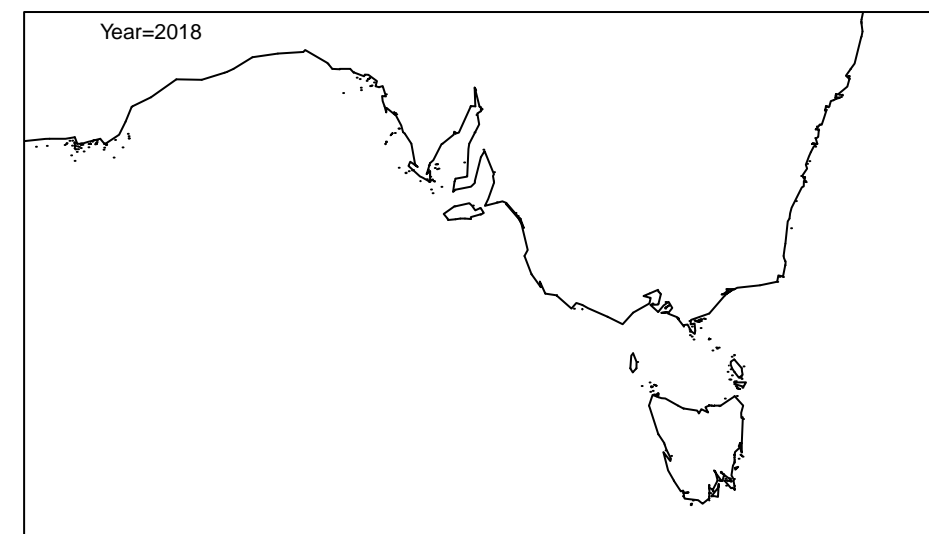
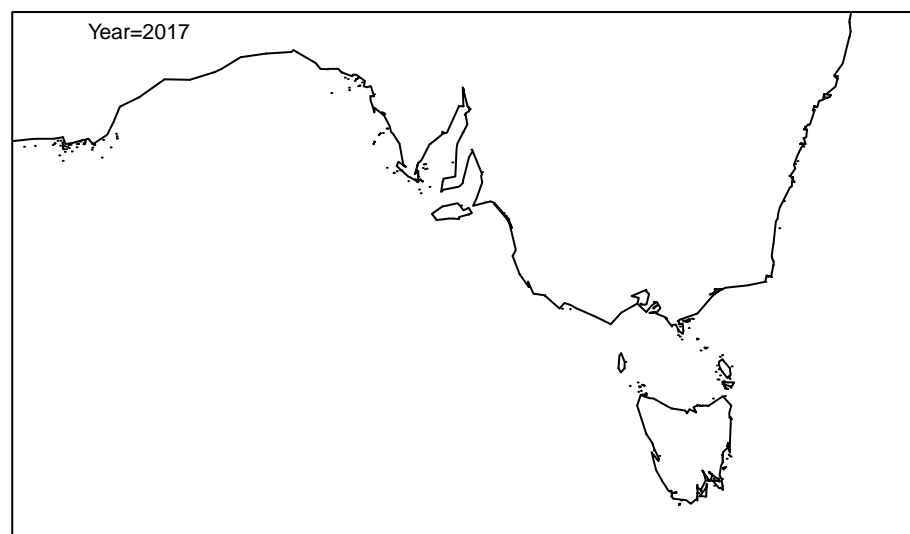
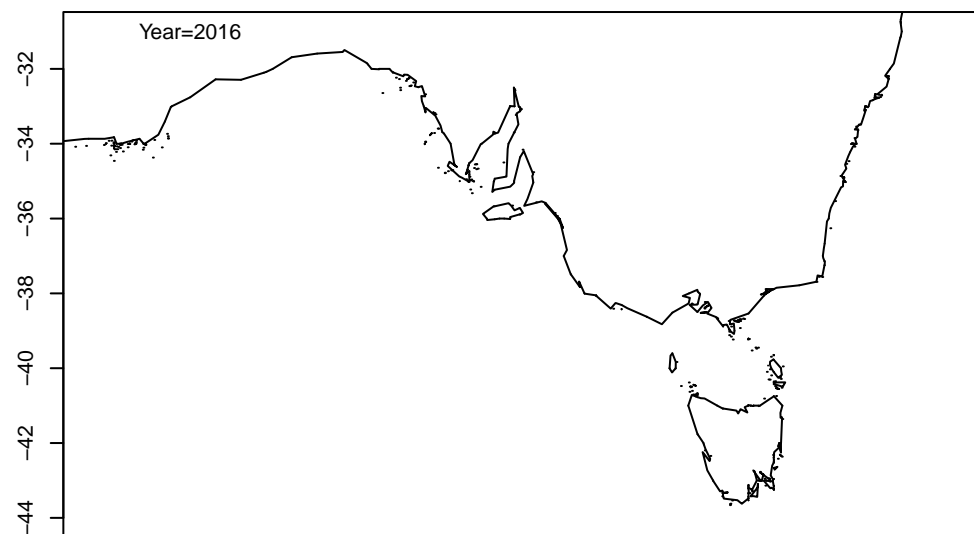
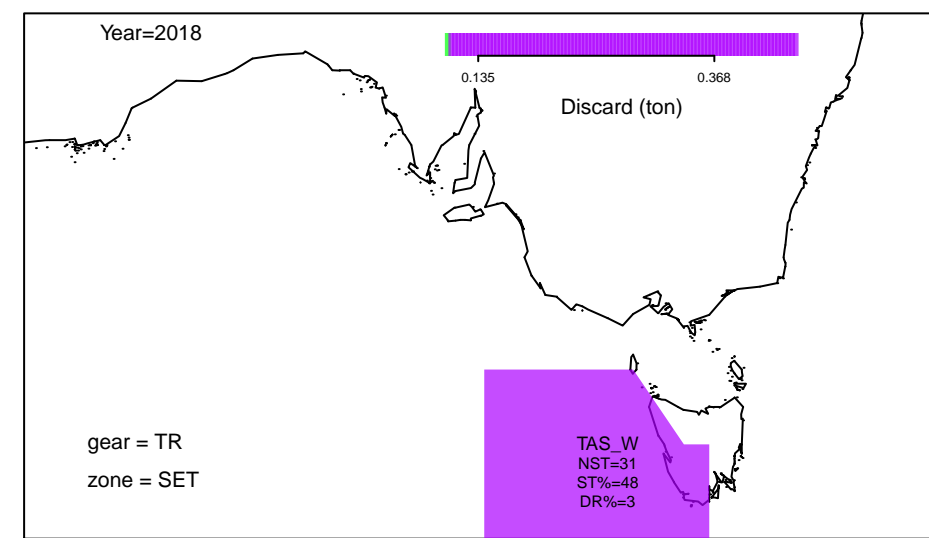
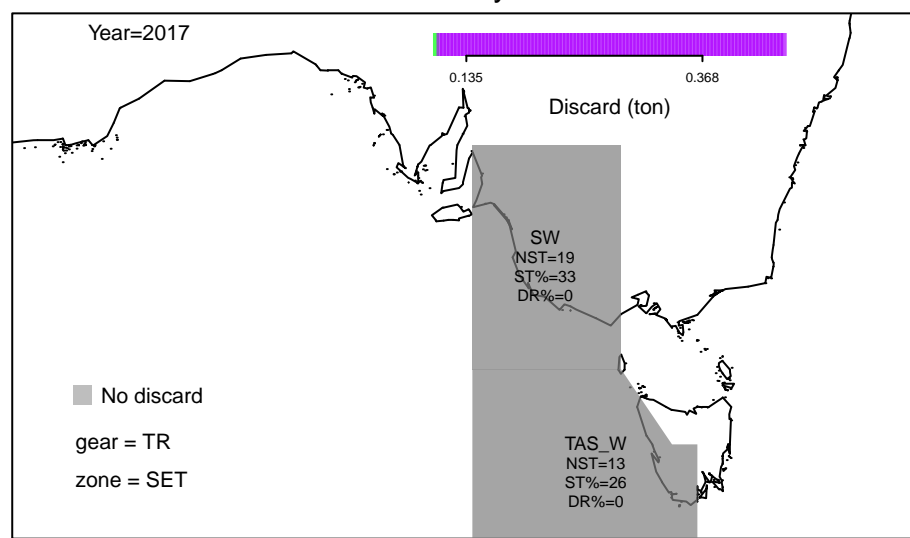
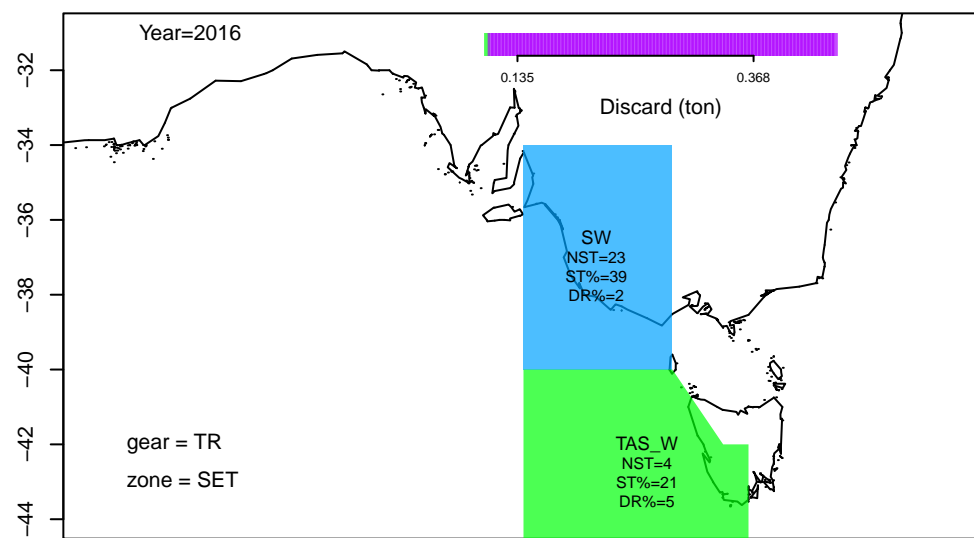


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# Mirror Dory East

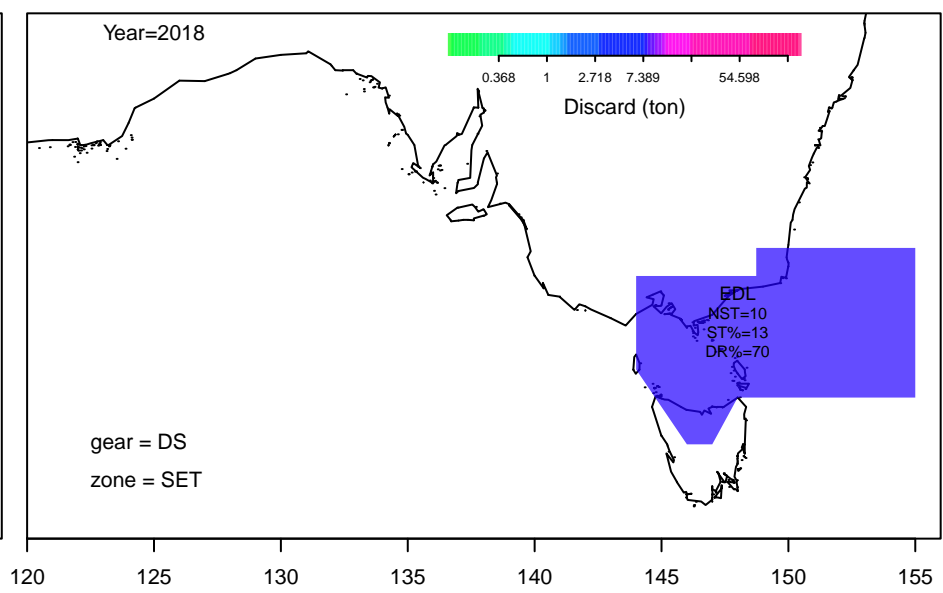
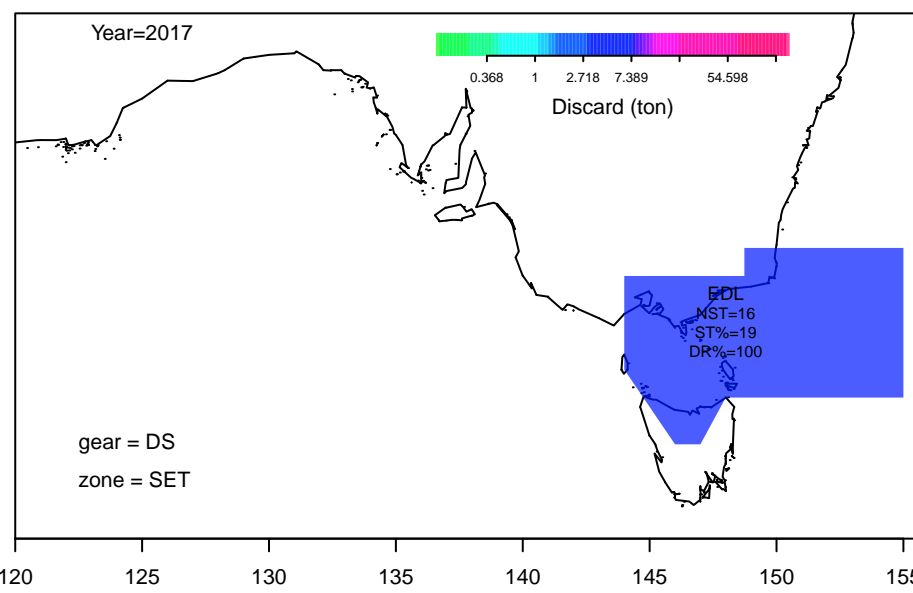
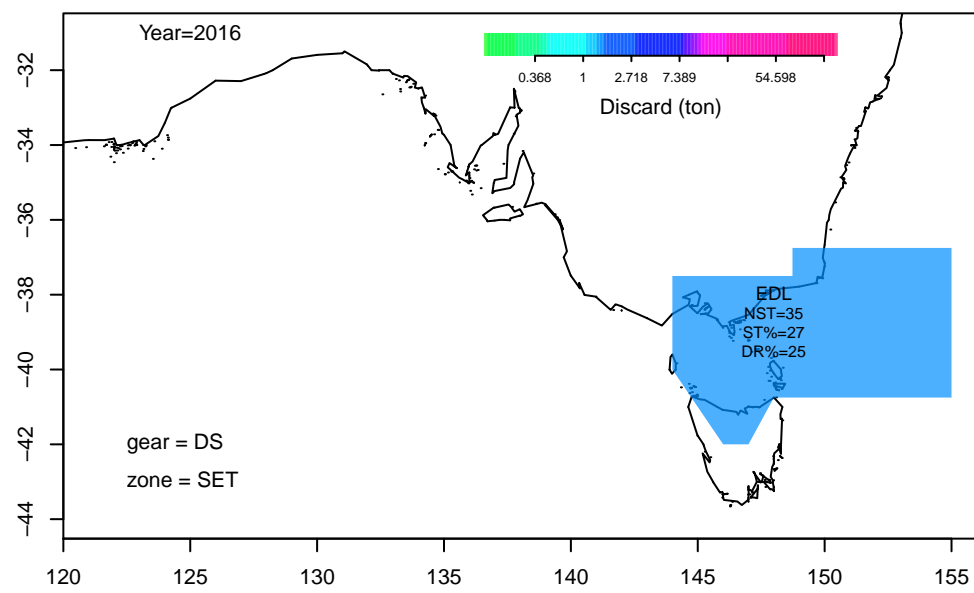
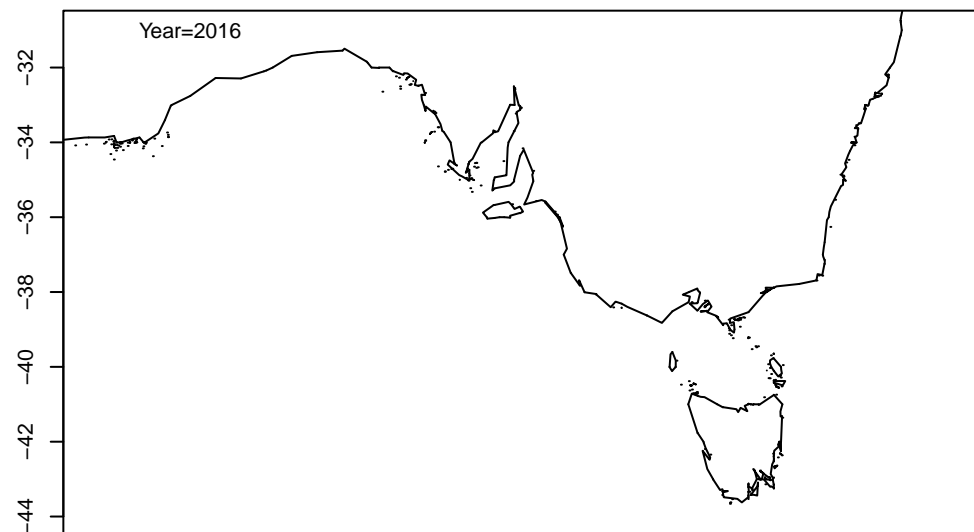
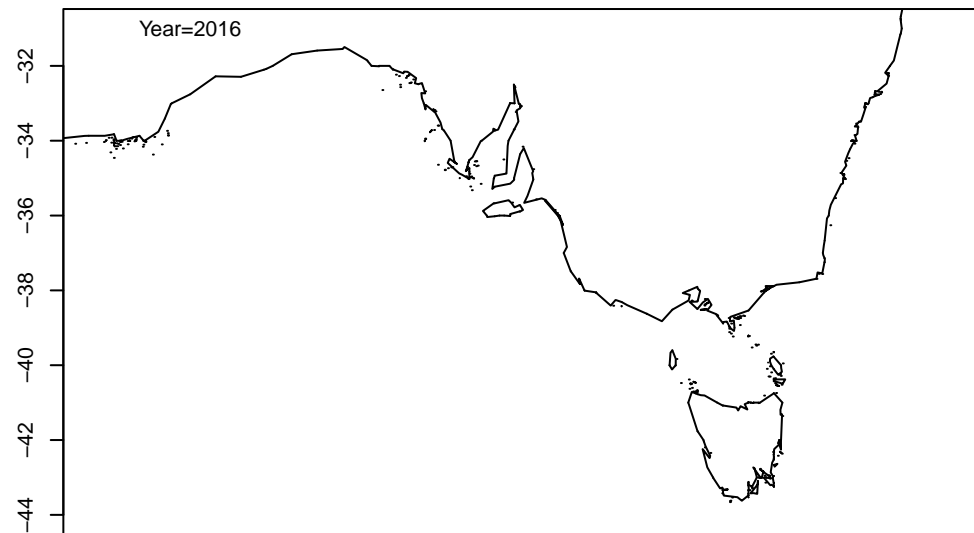
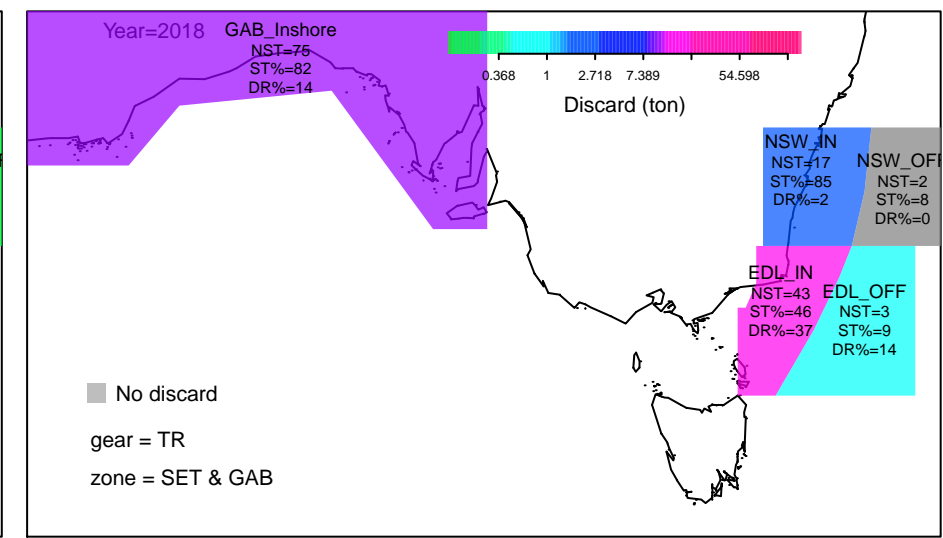
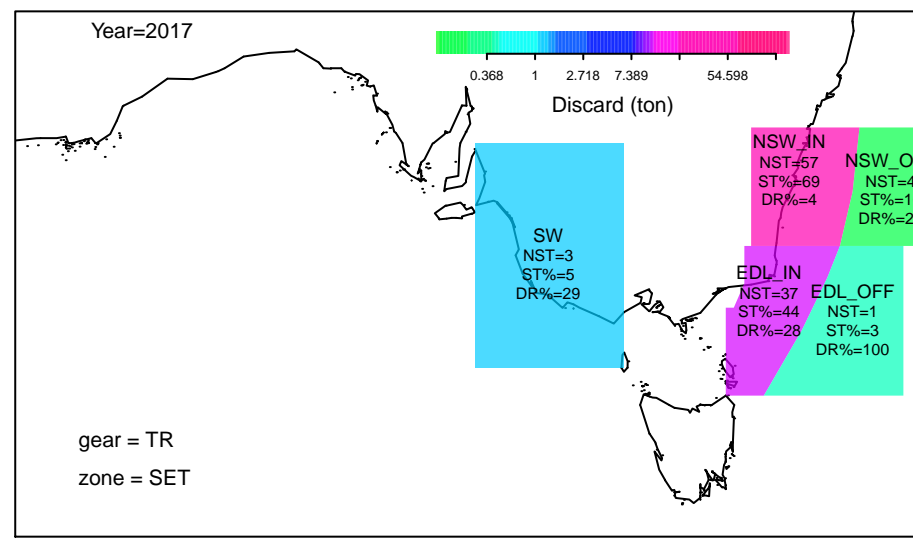
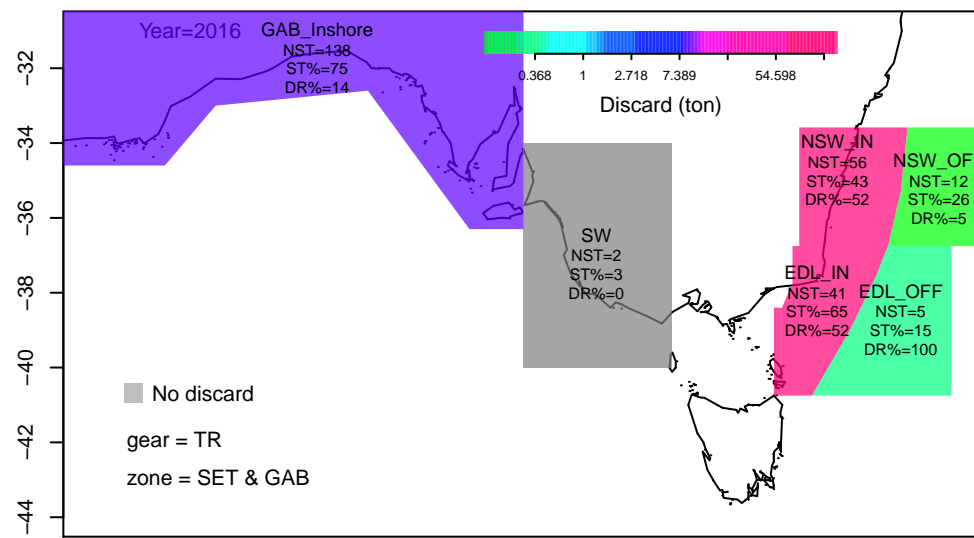


# Mirror Dory West



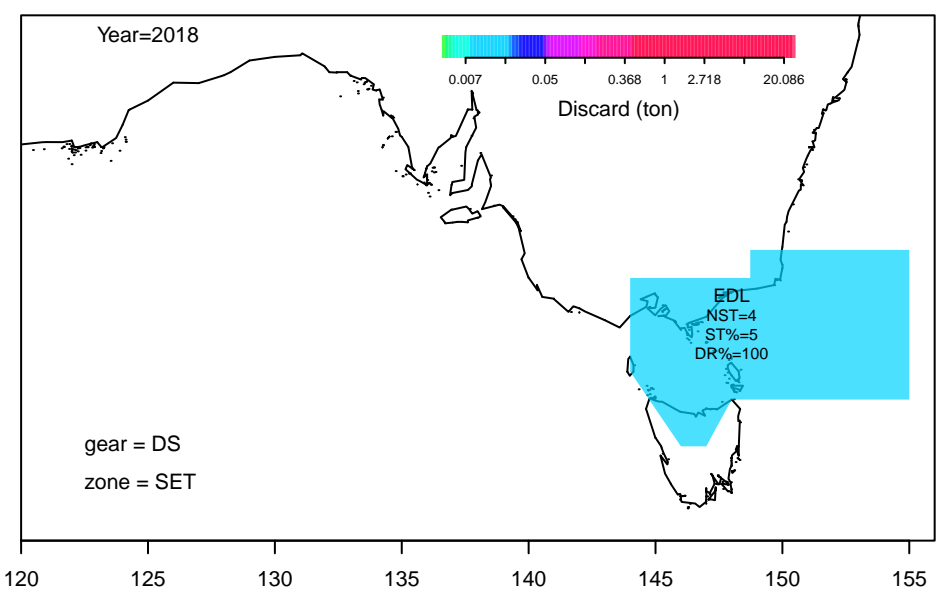
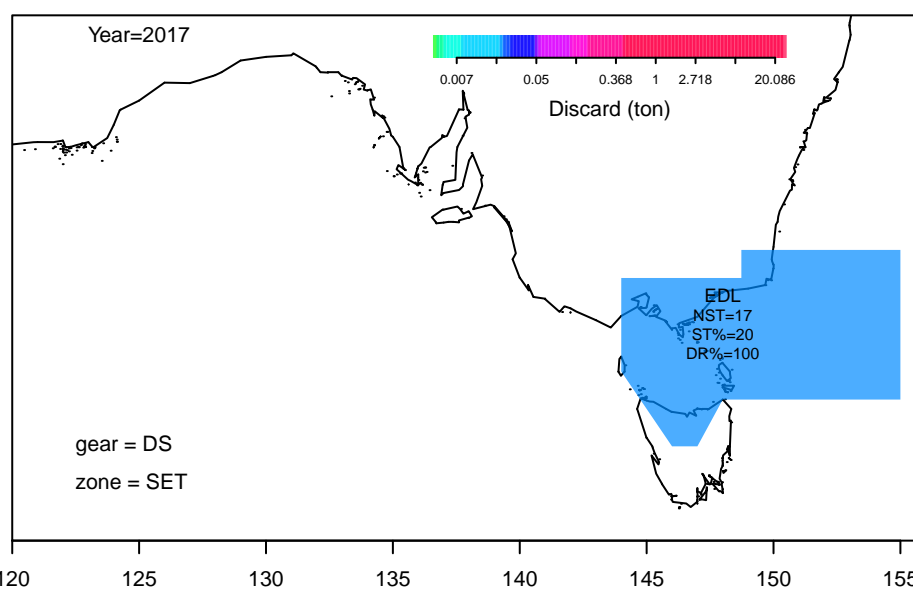
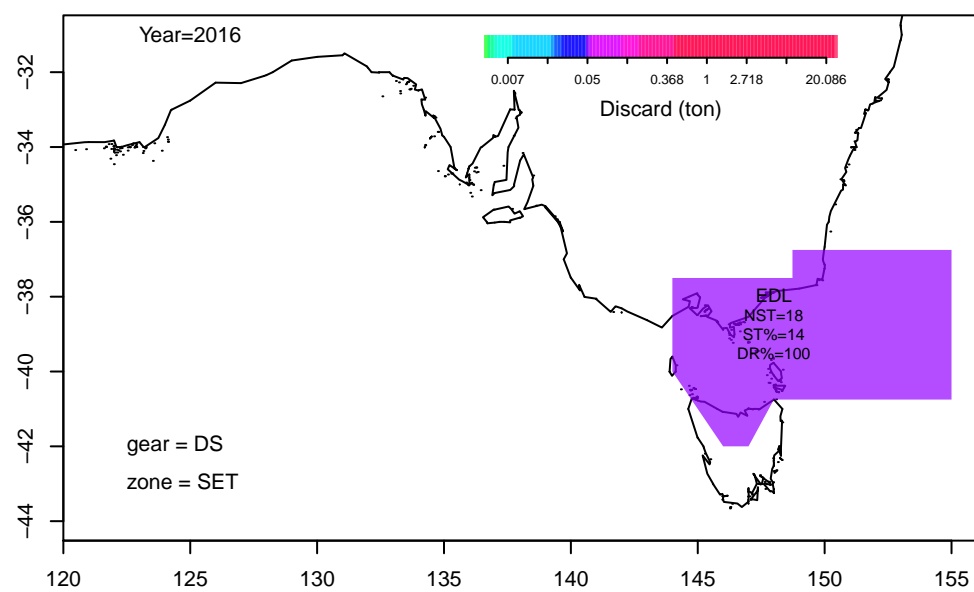
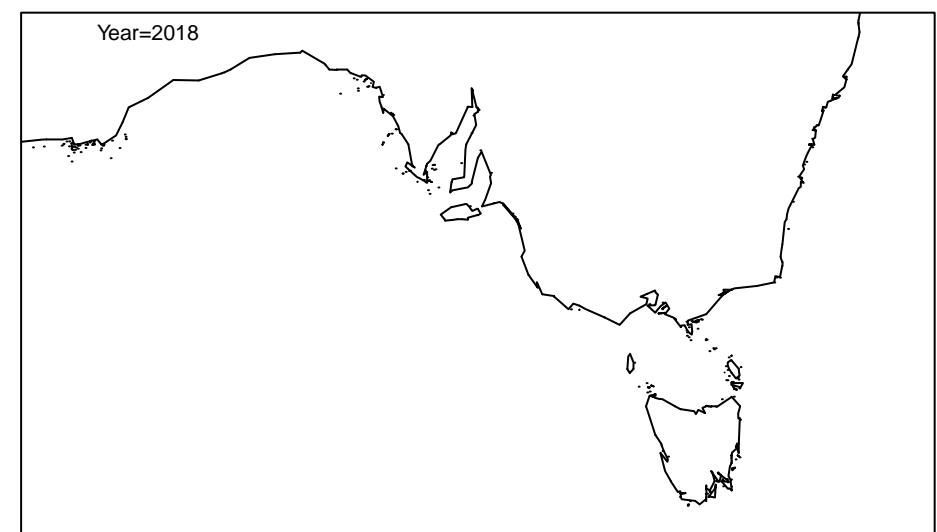
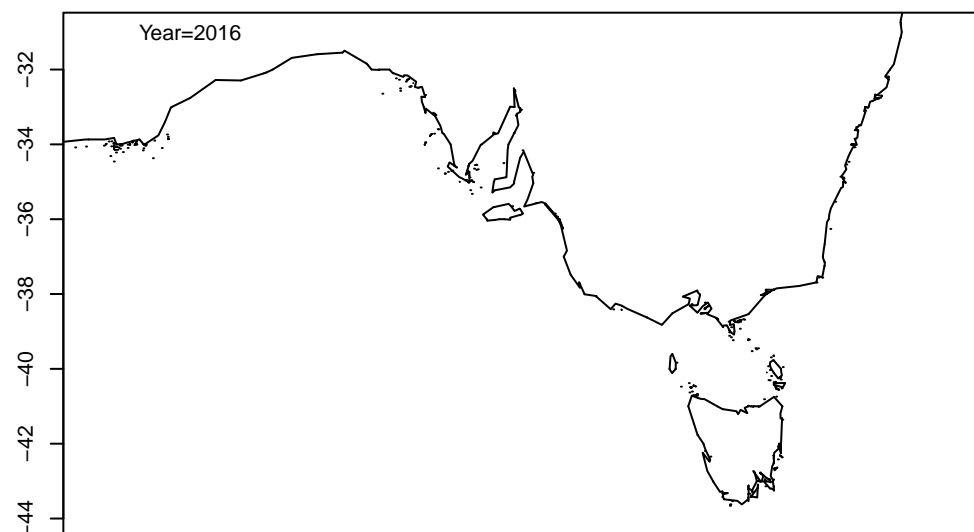
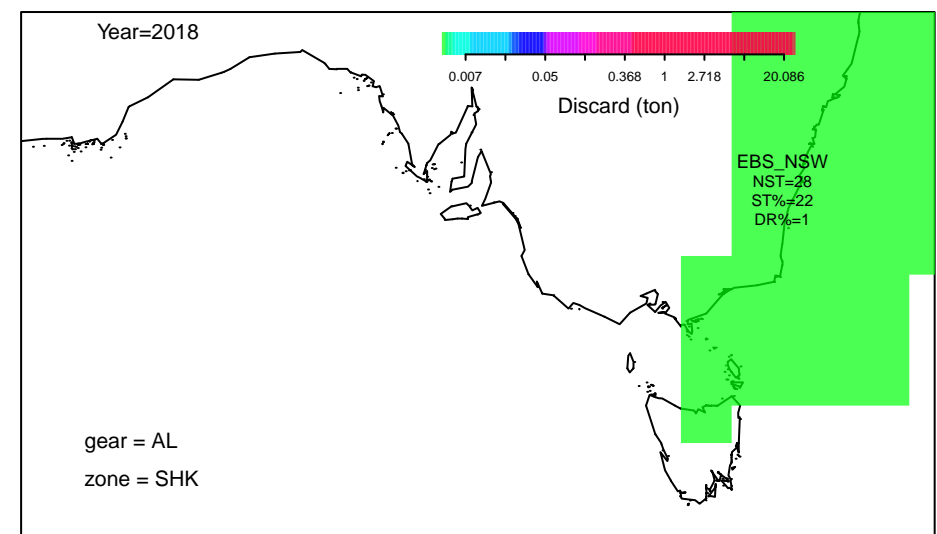
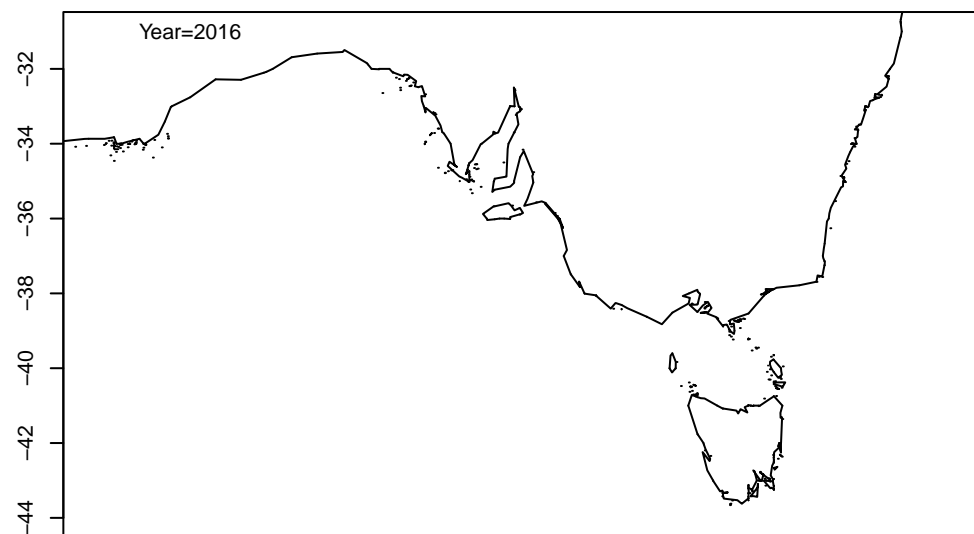
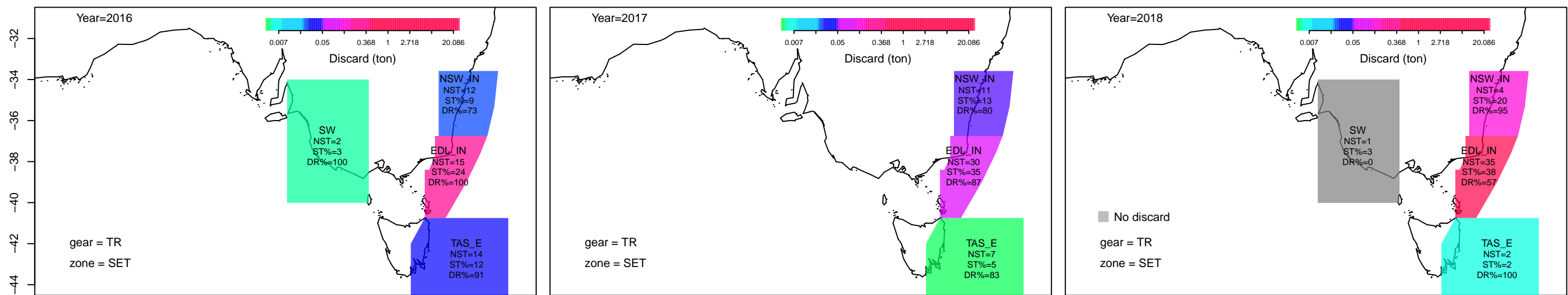
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# Ocean Jackets



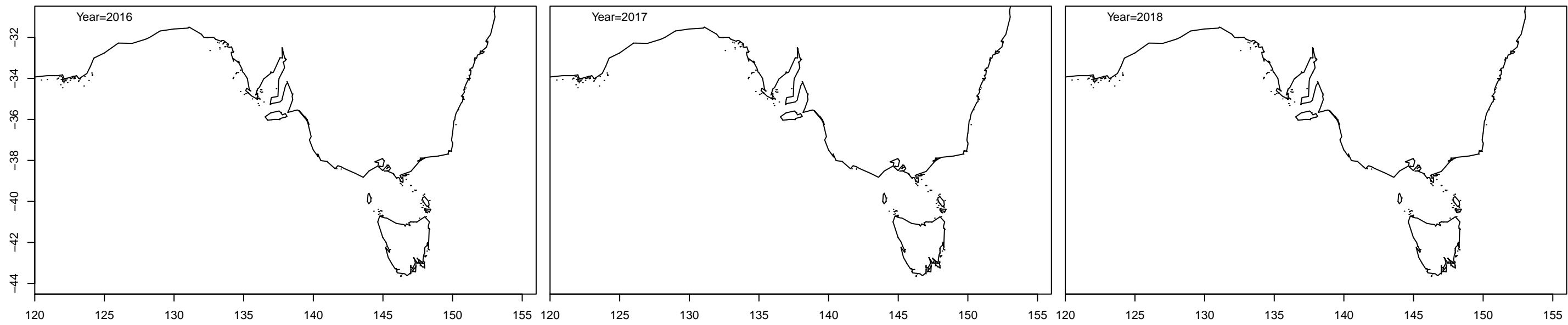
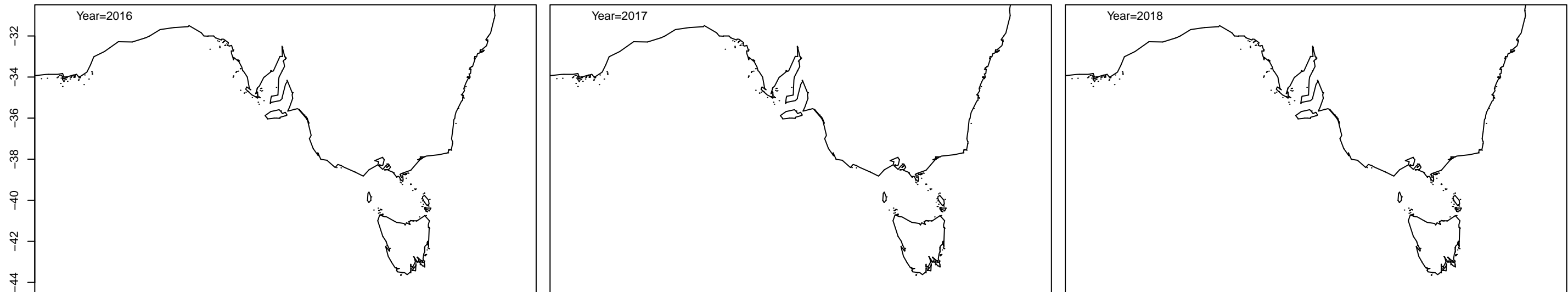
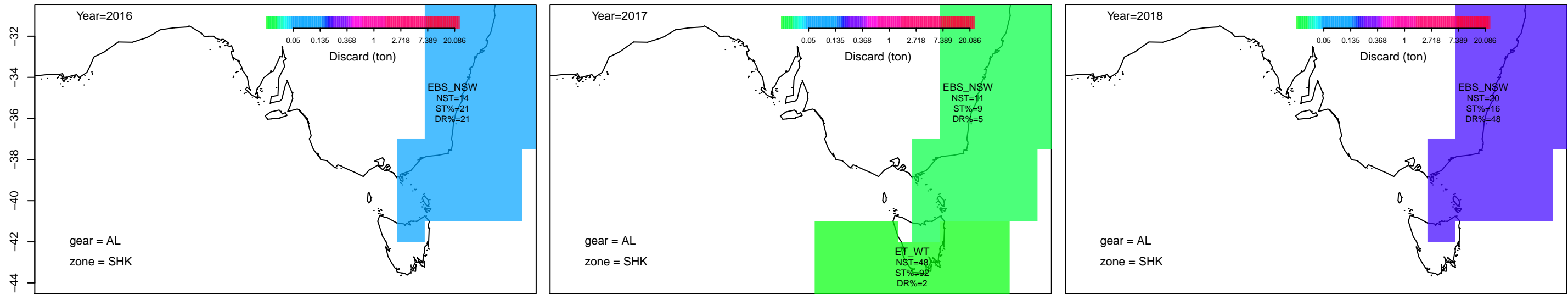
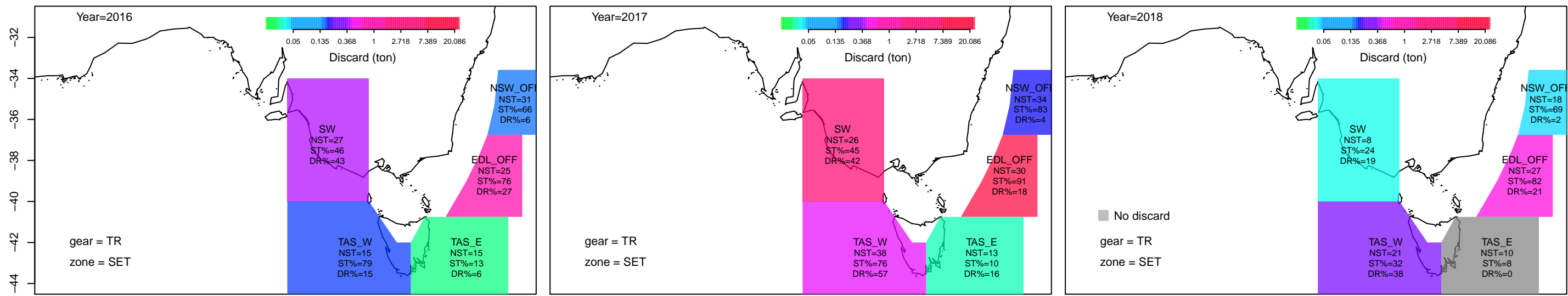
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# Ocean Perch Inshore



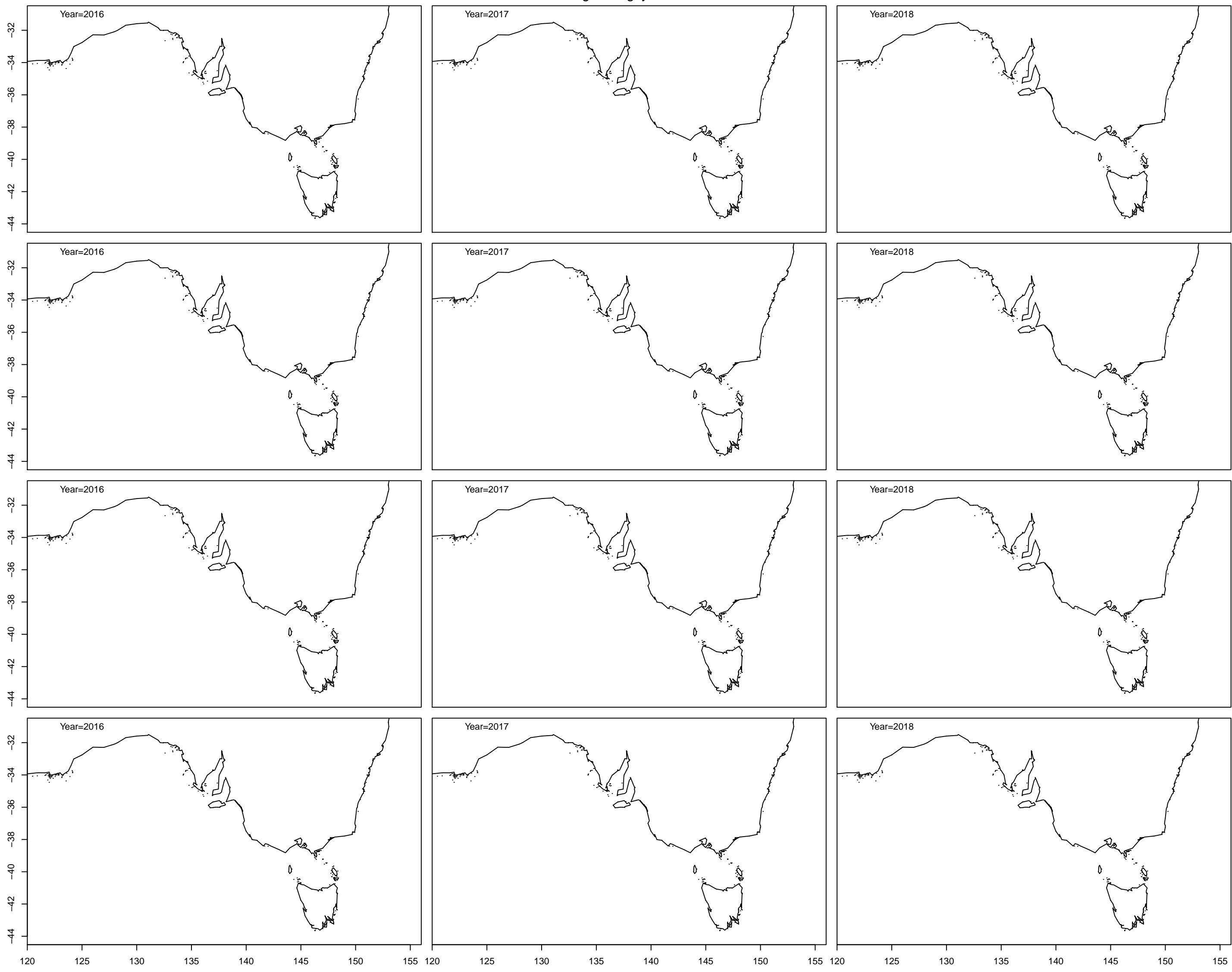
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# Ocean Perch Offshore

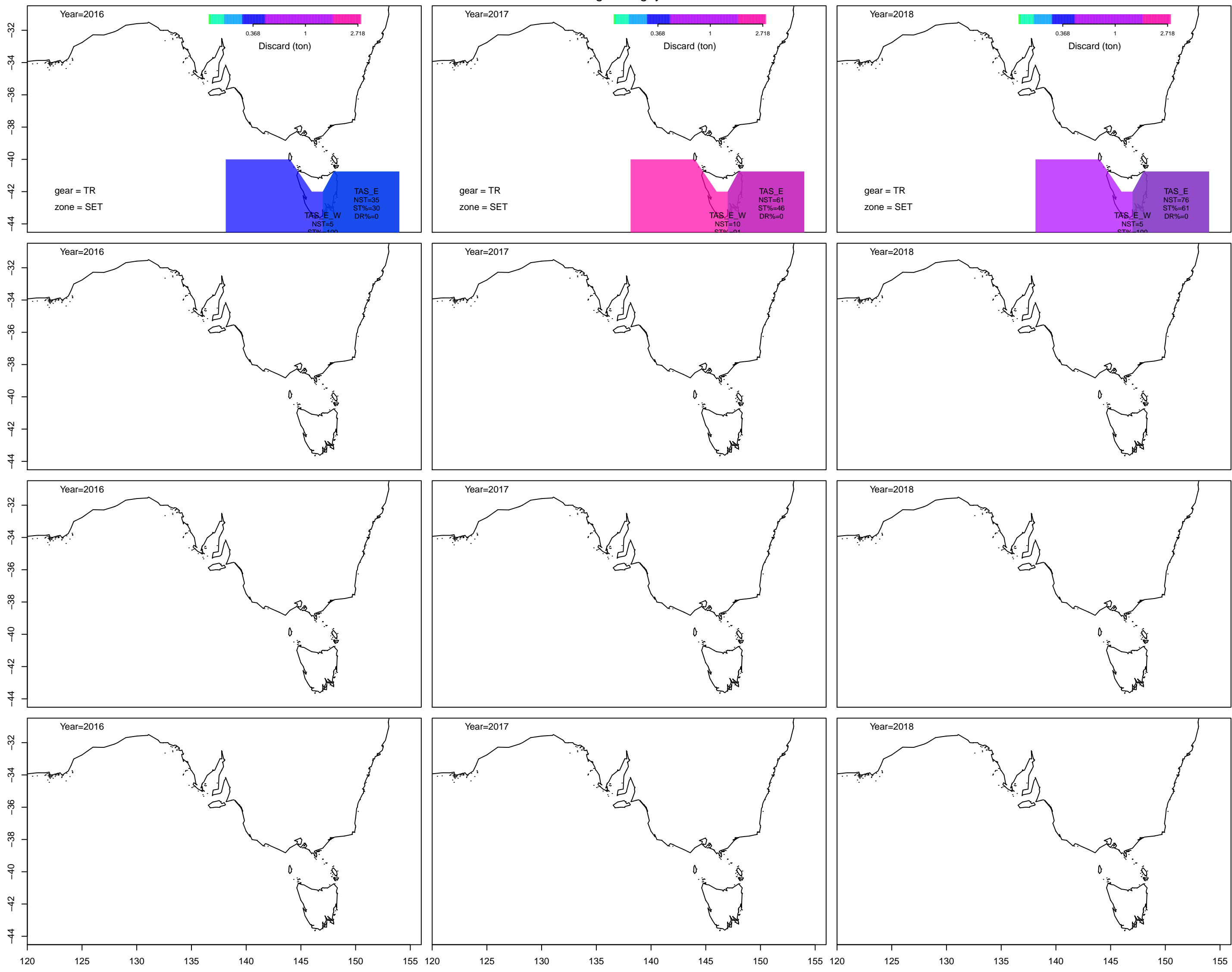




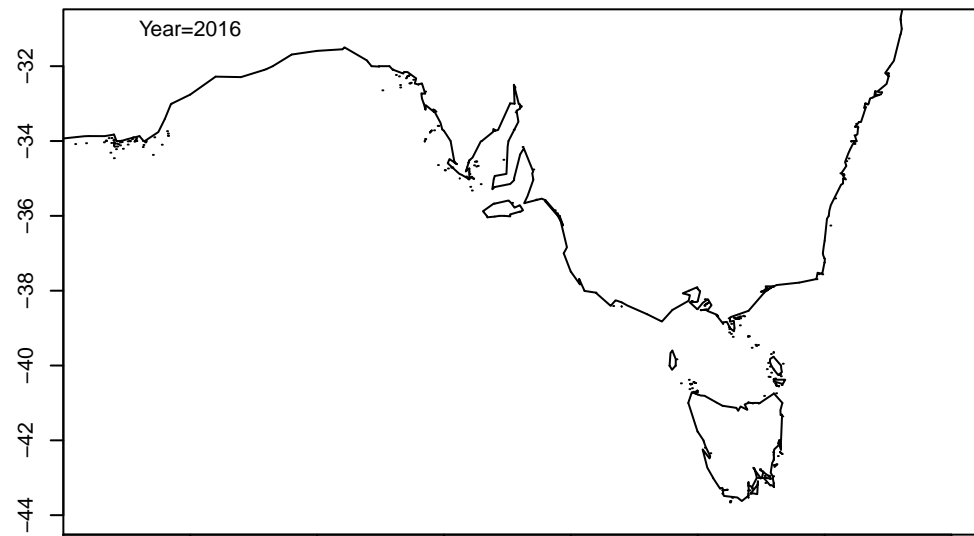
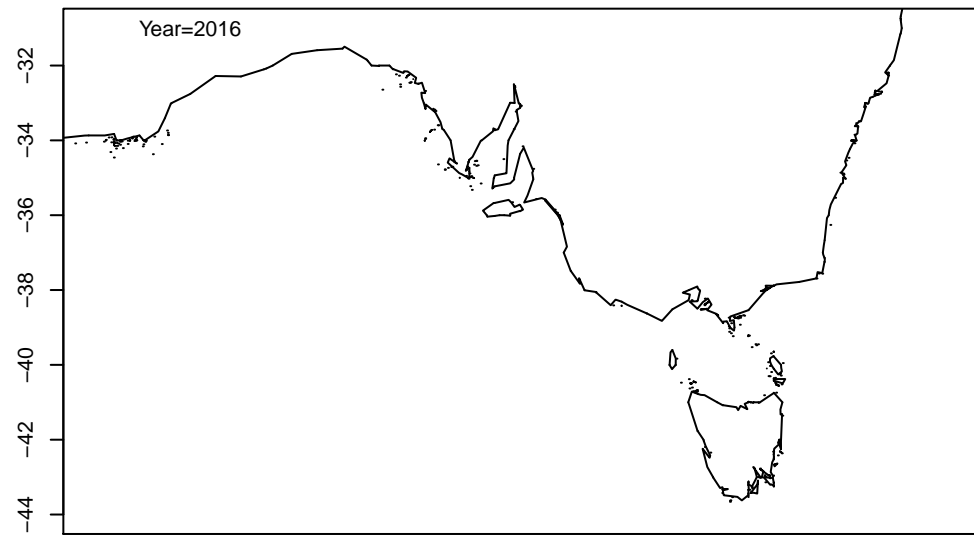
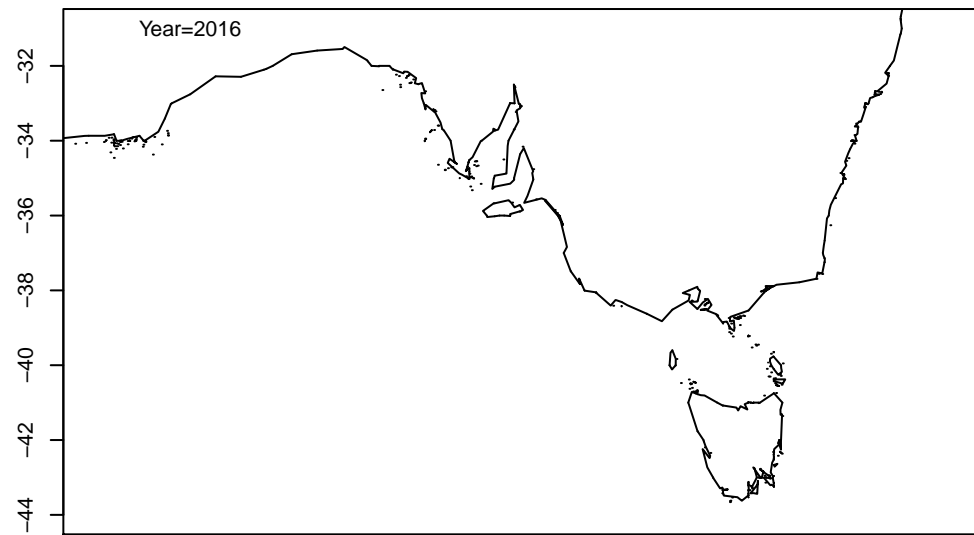
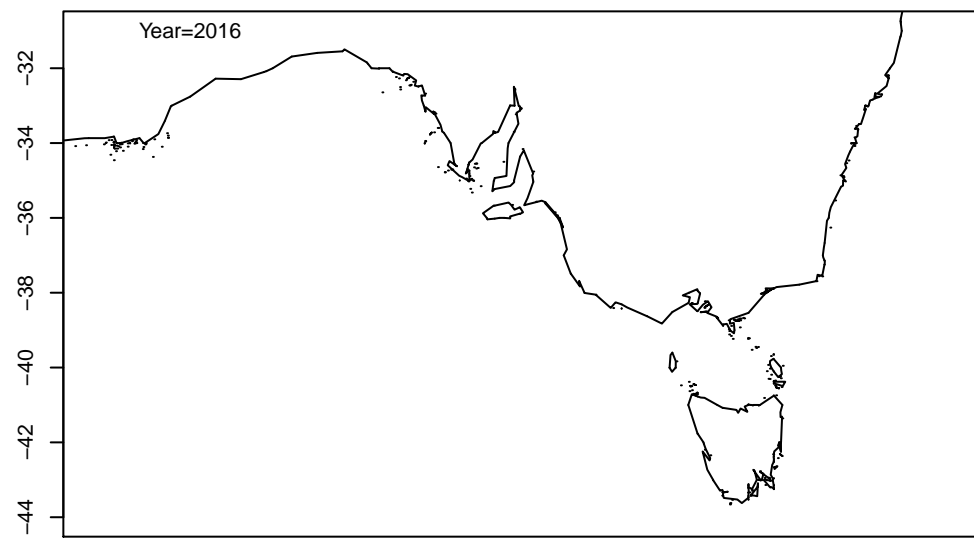
# Orange Roughy Cascade



# Orange Roughy East

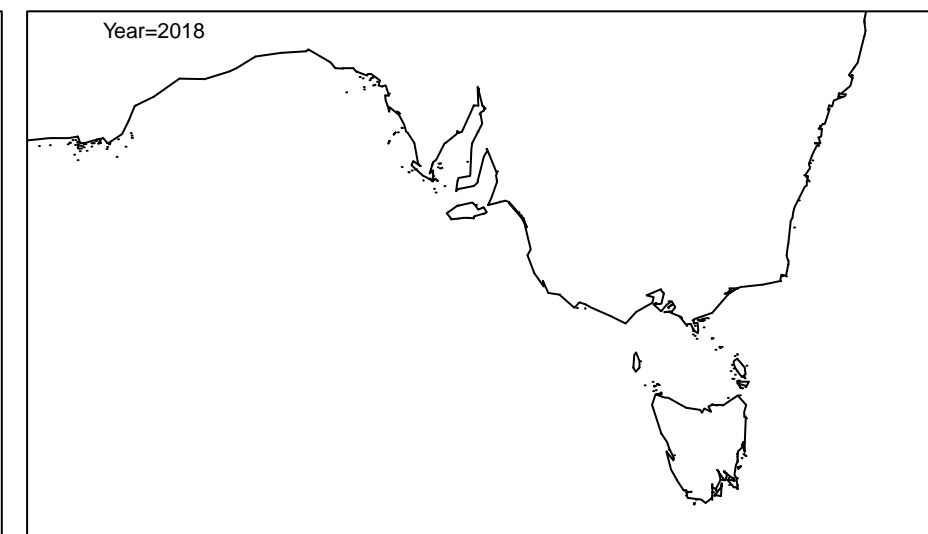
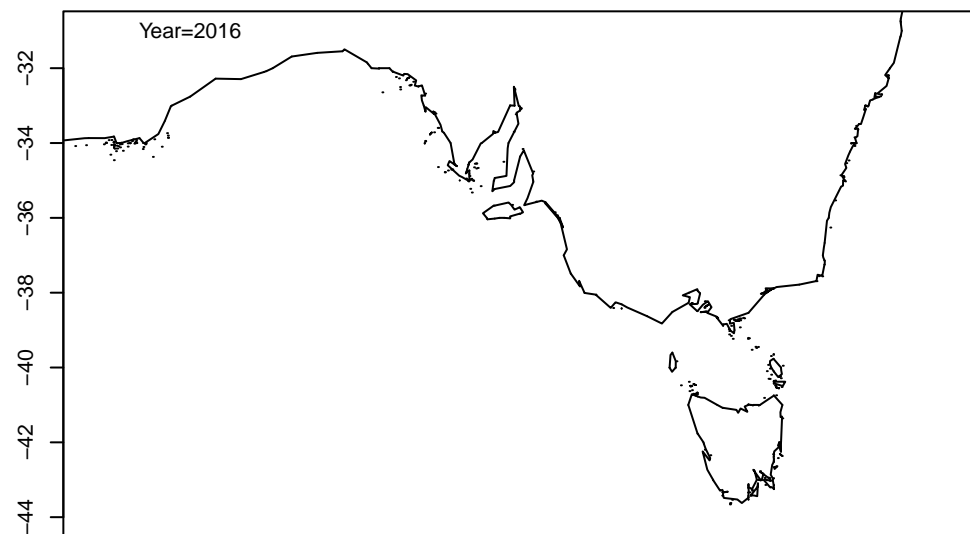
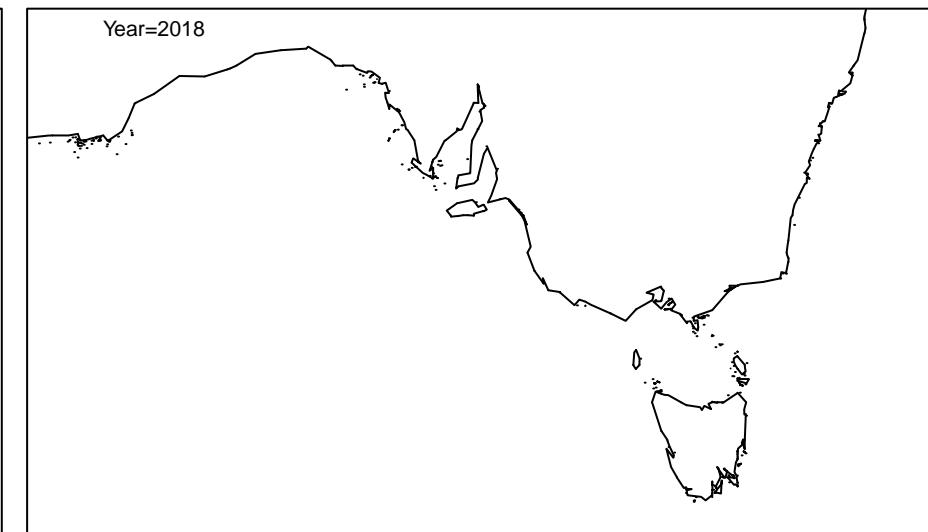
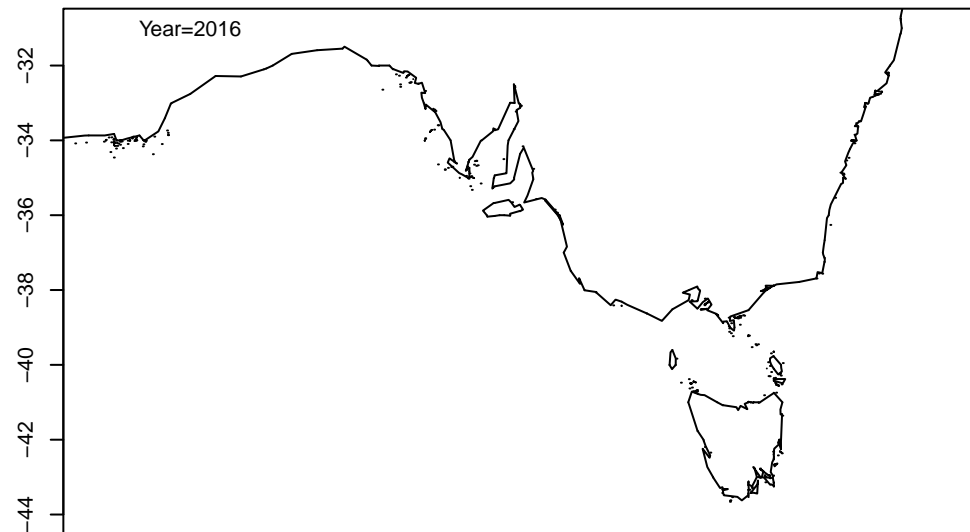
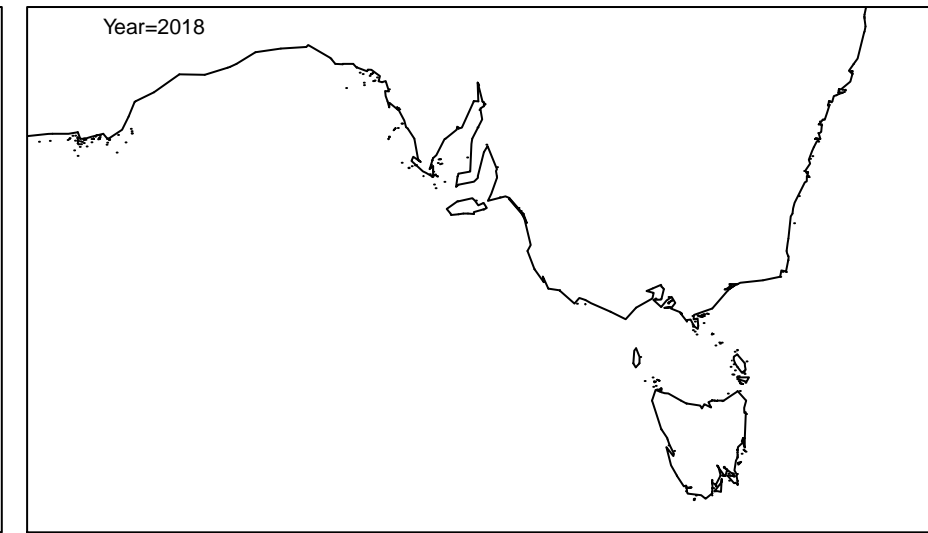
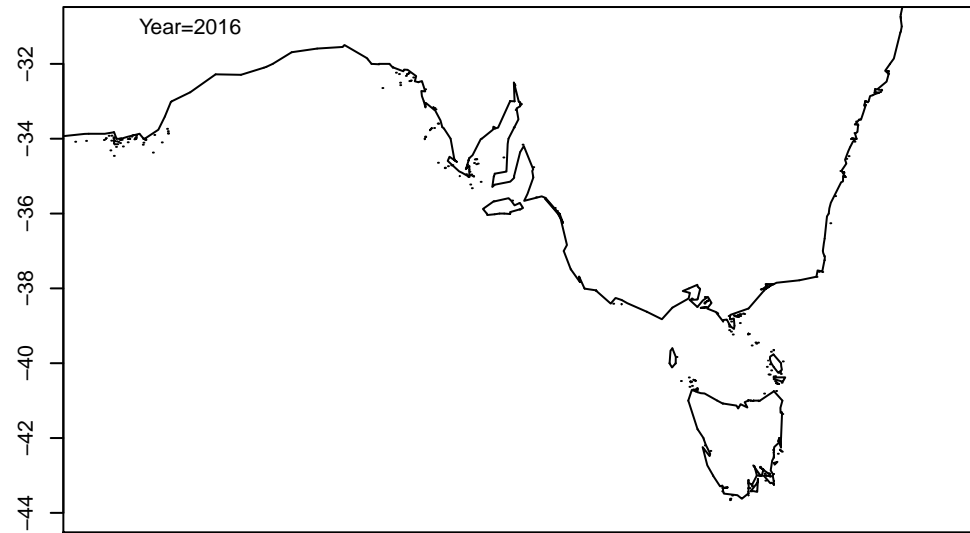
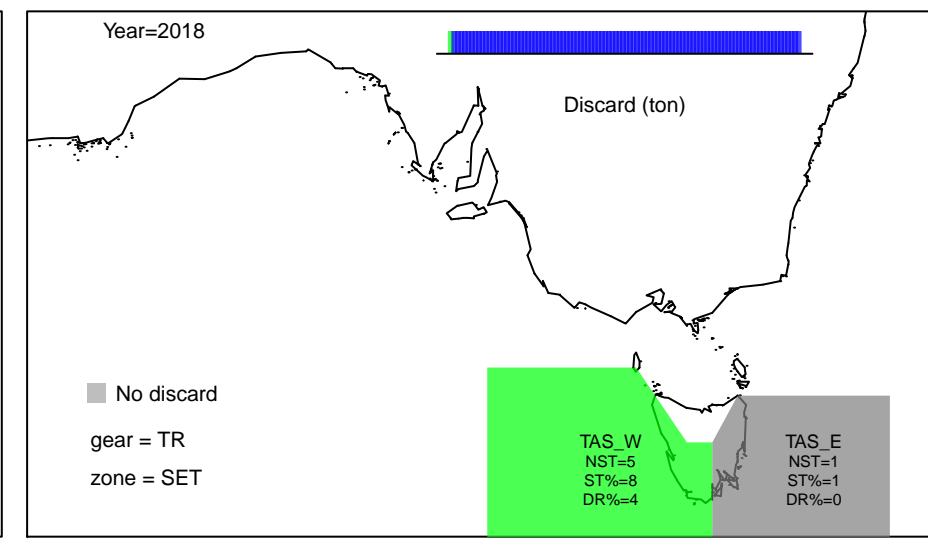
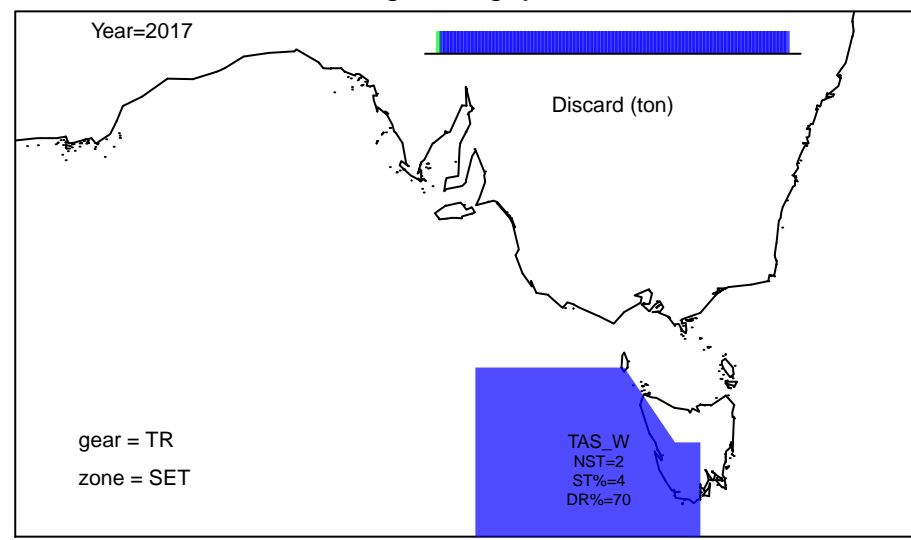
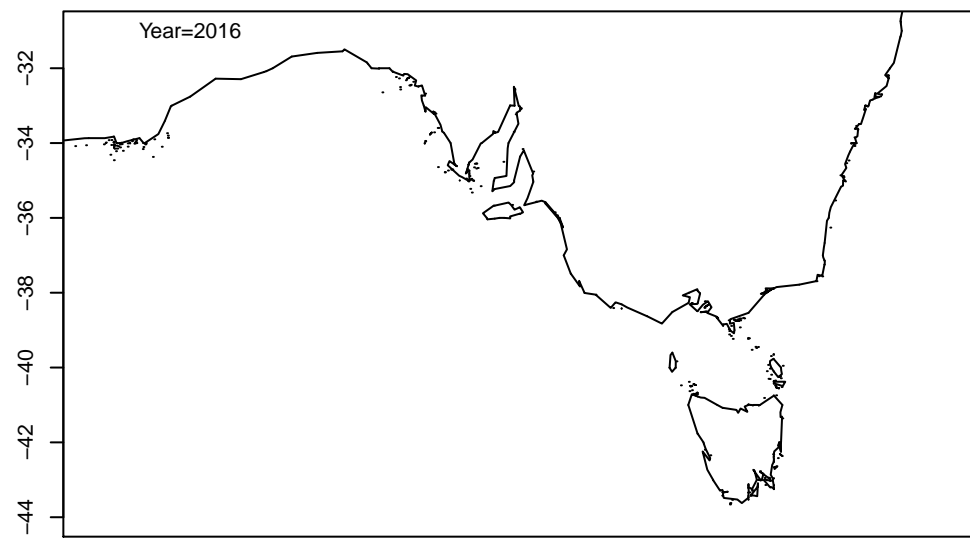


Orange Roughy GAB



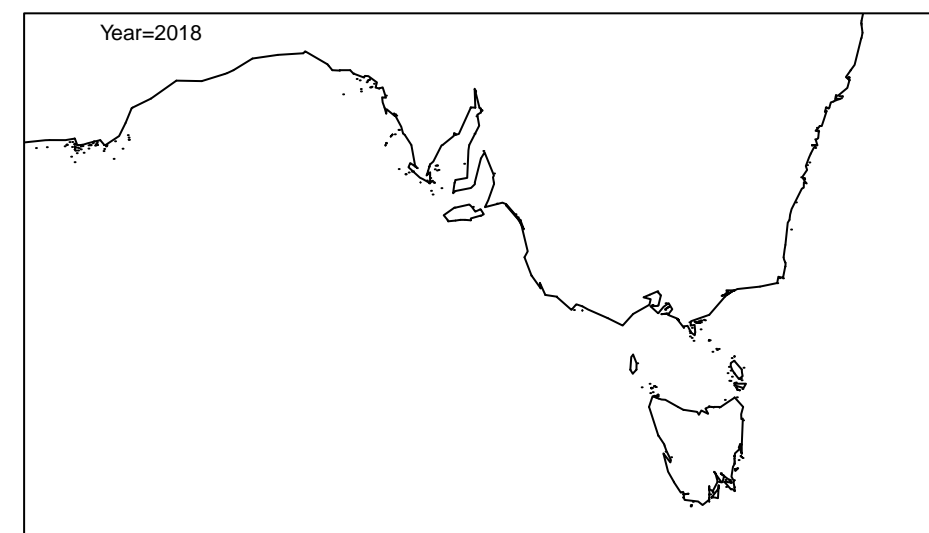
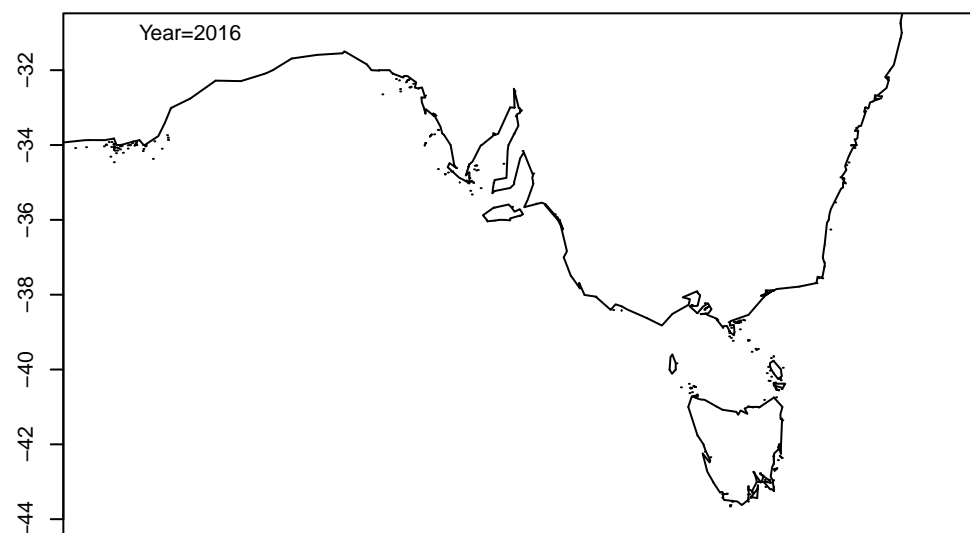
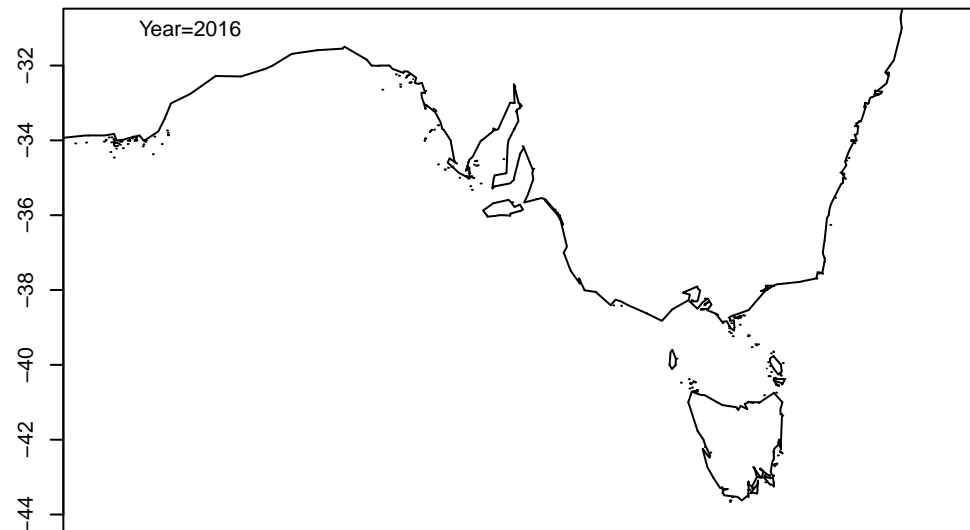
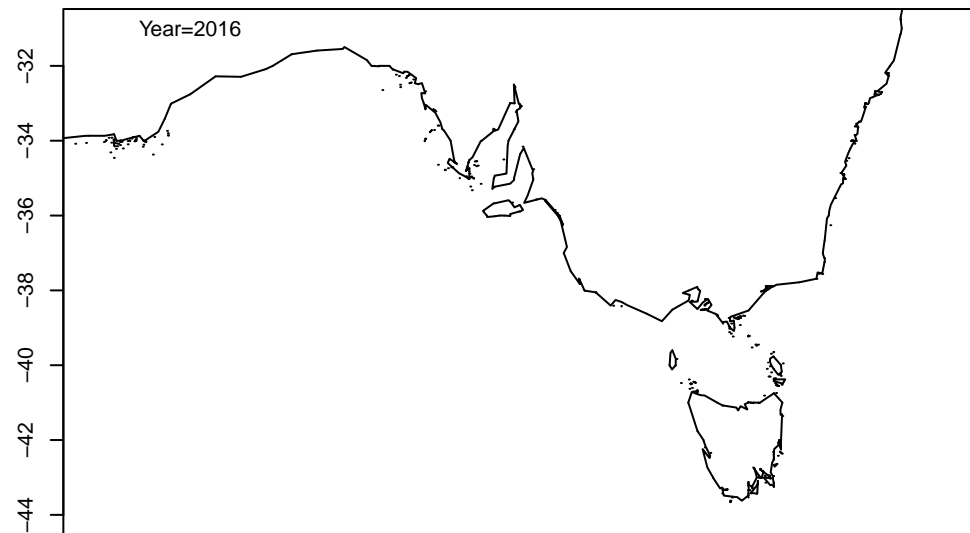
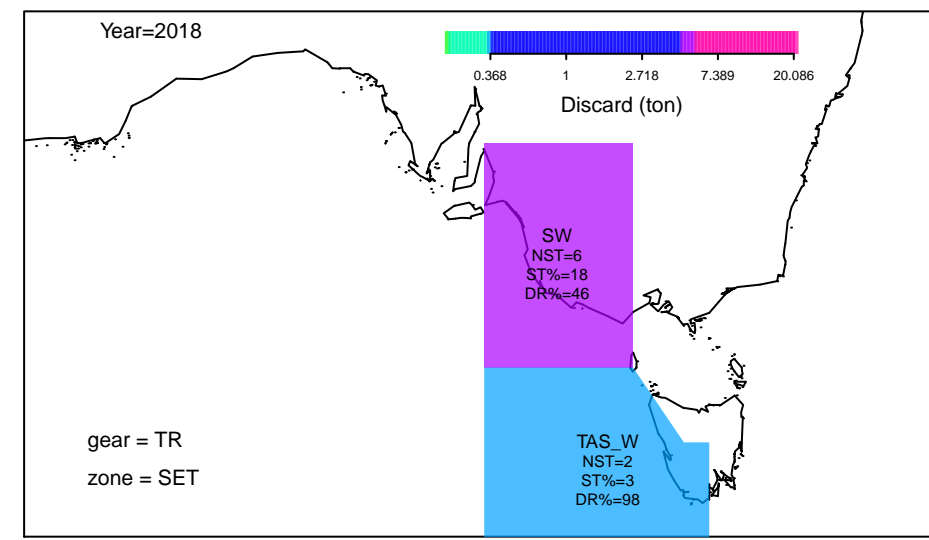
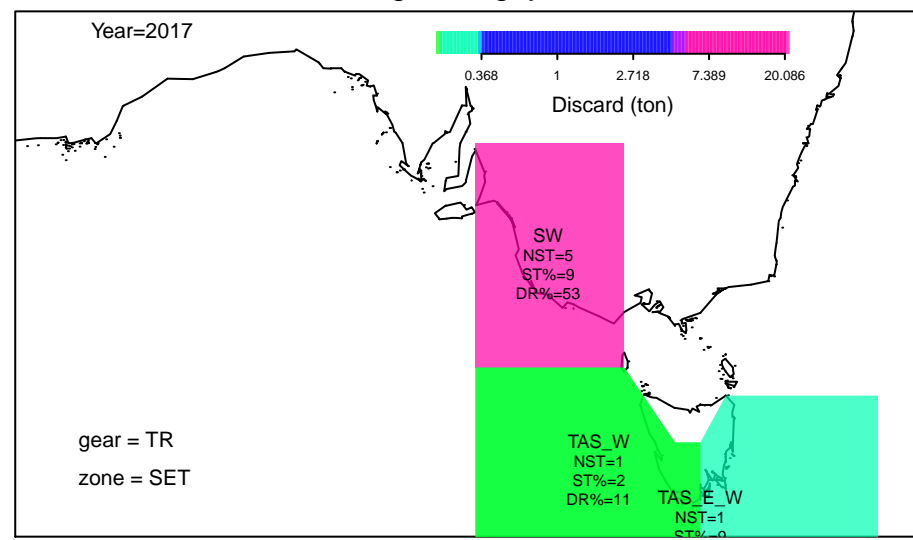
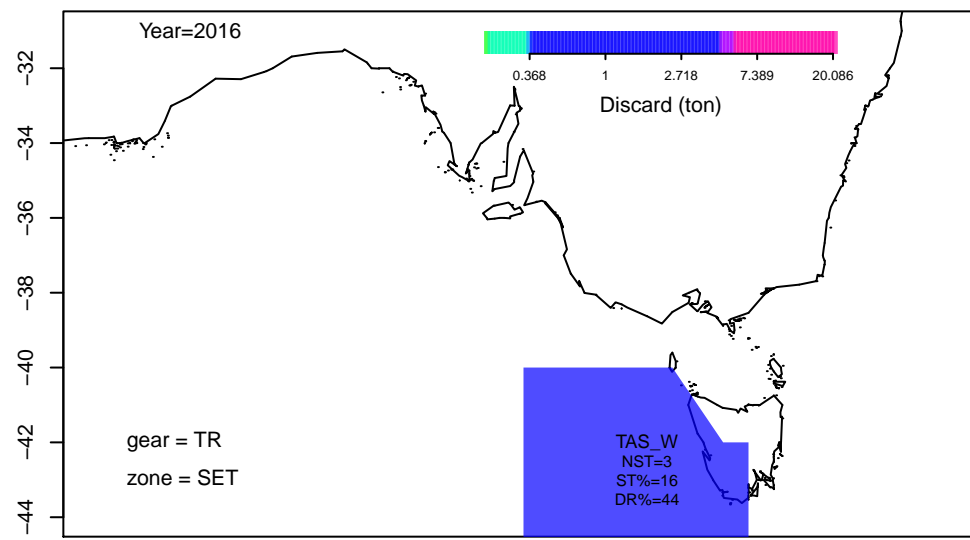
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# Orange Roughy South



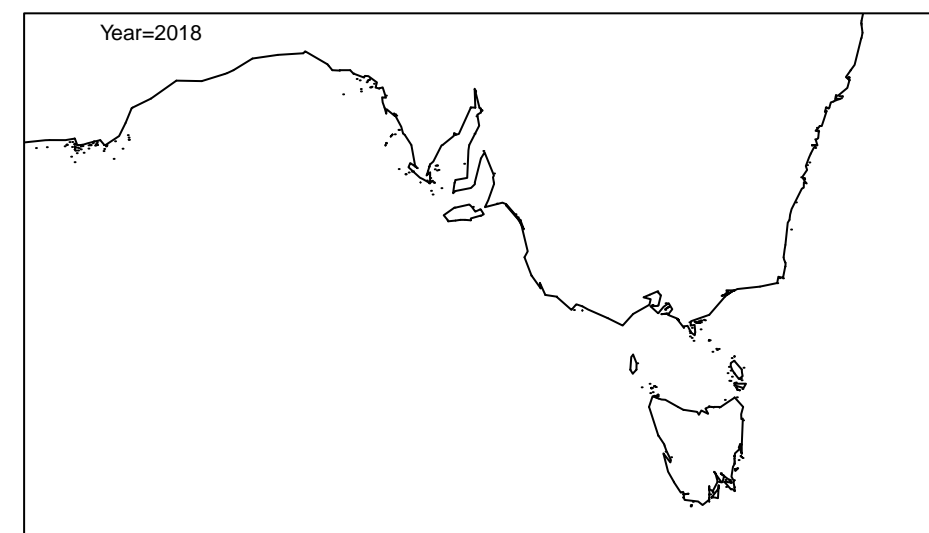
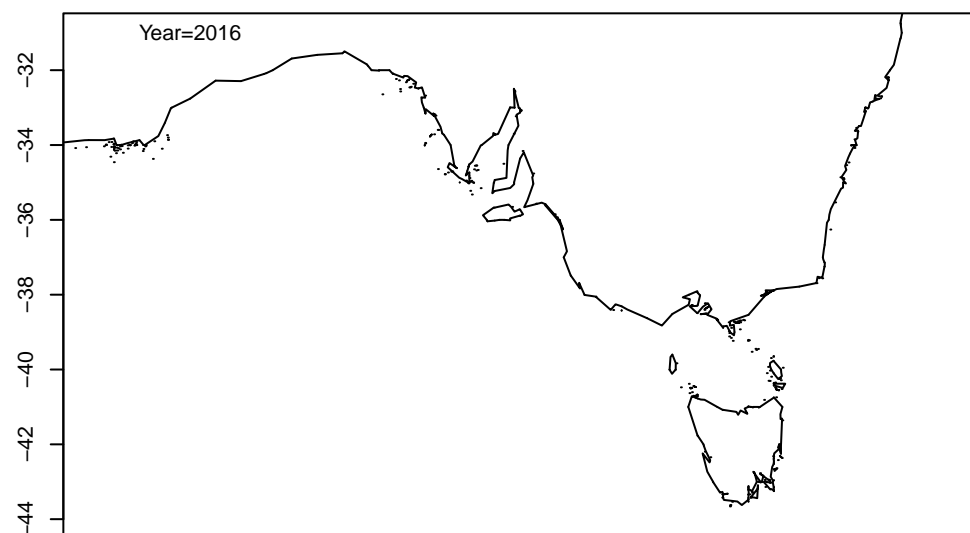
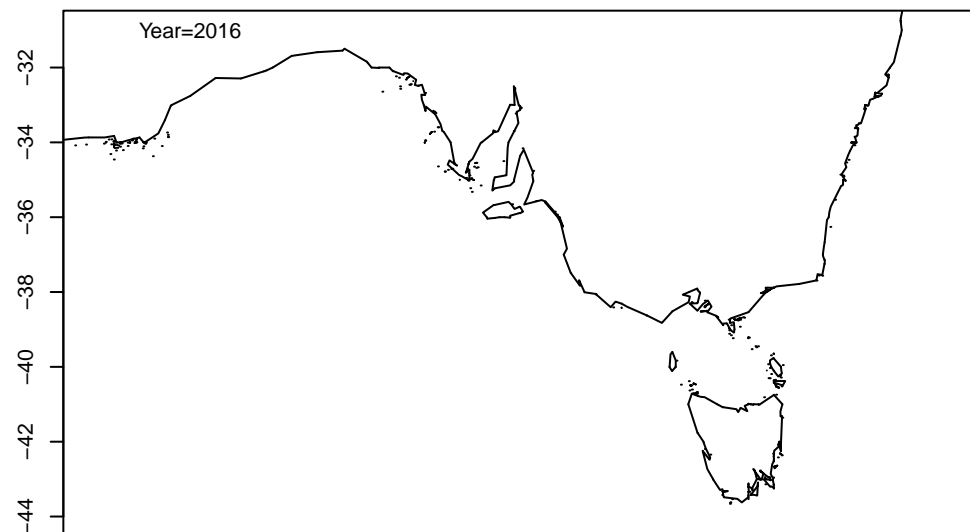
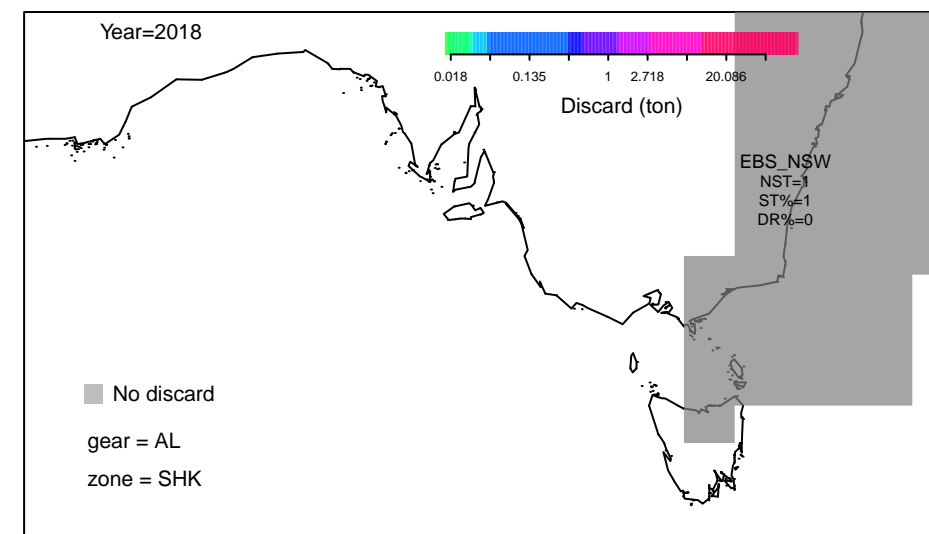
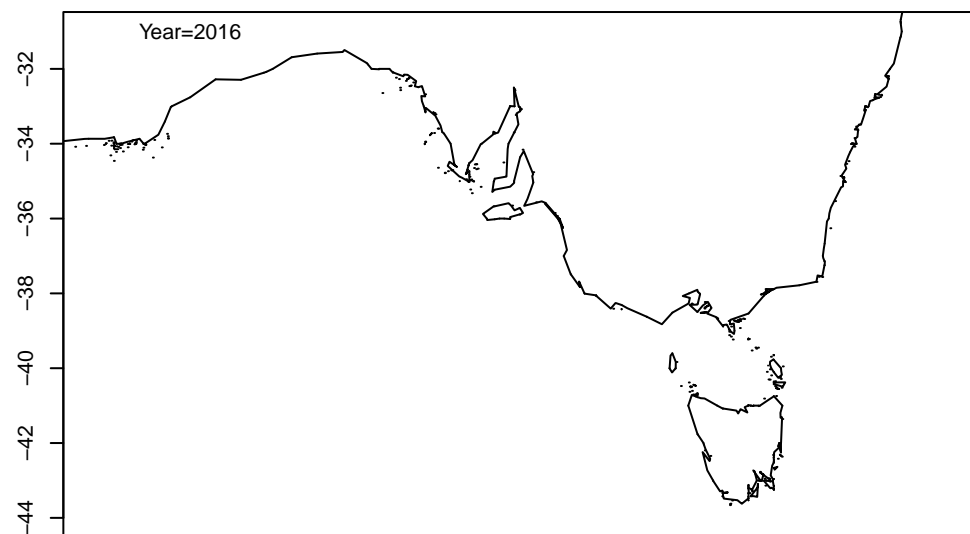
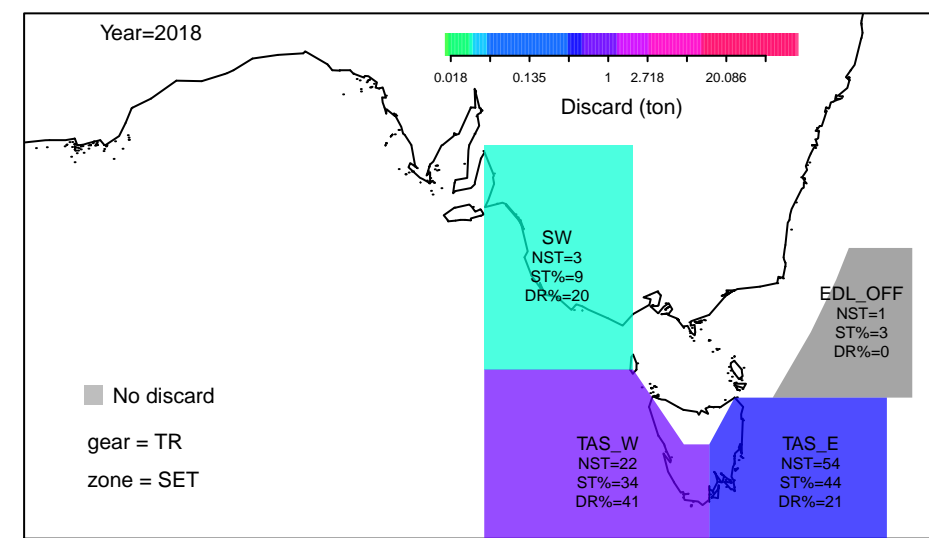
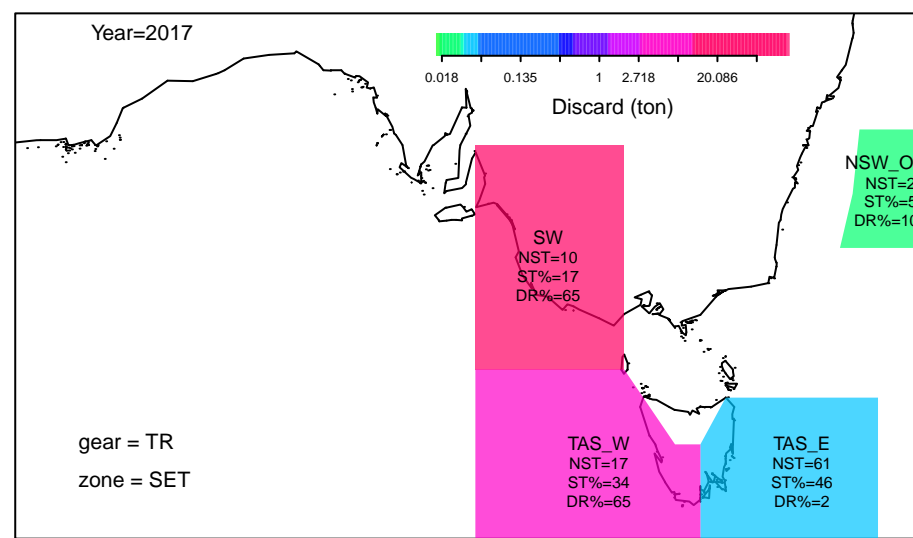
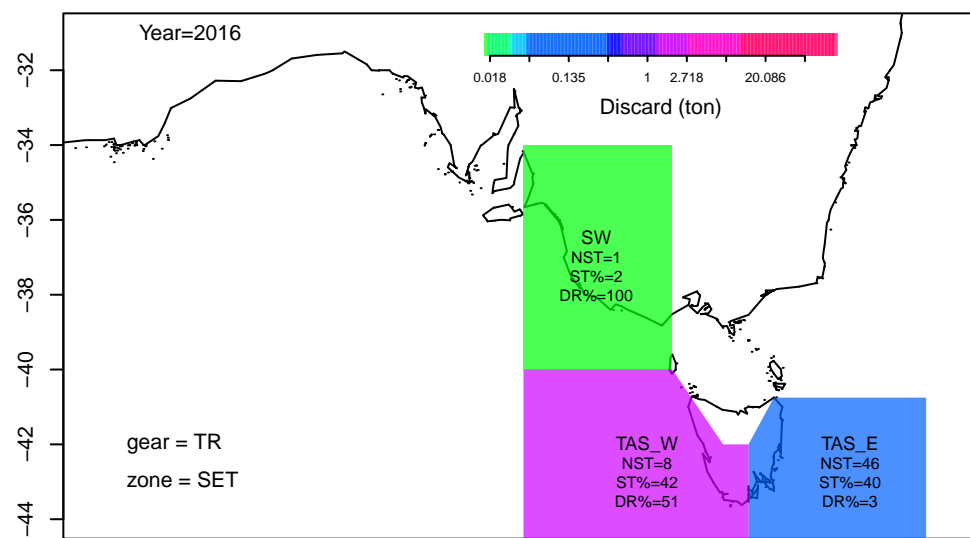
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# Orange Roughy West

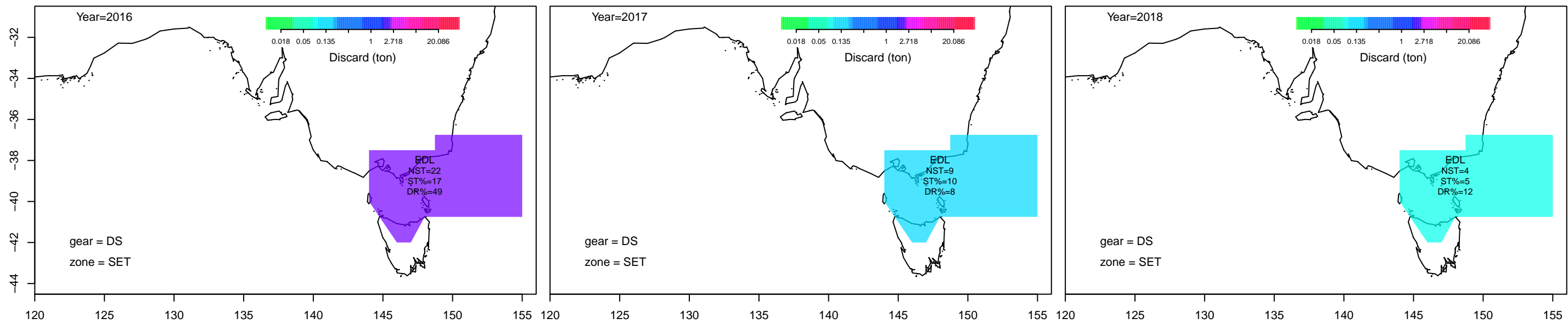
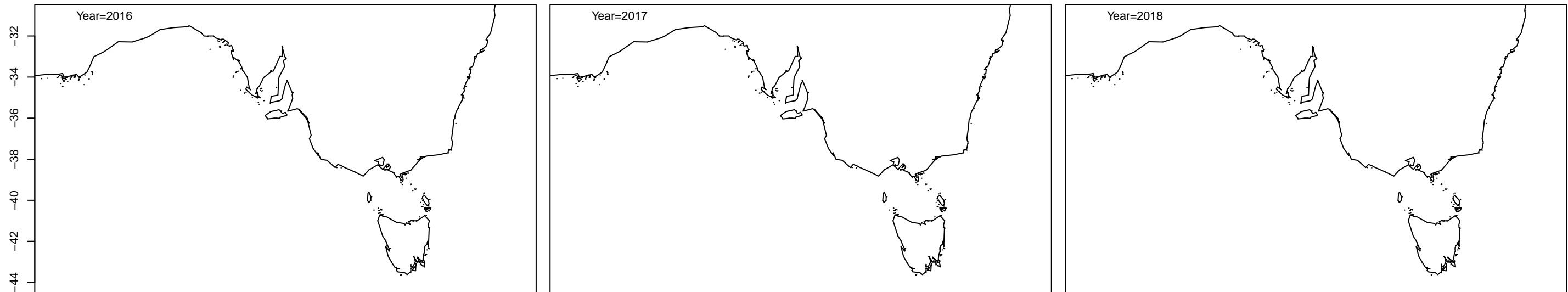
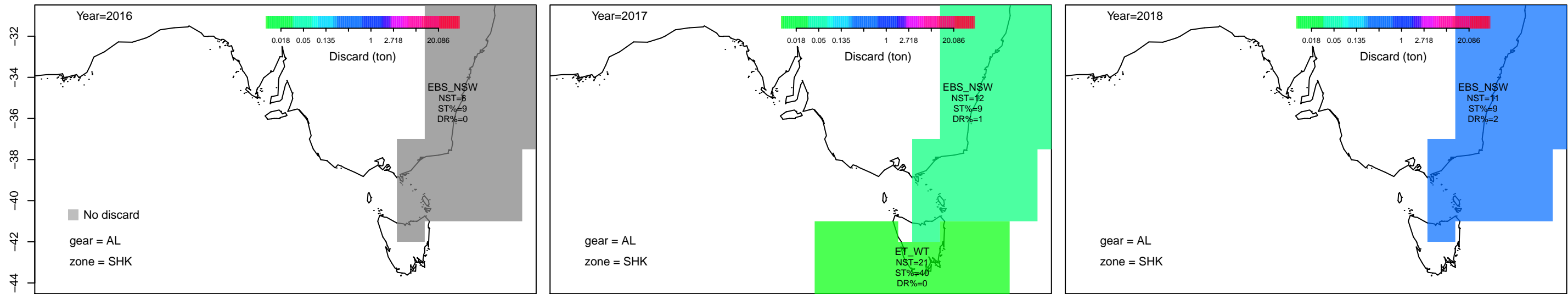
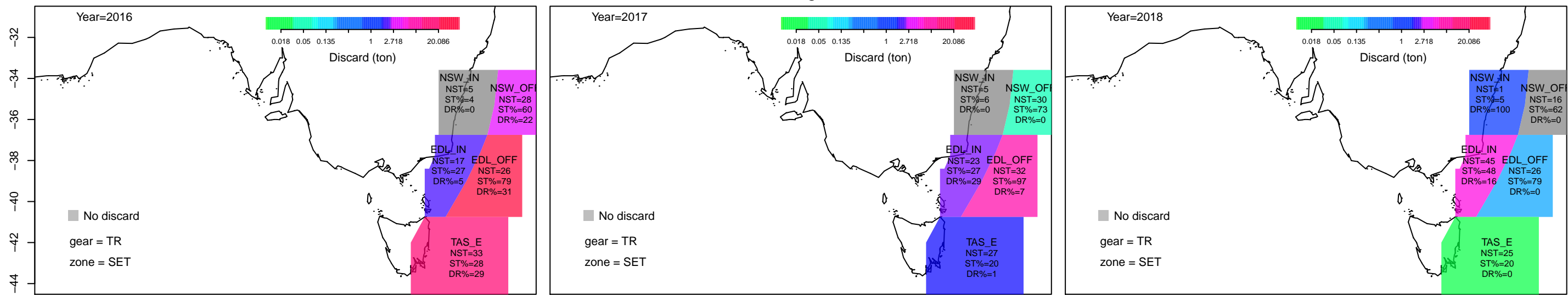


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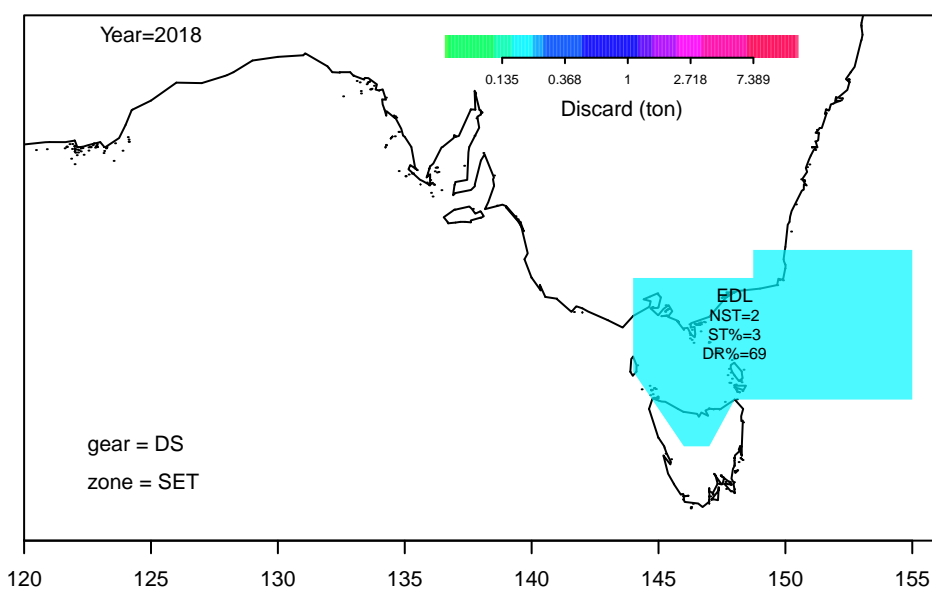
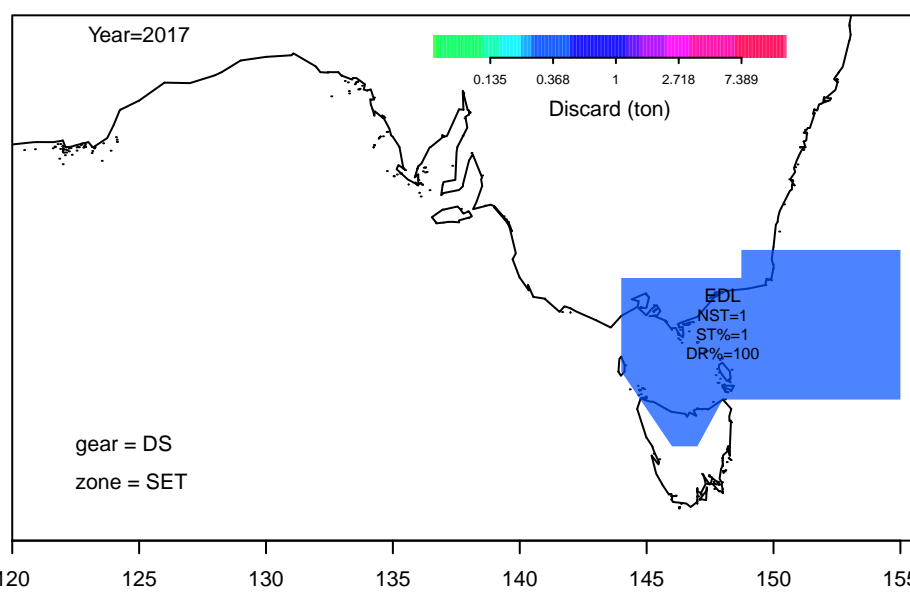
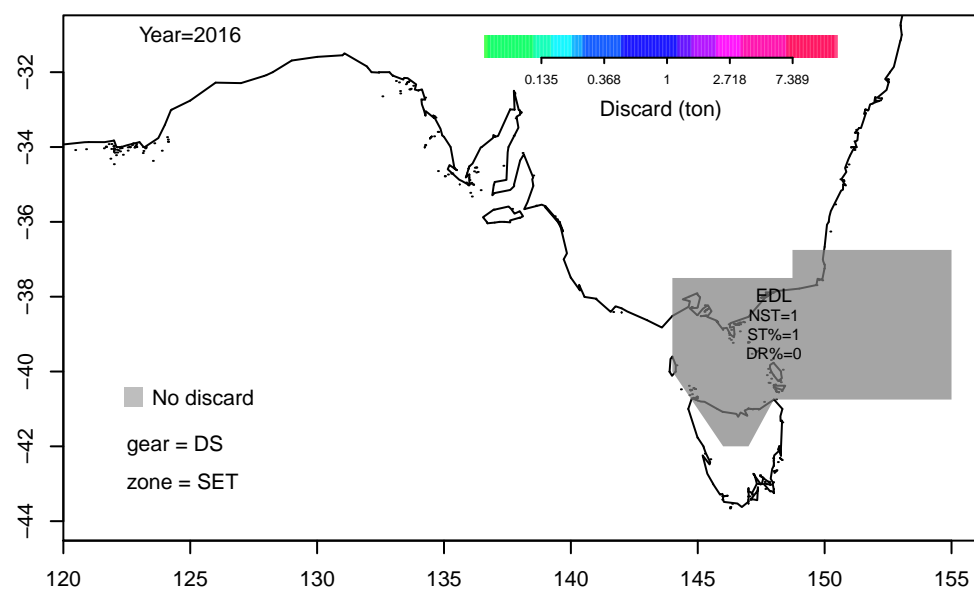
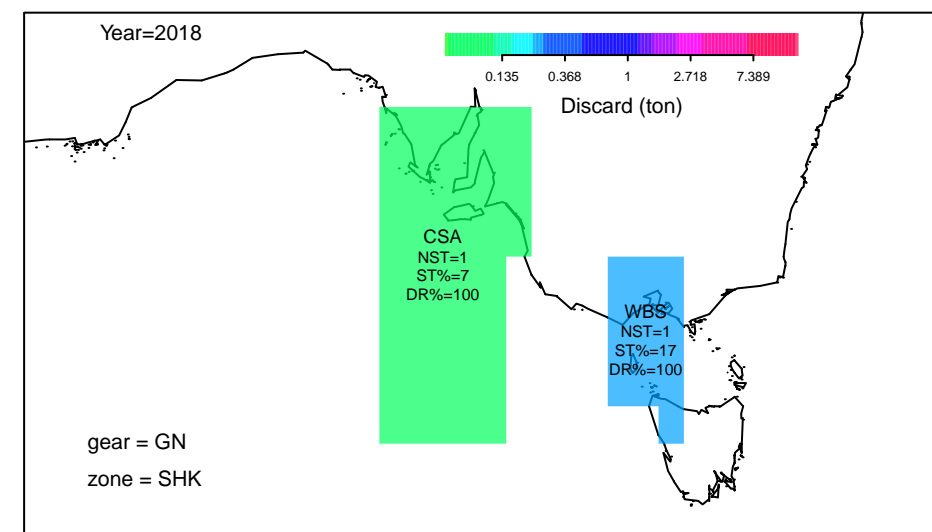
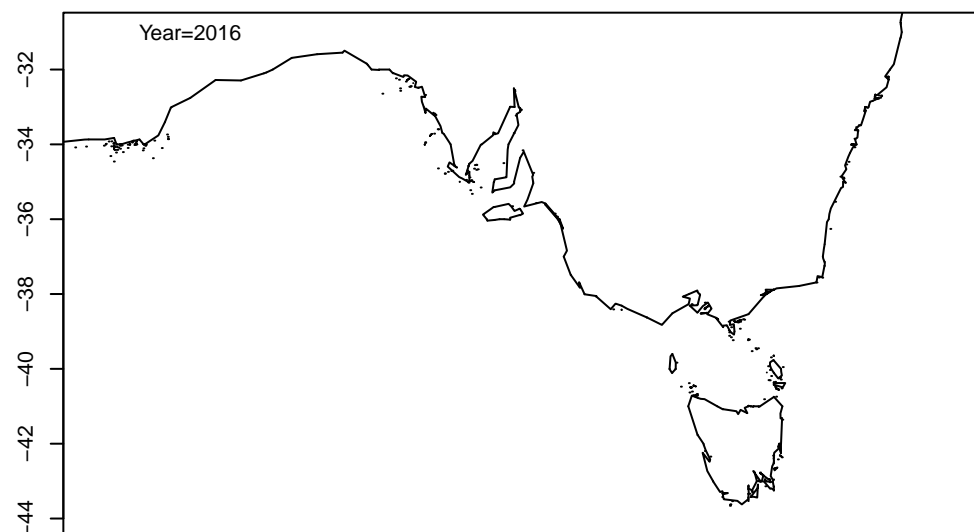
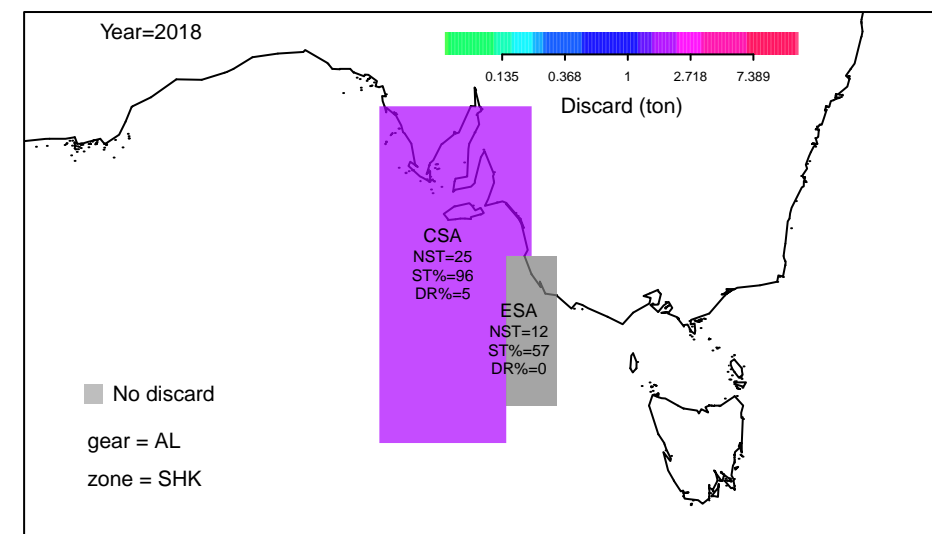
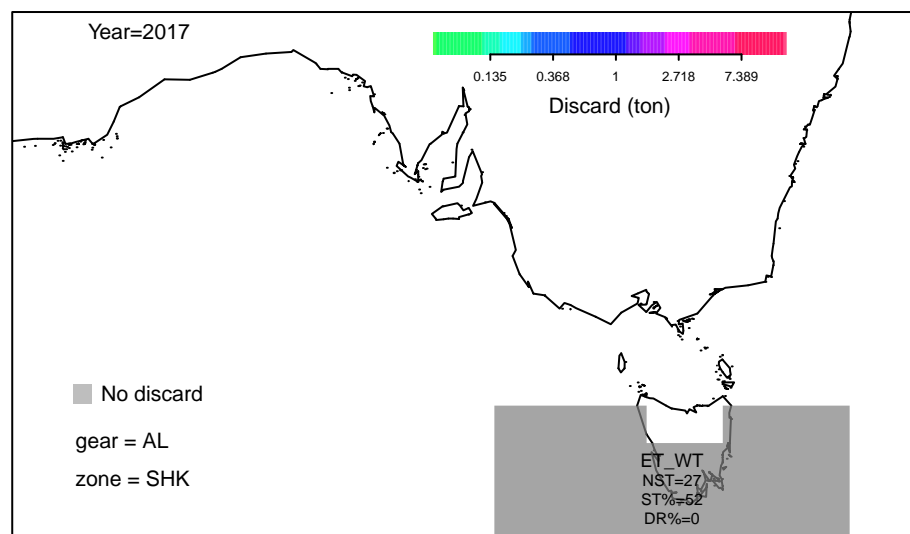
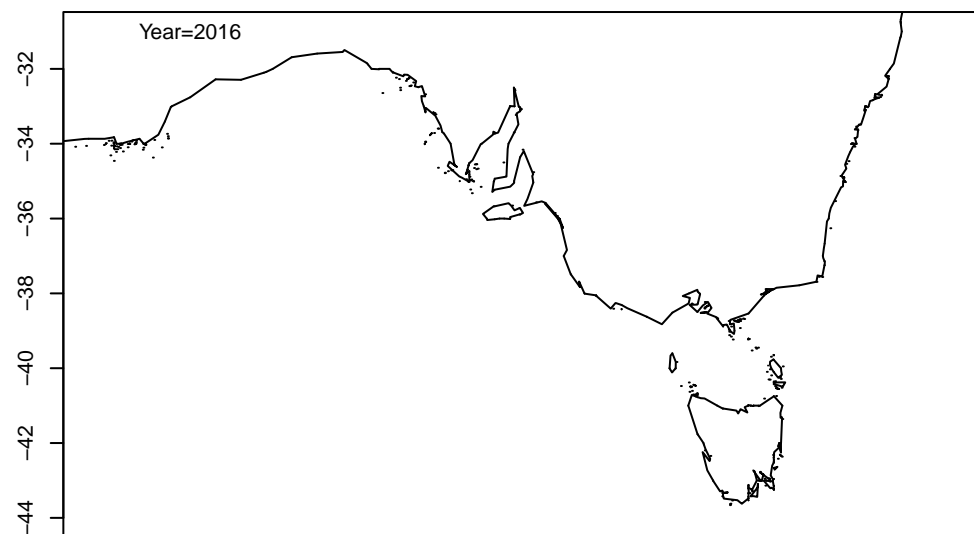
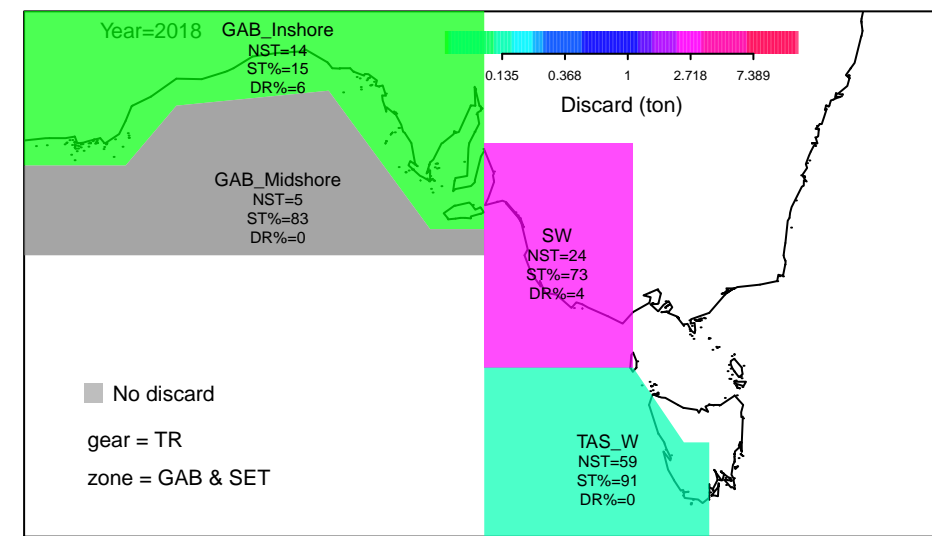
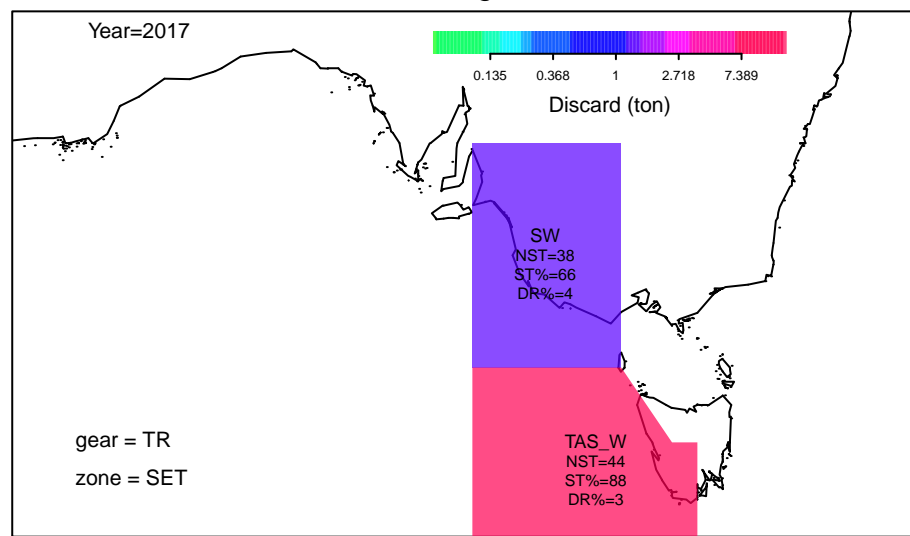
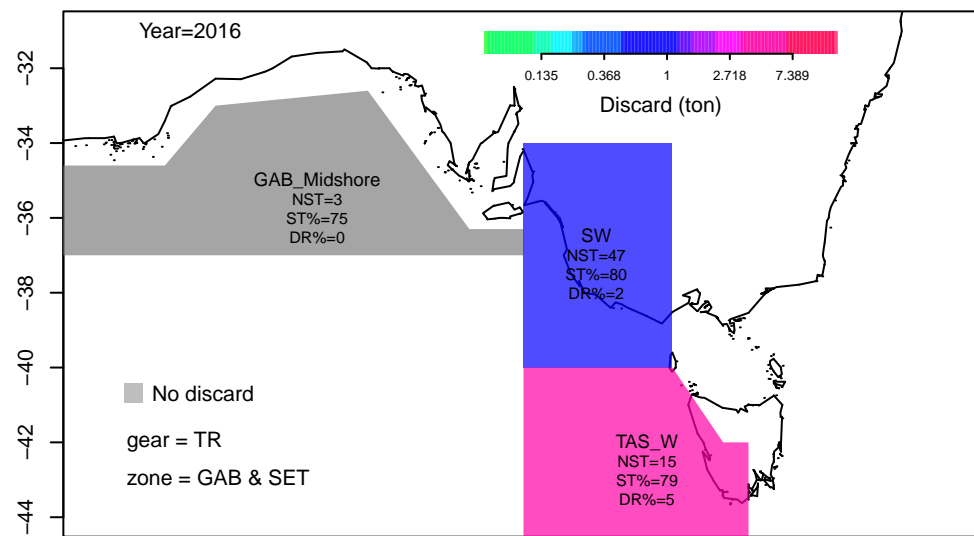
# Oreos



# Pink Ling East

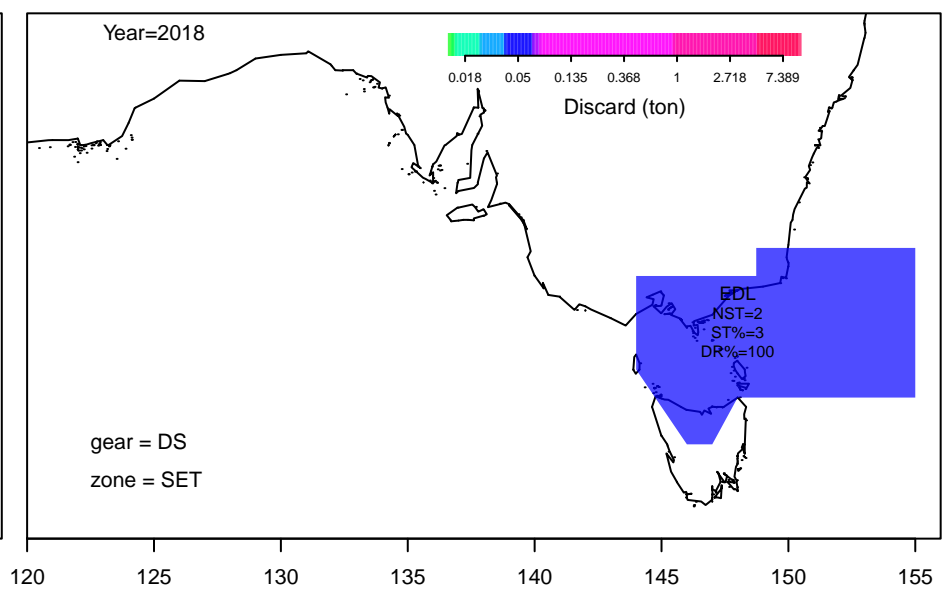
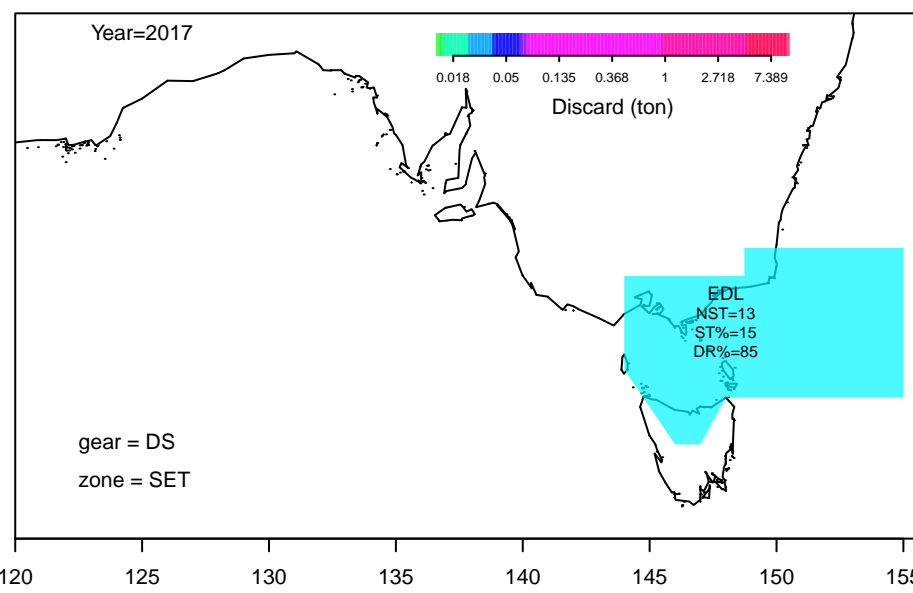
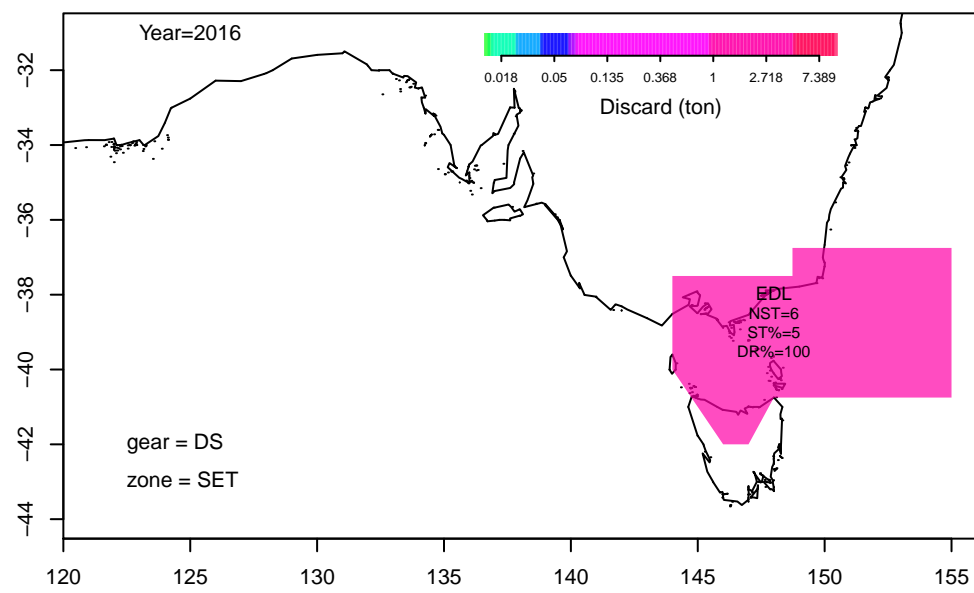
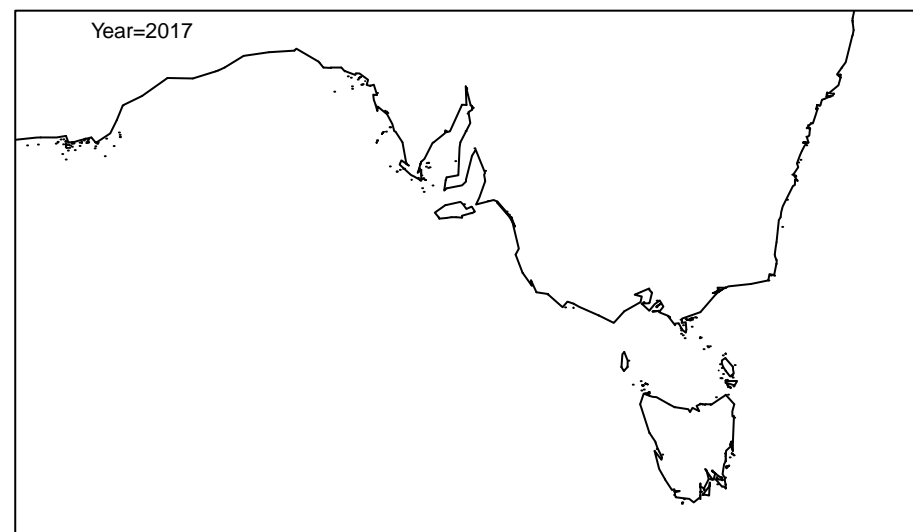
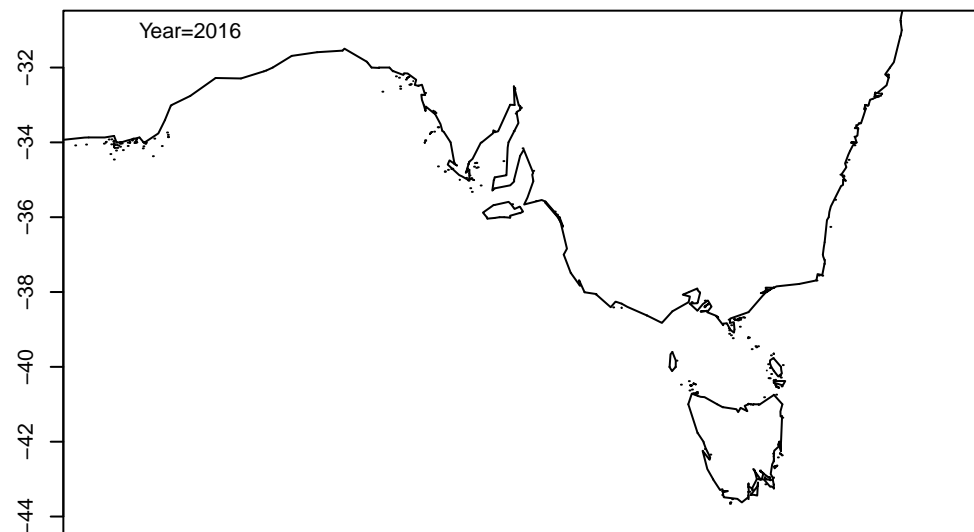
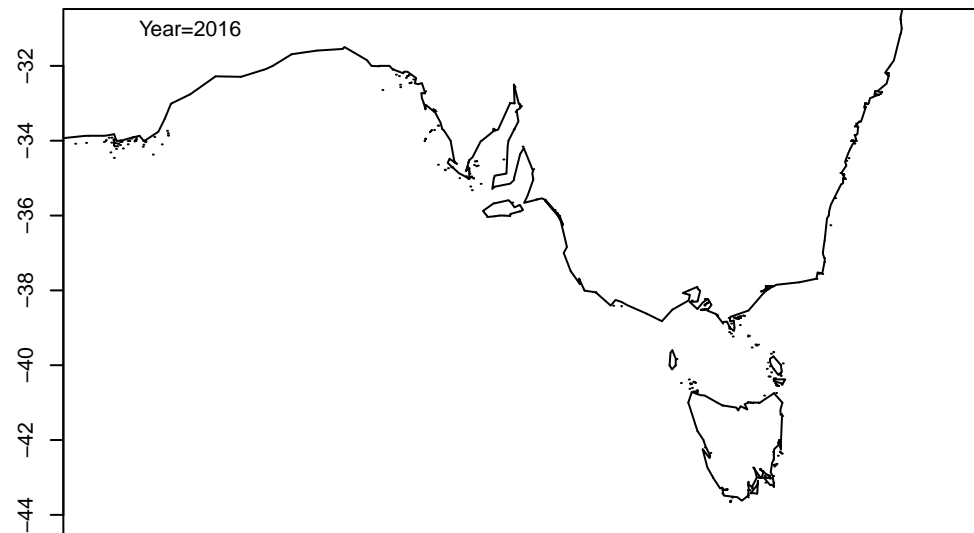
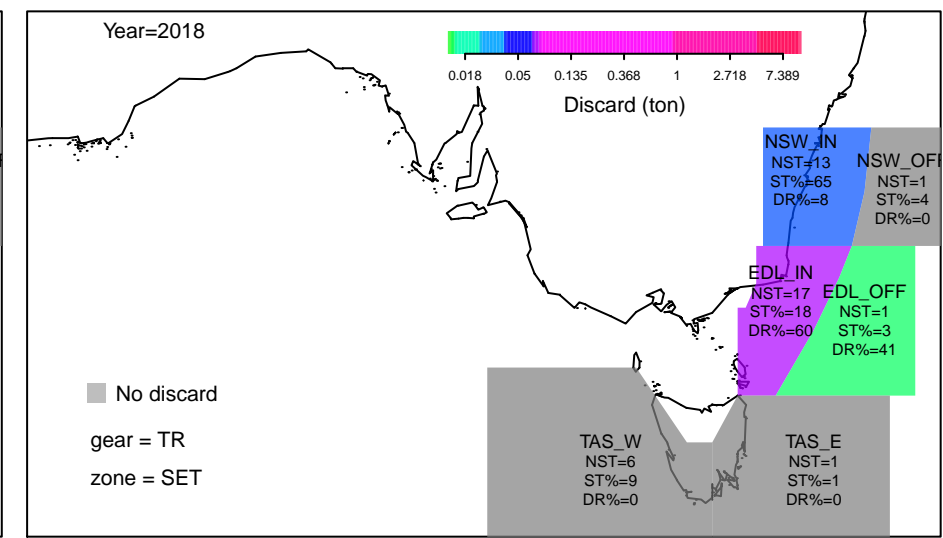
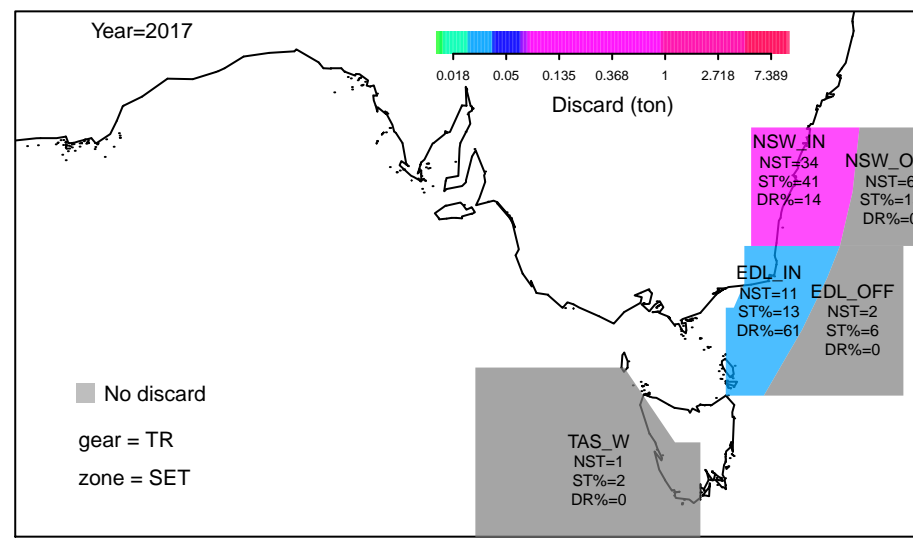
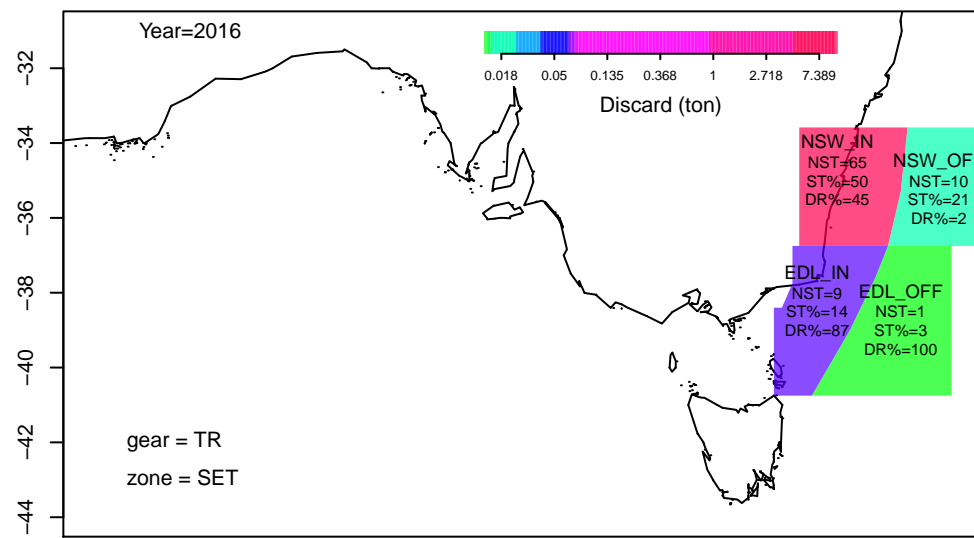


# Pink Ling West

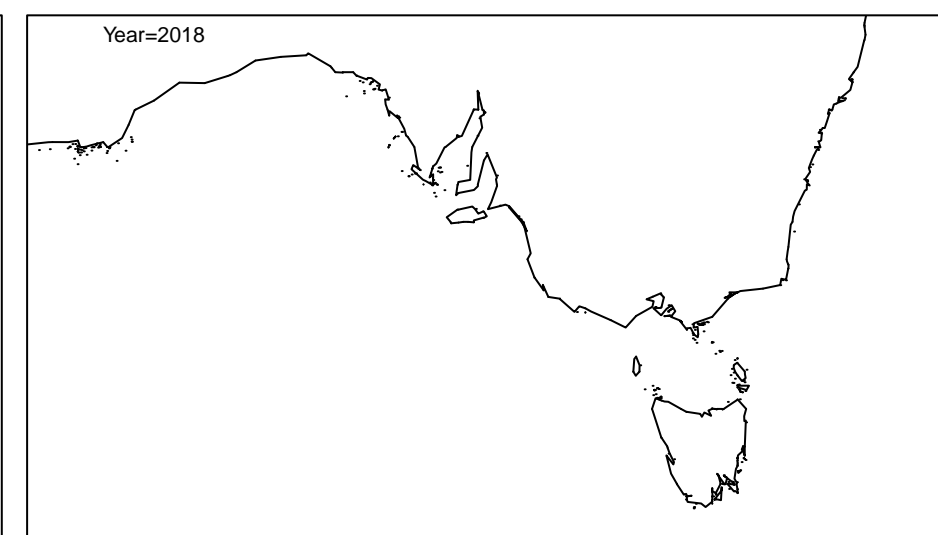
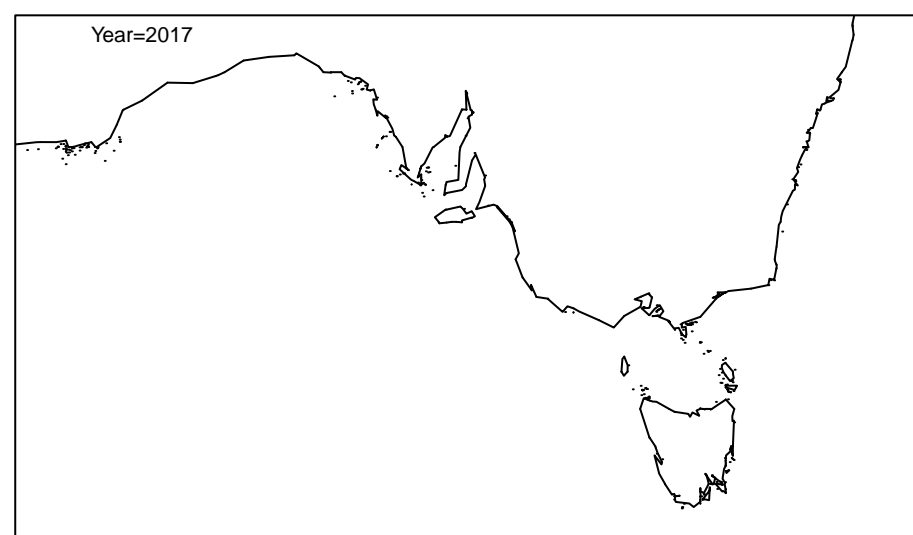
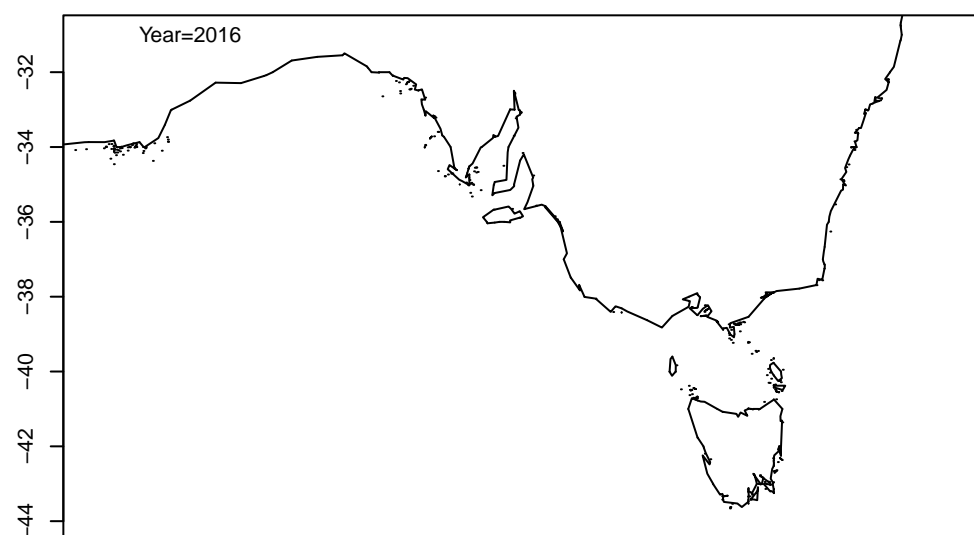
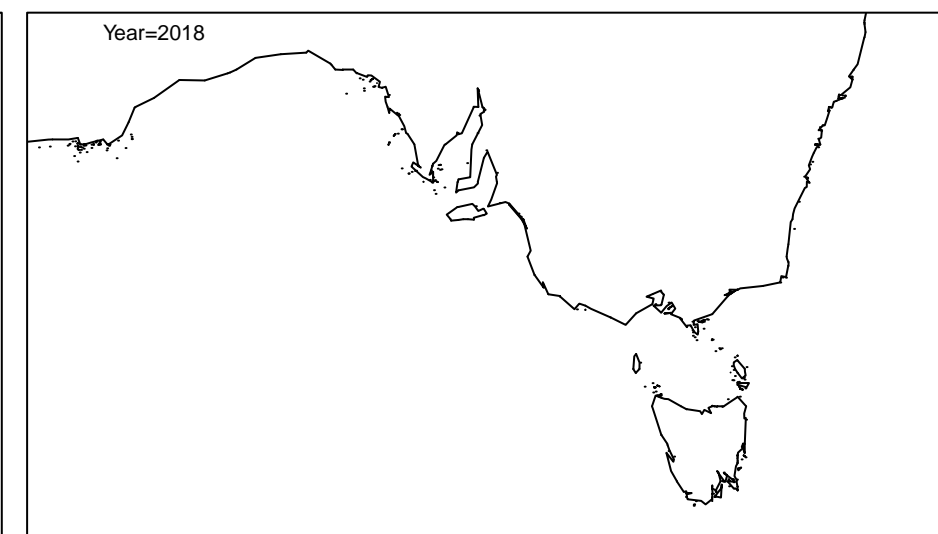
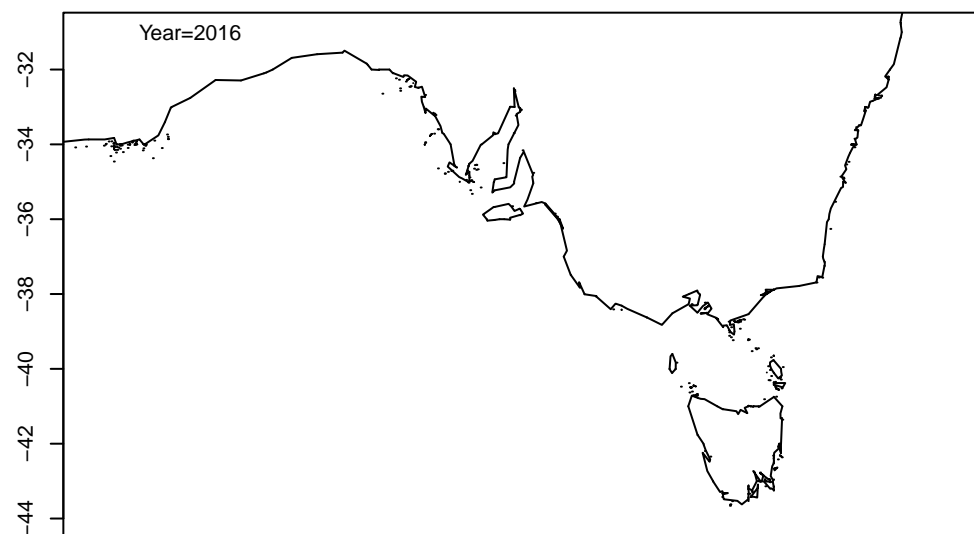
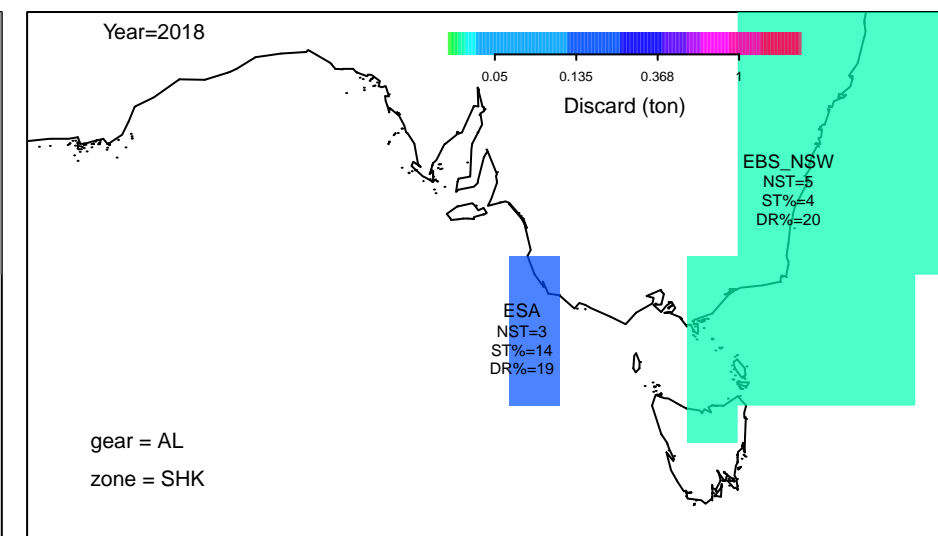
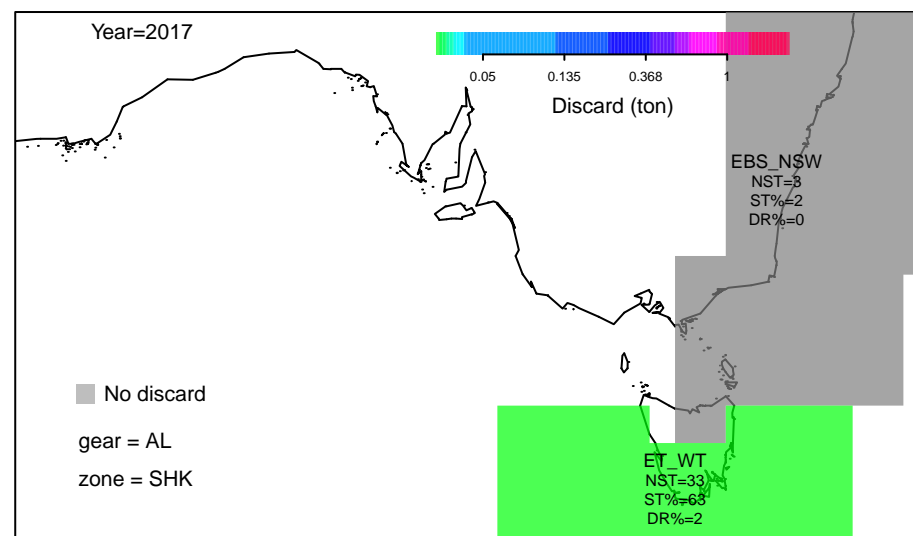
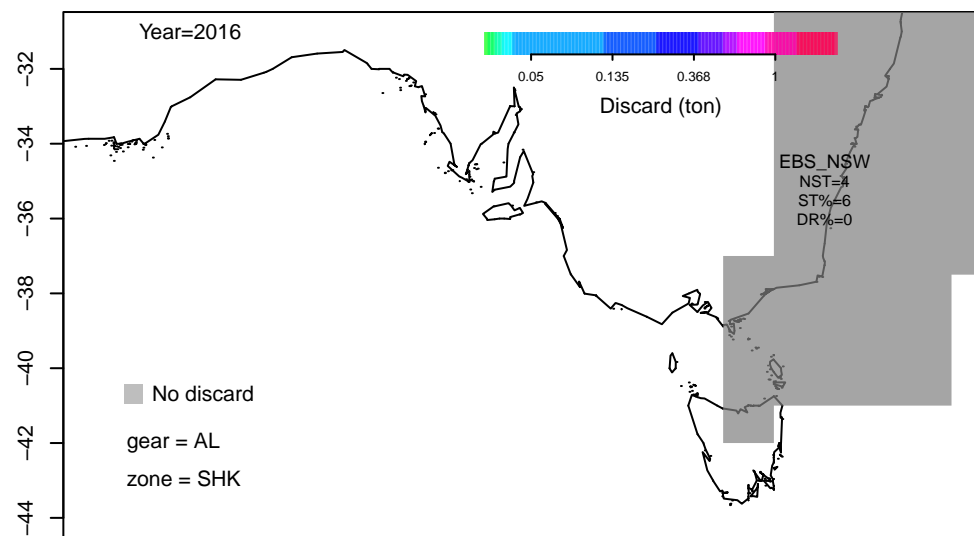
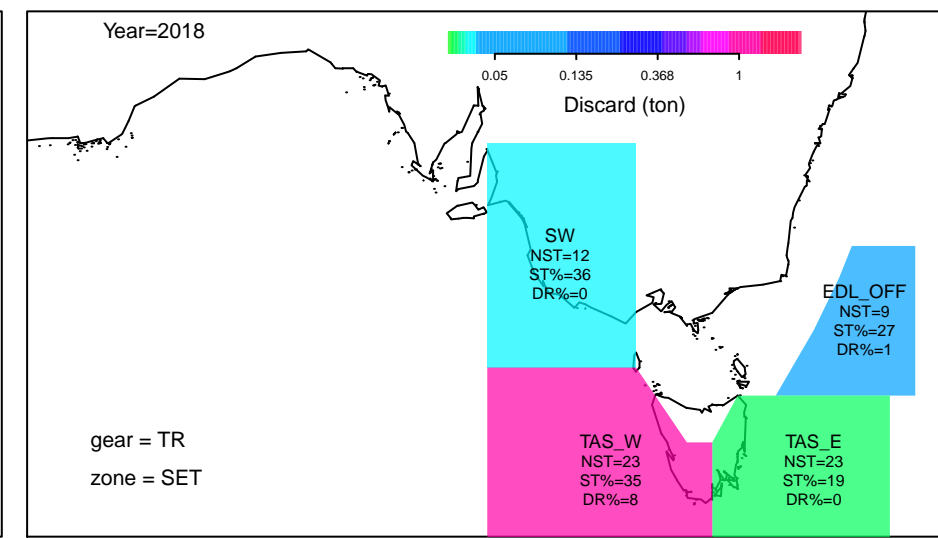
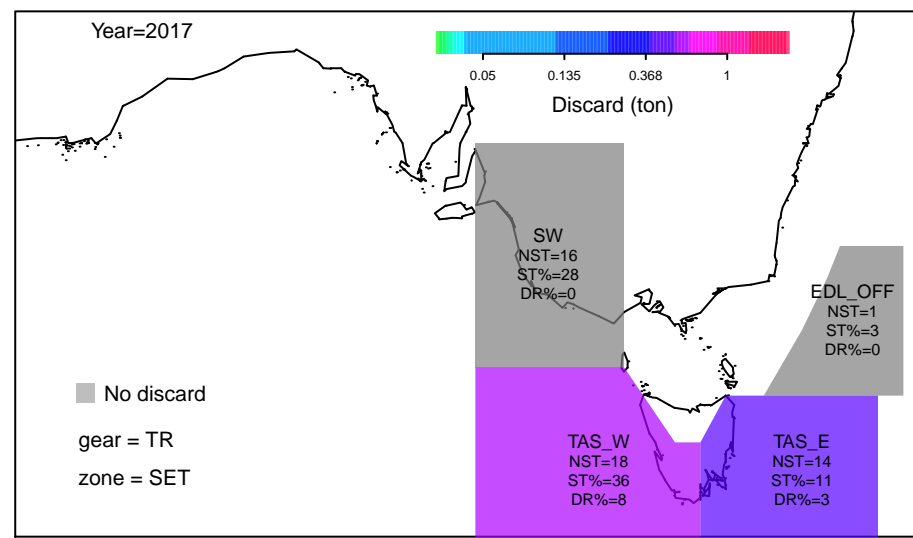
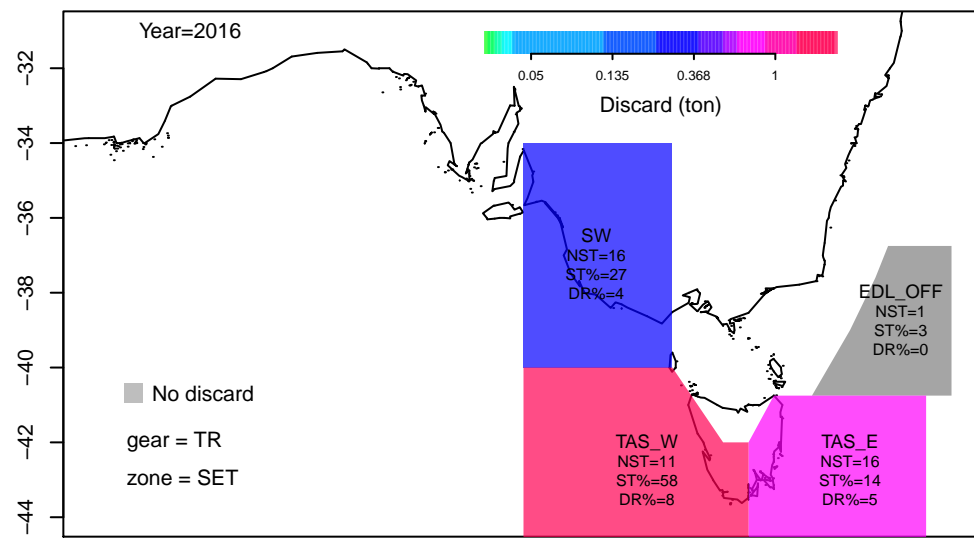




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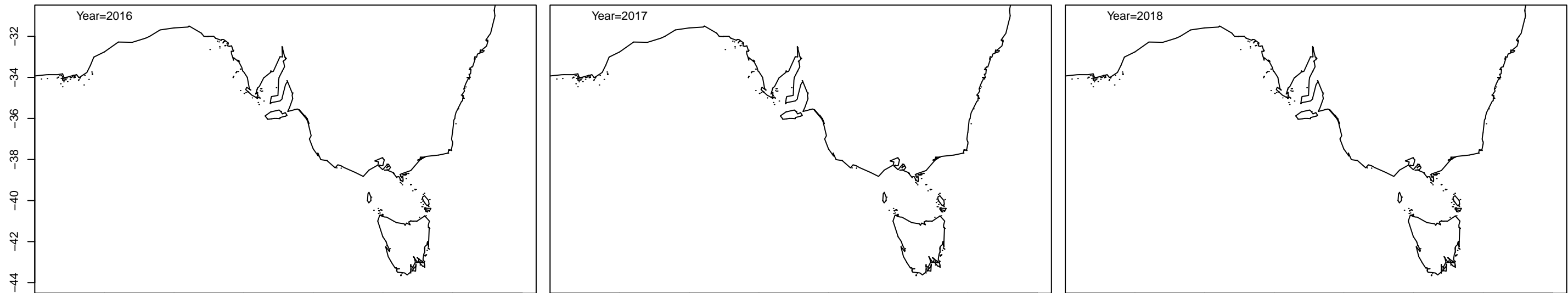
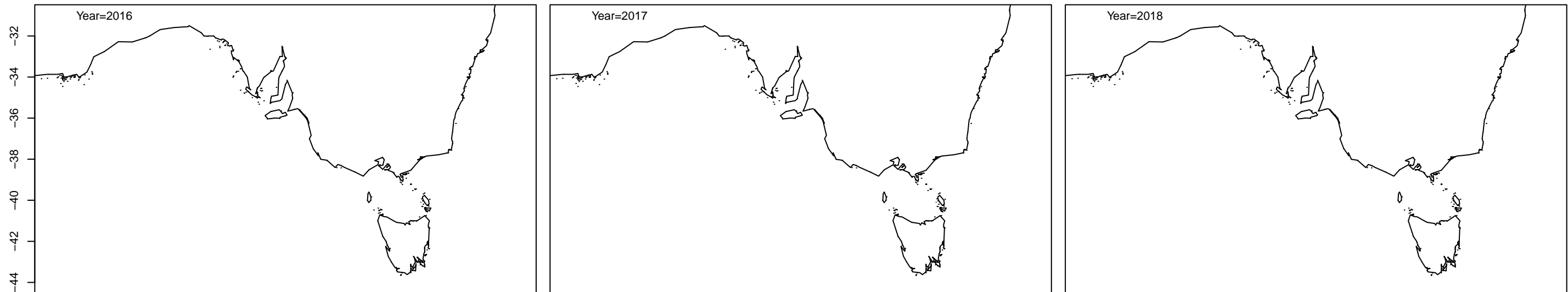
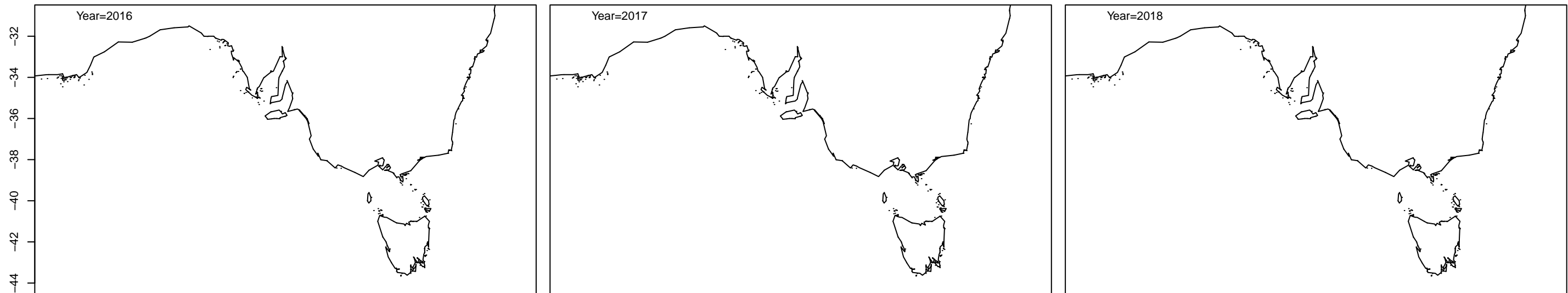
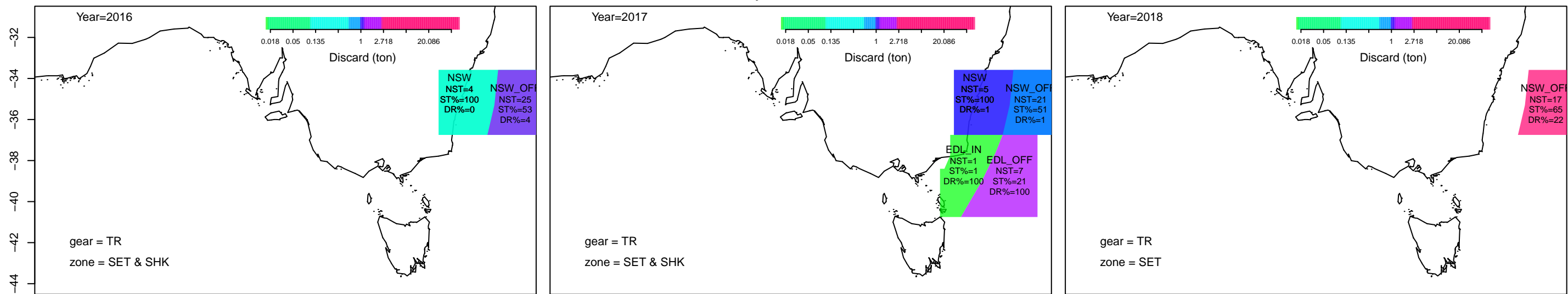


# Ribaldo



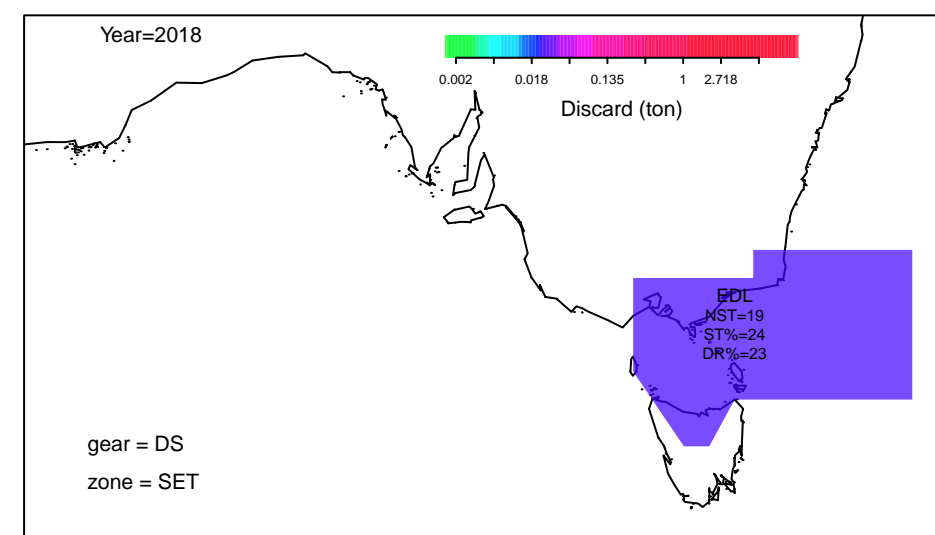
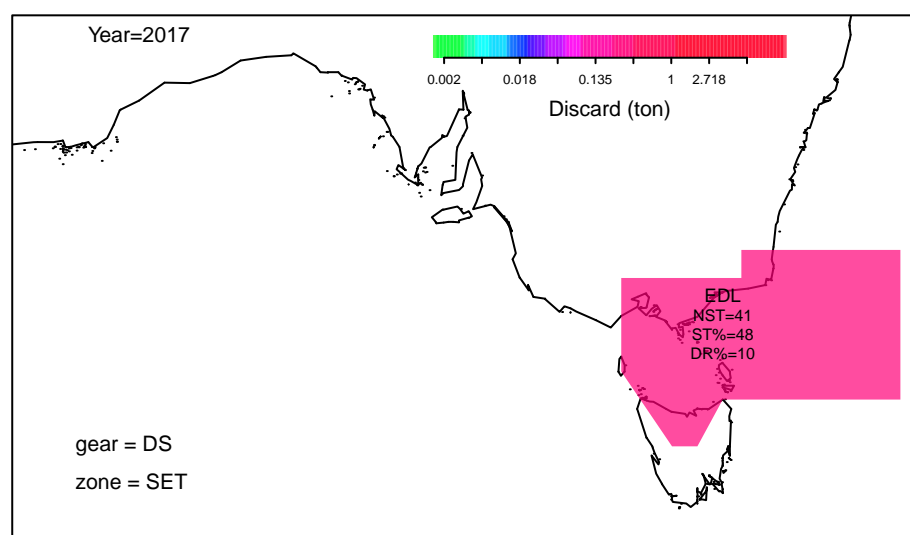
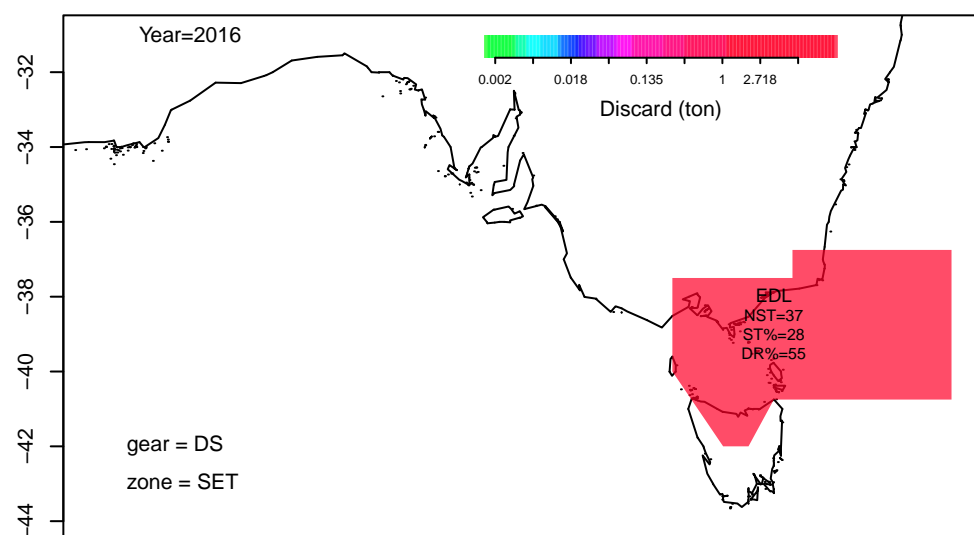
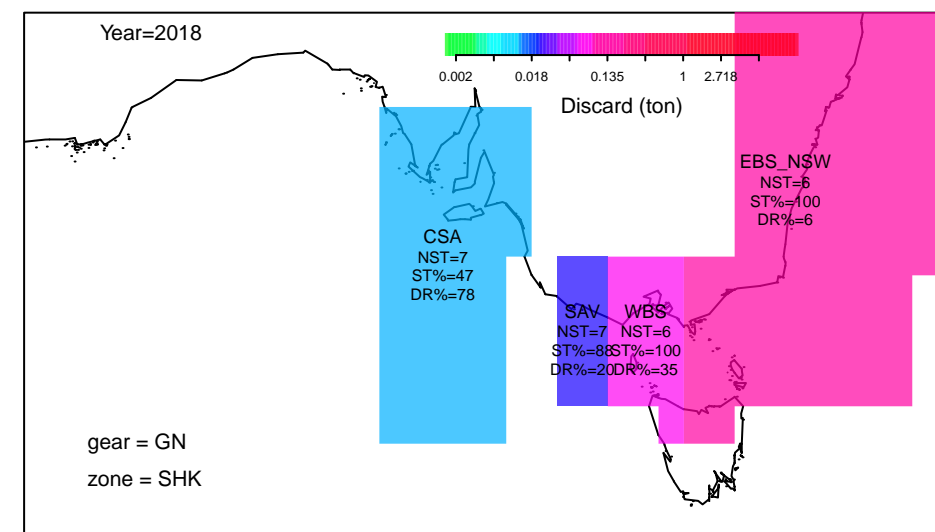
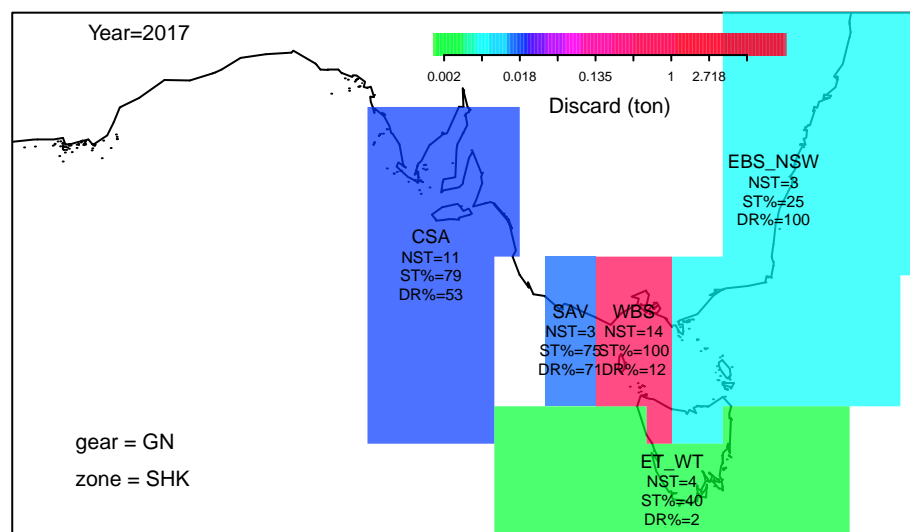
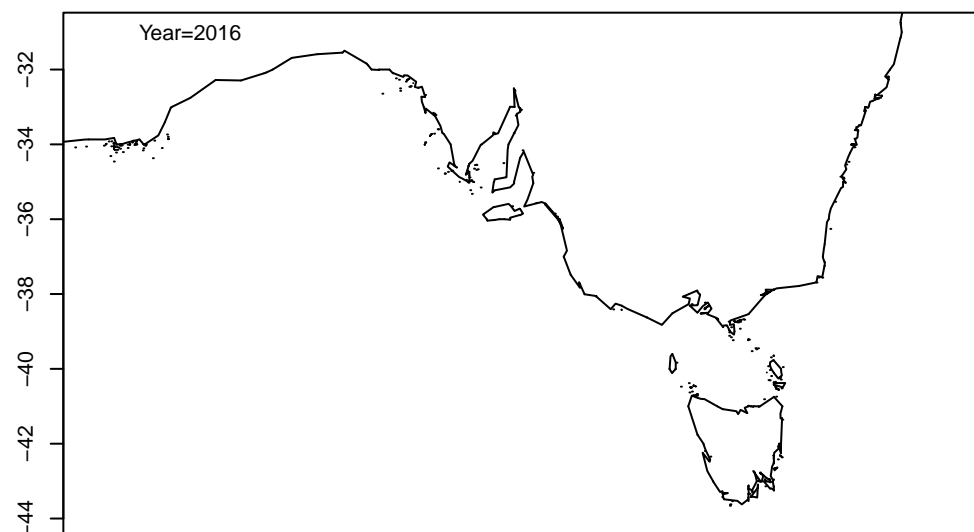
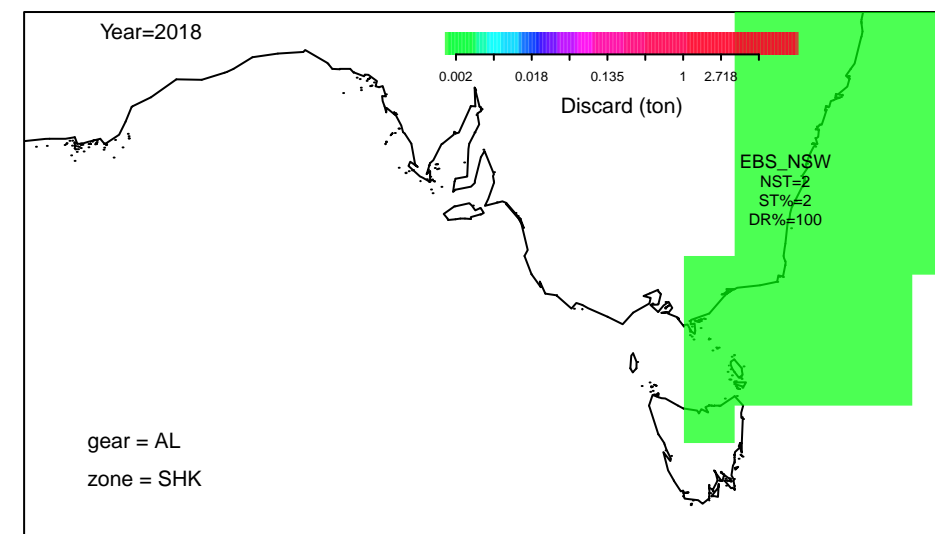
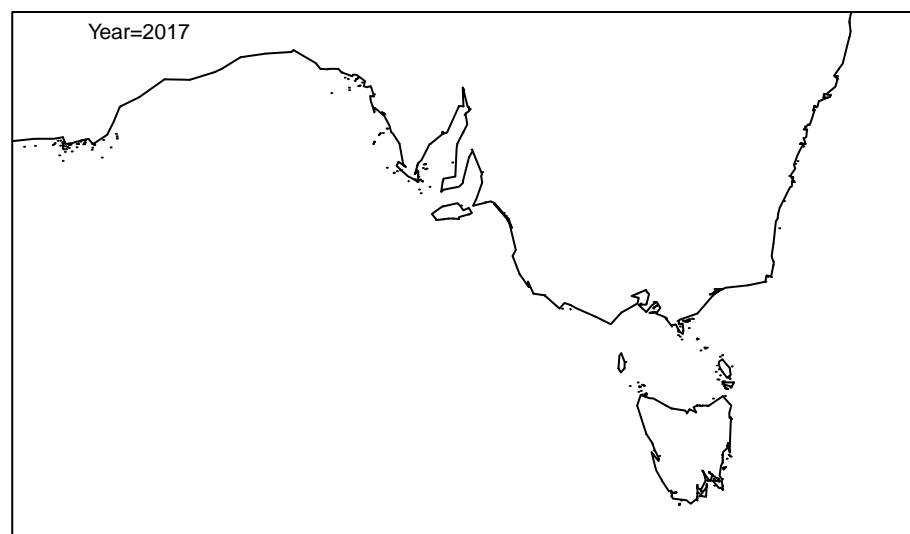
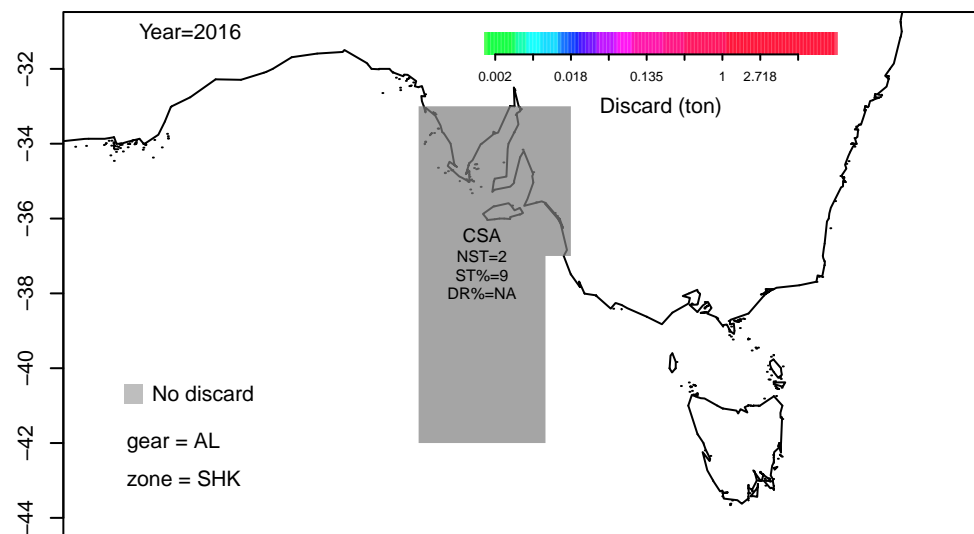
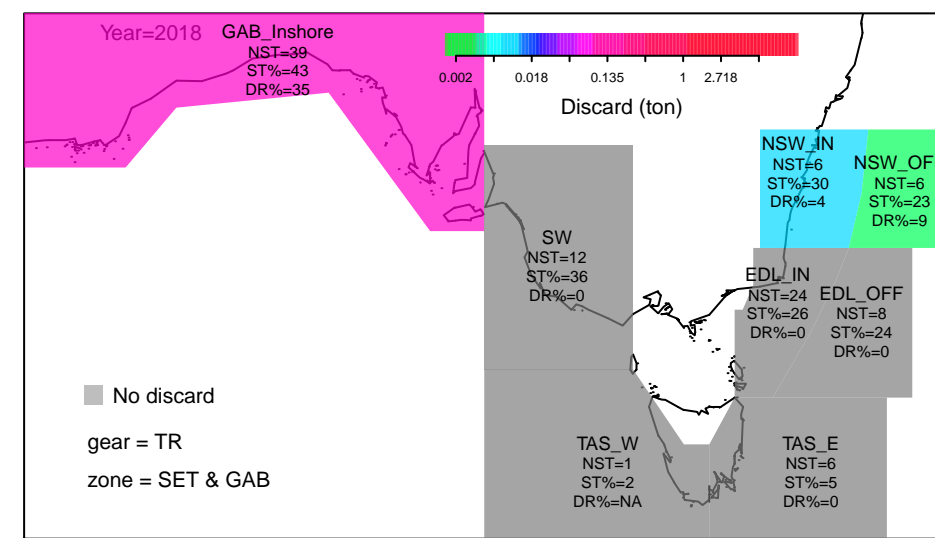
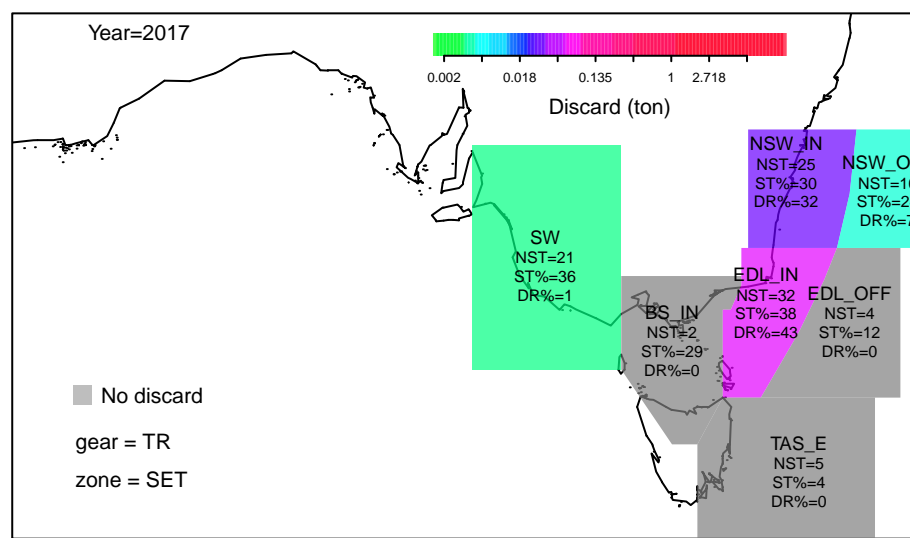
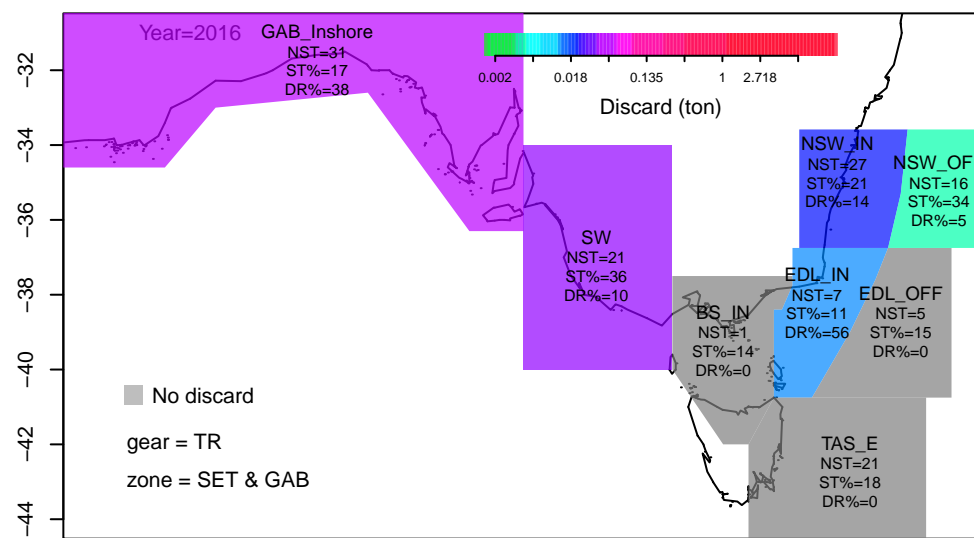
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# Royal Red Prawn

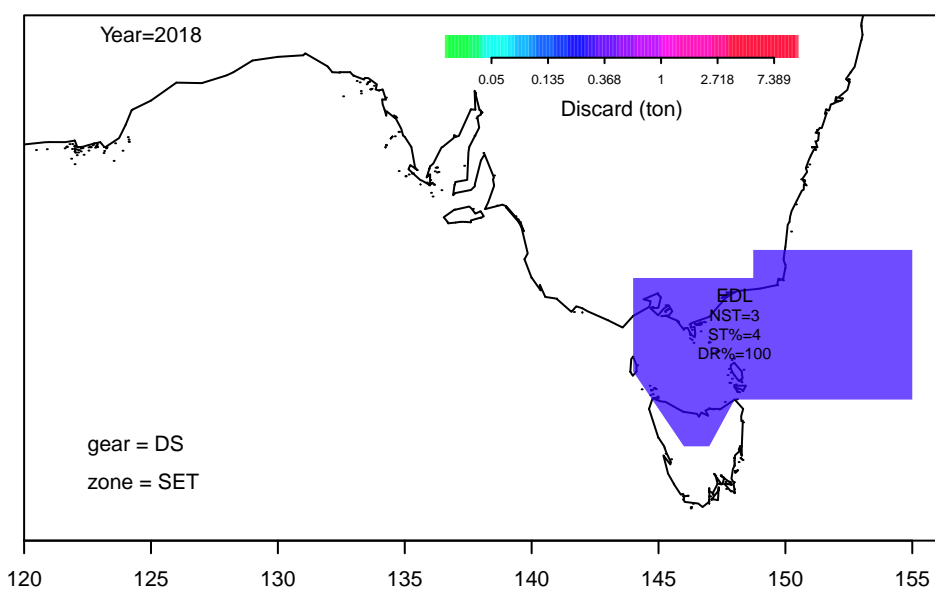
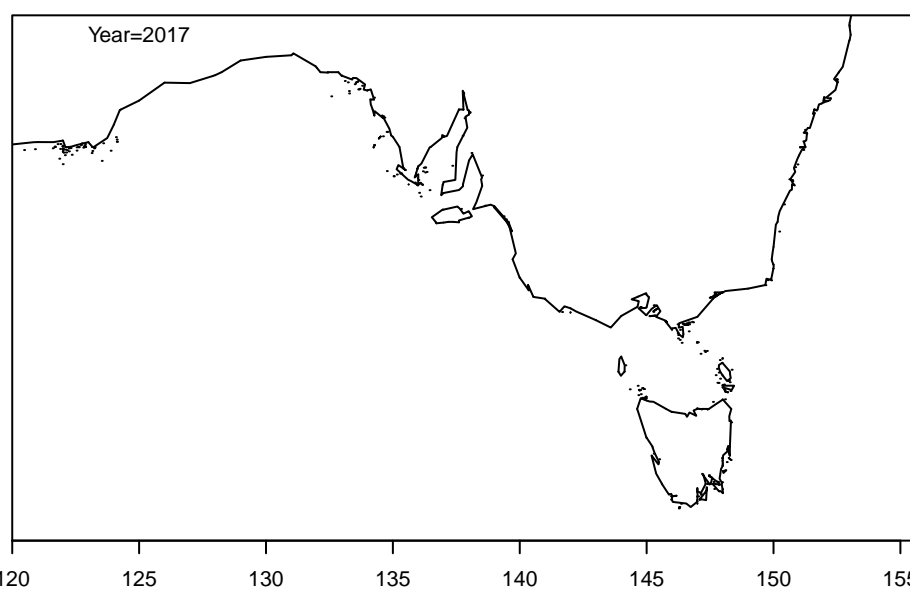
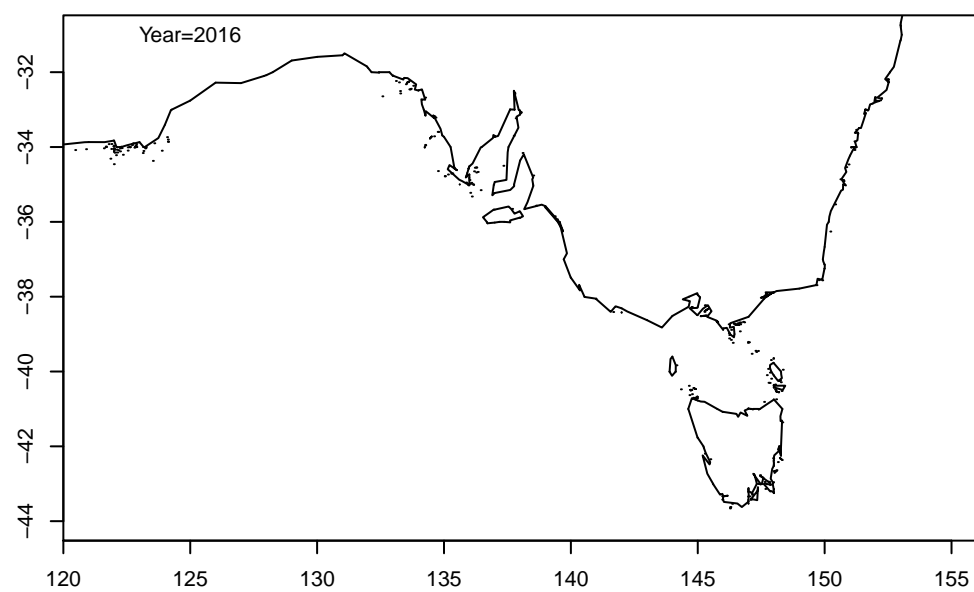
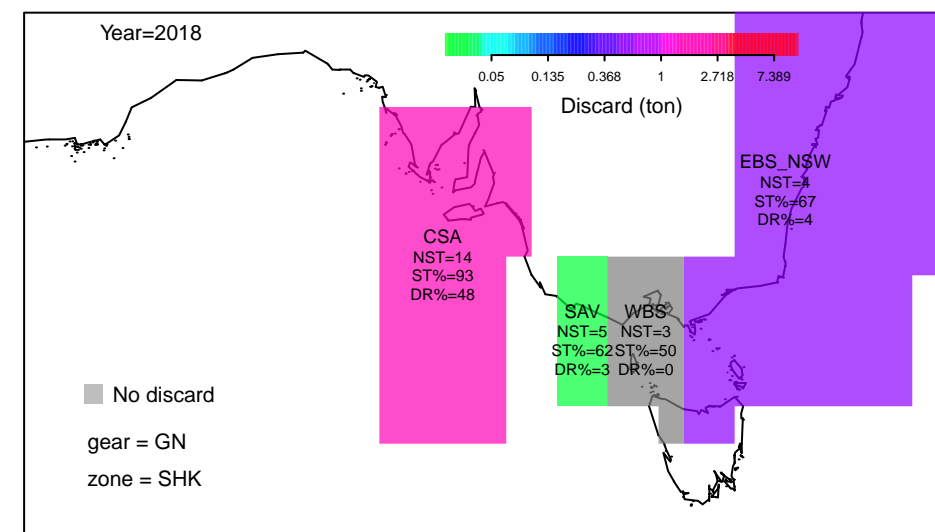
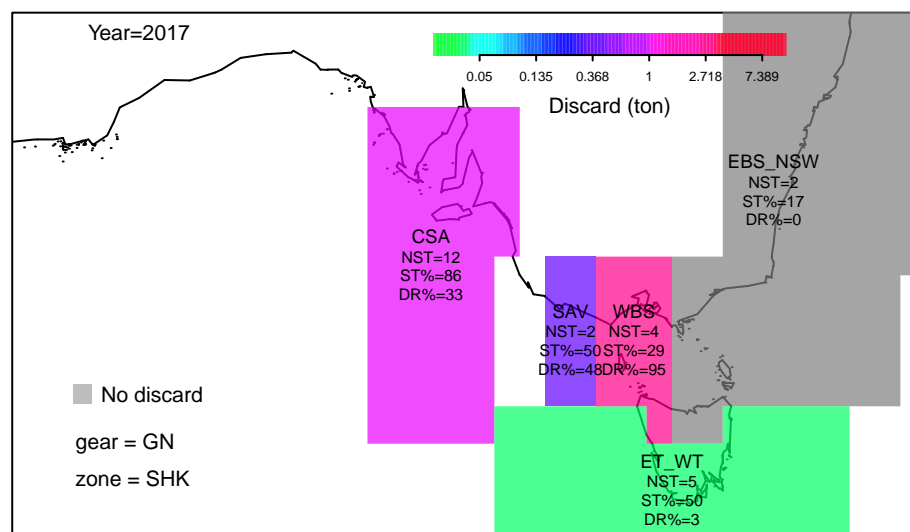
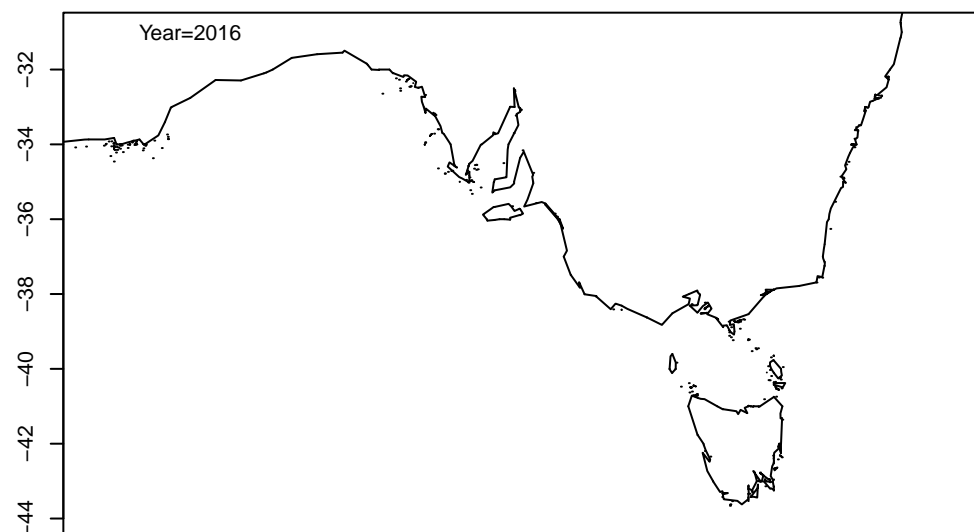
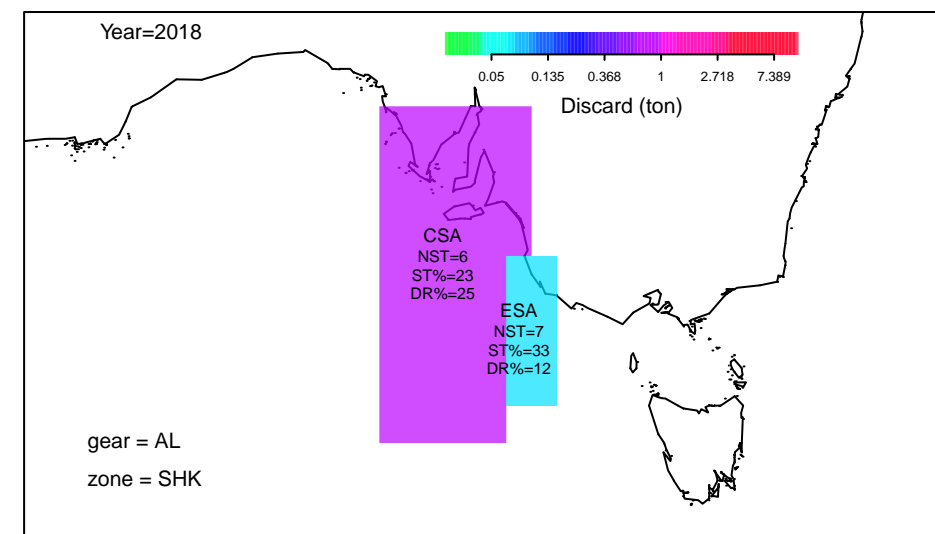
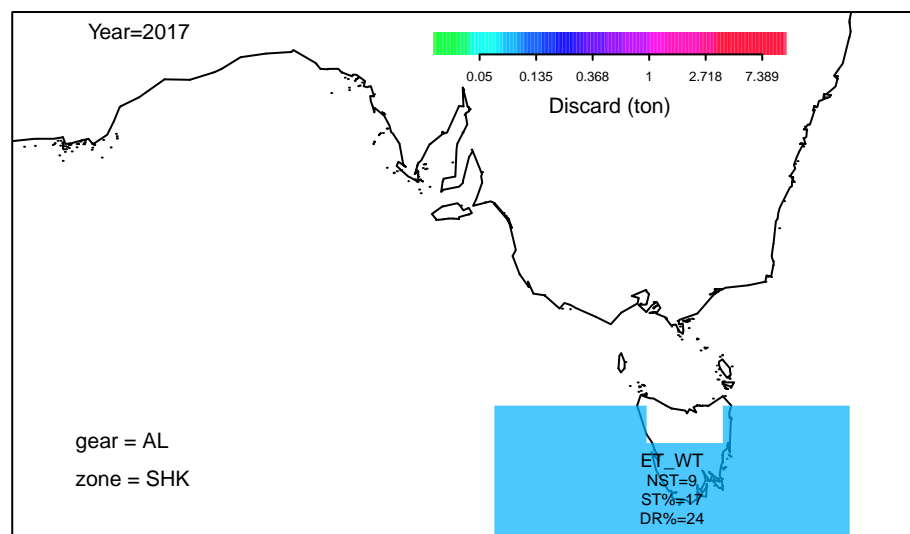
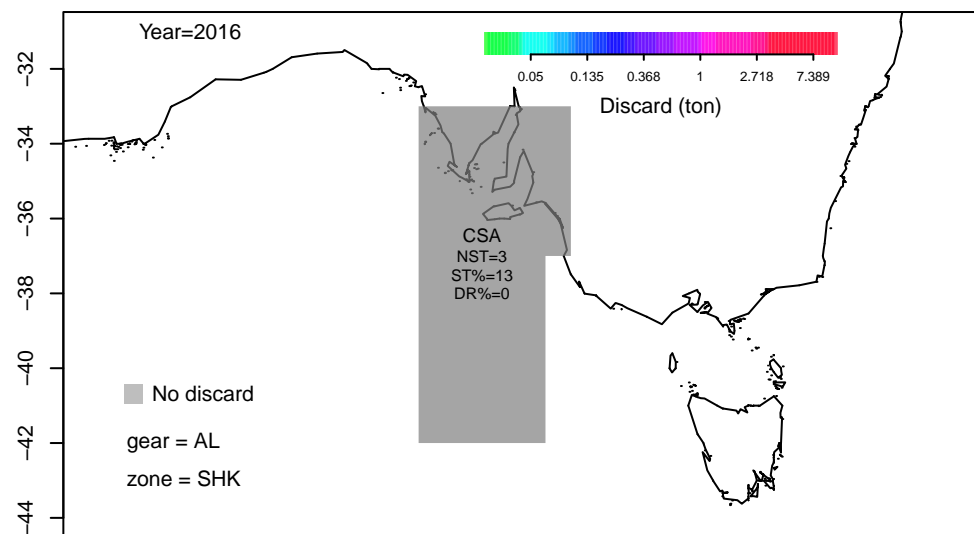
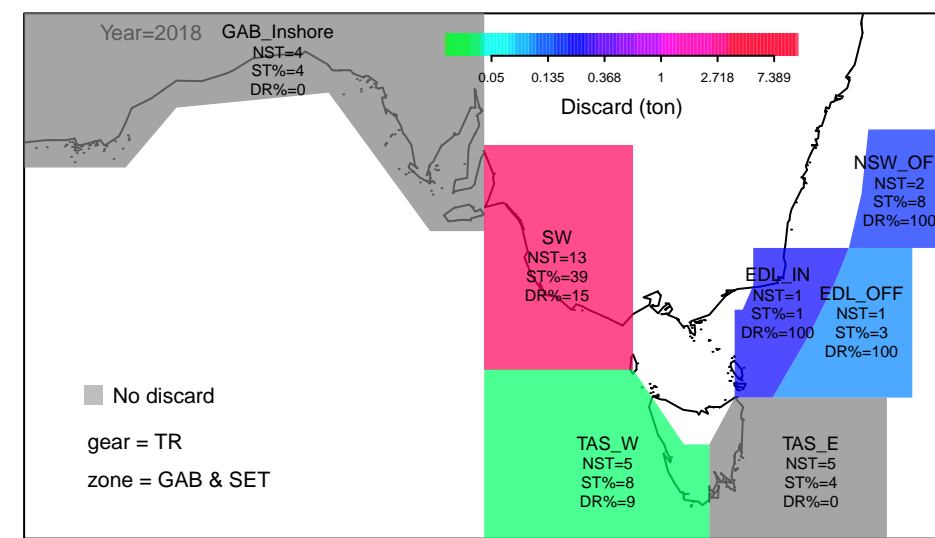
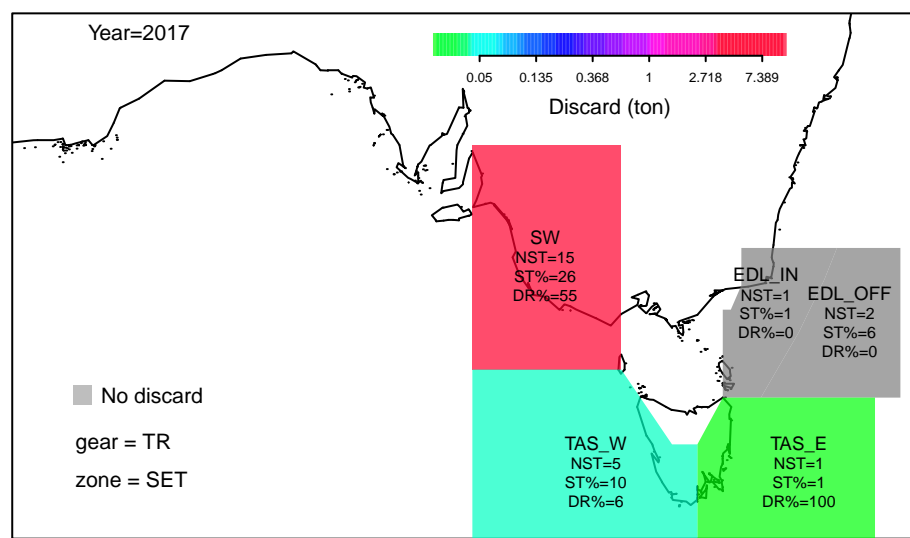
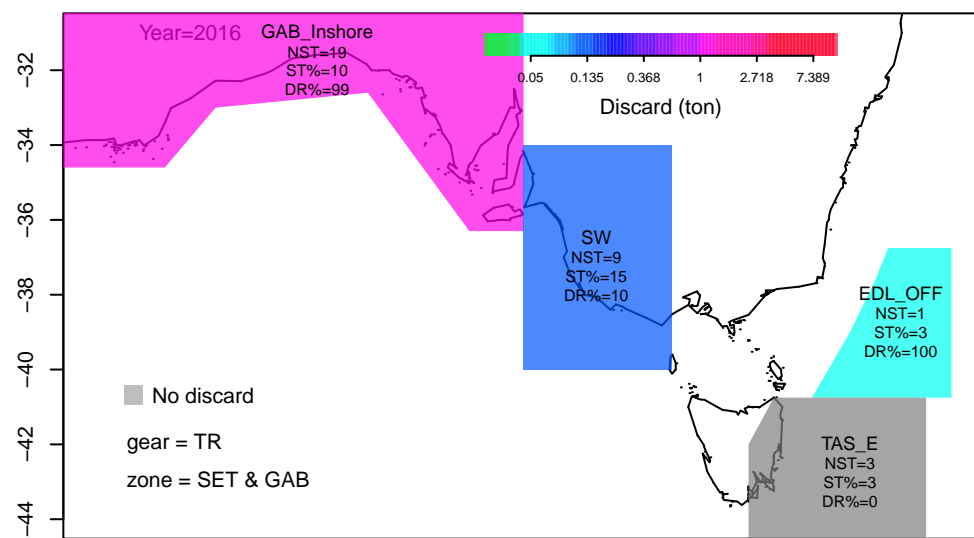


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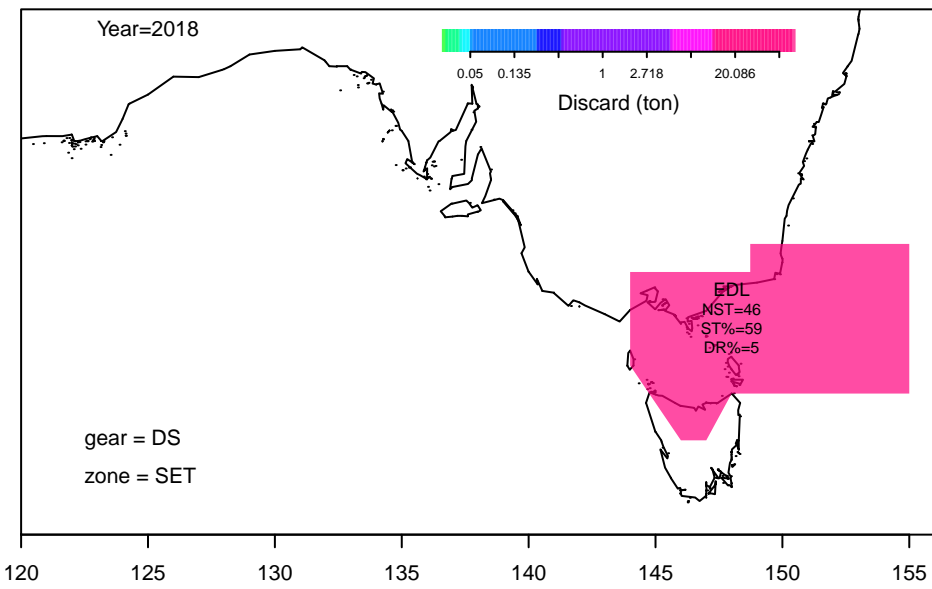
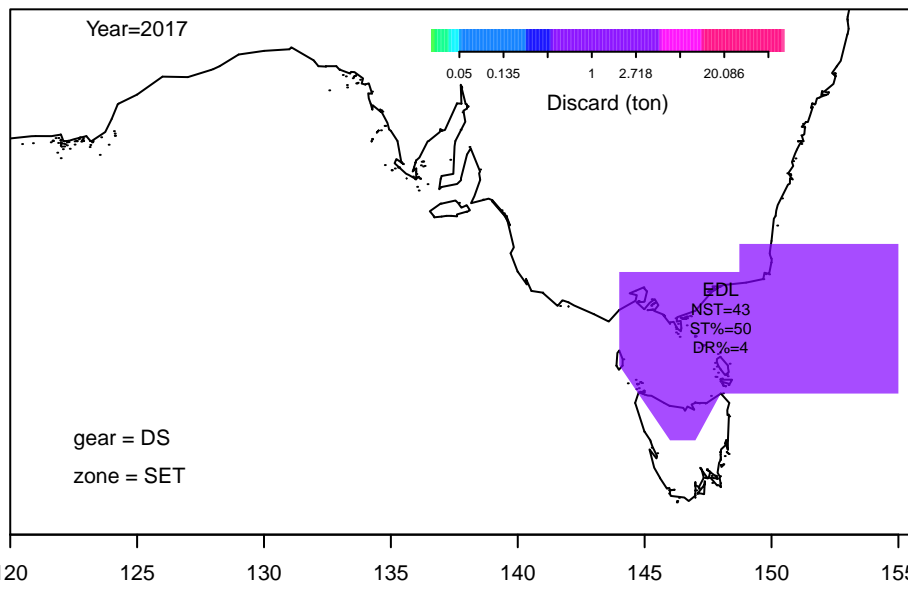
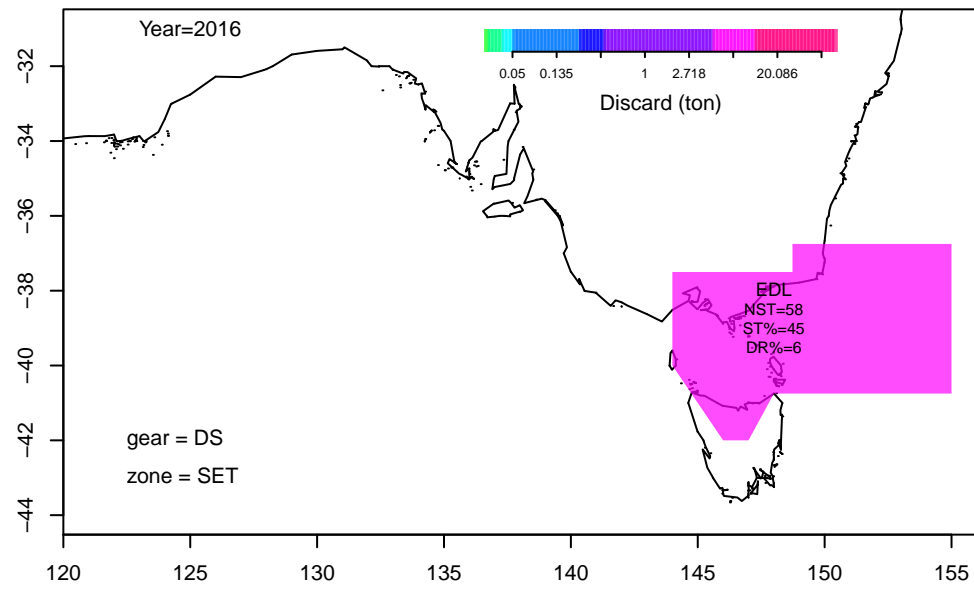
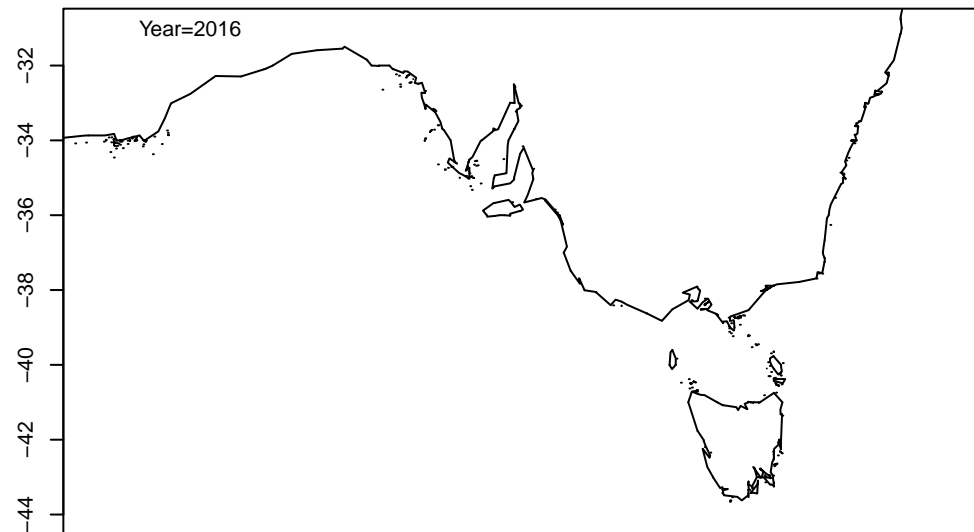
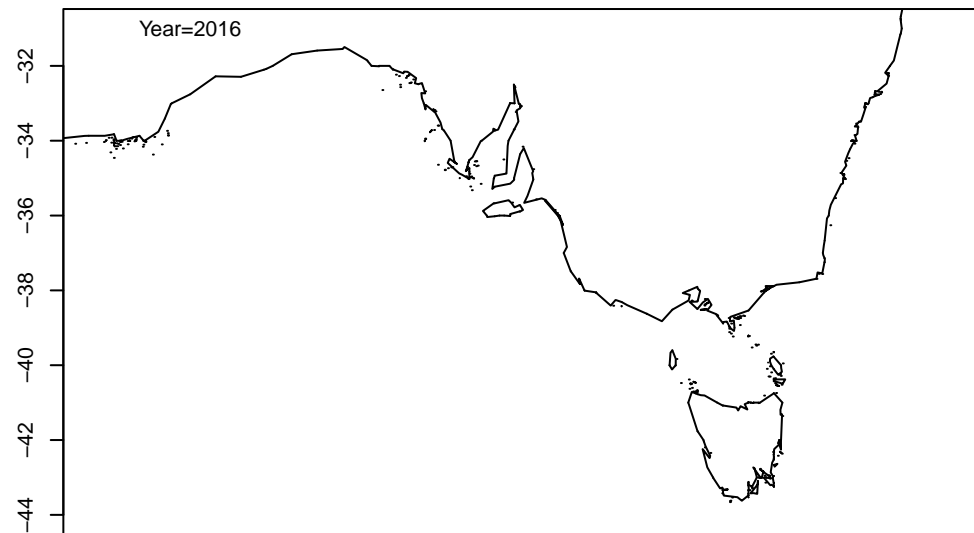
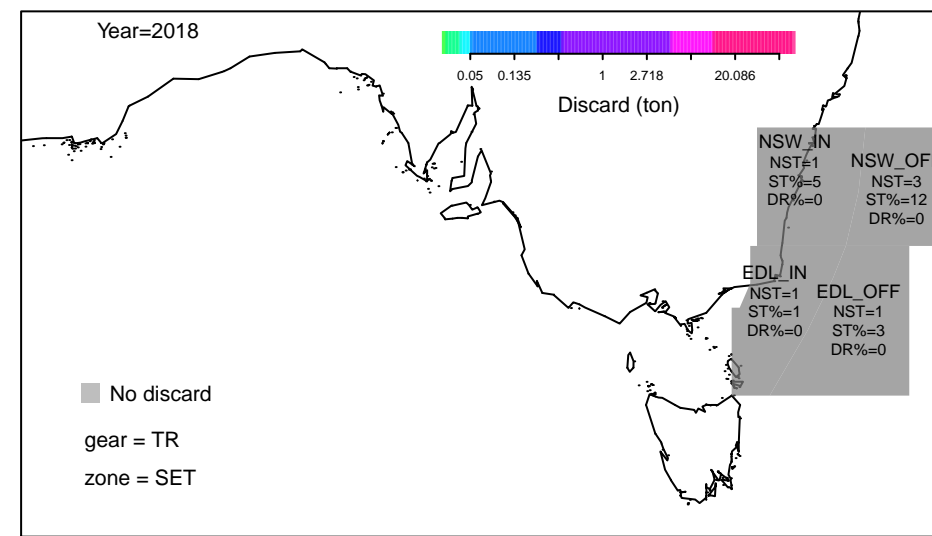
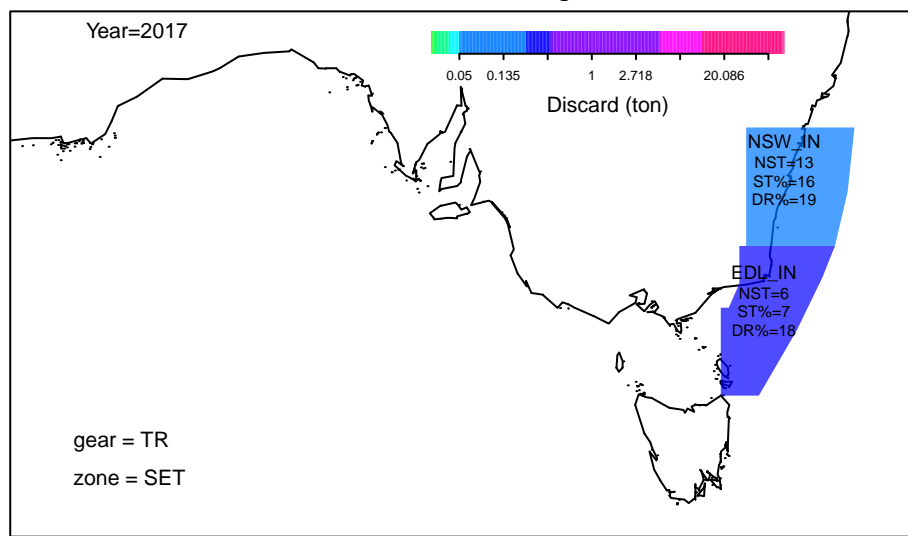
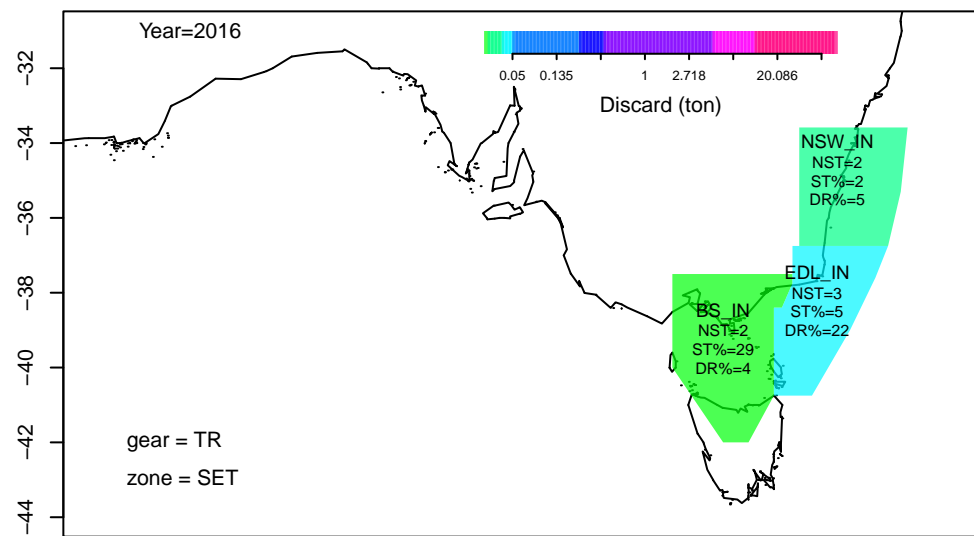
# Saw Shark



# School Shark

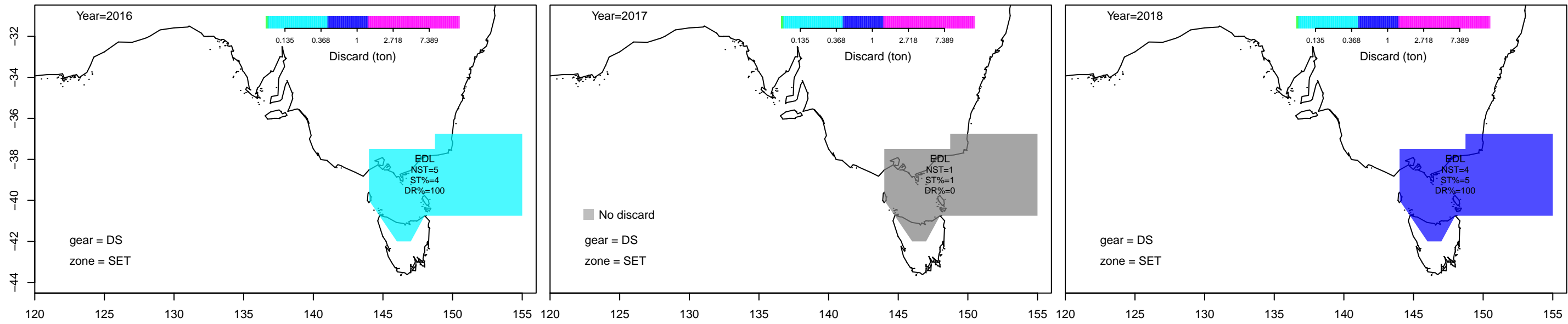
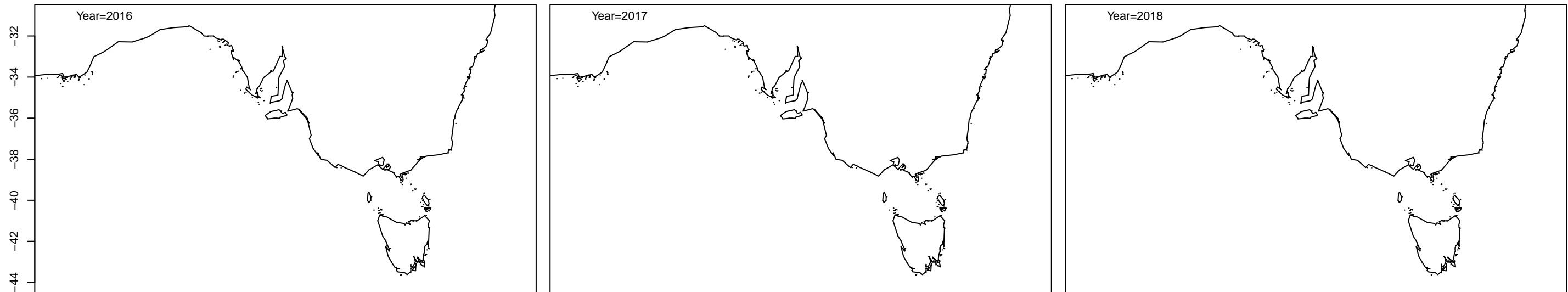
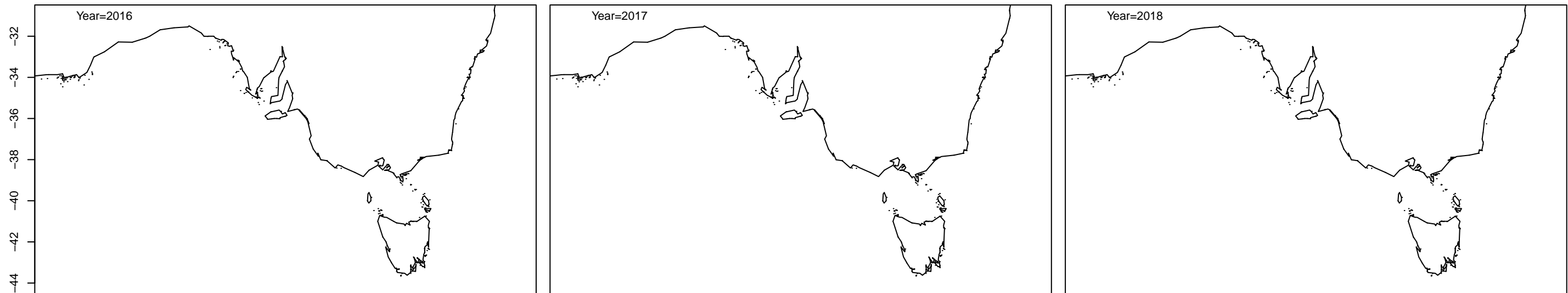
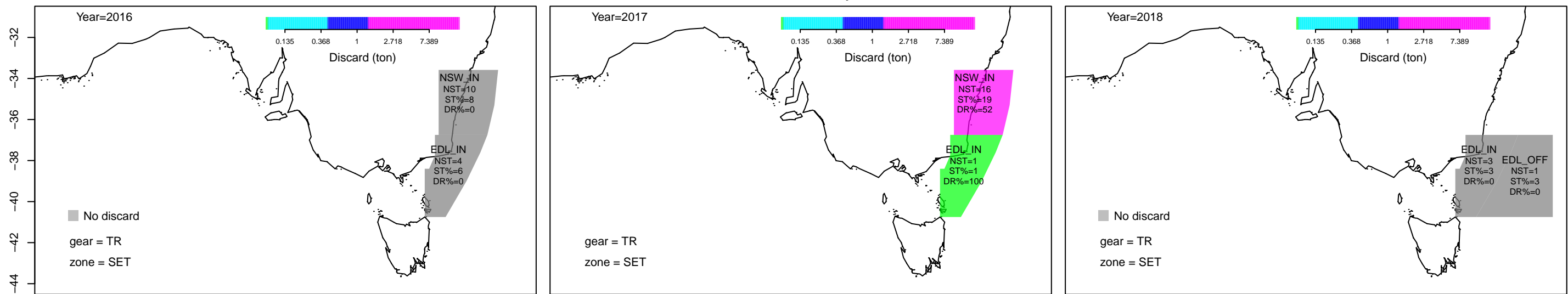


# School Whiting

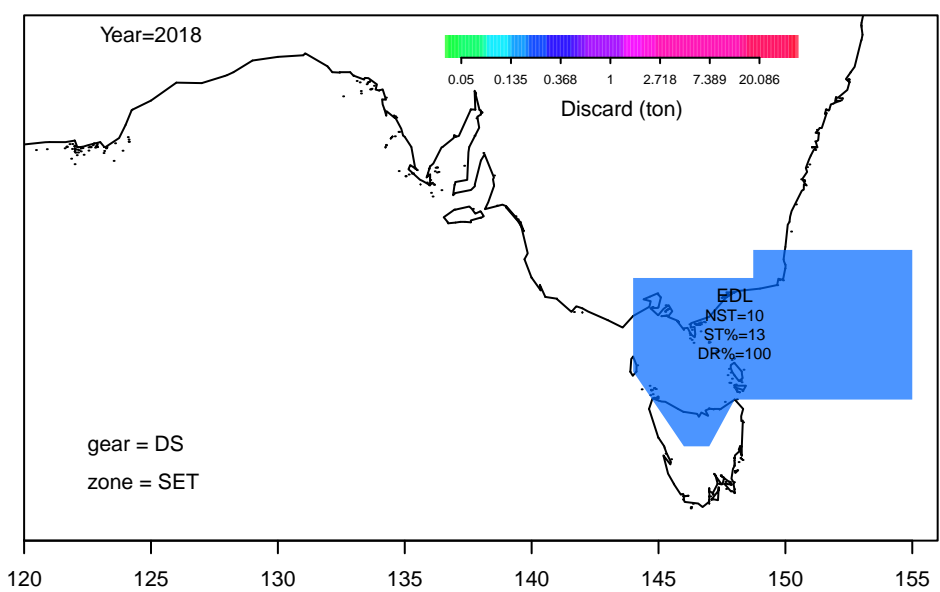
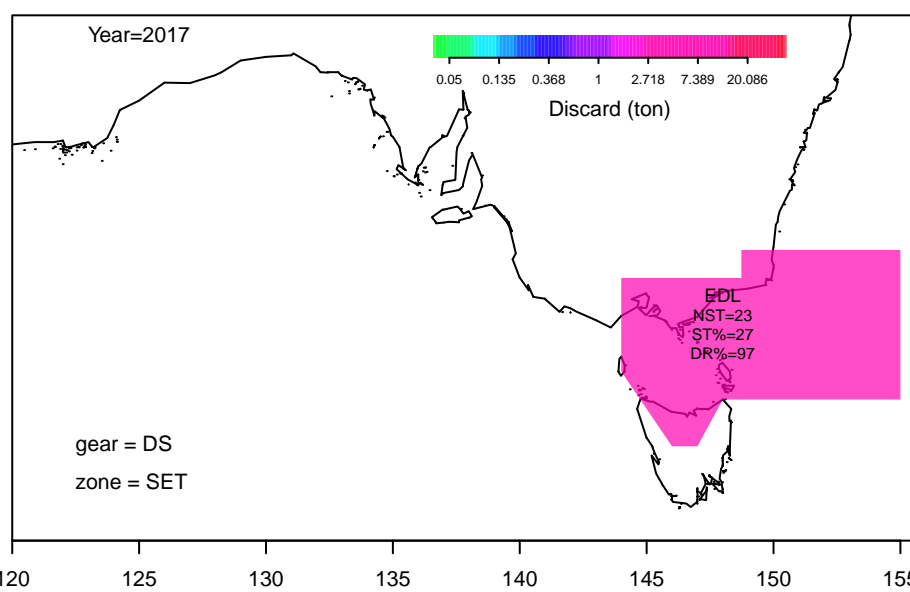
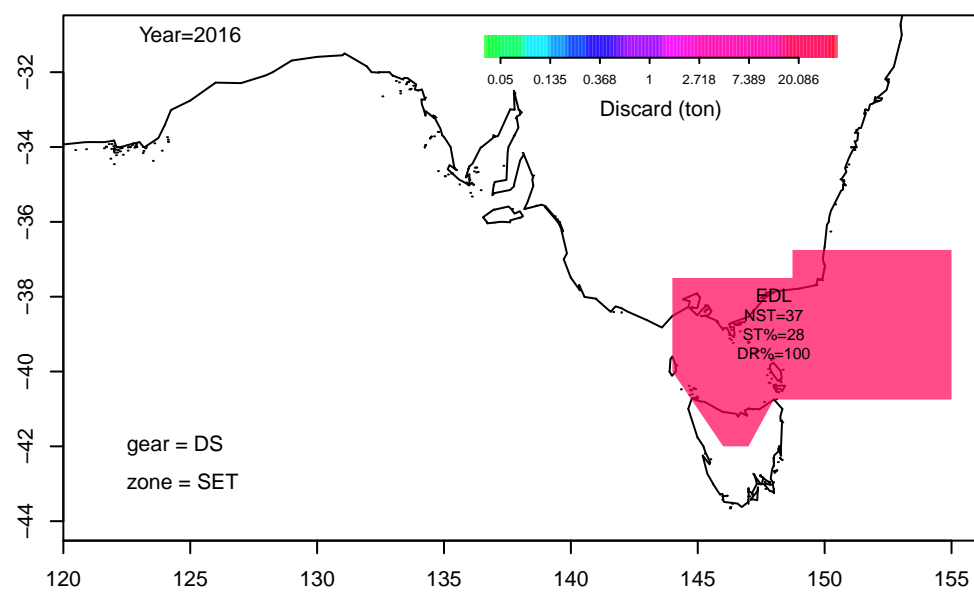
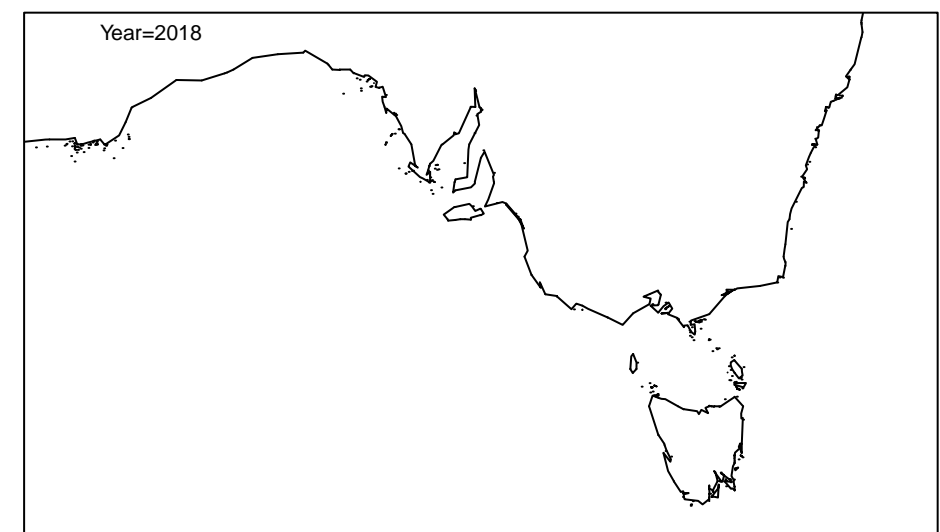
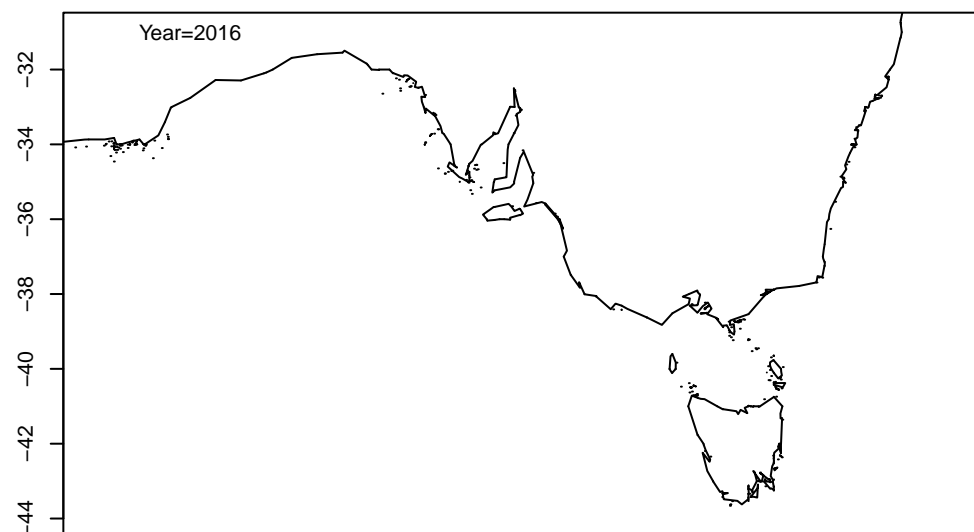
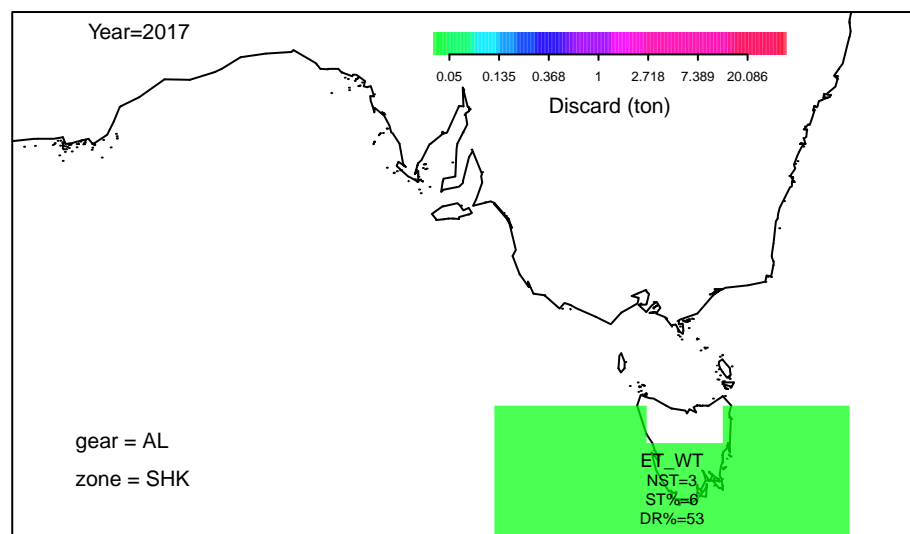
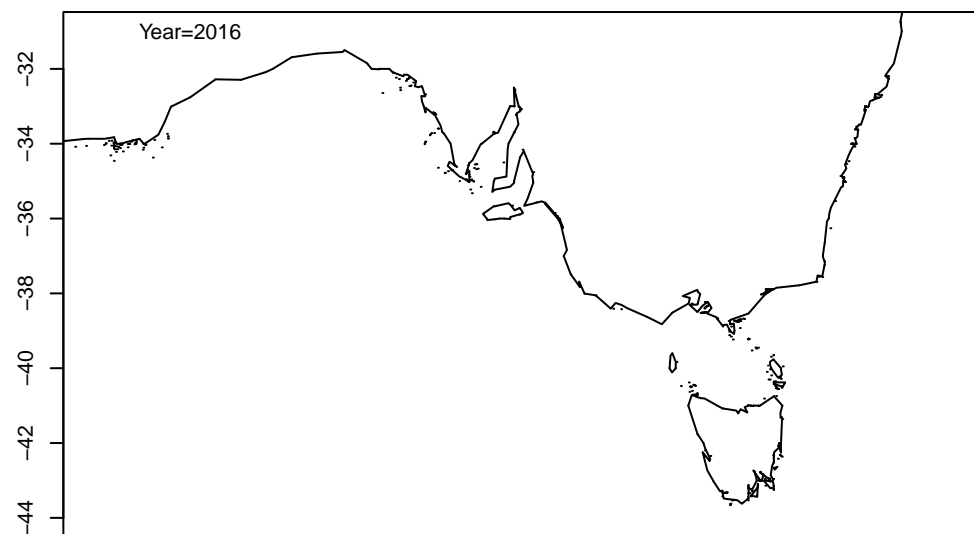
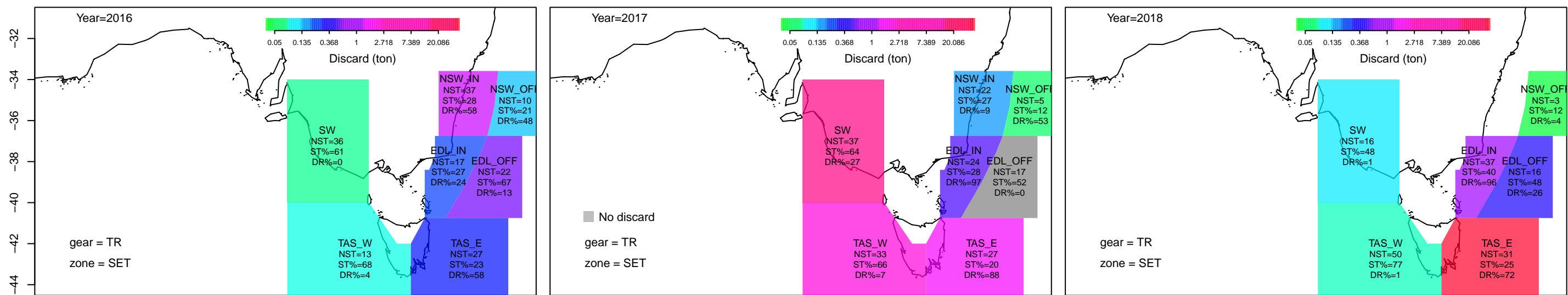


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# Silver Trevally

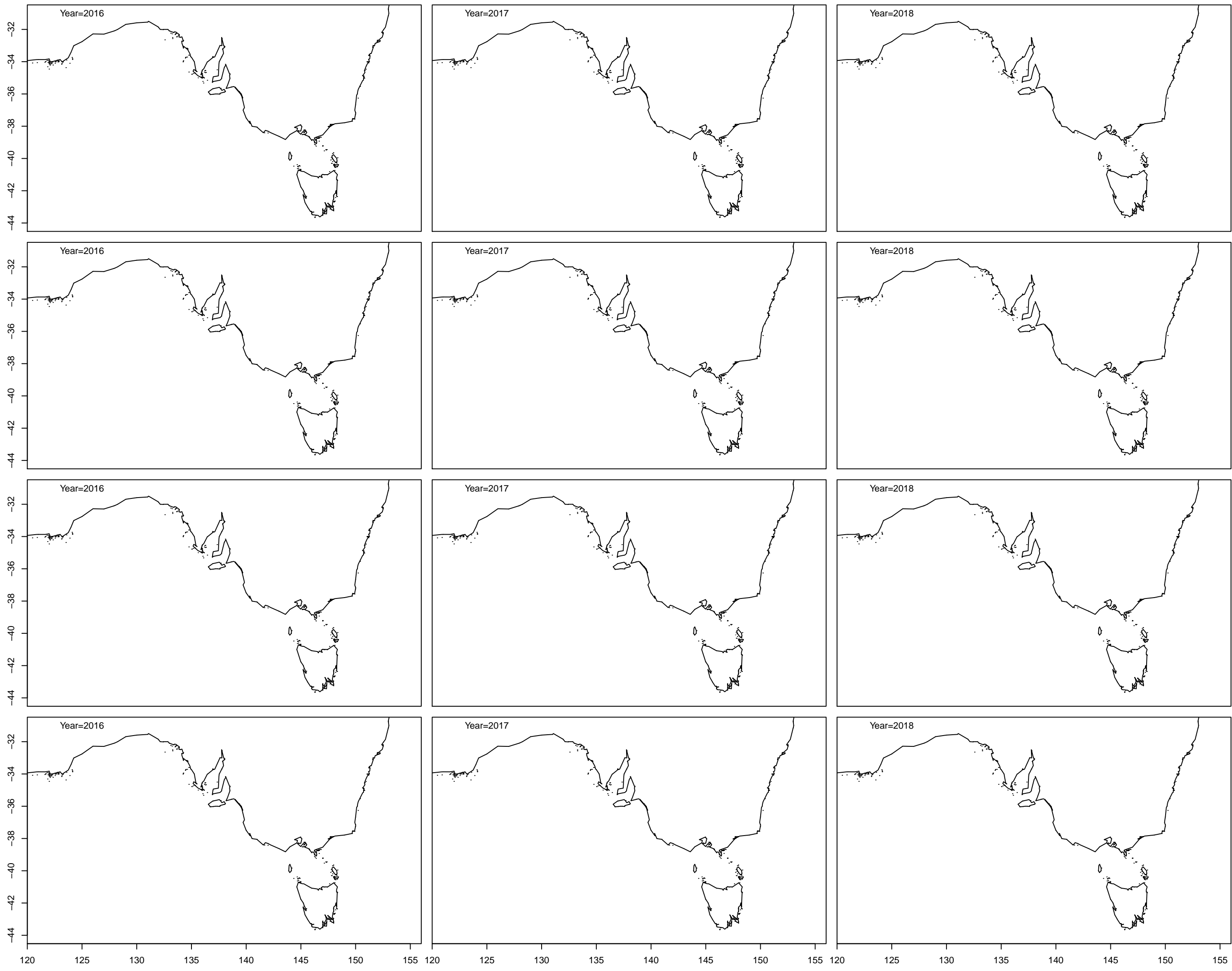


# Silver Warehouse

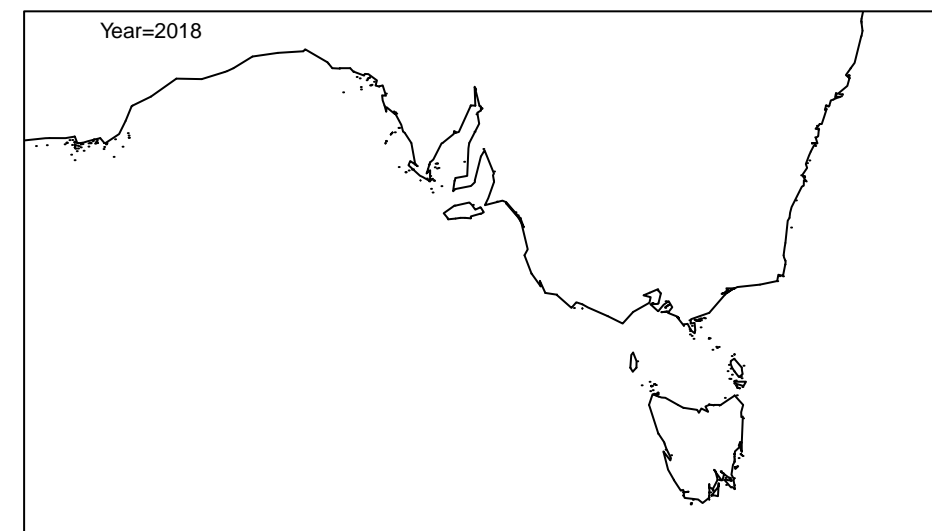
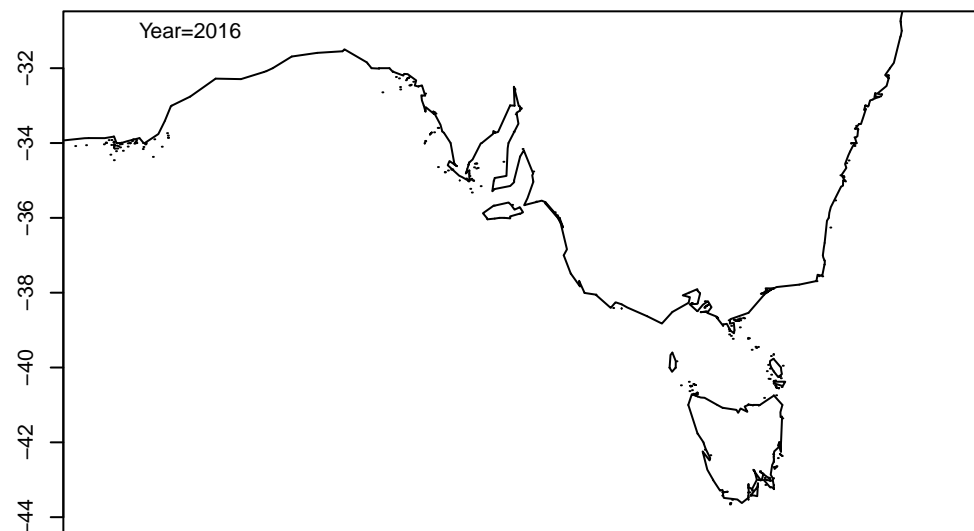
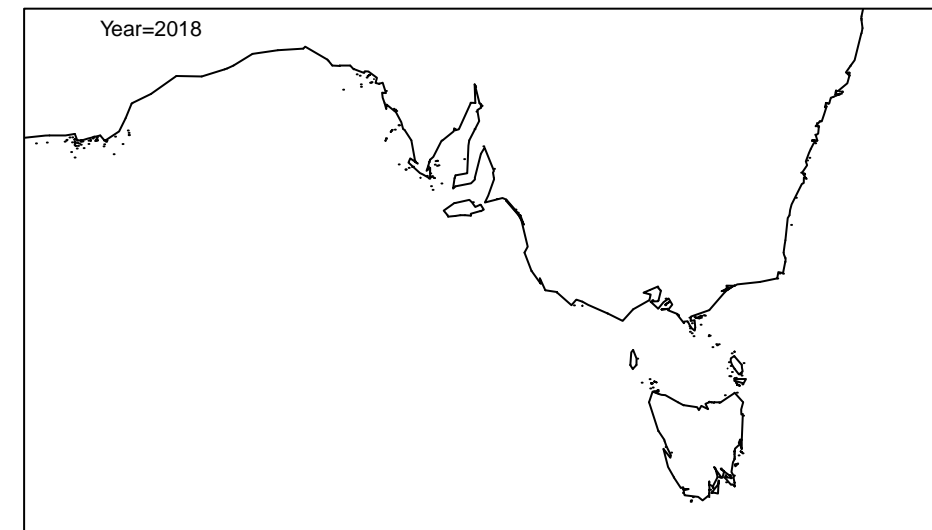
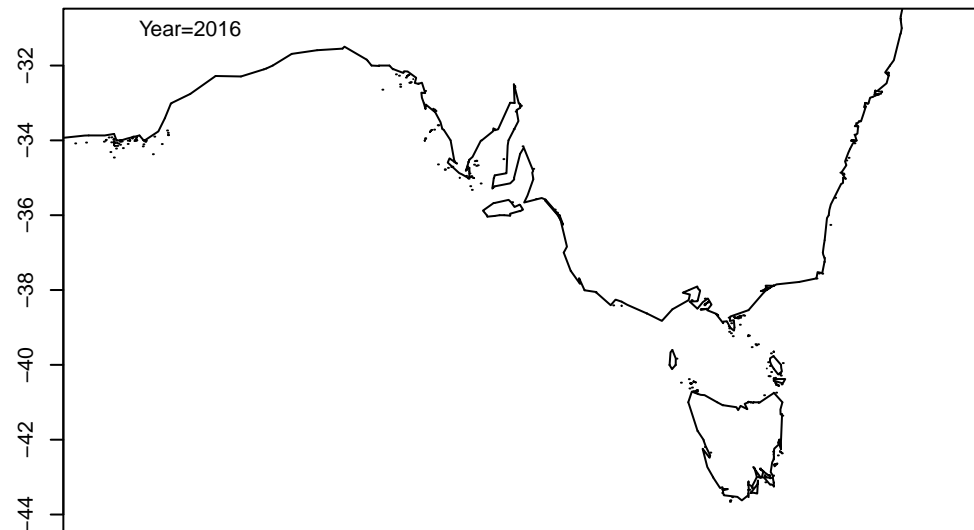
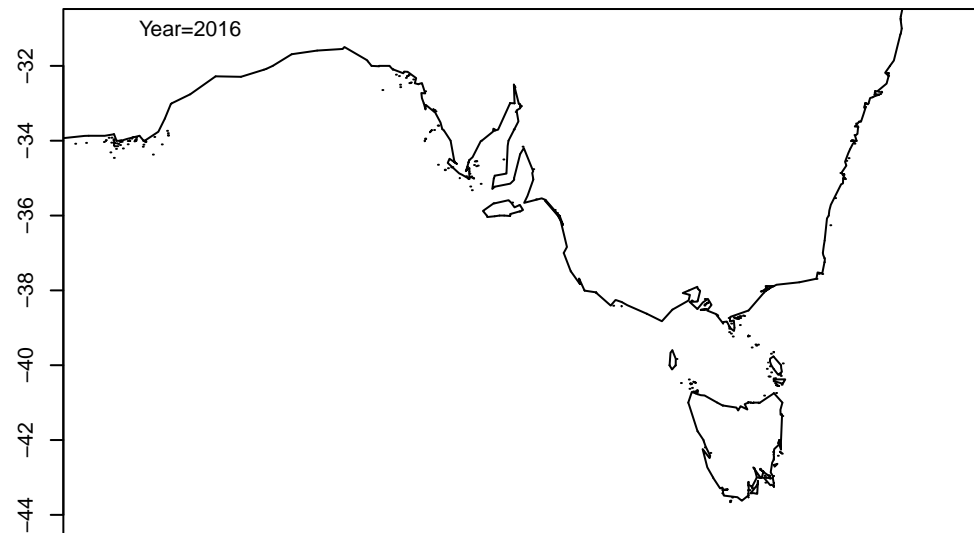
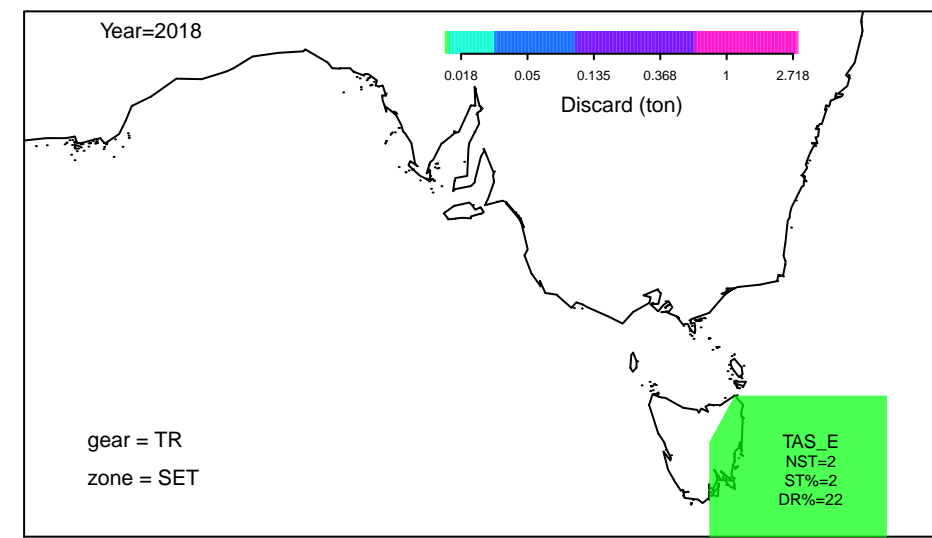
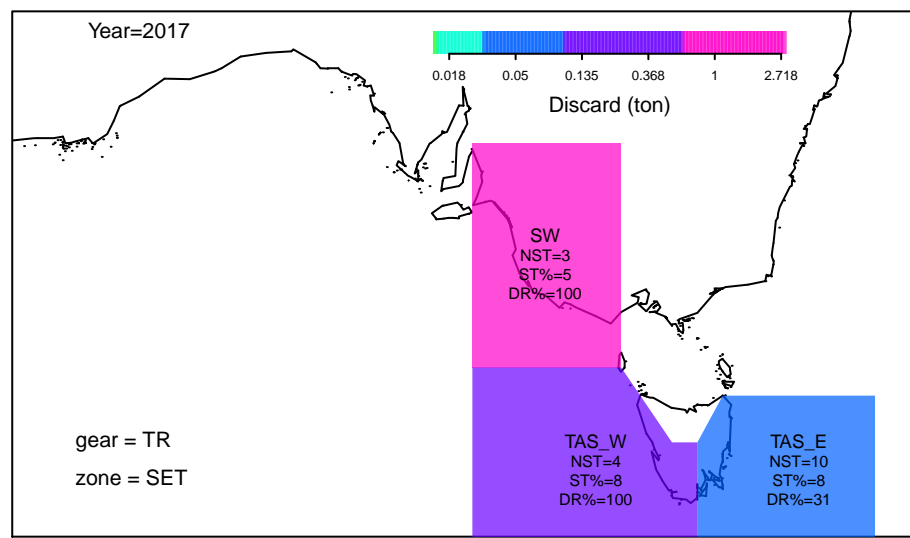
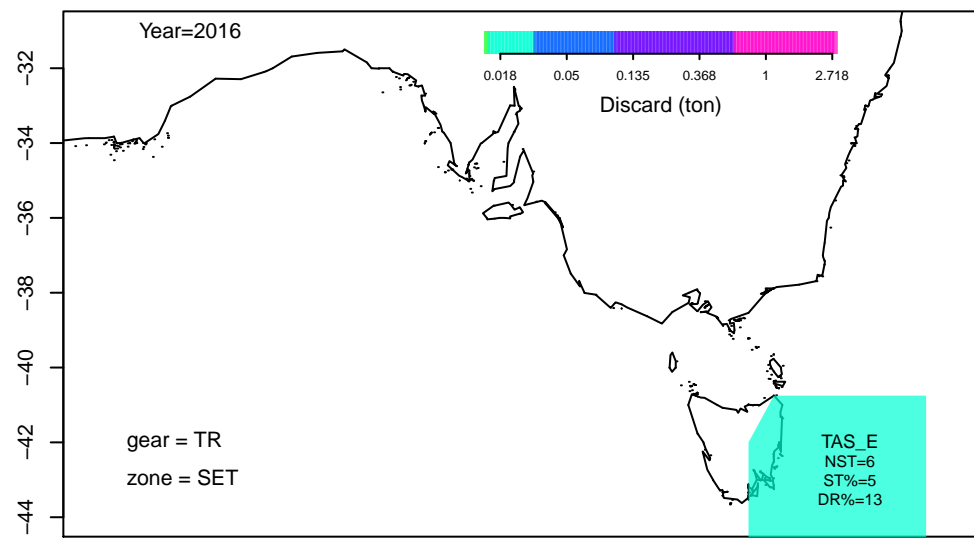




# Smooth Oreo Cascade



# Smooth Oreo Non-Cascade



120 125 130 135 140 145 150 155 120 125 130 135 140 145 150 155 120 125 130 135 140 145 150 155



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