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ANALYSIS OF SIZE FREQUENCY DATA FOR THE 2026 YELLOWFIN AND BIGEYE ASSESSMENTS

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Executive Summary

This Information Paper describes the pre-processing of size composition data prior to integration into the 2026 stock assessment models for bigeye and yellowfin tuna in the western and central Pacific Ocean, and provides a comprehensive summary of reweighted size compositions and their associated input sample sizes.

The reweighting of size compositions for assessments of western and central Pacific Ocean tuna and billfish stocks has historically been complicated by unrepresentative coverage of size samples, temporal changes in the coverage of size samples between fleets within assessment model fisheries, as well as temporal changes in their contributions to catches. This can result in temporal variability that is driven by changes in sampling, rather than changes in the size composition of catches or the underlying population.

There were two key areas of focus for this assessment cycle. The first was the strengthening of data filters to improve reweighted size compositions, in particular to remove apparent noise and temporal variability in fishery-level size compositions driven both by limited or unrepresentative sampling, as well as temporal changes in sampling rates per fleet in mixed-fleet fisheries. The second was the conversion of longline weight compositions to lengths external to the assessment model, to facilitate more effective exploration of fishery-level size data and conflicts in size data among data sources without the complication of alternative size metrics. This conversion of weights to lengths was further motivated by the reduction in coverage of available weight samples through time, coupled with the superior coverage of length samples in recent years with more length data being provided by observer programmes, for a range of longline fisheries in the assessments.

1 Introduction

This Information Paper describes the pre-processing of size composition data prior to integration into the 2026 assessment models for bigeye (Kim et al., 2026) and yellowfin (Magnusson et al., 2026) in the western and central Pacific Ocean.

Statistical correction of size composition data is required for assessments of tuna and tuna-like species in the western and central Pacific Ocean as samples are often collected unevenly in space and time. As such, the samples require reweighting using either catch, to be representative of the size of fish being removed from the population in the case of extraction fisheries, or estimates of relative abundance, to be representative of the size of fish in the population in the case of index fisheries. This reweighting procedure was applied to size compositions of selected purse seine and longline fisheries for the 2026 bigeye and yellowfin assessments.

Catches of fisheries in the western and central Pacific Ocean are sampled for size through a range of data collection programmes and sampling protocols (e.g., Hamer et al., 2025). Length data are collected by at-sea observers across a range of fisheries, primarily purse seine and longline. Length and weight data are also collected in ports throughout the region, as part of dedicated port sampling programmes. Additionally, length and weight data are provided to the Pacific Community as aggregate data submissions, with weight data submissions typically limited to longline fisheries. Aggregate data submissions can include samples from both at-sea observers and port-sampling, as well as data collected by fishers, though it is not possible to separate out these data by origin due to their aggregated nature.

Weight samples have historically been preferred for compositional inputs for longline fisheries in assessments of bigeye and yellowfin tuna in the western and central Pacific Ocean (e.g., McKechnie, 2014). Weight data are considered to be more representative of historic size compositions of commercial Japanese longliners, a key longline fleet in the region with the longest time-series of both catches and size data, whereas length data from Japanese longliners includes data from both training vessels as well as commercial vessels. However, the coverage of catches by available weight samples has declined through time, both in terms of spatial coverage as well as the coverage per fleet. As such, there has historically been interest in supplementing weight compositions with length compositions for longline fisheries (McKechnie, 2014; Peatman et al., 2020, 2023). Length compositional inputs for longline fisheries were prepared for the 2023 assessments of bigeye and yellowfin in the western and central Pacific Ocean (Peatman et al., 2023), but were ultimately not used in the assessments, in part because the inclusion of length compositions in the 2020 assessments was not influential (Day et al., 2023; Magnusson et al., 2023). One point of concern when including both weight and length compositional inputs in an assessment is the potential to introduce conflict in to the assessment model, if the observations from the two size units are not consistent. In this context, for the 2026 assessment models, we explored the conversion of longline weight compositions into lengths, external to the assessment model. This allows direct comparisons of available size data of both units (i.e., weights

and lengths), as well as comparisons between data sources for a given fleet, without the complication of the different size units. These comparisons facilitate identification of potential conflict between available length and weight data, as well as conflict between data sources. Additionally, this approach enables the direct comparison of model fits to weight compositions (converted to lengths) and fits to length data. The approach also provides flexibility to incorporate spatial variation in length-weight relationships in the preparation of compositional inputs.

This report documents the reweighting of size compositional inputs to the 2026 assessments of bigeye and yellowfin in the western and central Pacific Ocean, covering selected purse seine and longline extraction fisheries, as well as index fisheries.

2 Methods

The procedure used to reweight size compositions for extraction and index longline fisheries was developed from the approach used to prepare longline size compositions for the 2023 bigeye and yellowfin assessments (Peatman et al., 2023), which built on the approach of McKechnie (2014) and Tremblay-Boyer et al. (2018) for extraction and index fisheries respectively. Similarly, the procedure used to reweight purse seine extraction fishery compositions was developed from that used to prepare purse seine fishery compositions for the 2023 bigeye and yellowfin assessments (Peatman et al., 2023), which was itself developed from the approach of Abascal et al. (2014). Reweighted size compositions were generated for a subset of the purse seine and longline fisheries included in the 2026 assessments (Table 1 & Table 2), based on the region and subarea definitions provided in Figure 1.

Ninety-five 2cm length classes were used for both species, covering 10–12cm through to 198–200cm. Two hundred 1kg weight classes were used for both species, covering 0–1kg through to 199–200kg. For both length and weight classes, the intervals were right-open (e.g., $10 \leq \text{length} < 12$ cm). Throughout this report, length refers to upper-jaw to fork length, and weight refers to whole weight.

2.1 Data preparation

2.1.1 Conversion of weights to lengths

Weight-length relationships were estimated using the filtered paired weight-length dataset prepared to estimate length-weight relationships through WCPFC Project 90 (Macdonald et al., 2023). The analysed dataset included 1,358,097 bigeye and 1,542,557 yellowfin, sampled both in ports as well as at-sea by observers. These weight-length relationships were then used to predict the probability of an individual in a given weight class being in each length class. These probabilities were then applied to weight frequency data in WT Master to convert to length frequencies, which are referred to throughout this report as weight-as-length data.

Log-linear models were used to estimate weight-length relationships, with the variance also a log-linear

function of log-transformed weight:

$$\ln(L_i) = \ln(a) + b \cdot \ln(W_i) + \epsilon_i \quad (1)$$

$$\epsilon_i \sim N(0, \sigma_i) \quad (2)$$

$$\ln(\sigma_i) = \ln(\alpha) + \beta \cdot \ln(W_i) \quad (3)$$

where L_i and W_i are the length and weight of individual i respectively, a and b are the weight-length relationship parameters ($L = a \cdot W^b$), and α and β are the parameters defining the of the relationship between the variance (σ_i^2) and weight. Prior to fitting the models, lengths were rounded to the nearest integer below, and then converted to the mid-point of the resulting 1cm length class, as the length measurements included a mixture of decimal measurements, as well as lengths measured to the nearest cm below.

The fitted weight-length relationships are provided in Figure A.1. The fitted weight-length relationships were able to accurately predict the observed lengths of individuals across the range of weights in the analysed dataset (Figure A.2). However, we note that there was apparent overdispersion in residuals, which was not fully resolved by the inclusion of the log-linear relationship between variance and weight.

Uncertainty in the parameters defining the weight-length relationship was obtained using a non-parametric bootstrap procedure with 2,048 replicates. For each replicate, a bootstrap sample was drawn at random from the analysed dataset, the weight-length relationship was then fitted to the bootstrap sample, and the estimated parameters extracted. The probability of an individual in a given (1kg) weight class belonging to each (2cm) length class, referred to as $P(L_i|W_i)$, was then estimated from the fitted weight-length relationships as follows. First, for each weight class, a random draw of weight was taken from the uniform distribution defined by the limits of weight interval. A parameter set was then drawn at random from the 2,048 bootstrap samples, and then applied to the random draw of weight to estimate length. This process was repeated 10,000 times, and $P(L_i|W_i)$ estimated as the proportion of estimated lengths falling in each length class, per weight class. The resulting estimates of $P(L_i|W_i)$ are provided in Figure A.3.

Weight frequencies in WT Master were then converted to estimated length frequencies by applying $P(L_i|W_i)$ per weight class. The conversion of weight data to lengths was preferred, rather than the opposite, as it allows for incorporation of variability in lengths-at-weight, which is not currently incorporated within MULTIFAN-CL. Furthermore, size data submissions are moving towards greater coverage by length data than weight data, and length data is preferable to weight data due to the multiple conversion factors required when using weight data (Hamer et al., 2026).

2.1.2 Initial data filtering

Initial data filters were applied to available size data held by the Pacific Community, including the exclusion of records due to concerns around data reliability that have been flagged in earlier assessments or as part of the ongoing review of size data through WCPFC Project 127 (e.g., [Hamer et al., 2025, 2026](#)).

The following filters were applied to available weight samples in WT Master when preparing longline size compositions:

1. Following [Peatman et al. \(2023\)](#), weight samples for the Taiwanese offshore ('TWOS') fleet were excluded from 2004 to 2009 (inclusive) for the offshore fisheries, due to an unexplained shift in size compositions over this period.
2. Following [Peatman et al. \(2023\)](#), weight samples for the Taiwanese distant-water ('TWDW') longline fleet from 2014, and the Fijian longline fleet from 2001 in regions 3 (bigeye) and 4 (yellowfin), were excluded due to apparent contamination with 2kg (or larger) weight classes.
3. Aggregate Taiwanese weight data (origin ID = 'TWWT') were excluded due to apparent errors in geo-referencing of spatial cells in data submissions. Work is ongoing to address this in historic data submissions.
4. Following earlier assessments, weight samples for Japanese vessels from regional port-sampling programmes were excluded (origin ID = 'SPWT').

The following filters were applied to available length samples in LF Master when preparing longline size compositions:

1. Taiwanese aggregate length data submissions (origin ID = 'TWLL') were excluded over concerns around inclusion of visual estimates of length ([Hamer et al., 2025](#)). We note that average lengths of bigeye and yellowfin caught by Taiwanese longliners in the 'TWLL' dataset have previously been shown to be substantially larger than those available from other data sources ([Peatman et al., 2023](#)).
2. Following earlier assessments, length samples for Japanese vessels from regional port-sampling programmes were excluded (origin ID = 'SPLL').
3. Japanese aggregate length data were excluded (origin ID = 'JPLL'), due to concerns around coverage of data collected on training vessels.

2.1.3 Purse seine data preparation

Length samples from the US Multilateral Treaty Port Sampling (i.e. origin ID = 'TTPS') and Japanese Purse Seine Port Sampling (origin ID = 'JPPS') datasets were extracted from SPC's LF MASTER database. Data from 2010 onwards were excluded due to the high observer coverage during this

period. Samples that could not be attributed to assessment fisheries were excluded, e.g., samples with unknown school association in regions where fisheries are specific to set-type. Samples provided at a 10 (latitude) x 20° (longitude) or 5 x 10° spatial resolution were split to 5° cells, using the proportion of reported US (TTPS data) or Japanese catch (JPPS) in each 5° cell, for the year-quarter and set type in question (i.e. associated vs unassociated). We note that more than 80% of TTPS and JPPS samples were available at a minimum of a 5° resolution.

Observer grab and spill samples were extracted from SPC's master observer database, along with the association type and total catch of each set recorded by observers. Data from an observer's first purse seine trip were excluded. Spill samples were used where available, including both paired grab / spill trips and observer data from the Philippines observer programme, otherwise grab samples were used. Grab samples were corrected for grab sample bias using correction factors (Peatman et al., 2019).

The resolution of strata used in the reweighting process was year-quarter, 5° cell, and fishery. Fisheries were specific to set type, i.e., free-school vs associated. First, we implemented a set-level lower limit for observer sampling intensity, i.e. total samples per tonne of catch. This ensures that high volume sets with low levels of sampling do not have excessive influence on reweighted length compositions in years with relatively limited sampling coverage. The lower limit was set at approximately 20% of the target grab sampling rate, i.e. 0.33 grab samples per tonne.

Observer length samples of all tropical tunas were raised from set-level to strata-level by first converting set-level numbers by species and length class to proportions by species and length class. These proportions were then raised to estimated numbers caught by species and length class, so that the estimated set catch across all species summed to the observer's estimate of catch weight for the set. Length weight parameters used in this process are provided in Table 3. We then aggregated from set-level to strata-level by summing estimated numbers caught by species and length class across sets, and then rescaling the strata-level numbers so that the total frequency in each strata was equal to the original sample size. We then filtered the length frequencies for bigeye and yellowfin.

Separately, US Multilateral Treaty Port Sampling data and Japanese Port Sampling data were raised to a strata-level by summing the numbers of samples in each length class across records. These samples were then combined with the strata-level observer samples, giving bigeye and yellowfin length frequencies per strata (i.e., a resolution of year-quarter, 5° cell, and fishery).

2.1.4 Longline data preparation

Available length and weight samples from SPC's LF MASTER and WT MASTER databases were extracted. Size samples and aggregate longline catch data were matched and aggregated to consistent fleet groupings using lookup tables held by SPC's Data Management team. 'Fleet' refers to the combination of flag-state and fleet code for those fishing nations with distinct fleet segments in reported size data and catch and effort data. The size samples and aggregate catch data were then

aggregated to a year-quarter temporal resolution to match the structure of the assessment model.

The reweighting procedure was implemented at a 10 x 20° spatial resolution. However, 10 x 20° cells can span multiple assessment regions, as well as the boundary of the spatial domain of the assessment model. As an initial step, size samples for each fleet were aggregated to a 10 x 20° and region spatial resolution, separately for each species, as follows:

1. All size samples were split to a 5° spatial resolution using the proportion of reported catches of bigeye or yellowfin (numbers) by 5° degree cell for a given year-quarter and fleet. For example, size samples provided at a 10 x 20° resolution would be split between a maximum of eight 5° cells.
2. The 5° cells were then assigned to an assessment model region, and any 5° cells outside the spatial domain of the assessment model were excluded.
3. The size samples in each region were then aggregated back up to a 10 x 20° and region spatial resolution, i.e. an overall resolution of year-quarter, region, 10 x 20° cell and fleet.

2.1.5 Identification of apparent binning of size classes

Binomial tests were applied to longline data in the LF Master and WT Master datasets, in order to identify and address reportedly 1cm or 1kg data with over-representation of 5cm or 5kg size classes, following the approach in [Teears et al. \(2024\)](#). Over-representation of 5cm (or kg) size classes may reflect a tendency for a sampler to have rounded to the nearest multiple of 5, but in extreme cases also includes reportedly 1cm (or kg) data consisting of only 5cm (or kg) size classes.

For a given strata, we tested for 5cm size class contamination by calculating the number of samples in 1cm length classes that are multiples of 5, and then applying a (one-tailed) binomial test for greater than expected numbers for length classes that were multiples of 5. The expected probability was conservatively set to 0.3. A p-value of 0.05 was considered appropriate for the threshold for identification of contaminated data. A similar approach was used to identify 1kg data with apparent contamination with 5kg data. Length and weight data identified as contaminated were then excluded when preparing compositional inputs, given the 2cm and 1kg length and weight class intervals respectively. A similar approach was applied to purse seine length samples collected by observers, though the tests were applied at a set-level to maximise the statistical power of the tests.

For longline samples, apparent over-representation of 5kg weight classes in 1kg data was rare with affected strata accounting for ca. 0.1% of total weight samples. However, over-representation of 5kg data was strong when present (Figure B.1). Apparent over-representation of 5cm length samples in longline data was slightly more prevalent, affecting ca. 4% of total length samples, and was similarly strong when present (Figure B.2). For purse seine observer samples, apparent over-representation of 5cm length classes in 1cm data affected ca. 3% of total length samples, though apparent over-representation was strong when present (Figure B.3).

Similar tests were also applied to identify over-representation of 2cm (longline and purse seine) and 2kg (longline) size classes, the former focussing on 2cm length intervals with an odd lower limit (e.g., 51-53cm) given the length classes used in the assessments. The tests flagged strata with apparent over-representation of 2cm and 2kg size classes, though examination of a subset of strata-level size frequencies did not provide clear evidence of data issues. This may reflect false-positives driven by strata where dominant length classes happened to be odd or even.

2.2 Investigation of differences in size compositions between size units and data sources

Comparisons of size compositions were undertaken per longline fleet and region to assess the consistency between size units, i.e., weight and lengths, as well as data sources, e.g., port-sampling vs. at-sea observers. These comparisons were also supplemented by examination of spatial and temporal coverage within region per data source, to inform potential drivers for any differences in size compositions between data sources.

In general, weight and length data appeared to be broadly consistent when size data were available for both size units, e.g., see Appendix C for comparisons for Taiwan's offshore fleet (Figure C.1), China (Figure C.2) and the Federated States of Micronesia (Figure C.3).

Comparisons of size compositions between data source were typically complicated by limited overlap between data sources, both temporally and spatially. The Hawai'i-based US fleet was an exception to this, with comprehensive size samples for both species available from commercial auction weight data and length samples from at-sea observers in the last two decades. The commercial auction weight data are collected for all bigeye and yellowfin sold in Hawai'i, whilst observers sample every third fish for lengths, with minimum at-sea observer coverage rates of 20% in the tuna-target fishery. The high sampling rates for both species, in combination with the representative coverage from both data sources, allowed for detailed comparisons of size compositions between the two data sources (Figure C.4). There was apparent under-representation of fish less than 75cm in length in the commercial auction weight data for yellowfin and, to a lesser extent, bigeye, suggesting that the smaller individuals were not sold at auction. For yellowfin, size compositions were prepared using length data from observers, with commercial auction weight data preferred for bigeye given the greater sampling rates combined with the weaker discrepancy between the two data sources.

Port-sampling data from Guam (origin ID GUWT) represents approximately 25% of available weight samples for both bigeye and yellowfin. The Guam port-sampling data primarily covers catches from Japan's fleet and Taiwan's offshore fleet, from regions 1-WEST, 2, and 3-WEST (bigeye) or 4-WEST (yellowfin). The size of fish from Guam's port-sampling data were consistently larger than those from other data sources in regions 1-WEST and 2 for Japan's fleet (e.g., Figure C.5), with no consistent differences against the other data sources either for Japan's fleet in other regions (e.g., Figure C.6), or the remaining longline fleets. Comparison of spatial coverage of sampling suggested that the difference in size compositions for Japan in regions 1-WEST and 2 was due to the limited spatial coverage of

the Guam weight data, with sampling focussed around the equatorial region north of Palau and the Federated States of Micronesia. This area has relatively large individuals in sampled catches, but contributes a relatively modest proportion of catch for the regions concerned.

2.3 Reweighting of purse seine extraction fishery compositions

Strata for the reweighting of purse seine extraction fishery compositions were defined on the basis of year-quarter, 5° cell, and fishery. The strata-level purse-seine length frequencies (Section 2.1.3) were raised to an MFCL fishery resolution, i.e. year-quarter and fishery, as follows:

1. The size samples were filtered for strata with a minimum of 100 samples, to attempt to reduce noise in size compositions due to low sample sizes. The total remaining samples per fishery and year-quarter are referred to as the ‘original sample size’ (OSS).
2. Strata-level numbers by size class were converted to catch weight proportions by size class, using the length-weight parameters in Table 3.
3. Strata-level catch weight proportions by size class were then converted to total species-specific catch weights by size class by multiplying by strata-level species-specific catch taken from S BEST data.
4. Strata-level catch weights by size class were then aggregated across strata to obtain MFCL fishery resolution catch weights by size class (i.e., year-quarter, fishery and length class).
5. Catch weights by size class were then converted to numbers caught by size class, by calculating the average weight of each size class using the length-weight relationships in Table 3.
6. Numbers caught by size class were then converted to proportions by size class, and then rescaled so that the total frequency in each year-quarter for a given fishery was equal to the ‘original sample size’ (from step 1) multiplied by the proportion of catch from strata with length sample (for the year-quarter and fishery combination).
7. The MFCL fishery resolution length compositions were then filtered for year-quarters where sampled strata accounted for a minimum of 30% of the species-specific total catch of the fishery, i.e., filtering for year-quarters where the sum of strata weights from sampled 5° cells exceeded 0.3. This limit is referred to as the ‘minimum sampled weighting’.
8. Finally, the MFCL fishery resolution length compositions were filtered for year-quarters with a minimum ‘original sample size’ of 250.

This approach scales the reweighted frequencies at a year-quarter and fishery resolution by the proportion of bigeye or yellowfin catch from 5° cells with size samples per fishery and year-quarter. For example, if sampled 5° cells accounted for 75% of the total bigeye catch for a specific extraction fishery and year-quarter, then the sum of the reweighted frequencies (i.e., the ‘input sample size’, see

Section 2.7) for that extraction fishery and year-quarter would be equal to 75% of the original sample size.

2.3.1 *Reweighting of compositions for the domestic Philippines and Indonesian purse seine fisheries in region 2*

The domestic Philippines extraction fishery in region 2 ('PS.PH.DOM.2') consists of two distinct fleets: the purse seine high-seas pocket fishery; and, domestic purse seine vessels operating in the Philippines EEZ. In earlier assessments, these fleets were grouped with the domestic Indonesian purse seine fishery operating in region 2, and size compositions were not reweighted due to the lack of information on the spatial distribution of catches for the domestic fleets. In this assessment, separate extraction fisheries were defined for the Philippines ('PS.PH.DOM.2') and Indonesia ('PS.ID.DOM.2'). Additionally, following the approach used for the 2025 skipjack assessment (Teears et al., 2025), extraction fishery compositions for the domestic Philippines fishery ('PS.PH.DOM.2') were reweighted using the procedure in Section 2.3, but with strata defined on the basis of year-quarter, fleet (defined above), and (MFCL) fishery.

Extraction fishery compositions for the domestic Indonesia fishery ('PS.ID.DOM.2') were not reweighted due to limited information on the spatial distribution of both catches and length samples. However, available length samples were parsed through the reweighting procedure with strata defined on the basis of fleet, but with a single fleet. This approach ensures that consistent filters are applied for both the 'PS.PH.DOM.2' and 'PS.ID.DOM.2' fisheries.

2.4 *Reweighting of longline extraction and index fishery compositions*

Strata for the reweighting of longline extraction fishery compositions were defined as the combination of year-quarter, 10 x 20° cell, fleet and fishery. The size compositions were reweighted separately for each size metric (i.e., length or weight) using the following approach:

1. For a given fishery, size samples and aggregate catches (numbers) were aggregated to a strata resolution.
2. The size samples were then filtered for strata with a minimum of 250 samples, to attempt to reduce noise in size compositions due to low sample sizes. The total remaining samples per fishery and year-quarter are referred to as the 'original sample size' (OSS).
3. 'Strata weights' for each extraction fishery were then calculated using the proportion of catch over a time-window of $2k + 1$ quarters accounted for by each 10 x 20° cell and fleet combination per year-quarter:

$$W_{lft} = \frac{\sum_{\tau=t-k}^{t+k} C_{lft\tau}}{\sum_{ij} \sum_{\tau=t-k}^{t+k} C_{ijf\tau}} \quad (4)$$

where W_{lft} and C_{lft} are the strata weight and catch (respectively) for fleet l in 10 x 20° cell

i and year-quarter t for assessment fishery f . Strata weights (W_{ift}) were calculated over a time-window of 11 quarters (i.e., $k = 5$) for extraction fisheries.

4. Strata-level numbers by size class were then converted to proportions by size class.
5. Strata-level proportions by size class were then weighted by multiplying by the appropriate strata weight W_{ift} .
6. The weighted proportions by size class were then summed across strata to obtain proportions by size class and year-quarter for the fishery.
7. The assessment model fishery-resolution proportions by size class were then raised to numbers by size class, by multiplying by the original sample size (OSS) for the fishery and year-quarter .
8. The assessment model fishery-resolution length compositions were then filtered for year-quarters where sampled strata accounted for a minimum of 30% of the species-specific total catch (extraction fisheries), i.e., filtering for year-quarters where the sum of strata weights from sampled 10 x 20° cell and fleet combinations exceeded a specified threshold. This limit is referred to as the ‘minimum sampled weighting’.
9. Finally, the assessment model fishery-resolution length compositions can be filtered for year-quarters with a minimum original sample size, though this was not utilised here given the stronger filtering applied at a strata resolution.

For index fisheries, strata were defined as the combination of year-quarter, 10 x 20° cell, and fishery. The size compositions were then reweighted using the same approach as that outlined for extraction fisheries, but with strata weights calculated on the basis of estimated relative abundance from the CPUE standardisation models per 10 x 20° cell and year-quarter (nu_{ift}) instead of catch:

$$W_{ift} = \frac{\sum_{\tau=t-k}^{t+k} \nu_{if\tau}}{\sum_i \sum_{\tau=t-k}^{t+k} \nu_{if\tau}}$$

For index fisheries, strata weights were calculated using a time-window of 1 quarter ($k = 0$). The strength of filters applied in the reweighting procedure are provided in Section 2.6.

This approach implicitly scales the reweighted frequencies at a year-quarter and fishery resolution by the proportion of catch from 10 x 20° cell and fleet combinations with available size samples in the case of extraction fisheries, and the proportion of estimated relative abundance from 10 x 20° cells with available size samples in the case of index fisheries. For example, if sampled 10 x 20° cell and fleet combinations accounted for 75% of the total catch for an extraction fishery and year-quarter, then the sum of the reweighted frequencies (i.e., the ‘input sample size’, see Section 2.7) for that fishery and year-quarter combination would be equal to 75% of the original sample size (OSS).

2.5 Size composition options

Three sets of reweighted size compositions were prepared for longline extraction fisheries:

- (A) Weight compositions only, as used in the 2023 assessments.
- (B) Weights converted to lengths, to allow assessing the impacts of this change in isolation in the step-wise procedure for model development.
- (C) Weights converted to lengths, supplemented by length compositions in cases where length data has superior coverage relative to weight data.

For the latter option, either weight data (converted to lengths) or length data were used in each time-step for a given fishery, but never both weight data and length data. As noted in Section 1, this approach avoids inadvertently introducing conflict into the assessment caused by discrepancies between the two datasets, and also avoids double-counting of individuals that were sampled for both length and weight data, e.g., for fish sampled in ports.

For the (longline) index fishery compositions, reweighted size compositions were prepared using weight data only, both as weight compositions, and weight-as-length compositions. This approach avoids introducing apparent temporal variation in compositions reflecting sampling effects with the switch from weight data to length data, rather than changes in the size of the underlying population.

For purse seine extraction fishery compositions, reweighted size compositions were prepared using length data only, which represent the vast majority of available size data for purse seine fisheries in the Western and Central Pacific Ocean.

2.6 Data filtering strengths

The strength of data filtering rules represents a compromise between attempting to remove artefacts of sampling in compositional inputs to the assessment model, due to limited or unrepresentative sampling, whilst also ensuring that there are sufficient compositional inputs to obtain robust estimates of selectivities. Filtering strengths were selected separately for each species and fishery type (i.e., purse seine extraction fisheries, longline extraction fisheries, and the different index fisheries), to attempt to get the most robust estimates of compositions across all assessment model fisheries within that fishery type. The data filtering rules that were applied are described separately below, which were applied in addition to the data filters implemented in the data preparation step (Section 2.1.2).

Weight and weight-as-length compositional inputs for longline extraction fisheries were generated with the following filters:

1. A minimum of 250 samples per strata (i.e., combination of year-quarter, 10 x 20° cell, fleet and fishery).

2. A minimum sampled weighting of 0.3, i.e., sampled strata must account for a minimum of 30% of the catch for a fishery and year-quarter.

For yellowfin, length compositions for the 'LL.US.1' fishery were used instead of weight compositions for all compositional inputs, due to apparent sampling bias in available weight data for small fish (see Section 2.2).

Length compositional inputs for longline extraction fisheries were generated with the same filtering strengths as used for the weight compositions. Combined weights-as-lengths plus length compositions were then created by identifying the point in time when length samples had superior sampling coverage per fishery (see Figures 4 & 5), along with consideration of the evolution of fleet-specific contributions to catches through time.

For bigeye, the following approach was used to generate weight-as-length plus length compositions:

1. Only weight-as-lengths compositions were used for the LL.US.1, LL.WEST.1, LL.ALL.2, LL.OS.2 and LL.AU.5 fisheries, as weight data had superior coverage of catches. However, we note that coverage of both weight and length samples was relatively low for the LL.OS.2 fishery.
2. For LL.EAST.1, weight-as-lengths compositions were used for the period until 2007, when Japan's fleet accounted for the majority of the catch and coverage rates of weight samples were relatively high. Neither weight or length data were used for the period 2008 to 2014 given the limited coverage of sampling for both size units for the key fleets in the fishery. Length compositions were then used for the period 2015 onwards.
3. For LL.ARCH.3, weight-as-lengths compositions were used for the period through to 1994, when Japan's fleet accounted for the majority of the catch. Coverage of weight samples was reasonably representative when available in this period, but sampling was temporally sparse. Length compositions were then used from 1995 onwards.
4. For LL.WEST.3, weight-as-lengths compositions were used for the period through to 2004, when Japan's fleet accounted for the majority of the catch and coverage rates of weight samples were relatively high. Neither weight or length data were used for the period 2005 to 2009 given the limited coverage of sampling for both size units for the key fleets in the fishery during these years. Length compositions were then used for the period 2010 onwards.
5. For LL.ALL.4, weight-as-lengths compositions were used for the period through to 1974, when Japan's fleet accounted for the majority of the catch and coverage rates of weight samples were relatively high. Neither weight or length data were used for the period 1975 to 2009 given the limited coverage of sampling for both size units for the key fleets in the fishery. Length compositions were then used for the period 2010 onwards.

6. For LL.ALL.5, weight-as-lengths compositions were used for the period through to 1994, when Japan's fleet accounted for the majority of the catch and coverage rates of weight samples were relatively high. Neither weight or length data were used for the period 1975 to 2002 given the limited coverage of sampling for both size units for the key fleets in the fishery. Length compositions were then used for the period 2003 onwards.
7. For LL.OS.3, weight-as-lengths compositions were used for the period through to 2014, where weight samples had broadly good coverage of catches for the main fleets. Length compositions were then used for the period 2015 onwards.

For yellowfin, the following approach was used to generate weight-as-length plus length compositions:

1. Only weight-as-lengths compositions were used for the LL.WEST.1, LL.ALL.2, LL.OS.2 and LL.AU.5 fisheries, as weight data had superior coverage of catches. However, for the LL.WEST.1 fishery, coverage of the Taiwanese offshore fishery was limited, despite the fleet accounting for a substantial proportion of annual catches from 2004 onwards. Furthermore, we note that coverage of both weight and length samples was relatively low for the LL.OS.2 fishery.
2. For LL.EAST.1, weight-as-lengths compositions were used for the period until 2002 when Japan's fleet accounted for the majority of the catch and coverage rates of weight samples were relatively high. Neither weight or length data were used for the period 2003 to 2014 given the limited coverage of sampling for both size units for the key fleets in the fishery. Length compositions were then used for the period 2015 onwards.
3. For LL.ALL.3, weight-as-lengths compositions were used for the period through to 1994, when Japan's fleet accounted for the majority of the catch. Coverage of weight samples was reasonably representative when available in this period, but sampling was temporally sparse. Length compositions were then used from 2000 onwards.
4. For LL.WEST.4, weight-as-lengths compositions were used for the period through to 2004, when Japan's fleet accounted for the majority of the catch and coverage rates of weight samples were relatively high. Neither weight or length data were used for the period 2005 to 2009 given the limited coverage of sampling for both size units for the key fleets in the fishery. Length compositions were then used for the period 2010 onwards.
5. For LL.EAST.4, weight-as-lengths compositions were used for the period through to 1984, when Japan's fleet accounted for the majority of the catch and coverage rates of weight samples were relatively high. Neither weight or length data were used for the period 1985 to 2009 given the limited coverage of sampling for both size units for the key fleets in the fishery during these years. Length compositions were then used for the period 2010 onwards.
6. For LL.ALL.5, weight-as-lengths compositions were used for the period through to 1994, when

Japan's fleet accounted for the majority of the catch and coverage rates of weight samples were relatively high, with the exception of the 1970s when the contribution of Japan's fleet to annual catches was lower. Neither weight or length data were used for the period 1995 to 2002 given the limited coverage of sampling for both size units for the key fleets in the fishery. Length compositions were then used for the period 2003 onwards.

7. For LL.OS.4, weight-as-lengths compositions were used for the period through to 2009, where weight samples had broadly good coverage of catches for the main fleets. Length compositions were then used for the period 2010 onwards.

Length compositional inputs for large-scale equatorial purse seine fisheries were generated with the following filters:

1. A minimum of 100 samples per strata (i.e., combination of year-quarter, 5° cell, and fishery). This threshold was set lower than the equivalent used for longline extraction fisheries given the finer spatial resolution of strata, coupled with the sampling protocol used for purse seine fisheries which ensures a broadly consistent sampling rate per unit catch.
2. A minimum sampled weighting of 0.3, i.e., sampled strata must account for a minimum of 30% of the catch for a fishery and year-quarter.
3. A minimum original sample size of 250 samples per fishery and year-quarter.

Additionally, purse seine length samples from port-sampling data were excluded, leaving only length samples from at-sea observers. Port-sampling data were excluded as the dataset only provides coverage for vessels flagged to the US and Japan, and so raises the potential for introduction of temporal changes in size compositions that reflect sampling effects rather than shifts in size compositions of catches. Additionally, observer length samples prior to 2010 were excluded, again given the potential to introduce sampling effects given the varying rates of observer coverage per-flag pre-2010 before the requirement for 100% observer coverage in the equatorial purse seine fishery. Finally, we excluded data from year-quarters where observer coverage was impacted by the COVID-19 pandemic, i.e., the 3rd quarter of 2020 through to the 3rd quarter of 2022 inclusive. This COVID filter was applied to all bigeye purse-seine fisheries and yellowfin purse-seine fisheries in region 4, but not yellowfin purse seine fisheries in region 3 as observer coverage remained relatively high despite the impacts of the pandemic (Peatman et al., 2022).

Length compositional inputs for the domestic Philippines and Indonesia purse seine fisheries were generated with the following filters:

1. A minimum of 100 samples per strata (i.e., combination of year-quarter, fleet and fishery).
2. A minimum sampled weighting of 0.95, i.e., sampled strata must account for a minimum of 95% of the catch for a fishery and year-quarter.

3. A minimum original sample size of 250 samples per fishery and year-quarter.

Length compositions for the domestic Philippines purse seine fishery were also filtered to include only year-quarters where samples were available from both the high-seas pocket fleet, as well as the fleet operating inside the Philippines EEZ. Finally, compositions for the domestic Philippines purse seine fishery from the third quarter of each year were excluded, to remove seasonal variability driven by the reduction in catches of the high-seas pocket fleet driven by the FAD-closure.

Weight and weight-as-length compositional inputs for longline index fisheries were generated with the following filters:

1. A minimum of 250 samples per strata (i.e., combination of year-quarter, 10 x 20° cell and fishery).
2. A minimum sampled weighting of 0.15, i.e., sampled strata must account for a minimum of 15% of the total relative abundance for a fishery and year-quarter.

Additionally, weight samples were filtered to only include those collected from Japanese longliners. In practise, this filter is only influential post-2000, as before this there are limited weight samples available for other longline fleets operating in the western and central Pacific Ocean.

Index fishery compositions were also prepared for a single-region assessment using a fleets-as-areas approach (Hampton et al., 2026). Weight and weight-as-length compositional inputs were prepared using the same filters as used for region-specific index fishery, i.e., a minimum of 250 samples per strata, a minimum sampled weighting of 0.15 (across the western and central Pacific Ocean), and the use of samples from Japanese vessels only. Additionally, the compositions were filtered for year-quarters with a minimum sampled weighting of 0.15 in each of region 1, 2, 3 and 4 (individually), to mitigate against bias resulting from the spatial contraction of the Japanese fleet. This filter was not applied to region 5, due to the limited coverage of available samples across the majority of the timeseries.

2.7 Input sample sizes (ISS) for the assessment models

As described above, the number of samples per fishery and year-quarter after the initial filtering steps (e.g., step 4 in Section 2.4) is referred to as the ‘original sample size’ (OSS). We refer to the sum of the frequencies of the reweighted size compositions as the ‘input sample size’ (ISS). The input sample sizes are equal to the original sample size multiplied by the proportion of the total catch (extraction fisheries) or abundance (index fisheries) from strata with size samples (for each fishery and year-quarter combination). Input sample sizes were also further reduced by 50% for longline fisheries where samples were used for both extraction and index fisheries size compositions. We note that the input sample sizes may be further adjusted as part of the model fitting procedure.

3 Results & Discussion

Time-series of annual longline catches, weight samples and length samples across all model regions are provided in Figures 2 & 3 respectively. The numbers of weight samples and length samples are after implementing the various data filters (see Sections 2.1.2 & 2.6). For both species, there is typically a lag between a longline fleet entering the fishery, and the availability of size samples. There are also key longline fleets in the region which account for a substantial proportion of total catch across the full timeseries, but have limited availability of either weight or length samples.

Rewighted size compositions and their associated input sample sizes are provided in Appendices specific to each species, fishery type and unit of size:

- Length compositions for large-scale equatorial purse seine extraction fisheries for bigeye: Appendix E, Figures E.1 to E.4.
- Length compositions for domestic purse seine extraction fisheries for bigeye: Appendix E, Figures E.5 to E.7.
- Length compositions for large-scale equatorial purse seine extraction fisheries for yellowfin: Appendix F, Figures F.1 to F.9.
- Length compositions for domestic purse seine extraction fisheries for yellowfin: Appendix F, Figures F.10 to F.12.
- Size compositions for longline extraction fisheries for bigeye: Appendix G, with weight and weight-as-length compositions (Figures G.1 to G.12) and weight-as-length plus length compositions (Figures G.13 to G.24).
- Size compositions for longline extraction fisheries for yellowfin: Appendix H, with weight and weight-as-length compositions (Figures H.1 to H.12) and weight-as-length plus length compositions (Figures H.13 to H.24).
- Weight and weight-as-length compositions for region-specific longline index fisheries for bigeye: Appendix I, Figures I.1 to I.6).
- Weight and weight-as-length compositions for the WCPO-wide longline index fishery for bigeye: Appendix I, Figures I.7 to I.8).
- Weight and weight-as-length compositions for region-specific longline index fisheries for yellowfin: Appendix J, Figures J.1 to J.6).
- Weight and weight-as-length compositions for the WCPO-wide longline index fishery for yellowfin: Appendix J, Figures J.7 to J.8).

There was evidence of apparent cohort progression in reweighted size compositions of purse seine extraction fisheries for both species (e.g., see Figure F.7). Reweighted size compositions of yellowfin in

unassociated purse seine fisheries demonstrated the characteristic multi-modal distribution, particularly for the PS.UNA.4.EAST fishery in the central Pacific (Figure F.9). There were relatively limited samples available for large-scale purse seine fisheries in region 2, resulting in sparse composition estimates, with no compositions post-filtering for bigeye.

Reweighted size compositions for longline extraction fisheries in higher latitude regions typically demonstrated a pattern of relatively few dominant size classes within a year- quarter, with increases in size that may reflect cohort progression along with seasonal variation in availability of larger fish (e.g., Figures G.10 & H.11). Longline fisheries in the equatorial regions generally demonstrated less temporal and seasonal variability in compositions compared with fisheries in the temperate / subtropical regions, though this may also partially reflect the fact that the higher-latitude fisheries are either single-fleet (i.e., the AU and US fisheries) or have fewer key fleets (e.g., fisheries in 1-WEST and 1-EAST). There are a number of longline extraction fisheries with a limited number of weight (and weight-as-length) compositions towards the end of the time-series, which can have a different size distribution compared to the rest of the time-series (e.g., Figure G.7). These terminal data points are potentially informative as they include information on the recent weight compositions of catches from a more representative subset of fleets, whereas the rest of the timeseries is primarily informed by weight samples from Japan.

Length data provide superior representation of catches towards the end of the time series for most longline fisheries, relative to weight data. As such, we recommend that the ‘weight-as-lengths plus lengths’ compositions be used for longline extraction fisheries in the assessments, with a switch from weight-based to length-based compositions when length data provide superior coverage of catches. We recommend time-block selectivities for fisheries using both weight and length-based compositions in the first instance, based on the timing of the switch from weights to lengths, to account for any potential conflict between the two size units. Time-blocks could also be trialled to reflect known changes in gear configuration where there is clear evidence for accompanying shifts in size compositions, e.g. the switch from kuralon to monofilament mainlines in the mid-1990s (Miyabe et al., 1995).

Index fishery compositions demonstrated a general declining temporal trend in region 1 for both species (Figures I.2 & J.2). Index fishery compositions for region 2 exhibited a weaker decline in sizes through time, though with substantial variability (Figures I.3 & J.3). The bigeye index fishery in region 4 demonstrated a declining temporal trend through to 1980, followed by an increasing trend through the 1990s (Figure I.5). There was limited evidence of persistent temporal trends in sizes for index fisheries in regions 3 for bigeye, and 3 and 4 for yellowfin (Figures I.4, J.4 & J.5), with relatively sparse estimated compositions of both species in region 5 (Figures I.6 & J.6).

The existing procedures used to reweight size compositions provide a means of accounting for imbalanced sampling across fleets and regions. However, the reweighting procedure can not infer size compositions for strata with no available samples. There are numerous cases where there is no coverage of key fleets with available size samples for some years along with differing temporal trends

in sampling rates across fleets, particularly for longline fisheries. This can result in temporal variation in both index and extraction fishery compositions which likely reflects changes in sampling availability and intensity between fleets, rather than changes in the composition of catches or the underlying population. Spatial-temporal modelling approaches provide a means of inferring size compositions for strata missing samples (Maunder et al., 2020). The approach implemented here for index fisheries was to only use weight size samples from Japanese longliners. Critically, this mitigates against the introduction of bias resulting from temporal shifts in sampling rates between fleets. However, it also introduces an inconsistency between the fleets used to inform the standardised CPUE timeseries for the index, and the fleets used to inform the reweighted size compositions. Additionally, there is also the potential for bias resulting from the spatial contraction of the Japanese longline fleet through time (Castillo-Jordán et al., 2026). Regardless, the use of only Japanese weight samples for index fishery compositions was considered to be the most pragmatic way forward for this assessment cycle, with spatio-temporal standardisation of compositions the preferred option in the future.

Weight-length relationships were estimated using a filtered paired weight-length dataset prepared through WCPFC Project 90 (Macdonald et al., 2023). This dataset includes data from a variety of datasets, and includes estimates of whole-weight for individuals that had already been processed at the time of sampling (e.g., gilled and gutted). The weight-length models were relatively simplistic, aiming to be broadly consistent to the length-weight relationships used in the assessments. In the future, analysts could consider further developing the models to account for the effects of weight-weight conversions, spatial/temporal variation (e.g., see Appendix 1 in Macdonald et al., 2023).

It is difficult to objectively assess the quality of size composition inputs, e.g., when comparing different filtering strengths or approaches, as there is limited a priori information on what constitutes plausible levels of variability, e.g. temporal variation. The approach implemented here is to attempt to remove apparent noise in size compositions through the application of consistent data filtering rules. If apparent noise at a fishery level can be removed by excluding size compositions from fleets or strata with limited sampling, then it suggests that the observed patterns in compositions were an artefact of sampling. Additionally, if temporal variation is removed when increasing the ‘minimum sampled weighting’, it suggests that the apparent variation reflected unrepresentative sampling. However, it is relatively time-consuming to construct various options for size composition inputs and then assess the sensitivity of the assessment models to the different approaches, and the comparisons are necessarily subjective. The ongoing review of size data holdings of the Pacific Community has identified data sources that should be excluded from compositional inputs, e.g., based on concerns around sampling approaches, and has already proven to be a valuable objective complement to the more subjective filtering approaches that are typically implemented in assessments of tuna and billfish species in the western and central Pacific Ocean. (Hamer et al., 2025).

In this assessment, we have applied stronger filters to attempt to mitigate against the propagation of sampling effects and statistical noise in size samples through to compositional inputs to the assessment.

This is motivated by a focus on attempting to remove compositional data that are unreliable or unrepresentative, at the potential cost of also excluding size data that may be reliable. The thresholds for minimum number of samples per strata are an order of magnitude higher than those used in the previous assessments, and more consistent with suggested rules of thumb in the literature (e.g., [Gerritsen and McGrath, 2007](#)). Despite this, there are still examples of reweighted compositions with strong unexplained temporal trends, e.g., Figure G.2, and apparent statistical noise, e.g., Figure G.8.

The reweighting of size compositions has historically been complicated by unrepresentative coverage of size samples, temporal changes in the coverage of size samples between fleets within assessment model fisheries, as well as temporal changes in their contributions to catches. This is problematic in the sense that temporal changes in sampling coverage can result in apparent shifts in size compositions within an assessment fishery that are driven by sampling, rather than changes in the size composition of catches and the underlying population. More fundamentally, it also creates difficulties in determining the most appropriate structuring of fisheries in the assessment model, e.g., separating spatial variation from variability between fleets, identifying fleets with similar size compositions, etc.

In this assessment we have moved to defining strata using both spatial cell and fleet for longline extraction fisheries, rather than simply based on spatial cell. This approach has a number of advantages. First, the reweighting process now explicitly accounts for both between-fleet variation in size compositions within an assessment fishery, as well as spatial variation. In the previous assessments, the reweighting procedure only accounted for spatial variation. However, more importantly, the more detailed stratification results in a more direct measure of the coverage of available samples for mixed-fleet fisheries, which is used as the basis of the ‘minimum sampled weight’ filters in the reweighting procedure, as well as to downweight input sample sizes based on sampling coverage and compare sampling coverage between weight and length data. The more detailed stratification simplifies the identification of time-steps where available samples are unlikely to be representative of catches of the assessment model fishery. Additionally, the more detailed stratification also increases the power of the filter for a minimum number of samples per strata, as sufficient samples are required per spatial cell and fleet combination. This can remove poorly estimated compositions for a given spatial cell resulting from the pooling of limited numbers of samples across a range of fleets, which may otherwise be retained if stratifying spatially.

The Guam port-sampling dataset accounts for a substantial proportion of total weight samples of both bigeye and yellowfin. Exploratory data analysis detected differences in size compositions of Japan’s longline fleet in region 1-WEST and 2 from the Guam port-sampling dataset, relative to other data sources. This appears to be a spatial effect driven by the relatively constrained spatial coverage of the Guam port-sampling dataset, in an area with relatively large fish in catches. Compositional inputs were generated with and without Guam port-sampling data, confirming that the reweighted compositions were reasonably insensitive to the inclusion of the Guam port-sampling data, which may be due to the downweighting applied to the Guam port-sampling data due to corresponding low catches. Regardless,

future assessments should consider shifting the south latitudinal limit of 1-WEST from 10N to 15N, to reduce spatial heterogeneity of size compositions in longline catches within the region.

Input sample sizes are downweighted to account for the coverage of the catch (extraction fisheries) or relative abundance (index fisheries) from strata with available size data after filtering. The downweighting of index fishery input sample sizes is typically stronger than for extraction fisheries, due spatial cells with estimated relative abundance but no catch and/or size samples. However, the relatively large original and input sample sizes are likely illusionary, in the sense that they over-estimate the precision of the estimated size compositions. It would be better to estimate the input sample sizes in a way that better reflects the precision of the compositional data (e.g., [Stewart and Hamel, 2014](#)). However, this requires samples to be available at a trip, and ideally an event, resolution. This information is not comprehensively available for all of the Pacific Communities size data holdings, particularly historic aggregated size data submissions. More appropriate measures of sample size would also increase the utility of statistical tests to compare size compositions, e.g. Kolmogorov-Smirnov tests, as the tests appear to be prone to type-I errors when using sampled individuals as the sample size.

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Declaration of generative AI and AI-assisted technologies in the SC paper preparation process

No AI technologies were used in the preparation of this paper.

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Tables

Table 1: Extraction and index fisheries in the 2026 bigeye assessment model (Kim et al., 2026), and whether their size compositions are reweighted. Region refers to region and subarea where relevant. Nationality: ALL = all flag-states; US = United States of America; OS = Offshore fleets; AU = Australia; JP = Japan; ID = Indonesia; PH = Philippines; VN = Vietnam. Gear: LL = longline, PS = purse seine (ASS = associated sets, UNA = unassociated sets), PL = Pole and line, HL = handline, MISC = miscellaneous, I = index.

Fishery ID	Nationality	Gear	Region	Rewighted compositions
LL.WEST.1	ALL	LL	1-WEST	TRUE
LL.EAST.1	ALL	LL	1-EAST	TRUE
LL.US.1	US	LL	1	TRUE
LL.ALL.2	ALL	LL	2	TRUE
LL.OS.2	OS	LL	2	TRUE
LL.ARCH.3	ALL	LL	3-ARCH	TRUE
LL.WEST.3	ALL	LL	3-WEST	TRUE
LL.ALL.4	ALL	LL	4	TRUE
LL.OS.3	OS	LL	3-WEST	TRUE
LL.ALL.5	ALL	LL	5	TRUE
LL.AU.5	AU	LL	5	TRUE
PS.JP.1	JP	PS	1	TRUE
PL.JP.1	JP	PL	1	FALSE
HL.ID.2	ID	HL	2	FALSE
HL.PH.2	PH	HL	2	FALSE
PL.ALL.2	ALL	PL	2	FALSE
PS.ASS.2	ALL	PS-ASS	2	TRUE
PS.UNA.2	ALL	PS-UNA	2	TRUE
PS.ID.DOM.2	ID	PS	2	TRUE
PS.PH.DOM.2	PH	PS	2	TRUE
MISC.ID.2	ID	MISC	2	FALSE
MISC.PH.2	PH	MISC	2	FALSE
MISC.VN.2	VN	MISC	2	FALSE
PL.ALL.3	ALL	PL	3	FALSE
PS.ASS.3	ALL	PS-ASS	3	TRUE
PS.UNA.3	ALL	PS-UNA	3	TRUE
PS.ASS.4	ALL	PS-ASS	4	TRUE
PS.UNA.4	ALL	PS-UNA	4	TRUE
LL.Index.1	ALL	I	1	TRUE
LL.Index.2	ALL	I	2	TRUE
LL.Index.3	ALL	I	3	TRUE
LL.Index.4	ALL	I	4	TRUE
LL.Index.5	ALL	I	5	TRUE

Table 2: Extraction and index fisheries in the 2026 yellowfin assessment model (Magnusson et al., 2026), and whether their size compositions are reweighted. Region refers to region and subarea where relevant. Nationality: ALL = all flag-states; US = United States of America; OS = Offshore fleets; AU = Australia; JP = Japan; ID = Indonesia; PH = Philippines; VN = Vietnam. Gear: LL = longline, PS = purse seine (ASS = associated sets, UNA = unassociated sets), PL = Pole and line, HL = handline, MISC = miscellaneous, I = index.

Fishery ID	Nationality	Gear	Region	Rewighted compositions
LL.WEST.1	ALL	LL	1-WEST	TRUE
LL.EAST.1	ALL	LL	1-EAST	TRUE
LL.US.1	US	LL	1	TRUE
LL.ALL.2	ALL	LL	2	TRUE
LL.OS.2	OS	LL	2	TRUE
LL.ALL.3	ALL	LL	3	TRUE
LL.WEST.4	ALL	LL	4-WEST	TRUE
LL.EAST.4	ALL	LL	4-EAST	TRUE
LL.OS.4	OS	LL	4-WEST	TRUE
LL.AU.5	AU	LL	5	TRUE
LL.ALL.5	ALL	LL	5	TRUE
PS.JP.1	JP	PS	1	TRUE
PL.JP.1	JP	PL	1	FALSE
HL.ID.2	ID	HL	2	FALSE
HL.PH.2	PH	HL	2	FALSE
PL.ALL.2	ALL	PL	2	FALSE
PS.ASS.2	ALL	PS-ASS	2	TRUE
PS.UNA.2	ALL	PS-UNA	2	TRUE
PS.ID.DOM.2	ID	PS	2	TRUE
PS.PH.DOM.2	PH	PS	2	TRUE
MISC.ID.2	ID	MISC	2	FALSE
MISC.PH.2	PH	MISC	2	FALSE
MISC.VN.2	VN	MISC	2	FALSE
PL.ALL.3	ALL	PL	3	FALSE
PS.ASS.3	ALL	PS-ASS	3	TRUE
PS.UNA.3	ALL	PS-UNA	3	TRUE
PL.ALL.4	ALL	PL	4	FALSE
PS.ASS.4.WEST	ALL	PS-ASS	4-WEST	TRUE
PS.UNA.4.WEST	ALL	PS-UNA	4-WEST	TRUE
PS.ASS.4.EAST	ALL	PS-ASS	4-EAST	TRUE
PS.UNA.4.EAST	ALL	PS-UNA	4-EAST	TRUE
LL.Index.1	ALL	I	1	TRUE
LL.Index.2	ALL	I	2	TRUE
LL.Index.3	ALL	I	3	TRUE
LL.Index.4	ALL	I	4	TRUE
LL.Index.5	ALL	I	5	TRUE

Table 3: Length-weight parameters used to reweight purse seine fishery compositions. Parameters for skipjack were taken from Teears et al. (2022). Parameters for bigeye and yellowfin were generated through WCPFC Project 90 (Macdonald et al., 2023).

Species code	a	b
SKJ	1.144e-05	3.148
YFT	1.987e-05	2.991
BET	3.063e-05	2.932

Figures

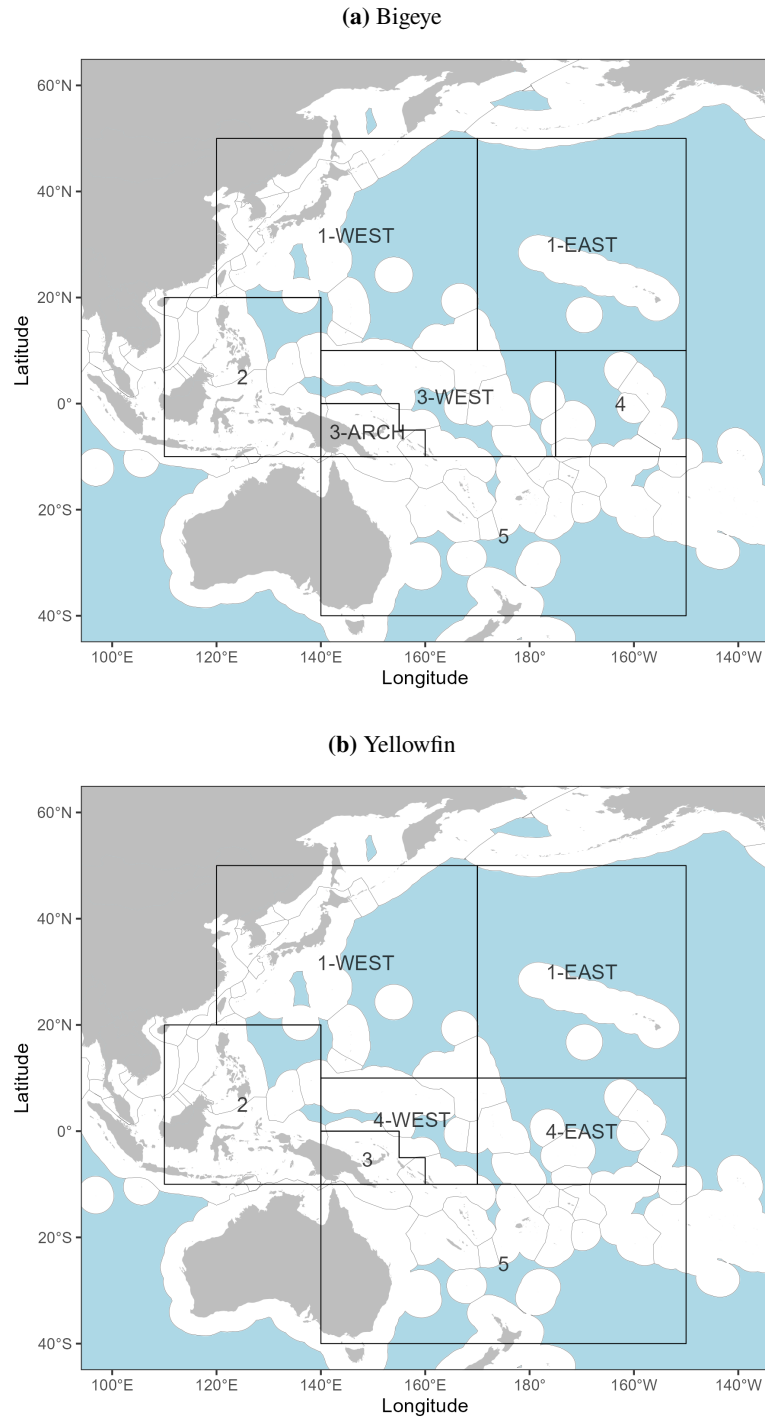


Figure 1: The region structures used to define fisheries for (a) bigeye and (b) yellowfin. For bigeye, purse-seine extraction fisheries in region 3 were not specific to subareas (3-WEST and 3-ARCH). All other extraction fisheries for both species were specific to subarea, i.e., a fleets-as-areas approach.

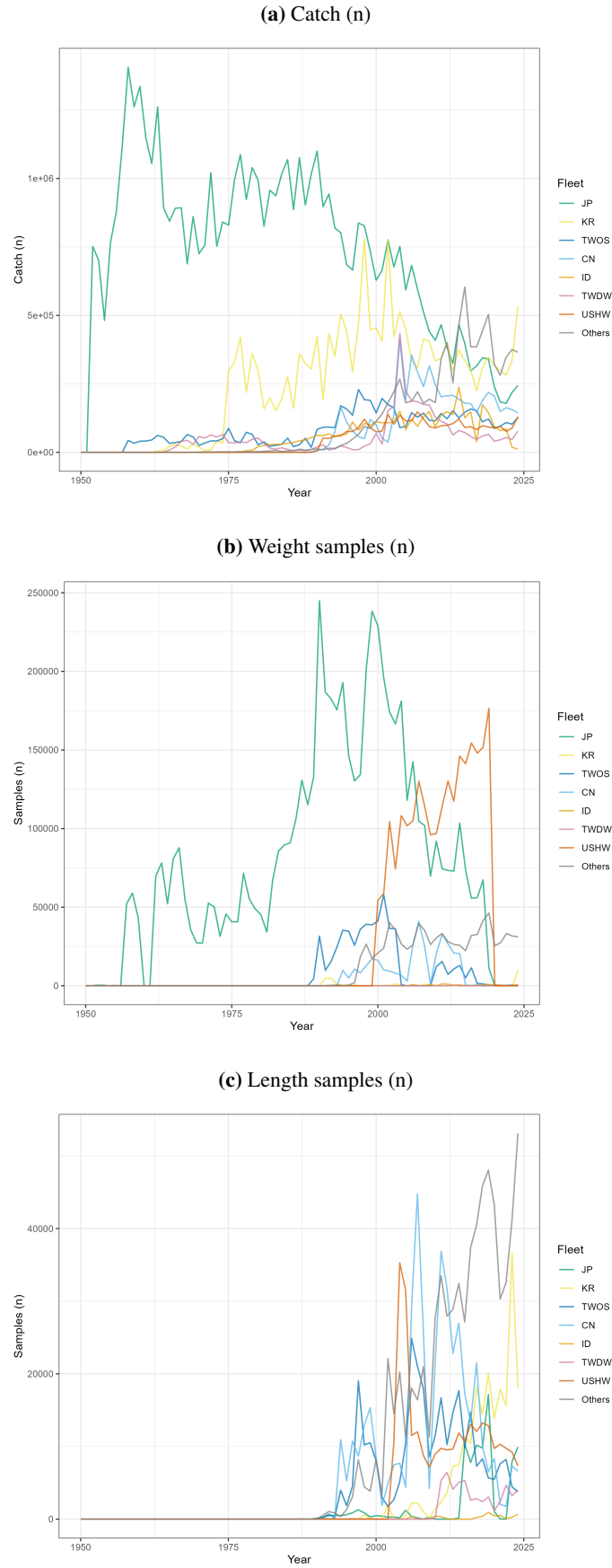


Figure 2: Time series of annual bigeye a) catch (n), b) weight samples, and c) length samples per fleet across all assessment model regions, post-filtering of size samples. ‘Others’ includes all fleets not in the top 7 in terms of total catch over the time series.

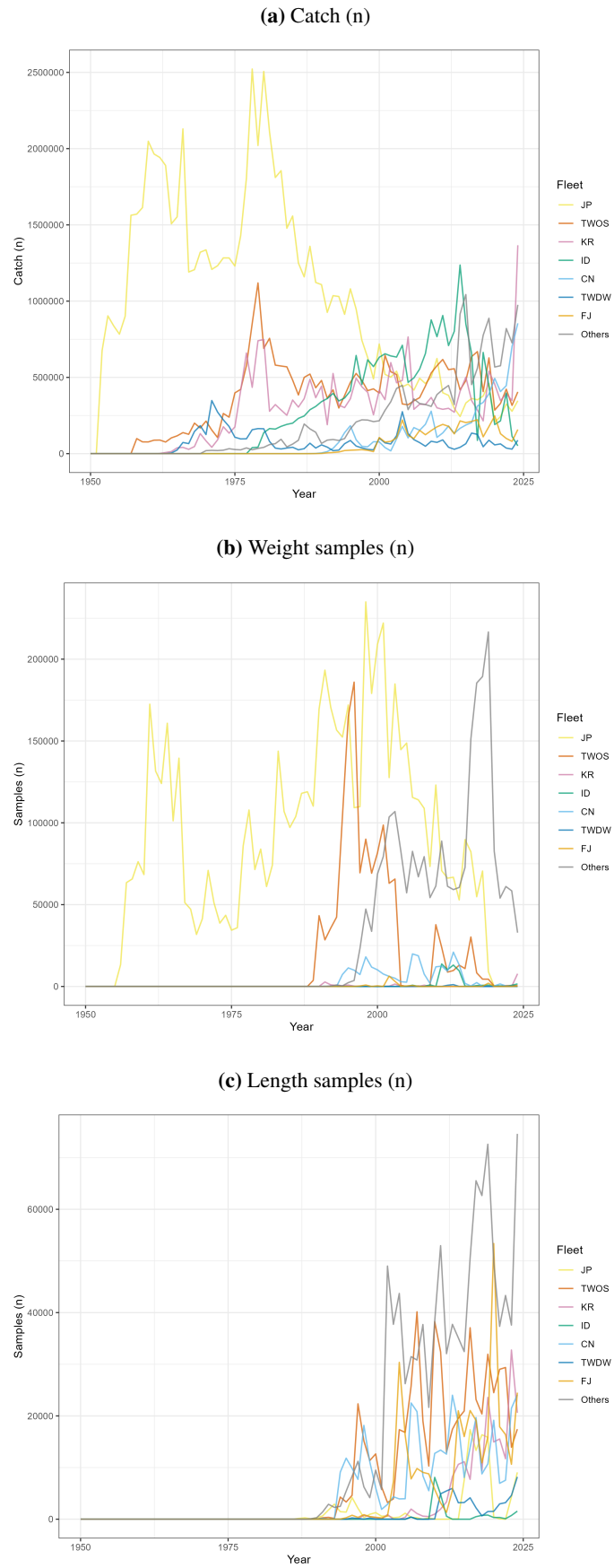


Figure 3: Time series of annual yellowfin a) catch (n), b) weight samples, and c) length samples per fleet across all assessment model regions, post-filtering of size samples. . ‘Others’ includes all fleets not in the top 7 in terms of total catch over the time series.

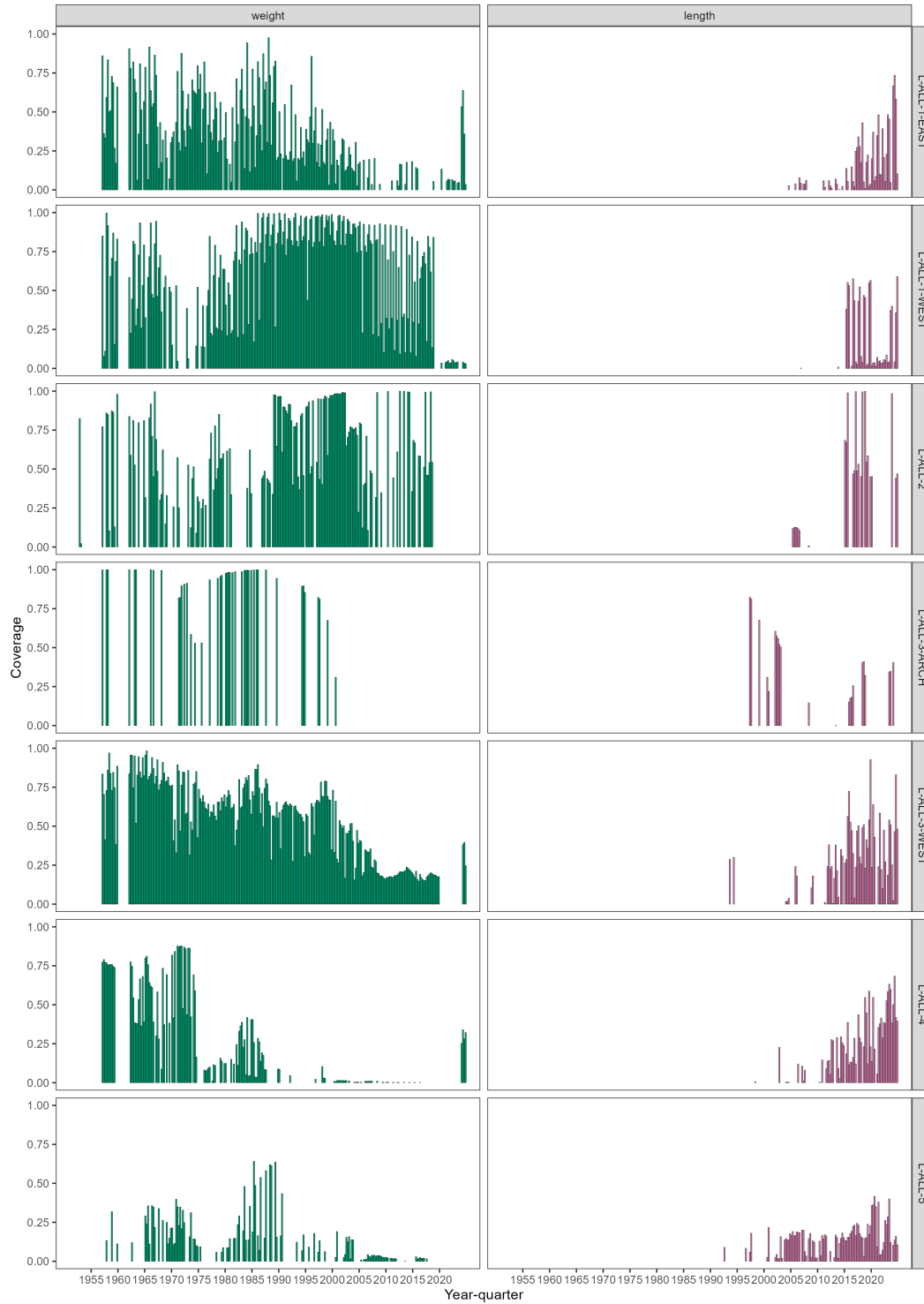


Figure 4: Comparisons of the coverage of weight (green) and length (purple) samples per longline extraction fishery for bigeye. ‘Coverage’ refers to the proportion of catch from $10 \times 20^\circ$ cell and fleet combinations, after applying filtering rules outlined in Section 2.6. Continues on following page.

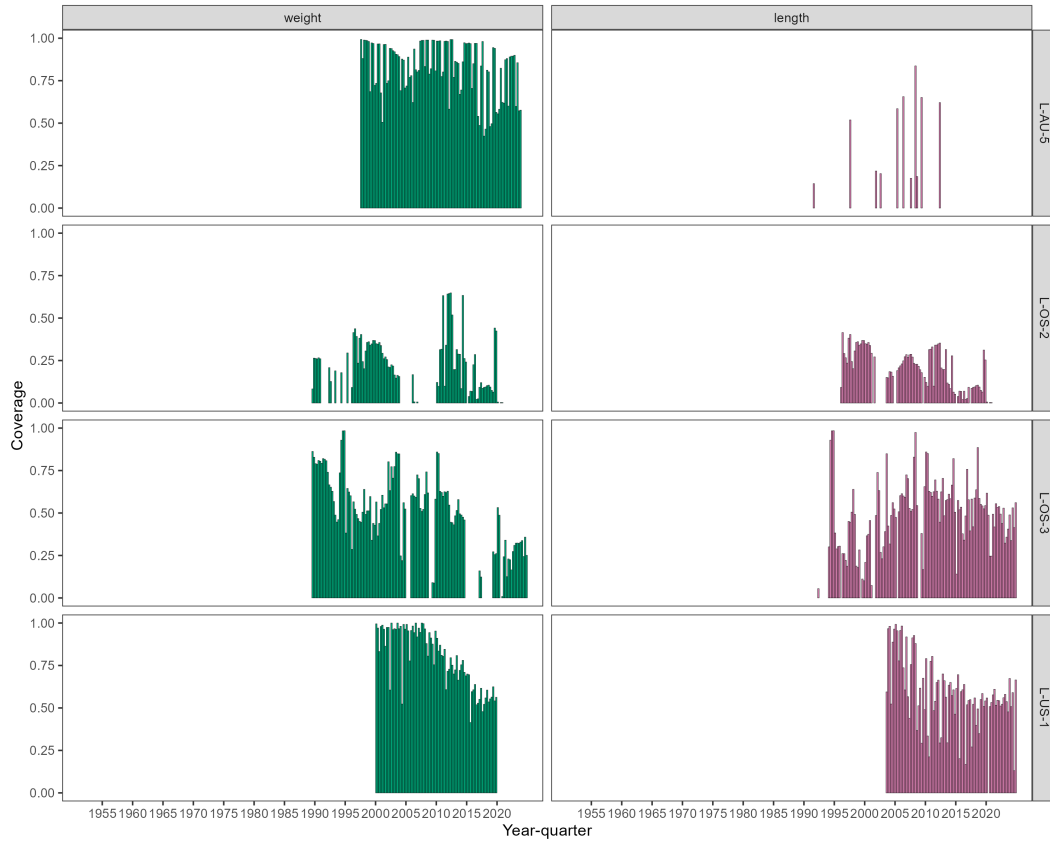


Figure 4: Comparisons of the coverage of weight (green) and length (purple) samples per longline extraction fishery for bigeye (contd.). ‘Coverage’ refers to the proportion of catch from 10 x 20° cell and fleet combinations, after applying filtering rules outlined in Section 2.6.

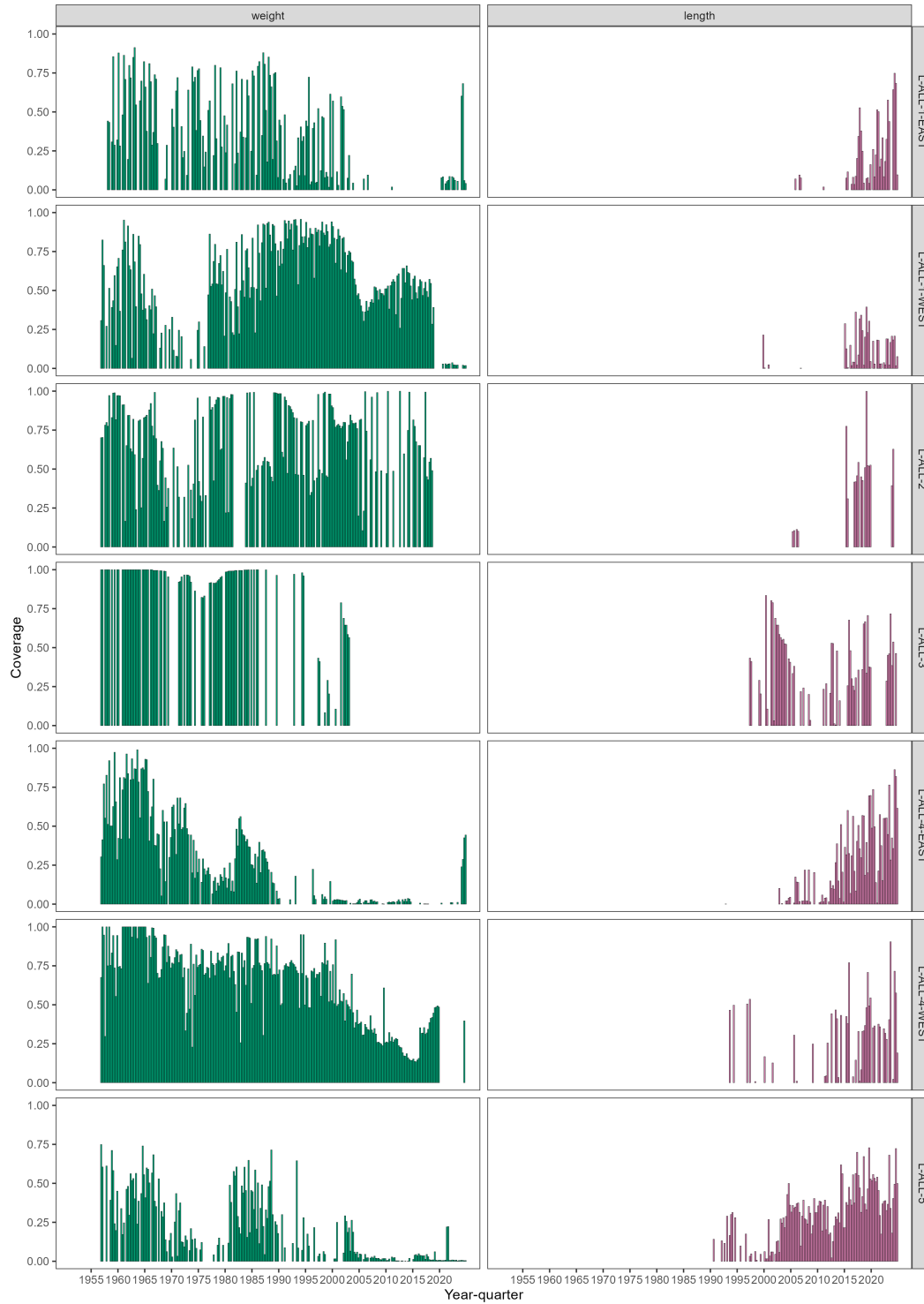


Figure 5: Comparisons of the coverage of weight (green) and length (purple) samples per longline extraction fishery for yellowfin. ‘Coverage’ refers to the proportion of catch from 10 x 20° cell and fleet combinations, after applying filtering rules outlined in Section 2.6. Continues on following page.

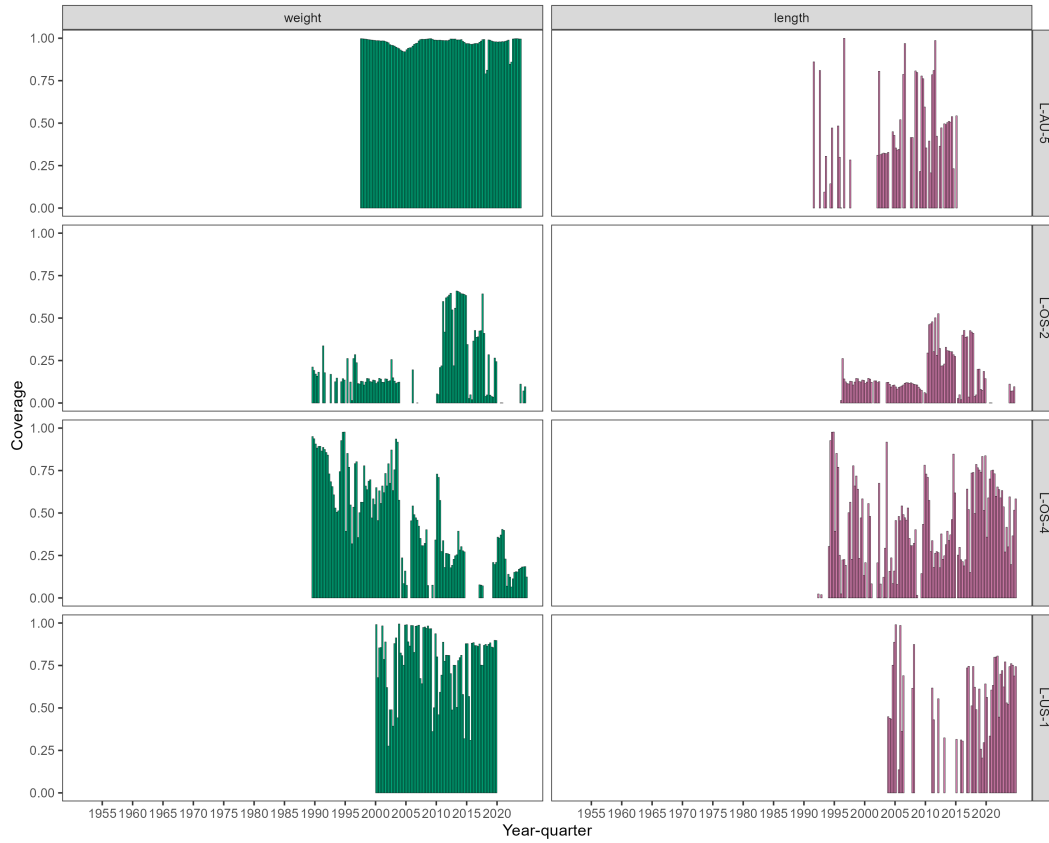


Figure 5: Comparisons of the coverage of weight (green) and length (purple) samples per longline extraction fishery for yellowfin (contd.). ‘Coverage’ refers to the proportion of catch from $10 \times 20^\circ$ cell and fleet combinations, after applying filtering rules outlined in Section 2.6.

Appendices

A Conversions from weight to lengths

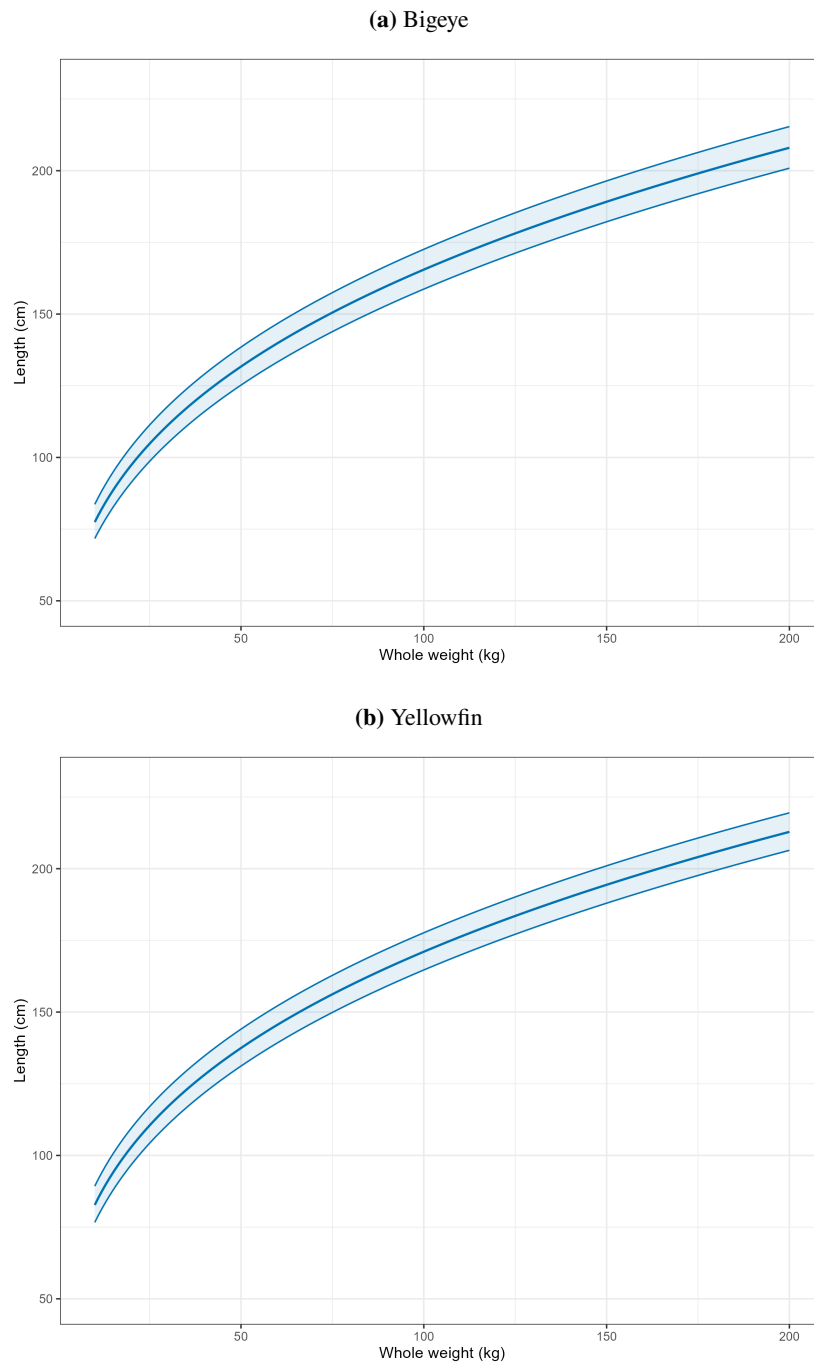


Figure A.1: Predicted mean length (with 95% CI) against weight for (a) bigeye and (b) yellowfin, based on the fitted weight-length relationships.

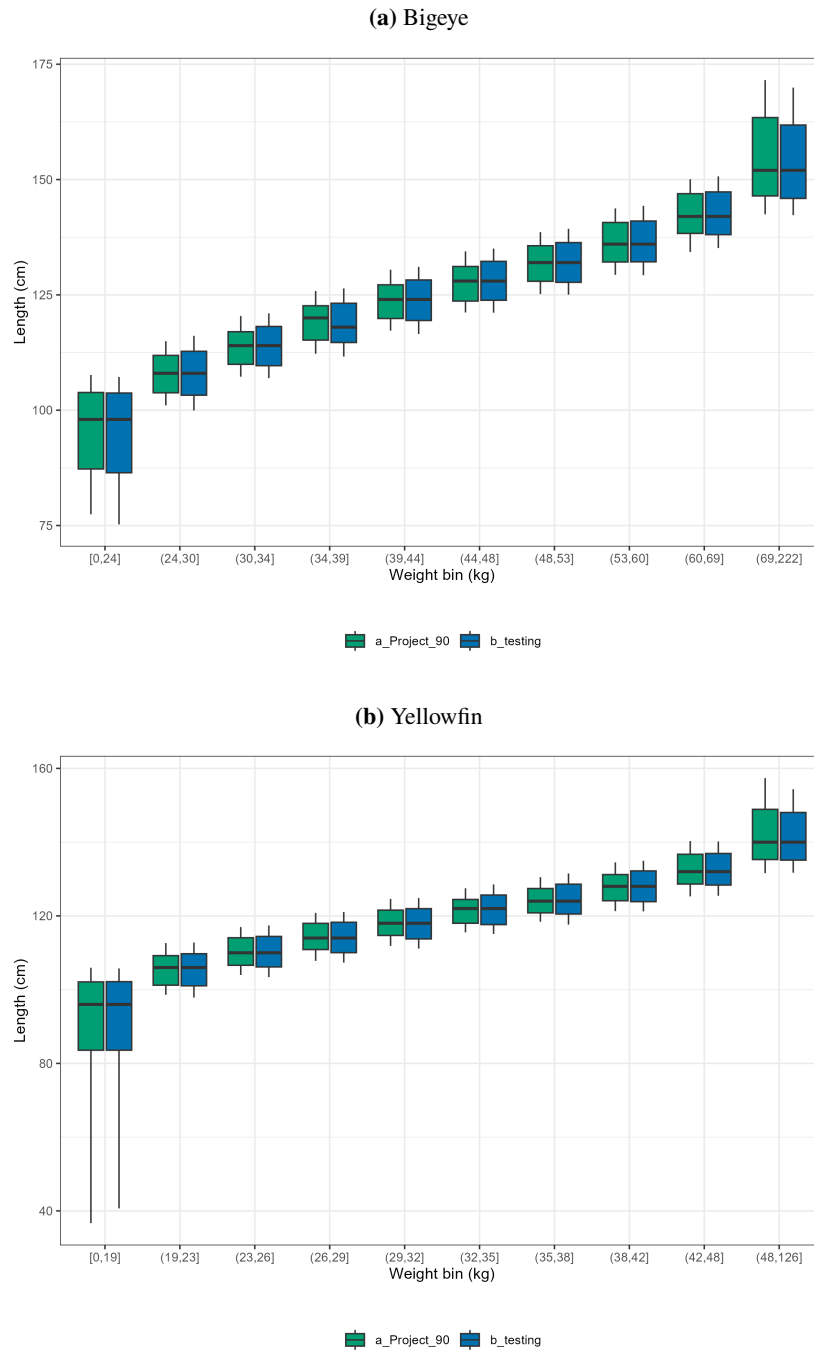


Figure A.2: Comparisons of the distributions of estimated (blue) and observed (green) mean lengths (means with 75% and 95% intervals), by weight interval for (a) bigeye and (b) yellowfin.

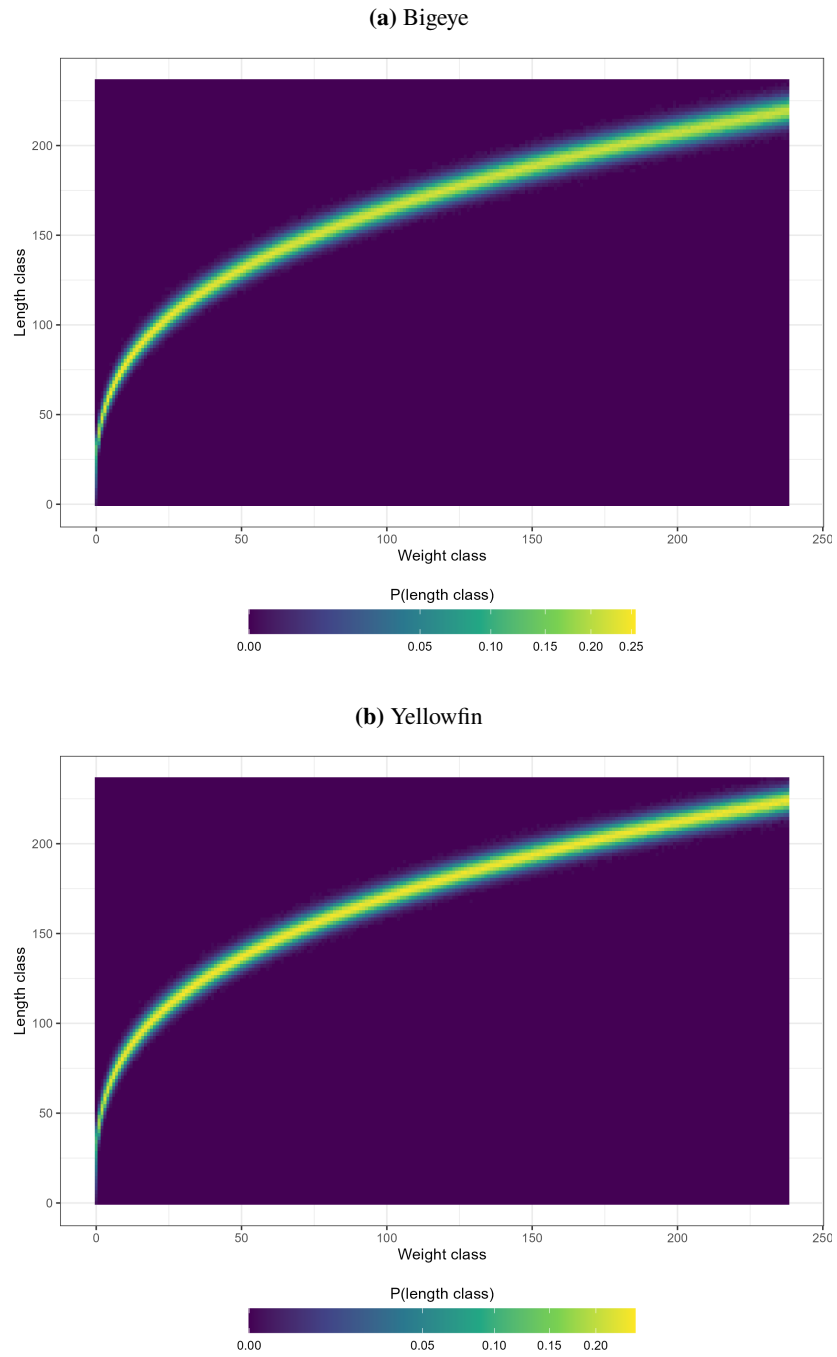


Figure A.3: The estimated probability of an individual belonging to a (2cm) length class, per (1 kg) weight class, for (a) bigeye and (b) yellowfin.

B Statistical tests to identify apparent over-representation of size classes

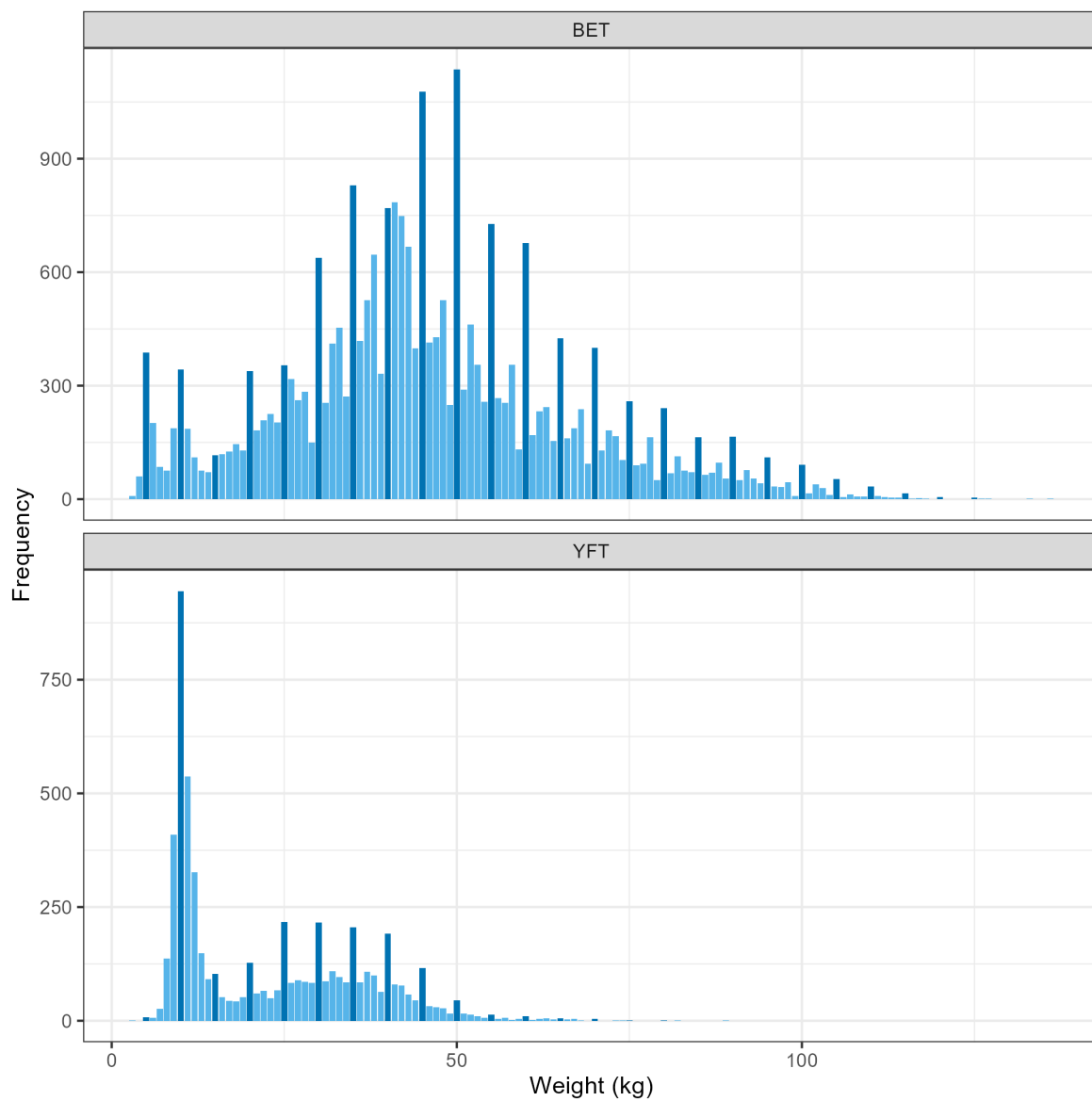


Figure B.1: Overall longline weight frequencies from strata with apparent over-representation of 5kg data for bigeye (top panel) and yellowfin (bottom).

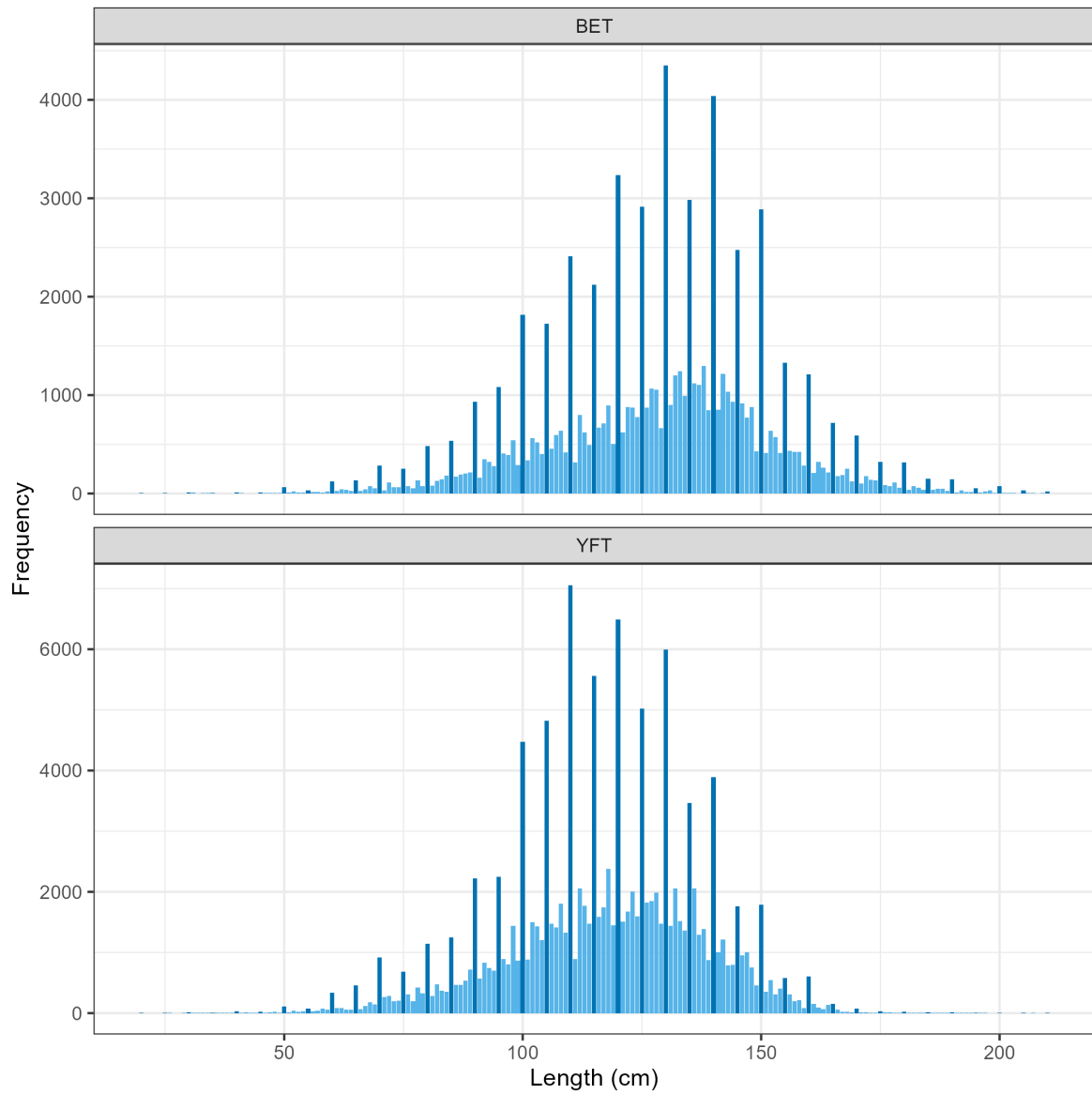


Figure B.2: Overall longline length frequencies from strata with apparent over-representation of 5cm data for bigeye (top panel) and yellowfin (bottom).

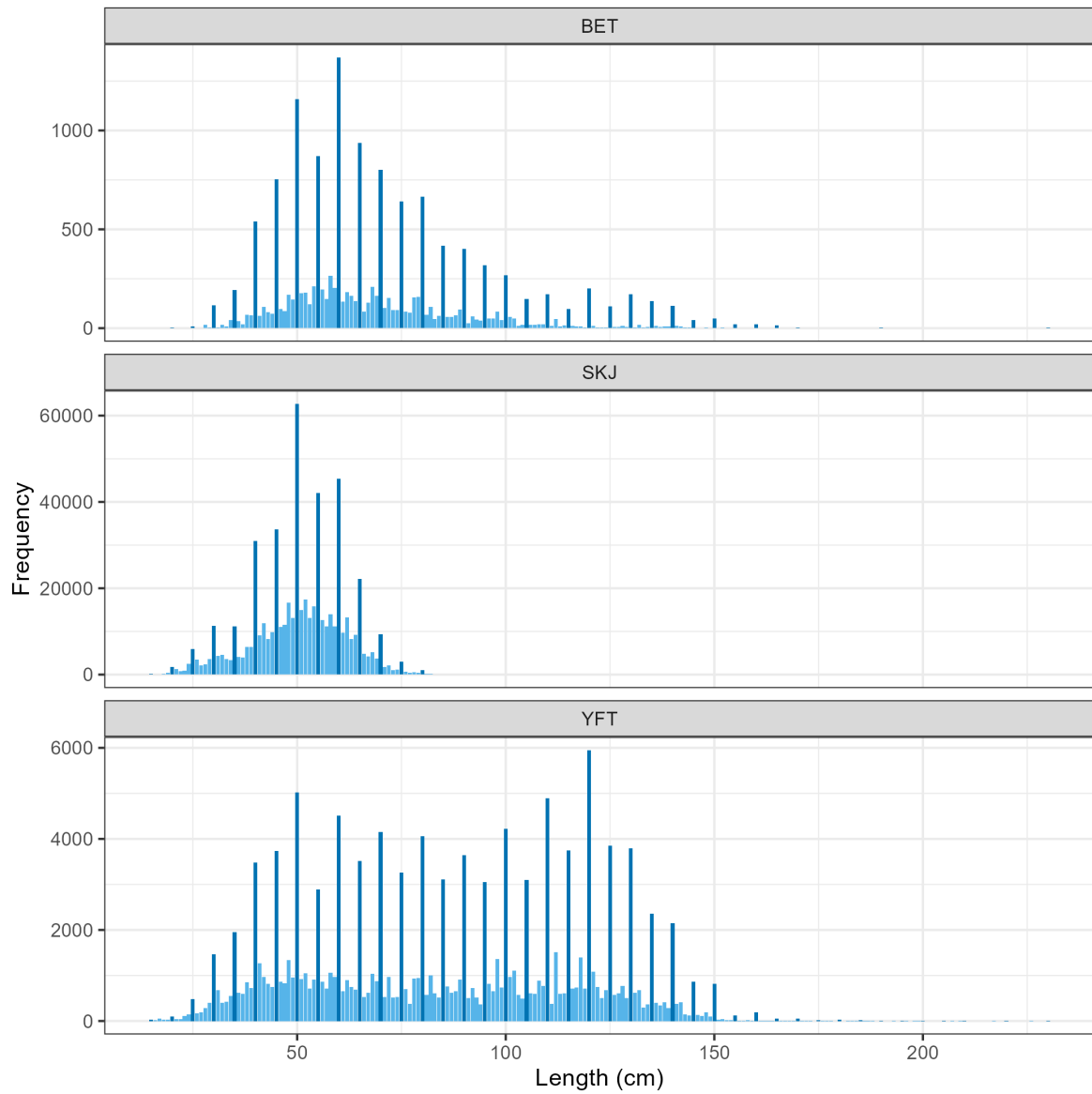
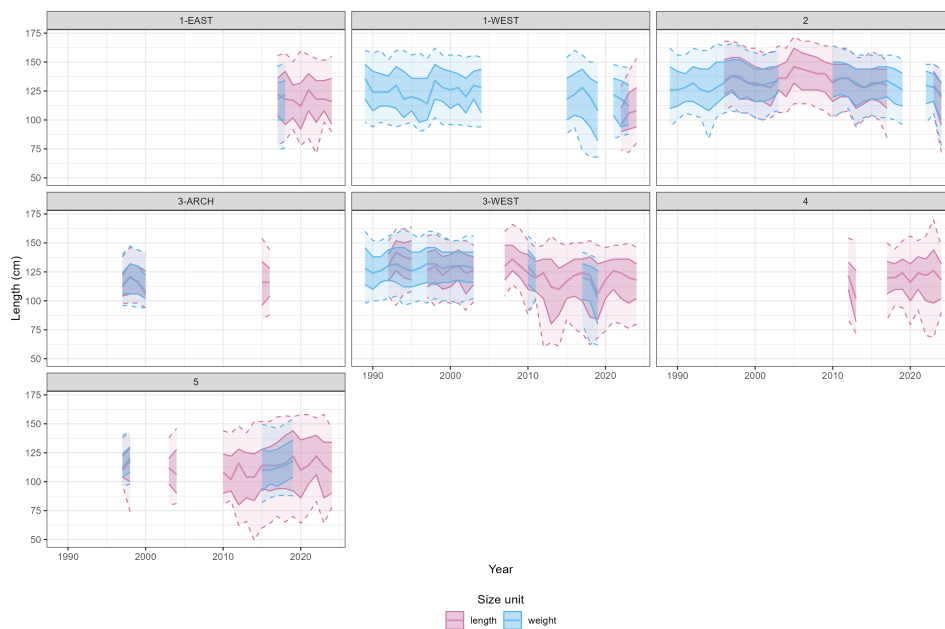


Figure B.3: Overall purse seine length frequencies from sets with apparent over-representation of 5cm data for bigeye (top panel), skipjack (middle) and yellowfin (bottom).

C Comparisons of size compositions between size units and data sources

(a) Bigeye



(b) Yellowfin

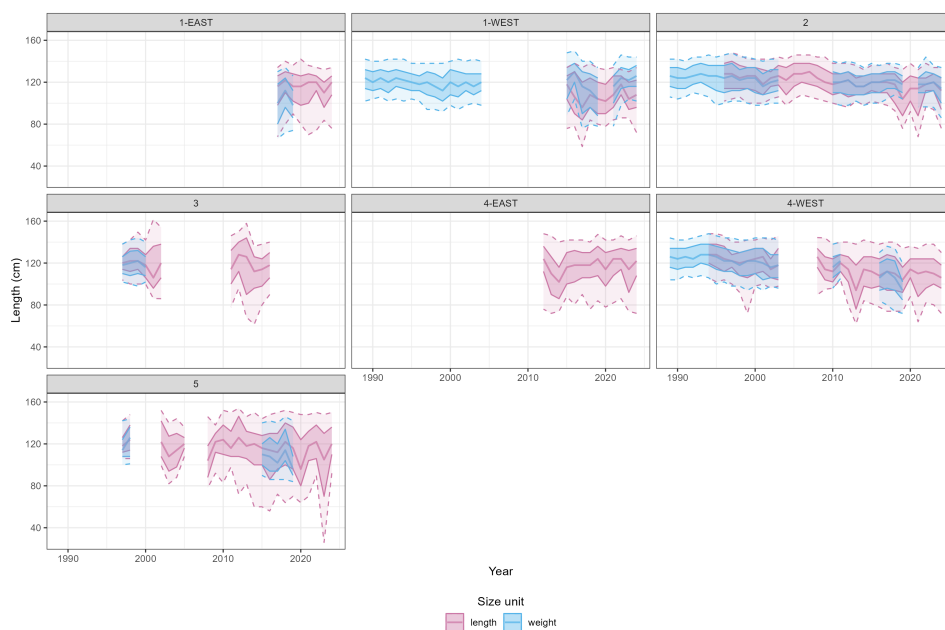
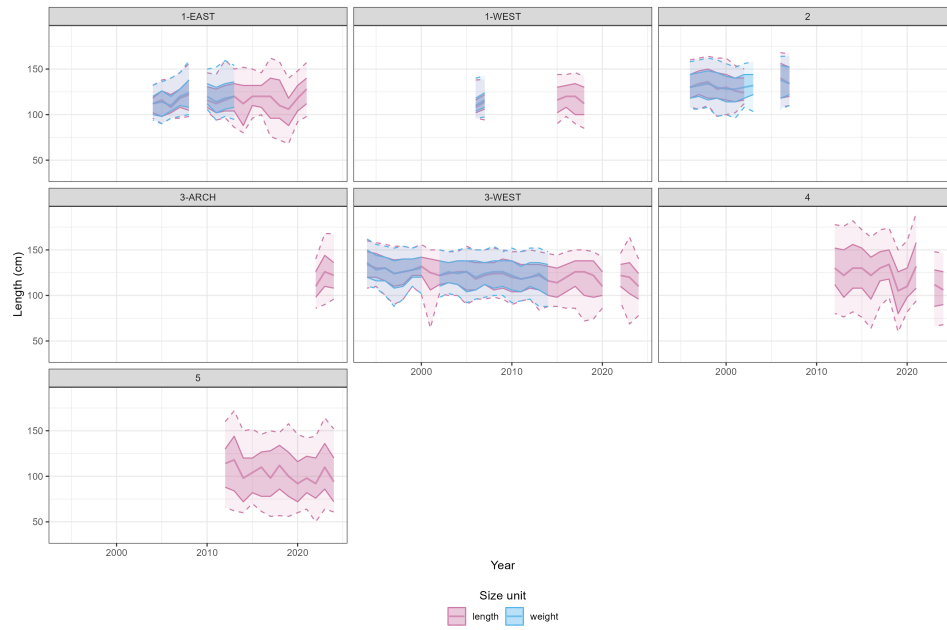


Figure C.1: Species-specific annual (unweighted) size compositions per region from weight samples (converted to lengths) and length samples for Taiwan's offshore fleet (medians plus 66% and 95% intervals)

(a) Bigeye



(b) Yellowfin

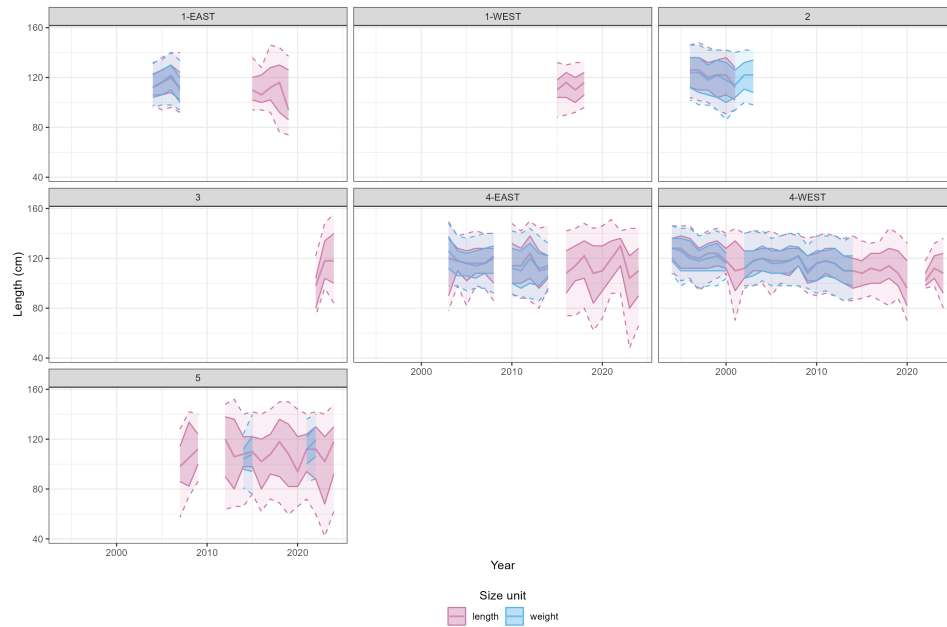
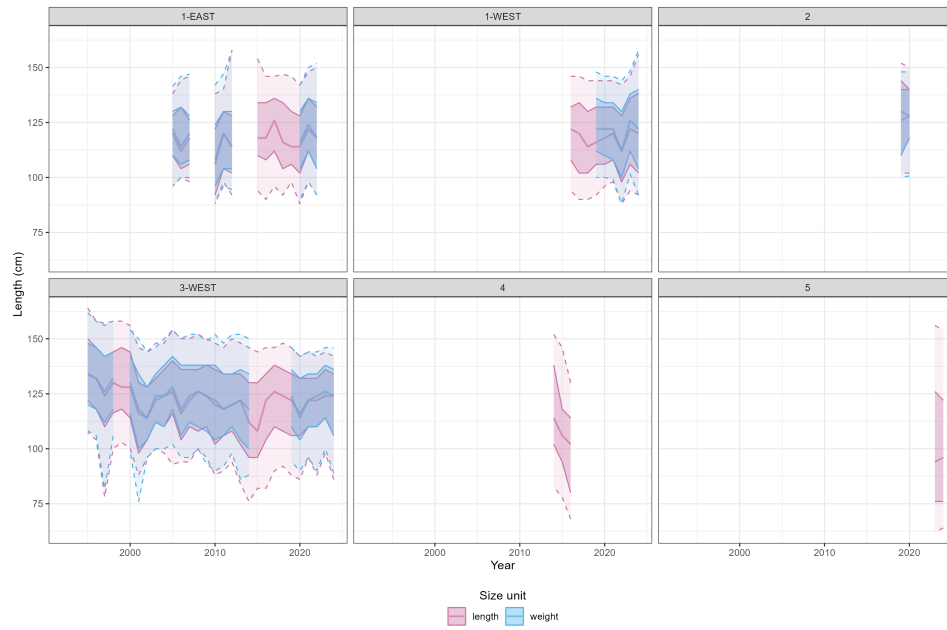


Figure C.2: Species-specific annual (unweighted) size compositions per region from weight samples (converted to lengths) and length samples for China's fleet (medians plus 66% and 95% intervals)

(a) Bigeye



(b) Yellowfin

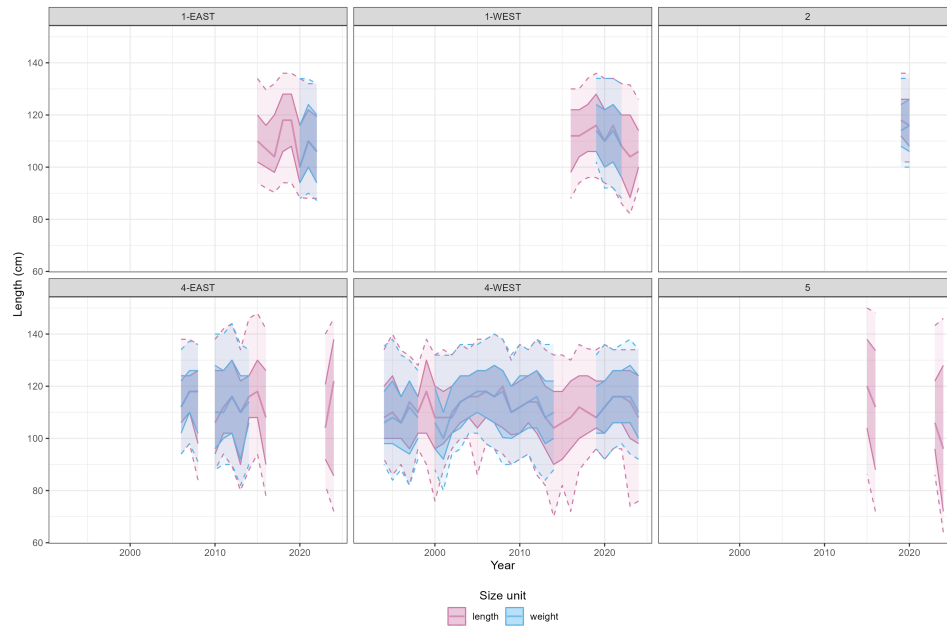
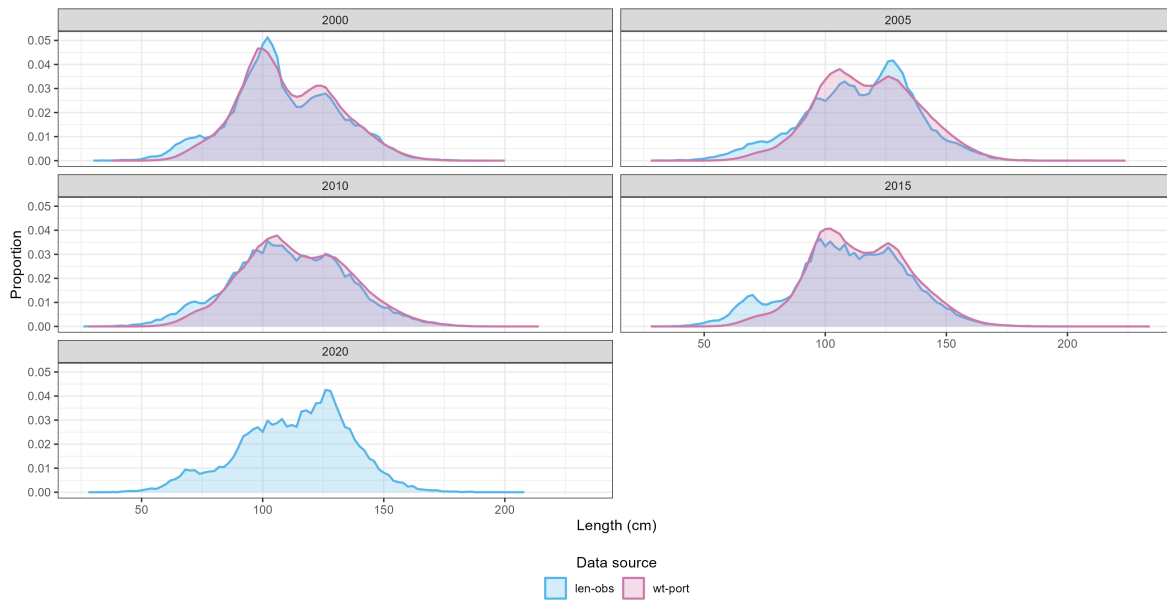


Figure C.3: Species-specific annual (unweighted) size compositions per region from weight samples (converted to lengths) and length samples for the Federated States of Micronesia's fleet (medians plus 66% and 95% intervals)

(a) Bigeye



(b) Yellowfin

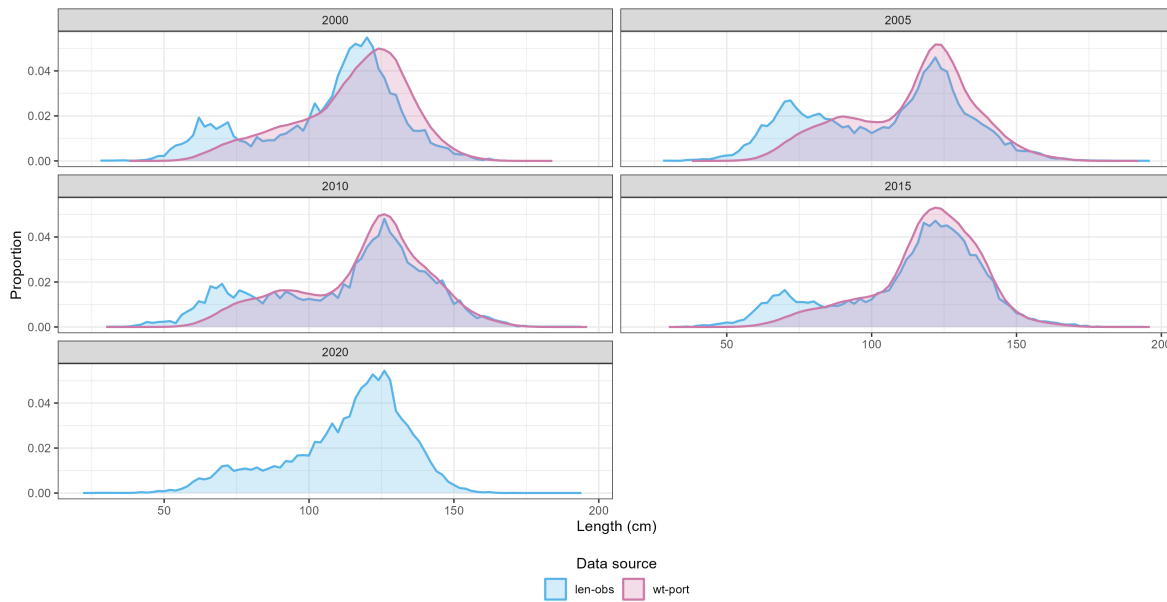


Figure C.4: Species-specific size distributions for the USHW longline fleet in region 1-EAST from commercial auction weight data converted to lengths (wt-port; purple) and observer length samples (len-obs; blue), per 5 year block (referenced by starting year).

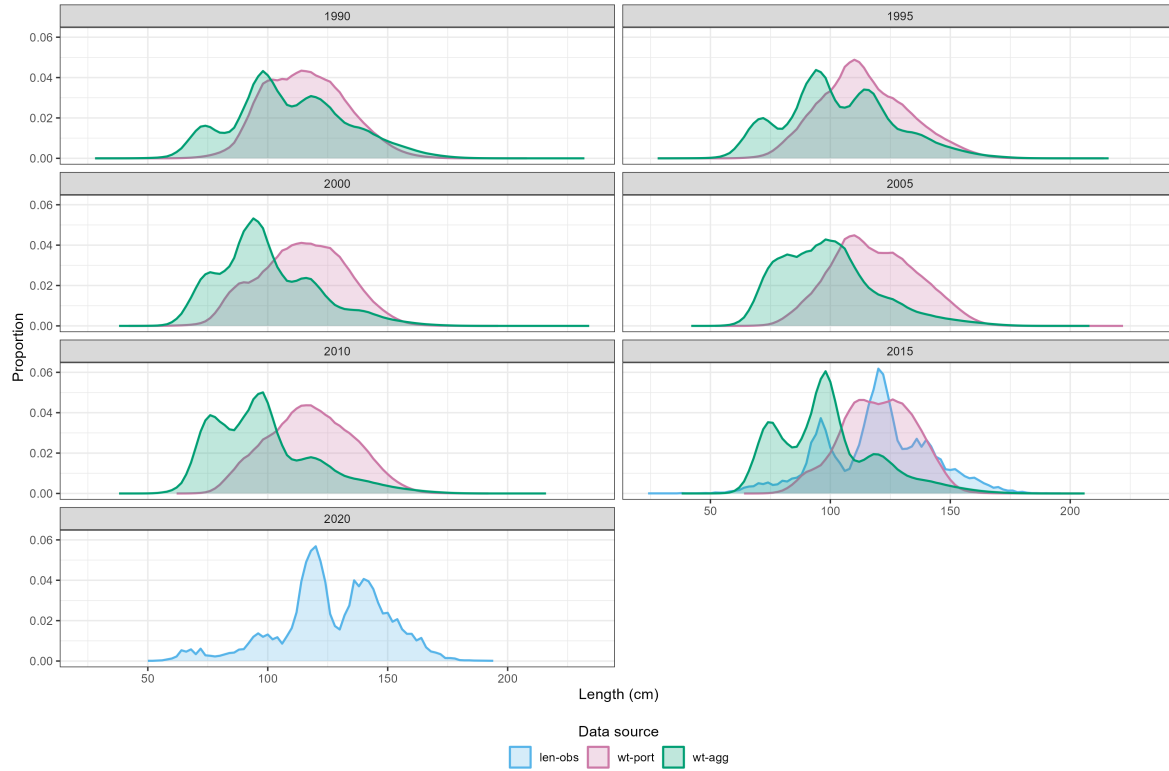


Figure C.5: Bigeye size distributions for Japan's longline fleet in region 1-WEST from aggregate weight data (green), aggregate length data (orange), at-sea observer length samples (blue) and port-sampling from Guam (purple), per 5 year block (referenced by starting year).

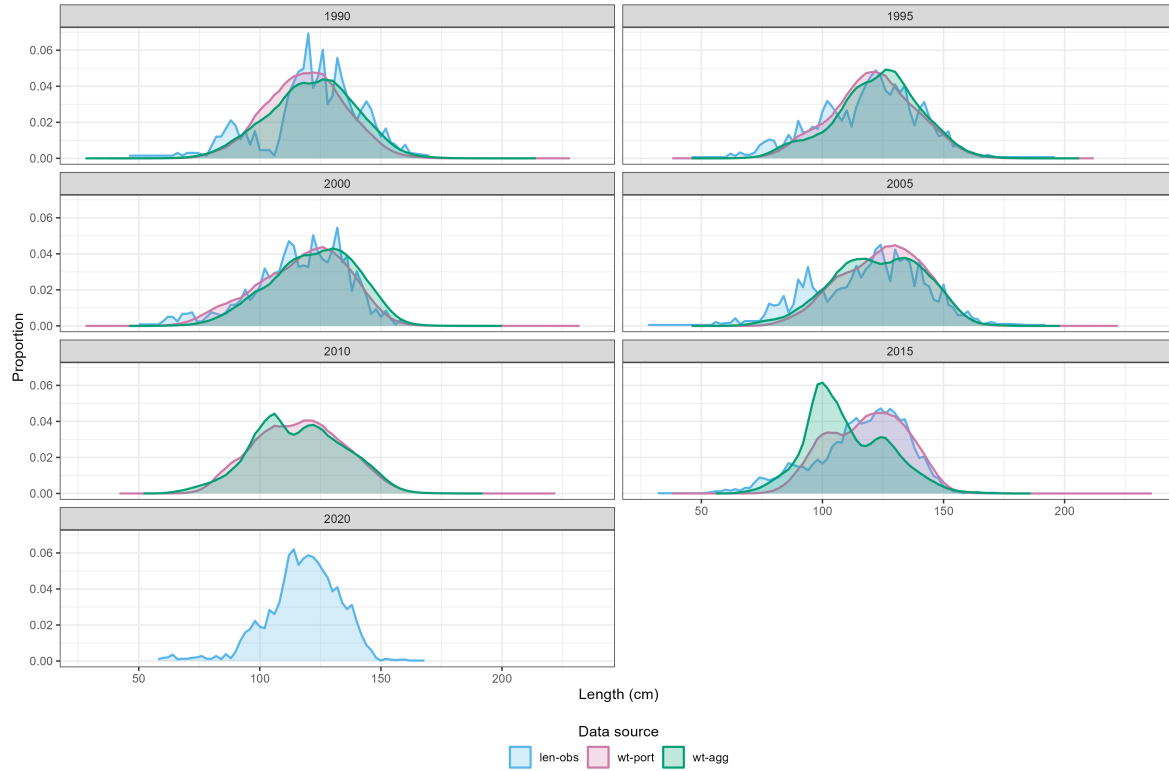


Figure C.6: Bigeye size distributions for Japan's longline fleet in region 3 from aggregate weight data (green), aggregate length data (orange), at-sea observer length samples (blue) and port-sampling from Guam (purple), per 5 year block (referenced by starting year).

D Catch proportions per fleet for mixed-fleet fisheries

D.1 Mixed-fleet fisheries for bigeye

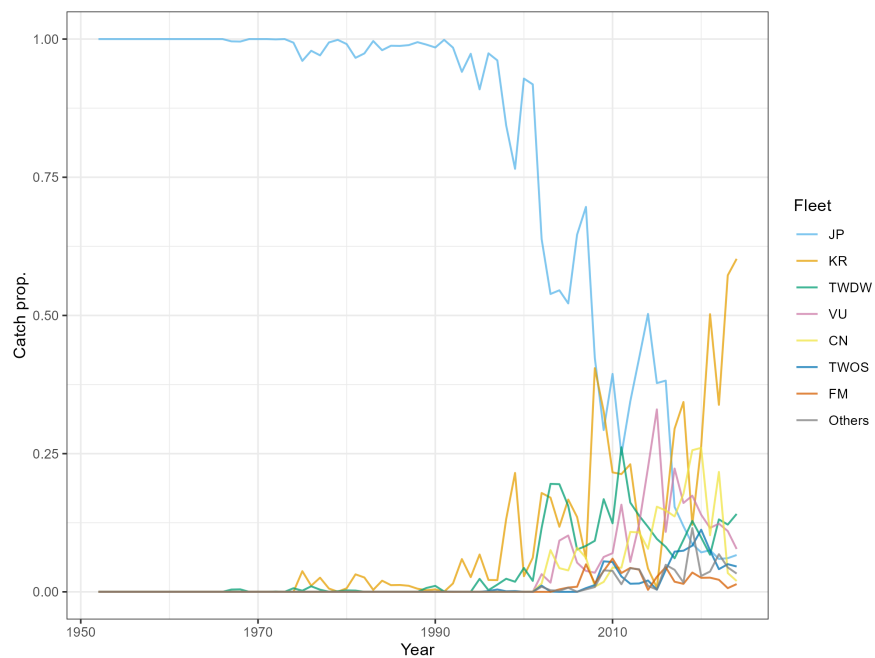


Figure D.1: The proportion of total annual catch of bigeye per fleet for fishery LL.EAST.1 .

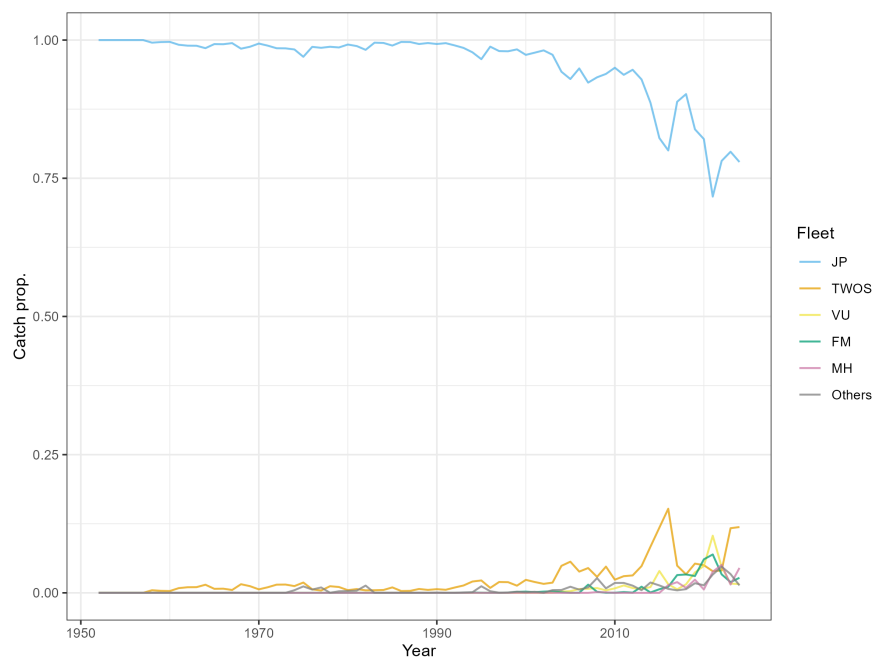


Figure D.2: The proportion of total annual catch of bigeye per fleet for fishery LL.WEST.1 .



Figure D.3: The proportion of total annual catch of bigeye per fleet for fishery LL.ALL.2 .

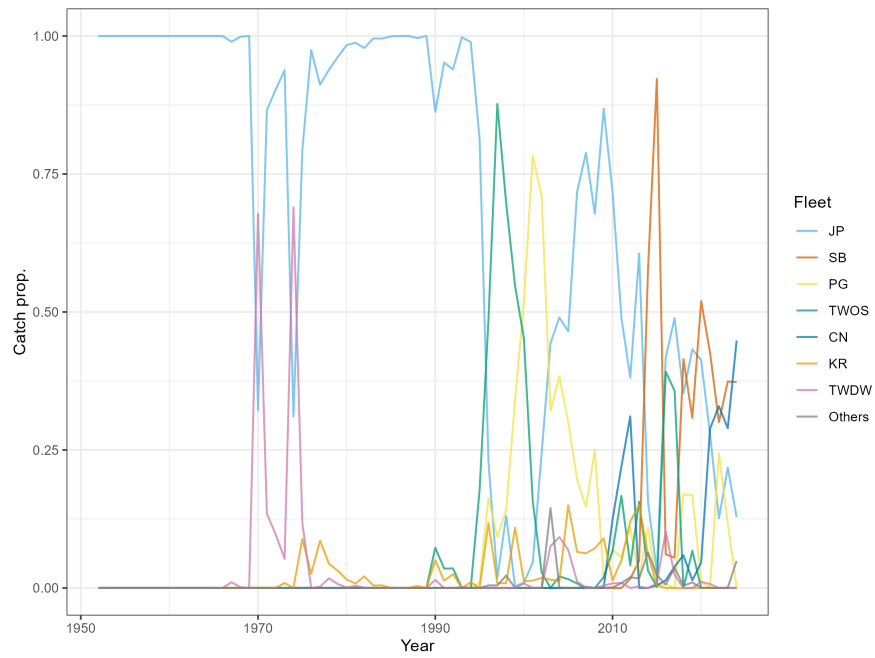


Figure D.4: The proportion of total annual catch of bigeye per fleet for fishery LL.ARCH.3 .

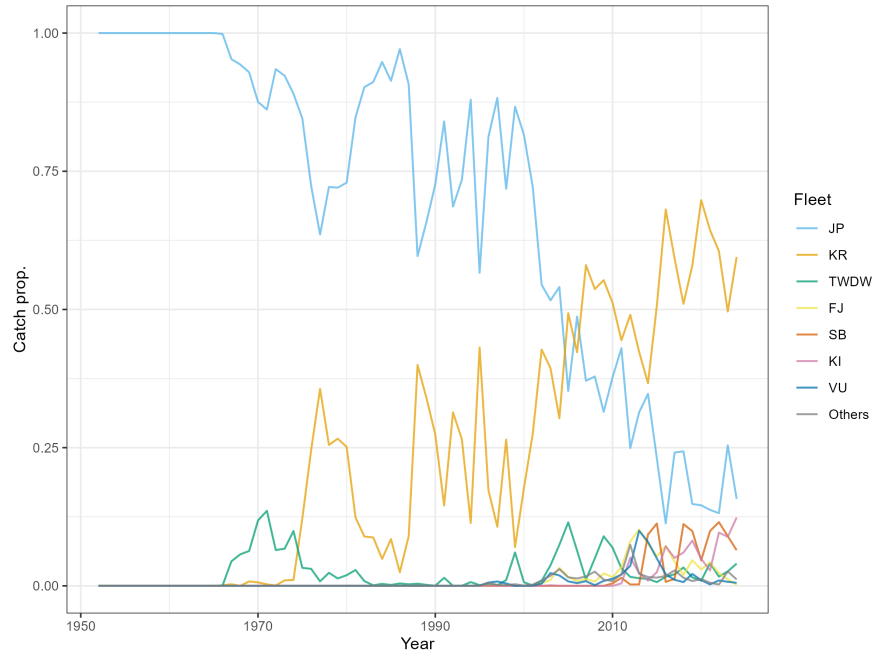


Figure D.5: The proportion of total annual catch of bigeye per fleet for fishery LL.WEST.3 .

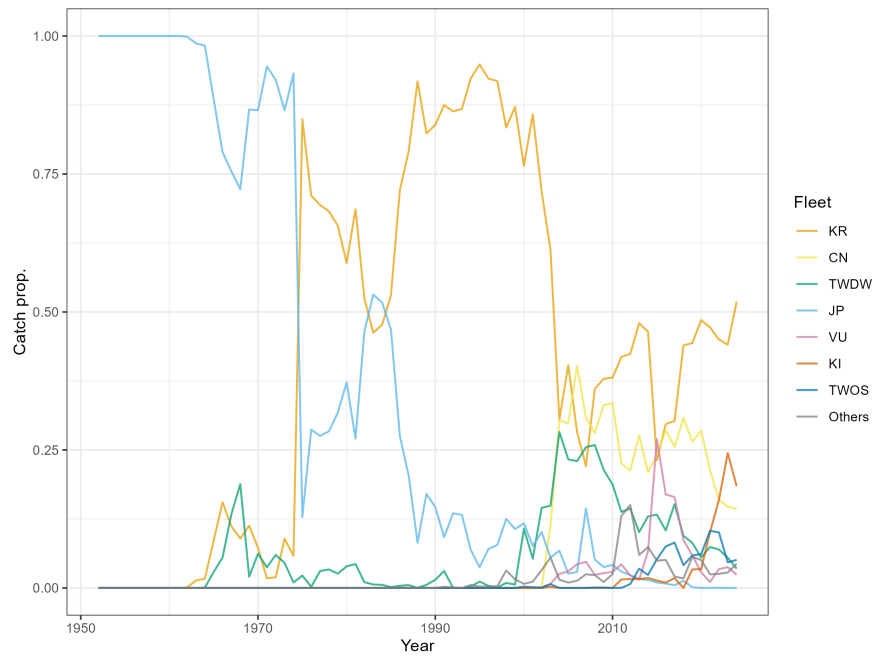


Figure D.6: The proportion of total annual catch of bigeye per fleet for fishery LL.ALL.4 .

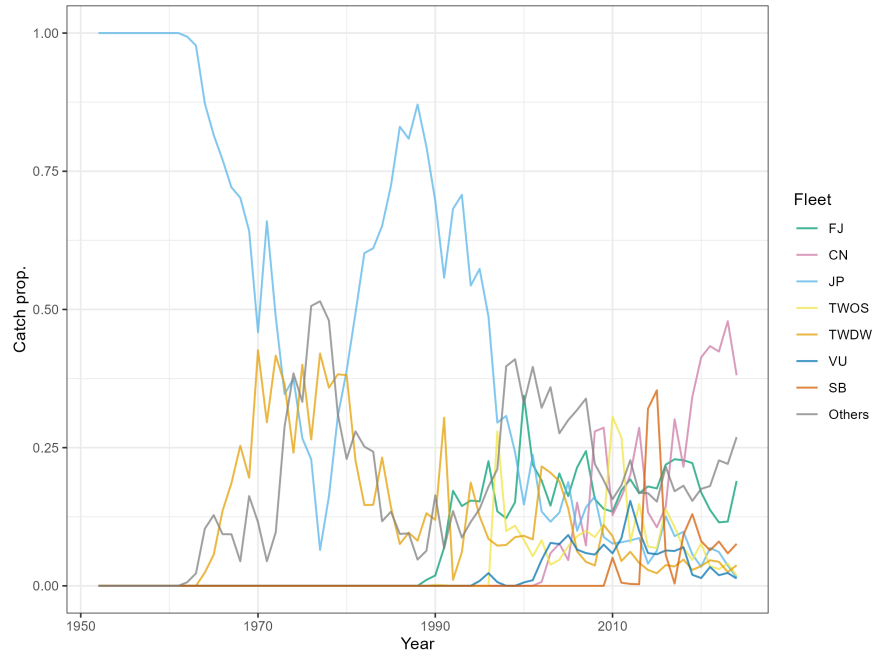


Figure D.7: The proportion of total annual catch of bigeye per fleet for fishery LL.ALL.5 .



Figure D.8: The proportion of total annual catch of bigeye per fleet for fishery LL.OS.2 .

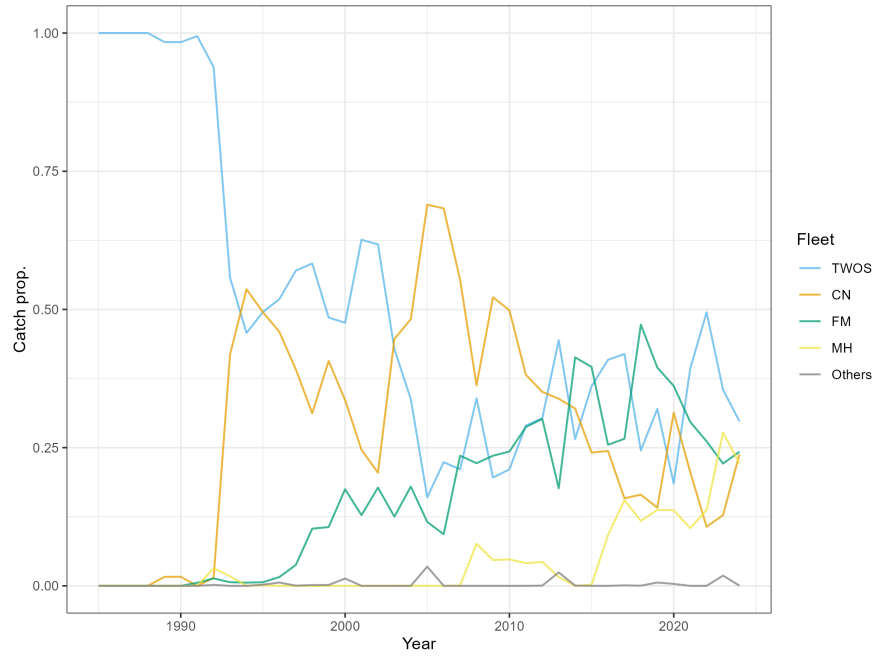


Figure D.9: The proportion of total annual catch of bigeye per fleet for fishery LL.OS.3 .

D.2 Mixed-fleet fisheries for yellowfin

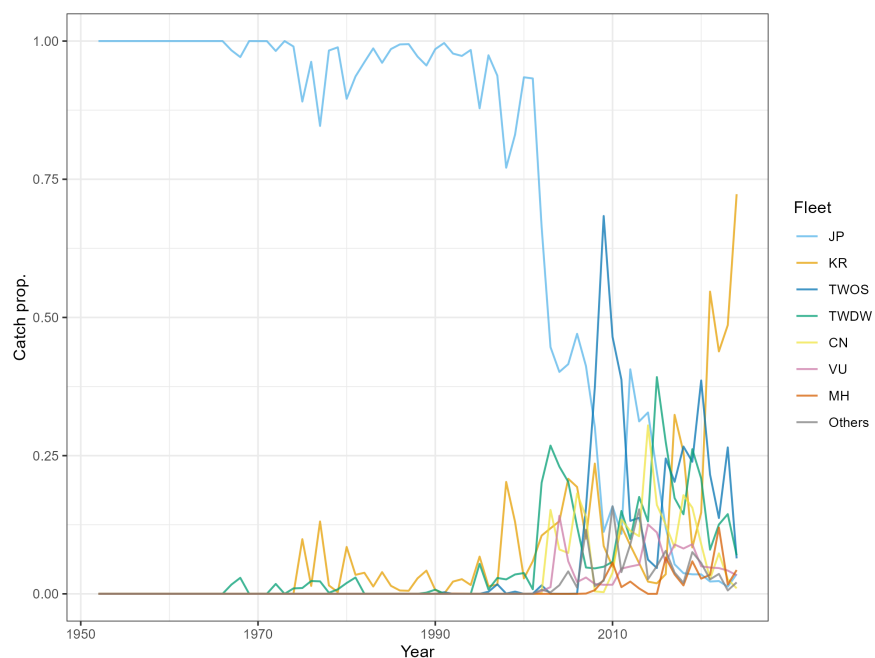


Figure D.10: The proportion of total annual catch of yellowfin per fleet for fishery LL.EAST.1 .

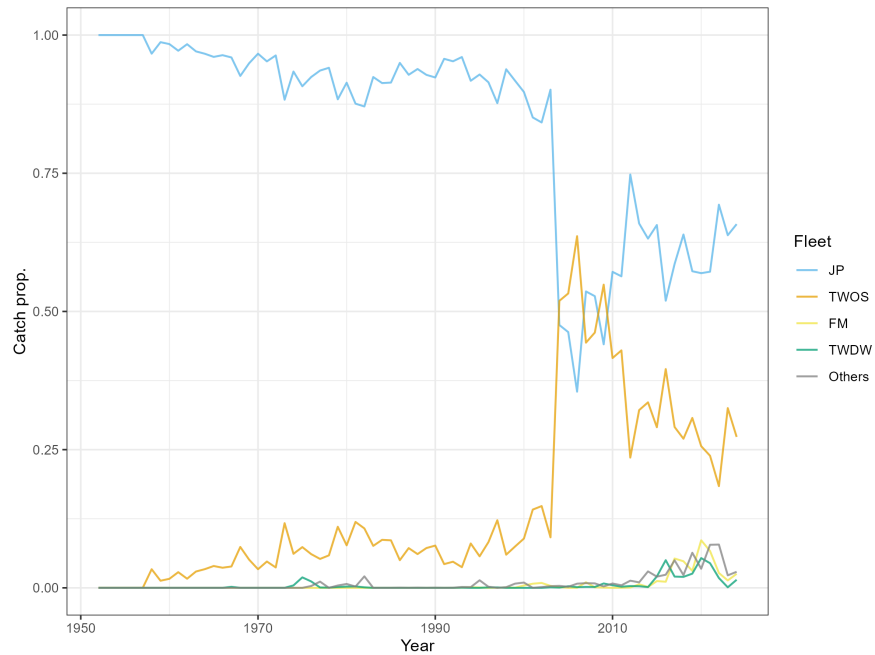


Figure D.11: The proportion of total annual catch of yellowfin per fleet for fishery LL.WEST.1 .

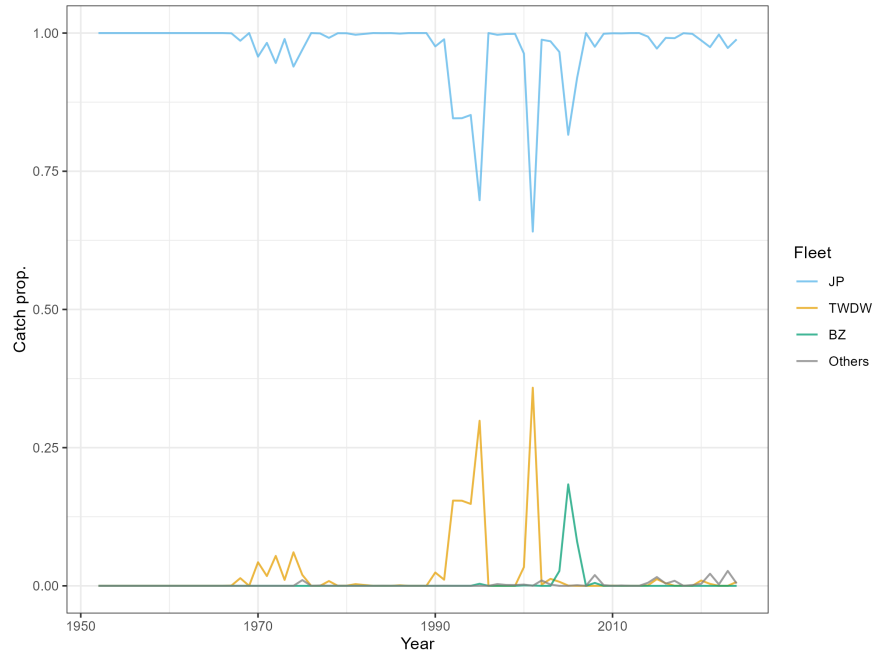


Figure D.12: The proportion of total annual catch of yellowfin per fleet for fishery LL.ALL.2 .

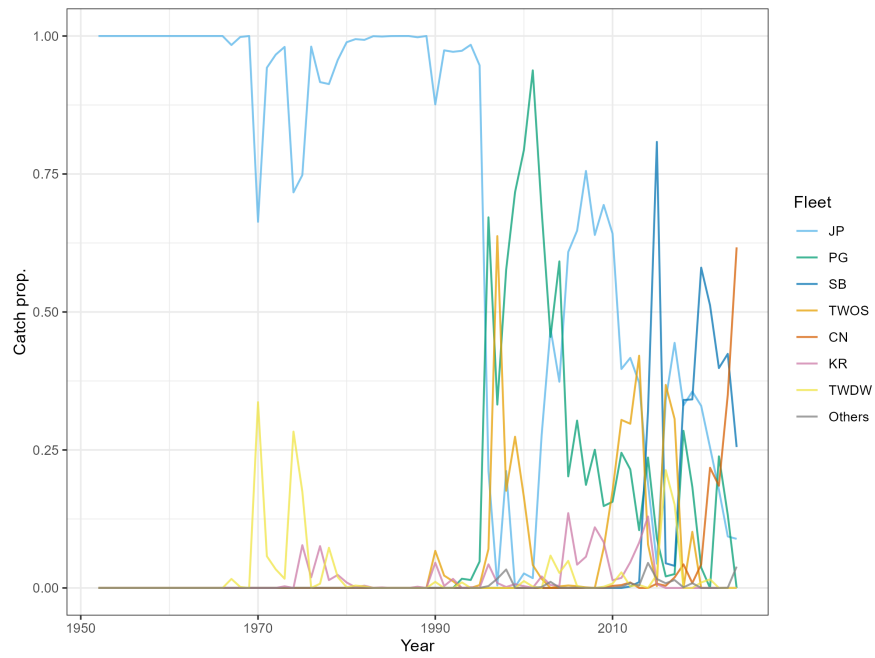


Figure D.13: The proportion of total annual catch of yellowfin per fleet for fishery LL.ALL.3 .

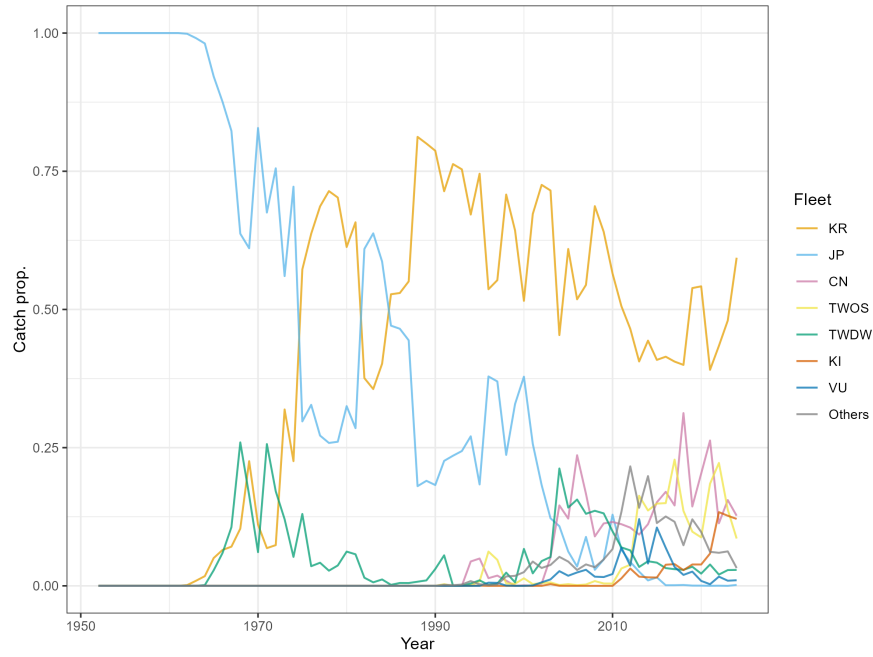


Figure D.14: The proportion of total annual catch of yellowfin per fleet for fishery LL.EAST.4 .



Figure D.15: The proportion of total annual catch of yellowfin per fleet for fishery LL.WEST.4 .

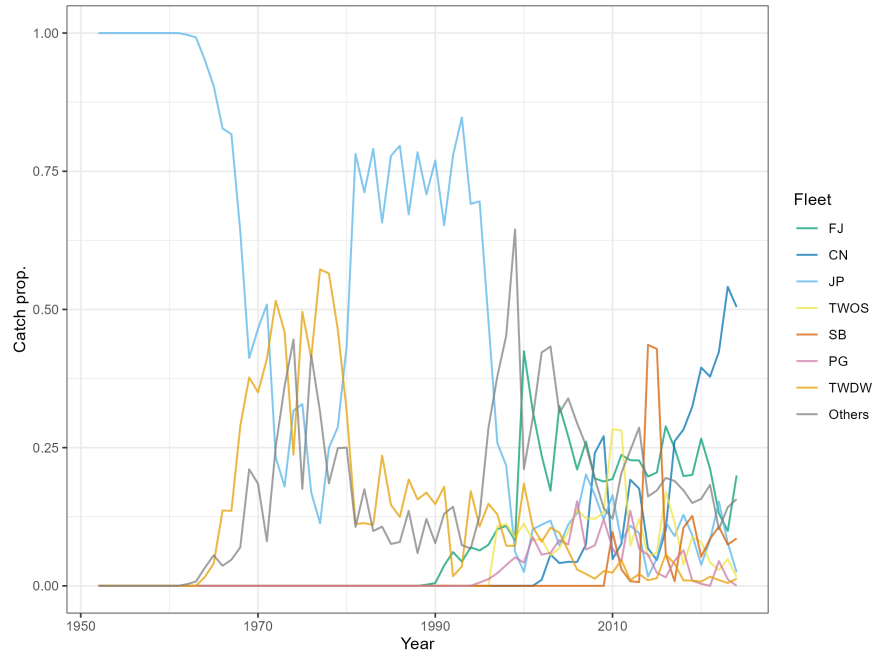


Figure D.16: The proportion of total annual catch of yellowfin per fleet for fishery LL.ALL.5 .

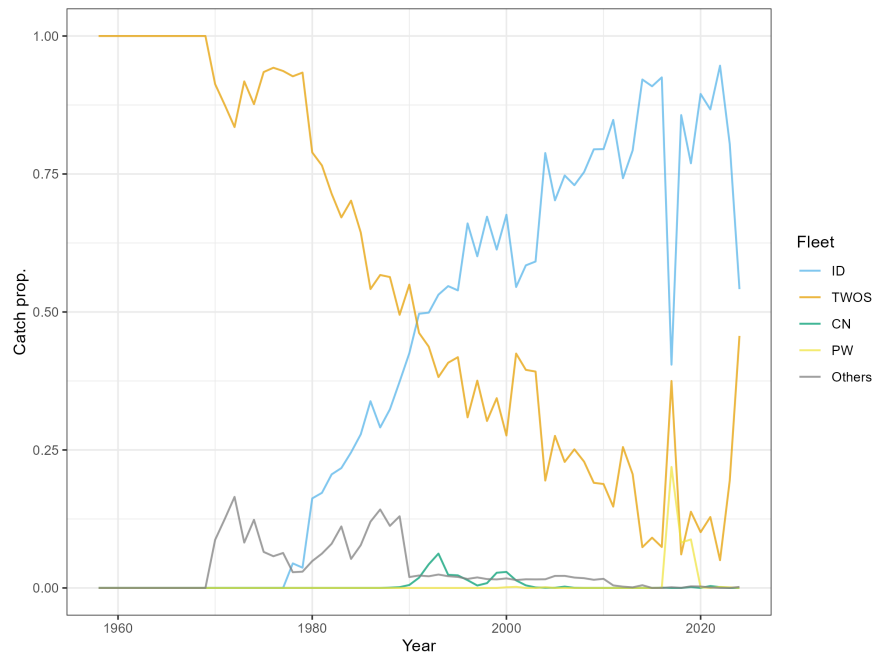


Figure D.17: The proportion of total annual catch of yellowfin per fleet for fishery LL.OS.2 .

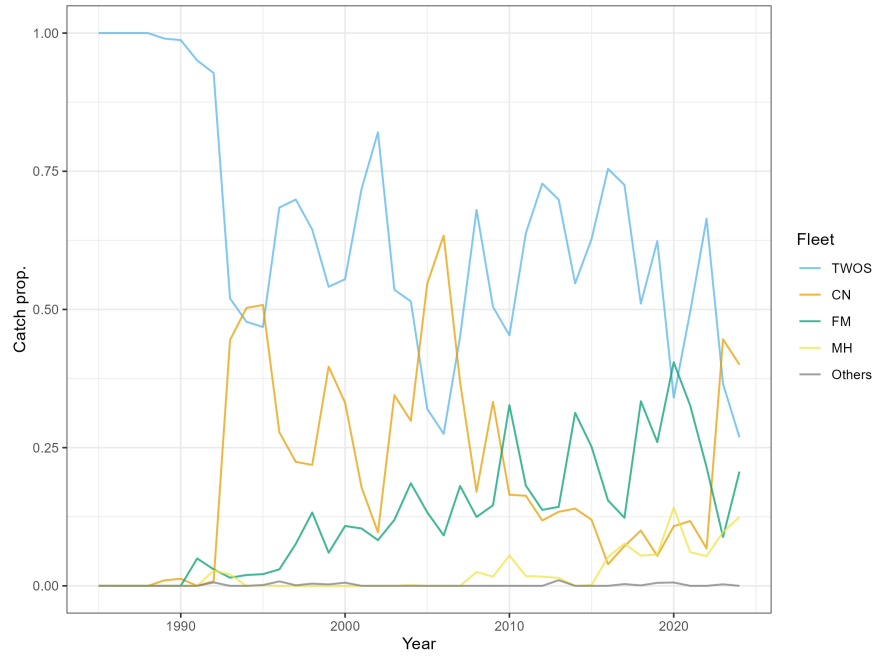


Figure D.18: The proportion of total annual catch of yellowfin per fleet for fishery LL.OS.4 .

E Bigeye purse seine fishery compositions

E.1 Bigeye large-scale equatorial purse seine fisheries

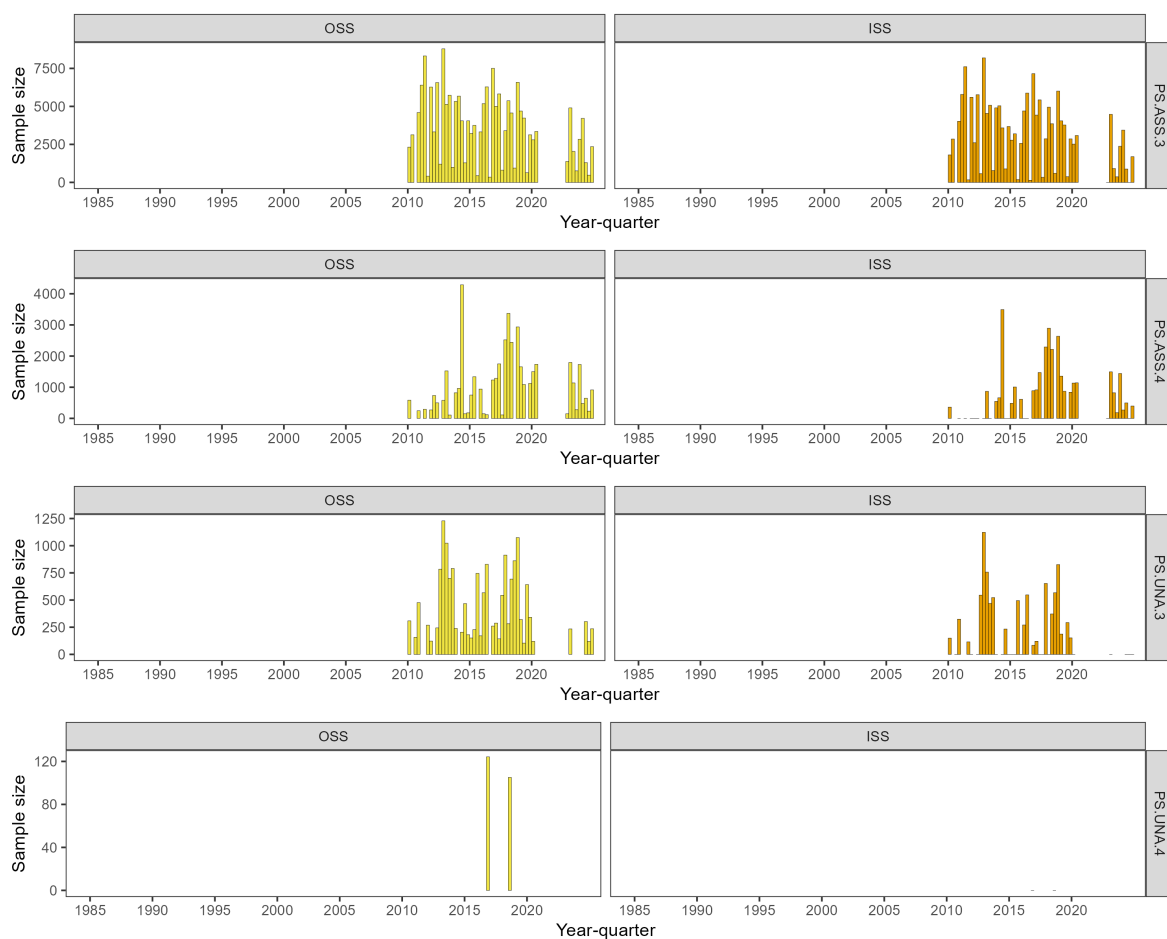


Figure E.1: Original sample sizes (OSS) and input sample sizes (ISS) for bigeye large-scale equatorial purse seine extraction fishery length compositions.

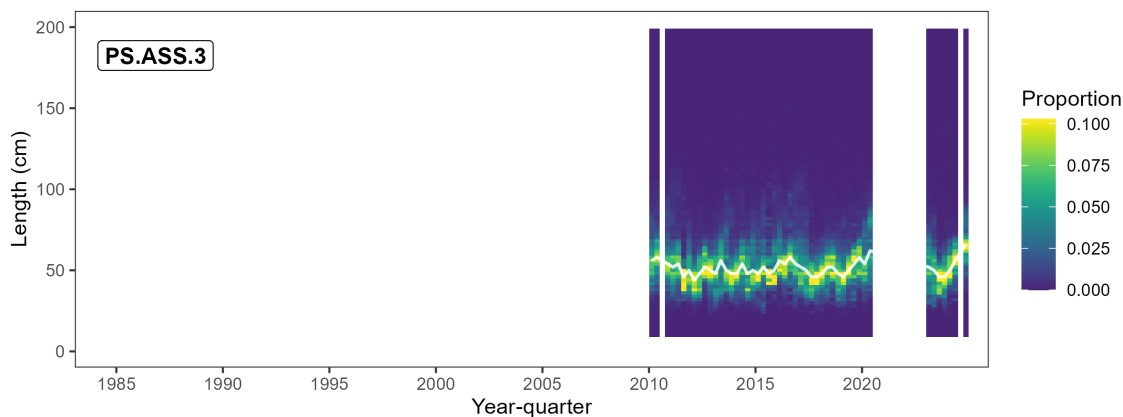


Figure E.2: Reweighted length compositions of bigeye for the purse seine extraction fishery PS.ASS.3. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

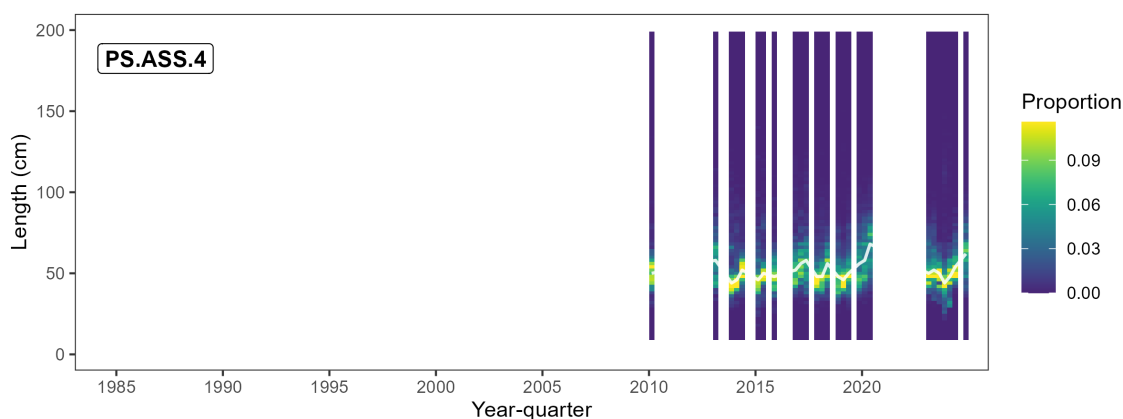


Figure E.3: Reweighted length compositions of bigeye for the purse seine extraction fishery PS.ASS.4. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

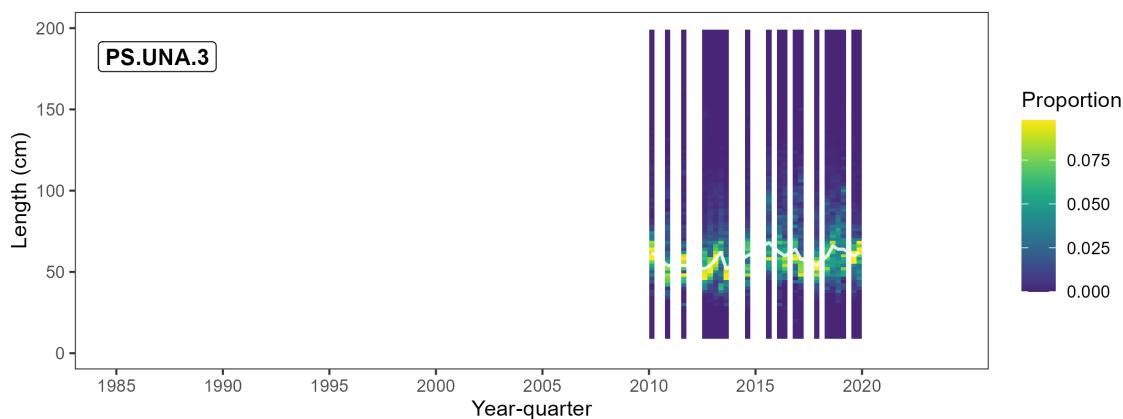


Figure E.4: Reweighted length compositions of bigeye for the purse seine extraction fishery PS.UNA.3. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

E.2 Bigeye domestic purse seine fisheries

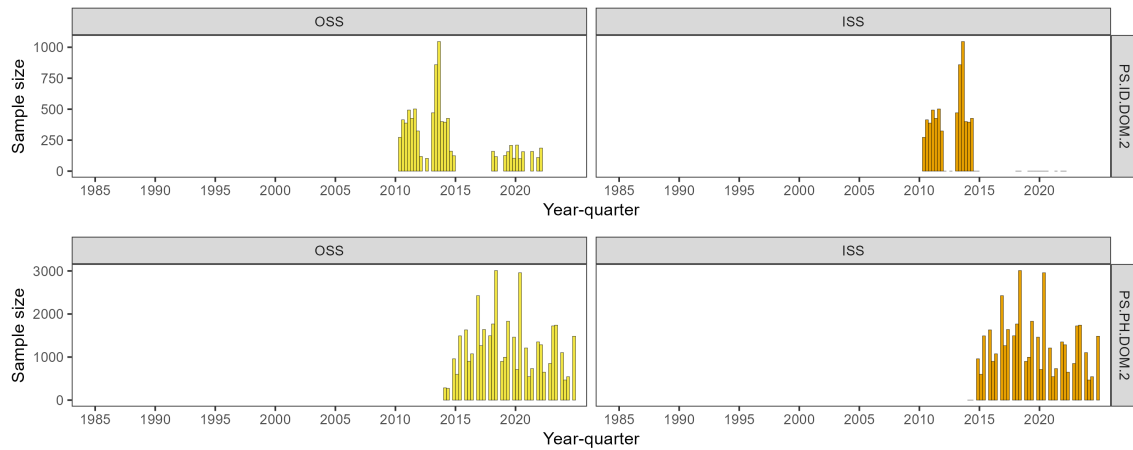


Figure E.5: Original sample sizes (OSS) and input sample sizes (ISS) for bigeye domestic purse seine extraction fishery length compositions.

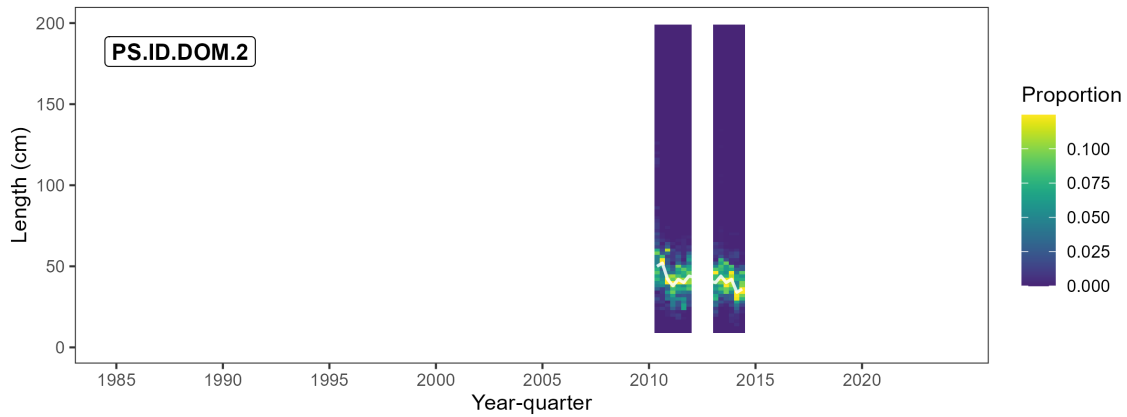


Figure E.6: Reweighted length compositions of bigeye for the domestic purse seine extraction fishery PS.ID.DOM.2. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

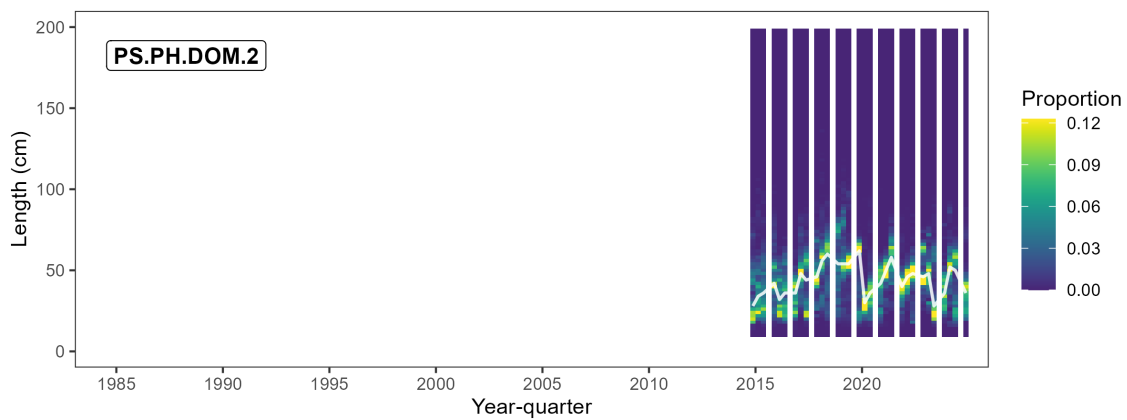


Figure E.7: Reweighted length compositions of bigeye for the domestic purse seine extraction fishery PS.PH.DOM.2. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

F Yellowfin purse seine fishery compositions

F.1 Yellowfin large-scale equatorial purse seine fisheries

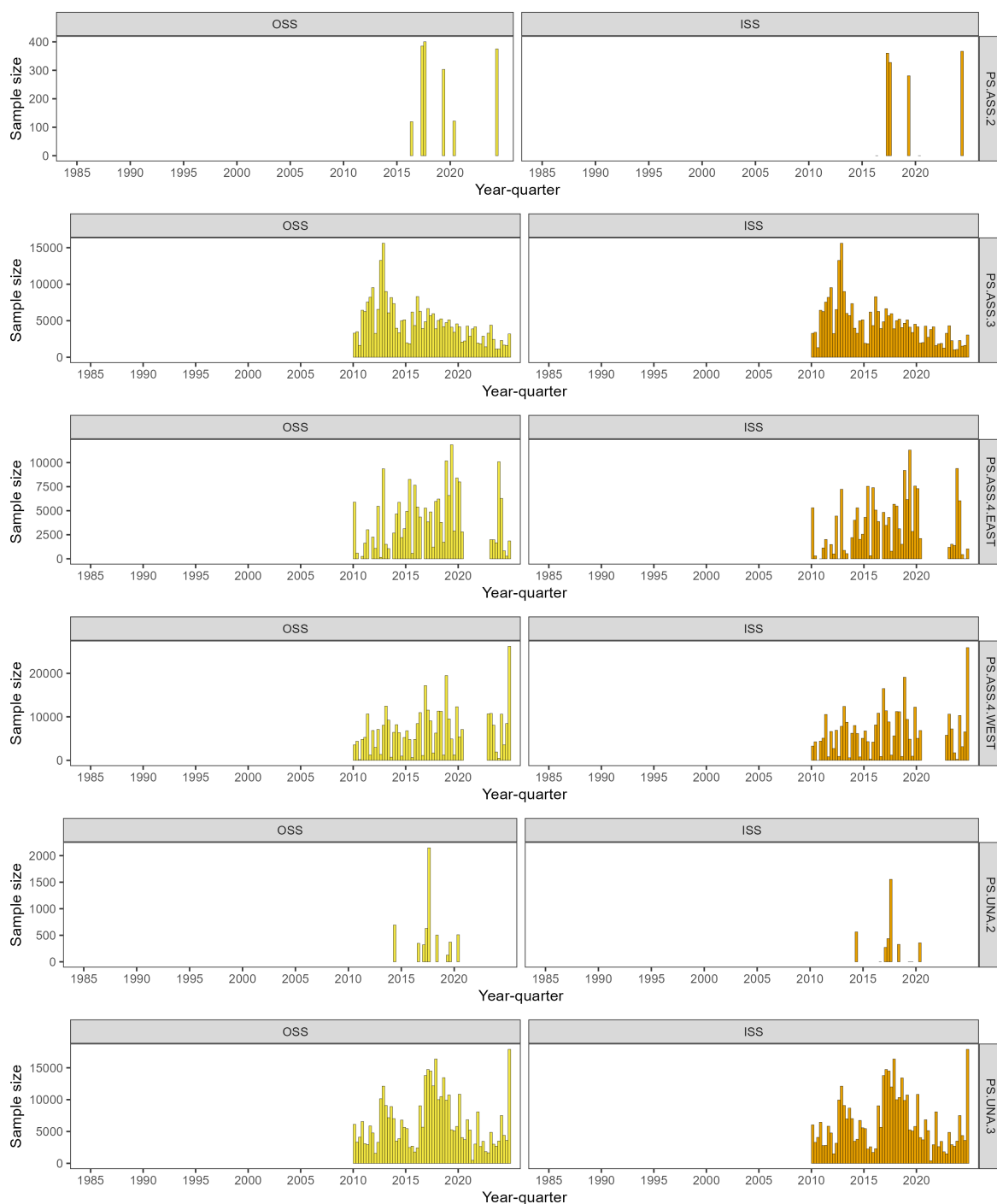


Figure F.1: Original sample sizes (OSS) and input sample sizes (ISS) for yellowfin large-scale equatorial purse seine extraction fishery length compositions.

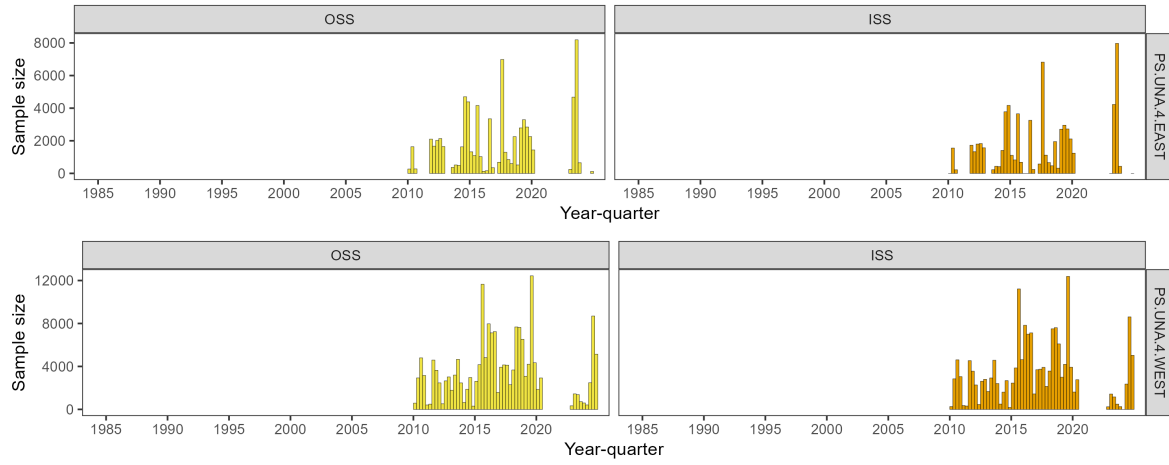


Figure F.1: Original sample sizes (OSS) and input sample sizes (ISS) for yellowfin large-scale equatorial purse seine extraction fishery length compositions (contd.).

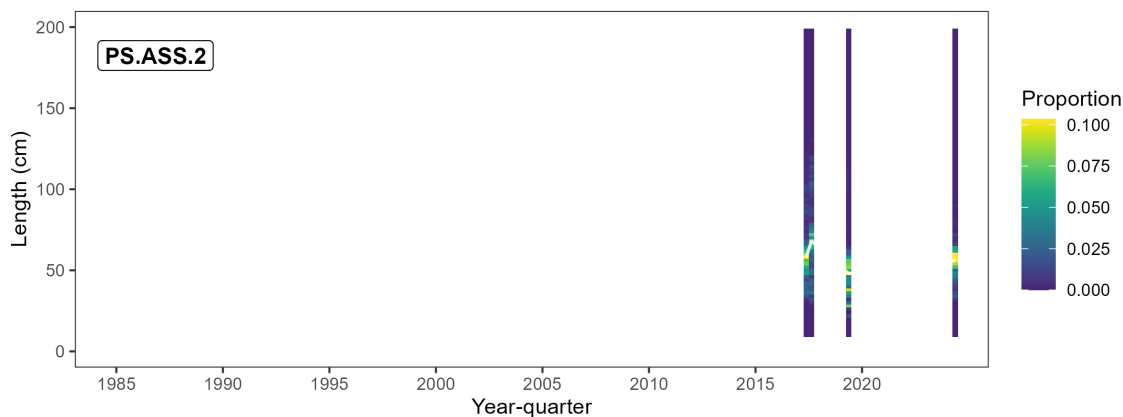


Figure F.2: Reweighted length compositions of yellowfin for the purse seine extraction fishery PS.ASS.2. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

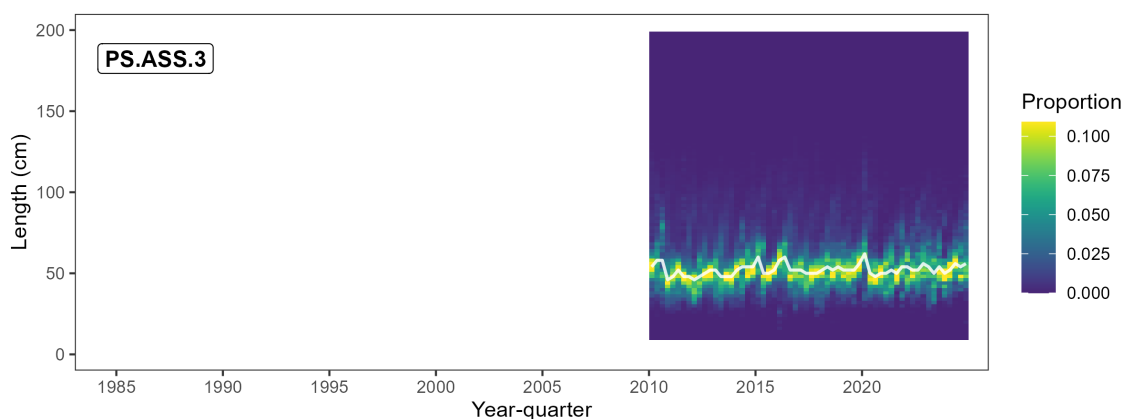


Figure F.3: Reweighted length compositions of yellowfin for the purse seine extraction fishery PS.ASS.3. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

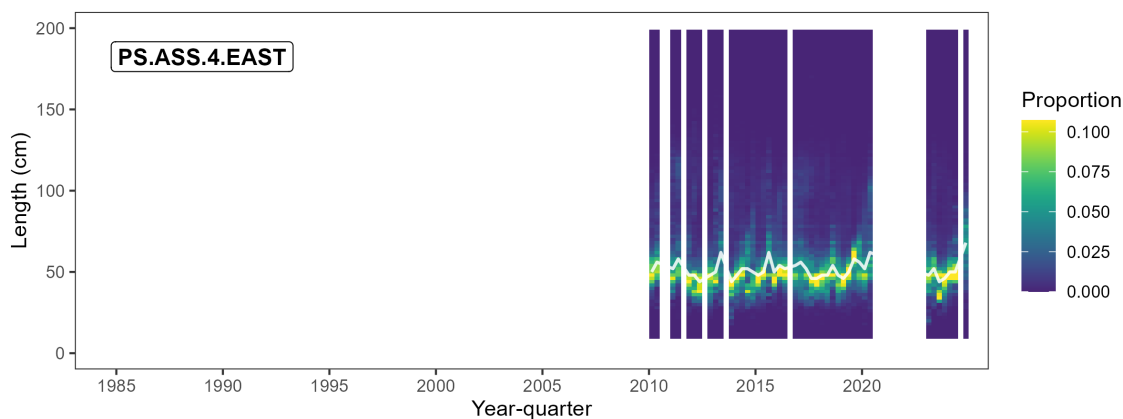


Figure F.4: Reweighted length compositions of yellowfin for the purse seine extraction fishery PS.ASS.4.EAST. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

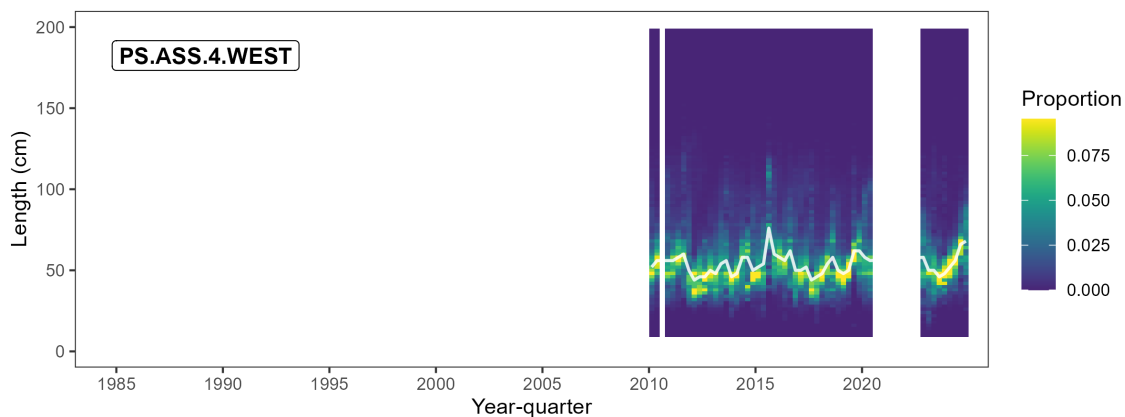


Figure F.5: Reweighted length compositions of yellowfin for the purse seine extraction fishery PS.ASS.4.WEST. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

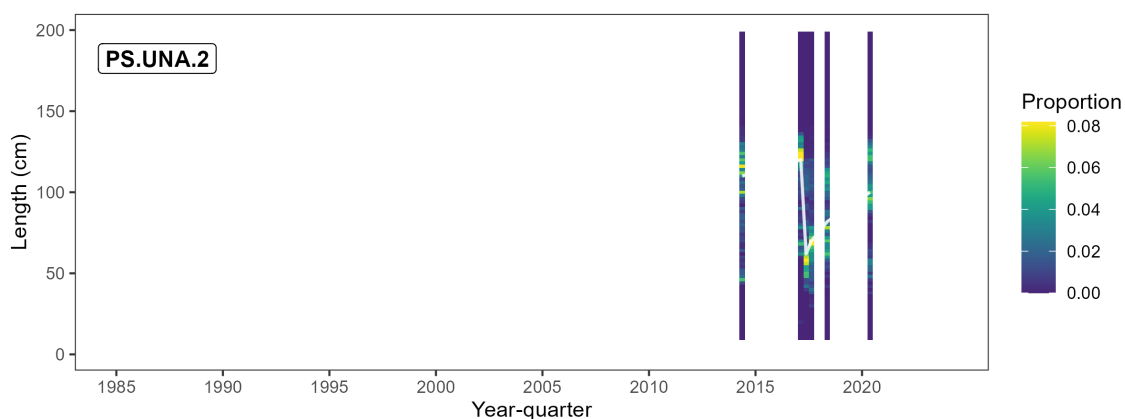


Figure F.6: Reweighted length compositions of yellowfin for the purse seine extraction fishery PS.UNA.2. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

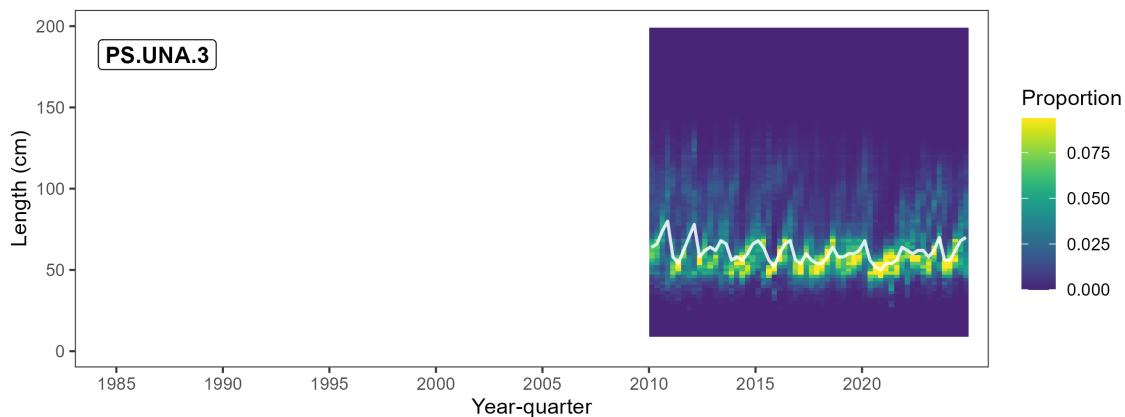


Figure F.7: Reweighted length compositions of yellowfin for the purse seine extraction fishery PS.UNA.3. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

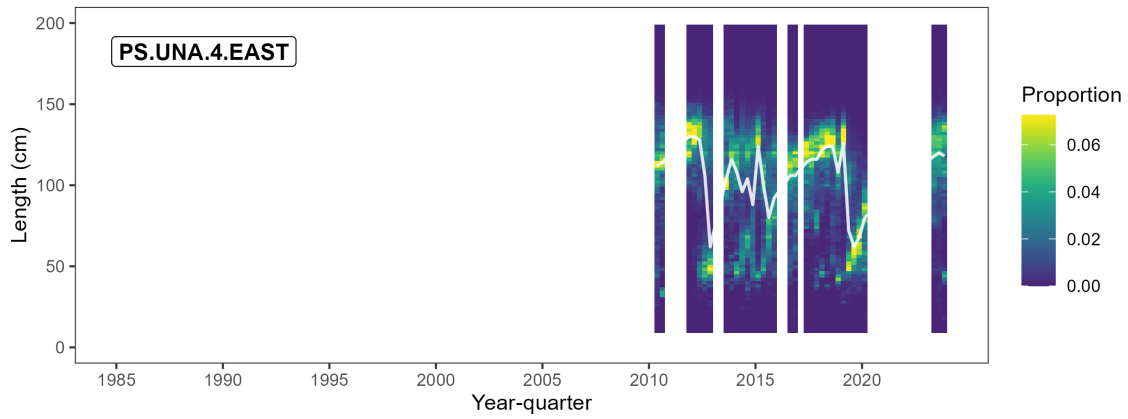


Figure F.8: Reweighted length compositions of yellowfin for the purse seine extraction fishery PS.UNA.4.EAST. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

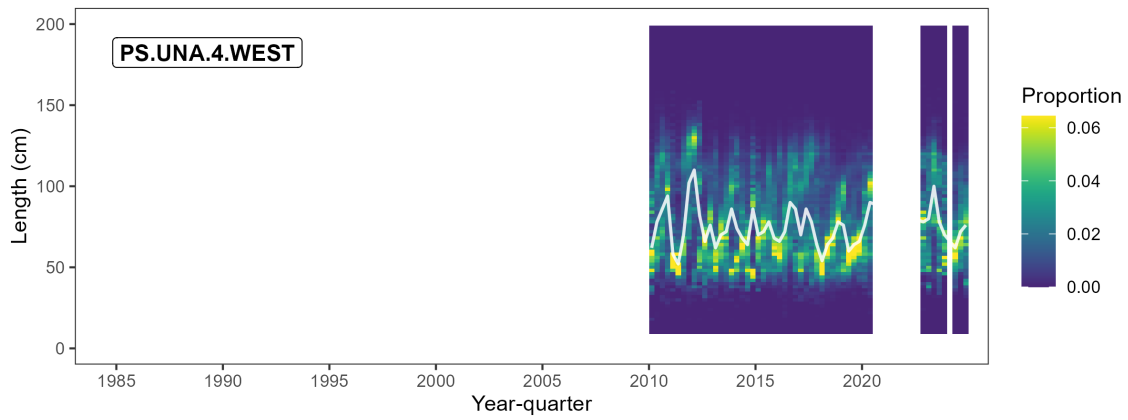


Figure F.9: Reweighted length compositions of yellowfin for the purse seine extraction fishery PS.UNA.4.WEST. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

F.2 Yellowfin domestic purse seine fisheries

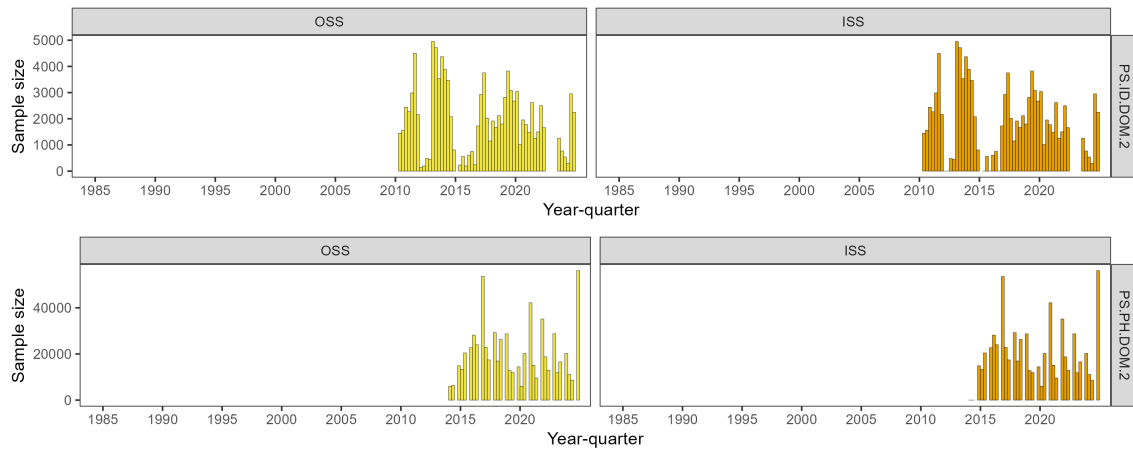


Figure F.10: Original sample sizes (OSS) and input sample sizes (ISS) for yellowfin domestic purse seine extraction fishery length compositions.

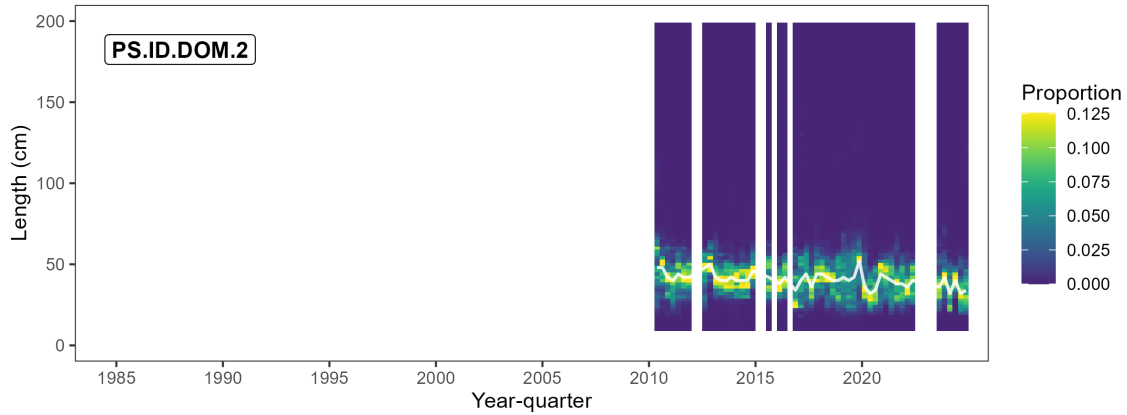


Figure F.11: Reweighted length compositions of yellowfin for the domestic purse seine extraction fishery PS.ID.DOM.2. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

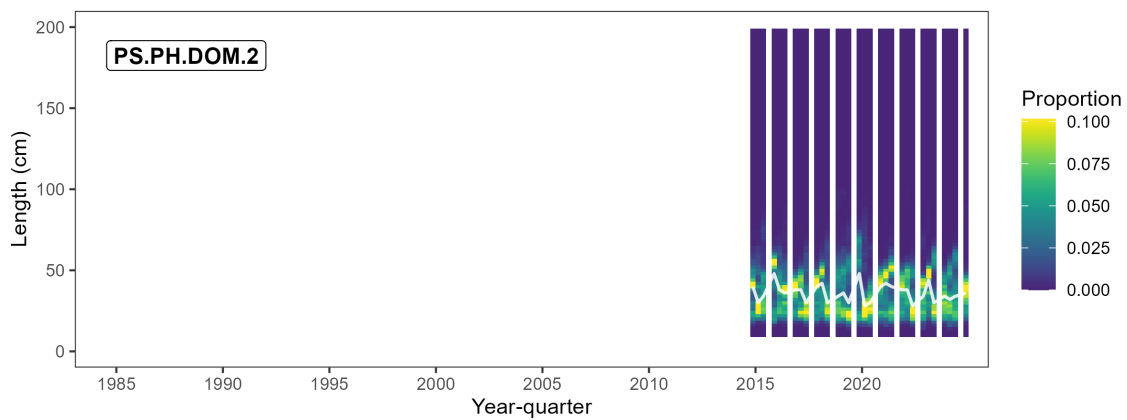


Figure F.12: Reweighted length compositions of yellowfin for the domestic purse seine extraction fishery PS.PH.DOM.2. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

G Bigeye longline extraction fishery compositions

G.1 Weight compositions, and weight-as-length compositions

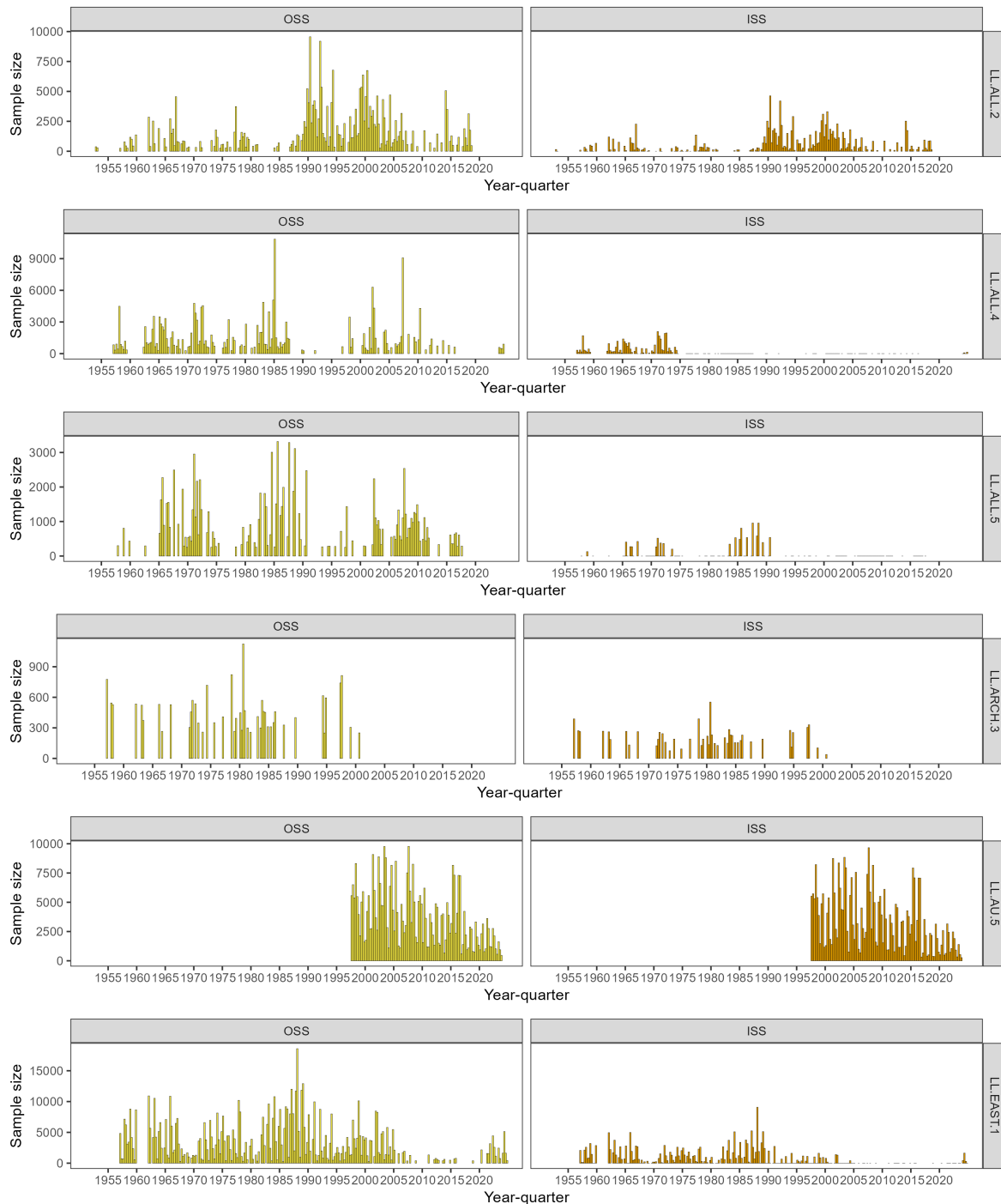


Figure G.1: Original sample sizes (OSS) and input sample sizes (ISS) for bigeye longline extraction fishery weight compositions, and weight-as-length compositions.

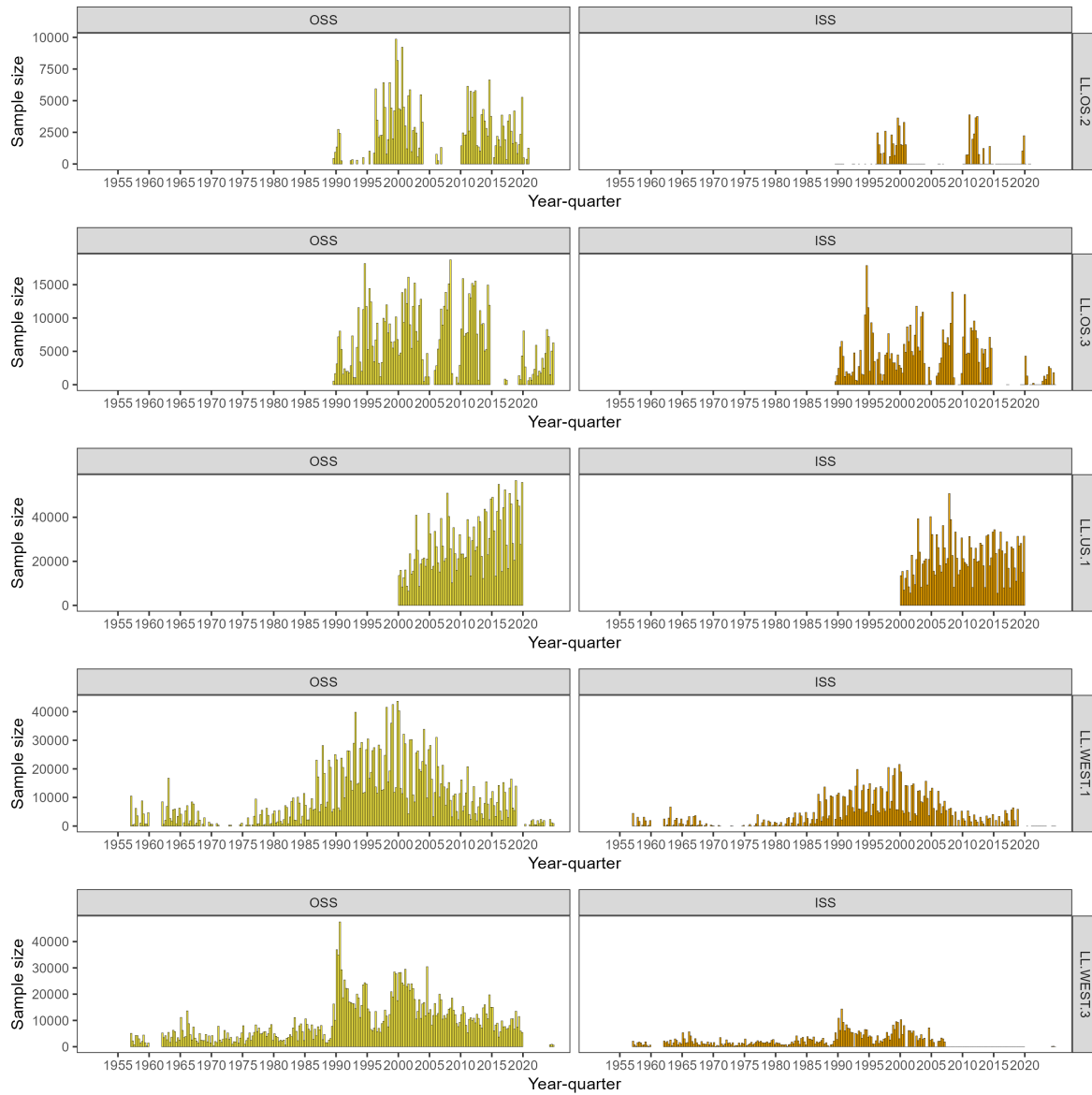


Figure G.1: Original sample sizes (OSS) and input sample sizes (ISS) for bigeye longline extraction fishery weight compositions, and weight-as-length compositions (contd.).

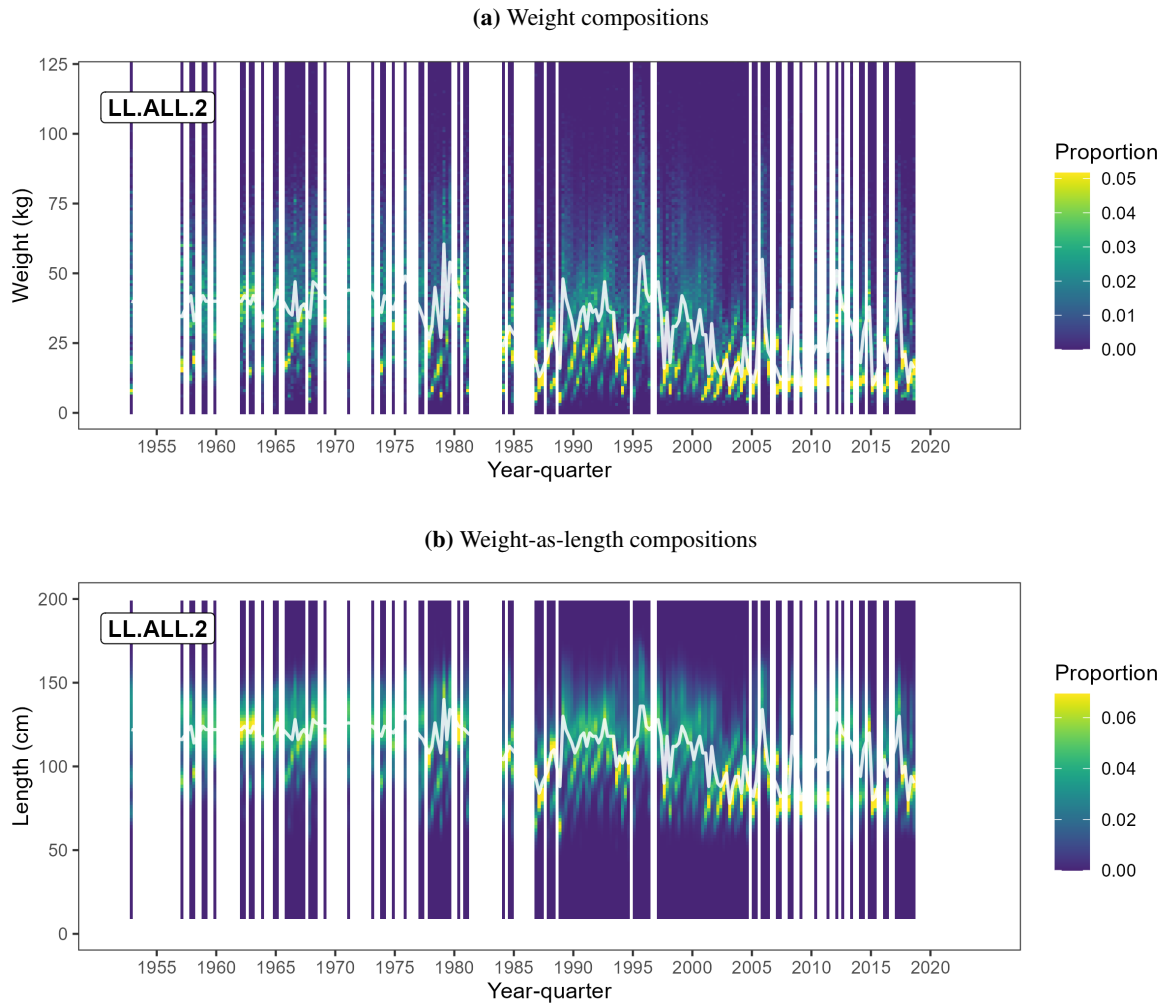


Figure G.2: Reweighted a) weight compositions and b) weight-as-length compositions of bigeye for the longline extraction fishery LL.ALL.2. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95% weighted percentile, and the white line the median size.

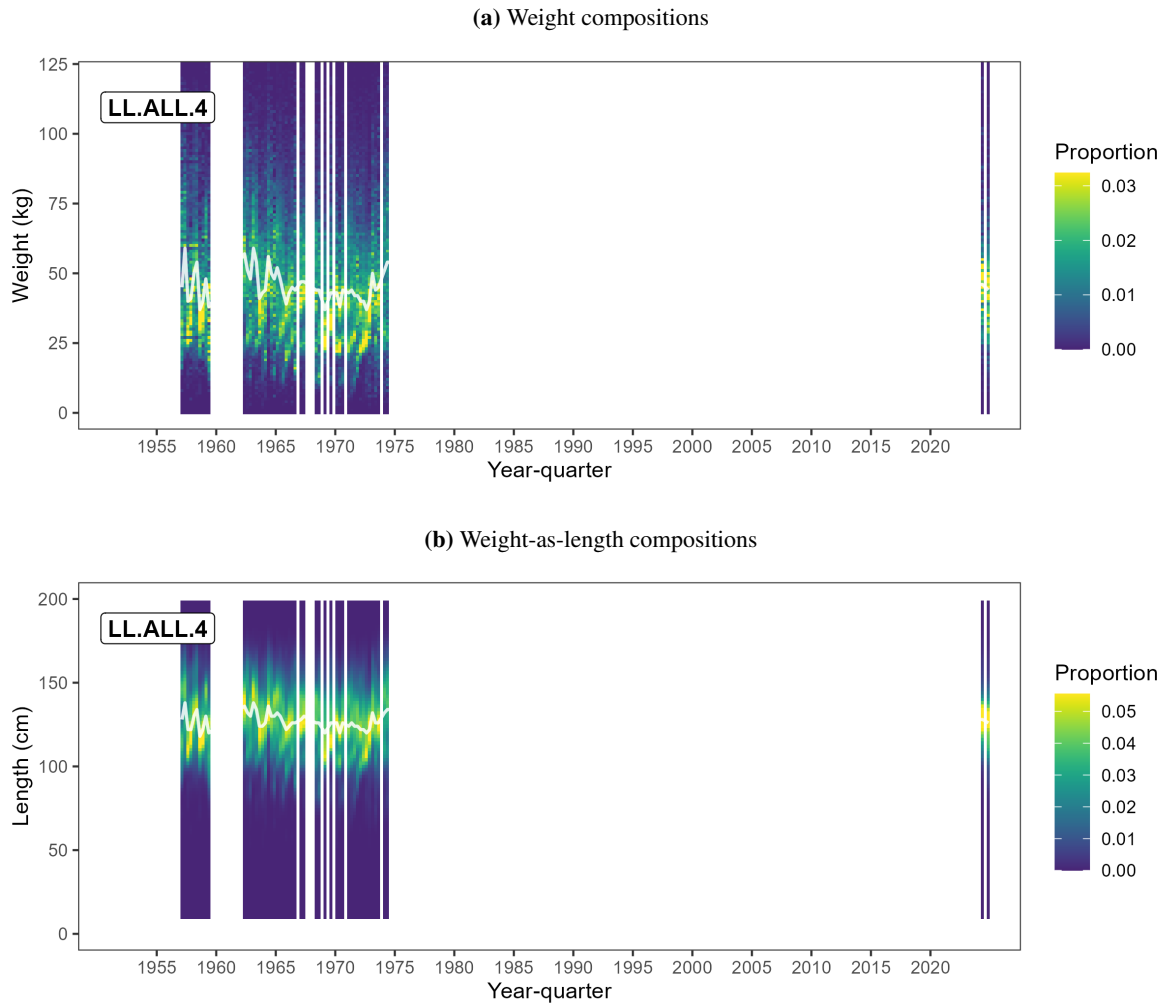


Figure G.3: Reweighted a) weight compositions and b) weight-as-length compositions of bigeye for the longline extraction fishery LL.ALL.4. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95% weighted percentile, and the white line the median size.

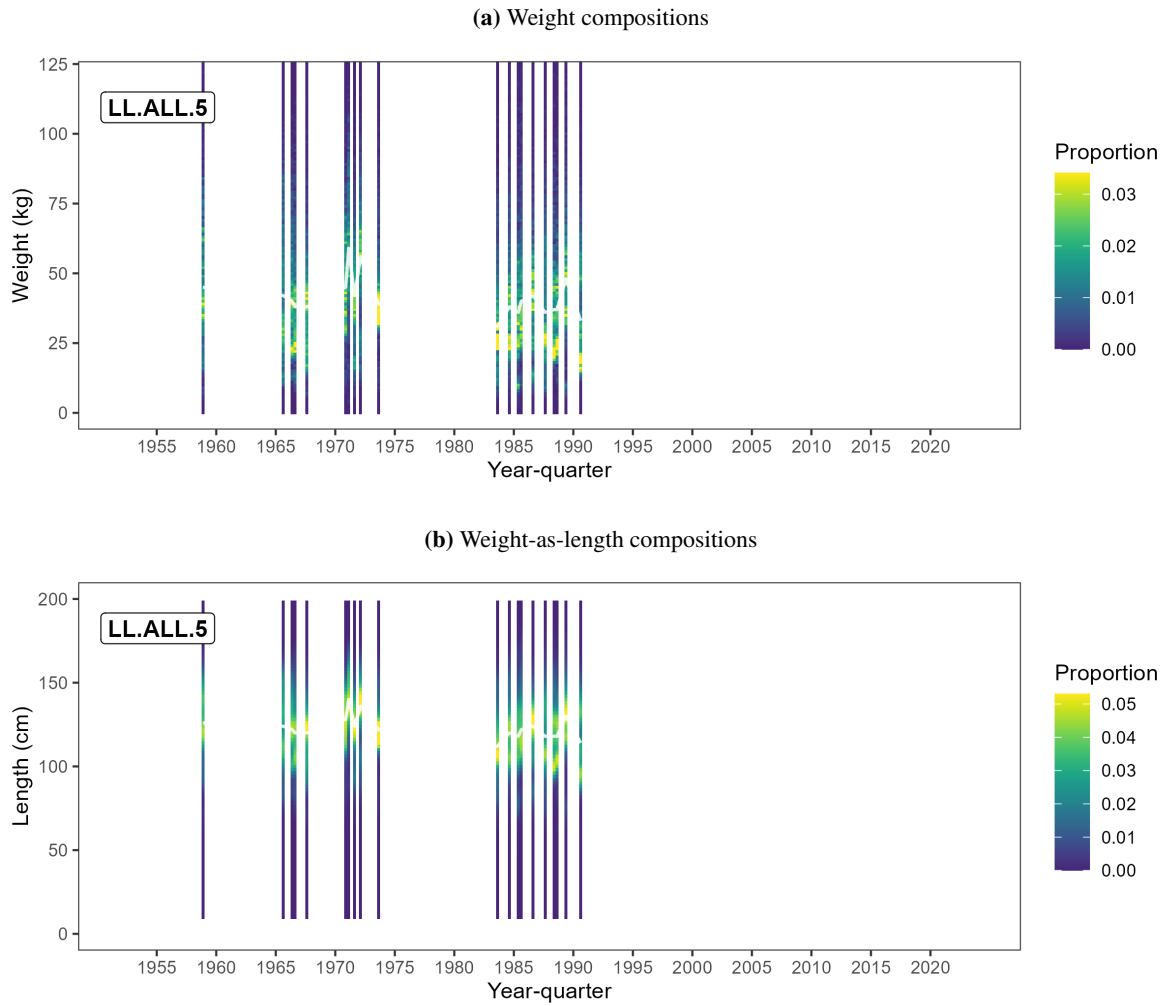


Figure G.4: Reweighted a) weight compositions and b) weight-as-length compositions of bigeye for the longline extraction fishery LL.ALL.5. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95% weighted percentile, and the white line the median size.

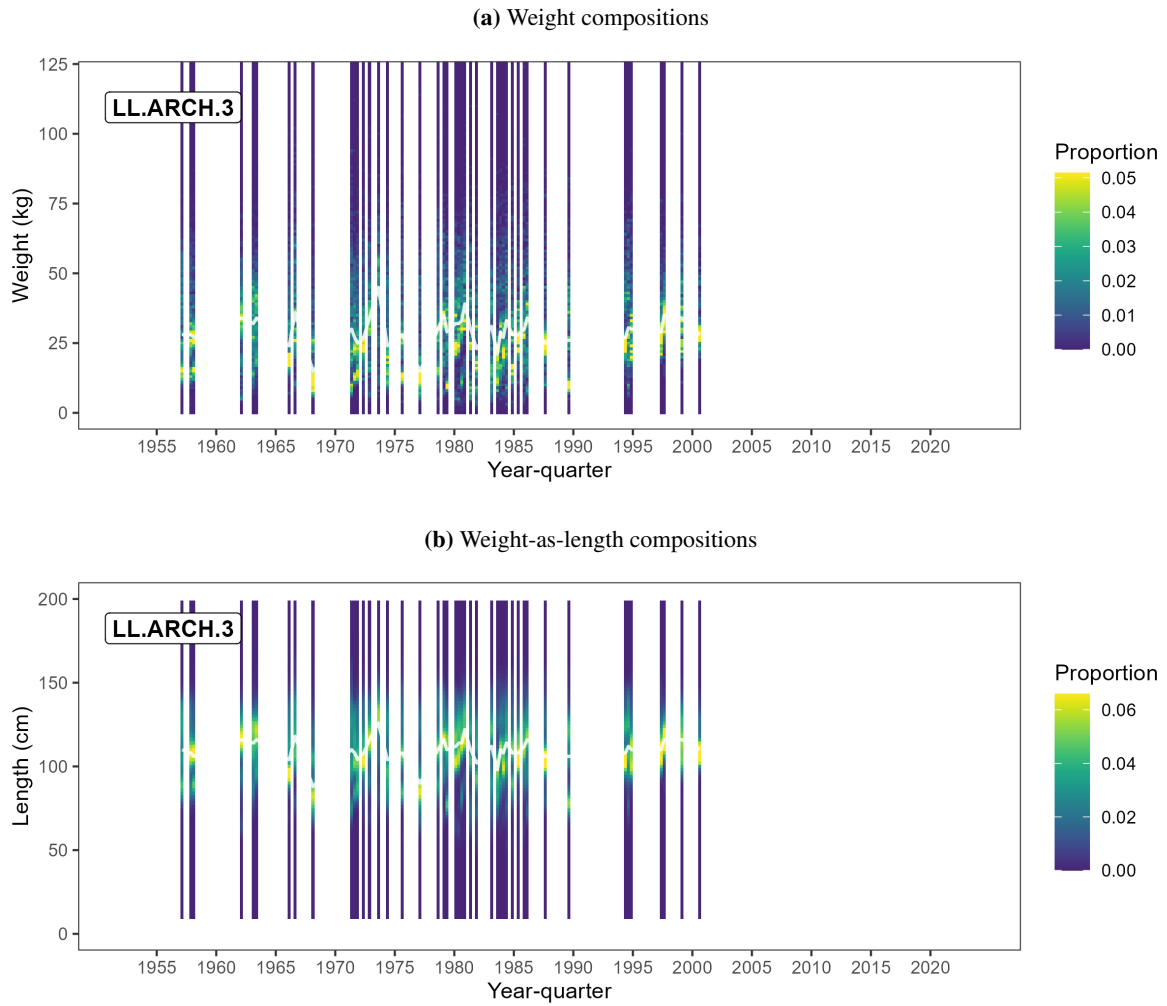


Figure G.5: Reweighted a) weight compositions and b) weight-as-length compositions of bigeye for the longline extraction fishery LL.ARCH.3. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95% weighted percentile, and the white line the median size.

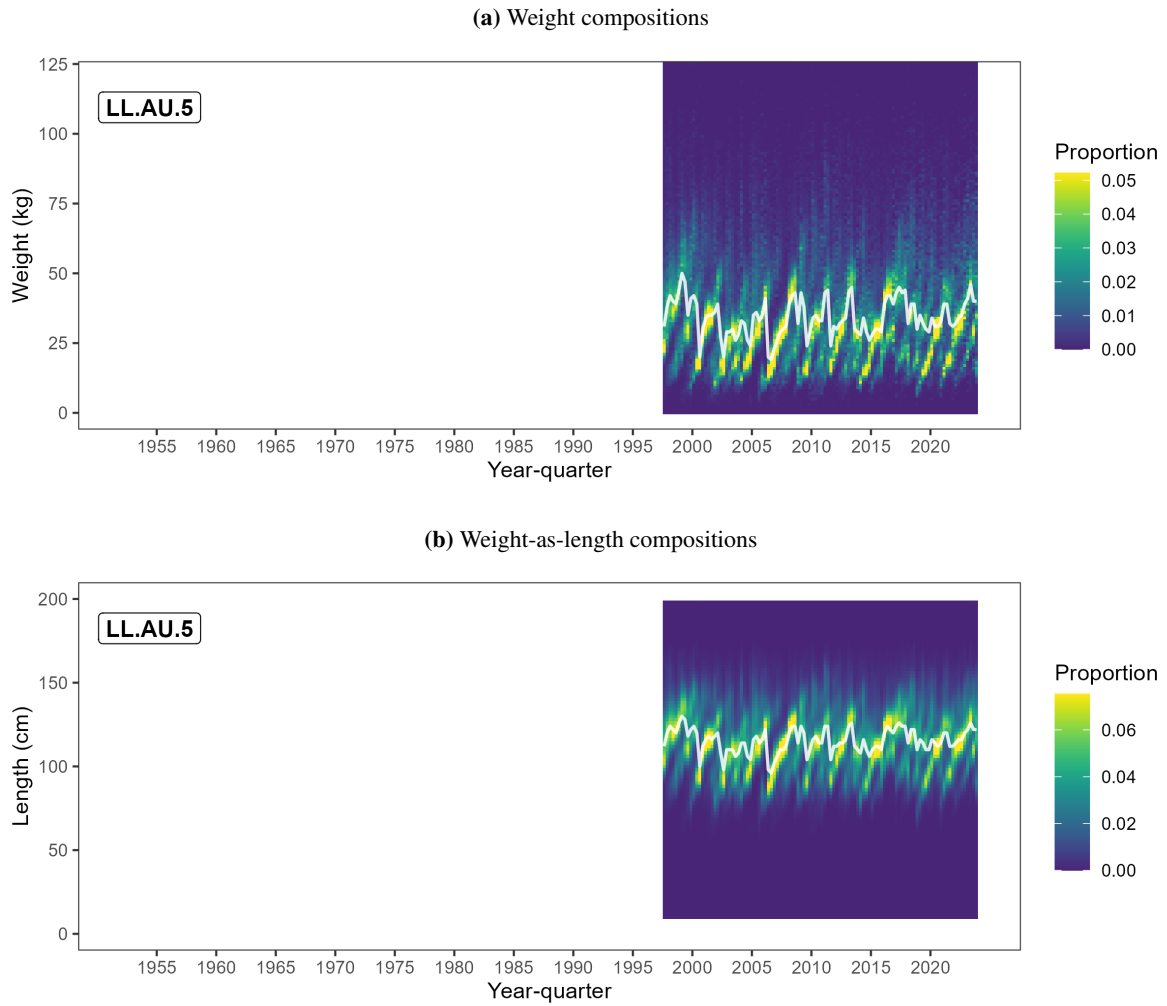


Figure G.6: Reweighted a) weight compositions and b) weight-as-length compositions of bigeye for the longline extraction fishery LL.AU.5. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95th weighted percentile, and the white line the median size.

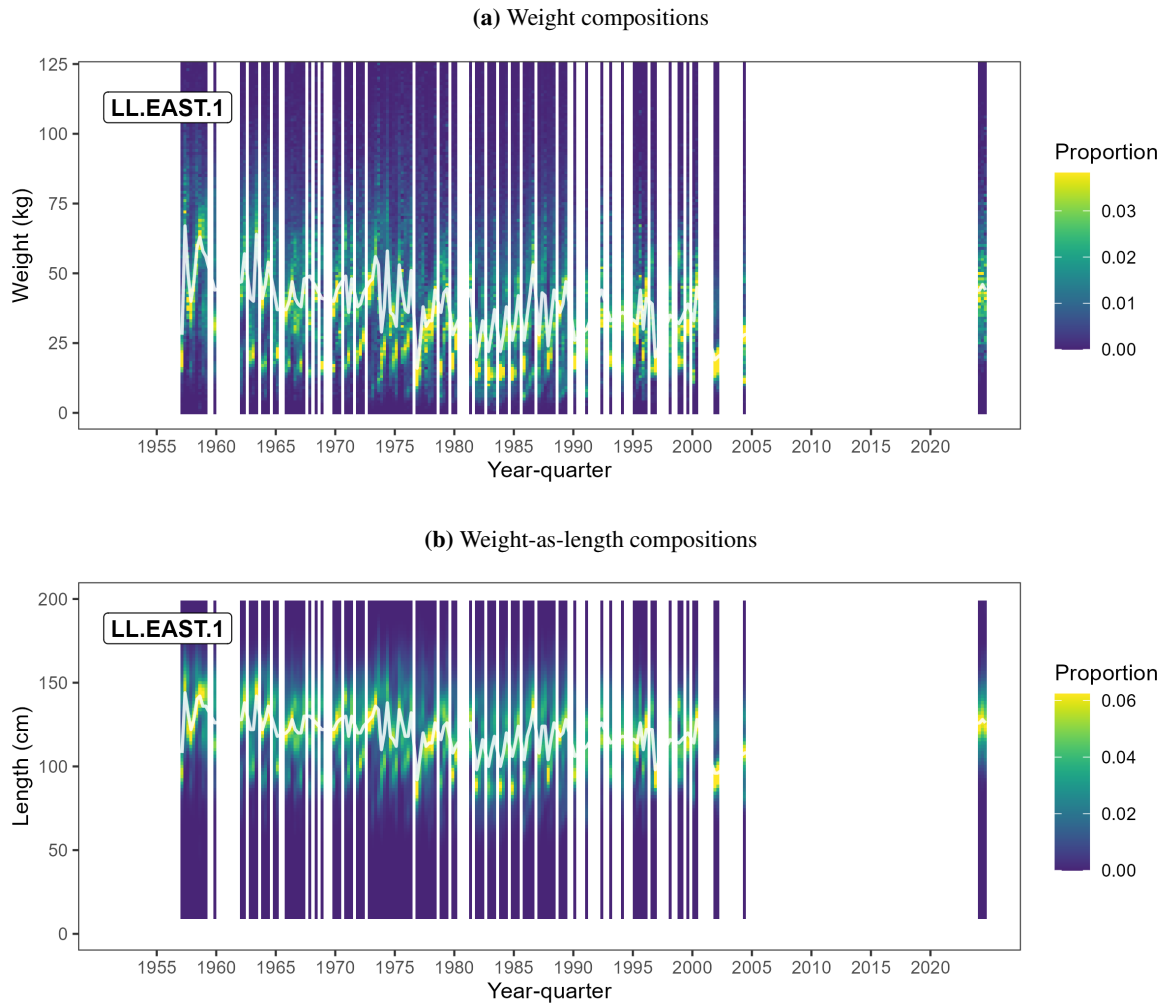


Figure G.7: Reweighted a) weight compositions and b) weight-as-length compositions of bigeye for the longline extraction fishery LL.EAST.1. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95% weighted percentile, and the white line the median size.

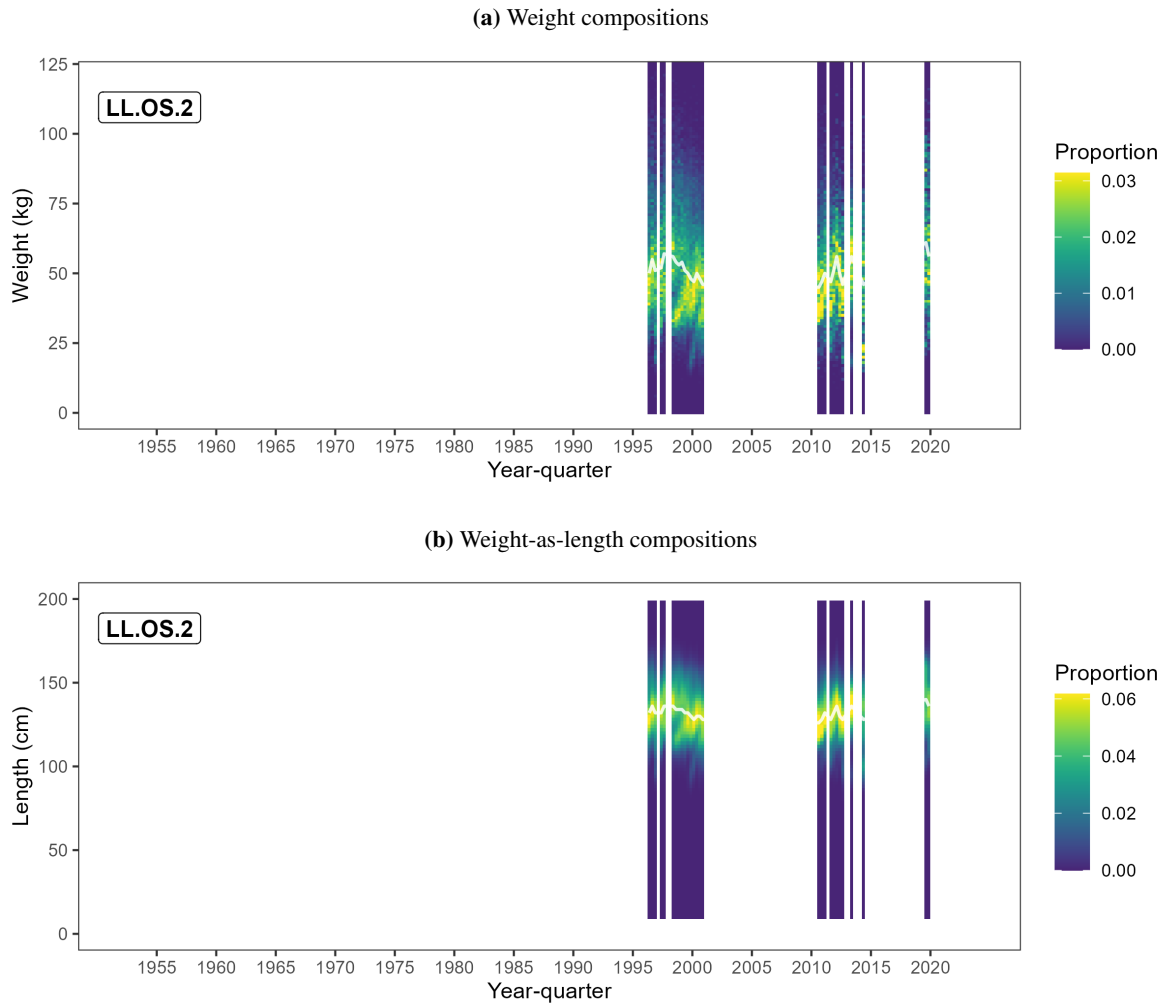


Figure G.8: Reweighted a) weight compositions and b) weight-as-length compositions of bigeye for the longline extraction fishery LL.OS.2. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95th weighted percentile, and the white line the median size.

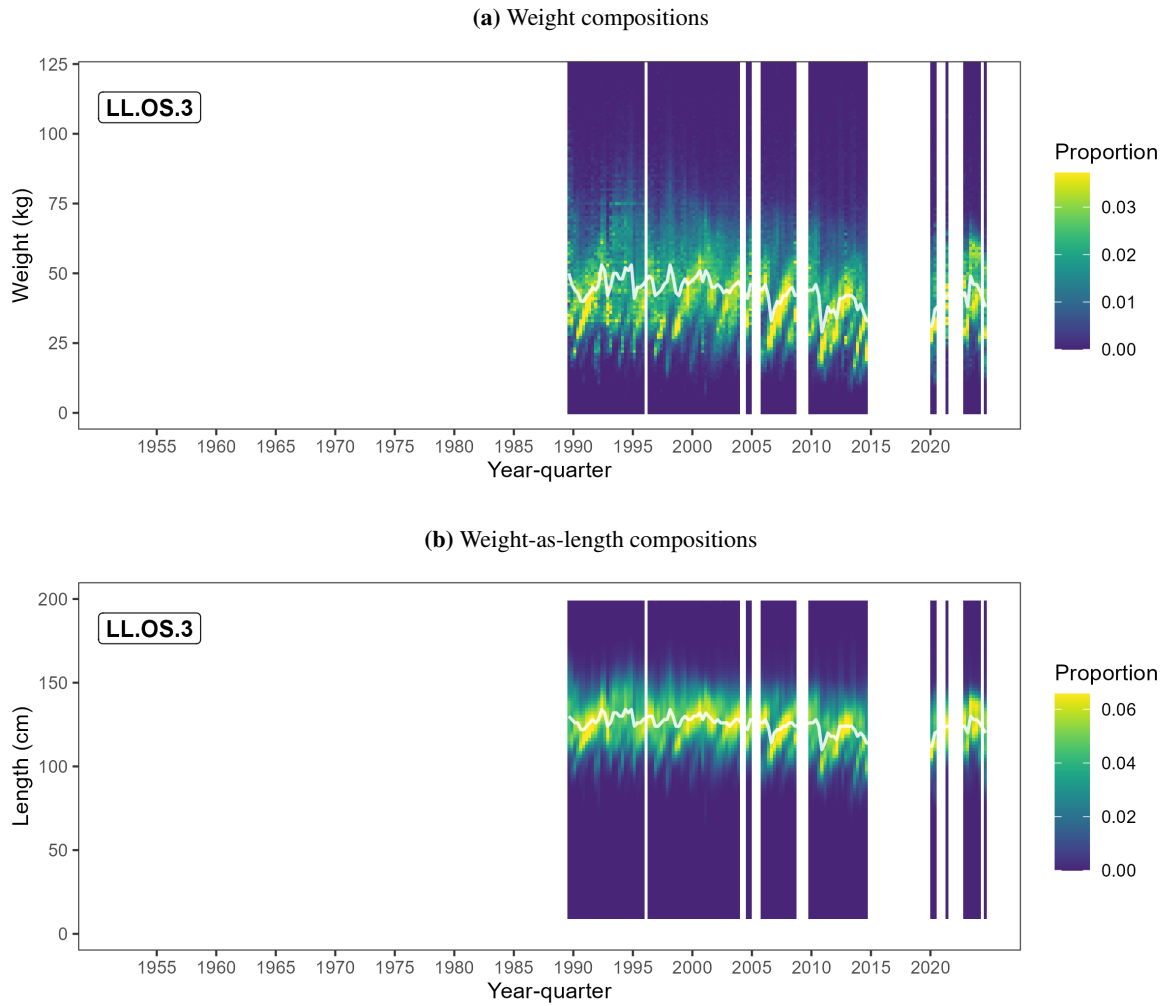


Figure G.9: Reweighted a) weight compositions and b) weight-as-length compositions of bigeye for the longline extraction fishery LL.OS.3. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95th weighted percentile, and the white line the median size.

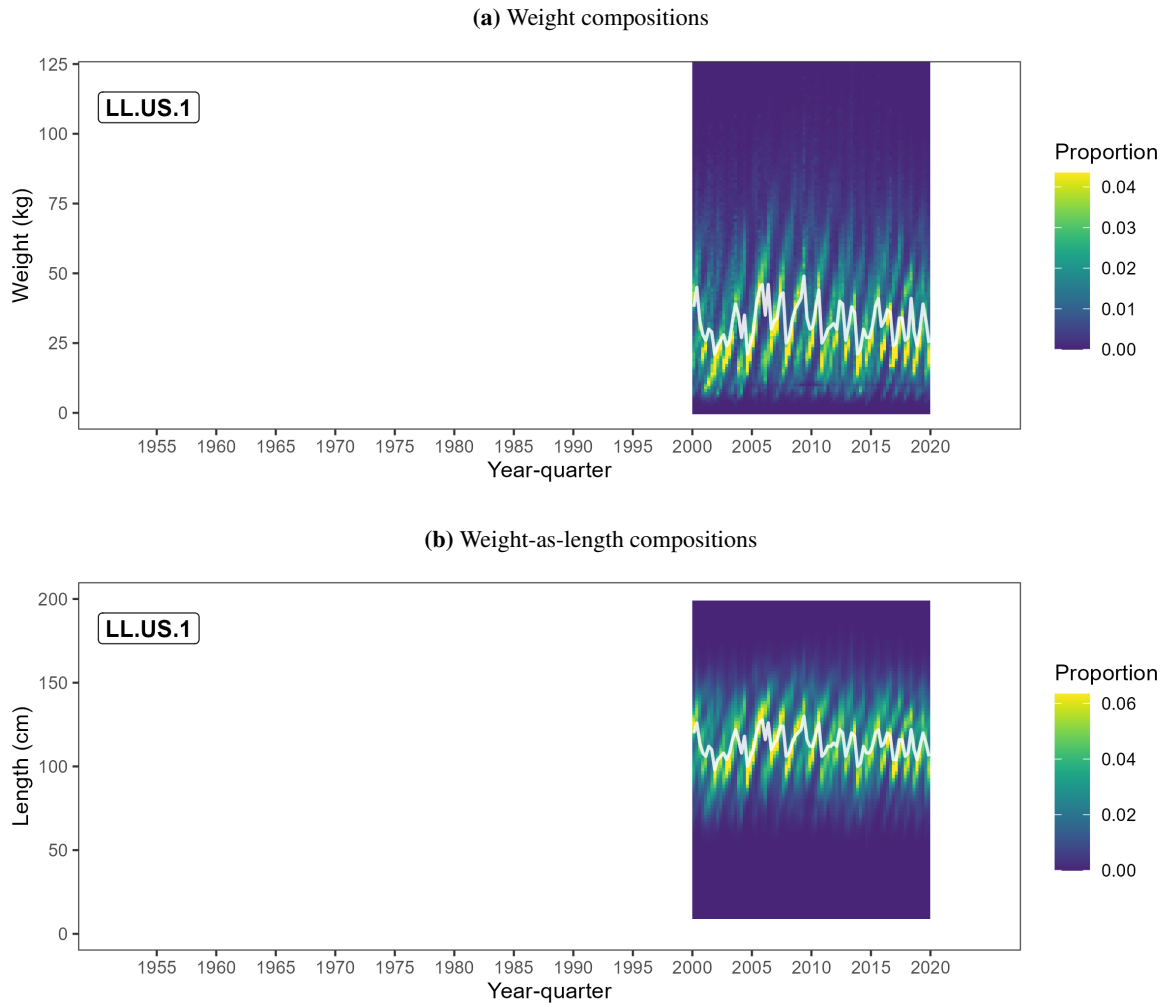


Figure G.10: Reweighted a) weight compositions and b) weight-as-length compositions of bigeye for the longline extraction fishery LL.US.1. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95th weighted percentile, and the white line the median size.

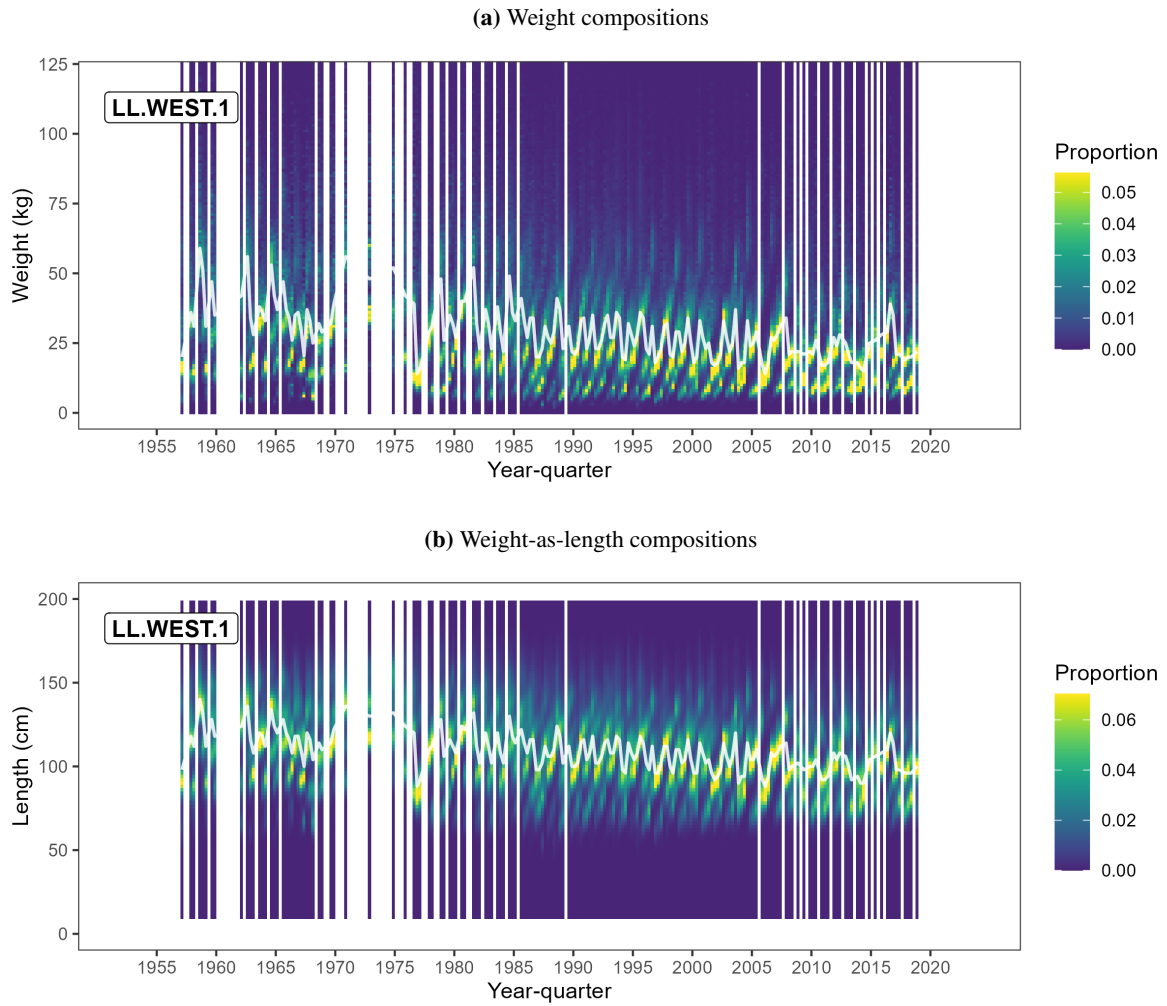


Figure G.11: Reweighted a) weight compositions and b) weight-as-length compositions of bigeye for the longline extraction fishery LL.WEST.1. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95% weighted percentile, and the white line the median size.

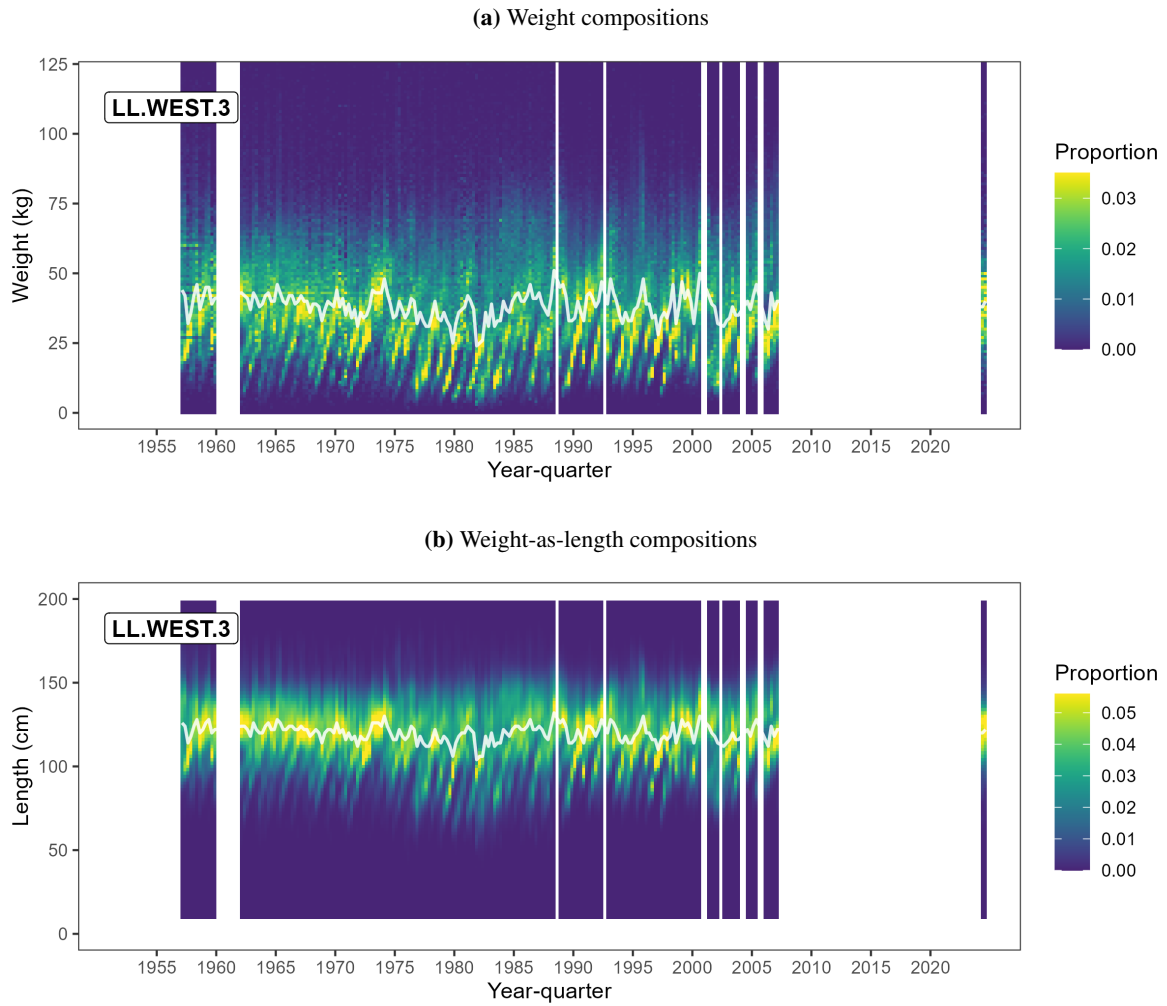


Figure G.12: Reweighted a) weight compositions and b) weight-as-length compositions of bigeye for the longline extraction fishery LL.WEST.3. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95% weighted percentile, and the white line the median size.

G.2 Weight-as-length plus length compositions

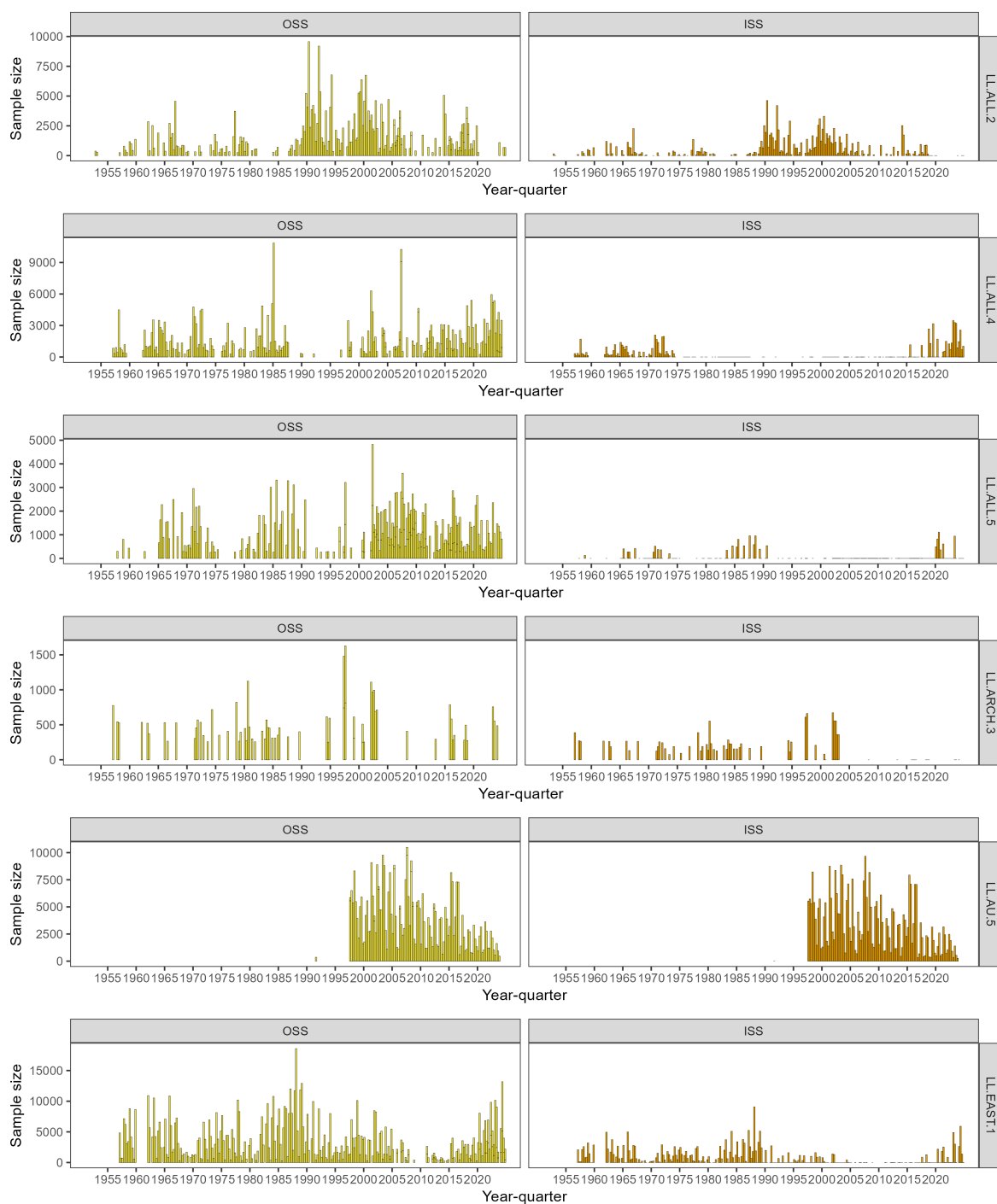


Figure G.13: Original sample sizes (OSS) and input sample sizes (ISS) for bigeye longline extraction fishery weight-as-length plus length compositions.

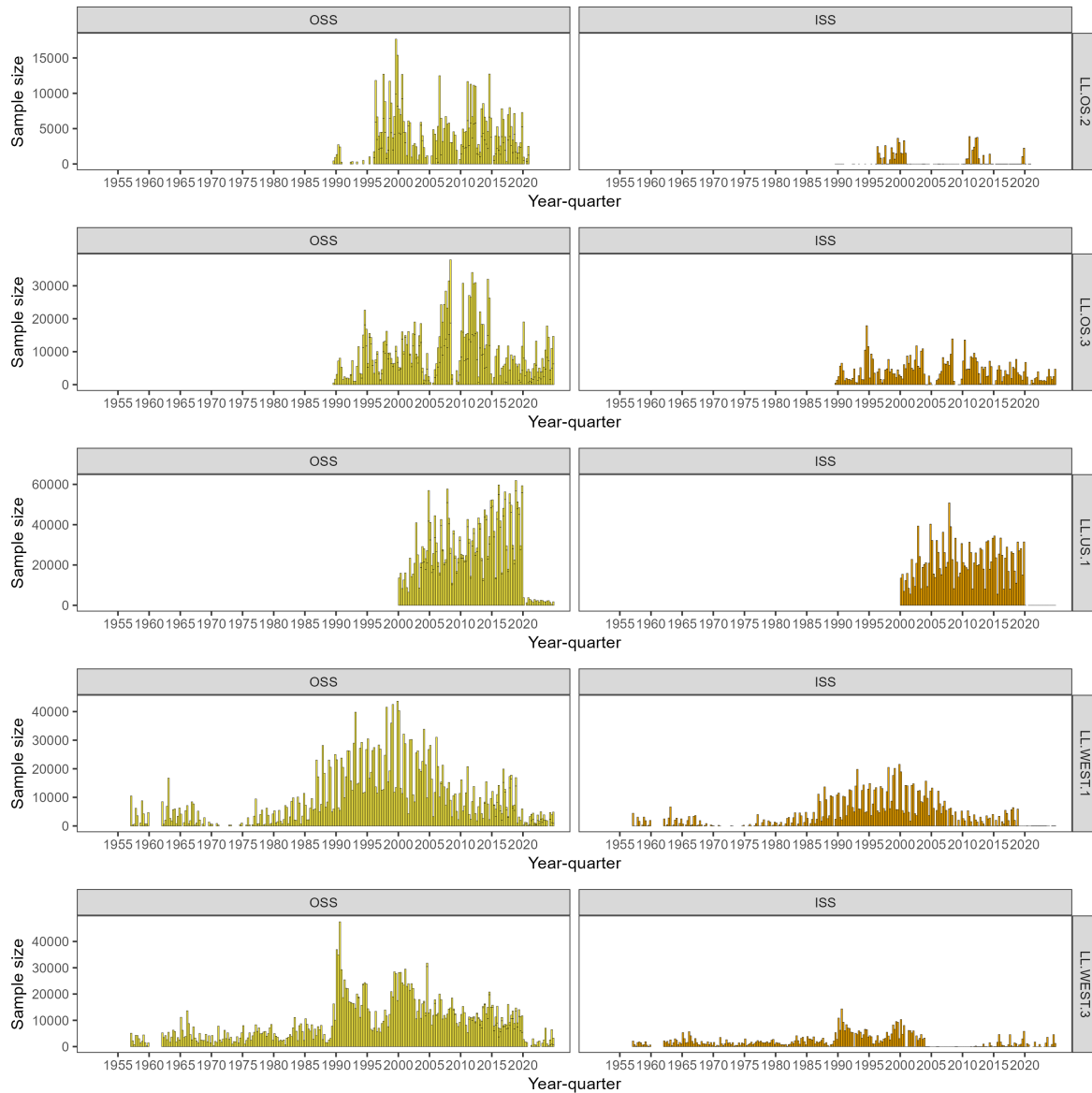


Figure G.13: Original sample sizes (OSS) and input sample sizes (ISS) for bigeye longline extraction fishery weight-as-length plus length compositions (contd.).

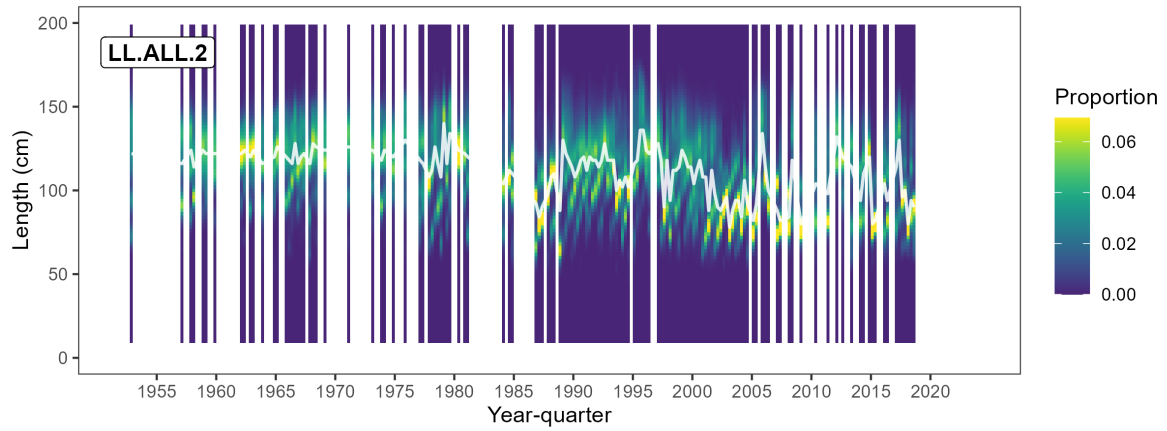


Figure G.14: Reweighted weight-as-length plus length compositions of bigeye for the longline extraction fishery LL.ALL.2. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

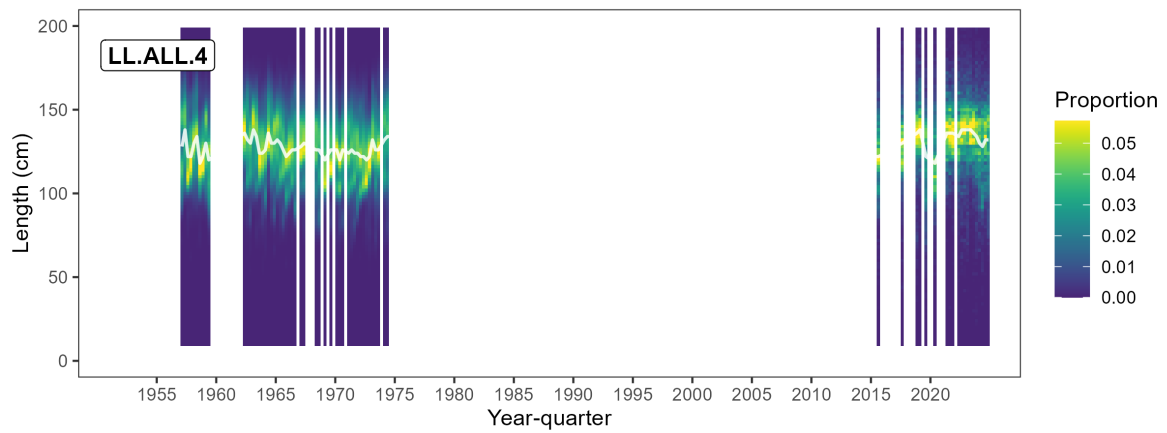


Figure G.15: Reweighted weight-as-length plus length compositions of bigeye for the longline extraction fishery LL.ALL.4. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

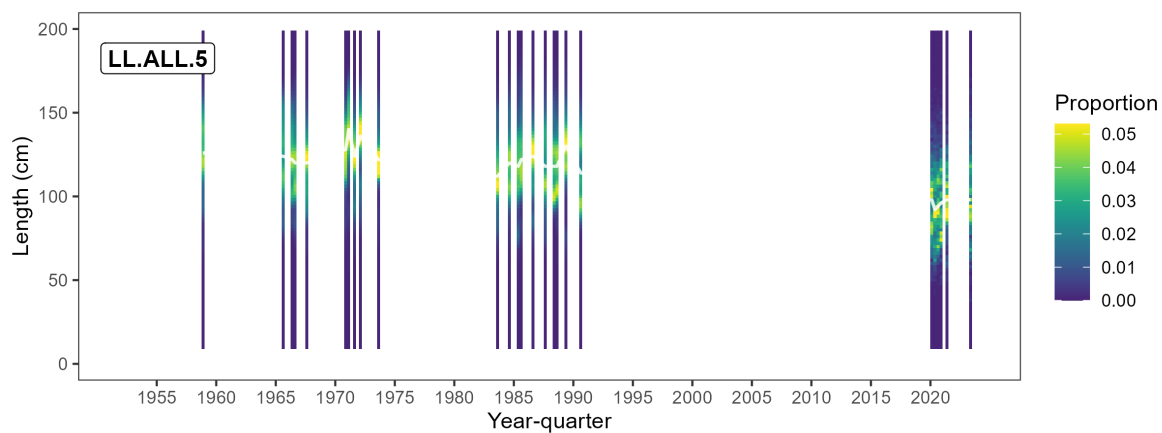


Figure G.16: Reweighted weight-as-length plus length compositions of bigeye for the longline extraction fishery LL.ALL.5. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

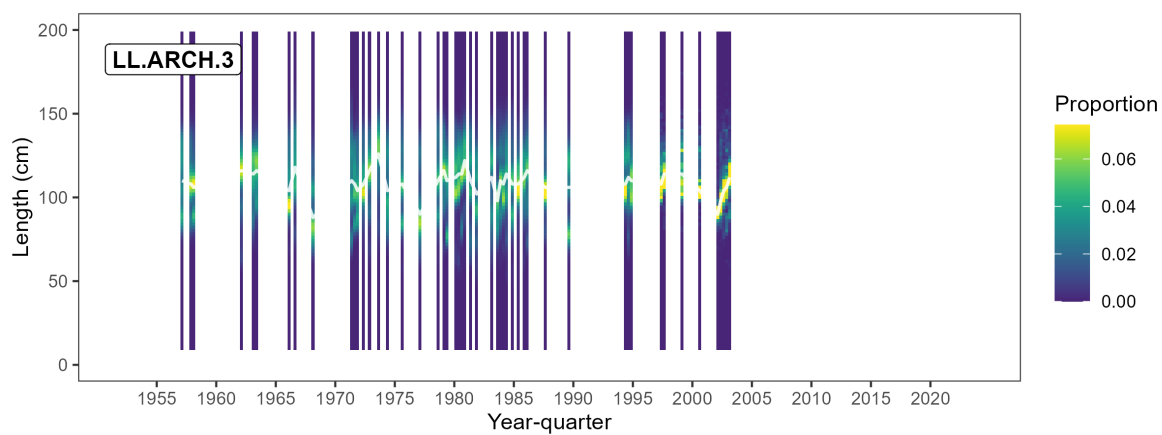


Figure G.17: Reweighted weight-as-length plus length compositions of bigeye for the longline extraction fishery LL.ARCH.3. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

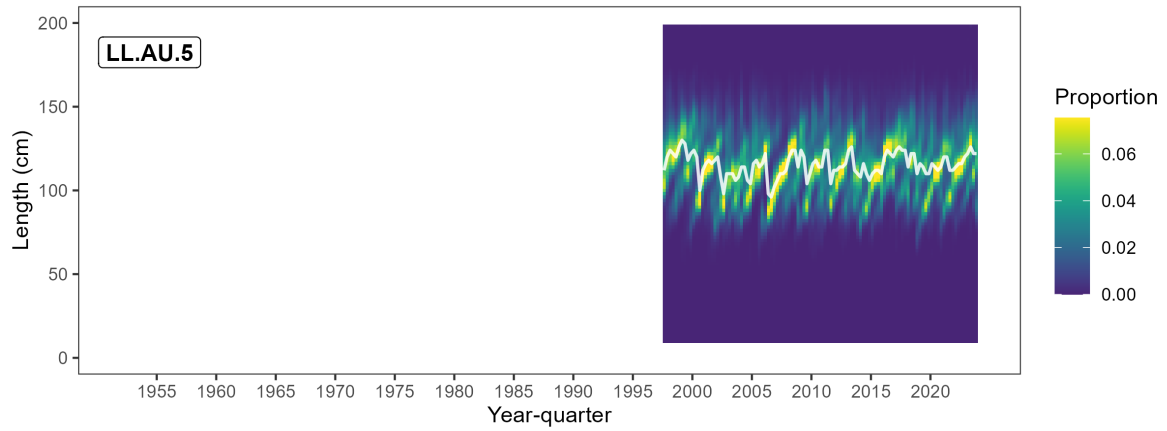


Figure G.18: Reweighted weight-as-length plus length compositions of bigeye for the longline extraction fishery LL.AU.5. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

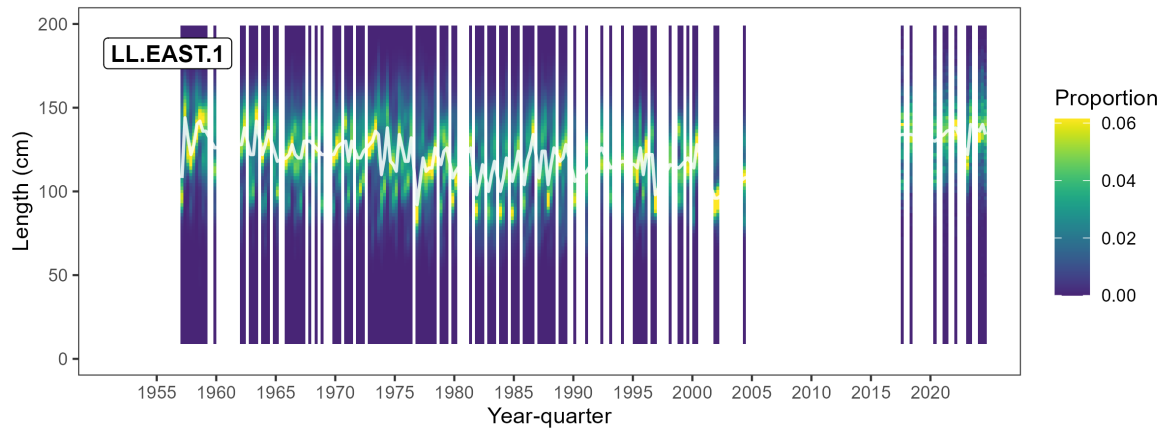


Figure G.19: Reweighted weight-as-length plus length compositions of bigeye for the longline extraction fishery LL.EAST.1. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

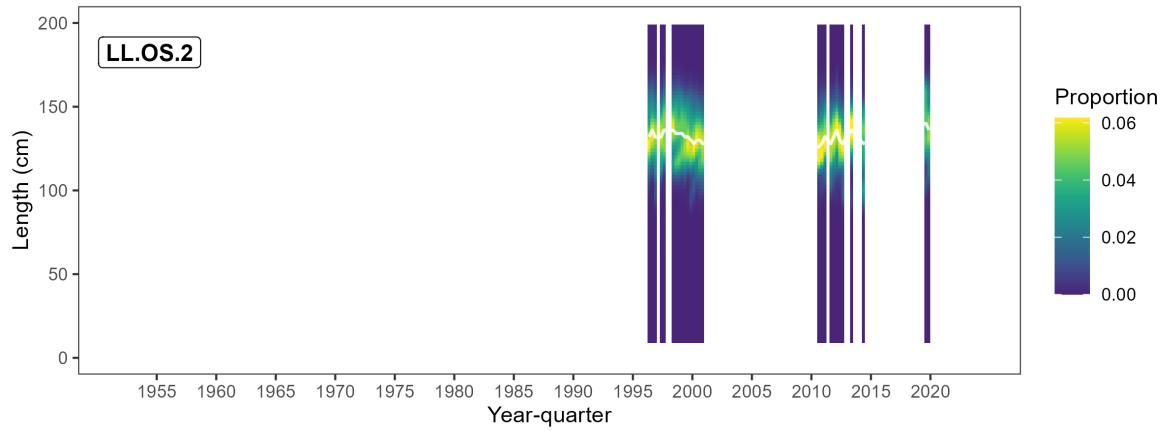


Figure G.20: Reweighted weight-as-length plus length compositions of bigeye for the longline extraction fishery LL.OS.2. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

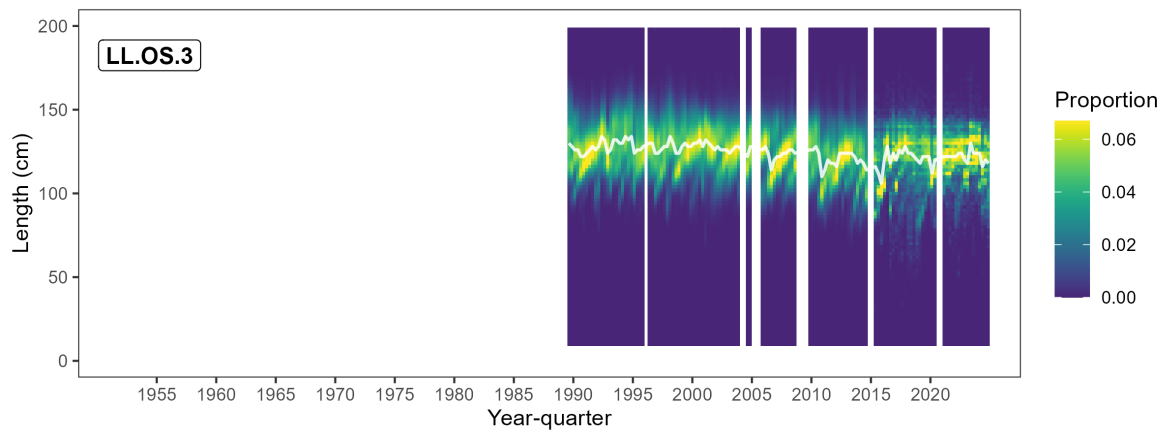


Figure G.21: Reweighted weight-as-length plus length compositions of bigeye for the longline extraction fishery LL.OS.3. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

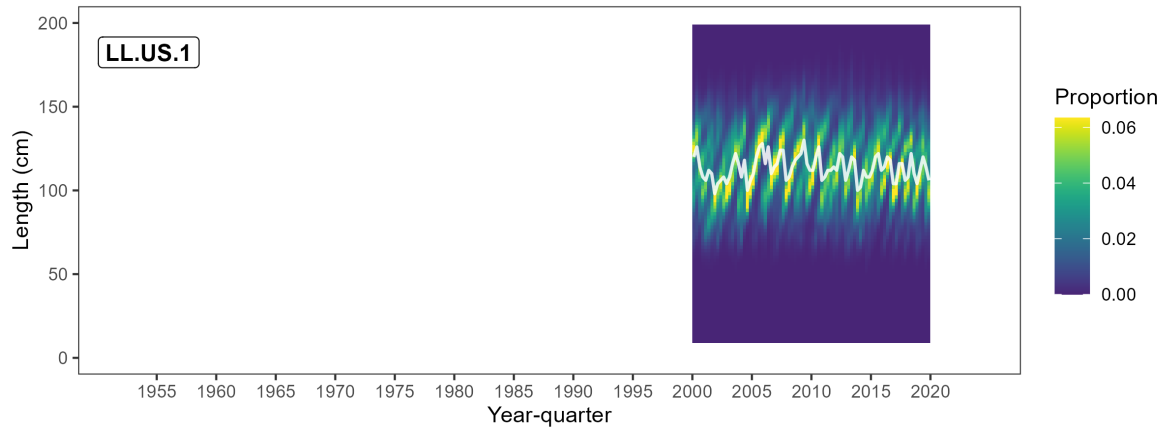


Figure G.22: Reweighted weight-as-length plus length compositions of bigeye for the longline extraction fishery LL.US.1. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

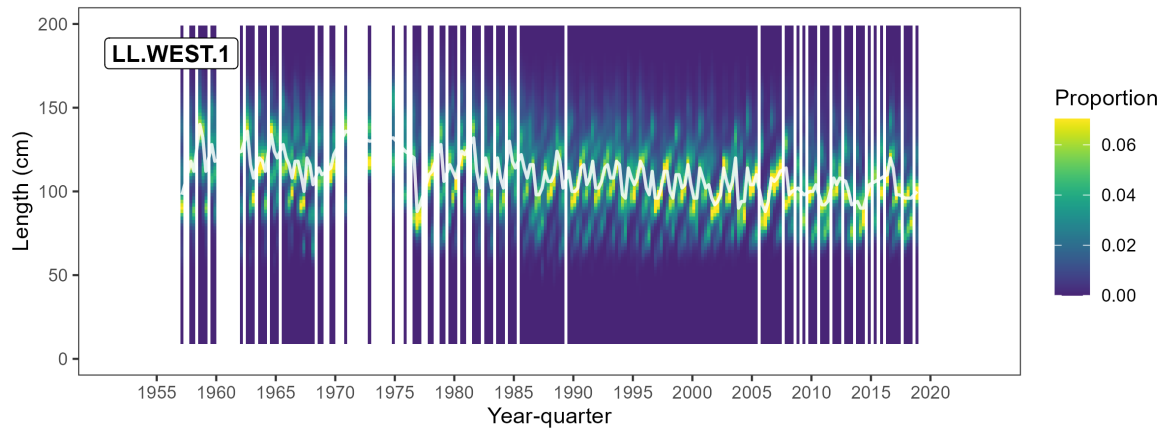


Figure G.23: Reweighted weight-as-length plus length compositions of bigeye for the longline extraction fishery LL.WEST.1. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

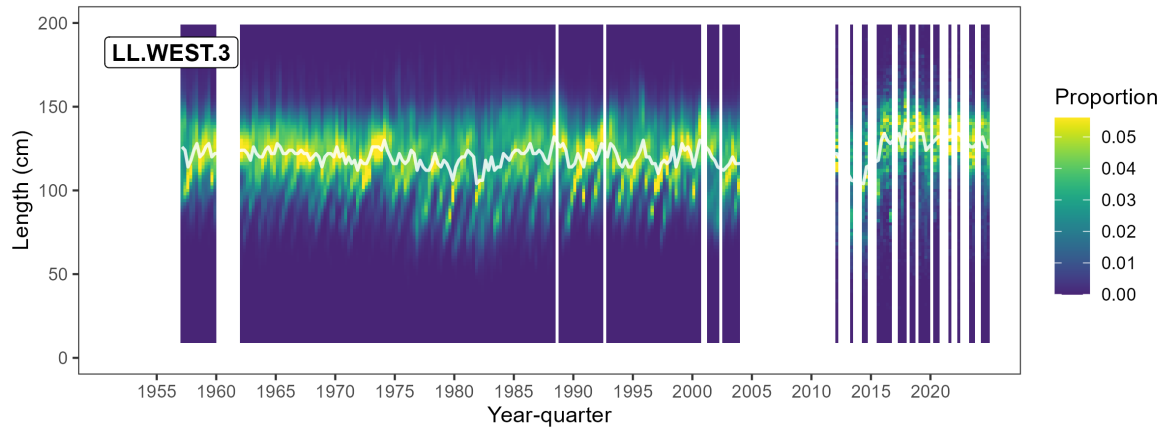


Figure G.24: Reweighted weight-as-length plus length compositions of bigeye for the longline extraction fishery LL.WEST.3. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

H Yellowfin longline extraction fishery compositions

H.1 Weight compositions, and weight-as-length compositions

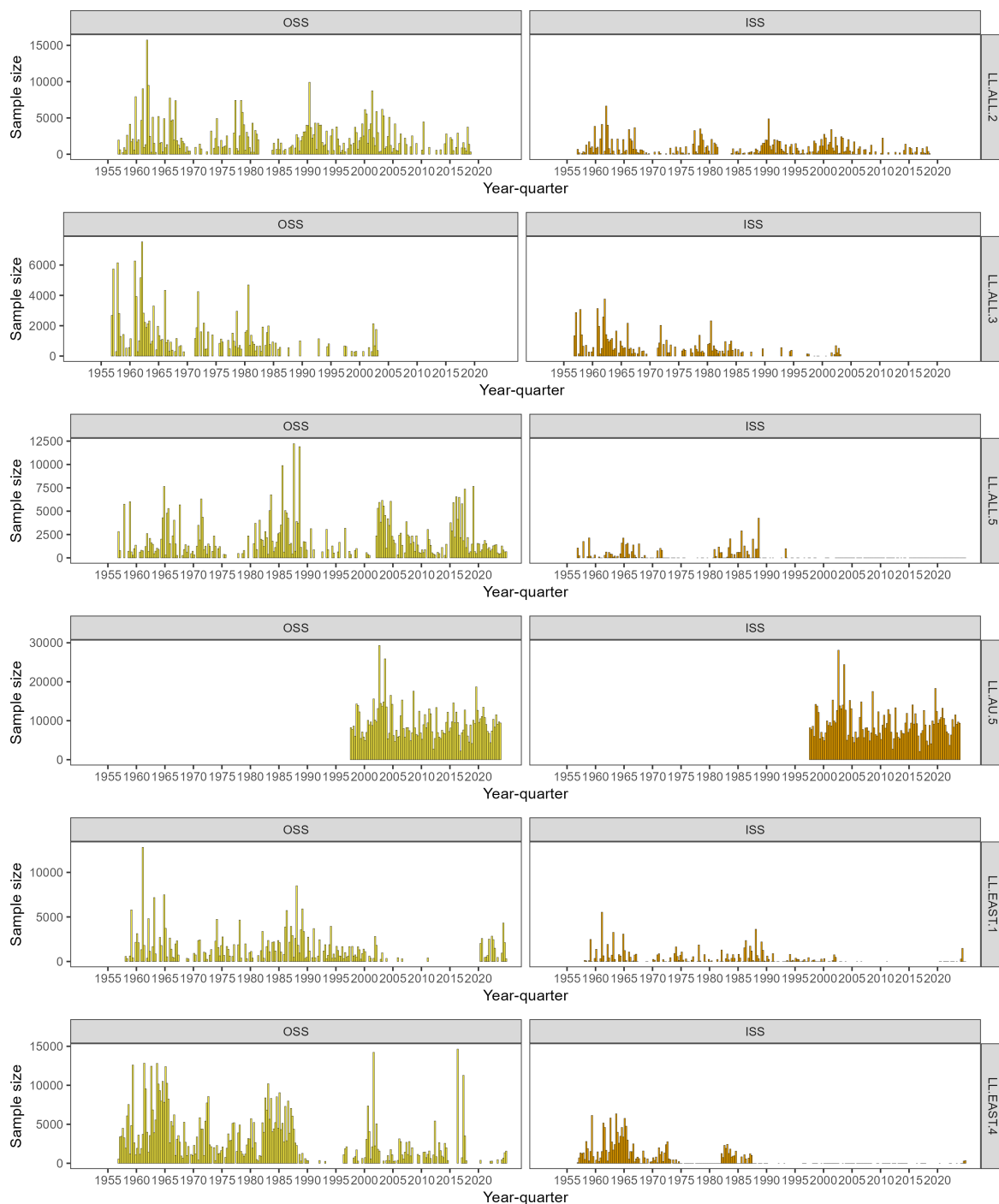


Figure H.1: Original sample sizes (OSS) and input sample sizes (ISS) for yellowfin longline extraction fishery weight compositions, and weight-as-length compositions.

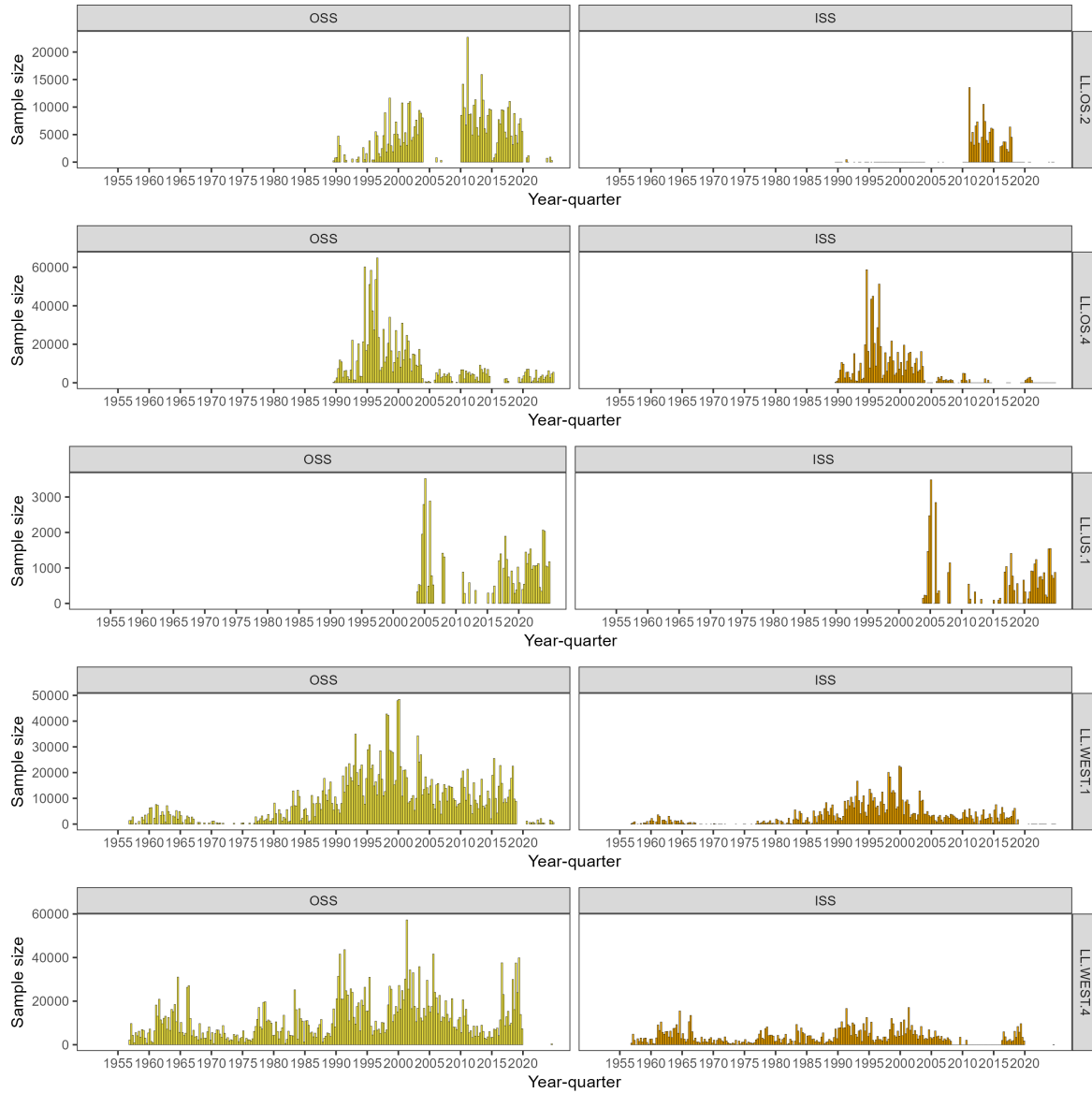


Figure H.1: Original sample sizes (OSS) and input sample sizes (ISS) for yellowfin longline extraction fishery weight compositions, and weight-as-length compositions (contd.).

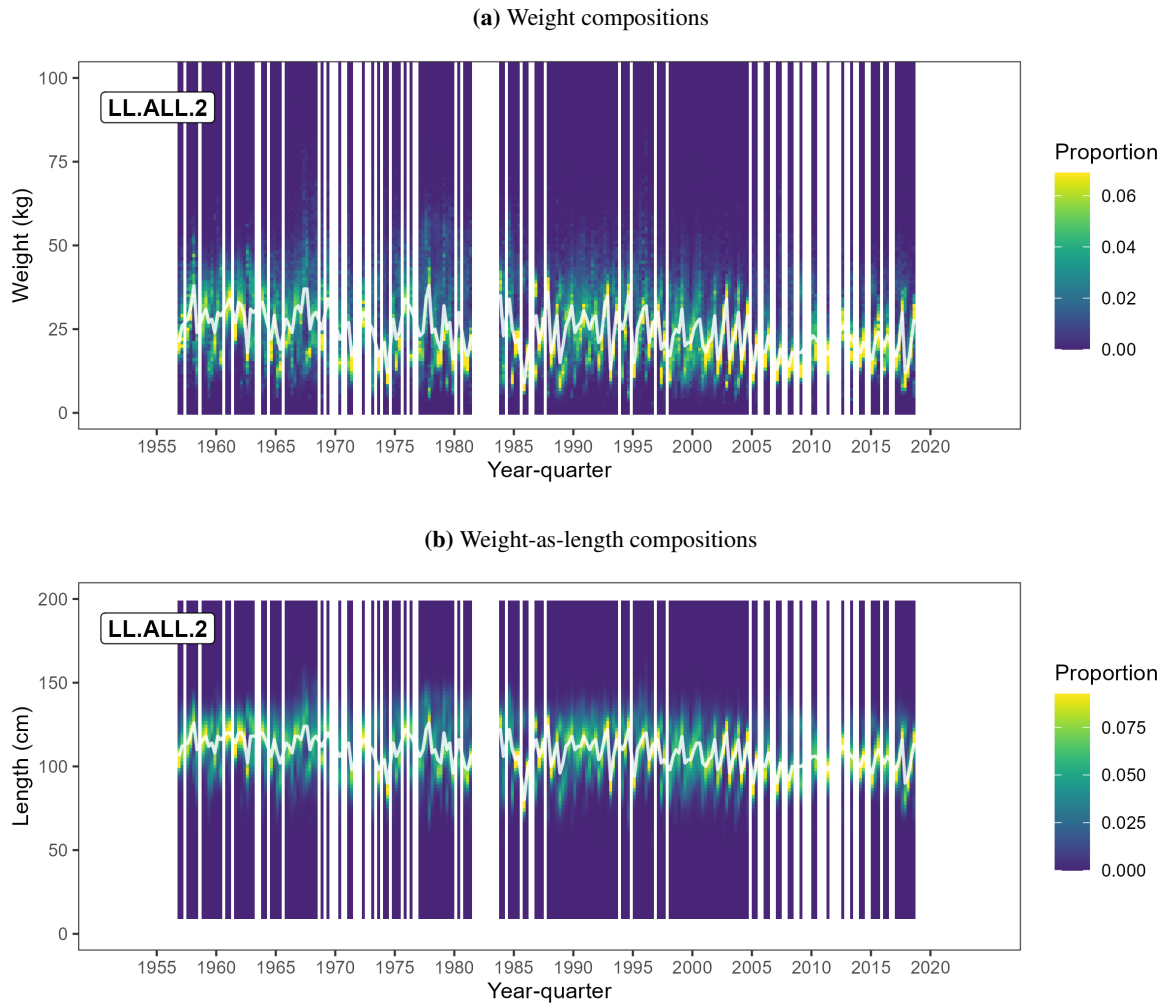


Figure H.2: Reweighted a) weight compositions and b) weight-as-length compositions of yellowfin for the longline extraction fishery LL.ALL.2. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95% weighted percentile, and the white line the median size.

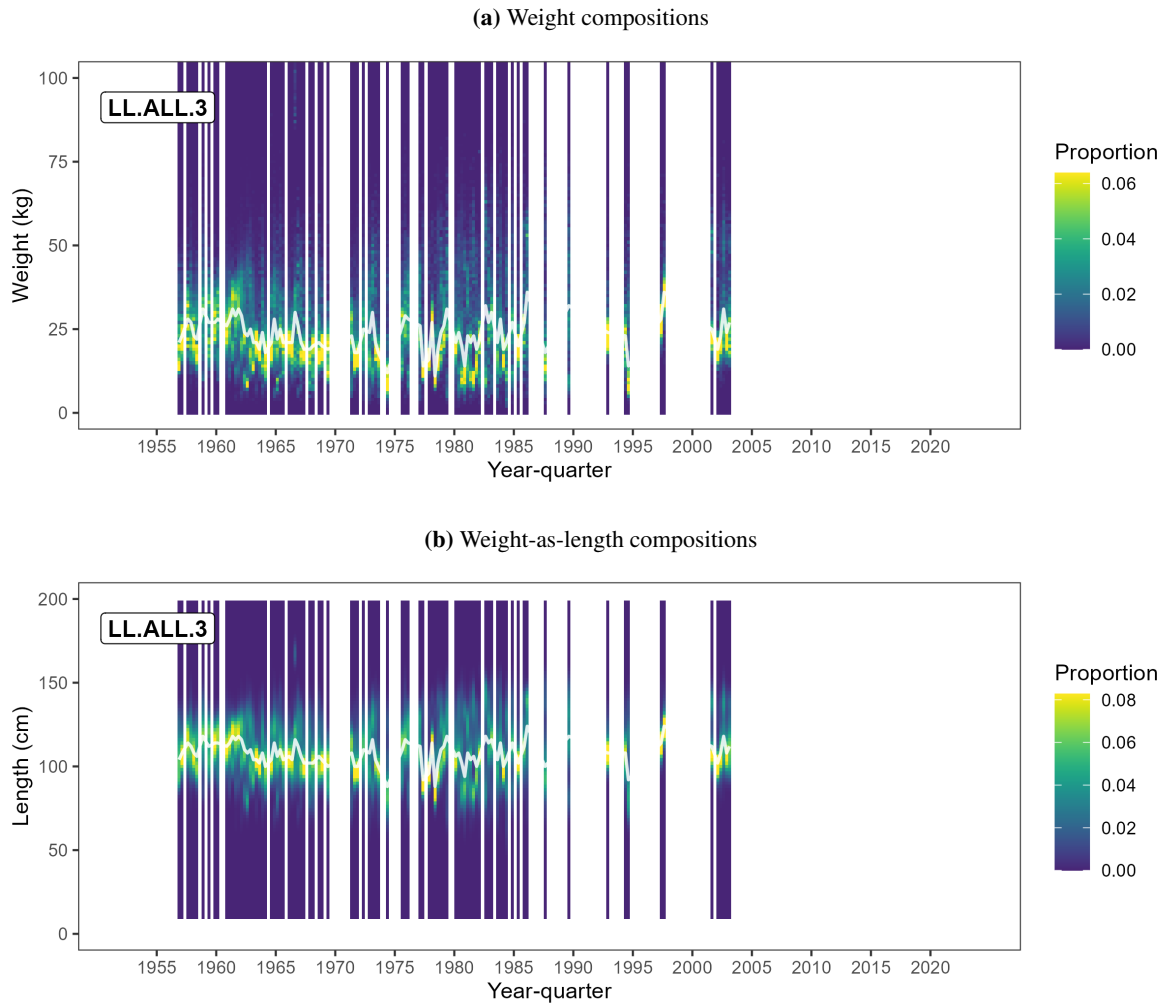


Figure H.3: Reweighted a) weight compositions and b) weight-as-length compositions of yellowfin for the longline extraction fishery LL.ALL.3. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95% weighted percentile, and the white line the median size.

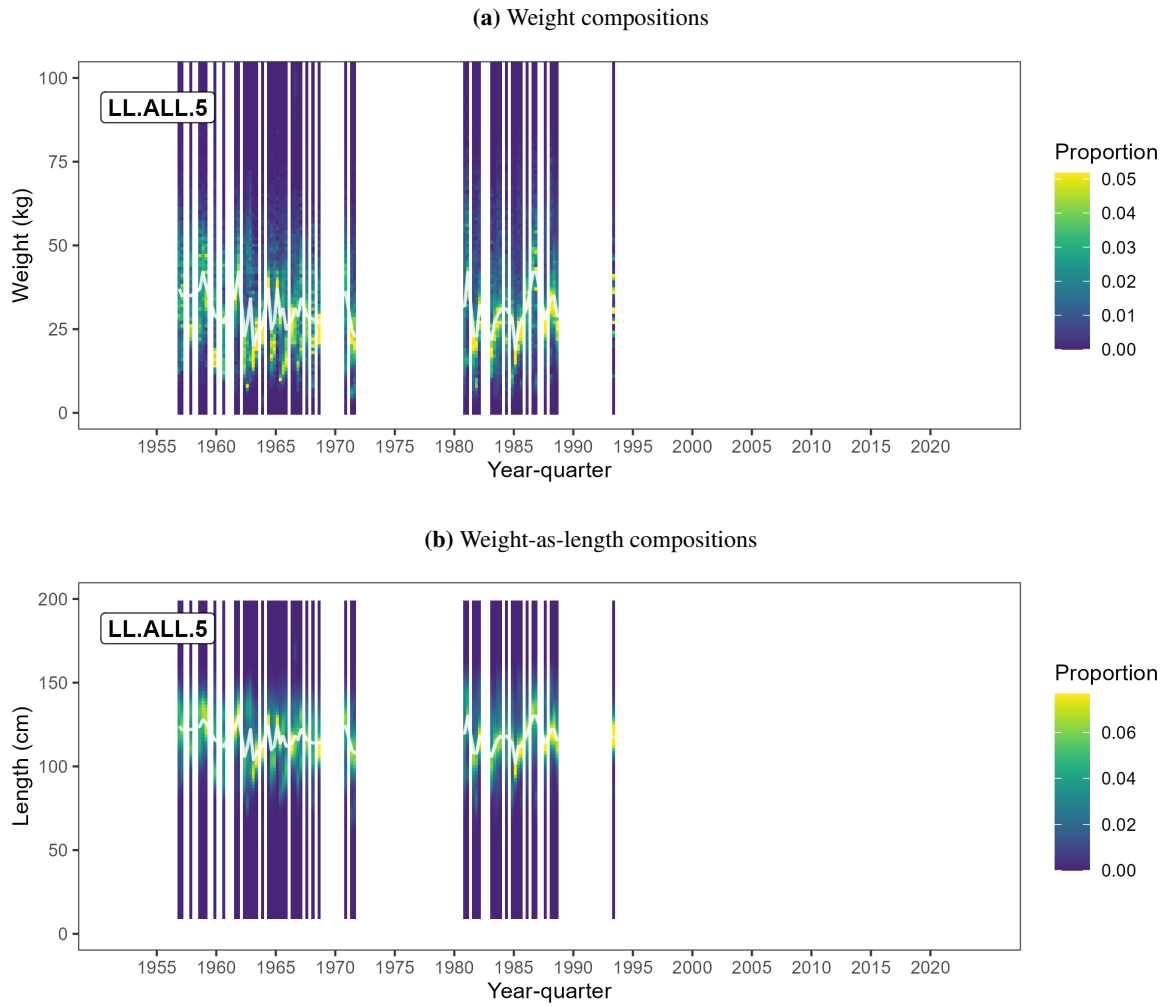


Figure H.4: Reweighted a) weight compositions and b) weight-as-length compositions of yellowfin for the longline extraction fishery LL.ALL.5. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95% weighted percentile, and the white line the median size.

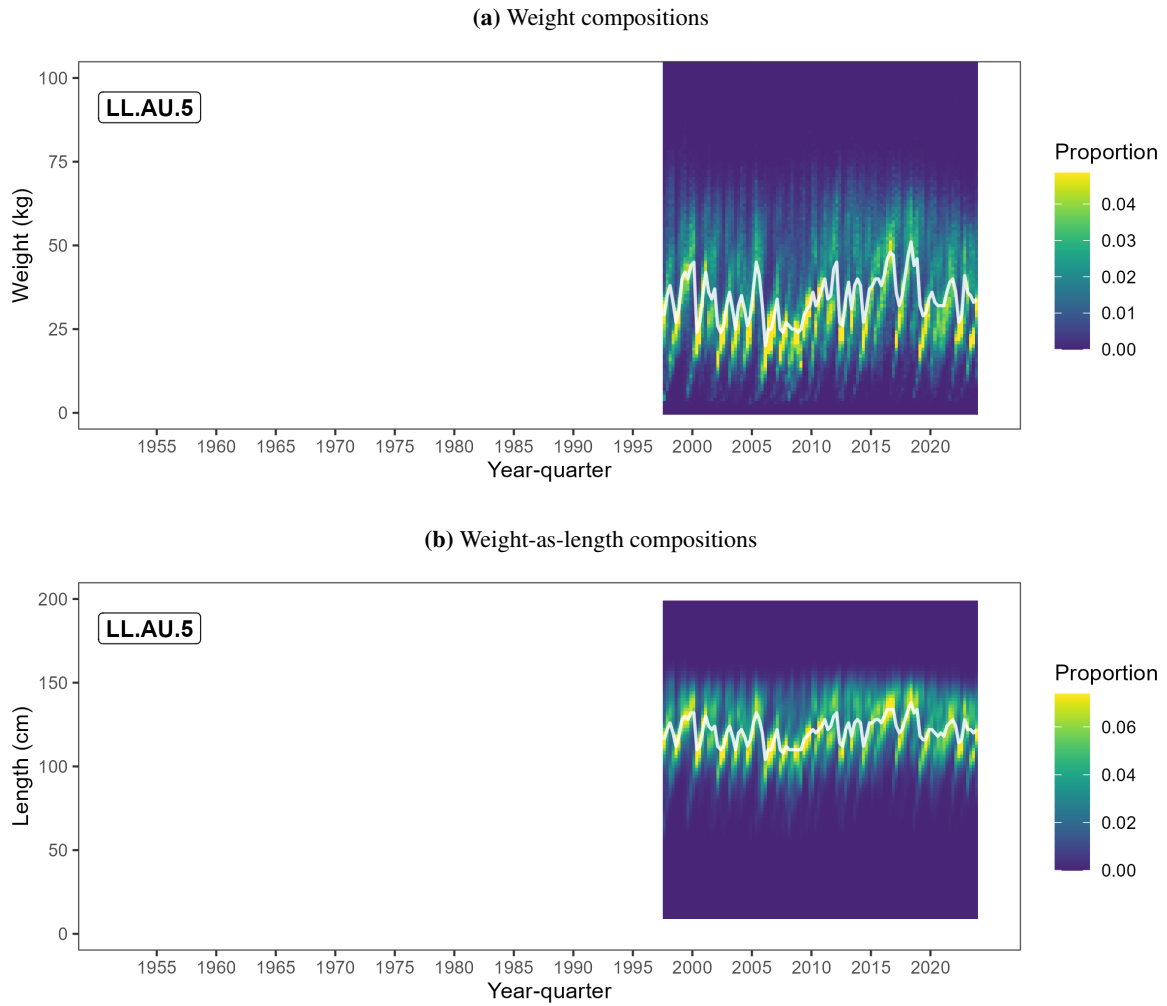


Figure H.5: Reweighted a) weight compositions and b) weight-as-length compositions of yellowfin for the longline extraction fishery LL.AU.5. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95th weighted percentile, and the white line the median size.

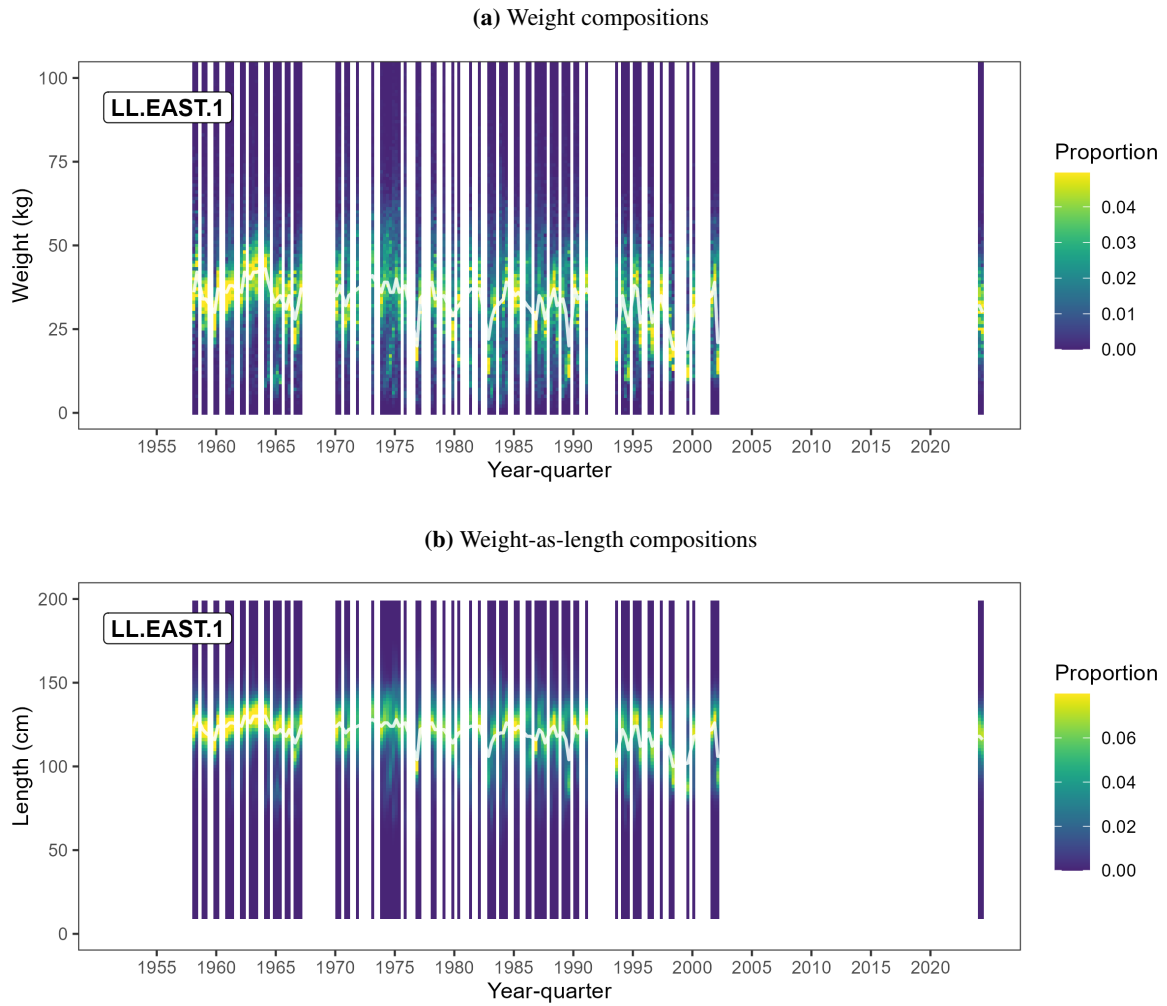


Figure H.6: Reweighted a) weight compositions and b) weight-as-length compositions of yellowfin for the longline extraction fishery LL.EAST.1. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95% weighted percentile, and the white line the median size.

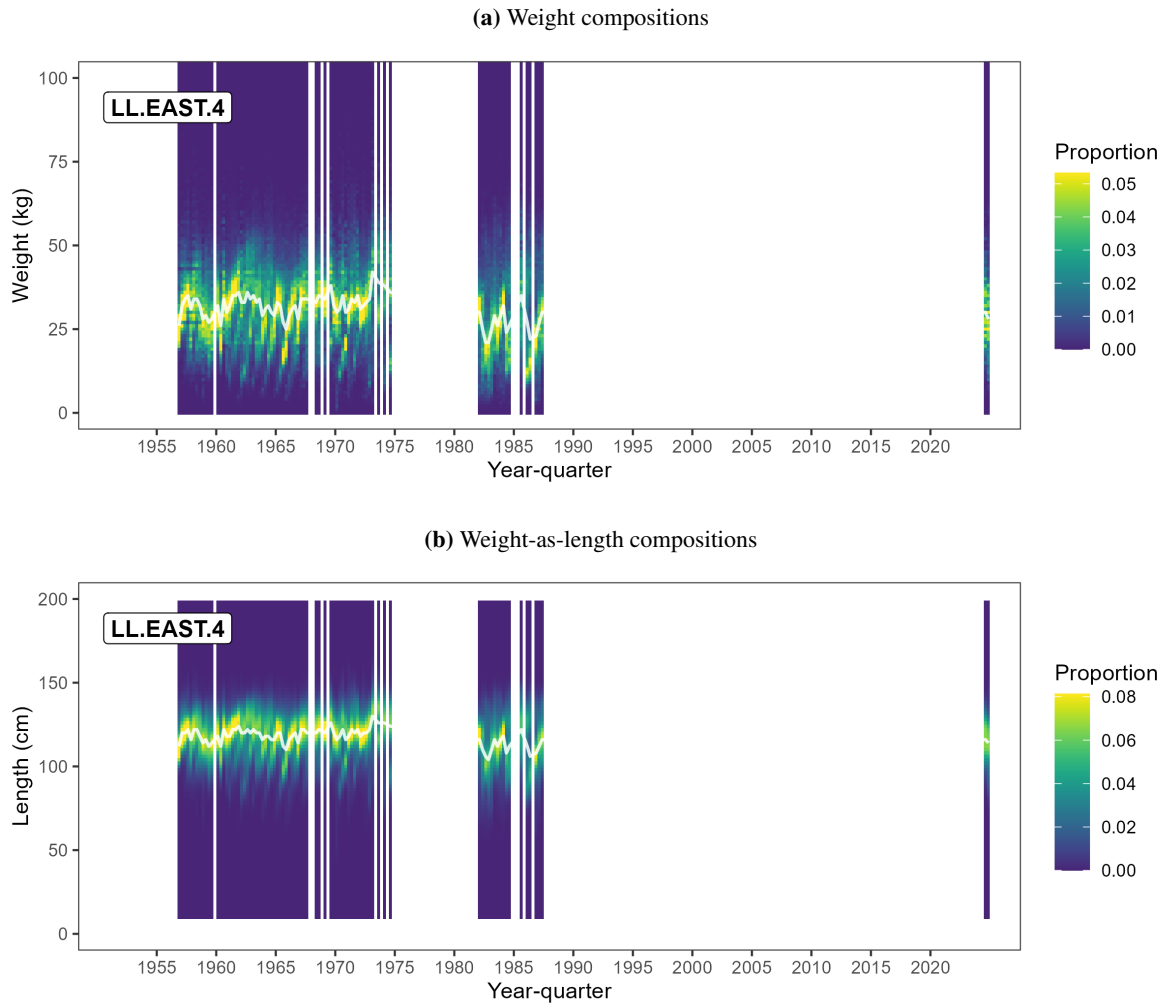


Figure H.7: Reweighted a) weight compositions and b) weight-as-length compositions of yellowfin for the longline extraction fishery LL.EAST.4. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95% weighted percentile, and the white line the median size.

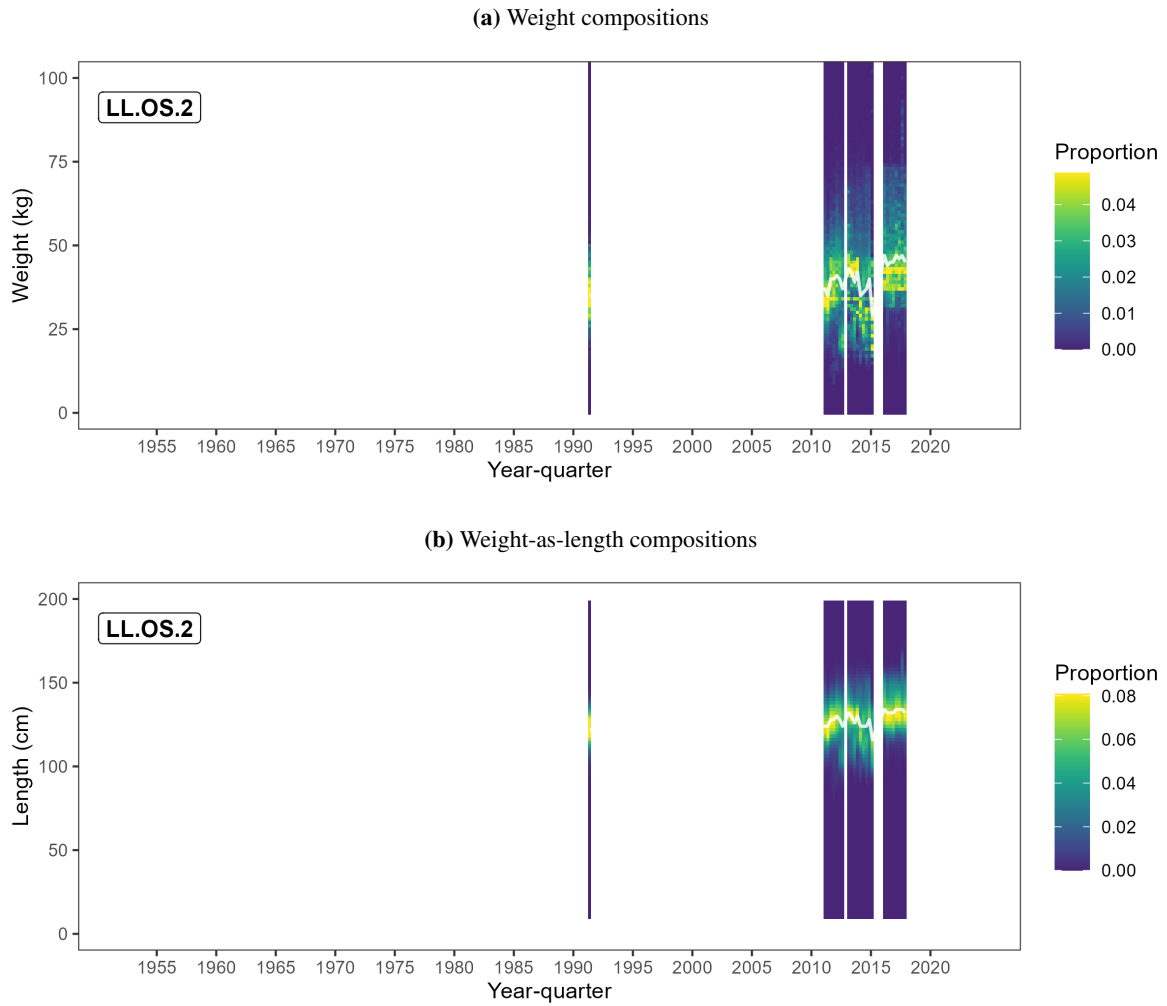


Figure H.8: Reweighted a) weight compositions and b) weight-as-length compositions of yellowfin for the longline extraction fishery LL.OS.2. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95th weighted percentile, and the white line the median size.

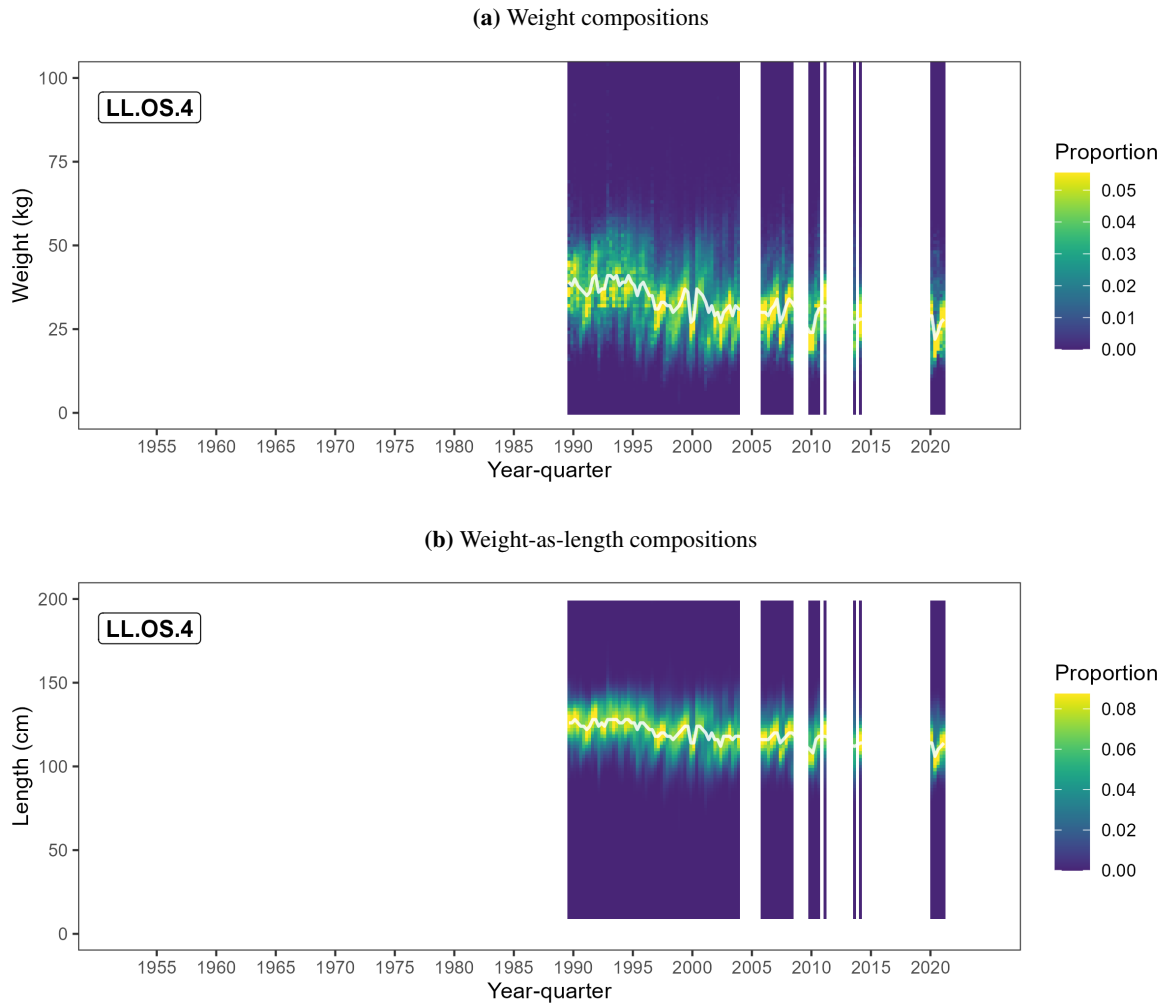


Figure H.9: Reweighted a) weight compositions and b) weight-as-length compositions of yellowfin for the longline extraction fishery LL.OS.4. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95th weighted percentile, and the white line the median size.

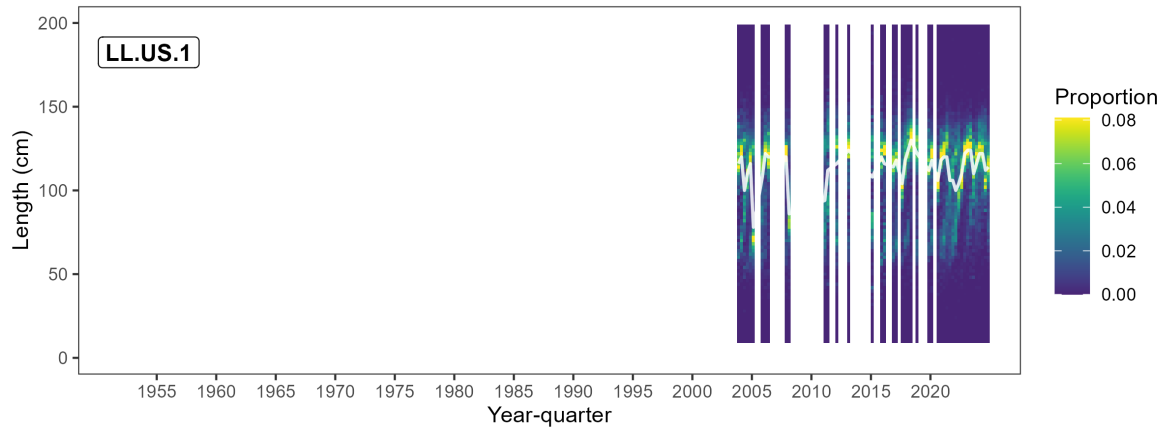


Figure H.10: Reweighted length compositions of yellowfin for the longline extraction fishery LL.US.1. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

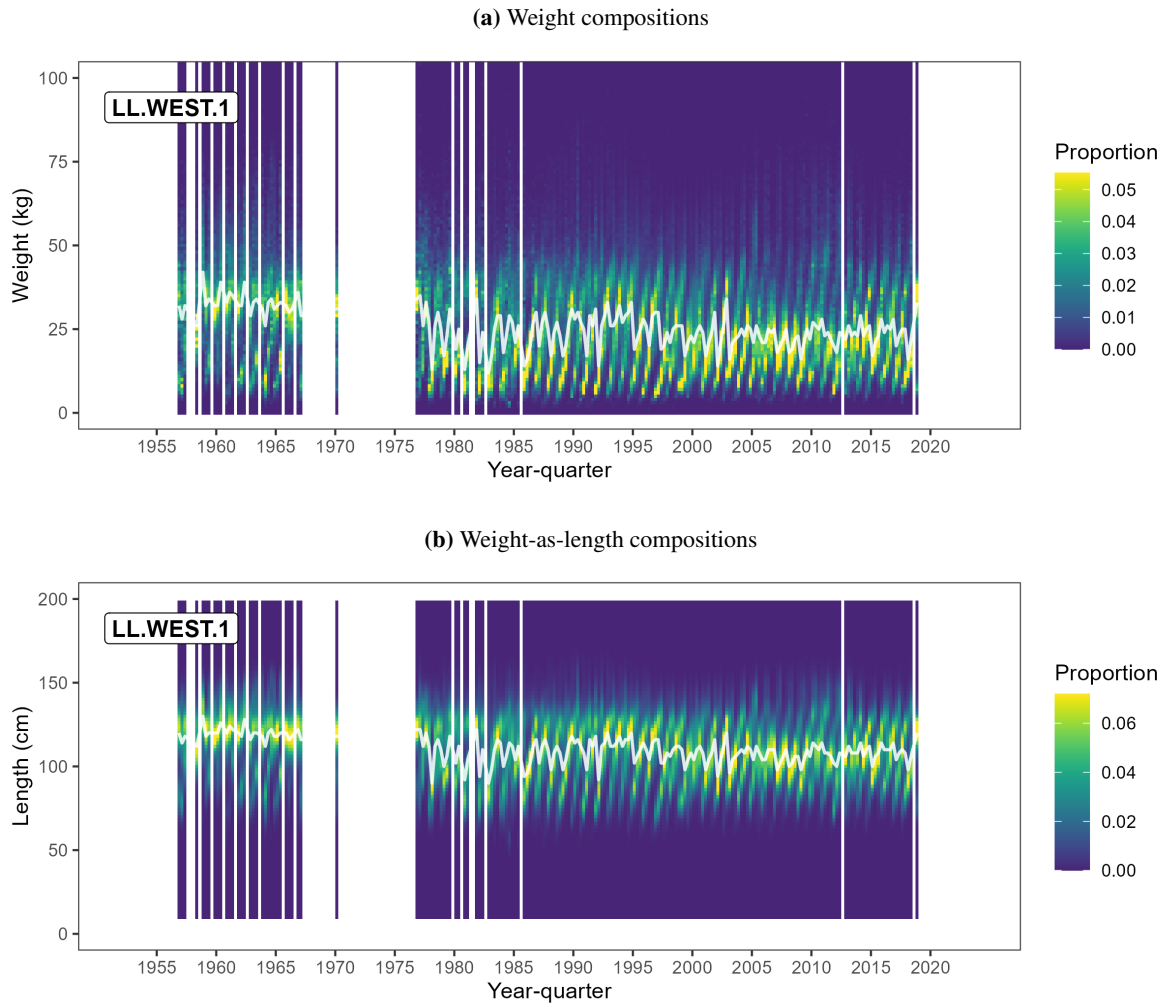


Figure H.11: Reweighted a) weight compositions and b) weight-as-length compositions of yellowfin for the longline extraction fishery LL.WEST.1. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95% weighted percentile, and the white line the median size.

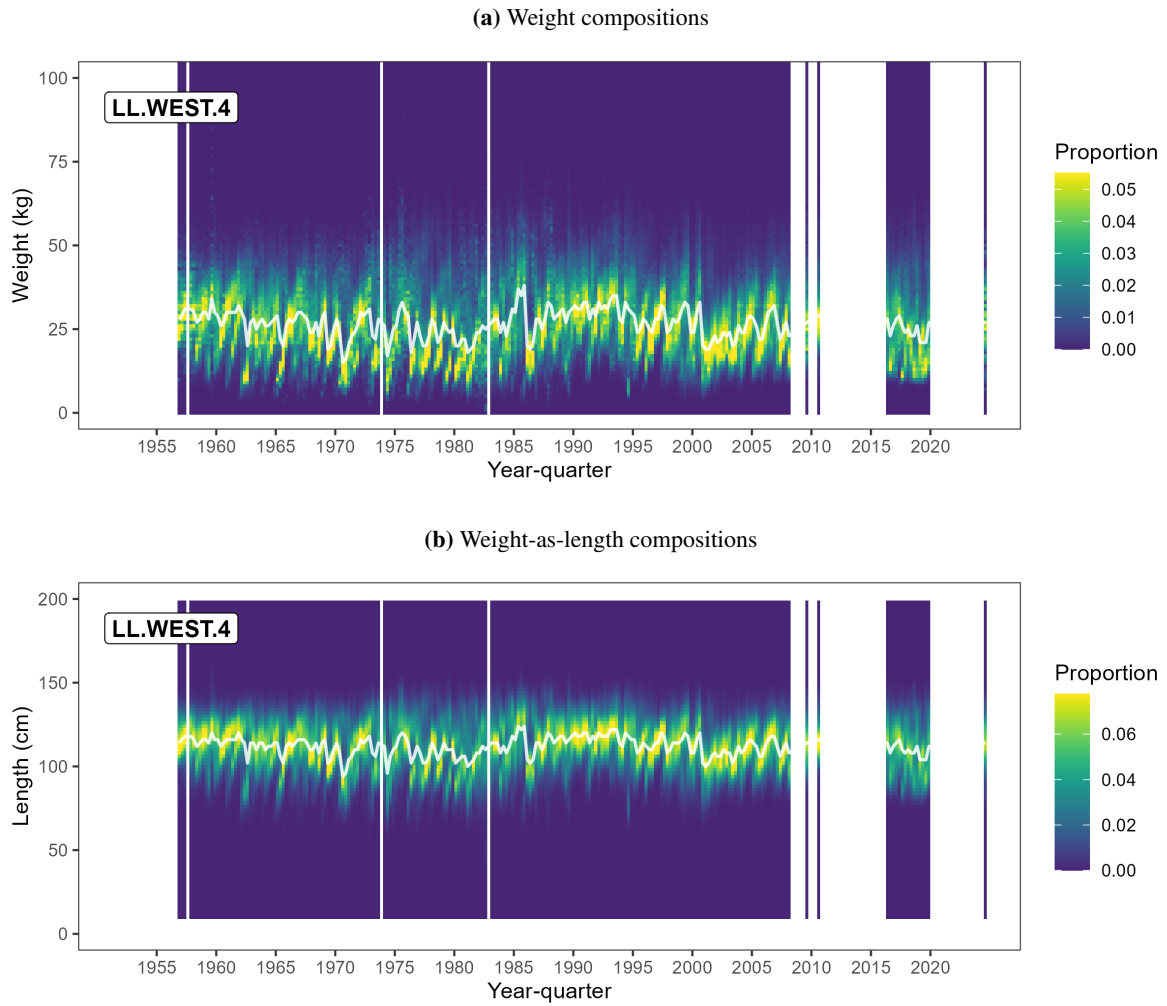


Figure H.12: Reweighted a) weight compositions and b) weight-as-length compositions of yellowfin for the longline extraction fishery LL.WEST.4. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95% weighted percentile, and the white line the median size.

H.2 Weight-as-length plus length compositions

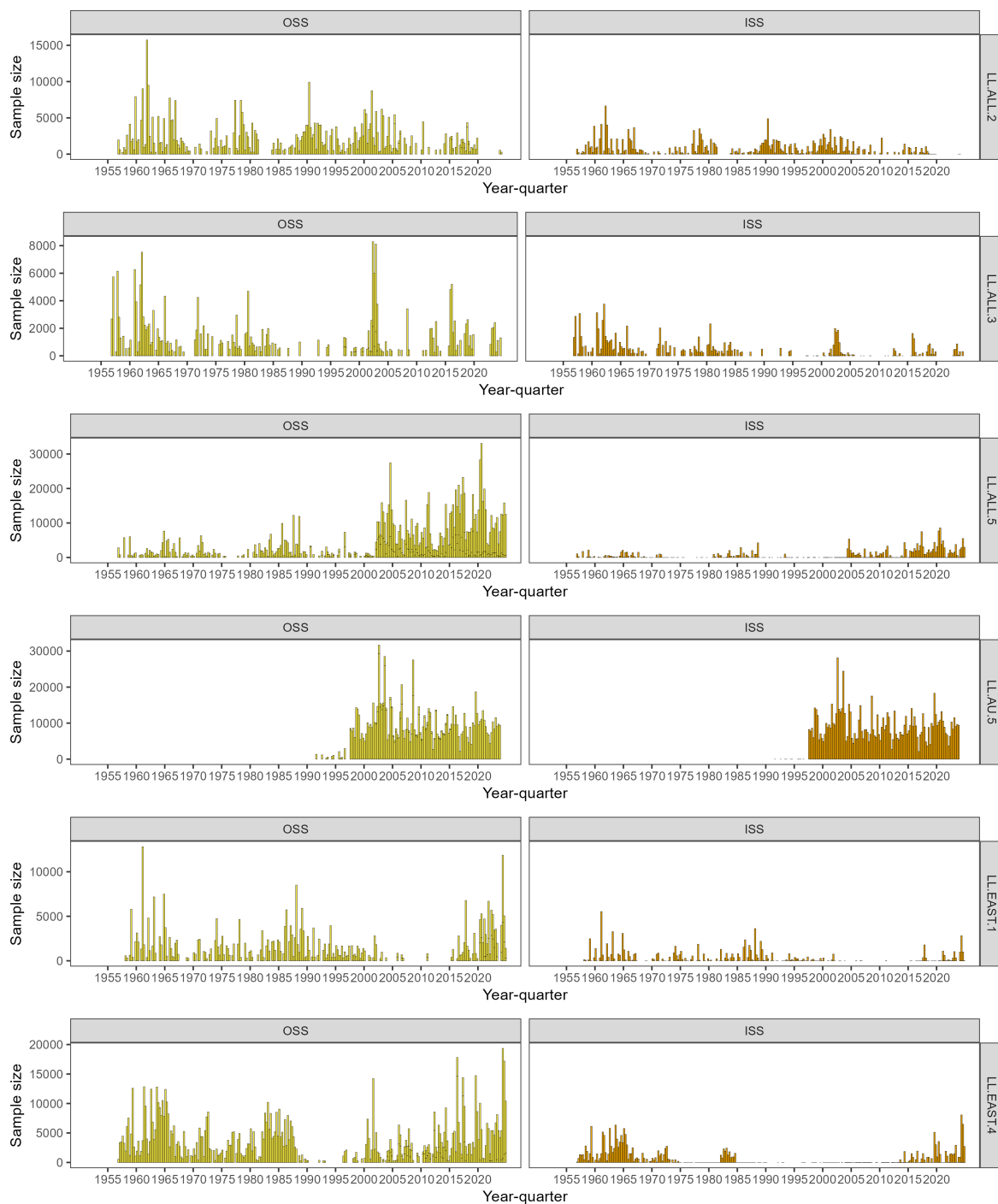


Figure H.13: Original sample sizes (OSS) and input sample sizes (ISS) for yellowfin longline extraction fishery weight-as-length plus length compositions.

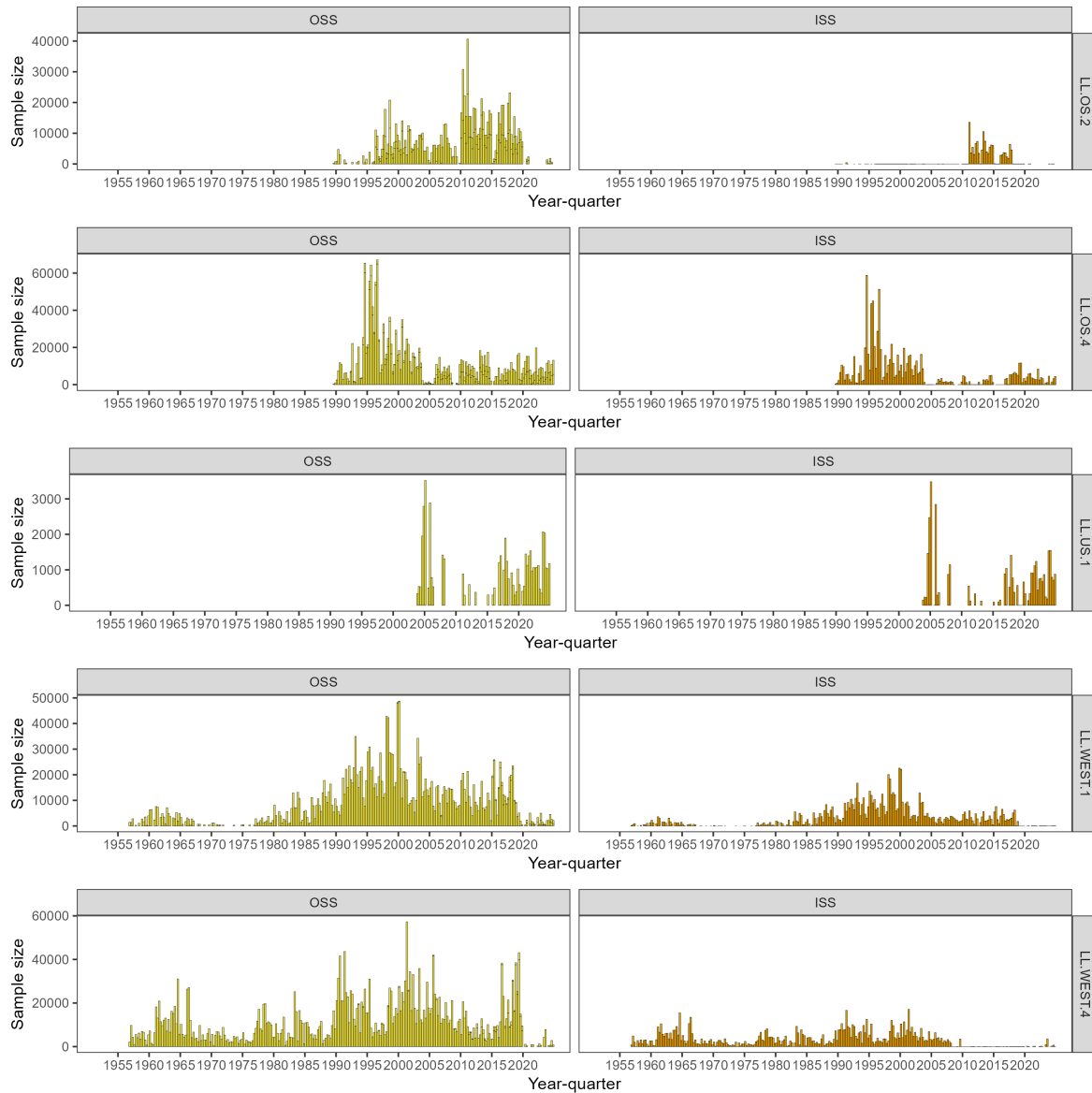


Figure H.13: Original sample sizes (OSS) and input sample sizes (ISS) for yellowfin longline extraction fishery weight-as-length plus length compositions (contd.).

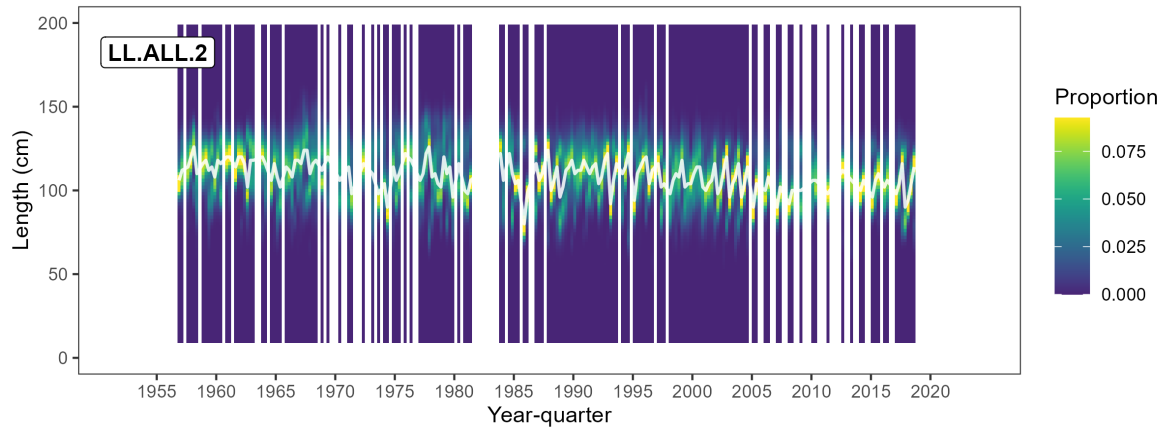


Figure H.14: Reweighted weight-as-length plus length compositions of yellowfin for the longline extraction fishery LL.ALL.2. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

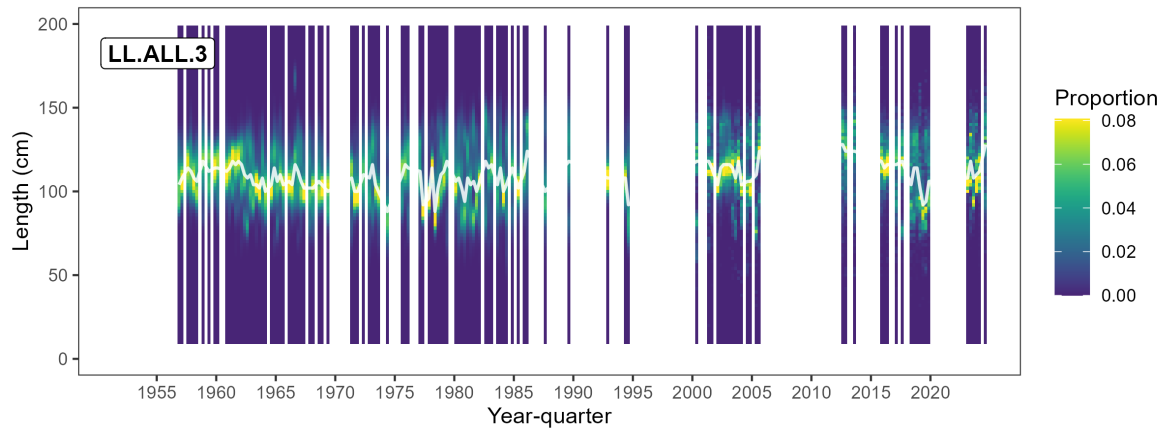


Figure H.15: Reweighted weight-as-length plus length compositions of yellowfin for the longline extraction fishery LL.ALL.3. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

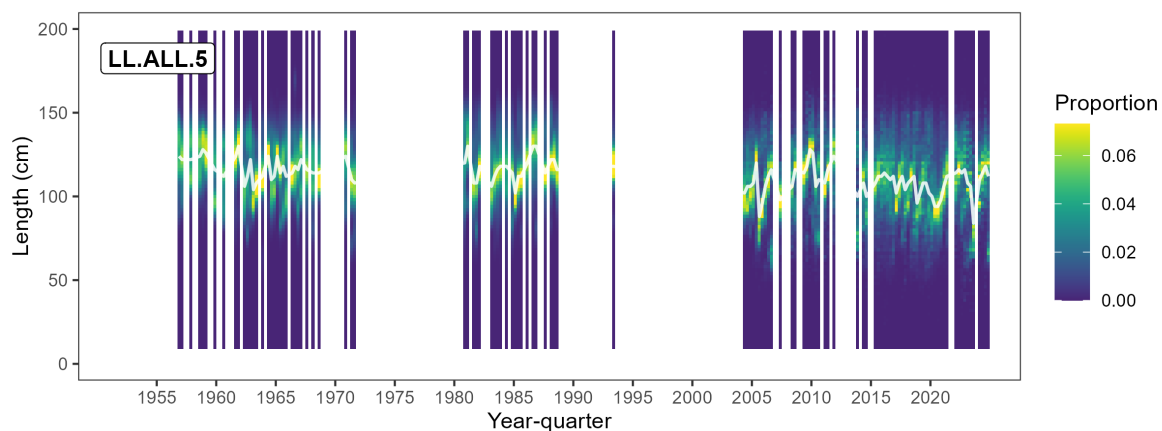


Figure H.16: Reweighted weight-as-length plus length compositions of yellowfin for the longline extraction fishery LL.ALL.5. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

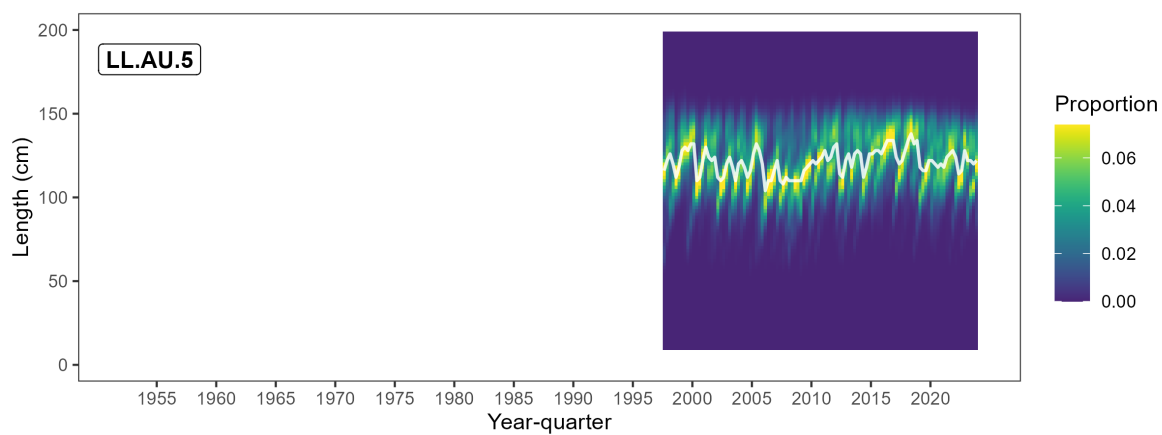


Figure H.17: Reweighted weight-as-length plus length compositions of yellowfin for the longline extraction fishery LL.AU.5. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

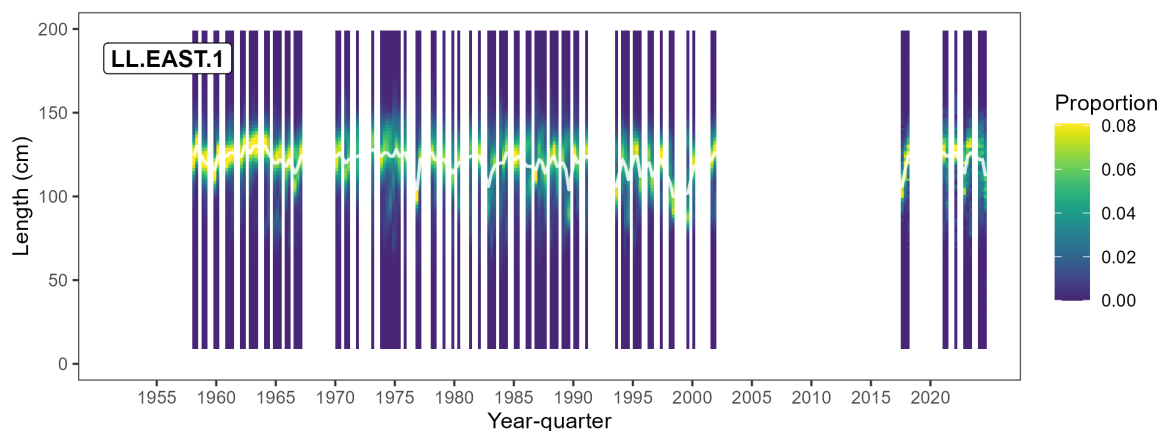


Figure H.18: Reweighted weight-as-length plus length compositions of yellowfin for the longline extraction fishery LL.EAST.1. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

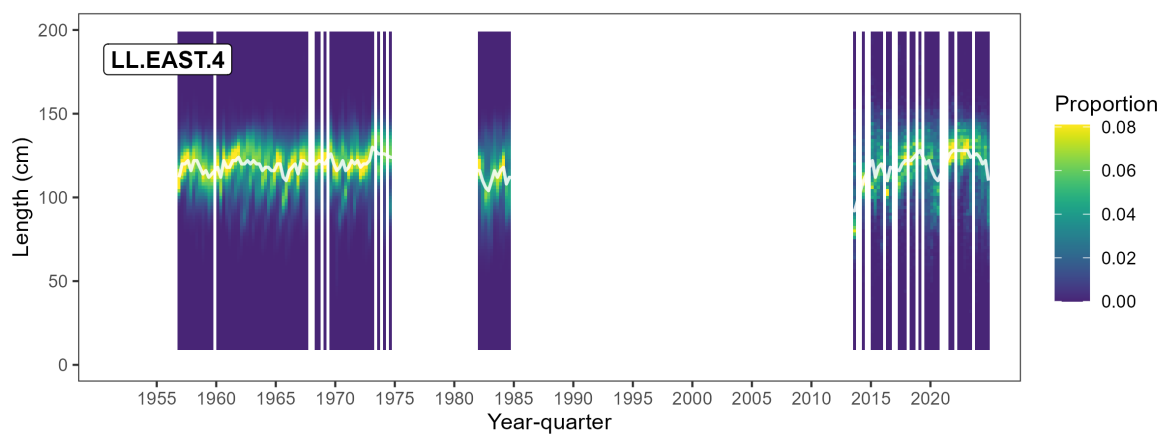


Figure H.19: Reweighted weight-as-length plus length compositions of yellowfin for the longline extraction fishery LL.EAST.4. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

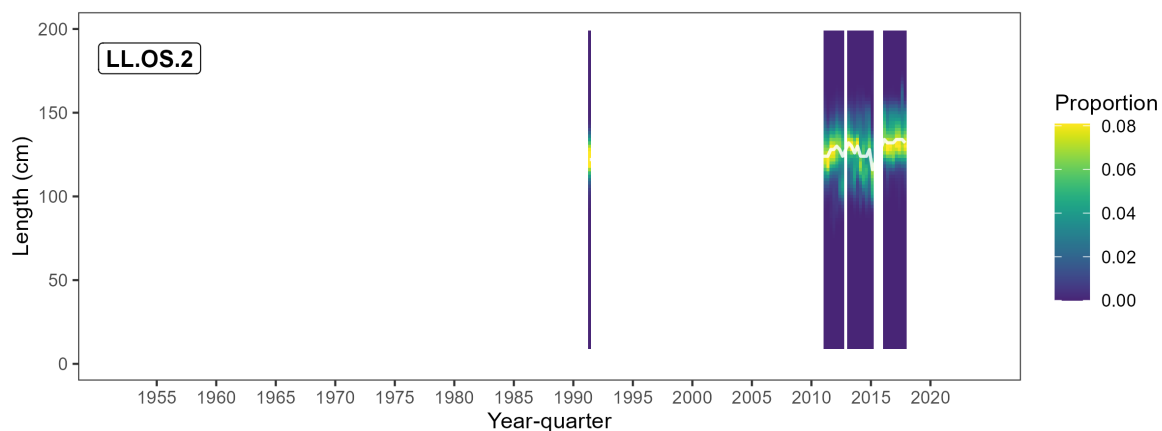


Figure H.20: Reweighted weight-as-length plus length compositions of yellowfin for the longline extraction fishery LL.OS.2. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

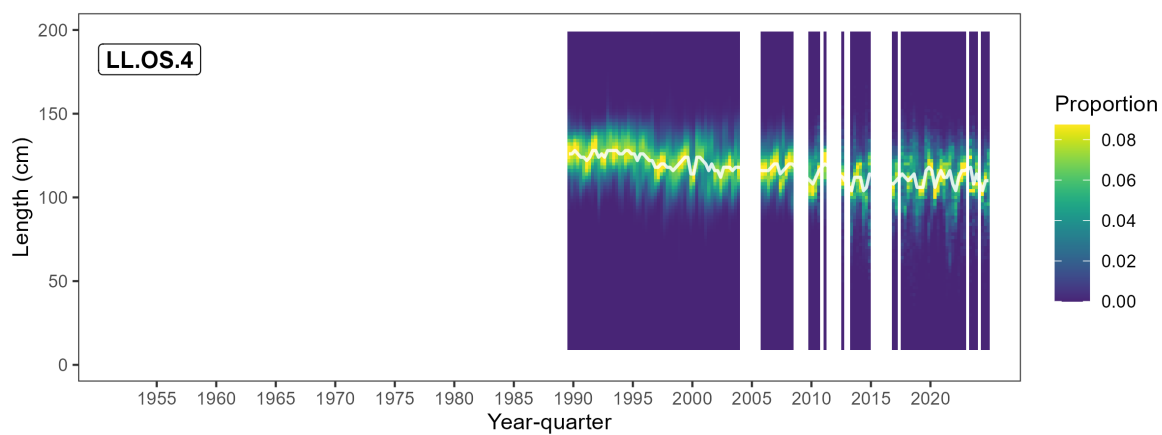


Figure H.21: Reweighted weight-as-length plus length compositions of yellowfin for the longline extraction fishery LL.OS.4. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

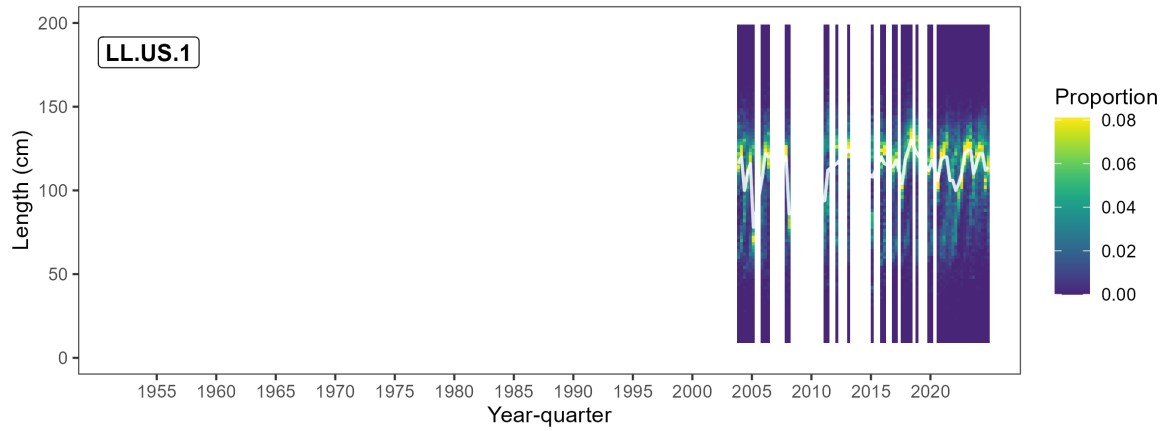


Figure H.22: Reweighted weight-as-length plus length compositions of yellowfin for the longline extraction fishery LL.US.1. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

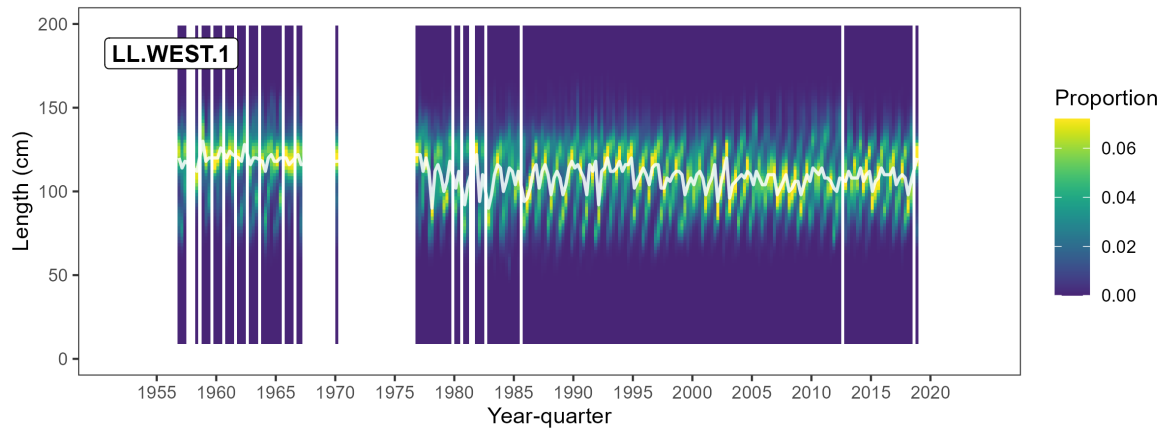


Figure H.23: Reweighted weight-as-length plus length compositions of yellowfin for the longline extraction fishery LL.WEST.1. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

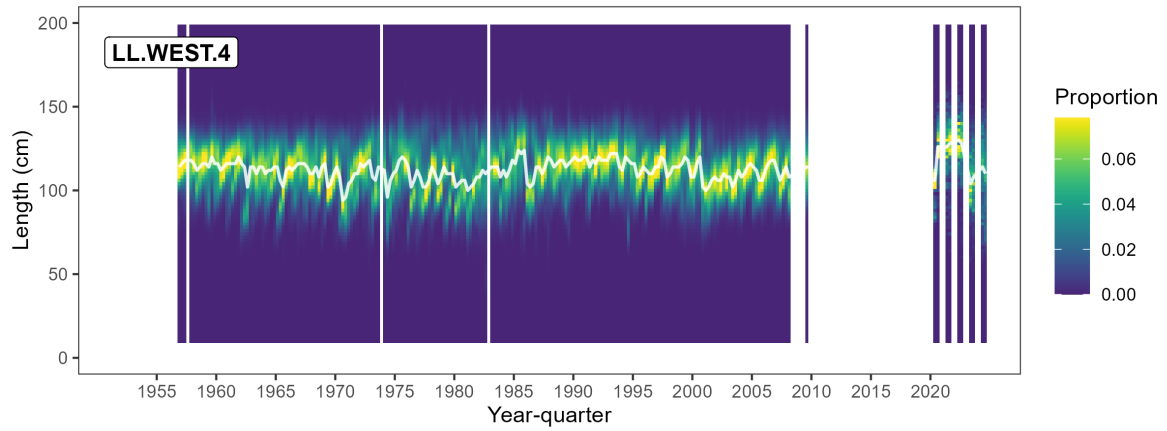


Figure H.24: Reweighted weight-as-length plus length compositions of yellowfin for the longline extraction fishery LL.WEST.4. The colour of each cell gives the proportions by size class for the year-quarter, and the white line the median size.

I Bigeye longline index fishery compositions

I.1 Region-specific bigeye longline index fishery compositions

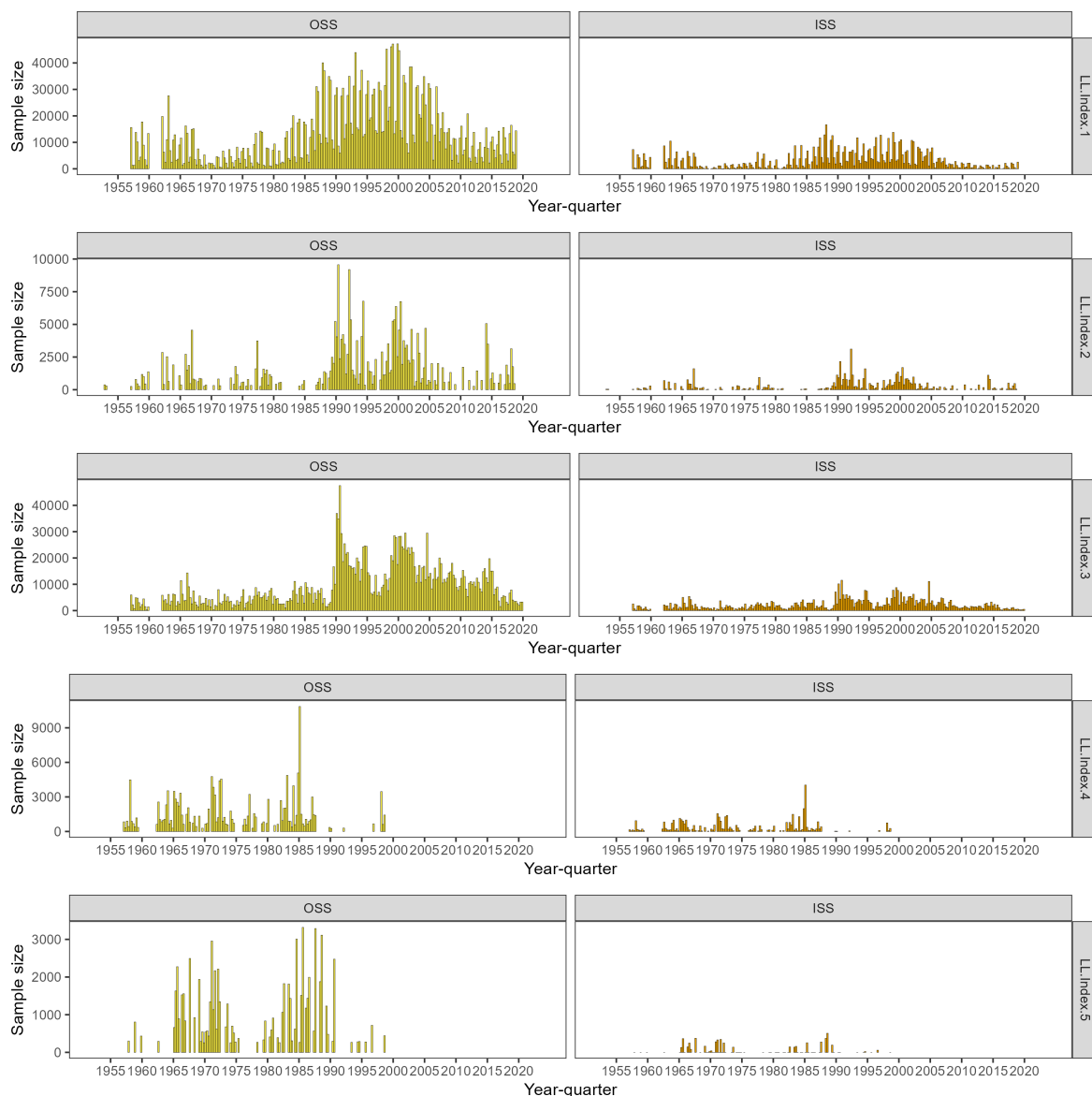


Figure I.1: Original sample sizes (OSS) and input sample sizes (ISS) for bigeye longline index fishery weight compositions, and weight-as-length compositions.

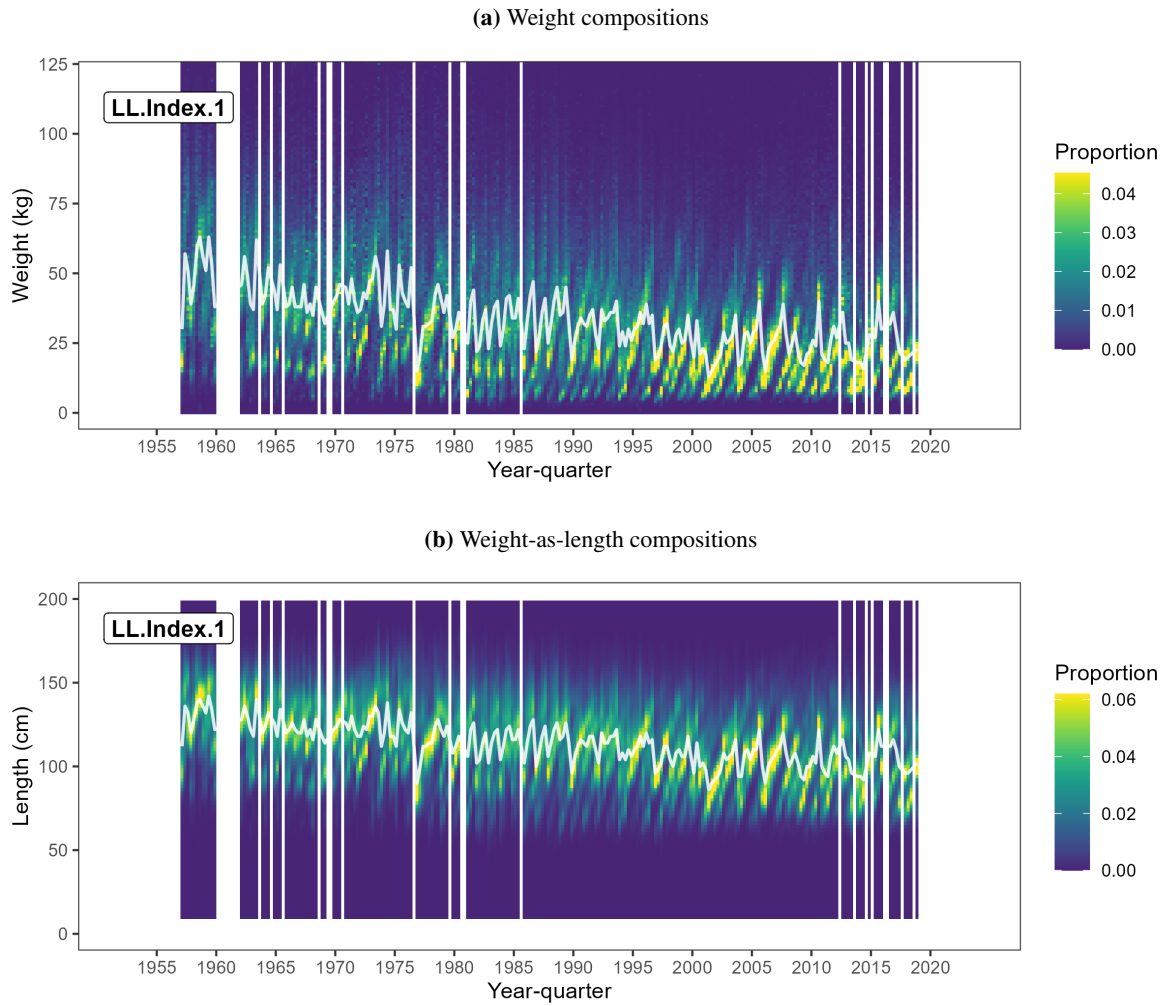


Figure I.2: Reweighted a) weight compositions and b) weight-as-length compositions of bigeye for the longline index fishery LL.Index.1. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95% weighted percentile, and the white line the median size.

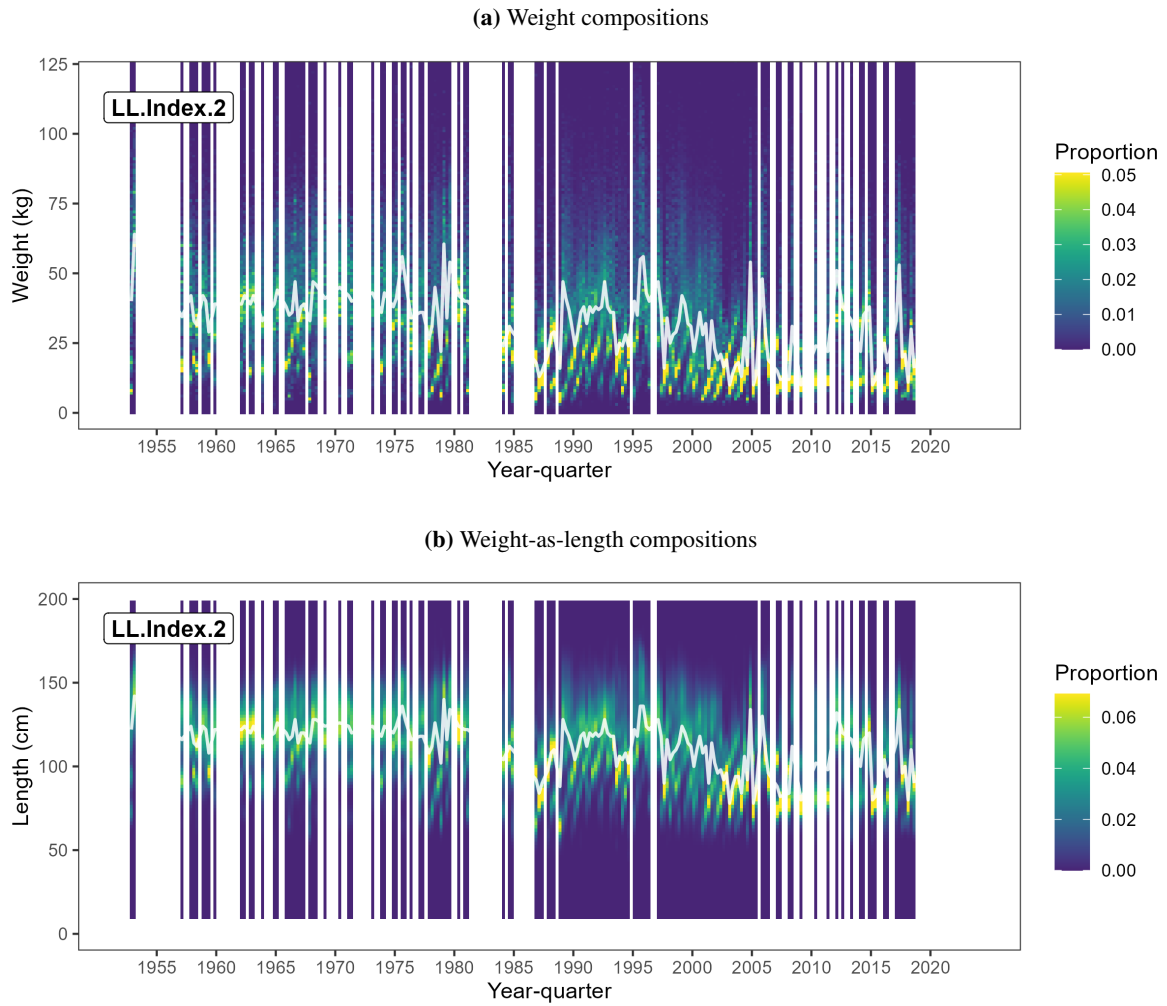


Figure I.3: Reweighted a) weight compositions and b) weight-as-length compositions of bigeye for the longline index fishery LL.Index.2. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95% weighted percentile, and the white line the median size.

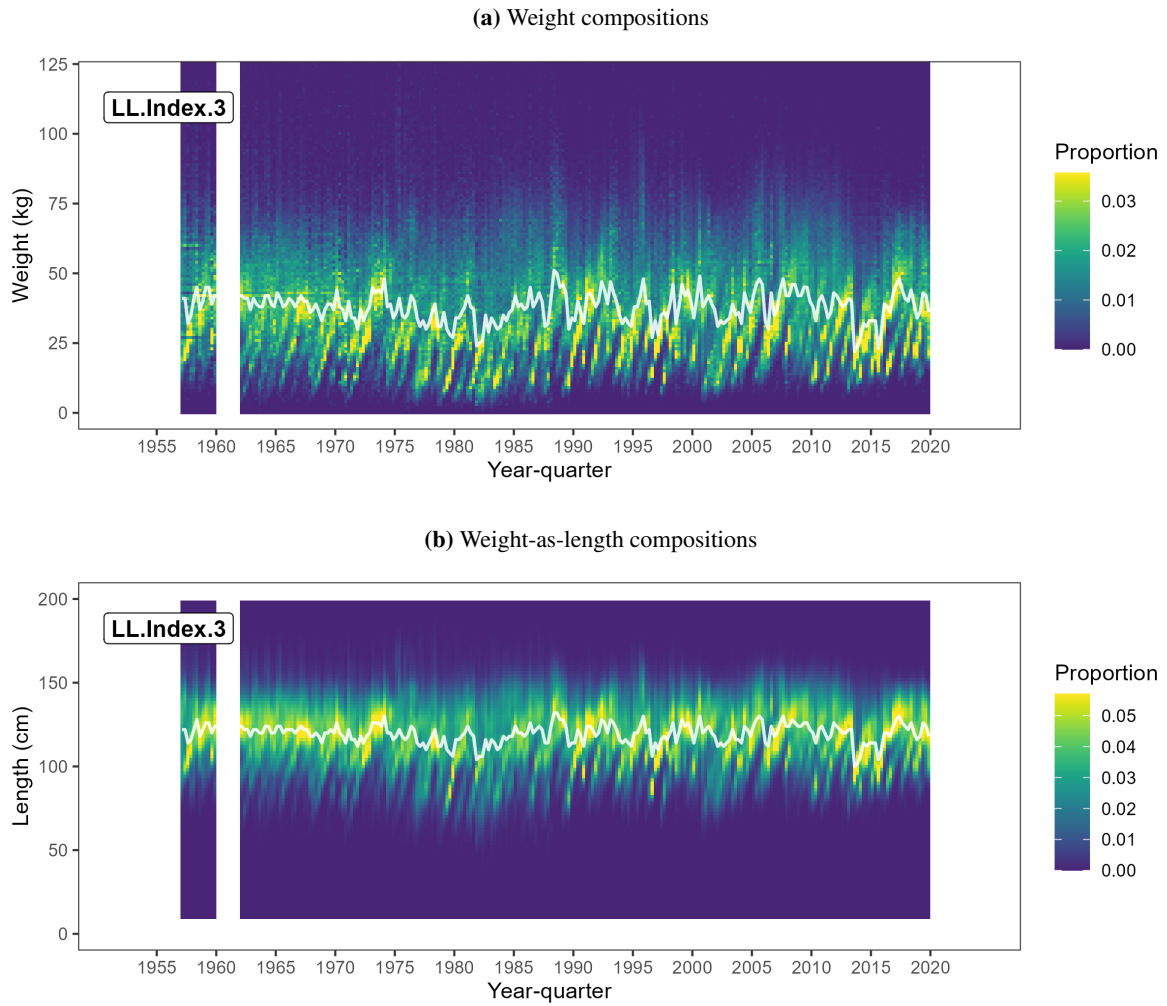


Figure I.4: Reweighted a) weight compositions and b) weight-as-length compositions of bigeye for the longline index fishery LL.Index.3. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95% weighted percentile, and the white line the median size.

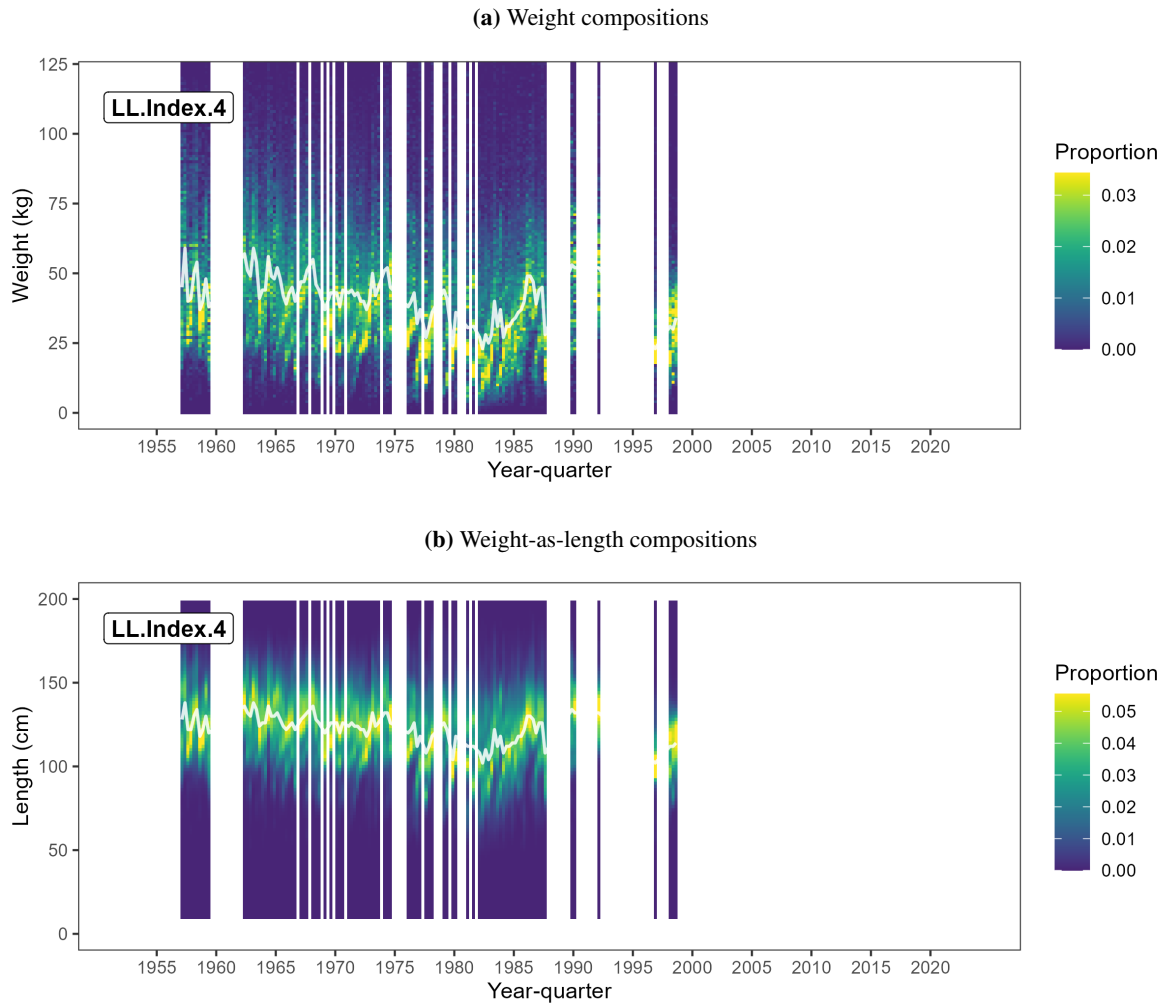


Figure I.5: Reweighted a) weight compositions and b) weight-as-length compositions of bigeye for the longline index fishery LL.Index.4. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95% weighted percentile, and the white line the median size.

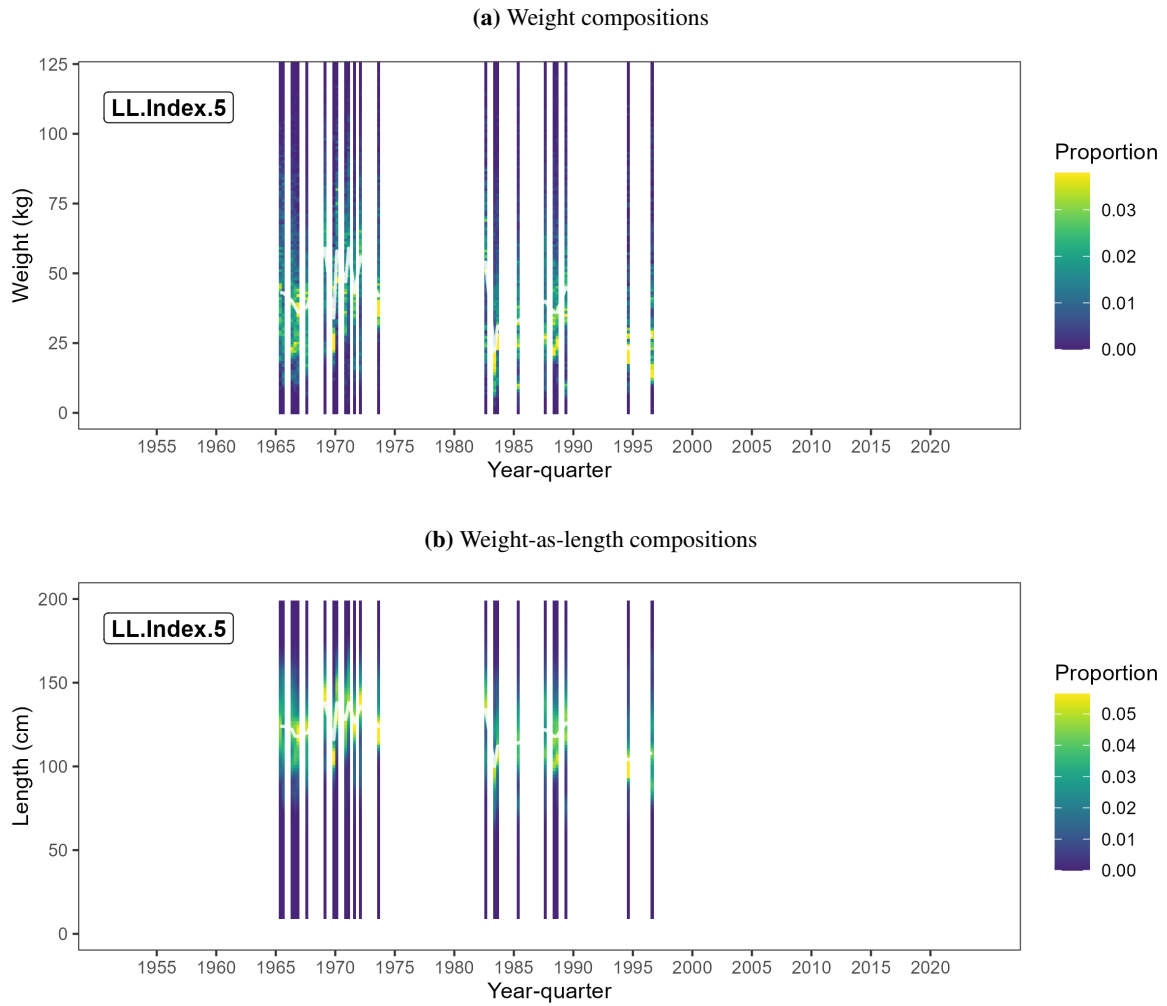


Figure I.6: Reweighted a) weight compositions and b) weight-as-length compositions of bigeye for the longline index fishery LL.Index.5. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95% weighted percentile, and the white line the median size.

1.2 WCPO-wide bigeye longline index fishery composition

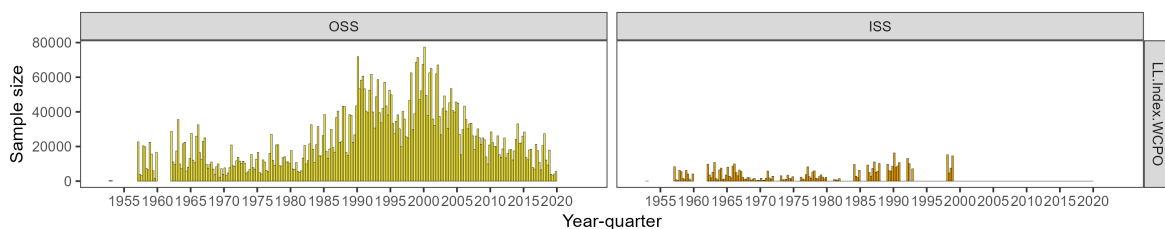


Figure I.7: Original sample sizes (OSS) and input sample sizes (ISS) for the WCPO-wide bigeye longline index fishery's weight compositions, and weight-as-length compositions.

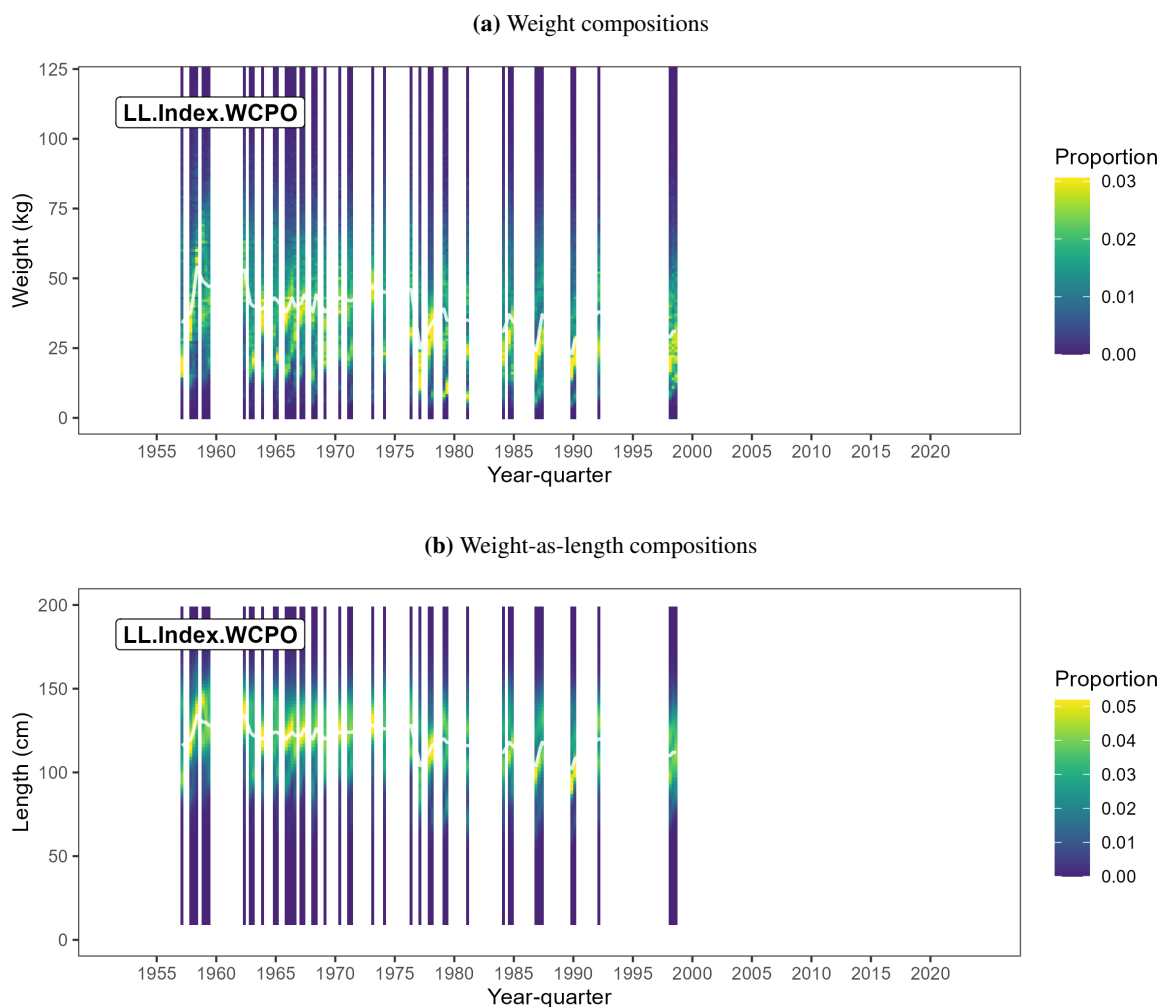


Figure I.8: Reweighted a) weight compositions and b) weight-as-length compositions of bigeye for the longline index fishery LL.Index.WCPO. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95th weighted percentile, and the white line the median size.

J Yellowfin longline index fishery compositions

J.1 Region-specific yellowfin longline index fishery compositions

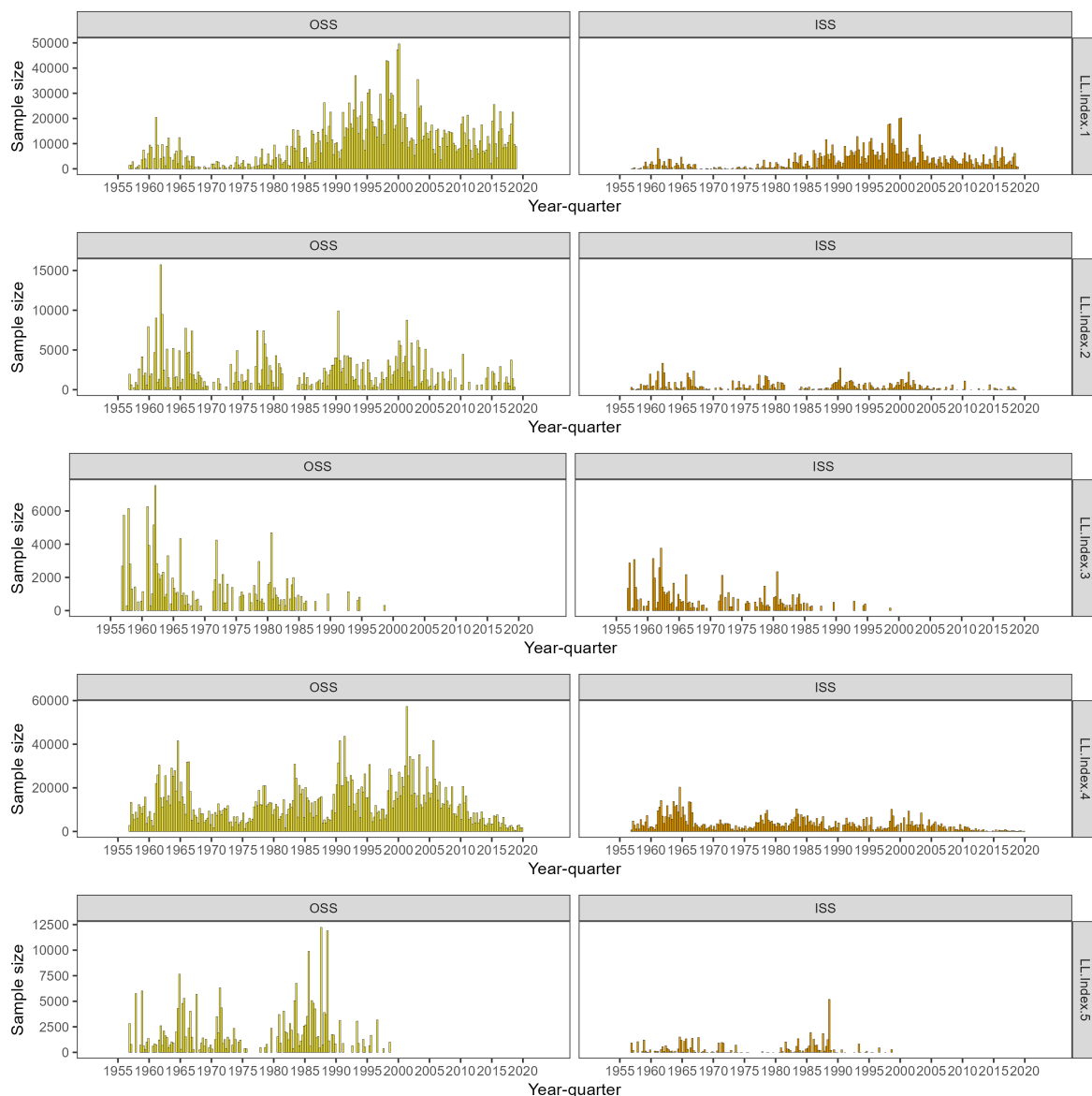


Figure J.1: Original sample sizes (OSS) and input sample sizes (ISS) for yellowfin longline index fishery weight compositions, and weight-as-length compositions.

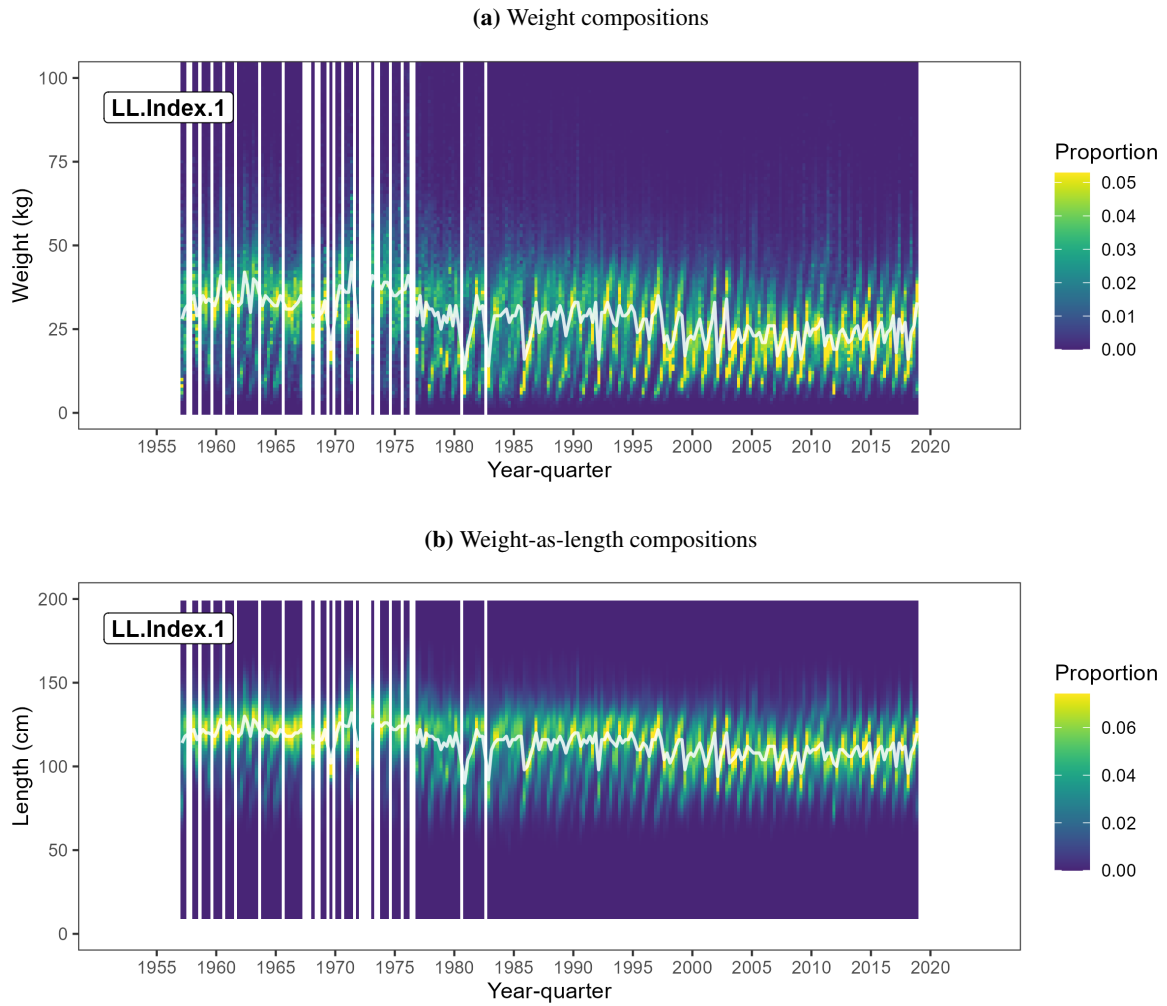


Figure J.2: Reweighted a) weight compositions and b) weight-as-length compositions of yellowfin for the longline index fishery LL.Index.1. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95th weighted percentile, and the white line the median size.

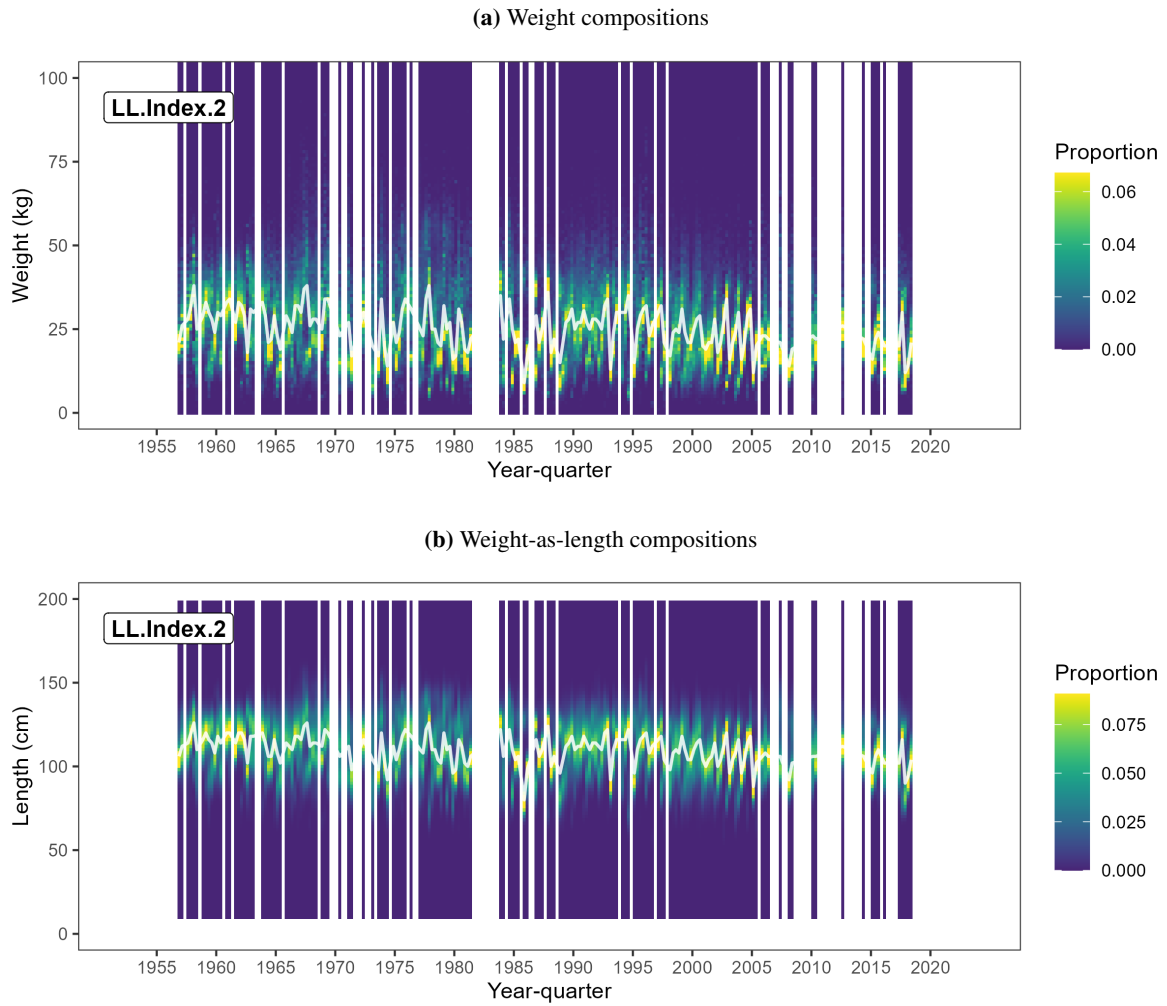


Figure J.3: Reweighted a) weight compositions and b) weight-as-length compositions of yellowfin for the longline index fishery LL.Index.2. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95th weighted percentile, and the white line the median size.

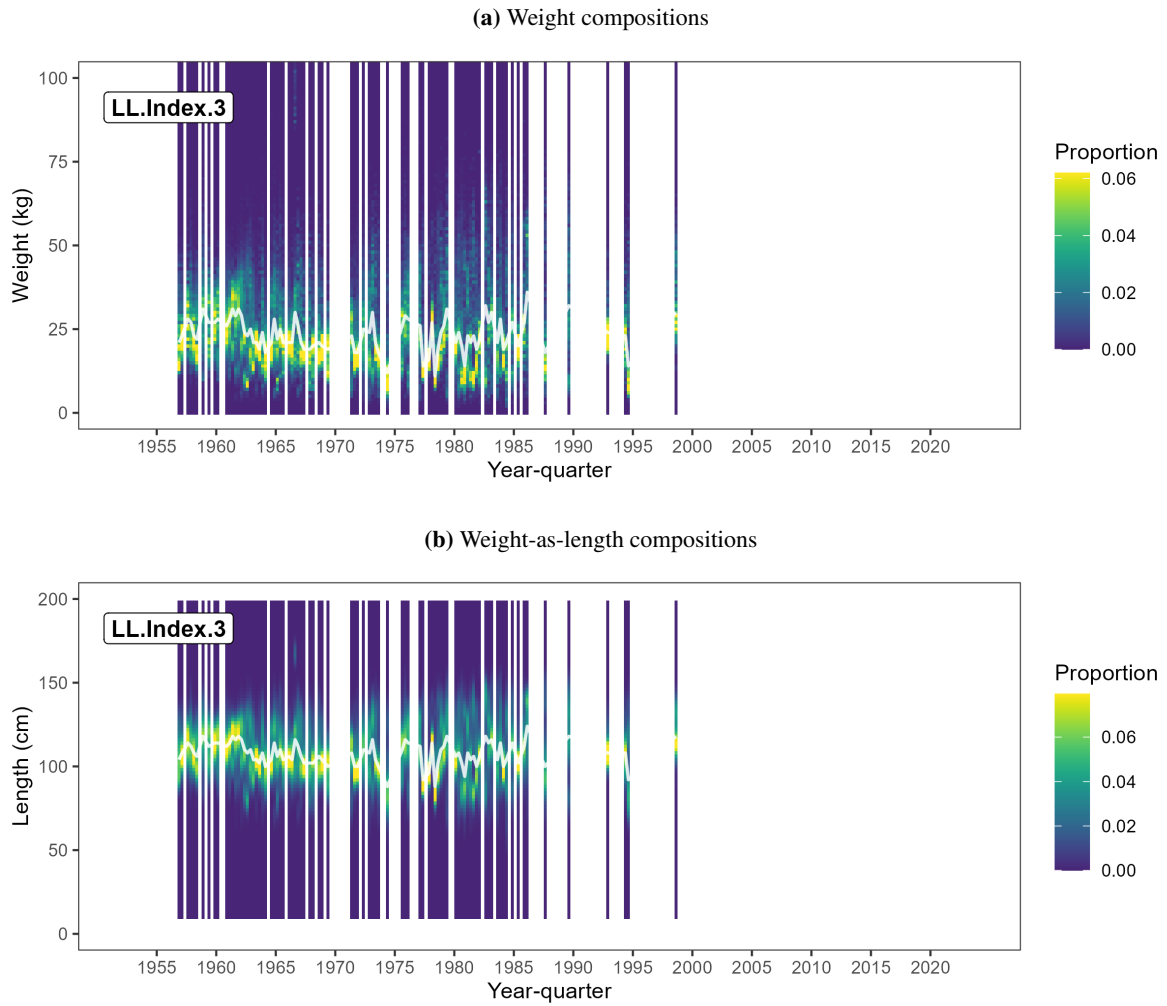


Figure J.4: Reweighted a) weight compositions and b) weight-as-length compositions of yellowfin for the longline index fishery LL.Index.3. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95th weighted percentile, and the white line the median size.

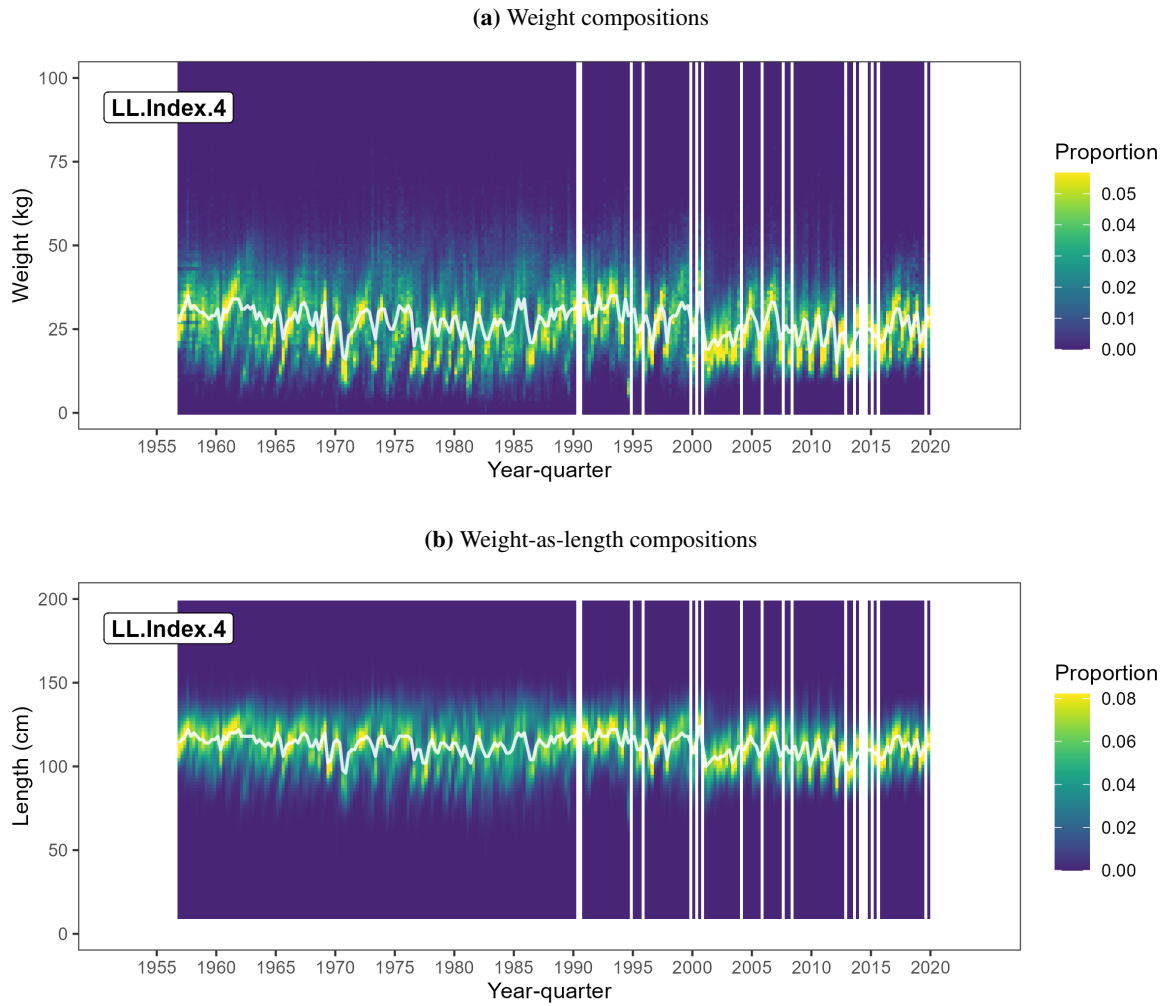


Figure J.5: Reweighted a) weight compositions and b) weight-as-length compositions of yellowfin for the longline index fishery LL.Index.4. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95th weighted percentile, and the white line the median size.

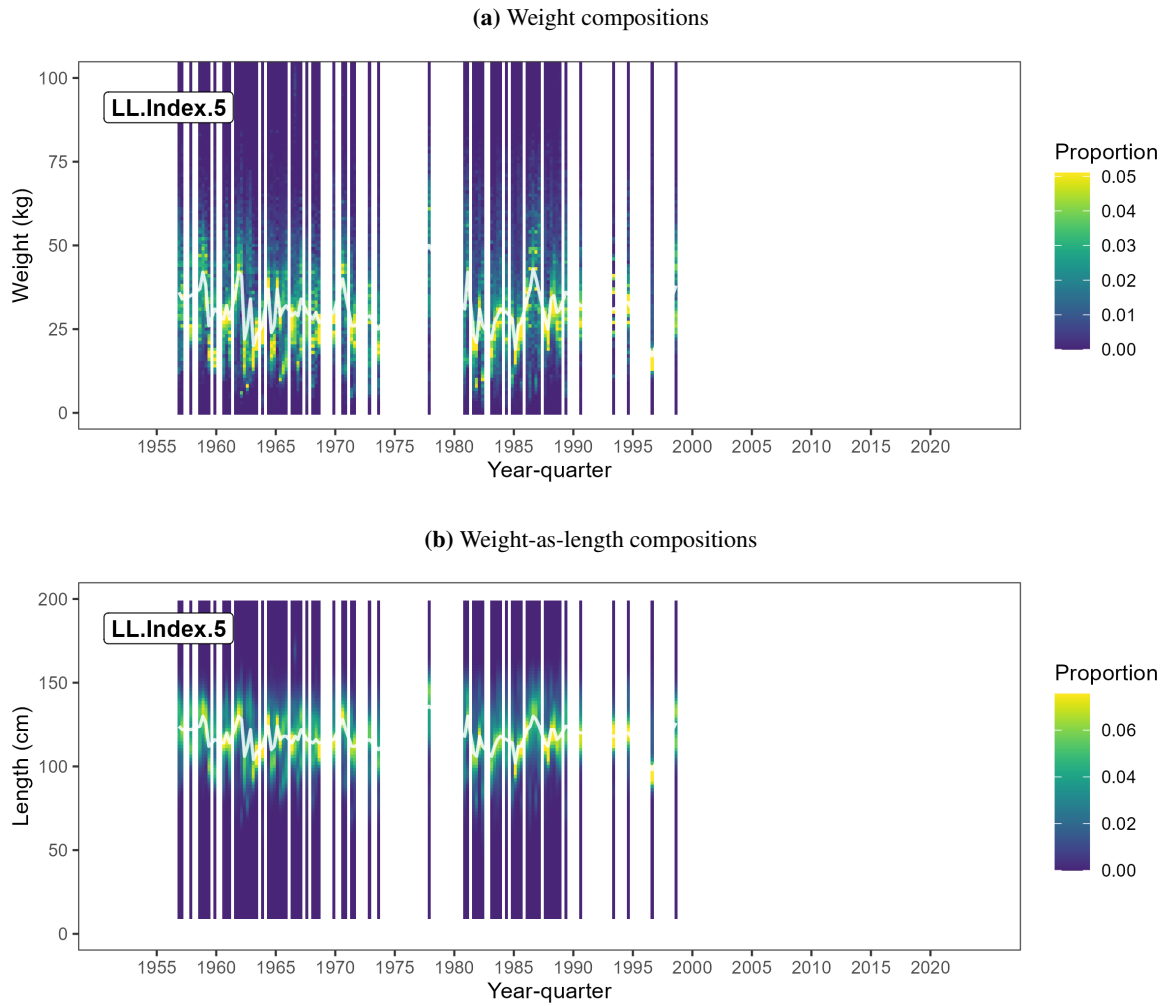


Figure J.6: Reweighted a) weight compositions and b) weight-as-length compositions of yellowfin for the longline index fishery LL.Index.5. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95th weighted percentile, and the white line the median size.

J.2 WCPO-wide yellowfin longline index fishery composition

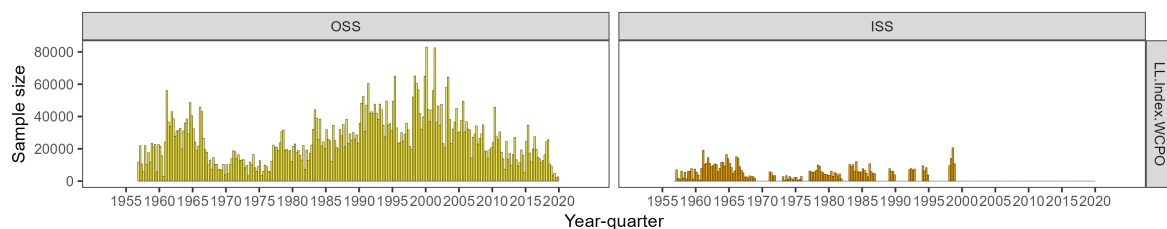


Figure J.7: Original sample sizes (OSS) and input sample sizes (ISS) for the WCPO-wide yellowfin longline index fishery's weight compositions, and weight-as-length compositions.

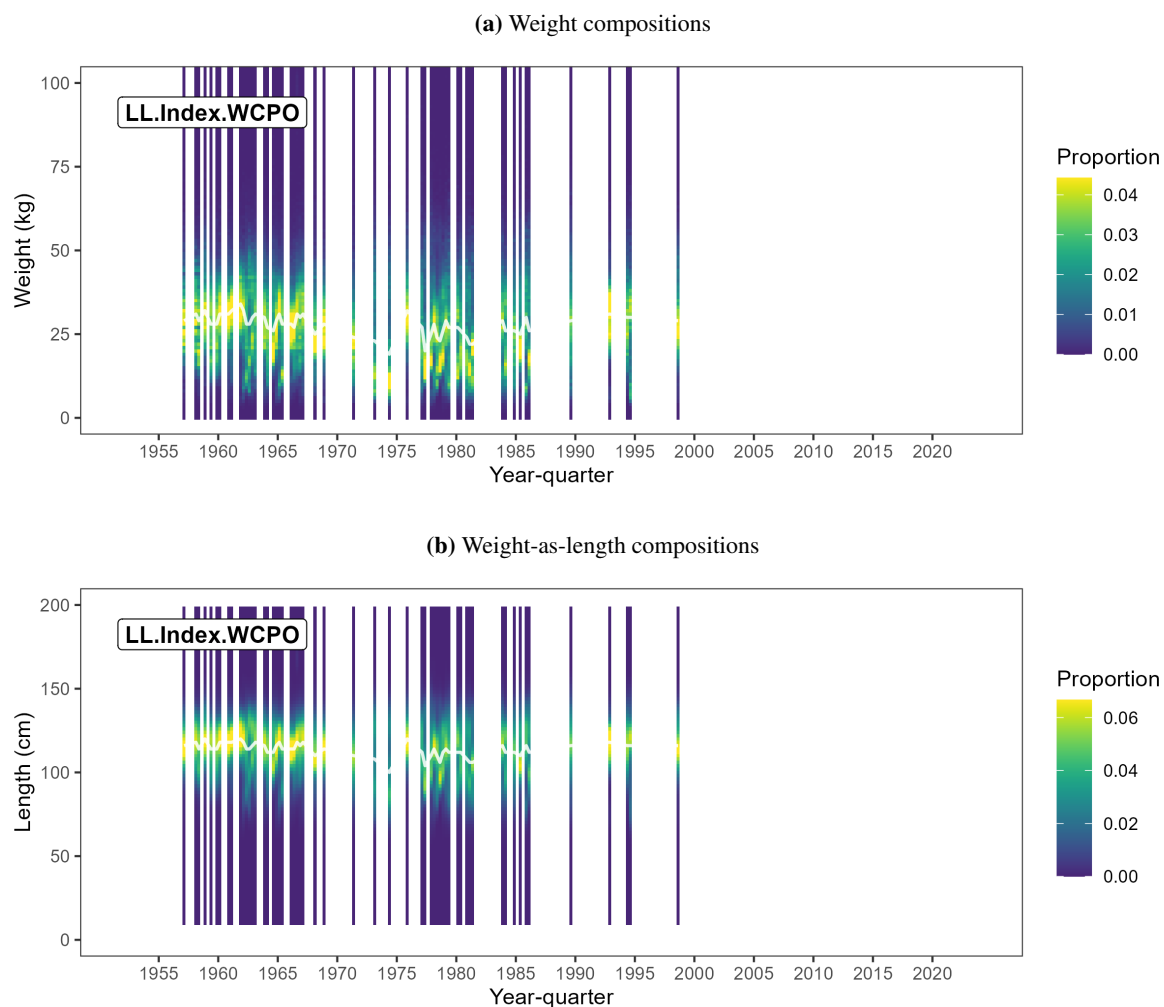


Figure J.8: Reweighted a) weight compositions and b) weight-as-length compositions of yellowfin for the longline index fishery LL.Index.WCPO. The colour of each cell gives the proportions by size class for the year-quarter, capped at the 95% weighted percentile, and the white line the median size.