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**BACKGROUND ANALYSES AND DATA INPUTS FOR THE 2026 WCPO YELLOWFIN AND BIGEYE
TUNA STOCK ASSESSMENT**

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1 Author contribution

Thomas Teears: lead analyst, prepared data inputs, performed the analyses and results interpretation, and primary author of the report.

2 Revision 1

This revision involves the correction of the plot of decadal distribution of longline effort ([Figure 4](#)), the plot of decadal distribution of nominal CPUE for both bigeye and yellowfin ([Figs. 6](#) and [7](#)), and the bigeye northern binomial sub-model formula ([Table 4](#)).

3 Executive Summary

This information paper provides details on the key supporting analyses and data sets used to inform the 2026 assessment models for the Western and Central Pacific Ocean (WCPO) bigeye and yellowfin stocks. These include standardisation of catch per unit effort (CPUE) data to provide indices of regional relative abundance in the assessment models, the preparation of tagging data to construct tag input files, and fishery-specific summaries of size compositions (raw and processed) and catch data.

The operational longline (LL) fishery CPUE time-series were standardised to provide indices of relative abundance for the longline index fisheries assigned to each model region. Multiple changes were made to accommodate requests from the pre-assessment workshop (PAW; [Hamer 2026](#)) and these include:

- Modelling was performed separately at the sub-basin scale level to inform regional temporal dynamics.
- Modelling was performed over the entire spatial extent to inform relative scaling across regions.
- Encounter and positive component sub-models were implemented separately to allow for differences in model formulas; specifically to allow the number of hooks to be included in the encounter sub-model.
- A thermal threshold was applied to reduce estimates of relative abundance in areas where encounter probability was low.
- The inclusion of vessel ID as a random effect to account for vessel effects.
- An increase in the number of samples included in the sub-sampling of LL data for regional indices.

The resulting indices for both bigeye and yellowfin tuna showed declines in stock assessment regions and were consistent with the trends seen in both the previous analyses ([McKechnie et al., 2017b](#); [Vincent and Ducharme-Barth, 2020](#); [Tears et al., 2023](#)).

4 Introduction

Stock assessments for tuna in the WCPO conducted by the Pacific Community (SPC) generally utilize the statistical software MULTIFAN-CL (MFCL, ([Fournier et al., 1998](#); [Hampton and Fournier, 2001](#); [Kleiber et al., 2019](#))). These models have extensive data requirements and specific formats for input files. This paper describes the data and its pre-processing that were used in the 2026 stock assessments of bigeye tuna (*Thunnus obesus*) and yellowfin tuna (*Thunnus albacares*) in the WCPO where stand-alone manuscripts were not considered warranted in each case. This report

should not be viewed as the only inputs used in the 2026 stock assessments. Instead, readers should also refer to [Peatman et al. \(2026a\)](#) (size composition data), [Peatman et al. \(2026b\)](#) (tag seeding), [Peatman et al. \(2026c\)](#) (tag corrections) and [Scutt Phillips et al. \(2026\)](#) (tag mixing).

5 CPUE standardisation

This section describes the processes and analyses used to generate indices of relative abundance from fisheries-dependent LL operational (set-level) catch and effort data. Given the spatial and temporal scale of the different LL fleets operating in the region, the resulting indices of abundance represent an important input to the stock assessments of both bigeye and yellowfin tuna. The operational LL dataset is a consolidation of operational level data from the distant-water fishing nations (DWFNs) and Pacific-Island countries and territories (PICTs) longline fleets operating in the Pacific basin. This dataset is the most complete spatial-temporal record of longline fishing activity in the Pacific, spanning from 1952 to the present and is the result of a tremendous collaborative, data sharing effort from the countries involved.

This dataset was first created in 2015 in support of the Pacific-wide bigeye tuna stock assessment ([McKechnie et al., 2015](#)), and was subsequently analysed to generate indices of relative abundance ([McKechnie et al., 2017b](#)) for the 2017 WCPFC bigeye and yellowfin tuna stock assessments ([McKechnie et al., 2017a](#); [Tremblay-Boyer et al., 2017](#)). The 2015 analysis describes in detail the analyses on the inclusion of gear and vessel variables that are unavailable for the full time period of interest ([McKechnie et al., 2015](#)). The current work builds off these previous efforts and analyses of the operational LL data, as well as the spatial-temporal modelling done in support of WCPFC bigeye and yellowfin tuna stock assessments in 2020 and 2023 ([Ducharme-Barth and Vincent, 2020](#); [Tears et al., 2023](#)).

One of the key outcomes resulting from the PAW discussion regarding CPUE analyses ([Hamer, 2026](#)) was to develop estimates of regional temporal dynamics of relative abundance from region-specific spatial-temporal models based on the currently adopted spatial structures within the assessment models ([Figure 1](#)). However, in instances where regions were comparatively small, the estimates should be developed using models fitted to sub-basins ([Figure 2](#)).

Coding scripts for standardisation of LL CPUE are available at SPC GitHub repository [ofp-sam-BET-YFT-2026-cpue](#) (login required). All analyses were performed in ‘R’ ([R Core Team, 2025](#)).

5.1 Fisheries data

The operational dataset consisted of 12,120,764 LL set-level records from the commercial LL log-books of 32 different fishing nations from a period of 1952 through 2024 (the terminal year of the bigeye and yellowfin assessments; [Figs. 3 and 4](#)). In the consolidated dataset, each record contained the vessel’s flag, fleet, date, location (to the nearest 1°x1° spatial cell), effort (number of hooks

fished), and species catch (albacore tuna, bigeye tuna, striped marlin², swordfish, and yellowfin tuna; [Figure 5](#)). Nominal CPUE (defined as catch in numbers of fish per 100 hooks fished) indicated declines in catch rate over the model period in key regions for each species ([Figs. 6 and 7](#)). Hooks-between-floats (HBF) and unique vessel ID were also available although coverage was incomplete, particularly in the early years.

Prior to analysis, the data were filtered following the method first described in [McKechnie et al. \(2015\)](#). This data cleaning process occurred in the following steps:

1. Removed records from 2025 and 2026: -35,522 records (-0.29%)
2. Removed records from outside of the Pacific basin: -22,504 records (-0.19%)
3. Removed records with more than 50 HBF: -33,998 records (-0.28%)
4. Removed records with number of hooks fished per set greater than 5,000 or less than 150: -8,186 records (-0.07%)
5. Removed records with more fish caught than number of hooks fished: -19 records (negligible)
6. Removed records with vessels that did not fish at least 10 quarters³ or made less than 30 sets: -892,437 records (-7.40%)
7. Removed records flagged under Belize (BZ), Panama (PA), or Spain (ES): -27,503 records (-0.25%)
8. Remaining records: 11,136,117 records (91.61%)

Catches without the presence of any of the five species included in the data set were retained as these zero catches were informative for establishing species distribution limits within the spatial-temporal modelling framework assuming that targeting and reporting remained relatively constant. Records that were missing HBF were not excluded as these were imputed as was done previously ([Ducharme-Barth and Vincent, 2020](#); [Teears et al., 2023](#)).

5.1.1 Missing data imputation

Given the limited number of catchability variables that were available across fleets over the time-series of the assessment period, it was necessary to impute missing HBF values to maintain temporal continuity in the standardized indices. This imputation procedure was conducted to estimate missing observations of HBF (predominantly from Japanese records prior to 1967 and records from a variety of flags in the south-east of the WCPO below 10°S and east of 170°E; [Figure 8](#)), and missing fleet identifiers (OS or DW) for Japanese records prior to 1957.

In both cases a formulation of the Random Forests (RF) machine learning approach ([Breiman, 2001](#)), Ensemble Random Forests (ERF; [Siders et al. \(2020\)](#)), was applied to predict the missing

²Striped marlin catch was unavailable for Japanese records prior to 1967.

³Vessels that entered the fishery within the last 10 quarters of the model period were not subject to this exclusion

observations. RF is a computationally efficient machine learning algorithm capable of handling large quantities of ‘training’ data, non-linear interactions between variables, and can produce predictions either via regression or multiple-category classification.

As was done in previous assessments, I developed flag-specific ERF models which predicted the HBF bin (bins of 5 HBF) from missing HBF ($n=2,332,691$) using fleet id, year, month, longitude, latitude, number of hooks fished, total catch in numbers, and proportion of species catch for albacore tuna, bigeye tuna, striped marlin, swordfish, and yellowfin tuna.

Japanese records with missing fleet (OS or DW; $n=258,179$) were predicted using a similar classification approach. Missing fleet prior to 1957 was predicted as a function of month, longitude, latitude, number of hooks fished, total catch in numbers, and proportion of species catch for albacore tuna, bigeye tuna, swordfish, and yellowfin tuna. The training dataset was the Japanese records with fleet recorded from 1958-1967.

I refer readers to [Ducharme-Barth and Vincent \(2020\)](#) for further information on methodology for developing flag-specific predictions of HBF and missing fleet identification for Japanese records.

5.2 Spatial-temporal trends in nominal CPUE

The spatial distribution of nominal CPUE for bigeye ([Figure 6](#)) and yellowfin tuna ([Figure 7](#)) indicated declines in the intensity of hot spots of nominal CPUE. For bigeye tuna, these hotspots were located along the equatorial counter-currents (particularly in the eastern Pacific Ocean), and around the Hawaiian islands. Yellowfin tuna indicated a hot-spot in the equatorial western and central Pacific Ocean.

5.3 Modelling approach

The volume of records in the operational longline dataset presents computational challenges. Modelling the data in a spatial-temporal framework such as the ‘sdmTMB’ package ([Anderson et al., 2022](#)), can be much slower compared to a traditional delta-lognormal generalized linear model (GLM) without interactions between the spatial and temporal terms. The run time for a spatial-temporal model is impacted by the spatial extent modelled, the resolution of the spatial effects (i.e., the number of ‘knots’), the number of time steps estimated, the statistical distribution selected, the number of parameters from catchability and density related explanatory variables, and the volume of data. The length of the stock assessment time-series (1952-2024) and the corresponding quarterly time-step determines the number of time steps for the CPUE model leaving spatial extent of the model, resolution of spatial effects, statistical distribution, explanatory variables, and volume of data as factors for improved computational efficiency.

5.3.1 Uncoupling of sub-models

Bigeye and yellowfin tuna are highly migratory species with spatial-temporal variation in encounter probability. In previous assessments, delta models were implemented to account for the probability of encounter and the estimation of mean density in one complete model framework. However, it was suggested at the PAW to add the number of hooks as an explanatory variable to the binomial component formula and this was accomplished by implementing the sub-models in separate steps. In addition to allowing number of hooks to be added to the binomial component and improving computational efficiency, it also afforded the selection of explanatory variables tailored to each stage of the data generating process.

5.3.2 Spatial extent

In previous assessments of tuna stocks in the WCPO, CPUE indices were used to provide information to the MFCL assessment model on regional scaling (i.e., relative abundance across regions) as well as temporal dynamics of region-specific relative abundance from a single, ‘global’ model (i.e., over the entire spatial extent) for each species. A recommendation from PAW discussions suggested providing information on regional scaling and region-specific temporal dynamics separately by modelling region-specific data independently from a global model. This approach has the advantage of reducing the spatial extent of each region-specific model thus improving computational efficiency. For the equatorial regions west of 140°E, the models were fitted over the entire tropical sub-basin (Figure 2) in order to maintain continuity over this area while relative abundance predictions were performed separately for each region within the sub-basin.

For the global model, it was recommended by PAW to use data from several distant-water flags with broad spatial-temporal coverage such as Japan (JP), Korea (KR), and Chinese Taipei (TW; Figure 9). Only data from 2005 and after were included from TW due to concerns expressed at the PAW about data quality prior to 2005.

For the regional models, achieving model convergence was quite difficult resulting in errors during optimisation preventing model completion and convergence. This was a problem before the PAW and continued to persist thereafter adding additional time to complete these analyses. These issues might be attributed to the numerous data sources (i.e., 32 flags) with highly variable coverage, data quality, and error patterns.

Given the difficulties of model fitting without optimisation errors and achieving basic convergence (i.e., a positive definite Hessian (PDH) and a small max gradient), I investigated the diagnostics from exploratory models used for variable selection and they indicated over parametrisation. Multiple methods to decrease the number of parameters were employed to ameliorate these difficulties, and these include:

- A reduction in the number of flags and vessels (i.e., removal of those with fewer observations) customised by sub-basin (see filtering details in Table 1).

- A reduction in the number of knots in the estimation mesh. The final cumulative knot configuration (across all sub-basins) was 216 as compared to 371 in the 2023 analyses (north=74, Indonesia-Philippines-Vietnam (ID-PH-VN)=34, tropical=50, south=58, and global=152, [Figure 10](#)).
- Changing the model formula such that numerical variables that were specified as splines were modelled instead with intercepts and slopes and, in some cases, variables were removed altogether beginning with the ones that were chosen last in the variable selection process (i.e., the least impactful in improving predictive performance).
- The data in the southern sub-basin prior to 1954 was removed to allow the binomial sub-model to converge as there was no contrast in the presence/absence in those early years (i.e., 100% positive observations).

The spatial-temporal coverage of data was impacted slightly by the filtering of flags and vessels ([Figure 11](#)).

Model fitting and bias-corrected prediction of indices takes multiple days per sub-basin again extending the time required to apply this approach. A ‘sanity’ check (as provided in the sdmTMB package) provides a quick way to assess convergence of the model fit and a successful sanity check would include:

- Non-linear minimizer suggests successful convergence
- Hessian matrix is positive definite
- No extreme or very small eigenvalues detected
- No gradients with respect to fixed effects are ≥ 0.001
- No sigma parameters are < 0.01
- No sigma parameters are > 100
- Range parameter doesn’t look unreasonable

Many of the fitted models were able to pass the sanity check however, there were some that were not, including the bigeye ID-PH-VN binomial, both bigeye southern sub-models, the yellowfin northern positive component sub-model, yellowfin ID-PH-VN binomial, and both of the yellowfin southern sub-models. Due to the difficulty in achieving basic convergence, the number of models being fitted, and the limited time left in the assessment cycle, further exploration for improving model fits was not undertaken. The switch to the sub-basin modelling for CPUE indices, while in theory was a reasonable idea, in practice implementing the approach was not as straightforward as it might of seemed at PAW. It took a lot more time and this will need to be considered in future assessments if this approach is continued.

5.3.3 Sub-sampling

Another approach to managing the computational challenge presented by the operational longline dataset was to randomly sub-sample the number of records to reduce the computational overhead of the model as was applied in previous analyses. In the previous analyses (Teears et al., 2023), the sub-sampling algorithm randomly sampled 5 observations within predefined strata of time step $\times$ spatial cell $\times$ flag-group (quarterly time-step at $5^\circ \times 5^\circ$ spatial cells). However, discussions at the PAW indicated the need for an increase in sampling intensity, thus, for the current analyses sub-basin scale models, random sampling was increased to 20 observations per predefined strata of time step $\times$ spatial cell $\times$ flag-group.

5.3.4 Explanatory variable selection

Potential density (i.e., environmental factors) and catchability variables were selected by comparing predictive performance (Geisser and Eddy, 1979; Sivula et al., 2020) of candidate models using k-fold cross-validation and the expected log pointwise predictive density (ELPD; Gelman et al. (2014)) as a metric. Cross-validation was implemented by splitting the data into five, approximately equal data sets that were spatially blocked (Figure 12) using the blockCV package (Valavi et al., 2019). One fold was withheld (for testing predictive performance) while the other folds were used to train the model. The trained model then predicts the testing data set and provides an estimate of predictive performance as ELPD. This process is repeated for each fold until all folds have been tested and the ELPD values are summed for comparison. The candidate model with the best predictive performance is then adopted as the best model. Variables were added in a forward stepwise process until predictive performance no longer improved.

I chose to implement the spatial-temporal modelling framework with the inclusion of environmental data as density variables. To capture Seasonal patterns, month was included as a cyclic spline (with 12 knots). Oceanographic variables were also evaluated and assumed to impact density in abundance predictions and were included as a cubic regression polynomial spline (with 3 knots). The potential density variables included sea-surface temperature (SST), El Niño-Southern Oscillation data (ENSO), and Pacific Decadal Oscillation effect data (PDO) as these were considered representative of important thermal and productivity metrics. Chlorophyll-a was also included in the exploration of variables but not included in final analyses as these data were temporally limited (≥ 1997).

The vertical distribution of bigeye and yellowfin tuna has been demonstrated to be linked with thermal preference (Holland et al., 1992; Schaefer and Fuller, 2002) and the depth of the thermocline can impact yellowfin habitat (Houssard et al., 2017). Abascal et al. (2018) demonstrated that thermocline depth has been shown to affect catch rates of bigeye by longline gears and can be used to predict spatial-temporal variability at a basin scale. In the 2023 analyses, the difference between the depth of the 12°C isotherm and the 18°C isotherm ($\Delta\text{temp}_{12-18^\circ\text{C}}$) was indicated to be an important variable for predicting catch rates (Teears et al., 2023). Thus, $\Delta\text{temp}_{12-18^\circ\text{C}}$ was

included in the current analyses as a potential explanatory variable.

The SST and $\Delta\text{temp}_{12-18^\circ\text{C}}$ data were derived from [Gouretski and Cheng \(2020\)](#) and downloaded at www.metoffice.gov.uk/hadobs/en4. ENSO data was derived from [Rayner et al. \(2003\)](#) and downloaded at psl.noaa.gov/data/timeseries/month/DS/Nino4. PDO data were derived from [Newman et al. \(2016\)](#) and downloaded at psl.noaa.gov/pdo. Chlorophyll-a was derived from [Sathyendranath et al. \(2023\)](#) and downloaded from [Chlorophyll-a](#).

I continued the inclusion of catchability variables within the spatial-temporal modelling framework. The distant water fishing nation records for JP, TW, and the United States (US) were split by fleet group based on differences in operation and/or gear configuration. The Fiji (FJ) charter vessels were also split apart from the domestic FJ records. Records from PICT flags and ID were grouped into 3 categories, broadly corresponding to pelagic eco-regions in the WCPO ([Longhurst, 1999](#)) and patterns in species catch composition: countries with exclusive economic zones (EEZs) overlapping with the northern extent of the western Pacific warm pool, countries with EEZs mainly within the equatorial waters of 10°N and 10°S latitude, and countries with EEZs primarily south of 10°S latitude. For clarity,

Longline fishers are able to manipulate the characteristics of their gear in order to target depths associated with particular species, often on a set-by-set basis. This is done through a combination of adjustments to the line setting speed, float line length, branch line length, and HBF. Even still, variability in current, surface winds, and water density can result in longlines with the same gear configuration fishing at effectively different depths. Additionally, the material of the mainline can also affect the position of hooks in the water column although, this is unlikely to change from set to set. Onboard observers commonly record this information however, it was largely unavailable (except for HBF) in the operational longline dataset consolidated across all flags. As a result, HBF was the only available covariate which could be used to model the effects of gear configuration on bigeye and yellowfin tuna catch rates.

A recommendation from the PAW suggested the correction of HBF values based on the conversion of the mainline material from kuralon to monofilament in the mid-1990s (between 1993 and 1995) for the JP fleet. It was suggested that the lighter monofilament would require more HBF as compared to what would be needed with the heavier kuralon to achieve the desired depth of the longline to maximize catch rates. Therefore, an adjustment to the HBF values could be performed to account for this change in mainline material. An exploratory investigation was undertaken where reported HBF (unbinned) was modelled in a spatial-temporal model (i.e., sdmTMB) configured as a lognormal GLM with explanatory variables including number of hooks (as a spline), random effects for vessel identification (ID), and targeting cluster (estimated from K-means cluster analysis). Results from the analysis were inconclusive ([Figure 13](#)) as estimated HBF varied spatially and there was no evidence that HBF was stable before 1993 or after 1995. Furthermore, the global estimated difference from 1993 to 1995 was less than 1 HBF. Given the methodology employed to estimate missing HBF values into bins of 5 (see [Section 5.1.1](#)), the addition of 1 HBF to each value before

1993 was not adopted in the current analysis.

As was done in the previous analyses (Ducharme-Barth and Vincent, 2020; Teears et al., 2023), HBF ‘bins’ were modelled using a penalized ‘bs’ spline with 3 degrees of freedom. This enforced a correlation structure on the data such that adjacent HBF bins were estimated to have a similar effect. HBF and flag-group were included as potential variables in the current analyses. Additionally, discussion with industry leaders suggested the inclusion of lunar phase as an important exploratory variable therefore, lunar phase was also included as a potential variable (implemented using the ‘lunar’ package in R).

Vessel ID represents an important variable that could explain changes in catchability over time as was demonstrated in previous analyses on CPUE standardisation (Kinoshita et al., 2019; Nishimoto et al., 2025; Teears et al., 2022, 2025). Therefore, given the improvements in computational efficiency in the current analyses, vessel ID was included as a potential catchability variable as a random effect. Based on recommendations from the PAW, vessel ID nested within flag-group as a random effect was also included as a potential variable.

In order to reduce variable selection processing time, the binomial sub-models data were subset to include data ≥ 2005 and ≤ 2015 . For the global models and the positive component sub-basin sub-models variable selections’ data were subset to include data ≥ 2010 and ≤ 2015 .

In summary, the potential density variables included SST, ENSO, PDO, month, and $\Delta\text{temp}_{12-18^\circ\text{C}}$. The potential catchability variables included HBF, lunar phase, vessel ID, flag-group, vessel ID nested within flag-group (vessel ID and vessel ID nested in flag-group were not considered together within a single model), and number of hooks (in the binomial sub-model). Additionally, interactions between variables were also explored as interactive splines to allow more flexibility in modelling these potentially complex relationships. Correlations between variables were prevented by removing potential variables that correlated with previously selected variables (Figure 14).

The explanatory variables that improved predictive performance of bigeye and yellowfin CPUE standardisation (Tables 2 and 3 and Figs. 15 to 19) varied spatially and by spatial scale as well as by species and sub-model. All models selected a combination of density and catchability variables. Vessel ID or vessel ID nested in flag were selected for every model except for the yellowfin northern positive component model. Number of hooks was selected for all binomial sub-models and month was selected for all sub-models with the exception of the binomial ID-PH-VN sub-basin model. Furthermore, several interactive terms were selected for various explanatory variables to allow more complexity of information for predicting the response variable.

5.4 Model configuration

Spatial-temporal models have been shown to be more accurate and less biased than equivalently structured delta-GLMs when fit to fisheries dependent data (Grüss et al., 2019; Zhou et al., 2019). Additionally, explicitly modelling the spatial-temporal structure of the data allows these models

to cope with non-stationary effort distributions like the ones exhibited in the operational long-line dataset (Ducharme-Barth et al., 2019). In the previous analysis (Tearns et al., 2023), the sdmTMB spatial-temporal modelling approach (Anderson et al., 2022) was used to generate regionally weighted, relative abundance indices as the spatial average of predicted abundance once catchability effects have been ‘standardized’ out. The models implemented in the sdmTMB package (version 0.8.0), were spatial-temporal delta generalized linear mixed models (GLMMs). These models accounted for an interactive relationship between space and time and were specified using Gaussian random fields to define the spatial and spatial-temporal components of the model (Anderson et al., 2022). These Gaussian random fields are defined with a Matern covariance function. Using the estimated correlation structure of the data, spatial-temporal delta-GLMMs can simultaneously interpolate abundance of unobserved strata. The addition of environmental variables can further inform areas of poor sampling by creating a biological envelope of relative density while allowing the model to detect spatial changes in the distribution due to infrequent environmental events. The delta-GLMM structure implemented in R using the sdmTMB package to update the CPUE analyses is defined below.

Binomial component

$$y_i \sim \text{Bernoulli}(p_i)$$

$$\log \frac{p_i}{1 - p_i} \sim \text{as.factor}(\text{YearQtr}_i) + \omega(x_i) + \phi(x_i, t_i) + \dots + \varepsilon$$

Positive component

$$c_i \sim \text{lognormal}(\log \mu_i, \sigma^2)$$

$$\log \mu_i \sim \text{as.factor}(\text{YearQtr}_i) + \omega(x_i) + \phi(x_i, t_i) + \dots + \varepsilon$$

where y is the observed binomial presence/absence response variable, p is the probability of encounter, c is the observed positive component catch rate response variable (CPUE; as number of fish / 100 hooks), μ is the average CPUE with σ^2 standard deviation, i is the record number, ω is the spatial random effect at location x , and ϕ is the spatial-temporal random effect at location x and time t . The spatial variation term $\omega(x_i)$ is characterised by a Gaussian random field assuming a Matern covariance function to account for spatial autocorrelation with ω drawn from a multivariate normal distribution with a covariance matrix Σ_ω .

$$\omega \sim \text{MVNormal}(0, \Sigma)$$

The spatial-temporal random effects $\phi(x, t)$ account for the interaction between time and the model spatial structure. The models have an observation level random effect ε , assumed to come from a Gaussian distribution with a mean of 0.

The spatial knot configuration (i.e., estimation mesh parametrisation) was structured based on the spatial scale (i.e., global or sub-basin) and area modelled and is described above (see [Section 5.3.2](#))

The extrapolation grid was at a $5^\circ \times 5^\circ$ spatial resolution across the spatial domain of the area of interest. A thermal limit was used to remove cells in the extrapolation grid with a low probability of encounter based on temperature to provide a more biologically realistic estimate of abundance in areas with unsuitable seasonal environmental conditions. Thermal limits were applied at 17°C for bigeye and 19°C for yellowfin as these temperatures corresponded to the point when the trajectory of average observed encounter probability was ≤ 0.1 ([Figure 20](#)). As the extrapolation grid used for predicting abundance contains spatial cells for all time-steps and contains SST information that varies over space and time, spatial cells have the potential of being removed in some time-steps and not others, allowing for changes in seasonal conditions to determine whether a cell is included in the predictions.

Predicted CPUE (density; $d(c, t)$) for each cell (c) within the extrapolation grid in each time period (t) was estimated by obtaining the product of the back-transformed linear predictors. Catchability variables were held constant to remove their effects on estimates of relative abundance and density variables were allowed to vary over space and time to inform local density. Area-weighted, bias-corrected, region-specific indices were calculated as:

$$E_{r,t} = \sum_{c=1}^{N_r} a_c d_{c,t}$$

where E is the estimated relative abundance in region r (for the global model) at time t and a is the area associated with cell c for cells 1 to N_r cells in region r . Sub-model specific standard errors are calculated internally in Template Model Builder (TMB) using the inverse Hessian ([Anderson et al., 2022](#)). Total uncertainty was calculated by combining the output distributions (i.e., probability of encounter times the bias-corrected positive component).

Residual analysis was performed using probability-integrated-transform (PIT) residuals ([Warton et al., 2017](#)), evaluated using the ‘DHARMA’ R package ([Hartig and Lohse, 2017](#)).

The final formulas for all CPUE models are presented in [Table 4](#).

5.5 Diagnostics

Diagnostic plots including PIT residuals (aggregated over time), observation quantiles against expected quantiles (QQ) with DHARMA residuals against rank transformed predictions, spatial DHARMA residuals, and spatial uncertainty by decade if available (i.e., if a PDH was achieved)

are presented for global and sub-basins for binomial and positive component sub-models for both species (Figs. 21 to 30). The PIT residuals for the regional models exhibited a more normal distribution centred around 0.5 than the global models. The QQ plots and residuals against predictions plots indicate assumptions regarding distributions are reasonably met however, there may be issues with dispersion and poor fit based on the dispersion tests, KS tests, and outlier tests. For all the models, there was no clear spatial patterning of residuals. The spatial uncertainty plots indicated higher uncertainty for regional models although, the tropical sub-basin uncertainty was not as severe as the other sub-basins. Generally, the binomial sub-models indicated higher uncertainty than positive component sub-models.

5.6 Relative abundance

Estimates of bigeye relative abundance show similar declines across the assessment regions (Figure 31) with proportional abundance in region 1 lower at the end of the time-series than the beginning compared to other regions. Spatial patterns in relative abundance over time differ between the global and sub-basin specific models (Figs. 32 and 33). For example, in region 1, the global results indicate higher relative abundance above 20°N than indicated in the northern sub-basin results.

Estimates of yellowfin relative abundance also show declines across the assessment regions (Figure 34) however, proportional abundance in region 1 was higher at the end of the time-series than the beginning. Region 4 indicated the highest proportion of the stock throughout the time-series and indicated a slight proportional decline over time. Similar to bigeye, spatial patterns in relative abundance over time differ between the global and sub-basin specific models (Figs. 35 and 36) as evidenced by the higher abundance around the archipelago (region 3) in the global model compared to the tropical sub-basin results.

For both species, estimates of uncertainty from the sub-basin models were quite high (Figs. 31 and 34).

6 Construction of tagging data files

Mark-recapture tagging data can provide valuable information to an assessment if it is representative of the entire population. These data can influence the estimation of fishing mortality, natural mortality, regional biomass scaling, and movement among regions within an integrated assessment model. The creation of the tag files used in MFCL for the 2026 assessments of bigeye and yellowfin follow the general methods previously outlined in Berger et al. (2014); McKechnie et al. (2017b); Vincent and Ducharme-Barth (2020); Teears et al. (2023). Preparation of input files coding scripts are available at SPC GitHub repository [ofp-sam-2026-BET-YFT-tag-prep](#) (login required). All analyses performed in ‘R’ (R Core Team, 2025).

6.1 Tagging data

Mark-recapture information from four tagging programs are available to be included in these assessments: the Regional Tuna Tagging Programme (RTTP; 1989-1992), Coral Sea Tagging Program (CSTP, intermittently over 1991-2001), Pacific Tuna Tagging Program (PTTP; 2006-present) and the Japanese Tagging Program (JPTP 2000-present). The CSTP tagging data were included in previous assessments and were unique in that bigeye (and to a lesser extent yellowfin) would return to the Coral Sea where they were initially tagged, many years later (often more than a decade). However, these recaptures are not considered representative of the entire southern region and were excluded in the current assessments.

The tag displacements for bigeye tuna ([Figure 37](#)) indicated substantial southerly movements within and from region 1 to region 2, from the JPTP program. The PTTP program demonstrated extensive longitudinal movements within and from the regions 3 and 4 to outside of the entire assessment region into the eastern Pacific Ocean (EPO) and, to a lesser extent, to region 2. The movement of tagged bigeye out of the assessment region to the EPO is an issue that requires further consideration for modelling these data. While recapture tags in the EPO are removed and the release adjusted to account for this, many tag fish likely move to the EPO that are not recaptured and not available for recapture in the model region. There is currently no reduction of the available tag population in the model region to account for the loss by emigration. The RTTP program displacements indicated more localized movements within the equatorial regions.

The tag displacements for yellowfin tuna ([Figure 38](#)) indicated similarities to bigeye tuna displacements with considerable southerly movements within and from region 1 to region 2, from the JPTP program. The PTTP program also exhibited substantial longitudinal movements within and from regions 3 and 4 to region 2 and to the EPO. However, unlike bigeye tuna displacements, there was far more movement to region 2 and much less to the EPO for yellowfin tuna indicating that the issue of accounting for tag losses due to emigration out of the model region are not as critical as for bigeye tuna. The RTTP program displacements indicated patterns similar to the PTTP program.

6.2 Tag file preparation overview

Many of the tags are unusable in the assessment due to inadequate information such as missing data (e.g., time, location, or fishery of recapture), outside of spatial extent, or they cannot be attributed to a fishery because they are captured by a gear that is not included in the assessment. The ratio of releases to recaptures can impact estimates of mortality in the assessment model and, to preserve this ratio, the number of releases need to be corrected based on the number of recaptures that can be used in the model. Additionally, tagging induced mortality and tag shedding ([Vincent et al., 2019](#)) can impact overall survival that is not related to either natural or fishing mortality as well as the differential effects of individual taggers on tagging-induced mortality (i.e., tagger effects; [Berger et al. \(2014\)](#); [Peatman et al. \(2022\)](#); [Scutt Phillips et al. \(2020\)](#); [Vincent et al. \(2019\)](#)).

These factors need to be accounted for to ensure parameters of interest in MFCL are more accurately estimated and not biased. The observed proportion of tag returns were corrected to reflect the actual recapture rate and this process was conducted using the same methods as the previous bigeye and yellowfin stock assessments (Vincent et al., 2019; Teears et al., 2022). The formulae and methods used are presented in detail in McKechnie et al. (2016) and I refer the readers to that report. A summary is provided below.

The creation of the tagging data files for use in MFCL were:

1. Extraction and filtering of release/recapture data from the database.
2. Correction of releases for base tagging-induced mortality (7% assumed) and mortality from tagger effects (Peatman et al., 2022; Scutt Phillips et al., 2020).
3. Correction for tag shedding (6.97%; Vincent et al. (2019)).
4. Correction of usability ratio calculated as the ratio of usable to total recaptures at the scale of the release event.
5. Consideration of grouping of fisheries/tagging programs for tag recaptures and reporting rates.
6. Construction of tag reporting rate priors from tag seeding experiments (Peatman et al., 2020).

To reduce computational time for MFCL and improve model stability, all release events with less than 10 effective tag releases were excluded. All release events that occurred after the end of 2022 were excluded from the assessment to prevent biases from not including re-captured fish that were not reported or entered into the database at the time of the assessment (there is often a substantial lag between recapture and reporting); although it cannot be guaranteed that more tag returns will not eventuate for the 2022-2024 period. Tagger effects and reporting rate priors were updated with additional data as available (Peatman et al., 2026c,b).

Since the previous stock assessment, the tagging data has been updated and improved in multiple ways. Firstly, additional work was done to continue the validation of bigeye and yellowfin tag recaptures. Validation of recaptures is challenging as many tags are difficult to assign to a specific location, date, gear, and/or flag due to the nature of the shipping and processing of tuna catches. This information is vital for mapping recaptures to an extraction fishery and can sometimes be gleaned using auxiliary information.

Another important improvement to the tagging data was the restructuring of the tagging database allowing one recapture to be linked to multiple 'candidate' vessels that may have potentially recaptured the tagged tuna in question (e.g., vessels that transhipped tuna to the same vessel). Although this further complicates the processing of tagging data, the advantage is that a group of potential recapture locations and dates can be aggregated to provide a window of possible locations and dates subsequently, providing the ability to reasonably approximate the recapture fishery. Therefore, in

the current assessment, a higher percentage of the recaptures were assigned to fisheries, resulting in higher quality tagging information being input into the MFCL assessment model.

Additional work was done to improve the fishery assignments of recaptures. In region 2, if bigeye or yellowfin were greater than 70cm or at liberty for more than 365 days, they were assigned to the ID handline fishery and if they did not meet these criteria, they were assigned to the miscellaneous (domestic) ID fleet. These assumptions were based on size compositions of these two fisheries. For fish with no recapture length, I estimated the age at release using the length at release and the VB growth parameters from the last corresponding assessments (BET: $L1=2.33e+01$, $L2=1.48e+02$, $K=1.14e-01$; YFT: $L1=1.98+01$, $L2=1.42+02$, $K=1.32-01$). I then estimated the age at recapture using time at liberty and the estimated age at release. Finally, I used the VB growth curve to estimate the length at recapture using the estimated age at recapture.

For remaining recaptures with missing fishery assignments (mostly due to lack of gear information), they were randomly assigned to either the longline fishery or the associated purse seine fishery in the region of recapture based on the proportions of longline to purse seine recaptures in that region. I assume there is no bias in reporting by gear however, this may be a source of uncertainty and further investigation in future assessments may be warranted.

After preparing the data, updating the tagger effects, and applying the various correction factors to the raw data, the resulting tagging data for the 2026 bigeye and yellowfin stock assessments were similar to the tagging data from the corresponding 2023 assessments as shown in [Figs. 39 to 42](#).

7 Summaries of size composition and catch data

Appendix 2 ([Section 15](#)) provides summary plots of size compositions (raw and processed) and catch data available for the assessments aggregated by model fishery definitions [Figure 59](#) to [Figure 164](#). Note the raw data go through an extensive filtering and reweighting process to produce the size frequency data that eventually is input to MFCL ([Peatman et al., 2026a](#)).

8 Inputs preparation and impacts on assessment cycle process

Extensive work was performed prior to the PAW to develop an alternative model ensemble approach to CPUE standardisation where longline data were modelled separately by flag (in the spatial-temporal framework) and then combined (via bootstrapping) into regional indices as assessment inputs which had several benefits including:

- The inclusion of a higher proportion of data into the analyses.
- Tailoring catchability and density variables to the flag-specific data and area of fleet operation.
- Tailoring spatial and spatial-temporal random effects to the flag-specific data and area of fleet operation.

- In addition to developing indices as inputs to the assessments, flag-specific results could be provided to inform local dynamics (specifically for fleets with smaller spatial extents such as PICTs).
- Capturing flag and area-specific error patterns due to differences in data-generating processes.
- Preserving vessel-specific spatial-temporal patterns that do not respect regional boundaries.
- Improved estimates of uncertainty.

There was conflicting support for this alternate approach at the PAW and the ‘region-specific’ approach presented in [Section 5](#) was selected by the PAW for the current assessments. Work to develop and refine the region-specific approach was substantial due to the nature of the approach (i.e., from one model in 2023 to five for each species in 2026). Furthermore, persistent problems with achieving basic levels of convergence (see [Section 5.3.2](#) for further details) resulted in the development of input CPUE indices requiring six weeks after the PAW before results could be provided as inputs in the assessments thus, further slowing down the preparation of other input files.

The tagging data preparation also had challenges to overcome as it required the tagging code to be rewritten to accommodate the new regional and fisheries’ structures and the change to the method for applying mixing periods. Specifically, in the 2023 assessments, various mixing period scenarios (i.e., 1, 2, and 3 quarters) were applied by the use of multiple tag files created specifically by mixing period scenario. However, in the current assessment, tag mixing periods are specified in the ‘ini’ file due to updates in the MFCL software designed to accommodate release event specific mixing periods.

Additionally, there were difficulties in the preparation of catch data as updates to 2024 catch data were not fully complete as late as the last week of June.

These challenges as well as extensive work involving the size composition data ([Peatman et al., 2026a](#)) caused delays in the assessment process and resulted in the delivery of input files to the lead assessment scientists much later than in previous assessments.

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10 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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12 Tables

Table 1: Minimum number of observations (limit) to be included in the sub-basin scale CPUE standardisation by flag and vessel with resulting percentage of observations (% obs.), reduction in flags (Δ flags), and reduction in vessels (Δ vessels).

Species	Sub-basin	Flag limit	Vessel limit	% obs.	Δ flags	Δ vessels
BET	North	1,000	50	91%	21 to 9	3,561 to 1,260
	ID-PH-VN	20	5	99%	16 to 14	1,405 to 1,024
	Tropical	1,000	50	91%	27 to 14	4,369 to 1,867
	South	200	20	97%	27 to 23	3,802 to 2,466
YFT	North	1,000	50	91%	21 to 9	3,561 to 1,260
	ID-PH-VN	20	5	99%	16 to 14	1,405 to 1,024
	Tropical	1,000	50	91%	27 to 14	4,376 to 1,868
	South	1,000	50	90%	27 to 21	3,802 to 1,713

Table 2: Variables selected for bigeye CPUE standardisation models by spatial extent and sub-model.

BET Binomial					
Variable	Global	North	ID-PH-VN	Tropical	South
PDO	X		X	X	
ENSO		X			
SST	X	X	X		X
$\Delta\text{temp}_{12-18^\circ\text{C}}$				X	
Month	X	X	X	X	X
Chlorophyll-a	X				
HBF	X	X	X	X	
Flag	X	X	X	X	X
Vessel ID			X	X	
Flag:Vessel ID	X	X			X
100s of Hooks	X	X	X	X	X
Lunar phase			X	X	X

BET Positive component					
Variable	Global	North	ID-PH-VN	Tropical	South
PDO	X	X	X		
ENSO				X	X
SST	X	X			
$\Delta\text{temp}_{12-18^\circ\text{C}}$			X	X	X
Month	X	X	X	X	X
Chlorophyll-a	X				
HBF			X	X	X
Flag	X		X	X	
Vessel ID	X		X		
Flag:Vessel ID		X		X	X
Lunar phase		X	X	X	X

Table 3: Variables selected for yellowfin CPUE standardisation models by spatial extent and sub-model.

YFT Binomial					
Variable	Global	North	ID-PH-VN	Tropical	South
PDO	X			X	X
ENSO		X			
SST	X	X	X		
$\Delta\text{temp}_{12-18^\circ\text{C}}$					X
Month	X	X		X	X
Chlorophyll-a	X				
HBF	X	X	X		X
Flag	X	X	X	X	X
Vessel ID	X		X		X
Flag:Vessel ID		X		X	
100s of Hooks	X	X	X	X	X
Lunar phase			X	X	X

YFT Positive component					
Variable	Global	North	ID-PH-VN	Tropical	South
PDO	X	X		X	
ENSO			X		X
SST	X	X	X	X	
$\Delta\text{temp}_{12-18^\circ\text{C}}$					X
Month	X	X	X	X	X
Chlorophyll-a	X				
HBF	X	X	X	X	X
Flag	X	X		X	X
Vessel ID	X		X		
Flag:Vessel ID				X	X
Lunar phase		X	X		X

Table 4: CPUE model formulas for global and sub-basin binomial and positive component sub-models. Formula symbols include the presence/absence (PA) response variable, number of hooks (in 100s; hhook), and difference in depth of the 12°C and 18°C isotherms ($\Delta\text{temp}_{12-18^\circ\text{C}}$). Variables are listed in order of selection (i.e., variables selected first have the largest improvement on predictive performance)

BET	
Area	Formula
Global	$PA \sim \dots(1 flag : vessel.ID) + s(hbf, sst) + flag + s(hhook, bs = 'cr') + s(PDO, bs = 'cr') + s(month, bs = 'cc', k = 12)$ $cpue \sim \dots(1 vessel.ID) + flag + s(month, bs = 'cc', k = 12) + s(PDO, sst)$
North	$PA \sim \dots(1 flag : vessel.ID) + s(hbf, sst) + s(month, bs = 'cc', k = 12) + flag +$ $s(hhooks, bs = 'cr') + s(ENSO, bs = 'cr')$ $cpue \sim \dots(1 flag : vessel.ID) + s(month, lunar.phase) + s(PDO, sst) + flag$
ID-PH-VN	$PA \sim \dots s(hbf, lunar.phase) + (1 vessel.ID) + s(PDO, sst) + s(hhooks, bs = 'cr') + flag + s(month, bs = 'cc', k = 12)$ $cpue \sim \dots s(hbf, lunar.phase) + (1 vessel.ID) + s(PDO, \Delta\text{temp}_{12.18}) + flag + s(month, bs = 'cc', k = 12)$
Tropical	$PA \sim \dots(1 vessel.ID) + hbf * \Delta\text{temp}_{12.18} + flag + hhook + PDO$ $cpue \sim \dots(1 flag : vessel.ID) + hbf * \Delta\text{temp}_{12.18} + month * lunar.phase + flag + ENSO$
South	$PA \sim \dots(1 flag : vessel.ID) + flag + sst * lunar.phase + hhook + s(month, bs = 'cc', k = 12) + hbf * ENSO$ $cpue \sim \dots(1 flag : vessel.ID) + s(hbf, bs = 'bs', m = c(3, 2)) + s(\Delta\text{temp}_{12.18}, bs = 'cr') + s(lunar.phase, bs = 'cr') +$ $s(ENSO, bs = 'cr') + s(month, bs = 'cc', k = 12)$
YFT	
Area	Formula
Global	$PA \sim \dots(1 vessel.ID) + s(hbf, sst) + flag + s(hhooks, bs = 'cr') + s(month, bs = 'cc', k = 12) + s(PDO, bs = 'cr')$ $cpue \sim \dots(1 vessel.ID) + s(month, bs = 'cc', k = 12) + s(hbf, PDO) + flag + s(sst, bs = 'cr')$
North	$PA \sim \dots(1 flag : vessel.ID) + s(hbf, sst) + s(month, bs = 'cc', k = 12) + flag +$ $s(hhooks, bs = 'cr') + s(ENSO, bs = 'cr')$ $cpue \sim \dots flag + s(hbf, sst) + s(month, lunar.phase) + s(PDO, bs = 'cr')$
ID-PH-VN	$PA \sim \dots(1 vessel.ID) + s(hbf, sst) + flag + s(hhook, bs = 'cr') + s(lunar.phase, bs = 'cr')$ $cpue \sim \dots(1 vessel.ID) + s(hbf, month) + s(ENSO, sst) + s(lunar.phase, bs = 'cr')$
Tropical	$PA \sim \dots(1 flag : vessel.ID) + s(hhooks, bs = 'cr') + flag + s(month, lunar.phase) + s(PDO, bs = 'cr')$ $cpue \sim \dots(1 flag : vessel.ID) + flag + s(PDO, sst) + s(month, bs = 'cc', k = 12) + s(hbf, bs = 'bs', m = c(3, 2))$
South	$PA \sim \dots(1 vessel.ID) + s(hbf, \Delta\text{temp}_{12.18}) + s(month, bs = 'cc', k = 12) + s(PDO, lunar.phase) +$ $s(hhooks, bs = 'cr') + flag$ $cpue \sim \dots flag + s(month, bs = 'cc', k = 12) + s(ENSO, bs = 'cr') + s(hbf, bs = 'bs', m = c(3, 2)) + (1 flag : vessel.ID) +$ $s(lunar.phase, bs = 'cr') + s(\Delta\text{temp}_{12.18}, bs = 'cr')$

13 Figures

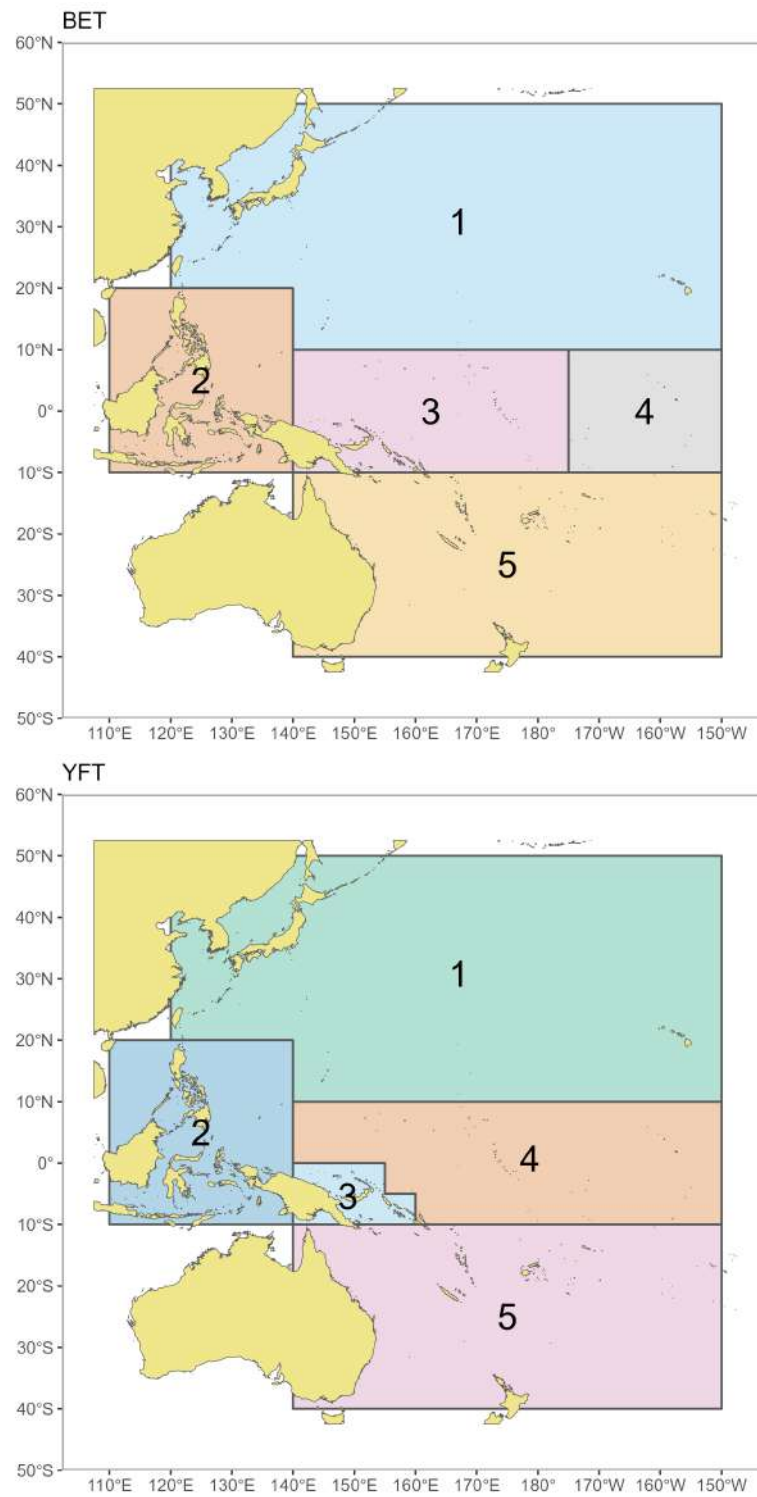


Figure 1: The geographical area covered by the stock assessments and the boundaries of the five model regions used for the 2026 bigeye (top) and yellowfin (bottom) assessments.

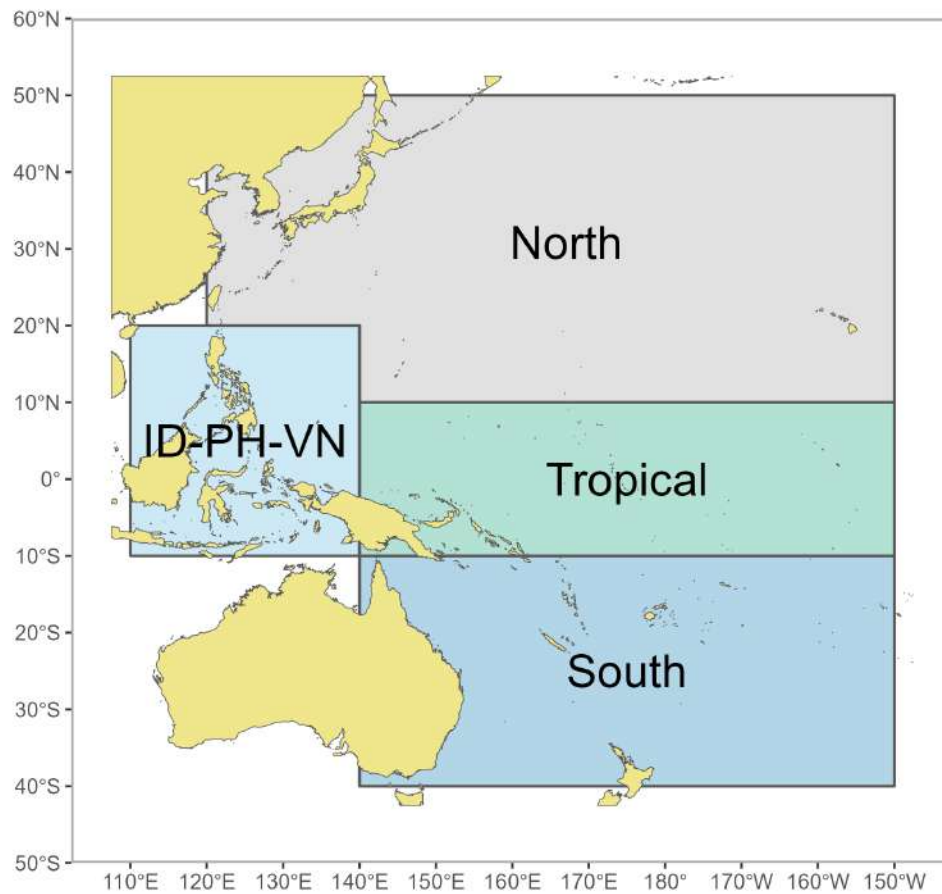


Figure 2: The geographical area covered by the stock assessments and the boundaries of the four sub-basins used for fitting the ‘region’-specific CPUE standardisation models.

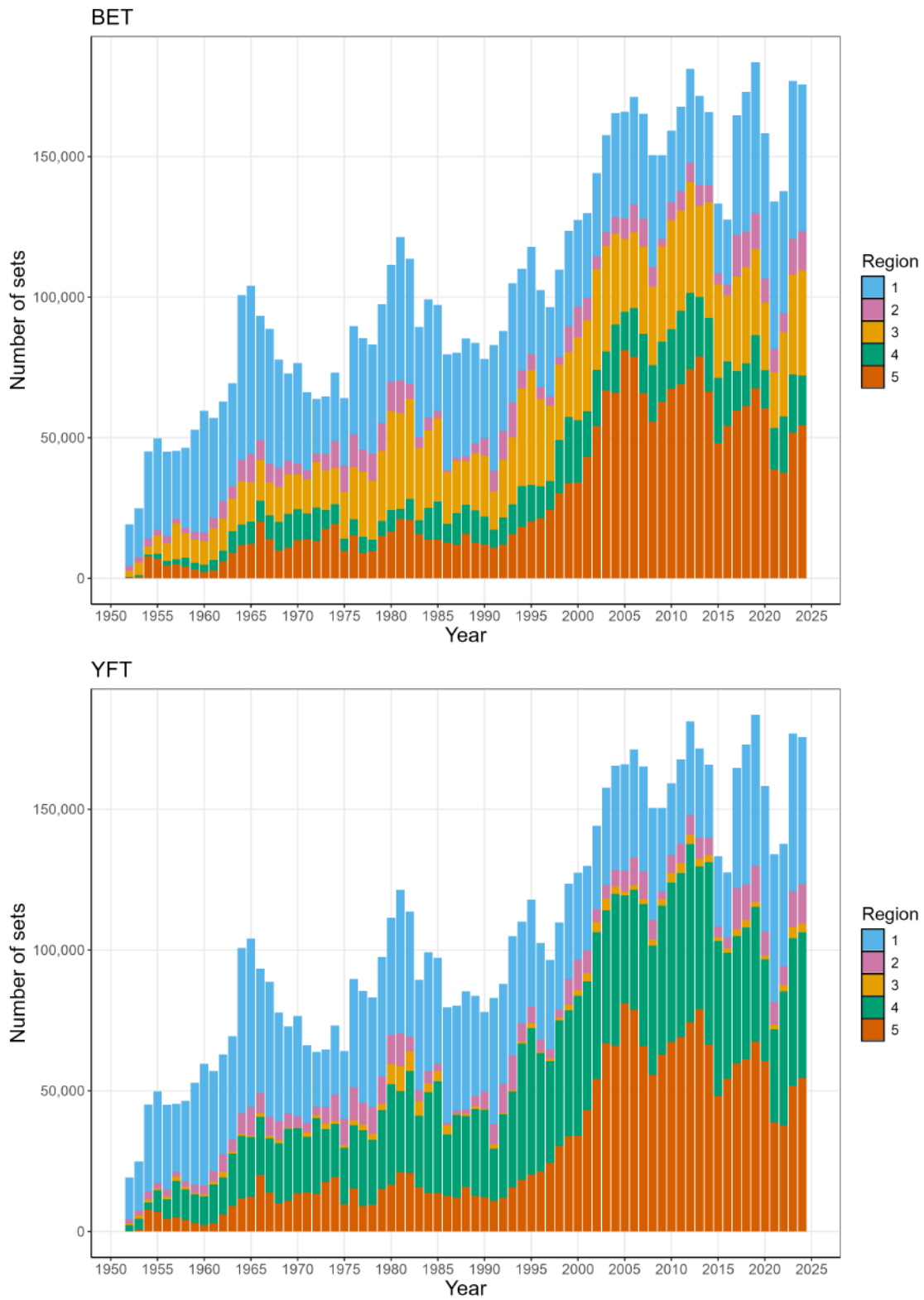


Figure 3: The number of operational longline sets within each assessment region over time for bigeye (top) and yellowfin (bottom).

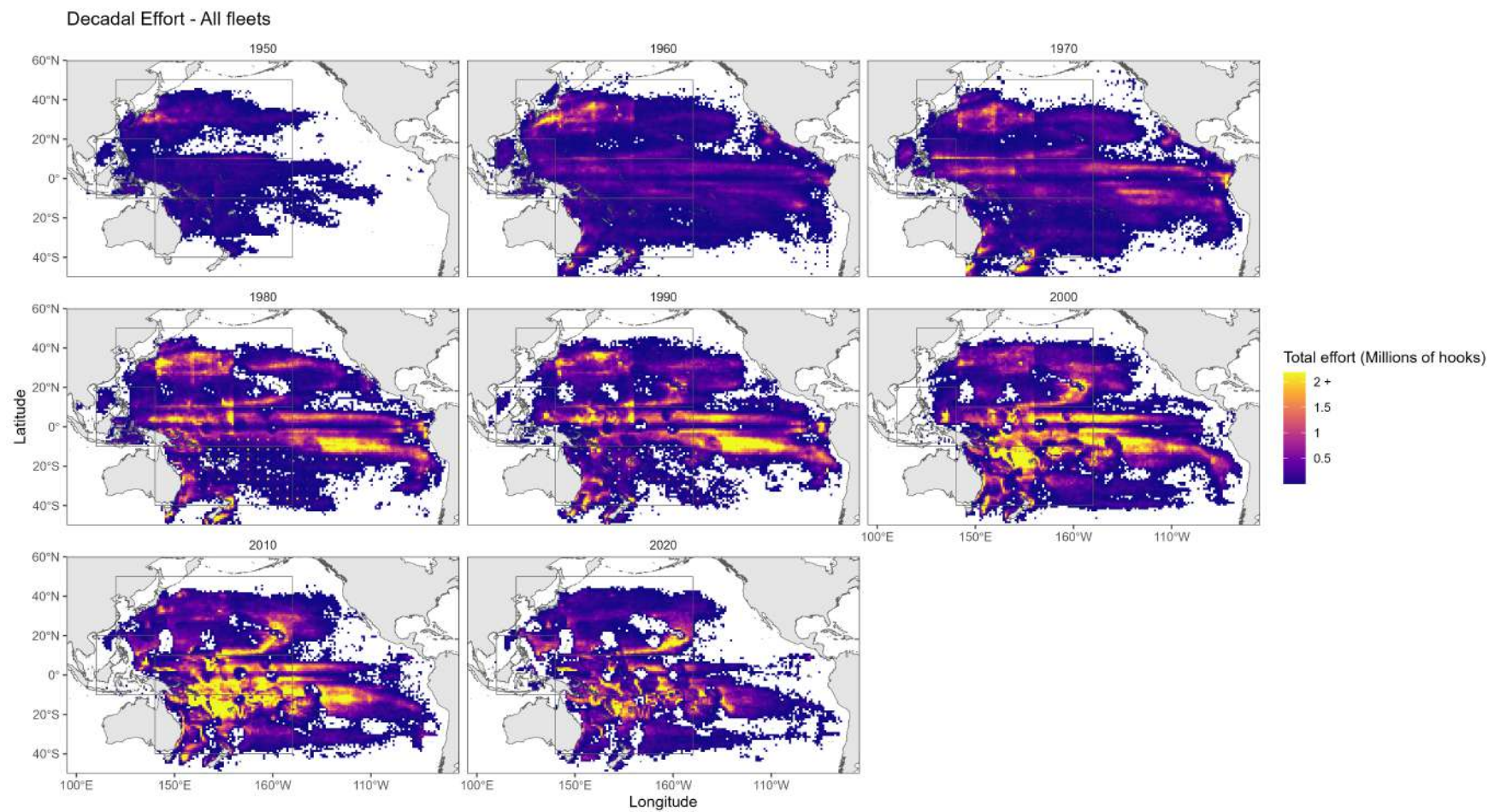


Figure 4: The decadal distribution of longline fishing effort (defined as hooks fished) across all fishing fleets in the operational longline data set.

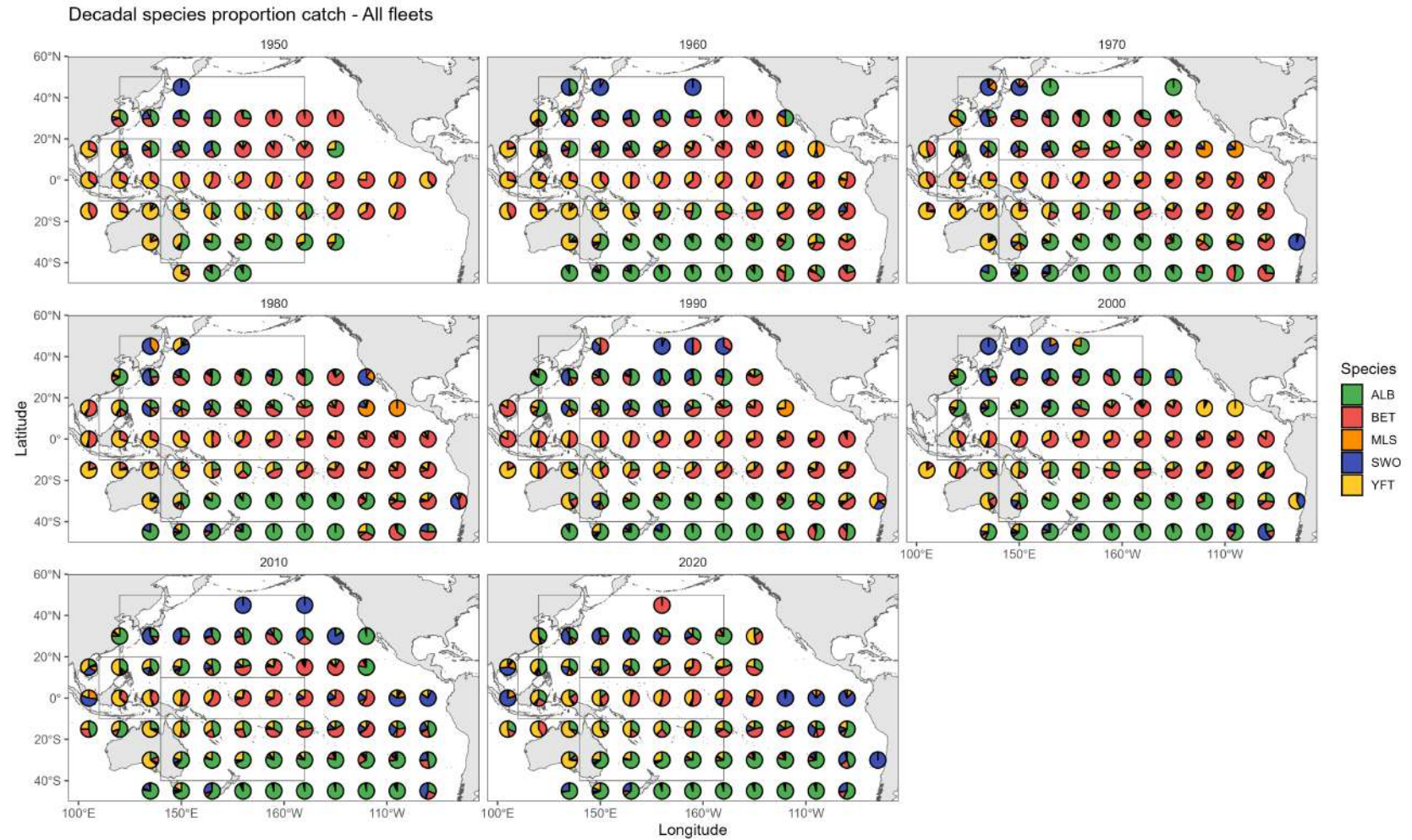


Figure 5: The decadal distribution of proportion of species caught across all fishing fleets by $15^{\circ} \times 15^{\circ}$ spatial cell in the operational longline data set.

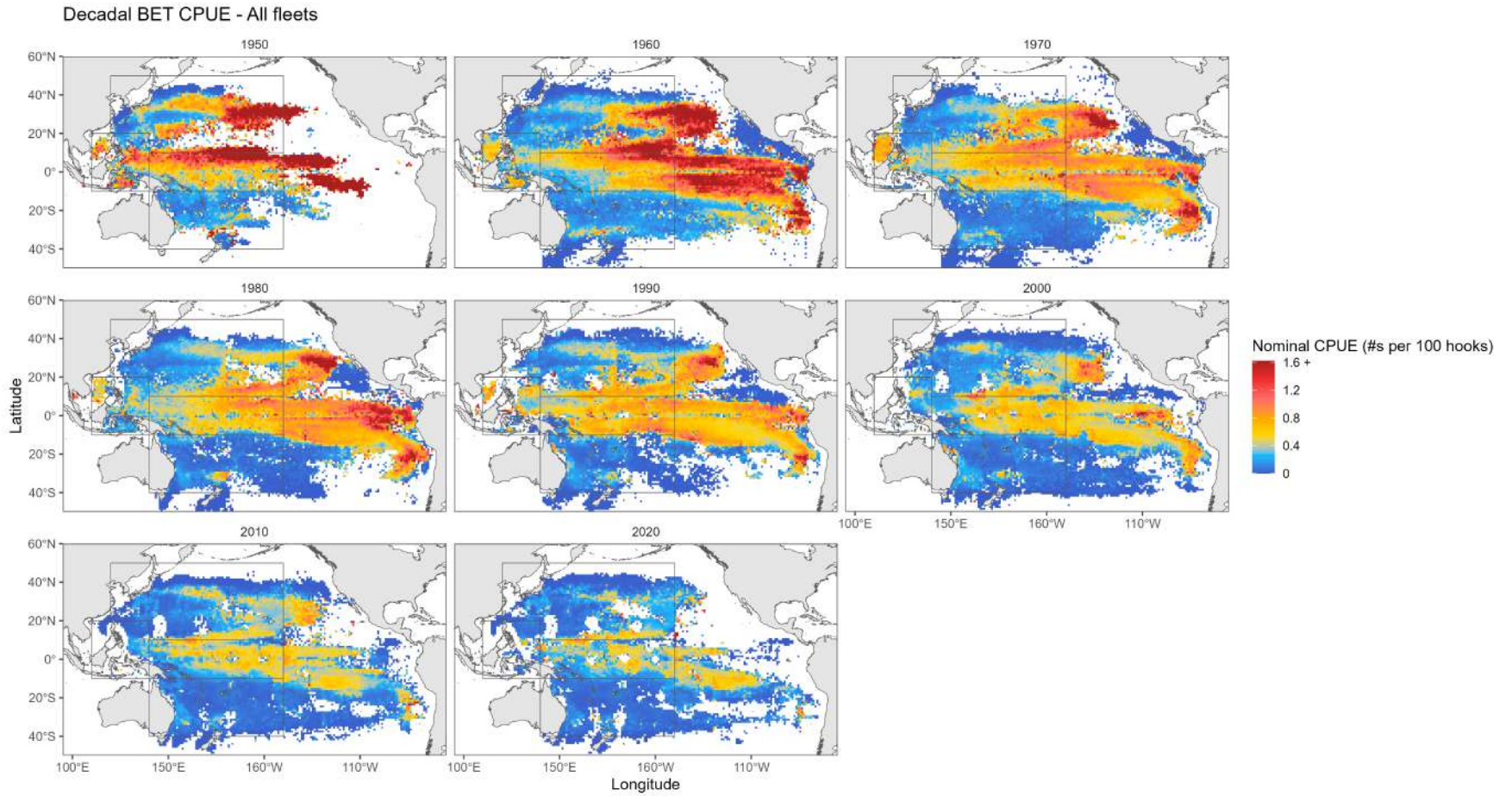


Figure 6: The decadal distribution of nominal CPUE (numbers per 100 hooks fished) for bigeye (top) and yellowfin (bottom) across all fishing fleets in the operational longline data set.

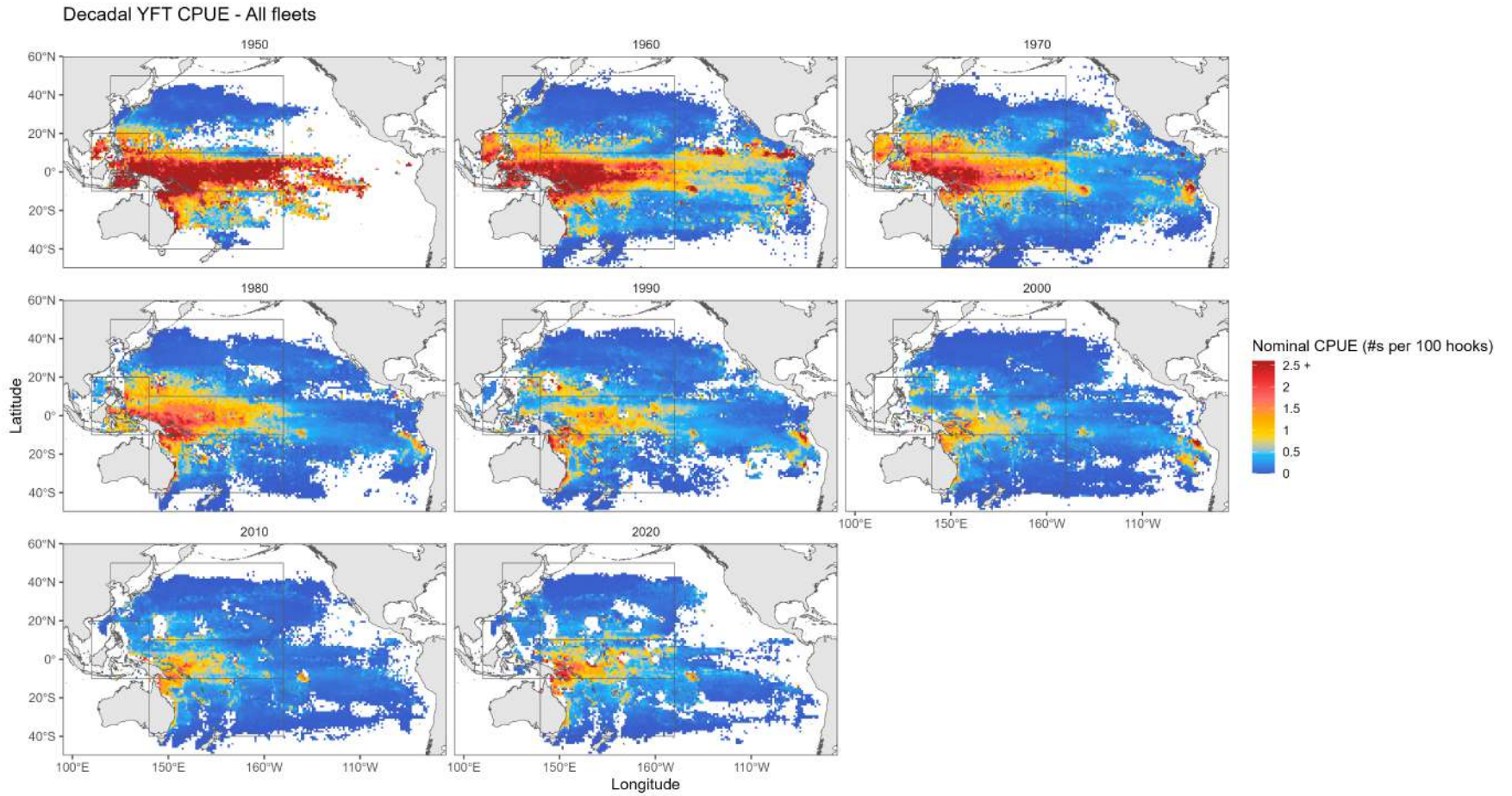


Figure 7: The decadal distribution of nominal CPUE (numbers per 100 hooks fished) for bigeye (top) and yellowfin (bottom) across all fishing fleets in the operational longline data set.

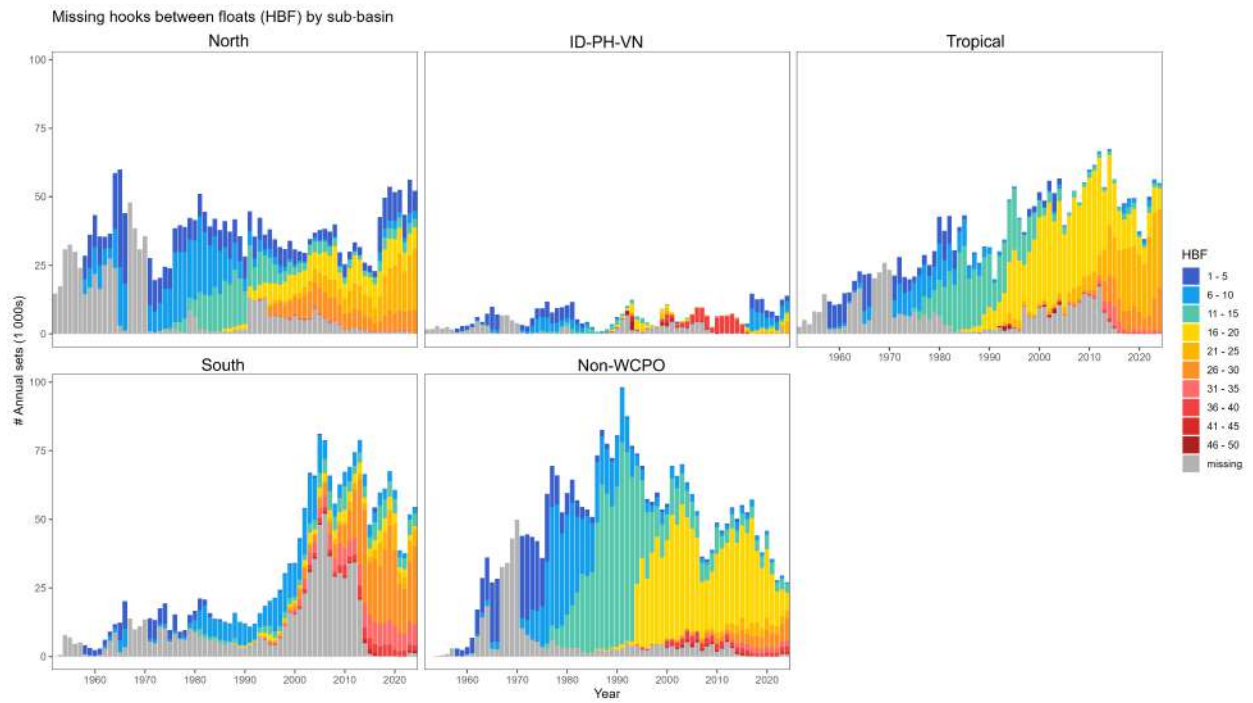


Figure 8: The number of records with and without HBF by sub-basin. The colour of the bar indicates the "bin" of HBF that each record was assigned to.

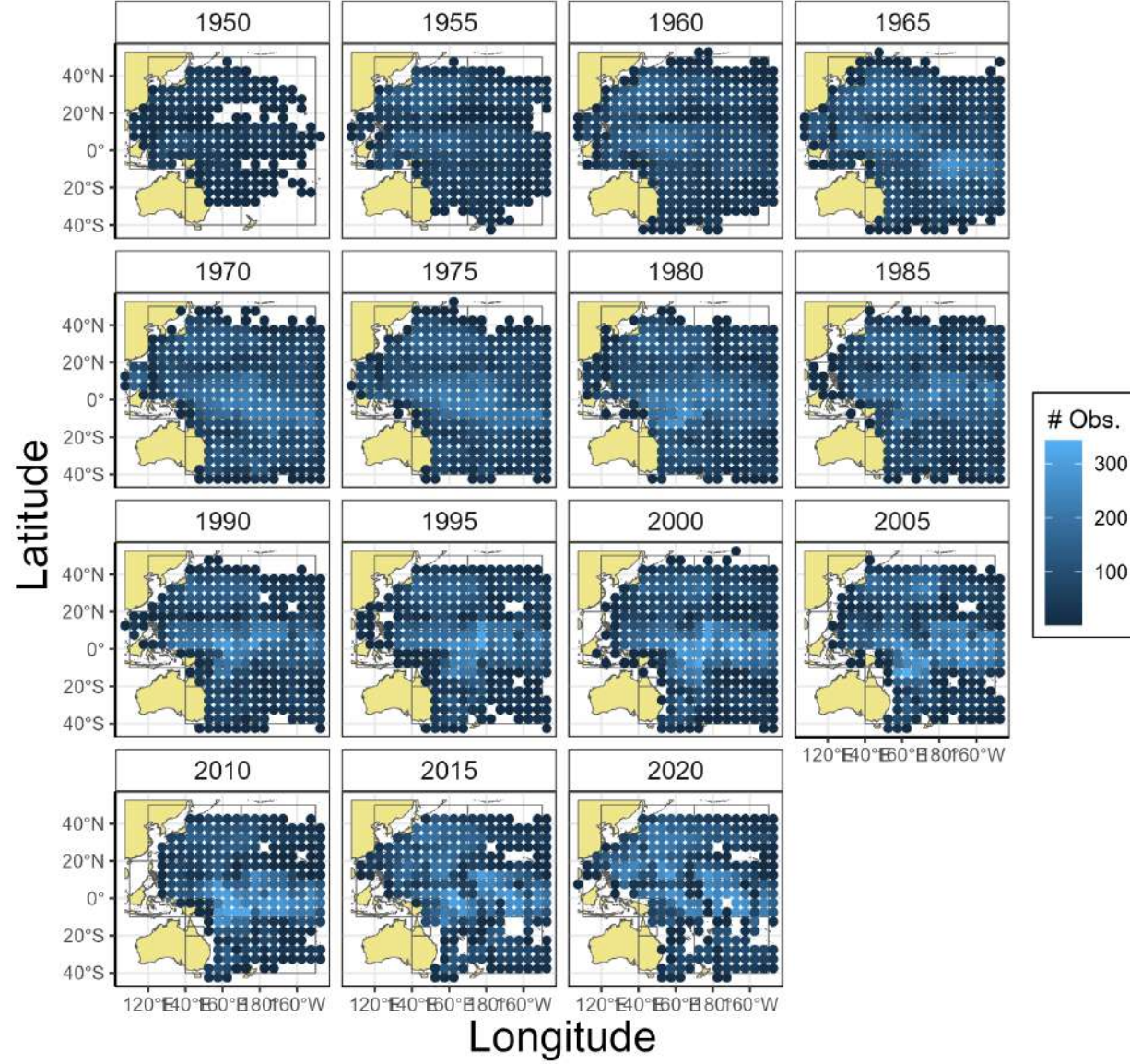


Figure 9: The number of observations by 1°x1° spatial cells over five-year periods from the longline operational data from JP, KR, and TW.

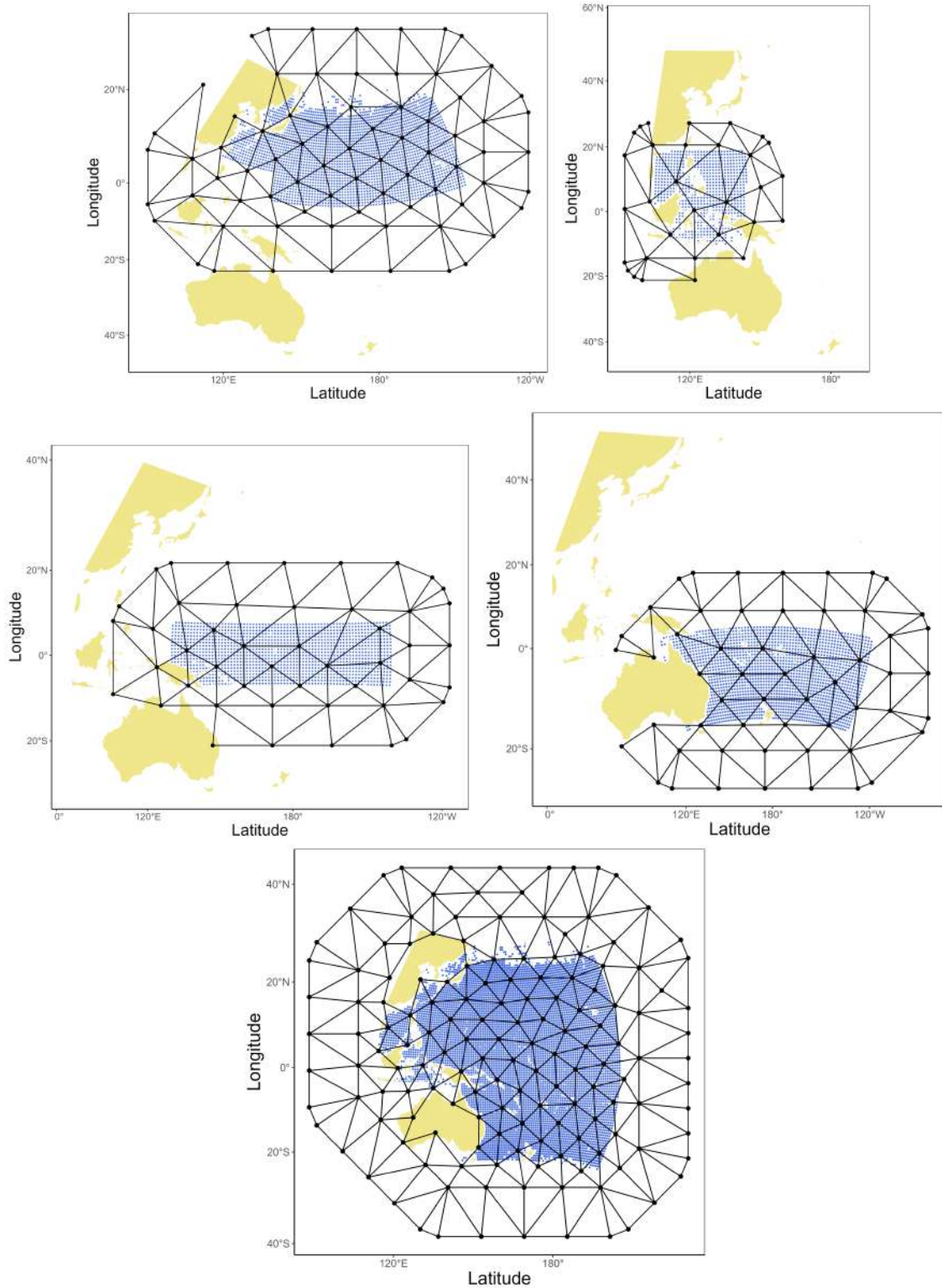


Figure 10: Equidistant projections showing sub-basin scale and global spatial knot distributions (black dots with black lines connecting them) used to define the mesh for the spatial-temporal standardisation model used in the 2026 assessments of bigeye and yellowfin tuna. Observation locations show in blue. Sub-basins include north (top-left), ID-PH-VN (top-right), tropical (middle-left), south (middle-right), and global (bottom).

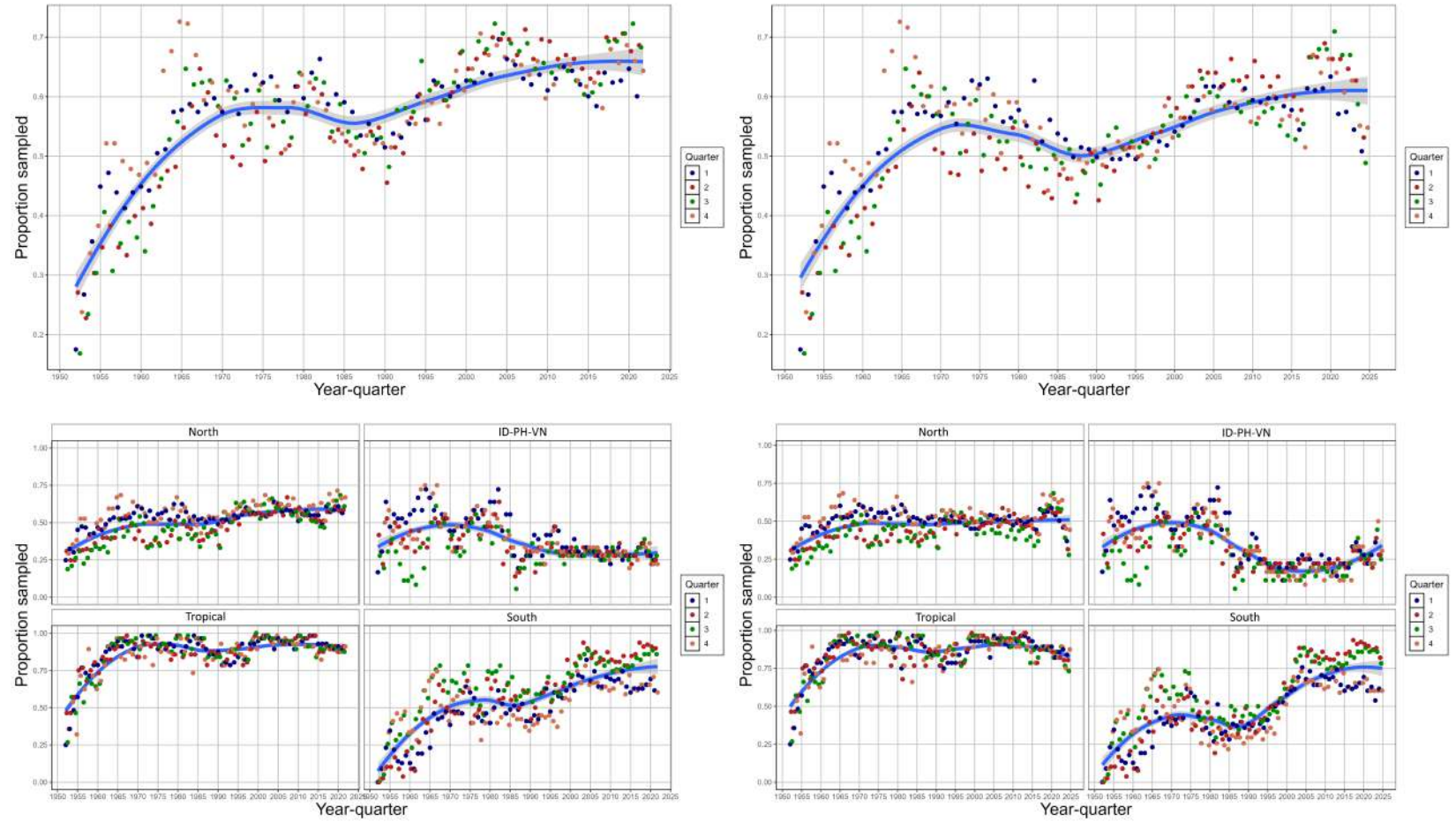


Figure 11: Global (top) and sub-basin (bottom) spatial-temporal coverage over time from the 2023 (left) and 2026 (right) CPUE analyses. Proportion sampled was calculated as proportion of $5^{\circ} \times 5^{\circ}$ cells with at least 5 observations.

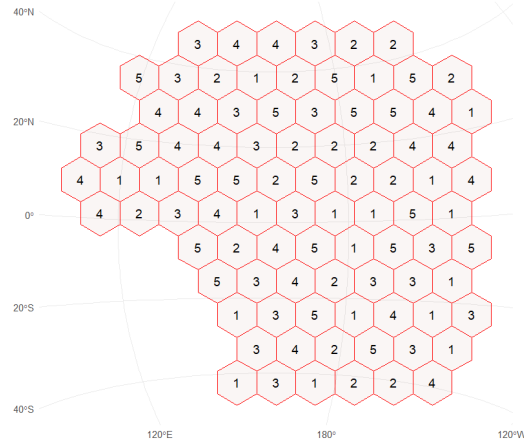


Figure 12: Example of spatial blocking of longline operational data for k-fold ($k=5$) cross-validation used in testing the predictive performance of candidate models with potential environmental and catchability variables. The number in each block corresponds to the fold assignment (1-5).

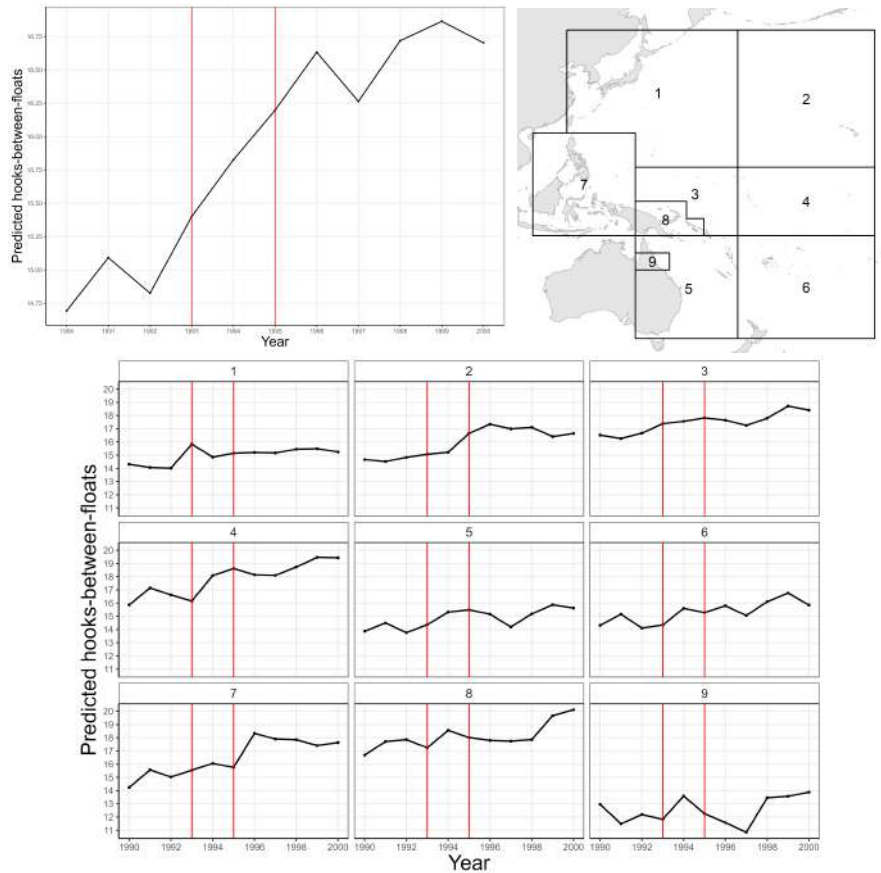


Figure 13: Estimation of hooks-between-floats over time using JP data for the global extent (top-left) and the regions (bottom). Regional results presented based on the 2023 bigeye and yellowfin spatial structure (top-right). Red lines are presented to highlight the time-period when mainline material predominantly shifted from kuralon to monofilament.

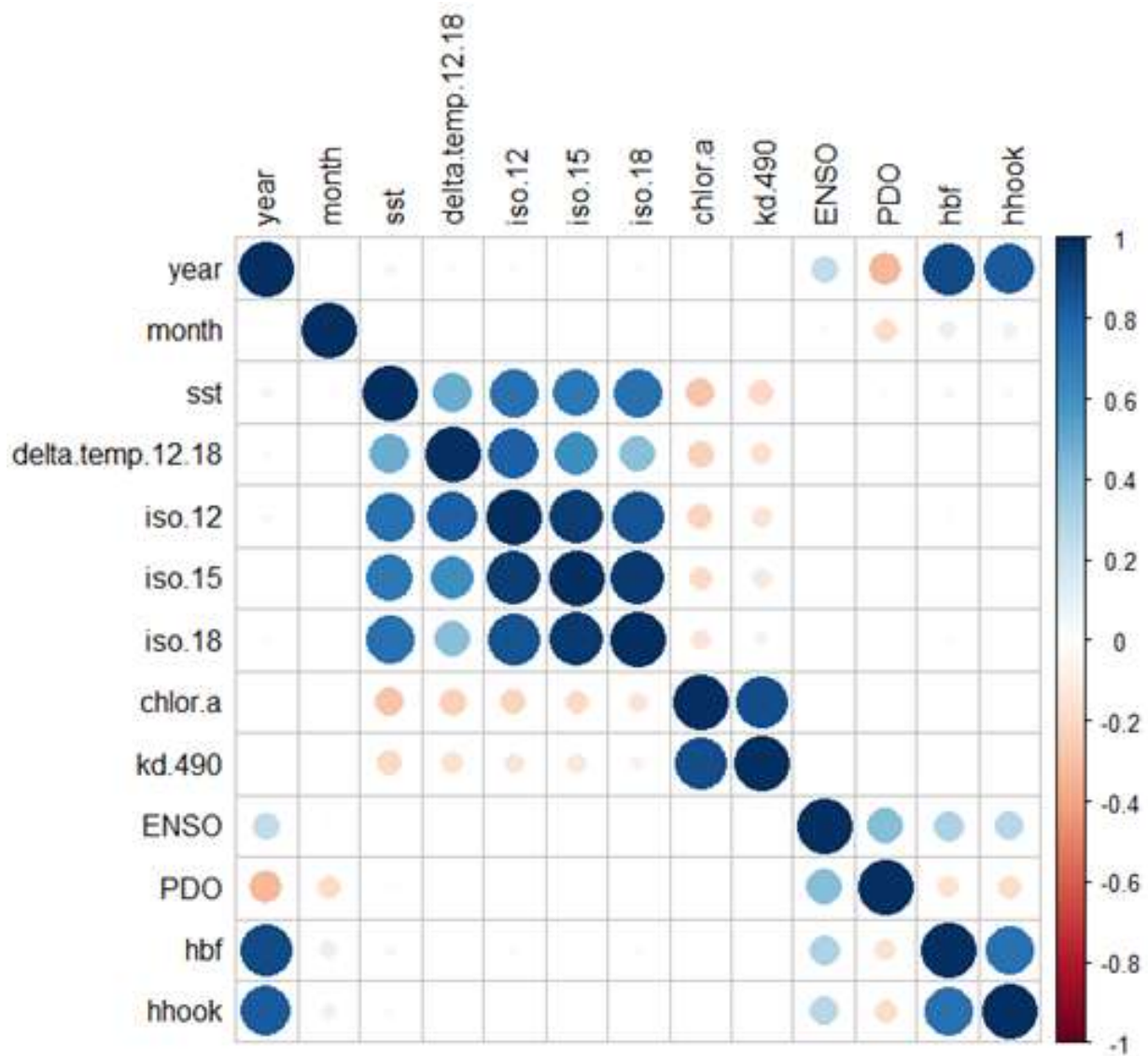


Figure 14: Correlations between potential explanatory variables including year, month, sea-surface temperature (sst), $\Delta\text{temp}_{12-18^\circ\text{C}}$ (delta.temp.12.18), 12°C isotherm (iso.12), 15°C isotherm (iso.15), 18°C isotherm (iso.18), chlorophyll-a (chloro.a), diffuse attenuation coefficient at 490 nanometers (kd.490), El Niño-Southern Oscillation (ENSO), Pacific Decadal Oscillation (PDO), hooks-between floats (hbf), and number of hooks (in 100s; hhook).

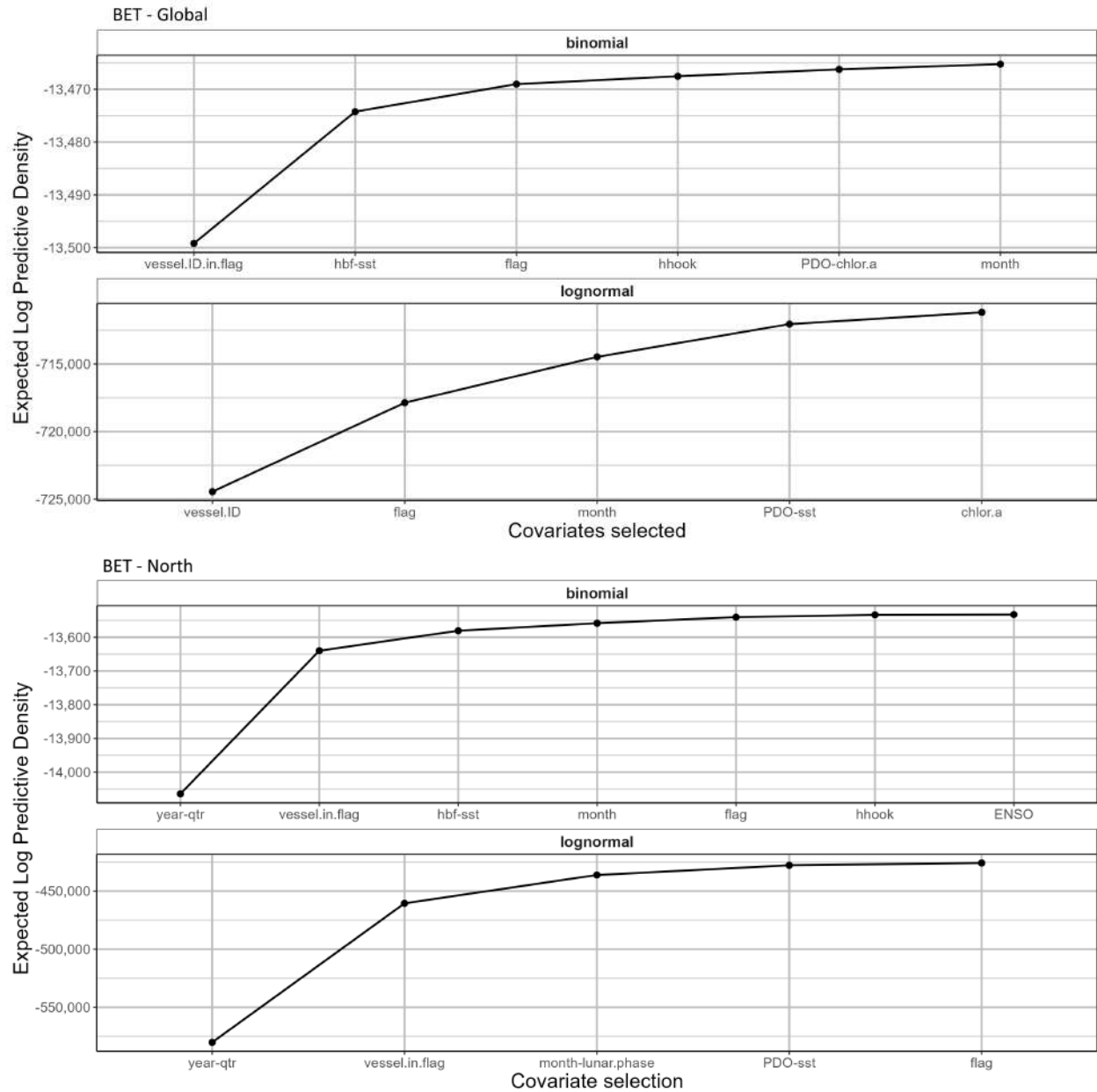


Figure 15: Improvement in predictive performance (Expected Log Predictive Density; ELPD) by variable selected for bigeye global and the north sub-basin CPUE standardisation models.

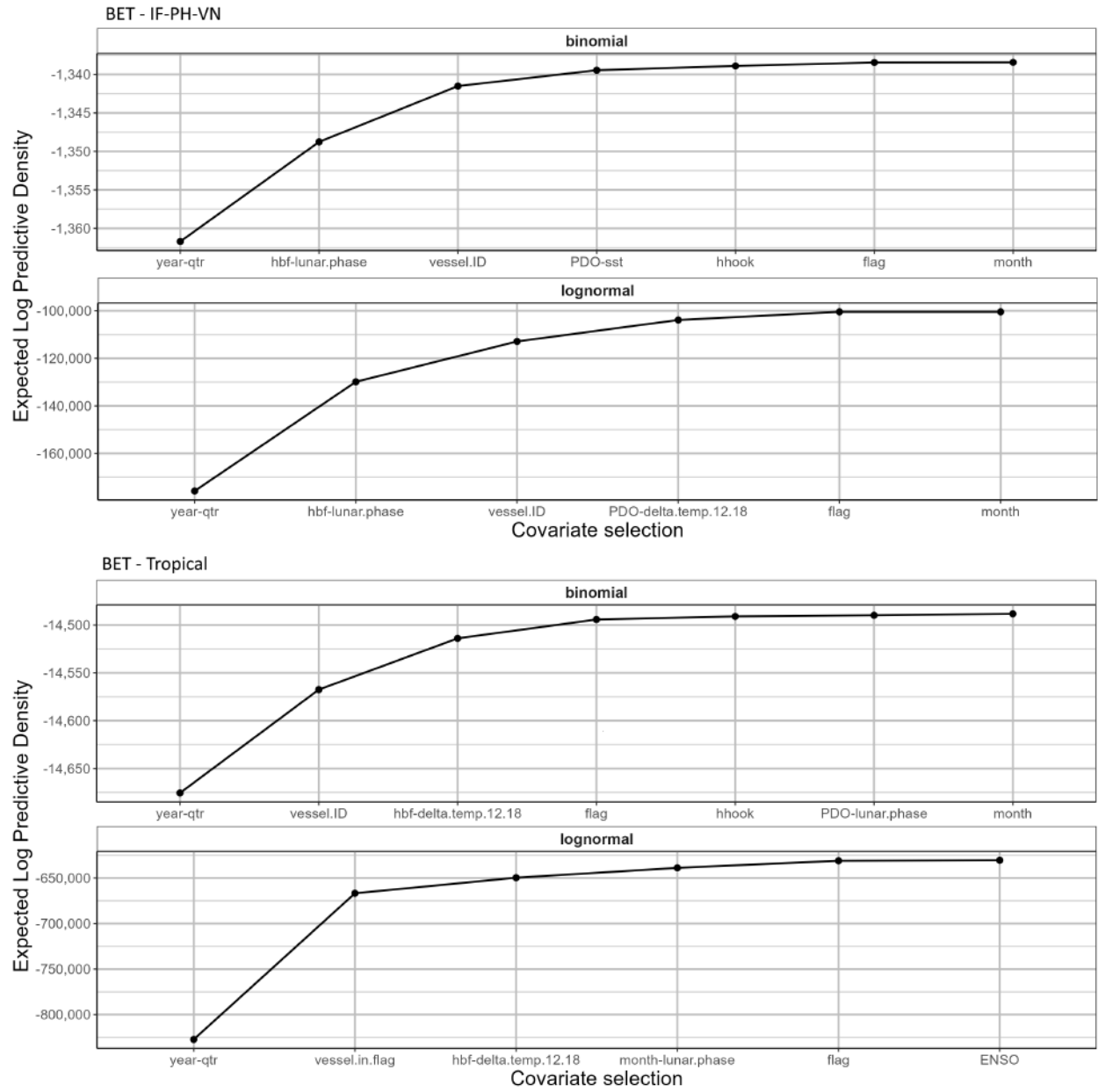


Figure 16: Improvement in predictive performance (Expected Log Predictive Density; ELPD) by variable selected for bigeye ID-PH-VN and the tropical sub-basins CPUE standardisation models.

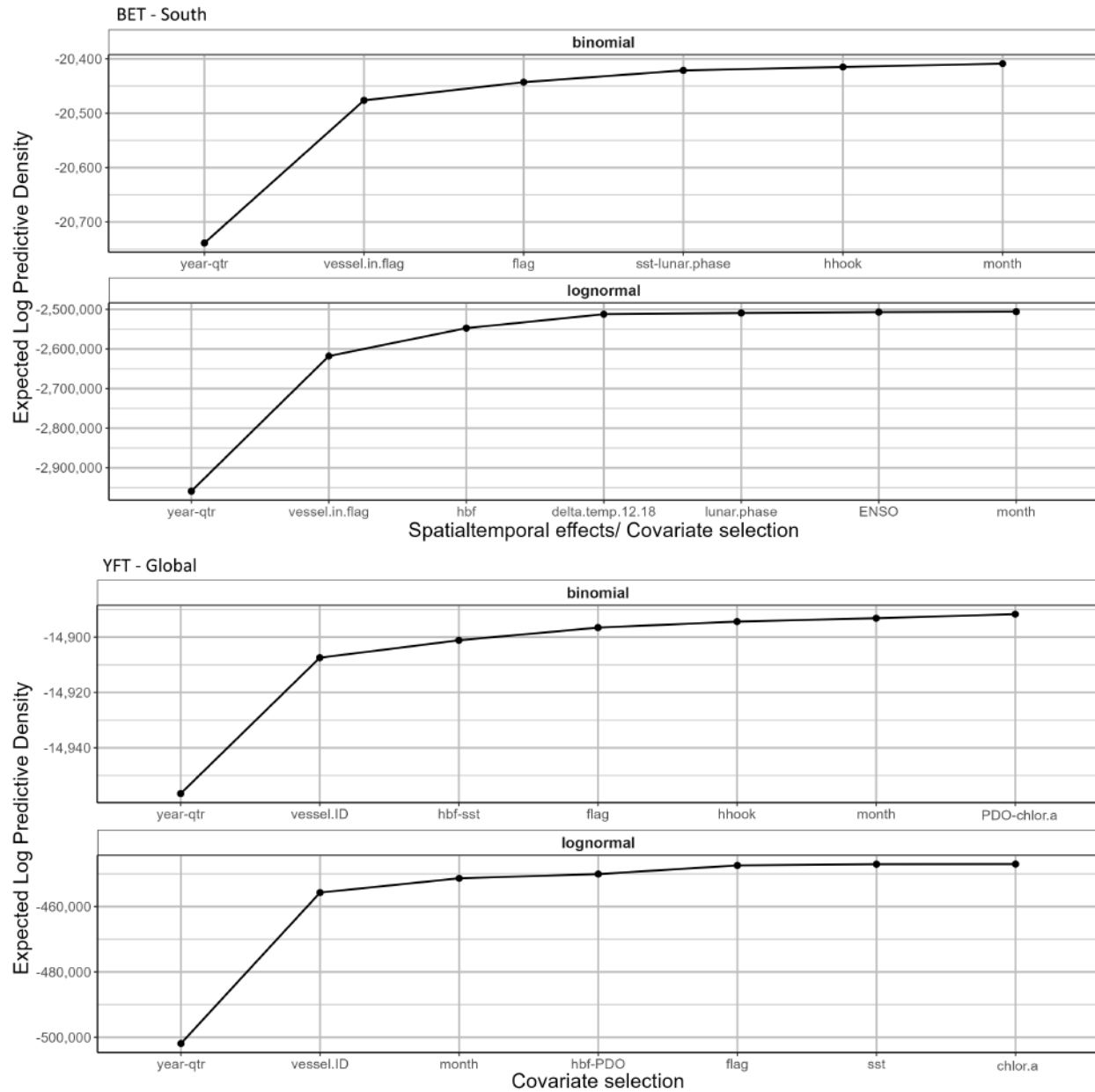


Figure 17: Improvement in predictive performance (Expected Log Predictive Density; ELPD) by variable selected for bigeye south sub-basin and the yellowfin global CPUE standardisation models.

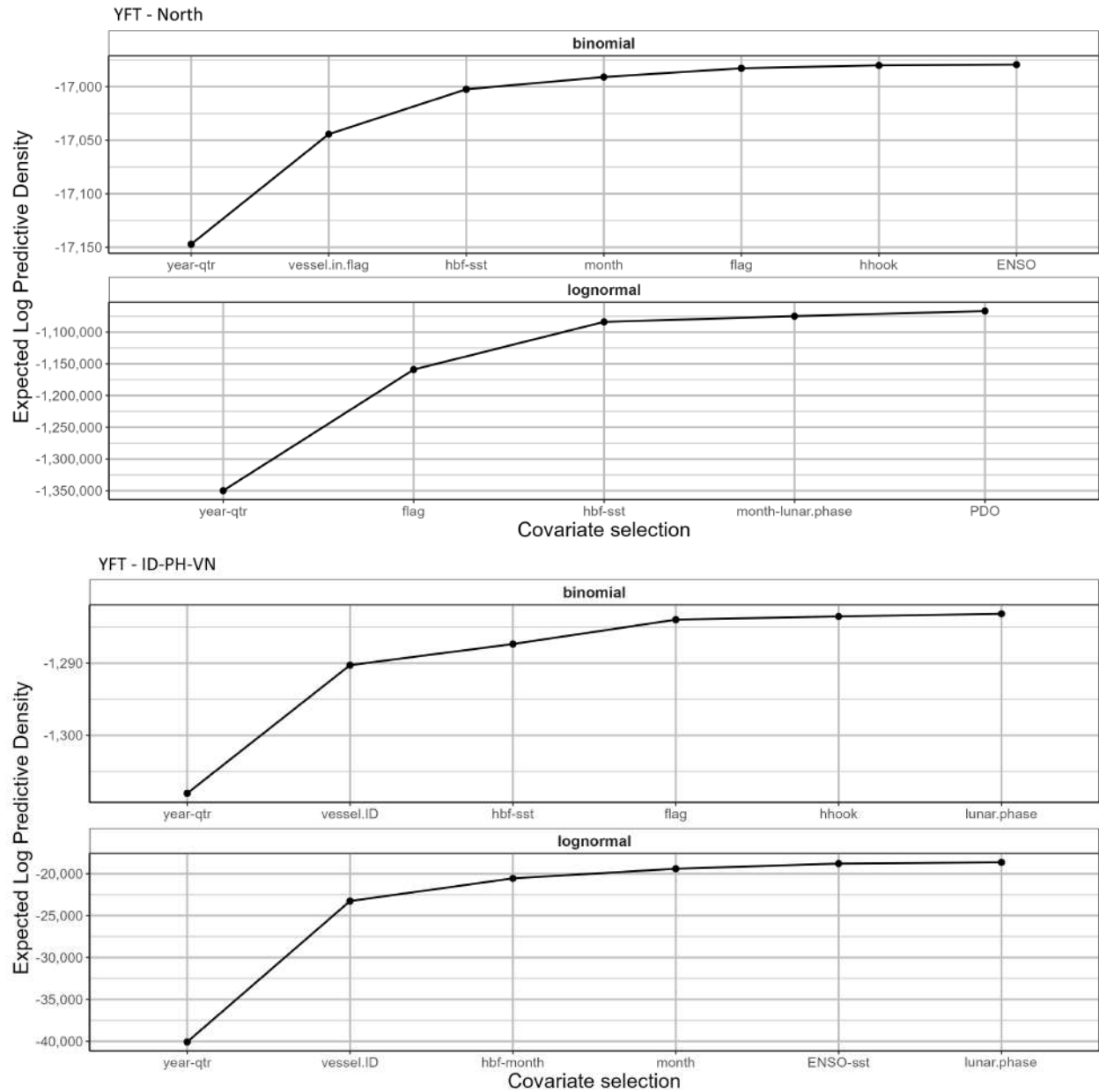


Figure 18: Improvement in predictive performance (Expected Log Predictive Density; ELPD) by variable selected for yellowfin north and ID-PH-VN sub-basins CPUE standardisation models.

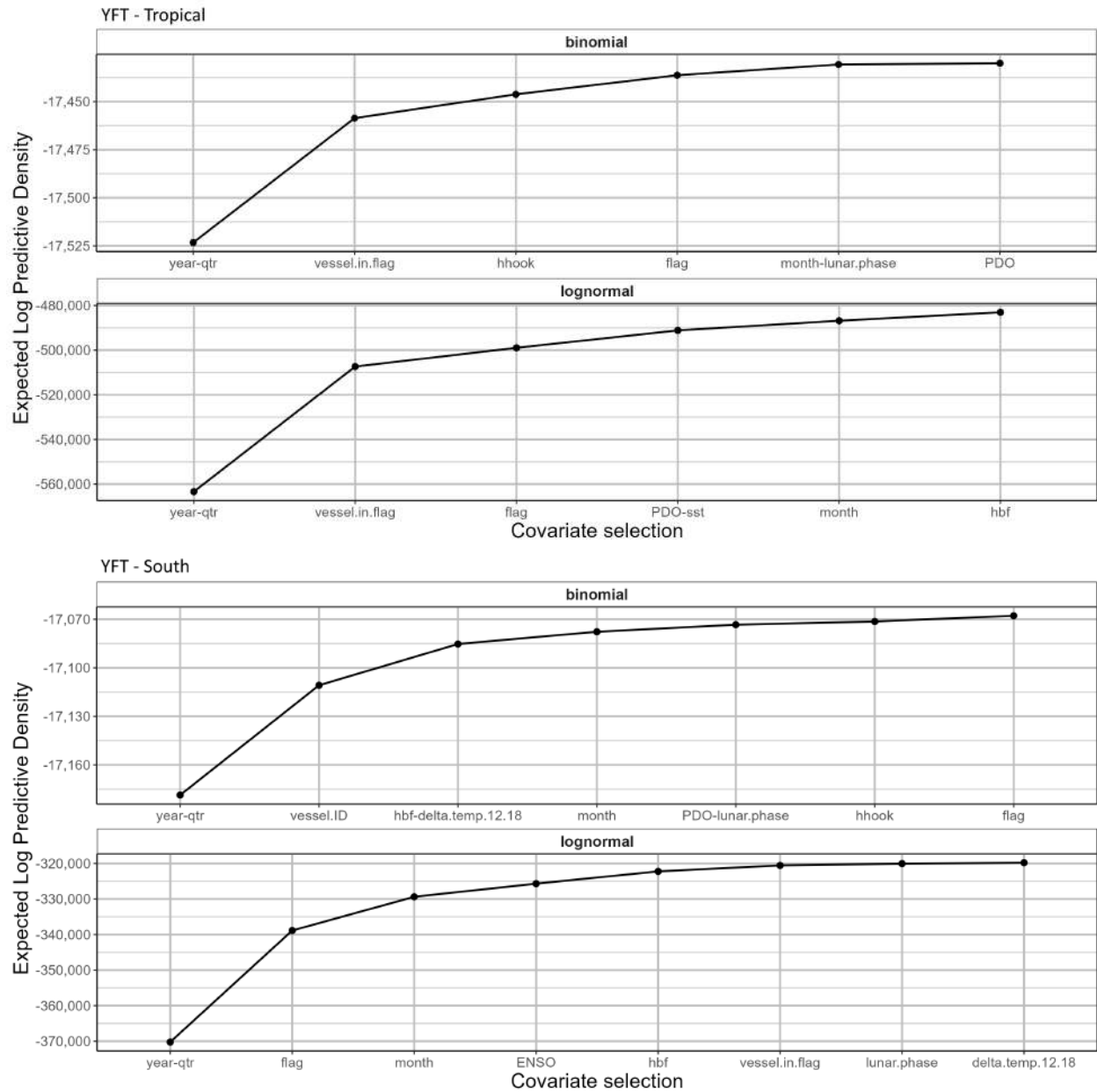


Figure 19: Improvement in predictive performance (Expected Log Predictive Density; ELPD) by variable selected for yellowfin tropical and south sub-basins CPUE standardisation models.

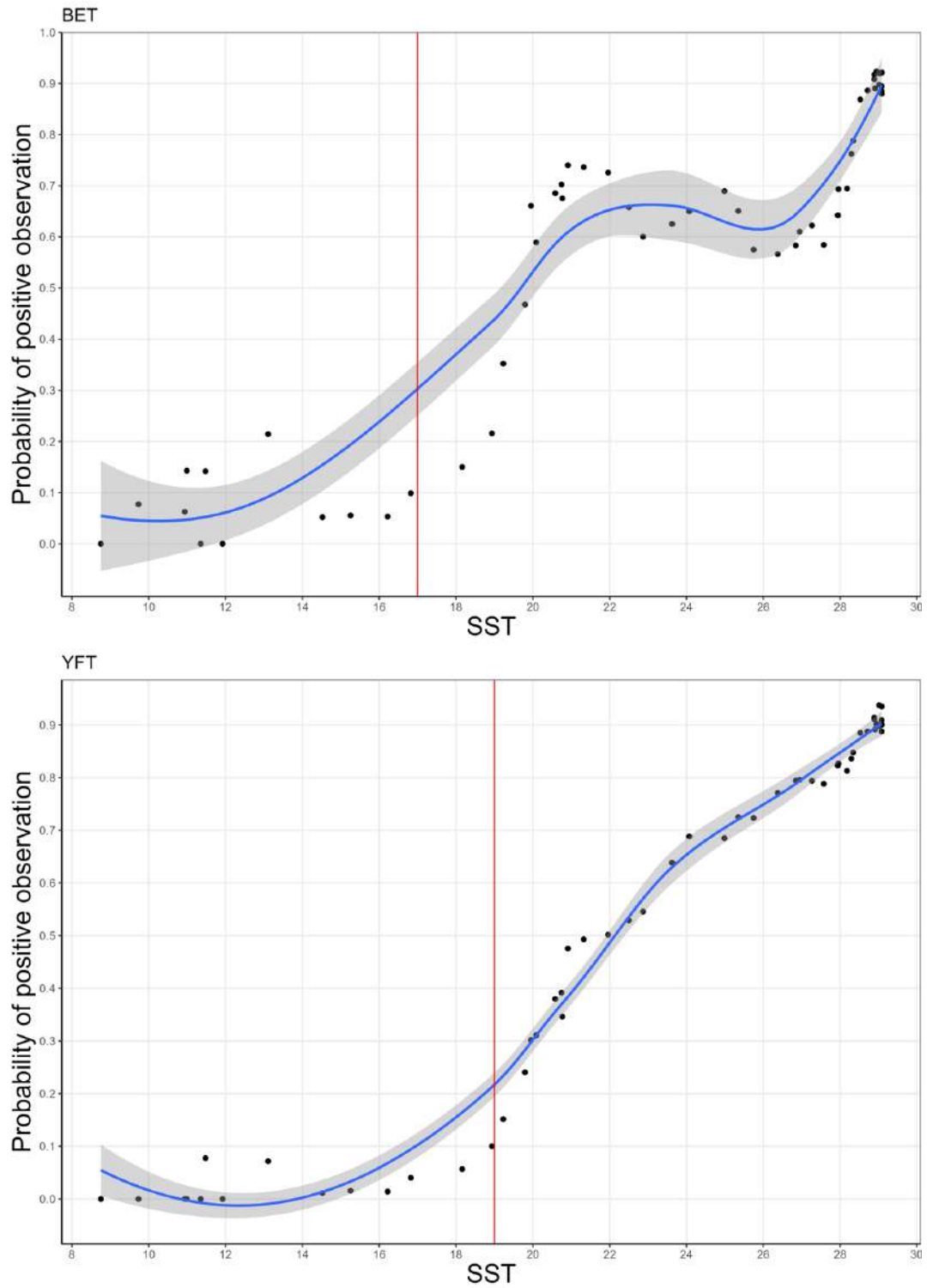


Figure 20: Mean observed probability of a positive observation vs. sea-surface temperature (SST) for bigeye (top) and yellowfin (bottom) for the development of the CPUE thermal limits. Red line indicates the selected thermal limit based on a low probability of encounter. Loess lines included.

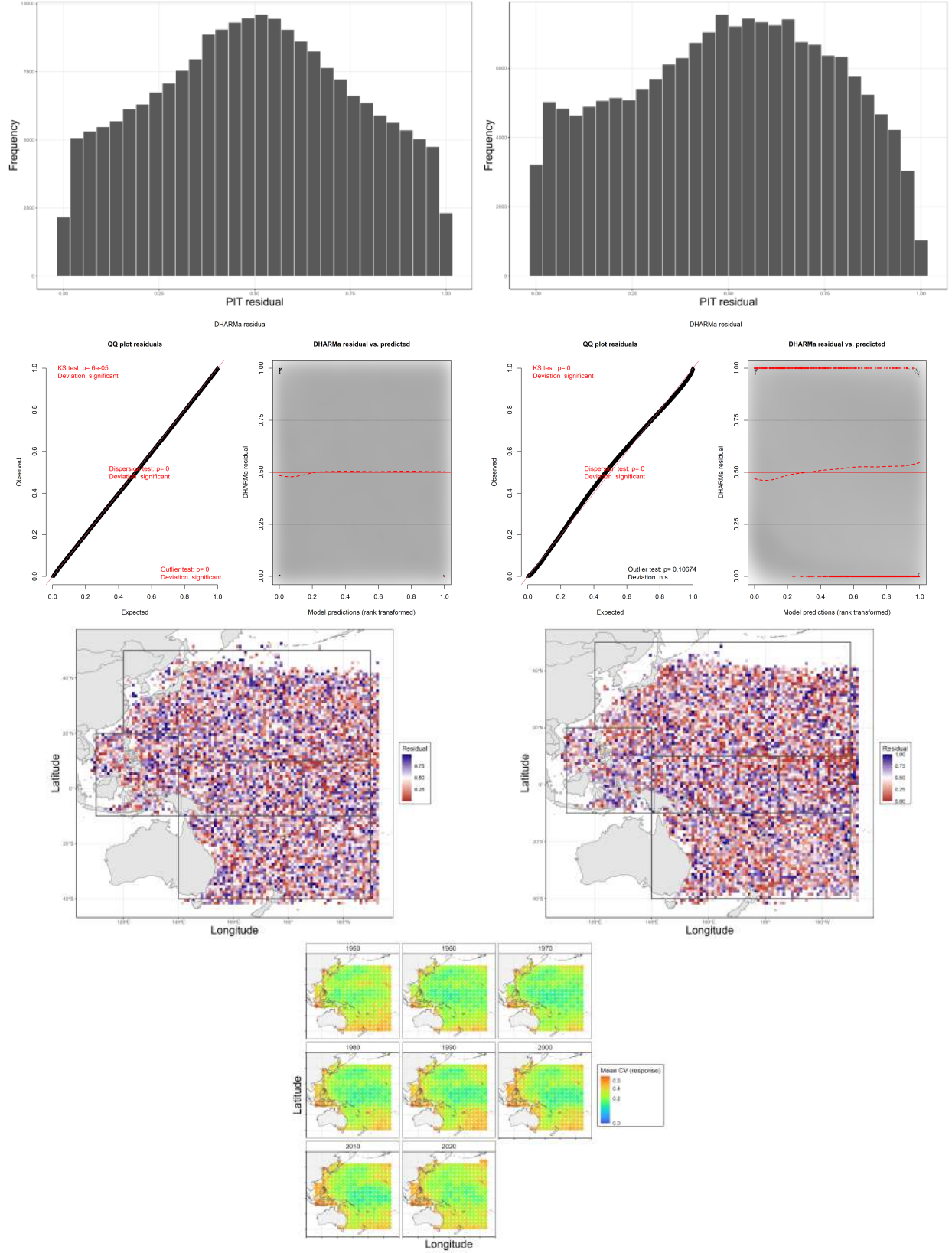


Figure 21: Diagnostic plots for global bigeye binomial (left) and positive component (right) models including DHARMa residual histograms (top), QQ plots with DHARMa residuals vs. predicted (upper-middle), spatial residuals (lower-middle), and positive component spatial uncertainty (bottom).

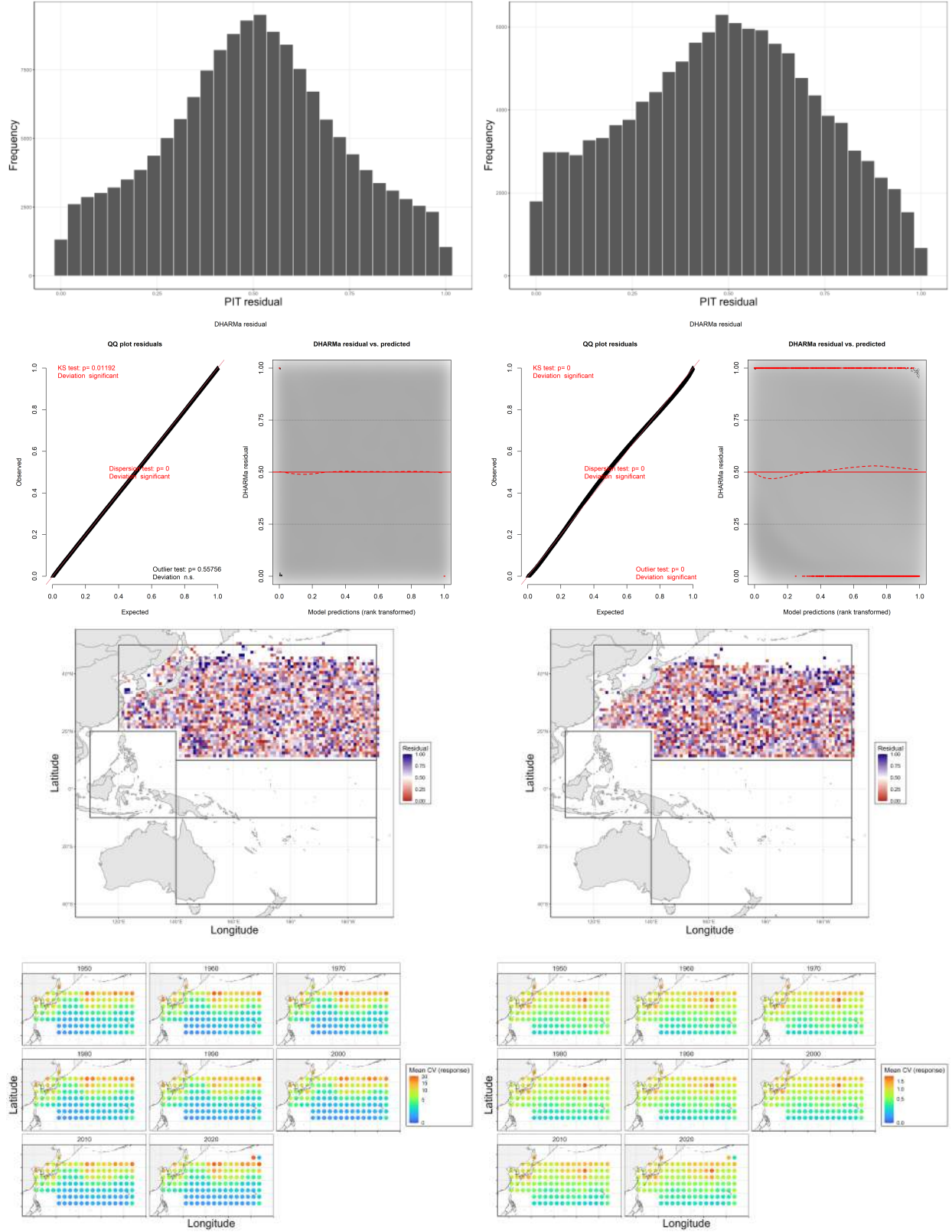


Figure 22: Diagnostic plots for north bigeye binomial (left) and positive component (right) models including DHARMa residual histograms (top), QQ-plots with DHARMa residuals vs. predicted (upper-middle), spatial residuals (lower-middle), and spatial uncertainty (bottom).

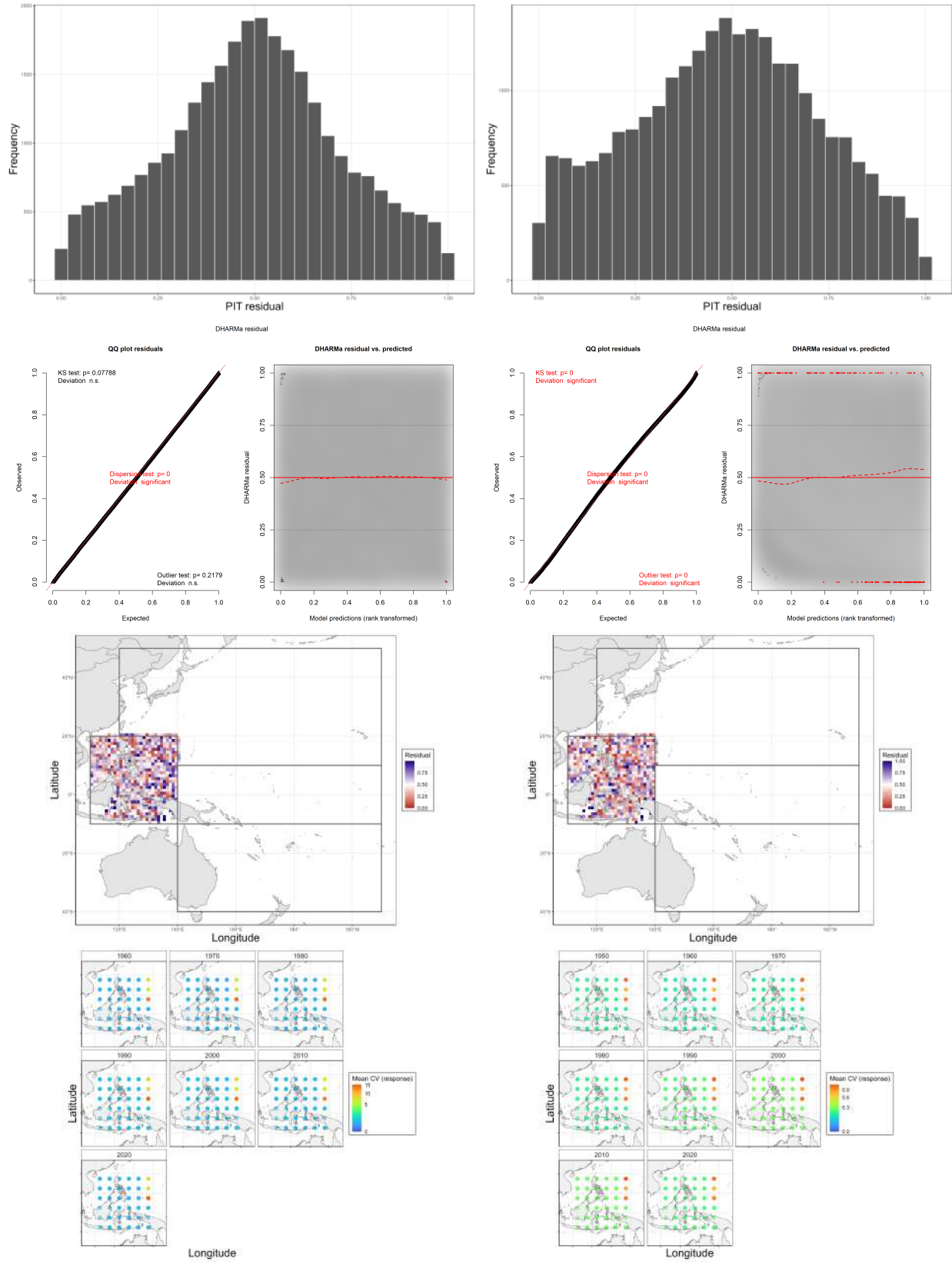


Figure 23: Diagnostic plots for ID-PH-VN bigeye binomial (left) and positive component (right) models including DHARMA residual histograms (top), QQ-plots with DHARMA residuals vs. predicted (upper-middle), spatial residuals (lower-middle), and spatial uncertainty (bottom).

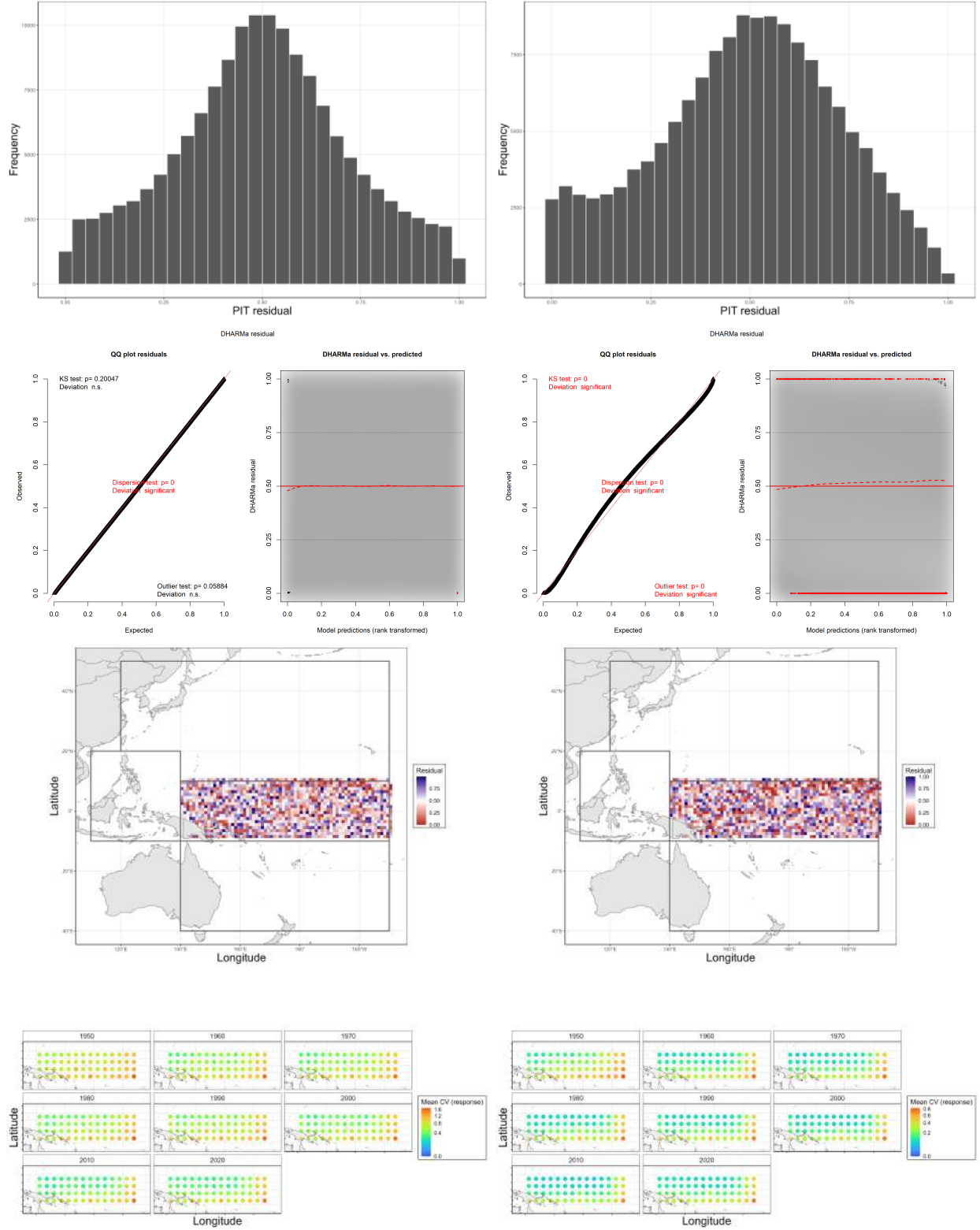


Figure 24: Diagnostic plots for tropical bigeye binomial (left) and positive component (right) models including DHARMA residual histograms (top), QQ-plots with DHARMA residuals vs. predicted (upper-middle), spatial residuals (lower-middle), and spatial uncertainty (bottom).

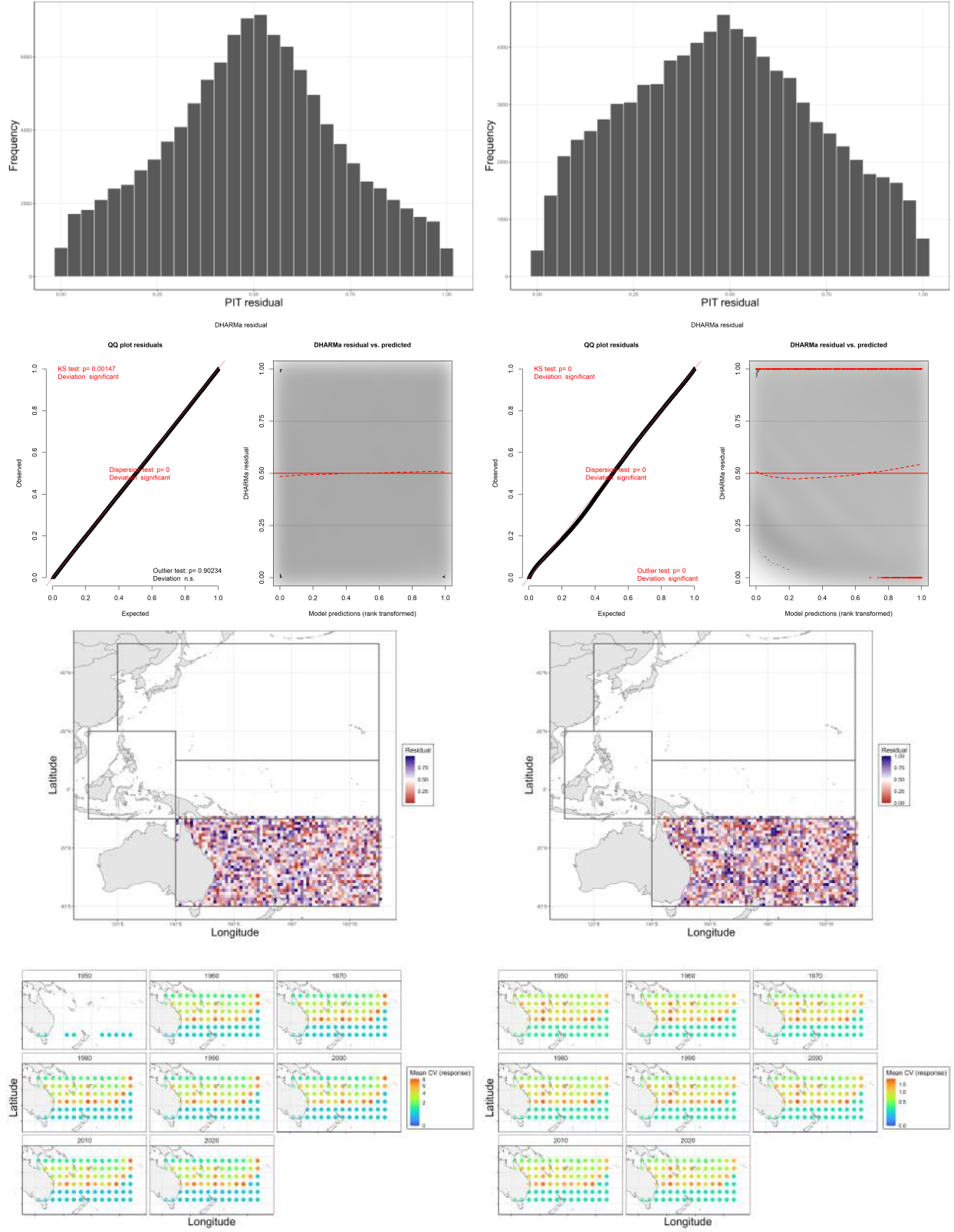


Figure 25: Diagnostic plots for south bigeye binomial (left) and positive component (right) models including DHARMA residual histograms (top), QQ-plots with DHARMA residuals vs. predicted (upper-middle), spatial residuals (lower-middle), and spatial uncertainty (bottom).

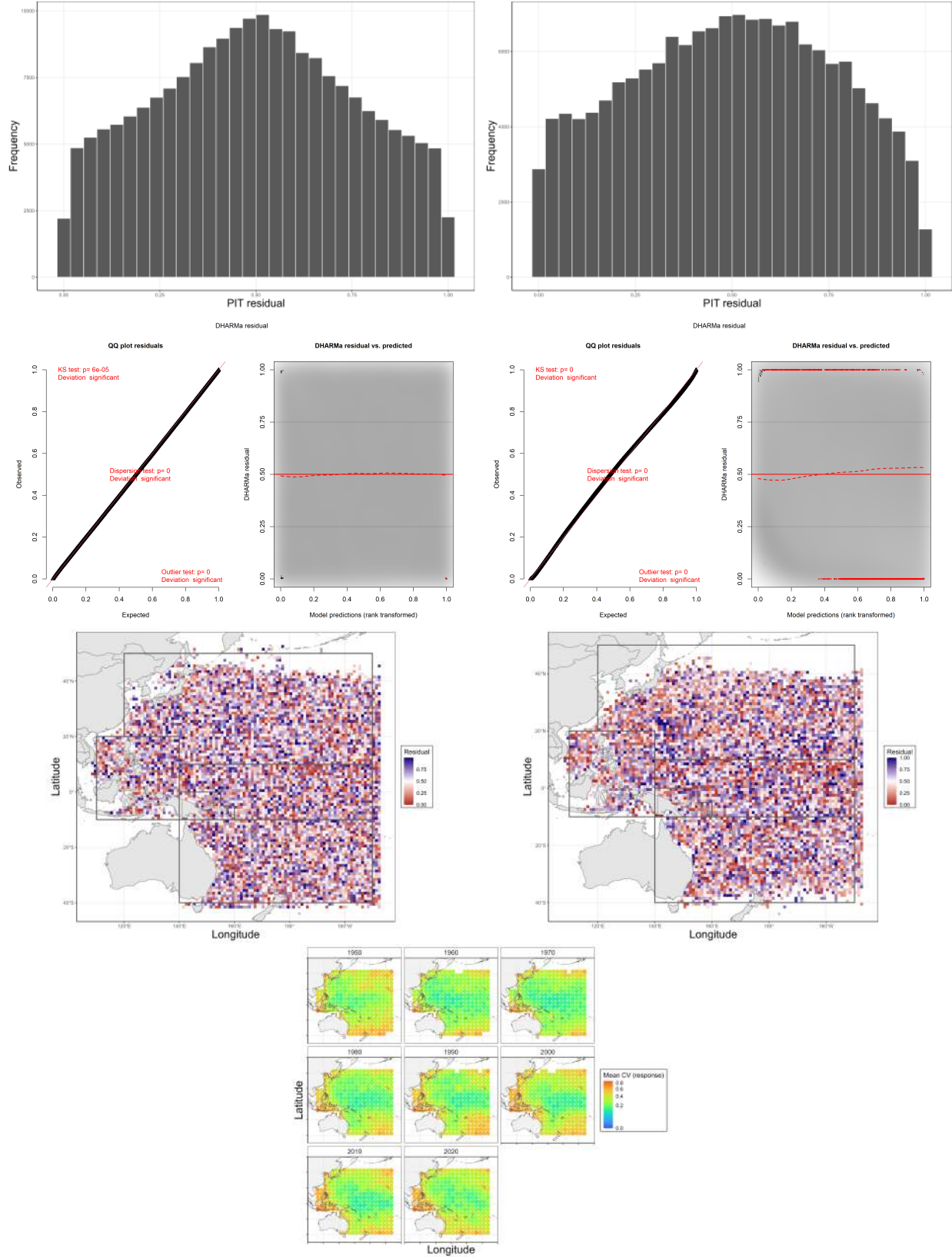


Figure 26: Diagnostic plots for global yellowfin binomial (left) and positive component (right) models including DHARMa residual histograms (top), QQ-plots with DHARMa residuals vs. predicted (upper-middle), spatial residuals (lower-middle), and positive component spatial uncertainty (bottom).

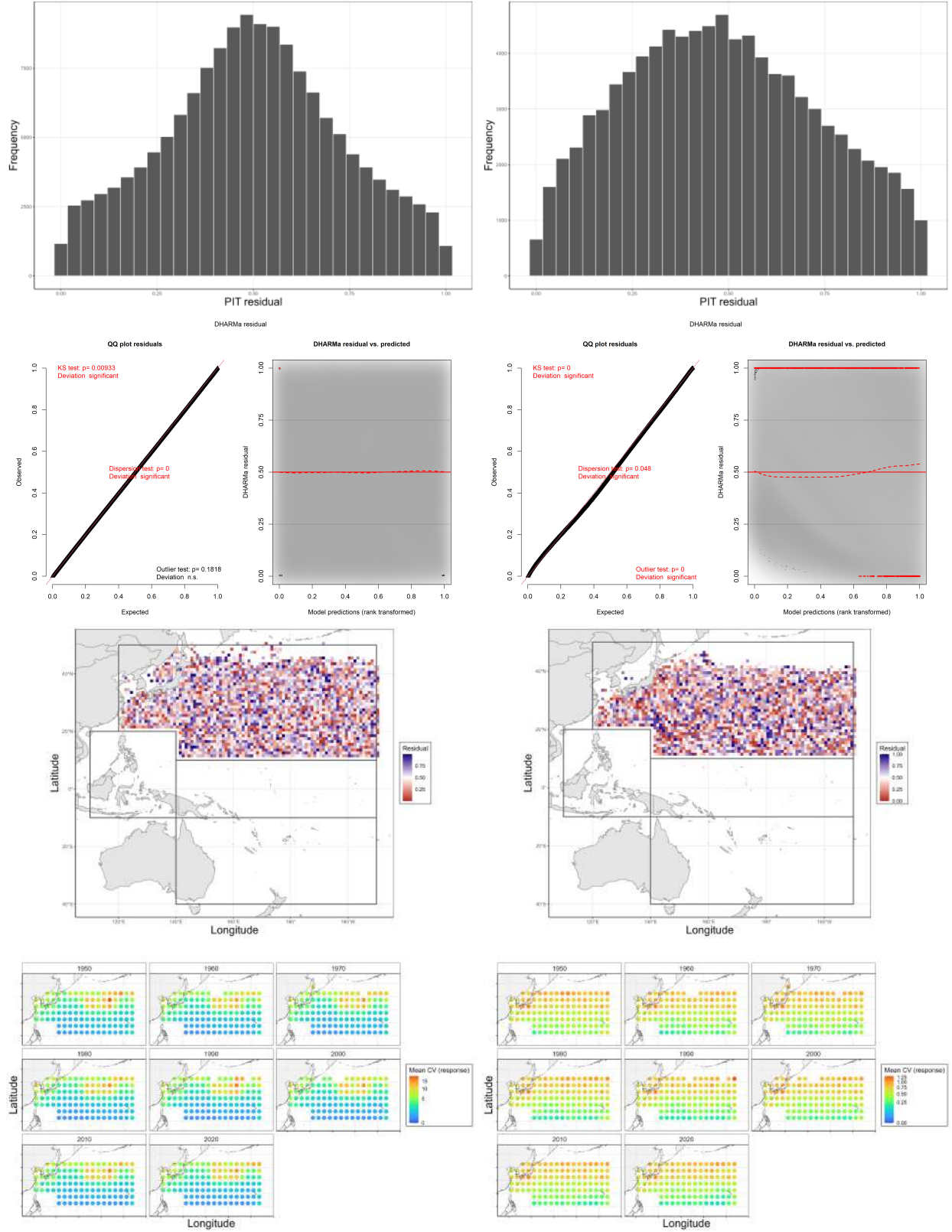


Figure 27: Diagnostic plots for north yellowfin binomial (left) and positive component (right) models including DHARMa residual histograms (top), QQ-plots with DHARMa residuals vs. predicted (upper-middle), spatial residuals (lower-middle), and spatial uncertainty (bottom).

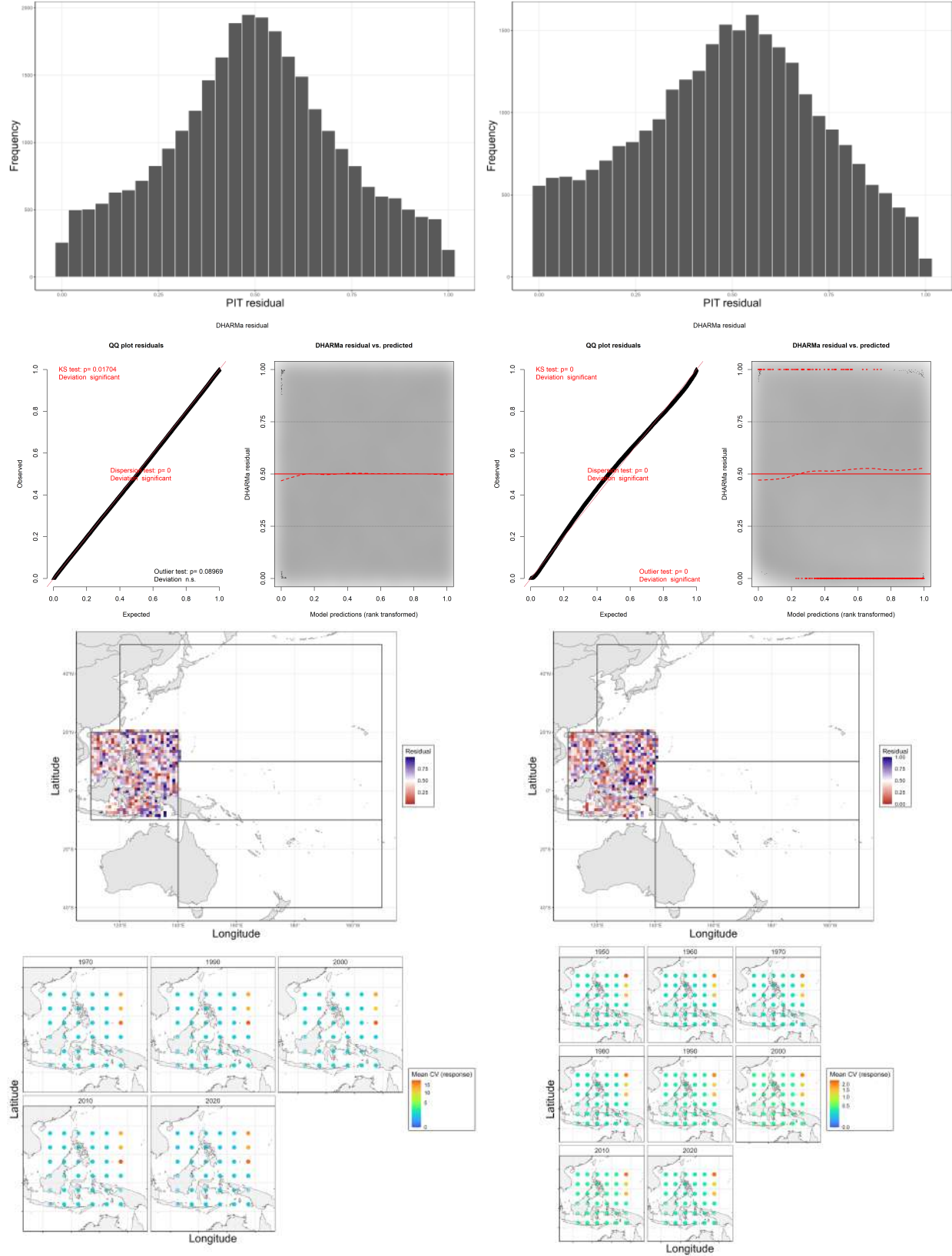


Figure 28: Diagnostic plots for ID-PH-VN yellowfin binomial (left) and positive component (right) models including DHARMA residual histograms (top), QQ-plots with DHARMA residuals vs. predicted (upper-middle), spatial residuals (lower-middle), and spatial uncertainty (bottom).

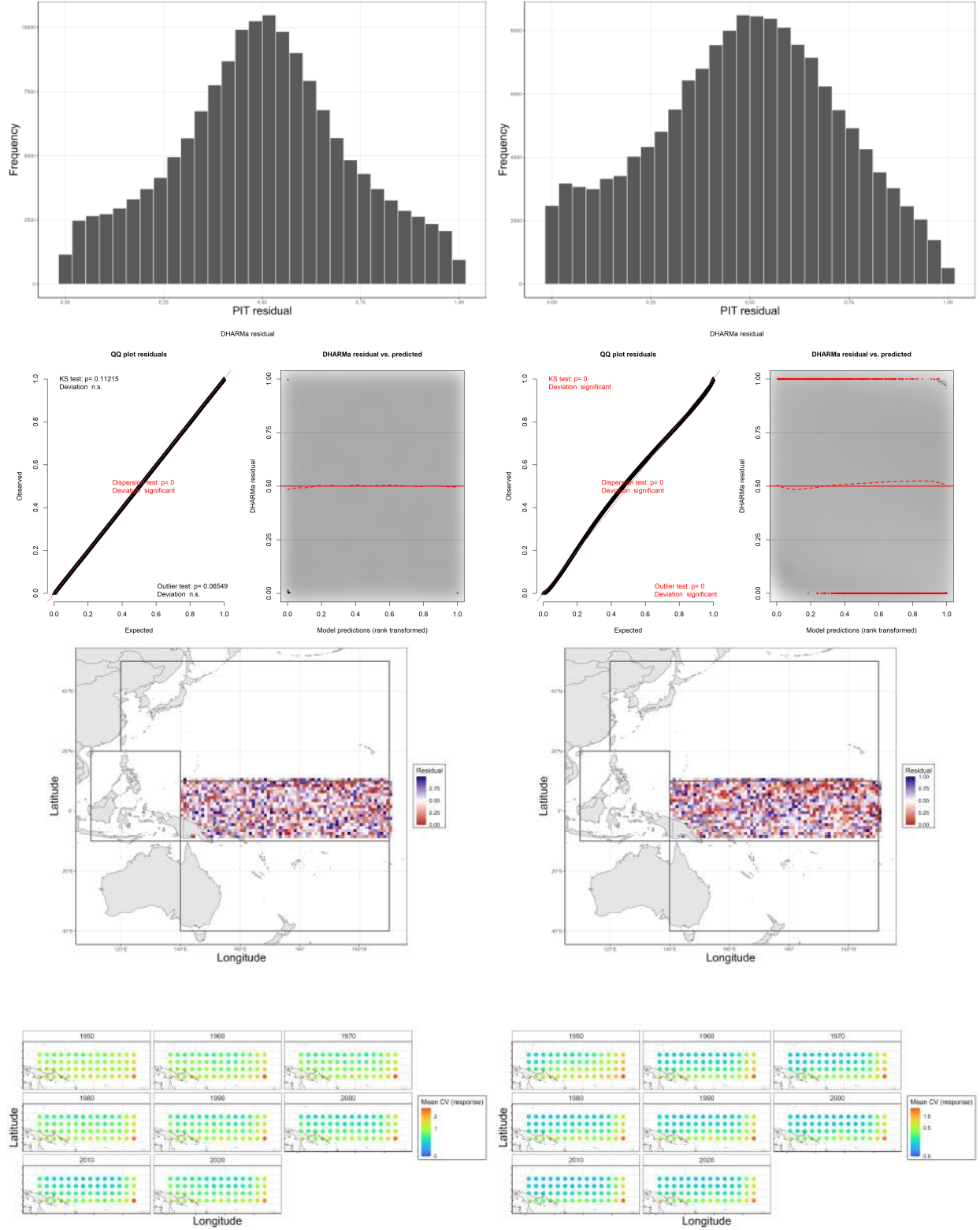


Figure 29: Diagnostic plots for tropical yellowfin binomial (left) and positive component (right) models including DHARMA residual histograms (top), QQ-plots with DHARMA residuals vs. predicted (upper-middle), spatial residuals (lower-middle), and spatial uncertainty (bottom).

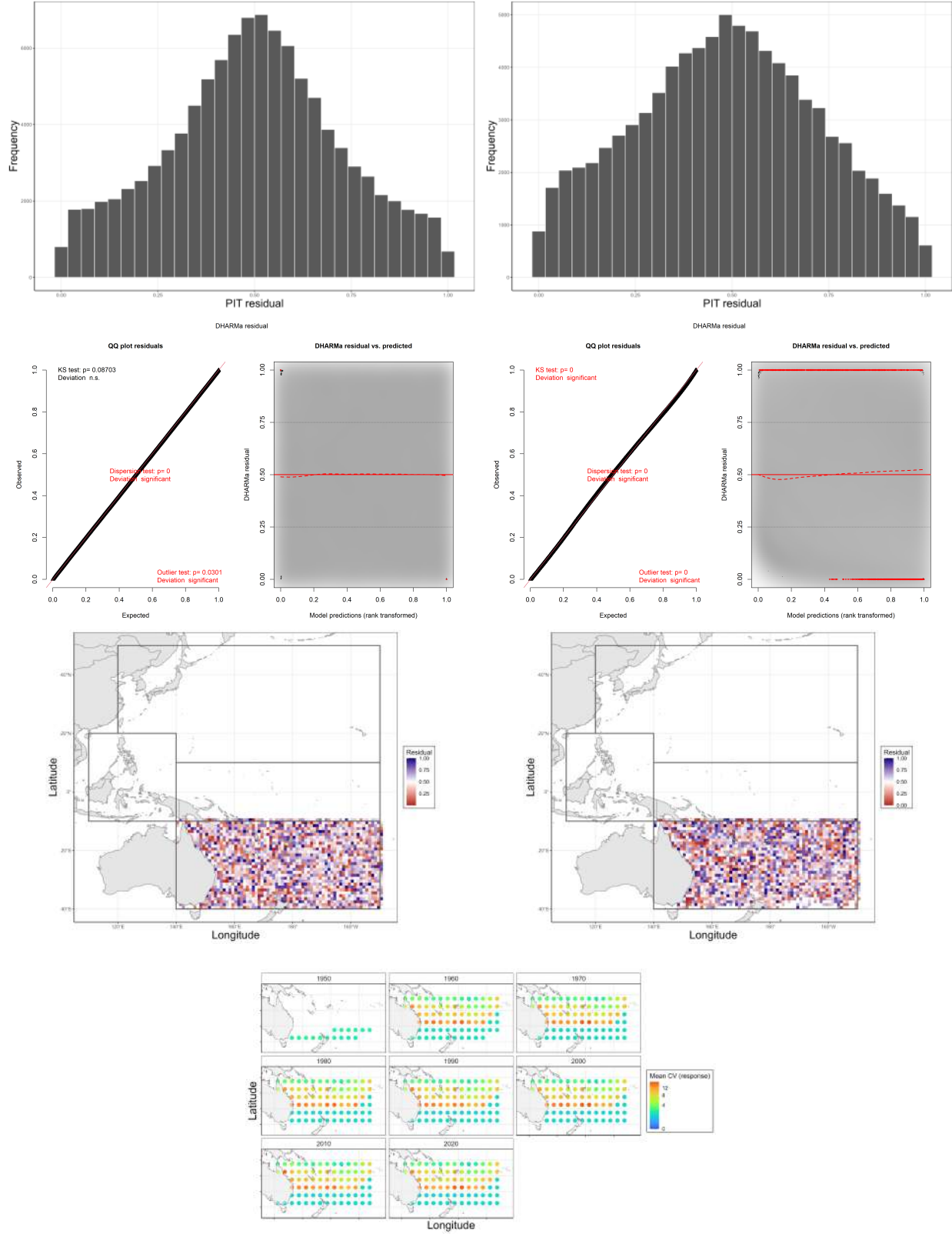


Figure 30: Diagnostic plots for south yellowfin binomial (left) and positive component (right) models including DHARMA residual histograms (top), QQ-plots with DHARMA residuals vs. predicted (upper-middle), spatial residuals (lower-middle), and spatial uncertainty (bottom).

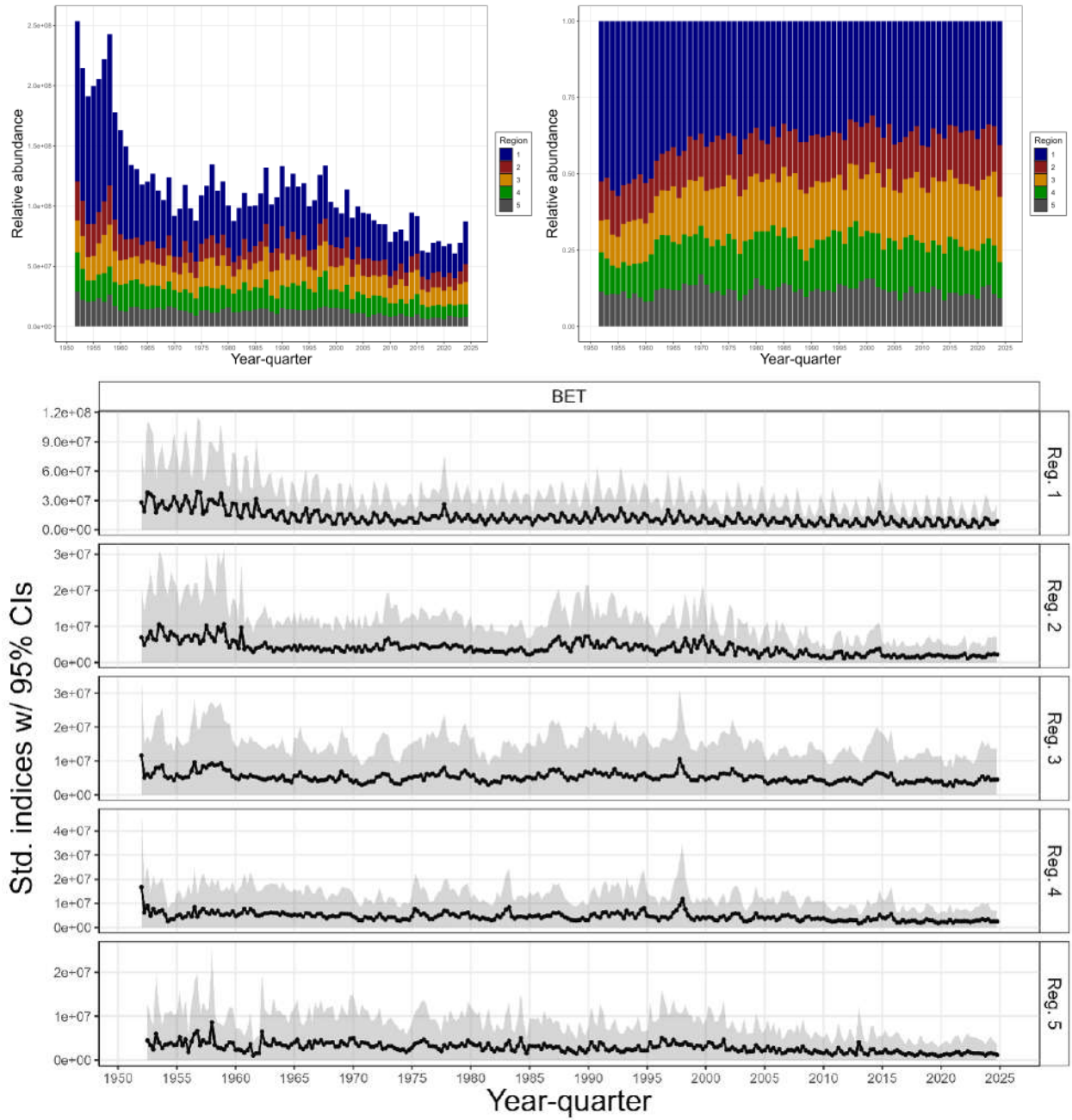


Figure 31: Absolute (top-left) and proportional (top-right) bigeye relative abundance by year and region from the global model. Region-specific estimates of bigeye relative abundance with confidence intervals from the region-specific models are provided (bottom) from 1952 to 2024.

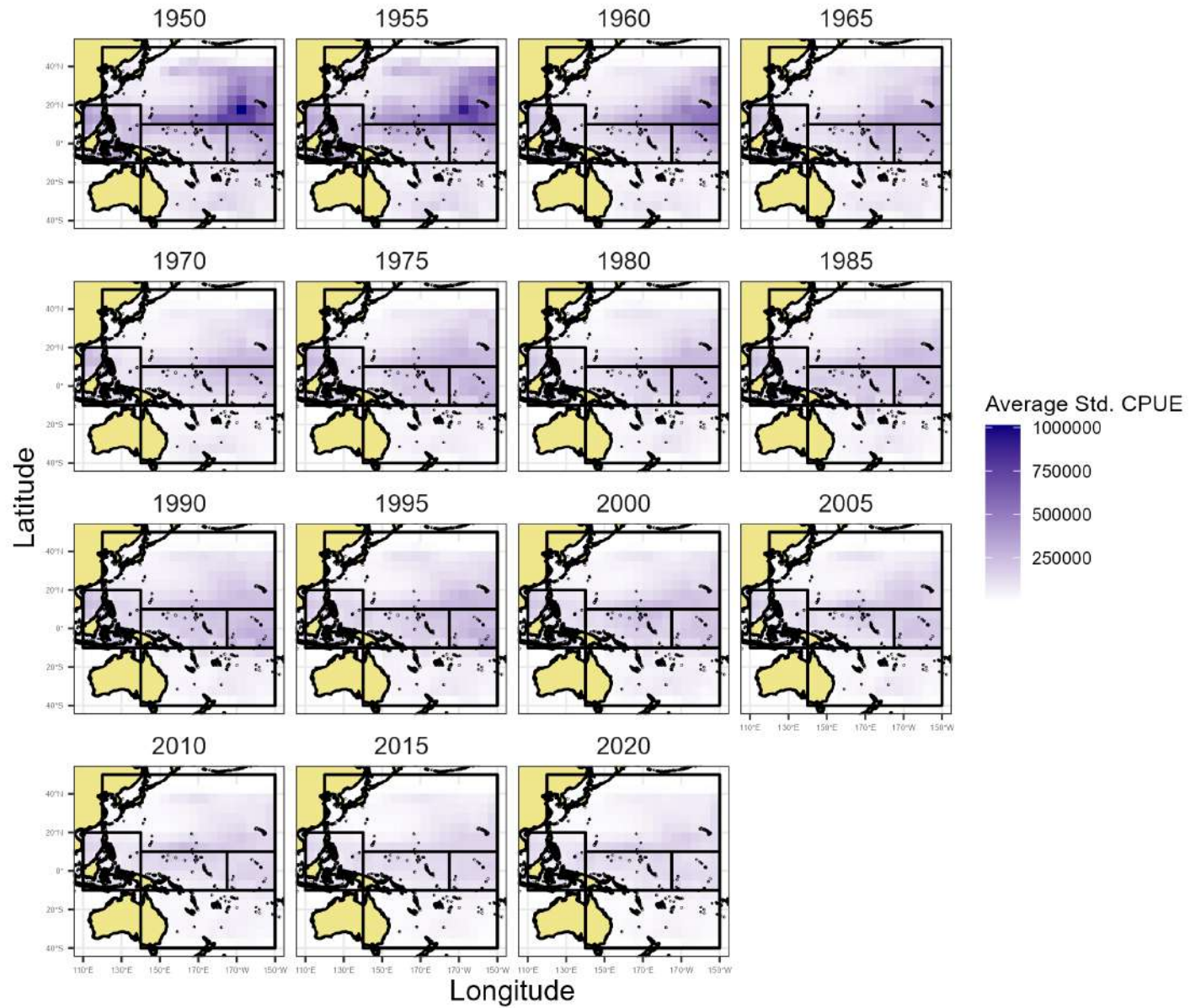


Figure 32: The spatial distribution of relative abundance aggregated over time by 5°x5° spatial cells and 5-year periods from the global bigeye CPUE standardisation model.

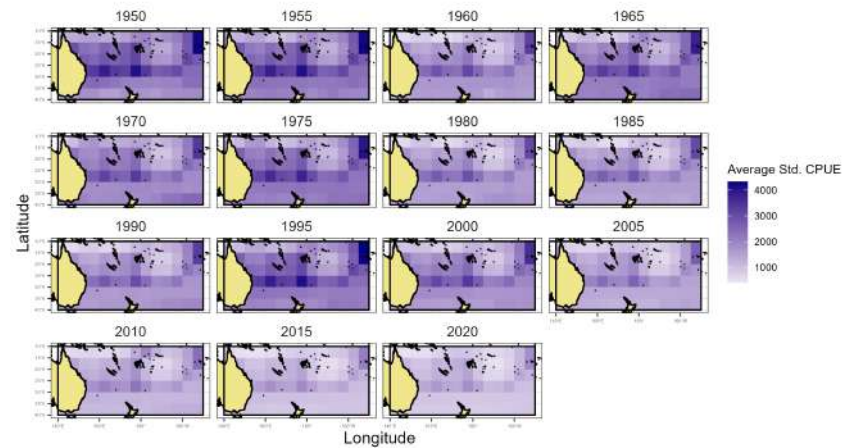
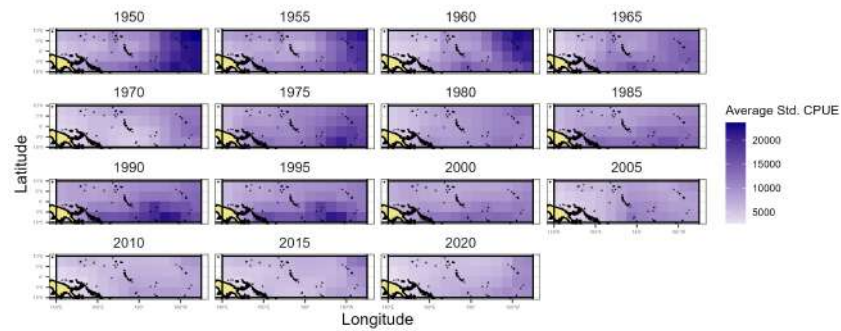
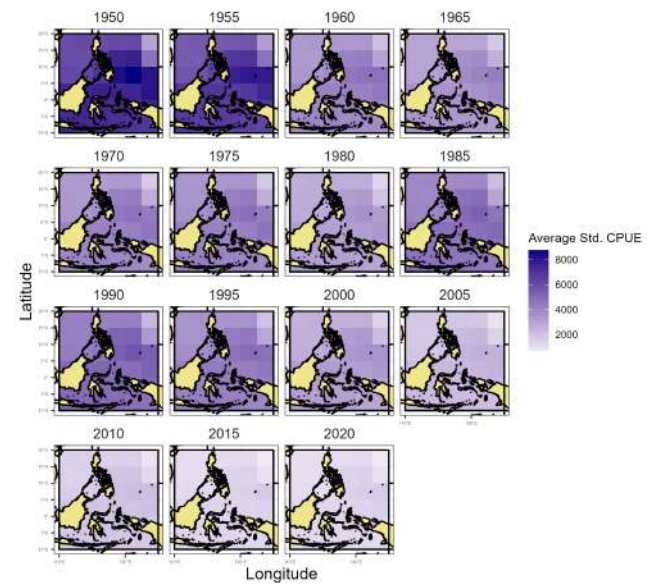
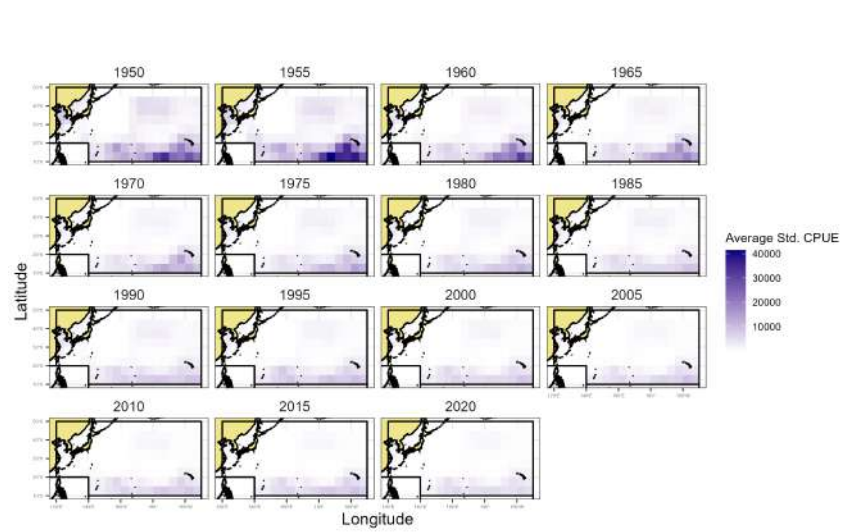


Figure 33: The spatial distribution of relative abundance aggregated over time by $5^{\circ} \times 5^{\circ}$ spatial cells and 5-year periods from the sub-basin specific bigeye CPUE standardisation models. Included northern (top-left), ID-PH-VN (top-right), tropical (bottom-left), and southern (bottom-right).

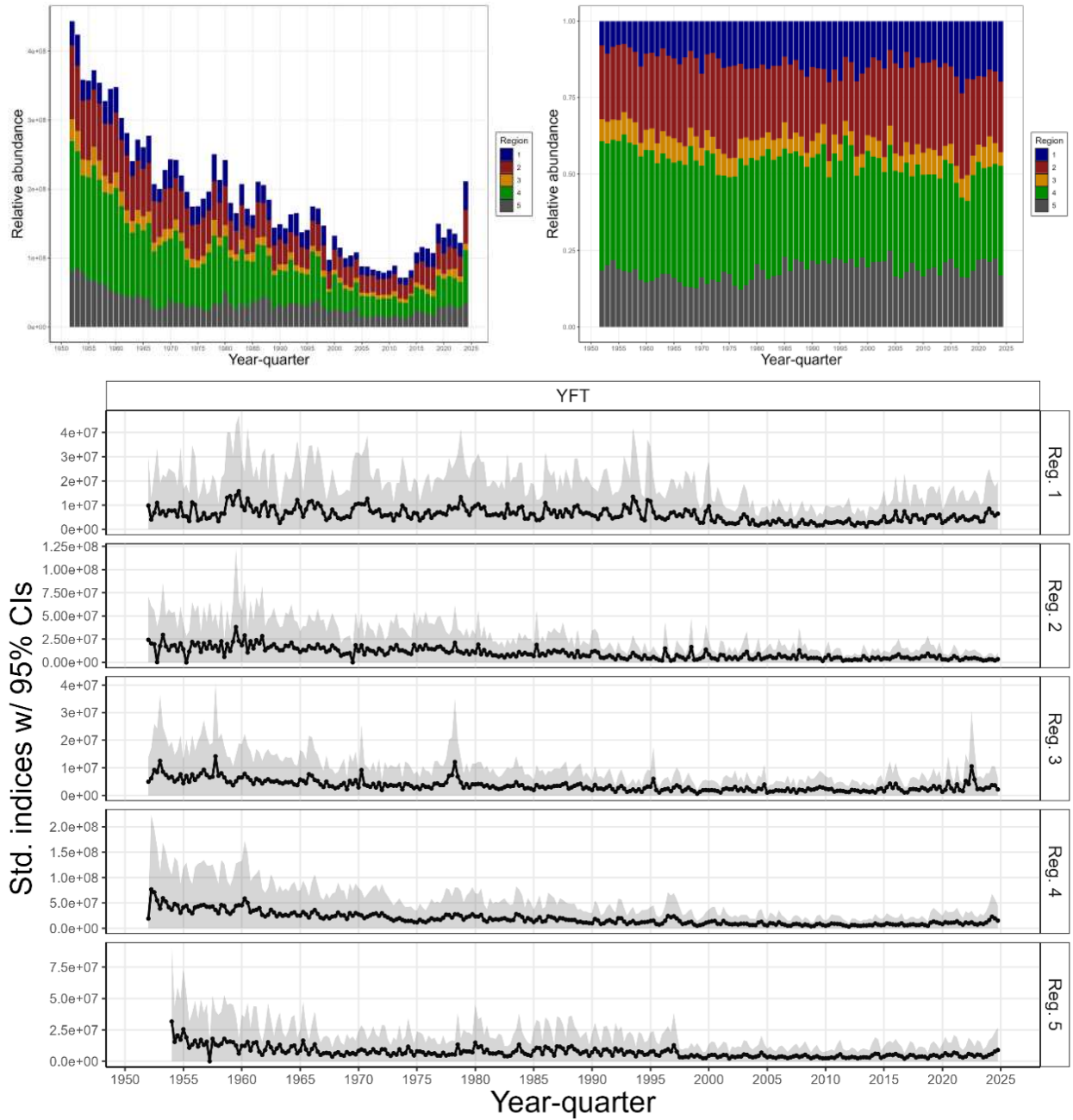


Figure 34: Absolute (top-left) and proportional (top-right) yellowfin relative abundance by year and region from the global model. Region-specific estimates of yellowfin relative abundance with confidence intervals from the region-specific models are provided (bottom) from 1952 to 2024.

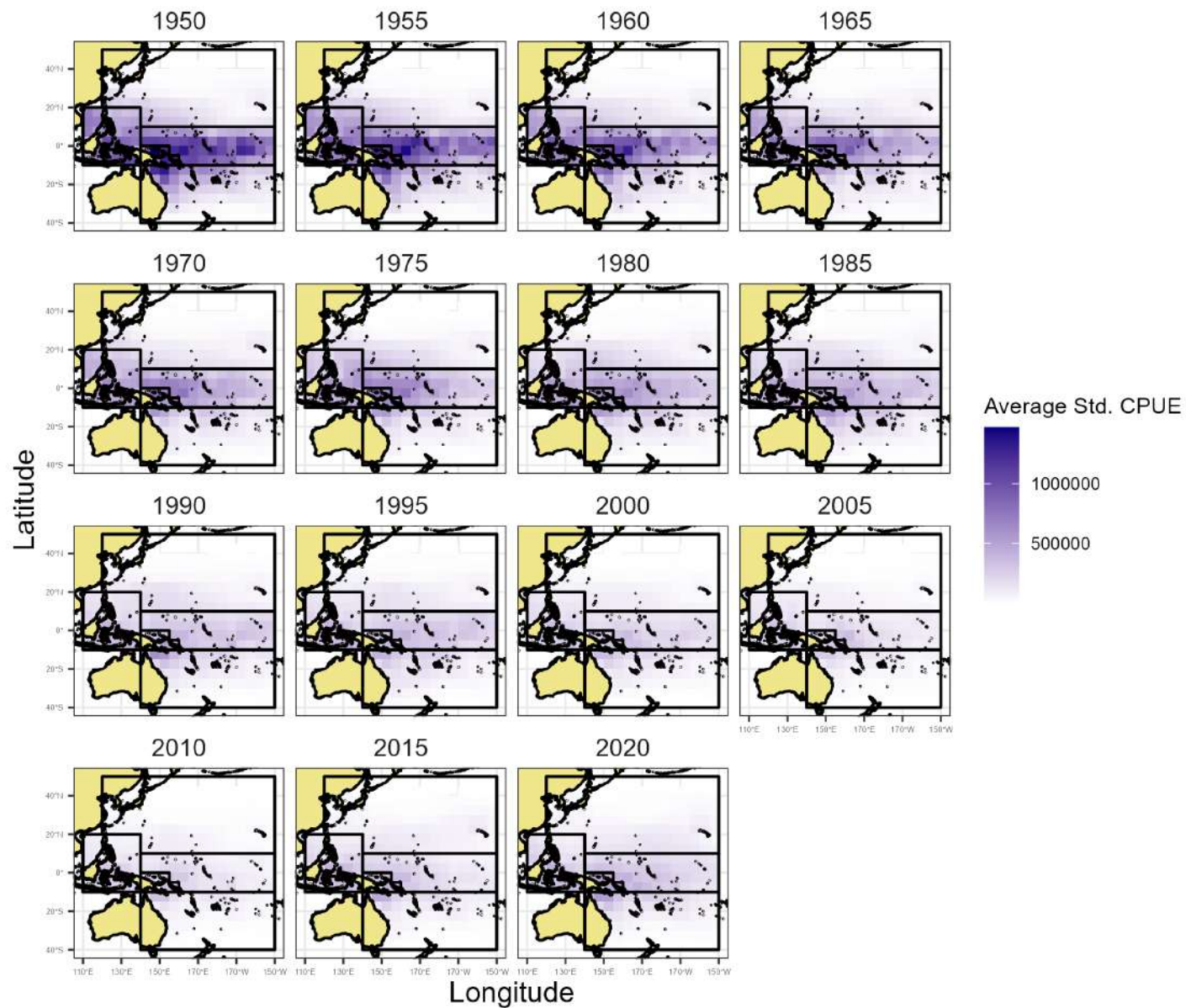


Figure 35: The spatial distribution of relative abundance aggregated over time by 5°x5° spatial cells and 5-year periods from the global yellowfin CPUE standardisation model.

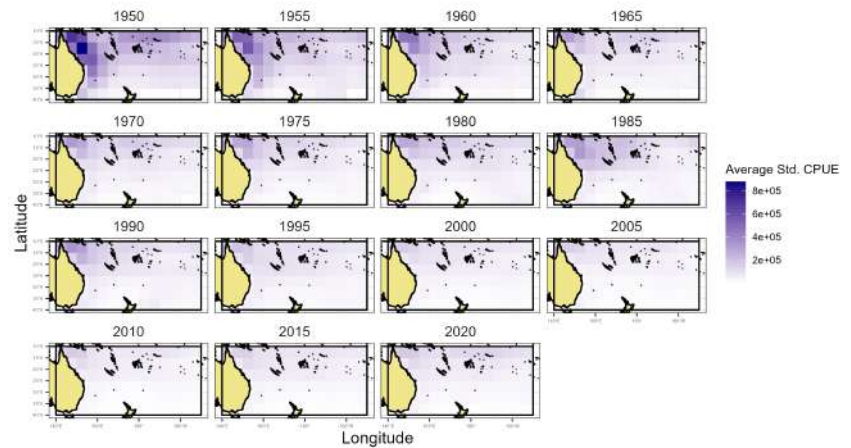
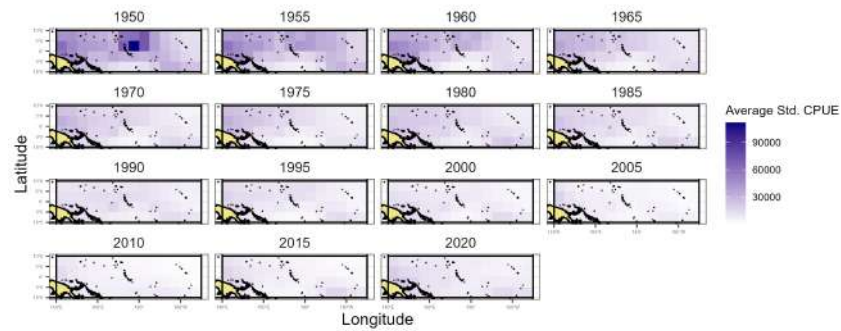
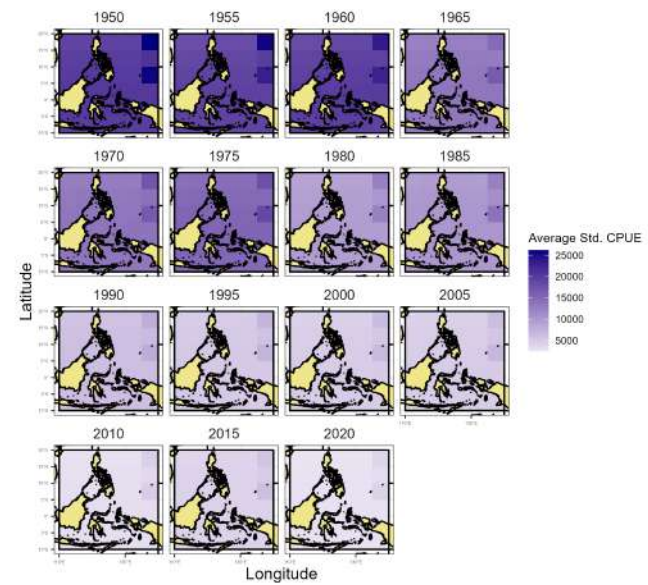
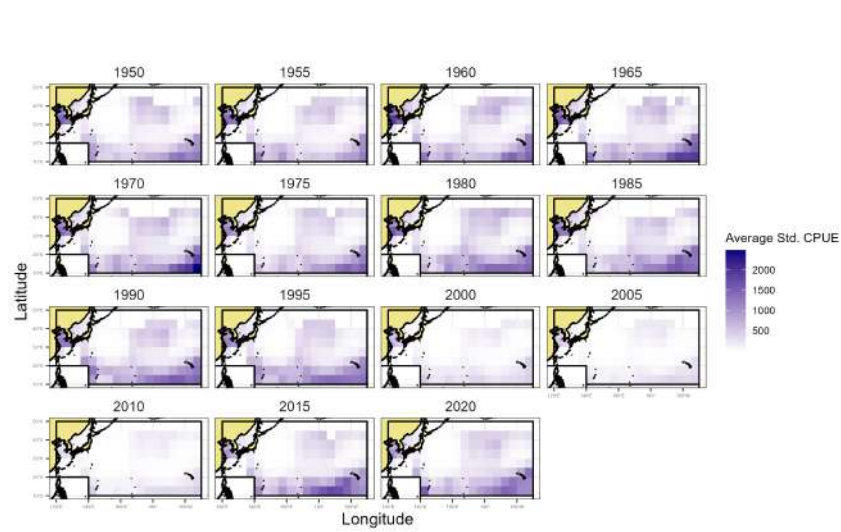


Figure 36: The spatial distribution of relative abundance aggregated over time by $5^{\circ} \times 5^{\circ}$ spatial cells and 5-year periods from the sub-basin specific yellowfin CPUE standardisation models. Included northern (top-left), ID-PH-VN (top-right), tropical (bottom-left), and southern (bottom-right).

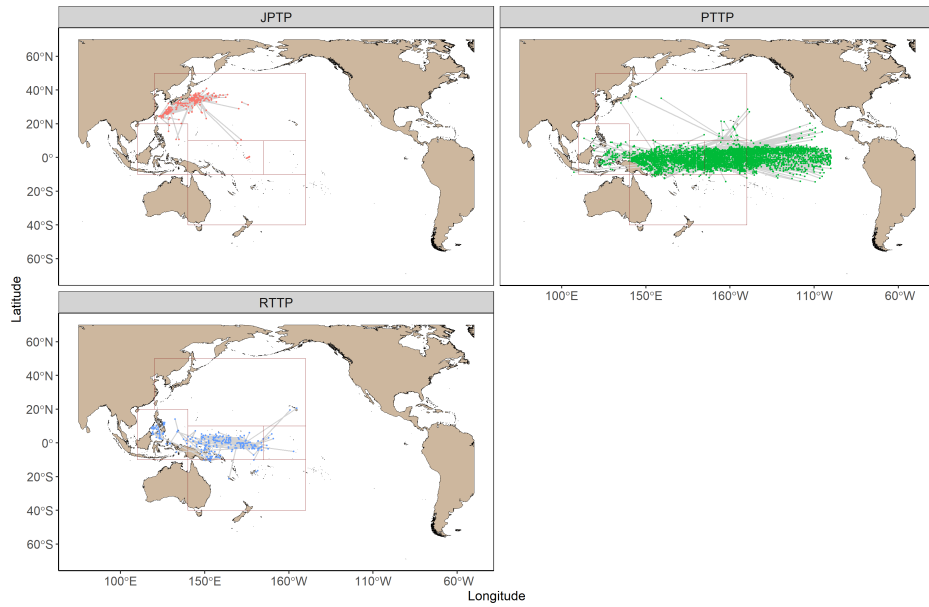


Figure 37: Mark-recapture displacements (grey lines, points indicate recapture locations) of bigeye tuna for the Pacific Tuna Tagging Program (PTTP, green), the Regional Tuna Tagging Program (RTTP, blue), and Japanese Tagging Program (JPTP, red). Recapture locations identified with coloured points.

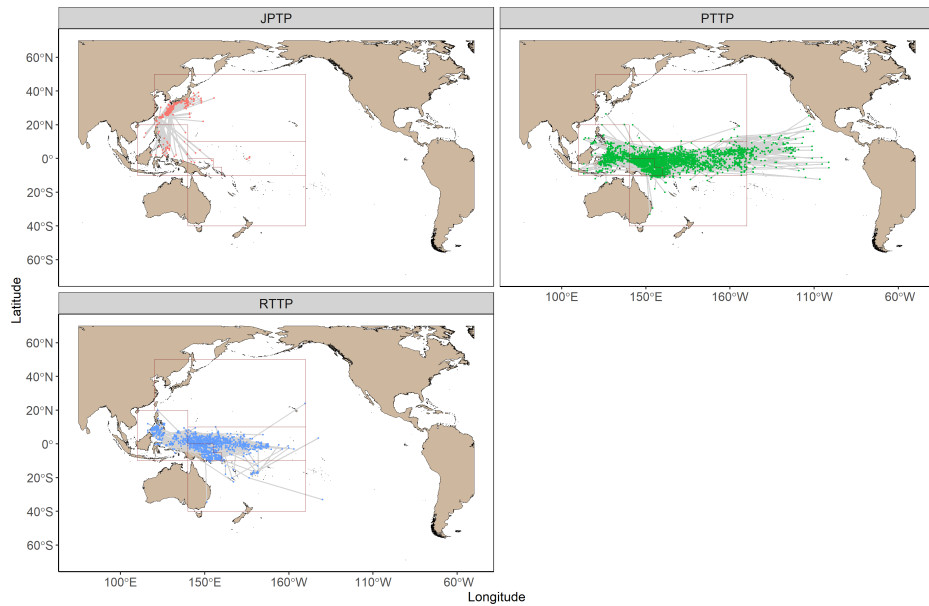


Figure 38: Mark-recapture displacements (grey lines, points indicate recapture locations) of yellowfin tuna for the Pacific Tuna Tagging Program (PTTP, green), the Regional Tuna Tagging Program (RTTP, blue), and Japanese Tagging Program (JPTP, red). Recapture locations identified with coloured points.

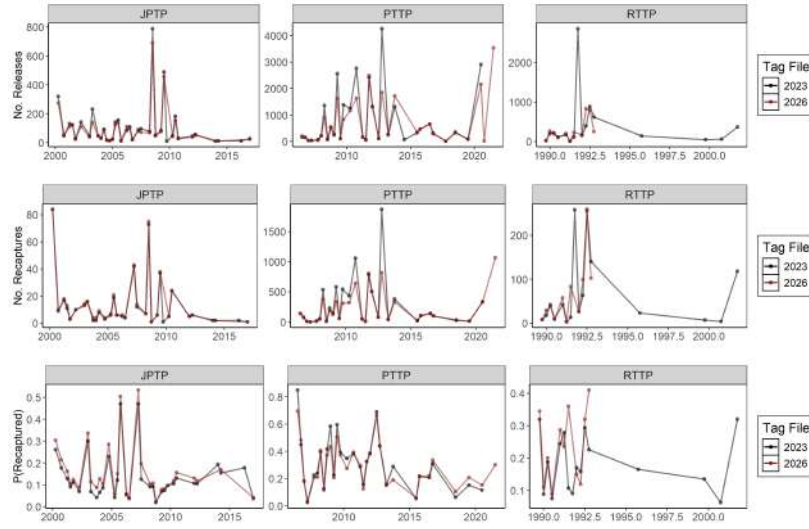


Figure 39: Number of effective releases, recaptures, and the probability of recapture by year for tagged bigeye from the Japanese Tagging Program (JTP), Pacific Tuna Tagging Program (PTTP), and Regional Tuna Tagging Program (RTTP) from the 2023 and current assessments.

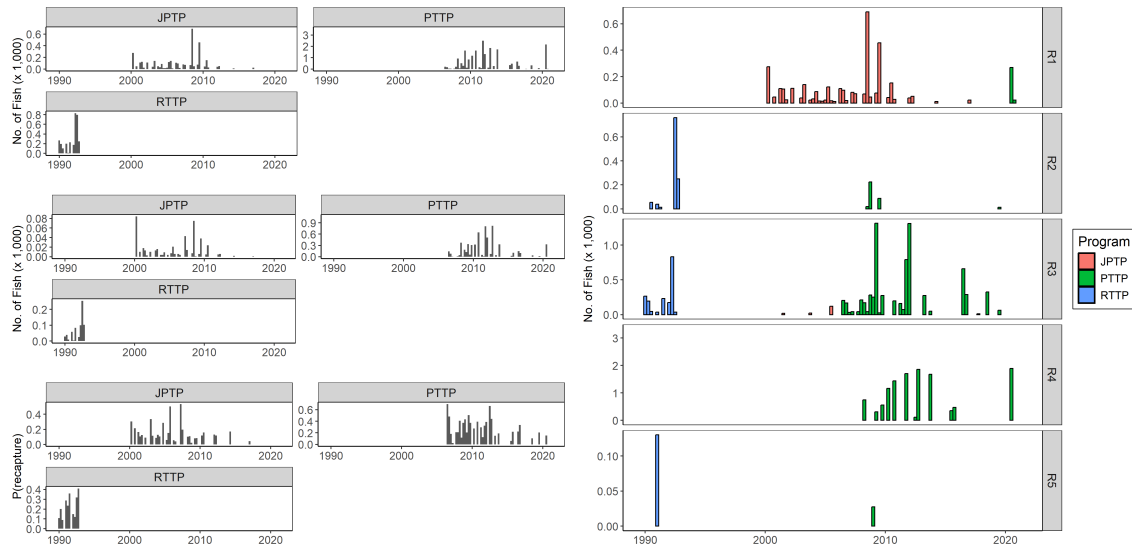


Figure 40: Mark-recapture histograms of effective releases, recaptures, probability of recapture, and releases by region for bigeye tuna by program for the Pacific Tuna Tagging Program (PTTP), the Regional Tuna Tagging Program (RTTP), and Japanese Tagging Program (JTP).

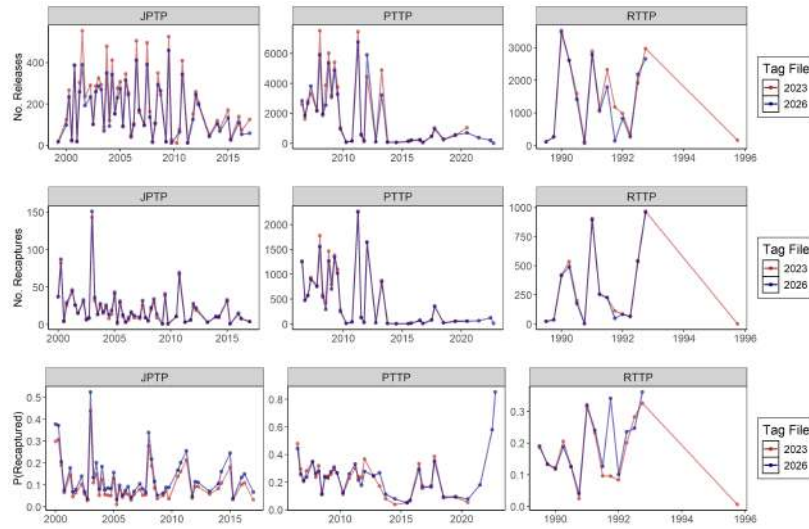


Figure 41: Number of effective releases, recaptures, and the probability of recapture by year for tagged yellowfin from the Japanese Tagging Program (JTP), Pacific Tuna Tagging Program (PTTP), and Regional Tuna Tagging Program (RTTP) from the 2023 and current assessments.

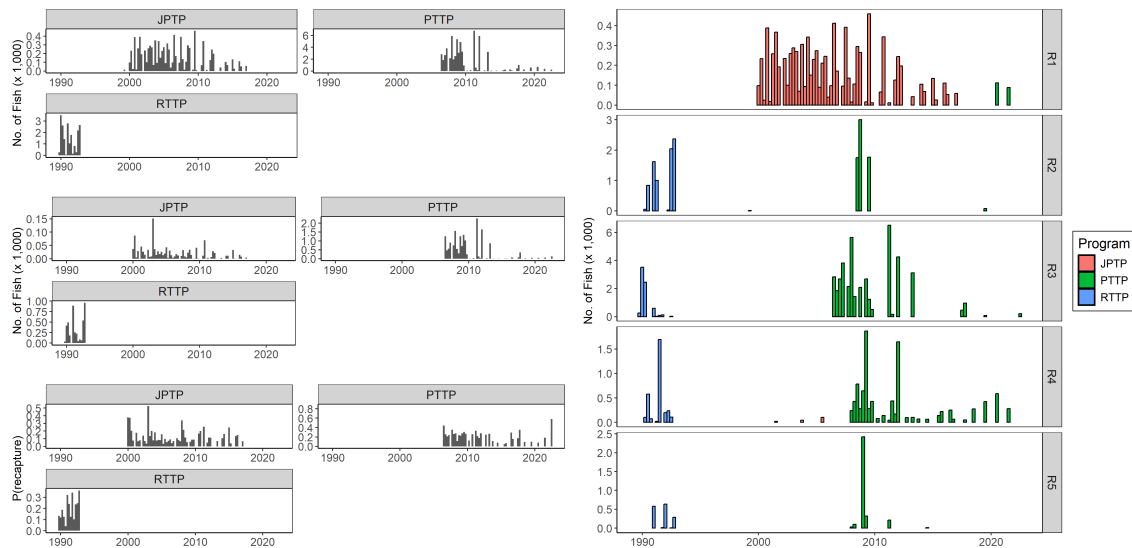


Figure 42: Mark-recapture histograms of effective releases, recaptures, probability of recapture, and releases by region for yellowfin tuna by program for the Pacific Tuna Tagging Program (PTTP), the Regional Tuna Tagging Program (RTTP), and Japanese Tagging Program (JTP).

14 Appendix 1: Auxiliary CPUE standardisation plots

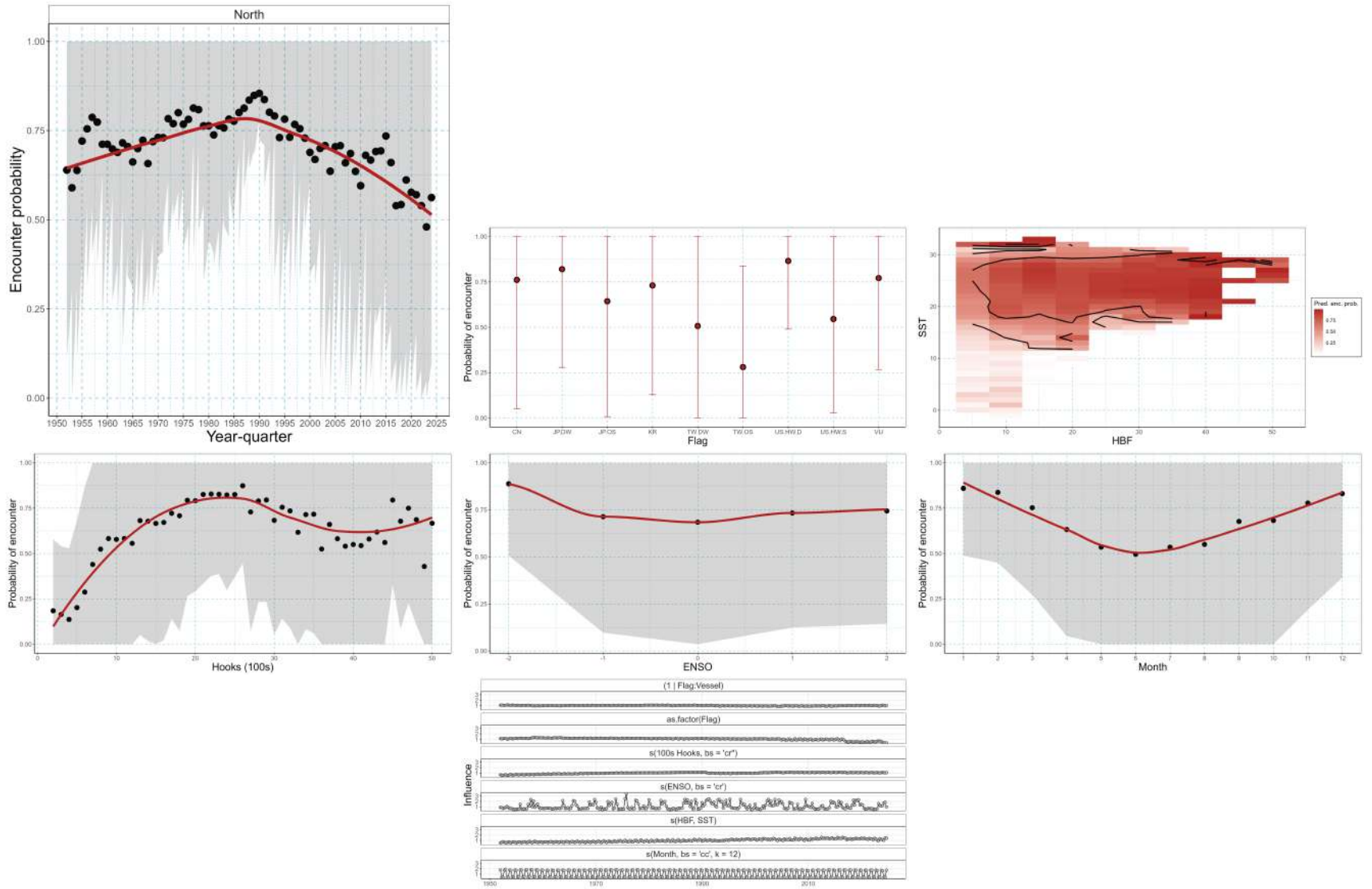


Figure 43: Auxiliary plots for the bigeye northern sub-basin binomial model. Plots include encounter probability over time (top-left), flag effect (top-center), interaction between HBF and SST (top-right), number of hooks effect (middle-left), ENSO effect (center), month effect (middle-right), and variable influence (bottom). Includes mean observations (black) and predictions (red).

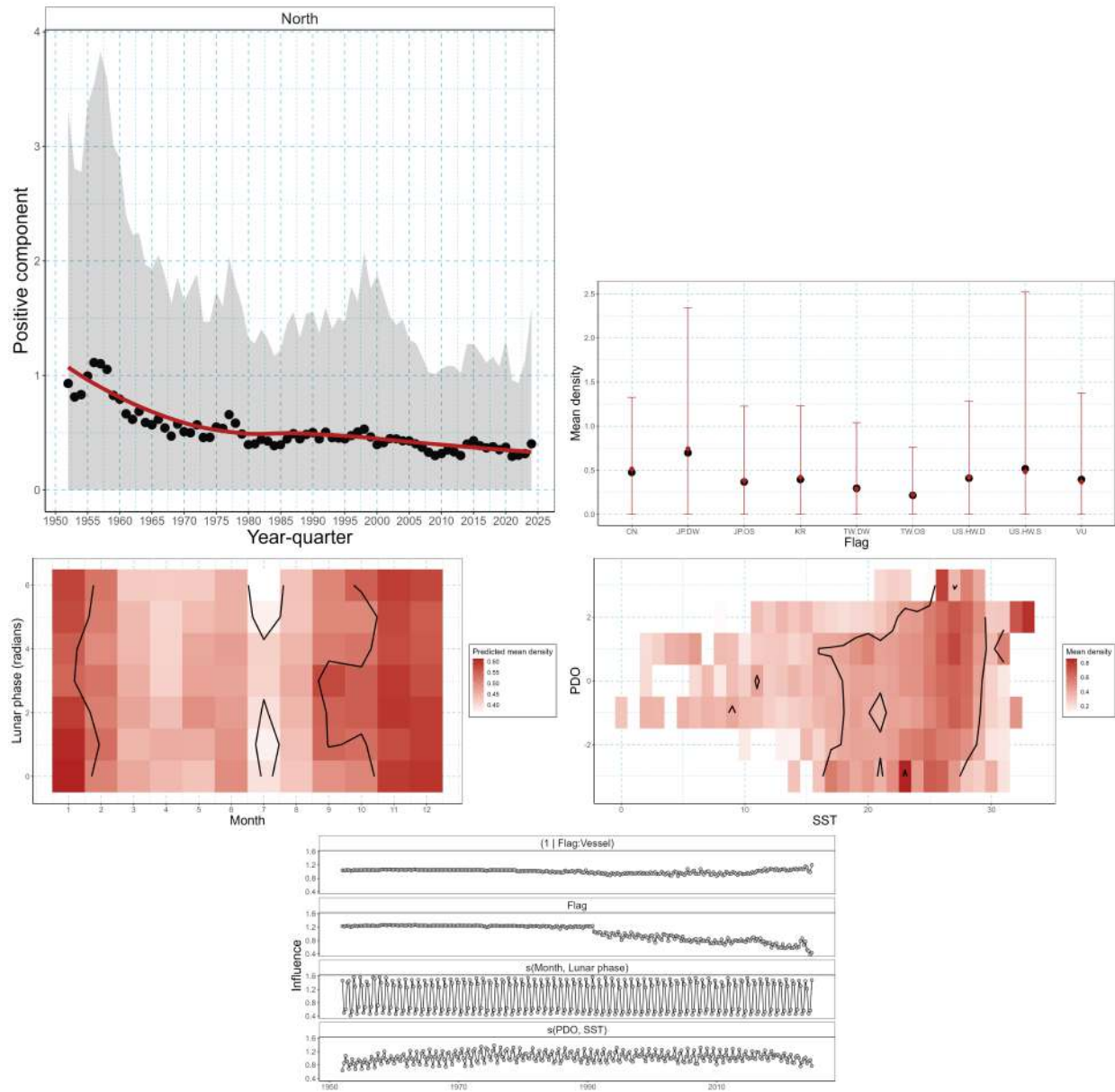


Figure 44: Auxiliary plots for the bigeye northern sub-basin positive component model. Plots include positive component over time (top-left), flag effect (top-right), interactive effect between lunar phase and month (middle-left), interactive effect between SST and PDO (middle-right), and variable influence (bottom). Includes mean observations (black) and predictions (red).

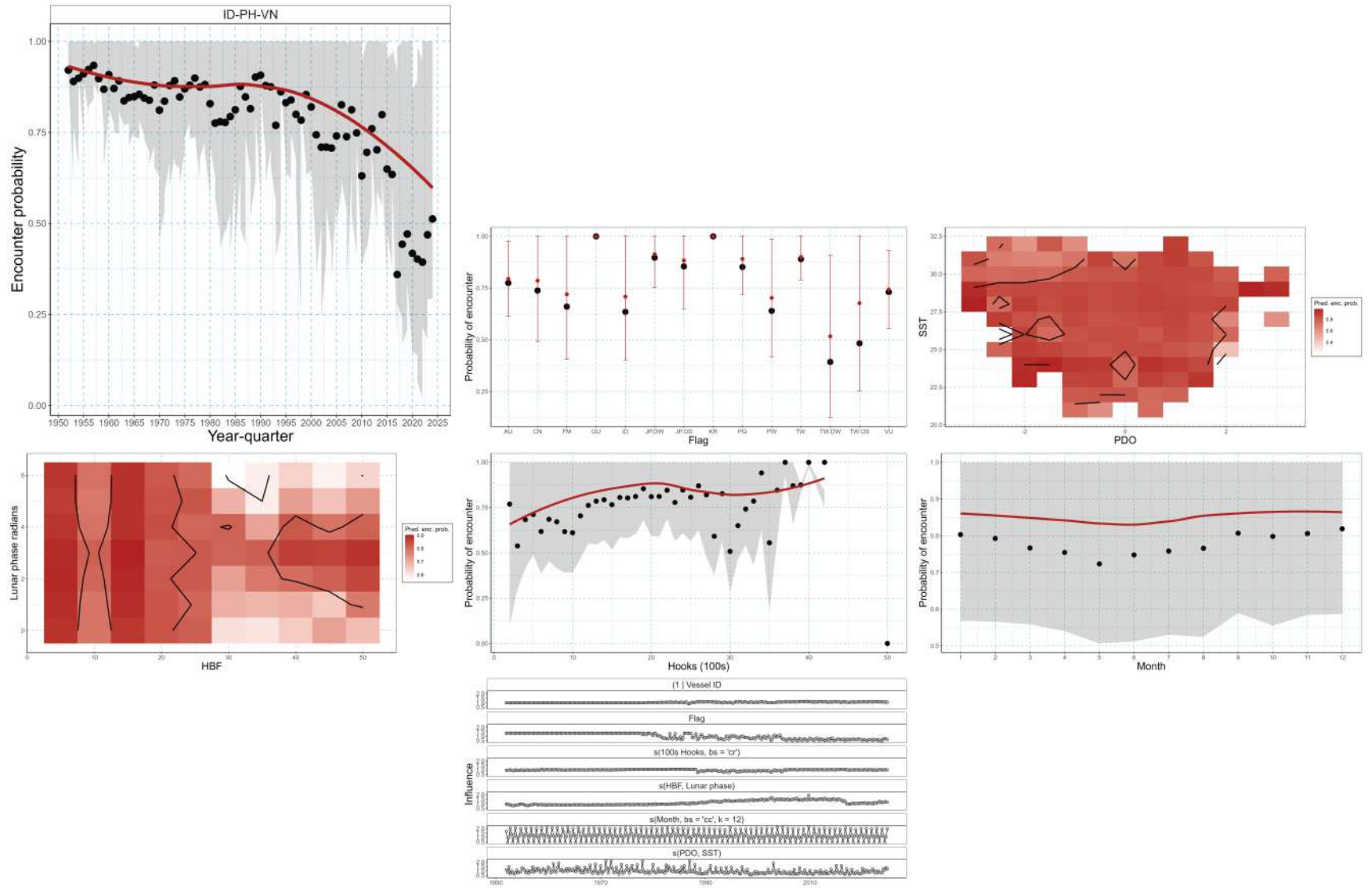


Figure 45: Auxiliary plots for the bigeye ID-PH-VN sub-basin binomial model. Plots include encounter probability over time (top-left), flag effect (top-center), interaction between PDO and SST (top-right), interaction between HBF and lunar phase (middle-left), number of hooks effect (center), month effect (middle-right), and variable influence (bottom). Includes mean observations (black) and predictions (red).

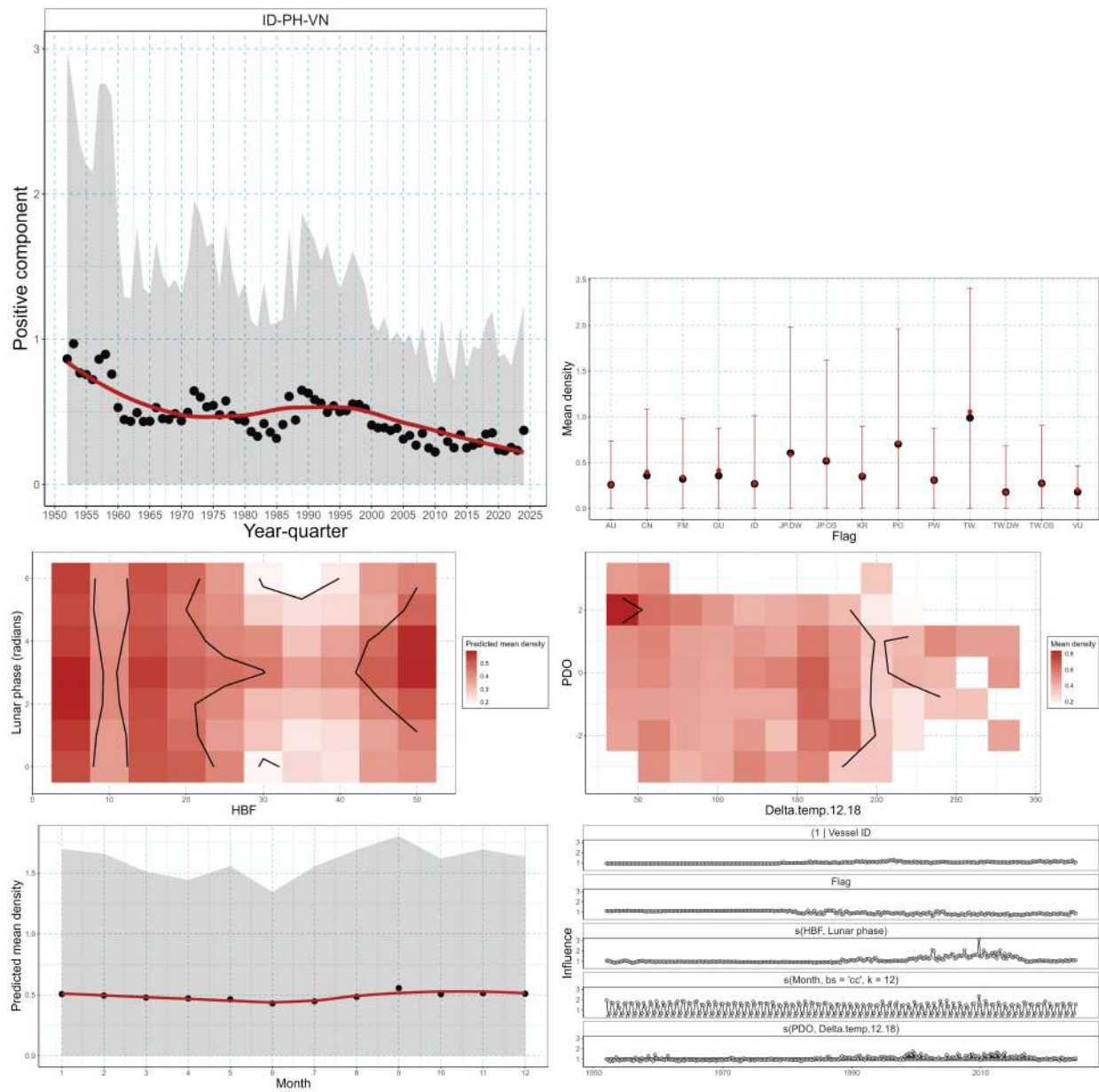


Figure 46: Auxiliary plots for the bigeye ID-PH-VN sub-basin positive component model. Plots include positive component over time (top-left), flag effect (top-right), interactive effect between lunar phase and HBF (middle-left), interactive effect between $\Delta\text{temp}_{12-18}^{\circ}\text{C}$ and PDO (middle-right), month effect (bottom-left), and variable influence (bottom-right). Includes mean observations (black) and predictions (red).

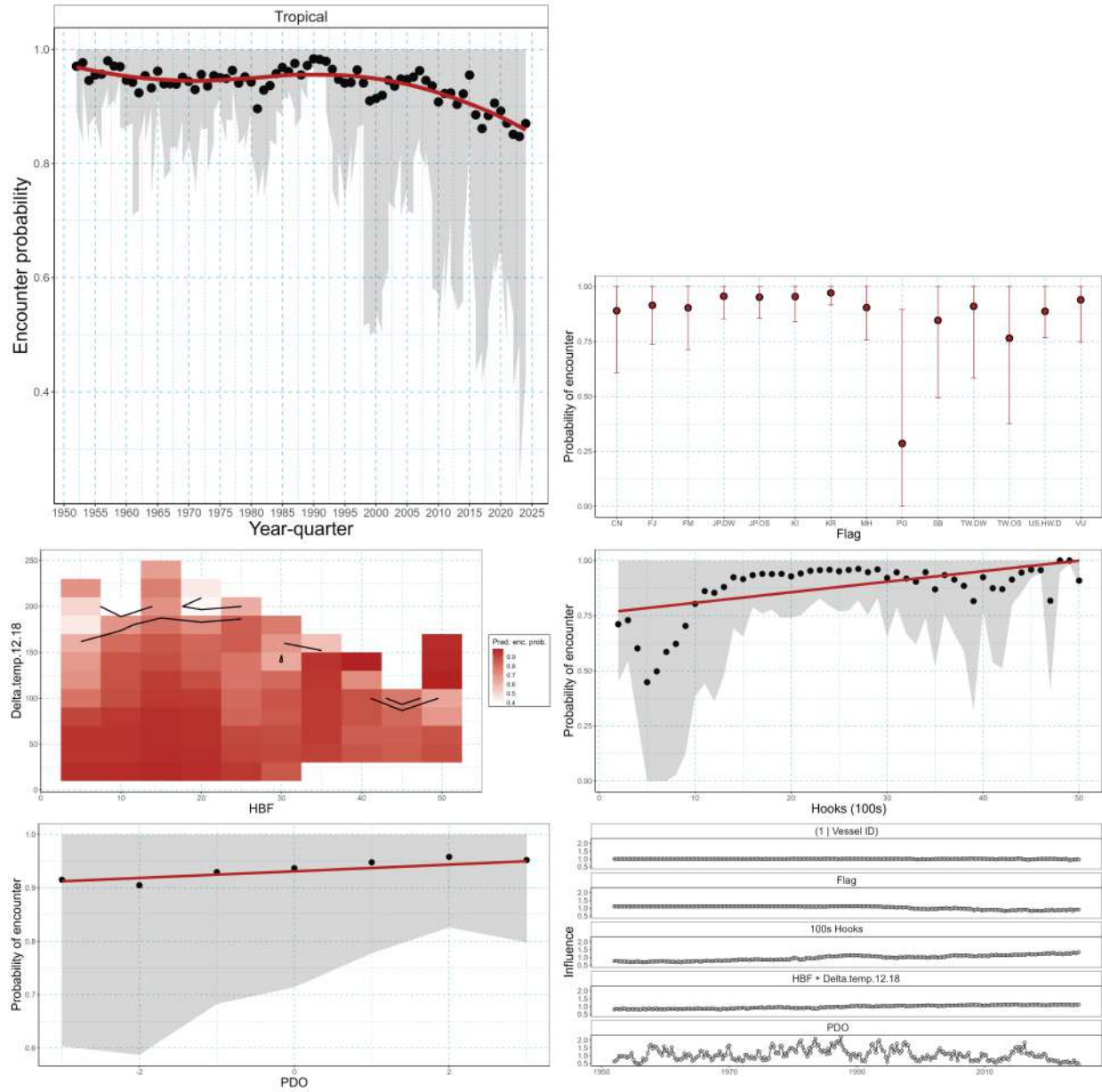


Figure 47: Auxiliary plots for the bigeye tropical sub-basin binomial model. Plots include encounter probability over time (top-left), flag effect (top-right), interaction between HBF and $\Delta\text{temp}_{12-18^\circ\text{C}}$ (middle-left), number of hooks effect (middle-right), PDO effect (bottom-left), and variable influence (bottom-right). Includes mean observations (black) and predictions (red).

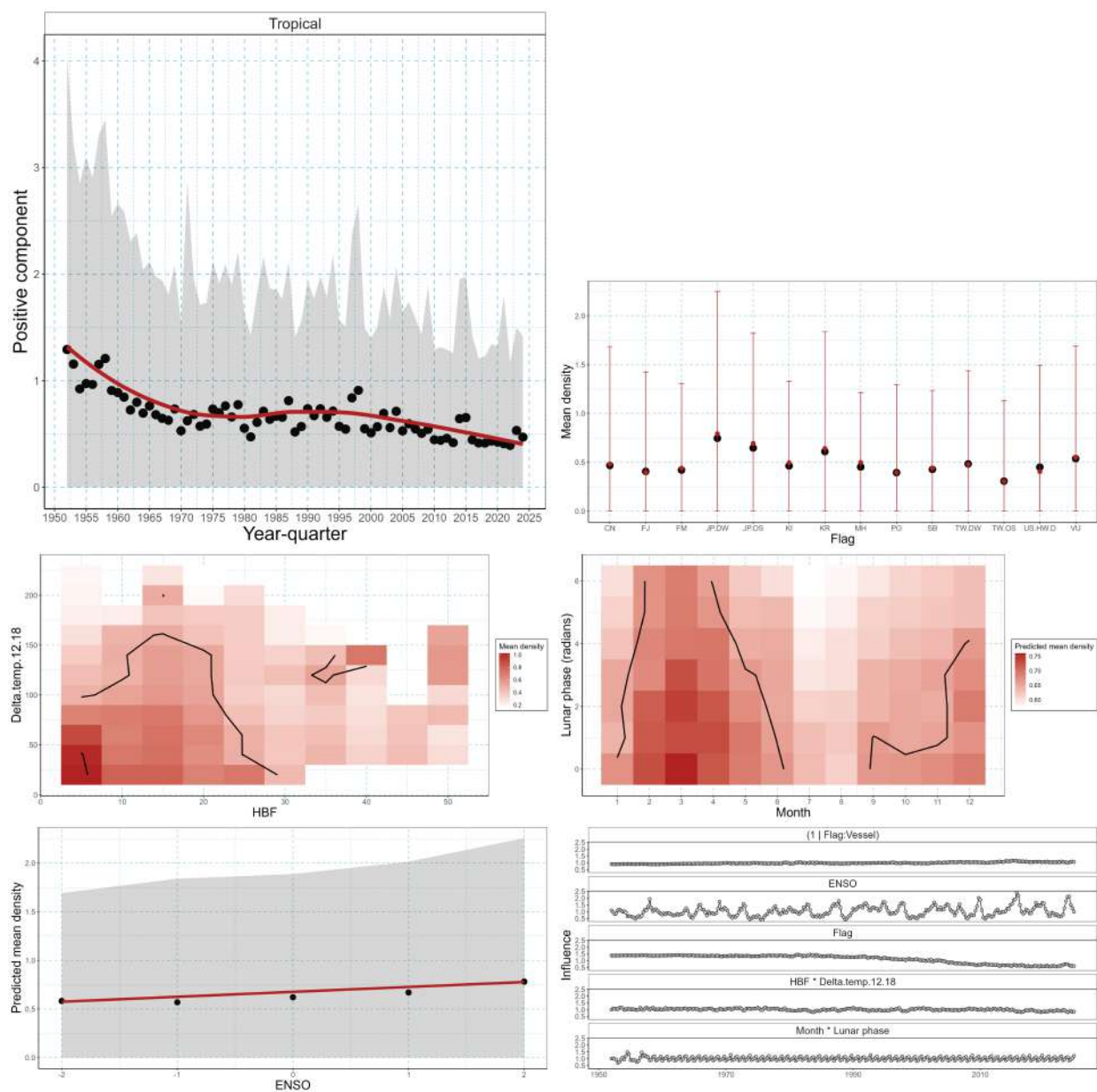


Figure 48: Auxiliary plots for the bigeye tropical sub-basin positive component model. Plots include positive component over time (top-left), flag effect (top-right), interactive effect between HBF and $\Delta\text{temp}_{12-18}^{\circ\text{C}}$ (middle-left), interactive effect between lunar phase and month (middle-right), ENSO effect (bottom-left), and variable influence (bottom-right). Includes mean observations (black) and predictions (red).

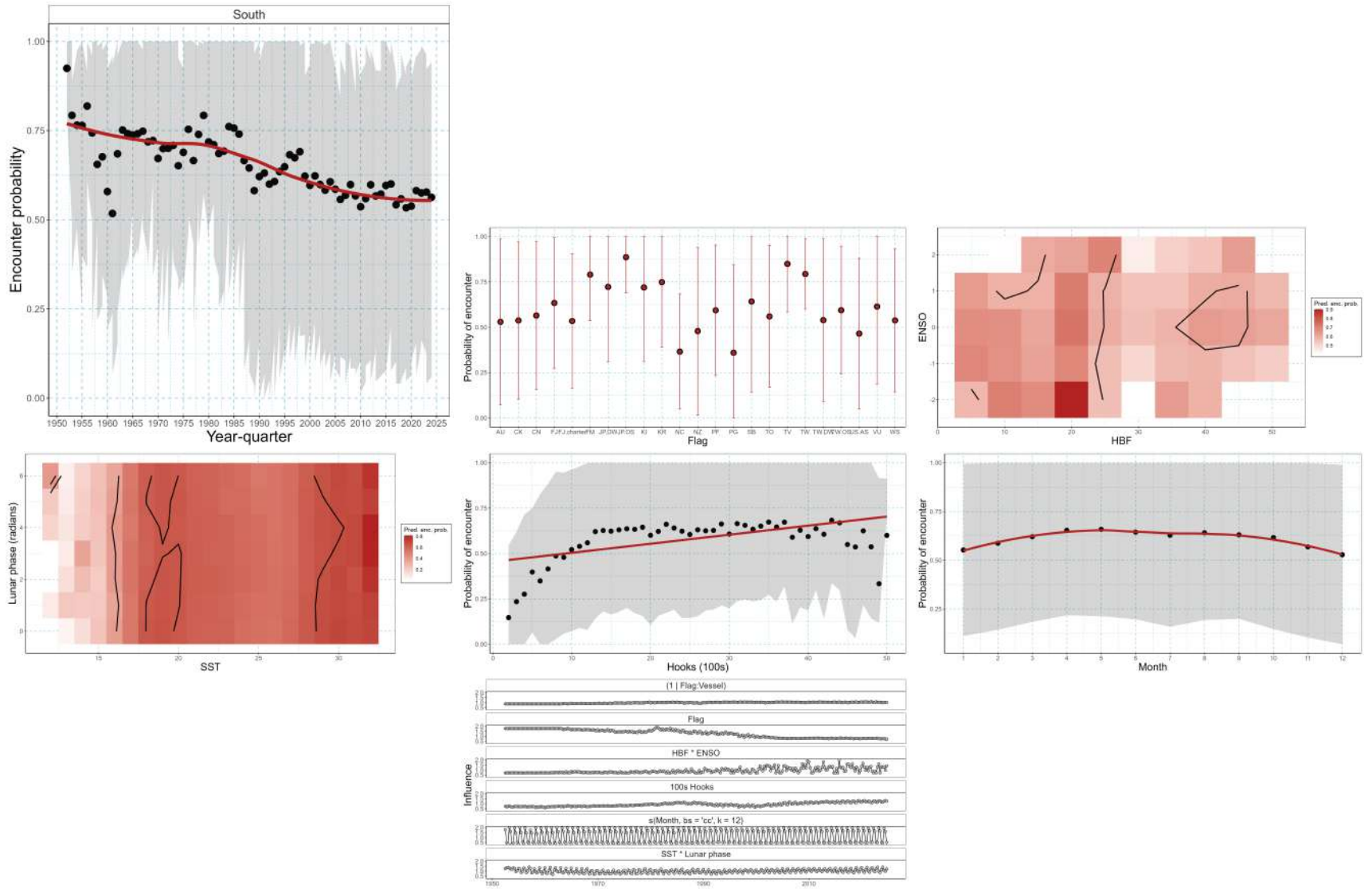


Figure 49: Auxiliary plots for the bigeye southern sub-basin binomial model. Plots include encounter probability over time (top-left), flag effect (top-center), interaction between HBF and ENSO (top-right), interaction between SST and lunar phase (middle-left), number of hooks effect (center), month effect (middle-right), and variable influence (bottom). Includes mean observations (black) and predictions (red).

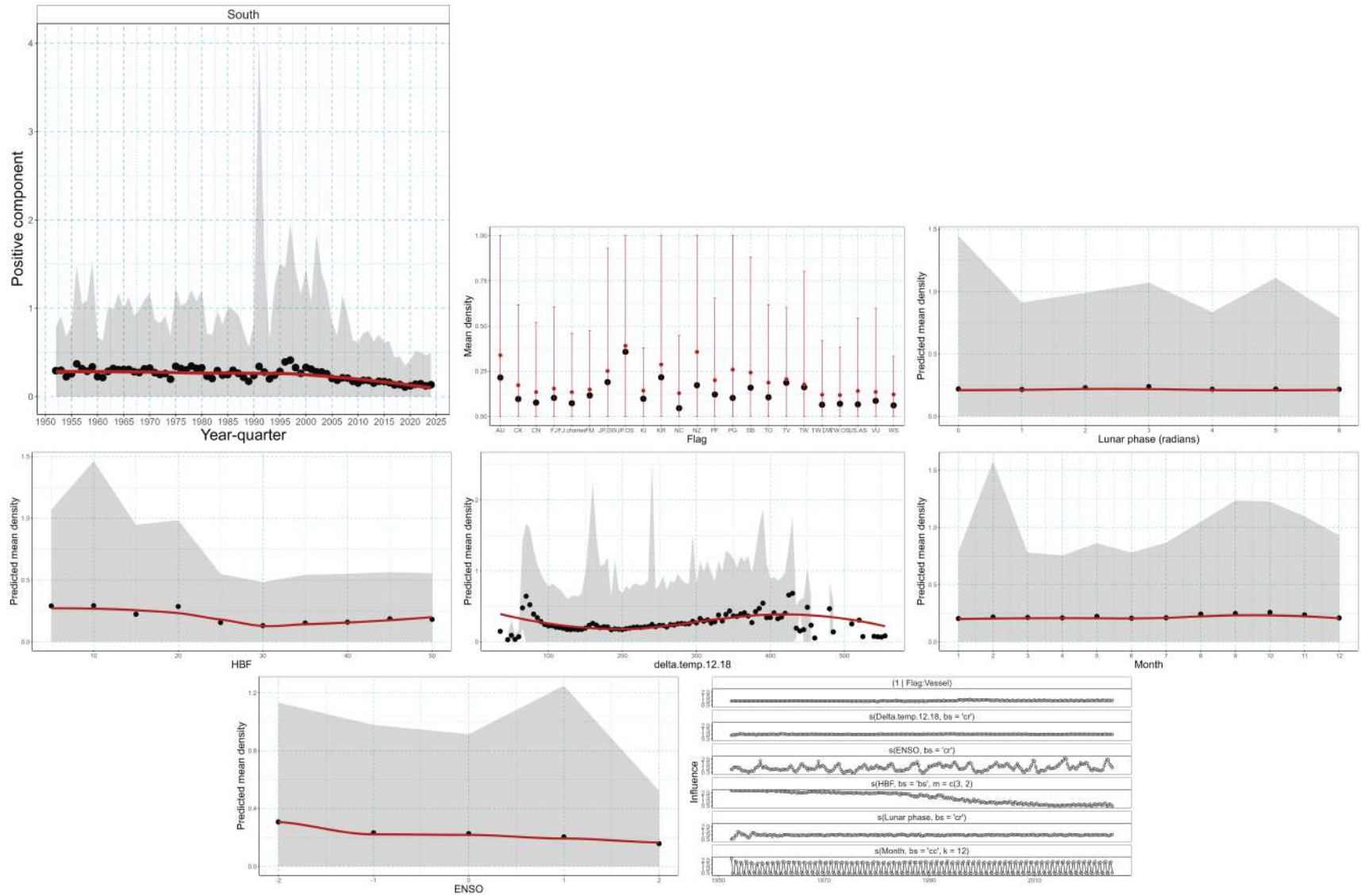


Figure 50: Auxiliary plots for the bigeye southern sub-basin positive component model. Plots include positive component over time (top-left), flag effect (top-center), lunar phase effect (top-right), HBF effect (middle-left), $\Delta\text{temp}_{12-18}^{\circ\text{C}}$ effect (center), month effect (middle-right), ENSO effect (bottom-left), and variable influence (bottom-right). Includes mean observations (black) and predictions (red).

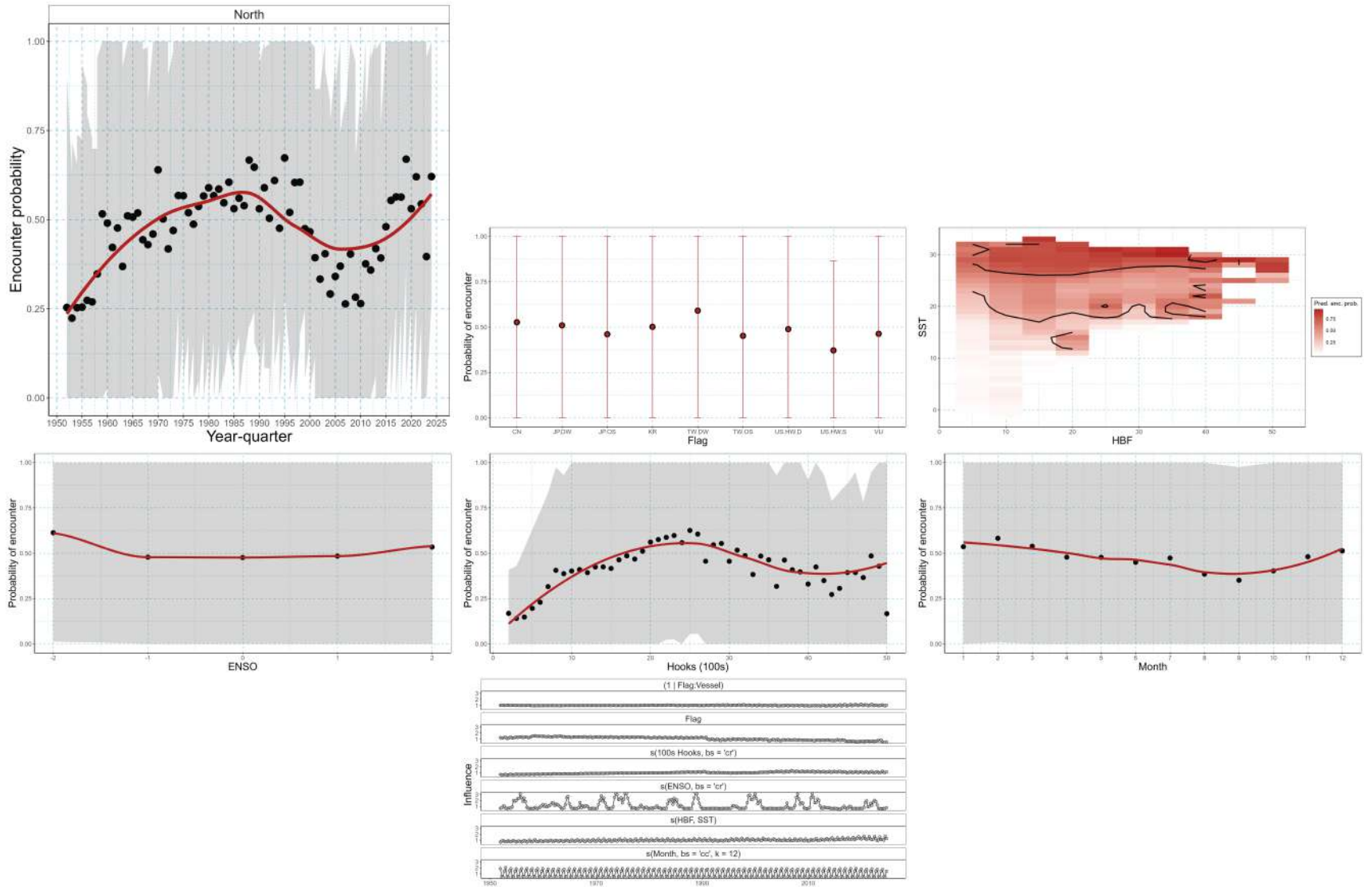


Figure 51: Auxiliary plots for the yellowfin northern sub-basin binomial model. Plots include encounter probability over time (top-left), flag effect (top-center), interaction between HBF and SST (top-right), ENSO effect (middle-left), number of hooks effect (center), month effect (middle-right), and variable influence (bottom). Includes mean observations (black) and predictions (red).

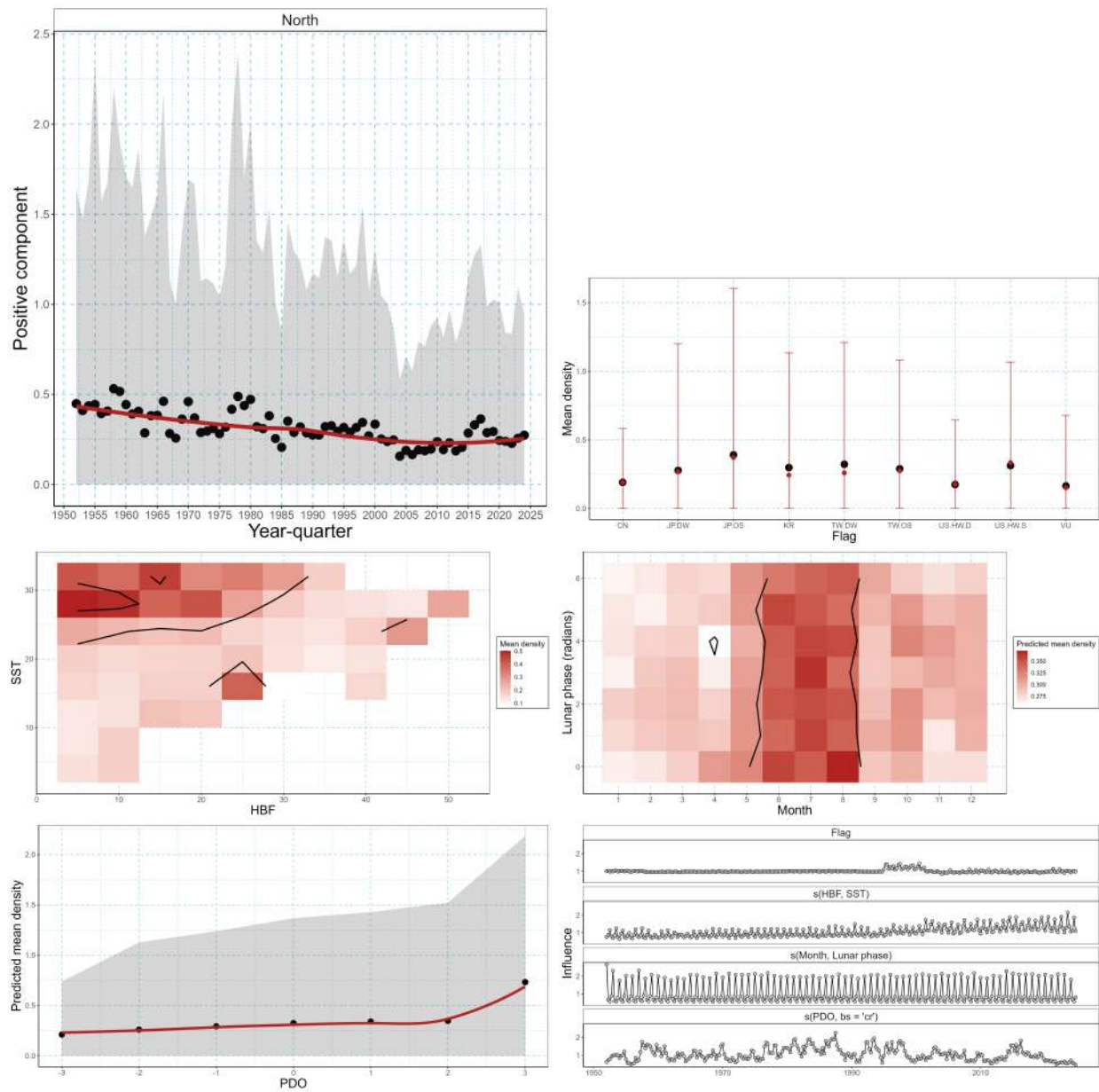


Figure 52: Auxiliary plots for the yellowfin northern sub-basin positive component model. Plots include positive component over time (top-left), flag effect (top-right), interactive effect between HBF and SST (middle-left), interactive effect between lunar phase and month (middle-right), PDO effect (bottom-left), and variable influence (bottom-right). Includes mean observations (black) and predictions (red).

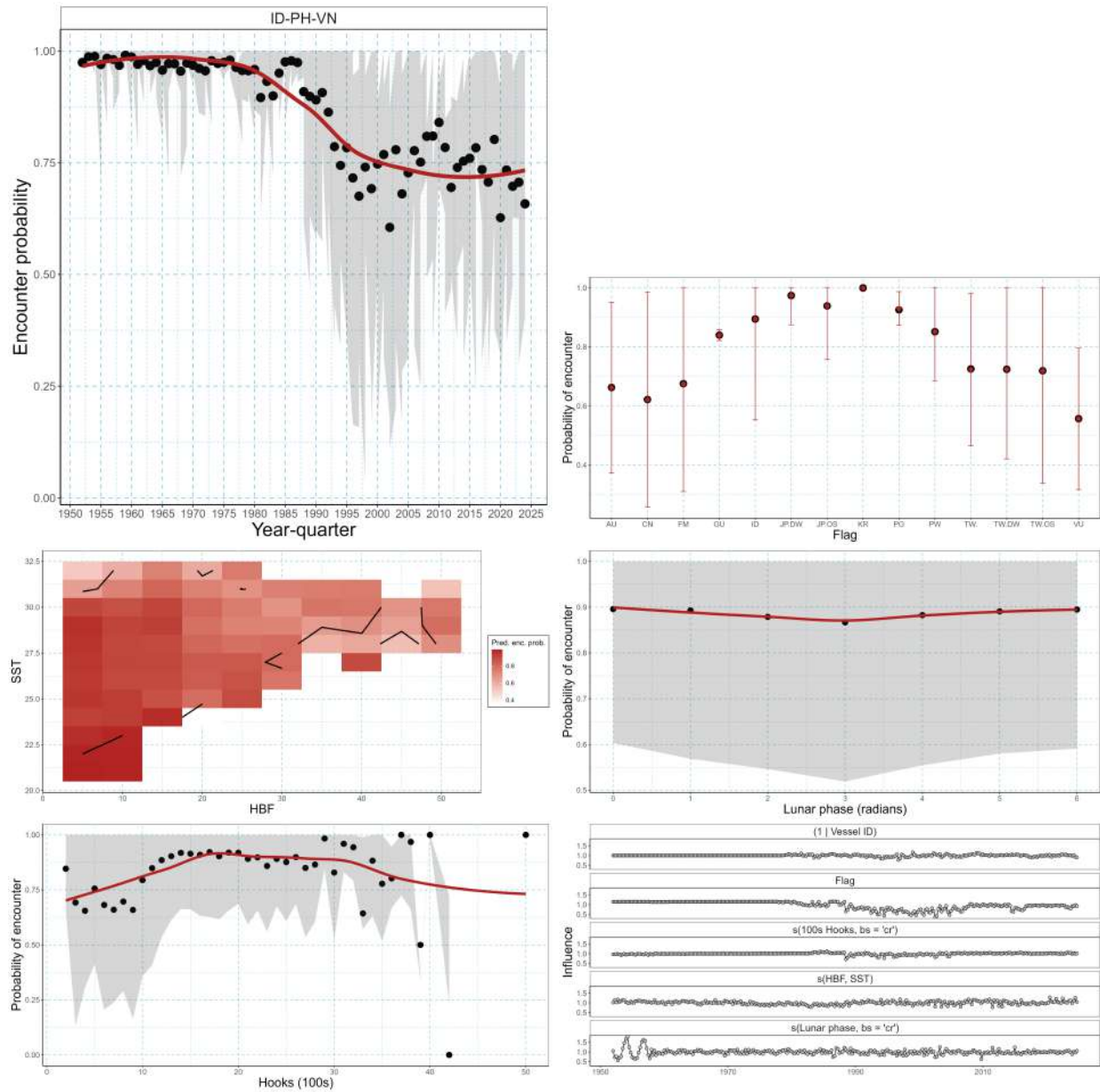


Figure 53: Auxiliary plots for the yellowfin ID-PH-VN sub-basin specific binomial model. Plots include encounter probability over time (top-left), flag effect (top-right), interaction between HBF and SST (middle-left), lunar phase effect (middle-right), number of hooks effect (bottom-left), and variable influence (bottom-right). Includes mean observations (black) and predictions (red).

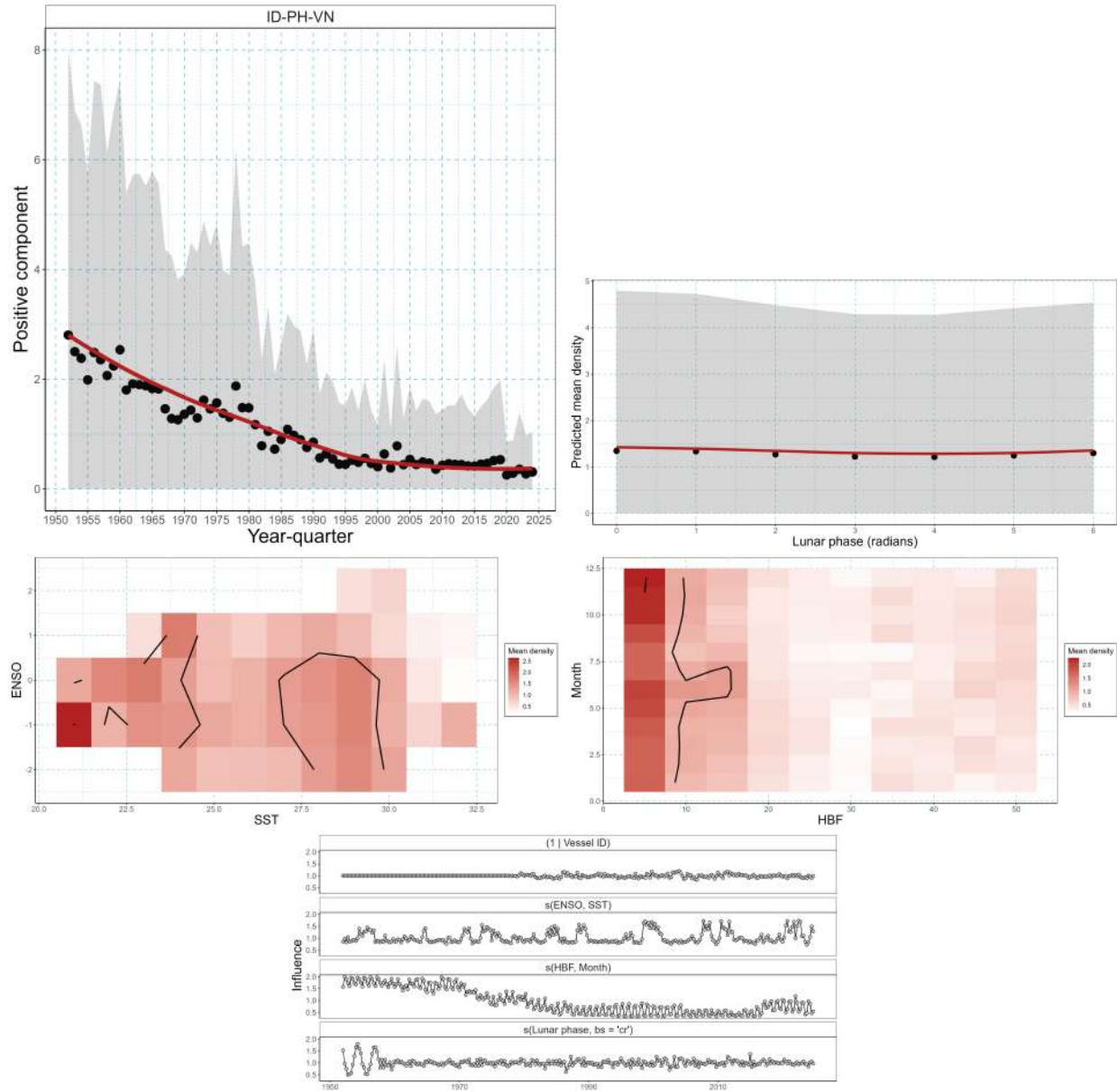


Figure 54: Auxiliary plots for the yellowfin ID-PH-VN sub-basin positive component model. Plots include positive component over time (top-left), lunar phase effect (top-right), interactive effect between SST and ENSO (middle-left), interactive effect between HBF and month (middle-right), and variable influence (bottom). Includes mean observations (black) and predictions (red).

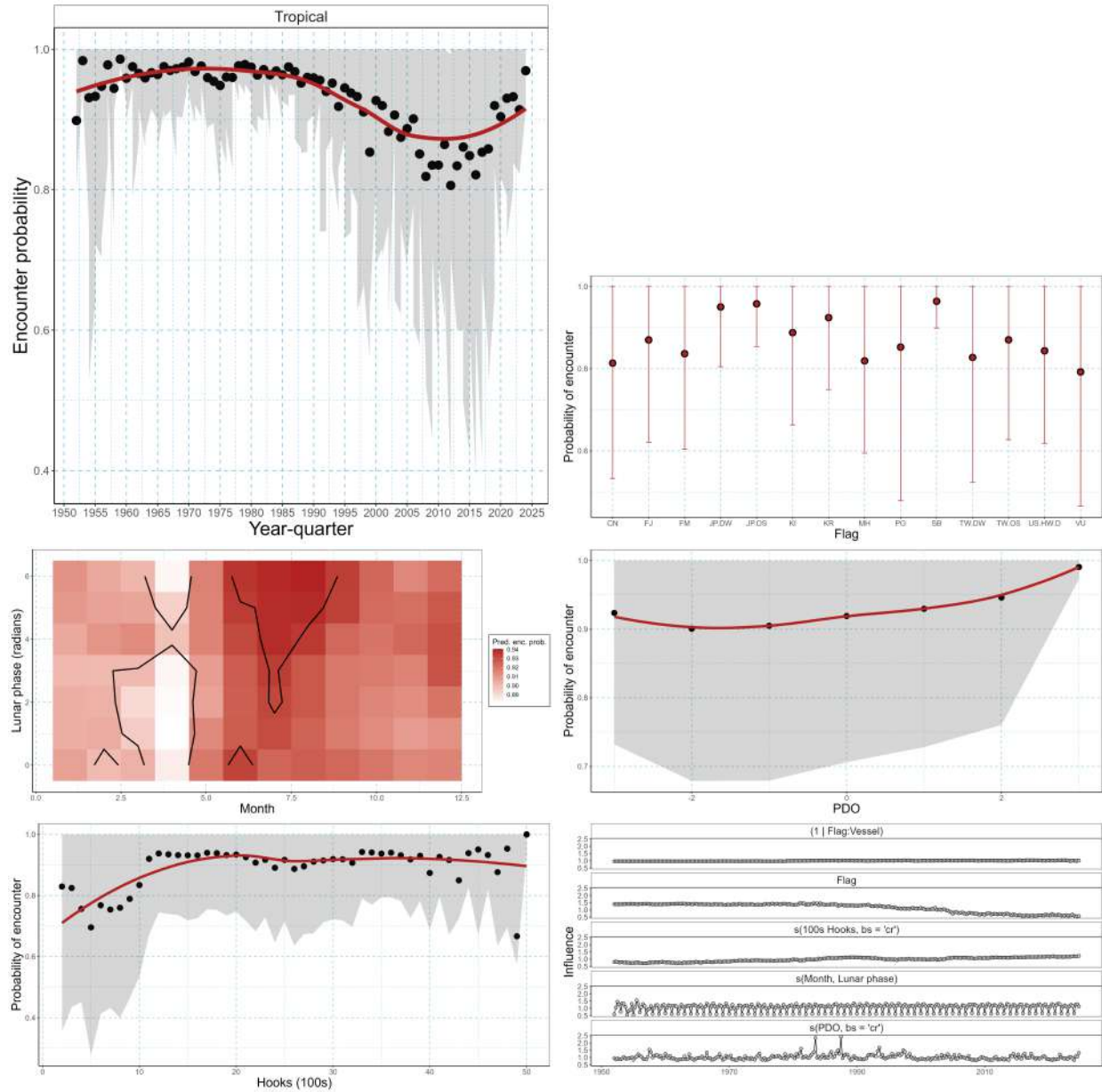


Figure 55: Auxiliary plots for the yellowfin tropical sub-basin binomial model. Plots include encounter probability over time (top-left), flag effect (top-right), interaction between month and lunar phase (middle-left), PDO effect (middle-right), number of hooks effect (bottom-left), and variable influence (bottom-right). Includes mean observations (black) and predictions (red).

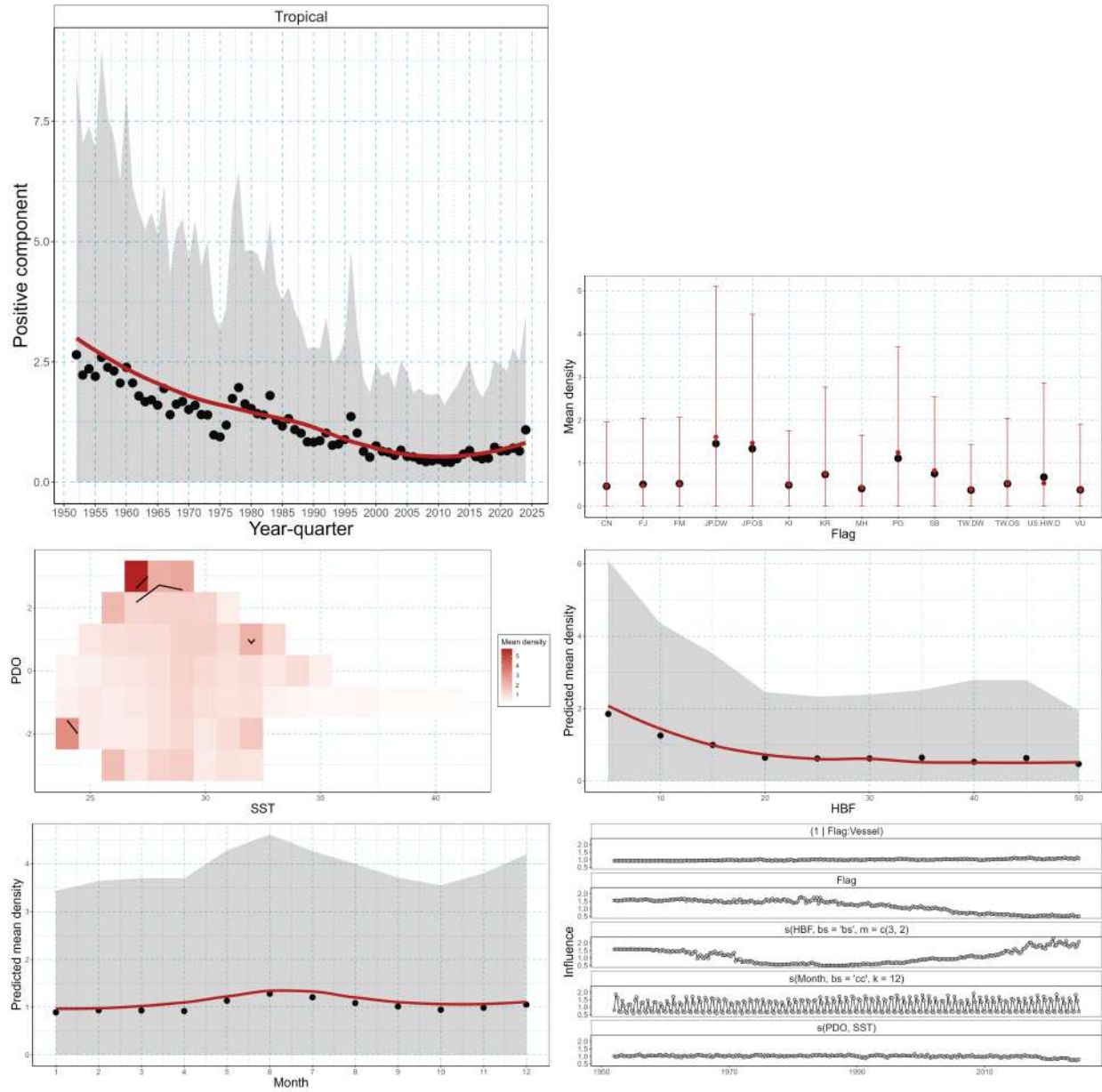


Figure 56: Auxiliary plots for the yellowfin tropical sub-basin positive component model. Plots include positive component over time (top-left), flag effect (top-right), interactive effect between SST and PDO (middle-left), HBF effect (middle-right), month effect (middle-right), and variable influence (bottom). Includes mean observations (black) and predictions (red).

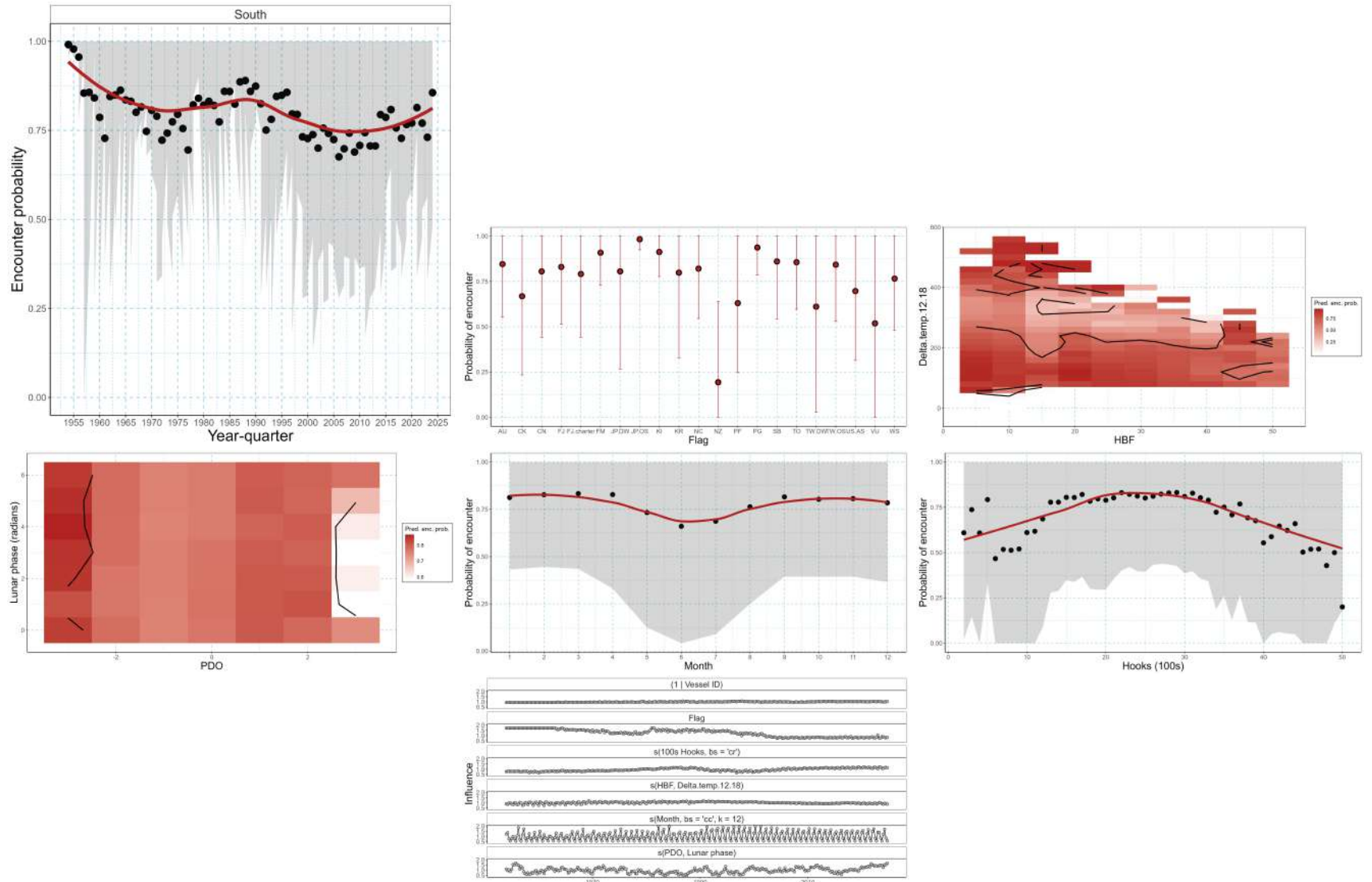


Figure 57: Auxiliary plots for the yellowfin southern sub-basin binomial model. Plots include encounter probability over time (top-left), flag effect (top-center), interaction between HBF and $\Delta\text{temp}12-18^{\circ}\text{C}$ (top-right), interaction between PDO and lunar phase (middle-left), month effect (center), number of hooks effect (middle-right), and variable influence (bottom). Includes mean observations (black) and predictions (red).

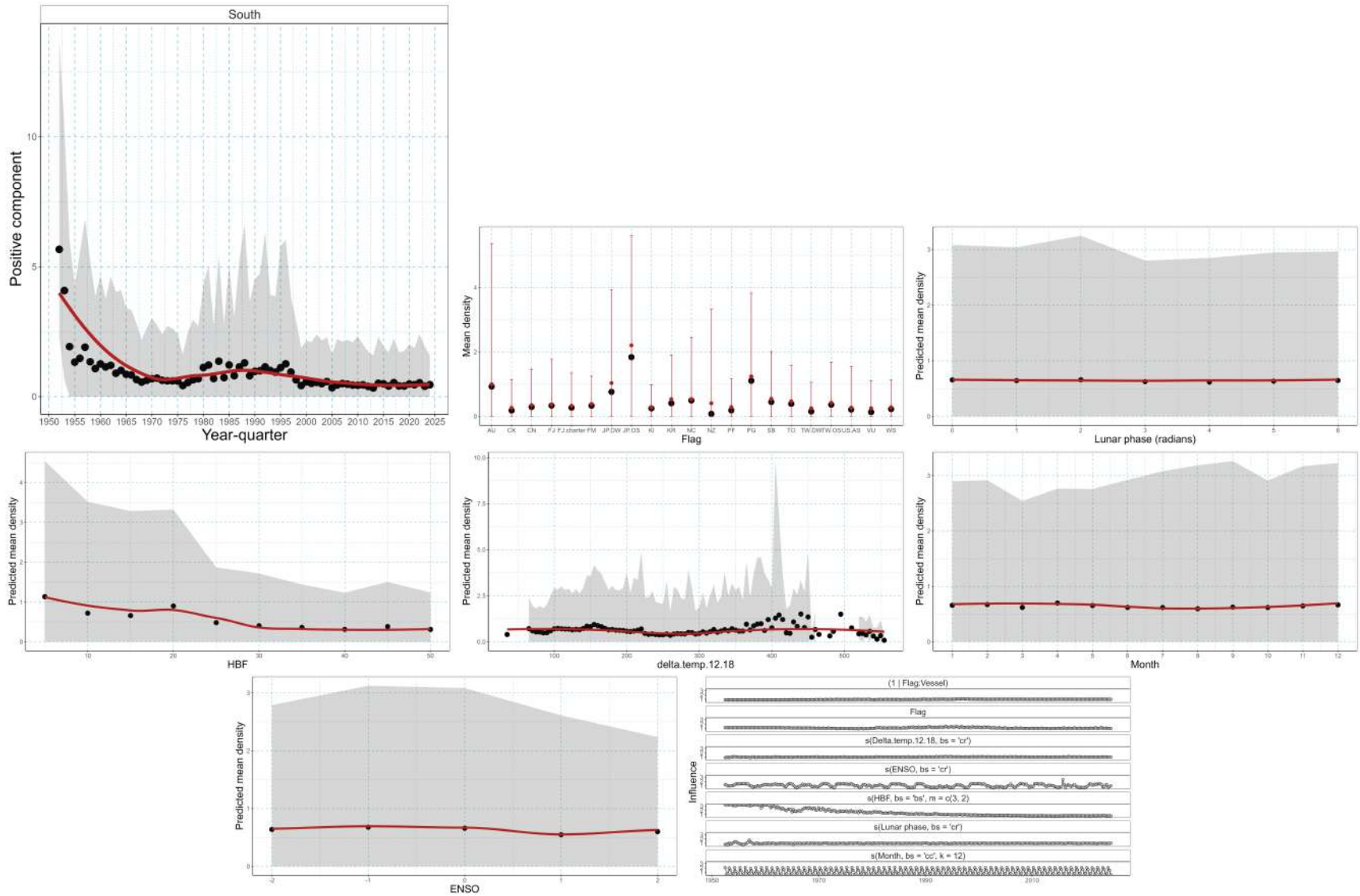


Figure 58: Auxiliary plots for the yellowfin southern sub-basin positive component model. Plots include positive component over time (top-left), flag effect (top-center), lunar phase effect (top-right), HBF effect (middle-left), $\Delta\text{temp}12-18^{\circ}\text{C}$ effect (center), month effect (middle-right), ENSO effect (bottom-left), and variable influence (bottom-right). Includes mean observations (black) and predictions (red).

15 Appendix 2: Catch and length frequency data summaries by fishery

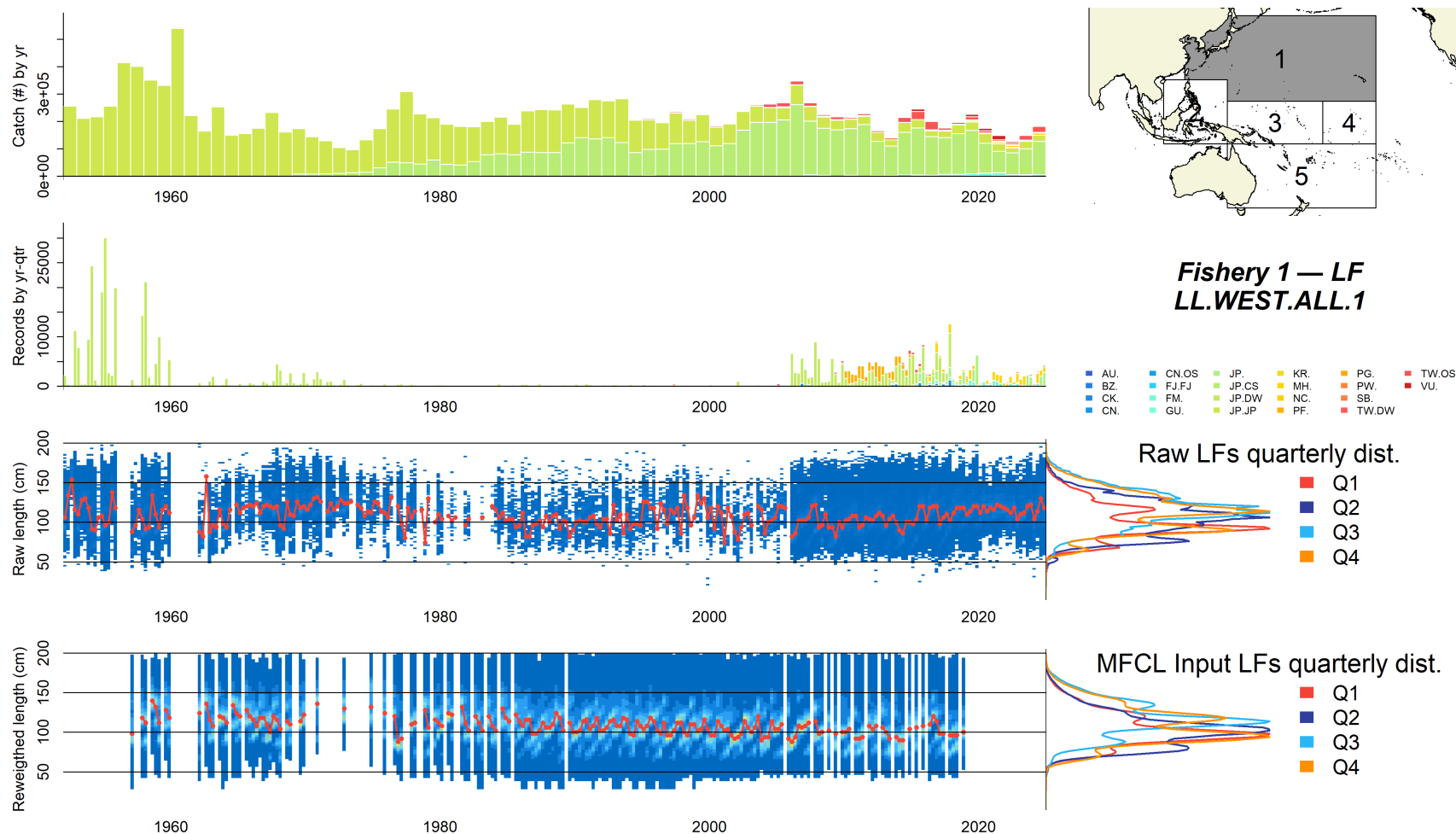


Figure 59: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 1 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

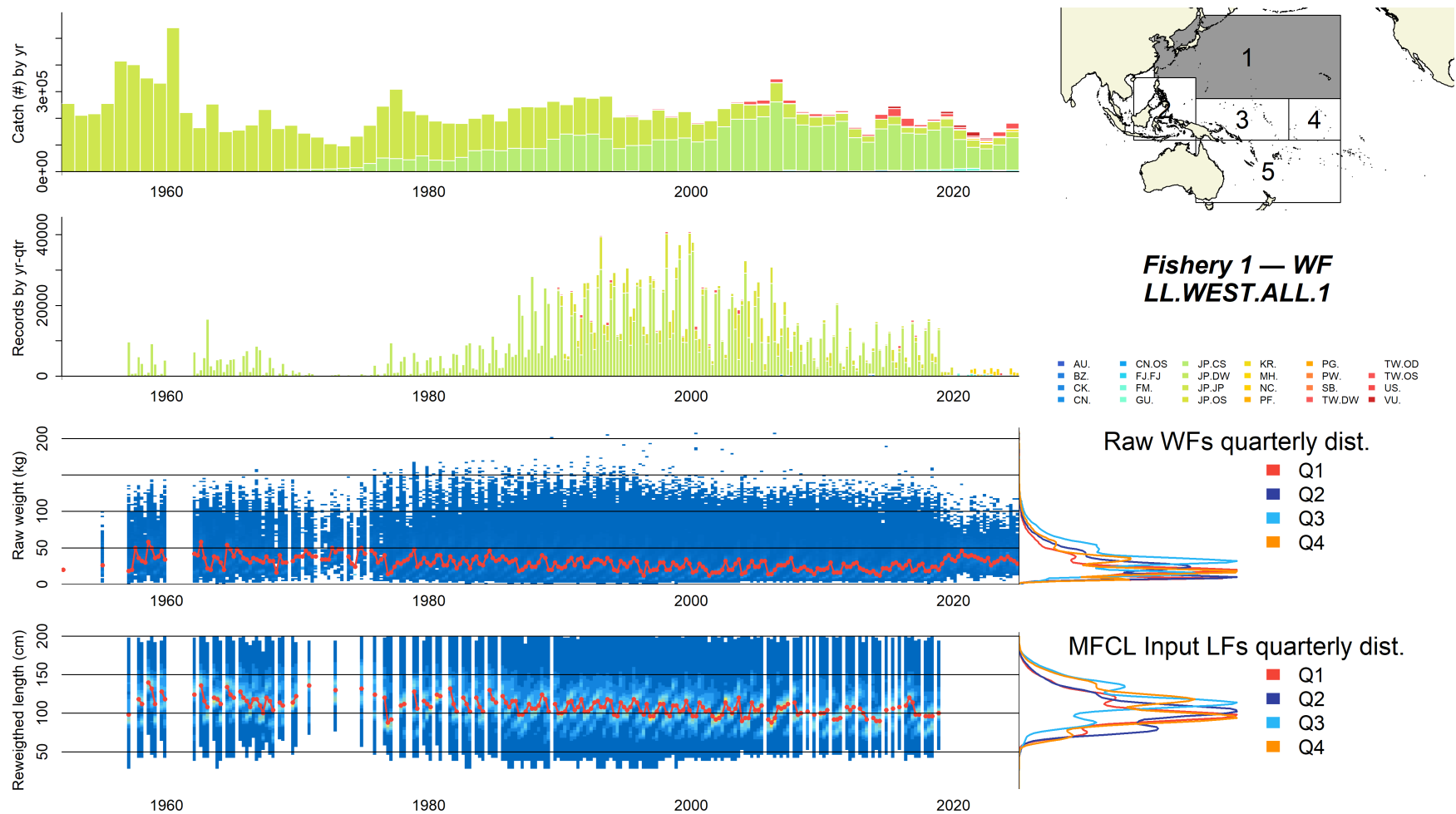


Figure 60: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 1 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

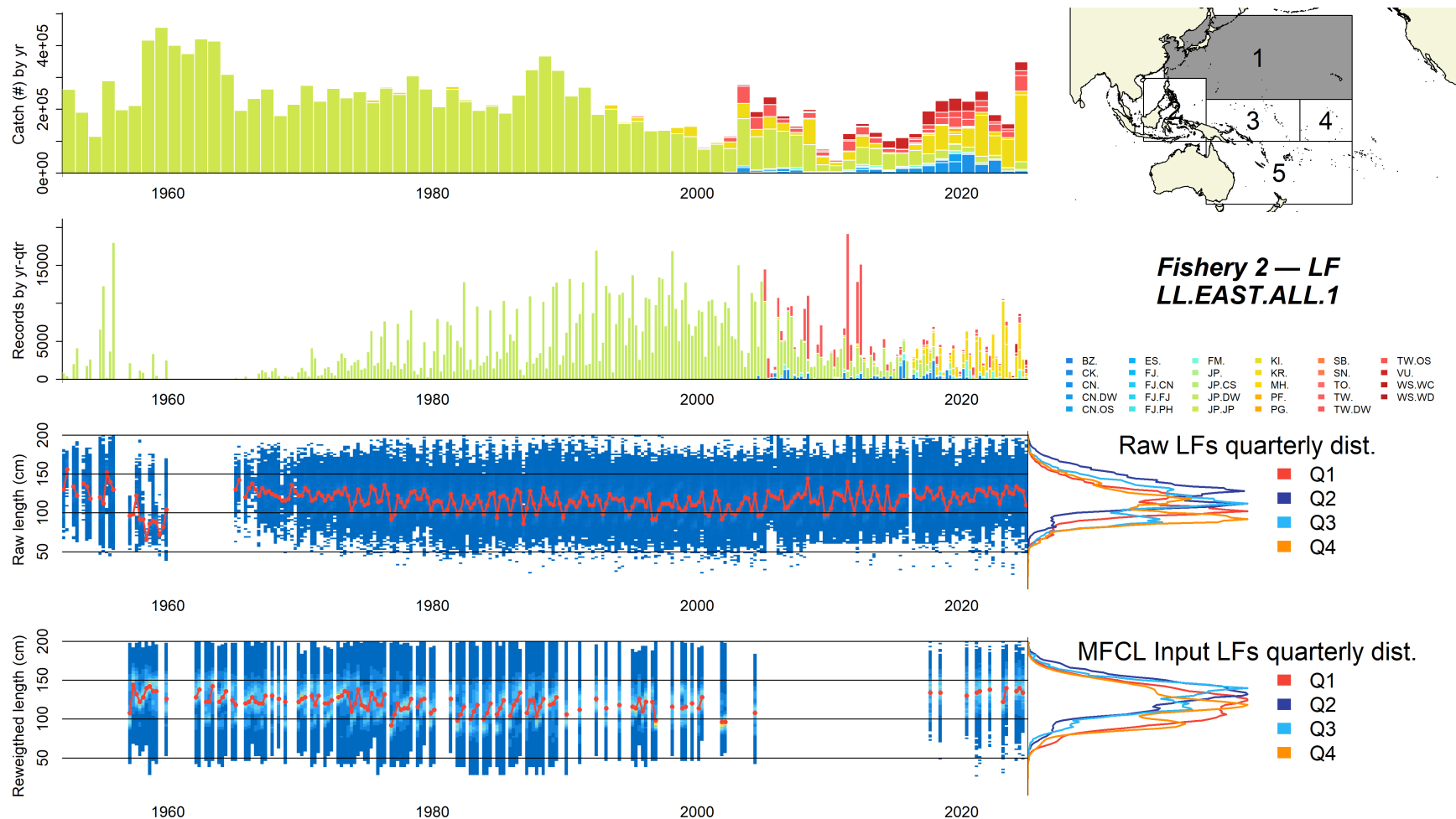


Figure 61: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 2 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

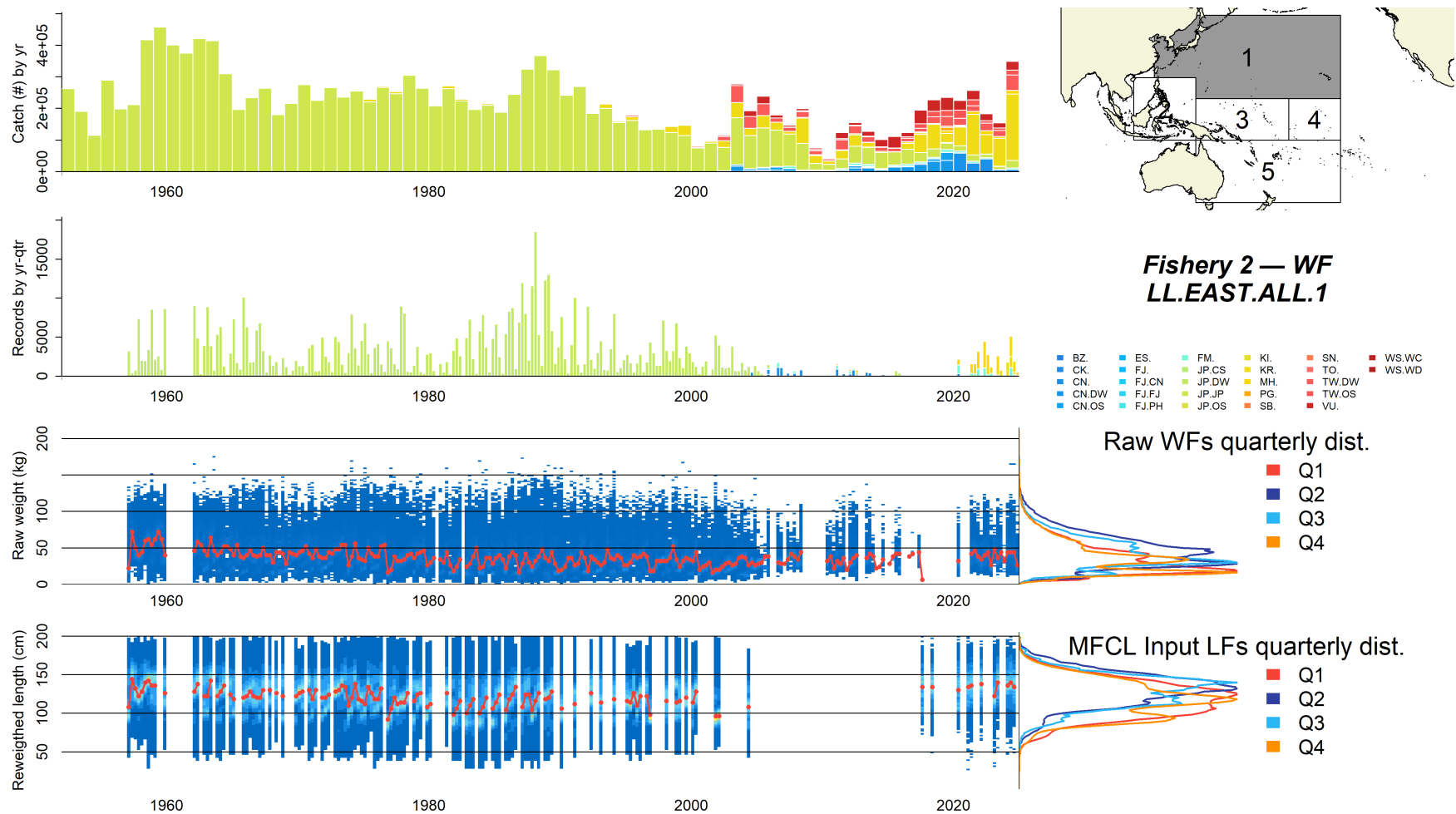


Figure 62: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 2 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

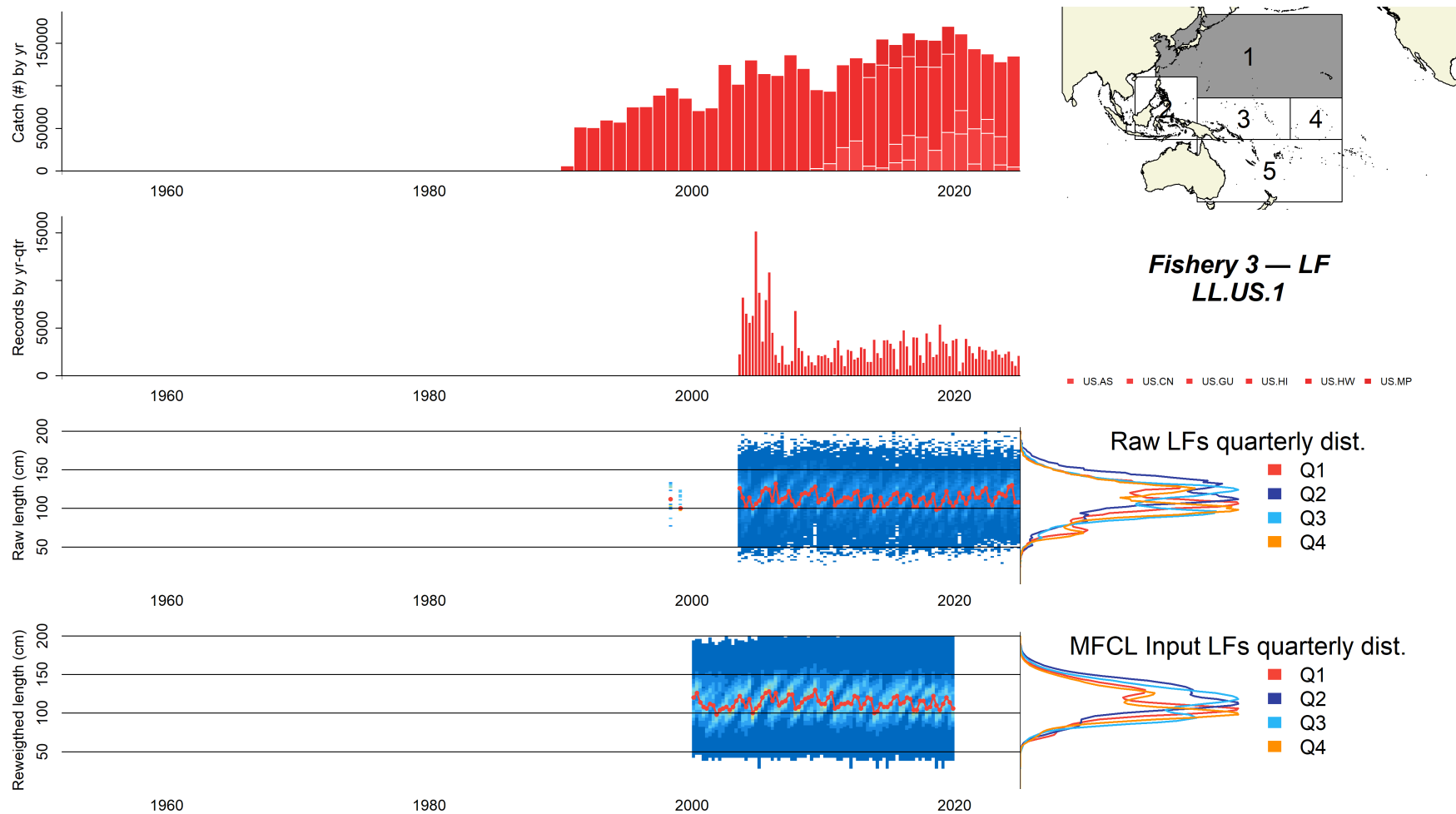


Figure 63: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 3 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

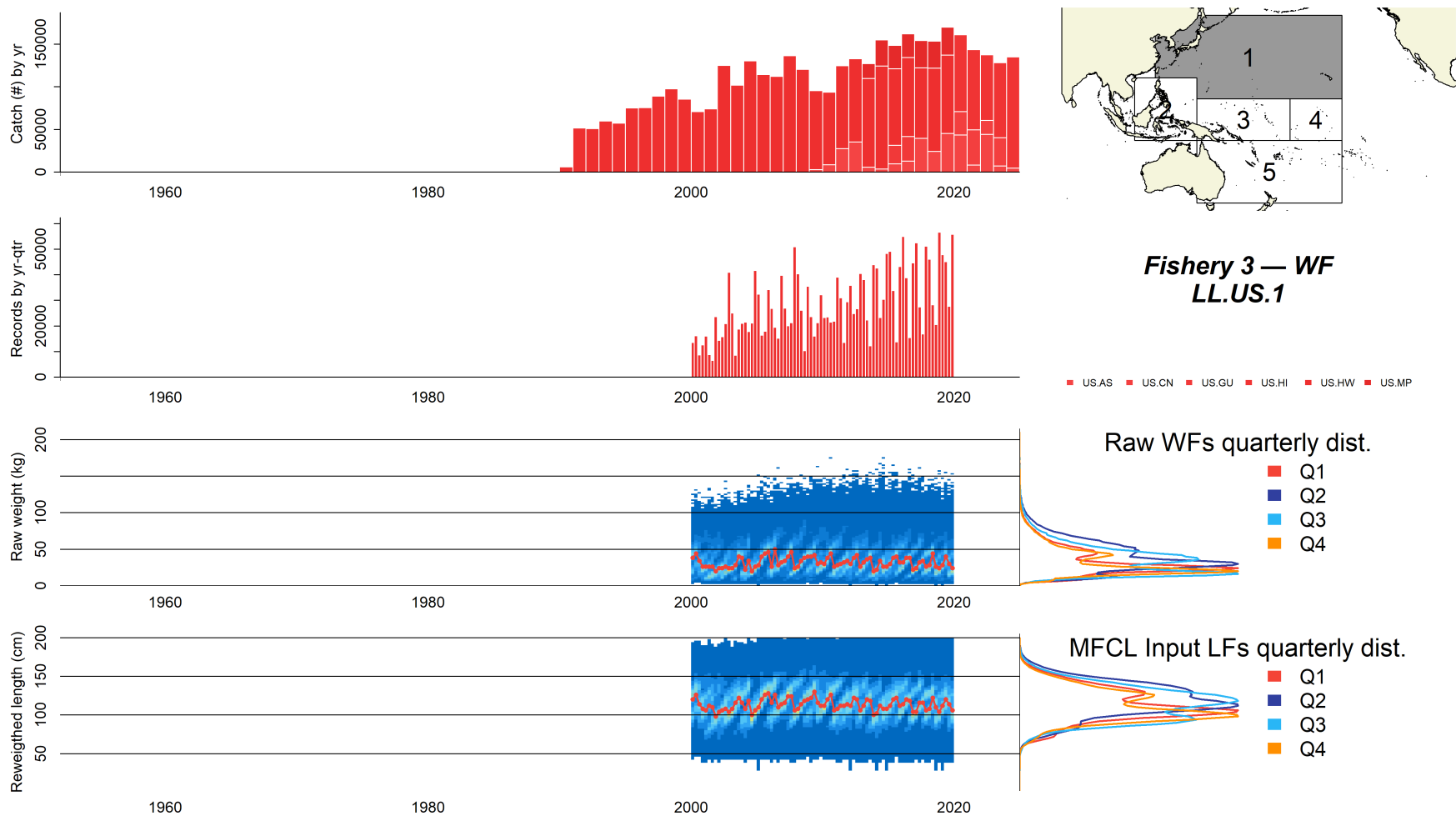


Figure 64: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 3 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

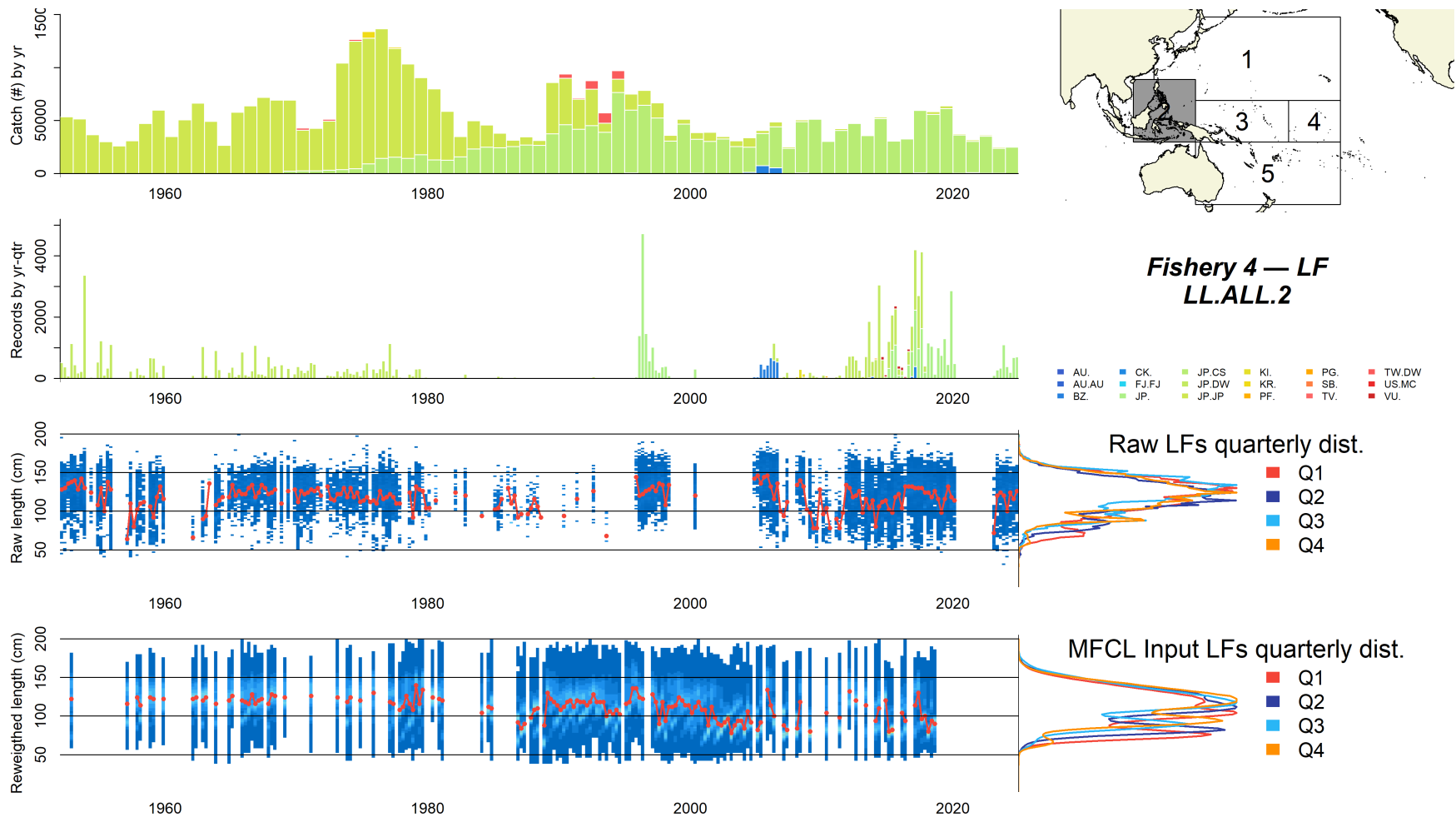


Figure 65: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 4 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

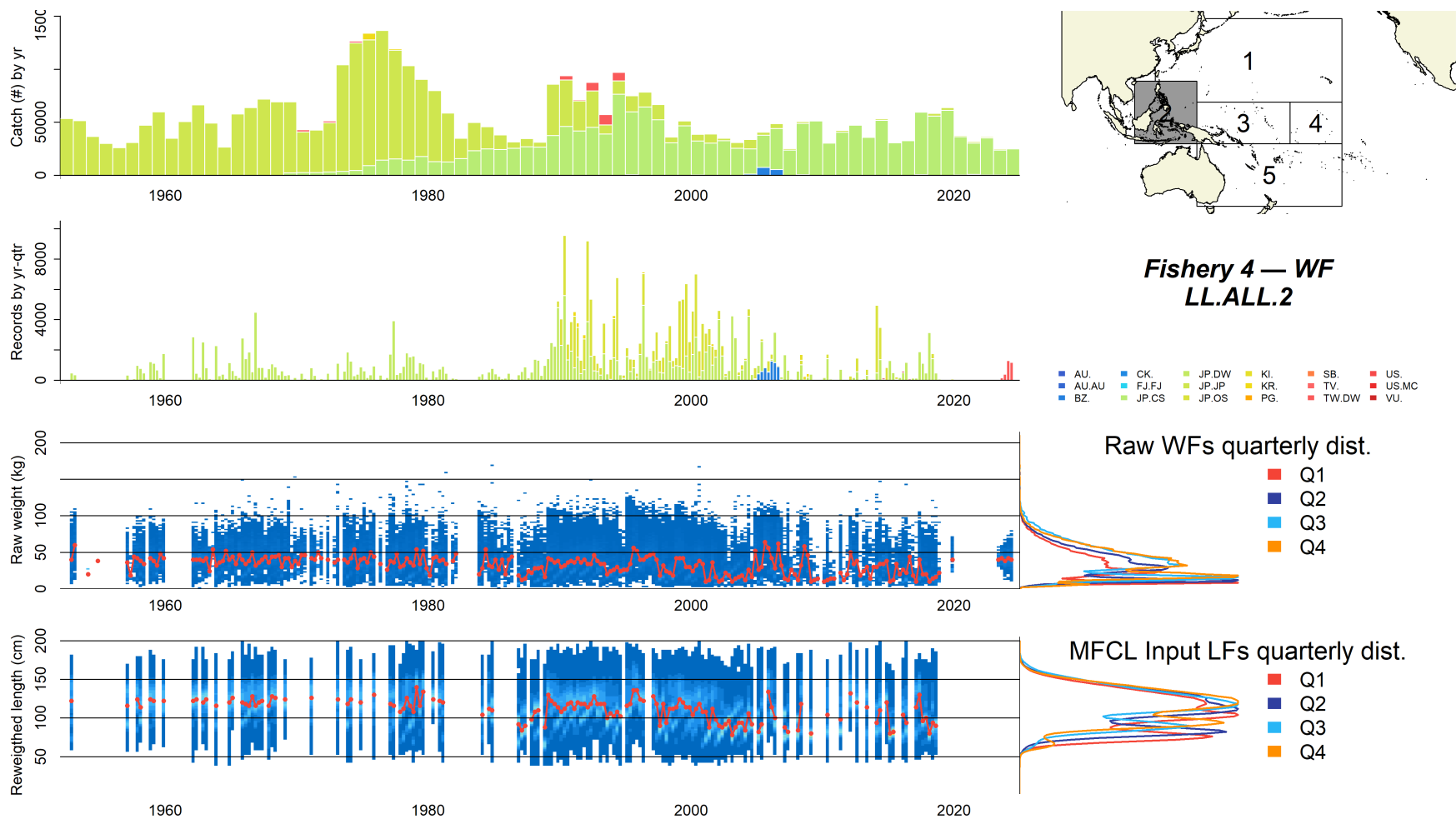


Figure 66: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 4 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

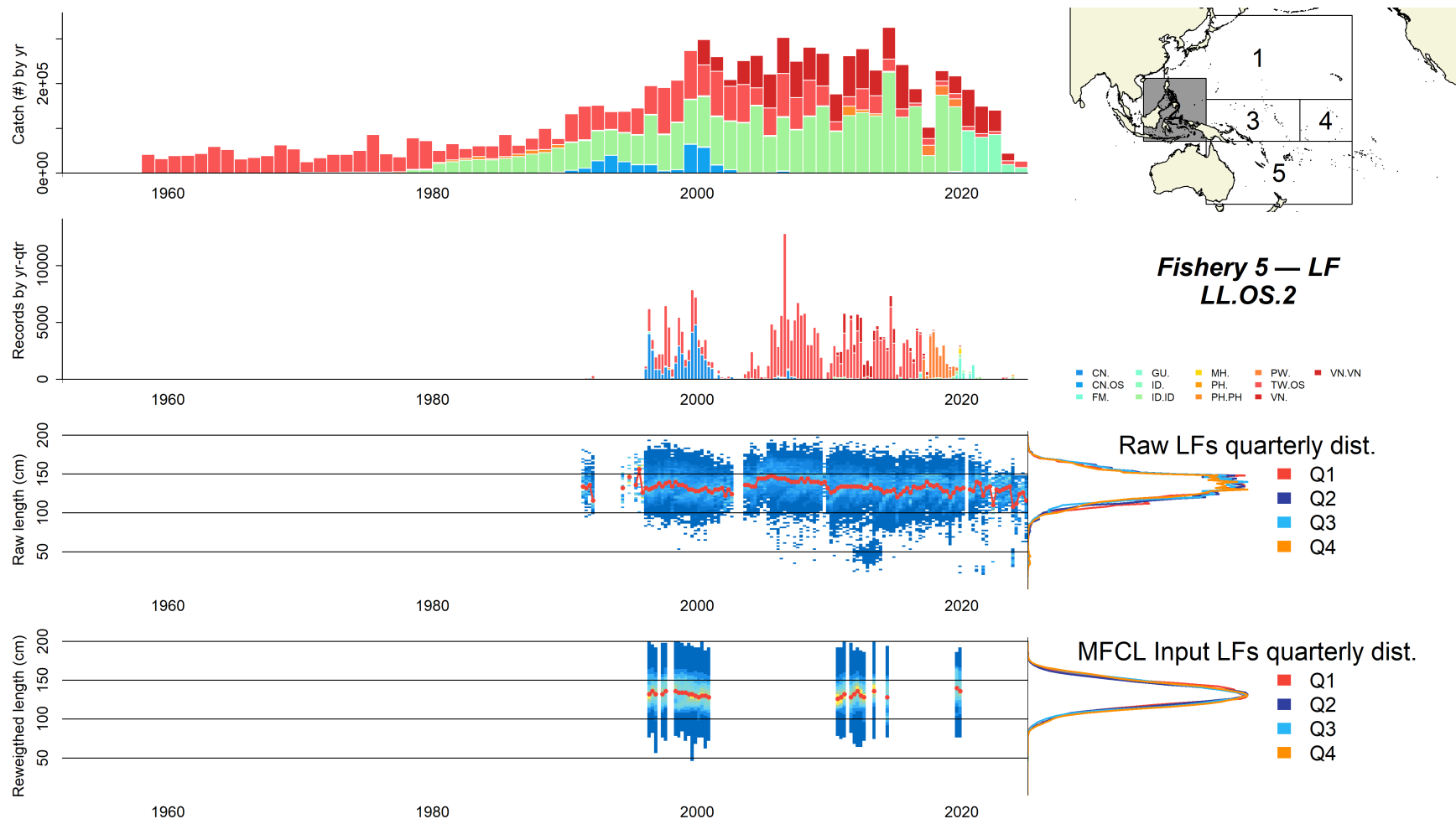


Figure 67: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 5 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

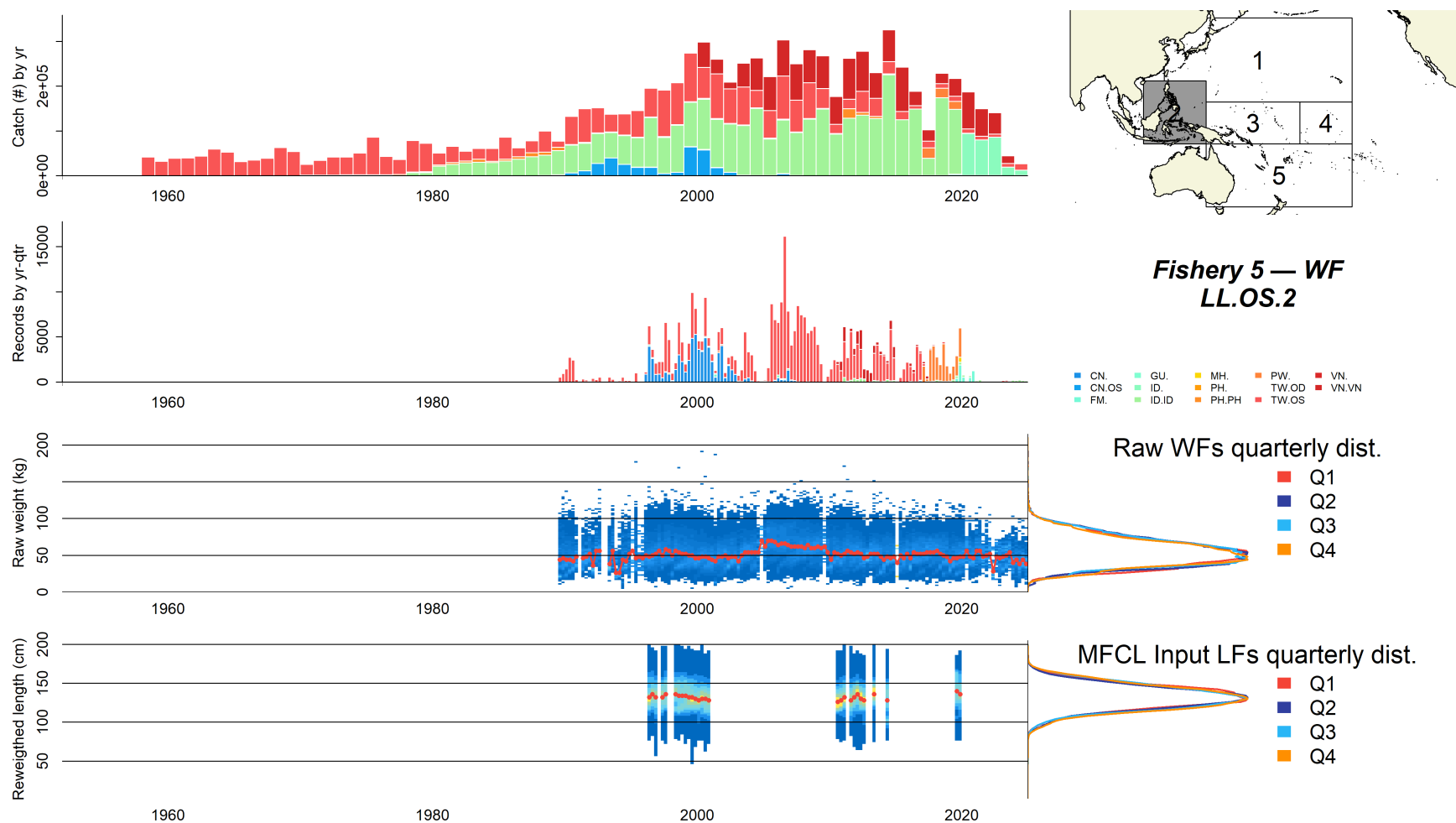


Figure 68: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 5 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

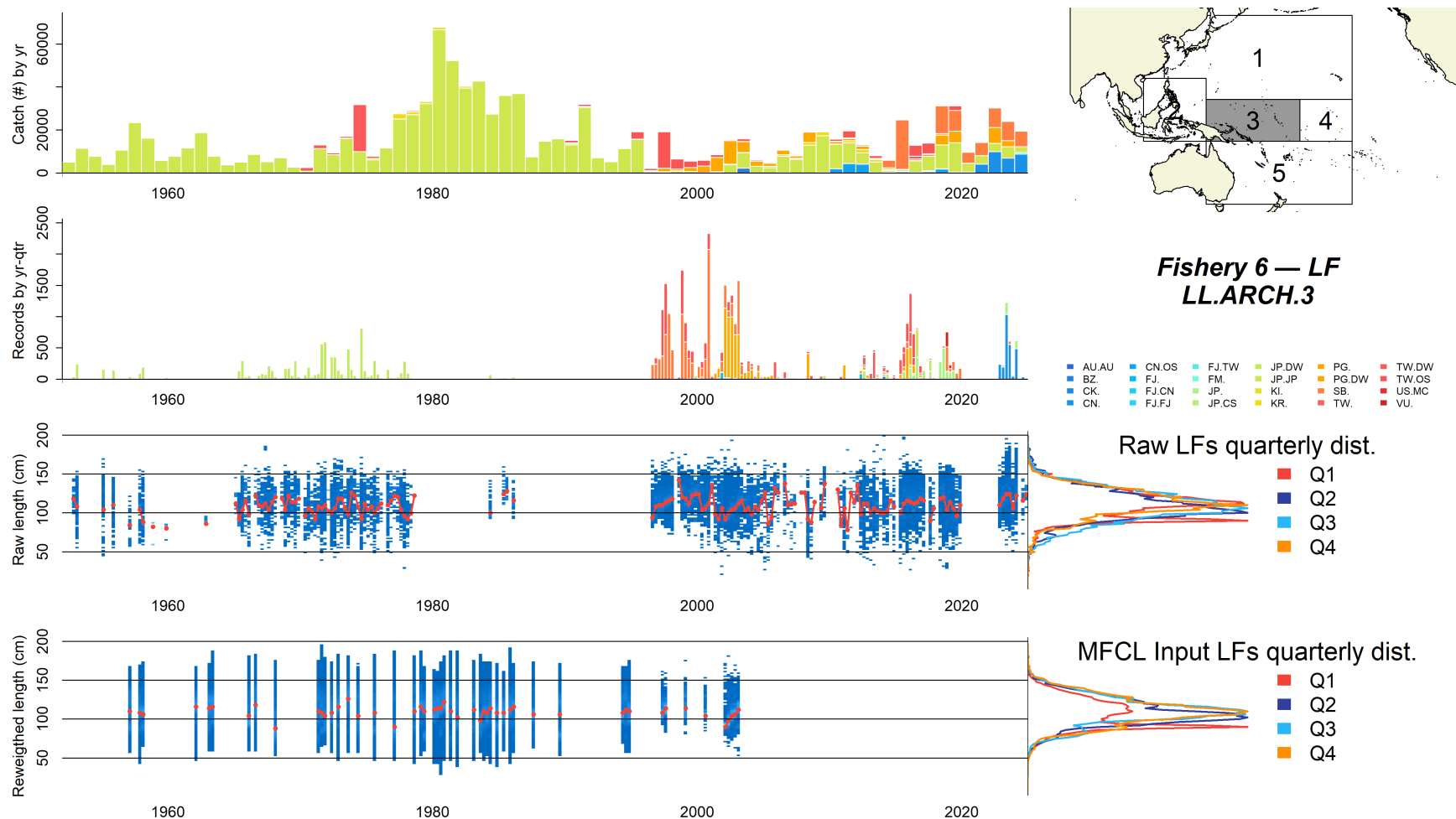


Figure 69: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 6 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

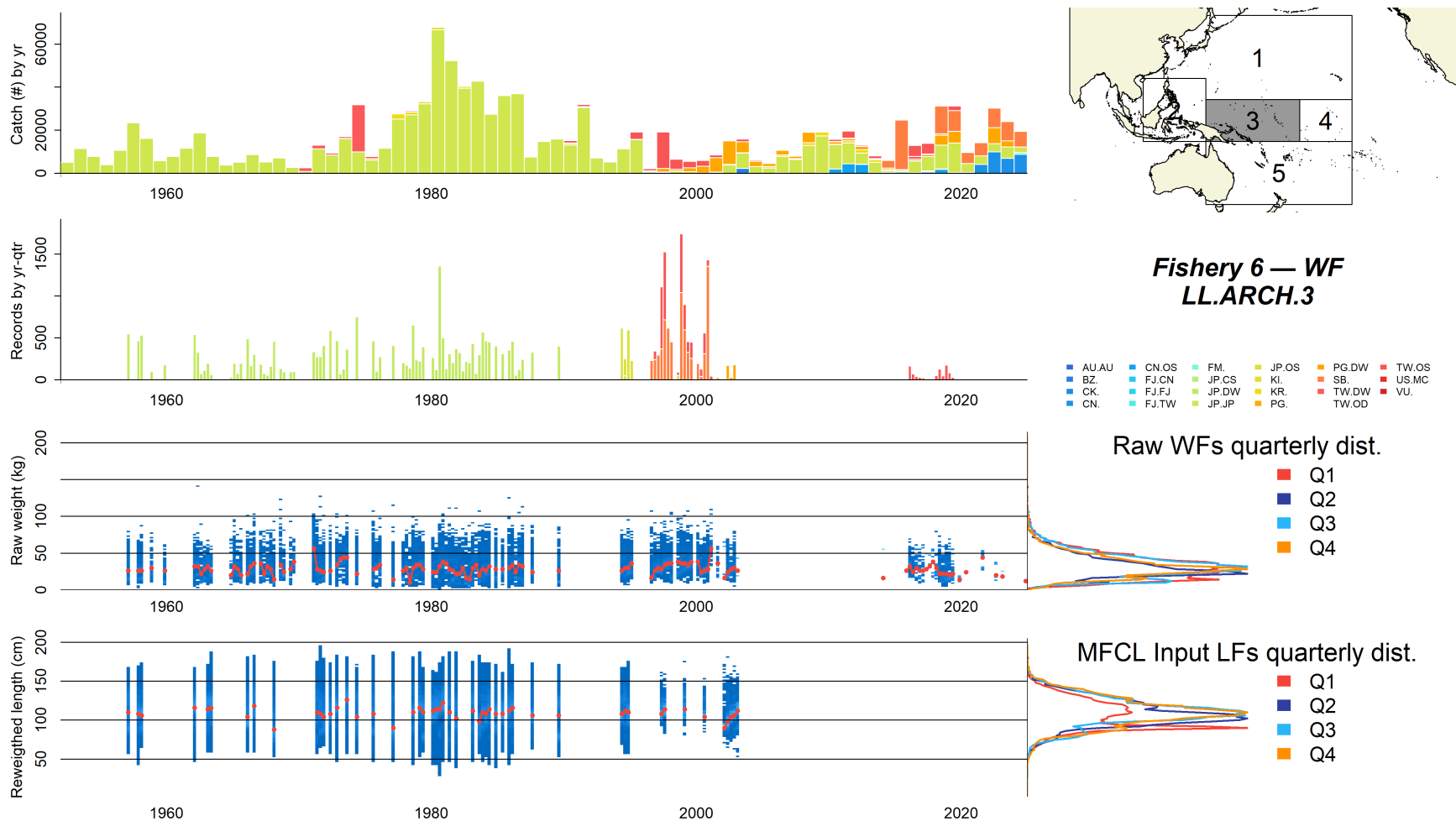


Figure 70: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 6 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

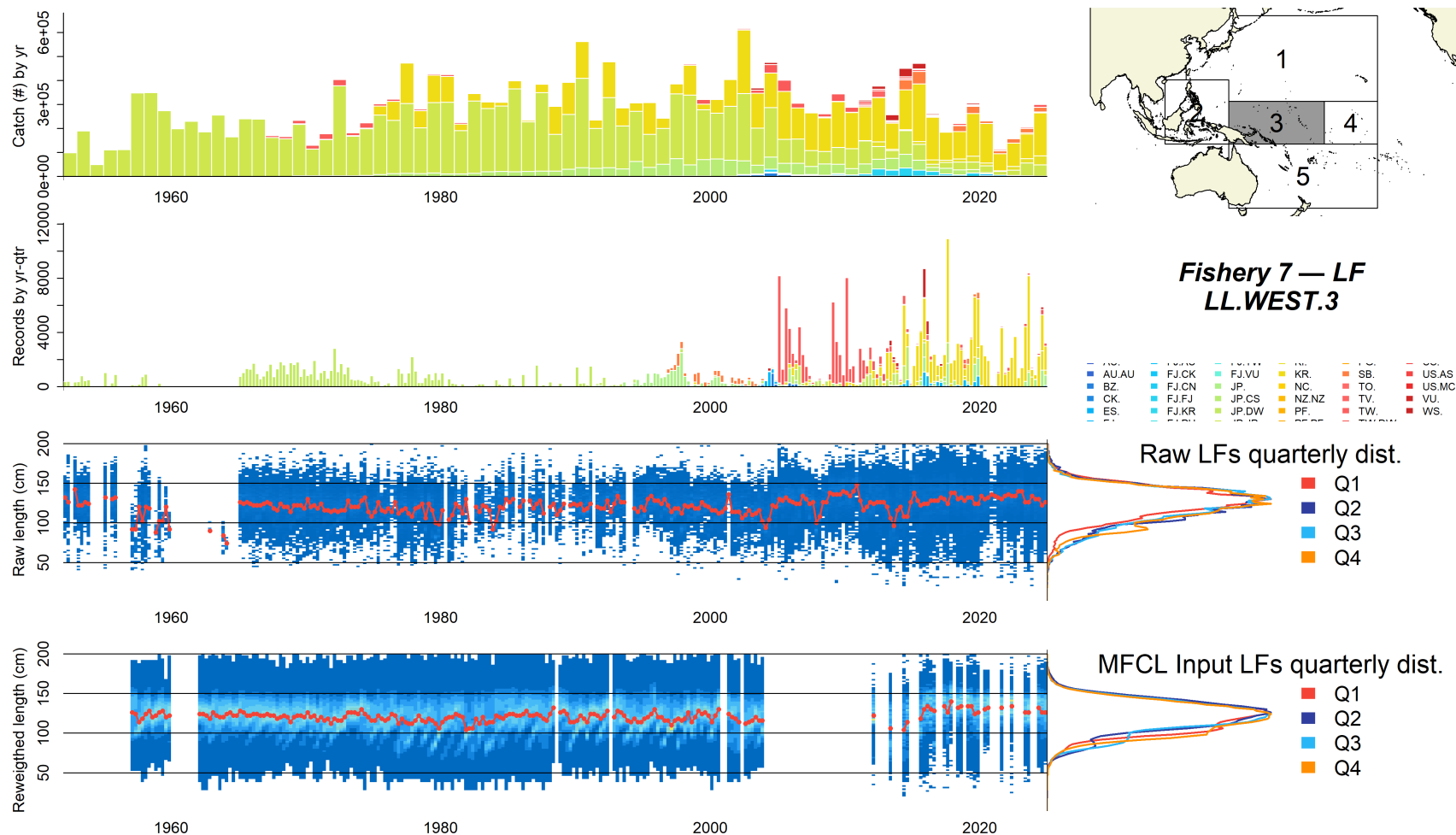


Figure 71: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 7 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

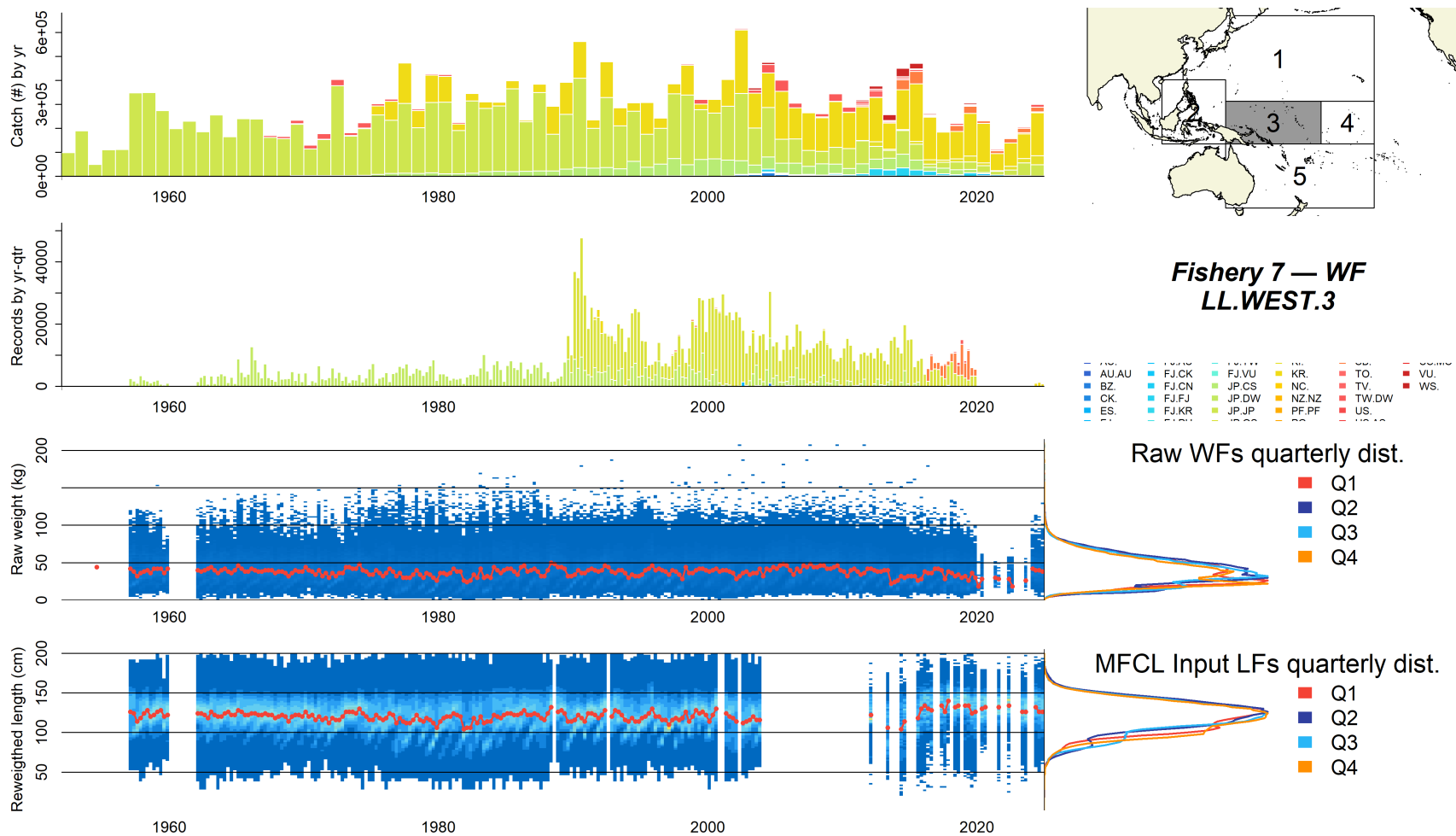


Figure 72: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 7 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

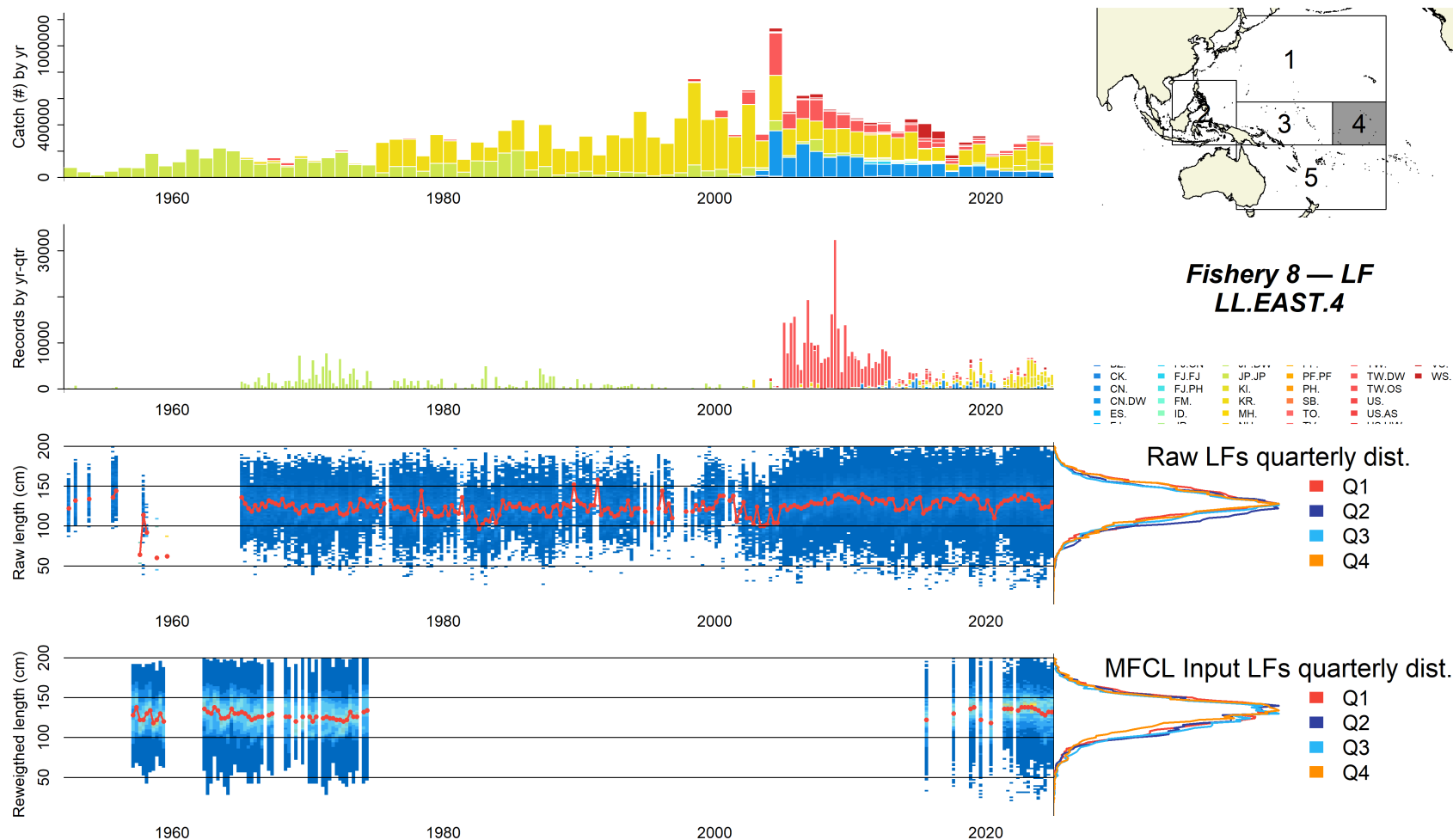


Figure 73: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 8 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

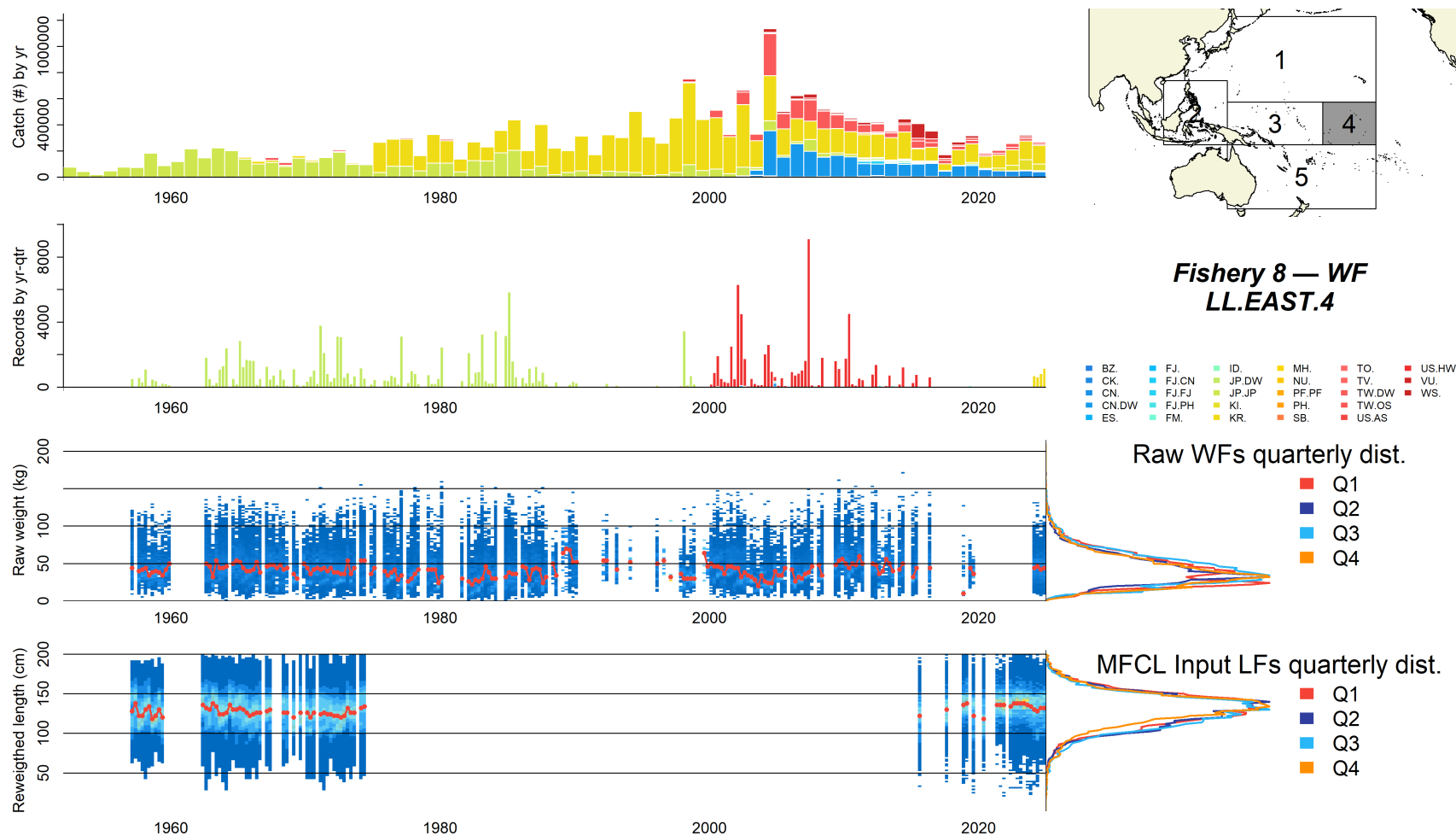


Figure 74: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 8 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

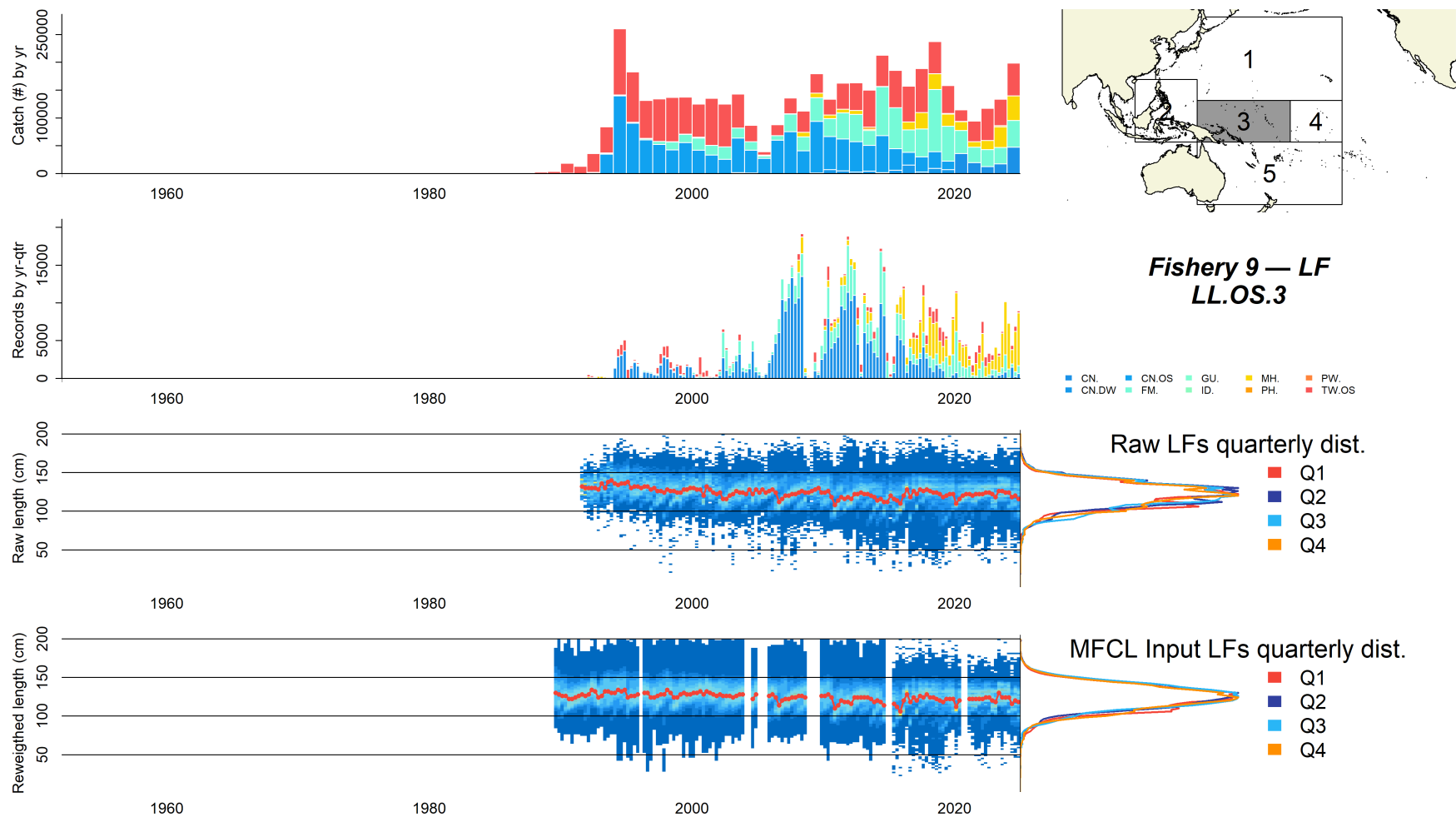


Figure 75: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 9 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

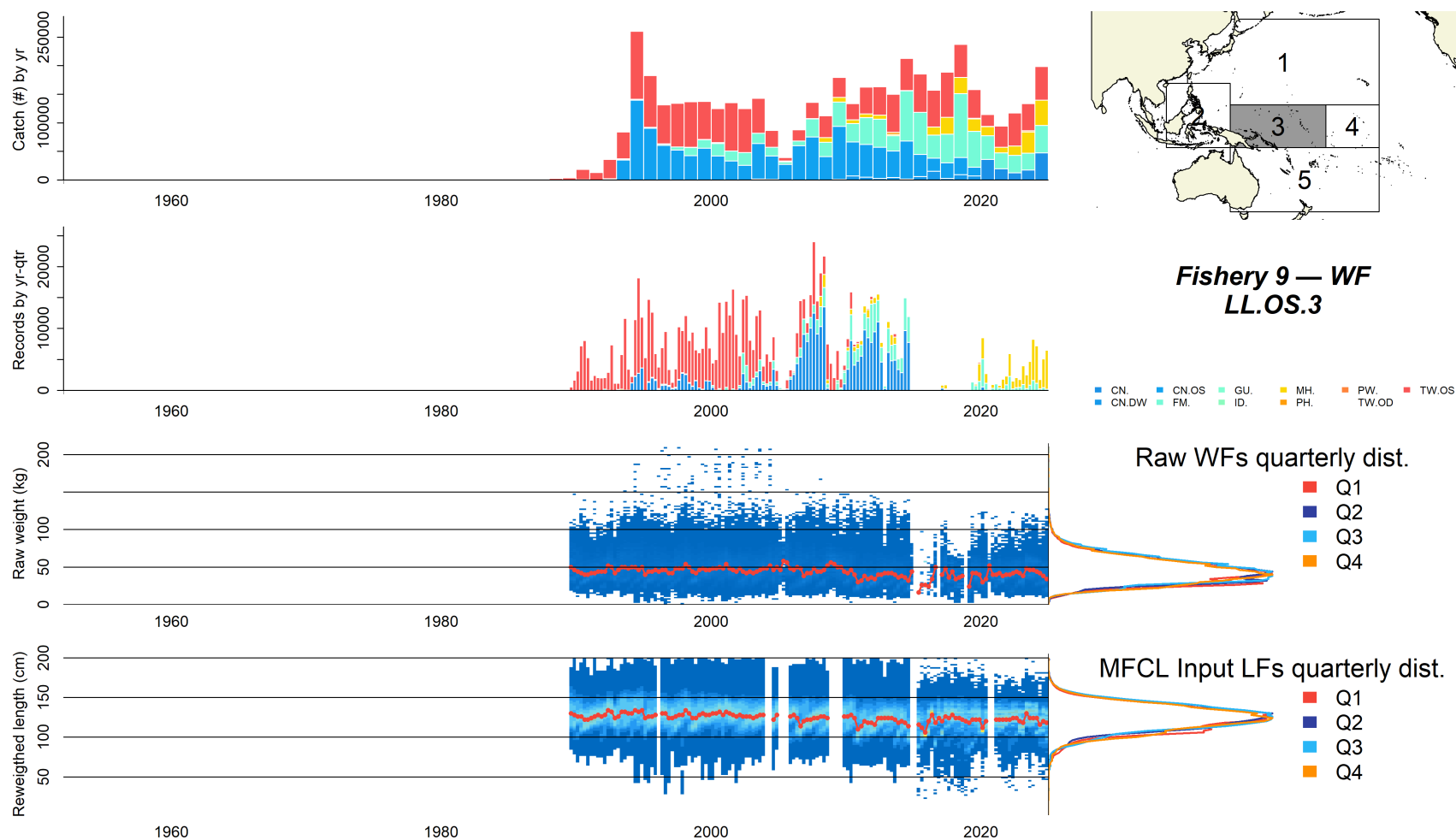


Figure 76: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 9 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

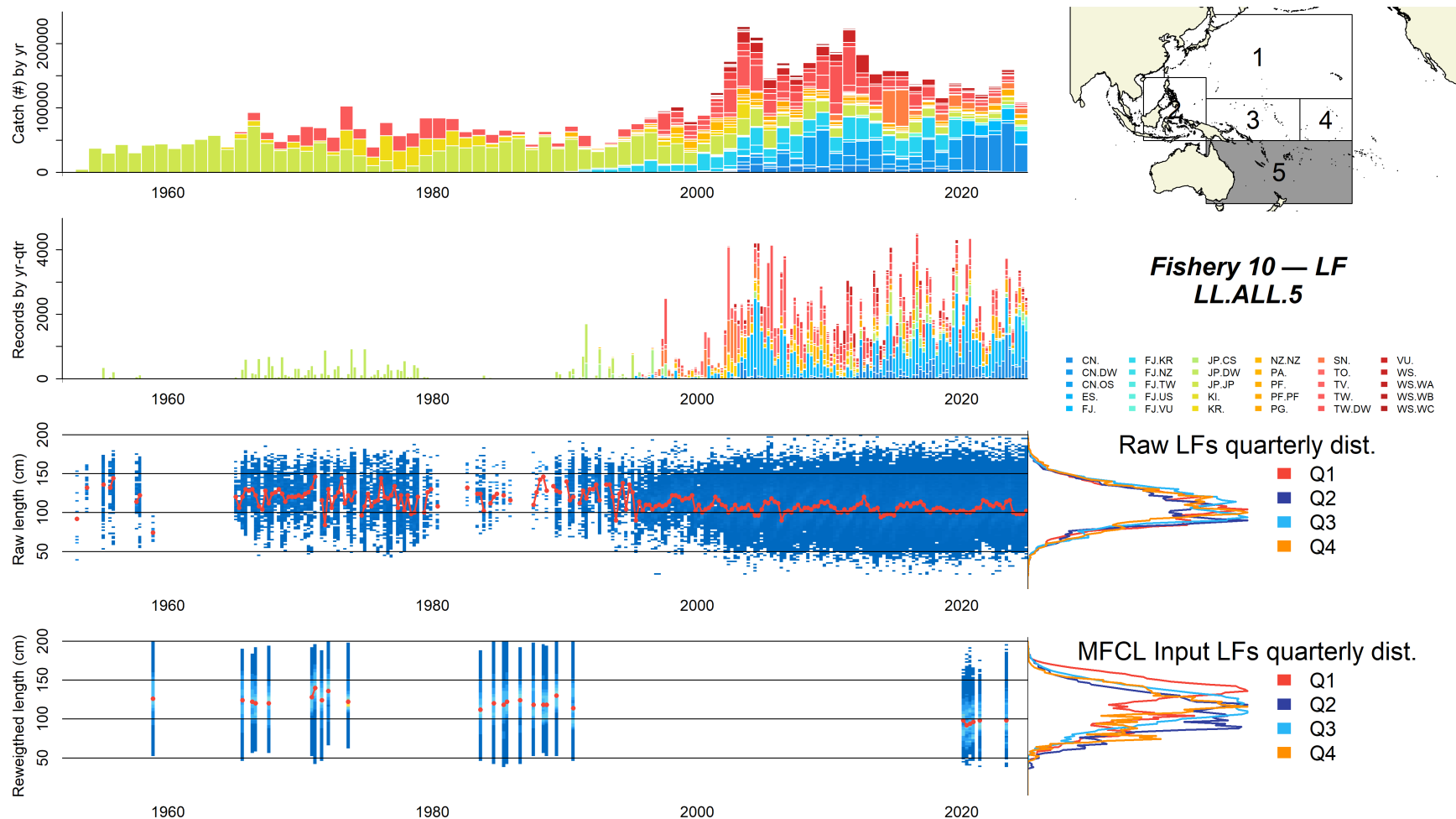


Figure 77: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 10 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

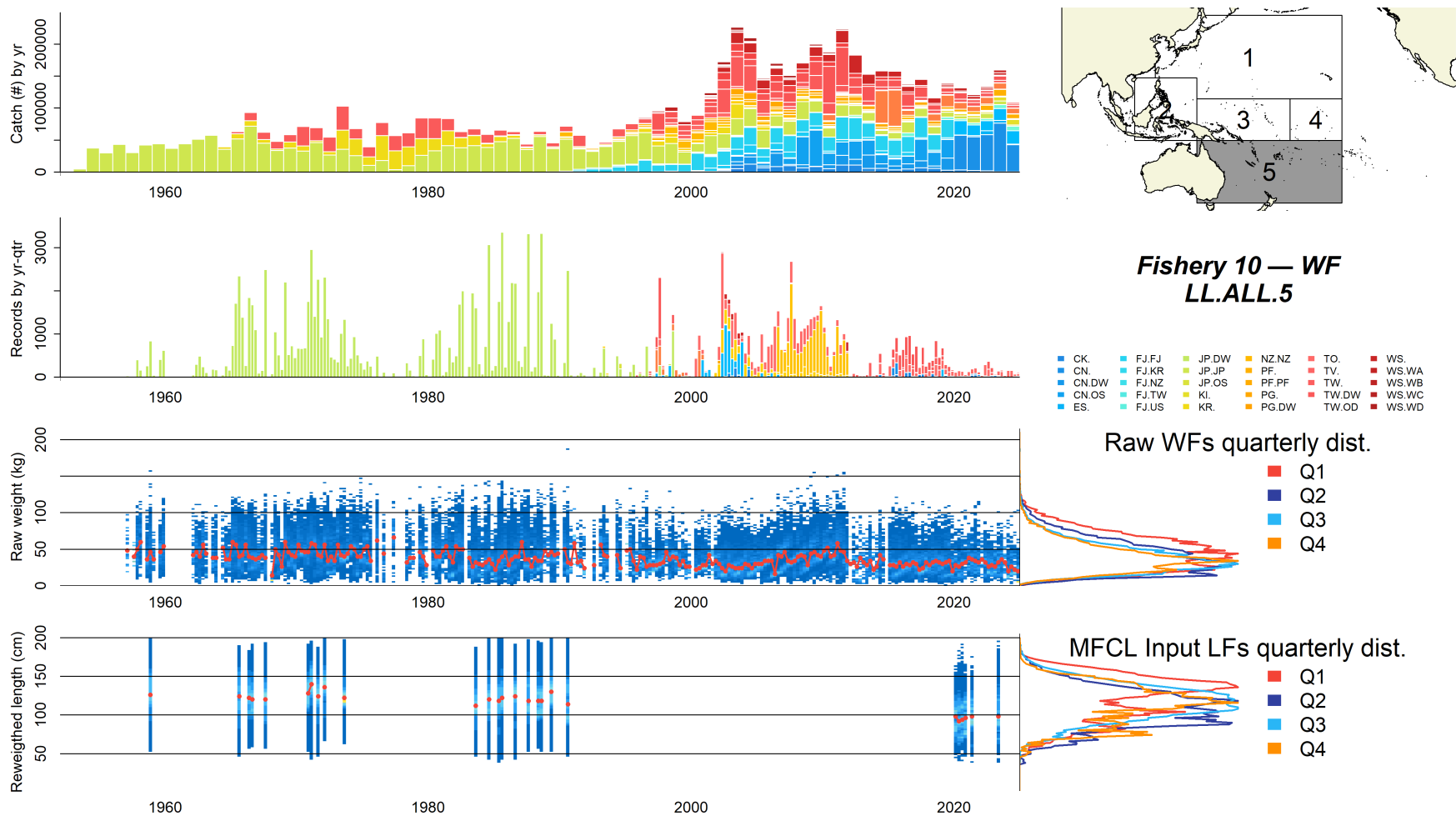


Figure 78: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 10 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

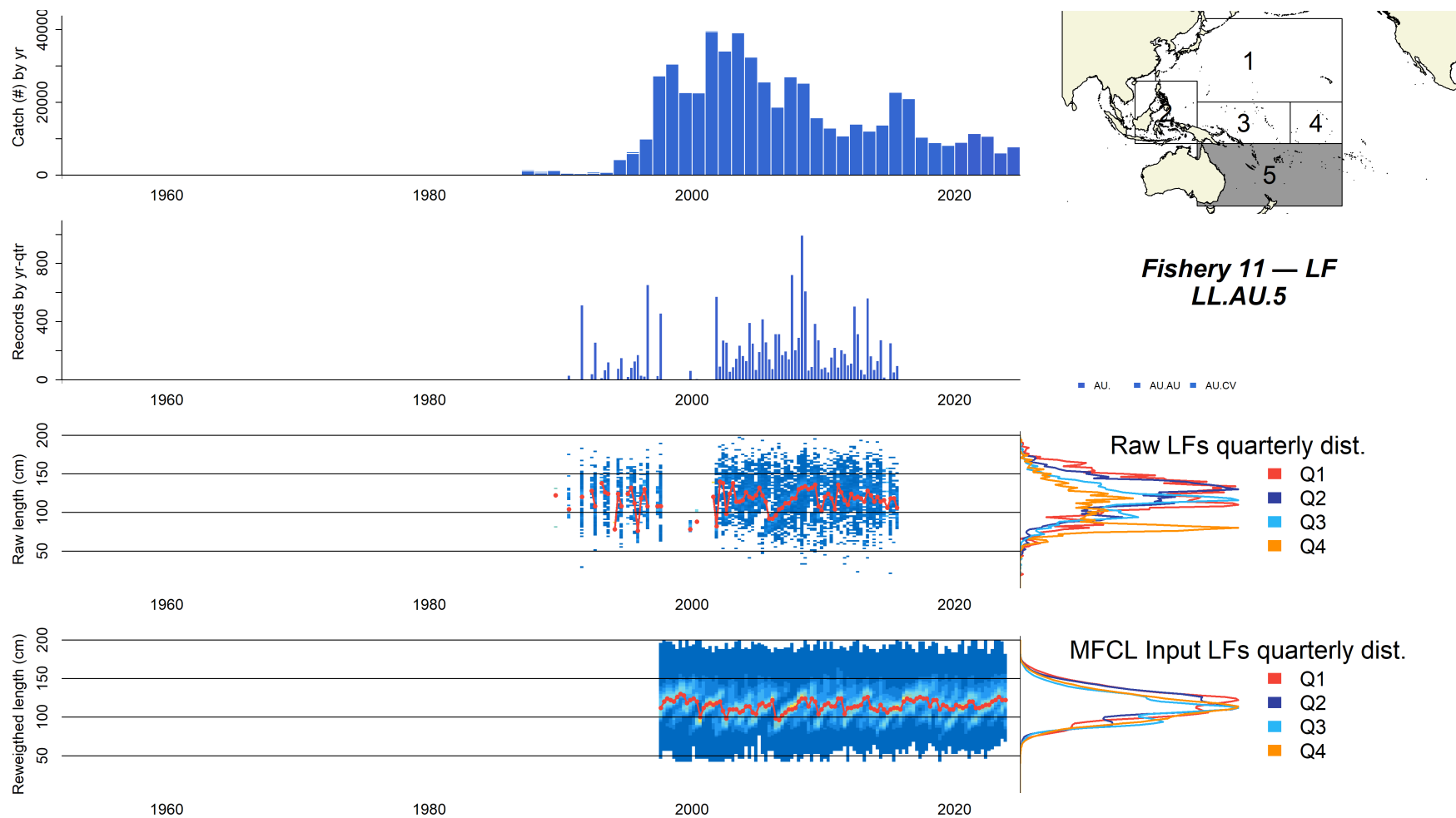


Figure 79: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 11 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

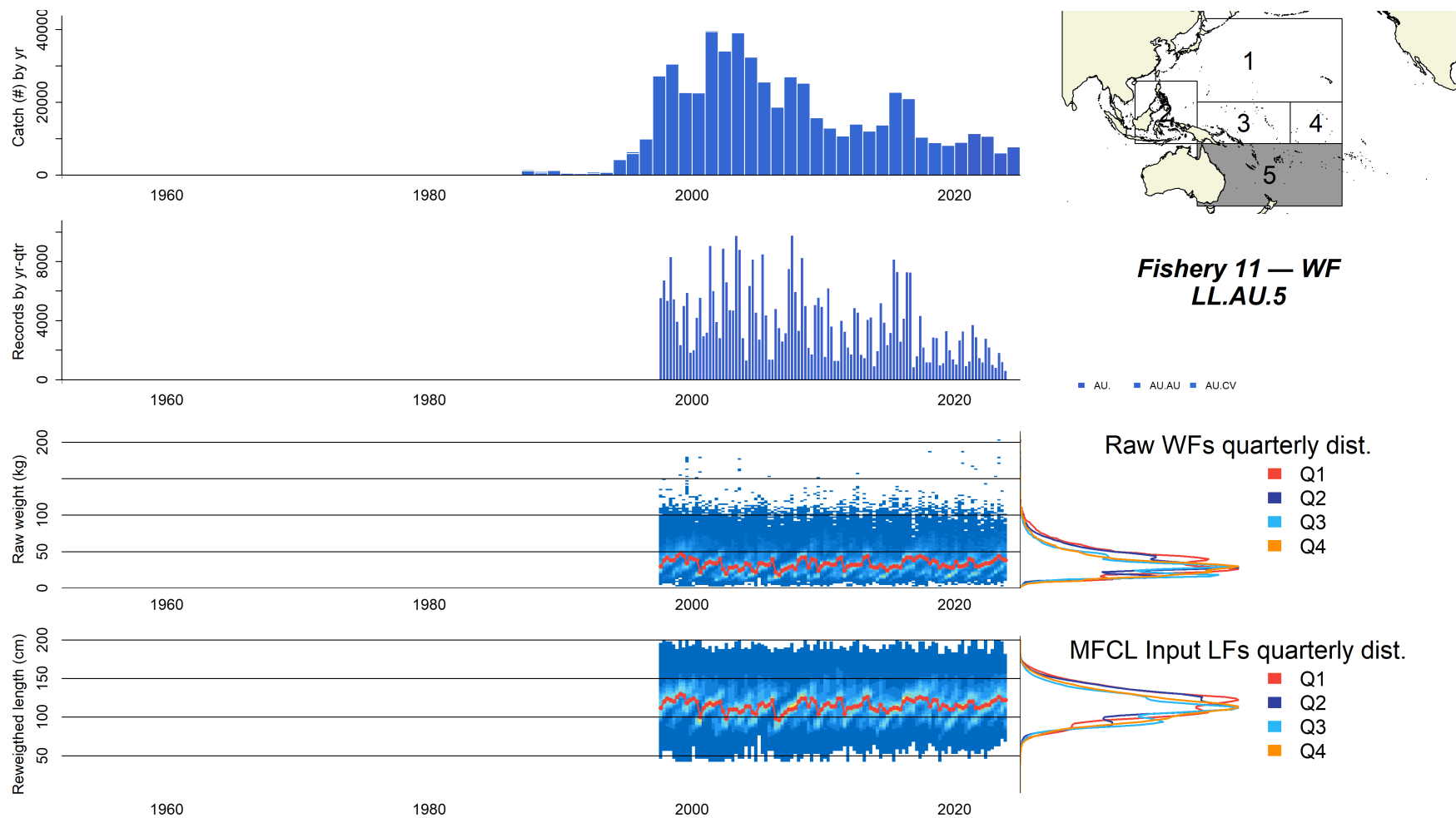


Figure 80: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 11 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

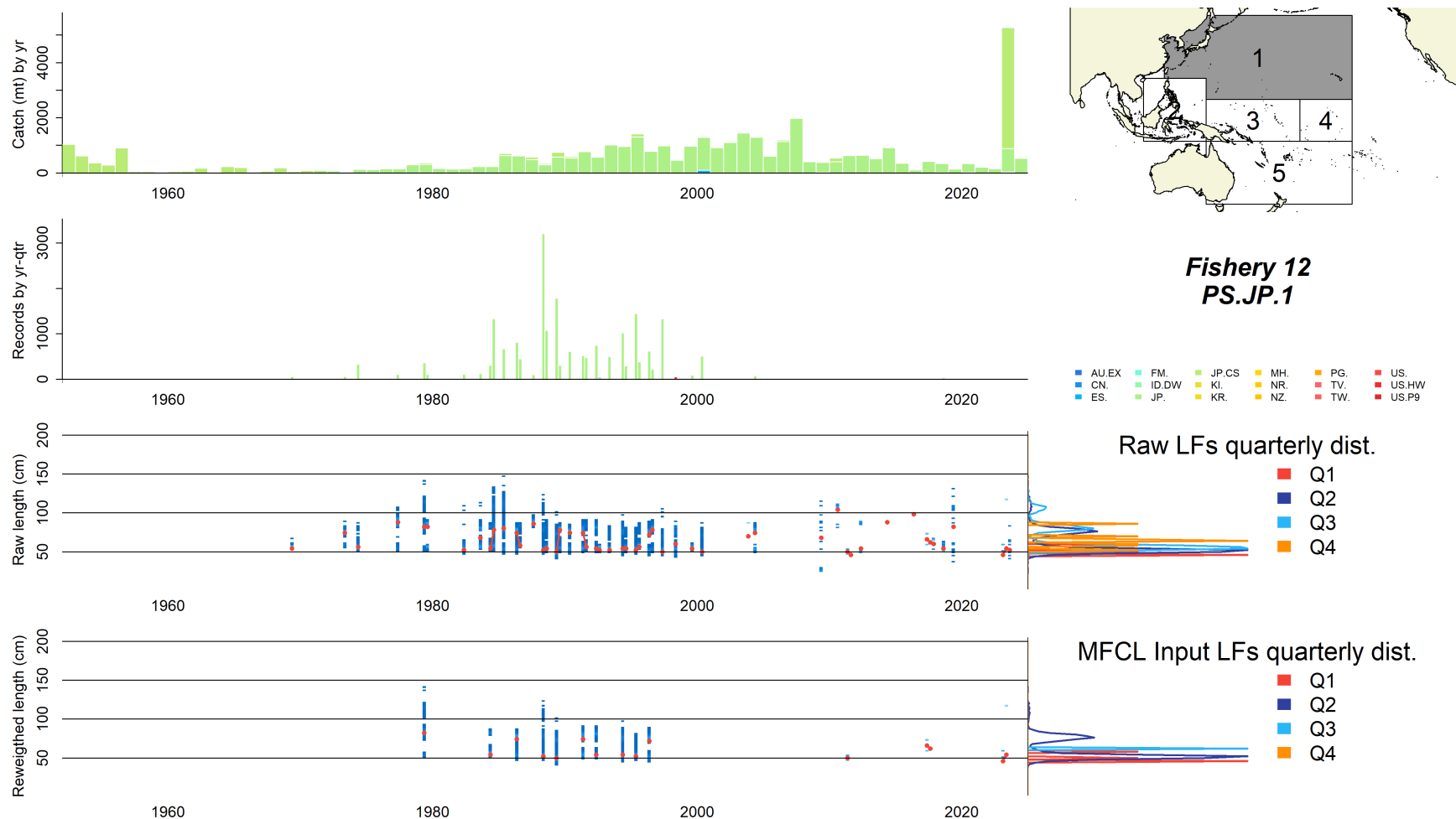


Figure 81: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 12 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

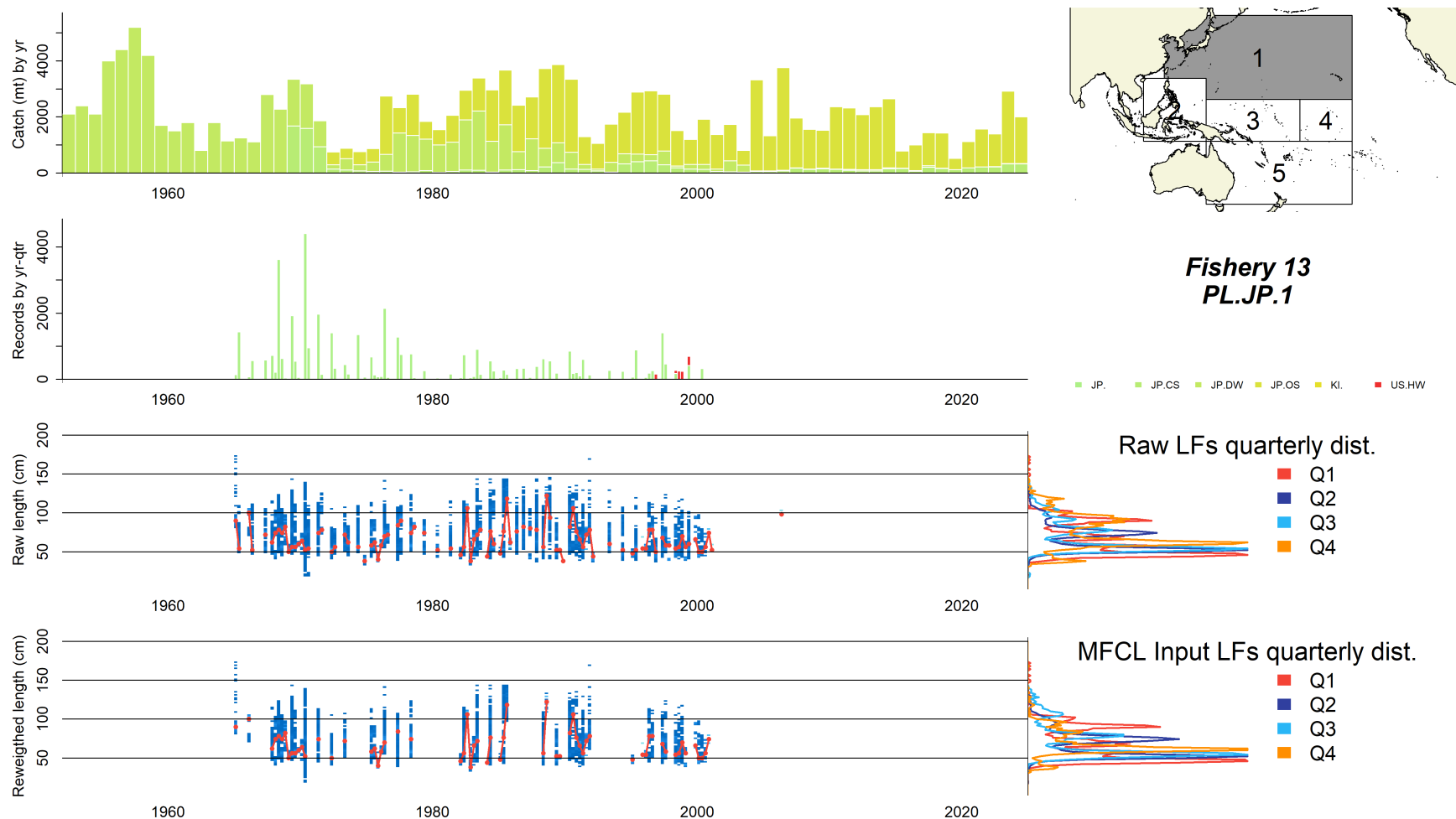


Figure 82: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 13 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

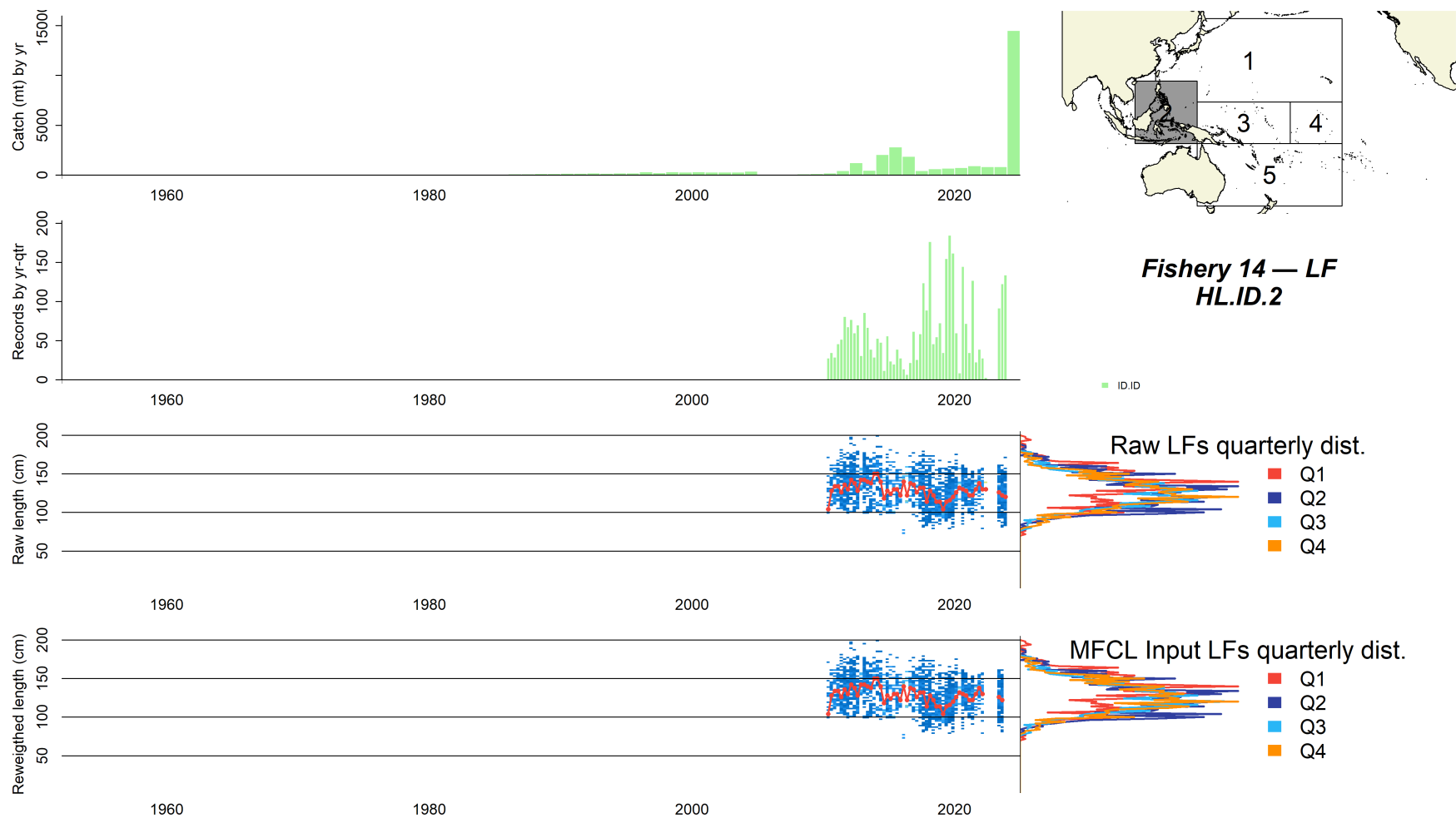


Figure 83: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 14 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

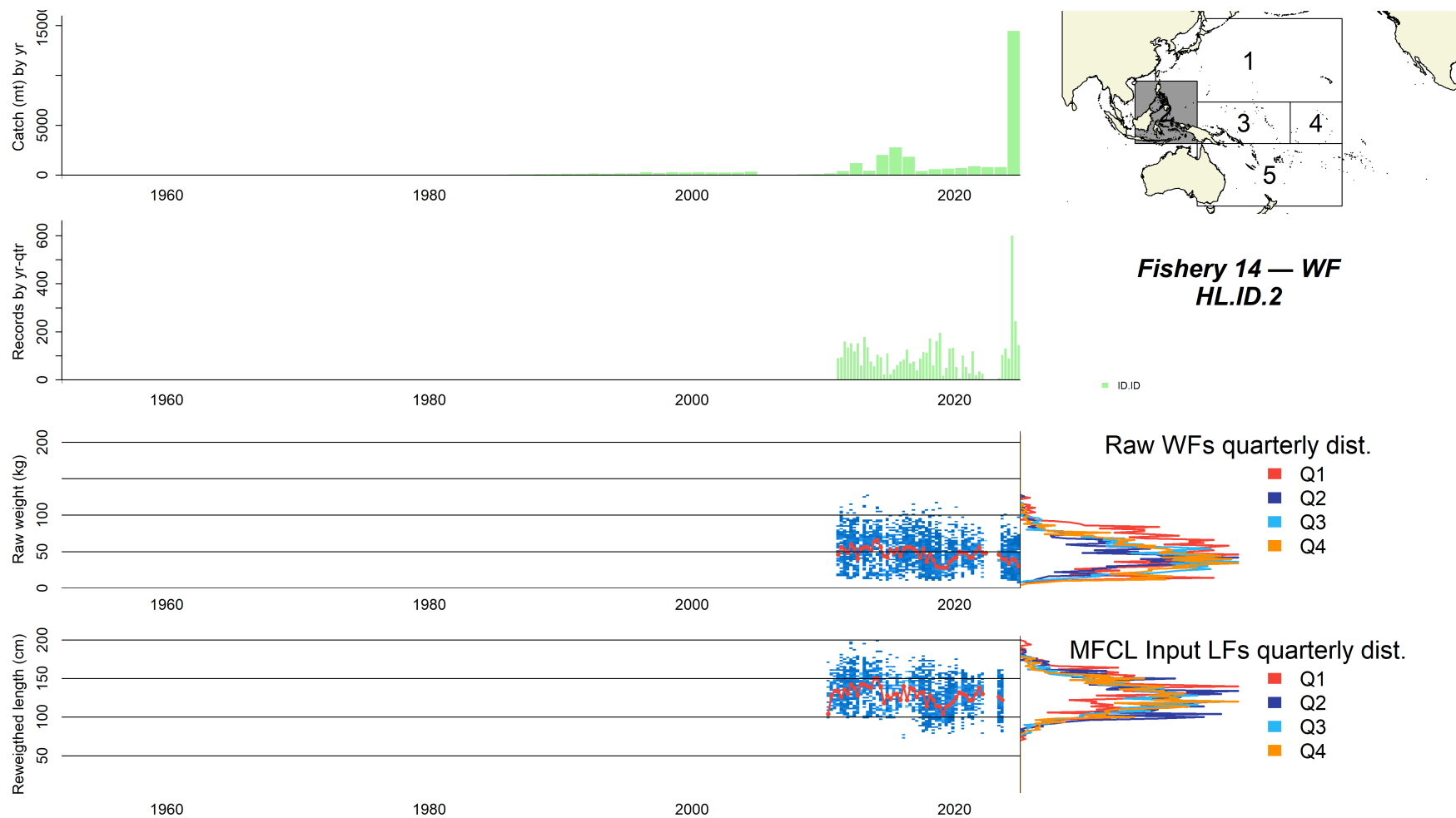


Figure 84: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 14 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

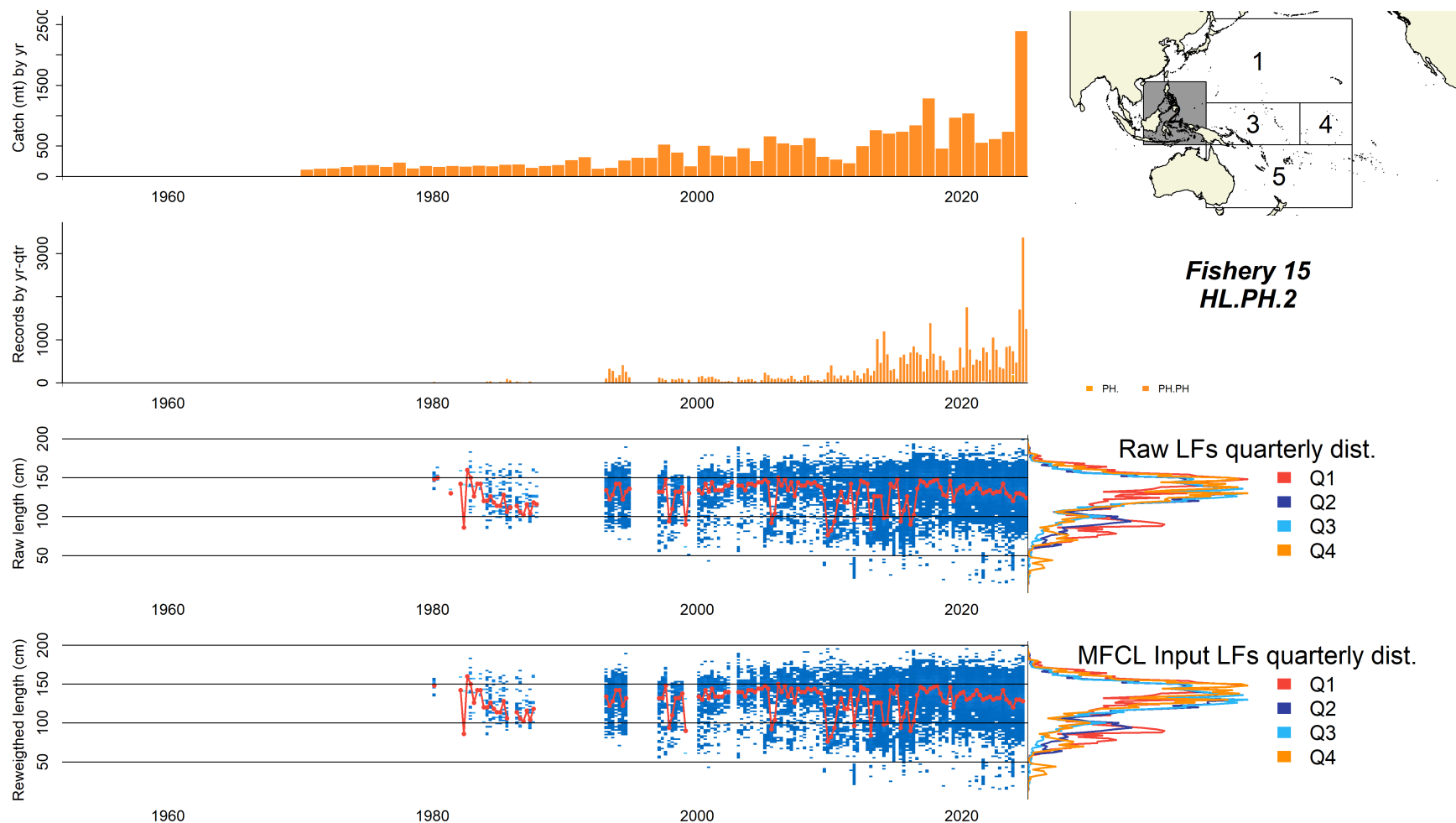


Figure 85: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 15 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

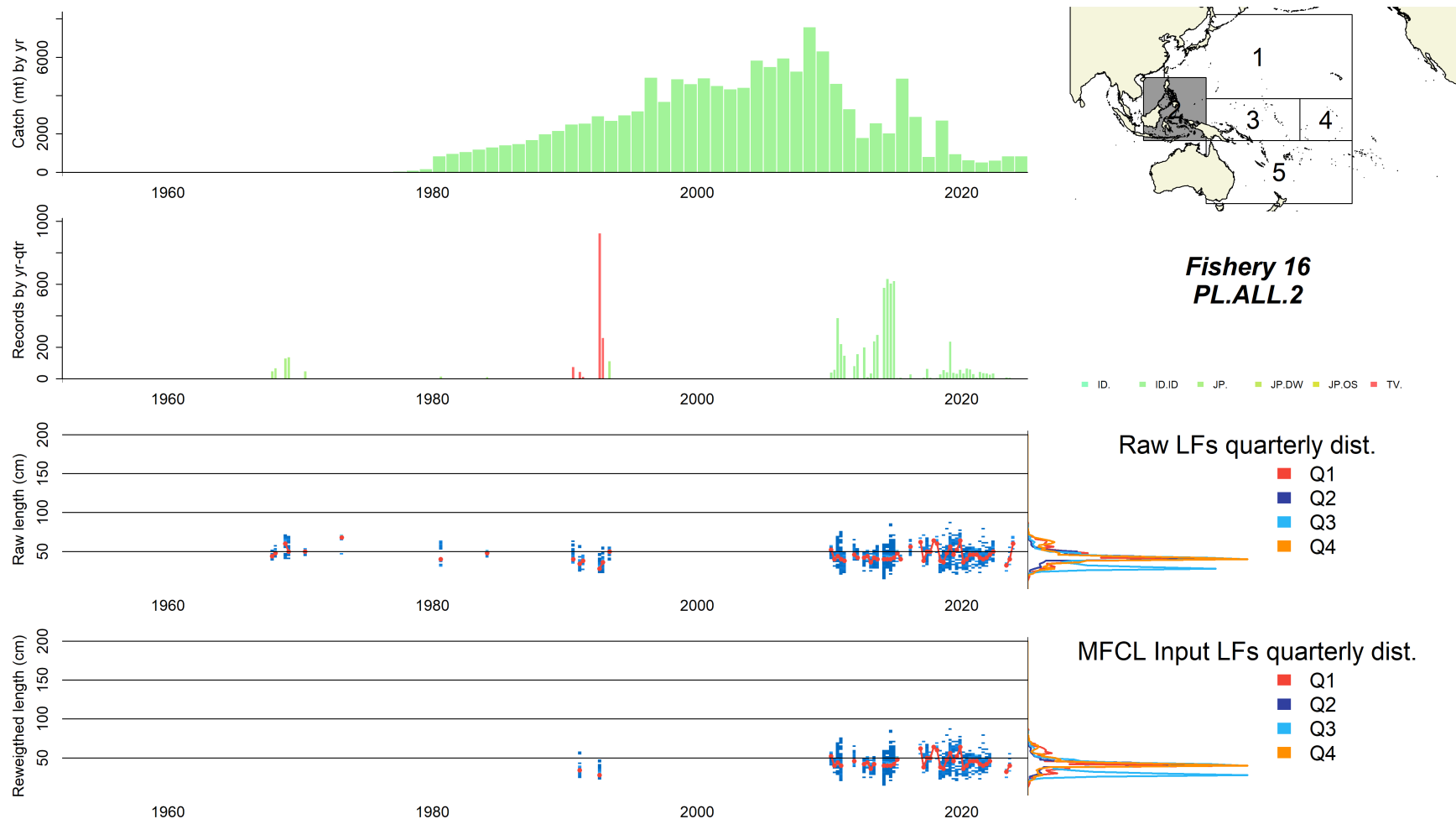


Figure 86: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 16 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

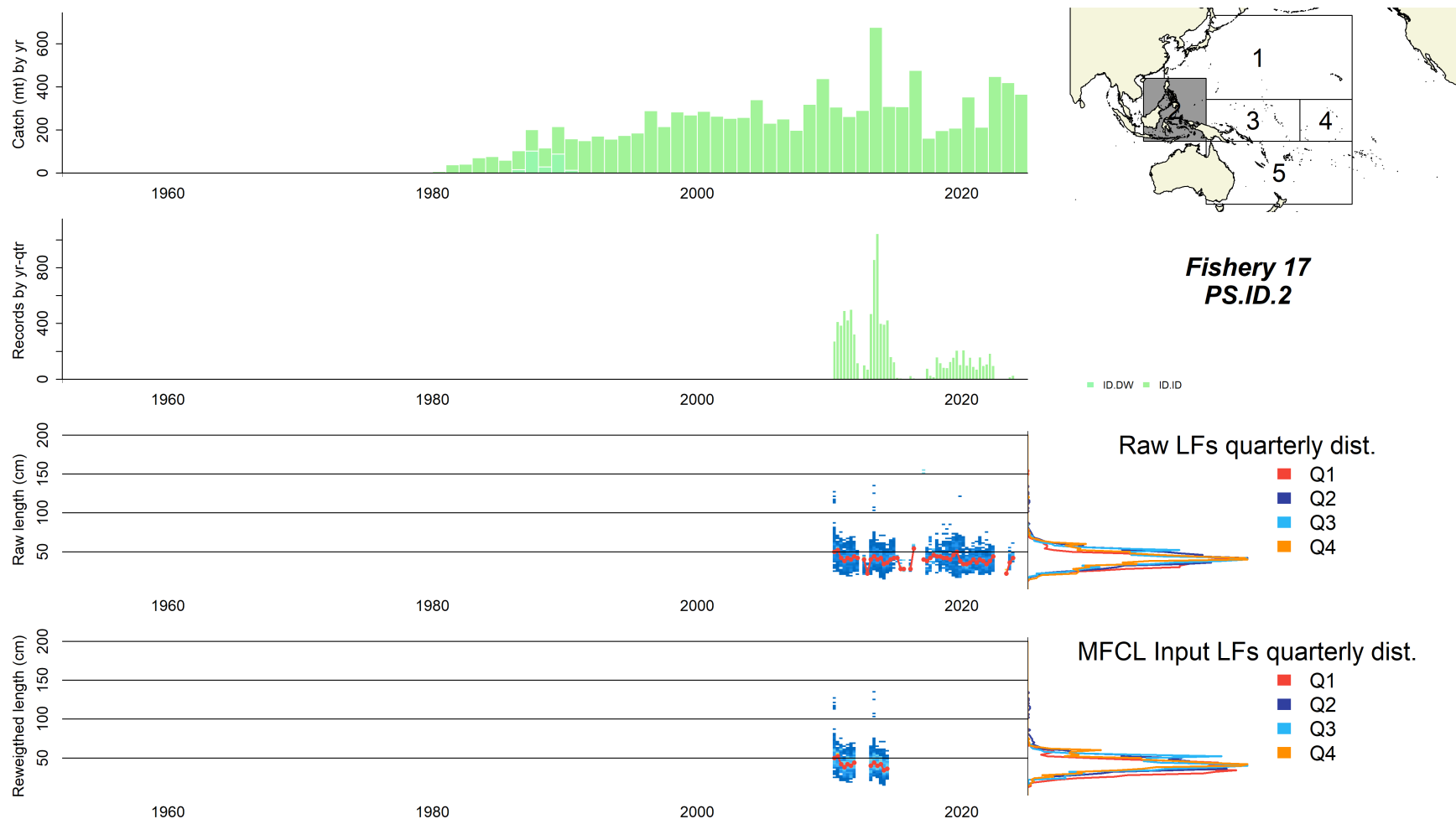


Figure 87: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 17 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

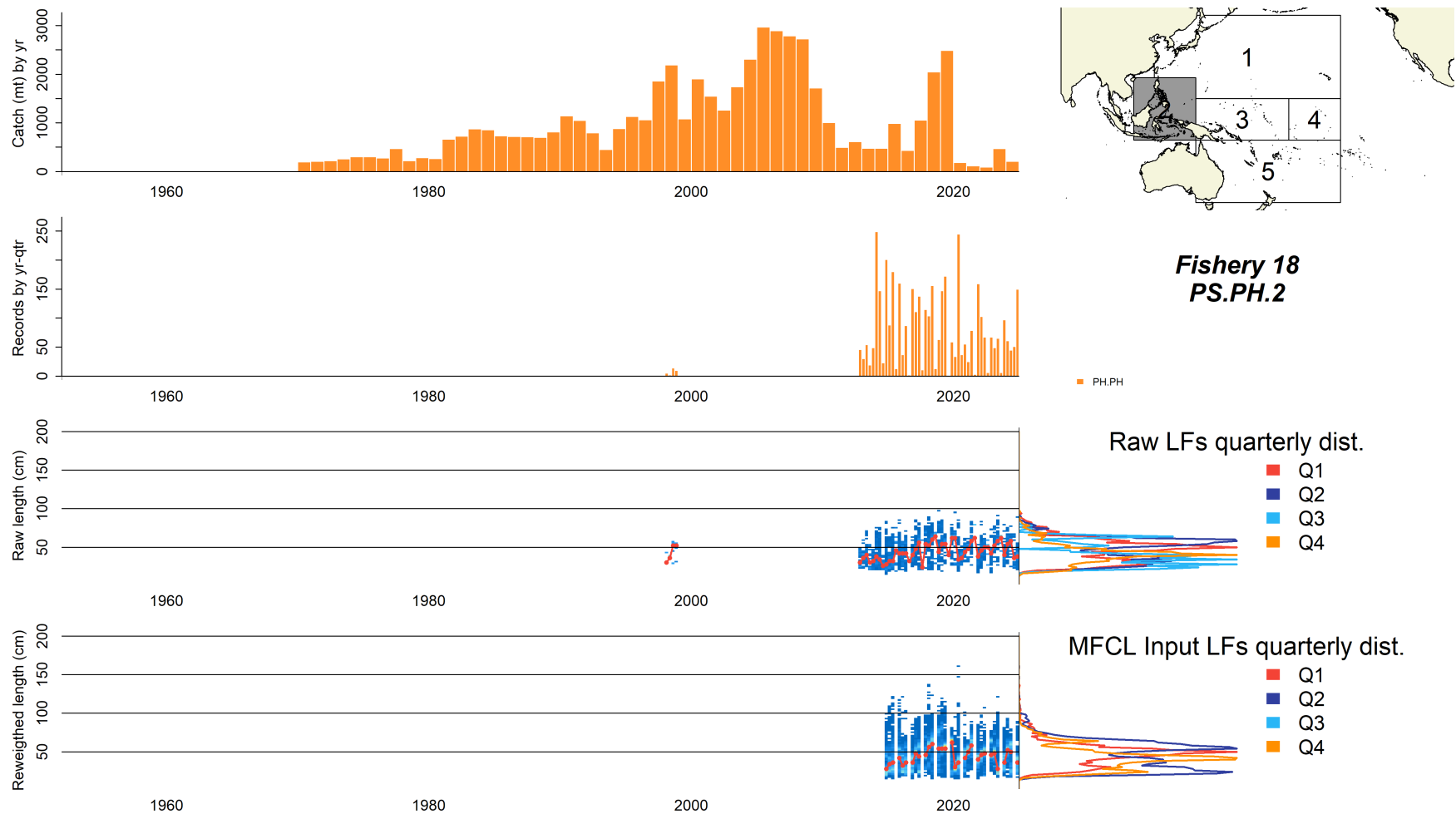


Figure 88: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 18 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

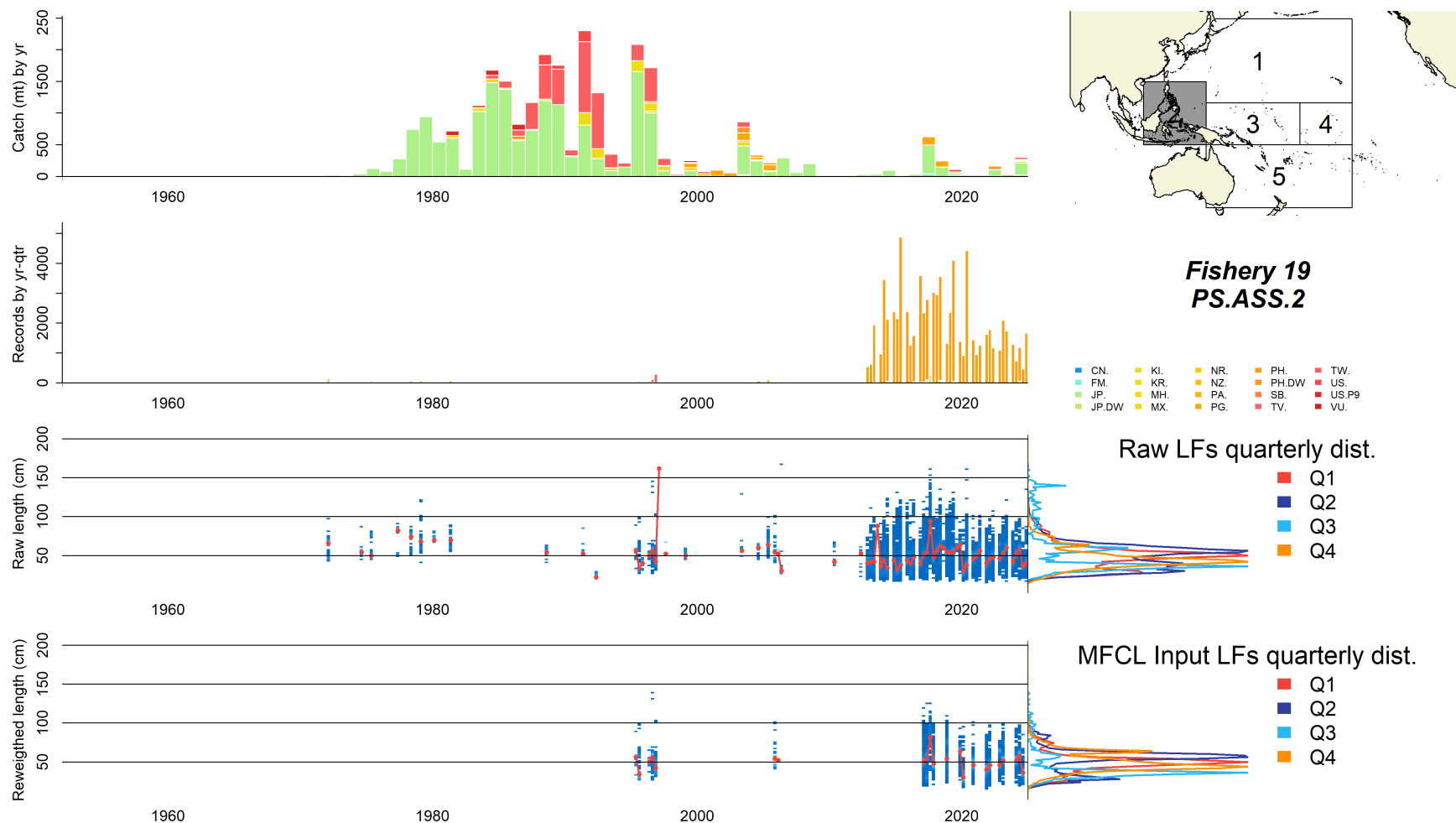


Figure 89: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 19 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

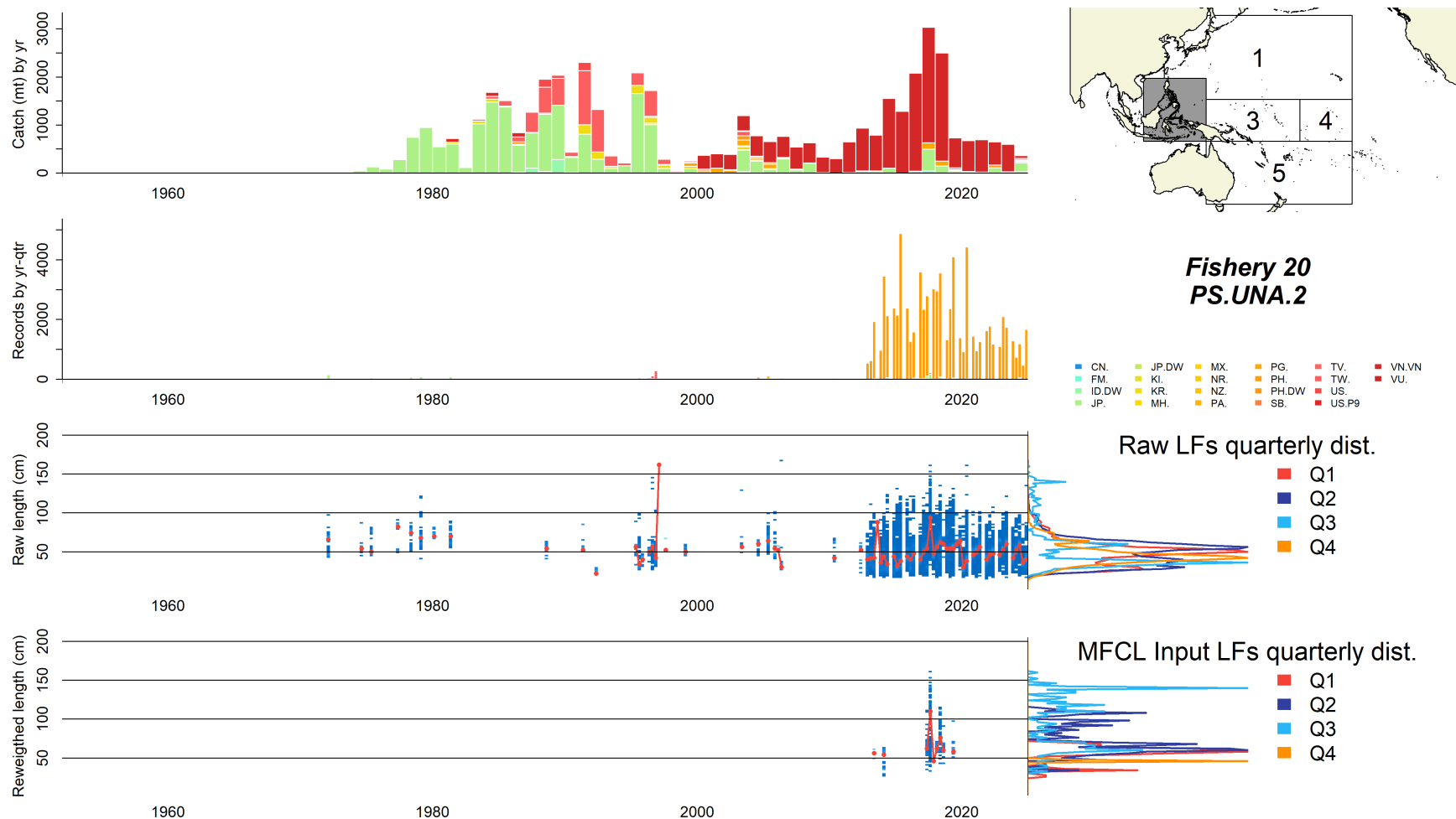


Figure 90: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 20 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

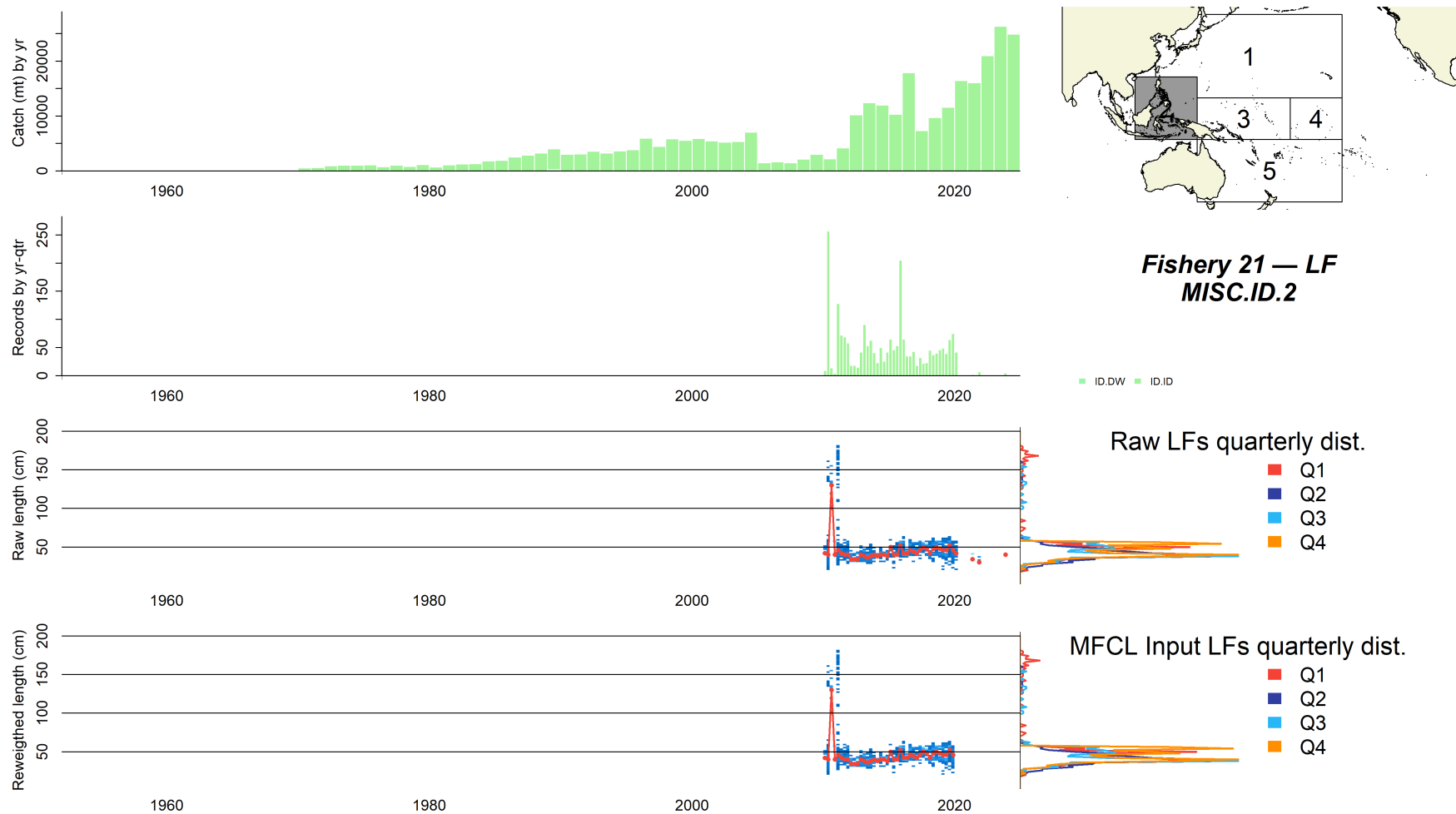


Figure 91: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 21 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

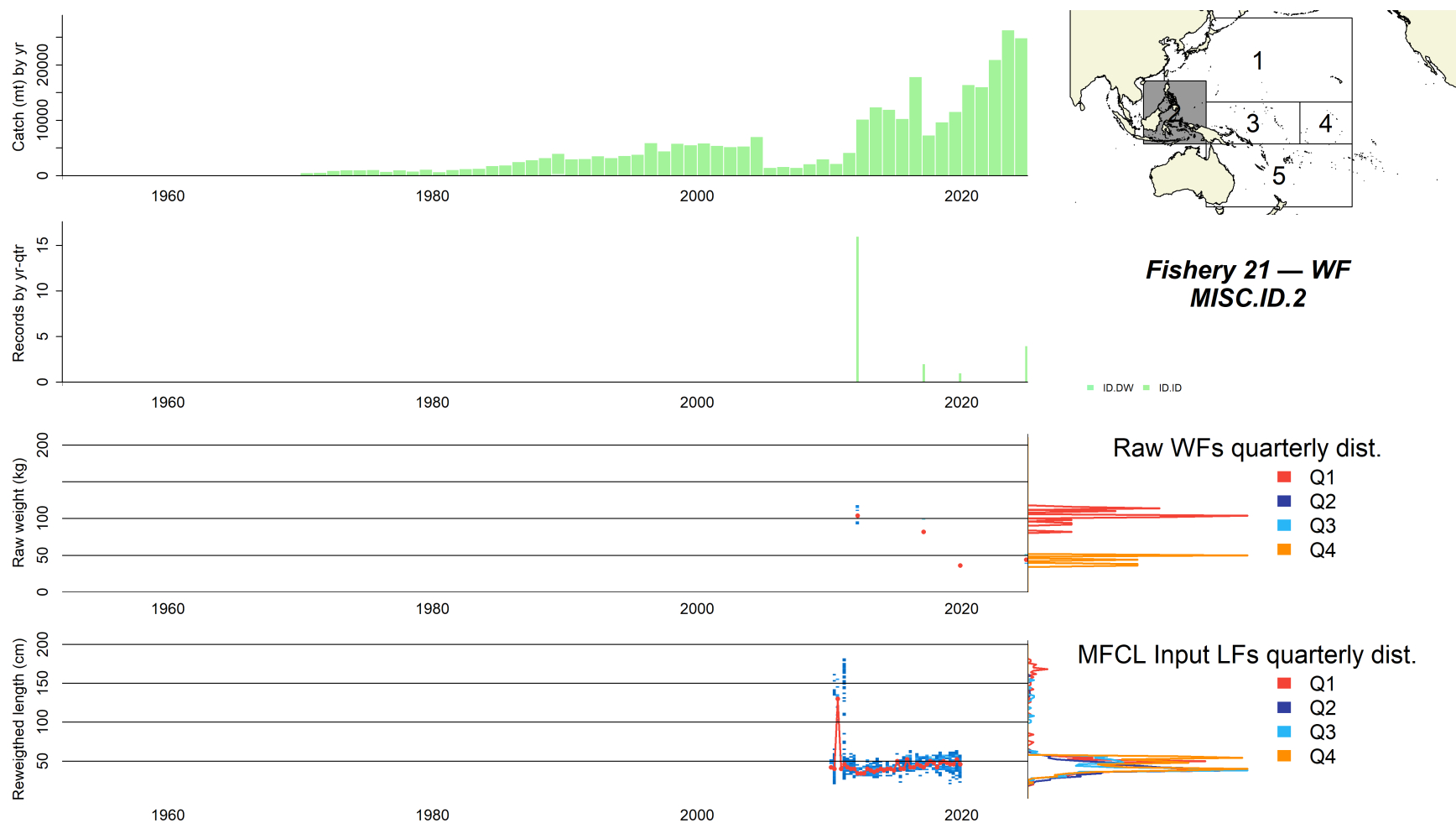


Figure 92: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 21 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

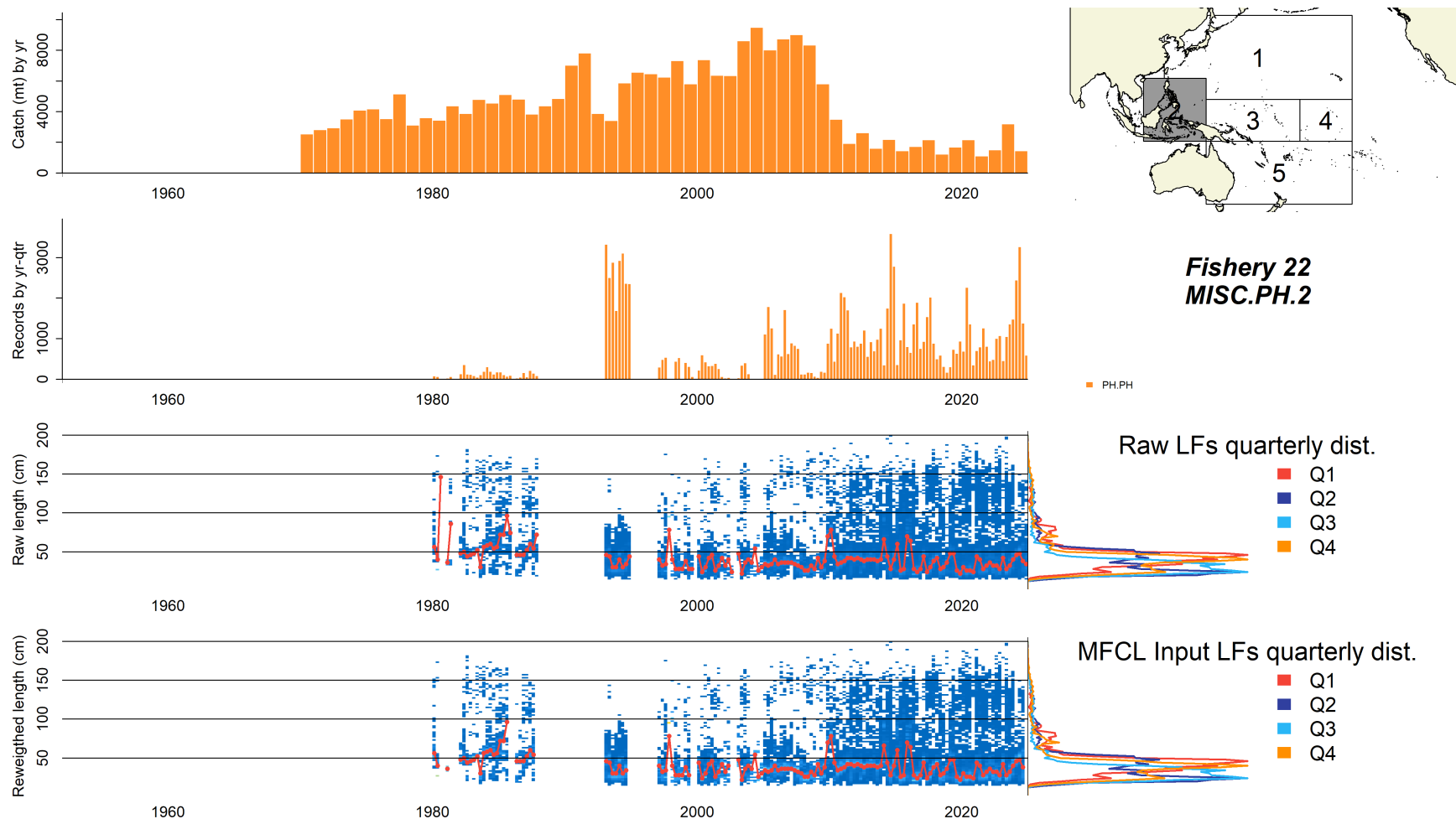


Figure 93: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 22 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

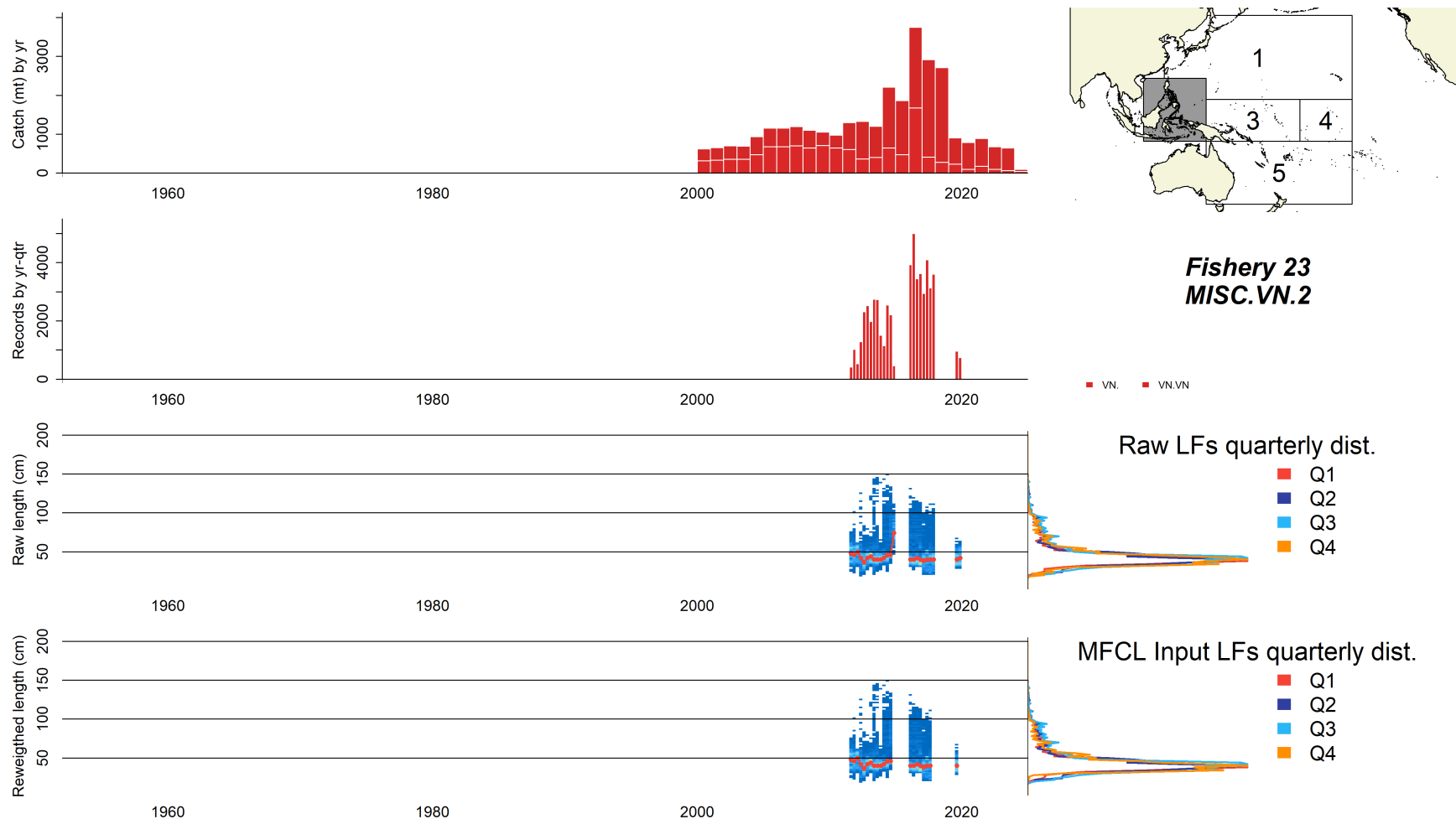


Figure 94: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 23 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

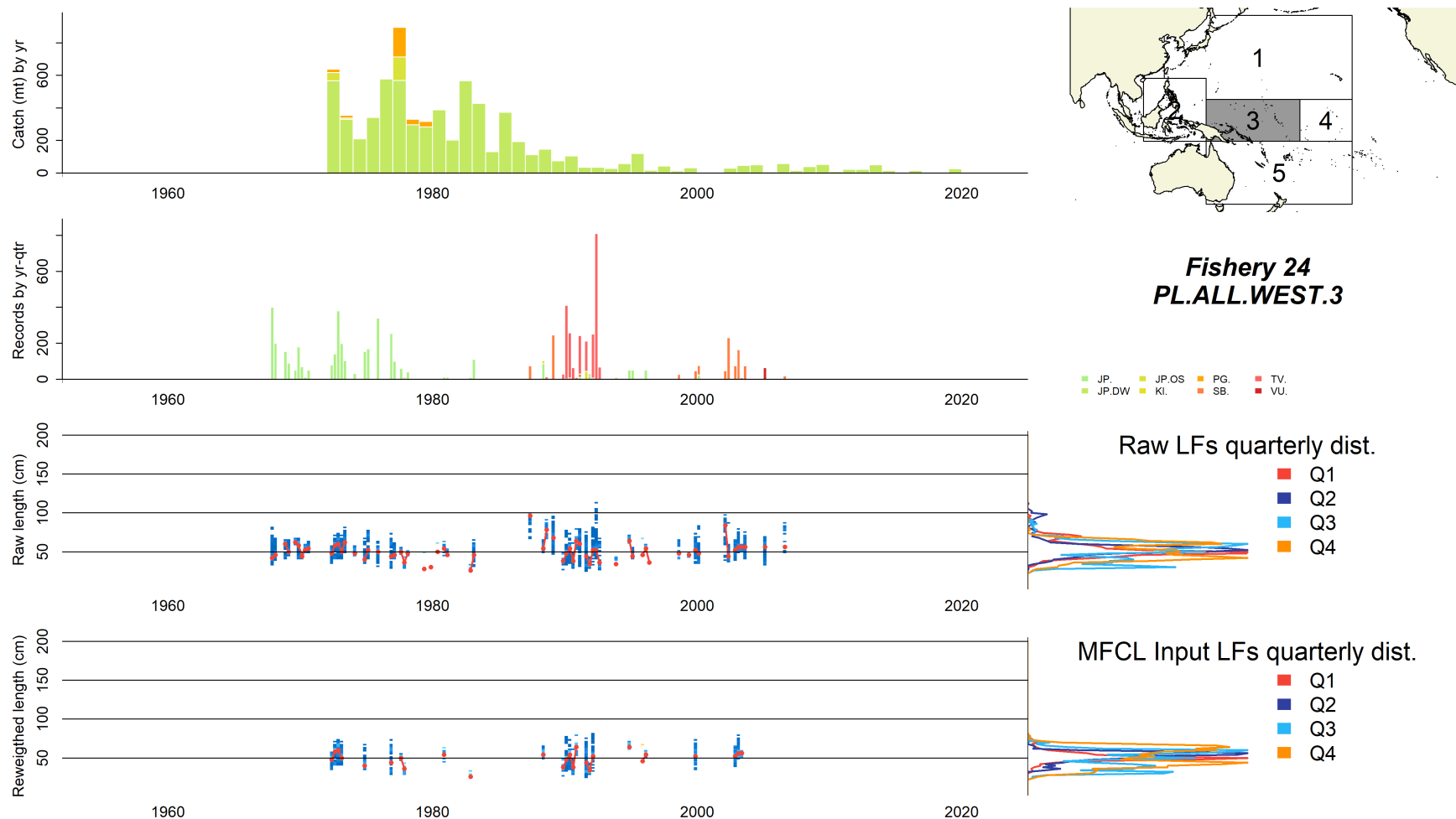


Figure 95: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 24 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

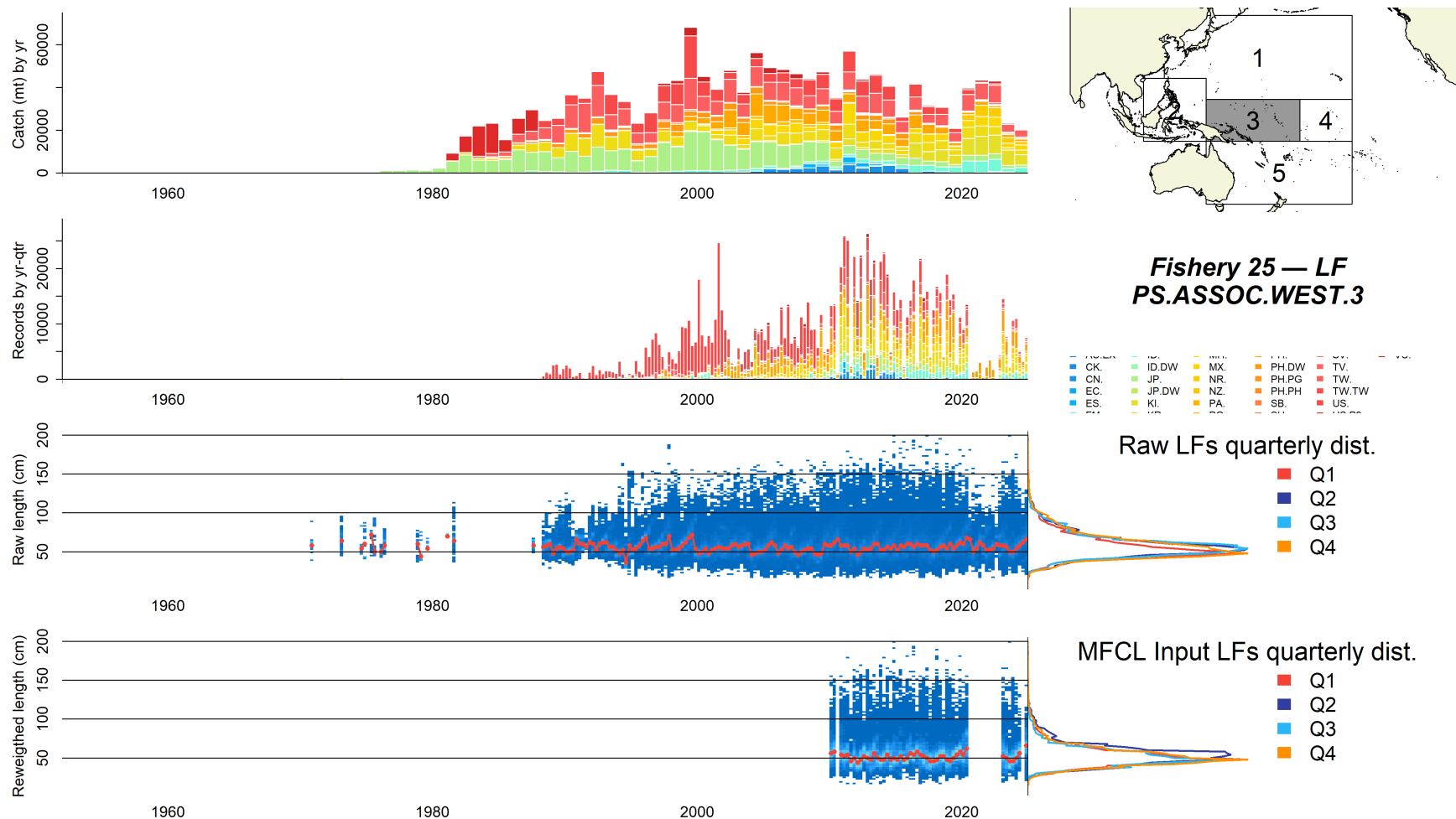


Figure 96: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 25 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

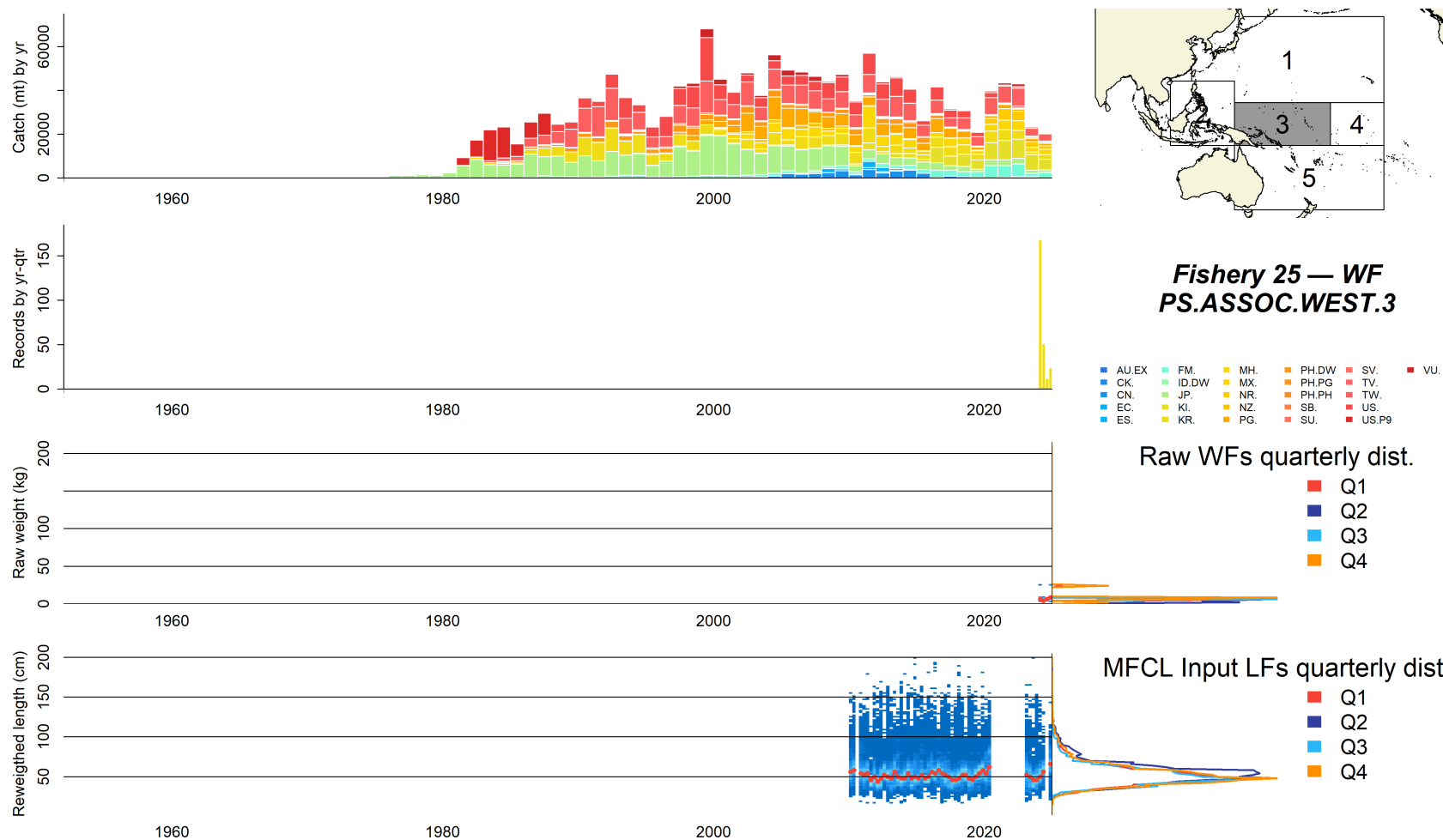


Figure 97: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 25 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

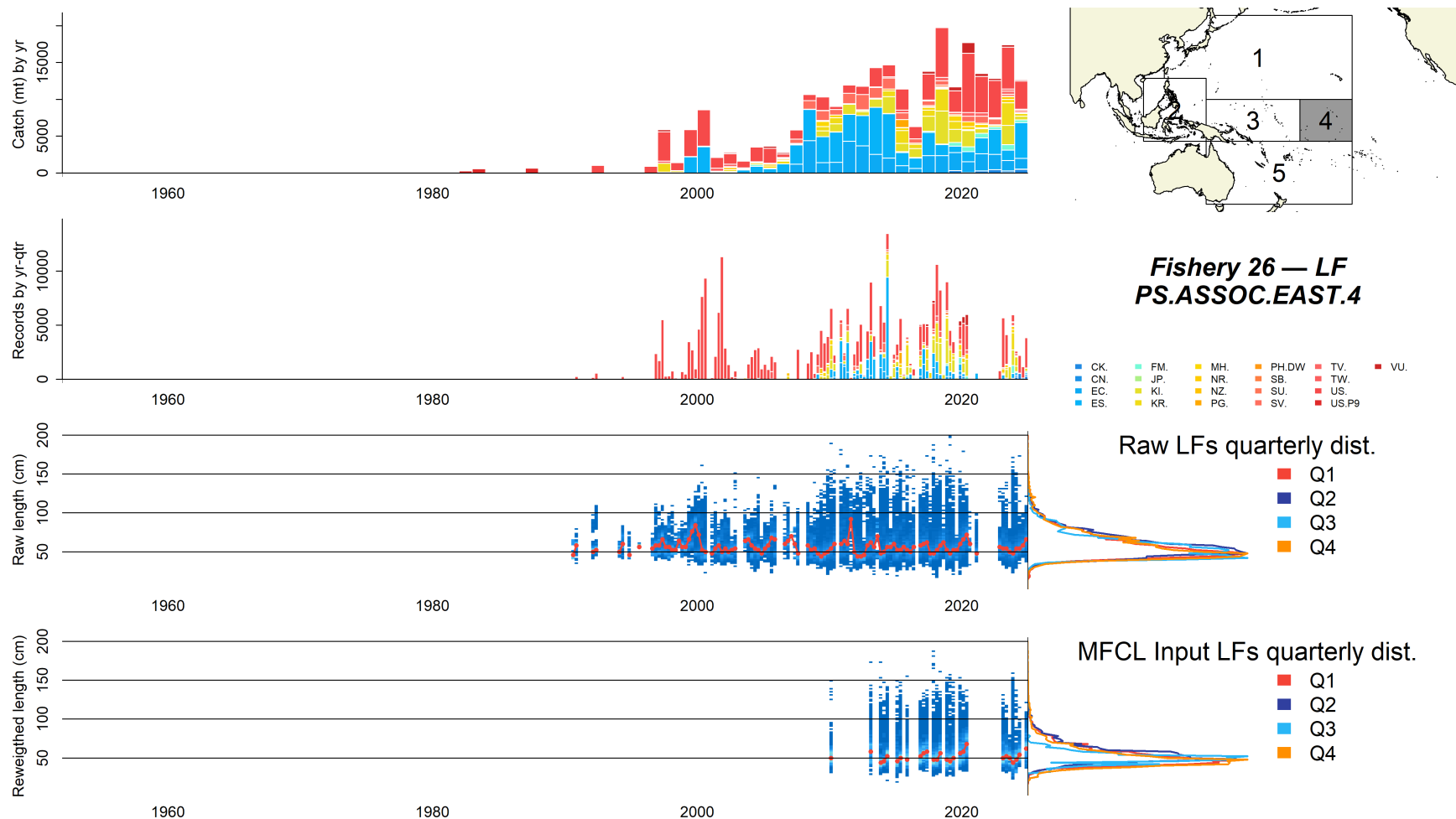


Figure 98: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 26 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

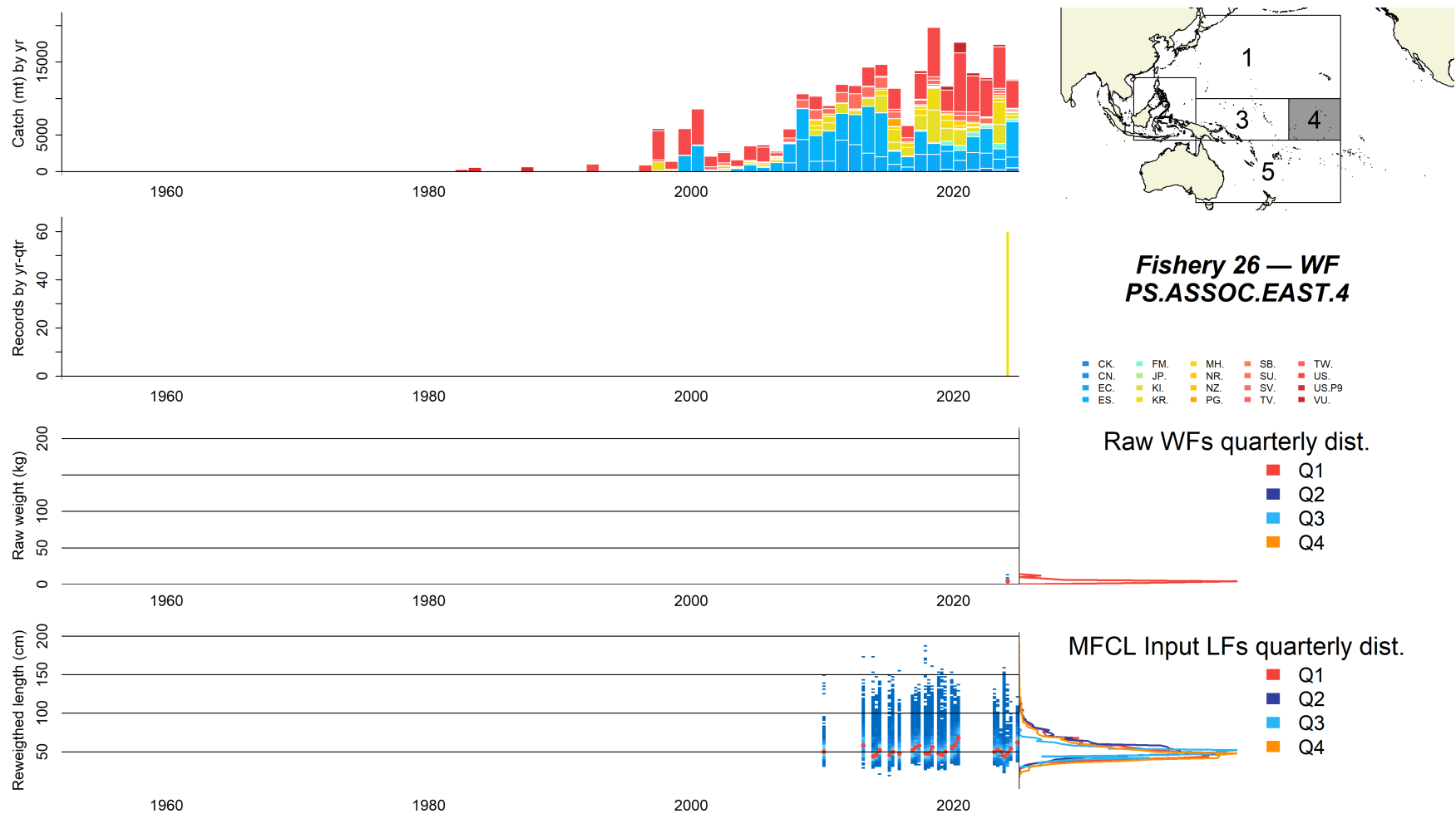


Figure 99: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 26 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

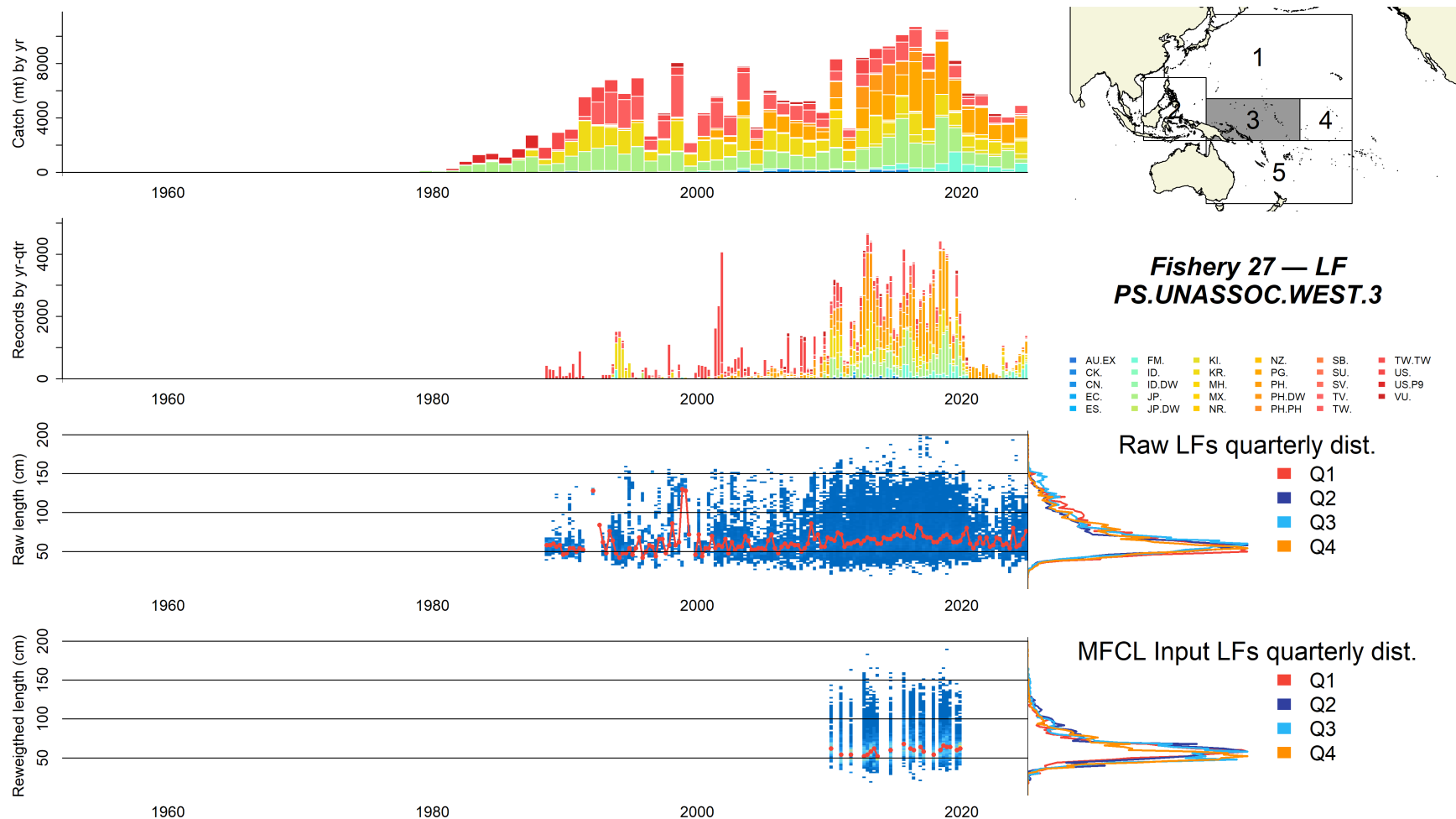


Figure 100: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 27 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

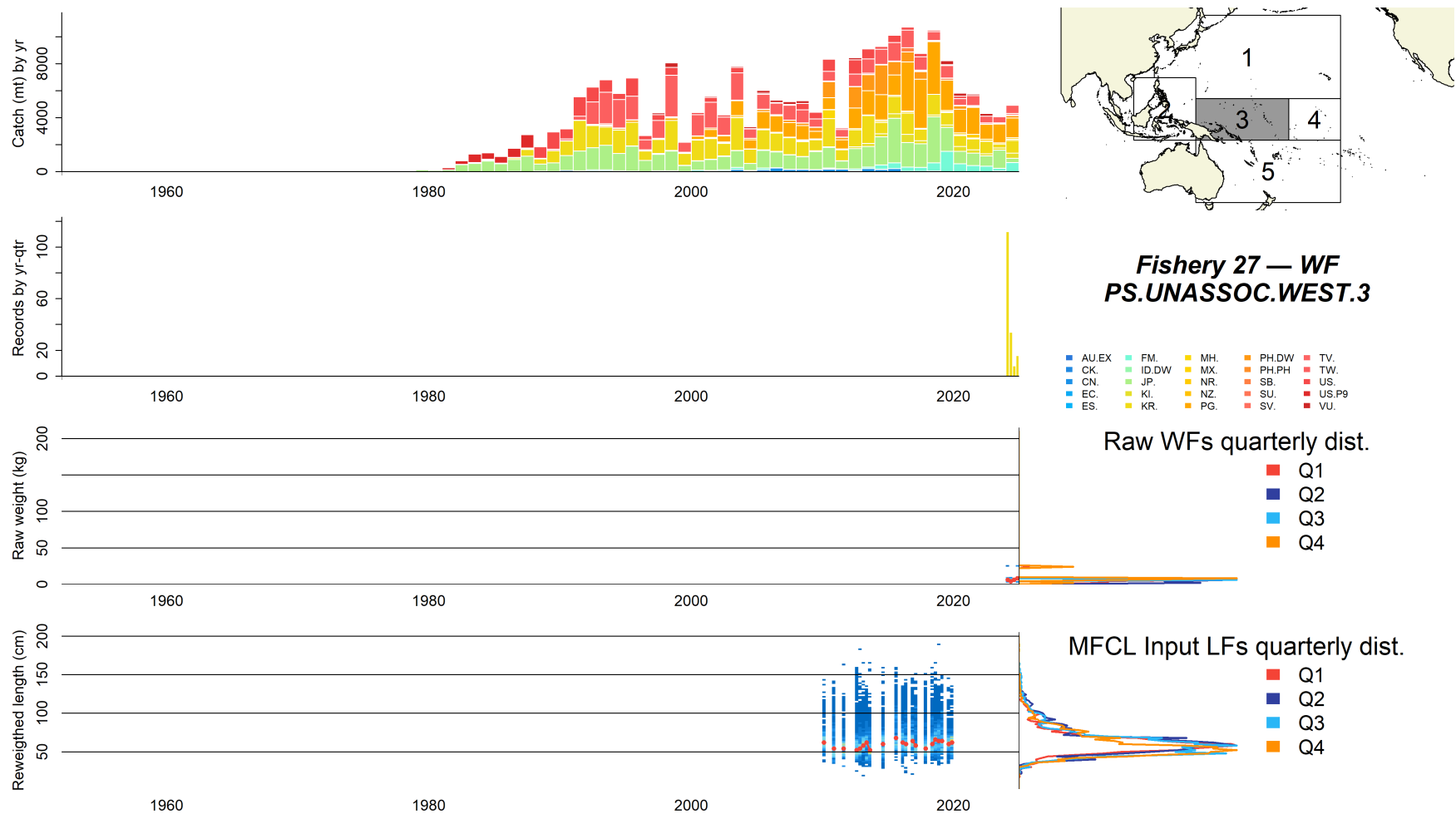


Figure 101: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 27 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

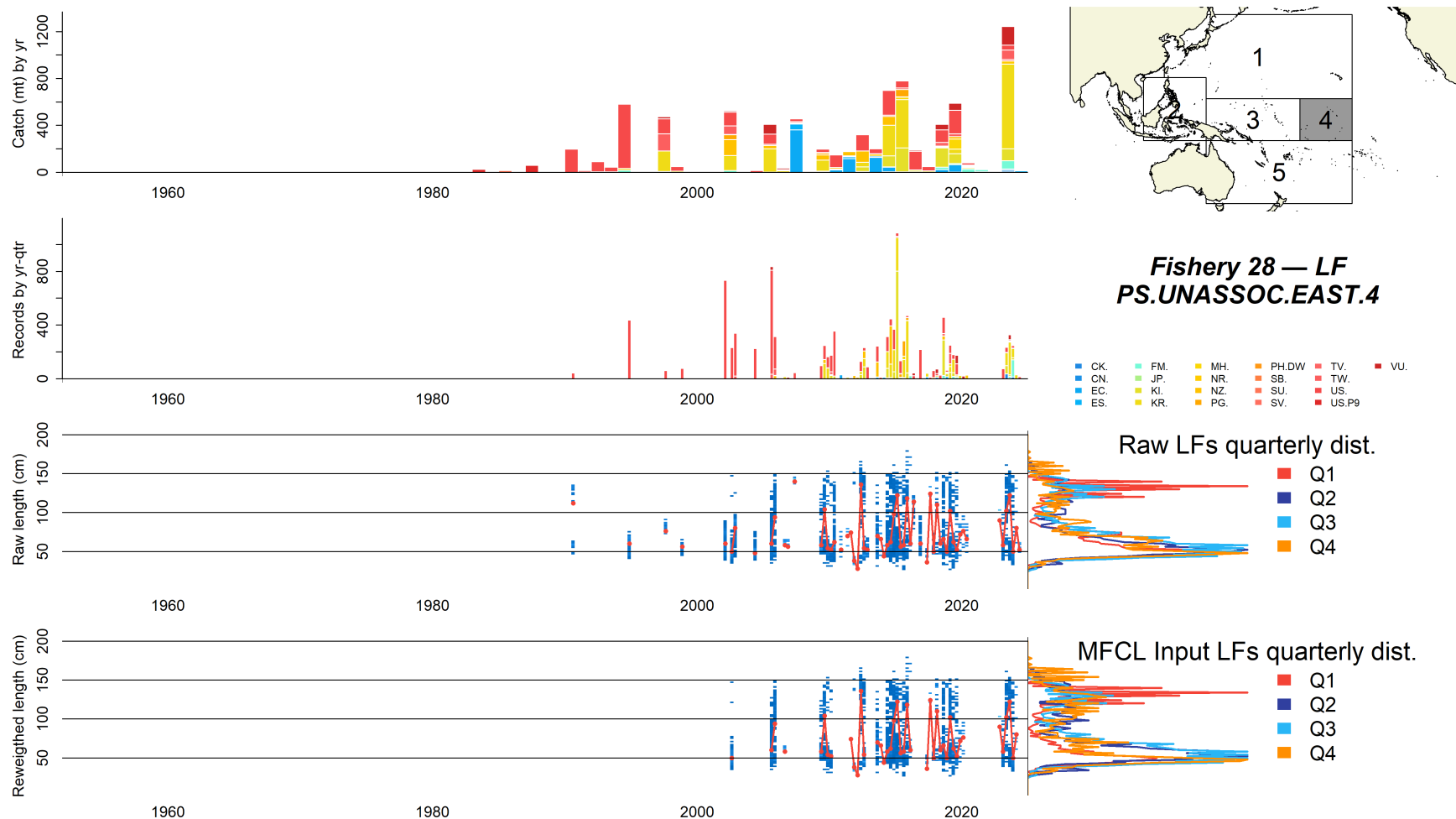


Figure 102: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 28 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

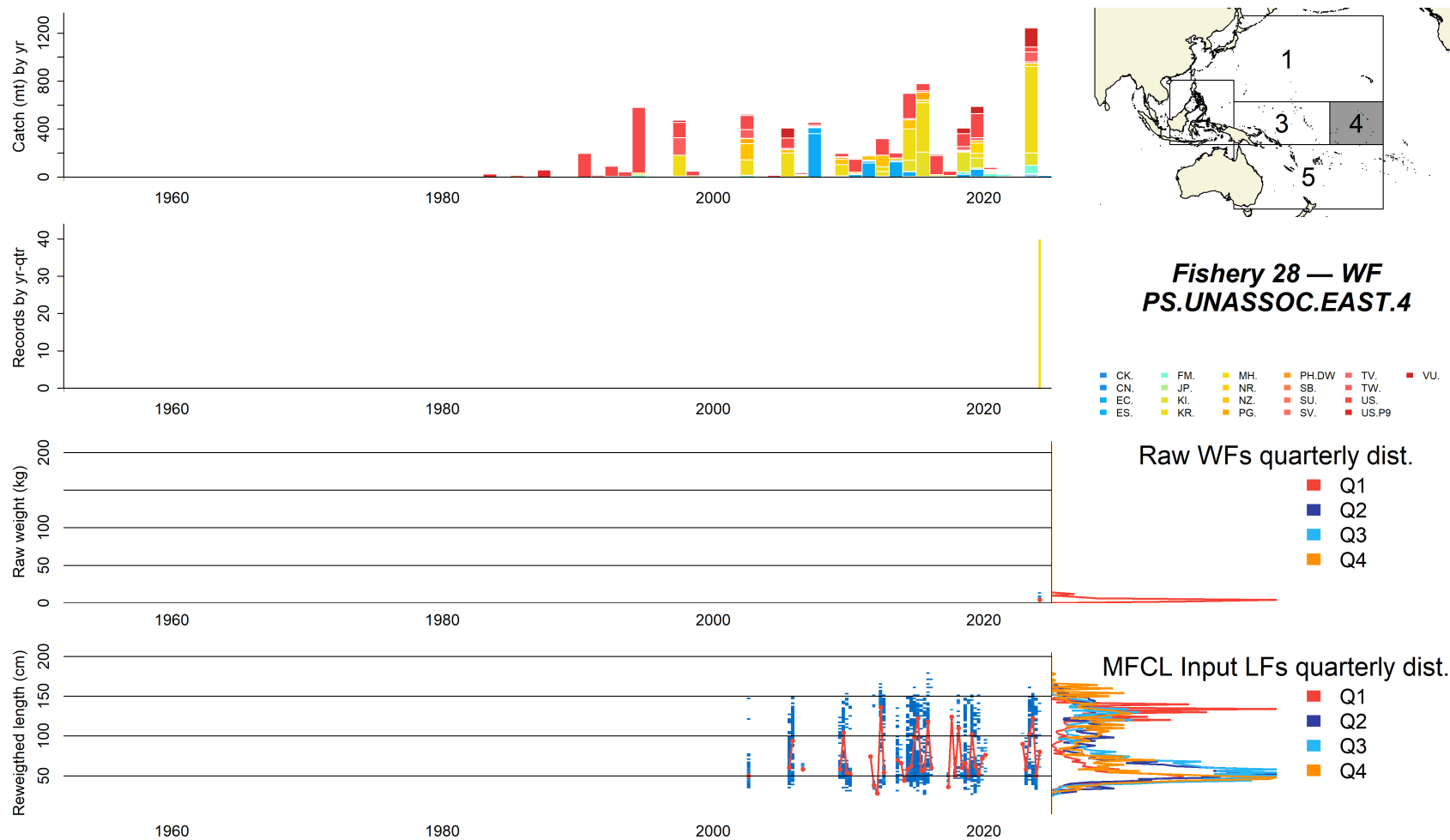


Figure 103: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 28 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

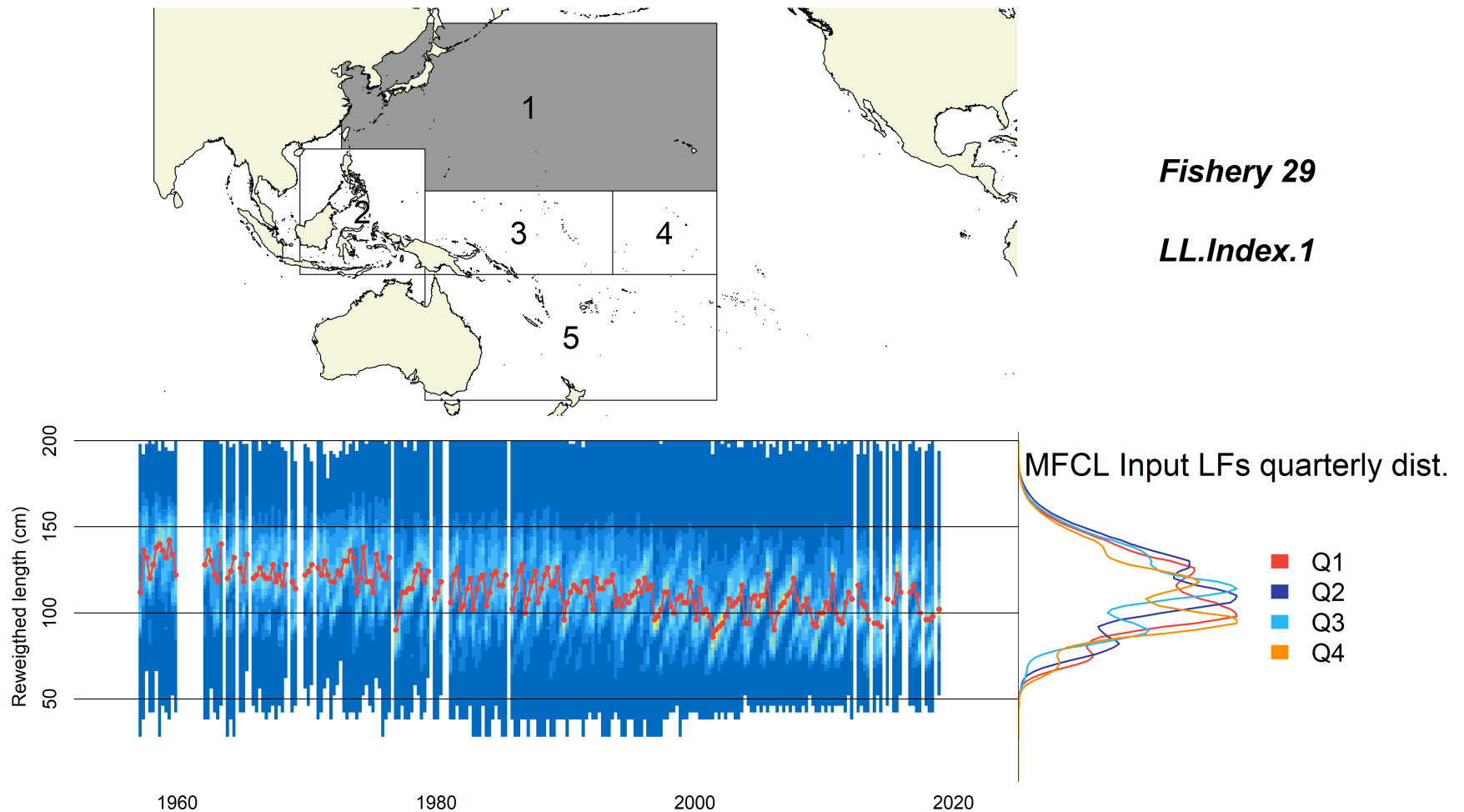


Figure 104: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 29 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

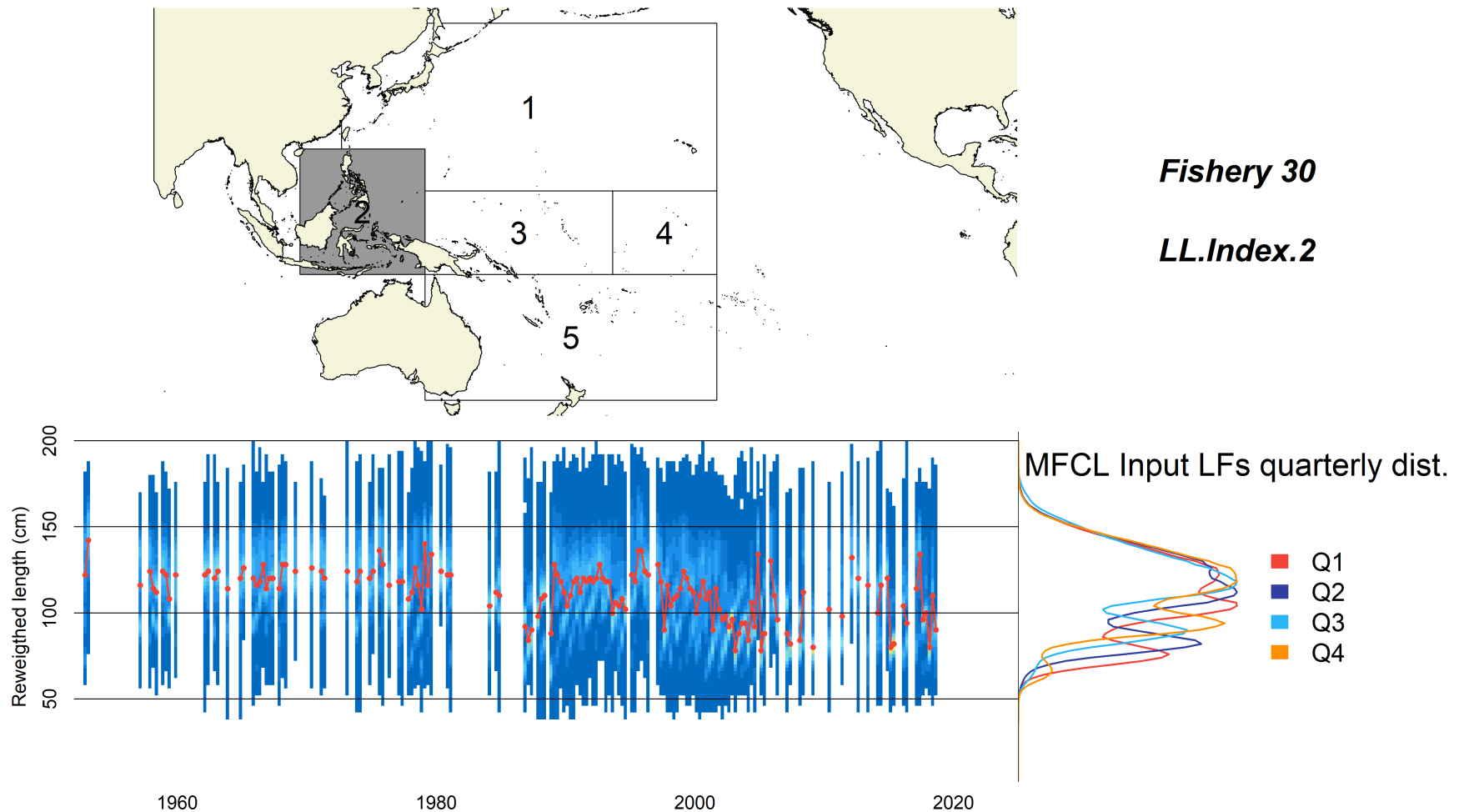


Figure 105: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 30 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

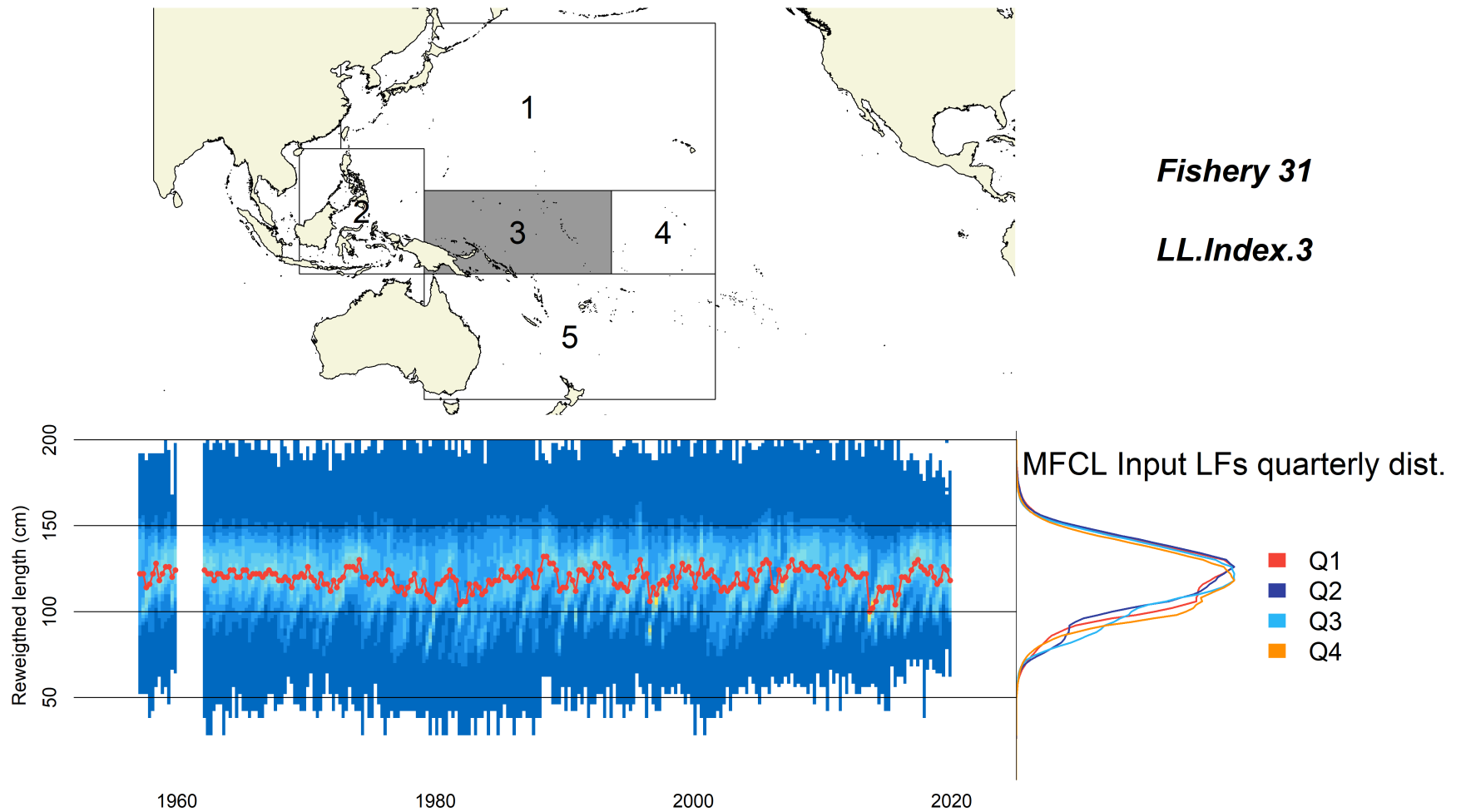


Figure 106: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 31 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

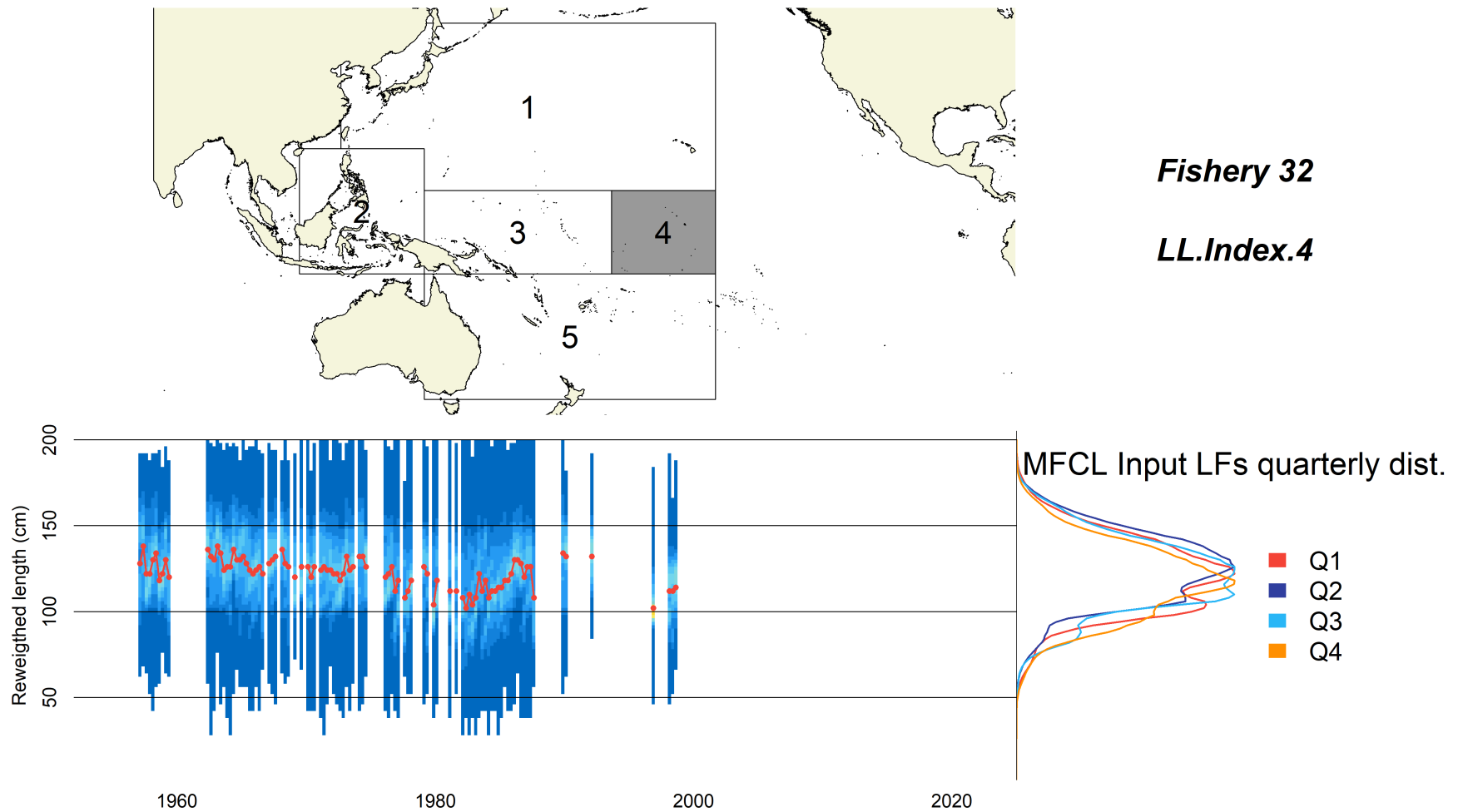


Figure 107: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 32 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

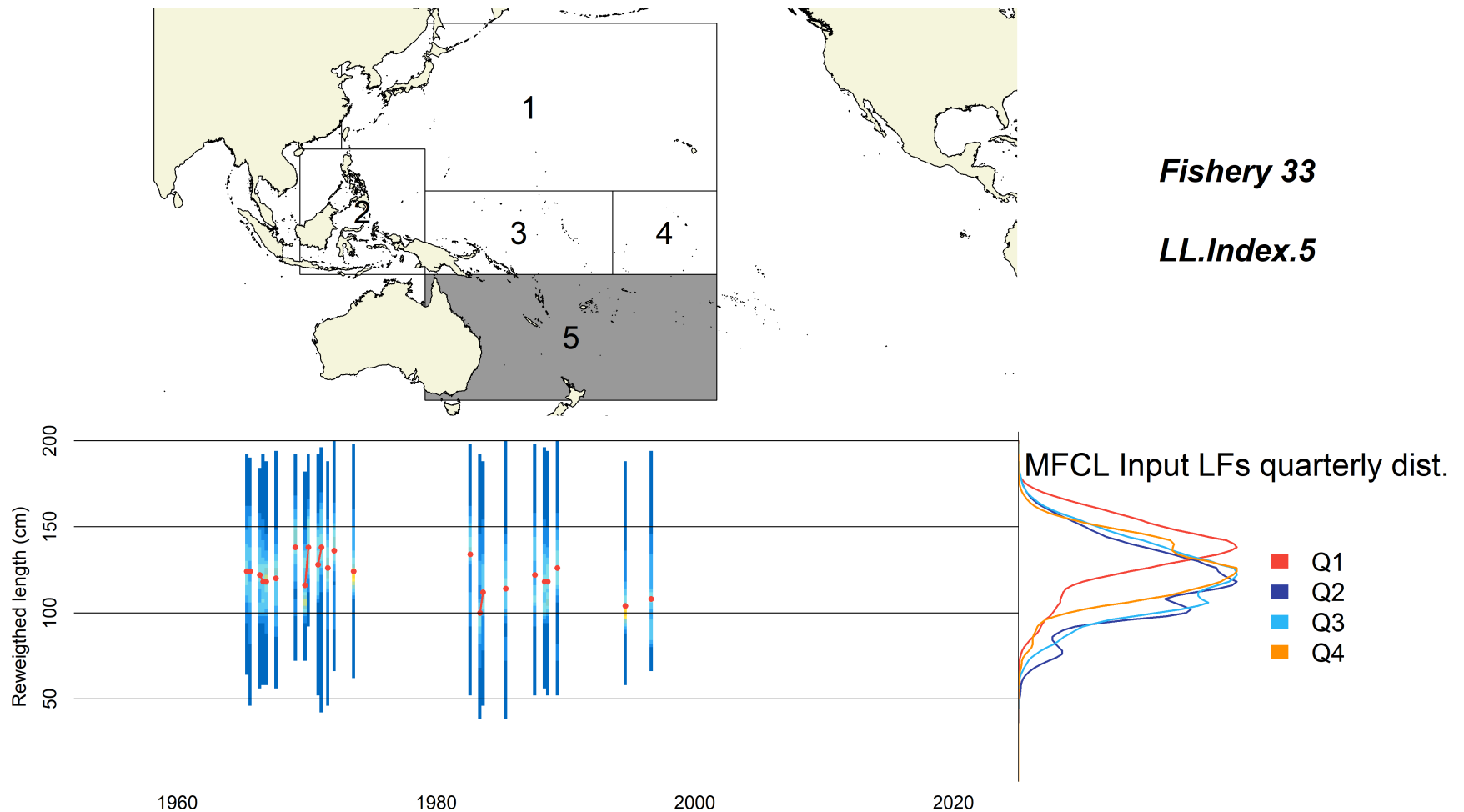


Figure 108: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 33 of the 2026 bigeye stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

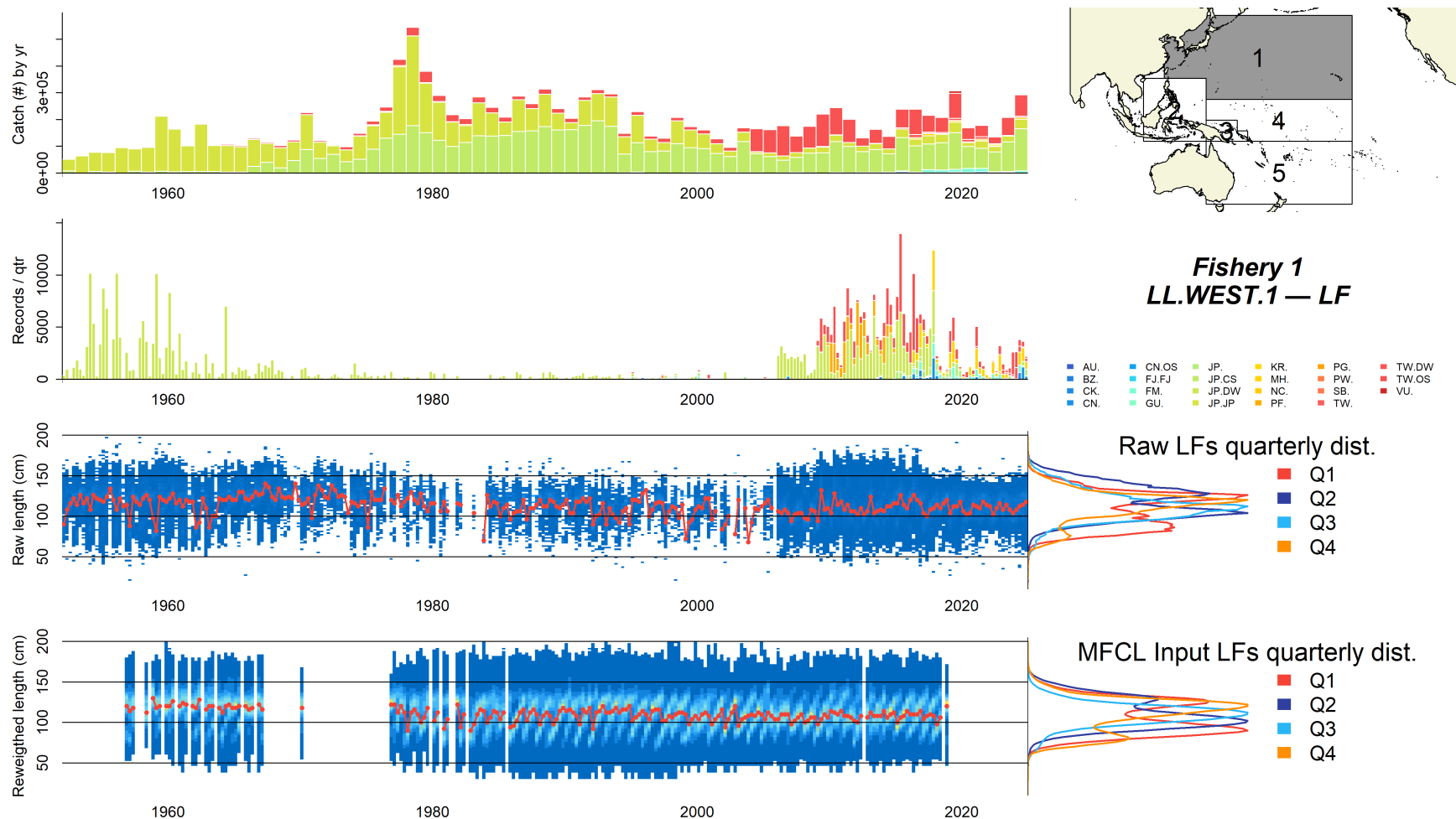


Figure 109: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 1 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

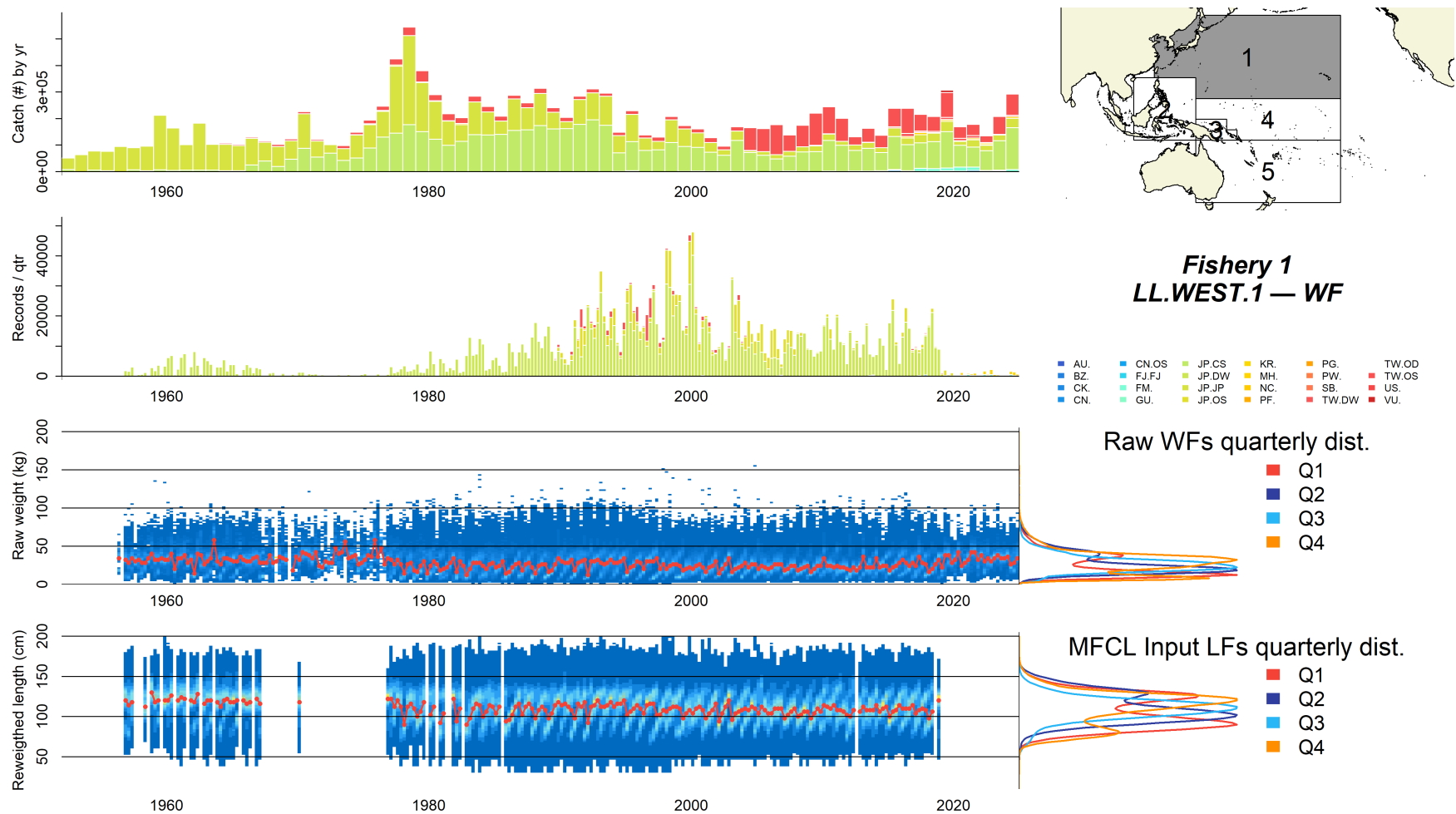


Figure 110: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 1 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

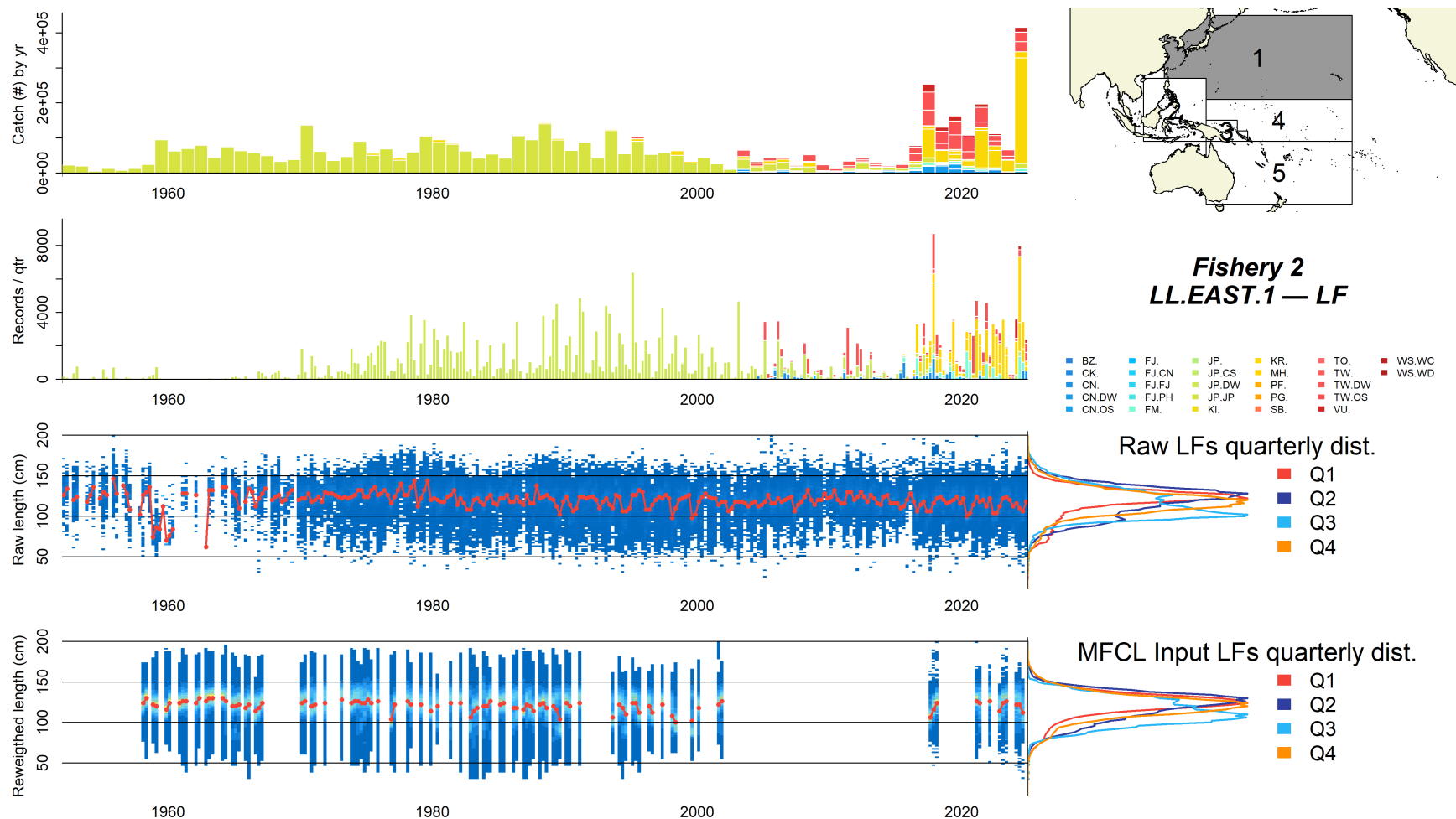


Figure 111: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 2 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

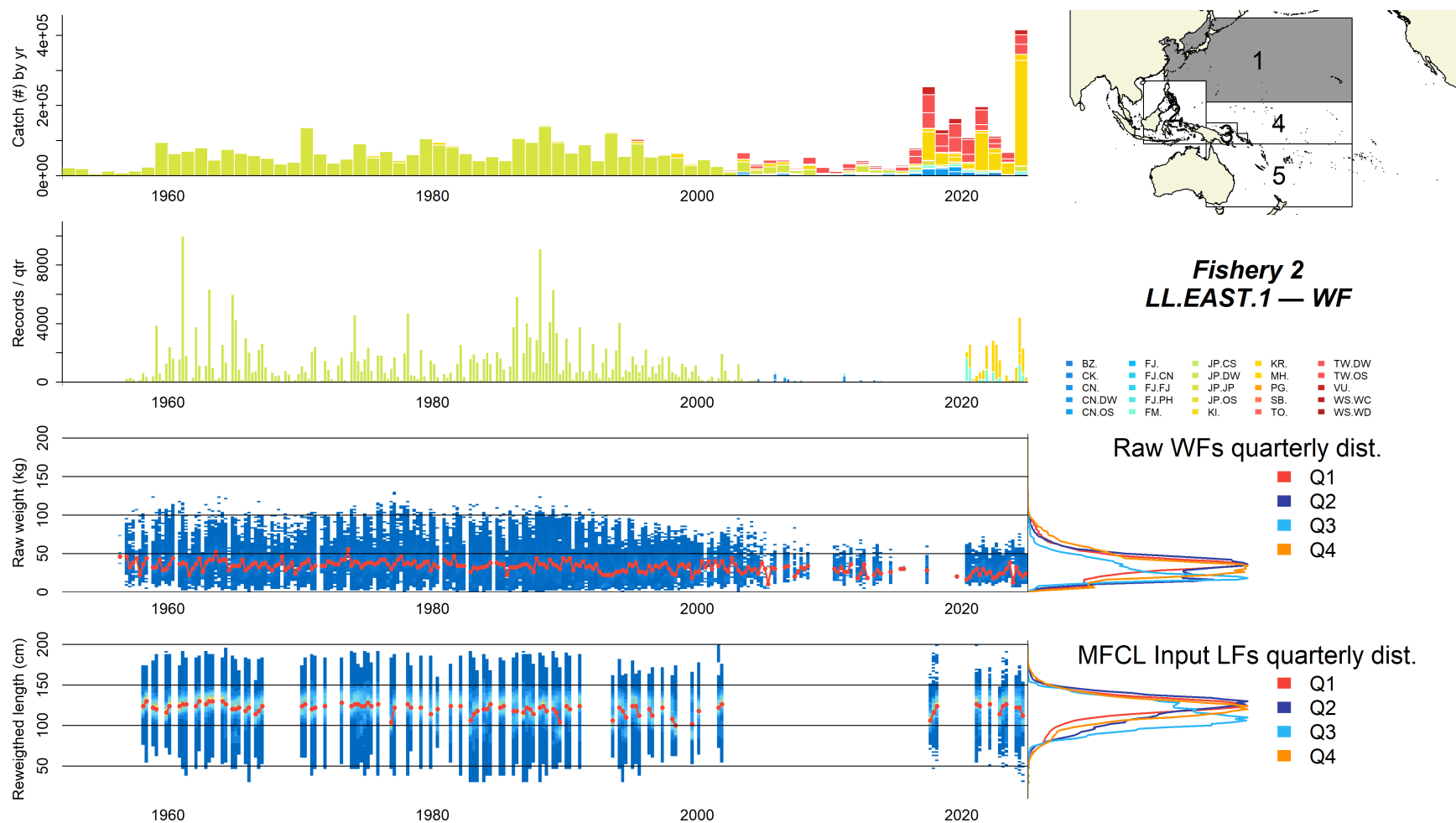


Figure 112: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 2 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

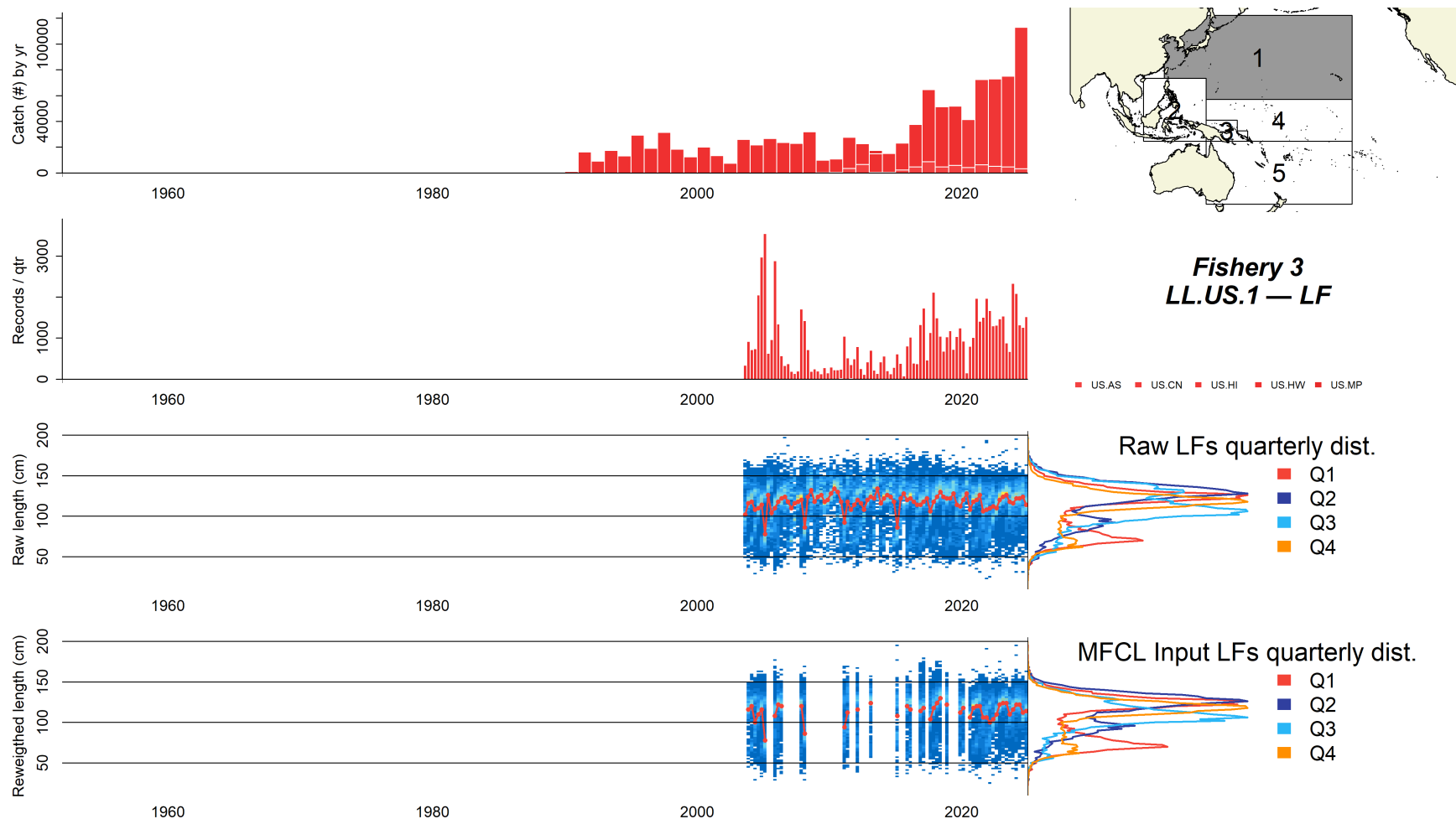


Figure 113: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 3 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

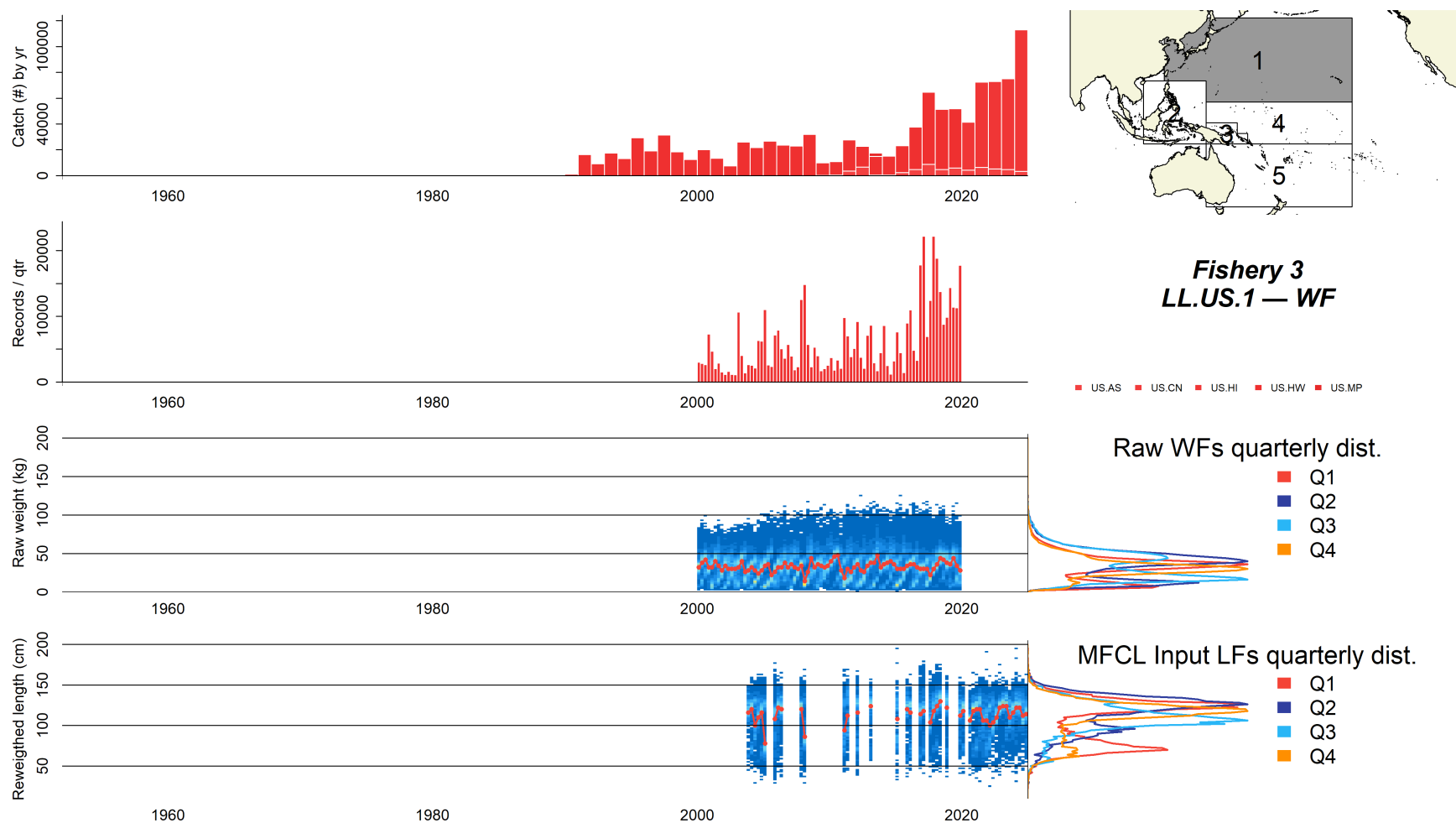


Figure 114: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 3 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

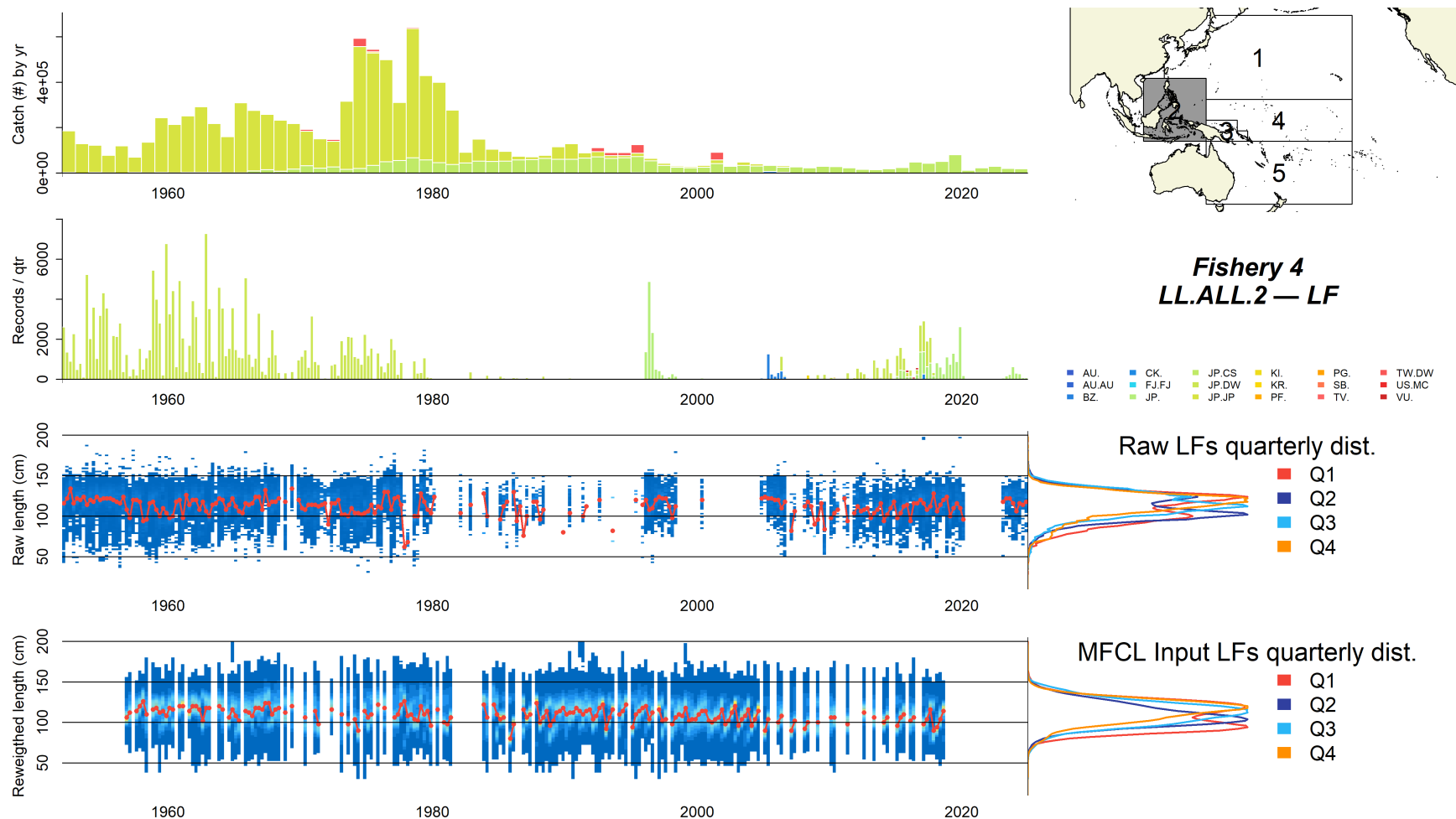


Figure 115: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 4 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

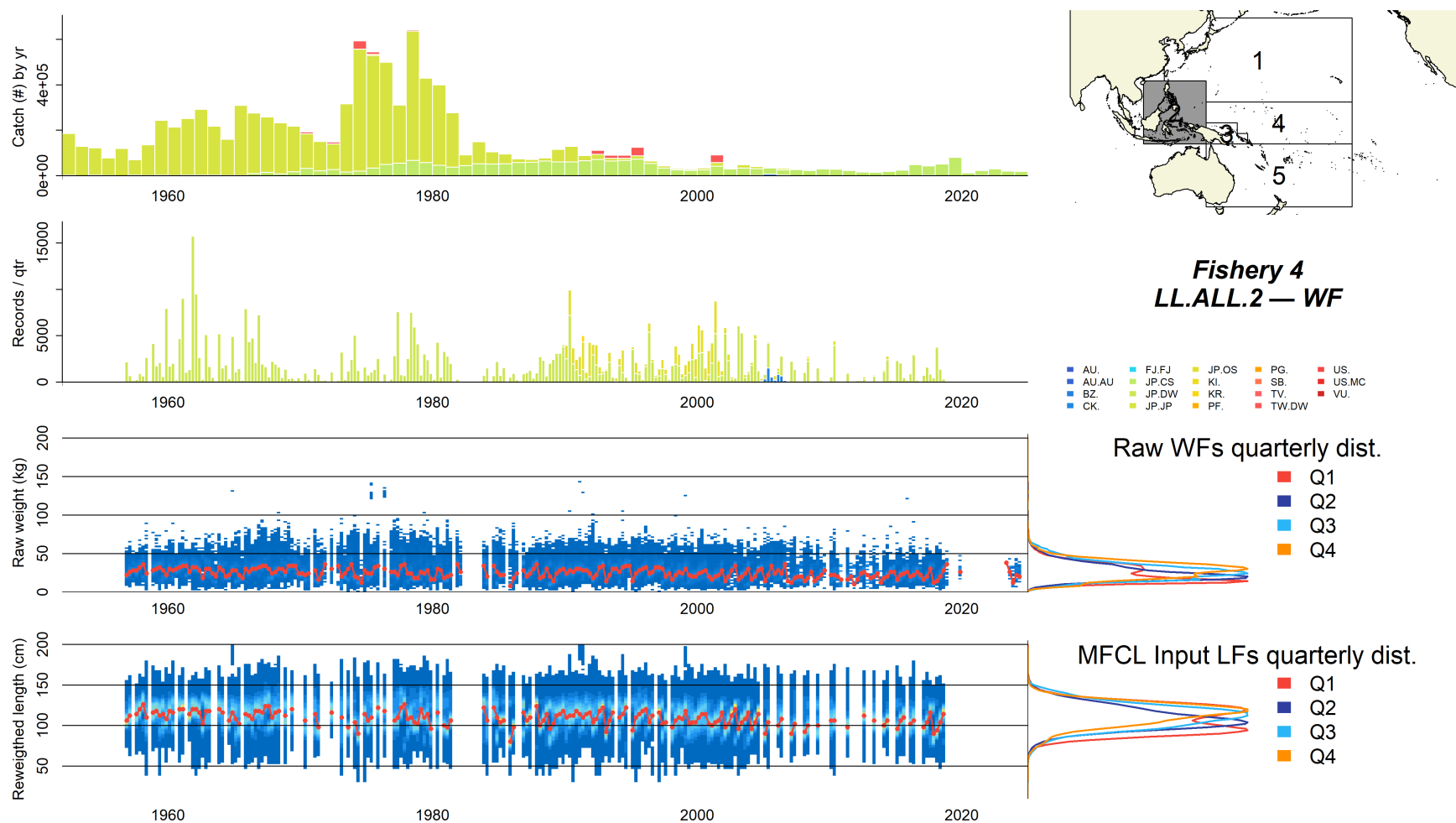


Figure 116: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 4 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

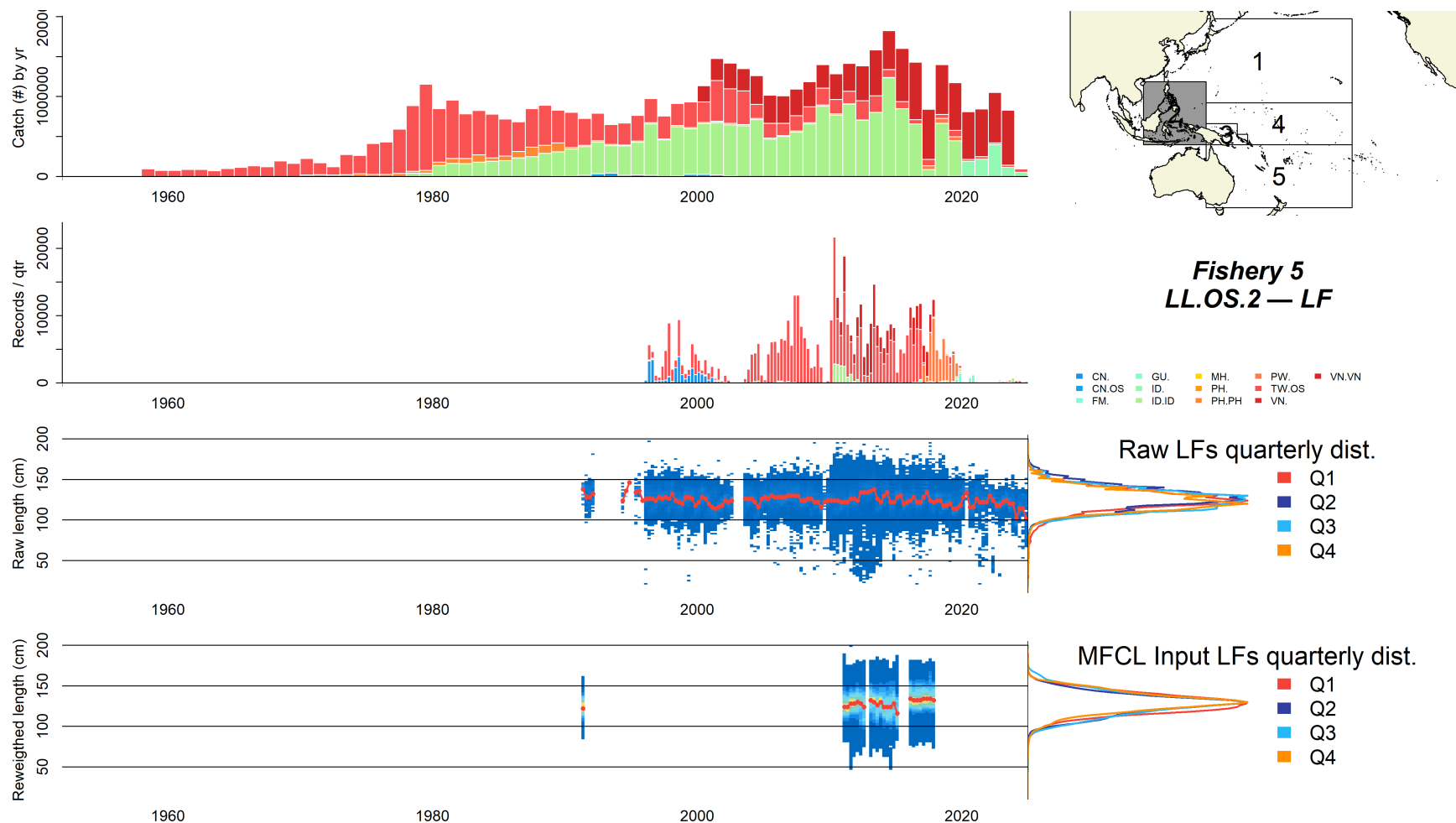


Figure 117: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 5 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

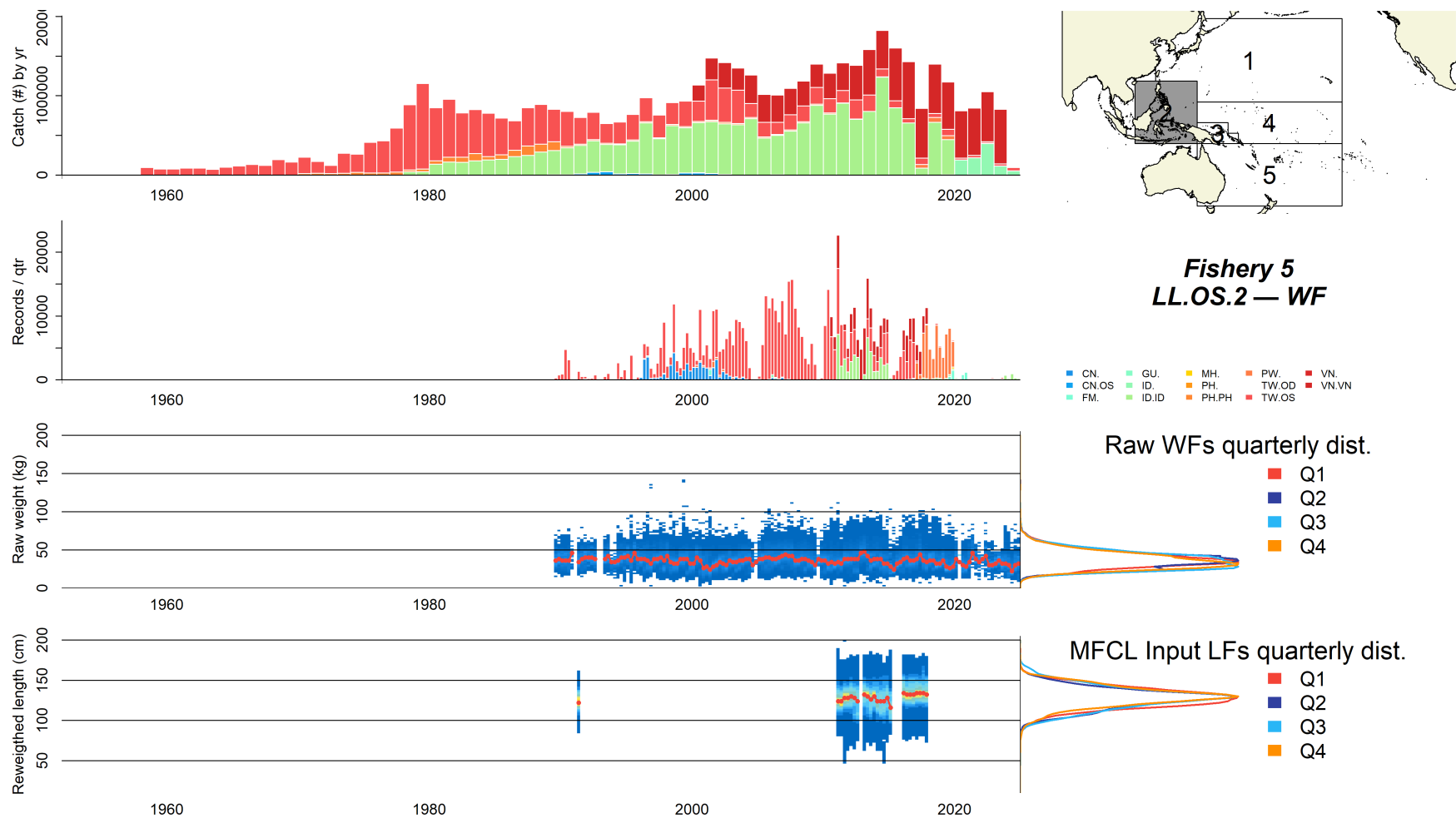


Figure 118: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 5 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

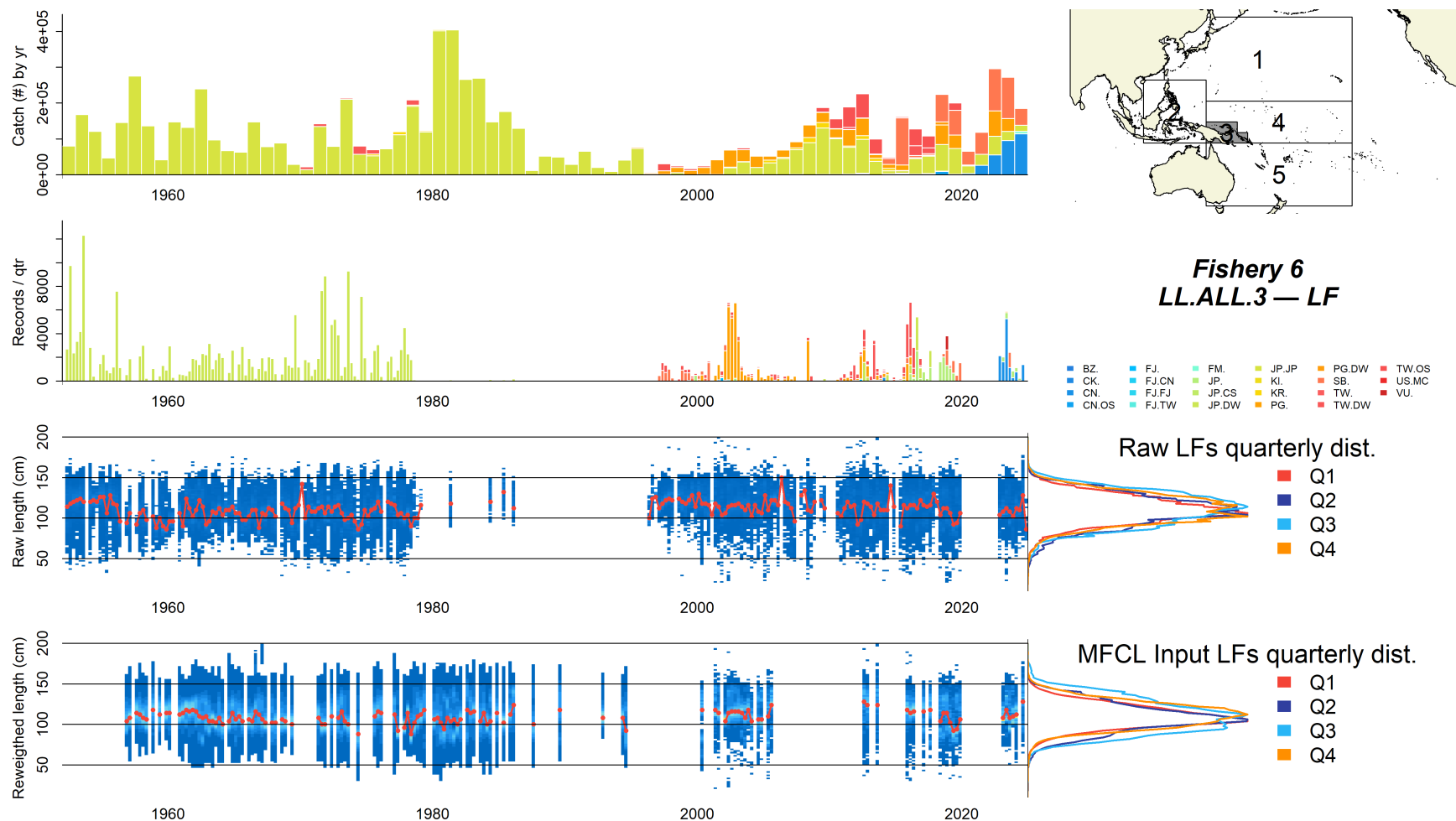


Figure 119: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 6 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

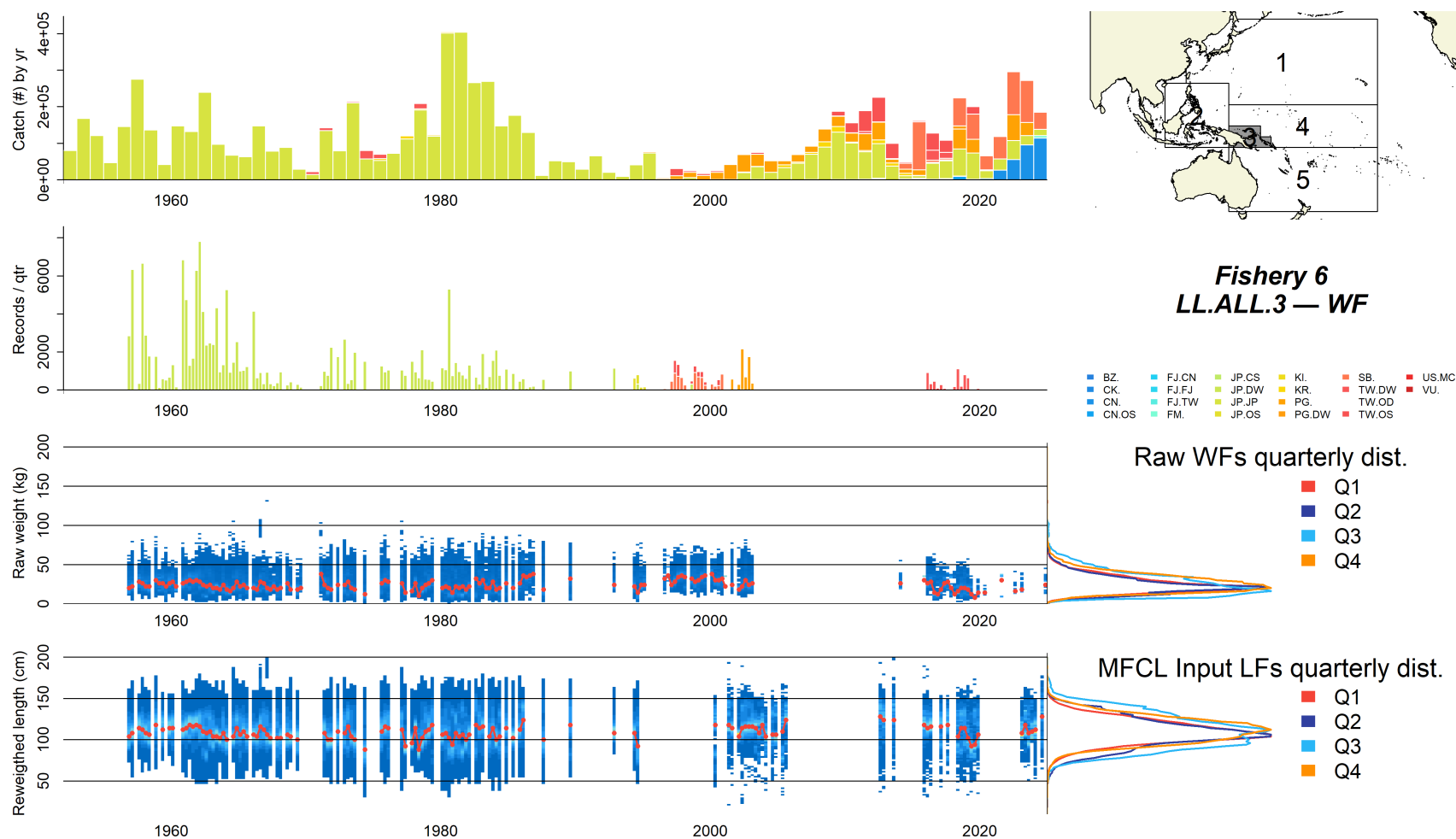


Figure 120: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 6 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

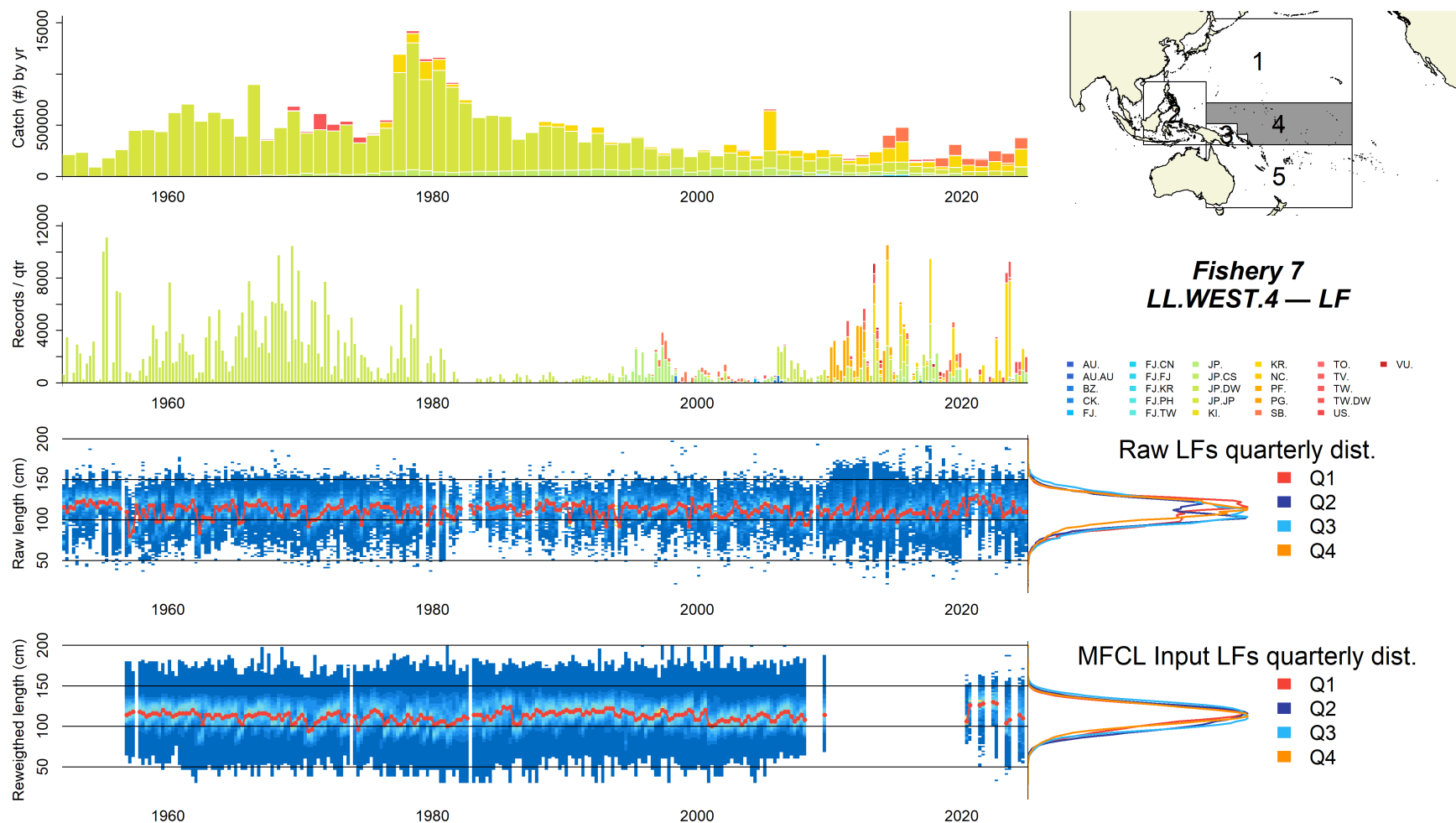


Figure 121: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 7 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

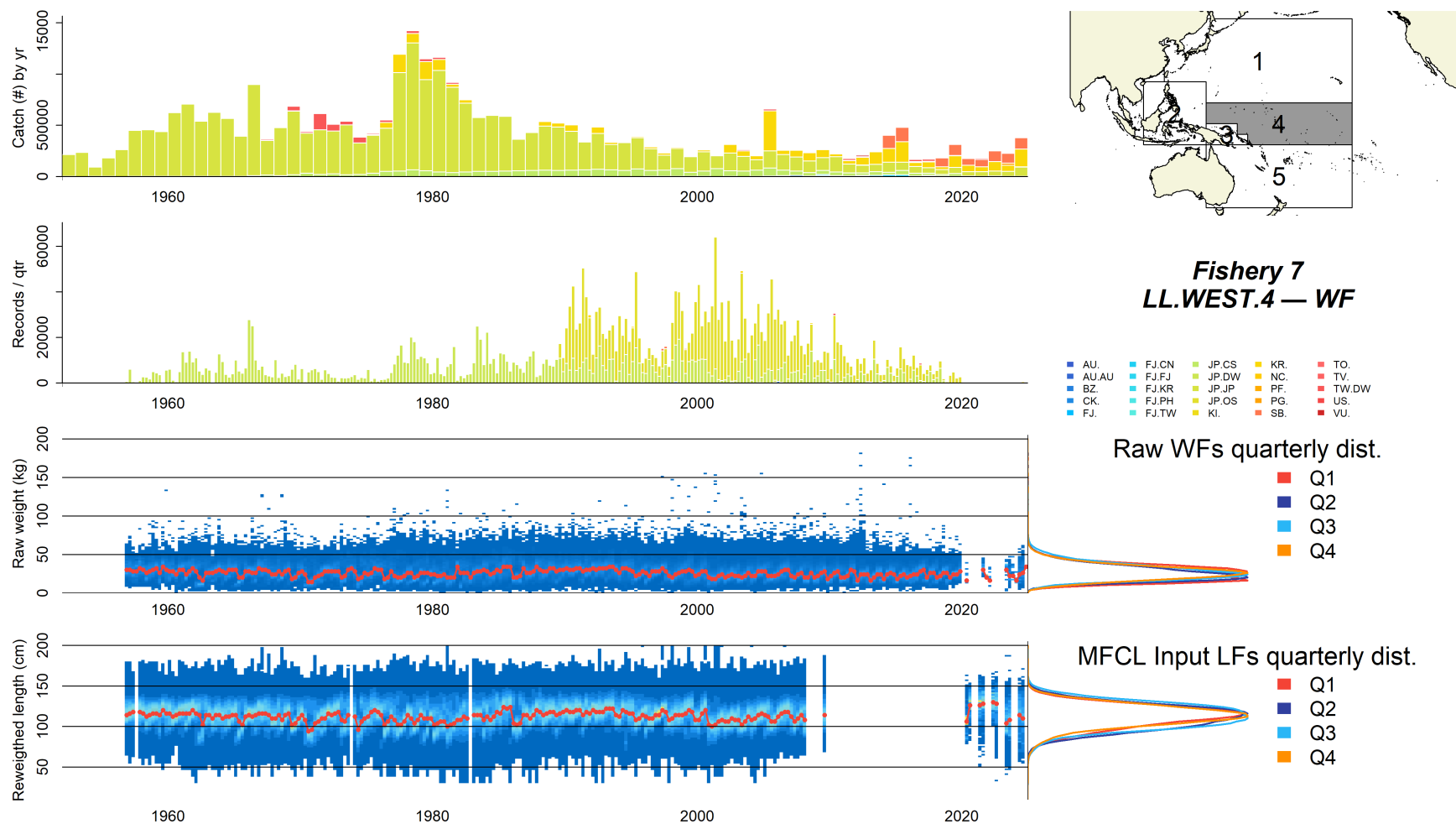


Figure 122: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 7 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

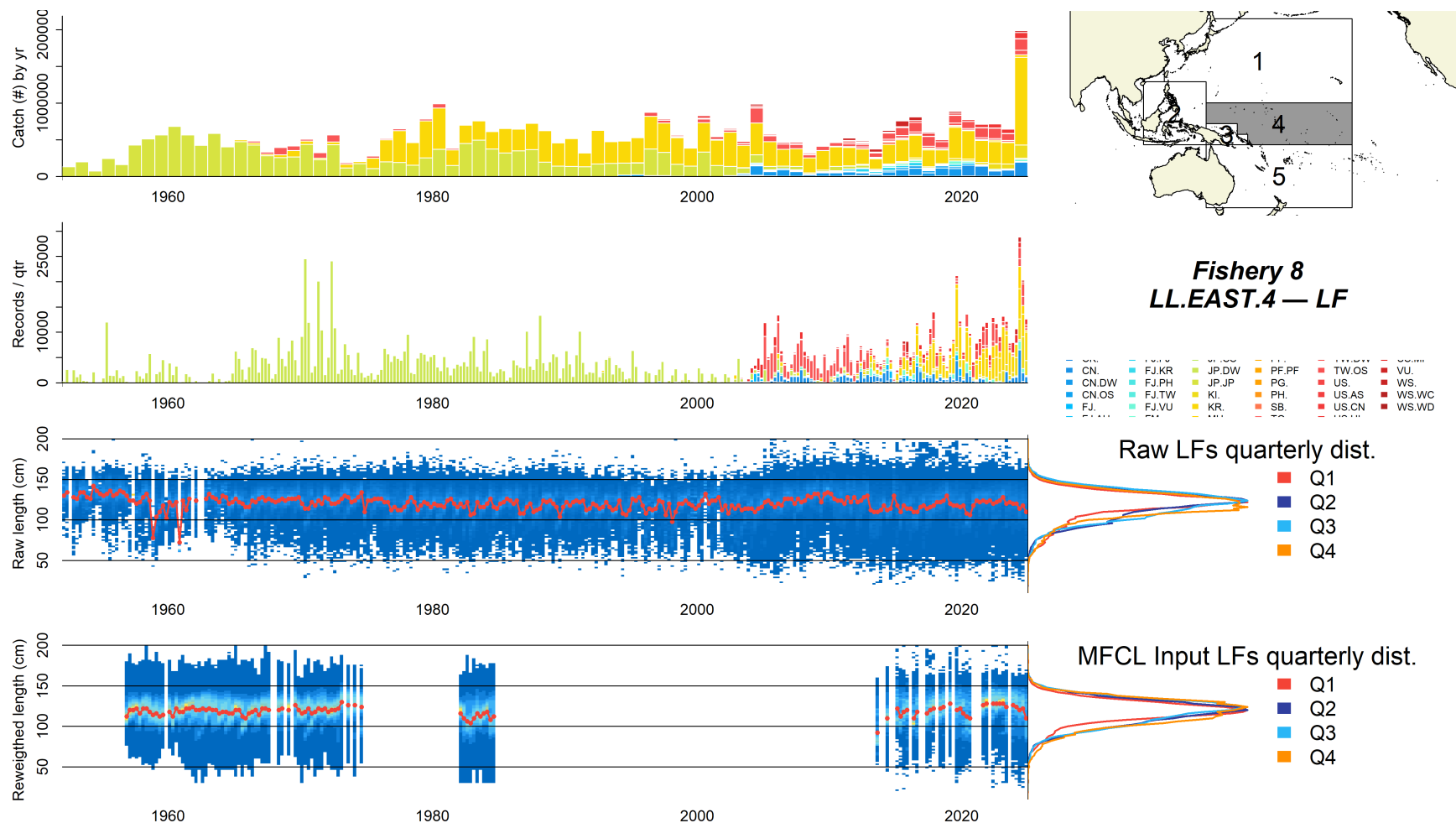


Figure 123: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 8 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

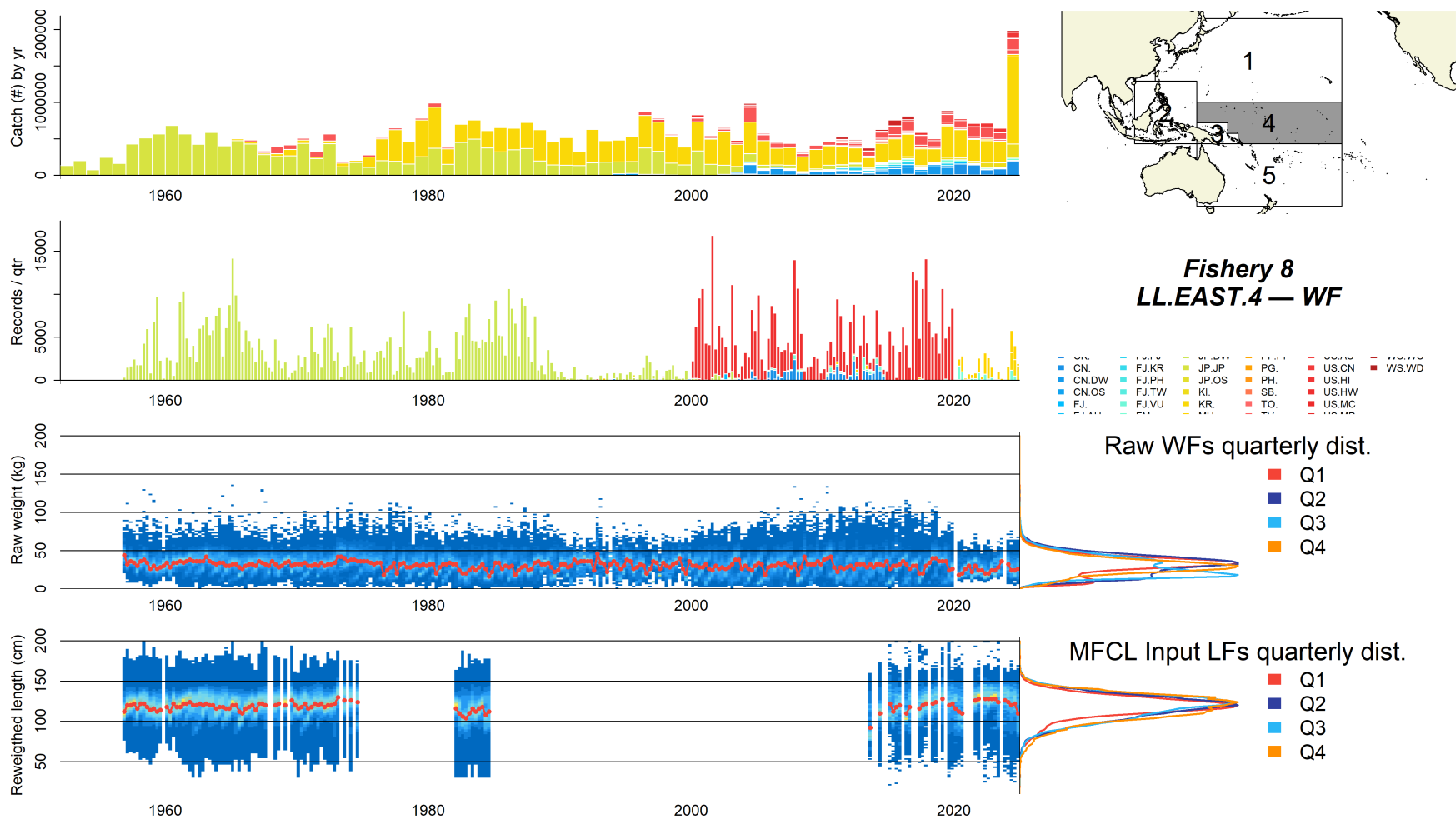


Figure 124: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 8 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

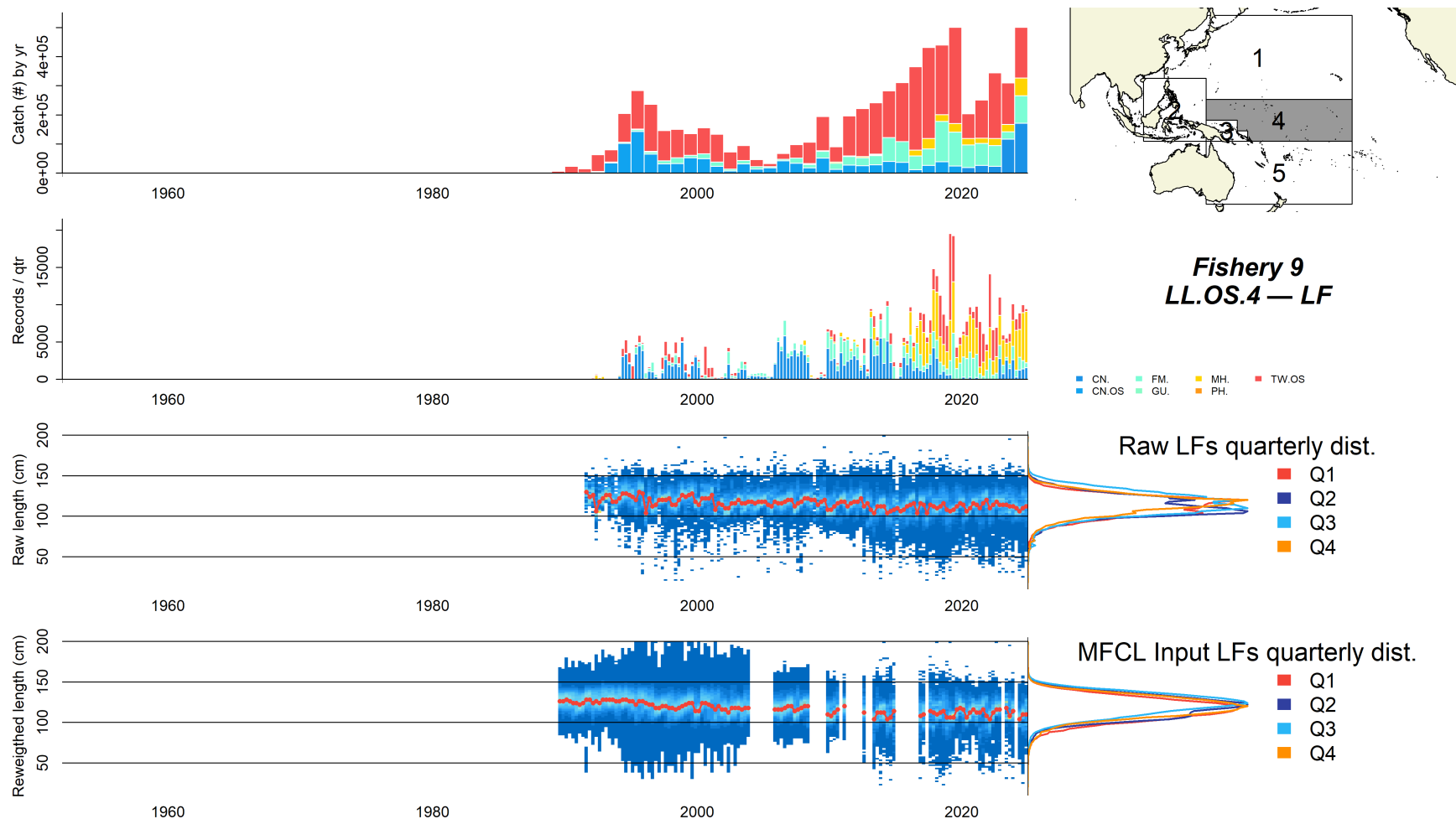


Figure 125: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 9 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

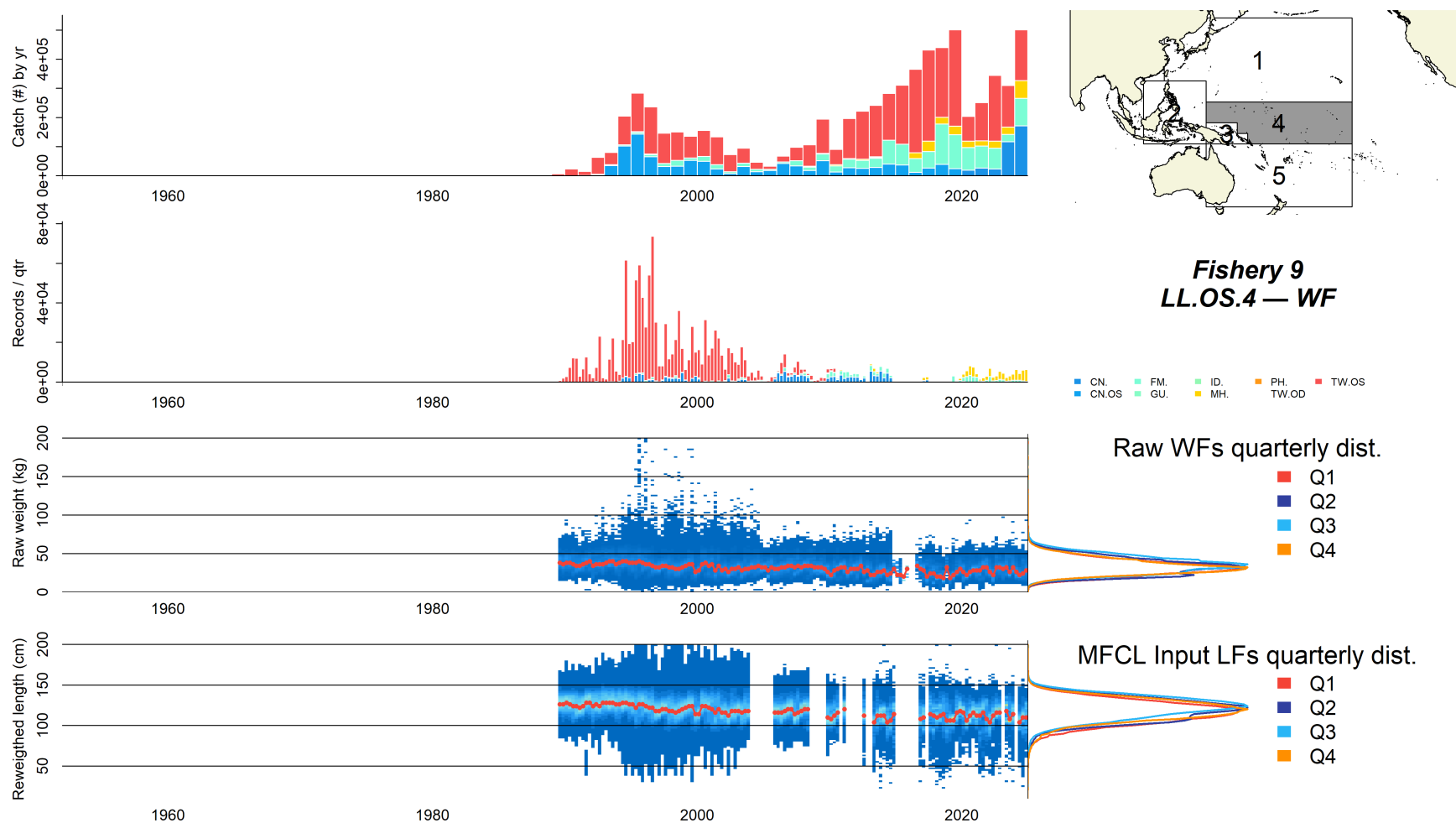


Figure 126: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 9 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

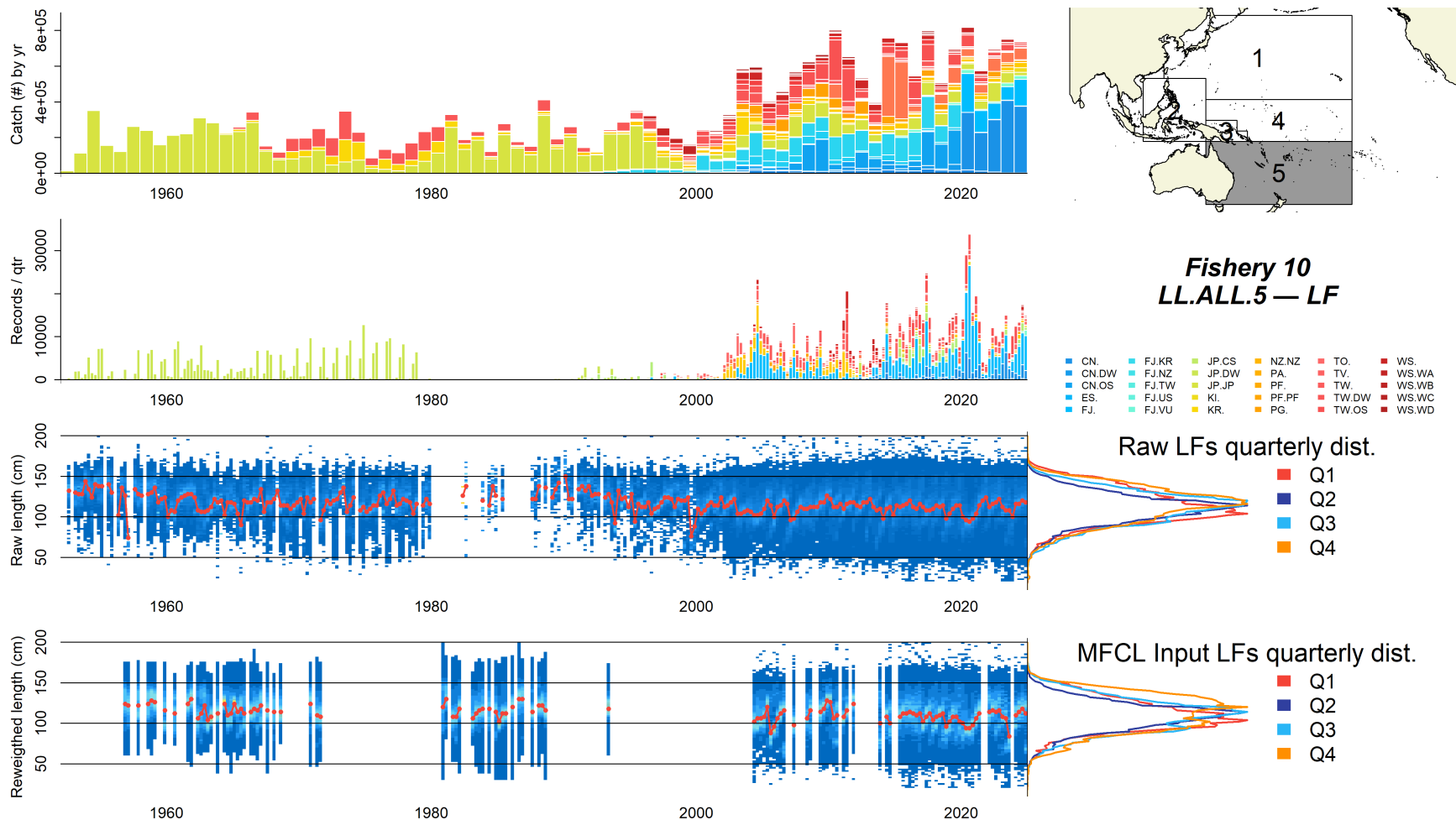


Figure 127: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 10 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

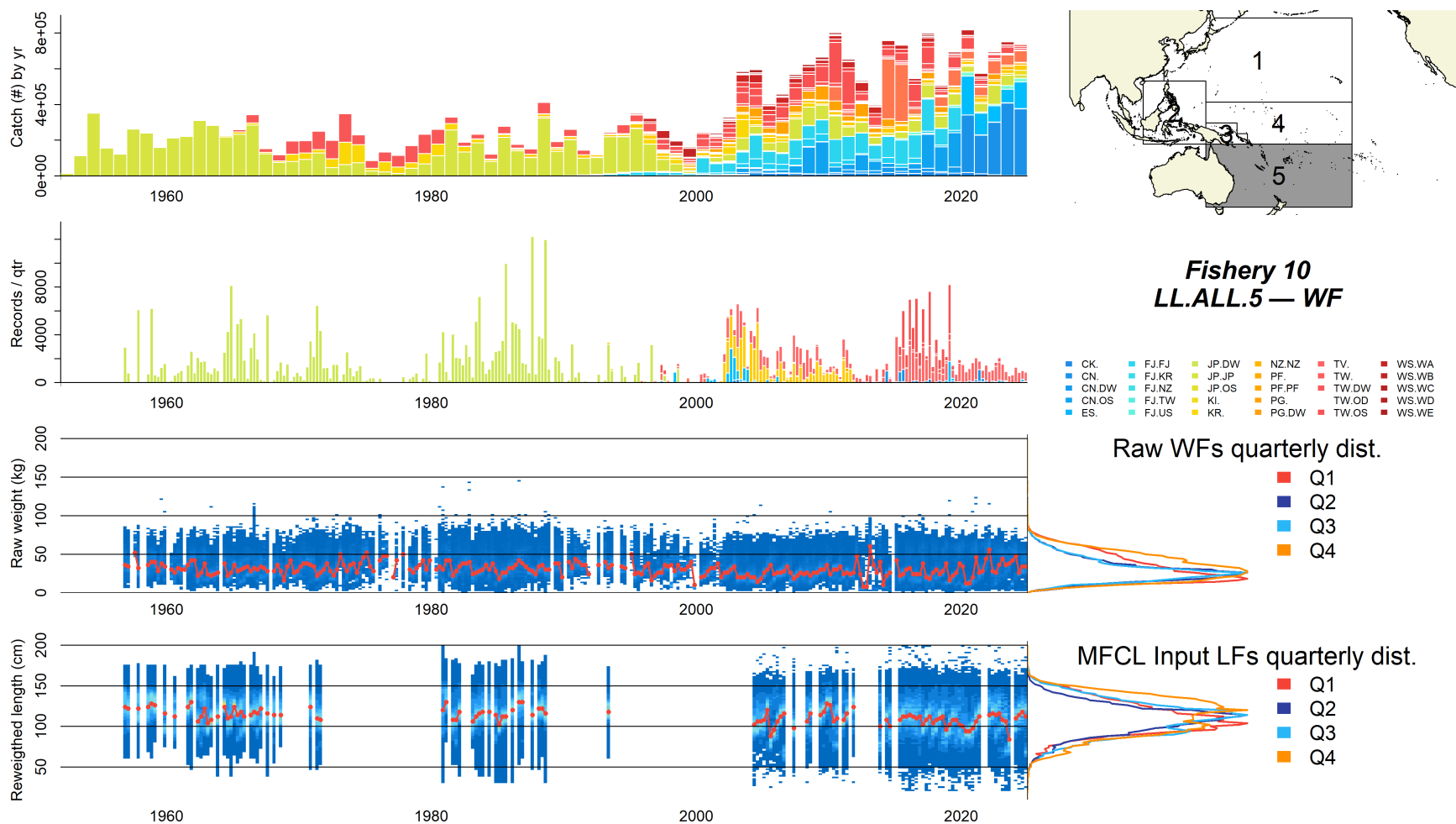


Figure 128: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 10 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

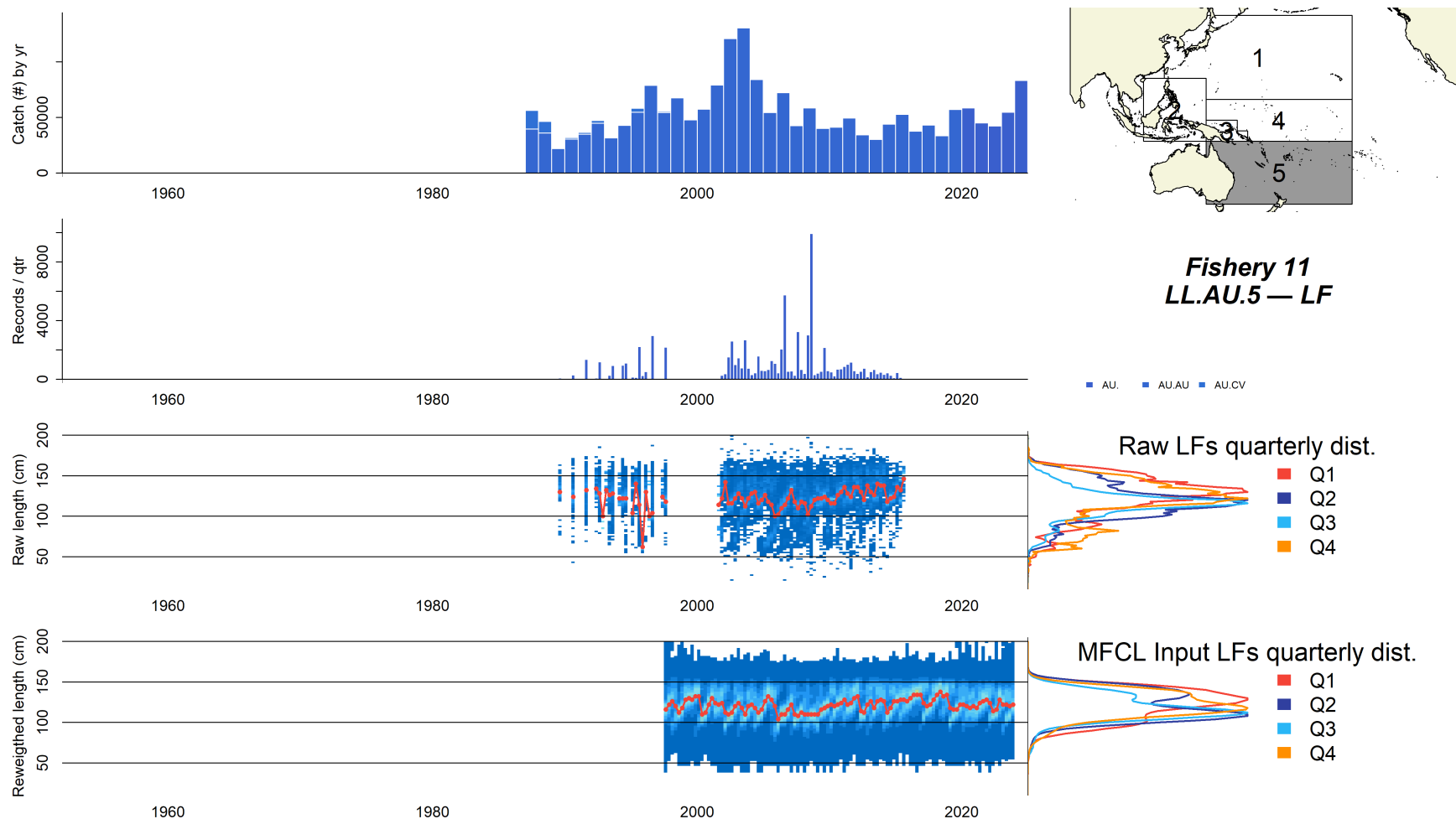


Figure 129: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 11 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

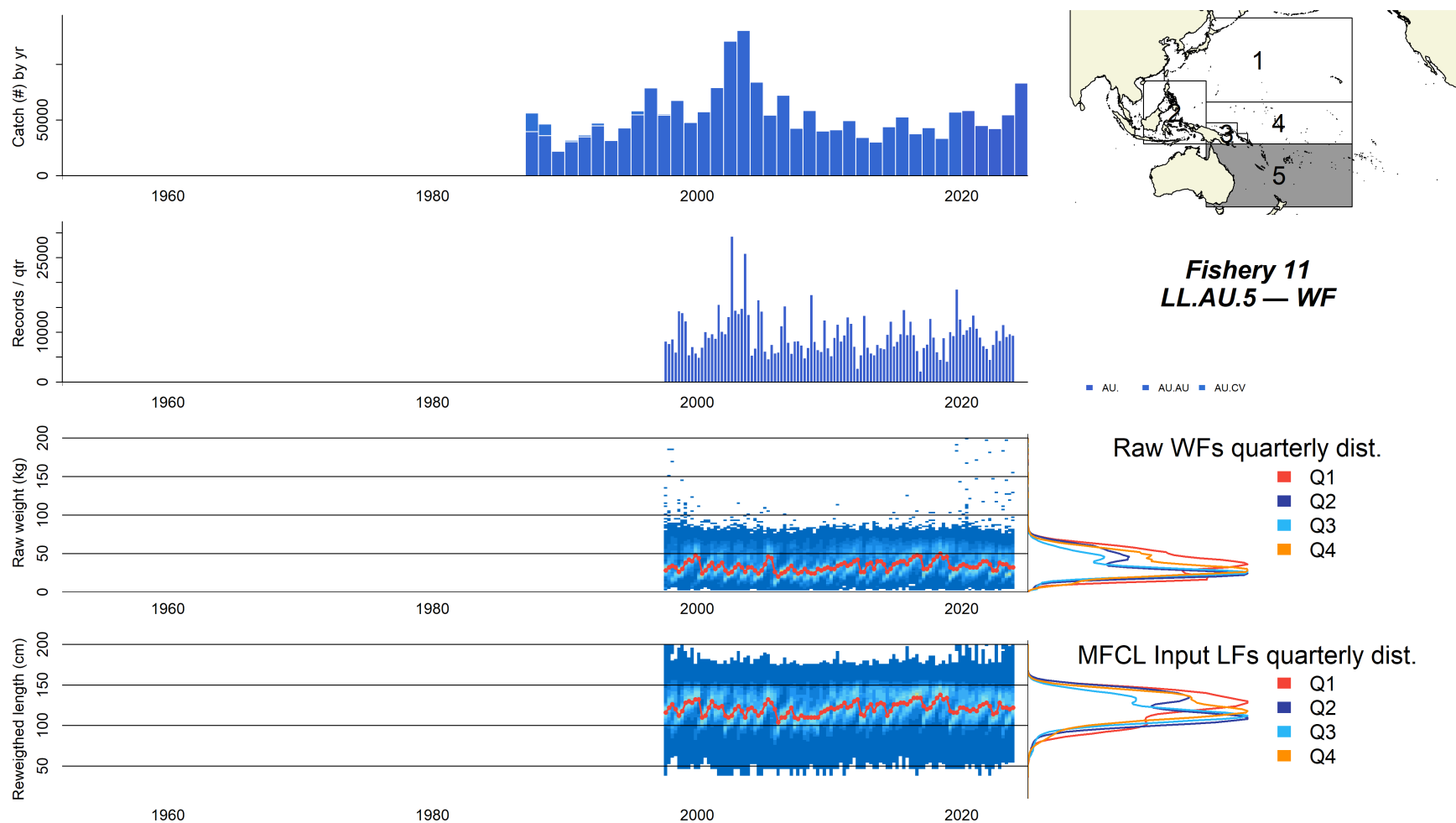


Figure 130: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 11 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

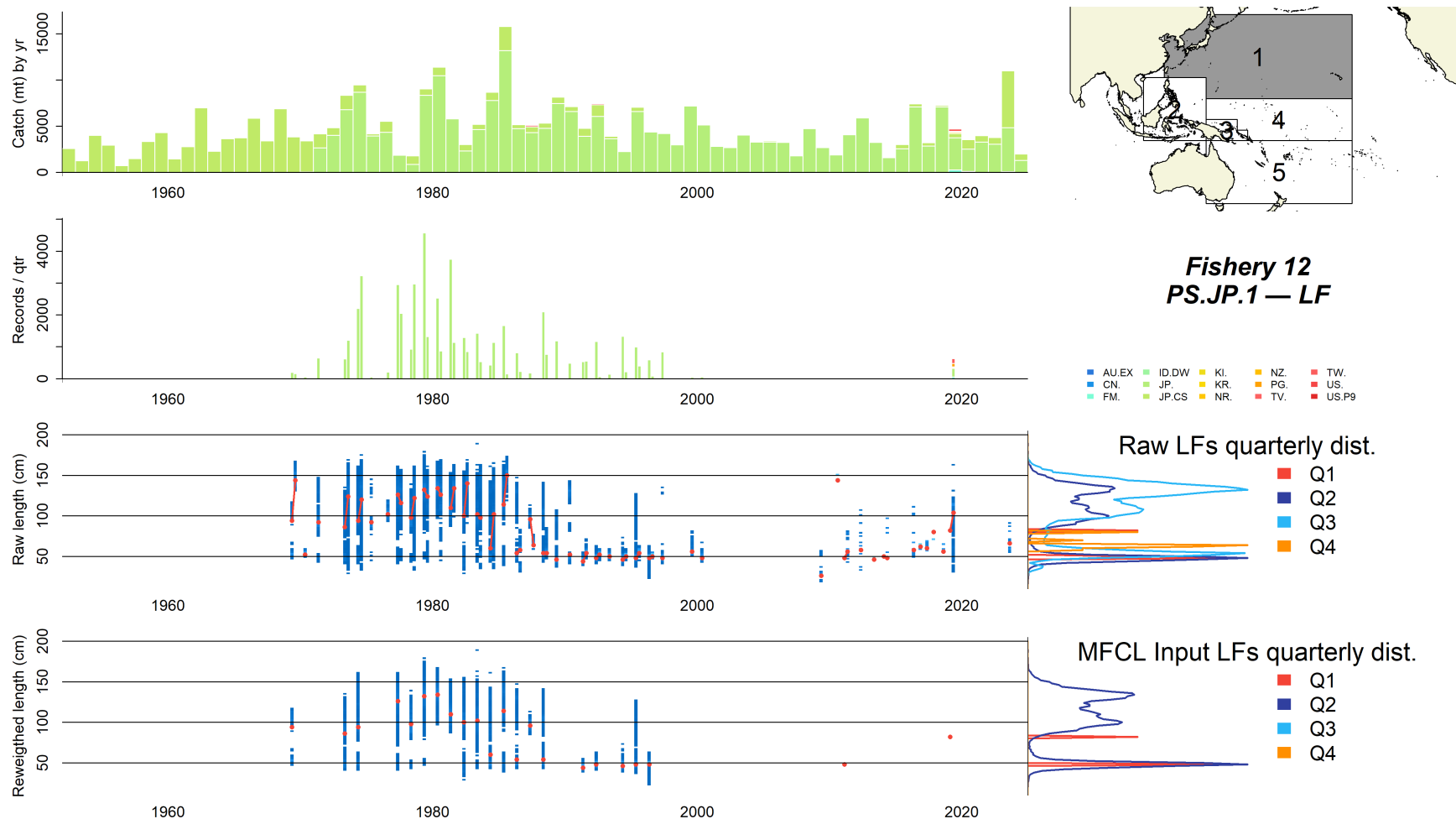


Figure 131: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 12 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

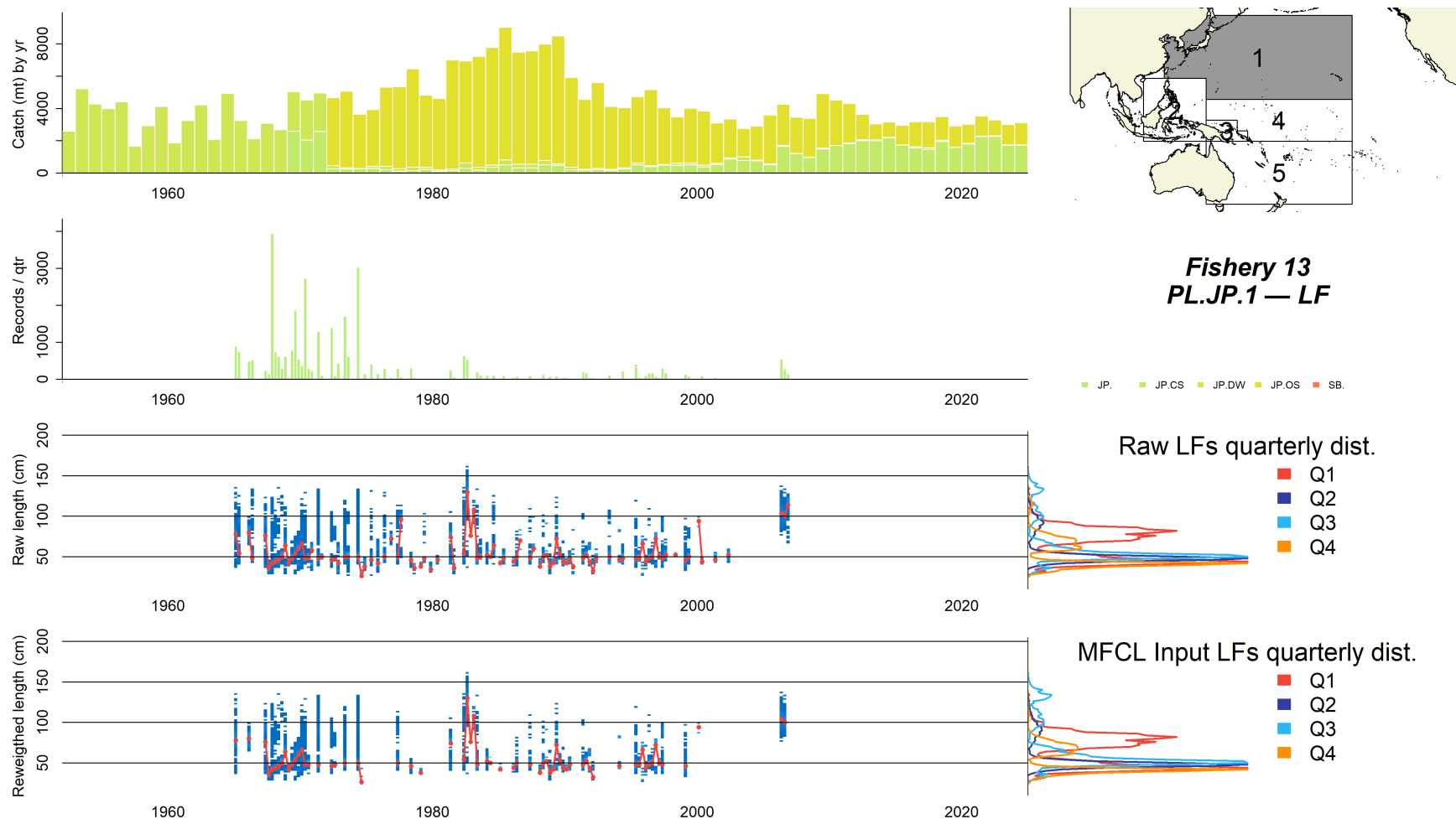


Figure 132: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 13 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

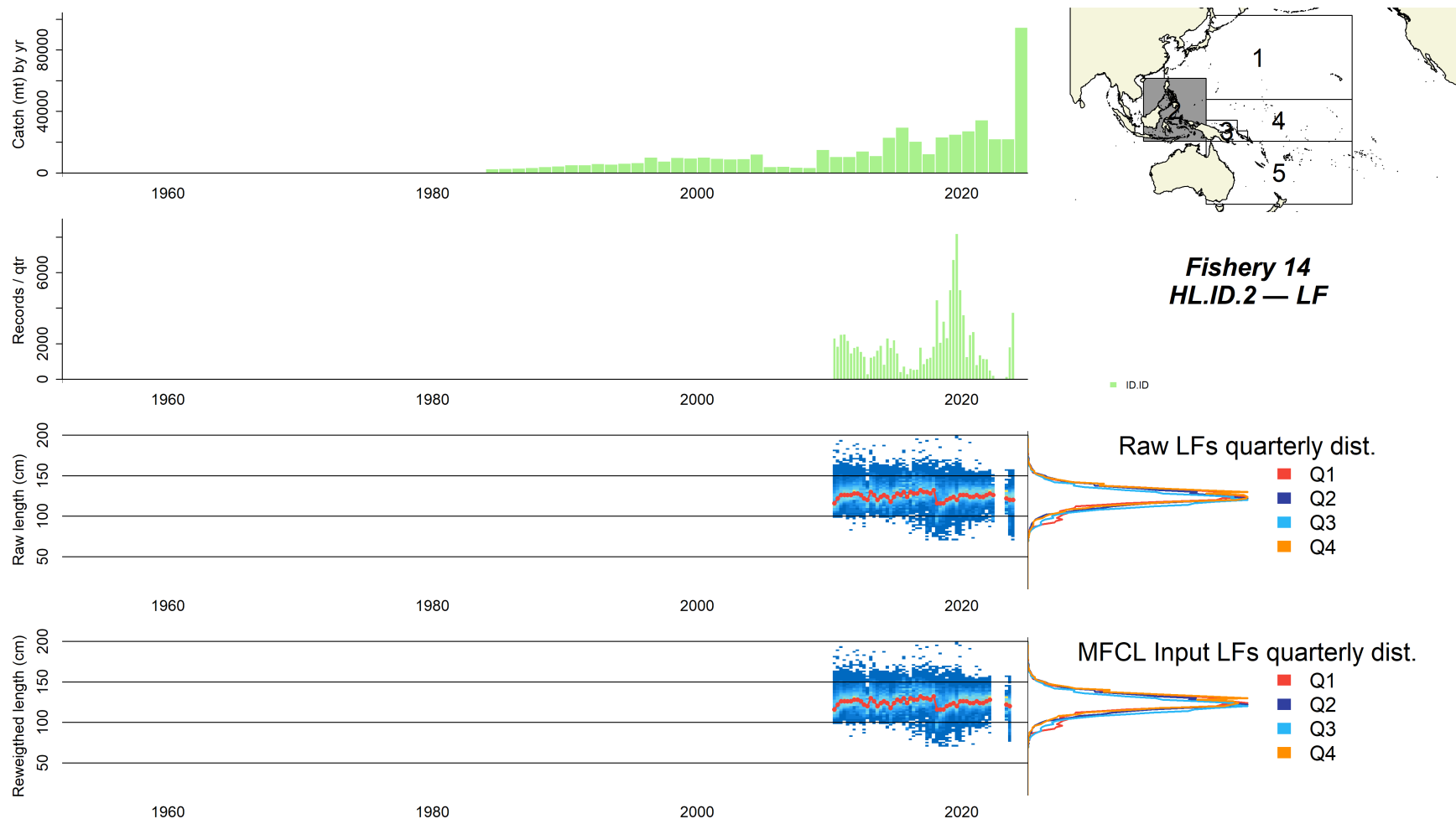


Figure 133: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 14 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

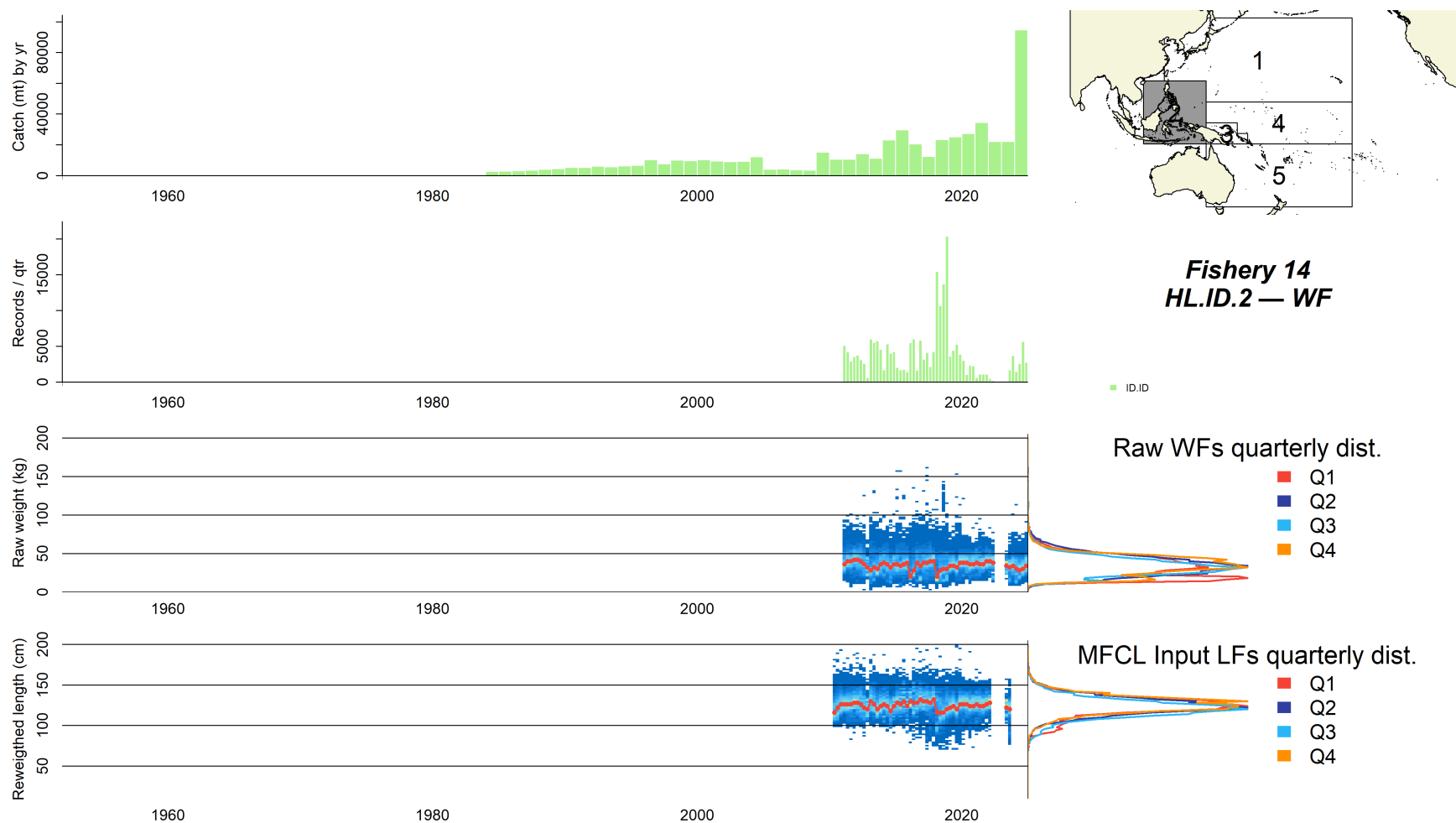


Figure 134: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 14 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

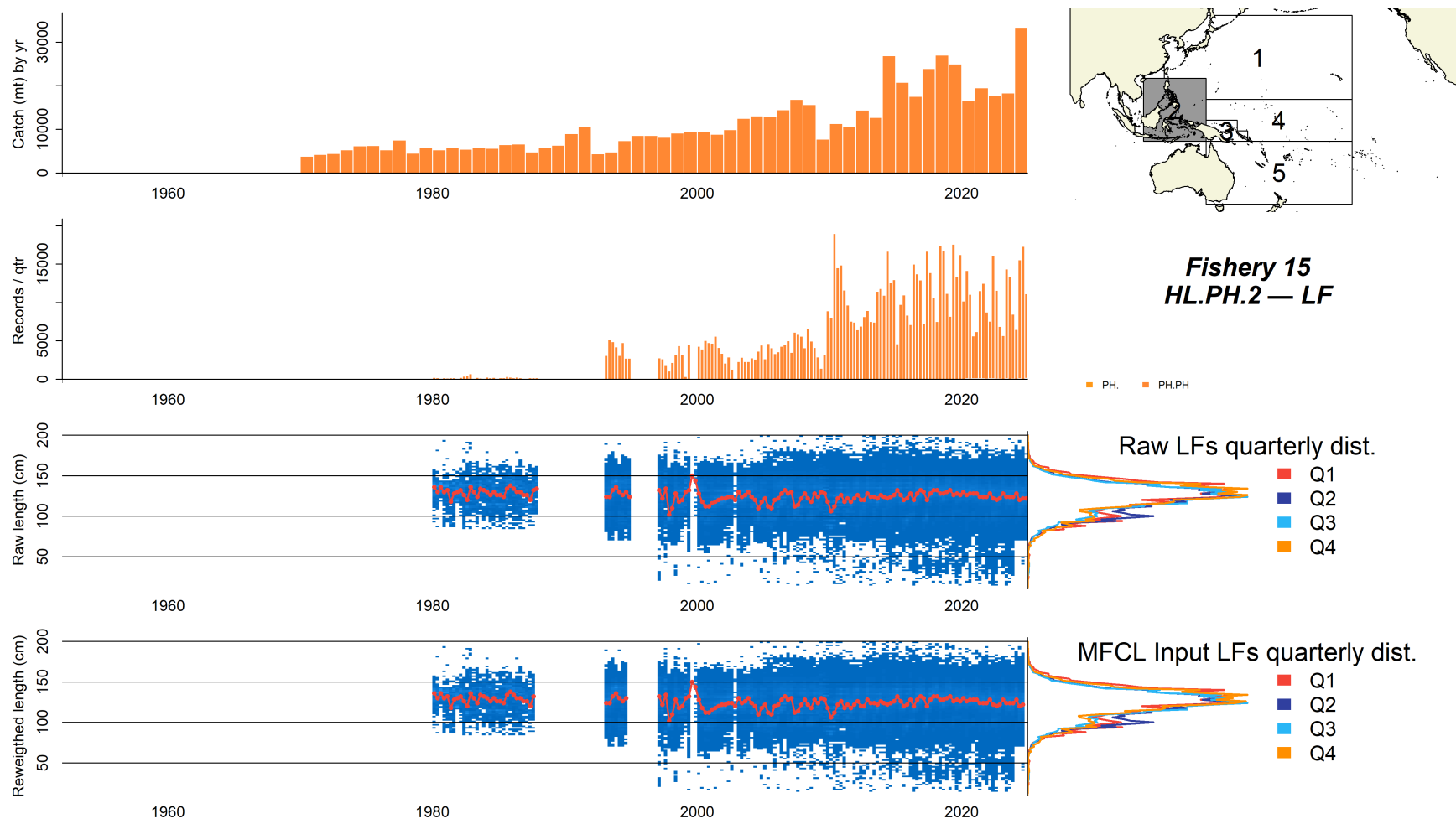


Figure 135: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 15 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

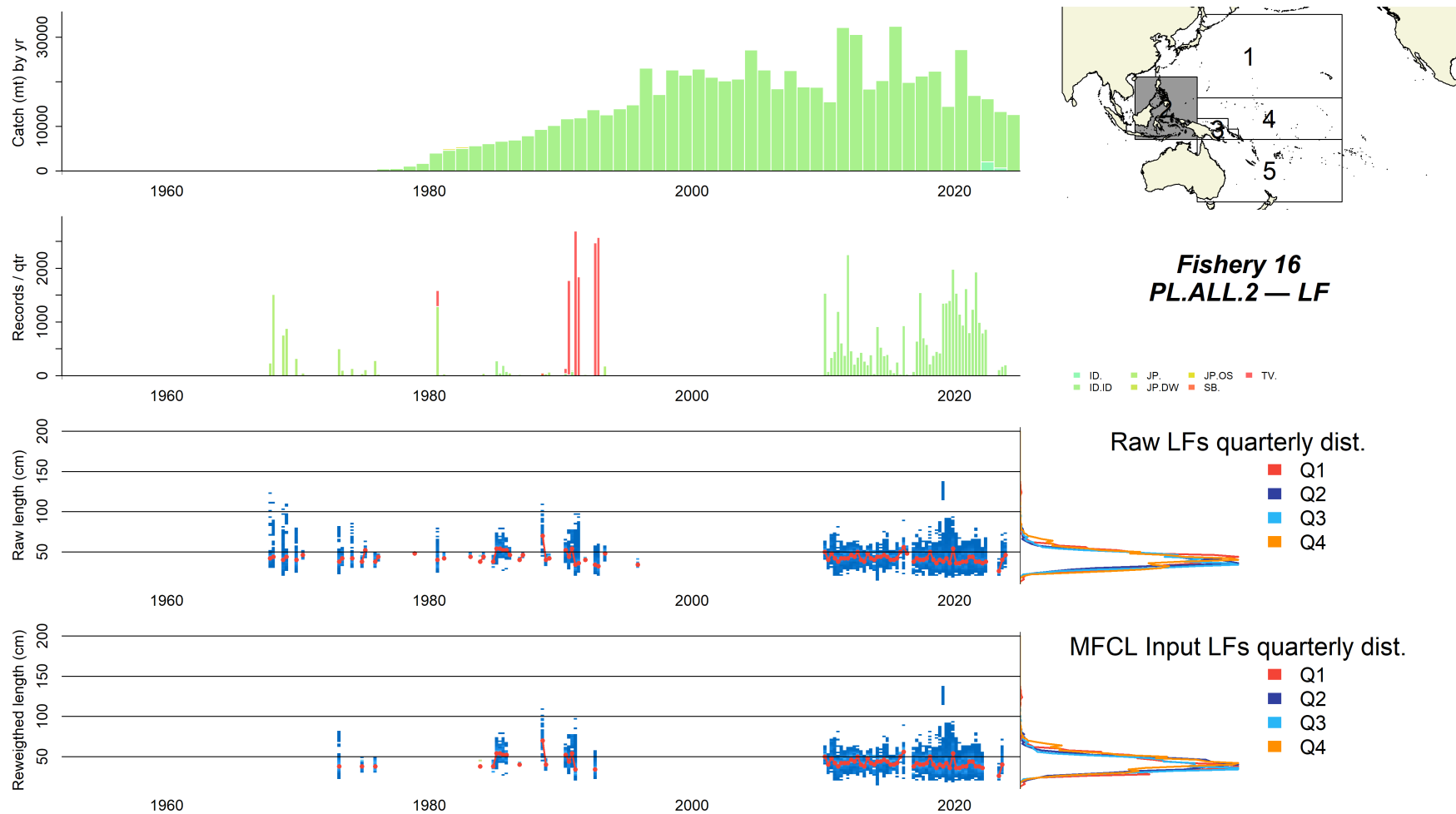


Figure 136: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 16 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

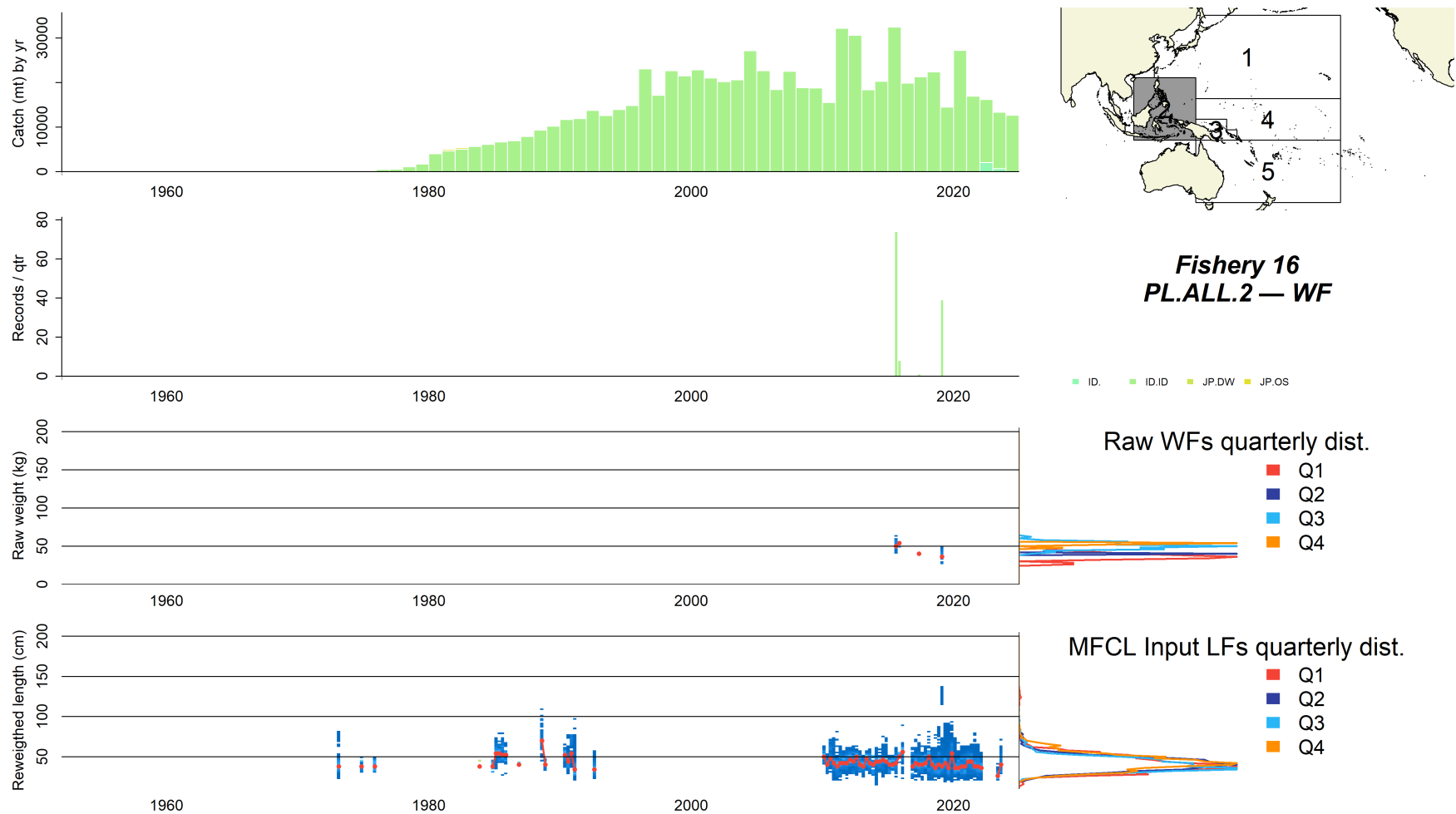


Figure 137: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 16 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

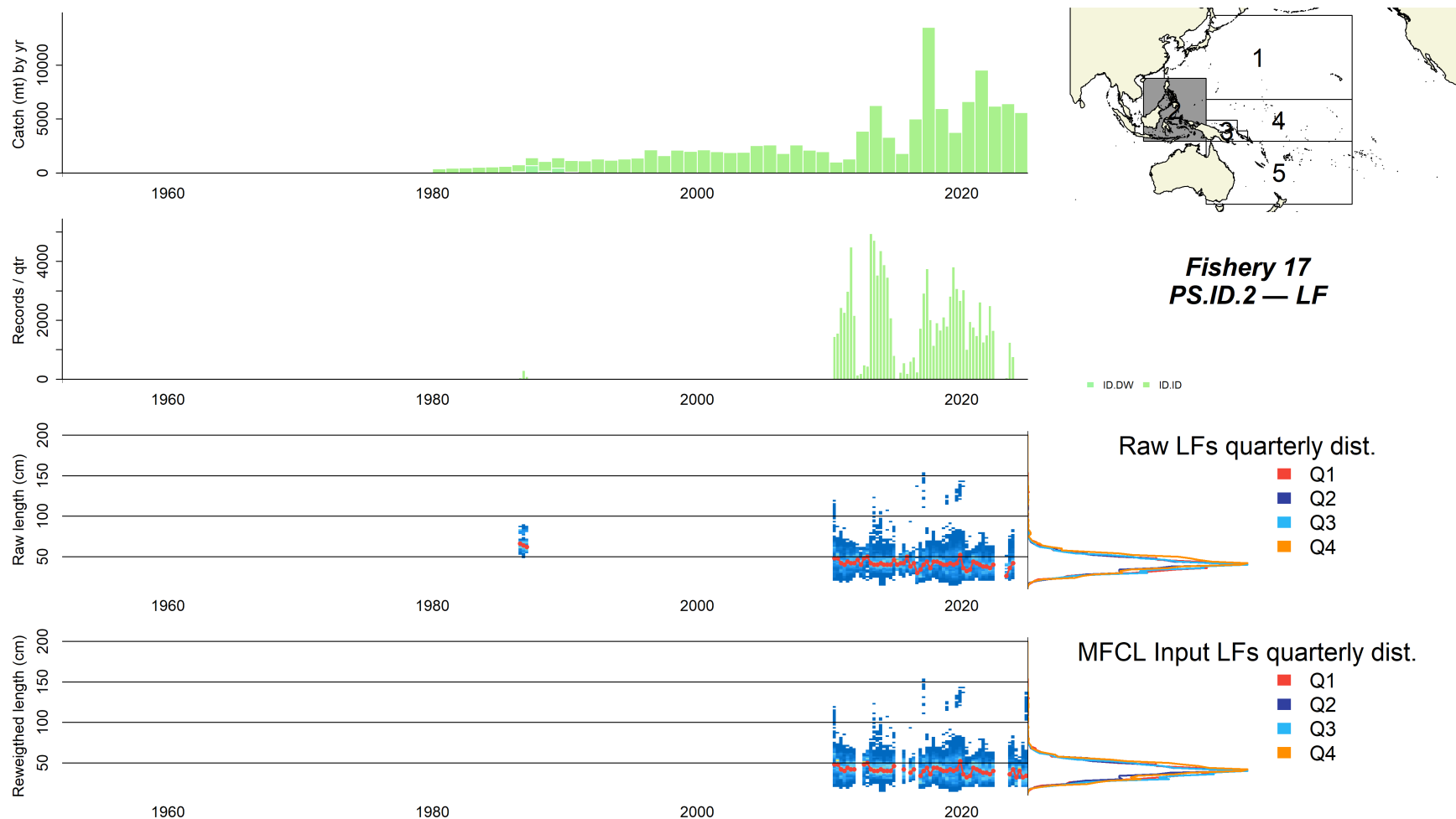


Figure 138: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 17 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

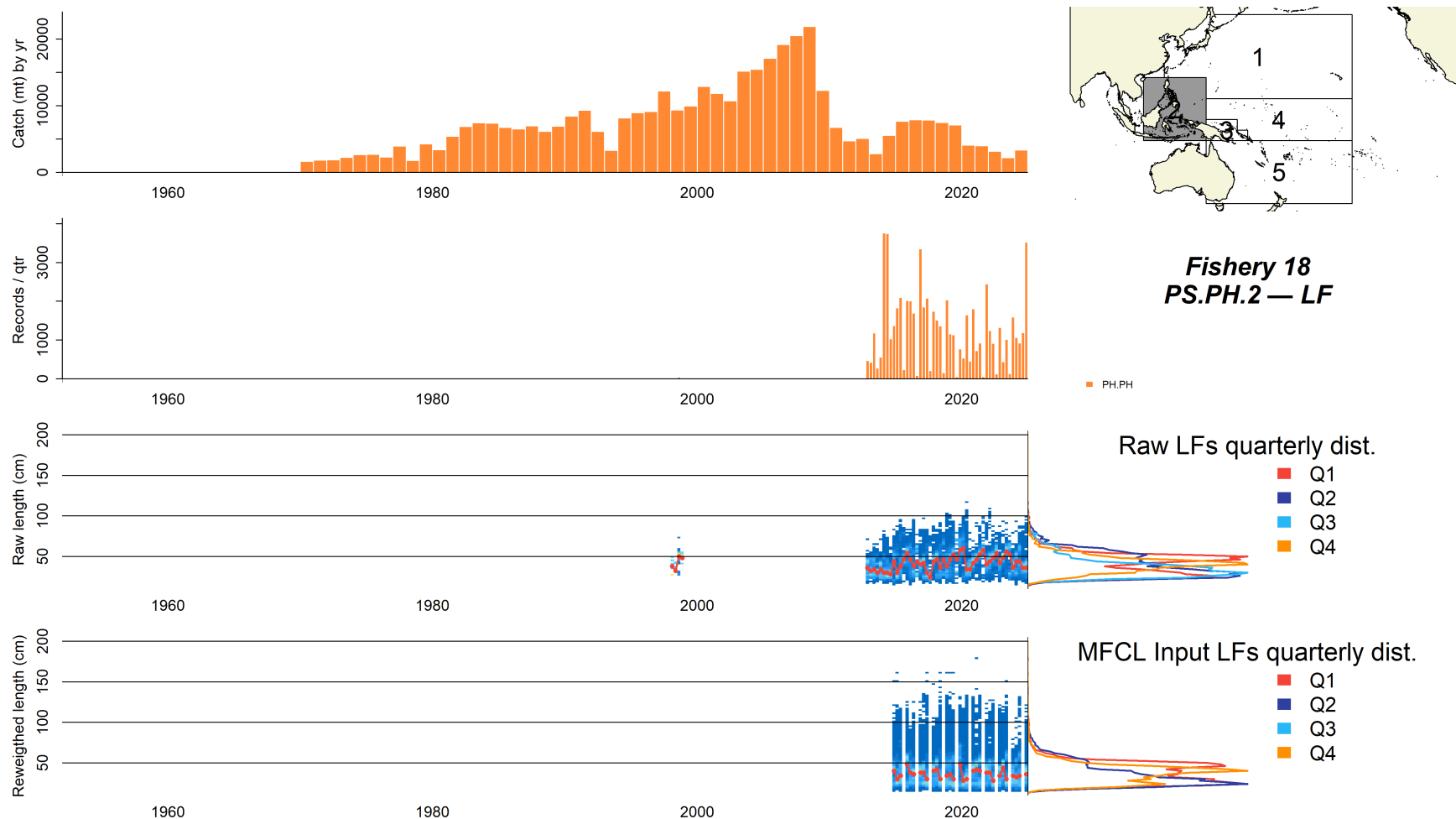


Figure 139: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 18 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

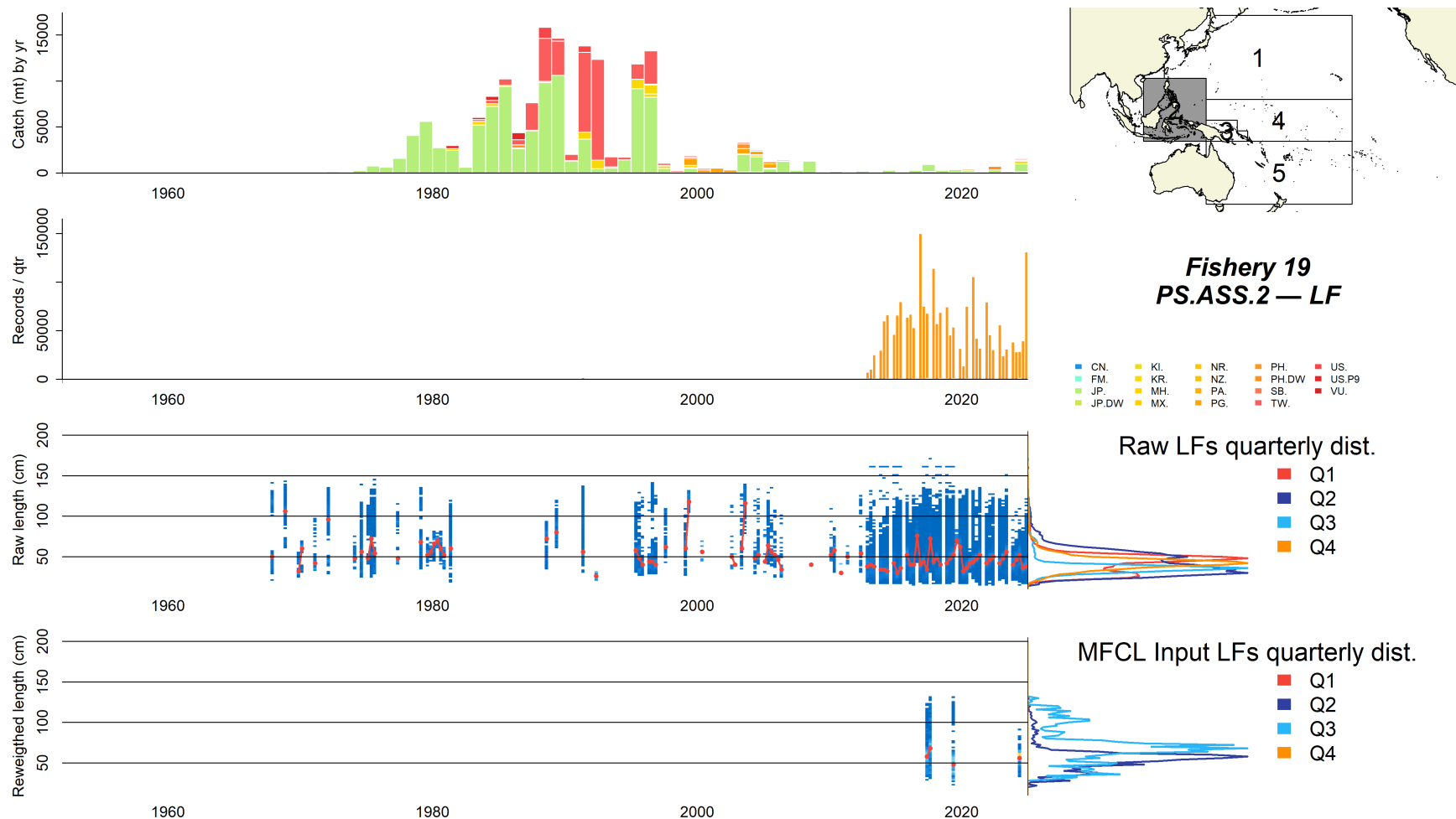


Figure 140: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 19 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

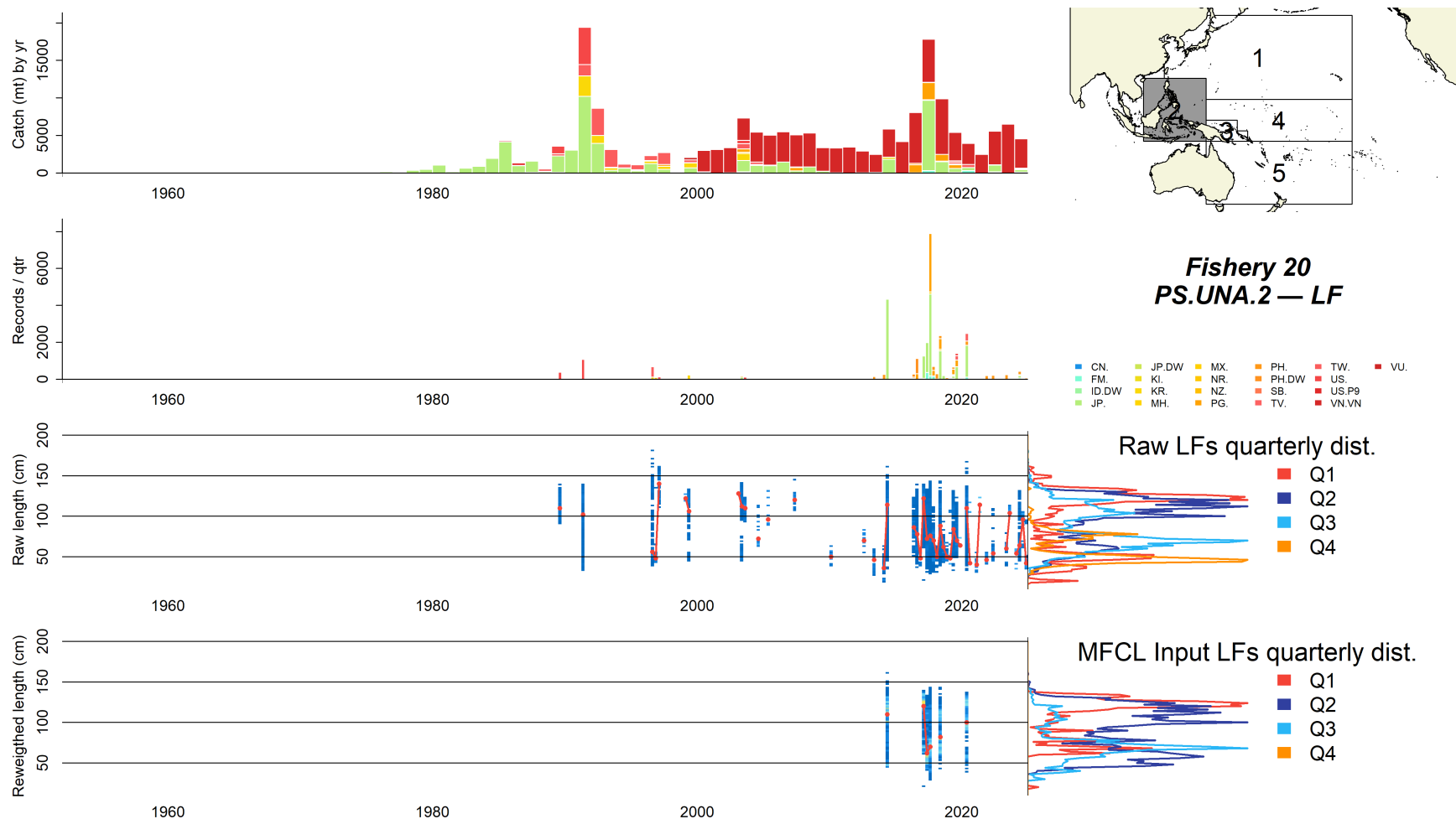


Figure 141: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 20 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

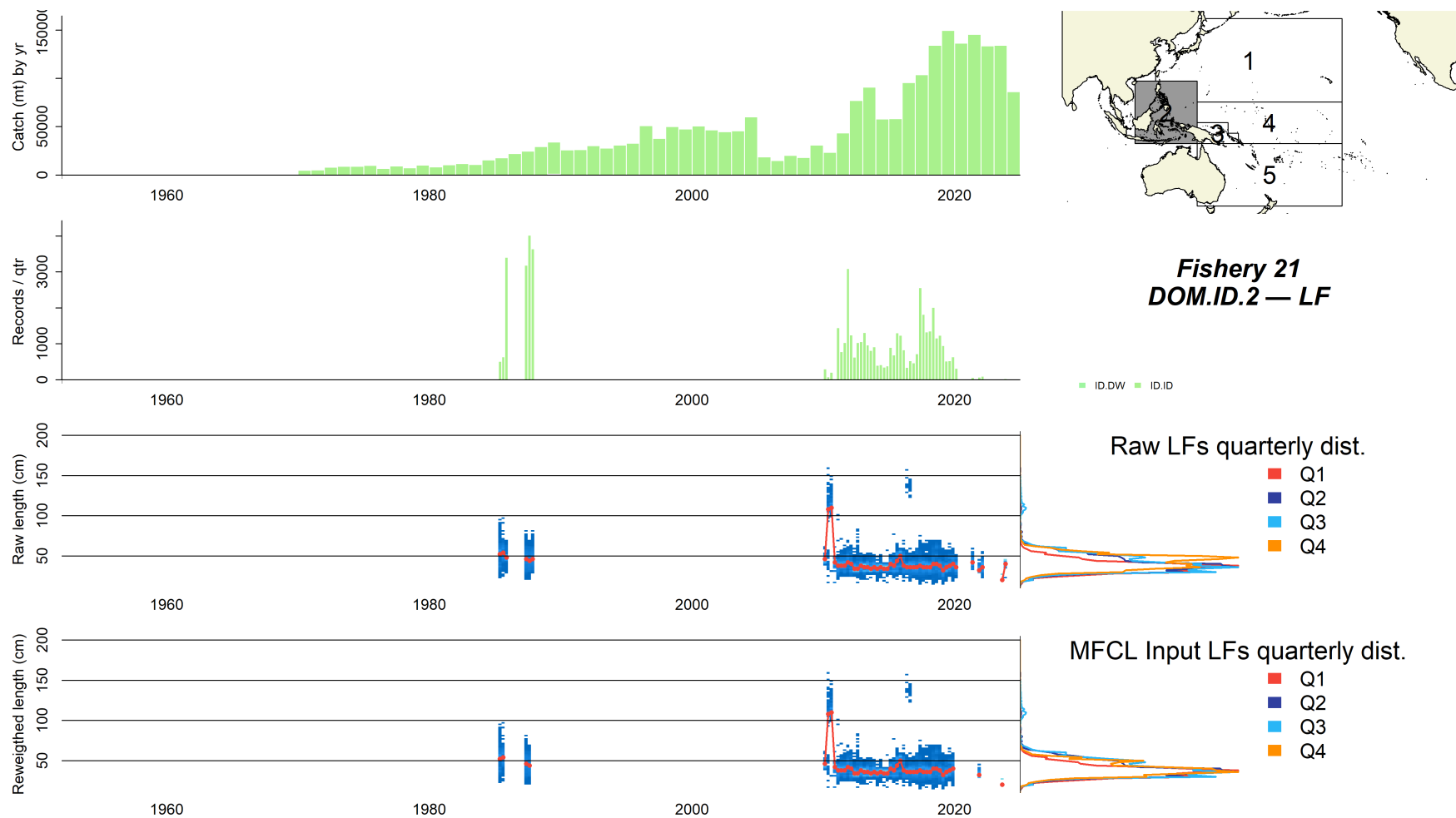


Figure 142: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 21 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

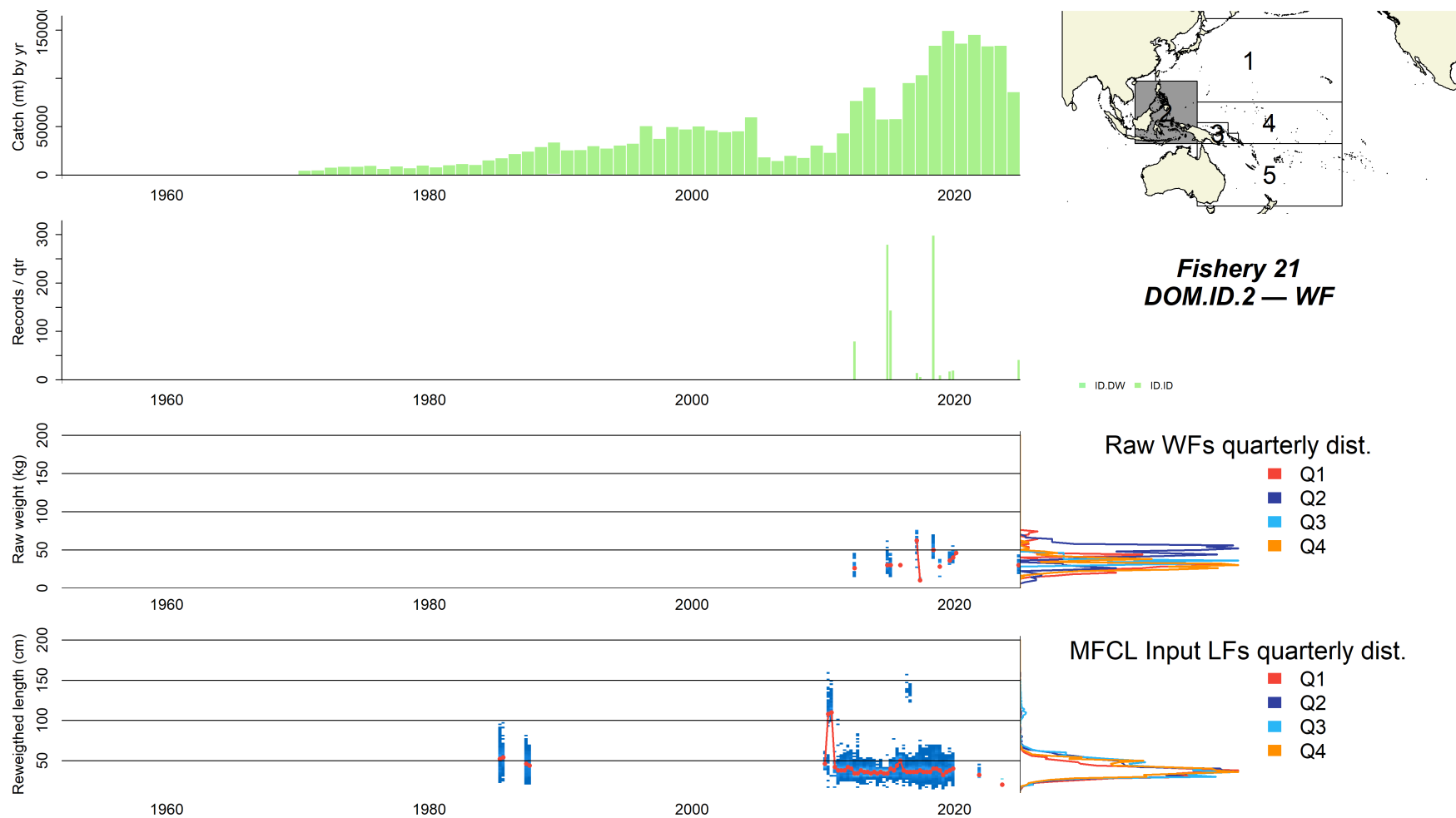


Figure 143: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 21 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

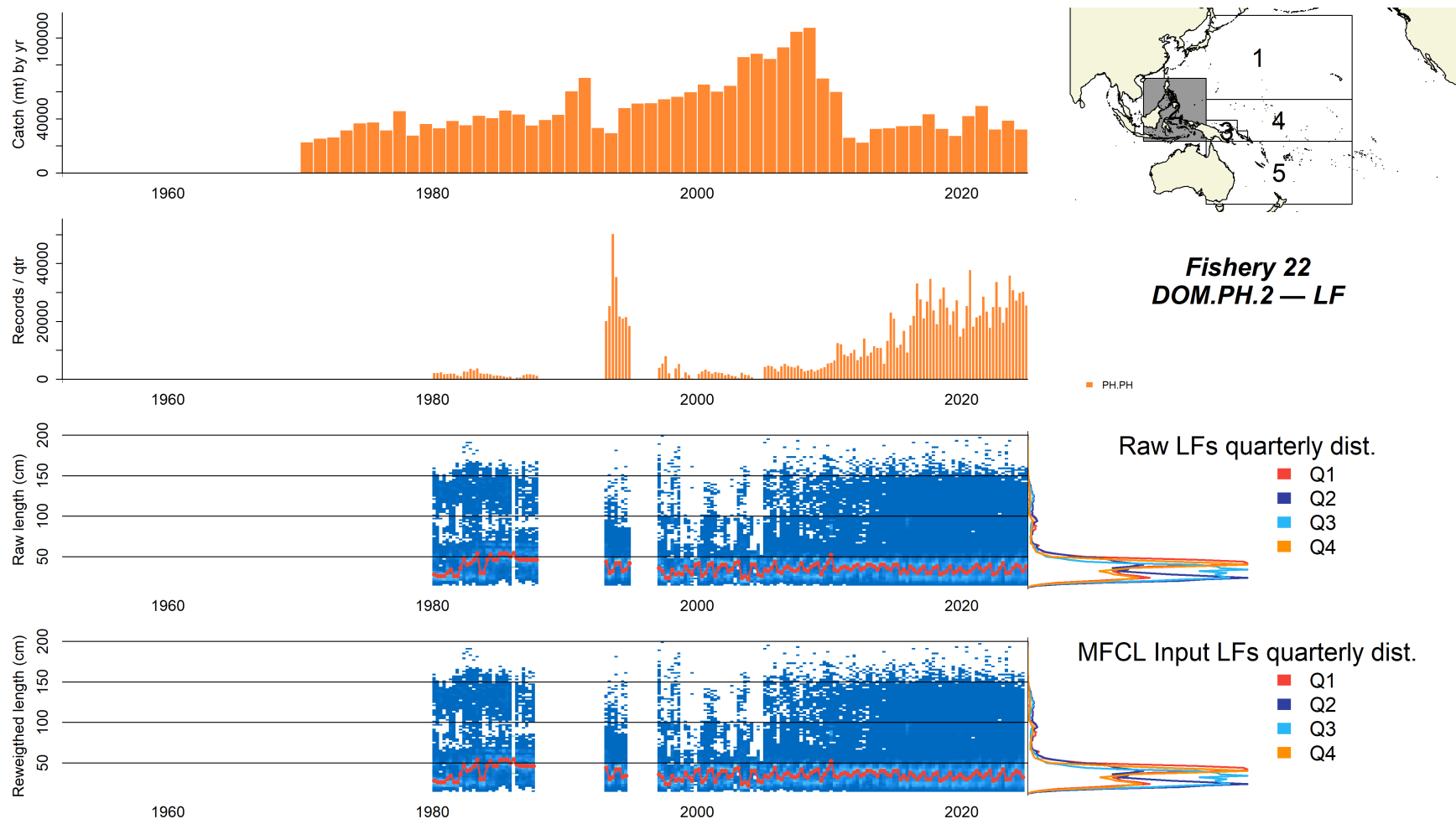


Figure 144: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 22 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

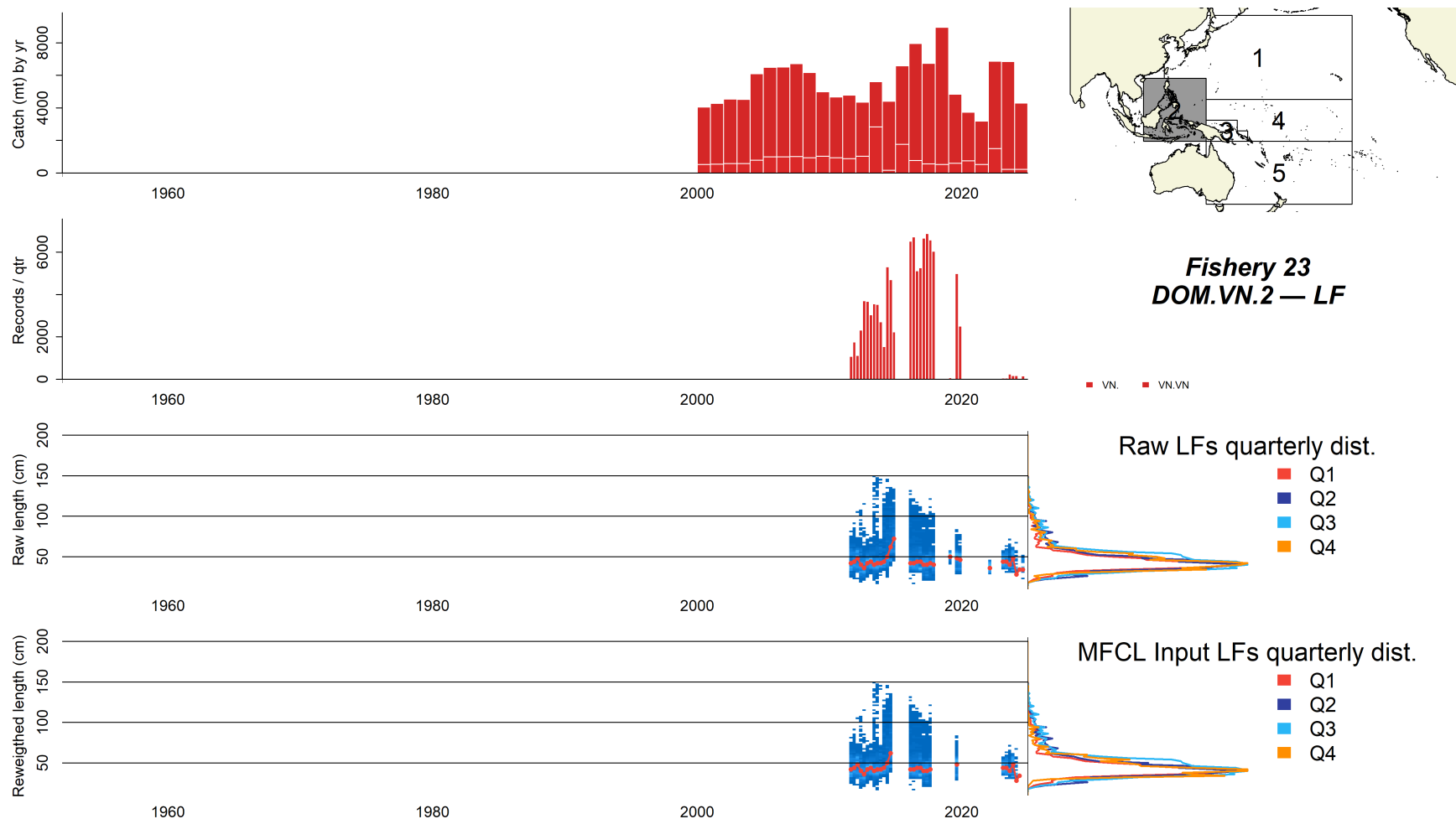


Figure 145: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 23 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

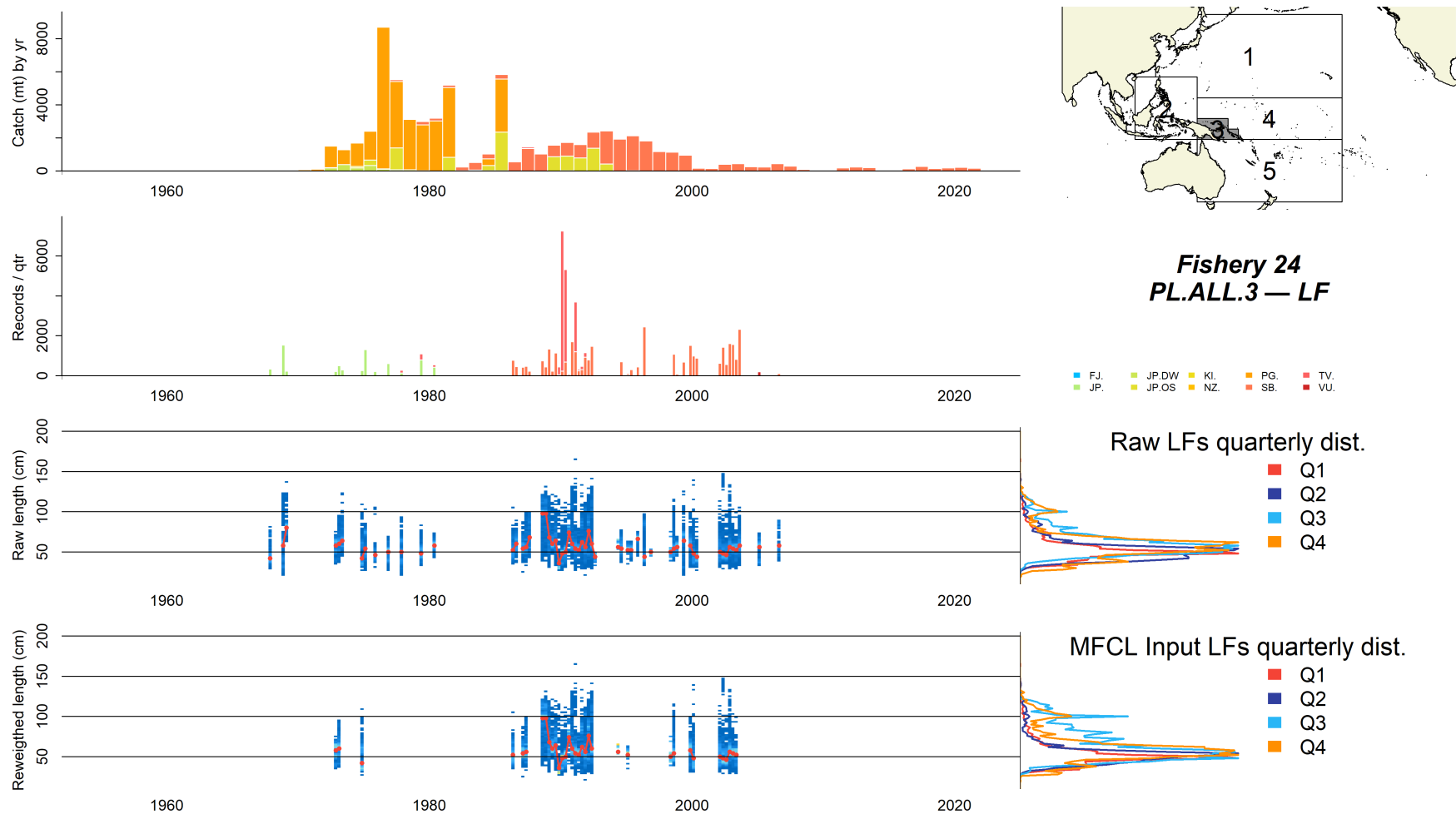


Figure 146: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 24 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

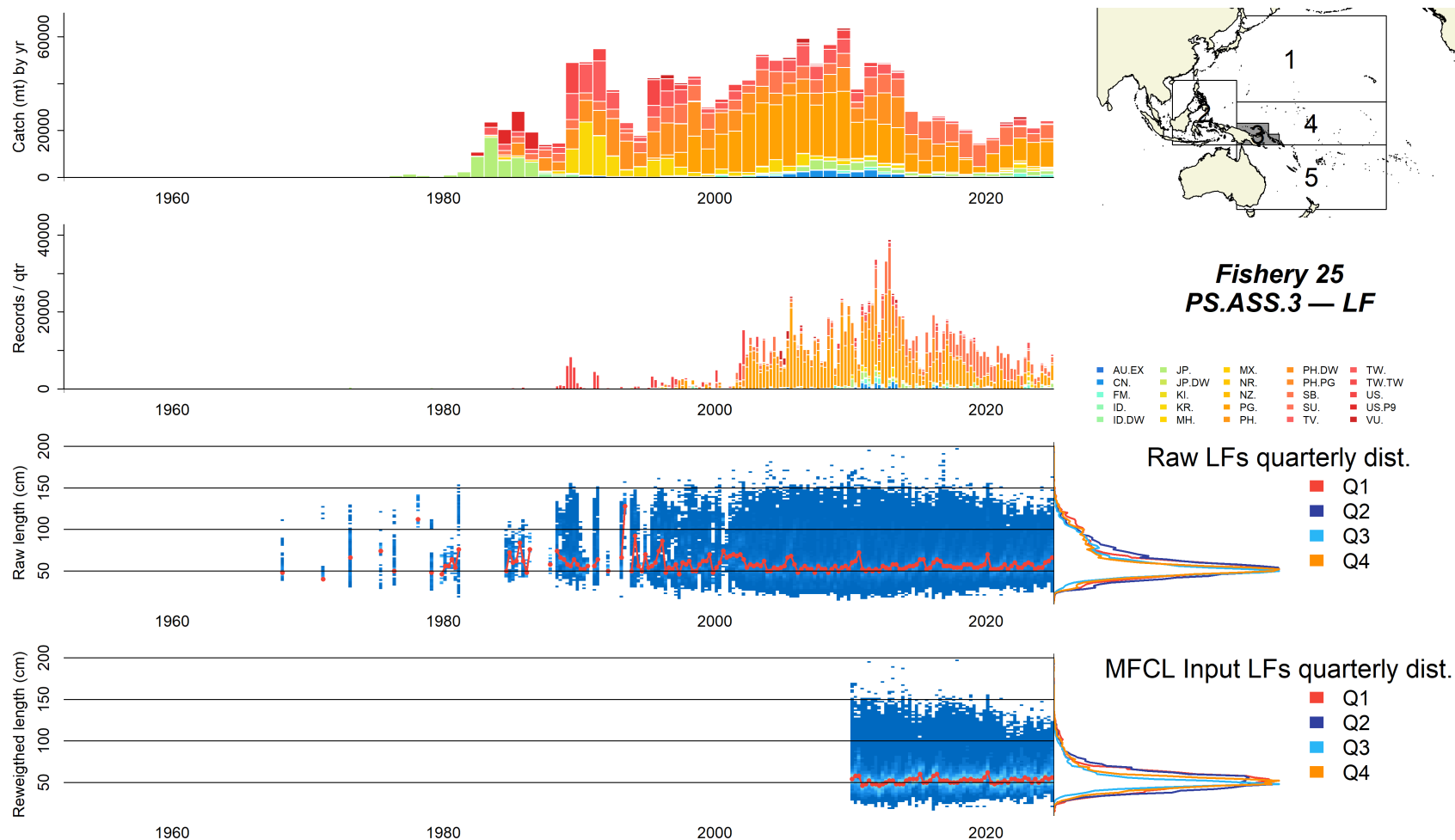


Figure 147: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 25 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

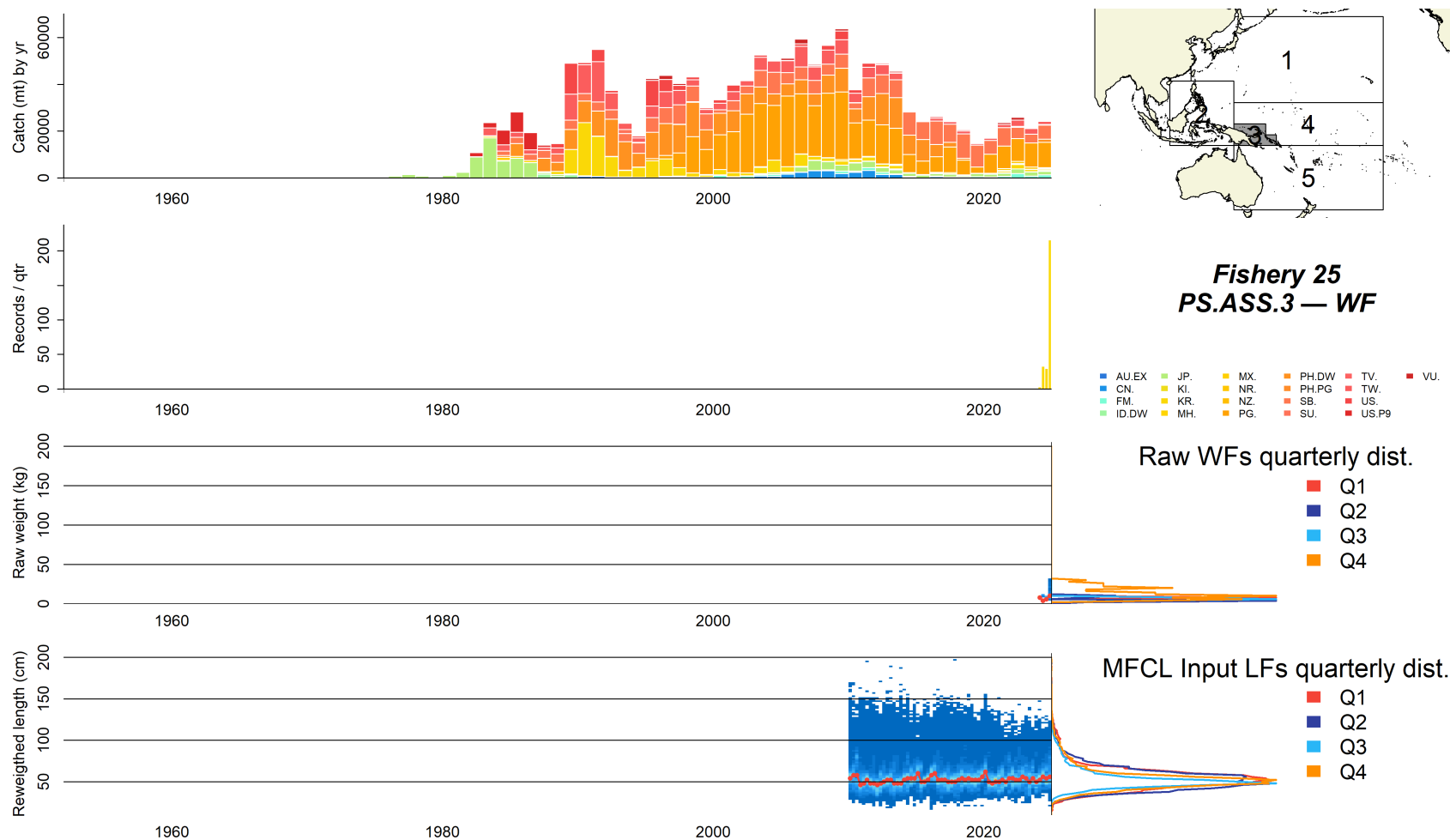


Figure 148: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 25 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

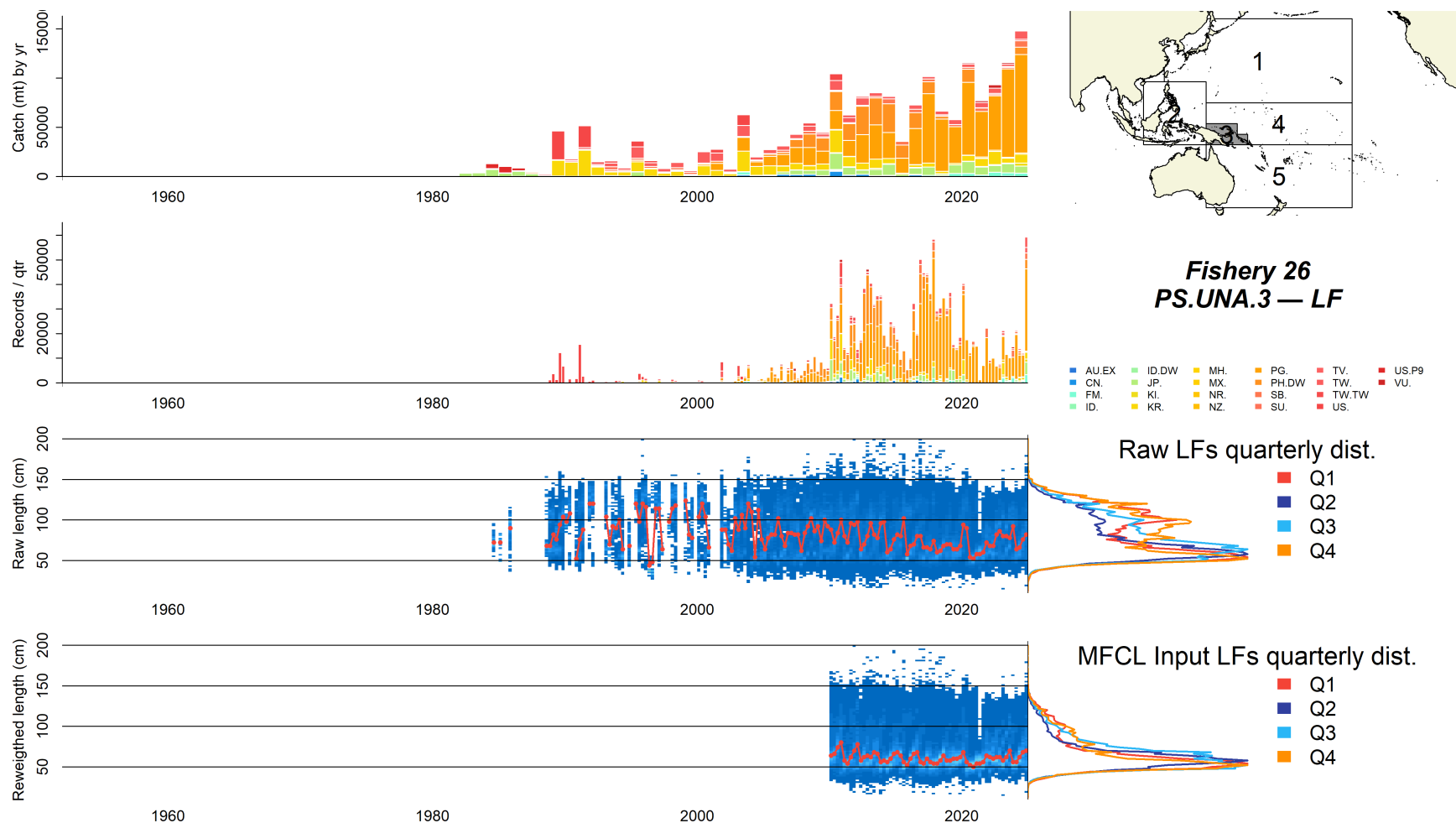


Figure 149: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 26 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

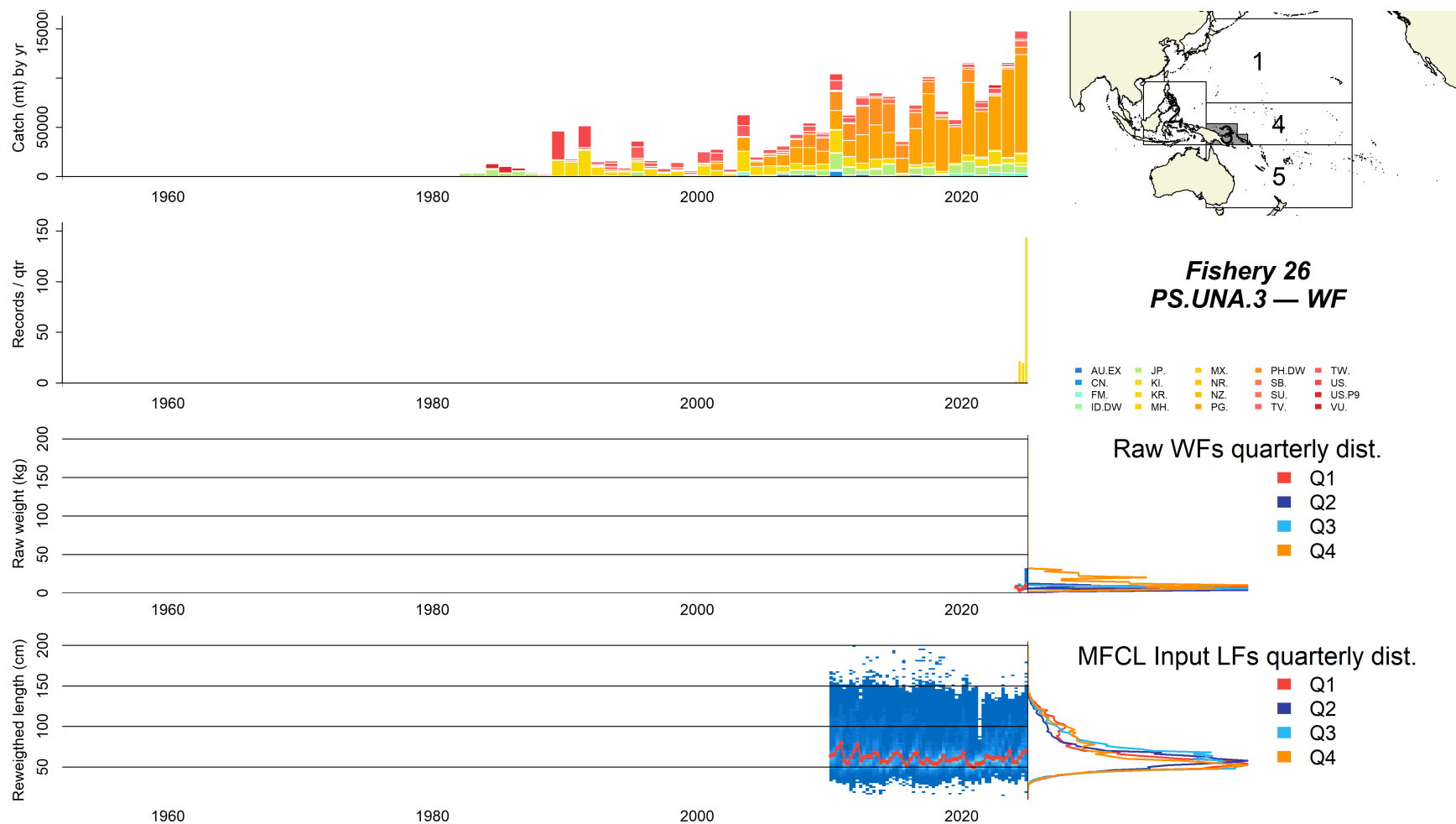


Figure 150: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 26 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

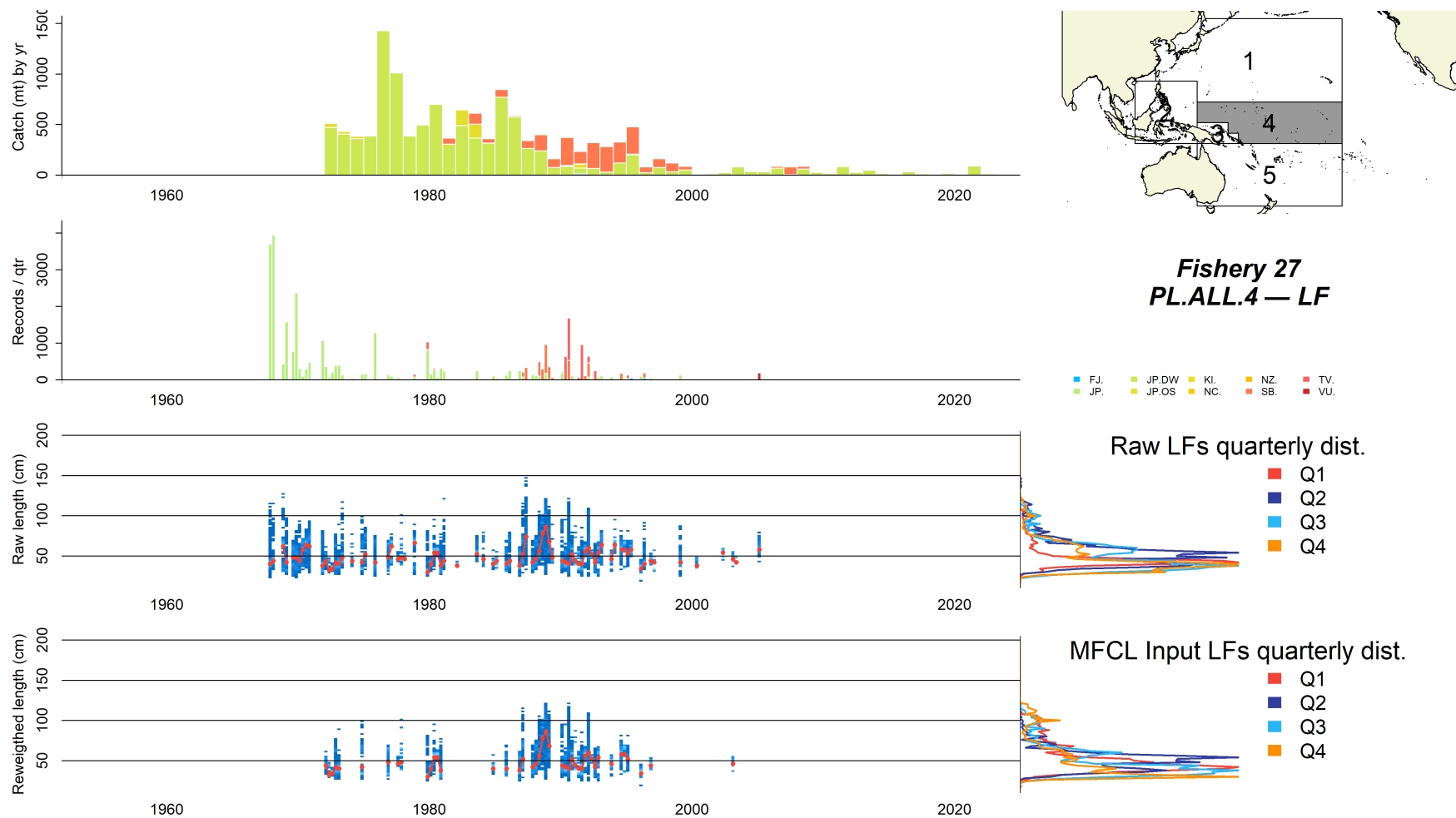


Figure 151: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 27 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

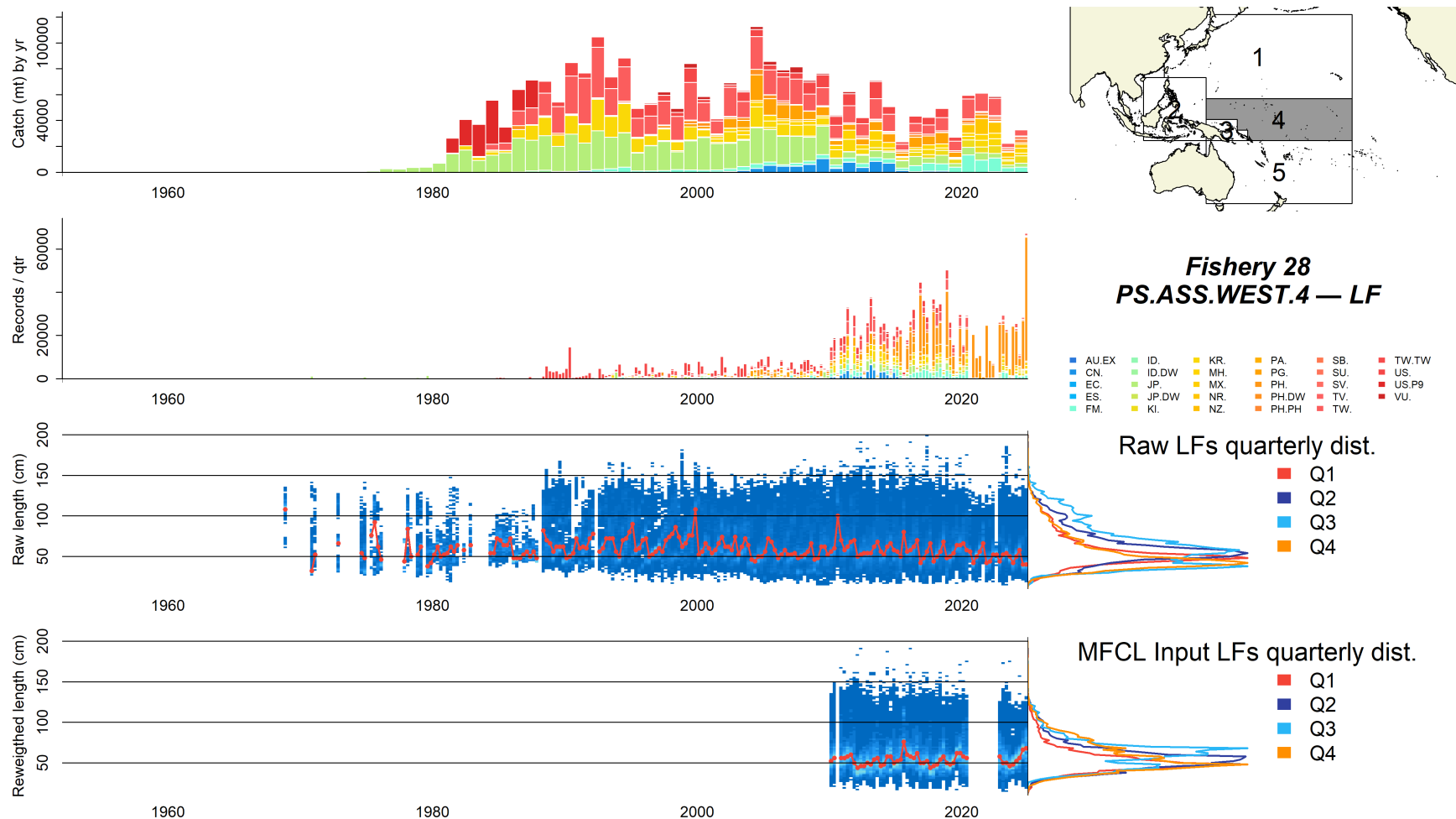


Figure 152: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 28 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

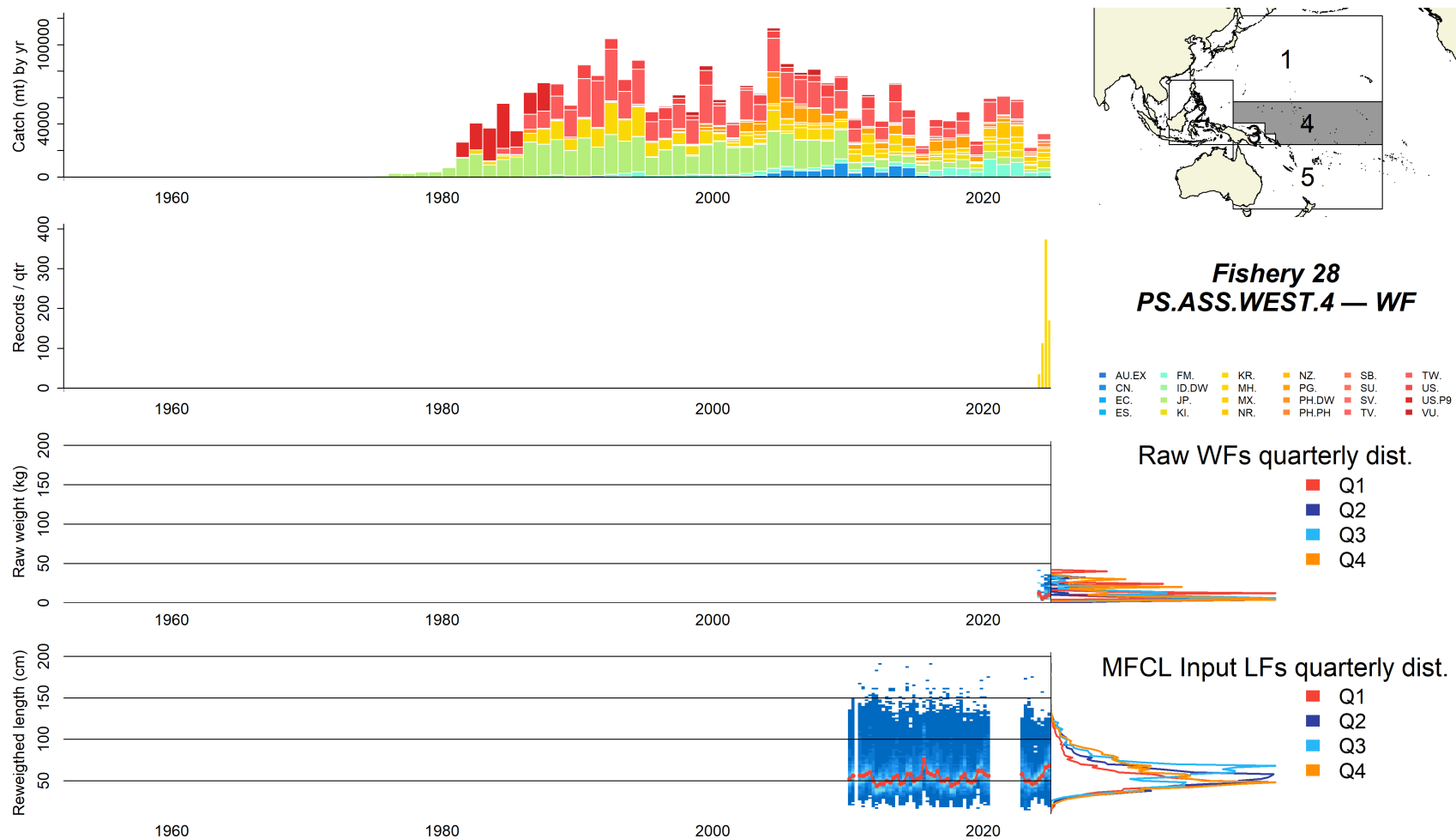


Figure 153: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 28 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

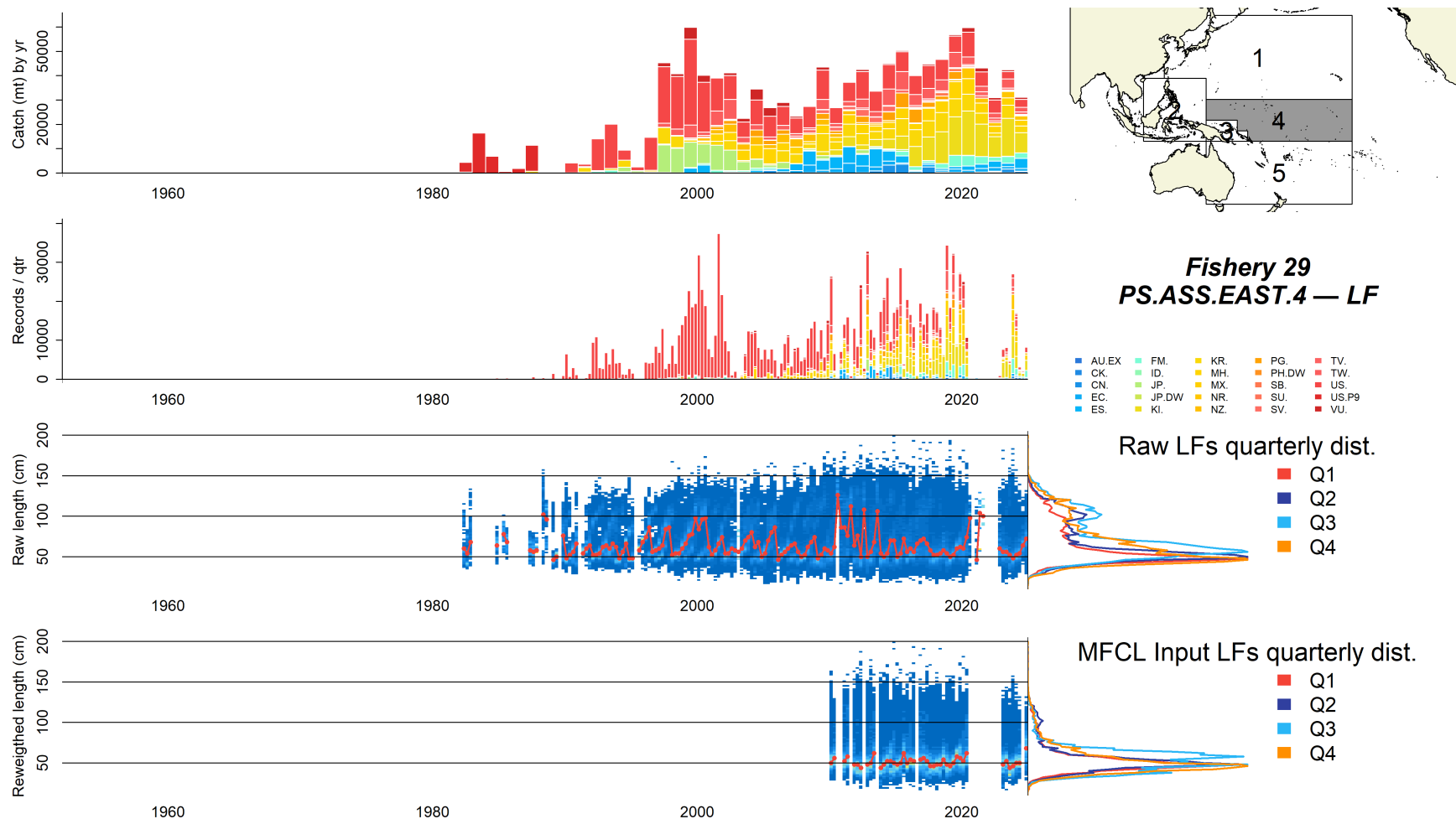


Figure 154: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 29 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

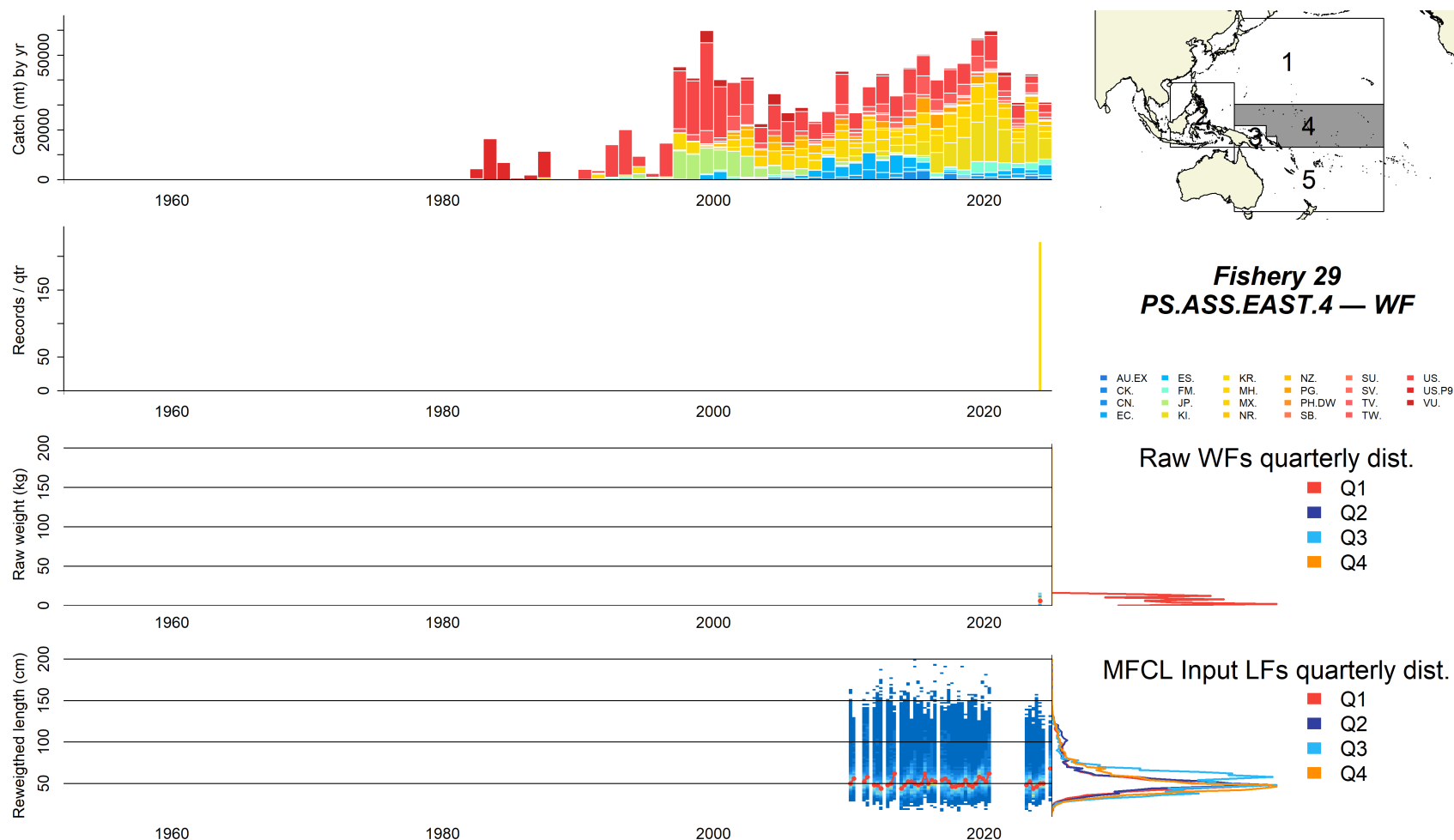


Figure 155: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 29 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

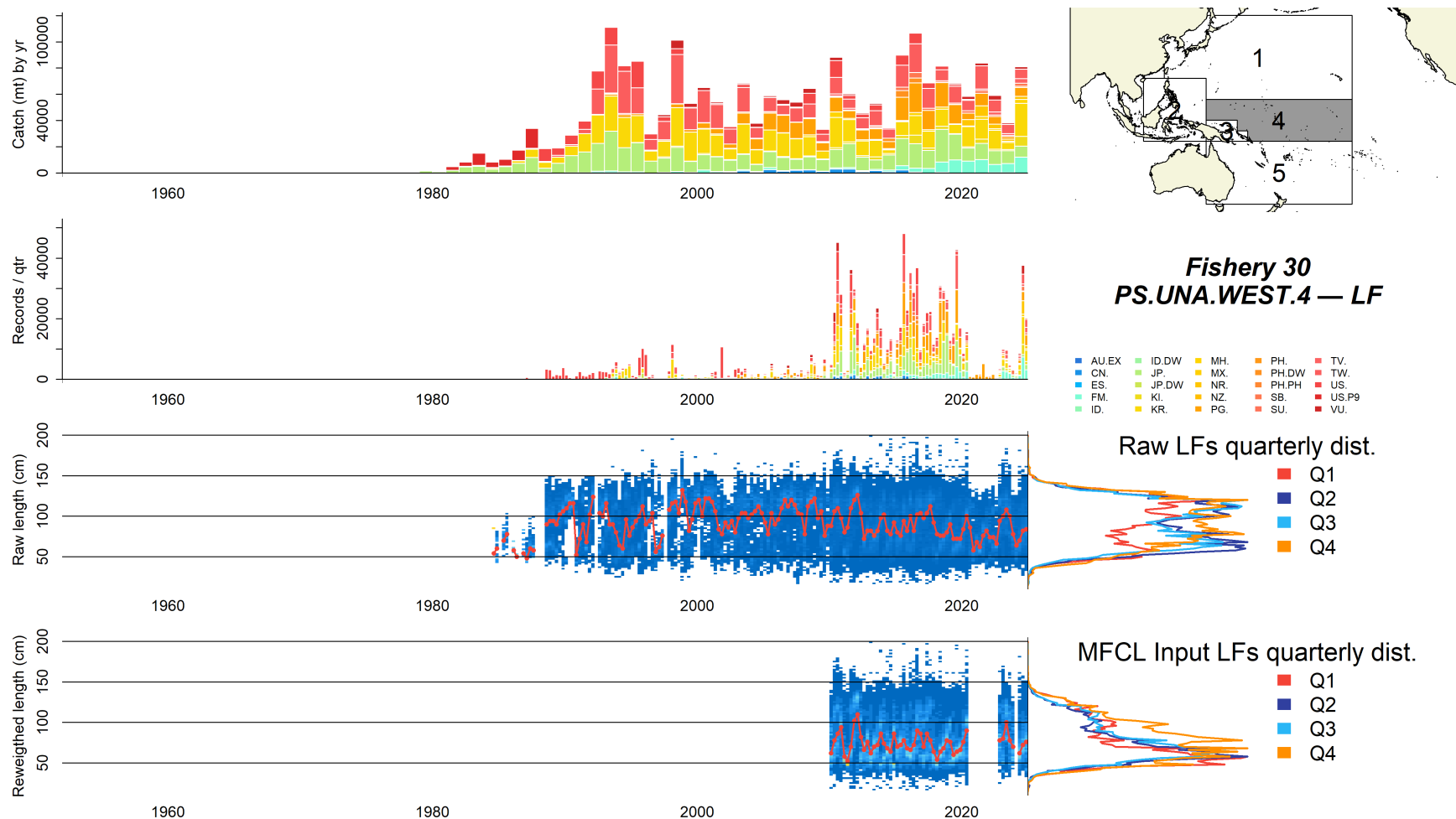


Figure 156: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 30 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

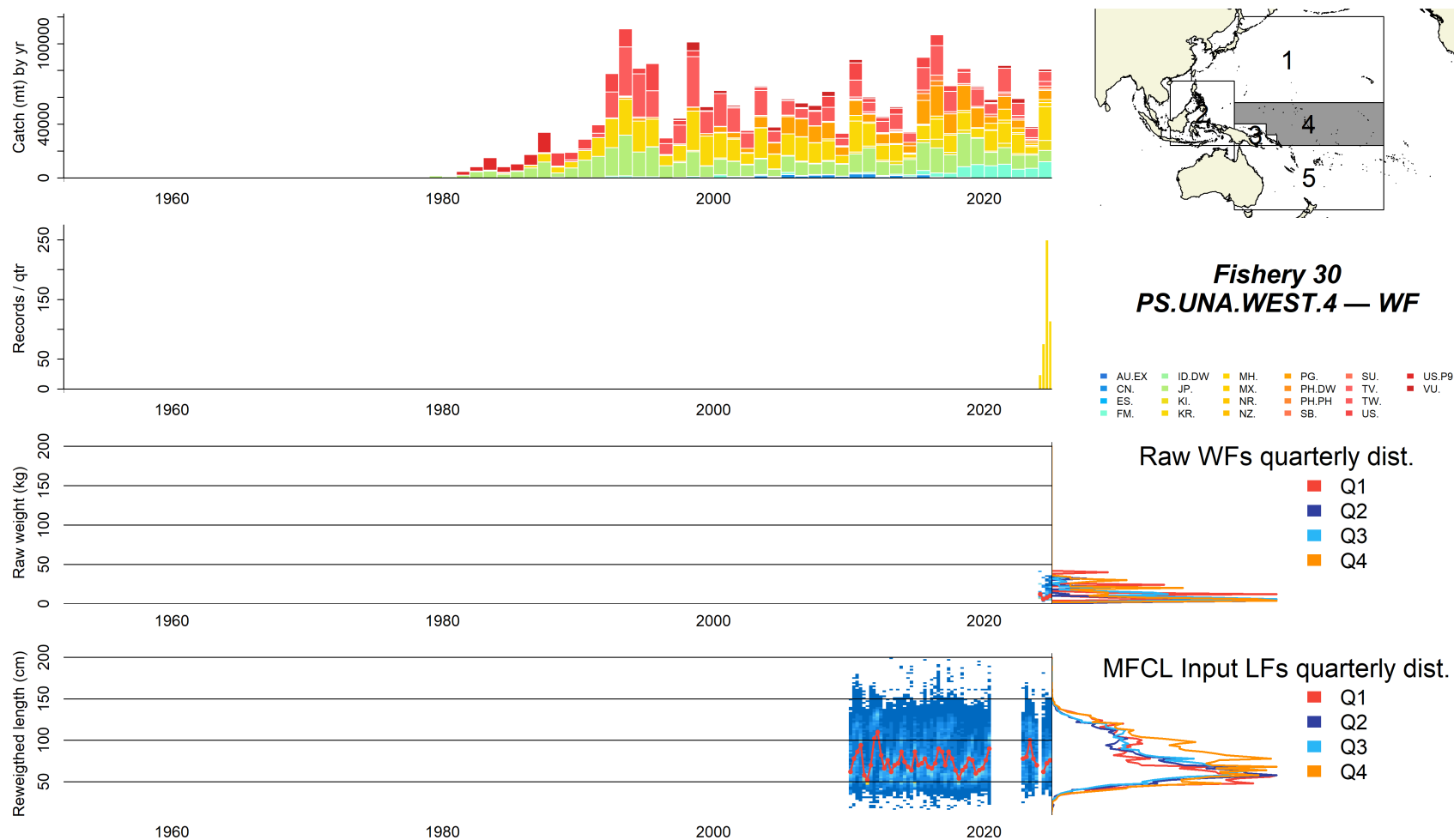


Figure 157: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 30 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

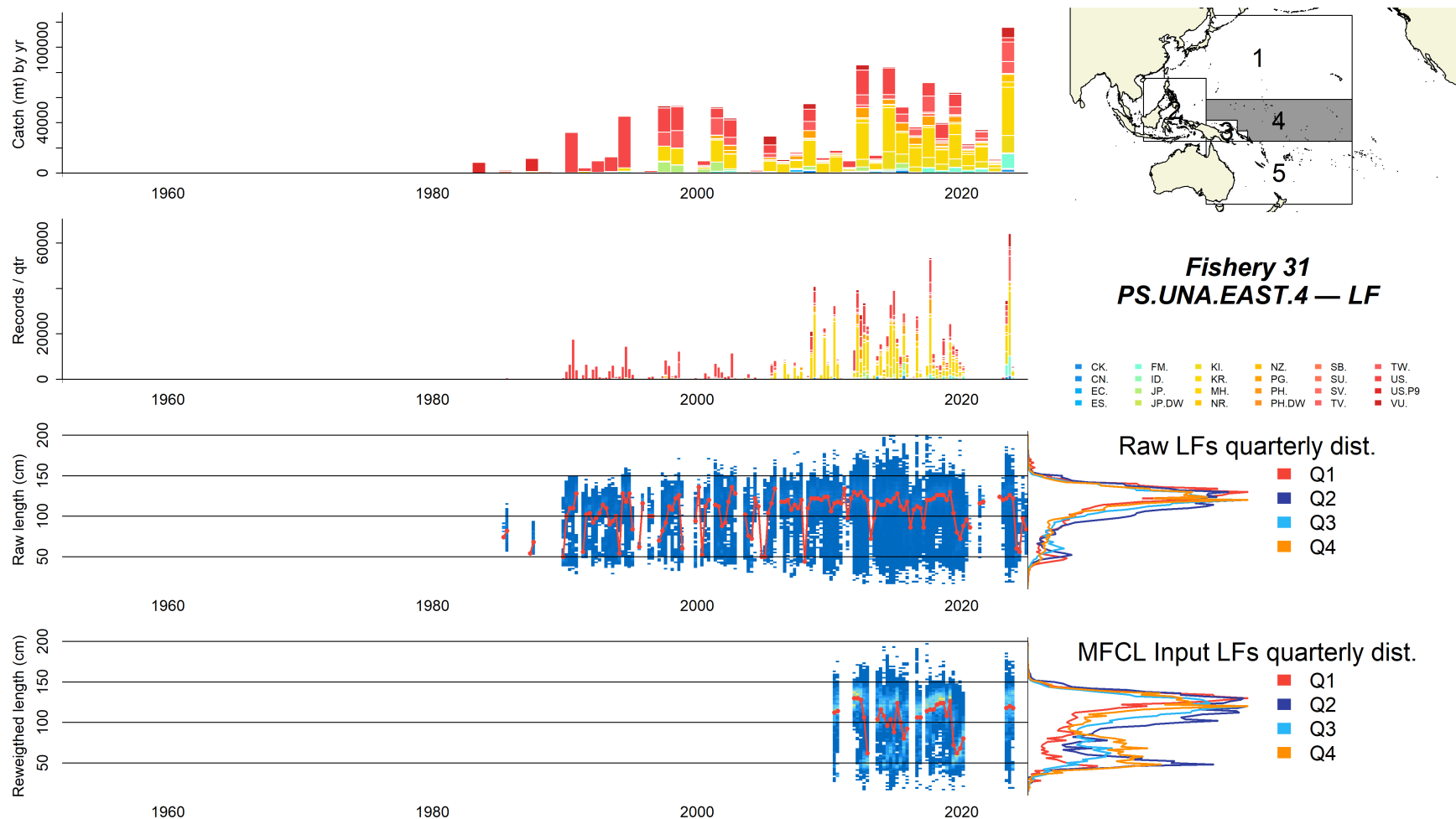


Figure 158: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 31 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

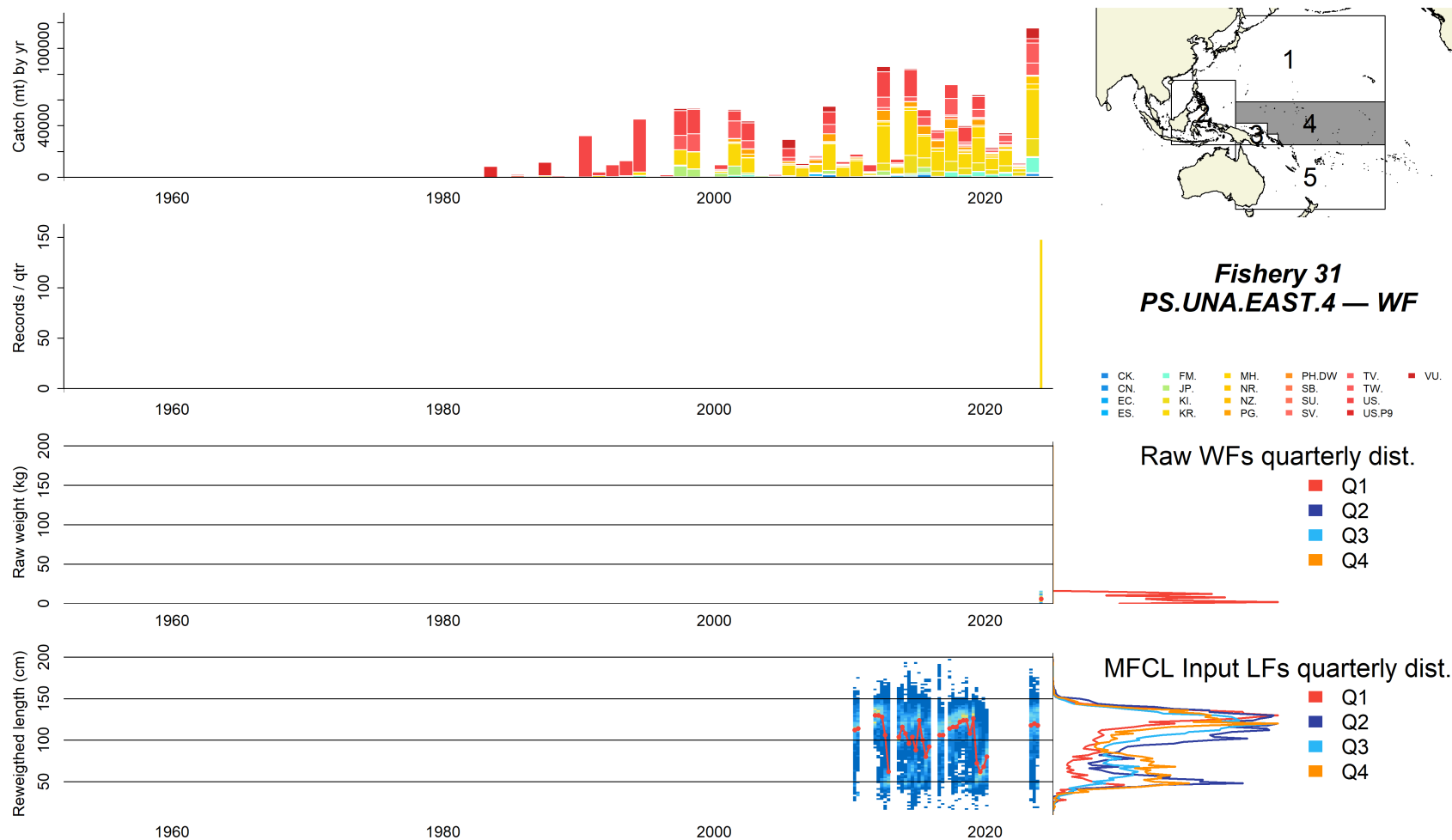


Figure 159: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 31 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured weight (2nd left), trends in weight composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

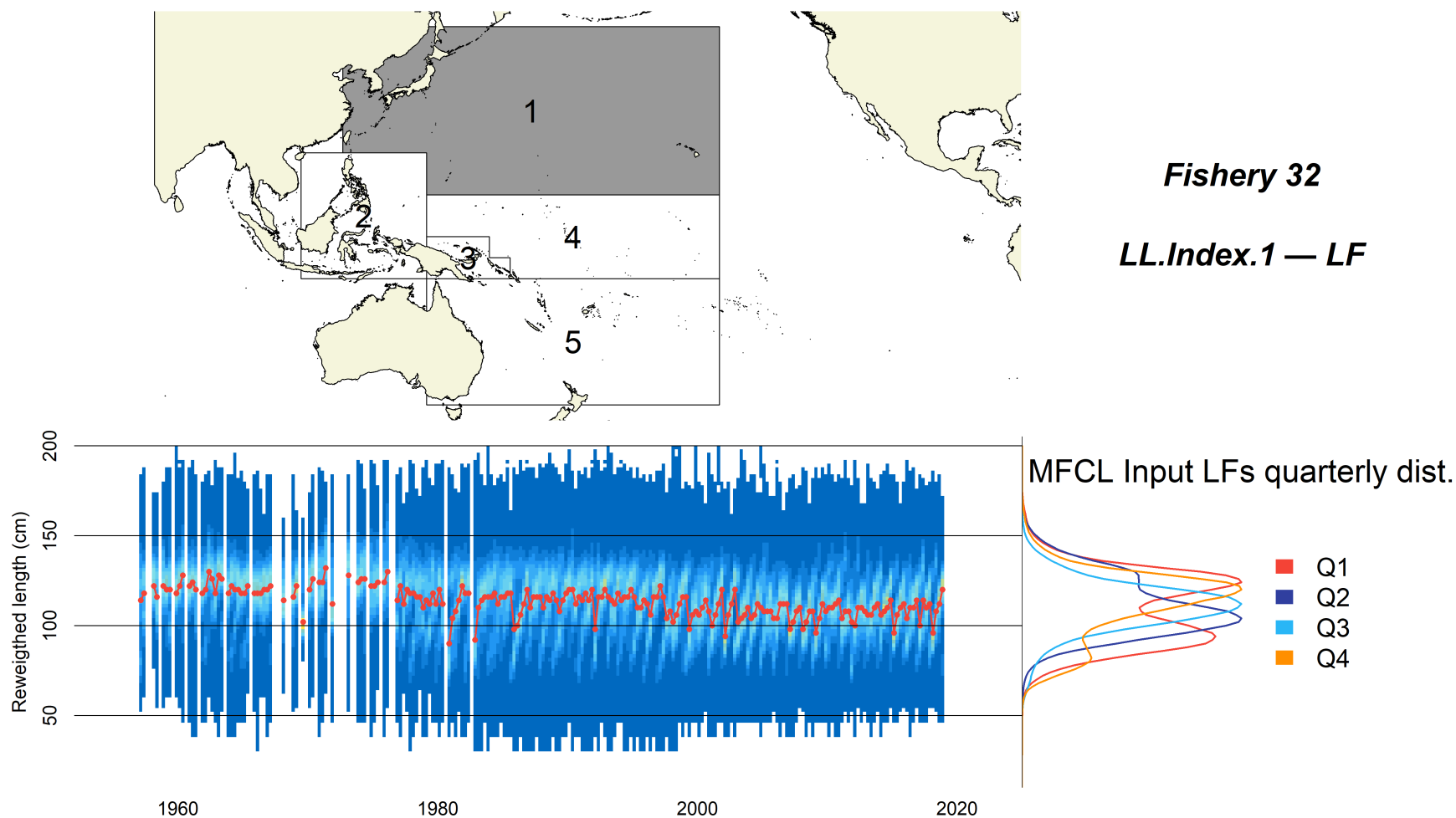


Figure 160: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 32 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

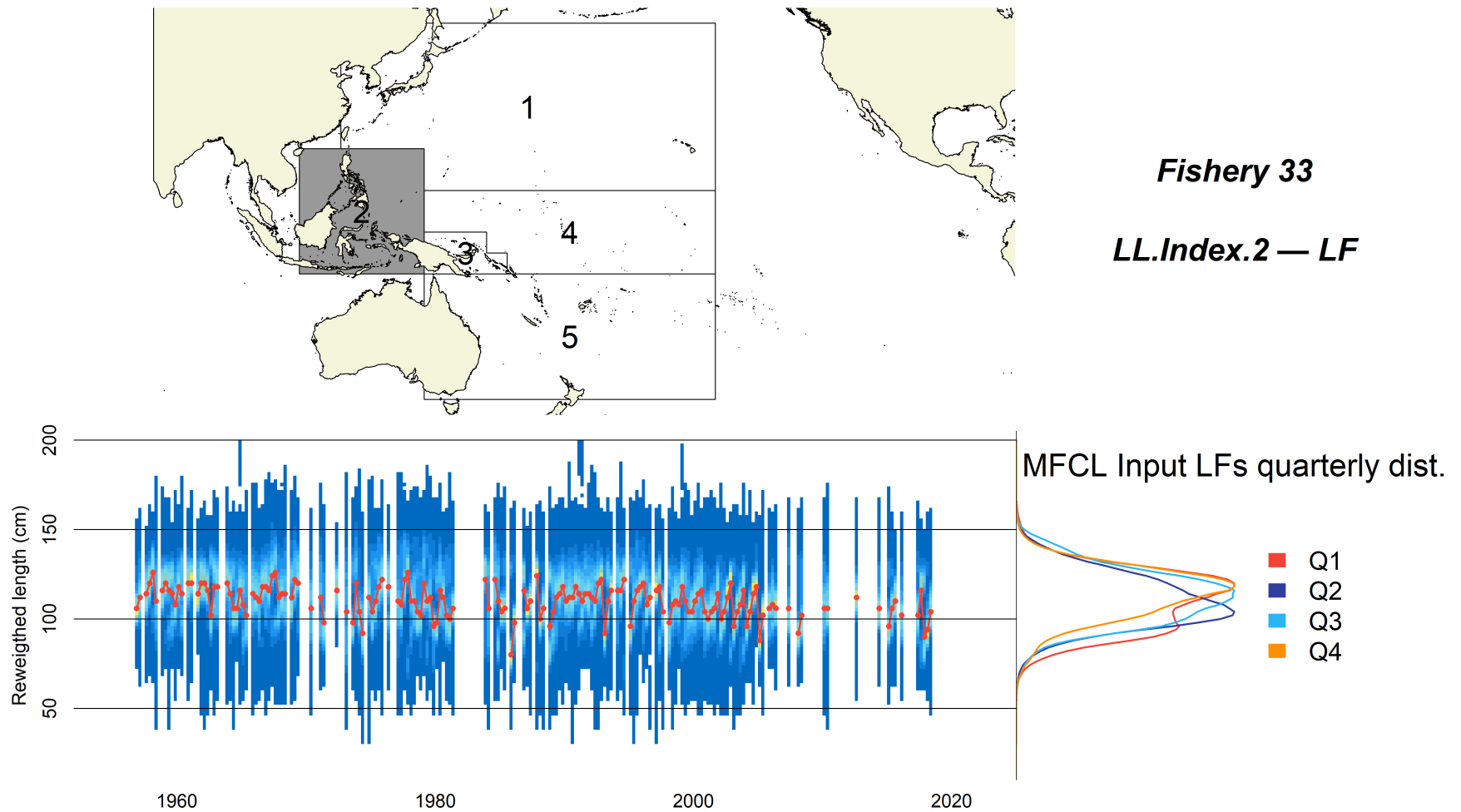


Figure 161: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 33 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

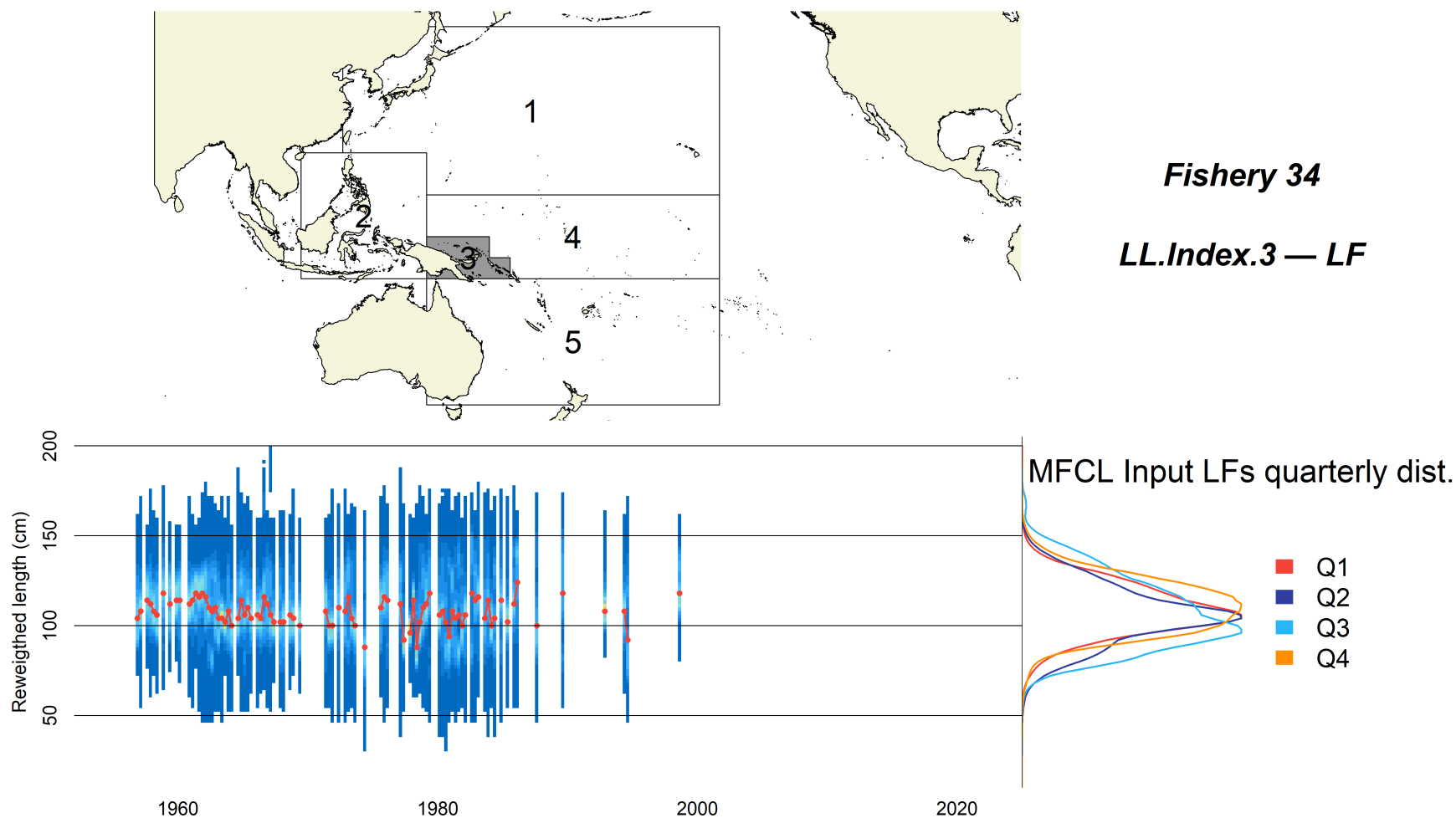


Figure 162: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 34 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

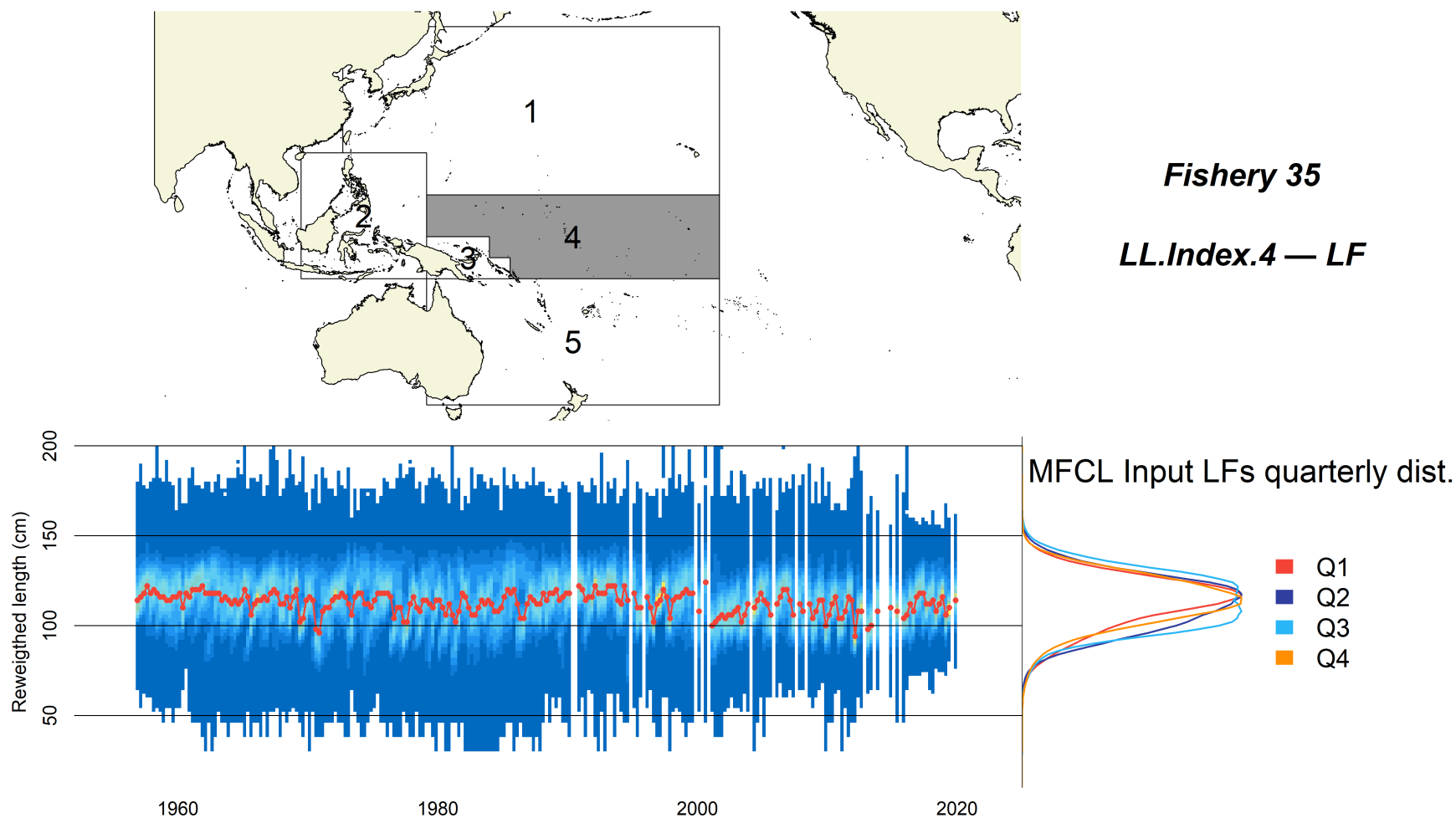


Figure 163: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 35 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.

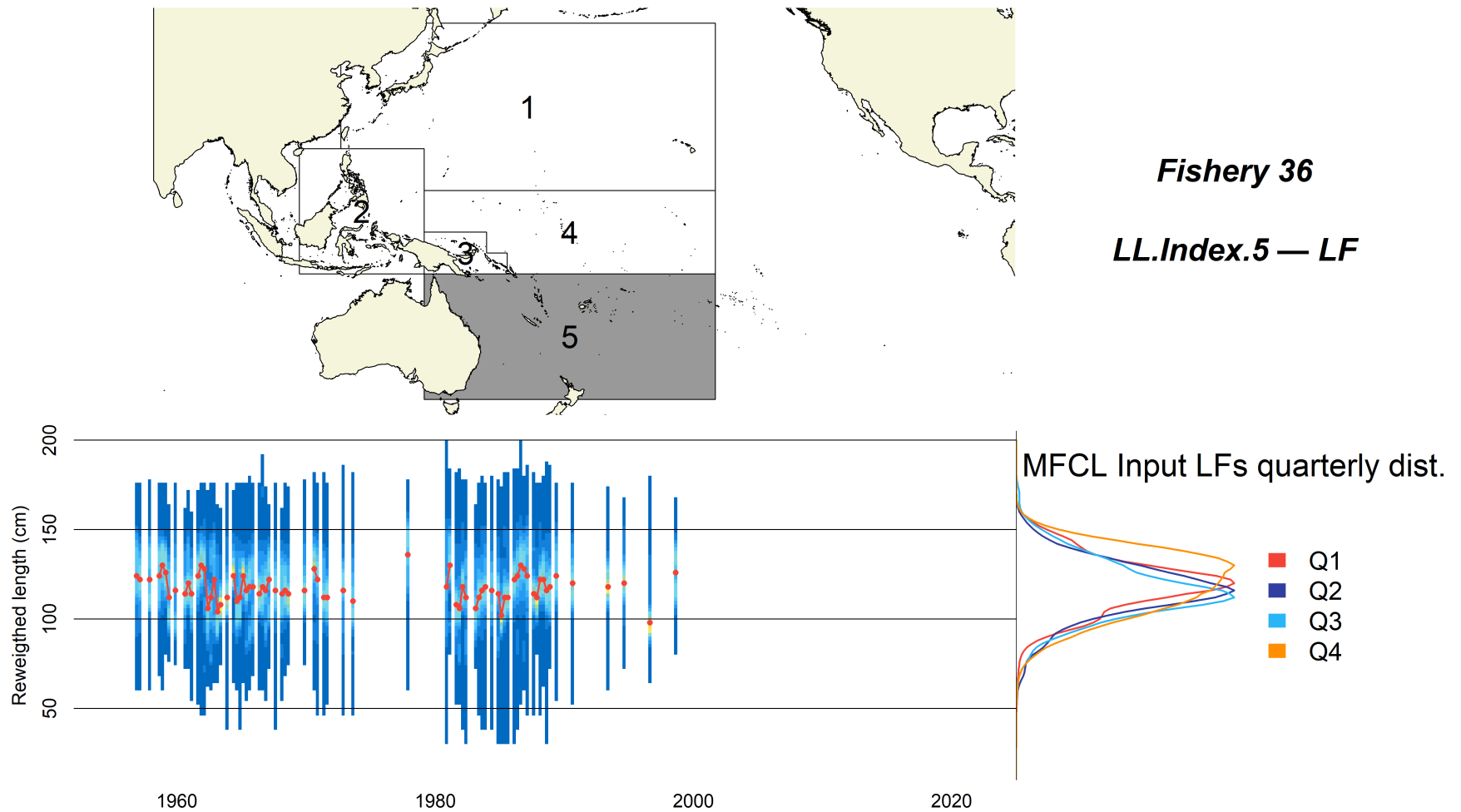


Figure 164: Summary of raw available data and processed length frequencies (MFCL Input LFs) for fishery 36 of the 2026 yellowfin stock assessment. The panels display: the region and fishery area of occurrence (top right), the annual catch by fleet within the fishery, in metric tons (top left), the annual number of fish with measured length (2nd left), trends in length composition data with the median highlighted in red (3rd left) with the overall quarterly size distribution over the time-span of the fishery, and trends in processed length compositions with the median highlighted in red (bottom left) with the overall quarterly size distribution over the time-span of the fishery.