

## 7 Western Horse Mackerel –in Subarea 8 and divisions 2.a, 3.a (Western Part), 4.a, 5.b, 6.a, 7.a–c and 7.e–k

### 7.1 TAC and ICES advice applicable to 2021 and 2022

Since 2011, the TACs cover areas in line with the distribution areas of the stock.

For 2021 the TAC was the following (EU 2021/1239):

Areas	TAC 2021	Stocks fished in this area
2.a, 4.a, 5.b, 6, 7.a-c, 7.e-k, 8.abde, 12, 14	70 254 t	Western stock & North Sea stock in 4.a 1-2 quarters
4.b,c, 7.d	14 014 t	North Sea stocks
Division 8.c	11 121 t	Western stock

For 2022 the TAC was the following (EU 2022/109):

Areas	TAC 2022	Stocks fished in this area
2.a, 4.a, 5.b, 6, 7.a-c, 7.e-k, 8.abde, 12, 14	49 178 t	Western stock & North Sea stock in 4.a 1-2 quarters
4.b,c, 7.d	3 461 t	North Sea stocks
Division 8.c	2 780 t	Western stock

The TAC for the western stock should apply to the distribution area of western horse mackerel as follows:

All Quarters: 2.a, 5.b, 6.a, 7.a-c, 7.e-k, 8.a-e

Quarters 3&4: 3.a (west), 4.a

The TAC for the North Sea stock should apply to the distribution area of North Sea horse mackerel as follows:

All Quarters: 3.a (east), 4.b-c, 7.d

Quarters 1&2: 3.a (west), 4.a

In 2021, ICES advised on the basis of MSY approach that Western horse mackerel catches in 2022 should be no more than 71 138 tonnes. The Western horse mackerel TAC for 2022 is 71 138 tonnes. The TAC should apply to the total distribution area of this stock. The horse mackerel catches in Division 3.a are taken outside the horse mackerel TACs.

### 7.1.1 The fishery in 2021

Information on the development of the fisheries by quarter and division is shown in Tables 5.1.1 and 5.1.2 and in Figures 5.1.1.a–d. The total catch allocated to Western horse mackerel in 2021 was 81 375 tonnes which is 421 tonnes less than in 2020 and matched the ICES advice. The catches of horse mackerel by country and area are shown in Tables 7.1.1.1-5 while the catches by quarter since 2000 are shown in Figure 7.1.1.1.

### 7.1.2 Estimates of discards

Discard data are available since 2000 for some countries. Prior to 2013, the estimates available are considered to be an underestimate (Figure 7.1.2.1).

In 2021, most countries have submitted discard information. Countries that reported discard estimates for horse mackerel were Spain, France, Ireland, and UK). 2021 discard estimates for Germany, the Netherlands and Norway are considered to be equal to zero. Total discards for Western horse mackerel were 1 641 tonnes, equal to 2% in weight of the total catches, a decrease in comparison to last year.

Discard data are included in the assessment as part of the total catches.

Length frequency distributions of discards were provided by Spain, France, Ireland, and UK but are not included in the assessment length-frequency input data.

### 7.1.3 Stock description and management units

The Western horse mackerel stock is distributed in divisions 2.a, 5.b, 3.a, 4.a, 6.a, 7.a-c, 7.e-k and 8.a-e (for more details see Section 5.3 and Figure 7.1.3.1) and spawns in the Bay of Biscay, and in UK and Irish waters before parts of the stock migrate northwards into the Norwegian Sea and the North Sea where they are fished in the third and fourth quarter (note for area 4.a, only catches taken in quarters 3 and 4 are considered to be from the western stock). The western stock is considered a management unit and advised accordingly with TAC set in accordance with the distribution of the stock (note that catches in division 3.a are taken outside the TAC).

## 7.2 Scientific data

### 7.2.1 Egg survey estimates

In 2022 a new egg survey was carried out in the western and southern spawning areas and a working document with preliminary results of the survey was presented to WGWISE members (WD07: O’Hea *et al.* 2022). Final results for 2022 will be available for the WGWISE meeting 2023. Details of this mackerel and horse mackerel egg survey are also given in section 8.6.1 of this report. The 2022 egg survey results are not used in the 2022 assessment (the SS model is not configured to use in-year survey data and catch data would also be required, which is not available until the end of the year). Data from the 1992-2019 surveys are therefore used in the assessment (O’Hea *et al.* 2019). The time series of TAEP estimates used in the assessment is shown in table 7.2.1.1.

## 2022 (preliminary) egg survey results

Sampling was undertaken over 6 sampling periods. Egg abundance plots displaying the spatial distribution of stage 1 horse mackerel eggs are presented for periods 3-7 in figures 7.2.1.1-5. Period number and duration are the same as those used to estimate the western mackerel stock, as are the dates defining the start and end of spawning. In general, egg numbers were low with occasional high counts at some stations.

During the 2022 survey, peak spawning for horse mackerel occurred during period 6 with high egg numbers recorded from the Celtic Sea to the northern Bay of Biscay, close to the 200m contour (figure 7.2.1.5).

Egg production by survey period (plotted at mid-period) is shown in figure 7.2.1.6. The results from previous surveys are also shown for comparison. The shape of the egg production curve does not suggest that spawning start and end dates should be altered for the 2022 survey. Total annual egg production for 2022 is estimated to be  $5.15 \times 10^{14}$ , a threefold increase on the 2019 estimate of  $1.78 \times 10^{14}$ , which is the lowest estimate in the time series.

## Fecundity parameters

In 2022, only DEPM ovary samples were collected in periods 6 and 7 for horse mackerel, during peak of spawning. In addition, samples were collected from the Irish WESPAS surveys in periods 6 and 7. At the time of writing, no horse mackerel fecundity results are available. All samples will be analysed and results presented at the 2023 WGMEGS meeting.

The Western horse-mackerel egg data of the DEPM survey are still under revision. Data are expected to be analysed and results will be presented at the 2023 WGMEGS.

## 7.2.2 Other surveys for Western horse mackerel

### *Bottom-trawl surveys*

A bottom-trawl survey index for recruitment was available for 2021. The recruitment index is based on IBTS surveys conducted by Ireland, France and Scotland covering the main distribution of the stock (Bay of Biscay, Celtic Sea, West of Ireland and West of Scotland) from 2003 to 2021. A Bayesian Delta-GLMM is used to calculate an index of juvenile abundance based on catch rates, and the index is updated every year when new data become available (ICES 2017). The updated values are shown in Figure 7.2.2.1 (middle panel) and the indices estimated in 2020-2022 are given in Table 7.2.2.1. Annual revisions of the index are minor. The 2017 data point was highly uncertain due to very limited coverage of the French survey: the French research vessel had technical issues and could therefore only cover less than 1/3 of the stations usually sampled. Despite this high uncertainty, the 2017 data point suggested a very strong recruitment to be expected the following year. This perception was confirmed by the presence of numerous small fish in the 2017 and 2018 catch data. The overall trend suggests an increase in recruitment from 2013 to 2017 and a decrease back down to 2016 levels in 2018. Recruitment in 2019 and 2020 decreased further and was close to the lowest values of the time series, followed by an increase again in 2021.

### *Acoustic surveys*

In the Bay of Biscay two coordinated acoustic surveys take place in spring, PELGAS (Ifremer-France) and PELACUS (IEO-Spain). Only the PELACUS survey, which covers the ICES division 8c, is used in the assessment. There is no biomass estimate for 2020 because the survey was cancelled due to the Covid-19 pandemic, however the survey resumed in 2021. The estimate for 2022

is shown in this report (Figure 7.2.2.1, Table 7.2.2.2.), but it is not part of the assessment this year (no catches available yet for 2022).

The biomass estimated by the PELACUS survey was high in the 1990s, reaching the maximum value in 1998 (139 395 t). Biomass values are lower in the 21<sup>st</sup> century, peaking in 2010 (53 417 t) and 2015 (67 068 t). Biomass has fluctuated around 10 000 t over the most recent 4 surveys.

### 7.2.3 Effort and catch per unit effort

No new information was presented on effort and catch per unit effort.

### 7.2.4 Catch in numbers

In 2021, the Netherlands (4a, 6a, 7bcefgjh, 8a), Ireland (6a, 7bj), Norway (4a), Spain (8bc), UK (England & Scotland) (4a, 6a, 7efj) and Germany (7efghj) provided catch in numbers-at-age (Figure 7.2.4.1). The catch sampled for age readings in 2021 covered 79% of the total reported catch which is a considerable increase in comparison to last year. Last year's reduction to 51% was primarily due to the impact of the Covid pandemic on the national sampling programs. Catch in number-at-length were available from the Netherlands (4a, 6a, 7bcefgjh, 8a), Ireland (6a, 7bgj), Spain (6a, 7bcghjk, 8abc) and UK (England & Scotland) (4a, 6a, 7efj) as well as from France (7e, 8ab), Norway (4a) and Germany 7efghj).

The total annual and quarterly catches in number for western horse mackerel in 2021 are shown in Table 7.2.4.1. The sampling intensity is discussed in Section 5.9.

The catch-at-age matrix is given in Table 7.2.4.2 and illustrated in Figures 7.2.4.2 and 7.2.4.3. The latter shows the dominance of the 1982-year class in the catches since 1984 until it entered the plus group in 1997. Since 2002, the 2001-year class, which entered the plus group in 2016, has been caught in considerable numbers. The 2008-year class can be followed in the catch data suggesting it was stronger than other year classes subsequent to the 2001.

Spain, Ireland, the Netherlands and UK (England) also provided the age length keys (ALK) for 2021.

### 7.2.5 Length and age data

*Mean length-at-age and mean weight-at-age in the catches*

The mean weight and mean length-at-age in the catches by area, and by quarter in 2021 are shown in Tables 7.2.5.1 and 7.2.5.2. Weight-at-age time-series is shown in Figure 7.2.5.1.

*Mean weight at age in the stock*

Prior to 2017, estimates of mean weight-at-age in the stock for the assessment were based on catch weight-at-age from Q1 and Q2, (Table 7.2.5.3). At present, the stock weight-at-age used in the forecast is an output of the assessment (presented in Table 7.4.1). Further information can be found in the stock annex.

### 7.2.6 Maturity ogive

Maturity-at-age is presented in Table 7.2.6.1. In the assessment model a constant logistic function was used (Figure 7.2.6.1). Further information can be found in the stock annex.

### 7.2.7 Natural mortality

A fixed natural mortality of  $0.15 \text{ year}^{-1}$  is assumed for all ages and years in the assessment. Further information can be found in the stock annex.

### 7.2.8 Fecundity data

Potential fecundity data ( $10^6$  eggs) per kg spawning females are available for the years 1987, 1992, 1995, 1998, 2000, 2001: the data are presented in Table 7.2.8.1 but were not used in the assessment model. In the assessment the fecundity is modelled as linear eggs/kg on body weight. Further information can be found in the stock annex.

### 7.2.9 Information from stakeholders

The EU fishing industry, partly in conjunction with the Pelagic Advisory Council (PELAC), has been working on a number of research projects relevant to Western horse mackerel that are briefly reported here. More details can be found in section 1.4.8 of this report and (WD02: Pastoors, 2022).

The Pelagic Freezer-trawler Association (PFA) provided an annual report on the self-sampling programme that started in 2015. Currently, all members (15 vessels in 2021) participate in the programme providing data during the main fishing season (October–March). Overall, the self-sampling activities for the horse mackerel fisheries during the years 2016-2022 (up to 11/08/2022) covered 250 fishing trips with 3316 hauls, a total catch of 128 553 tonnes and 130 146 individual length measurements. The main fishing areas are ICES division 6.a, division 7.b and division 7.j. Western horse mackerel have a wide range in the length distributions in the catch. Median lengths in divisions 6.a, 7.b and 7.j have fluctuated between 25.2 and 31.9 cm. In ICES division 7.h, median lengths in the catch have been smaller and fluctuated between 20.7 and 24.5 cm (for more details see WD02: Pastoors, 2022).

There is also an industry-science collaboration aimed at improving the knowledge on gonad development of mackerel and horse mackerel. Samples were taken by the fishing industry (PFA vessels) on both targeted and by-catches of mackerel and/or horse mackerel. The overall aim for Western horse mackerel is to identify the spawning period in 2020 and investigate if the current egg survey (MEGS) is covering this period for details see section 1.4.8.3.

Additionally, genetic samples have been also collected from 7.d and 7.e by the PFA on board of commercial vessels in the Autumn of 2020, as well as from 4.a during the NS-IBTS in Q3. The study has shown evidence for separating western, North Sea and southern horse mackerel for details see section 1.4.8.3.

### 7.2.10 Data exploration

The length frequency distributions of the landings for the entire fleet included in the model are shown in Figures 7.2.10.1-2. The length distributions 2015-2020 show a considerable amount of very small fish, mostly from Spanish catches. In 2021 the recent trend of large catches of small fish has changed and the length distribution is a more normal distribution with the most common landed lengths around 30cm. The main mode of the distribution continuously increased since 2004 to 2017. It has been lower in recent years, but has started to increase, probably due to the growth of the small individuals observed in recent years. The length distribution of discards

has been provided by some countries since 2018. However, this information was not available at the last benchmark (2017) and therefore they are not included in the current assessment.

Within-cohort consistency of the catch-at-age matrix is investigated in Figure 7.2.10.3: this shows that the catch-at-age data contains information on year-class strength that could form the basis for an age-structured model. The numbers at age in the catch by decade show a slight trend towards younger individuals when moving from the beginning of the time-series towards the end (Figure 7.2.10.4).

The indices of abundance used in the assessment cover different areas and therefore represent different parts of the stock. Negative correlations between indices that should represent the same portion of the population may lead to problems in the fitting of the model. The correlation between time-series was therefore estimated and is presented in Figure 7.2.10.5. There was no strong correlation between the IBTS recruitment index and the other two surveys. The egg survey index, which aims to represent the adult portion of the stock was strongly positively correlated with the PELACUS acoustic survey biomass estimate.

### 7.2.11 Assessment model, diagnostics

A one fleet, one sex, one area stock synthesis model (SS; Stock Synthesis v3.30) is used for the assessment of Western horse mackerel stock in the Northeast Atlantic. A description of the model can be found in the stock annex. The assessment presented is an update of the 2021 assessment, with the inclusion of the 2021 estimates for the IBTS recruitment index, the 2021 length frequency distribution of the landings, and the 2021 total catch and conditional ALKs. The biomass estimates and length distribution provided by the PELACUS survey were not available in 2020 because the survey was cancelled due to the Covid pandemic (see section 7.13), but the survey resumed in 2021 and was used in this assessment. As in last year's assessment, the length and age distributions were tuned using the Francis reweighting approach.

Fits to the available data are given in Figure 7.2.11.1, and model estimates with associated precision in Figure 7.2.11.2. Model estimates and residual patterns are similar to those presented in the benchmark (ICES, 2017b) and remain unchanged from last year's assessment for almost all variables, except for some patterns noted in the 2018 and 2020 ALK, that was not evident in 2019 or 2021. Recruitment estimates are higher than last year's assessment. The model does not fit well to the biomass estimates and length composition provided by the PELACUS survey. The fitting to the most recent length frequency distributions and the conditional ALKs remains sub-optimal and it does not capture the small fish observed in recent years.

The 2022 assessment shows strong retrospective patterns, with peels falling outside the confidence intervals of SSB (2 peels) and recruitment (3 peels) estimates (Figure 7.2.11.3). The pattern is very consistent and has led to a rescaling of the SSB (downwards) and F (upwards) in the past years. Further investigation is needed to identify the reason of the pattern and resolve it. The Mohn's rho values are now above the limit of the tolerance threshold with 0.329 for SSB and -0.251 for F.

## 7.3 State of the Stock

### 7.3.1 Stock assessment

The SS model with new length and age data from the commercial fleet, and the 2021 information from the IBTS index is presented as the final assessment model. Stock numbers-at-age and fishing mortality-at-age are given in Tables 7.3.1.1 and 7.3.1.2, and a stock summary is provided in Table 7.3.1.3, and illustrated in Figure 7.2.11.2. SSB peaked in 1988 following the recruitment of

the exceptionally strong 1982 year-class. Subsequently, SSB slowly declined until 2003 and then recovered again following the moderate-to-strong year-class of 2001 (a third of the size of the 1982 year-class). SSB reached the minimum values of the time series in 2017 (834 480 t), increasing slightly in recent years. In 2022, SSB is estimated to be below  $B_{lim}$ .

The recruitment has been weak since 2001, reaching the lowest values in 2009–2011 and 2013. Recruitment estimates for 2014–2018 are the highest observed since 2008 and are higher than the geometric mean estimated over the years 1983–2021. Recruitment in 2019–2021 was low again with an increase to remain above the mean in 2022.

Fishing mortality (ages 1–10) has oscillated over the time series. It increased after 2007 as a result of increasing catches and decreasing biomass as the 2001 year-class was reduced. The fishing mortality decreased between 2013 and 2017 due to a decrease in catches and a reduced proportion of the adult population in the exploited stock. The fishing mortality in 2021 (0.086) is just above  $F_{MSY}$  (0.074) and slightly higher than the previous year but continues to be close to the lowest value in the time series since 2007.

## 7.4 Short-term forecast

A deterministic short-term forecast was conducted using the 'fwd()' method in FLR (Flash R add-on package).

### *Input*

Table 7.4.1. lists the input data for the short-term predictions. Weight at age in the stock and weight at age in the catch are equal to the year-invariant weight at age function used in the stock synthesis model. Exploitation pattern is based on estimated fishing mortality in 2021 and is the average of ages 1 to 10. Natural mortality is assumed to be 0.15 across all ages. The proportion mature for this stock has a logistic form with fully mature individuals at age 4 as used in the assessment model.

The expected landings for the intermediate year were set at 100% of the TAC (71 138 t) after confirmation from individual institutes that TAC was close to being fully taken by August 2022. Note that although the plus group in the catch was set at 15+, the true population in SS model is set to arrive up to age 20 (as from literature) and is therefore estimated accordingly.

### *Output*

A range of predicted catch and SSB options from the short-term forecast are presented in Table 7.4.2.

## 7.5 Uncertainties in the assessment and forecast

Despite the increased amount of data used and information available to the stock assessment, the model suffers from a retrospective pattern whenever a new year of data is included. This year rescaling is relatively significant with a pattern over the past 5 years (rescaling biomass down and vice-versa for  $F_{1-10}$ ).

The fitting to the fishery independent indices remains good for two of the three surveys used: IBTS and MEGS. A degradation of the fitting to the IBTS recruitment index was observed the past couple of years, but the estimates remained within the confidence intervals provided. The fit to the PELACUS acoustic index remains poor.

The change in selectivity, which is detected from both the length and the age composition of the catch data, is not entirely picked up from the model. In general, the model tends to overestimate the mean age of the last decade. The selectivity issue should be further investigated and

addressed: for example, it is not clear whether the high presence of small specimens in the landings data is due to the inclusion of BMS individuals in the overall catch instead of having it as discard (the discard ban was implemented in 2015 for pelagic species) or if this is due to an effective change in selectivity (i.e. catchability of the gear and availability of the stock).

The model fixes the realised fecundity with a constant number of eggs/kg independently of the individual weight. However, Western horse mackerel is known to be an indeterminate spawner, which implies this relationship may not be appropriate when it comes to the use of an egg survey as index of spawning biomass. During the benchmark an attempt was made to estimate the parameters relative to fecundity, however, the information provided to the model was not sufficient. The inclusion of this feature, whenever appropriate data become available, would help to improve the reliability of the assessment.

The assumed value for natural mortality should be investigated. However, there is no data available (such as tagging) that could assist in estimating natural mortality more accurately. Nevertheless, total mortality appears to be low, given the persistence of the 1982-year class in the catch data.

The assessment, as was developed at the benchmark, has an increased amount of information for providing more robust estimates of recruitment, also informed when occasional strong year classes are observed in the catch. On the contrary, the SSB is informed only by the triennial egg survey and by the acoustic survey (which only covers a small part of the stock distribution and size ranges, has a very low weight in the model and is very noisy): a new index for the spawning biomass would therefore be beneficial for the future stability of this assessment. The development of a combined SSB index estimated from appropriate surveys in the area (e.g., PELACUS, PELGAS, WESPAS) should be pursued.

## 7.6 Comparison with previous assessment and forecast

A comparison of the update assessment with the historic ones (previous 4 years) is shown in Figure 7.2.11.4: the new information created a downward rescaling of the assessment biomass and upward revision of  $F$ . Recruitment, on the other hand, remains fairly stable until 2015 but a downward revision is estimated from then on.

## 7.7 Management Options

### 7.7.1 MSY approach

In 2017 stochastic equilibrium analyses were carried out using the *EqSim* software (WKWIDE 2017) to provide an estimate for  $F_{MSY}$  and other biological reference points. During WGWIDE 2017 further investigations were carried out and summarised in a Working Document attached to WGWIDE 2017 report (ICES, 2017a).

Reference points were subsequently revised during an inter-benchmark workshop carried out in July-August 2019 as those derived during the 2017 benchmark were deemed no longer appropriate in light of the retrospective pattern observed in the model. More robust reference points were therefore put forward after a number of alternatives were examined, following ICES guidelines, and based on the 2018 assessment. The detailed rationale can be found in the inter-benchmark report (ICES, 2019a).

SSB in 2003 was adopted as a proxy for  $B_{pa}$  on the basis that fishing mortality had been relatively low for the data period ( $F_{bar}$  mean  $\sim 0.11$ , natural mortality = 0.15), and there was no indication of impaired recruitment below the associated  $B_{lim}$ , despite a continuing decline in SSB.  $F_{MSY}$  was



derived from stochastic simulations as before and evaluated at 0.074. In 2021,  $F_{pa}$  was re-defined as  $F_{p05}$  (ICES, 2021b). These updated reference points were used in determining the MSY based 2023 catch advice.

### 7.7.2 Management plans and evaluations

An overview of earlier management plans and management plan evaluations was presented at WGWIDE 2017. To date, no agreed management plan is available for this stock despite several attempts to develop such management plans. The Pelagic Advisory Council (PELAC), together with several researchers have carried out an evaluation of potential harvest control rules for Western horse mackerel (for details see Stock Annex). This rebuilding plan has not been currently approved by the European Commission and the UK. The working group no longer considers this management plan appropriate as it is outdated by 2 years.

## 7.8 Management considerations

The 2001 year-class has now entered the plus group but no other detectable very strong year-classes entering the fishery, even though a higher amount of age 1-2 years old fish have been observed in the catches in the past 4-5 years.

Due to the downward revision of the stock, and SSB falling below  $B_{lim}$ , following the MSY approach, the advice for 2023 is catches in 2023 should be zero. It is expected that even with 0 catch there will be some discard landings in 2023 available as with previous years.

Note that subarea 8.c is included in the ICES advice for Western horse mackerel.

## 7.9 Ecosystem considerations

Knowledge about the distribution of the Western horse mackerel stock is mostly gained from the egg surveys and the seasonal changes in the fishery. Based on these observations it is not possible to infer a trend in the distribution of Western horse mackerel. However, from catch data it appears that the stock is concentrated in the southern areas, and it is mostly characterized by small individuals.

## 7.10 Regulations and their effects

There are horse mackerel management agreements between EU and the UK, but not with Norway. The TAC set by EU and the UK therefore only applies to EU and UK waters and the EU and UK fleet in international waters. The minimum landing size of horse mackerel by the EU and UK fleet is 15 cm (10% undersized allowed in the catches). In Norwegian waters there is no quota for horse mackerel but existing regulations on bycatch proportions as well as a general discard prohibition (for all species) apply to horse mackerel.

An overview of the scientific advice, the TACs (or sum of unilateral quota) and the catches is shown in Figure 7.10.1. From 2001 onwards, TACs and catches have fluctuated around the scientific advice, where in some years the TACs were set higher and in other years lower than the scientific advice.

The stock allocations were changed in 2005 following the results of the HOMSIIR project (Abaunza *et al.* 2003) and 8.c is considered to be the western stock. Landings from 7.d are now allocated to the North Sea horse mackerel stock. Results of a recent genetic research project on stock structure of horse mackerel has been reported in sections 1.4.8.3. of this report.

## 7.11 Changes in fishing technology and fishing patterns

The description of the fishery is given in Section 5.1 and no large changes in fishing areas or patterns have taken place.

## 7.12 Changes in the environment

Migrations are closely associated with the slope current, and horse mackerel migrations are known to be modulated by temperature. Continued warming of the slope current is likely to affect the timing and spatial extent of this migration.

It has been reported a good correspondence between the modelled influx of Atlantic water to the North Sea in the first quarter and the horse mackerel catches taken by Norwegian purse-seiners in the Norwegian EEZ later in the year (October-November) since 1987 (Iversen *et al.* 2002, Iversen WD presented in ICES 2007/ACFM:31).

## 7.13 Deviations from stock annex caused by missing information from historic Covid-19 disruption

1. Stock: hom.27.2a4a5b6a7a-ce-k8

2. Missing or deteriorated survey data:

**The length composition and the biomass index annually provided by the PELACUS survey were not available in 2020 because the survey was cancelled due to the Covid pandemic.**

3. Missing or deteriorated catch data:

**The samples for age readings in 2020 covered only 51% of the catch, whereas in previous years was 69%. This decrease is due to the impact of the Covid pandemic on the national sampling programs. Spain had to reduce its sampling program and no sampling from Germany and Norway were available.**

4. Missing or deteriorated commercial LPUE/CPUE data:

**Not applicable**

5. Missing or deteriorated biological data:

**Not applicable**

6. Brief description of methods explored to remedy the challenge:

**Not applicable**

7. Suggested solution to the challenge, including reason for this selecting this solution:

**The assessment was carried out without the 2020 data from PELACUS. No alternative options were found.**

8. Was there an evaluation of the loss of certainty caused by the solution that was carried out?

**To test the sensitivity of the model to the PELACUS data, the assessment conducted in 2020 was carried out without the PELACUS data for 2019 and the results were compared with the outputs of the actual assessment in 2020. The fishing mortality was slightly higher and the spawning biomass slightly lower in recent years in the model without survey data, although the differences were inside of the confidence intervals of the parameters (Figure 7.13.1).**

## 7.14 References

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## 7.15 Tables

**Table 7.1.1.1. Western horse mackerel. Catches (t) in Subarea 2 by country (Data as submitted by Working Group members).**

Country	1980	1981	1982	1983	1984	1985	1986	1987
Denmark	-	-	-	-	-	-	-	39
France	-	-	-	-	1	1	- <sup>2</sup>	- <sup>2</sup>
Germany, Fed.Rep	-	+	-	-	-	-	-	-
Norway	-	-	-	412	22	78	214	3,272
USSR	-	-	-	-	-	-	-	-
Total	-	+	-	412	23	79	214	3,311

	1988	1989	1990	1991	1992	1993	1994	1995
Faroe Islands	-	-	9643	1,115	9,157 <sup>3</sup>	1,068	-	950
Denmark	-	-	-	-	-	-	-	200
France	- <sup>2</sup>	-	-	-	-	-	55	-
Germany, Fed. Rep.	64	12	+	-	-	-	-	-
Norway	6,285	4,770	9,135	3,200	4,300	2,100	4	11,300
USSR / Russia (1992 -)	469	27	1,298	172	-	-	700	1,633
UK (England + Wales)	-	-	17		-	-	-	-
Total	6,818	4,809	11,414	4,487	13,457	3,168	759	14,083

	1996	1997	1998	1999	2000	2001	2002	2003
Faroe Islands	1,598	799 <sup>3</sup>	188 <sup>3</sup>	132 <sup>3</sup>		-	-	-
Denmark	-	-	1,755 <sup>3</sup>	-		-	-	-
France	-	-	-	-		-	-	-
Germany	-	-	-	-		-	-	-
Norway	887	1,170	234	2,304	841	44	1,321	22
Russia	881	554	345	121	78	16	3	2
UK (England + Wales)	-	-	-	-	-	-	-	-
Estonia	-	78	22	-	-	-	-	-
Total	3,366	2,601	2,544	2557	919	60	1,324	24

	2004	2005	2006	2007	2008	2009	2010	2011
Faroe Islands	-	-	3	-	-	-	222	224
Denmark	-	-	-	-	-	-	-	-
France	-	-	-	-	-	-	-	-
Germany	-	-	-	-	-	-	-	-
Ireland	-	-	-	-	-	-	-	-
Netherlands	-	-	-	-	-	-	-	1
Norway	42	176	27	-	572	1,847	1,364	298
Russia	-	-	-	-	-	-	-	-
UK (England + Wales)	-	-	-	-	-	-	-	-
Estonia	-	-	-	-	-	-	-	-
Total	42	176	27	0	572	1,847	1,586	-

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Faroe Islands	-	-	-	-	-	-	-	-	-	-
Denmark	-	-	-	-	-	-	-	-	-	-
France	+	-	-	-	-	-	-	-	-	-
Germany	-	-	-	-	-	-	-	-	-	-
Ireland	-	-	-	-	-	-	-	-	-	-
Netherlands	-	-	107	-	-	-	-	-	-	-
Norway	66	30	302	10	45	5	718	867	290	12
Russia	-	-	-	-	-	-	-	-	-	-
UK (England + Wales)	-	-	-	-	-	-	-	-	-	-
Estonia	-	-	-	-	-	-	-	-	-	-
Total	66	30	409	10	45	5	718	867	290	12

<sup>2</sup>Included in 4.<sup>3</sup>Includes catches in Div. 5.b.<sup>4</sup>Taken in Div. 5.b.

**Table 7.1.1.2. Western horse mackerel. Catches (t) in North Sea Subarea 4 and Skagerrak Division 3.a by country (Data submitted by Working Group members). Catches partly concern the North Sea horse mackerel.**

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988
Belgium	8	34	7	55	20	13	13	9	10
Denmark	199	3,576	1,612	1,590	23,730	22,495	18,652	7,290	20,323
Faroe Is-lands	260	-	-	-	-	-	-	-	-
	292	421	567	366	827	298	2312	1891	7841
France	+	139	30	52	+	+	-	3	153
Germany, Fed.Rep.	1,161	412	-	-	-	-	-	-	-
Ireland	101	355	559	2,0292	824	1602	6002	8503	1,0603
Nether-lands	119	2,292	7	322	2	203	776	11,7283	34,4253
	-	-	-	2	94	-	-	-	-
Norway <sup>2</sup>	-	-	-	-	-	-	2	-	-
Poland	11	15	6	4	-	71	3	339	373
Sweden	-	-	-	-	3	998	531	487	5,749
UK (Engl. + Wales)	-	-	-	-	489	-	-	-	-
UK (Scot-land)									
USSR									
Total	2,151	7,253	2,788	4,420	25,987	24,238	20,808	20,895	62,877

Country	1989	1990	1991	1992	1993	1994	1995	1996	1997
Belgium	10	13	-	+	74	57	51	28	-
Denmark	23,329	20,605	6,982	7,755	6,120	3,921	2,432	1,433	976
Estonia	-	-	-	293	-	-	17	-	-
Faroe Islands	-	942	340	-	360	275	-	-	296
France	248	220	174	162	302	-	-	-	-
Germany, Fed.Rep.	506	2,469 <sup>4</sup>	5,995	2,801	1,570	1,014	1,600	7	37
Ireland	-	687	2,657	2,600	4,086	415	220	1,100	8,152
Netherlands	14,172	1,970	3,852	3,000	2,470	1,329	5,285	6,205	52
Norway	84,161	117,903	50,000	96,000	126,800	94,000	84,747	14,639	43,888
Poland	-	-	-	-	-	-	-	-	-
Sweden	-	102	953	800	697	2,087	-	95	1761
UK (Engl. + Wales)	10	10	132	4	115	389	478	40	10
UK (N. Ireland)	-	-	350	-	-	-	-	-	-
UK (Scotland)	2,093	458	7,309	996	1,059	7,582	3,650	2,442	10,511
USSR / Russia (1992 -)	-	-	-	-	-	-	-	-	-
Unallocated+discards	12,482 <sup>3</sup>	-317 <sup>3</sup>	-750 <sup>3</sup>	-278 <sup>5</sup>	-3,270	1,511	-28	136	-31,615 <sup>6</sup>
Total	112,047	145,062	77,904	114,133	140,383	112,580	98,452	26,125	34,068

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006
Belgium	19	21	-	-	-	-	-	-	-
Denmark	2,048	2,026	7	98	53	841	48	216	60
Estonia	-	-	-	-	-	-	-	-	-
Faroe Islands	28	908	24	0	671	5	76	35	0
France	379	60	49	-	-	255	-	1	-
Germany	4,620	4,072	0	0	4	534	0	44	1
Ireland	-	404	32	332	11	93	378	-	-
Lithuania	-	-	-	-	-	-	-	-	-
Netherlands	4,548	3,285	10	1	0	36	0	0	0
Norway	13,129	44,344	1,141	7,912	34,843	20,349	10,687	24,733	27,087
Russia	-	-	2	-	-	-	-	-	-
Sweden	1,761	1,957	1,009	68	561	1,002	567	216	0
UK (Engl. + Wales)	1	12	-	-	-	-	0	-	-
UK (Scotland)	3,041	1,658	3,054	3,161	252	0	0	22	61
Unallocated+discards	737	-325	10	0	0	-36	0	0	0
Total	30,311	58,422	5,338	11,572	36,395	23,079	11,756	25,267	27,210

<sup>1</sup> Includes Division 2.a. <sup>2</sup> Estimated from biological sampling. <sup>3</sup> Assumed to be misreported. <sup>4</sup> Includes 13 t from the German Democratic Republic. <sup>5</sup> Includes a negative unallocated catch of -4,000 t. <sup>6</sup> Negative values when there were overestimations of catch when comparing scientific with official data

Country	2007	2008	2009	2010	2011	2012	2013	2014
Denmark	74	2	207	61	19	9	0	23
Faroe Islands	3	55	0	8	0	0	0	53
France	-	1	-	-	268	-	-	17
Germany, Fed.Rep.	6	93	0	4	0	0	20	0
Ireland	651	298	342	14	755	25	7	-
Netherlands	-	-	-	-	-	-	-	-
Lithuania	22	0	7	339	81	92	0	310
Norway	4180	11631	57890	10556	13409	3183	6566	14051
Sweden	76	9	258	2	90	0	1	0
UK (Engl. + Wales)	31	-	-	-	-	-	16	203
UK (Scotland)	7	20	51	546	101	12	102	11
Unallocated +discards	0	0	0	0	0	0	0	30
Total	5050	12110	58755	11531	14723	3320	6712	14699

Country	2015	2016	2017	2018	2019	2020	2021
Denmark	37	7	21	289	183	22	11
Faroe Islands	0	0	67	0	6	-	-
France	12	4	1	2	98	0	2
Germany, Fed.Rep.	6	28	1	1	5	0.5	3
Ireland	8	-	-	-	-	-	-
Netherlands	-	0	14	7	72	1	27
Lithuania	12	130	-	-	-	0	-
Norway	8,887	8,765	9,880	8,601	8,154	10,376	3,651
Sweden	10	0	41	23	323	83	4
UK (Engl. + Wales)	134	13	4	0	-	0	0.5
UK (Scotland)	36	14	-	-	50	-	63
Unallocated +discards	32	97	87	162**	339	1239	160
Total	9,175	9,057	10,117	9,085	9144	11,700	3,923

\*\* 3t landings from UK (Northern Ireland incl.)



**Table 7.1.1.3 Western horse mackerel. Catches (t) in Subarea 6 by country (Data submitted by Working Group members).**

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988
Denmark	734	341	2,785	7	-	-	-	769	1,655
Faroe Islands	-	-	1,248	-	-	4,014	1,992	4,450 <sup>2</sup>	4,000 <sup>2</sup>
France	45	454	4	10	14	13	12	20	10
Germany, Fed. Rep.	5,550	10,212	2,113	4,146	130	191	354	174	615
Ireland	-	-	-	15,086	13,858	27,102	28,125	29,743	27,872
Netherlands	2,385	100	50	94	17,500	18,450	3,450	5,750	3,340
Norway	-	5	-	-	-		83	75	41
Spain	-	-	-	-	-		1	1	1
UK (Engl. + Wales)	9	5	+	38	+	996	198	404	475
UK (N. Ireland)						-	-	-	-
UK (Scotland)	1	17	83	-	214	1,427	138	1,027	7,834
USSR.	-	-	-	-	-	-	-	-	-
Unallocated + disc						-19,168	-13,897	-7,255	-
Total	8,724	11,134	6,283	19,381	31,716	33,025	20,455	35,157	45,842

Country	1989	1990	1991	1992	1993	1994	1995	1996	1997
Denmark	973	615	-	42	-	294	106	114	780
Faroe Islands	3,059	628	255	-	820	80	-	-	-
France	2	17	4	3	+	-	-	-	53
Germany, Fed. Rep.	1,162	2,474	2,500	6,281	10,023	1,430	1,368	943	229
Ireland	19,493	15,911	24,766	32,994	44,802	65,564	120,124	87,872	22,474
Netherlands	1,907	660	3,369	2,150	590	341	2,326	572	1335
Norway	-	-	-	-	-	-	-	-	-
Spain	1	1	1	3	-	-	-	-	-
UK (Engl. + Wales)	44	145	1,229	577	144	109	208	612	56
UK (N.Ireland)	-	-	1,970	273	-	-	-	-	767
UK (Scotland)	1,737	267	1,640	86	4,523	1,760	789	2,669	14,452
USSR/Russia (1992-)	-	44	-	-	-	-	-	-	-
Unallocated + disc.	6,493	143	-1,278	-1,940	-6,960 <sup>3</sup>	-51	-41,326	-11,523	837

Country	1989	1990	1991	1992	1993	1994	1995	1996	1997
Total	34,870	20,904	34,456	40,469	53,942	69,527	83,595	81,259	40,983

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006
Denmark		79							
Faroe Islands	-	-							
France	221			428	55	209	172	41	411
Germany	414	1031	209	265	149	1337	1413	1958	1025
Ireland	21951	31736	15843	20162	12341	20903	15702	12395	9780
Lithuania									2822
Netherlands	983	2646	686	600	450	847	3702	6039	1892
Spain	-	-						0	0
UK (Engl.+Wales)	227	344	41	91		46	5	52	
UK (N.Ireland)	1132	-	79	272	654	530	249	210	82
UK (Scotland)	10147	4544	1839	3111	1192	453	377	62	43
Unallocated+disc.	98	1507	0	0	0	0	0	0	0
Total	34815	41887	18697	24929	14840	24325	21619	20757	16055

<sup>1</sup>Included in Subarea 7. <sup>2</sup>Includes Divisions 3.a, 4.a, b and 6.b. <sup>3</sup>Includes a negative unallocated catch of -7000 t.

Country	2007	2008	2009	2010	2011	2012	2013	2014	2015
Denmark					58	1,131	433	856	3,045
Faroe Islands		573		66					
France		73			246			195	65
Germany	1,835	5,097	635	773	6,508	671	8,616	4,194	1,980
Ireland	20,010	18,751	16,596	19,985	23,556	29,282	19,979	15,745	10,894
Lithuania	80	641							
Netherlands	2,177	3,904	2,332	1,684	6,353	12,653	11,078	8,580	6,211
Norway	2	20	27	18	48	2			
Spain	0								
UK (Engl. + Wales)	332			463			451	18	58
UK (N.Ireland)				59	198		2,325	1,579	1,204

Country	2007	2008	2009	2010	2011	2012	2013	2014	2015
UK (Scotland)	38	588	243	89	2,528	1,231	385	1,277	696
Unallocated+disc.	0	0	0	0	230	2	-	123	
Total	24,474	29,648	19,833	23,136	39,726	44,973	43,266	32,567	24,153

Country	2016	2017	2018	2019	2020	2021
Denmark		3,462	4,982	6,467	2,267	1,853
Faroe Islands		113		20		-
France	23	1,025	197	550	3	908
Germany	4,069	2,884	2,779	1,418	0	-
Ireland	15,381	15,123	17,959	21,109	9,187	8,530
Lithuania	2,510					-
Netherlands	9,246	5,497	11,921	14,421	5,202	1,309
Norway						
Spain						
UK (Engl. + Wales)		66	32	830	817	249
UK (N.Ireland)	0		1,026	1,907	1,229	417
UK (Scotland)	956			627	331**	459
Unallocated+disc.		116	55	129	108	91
Total	32,186	28,286	38,950	47,480	19,146	13,818

\*\* 1.4t BMS included

**Table 7.1.1.4. Western horse mackerel. Catches (t) in Subarea 7 by country (Data submitted by the Working Group members).**

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988
Belgium	-	1	1	-	-	+	+	2	-
Denmark	5,045	3,099	877	993	732	1477	30408	27,368	33,202
France	1,983	2,800	2,314	1,834	2,387	1,881	3,801	2,197	1,523
Germany, Fed.Rep.	2,289	1,079	12	1,977	228	-	5	374	4,705
Ireland	-	16	-	-	65	100	703	15	481
Netherlands	23,002	25,000	27500	34,350	38,700	33,550	40,750	69,400	43,560

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988
Norway	394	-	-	-	-	-	-	-	-
Spain	50	234	104	142	560	275	137	148	150
UK (Engl. + Wales)	12,933	2,520	2,670	1,230	279	1,630	1,824	1,228	3,759
UK (Scotland)	1	-	-	-	1	1	+	2	2,873
USSR	-	-	-	-	-	120	-	-	-
Total	45,697	34,749	33,478	40,526	42,952	39,034	77,628	100,734	90,253

Country	1989	1990	1991	1992	1993	1994	1995	1996	1997
Faroe Islands	-	28	-	-	-	-	-	-	-
Belgium	-	+	-	-	-	1	-	-	18
Denmark	34,474	30,594	28,888	18,984	16,978	41,605	28,300	43,330	60,412
France	4,576	2,538	1,230	1,198	1,001	-	-	-	30,571
Germany, Fed.Rep.	7,743	8,109	12,919	12,951	15,684	14,828	17,436	15,949	28,267
Ireland	12,645	17,887	19,074	15,568	16,363	15,281	58,011	38,455	43,624
Netherlands	43,582	111,900	104,107	109,197	157,110	92,903	116,126	114,692	131,701
Norway	-	-	-	-	-	-	-	-	-
Spain	14	16	113	106	54	29	25	33	6
UK (Engl. + Wales)	4,488	13,371	6,436	7,870	6,090	12,418	31,641	28,605	17,464
UK (N.Ireland)	-	-	2,026	1,690	587	119	-	-	1,093
UK (Scotland)	+	139	1,992	5,008	3,123	9,015	10,522	11,241	7,902
Unallocated + discards	28,368	7,614	24,541	15,563	4,010	14,057	68,644	26,795	58,718
Total	135,890	192,196	201,326	188,135	221,000	200,256	330,705	279,100	379,776

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006
Faroe Islands	-	-		550	-	-	3,750	3,660	
Belgium	-	-	-	-		-			
Denmark	25,492	19,166	13,794	20,574	10,094	10,499	11,619	9,939	6,838
France	22,095	25,007	20,401	9,401	5,220	5,010	5,726	7,108	6,680
Germany	24,012	13,392	9,045	7,583	10,212	13,319	16,259	9,582	6,511
Ireland	48,860	25,816	32,869	29,897	23,366	13,533	8,469	20,405	16,841

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006
Lithuania	-	-							3,606
Netherlands	95,753	63,091	44,806	37,733	32,123	38,808	32,130	26,424	29,165
Spain	-	58	50	7	11	1	27	12	3
UK (Engl. + Wales)	11,925	7,249	4,391	5,913	4,393	3,411	4,097	2,670	2,754
UK (N.Ireland)	27	-	546	868	475	384	209		21
UK (Scotland)	5,095	4,994	5,142	1,757	1,461	268	1,146	59	365
Unallocated+discards	12,706	31,239	-9,515	2,888	434	17,146	16,553	11,875	4,679
Total	245,965	190,012	121,530	117,170	87,788	102,379	99,985	91,733	77,463

Country	2007	2008	2009	2010	2011	2012	2013	2014	2015
Faroe Islands	475	212		-	-	-	0		
Belgium				19	2		14		
Denmark	4856	1970	2710	5247	5831	2281	6373	5066	1474
France	2007	9703		260	7431	579	744	940	1552
Germany	3943	5693	14205	16847	14545	16391	15781	12948	7382
Ireland	8039	16282	23816	24491	14154	15893	15805	16922	10751
Lithuania	5387	4907				-	0		
Netherlands	32654	28077	23263	65865	49207	53644	41562	15529	18100
Norway	-	-	-	40		-	0		
Spain	11	11	6	3		10	0		
UK (Engl. + Wales)	5119	3245	6257	12139	11688	12122	3388	4576	1798
UK (Scotland)		469	1119	1713	299	91	17	101	6
Unallocated+discards	6012	-4624	-10891	6511	1	3038	4399	974	1929
Total	68504	65946	60487	133136	103157	104049	88083	57055	42992

Country	2016	2017	2018	2019	2020	2021
Denmark	314	1057	1,031	690	3,198	3,540
France	551	595	1,067	907	1,486	990
Germany	7313	4077	1,401	7,673	952	5,525

Country	2016	2017	2018	2019	2020	2021
Ireland	12193	7857	7,169	7,753	7,870	10,240
Lithuania	86					
Netherlands	14415	8445	14,009	15,159	9,036	17,473
Poland				127	1,000	1,605
Spain	0		0	1	6	14
UK (Engl. + Wales)	820	478	2,410	2,862	679**	2,401***
UK (Scotland)					3	92
UK (Northern Ireland)			52	0	2	933
Unallocated+discards	1692	830	548	918	311	677
Total	37384	23340	27,687	36,062	24,544	43,490

<sup>2</sup>French catches landed in the Netherlands \*\*21t BMS landings included

**Table 7.1.1.5. Western horse mackerel. Catches (t) in Subarea 8 by country (Data submitted by Working Group members).**

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988
Denmark	-	-	-	-	-	-	446	3,283	2,793
France	3,361	3,711	3,073	2,643	2,489	4,305	3,534	3,983	4,502
Netherlands	-	-	-	-	2	2	2	2	-
Spain	34,134	36,362	19,610	25,580	23,119	23,292	40,334	30,098	26,629
UK (Engl.+Wales)	-	+	1	-	1	143	392	339	253
USSR	-	-	-	-	20	-	656	-	-
Total	37,495	40,073	22,684	28,223	25,629	27,740	45,362	37,703	34,177

Country	1989	1990	1991	1992	1993	1994	1995	1996	1997
Denmark	6,729	5,726	1,349	5,778	1,955	-	340	140	729
France	4,719	5,082	6,164	6,220	4,010	28	-	7	8,564
Germany, Fed. Rep.	-	-	80	62	-	-	-	-	-
Netherlands	-	6,000	12,437	9,339	19,000	7,272	-	14,187	-
Spain	27,170	25,182	23,733	27,688	27,921	25,409	28,349	29,428	31,082
UK (Engl.+Wales)	68	6	70	88	123	753	20	924	430
Unallocated+discards	-	1,500	2,563	5,011	700	2,038	-	3,583	-2,944
Total	38,686	43,496	46,396	54,186	53,709	35,500	28,709	48,269	37,861

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006
Denmark	1,728	4,769	2,584	582					1,513
France	1,844	74	7	5,316	13,676	4,908	2,161	3,540	3,944
Germany	3,268	3,197	3,760	3,645	2,293	504	72	4,776	3,326
Ireland	-	-	6,485	1,483	704	1,314	1,882	1,808	158
Lithuania	-	-							401
Netherlands	8,123	13,821	11,769	35,106	12,538	6,620	1,047	6,372	6,073
Spain	23,599	24,461	24,154	23,531	24,752	24,598	16,245	16,624	13,874
UK (Engl. + Wales)	9	28	121	1,092	1,578	982	516	838	821
UK (Scotland)	-	-	249						
Unallocated+discards	1,884	-8658	5,093	4,365	1,705	2,785	2,202	7,302	4,013
Total	40,455	37,692	54,222	75,120	57,246	41,711	24,125	41,260	34,122

Country	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Denmark	2,687	3,289	3,109	632	200	581	14			
France	10,741	2,848			326	1,218	2,849	2,277	1,618	2,219
Germany		918	281	64	61		417	19	49	4
Ireland	694					39			0	32
Netherlands	211	6,269	1,848	98	49	7	1,057	526	635	1
Spain	14,265	19,840	21,071	38,742	34,581	13,502	22,542	19,443	13,072	14,235
UK (Engl. + Wales)		120	224	112	28		104	35	72	9
Unallocated+discards		67	913	7,412	417	431	2,055	182	9,314	6,643
Total	28,598	33,352	27,447	47,060	35,662	15,777	29,039	22,483	24,760	23,143

Country	2017	2018	2019	2020	2021
Denmark	1		422		638
France	2,303	2,176	2,914	728	808
Germany	210	554	144	2	2
Ireland	580	219	36	332	-
Netherlands	313	6	3	0.5	1,976

Country	2017	2018	2019	2020	2021
Spain	14,901	20,362	25,775	19,163	16,177
UK (Engl. + Wales)		2	344		
Unallocated+discards	2,907	1,921	1,755	1,104	713
Total	21,213	25,240	31,396	20,742	20,314

<sup>2</sup>Included in Subarea 7. <sup>3</sup>French catches landed in the Netherlands

**Table 7.2.1.1. Western horse mackerel. The time series of Total Annual Egg Production (TAEP) estimates (10<sup>12</sup> eggs). (\*) means preliminary.**

Year	TAEP
1992	2094
1995	1344
1998	1242
2001	864
2004	884
2007	1486
2010	1033
2013	366
2016	311
2019	178
2022*	515

**Table 7.2.2.1. Western horse mackerel. Time series of recruitment index estimated from the IBTS Surveys (2003-2021) in 2020-2022.**

Year	Index 2022		Index 2021	Index 2020
	Mean	CV		
2003	728100	0.30	732297	724708
2004	2516442	0.31	2453310	2439512
2005	2199332	0.33	2151351	2148828
2006	1501474	0.33	1499811	1482969
2007	3125619	0.29	3121579	3088715
2008	7824230	0.30	7481365	7272792



Year	Index 2022		Index 2021	Index 2020
	Mean	CV		
2009	1127972	0.27	1148964	1135301
2010	872244	0.30	864772	860652
2011	175162	0.35	178188	180361
2012	4435133	0.31	4339882	4356450
2013	1099932	0.24	1111210	1092849
2014	2905589	0.24	2931963	2922237
2015	4123241	0.28	4060794	4030569
2016	5421010	0.29	5280009	5216531
2017	9395798	0.49	9460399	9450737
2018	5657414	0.29	5657414	4000271
2019	1637102	0.29	1637102	1636554
2020	878485	0.27	878484	
2021	1015429	0.24		

**Table 7.2.2.2. Western horse mackerel. Time series of biomass from the PELACUS acoustic survey (in tonnes).**

Year	Biomass	CV
1992	57188	0.32
1993	25028	0.32
1995	93825	0.32
1997	74364	0.32
1998	139395	0.32
1999	71744	0.32
2000	26192	0.32
2001	40864	0.32
2002	41788	0.32
2003	26647	0.32
2004	23992	0.32
2005	40082	0.32
2006	13934	0.32

Year	Biomass	CV
2007	28173	0.32
2008	33614	0.32
2009	24020	0.32
2010	53417	0.32
2011	7687	0.32
2012	15479	0.32
2013	5532	0.32
2014	30454	0.32
2015	67068	0.32
2016	32581	0.32
2017	13845	0.32
2018	9270	0.32
2019	13075	0.32
2020	NA	NA
2021	10233	0.32
2022	18584	0.32

**Table 7.2.4.1. Western Horse Mackerel stock. Catch in numbers (thousands) at age by quarter and area in 2021 (15 = 15+ group)**

Q1																		
Age	27.2.a	27.6.a	27.7.b	27.7.c.2	27.7.e	27.7.f	27.7.g	27.7.h	27.7.j	27.7.j.2	27.7.k.1	27.8.a	27.8.b	27.8.c	27.8.c.e	27.8.c.w	27.8.d	Total
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	176.35	752.15	120.21	63.17	2043.64	0.72	3156.24
2	0	0	133.80	95.92	886.13	495.17	166.46	1323.10	3.08	63.16	0	49.37	245.53	182.76	161.46	244.24	0.20	4050.36
3	0.04	79.67	1903.08	1228.80	11121.17	4629.76	3470.68	17349.72	39.43	826.03	0.02	24.51	19.61	161.41	65.21	167.85	0.10	41087.08
4	0.83	1866.14	5518.74	1954.61	14505.82	8440.11	7269.86	25341.21	62.72	1438.23	0.02	18.43	2.65	0	12.17	296.52	0.08	66728.15
5	0.98	2198.85	2768.86	483.61	3207.53	1381.36	1674.92	4888.14	14.71	714.82	0.01	44.08	6.45	0	108.37	629.84	0.18	18122.70
6	1.68	3765.30	5691.95	434.04	1711.22	597.99	676.09	2948.37	13.52	1840.62	0.01	89.32	13.09	0	266.84	1228.99	0.36	19279.40
7	11.83	26467.51	17066.48	1392.89	2000.11	1857.82	1084.79	3410.17	38.23	12477.64	0.01	60.23	9.77	0	370.69	636.97	0.25	66885.38
8	1.07	2389.65	1403.38	103.16	102.87	118.92	13.51	176.32	2.50	653.03	0	60.60	11.09	0	569.06	443.63	0.25	6049.04
9	1.43	3196.87	1538.38	89.18	73.97	127.01	6.37	262.43	2.86	844.09	0	54.47	10.49	0	629.95	279.81	0.22	7117.53
10	0.33	731.31	913.53	81.55	373.17	33.93	2.12	200.45	1.81	253.56	0	54.71	11.84	0	575.97	336.34	0.22	3570.83
11	0.30	660.54	574.12	23.90	19.82	14.39	0.66	42.37	0.77	112.98	0	47.10	9.25	0	527.26	259.22	0.19	2292.87
12	0.38	860.39	296.77	58.72	19.71	14.31	1.32	39.11	0.76	354.02	0	23.40	4.61	0	260.51	130.12	0.10	2064.24
13	1.08	2418.11	877.00	119.15	478.28	133.04	3.29	110.73	1.98	318.27	0	9.10	1.62	0	126.88	25.24	0.04	4623.81
14	0.18	395.74	53.53	1.90	1.57	1.14	0.01	3.12	0.06	1.25	0	6.66	0.96	0	83.60	27.88	0.03	577.62
15+	0.70	1568.27	232.92	541.08	183.30	157.48	11.87	285.16	1.59	217.52	0	18.83	2.84	0	237.99	77.26	0.08	3536.88

Q2																		
Ages	27.6.a	27.7.a	27.7.b	27.7.c	27.7.c.2	27.7.e	27.7.f	27.7.g	27.7.h	27.7.j	27.7.j.2	27.8.a	27.8.b	27.8.c	27.8.c.e	27.8.c.w	27.8.d	Total
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	115.39	0.20	17.44	66.96	0.21	2.24	6.51	2.12	53.42	86.47	1362.73	38.75	332.22	50.88	0.11	2135.63
2	0	0.01	796.06	1.39	120.34	461.99	1.42	15.43	44.94	14.60	368.58	49.34	728.18	246.68	12.19	303.67	0.08	3164.89
3	0.01	0	206.90	0.36	31.28	120.07	0.37	4.01	11.68	3.79	95.79	80.20	273.22	327.36	306.39	3381.58	0.26	4843.28
4	0.24	0	20.97	0.04	3.17	11.43	0.04	0.41	1.18	0.38	10.45	66.82	70.57	15.81	1384.61	2320.77	0.23	3907.12
5	0.31	0	62.92	0.11	9.51	34.30	0.11	1.22	3.55	1.15	31.35	117.98	152.35	3.02	5285.07	1201.77	0.40	6905.14
6	0.50	0	62.92	0.11	9.51	34.30	0.11	1.22	3.55	1.15	31.35	127.66	173.69	1.82	6418.45	553.20	0.43	7419.97
7	3.49	0	125.84	0.22	19.02	68.59	0.22	2.44	7.10	2.31	62.70	98.57	140.05	0.24	4115.03	254.41	0.27	4900.52
8	0.54	0	41.95	0.07	6.34	22.86	0.07	0.81	2.37	0.77	20.90	56.33	159.58	0.15	1856.97	392.47	0.14	2562.33
9	0.50	0	83.89	0.15	12.68	45.73	0.15	1.63	4.74	1.54	41.80	43.45	182.72	0.22	1108.58	374.21	0.10	1902.08
10	0.21	0	20.97	0.04	3.17	11.43	0.04	0.41	1.18	0.38	10.45	40.53	186.71	0.19	1075.14	527.36	0.11	1878.31
11	0.12	0	41.95	0.07	6.34	22.86	0.07	0.81	2.37	0.77	20.90	38.14	156.55	0.24	743.91	495.42	0.08	1530.61
12	0.16	0	20.97	0.04	3.17	11.43	0.04	0.41	1.18	0.38	10.45	40.37	63.68	0.13	285.96	282.56	0.04	720.98
13	0.38	0	20.97	0.04	3.17	11.43	0.04	0.41	1.18	0.38	10.45	27.39	33.50	0.05	138.93	68.76	0.02	317.10
14	0.14	0	0	0	0	0	0	0	0	0	0	3.00	24.12	0.12	57.98	80.88	0.01	166.26
15+	0.46	0	0	0	0	0	0	0	0	0	0	37.17	93.32	1.32	232.62	431.50	0.05	796.44

**Table 7.2.4.1 cont. Western Horse Mackerel stock. Catch in numbers (thousands) at age by quarter and area in 2021 (15 = 15+ group)**

Q3																							
Ages	27.2.a	27.3.a	27.4.a	27.6.a	27.7.a	27.7.b	27.7.c.2	27.7.e	27.7.f	27.7.g	27.7.h	27.7.j	27.7.j.2	27.7.k.2	27.8.a	27.8.b	27.8.c	27.8.c.e	27.8.c.w	27.8.d	27.8.d.2	27.8.e	Total
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.85	79.42	0	149.96	0	0	0.01	0	234
1	0	0	0	0	0	0.88	0.01	5.12	0	0.14	0.09	0.00	0.02	0	148.35	502.62	45.81	6467.41	4.64	0.37	0.21	0.04	7175.72
2	0	0	0	0	0.05	34.70	0.36	1.78	0.12	5.54	3.68	158.69	41.69	0	77.61	174.72	52.75	3379.52	65.94	0.19	0.11	0.02	3997.47
3	0	0	0	0	0.36	254.51	2.65	11.58	0.87	40.60	27.00	898.38	572.70	0.03	40.63	68.28	0	1253.11	601.25	0.10	0.06	0.01	3772.13
4	0	0.01	1.54	0.01	0.58	412.80	4.30	18.94	1.41	65.86	43.79	1233.82	1152.02	0.06	44.82	70.92	0	1077.88	972.39	0.11	0.06	0.01	5101.32
5	0.11	0.62	163.11	0.65	0.49	348.35	3.63	15.86	1.19	55.58	36.95	891.00	1122.46	0.05	80.33	128.20	0.01	1384.43	2288.96	0.20	0.11	0.02	6522.28
6	0.05	0.29	76.29	0.31	1.16	830.86	8.65	37.04	2.84	132.56	88.14	2147.21	2656.01	0.11	121.08	201.64	0.03	1750.24	3778.11	0.30	0.17	0.03	11833.12
7	0.33	1.90	501.87	2.01	1.50	1072.86	11.17	47.71	3.67	171.16	113.81	1549.35	4652.98	0.15	47.18	110.32	0.05	765.52	1356.63	0.12	0.07	0.01	10410.34
8	0.83	4.78	1264.97	5.07	0.21	150.32	1.56	6.78	0.51	23.98	15.95	240.86	628.04	0.02	17.18	52.29	0.10	312.67	448.15	0.04	0.02	0	3174.33
9	0.32	1.85	488.88	1.96	0.08	57.14	0.59	3.22	0.20	9.12	6.06	56.77	272.91	0.01	22.34	64.42	0.10	289.49	702.94	0.06	0.03	0.01	1978.49
10	0.40	2.32	615.40	2.46	0.05	39.22	0.41	1.71	0.13	6.26	4.16	56.76	170.01	0.01	21.12	58.16	0.06	307.55	633.61	0.05	0.03	0.01	1919.89
11	0.14	0.80	211.62	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	17.69	36.36	0.14	298.00	502.49	0.04	0.02	0	1068.16
12	0.18	1.04	276.42	1.11	0.03	22.08	0.23	0.96	0.08	3.52	2.34	53.25	74.45	0	10.04	16.77	0.09	153.47	304.98	0.03	0.01	0	921.10
13	0.25	1.47	388.91	1.56	0.01	7.71	0.08	0.34	0.03	1.23	0.82	0.00	44.59	0	12.04	19.83	0.08	374.52	175.26	0.03	0.02	0	1028.79
14	0.32	1.85	490.47	1.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	12.33	18.00	0.04	410.97	154.31	0.03	0.02	0	1090.29
15+	0.94	5.45	1443.63	5.78	0.02	13.30	0.14	0.58	0.05	2.12	1.41	0.01	76.92	0	15.09	19.52	0	482.00	212.53	0.04	0.02	0	2279.56

Q4																					
Ages	27.2.a	27.3.a	27.4.a	27.6.a	27.7.a	27.7.b	27.7.c	27.7.c.2	27.7.e	27.7.f	27.7.g	27.7.h	27.7.j	27.7.j.2	27.8.a	27.8.b	27.8.c	27.8.c.e	27.8.c.w	Total	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1529.36	770.70	0.91	0.11	385.72	2686.80	
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5293.83	1019.14	115.08	752.91	2587.13	9768.10	
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4848.31	205.47	128.25	1528.48	2378.86	9089.36	
3	0.21	0.21	0.09	154.76	0.01	6.35	0.02	1.53	99.06	2.04	20.14	1060.58	146.84	1880.53	971.11	81.18	3.02	390.59	370.27	5188.53	
4	4.79	4.97	2.04	3601.82	0.04	66.25	0.06	4.95	432.64	6.63	65.32	2091.14	476.32	7292.19	684.38	78.66	1.53	159.01	352.97	15325.72	
5	1.90	1.97	89.95	1339.08	0.02	23.65	0.03	2.49	303.72	3.33	32.86	1033.35	239.61	3610.44	738.85	92.46	1.59	169.87	374.19	8059.36	
6	2.02	2.10	407.39	1114.13	0.03	13.78	0.05	4.07	323.65	5.45	53.73	2263.30	391.83	5528.57	943.76	132.27	0.94	278.33	400.97	11866.38	
7	7.80	8.09	906.59	4961.01	0.06	42.88	0.09	8.15	502.41	10.91	107.52	4066.96	784.00	11653.37	593.19	117.05	0.17	197.97	191.20	24159.43	
8	0.88	0.91	422.99	238.01	0.00	1.73	0.01	0.43	23.35	0.58	5.69	26.48	41.46	808.54	453.84	75.58	0.03	171.05	143.03	2414.59	
9	0.72	0.75	308.92	235.90	0.00	0.65	0	0.22	11.96	0.30	2.91	13.57	21.24	414.53	622.91	76.68	0.12	251.06	209.56	2172.01	
10	0.47	0.49	323.57	31.56	0.00	0.10	0	0.06	3.16	0.08	0.77	3.59	5.62	109.70	1064.44	110.50	0.20	357.48	453.97	2465.76	
11	0.38	0.39	264.16	22.23	0.00	0.01	0	0.01	0.31	0.01	0.07	0.35	0.54	10.60	873.63	78.71	0.08	282.41	398.84	1932.73	
12	0.75	0.78	513.55	54.35	0.00	0.20	0	0.12	6.51	0.16	1.58	7.38	11.55	225.63	422.02	27.59	0.10	105.73	234.75	1612.77	
13	0.82	0.85	461.29	158.37	0.00	0.50	0	0.13	7.09	0.18	1.73	8.04	12.59	245.47	448.33	39.88	0.04	142.24	206.27	1733.82	
14	0.48	0.50	351.51	11.94	0.00	0.01	0	0.01	0.36	0.01	0.09	0.41	0.64	12.53	505.66	54.10	0.02	140.06	240.94	1319.27	
15+	1.26	1.30	885.97	59.48	0.00	0.16	0	0.10	5.23	0.13	1.27	5.93	9.29	181.38	585.91	81.93	0.04	151.62	263.23	2234.24	

Table 7.2.4.1 cont. Western Horse Mackerel stock. Catch in numbers (thousands) at age by quarter and area in 2021 (15 = 15+ group)

all Q Ages	27.2.a	27.3.a	27.4.a	27.6.a	27.7.a	27.7.b	27.7.c	27.7.c.2	27.7.e	27.7.f	27.7.g	27.7.h	27.7.j	27.7.j.2	27.7.k.1	27.7.k.2	27.8.a	27.8.b	27.8.c	27.8.c.e	27.8.c.w	27.8.d	27.8.d.2	27.8.e	Total
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1534.21	850.13	0.91	150.06	385.87	0.01	0.01	0	2921.20
1	0	0	0	0	0	116.28	0.20	17.45	72.09	0.21	2.39	6.61	2.12	53.44	0	0	5705.00	3636.64	319.84	7615.71	4686.29	1.20	0.21	0.04	22235.72
2	0	0	0	0	0.06	966.67	1.39	216.62	1349.90	496.71	192.58	1371.87	176.36	473.58	0	0	5024.63	1353.90	610.43	5081.65	2992.71	0.47	0.11	0.02	20309.67
3	0.24	0.21	3.47	242.83	0.37	2398.53	0.38	1264.25	11351.89	4633.05	3603.28	18451.03	1088.45	3377.13	0.02	0.03	1116.46	442.28	491.80	2015.31	4520.95	0.46	0.06	0.01	55002.47
4	5.62	4.98	82.50	5663.86	0.62	6065.82	0.09	1967.03	14968.84	8448.18	7516.73	27480.82	1773.24	9896.42	0.02	0.06	814.46	222.81	17.34	2633.67	3942.66	0.41	0.06	0.01	91506.26
5	2.99	2.59	303.54	3664.04	0.51	3217.47	0.14	499.23	3561.40	1386.00	1798.13	5963.00	1146.47	5480.10	0.01	0.05	981.25	379.45	4.63	6947.74	4494.77	0.77	0.11	0.02	39834.41
6	3.75	2.39	552.06	5049.73	1.19	6616.41	0.16	456.27	2106.20	606.39	905.03	5304.62	2553.72	10057.83	0.01	0.11	1281.83	520.68	2.79	8713.86	5961.28	1.09	0.17	0.03	50697.59
7	19.95	9.99	1811.24	32432.52	1.57	18346.36	0.31	1431.23	2618.81	1872.62	1459.73	7600.88	2373.88	28849.56	0.01	0.15	799.16	377.19	0.47	5449.21	2439.21	0.63	0.07	0.01	107894.78
8	2.77	5.69	1745.98	2777.10	0.21	1600.11	0.08	111.50	155.86	120.08	50.68	221.32	285.59	2110.71	0	0.02	587.96	298.54	0.28	2909.75	1427.28	0.43	0.02	0	14411.98
9	2.47	2.60	850.69	3566.35	0.08	1682.37	0.15	102.68	134.87	127.65	25.68	286.97	82.41	1573.51	0	0.01	743.17	334.31	0.44	2279.09	1566.52	0.38	0.03	0.01	13362.44
10	1.20	2.81	962.83	824.70	0.06	975.20	0.04	85.19	389.48	34.18	12.92	209.48	64.57	543.82	0	0.01	1180.80	367.20	0.45	2316.14	1951.28	0.38	0.03	0.01	9922.76
11	0.81	1.19	491.26	722.13	0	616.56	0.07	30.24	42.99	14.47	2.75	45.12	2.08	144.52	0	0	976.55	280.87	0.46	1851.58	1655.98	0.32	0.02	0	6880.01
12	1.32	1.83	813.27	973.77	0.03	340.75	0.04	62.24	38.62	14.59	8.60	50.07	65.95	664.60	0	0	495.83	112.64	0.32	805.67	952.41	0.16	0.01	0	5402.73
13	2.16	2.32	893.84	2686.59	0.01	907.62	0.04	122.53	497.13	133.28	10.17	120.87	14.96	618.90	0	0	496.86	94.83	0.17	782.57	475.53	0.08	0.02	0	7860.50
14	0.98	2.35	860.15	454.85	0	53.58	0	1.90	1.93	1.15	0.21	3.53	0.70	13.78	0	0	527.64	97.18	0.18	692.60	504.02	0.07	0.02	0	3216.85
15+	2.90	6.76	2385.70	1773.09	0.02	247.55	0	541.31	189.11	157.66	18.13	292.59	10.88	475.90	0	0	657.00	197.60	1.37	1104.24	984.51	0.16	0.02	0	9046.51

Table 7.2.4.2. Western horse mackerel. Catch-at-age (thousands).

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1982	0	3713	21072	134743	11515	13197	11741	8848	1651	414	1651	6582	18483	28679	19432	8210
1983	0	7903	2269	32900	53508	15345	44539	52673	17923	3291	5505	3386	17017	23902	38352	46482
1984	0	0	241360	4439	36294	149798	22350	38244	34020	14756	4101	0	639	1757	5080	50895
1985	0	1633	4901	602992	4463	41822	100376	12644	16172	6200	9224	339	850	3723	1250	34814
1986	0	0	0	1548	676208	8727	65147	109747	25712	21179	15271	3116	1031	855	292	51531
1987	0	99	493	0	2950	891660	2061	41564	90814	11740	9549	19363	8917	1398	200	32899
1988	876	27369	6112	2099	4402	18968	941725	12115	39913	67869	9739	16326	17304	5179	4892	32396
1989	0	0	0	20766	18282	5308	14500	1276730	12046	59357	83125	13905	24196	13731	8987	18132
1990	0	20406	45036	138929	61442	33298	10549	20607	1384850	37011	70512	101945	14987	34687	18077	56598
1991	20176	24021	56066	17977	159643	97147	49515	21713	17148	1028420	20309	12161	43665	8141	7053	25553

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1992	14888	229694	36332	80550	56280	255874	126816	48711	18992	23447	1099780	13409	23002	65250	11967	33246
1993	46	131108	109807	16738	62342	105760	325674	141148	68418	55289	30689	1075610	11373	24018	68137	32140
1994	3686	60759	911713	115729	53056	44520	38769	221863	106390	40988	43083	22380	918512	10143	14599	36635
1995	2702	233030	646753	526053	269658	74592	114649	36076	228687	113304	96624	59874	63187	951901	39278	148243
1996	10729	19774	659641	864188	189273	87562	52050	55914	53835	57361	56962	91690	67114	56012	349086	165611
1997	4860	110451	471611	732959	408648	256563	141168	143166	143769	123044	133166	96058	176730	98196	51674	283110
1998	744	91505	184443	488661	359590	217571	153136	119309	77494	67072	50108	58791	30535	65839	57583	141362
1999	14822	97561	83715	176919	265820	254516	212217	187196	147271	77622	35582	22909	34440	29743	41830	122176
2000	565	66210	130897	64801	119297	232346	202175	165745	109218	54365	14594	17509	18642	18585	10031	73174
2001	60561	93125	204360	166641	113659	120410	141419	259974	218002	110319	38576	22749	17102	14092	18857	64868
2002	14044	505717	122603	158114	123258	66640	68890	95052	132743	87285	46167	29692	25333	11305	12753	72682
2003	1913	323194	509889	141442	148989	89122	59047	48582	52305	102089	57089	31748	27158	8832	7683	40641
2004	22237	159011	116055	486195	81099	98855	69441	48969	32589	51953	54542	33298	12581	13407	4305	21278
2005	1305	74538	171420	310767	540649	69957	74746	61889	44443	22726	27019	42746	23677	6849	7491	18626
2006	1905	53322	58091	75505	91274	482229	57377	37222	41970	16865	11828	17073	32025	12877	7464	24645
2007	5121	32399	38598	40530	61938	112724	347284	48160	29112	21504	8728	7015	8462	14021	7618	18335
2008	30155	78121	24456	53525	57125	84358	54701	297879	49889	36692	25172	14466	12787	9269	13194	24124
2009	47421	86053	31431	56816	40104	36174	62700	57683	273217	68318	42063	30583	21230	8266	6811	39752

**Table 7.2.4.3. Western horse mackerel. Marginal age-distribution (Timing = month of year, Fleet = 1 [commercial], sex = mixed, and sample size = no. samples/100).**

[illegible]

year	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Sample size	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	4.5	7.5	6.1	4.8	6.3	7.5	6.2	5.1	2.8	3.2	3.6
0	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.013	0.007	0.000	0.001	0.001	0.004	0.001	0.000	0.008	0.000	0.036	0.009
1	0.013	0.022	0.000	0.002	0.000	0.000	0.023	0.000	0.010	0.015	0.107	0.058	0.023	0.065	0.007	0.033	0.042	0.054	0.051	0.056	0.322
2	0.073	0.006	0.400	0.006	0.000	0.000	0.005	0.000	0.022	0.035	0.017	0.049	0.345	0.179	0.233	0.140	0.085	0.046	0.101	0.123	0.078
3	0.465	0.090	0.007	0.717	0.002	0.000	0.002	0.013	0.068	0.011	0.038	0.007	0.044	0.146	0.305	0.217	0.226	0.098	0.050	0.100	0.101
4	0.040	0.147	0.060	0.005	0.690	0.003	0.004	0.012	0.030	0.099	0.026	0.028	0.020	0.075	0.067	0.121	0.166	0.147	0.092	0.068	0.078
5	0.046	0.042	0.248	0.050	0.009	0.801	0.016	0.003	0.016	0.060	0.120	0.047	0.017	0.021	0.031	0.076	0.101	0.141	0.179	0.072	0.042
6	0.040	0.122	0.037	0.119	0.066	0.002	0.780	0.009	0.005	0.031	0.059	0.144	0.015	0.032	0.018	0.042	0.071	0.118	0.156	0.085	0.044
7	0.031	0.144	0.063	0.015	0.112	0.037	0.010	0.814	0.010	0.013	0.023	0.063	0.084	0.010	0.020	0.042	0.055	0.104	0.128	0.156	0.060
8	0.006	0.049	0.056	0.019	0.026	0.082	0.033	0.008	0.676	0.011	0.009	0.030	0.040	0.063	0.019	0.043	0.036	0.082	0.084	0.131	0.084
9	0.001	0.009	0.024	0.007	0.022	0.011	0.056	0.038	0.018	0.639	0.011	0.024	0.016	0.031	0.020	0.036	0.031	0.043	0.042	0.066	0.056
10	0.006	0.015	0.007	0.011	0.016	0.009	0.008	0.053	0.034	0.013	0.514	0.014	0.016	0.027	0.020	0.039	0.023	0.020	0.011	0.023	0.029
11	0.023	0.009	0.000	0.000	0.003	0.017	0.014	0.009	0.050	0.008	0.006	0.476	0.008	0.017	0.032	0.028	0.027	0.013	0.013	0.014	0.019
12	0.064	0.047	0.001	0.001	0.001	0.008	0.014	0.015	0.007	0.027	0.011	0.005	0.348	0.018	0.024	0.052	0.014	0.019	0.014	0.010	0.016
13	0.099	0.065	0.003	0.004	0.001	0.001	0.004	0.009	0.017	0.005	0.031	0.011	0.004	0.264	0.020	0.029	0.030	0.016	0.014	0.008	0.007
14	0.067	0.105	0.008	0.001	0.000	0.000	0.004	0.006	0.009	0.004	0.006	0.030	0.006	0.011	0.123	0.015	0.027	0.023	0.008	0.011	0.008
15	0.028	0.127	0.084	0.041	0.053	0.030	0.027	0.012	0.028	0.016	0.016	0.014	0.014	0.041	0.058	0.084	0.065	0.068	0.056	0.039	0.046



year	2003*	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Timing	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Fleet	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
Sex	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
catch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sample size	7.9	6.8	7.8	7.2	6.2	7.7	8.7	7.8	6.2	6.8	7.7	8.1	6.4	8.2	6.8	6.9	6.6	5.1	11.1
0	0.001	0.017	0.001	0.002	0.006	0.035	0.052	0.004	0.001	0.006	0.096	0.028	0.134	0.181	0.157	0.036	0.011	0.048	0.006
1	0.196	0.122	0.050	0.052	0.040	0.090	0.095	0.065	0.019	0.057	0.142	0.038	0.169	0.228	0.203	0.148	0.074	0.124	0.048
2	0.309	0.089	0.114	0.057	0.048	0.028	0.035	0.117	0.068	0.050	0.035	0.122	0.040	0.132	0.040	0.060	0.083	0.087	0.044
3	0.086	0.372	0.207	0.074	0.051	0.062	0.063	0.066	0.116	0.076	0.035	0.051	0.081	0.025	0.198	0.075	0.071	0.110	0.118
4	0.090	0.062	0.361	0.089	0.077	0.066	0.044	0.028	0.056	0.203	0.078	0.042	0.049	0.042	0.052	0.357	0.074	0.037	0.197
5	0.054	0.076	0.047	0.472	0.141	0.097	0.040	0.029	0.039	0.066	0.254	0.091	0.039	0.025	0.075	0.061	0.391	0.071	0.086
6	0.036	0.053	0.050	0.056	0.433	0.063	0.069	0.049	0.042	0.045	0.069	0.225	0.072	0.020	0.034	0.055	0.060	0.349	0.109
7	0.029	0.038	0.041	0.036	0.060	0.344	0.063	0.105	0.065	0.033	0.026	0.083	0.186	0.031	0.021	0.020	0.053	0.041	0.232
8	0.032	0.025	0.030	0.041	0.036	0.058	0.301	0.071	0.065	0.030	0.019	0.032	0.043	0.109	0.033	0.012	0.023	0.029	0.031
9	0.062	0.040	0.015	0.017	0.027	0.042	0.075	0.272	0.067	0.054	0.021	0.024	0.020	0.026	0.079	0.026	0.018	0.010	0.029
10	0.035	0.042	0.018	0.012	0.011	0.029	0.046	0.067	0.263	0.049	0.032	0.035	0.017	0.014	0.019	0.062	0.027	0.009	0.021
11	0.019	0.025	0.029	0.017	0.009	0.017	0.034	0.033	0.097	0.192	0.021	0.035	0.020	0.014	0.010	0.015	0.046	0.013	0.015

year	2003*	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
12	0.016	0.010	0.016	0.031	0.011	0.015	0.023	0.023	0.032	0.060	0.108	0.036	0.018	0.020	0.009	0.011	0.015	0.031	0.012
13	0.005	0.010	0.005	0.013	0.017	0.011	0.009	0.014	0.019	0.028	0.022	0.084	0.011	0.022	0.010	0.006	0.007	0.011	0.017
14	0.005	0.003	0.005	0.007	0.010	0.015	0.007	0.014	0.011	0.014	0.017	0.037	0.076	0.025	0.011	0.005	0.006	0.006	0.007
15	0.025	0.016	0.012	0.024	0.023	0.028	0.044	0.042	0.039	0.036	0.025	0.035	0.025	0.085	0.050	0.049	0.042	0.025	0.019

\*From 2003 the marginal age composition is replaced by the age-length key in the assessment.

Table 7.2.4.4. Western horse mackerel. Conditional age-length key.

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2003	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	2	7	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	2	11	1	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	3	18	9	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	0	13	15	3	1	0	0	0	0	0	0	0	0	0	0
2003	0	1	24	63	32	7	2	2	0	1	1	0	0	0	0	0
2003	0	0	8	72	88	22	8	2	1	4	5	0	0	0	0	0
2003	0	0	2	41	111	57	11	14	18	12	1	0	0	0	1	0
2003	0	0	0	9	72	81	33	29	29	32	5	1	1	0	0	0
2003	0	0	0	1	34	54	43	33	25	47	11	3	1	1	1	3

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2003	0	0	0	0	14	30	28	29	49	50	23	11	3	2	0	3
2003	0	0	0	0	1	8	22	23	33	52	19	5	7	2	2	5
2003	0	0	0	0	1	3	4	4	15	29	29	13	2	3	2	17
2003	0	0	0	0	0	2	3	2	7	15	10	8	6	2	3	5
2003	0	0	0	0	0	0	0	1	0	7	8	5	7	2	2	8
2003	0	0	0	0	0	1	0	2	1	3	6	2	2	0	4	4
2003	0	0	0	0	0	0	0	0	1	0	3	3	1	2	2	5
2003	0	0	0	0	0	0	0	0	1	1	1	2	1	0	0	8
2003	0	0	0	0	0	0	0	0	0	0	1	1	2	1	1	10
2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	8
2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
2003	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3
2004	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	0	17	18	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	0	52	126	2	1	0	0	0	0	0	0	0	0	0	0
2004	0	0	51	186	14	5	0	0	0	0	0	0	0	0	0	0
2004	0	0	29	164	44	27	6	3	2	2	2	0	0	0	0	0
2004	0	0	4	95	71	64	21	5	2	13	3	4	1	0	0	1

[illegible]

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
2005	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0
2005	0	0	1	42	54	0	0	0	0	0	0	0	0	0	0	0
2005	0	0	0	75	151	2	2	0	0	0	0	0	0	0	0	0
2005	0	0	0	61	230	4	4	2	0	0	0	0	0	0	0	0
2005	0	0	0	30	248	22	17	7	4	3	2	3	0	0	0	0
2005	0	0	0	18	160	40	35	7	8	7	7	6	2	0	2	1
2005	0	0	0	3	37	45	51	18	8	12	9	6	2	1	0	0
2005	0	0	0	0	3	21	39	26	8	19	20	10	3	0	0	3
2005	0	0	0	0	1	4	22	24	11	15	19	13	7	0	1	2
2005	0	0	0	0	0	1	10	12	6	6	15	14	2	0	2	3
2005	0	0	0	0	0	2	13	11	7	8	8	8	3	2	0	4
2005	0	0	0	0	0	1	0	3	0	2	9	5	3	2	0	9
2005	0	0	0	0	0	0	1	2	3	3	3	8	6	2	3	7
2005	0	0	0	0	0	0	0	1	2	0	1	5	6	5	1	11
2005	0	0	0	0	0	0	0	0	1	0	4	2	5	4	2	16
2005	0	0	0	0	0	0	0	1	0	1	1	2	3	0	1	15
2005	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	14

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2005	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	3
2005	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	3
2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2006	0	0	0	3	4	18	0	0	0	0	0	0	0	0	0	0
2006	0	0	0	4	20	201	3	2	0	0	0	0	0	0	0	0
2006	0	0	0	2	15	308	11	2	0	0	0	0	0	0	0	0
2006	0	0	0	0	7	303	24	12	3	3	0	0	0	0	0	0
2006	0	0	0	0	2	290	30	20	5	2	0	3	4	2	0	0
2006	0	0	0	0	1	129	67	34	31	5	1	6	8	7	0	0
2006	0	0	0	0	0	54	46	36	24	6	7	6	9	6	5	1
2006	0	0	0	0	0	14	22	21	27	8	6	6	8	5	3	2
2006	0	0	0	0	0	6	9	10	9	6	5	2	4	10	2	7
2006	0	0	0	0	0	2	4	9	6	4	2	2	8	3	4	7
2006	0	0	0	0	0	0	0	0	4	4	0	3	5	3	3	6
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2006	0	0	0	0	0	0	0	0	1	0	0	1	2	5	1	2
2006	0	0	0	0	0	0	0	0	0	0	0	0	3	3	2	5

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2006	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3
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2007	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
2007	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0
2007	0	0	0	1	12	2	39	0	0	0	0	0	0	0	0	0
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2007	0	0	0	0	1	3	360	7	5	3	1	1	0	0	0	0
2007	0	0	0	0	0	0	280	25	23	9	0	3	3	4	1	1
2007	0	0	0	0	0	2	213	27	27	19	10	2	1	9	4	2
2007	0	0	0	0	0	1	126	32	43	34	7	5	11	9	7	7
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2007	0	0	0	0	0	0	1	1	9	10	6	2	3	11	5	19
2007	0	0	0	0	0	0	0	0	6	2	2	5	4	5	5	18
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2007	0	0	0	0	0	0	0	0	0	1	4	0	0	3	6	11
2007	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	15
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2008	0	0	0	0	2	1	0	4	0	0	0	0	0	0	0	0
2008	0	0	0	0	14	19	4	52	1	0	0	0	0	0	0	0
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2008	0	0	0	0	0	3	2	276	39	32	12	2	7	3	8	7
2008	0	0	0	0	0	0	4	188	39	35	27	6	5	7	4	8
2008	0	0	0	0	0	0	2	79	25	29	28	7	2	7	13	16
2008	0	0	0	0	0	0	0	42	12	24	25	9	7	6	10	18
2008	0	0	0	0	0	0	0	14	9	25	19	5	5	6	5	28
2008	0	0	0	0	0	0	0	3	4	9	12	4	3	4	6	34
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2008	0	0	0	0	0	0	0	0	0	3	4	2	0	1	7	26
2008	0	0	0	0	0	0	0	0	1	2	1	1	0	0	3	23
2008	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	13
2008	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	4
2008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
2008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2009	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	5	4	6	1	0	3	0	0	0	0	0	0	0
2009	0	0	0	6	24	36	25	8	37	0	0	0	0	0	0	0
2009	0	0	0	0	23	64	67	26	167	5	2	3	0	0	0	0
2009	0	0	0	0	5	41	70	36	262	10	4	1	0	1	1	0
2009	0	0	0	0	1	12	45	22	314	22	8	2	2	0	0	5
2009	0	0	0	0	0	2	28	14	301	32	17	6	2	4	1	2
2009	0	0	0	0	0	1	11	5	229	38	17	17	6	1	2	9
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2009	0	0	0	0	0	0	0	4	87	21	19	12	9	1	8	27
2009	0	0	0	0	0	0	0	0	44	10	12	10	2	6	4	32

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2009	0	0	0	0	0	0	0	0	17	4	10	15	3	4	3	26
2009	0	0	0	0	0	0	0	0	6	7	13	11	4	3	0	17
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2009	0	0	0	0	0	0	0	0	0	0	6	3	3	3	2	16
2009	0	0	0	0	0	0	0	0	0	0	0	2	1	1	0	20
2009	0	0	0	0	0	0	0	0	0	0	0	5	0	1	0	11
2009	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	6
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2010	0	0	2	0	1	1	0	0	0	0	0	0	0	0	0	0
2010	0	0	3	2	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	5	4	1	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	2	4	7	3	3	0	1	0	0	0	0	0	0
2010	0	0	0	0	13	17	27	19	5	25	1	1	0	0	0	0
2010	0	0	0	0	4	12	17	26	12	69	3	2	1	1	0	1
2010	0	0	0	0	0	2	13	31	11	103	3	0	4	0	0	1
2010	0	0	0	0	0	1	10	13	11	145	4	5	1	1	1	1
2010	0	0	0	0	0	2	3	12	6	149	9	6	3	1	1	5

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2010	0	0	0	0	0	0	1	1	2	133	6	12	5	2	1	8
2010	0	0	0	0	0	0	1	1	2	86	10	9	4	4	3	15
2010	0	0	0	0	0	0	1	1	3	57	8	10	3	2	1	6
2010	0	0	0	0	0	0	0	0	1	30	9	7	6	3	2	11
2010	0	0	0	0	0	0	0	1	0	18	10	5	7	1	2	16
2010	0	0	0	0	0	0	0	0	1	14	8	7	8	3	3	15
2010	0	0	0	0	0	0	0	0	0	12	2	7	4	3	3	13
2010	0	0	0	0	0	0	0	0	0	3	3	6	1	4	0	17
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2010	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
2011	0	0	7	2	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	20	10	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	17	39	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	10	52	2	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	9	51	4	1	0	0	0	0	0	0	0	0	0	0
2011	0	0	8	33	17	4	2	1	2	0	2	0	0	0	0	0
2011	0	0	4	15	21	18	8	7	5	2	10	1	1	0	0	0

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2012	0	0	0	10	92	6	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	4	107	14	1	1	0	0	0	0	0	0	0	0
2012	0	0	0	0	97	28	3	2	1	2	0	1	0	0	0	0
2012	0	0	0	2	74	27	16	2	6	5	0	15	1	0	1	0
2012	0	0	0	0	26	34	20	9	16	16	5	44	0	1	0	1
2012	0	0	0	0	6	12	17	22	17	32	4	85	6	2	1	1
2012	0	0	0	0	0	4	8	13	26	26	8	113	2	4	0	4
2012	0	0	0	0	0	1	5	9	8	12	13	119	3	5	3	2
2012	0	0	0	0	0	0	0	2	7	12	1	118	7	5	2	4
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2012	0	0	0	0	0	0	0	0	2	2	3	55	8	6	4	11
2012	0	0	0	0	0	0	0	0	0	1	2	25	3	5	5	16
2012	0	0	0	0	0	0	0	0	0	0	1	14	2	5	5	10
2012	0	0	0	0	0	0	0	0	0	0	1	4	1	2	4	3
2012	0	0	0	0	0	0	0	0	0	0	0	2	1	2	3	3
2012	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	5

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2012	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
2013	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
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2013	0	0	0	2	14	59	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	1	27	116	1	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	18	153	8	1	0	0	0	0	0	0	0	0
2013	0	0	0	0	9	141	33	5	2	1	1	0	1	0	0	0
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2013	0	0	0	0	0	11	20	13	14	26	18	2	90	5	6	3
2013	0	0	0	0	0	3	10	13	10	15	13	7	119	4	2	3
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2013	0	0	0	0	0	0	2	4	0	0	9	3	68	5	7	3
2013	0	0	0	0	0	0	0	0	0	3	1	2	60	3	4	8
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2013	0	0	0	0	0	0	0	0	0	0	0	1	29	4	9	7
2013	0	0	0	0	0	0	0	0	0	0	1	0	23	3	2	12
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2013	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	7
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2013	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	5
2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2014	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	5	6	2	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	8	22	4	9	8	0	0	0	0	0	0	0	0	0
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2014	0	0	4	6	8	34	54	7	0	0	0	0	0	0	0	0
2014	0	0	0	0	8	24	83	21	0	0	0	0	0	0	0	0
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2014	0	0	0	0	0	0	2	5	3	3	9	12	10	27	8	7
2014	0	0	0	0	0	0	0	1	6	2	3	6	8	31	4	5
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2014	0	0	0	0	0	0	0	0	0	1	0	3	4	16	8	5
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2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2015	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
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2015	0	0	2	2	1	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	8	2	2	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	22	5	4	2	0	0	0	0	0	0	0	0	0
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2016	0	0	22	1	0	0	0	0	0	0	0	0	0	0	0	0
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2016	0	0	16	13	6	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	9	14	9	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	10	13	3	1	0	0	0	0	0	0	0	0	0
2016	0	0	0	3	12	4	4	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	5	2	0	0	0	0	0	0	0	0	0	0
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2016	0	0	0	0	1	1	4	4	5	0	0	0	0	0	0	0
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2016	0	0	0	0	0	0	1	8	15	2	0	0	1	0	0	0
2016	0	0	0	0	0	0	1	7	15	4	1	1	2	2	7	4
2016	0	0	0	0	0	0	1	7	7	2	0	2	5	3	5	7
2016	0	0	0	0	0	0	0	0	2	0	3	2	5	5	5	7
2016	0	0	0	0	0	0	0	0	1	1	1	1	2	4	7	6
2016	0	0	0	0	0	0	0	1	0	0	0	0	3	6	5	7
2016	0	0	0	0	0	0	0	0	0	0	0	0	1	5	13	7

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2017	0	0	4	104	11	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	112	23	1	0	0	0	0	0	0	0	0	0	0
2017	0	0	1	105	53	11	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	69	112	44	13	0	0	0	0	0	0	0	0	0
2017	0	0	1	47	88	128	39	5	1	0	0	0	0	0	0	0
2017	0	0	0	27	50	145	83	12	0	0	0	0	0	0	0	0
2017	0	0	0	6	29	117	136	50	4	7	1	0	0	0	0	2
2017	0	0	0	3	20	107	53	83	21	28	1	0	0	0	0	1
2017	0	0	0	0	6	73	24	27	99	74	11	0	0	0	1	2
2017	0	0	0	0	3	33	13	7	46	137	14	1	2	2	2	5
2017	0	0	0	0	2	7	3	11	40	97	80	7	2	3	8	6
2017	0	0	0	0	0	2	4	2	30	69	22	35	9	10	7	8
2017	0	0	0	0	0	0	1	2	10	47	16	20	31	16	15	6
2017	0	0	0	0	0	0	0	1	9	16	7	12	16	16	17	5
2017	0	0	0	0	0	0	0	0	3	14	6	10	6	9	27	4
2017	0	0	0	0	0	0	0	0	2	4	3	2	10	4	10	2
2017	0	0	0	0	0	0	0	0	0	5	3	2	0	1	2	1
2017	0	0	0	0	0	0	0	0	0	3	0	0	3	1	1	1

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2018	0	42	102	41	5	0	0	0	0	0	0	0	0	0	0	0
2018	0	21	184	100	49	0	0	0	0	0	0	0	0	0	0	0
2018	0	10	112	104	167	1	0	0	0	0	0	0	0	0	0	0
2018	0	0	70	119	431	11	1	0	0	0	0	0	0	0	0	0
2018	0	0	15	113	584	52	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	52	531	79	27	3	3	2	0	0	0	0	0	0
2018	0	0	0	6	409	146	49	10	3	3	0	0	0	0	0	0
2018	0	0	0	3	175	203	140	39	13	6	0	1	0	0	0	1
2018	0	0	0	0	81	145	217	93	15	15	4	0	0	0	0	0
2018	0	0	0	0	24	74	177	158	54	12	19	1	1	0	0	0
2018	0	0	0	0	3	34	130	59	138	61	55	8	0	0	0	2
2018	0	0	0	0	3	15	78	25	43	139	121	30	9	4	3	13
2018	0	0	0	0	0	3	41	40	16	65	229	39	16	8	4	40
2018	0	0	0	0	0	2	13	12	14	40	192	116	33	10	8	62
2018	0	0	0	0	0	0	2	7	4	27	102	63	91	27	18	106
2018	0	0	0	0	0	0	1	1	2	16	62	21	70	47	32	115
2018	0	0	0	0	0	0	0	2	1	6	26	15	16	15	45	135
2018	0	0	0	0	0	0	0	0	0	0	4	8	8	7	11	128

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	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2019	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	12	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	6	68	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	2	63	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	25	13	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	29	33	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	17	47	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	23	52	1	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	26	52	1	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	25	80	23	1	0	0	0	0	0	0	0	0	0	0	0
2019	0	19	99	63	2	2	0	0	0	0	0	0	0	0	0	0
2019	0	3	92	101	17	2	0	0	0	0	0	0	0	0	0	0
2019	0	2	67	101	45	31	1	0	0	0	0	0	0	0	0	0
2019	0	0	30	107	77	145	1	0	0	0	0	0	0	0	0	0
2019	0	0	5	67	108	358	0	0	0	0	0	0	0	0	0	0
2019	0	0	0	12	114	509	20	2	0	0	0	0	0	0	0	1
2019	0	0	0	1	83	526	80	18	0	0	1	1	0	0	0	3



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	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2021	0	0	12	123	160	55	6	0	0	0	0	0	0	0	0	0
2021	0	0	2	85	264	69	25	0	0	0	0	0	0	0	0	0
2021	0	0	0	20	261	138	55	11	0	0	0	0	0	0	0	0
2021	0	0	0	13	117	170	159	45	1	0	0	0	0	0	0	0
2021	0	0	1	16	93	73	191	139	0	0	0	0	0	0	0	0
2021	0	0	0	9	41	79	153	230	16	3	0	0	0	0	0	0
2021	0	0	0	1	15	58	79	402	58	19	0	0	0	0	0	0
2021	0	0	0	0	11	39	98	295	115	84	15	2	5	10	1	0
2021	0	0	0	1	6	17	74	265	81	152	31	2	14	15	0	3
2021	0	0	0	0	0	10	38	146	38	118	68	15	4	23	1	3
2021	0	0	0	0	0	3	19	61	19	44	69	38	12	23	5	17
2021	0	0	0	0	0	1	2	17	17	23	46	54	30	30	6	24
2021	0	0	0	0	0	0	1	14	17	19	16	10	59	54	15	27
2021	0	0	0	0	0	0	0	8	7	14	7	9	26	75	45	23
2021	0	0	0	0	0	0	0	0	6	5	6	4	3	22	78	13
2021	0	0	0	0	0	0	0	0	0	0	3	0	10	2	51	9
2021	0	0	0	0	0	0	0	0	0	0	0	0	1	4	12	1
2021	0	0	0	0	0	0	0	1	0	0	0	0	0	0	4	6



**Table 7.2.4.5. Western horse mackerel. Catch-at-length distribution from the commercial fleet.**

year		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Timing		7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Fleet		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Sex		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
catch		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sample number		42	50	40	47	53	57	37	46	87	68	49	48	66	63	82	101	108	104	96	51	111
Length bins (cm)	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	6	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	7	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
	8	0.003	0.003	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000
	9	0.001	0.006	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.030	0.001	0.000	0.000	0.000	0.000	0.000
	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.059	0.001	0.000	0.000	0.000	0.000	0.000
	11	0.009	0.007	0.000	0.002	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.037	0.001	0.000	0.000	0.000	0.000	0.000
	12	0.035	0.034	0.000	0.010	0.004	0.002	0.001	0.003	0.000	0.002	0.000	0.000	0.001	0.000	0.020	0.004	0.000	0.001	0.004	0.002	0.000
	13	0.014	0.055	0.001	0.018	0.003	0.002	0.002	0.003	0.002	0.005	0.000	0.000	0.004	0.000	0.016	0.007	0.002	0.007	0.011	0.016	0.002
	14	0.008	0.045	0.002	0.016	0.007	0.004	0.002	0.004	0.044	0.006	0.001	0.001	0.020	0.000	0.010	0.009	0.028	0.016	0.017	0.015	0.007
	15	0.016	0.039	0.007	0.022	0.017	0.007	0.001	0.033	0.054	0.010	0.003	0.002	0.048	0.001	0.012	0.014	0.017	0.026	0.016	0.003	0.009
	16	0.024	0.040	0.011	0.029	0.014	0.010	0.004	0.045	0.012	0.009	0.004	0.005	0.067	0.002	0.012	0.012	0.010	0.010	0.009	0.004	0.012

year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
17	0.042	0.049	0.011	0.020	0.006	0.014	0.008	0.021	0.008	0.009	0.010	0.009	0.052	0.002	0.008	0.018	0.010	0.003	0.008	0.011	0.010
18	0.044	0.054	0.016	0.025	0.007	0.013	0.012	0.020	0.014	0.009	0.017	0.009	0.043	0.003	0.011	0.019	0.022	0.008	0.005	0.016	0.010
19	0.044	0.037	0.021	0.035	0.012	0.012	0.012	0.008	0.024	0.010	0.017	0.022	0.026	0.006	0.024	0.028	0.027	0.013	0.011	0.019	0.015
20	0.052	0.030	0.031	0.042	0.018	0.012	0.024	0.009	0.036	0.026	0.016	0.034	0.022	0.015	0.024	0.047	0.029	0.029	0.018	0.019	0.013
21	0.061	0.033	0.027	0.091	0.054	0.023	0.036	0.014	0.019	0.057	0.030	0.046	0.022	0.025	0.021	0.055	0.043	0.051	0.030	0.046	0.027
22	0.072	0.031	0.027	0.109	0.120	0.039	0.076	0.044	0.024	0.062	0.041	0.035	0.022	0.028	0.019	0.041	0.060	0.069	0.038	0.034	0.029
23	0.098	0.034	0.032	0.117	0.120	0.086	0.123	0.065	0.032	0.044	0.048	0.039	0.026	0.024	0.026	0.023	0.072	0.121	0.038	0.030	0.039
24	0.112	0.054	0.026	0.092	0.113	0.161	0.102	0.067	0.031	0.034	0.059	0.049	0.026	0.026	0.031	0.016	0.065	0.135	0.053	0.047	0.048
25	0.087	0.077	0.029	0.088	0.084	0.139	0.109	0.081	0.037	0.033	0.051	0.072	0.045	0.030	0.032	0.022	0.058	0.109	0.097	0.021	0.059
26	0.069	0.063	0.040	0.069	0.071	0.086	0.114	0.101	0.049	0.041	0.041	0.076	0.075	0.036	0.031	0.026	0.039	0.077	0.126	0.041	0.065
27	0.059	0.044	0.071	0.063	0.058	0.068	0.099	0.110	0.084	0.067	0.050	0.066	0.087	0.060	0.038	0.033	0.042	0.048	0.132	0.103	0.075
28	0.043	0.032	0.094	0.042	0.048	0.049	0.069	0.097	0.105	0.092	0.055	0.052	0.076	0.102	0.060	0.037	0.050	0.033	0.103	0.171	0.102
29	0.027	0.026	0.106	0.031	0.038	0.034	0.048	0.072	0.098	0.119	0.083	0.064	0.058	0.118	0.075	0.060	0.056	0.032	0.067	0.117	0.113
30	0.021	0.025	0.107	0.019	0.028	0.024	0.030	0.053	0.066	0.106	0.117	0.087	0.050	0.112	0.093	0.083	0.069	0.032	0.050	0.091	0.116
31	0.014	0.021	0.111	0.014	0.024	0.017	0.020	0.041	0.043	0.078	0.101	0.094	0.054	0.109	0.095	0.092	0.074	0.039	0.042	0.052	0.087
32	0.012	0.023	0.098	0.008	0.019	0.022	0.016	0.033	0.035	0.062	0.072	0.073	0.046	0.096	0.063	0.098	0.066	0.039	0.034	0.033	0.055
33	0.009	0.025	0.047	0.009	0.021	0.028	0.013	0.023	0.033	0.041	0.052	0.055	0.035	0.077	0.063	0.088	0.057	0.032	0.032	0.029	0.030
34	0.008	0.029	0.027	0.010	0.024	0.031	0.014	0.016	0.032	0.026	0.043	0.036	0.025	0.047	0.029	0.069	0.045	0.028	0.025	0.028	0.022



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**Table 7.2.4.6. Western horse mackerel. Catch-at-length distribution from the PELACUS survey (fleet 5).**

year		1995	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2013	2014	2015	2016	2017	2018	2019	2021
Timing		5.08	5.08	5.08	5.08	5.08	5.08	5.08	5.08	5.08	5.08	5.08	5.08	5.08	5.08	5.08	5.08	5.08	5.08	5.08	5.08
Sex		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
catch		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sample number		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Length bins (cm)	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	7	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
	8	0.000	0.000	0.000	0.012	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000
	9	0.000	0.000	0.000	0.038	0.000	0.000	0.002	0.000	0.000	0.024	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.002	0.000	0.000
	10	0.000	0.000	0.000	0.055	0.000	0.000	0.207	0.000	0.004	0.148	0.000	0.000	0.004	0.000	0.049	0.000	0.047	0.017	0.003	0.002
	11	0.002	0.000	0.002	0.006	0.014	0.000	0.257	0.000	0.006	0.113	0.000	0.000	0.009	0.003	0.058	0.009	0.112	0.101	0.077	0.058
	12	0.043	0.017	0.009	0.002	0.046	0.000	0.092	0.000	0.001	0.025	0.000	0.000	0.024	0.015	0.108	0.014	0.097	0.068	0.144	0.110
	13	0.066	0.028	0.016	0.002	0.025	0.000	0.063	0.000	0.000	0.007	0.001	0.000	0.080	0.012	0.126	0.003	0.060	0.081	0.096	0.073
	14	0.047	0.084	0.013	0.000	0.006	0.000	0.038	0.000	0.000	0.009	0.000	0.001	0.083	0.003	0.095	0.009	0.034	0.087	0.038	0.029
	15	0.029	0.140	0.005	0.000	0.019	0.000	0.018	0.000	0.000	0.017	0.004	0.003	0.020	0.001	0.035	0.053	0.014	0.124	0.051	0.039
	16	0.018	0.123	0.000	0.000	0.025	0.000	0.005	0.000	0.001	0.034	0.020	0.004	0.027	0.011	0.007	0.165	0.017	0.184	0.068	0.052
	17	0.079	0.089	0.001	0.000	0.018	0.000	0.002	0.017	0.000	0.020	0.018	0.001	0.023	0.039	0.012	0.144	0.106	0.130	0.081	0.062

year	1995	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2013	2014	2015	2016	2017	2018	2019	2021
18	0.148	0.045	0.005	0.000	0.003	0.000	0.004	0.024	0.000	0.012	0.019	0.003	0.021	0.066	0.020	0.059	0.120	0.039	0.091	0.069
19	0.163	0.073	0.005	0.000	0.001	0.000	0.002	0.019	0.001	0.001	0.017	0.012	0.020	0.081	0.022	0.059	0.076	0.029	0.072	0.055
20	0.083	0.008	0.005	0.000	0.007	0.000	0.005	0.016	0.018	0.002	0.009	0.057	0.024	0.195	0.036	0.057	0.043	0.036	0.039	0.030
21	0.032	0.031	0.007	0.002	0.012	0.000	0.013	0.018	0.126	0.002	0.047	0.117	0.013	0.235	0.053	0.059	0.034	0.032	0.050	0.039
22	0.012	0.017	0.003	0.007	0.007	0.002	0.010	0.030	0.123	0.008	0.087	0.171	0.011	0.089	0.059	0.052	0.031	0.028	0.032	0.026
23	0.014	0.026	0.007	0.035	0.023	0.004	0.004	0.056	0.129	0.026	0.073	0.142	0.022	0.039	0.083	0.073	0.035	0.024	0.019	0.027
24	0.028	0.032	0.011	0.066	0.064	0.025	0.008	0.073	0.078	0.035	0.072	0.070	0.026	0.009	0.100	0.061	0.031	0.012	0.027	0.058
25	0.042	0.053	0.003	0.076	0.125	0.109	0.047	0.098	0.083	0.063	0.071	0.064	0.024	0.034	0.068	0.053	0.021	0.001	0.024	0.056
26	0.042	0.040	0.008	0.039	0.123	0.244	0.083	0.179	0.136	0.087	0.090	0.086	0.038	0.028	0.026	0.045	0.028	0.000	0.020	0.033
27	0.025	0.042	0.029	0.029	0.109	0.293	0.074	0.134	0.141	0.091	0.136	0.083	0.048	0.027	0.011	0.039	0.027	0.000	0.013	0.026
28	0.023	0.030	0.099	0.044	0.084	0.141	0.037	0.098	0.058	0.088	0.103	0.076	0.077	0.016	0.007	0.017	0.022	0.001	0.013	0.026
29	0.031	0.044	0.212	0.146	0.094	0.089	0.015	0.097	0.037	0.069	0.077	0.051	0.127	0.027	0.007	0.009	0.013	0.001	0.009	0.025
30	0.029	0.047	0.275	0.179	0.100	0.062	0.008	0.061	0.029	0.059	0.056	0.039	0.134	0.021	0.003	0.002	0.007	0.001	0.012	0.032
31	0.017	0.016	0.166	0.120	0.067	0.021	0.001	0.041	0.022	0.033	0.042	0.014	0.080	0.013	0.006	0.000	0.002	0.000	0.012	0.032
32	0.009	0.017	0.078	0.062	0.016	0.008	0.001	0.028	0.005	0.017	0.040	0.004	0.047	0.016	0.005	0.003	0.003	0.000	0.005	0.014
33	0.005	0.000	0.024	0.029	0.010	0.002	0.000	0.006	0.003	0.009	0.014	0.002	0.014	0.008	0.003	0.002	0.004	0.000	0.001	0.004
34	0.004	0.000	0.009	0.021	0.003	0.000	0.000	0.002	0.000	0.002	0.003	0.000	0.006	0.009	0.001	0.001	0.002	0.003	0.001	0.002
35	0.004	0.000	0.004	0.012	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.001	0.002	0.001	0.004	0.001	0.000	0.000	0.000

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**Table 7.2.5.1. Western horse mackerel stock. Mean weight (kg) in catch-at-age by quarter and area in 2021 (15 = 15+ group)**

Q1 Ages	27.2.a	27.6.a	27.7.b	27.7.c.2	27.7.e	27.7.f	27.7.g	27.7.h	27.7.j	27.7.j.2	27.7.k.1	27.8.a	27.8.b	27.8.c	27.8.c.e	27.8.c.w	27.8.d	Total
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NA
1	0	0	0	0	0	0	0	0	0	0	0	0.027	0.022	0.029	0.032	0.029	0.027	0.027
2	0	0	0.053	0.053	0.055	0.054	0.048	0.051	0.053	0.053	0.053	0.047	0.045	0.054	0.051	0.042	0.047	0.051
3	0.103	0.103	0.080	0.078	0.079	0.079	0.076	0.078	0.078	0.078	0.078	0.080	0.065	0.064	0.071	0.102	0.080	0.078
4	0.119	0.119	0.116	0.106	0.107	0.104	0.107	0.104	0.106	0.110	0.106	0.128	0.128	0	0.133	0.128	0.128	0.107
5	0.180	0.180	0.160	0.146	0.134	0.158	0.137	0.134	0.143	0.164	0.143	0.151	0.151	0	0.158	0.149	0.151	0.148
6	0.194	0.194	0.198	0.192	0.155	0.192	0.161	0.179	0.192	0.239	0.192	0.173	0.173	0	0.178	0.172	0.173	0.191
7	0.213	0.213	0.196	0.203	0.185	0.207	0.186	0.196	0.202	0.214	0.202	0.201	0.207	0	0.209	0.195	0.201	0.206
8	0.256	0.256	0.253	0.257	0.239	0.247	0.221	0.249	0.256	0.271	0.256	0.265	0.265	0	0.287	0.238	0.265	0.258
9	0.284	0.284	0.269	0.264	0.264	0.307	0.266	0.271	0.264	0.246	0.264	0.310	0.299	0	0.330	0.264	0.310	0.279
10	0.325	0.325	0.318	0.302	0.289	0.305	0.303	0.350	0.305	0.244	0.305	0.305	0.293	0	0.326	0.271	0.305	0.309
11	0.343	0.343	0.298	0.295	0.295	0.295	0.301	0.296	0.295	0.277	0.295	0.335	0.324	0	0.354	0.296	0.335	0.324
12	0.334	0.334	0.304	0.293	0.272	0.272	0.258	0.272	0.272	0.242	0.272	0.337	0.335	0	0.344	0.322	0.337	0.311
13	0.322	0.322	0.327	0.306	0.221	0.384	0.318	0.294	0.293	0.262	0.293	0.392	0.377	0	0.406	0.319	0.392	0.312
14	0.340	0.340	0.265	0.265	0.265	0.265	0.265	0.265	0.265	0.265	0.265	0.386	0.386	0	0.388	0.380	0.386	0.341
15+	0.346	0.346	0.399	0.358	0.311	0.478	0.411	0.505	0.393	0.335	0.393	0.448	0.447	0	0.438	0.478	0.448	0.377

Q2 Ages	27.6.a	27.7.a	27.7.b	27.7.c	27.7.c.2	27.7.e	27.7.f	27.7.g	27.7.h	27.7.j	27.7.j.2	27.8.a	27.8.b	27.8.c	27.8.c.e	27.8.c.w	27.8.d	Total
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NA
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0.103	0.103	0.103	0.103	0.103	0.103	0.103	0.103	0.103	0.103	0.103	0.092	0.076	0.072	0.114	0.095	0.093	0.094
4	0.119	0.213	0.213	0.213	0.213	0.213	0.213	0.213	0.213	0.213	0.213	0.119	0.120	0.105	0.126	0.115	0.119	0.120
5	0.189	0.211	0.211	0.211	0.211	0.211	0.211	0.211	0.211	0.211	0.211	0.144	0.144	0.121	0.147	0.131	0.144	0.145
6	0.197	0.257	0.257	0.257	0.257	0.257	0.257	0.257	0.257	0.257	0.257	0.165	0.167	0.125	0.166	0.142	0.165	0.166
7	0.215	0.279	0.279	0.279	0.279	0.279	0.279	0.279	0.279	0.279	0.279	0.195	0.196	0.173	0.180	0.225	0.184	0.189
8	0.274	0.356	0.356	0.356	0.356	0.356	0.356	0.356	0.356	0.356	0.356	0.248	0.280	0.371	0.224	0.277	0.237	0.241
9	0.288	0.372	0.372	0.372	0.372	0.372	0.372	0.372	0.372	0.372	0.372	0.278	0.324	0.393	0.271	0.296	0.282	0.291
10	0.318	0.293	0.293	0.293	0.293	0.293	0.293	0.293	0.293	0.293	0.293	0.280	0.318	0.407	0.279	0.280	0.283	0.283
11	0.336	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.312	0.356	0.383	0.319	0.304	0.318	0.322
12	0.332	0.392	0.392	0.392	0.392	0.392	0.392	0.392	0.392	0.392	0.392	0.329	0.342	0.341	0.333	0.325	0.330	0.334
13	0.324	0.465	0.465	0.465	0.465	0.465	0.465	0.465	0.465	0.465	0.465	0.333	0.416	0.486	0.413	0.353	0.390	0.401
14	0.339	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.383	0.387	0.391	0.388	0.378	0.383	0.383
15+	0.353	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.429	0.471	0.465	0.466	0.473	0.469	0.469

Table 7.2.5.1 cont. Western horse mackerel stock. Mean weight (kg) in catch-at-age by quarter and area in 2021 (15 = 15+ group)

Q3																							
Ages	27.2.a	27.3.a	27.4.a	27.6.a	27.7.a	27.7.b	27.7.c.2	27.7.e	27.7.f	27.7.g	27.7.h	27.7.j	27.7.j.2	27.7.k.2	27.8.a	27.8.b	27.8.c	27.8.c.e	27.8.c.w	27.8.d	27.8.d.2	27.8.e	Total
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0.173	0.173	0.173	0.171	0.173	0.173	0.173	0.180	0.161	0.173	0.120	0.120	0.120	0.115	0.129	0.120	0.120	0.120	0.145
4	0.210	0.210	0.210	0.210	0.192	0.192	0.192	0.190	0.192	0.192	0.192	0.192	0.192	0.192	0.148	0.149	0.148	0.148	0.148	0.148	0.148	0.148	0.173
5	0.269	0.269	0.269	0.269	0.231	0.231	0.231	0.230	0.231	0.231	0.231	0.234	0.229	0.231	0.176	0.181	0.198	0.173	0.178	0.176	0.176	0.176	0.199
6	0.277	0.277	0.277	0.277	0.244	0.244	0.244	0.244	0.244	0.244	0.244	0.245	0.243	0.244	0.193	0.197	0.220	0.192	0.193	0.193	0.193	0.193	0.219
7	0.288	0.288	0.288	0.288	0.255	0.255	0.255	0.257	0.255	0.255	0.255	0.251	0.256	0.255	0.211	0.223	0.239	0.209	0.211	0.211	0.211	0.211	0.247
8	0.298	0.298	0.298	0.298	0.270	0.270	0.270	0.274	0.270	0.270	0.270	0.276	0.268	0.270	0.237	0.243	0.235	0.235	0.237	0.237	0.237	0.237	0.272
9	0.306	0.306	0.306	0.306	0.312	0.312	0.312	0.351	0.312	0.312	0.312	0.296	0.315	0.312	0.256	0.258	0.252	0.257	0.256	0.256	0.256	0.256	0.280
10	0.313	0.313	0.313	0.313	0.312	0.312	0.312	0.312	0.312	0.312	0.312	0.364	0.295	0.312	0.287	0.284	0.293	0.288	0.287	0.287	0.287	0.287	0.299
11	0.321	0.321	0.321	0.321	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.335	0.330	0.338	0.348	0.327	0.335	0.335	0.335	0.332
12	0.328	0.328	0.328	0.328	0.373	0.373	0.373	0.373	0.373	0.373	0.373	0.418	0.342	0.373	0.355	0.354	0.351	0.362	0.352	0.355	0.355	0.355	0.350
13	0.333	0.333	0.333	0.333	0.368	0.368	0.368	0.368	0.368	0.368	0.368	0.368	0.368	0.368	0.388	0.386	0.382	0.392	0.380	0.388	0.388	0.388	0.366
14	0.338	0.338	0.338	0.338	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.413	0.410	0.387	0.413	0.413	0.413	0.413	0.413	0.379
15+	0.359	0.359	0.359	0.359	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.485	0.486	0.423	0.481	0.493	0.485	0.485	0.485	0.398

Q4																							
Ages	27.2.a	27.3.a	27.4.a	27.6.a	27.7.a	27.7.b	27.7.c	27.7.c.2	27.7.e	27.7.f	27.7.g	27.7.h	27.7.j	27.7.j.2	27.8.a	27.8.b	27.8.c	27.8.c.e	27.8.c.w	27.8.d	27.8.d.2	27.8.e	Total
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0.169	0.169	0.169	0.169	0.172	0.164	0.172	0.172	0.173	0.172	0.172	0.169	0.172	0.173	0.145	0.147	0.141	0.144	0.144	0.145	0.145	0.145	0.169
5	0.214	0.214	0.308	0.208	0.222	0.211	0.222	0.222	0.206	0.222	0.222	0.220	0.222	0.224	0.175	0.184	0.169	0.176	0.176	0.171	0.171	0.212	0.212
6	0.248	0.248	0.321	0.221	0.246	0.241	0.246	0.246	0.241	0.246	0.246	0.245	0.246	0.246	0.196	0.203	0.177	0.198	0.198	0.192	0.192	0.239	0.239
7	0.252	0.252	0.332	0.237	0.250	0.234	0.250	0.250	0.250	0.250	0.250	0.251	0.250	0.249	0.232	0.247	0.193	0.228	0.227	0.227	0.227	0.249	0.249
8	0.312	0.312	0.342	0.258	0.281	0.274	0.281	0.281	0.281	0.281	0.281	0.281	0.281	0.281	0.251	0.271	0.270	0.244	0.244	0.248	0.248	0.279	0.279
9	0.319	0.319	0.351	0.277	0.291	0.303	0.291	0.291	0.291	0.291	0.291	0.291	0.291	0.291	0.264	0.268	0.278	0.261	0.265	0.265	0.265	0.283	0.283
10	0.358	0.358	0.359	0.339	0.289	0.289	0.289	0.289	0.289	0.289	0.289	0.289	0.289	0.289	0.293	0.292	0.281	0.291	0.295	0.295	0.295	0.302	0.302
11	0.362	0.362	0.367	0.304	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.331	0.330	0.345	0.333	0.329	0.329	0.329	0.336	0.336
12	0.367	0.367	0.375	0.295	0.454	0.454	0.454	0.454	0.454	0.454	0.454	0.454	0.454	0.454	0.354	0.355	0.359	0.353	0.354	0.354	0.354	0.374	0.374
13	0.367	0.367	0.382	0.325	0.275	0.286	0.275	0.275	0.275	0.275	0.275	0.275	0.275	0.275	0.388	0.392	0.372	0.388	0.387	0.387	0.387	0.362	0.362
14	0.387	0.387	0.388	0.338	0.325	0.325	0.325	0.325	0.325	0.325	0.325	0.325	0.325	0.325	0.415	0.419	0.406	0.413	0.414	0.414	0.414	0.406	0.406
15+	0.408	0.408	0.410	0.372	0.507	0.507	0.507	0.507	0.507	0.507	0.507	0.507	0.507	0.507	0.476	0.483	0.479	0.481	0.470	0.470	0.470	0.450	0.450

**Table 7.2.5.1 cont. Western horse mackerel stock. Mean weight (kg) in catch-at-age by quarter and area in 2021 (15 = 15+ group)**

all Q	27.2.a	27.3.a	27.4.a	27.6.a	27.7.a	27.7.b	27.7.c	27.7.c.2	27.7.e	27.7.f	27.7.g	27.7.h	27.7.j	27.7.j.2	27.7.k.1	27.7.k.2	27.8.a	27.8.b	27.8.c	27.8.c.e	27.8.c.w	27.8.d	27.8.d.2	27.8.e	Total
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.027	0.019	0.049	0.022	0.047	0.022	0.021	0.021	0.027
1	0	0	0	0	0.058	0.068	0.069	0.069	0.067	0.068	0.067	0.068	0.069	0.069	0.000	0.044	0.048	0.029	0.040	0.041	0.045	0.031	0.042	0.042	0.042
2	0	0	0	0	0.135	0.088	0.092	0.074	0.068	0.055	0.055	0.052	0.127	0.096	0.053	0.146	0.075	0.056	0.057	0.078	0.071	0.061	0.079	0.079	0.072
3	0.146	0.153	0.140	0.136	0.172	0.092	0.106	0.079	0.080	0.079	0.078	0.083	0.174	0.138	0.078	0.173	0.113	0.091	0.069	0.112	0.101	0.096	0.120	0.120	0.090
4	0.162	0.169	0.157	0.152	0.191	0.122	0.188	0.107	0.109	0.104	0.108	0.110	0.184	0.166	0.106	0.192	0.143	0.138	0.108	0.136	0.127	0.129	0.148	0.148	0.122
5	0.205	0.227	0.269	0.191	0.231	0.169	0.214	0.148	0.141	0.159	0.142	0.150	0.230	0.217	0.143	0.231	0.170	0.166	0.137	0.153	0.161	0.154	0.176	0.176	0.169
6	0.224	0.252	0.302	0.201	0.244	0.204	0.253	0.195	0.172	0.192	0.181	0.208	0.245	0.244	0.192	0.244	0.191	0.188	0.144	0.173	0.184	0.175	0.193	0.193	0.205
7	0.229	0.259	0.295	0.217	0.255	0.200	0.270	0.205	0.201	0.208	0.201	0.227	0.250	0.235	0.202	0.255	0.224	0.220	0.187	0.188	0.210	0.195	0.211	0.211	0.219
8	0.286	0.300	0.308	0.257	0.271	0.257	0.351	0.262	0.264	0.248	0.259	0.255	0.277	0.275	0.256	0.270	0.252	0.270	0.313	0.239	0.249	0.253	0.237	0.237	0.262
9	0.297	0.310	0.322	0.284	0.312	0.275	0.370	0.277	0.305	0.307	0.293	0.274	0.295	0.273	0.264	0.312	0.268	0.298	0.329	0.284	0.268	0.295	0.256	0.256	0.282
10	0.334	0.321	0.329	0.325	0.312	0.317	0.293	0.301	0.289	0.305	0.307	0.348	0.355	0.270	0.305	0.312	0.293	0.304	0.335	0.294	0.284	0.297	0.287	0.287	0.301
11	0.348	0.335	0.347	0.342	0.385	0.304	0.385	0.314	0.343	0.295	0.326	0.301	0.352	0.301	0.295	0.000	0.330	0.344	0.363	0.336	0.316	0.331	0.335	0.335	0.328
12	0.352	0.345	0.358	0.333	0.376	0.314	0.394	0.299	0.341	0.275	0.361	0.307	0.423	0.328	0.272	0.373	0.351	0.347	0.350	0.345	0.340	0.338	0.355	0.355	0.340
13	0.341	0.346	0.358	0.323	0.362	0.331	0.458	0.311	0.227	0.384	0.314	0.295	0.282	0.278	0.293	0.368	0.385	0.399	0.410	0.397	0.376	0.390	0.388	0.388	0.334
14	0.362	0.349	0.359	0.341	0.325	0.265	0.325	0.265	0.276	0.266	0.295	0.272	0.320	0.320	0.265	0.000	0.414	0.409	0.392	0.408	0.406	0.398	0.413	0.413	0.383
15+	0.377	0.368	0.378	0.348	0.335	0.395	0.507	0.358	0.316	0.478	0.406	0.504	0.490	0.399	0.393	0.328	0.473	0.477	0.466	0.469	0.477	0.463	0.485	0.485	0.408

**Table 7.2.5.2. Western horse mackerel stock. Mean length (cm) in catch-at-age by quarter and area in 2021 (15 = 15+ group)**

Q1																		
Ages	27.2.a	27.6.a	27.7.b	27.7.c.2	27.7.e	27.7.f	27.7.g	27.7.h	27.7.j	27.7.j.2	27.7.k.1	27.8.a	27.8.b	27.8.c	27.8.c.e	27.8.c.w	27.8.d	Total
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NA
1	0	0	0	0	0	0	0	0	0	0	0	14.3	13.1	14.6	15.0	14.6	14.3	14.3
2	0	0	19.1	19.1	19.5	19.3	18.2	18.8	19.1	19.1	19.1	17.4	17.0	18.2	17.8	16.7	17.4	18.7
3	23.9	23.9	22.0	21.8	22.0	22.0	21.5	21.8	21.8	21.9	21.8	20.9	19.4	19.4	20.0	22.7	20.9	21.8
4	25.0	25.0	25.0	24.4	24.6	24.2	24.0	24.3	24.4	24.6	24.4	24.7	24.7	0	25.1	24.7	24.7	24.4
5	28.5	28.5	27.7	27.0	26.6	27.6	26.5	26.4	26.9	27.9	26.9	26.2	26.2	0	26.6	26.1	26.2	27.1
6	29.3	29.3	29.8	29.4	28.0	29.5	28.1	29.0	29.4	30.9	29.4	27.5	27.5	0	27.8	27.4	27.5	29.2
7	30.3	30.3	29.6	30.0	29.4	30.0	29.2	29.7	29.9	30.4	29.9	28.9	29.1	0	29.3	28.6	28.9	30.0
8	32.1	32.1	32.4	32.4	31.8	32.4	31.0	32.1	32.4	32.6	32.4	31.7	31.7	0	32.6	30.6	31.7	32.1
9	33.3	33.3	33.0	32.9	32.9	34.0	33.1	32.9	32.9	32.5	32.9	33.5	33.1	0	34.3	31.7	33.5	33.1
10	34.8	34.8	34.9	33.6	32.8	33.9	34.4	34.2	33.9	32.1	33.9	33.4	32.9	0	34.1	32.1	33.4	33.9
11	35.4	35.4	34.1	34.0	34.0	34.0	34.4	34.0	34.0	33.4	34.0	34.5	34.1	0	35.2	33.2	34.5	34.6
12	35.2	35.2	34.2	34.4	33.2	33.2	32.6	33.2	33.2	32.1	33.2	34.7	34.6	0	35.0	34.2	34.7	34.3
13	34.7	34.7	35.1	34.5	31.5	35.5	35.1	33.9	33.8	32.8	33.8	36.5	36.0	0	37.0	34.0	36.5	34.3
14	35.4	35.4	32.6	32.6	32.6	32.6	32.6	32.6	32.6	32.6	32.6	36.4	36.4	0	36.5	36.2	36.4	35.3
15+	35.5	35.5	37.2	35.8	33.4	38.9	38.4	38.6	36.5	35.6	36.5	38.3	38.3	0	38.0	39.2	38.3	36.2

Q2																		
Ages	27.6.a	27.7.a	27.7.b	27.7.c	27.7.c.2	27.7.e	27.7.f	27.7.g	27.7.h	27.7.j	27.7.j.2	27.8.a	27.8.b	27.8.c	27.8.c.e	27.8.c.w	27.8.d	Total
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NA
1	0	19	19	19	19	19	19	19	19	19	19	14	14	16	14	16	14	14
2	0	21	21	21	21	21	21	21	21	21	21	18	18	18	17	20	18	20
3	23.9	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.9	20.5	20.1	23.7	22.2	22.1	22.0
4	25.0	31.5	31.5	31.5	31.5	31.5	31.5	31.5	31.5	31.5	31.5	24.1	24.1	23.1	24.6	23.8	24.1	24.2
5	28.7	30.5	30.5	30.5	30.5	30.5	30.5	30.5	30.5	30.5	30.5	25.8	25.8	24.2	25.9	24.9	25.7	25.8
6	29.4	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	27.0	27.1	24.4	27.1	25.6	27.0	27.1
7	30.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	28.9	28.6	27.4	27.8	29.9	28.0	28.3
8	32.2	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	31.2	32.3	35.9	29.9	32.3	30.5	30.7
9	33.2	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	32.6	34.0	36.6	32.0	33.0	32.5	32.8
10	33.9	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	32.7	33.8	37.1	32.4	32.5	32.6	32.6
11	34.8	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	33.8	35.2	36.2	34.0	33.4	33.9	34.1
12	34.8	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	34.9	34.9	34.9	34.6	34.3	34.5	34.6
13	34.5	38.5	38.5	38.5	38.5	38.5	38.5	38.5	38.5	38.5	38.5	34.6	37.3	39.5	37.1	35.2	36.4	36.7
14	34.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.3	36.5	36.6	36.5	36.2	36.3	36.3
15+	35.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.8	39.0	38.9	38.8	39.1	38.9	38.9



**Table 7.2.5.2 cont. Western horse mackerel stock. Mean length (cm) in catch-at-age by quarter and area in 2021 (15 = 15+ group)**

Q3																							
Ages	27.2.a	27.3.a	27.4.a	27.6.a	27.7.a	27.7.b	27.7.c.2	27.7.e	27.7.f	27.7.g	27.7.h	27.7.j	27.7.j.2	27.7.k.2	27.8.a	27.8.b	27.8.c	27.8.c.e	27.8.c.w	27.8.d	27.8.d.2	27.8.e	Total
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13.16	13.07	13.16	13.21	13.16	13.16	13.16	13.16	13.1614922
1	0	0	0	0	17	17	17	17	17	17	17	17	17	17	17	16	18	17	17	17	17	17	17
2	0	0	0	0	25	25	25	24	25	25	25	24	27	25	21	20	19	21	24	21	21	21	21
3	0	0	0	0	26.9	26.9	26.9	26.7	26.9	26.9	26.9	27.0	26.7	26.9	24.1	24.1	24.1	23.8	24.8	24.1	24.1	24.1	25.4
4	30.5	30.5	30.5	30.5	28.2	28.2	28.2	28.0	28.2	28.2	28.2	28.0	28.3	28.2	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	27.3
5	31.1	31.1	31.1	31.1	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.1	30.0	30.0	27.6	27.9	28.8	27.5	27.7	27.6	27.6	27.6	28.6
6	31.4	31.4	31.4	31.4	30.5	30.5	30.5	30.5	30.5	30.5	30.5	30.3	30.7	30.5	28.6	28.8	29.9	28.5	28.6	28.6	28.6	28.6	29.5
7	32.0	32.0	32.0	32.0	31.1	31.1	31.1	31.1	31.1	31.1	31.1	31.0	31.1	31.1	29.5	30.0	30.8	29.3	29.5	29.5	29.5	29.5	30.8
8	32.4	32.4	32.4	32.4	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.1	32.2	32.2	30.7	31.0	30.6	30.6	30.7	30.7	30.7	30.7	31.9
9	32.8	32.8	32.8	32.8	33.4	33.4	33.4	34.1	33.4	33.4	33.4	31.5	33.8	33.4	31.6	31.6	31.4	31.6	31.5	31.6	31.6	31.6	32.2
10	33.1	33.1	33.1	33.1	33.0	33.0	33.0	33.0	33.0	33.0	33.0	34.5	32.5	33.0	32.8	32.7	33.0	32.9	32.8	32.8	32.8	32.8	32.9
11	33.5	33.5	33.5	33.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.6	34.5	34.8	35.1	34.4	34.6	34.6	34.6	34.4
12	33.8	33.8	33.8	33.8	35.7	35.7	35.7	35.7	35.7	35.7	35.7	36.5	35.1	35.7	35.4	35.3	35.2	35.6	35.3	35.4	35.4	35.4	34.9
13	34.0	34.0	34.0	34.0	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	36.5	36.4	36.3	36.6	36.2	36.5	36.5	36.5	35.5
14	34.2	34.2	34.2	34.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.3	37.2	36.5	37.3	37.3	37.3	37.3	37.3	35.9
15+	34.8	34.8	34.8	34.8	33.8	33.8	33.8	33.8	33.8	33.8	33.8	33.8	33.8	33.8	39.4	39.5	37.6	39.3	39.6	39.4	39.4	39.4	36.2

Q4																				
Ages	27.2.a	27.3.a	27.4.a	27.6.a	27.7.a	27.7.b	27.7.c	27.7.c.2	27.7.e	27.7.f	27.7.g	27.7.h	27.7.j	27.7.j.2	27.8.a	27.8.b	27.8.c	27.8.c.e	27.8.c.w	Total
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13.95	12.6	17.59	13.69	17.33	14.0492178
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	16	18	17	19	18
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	21	19	21	20	20
3	26.8	26.8	26.8	26.8	26.9	25.7	26.9	26.9	26.4	26.9	26.9	27.0	26.9	26.8	23.8	24.4	24.0	23.4	24.0	25.8
4	27.7	27.7	27.7	27.7	27.5	27.4	27.5	27.5	27.0	27.5	27.5	27.2	27.5	27.6	25.8	25.9	25.6	25.8	25.8	27.4
5	29.8	29.8	32.3	29.6	30.0	29.8	30.0	30.0	28.3	30.0	30.0	30.1	30.0	30.1	27.6	28.1	27.2	27.6	27.4	29.6
6	30.9	30.9	32.8	30.2	31.0	31.1	31.0	31.0	30.3	31.0	31.0	31.0	31.0	31.1	28.7	29.0	27.7	28.8	28.5	30.7
7	31.3	31.3	33.3	30.9	31.3	30.8	31.3	31.3	31.2	31.3	31.3	31.5	31.3	31.3	30.4	31.0	28.5	30.2	30.2	31.3
8	33.0	33.0	33.7	31.8	32.4	32.5	32.4	32.4	32.4	32.4	32.4	32.4	32.4	32.4	31.3	32.0	32.1	31.0	31.2	32.2
9	33.4	33.4	34.1	32.6	32.8	33.5	32.8	32.8	32.8	32.8	32.8	32.8	32.8	32.8	31.9	32.0	32.5	31.8	31.9	32.4
10	34.4	34.4	34.4	34.8	32.8	32.8	32.8	32.8	32.8	32.8	32.8	32.8	32.8	32.8	33.1	33.0	32.6	33.0	33.2	33.3
11	34.6	34.6	34.7	33.6	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	34.5	34.5	35.0	34.6	34.4	34.5
12	34.8	34.8	35.0	33.1	37.8	37.8	37.8	37.8	37.8	37.8	37.8	37.8	37.8	37.8	35.3	35.4	35.5	35.3	35.3	35.5
13	35.0	35.0	35.3	34.3	32.7	33.1	32.7	32.7	32.7	32.7	32.7	32.7	32.7	32.7	36.5	36.6	36.0	36.5	36.5	35.4
14	35.5	35.5	35.5	34.7	34.5	34.5	34.5	34.5	34.5	34.5	34.5	34.5	34.5	34.5	37.4	37.5	37.1	37.3	37.3	36.8
15+	36.2	36.2	36.2	36.1	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.2	39.4	39.3	39.3	39.0	37.9

**Table 7.2.5.2 cont. Western horse mackerel stock. Mean length (cm) in catch-at-age by quarter and area in 2021 (15 = 15+ group)**

all Q Ages	27.2.a	27.3.a	27.4.a	27.6.a	27.7.a	27.7.b	27.7.c	27.7.c.2	27.7.e	27.7.f	27.7.g	27.7.h	27.7.j	27.7.j.2	27.7.k.1	27.7.k.2	27.8.a	27.8.b	27.8.c	27.8.c.e	27.8.c.w	27.8.d	27.8.d.2	27.8.e	Total
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	14.0	12.7	17.6	13.2	17.3	13.2	13.2	13.2	14.0
1	0	0	0	0	18.0	19.0	19.0	19.0	18.8	19.0	18.8	19.0	19.0	19.0	0	16.5	17.3	14.5	16.3	16.5	16.8	14.9	16.6	16.6	16.5
2	0	0	0	0	24.0	20.5	20.5	19.9	19.9	19.3	18.6	18.9	23.8	20.9	19.1	24.8	20.4	18.4	18.6	20.7	20.0	18.9	20.8	20.8	20.1
3	26.3	26.8	26.0	25.8	26.8	22.4	21.3	21.8	22.0	22.0	21.6	22.1	26.8	25.4	21.8	26.9	23.6	21.7	19.9	23.6	22.7	22.3	24.1	24.1	22.5
4	27.3	27.7	27.1	26.8	28.1	25.3	29.1	24.4	24.6	24.3	24.1	24.5	27.8	27.3	24.4	28.2	25.7	25.4	23.3	25.2	24.6	24.7	26.0	26.0	25.1
5	29.4	30.1	31.1	28.9	30.0	28.1	30.4	27.1	26.8	27.6	26.7	27.1	30.0	29.8	26.9	30.0	27.3	27.0	25.3	26.3	26.7	26.3	27.6	27.6	27.6
6	30.2	31.0	32.3	29.5	30.5	29.9	31.8	29.5	28.5	29.5	28.7	29.9	30.4	30.9	29.4	30.5	28.4	28.3	25.6	27.5	28.0	27.6	28.6	28.6	29.3
7	30.7	31.4	32.3	30.4	31.1	29.8	32.7	30.0	29.9	30.1	29.7	30.7	31.1	30.9	29.9	31.1	30.0	29.8	28.2	28.2	29.4	28.6	29.5	29.5	30.3
8	32.5	32.5	32.7	32.1	32.2	32.5	36.2	32.7	32.6	32.4	32.0	32.2	32.2	32.5	32.4	32.2	31.3	32.0	33.7	30.6	31.1	31.2	30.7	30.7	31.8
9	33.2	33.0	33.3	33.2	33.5	33.1	36.2	33.3	34.0	34.0	33.3	32.9	32.0	32.9	32.9	33.4	32.0	33.1	34.3	32.5	32.0	32.9	31.6	31.6	32.8
10	34.1	33.3	33.6	34.7	33.0	34.8	33.5	33.6	32.8	33.9	33.4	34.1	34.3	32.4	33.9	33.0	33.1	33.4	34.5	33.0	32.7	33.1	32.8	32.8	33.3
11	34.7	33.9	34.2	35.3	37.4	34.3	37.5	34.7	35.9	34.0	35.2	34.2	35.9	34.2	34.0	0.0	34.5	34.9	35.6	34.6	33.9	34.4	34.6	34.6	34.4
12	34.8	34.2	34.6	35.1	35.7	34.5	36.6	34.5	35.0	33.3	35.4	34.1	36.7	34.4	33.2	35.7	35.3	35.1	35.2	35.0	34.9	34.8	35.4	35.4	34.8
13	34.7	34.4	34.7	34.6	35.6	35.2	38.3	34.6	31.6	35.5	34.4	33.8	33.0	33.0	33.8	35.8	36.4	36.8	37.2	36.8	36.1	36.5	36.5	36.5	34.8
14	35.1	34.5	34.8	35.3	34.5	32.6	34.5	32.6	32.9	32.6	33.5	32.8	34.3	34.3	32.6	0.0	37.3	37.2	36.7	37.1	36.8	37.3	37.3	37.3	36.2
15+	35.6	35.0	35.3	35.5	34.0	37.0	39.7	35.8	33.6	38.9	37.7	38.6	39.3	36.9	36.5	33.8	39.1	39.2	38.9	38.9	39.2	38.8	39.4	39.4	36.9

**Table 7.2.5.3. Western horse mackerel. Catch weights-at-age (kg), from Q1 and Q2 data (note that 2021 data is from Q1 and Q3).**

Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1982	0.024	0.052	0.066	0.080	0.207	0.232	0.269	0.280	0.292	0.305	0.369	0.348	0.348	0.348	0.356	0.366
1983	0.024	0.052	0.066	0.080	0.171	0.227	0.257	0.276	0.270	0.243	0.390	0.348	0.348	0.348	0.356	0.366
1984	0.024	0.052	0.064	0.077	0.122	0.155	0.201	0.223	0.253	0.246	0.338	0.348	0.348	0.348	0.356	0.366
1985	0.024	0.052	0.066	0.081	0.148	0.140	0.193	0.236	0.242	0.289	0.247	0.241	0.251	0.314	0.346	0.321
1986	0.024	0.052	0.066	0.080	0.105	0.134	0.169	0.195	0.242	0.292	0.262	0.319	0.287	0.345	0.260	0.360
1987	0.024	0.052	0.066	0.080	0.105	0.126	0.150	0.171	0.218	0.254	0.281	0.336	0.244	0.328	0.245	0.373
1988	0.024	0.052	0.066	0.080	0.105	0.126	0.141	0.143	0.217	0.274	0.305	0.434	0.404	0.331	0.392	0.424
1989	0.024	0.052	0.066	0.080	0.105	0.103	0.131	0.159	0.127	0.210	0.252	0.381	0.400	0.421	0.448	0.516
1990	0.024	0.052	0.066	0.080	0.105	0.127	0.135	0.124	0.154	0.174	0.282	0.328	0.355	0.399	0.388	0.379
1991	0.024	0.052	0.066	0.080	0.121	0.137	0.143	0.144	0.150	0.182	0.189	0.303	0.323	0.354	0.365	0.330
1992	0.024	0.052	0.066	0.080	0.105	0.133	0.151	0.150	0.158	0.160	0.182	0.288	0.306	0.359	0.393	0.401

Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1993	0.024	0.052	0.066	0.080	0.105	0.153	0.166(	0.173	0.172	0.170	0.206	0.238	0.308	0.327	0.376	0.421
1994	0.024	0.052	0.066	0.080	0.105	0.147	0.185	0.169	0.191	0.191	0.190	0.275	0.240	0.326	0.342	0.383
1995	0.024	0.052	0.059	0.066	0.119	0.096	0.152	0.166	0.178	0.187	0.197	0.222	0.215	0.246	0.237	0.298
1996	0.024	0.052	0.073	0.095	0.118	0.129	0.148	0.172	0.183	0.185	0.202	0.224	0.233	0.229	0.280	0.332
1997	0.024	0.052	0.066	0.080	0.112	0.124	0.162	0.169	0.184	0.188	0.208	0.241	0.229	0.268	0.286	0.266
1998	0.024	0.052	0.071	0.090	0.108	0.129	0.142	0.151	0.162	0.174	0.191	0.220	0.229	0.268	0.286	0.271
1999	0.024	0.052	0.081	0.110	0.120	0.130	0.160	0.170	0.180	0.190	0.210	0.241	0.233	0.268	0.286	0.274
2000	0.024	0.052	0.102	0.115	0.128	0.158	0.169	0.181	0.208	0.224	0.225	0.227	0.247	0.247	0.272	0.378
2001	0.020	0.048	0.077	0.109	0.133	0.160	0.169	0.176	0.187	0.205	0.220	0.241	0.265	0.244	0.266	0.308
2002	0.020	0.039	0.067	0.133	0.152	0.164	0.175	0.194	0.202	0.222	0.242	0.275	0.299	0.307	0.306	0.329
2003	0.022	0.060	0.089	0.114	0.142	0.160	0.175	0.178	0.194	0.205	0.226	0.249	0.267	0.286	0.278	0.317
2004	0.036	0.064	0.100	0.120	0.148	0.168	0.186	0.201	0.219	0.209	0.221	0.233	0.262	0.260	0.322	0.303
2005	0.023	0.053	0.071	0.114	0.136	0.158	0.184	0.196	0.197	0.202	0.222	0.230	0.247	0.281	0.268	0.344
2006	0.019	0.038	0.078	0.114	0.141	0.154	0.180	0.199	0.212	0.222	0.235	0.229	0.235	0.248	0.253	0.304
2007	0.024	0.048	0.067	0.092	0.130	0.150	0.163	0.186	0.210	0.233	0.248	0.256	0.264	0.286	0.310	0.347
2008	0.031	0.051	0.082	0.116	0.144	0.164	0.176	0.190	0.240	0.251	0.251	0.281	0.279	0.289	0.293	0.352
2009	0.025	0.047	0.070	0.107	0.156	0.177	0.187	0.203	0.225	0.252	0.270	0.292	0.306	0.322	0.316	0.370
2010	0.026	0.048	0.087	0.118	0.151	0.178	0.201	0.212	0.229	0.248	0.274	0.305	0.312	0.335	0.329	0.376

Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2011	0.028	0.051	0.079	0.112	0.151	0.172	0.192	0.211	0.223	0.243	0.261	0.288	0.305	0.324	0.329	0.330
2012	0.044	0.060	0.087	0.118	0.151	0.175	0.198	0.213	0.232	0.256	0.266	0.286	0.312	0.307	0.347	0.357
2013	0.040	0.058	0.102	0.130	0.154	0.172	0.195	0.228	0.243	0.249	0.248	0.288	0.288	0.321	0.348	0.355
2014	0.032	0.053	0.094	0.127	0.143	0.180	0.201	0.224	0.247	0.259	0.273	0.278	0.289	0.311	0.304	0.353
2015	0.021	0.082	0.083	0.137	0.144	0.176	0.200	0.219	0.235	0.256	0.279	0.285	0.297	0.313	0.312	0.348
2016	0.016	0.055	0.096	0.133	0.164	0.192	0.200	0.225	0.249	0.254	0.306	0.295	0.310	0.335	0.337	0.339
2017	0.016	0.039	0.077	0.098	0.124	0.173	0.199	0.216	0.249	0.266	0.286	0.307	0.333	0.334	0.337	0.370
2018	0.013	0.028	0.074	0.092	0.113	0.161	0.207	0.236	0.231	0.270	0.282	0.295	0.336	0.339	0.327	0.358
2019	0.011	0.032	0.074	0.108	0.156	0.159	0.205	0.237	0.268	0.277	0.304	0.309	0.346	0.386	0.400	0.402
2020	0.026	0.028	0.051	0.083	0.121	0.170	0.181	0.235	0.259	0.288	0.297	0.315	0.318	0.373	0.371	0.386
2021	0.027	0.042	0.072	0.090	0.122	0.169	0.205	0.219	0.262	0.282	0.301	0.328	0.340	0.334	0.383	0.408

**Table 7.2.6.1. Western horse mackerel. Maturity-at-age.**

	0	1	2	3	4	5	6	7	8	9	10	11+
1982	0	0	0.4	0.8	1	1	1	1	1	1	1	1
1983	0	0	0.3	0.7	1	1	1	1	1	1	1	1
1984	0	0	0.1	0.6	0.85	1	1	1	1	1	1	1
1985	0	0	0.1	0.4	0.8	0.95	1	1	1	1	1	1
1986	0	0	0.1	0.4	0.6	0.9	1	1	1	1	1	1
1987	0	0	0.1	0.4	0.6	0.8	1	1	1	1	1	1
1988	0	0	0.1	0.4	0.6	0.8	1	1	1	1	1	1
1989	0	0	0.1	0.4	0.6	0.8	1	1	1	1	1	1
1990	0	0	0.1	0.4	0.6	0.8	1	1	1	1	1	1
1991	0	0	0.1	0.4	0.6	0.8	1	1	1	1	1	1
1992	0	0	0.1	0.4	0.6	0.8	1	1	1	1	1	1
1993	0	0	0.1	0.4	0.6	0.8	1	1	1	1	1	1
1994	0	0	0.1	0.4	0.6	0.8	1	1	1	1	1	1
1995	0	0	0.1	0.4	0.6	0.8	1	1	1	1	1	1
1996	0	0	0.1	0.4	0.6	0.8	1	1	1	1	1	1
1997	0	0	0.1	0.4	0.6	0.8	1	1	1	1	1	1
1998	0	0	0.05	0.25	0.7	0.95	1	1	1	1	1	1
1999	0	0	0.05	0.25	0.7	0.95	1	1	1	1	1	1
2000	0	0	0.05	0.25	0.7	0.95	1	1	1	1	1	1
2001	0	0	0.05	0.25	0.7	0.95	1	1	1	1	1	1
2002	0	0	0.05	0.25	0.7	0.95	1	1	1	1	1	1
2003	0	0	0.05	0.25	0.7	0.95	1	1	1	1	1	1
2004	0	0	0.05	0.25	0.7	0.95	1	1	1	1	1	1
2005	0	0	0.05	0.25	0.7	0.95	1	1	1	1	1	1
2006	0	0	0.05	0.25	0.7	0.95	1	1	1	1	1	1
2007	0	0	0.05	0.25	0.7	0.95	1	1	1	1	1	1
2008	0	0	0.05	0.25	0.7	0.95	1	1	1	1	1	1
2009	0	0	0.05	0.25	0.7	0.95	1	1	1	1	1	1

	0	1	2	3	4	5	6	7	8	9	10	11+
2010	0	0	0.05	0.25	0.7	0.95	1	1	1	1	1	1
2011	0	0	0.05	0.25	0.7	0.95	1	1	1	1	1	1
2012	0	0	0.05	0.25	0.7	0.95	1	1	1	1	1	1
2013	0	0	0.05	0.25	0.7	0.95	1	1	1	1	1	1
2014	0	0	0.05	0.25	0.7	0.95	1	1	1	1	1	1
2015	0	0	0.05	0.25	0.7	0.95	1	1	1	1	1	1
2016	0	0	0.05	0.25	0.7	0.95	1	1	1	1	1	1
2017	0	0	0.05	0.25	0.7	0.95	1	1	1	1	1	1
2018	0	0	0.05	0.25	0.7	0.95	1	1	1	1	1	1
2019	0	0	0.05	0.25	0.7	0.95	1	1	1	1	1	1
2020	0	0	0.05	0.25	0.7	0.95	1	1	1	1	1	1
2021	0	0	0.05	0.25	0.7	0.95	1	1	1	1	1	1

**Table 7.2.8.1. Western horse mackerel. Potential fecundity (10<sup>6</sup> eggs) per kg spawning female vs. weight in kg.**

1987		1992		1995		1998		2000		2001		2001 (cont)	
w	pfec.	w	pfec.	w	pfec.	w	pfec.	w	pfec.	w	pfec.	w	pfec.
0.168	1.524	0.105	1.317	0.13	1.307	0.172	1.318	0.258	0.841	0.086	0.688	0.165	1.382
0.179	0.916	0.109	2.056	0.157	1.246	0.104	0.867	0.268	0.747	0.08	0.812	0.166	1.579
0.192	2.083	0.11	1.869	0.168	1.699	0.112	1.312	0.304	1.188	0.081	0.535	0.167	1.479
0.233	1.644	0.112	1.772	0.179	1.135	0.206	0.382	0.311	1.411	0.095	0.88	0.113	0.527
0.213	1.066	0.115	1.188	0.189	1.529	0.207	0.78	0.337	0.613	0.11	1.164	0.14	0.876
0.217	2.392	0.119	1.317	0.168	1.1	0.109	1.133	0.339	1.571	0.113	1.106	0.122	0.589
0.277	1.617	0.12	1.413	0.209	1.497	0.132	1.02	0.341	1.522	0.095	0.823	0.12	0.68
0.279	1.018	0.123	1.293	0.215	1.524	0.2	1.088	0.355	1.056	0.11	0.883	0.121	0.578
0.274	1.62	0.123	1.991	0.218	1.616	0.152	1.417	0.357	0.604	0.108	0.823	0.139	0.723
0.3	1.513	0.131	1.617	0.226	1.883	0.149	1.004	0.367	1.15	0.097	0.741	0.144	1.213
0.32	1.647	0.135	0.793	0.22	1.324			0.393	1.279	0.101	0.853	0.144	1.265
0.273	1.956	0.131	1.039	0.236	1.221			0.393	0.668	0.106	1.133	0.171	0.956
0.212	2.83	0.136	1.06	0.261	1.21			0.413	0.694	0.107	0.935	0.121	0.607
0.268	1.687	0.138	1.489	0.245	1.445			0.421	1.339	0.107	0.494	0.122	0.689

1987	1992		1995		1998		2000		2001		2001 (cont)	
0.32	1.088	0.147	1.214	0.306	1.693		0.423	0.798	0.11	0.85	0.139	0.915
0.318	1.208	0.151	1.158	0.314	1.312		0.445	1.03	0.111	0.67	0.153	0.943
0.343	1.933	0.16	1.349	0.46	1.575		0.446	1.208	0.103	0.632	0.154	0.709
0.378	1.429	0.165	1.359	0.449	1.43		0.152	0.643	0.111	0.547	0.156	0.773
0.404	1.849	0.165	0.945				0.165	0.579	0.118	0.88	0.162	1.158
0.428	2.236	0.167	1				0.175	0.596	0.107	0.944	0.174	1.389
0.398	1.538	0.168	1.545				0.179	0.997	0.104	0.724	0.175	1.426
0.431	1.223	0.18	1.299				0.19	0.744	0.111	0.86	0.179	1.248
0.432	1.465	0.174	1.487				0.197	0.613	0.11	0.728	0.179	1.236
0.421	1.843	0.178	1.594				0.203	0.702	0.111	0.544	0.18	2.353
0.481	1.757	0.185	1.475				0.219	0.472	0.129	0.935	0.184	2.255
0.494	1.611	0.195	1.41				0.223	0.806	0.114	0.901	0.139	0.931
0.54	1.754	0.203	1.937				0.227	0.606	0.114	0.557	0.161	1.037
0.564	2.255	0.205	1.534				0.289	1.273	0.151	1.377	0.162	0.893
0.585	1.221	0.213	1.577				0.294	1.395	0.153	1.596	0.169	0.691
		0.222	0.958				0.3	1.305	0.154	1.699	0.18	1.609
		0.275	2.444						0.103	0.679	0.185	1.776
									0.12	1.14	0.211	2.102
									0.12	0.631	0.224	1.466
									0.121	0.834	0.162	0.849
									0.144	0.626	0.17	0.668
									0.116	0.668	0.187	1.453
									0.118	1.194	0.198	1.371
									0.112	0.779	0.219	1.847
									0.126	0.782	0.22	1.578
									0.139	1.244	0.201	0.878
									0.119	1.212	0.206	1.196
									0.109	0.755	0.223	1.115
									0.122	0.841	0.225	1.43

1987	1992	1995	1998	2000	2001	2001 (cont)		
					0.131	0.929	0.233	1.724
8					0.135	0.862	0.241	1.131
					0.142	1.834	0.219	0.96
					0.146	1.689	0.237	1.33
					0.148	1.357	0.241	0.918
					0.151	1.817	0.34	0.605
					0.164	1.631	0.407	1.189
					0.164	1.052		



**Table 7.3.1.1. Western horse mackerel. Final assessment. Numbers-at-age (thousands).**

year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1982	478369 00	122480 0	250831 0	576778 0	106579 0	137759 0	125194 0	752509	489208	43703 2	40717 5	47048 2	56449 3	70717 1	40383 9	25872 4	22981 1	20300 1	17888 2	15770 8	11748 20
1983	150636 0	411383 00	105067 0	214228 0	490132 0	901783	116212 0	105426 0	633103	41139 6	36744 0	34230 3	39550 3	47452 0	59444 7	33946 4	21748 1	19317 6	17064 0	15036 5	11201 00
1984	161894 0	129501 0	352454 00	894754	181178 0	412063 0	755036	970653	879452	52779 8	34286 7	30619 0	28522 2	32954 0	39537 0	49528 8	28283 6	18120 1	16095 0	14217 3	10585 20
1985	212757 0	139193 0	110995 0	300430 00	757875	152632 0	345841 0	632296	811919	73521 7	44111 7	28652 1	25585 5	23832 6	27535 2	33035 4	41383 8	23632 3	15140 1	13448 1	10032 30
1986	265939 0	182958 0	119388 0	947683	255167 00	640806	128654 0	290976 0	531476	68213 9	61755 8	37048 5	24063 0	21486 9	20014 6	23123 8	27742 6	34753 4	19845 9	12714 4	95542 2
1987	522742 0	228643 0	156797 0	101742 0	802401	214854 00	537501	107670 0	243227 0	44400 4	56971 2	51570 8	30936 2	20092 4	17941 1	16711 5	19307 5	23164 0	29017 6	16570 5	90389 1
1988	282829 0	449299 0	195724 0	133267 0	857669	671669	178975 00	446460	892982	20157 80	36784 6	47191 3	42714 4	25622 4	16640 7	14858 8	13840 4	15990 2	19184 1	24031 9	88581 9
1989	317242 0	243054 0	384368 0	166110 0	112071 0	715617	557387	148048 00	368692	73683 1	16626 40	30334 7	38913 1	35219 8	21126 2	13720 4	12251 1	11411 3	13183 9	15817 1	92848 7
1990	221323 0	272617 0	207900 0	326105 0	139615 0	934424	593360	460650	122144 00	30392 6	60715 4	13697 70	24988 9	32054 0	29010 9	17401 6	11301 4	10091 0	93993	10859 2	89505 3
1991	391775 0	190071 0	232615 0	175388 0	271535 0	114958 0	763457	482586	373756	98987 50	24617 0	49164 3	11090 20	20230 7	25949 5	23485 5	14087 1	91487	81689	76089	81246 0
1992	765957 0	336358 0	162000 0	195733 0	145419 0	222311 0	932988	616429	388597	30056 5	79553 40	19778 0	39494 2	89081 8	16249 6	20842 5	18863 1	11314 4	73480	65610	71364 7
1993	696138 0	656750 0	285219 0	134713 0	159150 0	115988 0	174972 0	728580	479399	30160 6	23305 9	61657 60	15325 4	30599 3	69014 3	12588 5	16146 3	14612 7	87648	56922	60365 2

year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1994	6385880	5961650	5542790	2346090	1075830	1239210	887447	1325000	548746	360116	226277	174744	4621630	114856	229306	517156	94329	120986	109493	65674	494957
1995	3836720	5467840	5028040	4552080	1868720	834775	944280	669045	993332	410263	268886	168848	130354	3447040	85658	171004	385655	70342	90219	81648	418053
1996	2155970	3276980	4566950	4037690	3493900	1379850	600088	668167	469507	694263	286191	187397	117623	90786	2400390	596447	119067	268516	48975	62814	347903
1997	1497210	1843270	2747700	3700430	3145290	2631450	1015270	435502	481423	337096	497632	204971	134161	84191	64974	1717820	42682	85204	192146	35046	293894
1998	2574170	1276540	1529040	2171820	2766860	2242550	1815420	686963	291691	320850	224131	330496	136052	89025	55858	43104	1139550	28313	56518	127454	218185
1999	2711470	2201370	1071410	1241750	1698190	2094400	1659810	1326010	498296	210865	231571	161640	238257	98062	64159	40253	31061	821152	20402	40725	249056
2000	1999390	2318580	1847000	869408	969665	1283180	1546940	1209610	959566	359355	151821	166598	116243	171307	70499	46123	28936	22328	590261	14665	208295
2001	11846100	1712520	1957970	1521330	695878	757304	985274	1175960	914706	723765	270718	114306	125396	87481	128911	53049	34705	21773	168006	44412	167758
2002	2179360	10134800	1439700	1596120	1197020	531176	566053	727393	862551	668803	528397	197499	83361	91432	63780	93979	38673	25299	15872	12247	446038
2003	1064110	1865450	8536920	1178950	1265280	922884	401720	423267	540682	639288	495005	390827	146032	61627	67587	47144	69464	28584	18699	11731	338718
2004	1949000	910936	1571990	6997360	936037	977550	699678	301190	315498	401870	474517	367184	289813	108270	45687	50103	34947	51492	21188	13861	259767
2005	1481480	1670320	770991	1301550	5648980	739481	760790	539744	231269	241708	307549	362958	280787	221592	82778	34929	38303	26717	39364	16198	209178
2006	1231430	1269120	1411440	635985	1044310	4426210	569975	580750	409927	175211	182904	232595	274423	212265	167502	62569	26401	28951	20193	29752	170341

year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
2007	1956800	1055620	1075230	1171330	515397	829243	3465500	442570	448977	316241	135031	140891	179125	211311	163437	128966	48173	20326	22289	15547	154049
2008	4945330	1678710	897001	898450	960040	415500	660907	2743430	349120	353562	248830	106205	110793	140845	166144	128499	101395	37874	15980	17524	133333
2009	1277190	4239420	1422400	744600	728405	762764	325533	513549	2122550	269538	272694	191824	81855	85380	108532	128021	99011	78126	29182	12313	116234
2010	938294	1093160	3570050	1164040	589646	560805	575922	242984	381021	1570170	199114	201310	141563	60397	62992	80069	94444	73041	57633	21527	94826
2011	344757	802108	916174	2889600	905176	443052	411492	416708	174525	272692	1121840	142145	143654	100998	43085	44933	57112	67364	52097	41107	82987
2012	2417070	294622	671386	739362	2236040	675707	322604	295259	296710	123802	193092	793689	100523	101569	71400	30457	31762	40370	47615	36824	87712
2013	1053240	2066080	246842	543011	574223	1677340	494832	232924	211602	211872	88251	137530	565074	71553	72289	50814	21675	22603	28728	33884	88619
2014	3375470	899701	1726570	198463	417618	425139	1209580	351342	164041	148433	148342	61733	96161	395008	50012	50523	35512	15147	15796	20076	85606
2015	2396120	2884780	753259	1394150	153720	312140	310017	869306	250586	116563	105286	105132	43733	68107	279736	35415	35775	25145	10725	11184	74828
2016	2777670	2050940	2429710	616682	1104730	118452	235918	231657	645708	185589	86209	77817	77678	32307	50308	206619	26157	26423	18572	7921	63524
2017	3633800	2377160	1726350	1986380	487532	848642	89202	175591	171363	476216	136678	63446	57250	57138	23762	37000	151956	19237	19432	13658	52541
2018	2968230	3113140	2009260	1424950	1595430	382530	655178	68213	133605	130069	361042	103565	48061	43362	43273	17995	28020	115073	14568	14715	50129
2019	1356420	2541200	2624340	1648280	1132900	1234880	290637	492372	50969	99551	96788	268490	76992	35724	32228	32160	13373	20823	85515	10826	48187

year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
2020	1083960	1160330	2135440	2137200	1294770	862859	920631	213963	360089	37155	72459	70397	195208	55967	25966	23423	23373	9719	15133	62148	42886
2021	816224	998917	912502	1384850	1341580	875566	581151	630308	143506	239066	25200	46793	43929	121924	38258	15285	13605	13479	5583	8454	62126

**Table 7.3.1.2. Western horse mackerel. Final assessment. Fishing mortality-at-age.**

[illegible]

year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1995	0.008	0.030	0.069	0.115	0.153	0.180	0.196	0.204	0.208	0.210	0.211	0.212	0.212	0.212	0.212	0.212	0.212	0.212	0.212	0.212	0.212
1996	0.007	0.026	0.060	0.100	0.133	0.157	0.171	0.178	0.181	0.183	0.184	0.184	0.184	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185
1997	0.009	0.037	0.085	0.141	0.188	0.221	0.241	0.251	0.256	0.258	0.259	0.260	0.260	0.260	0.260	0.260	0.260	0.260	0.261	0.261	0.261
1998	0.006	0.025	0.058	0.096	0.128	0.151	0.164	0.171	0.174	0.176	0.177	0.177	0.177	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
1999	0.007	0.026	0.059	0.097	0.130	0.153	0.166	0.173	0.177	0.179	0.179	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180
2000	0.005	0.019	0.044	0.073	0.097	0.114	0.124	0.129	0.132	0.133	0.134	0.134	0.134	0.134	0.134	0.134	0.134	0.134	0.134	0.134	0.134
2001	0.006	0.024	0.054	0.090	0.120	0.141	0.153	0.160	0.163	0.165	0.165	0.166	0.166	0.166	0.166	0.166	0.166	0.166	0.166	0.166	0.166
2002	0.006	0.022	0.050	0.082	0.110	0.129	0.141	0.147	0.150	0.151	0.152	0.152	0.152	0.152	0.152	0.152	0.152	0.152	0.152	0.152	0.152
2003	0.005	0.021	0.049	0.081	0.108	0.127	0.138	0.144	0.147	0.148	0.149	0.149	0.149	0.149	0.149	0.149	0.149	0.149	0.149	0.149	0.149
2004	0.004	0.017	0.039	0.064	0.086	0.101	0.110	0.114	0.116	0.117	0.118	0.118	0.118	0.118	0.119	0.119	0.119	0.119	0.119	0.119	0.119
2005	0.005	0.018	0.043	0.070	0.094	0.110	0.120	0.125	0.128	0.129	0.129	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130
2006	0.004	0.016	0.036	0.060	0.081	0.095	0.103	0.107	0.109	0.110	0.111	0.111	0.111	0.111	0.111	0.111	0.111	0.111	0.112	0.112	0.112
2007	0.003	0.013	0.030	0.049	0.065	0.077	0.084	0.087	0.089	0.090	0.090	0.090	0.090	0.090	0.091	0.091	0.091	0.091	0.091	0.091	0.091
2008	0.004	0.016	0.036	0.060	0.080	0.094	0.102	0.107	0.109	0.110	0.110	0.110	0.111	0.111	0.111	0.111	0.111	0.111	0.111	0.111	0.111
2009	0.006	0.022	0.050	0.083	0.111	0.131	0.142	0.148	0.151	0.153	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154
2010	0.007	0.027	0.061	0.102	0.136	0.160	0.174	0.181	0.185	0.186	0.187	0.187	0.188	0.188	0.188	0.188	0.188	0.188	0.188	0.188	0.188
2011	0.007	0.028	0.064	0.106	0.142	0.167	0.182	0.190	0.193	0.195	0.196	0.196	0.197	0.197	0.197	0.197	0.197	0.197	0.197	0.197	0.197
2012	0.007	0.027	0.062	0.103	0.137	0.162	0.176	0.183	0.187	0.188	0.189	0.190	0.190	0.190	0.190	0.190	0.190	0.190	0.190	0.190	0.190

[illegible]

**Table 7.3.1.3. Western horse mackerel. Final assessment. Stock summary table.**

Year	Recruit (thousands)	Total Biomass	Spawning Biomass	Catch	Yield/SSB	Fbar(1-3)	Fbar(4-8)	Fbar(1-10)
1982	47973500	3007480	2351030	61197	0.0260	0.0081	0.0218	0.0183
1983	1409080	3517800	2477960	90442	0.0365	0.0111	0.0299	0.0251
1984	1529300	4168190	2600980	96244	0.0370	0.0101	0.0271	0.0227
1985	2061350	4763890	3044610	96343	0.0316	0.0083	0.0223	0.0187
1986	2605390	5186500	4307560	137499	0.0319	0.0102	0.0274	0.0230
1987	5209590	5376550	5036810	187338	0.0372	0.0128	0.0345	0.0289
1988	2733740	5358590	5073630	210989	0.0416	0.0143	0.0384	0.0322
1989	3106180	5198870	4865000	209583	0.0431	0.0145	0.0392	0.0328
1990	2128810	4956330	4599300	275968	0.0600	0.0203	0.0546	0.0458
1991	3848570	4599130	4282640	287438	0.0671	0.0229	0.0617	0.0517
1992	7613940	4233590	3922920	393631	0.1003	0.0349	0.0941	0.0789
1993	6952140	3823250	3443150	453246	0.1316	0.0461	0.1242	0.1041
1994	6397130	3445010	2930260	412291	0.1407	0.0479	0.1290	0.1081
1995	3888900	3184580	2568610	538950	0.2098	0.0711	0.1915	0.1605
1996	2130800	2835840	2258940	422396	0.1870	0.0620	0.1671	0.1400
1997	1455050	2588010	2130370	534673	0.2510	0.0875	0.2357	0.1975
1998	2488060	2194950	1887400	325340	0.1724	0.0596	0.1605	0.1345
1999	2653150	1973540	1751820	298992	0.1707	0.0603	0.1624	0.1361
2000	1952630	1759820	1556520	202732	0.1302	0.0450	0.1211	0.1015
2001	11569200	1668810	1411810	229081	0.1623	0.0557	0.1499	0.1256
2002	1982640	1619510	1257880	196120	0.1559	0.0512	0.1380	0.1156
2003	988367	1638910	1167000	191856	0.1644	0.0505	0.1360	0.1140
2004	1801970	1650310	1171620	159742	0.1363	0.0402	0.1083	0.0908
2005	1366060	1652080	1362250	182001	0.1336	0.0442	0.1191	0.0998
2006	1137640	1584930	1418690	155827	0.1098	0.0380	0.1024	0.0859
2007	2071850	1505090	1359080	123356	0.0908	0.0310	0.0835	0.0700
2008	4713810	1447290	1290160	143349	0.1111	0.0381	0.1025	0.0859
2009	1196590	1381580	1183320	183782	0.1553	0.0534	0.1438	0.1205

Year	Recruit (thousands)	Total Biomass	Spawning Biomass	Catch	Yield/SSB	Fbar(1-3)	Fbar(4-8)	Fbar(1-10)
2010	893847	1282810	1039260	203112	0.1954	0.0656	0.1765	0.1480
2011	338534	1155520	928577	193698	0.2086	0.0692	0.1865	0.1563
2012	2277900	1022860	880027	169859	0.1930	0.0674	0.1814	0.1521
2013	982006	905486	803142	165258	0.2058	0.0745	0.2006	0.1681
2014	3140900	797965	679877	136360	0.2006	0.0706	0.1901	0.1593
2015	2138820	737343	576525	98419	0.1707	0.0560	0.1507	0.1263
2016	2419130	735636	541909	98810	0.1823	0.0581	0.1564	0.1310
2017	2846550	753910	527801	82961	0.1572	0.0477	0.1284	0.1076
2018	2329200	803522	568172	101682	0.1790	0.0554	0.1491	0.1249
2019	1260210	839611	604308	124947	0.2068	0.0652	0.1755	0.1471
2020	1165290	842494	625449	76422	0.1222	0.0376	0.1014	0.0850
2021	816224	871032	693991	81557	0.1175	0.0377	0.1015	0.0851

**Table 7.4.1. Western Horse Mackerel. Short term prediction: INPUT DATA. \*geometric mean of the recruitment time series from 1983 to 2021. \*\* from assessment output**

Age	N	Mat	M	PF	PM	Stock weight at age**
0	816224	0.000	0.150	0	0	0.0091
1	998917	0.000	0.150	0	0	0.0251
2	912502	0.050	0.150	0	0	0.0493
3	1384850	0.250	0.150	0	0	0.0798
4	1341580	0.700	0.150	0	0	0.1166
5	875566	0.950	0.150	0	0	0.1519
6	581151	1.000	0.150	0	0	0.1824
7	630308	1.000	0.150	0	0	0.2087
8	143506	1.000	0.150	0	0	0.2312
9	239066	1.000	0.150	0	0	0.2503
10	25200	1.000	0.150	0	0	0.2664
11	46793	1.000	0.150	0	0	0.2799
12	43929	1.000	0.150	0	0	0.2911



Age	N	Mat	M	PF	PM	Stock weight at age**
13	121924	1.000	0.150	0	0	0.3004
14	38258	1.000	0.150	0	0	0.3080
15	15285	1.000	0.150	0	0	0.3142
16	13605	1.000	0.150	0	0	0.3193
17	13479	1.000	0.150	0	0	0.3234
18	5583	1.000	0.150	0	0	0.3268
19	8454	1.000	0.150	0	0	0.3294
20	62126	1.000	0.150	0	0	0.3334

**Table 7.4.2. Western Horse Mackerel. Short term prediction; single area management option table. Assumption: Catch 2022: 71 138 t (100% of 2022 TOTAL TAC).**

Scenarios	F <sub>factor</sub>	F <sub>bar</sub>	Catch_2022	Catch_2023	SSB_2023	SSB_2024	Change_SSB_2023-2024(%)	Change_Catch_2022-2023(%)
SSB <sub>2024</sub> = MSY B <sub>trigger</sub> = B <sub>pa</sub> = B <sub>lim</sub>	The B <sub>pa</sub> , B <sub>lim</sub> and MSY B <sub>trigger</sub> options were left blank because B <sub>pa</sub> , B <sub>lim</sub> and MSY B <sub>trigger</sub> cannot be achieved in 2024, even with a zero catch in 2023.							
F = F <sub>MSY</sub>	0.870	0.074	71 138	73 950	754 163	737 593	-2.2	3.95
F = F <sub>P05</sub> = F <sub>pa</sub>	0.929	0.079	71 138	78 719	754 163	733 196	-2.8	10.7
F = F <sub>lim</sub>	1.211	0.103	71 138	101 225	754 163	712 461	-5.5	42.3
F = 0	0	0	71 138	0	754 163	805 946	6.9	-100
F = F <sub>2022</sub>	0.844	0.072	71 138	71 813	754 163	739 564	-1.94	0.95
PelAC proposed HCR	0.341	0.015	71 138	15 513	754 163	791 583	4.96	-78

7.16 Figures

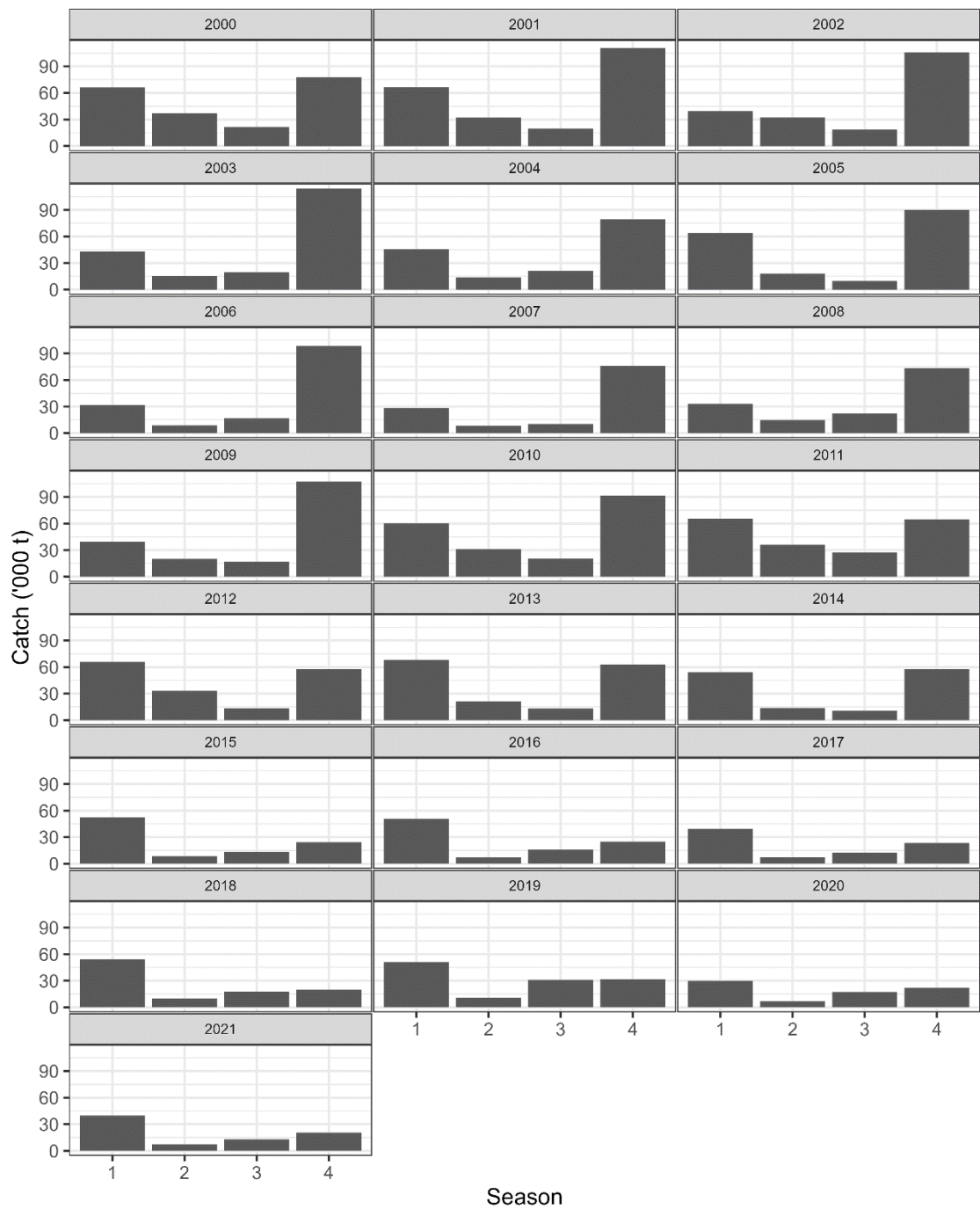


Figure 7.1.1.1: Western horse mackerel. Catch by quarter and year for 2000-2021.

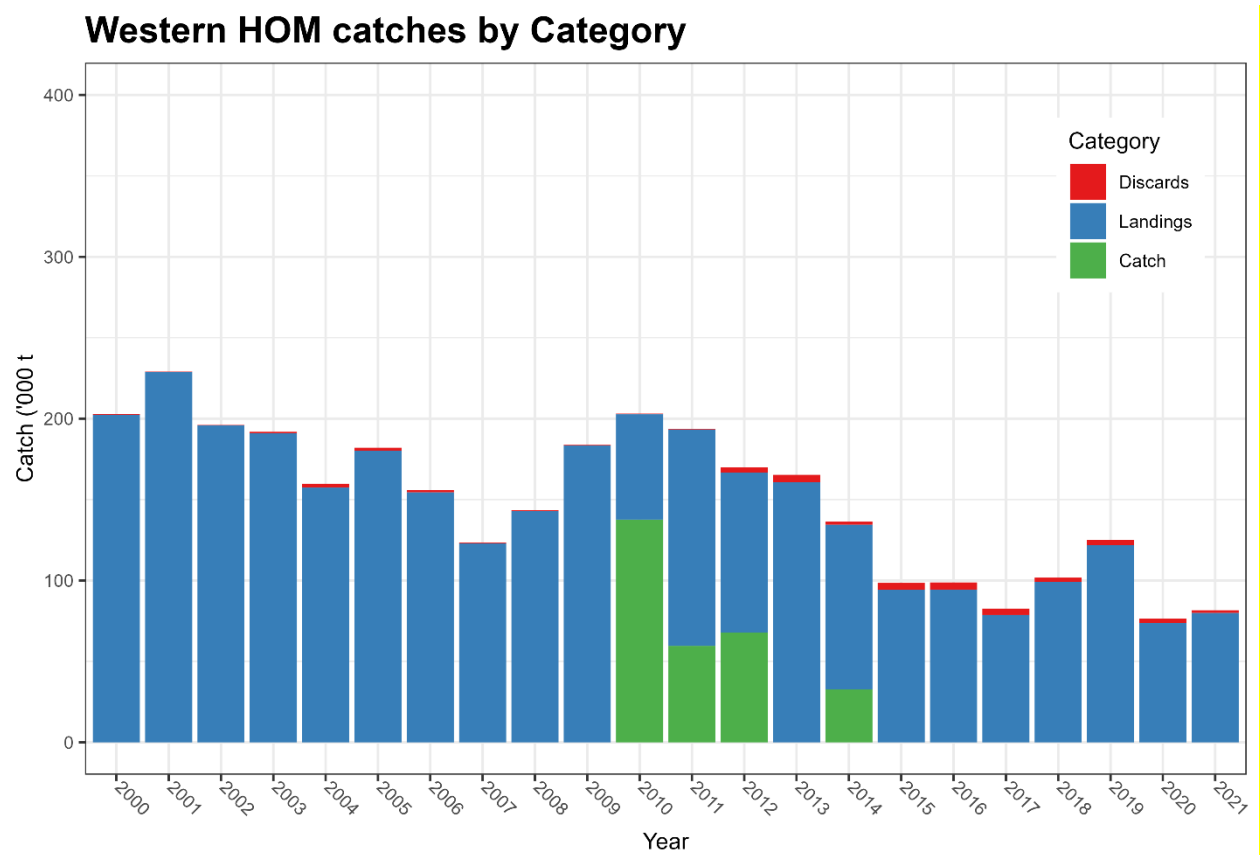


Figure 7.1.2.1. Western horse mackerel. Catch categories since 2000 (green bars indicate when countries have submitted catch data without specifying landings/discards).

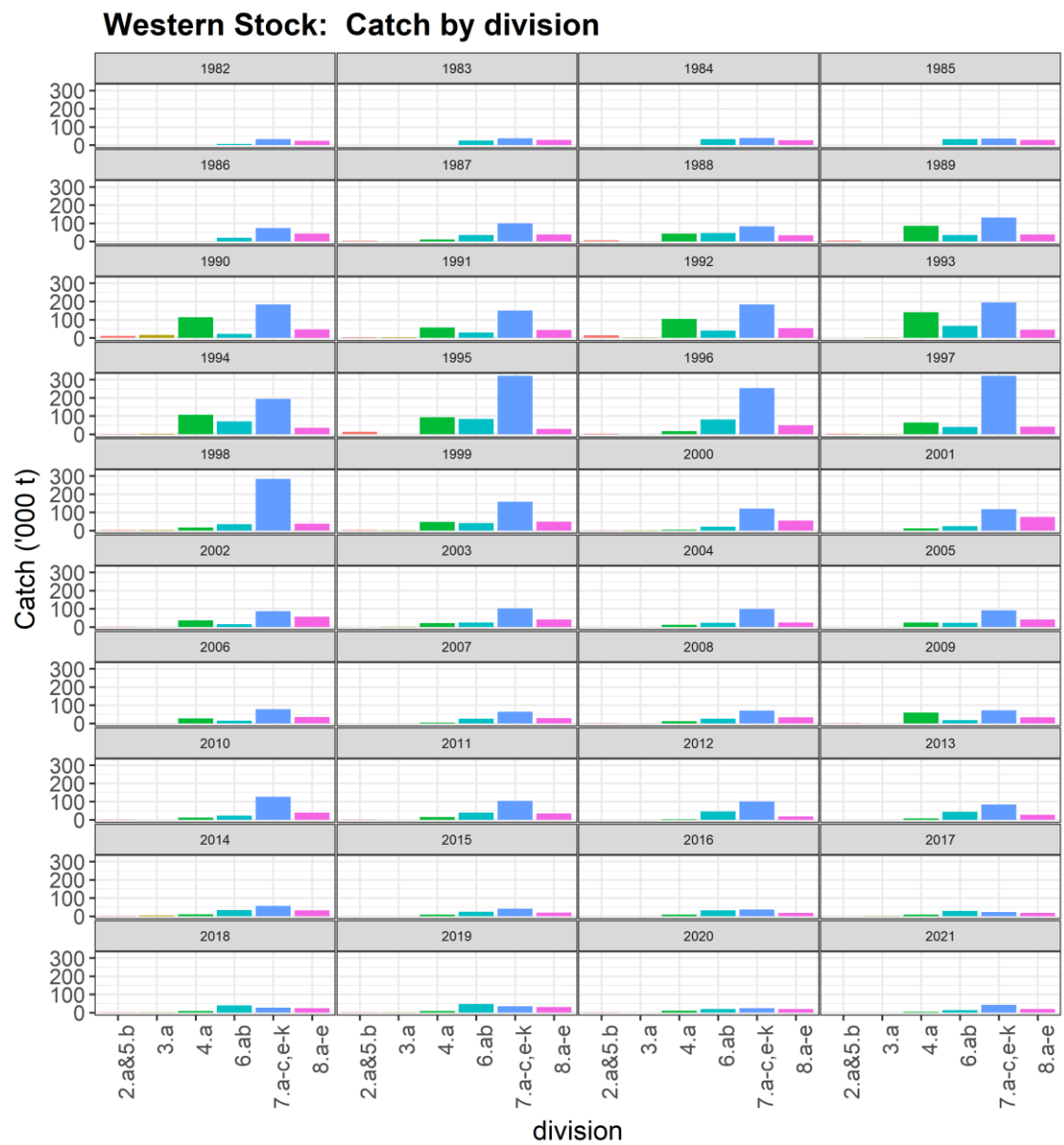


Figure 7.1.3.1: Western horse mackerel. Catch by ICES Division and year for 1982-2021.

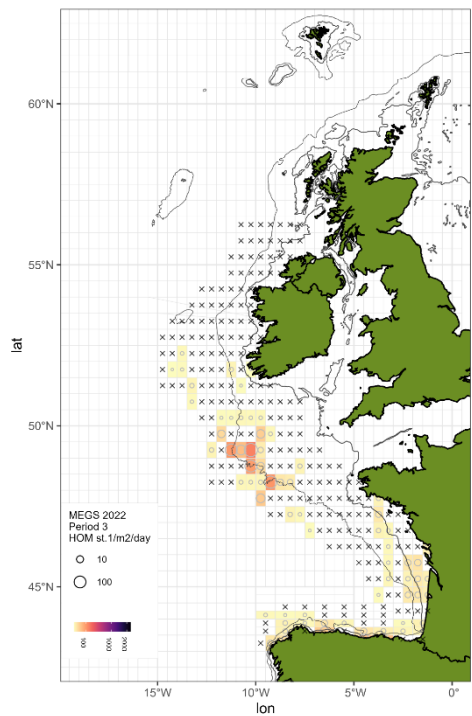


Figure 7.2.1.1: Western Horse mackerel egg production by half rectangle for period 3 (March 4th – April 8<sup>th</sup>, 2022). Circle areas and colour scale represent horse mackerel stage I eggs/m<sup>2</sup>/day by half rectangle. Crosses represent zero values.

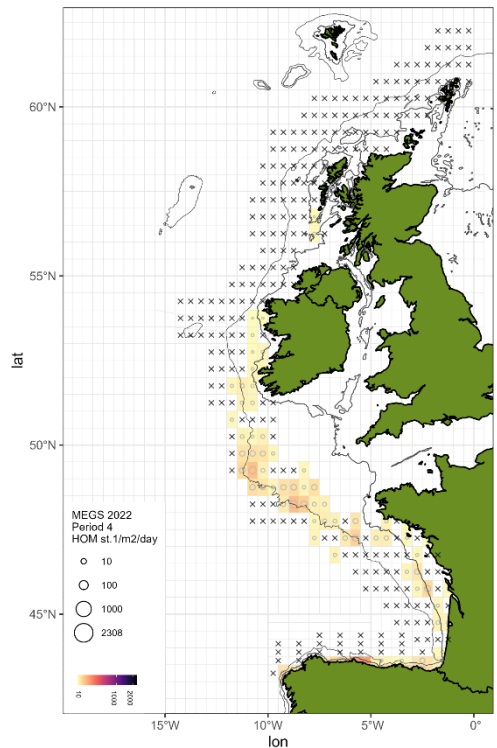
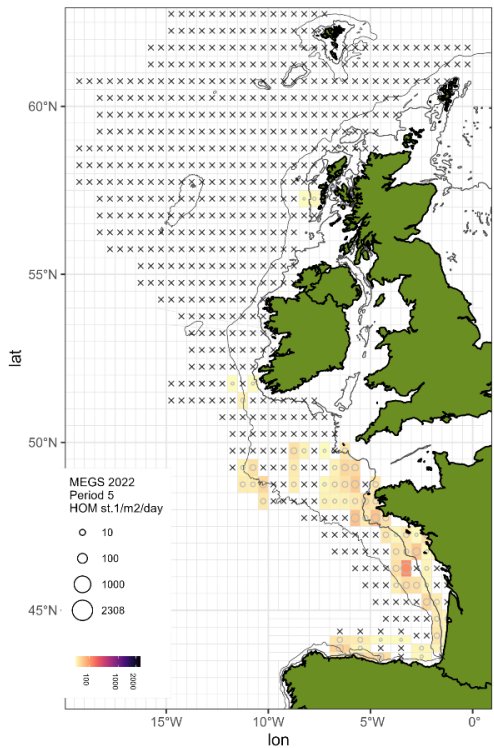
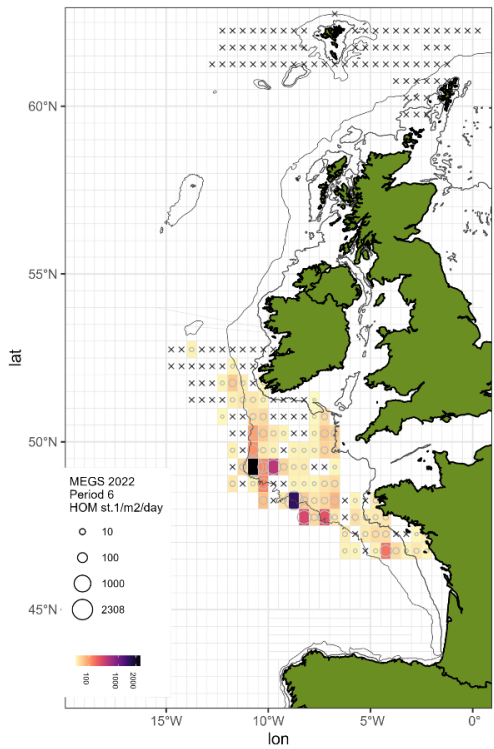


Figure 7.2.1.2: Western Horse mackerel egg production by half rectangle for period 4 (April 9<sup>th</sup> – 29<sup>th</sup>, 2022). Circle areas and colour scale represent horse mackerel stage I eggs/m<sup>2</sup>/day by half rectangle. Crosses represent zero values.



**Figure 7.2.1.3: Western Horse mackerel egg production by half rectangle for period 5 (Apr 30th – May 31<sup>st</sup>, 2022). Circle areas and colour scale represent horse mackerel stage I eggs/m<sup>2</sup>/day by half rectangle. Crosses represent zero values.**



**Figure 7.2.1.4: Western Horse mackerel egg production by half rectangle for period 6 (June 1<sup>st</sup> – 30<sup>th</sup>, 2022). Circle areas and colour scale represent horse mackerel stage I eggs/m<sup>2</sup>/day by half rectangle. Crosses represent zero values.**

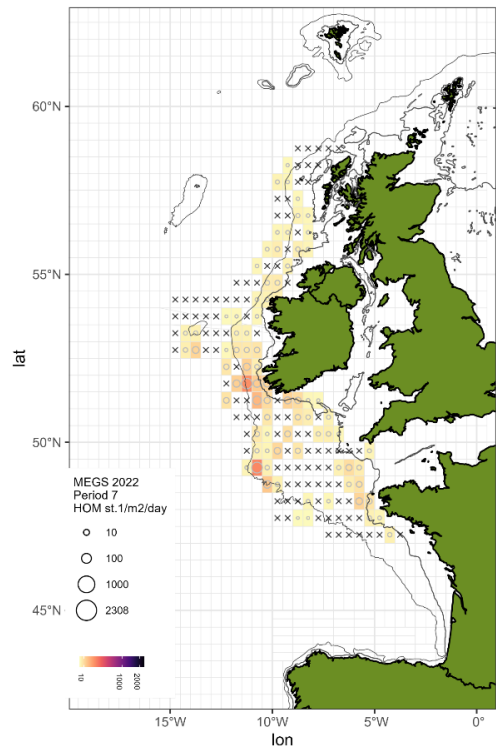


Figure 7.2.1.5: Western mackerel egg production by half rectangle for period 7 (July 1st – July 31st, 2022). Circle areas and colour scale represent horse mackerel stage I eggs/m2/day by half rectangle. Crosses represent zero values

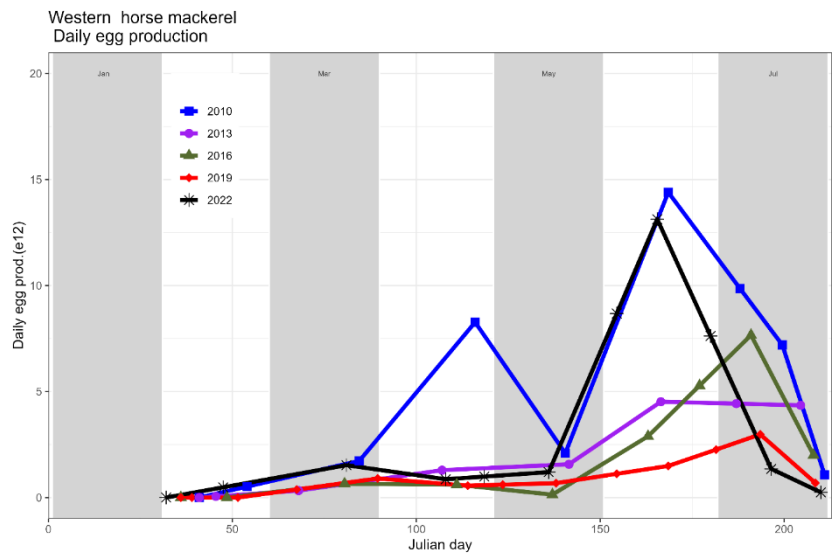


Figure 7.2.1.6: Provisional annual egg production curve for western horse mackerel for 2022, (black line). The curves for 2010, 2013, 2016 and 2019 are included for comparison



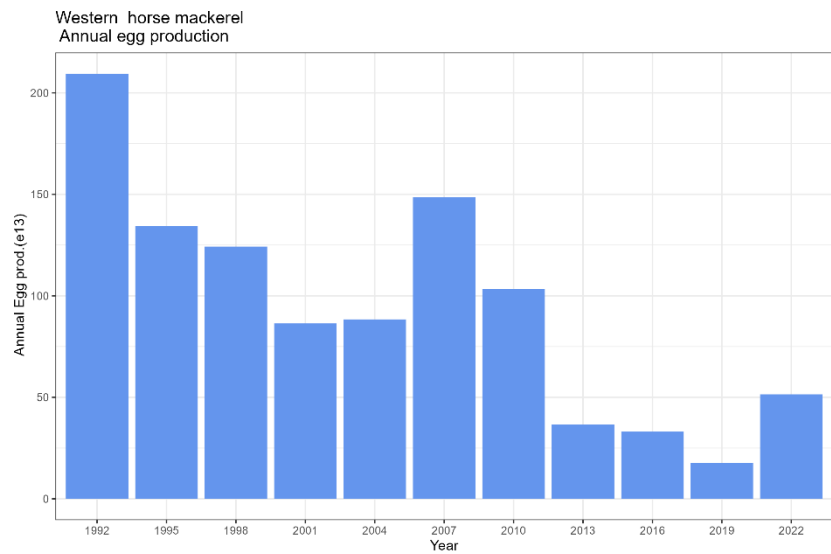


Figure 7.2.1.7. Provisional total annual egg production for western horse mackerel. Production figures back to 1992 are included for comparison.

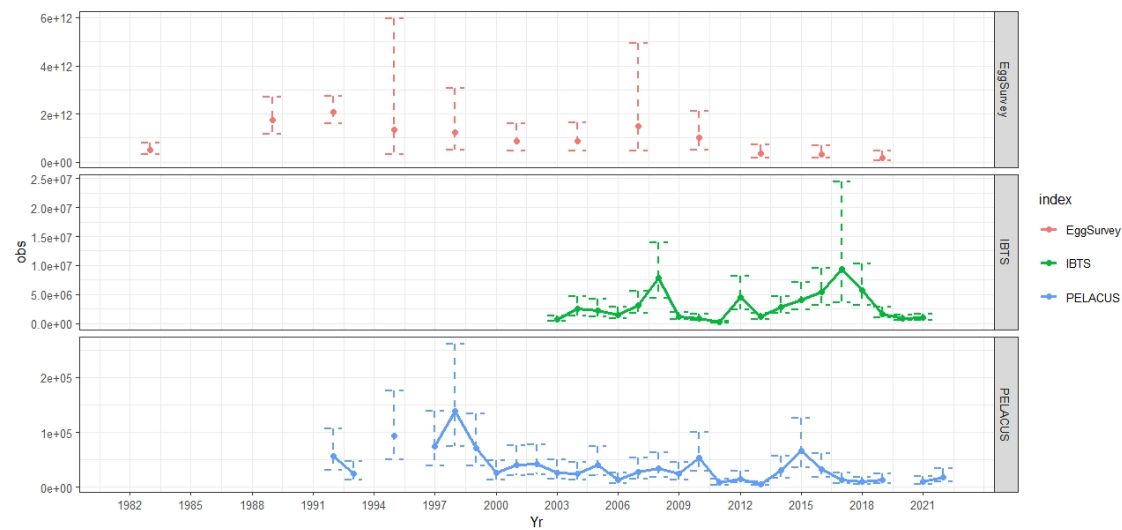


Figure 7.2.2.1: Western horse mackerel. Trend of the fisheries independent indices of abundance used in the assessment of Western Horse mackerel. Top: Spawning index from egg survey; middle: recruitment index from IBTS survey; bottom: biomass estimates from PELACUS acoustic survey. Confidence intervals are shown as well.

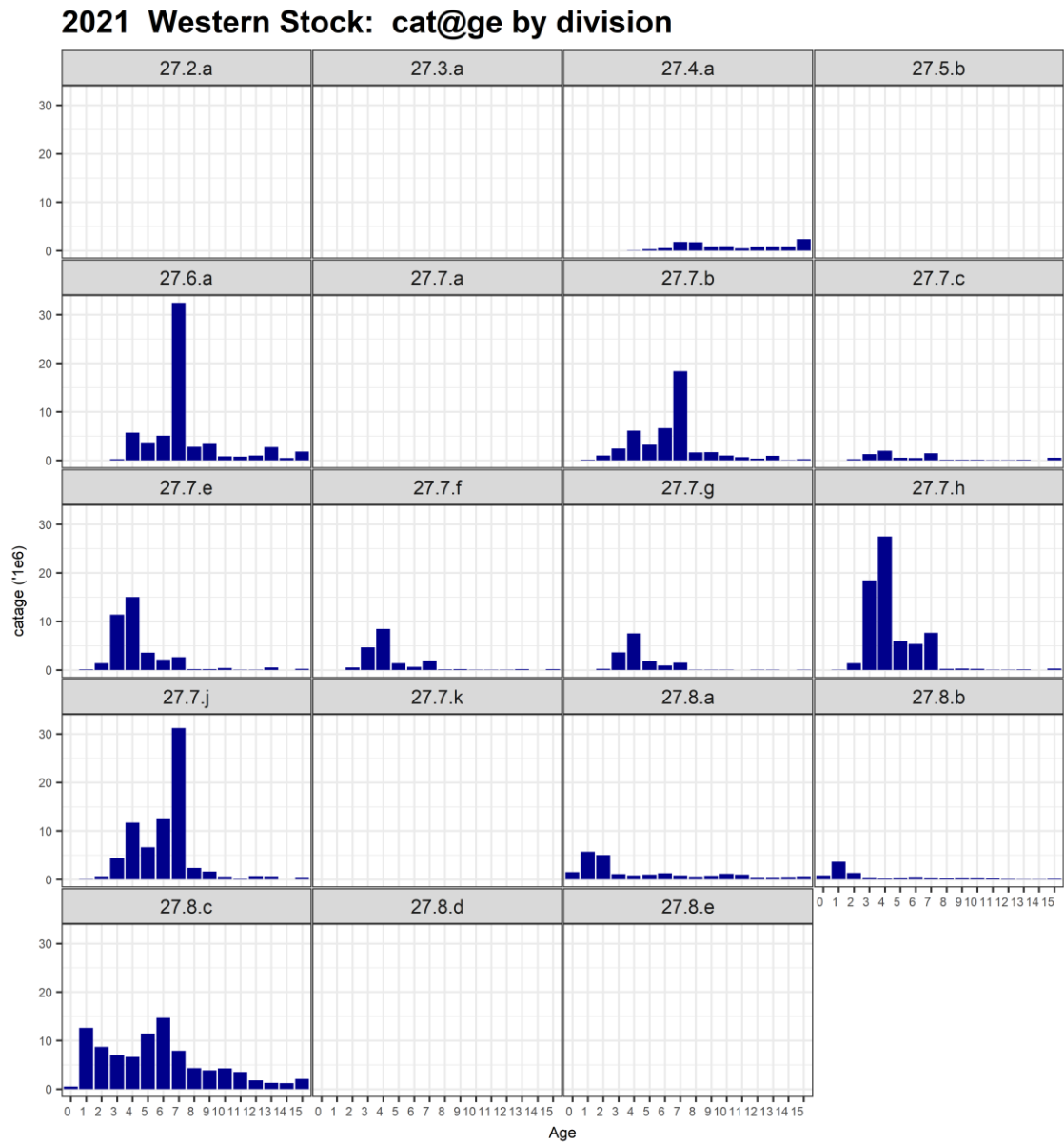


Figure 7.2.4.1: Western horse mackerel. Catch-at-age (millions) by ICES division in 2021.

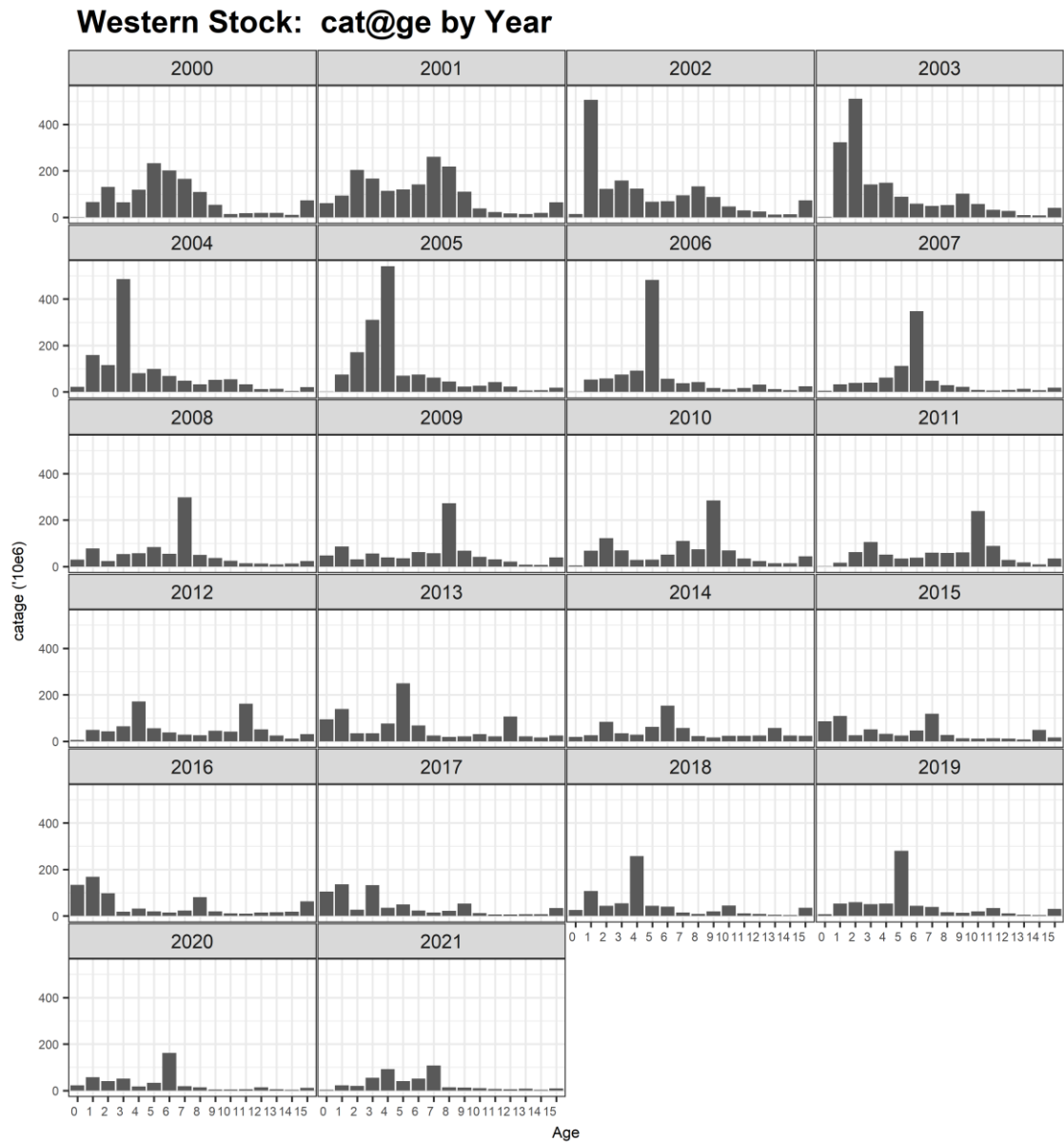
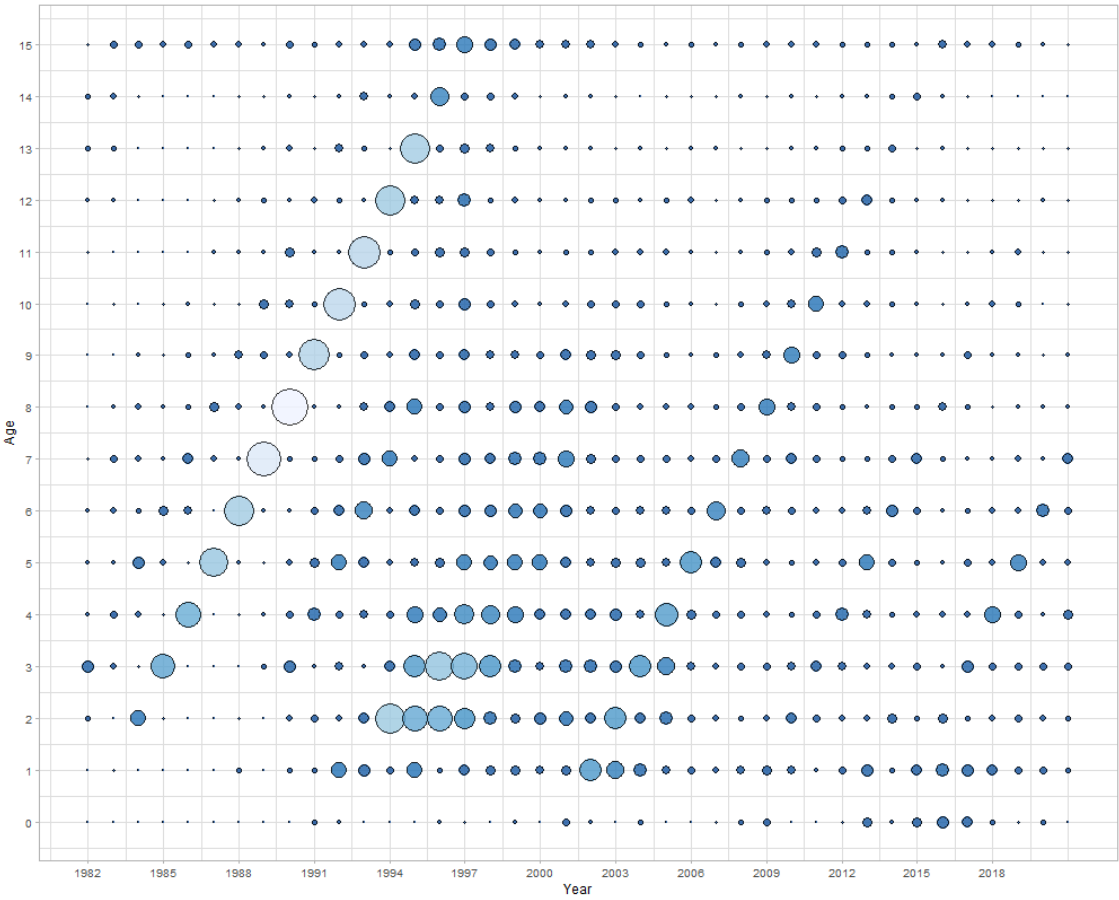


Figure 7.2.4.2: Western horse mackerel. Catch-at-age (millions) by Year.



**Figure 7.2.4.3: Western horse mackerel. Catch-at-age - the area of bubbles is proportional to the catch number. Age 15 is a plus group.**

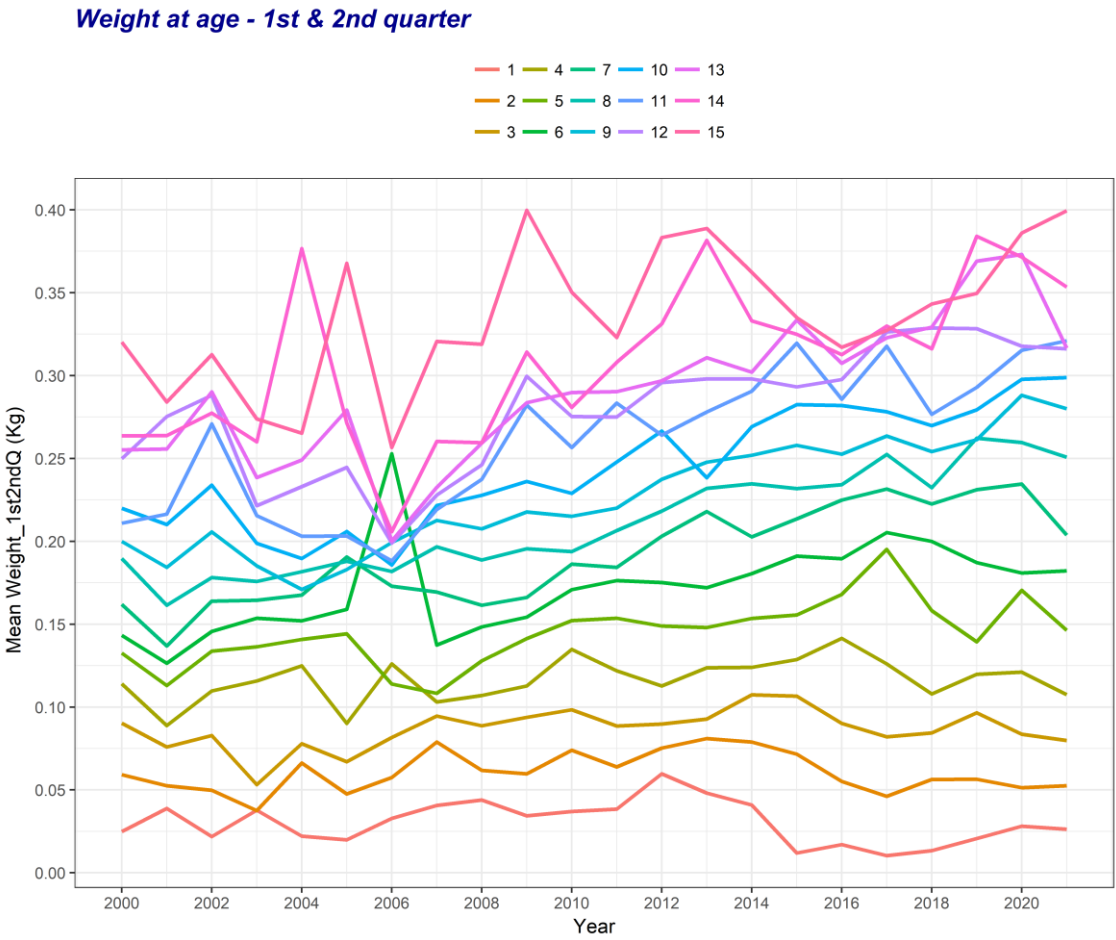


Figure 7.2.5.1: Western horse mackerel. Weight at age in the catch (kg) by year.

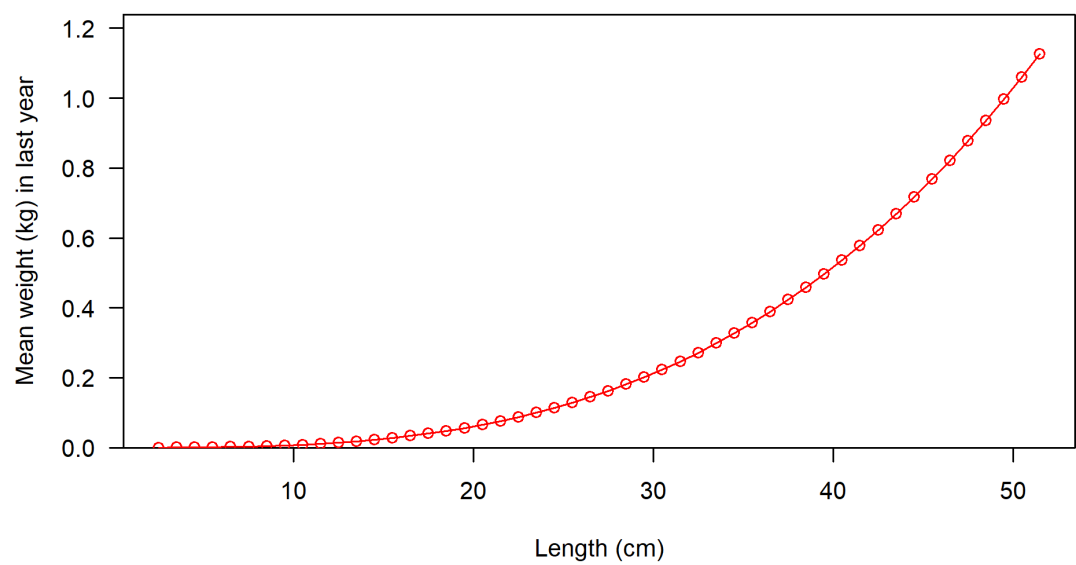


Figure 7.2.5.2: Western horse mackerel. Weight at length in the stock (kg) as estimated by the stock assessment.

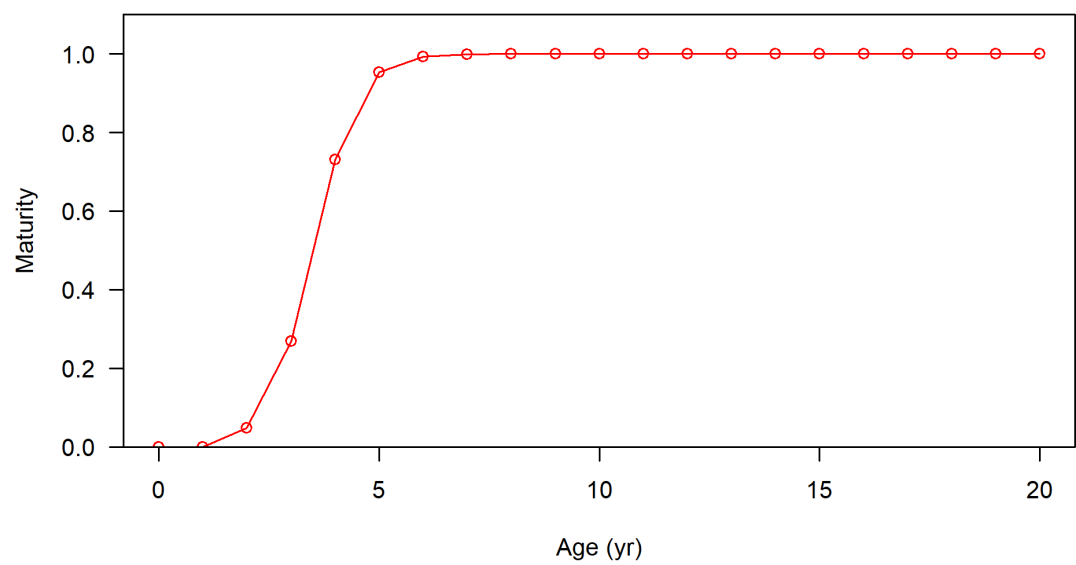


Figure 7.2.6.1: Western horse mackerel. Maturity at age as used in the assessment model.

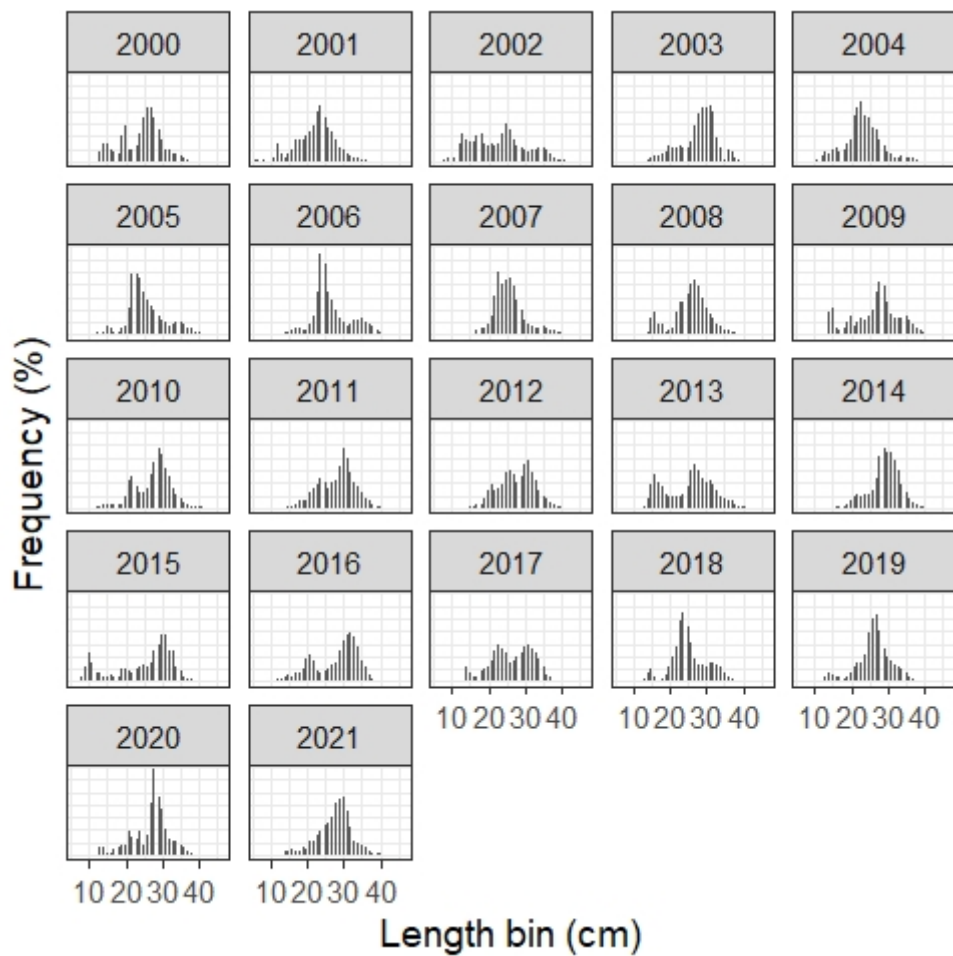


Figure 7.2.10.1: Western horse mackerel. Length frequency distribution of the landing data as used in the assessment model.

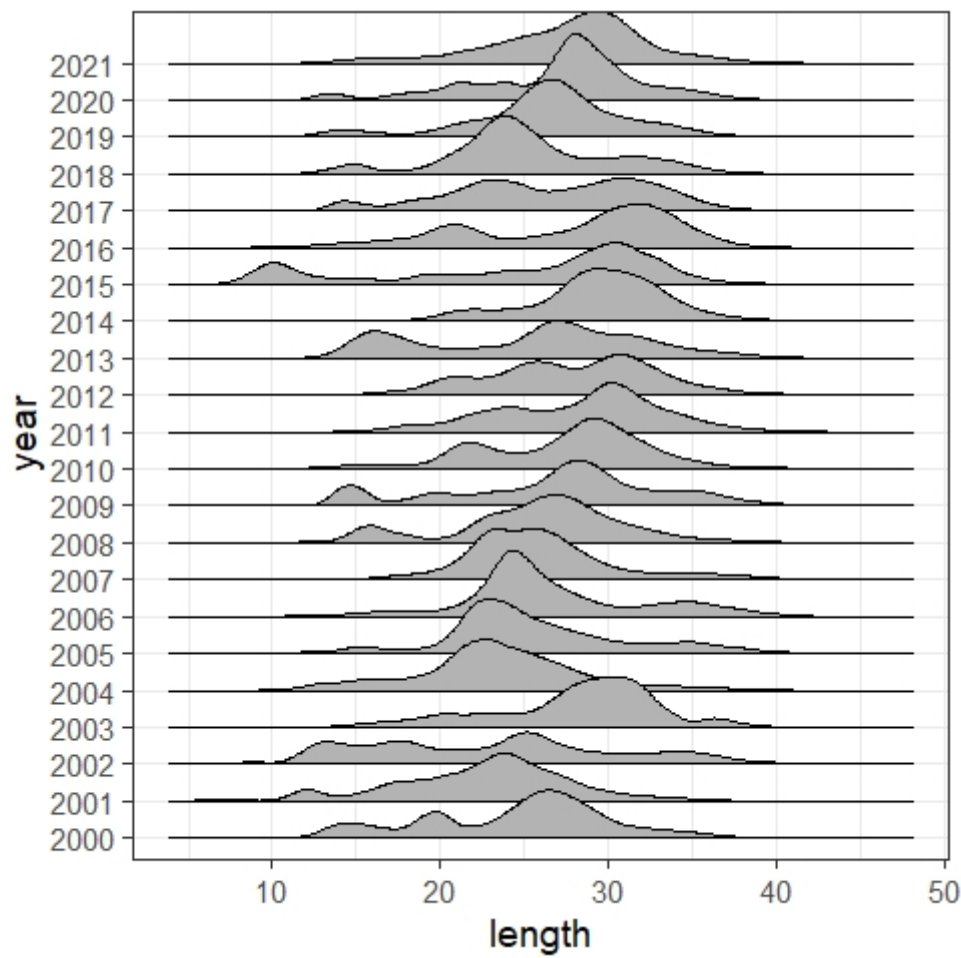


Figure 7.2.10.2: Western horse mackerel. Stacked length frequency distribution of the landing data as used in the assessment model.



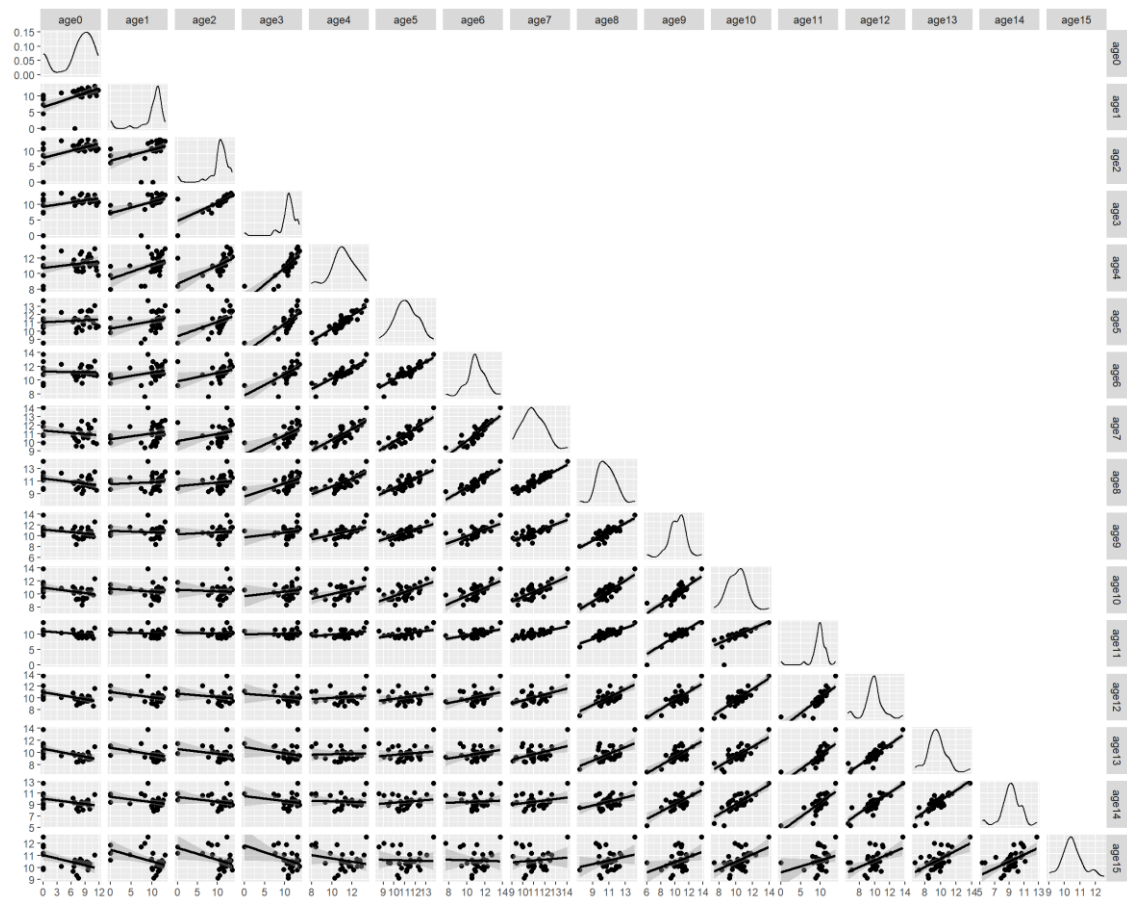


Figure 7.2.10.3: Western horse mackerel. Within-cohort consistency in the catch-at-age matrix, shown by plotting the log-catch of a cohort at a particular age against the log-catch of the same cohort at subsequent ages.

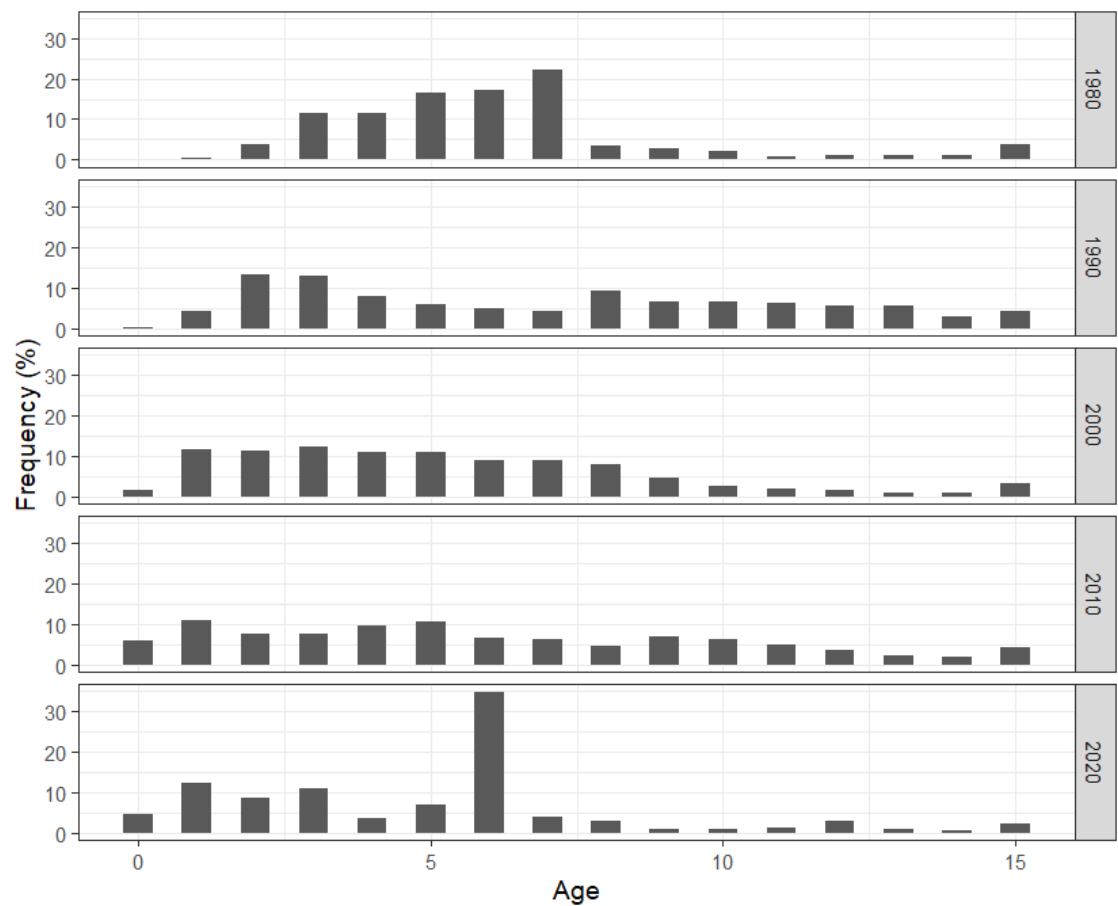


Figure 7.2.10.4: Western horse mackerel. Catch numbers at age composition by decade (*year* specifies start of decade i.e., 1980 = 1980-1999, also note that 2020 only includes years 2020-2021).

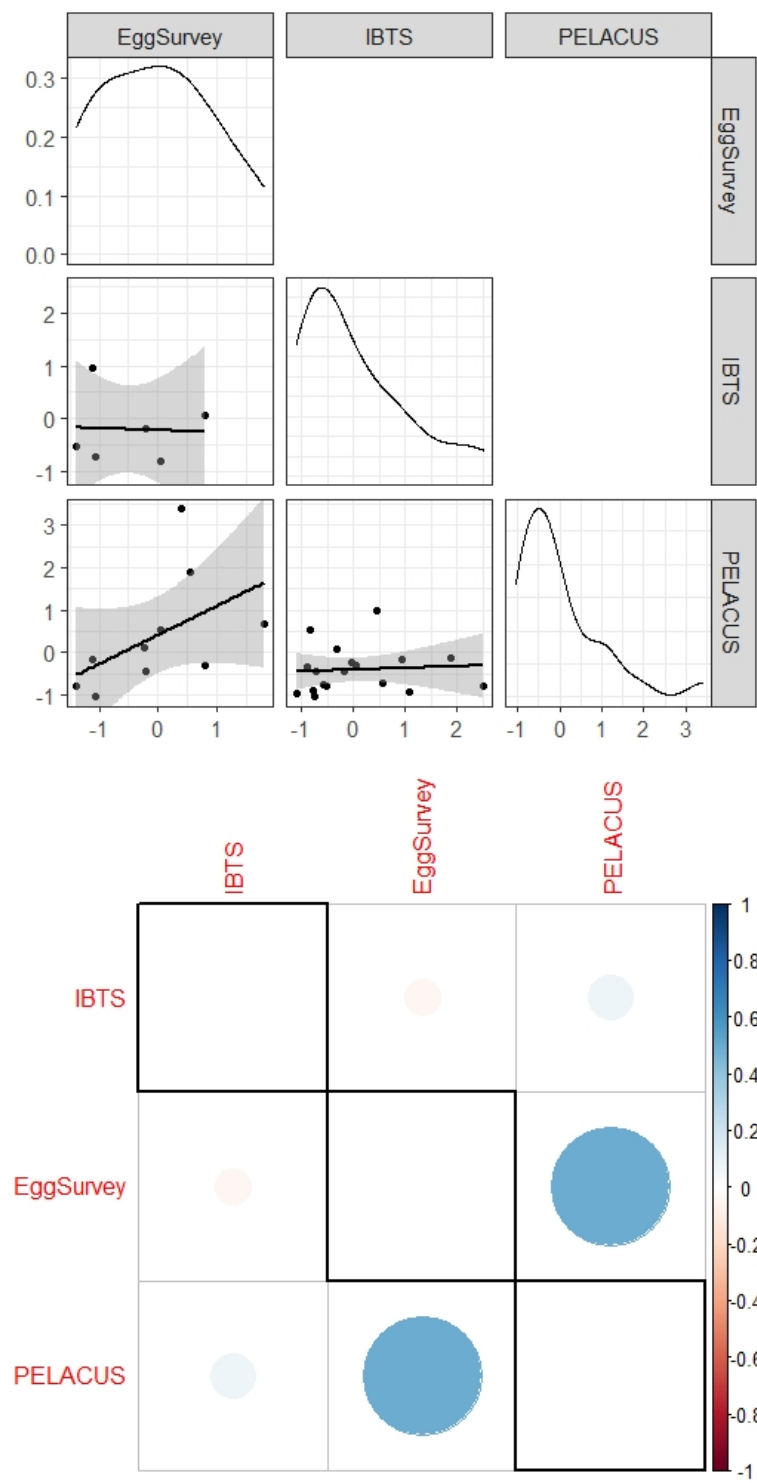


Figure 7.2.10.5: Western horse mackerel. Data exploration. Correlation plots between indices of abundance (including 2021 data points). Size and shade of circle indicates magnitude of correlation and color indicated sign (blue positive, red negative).

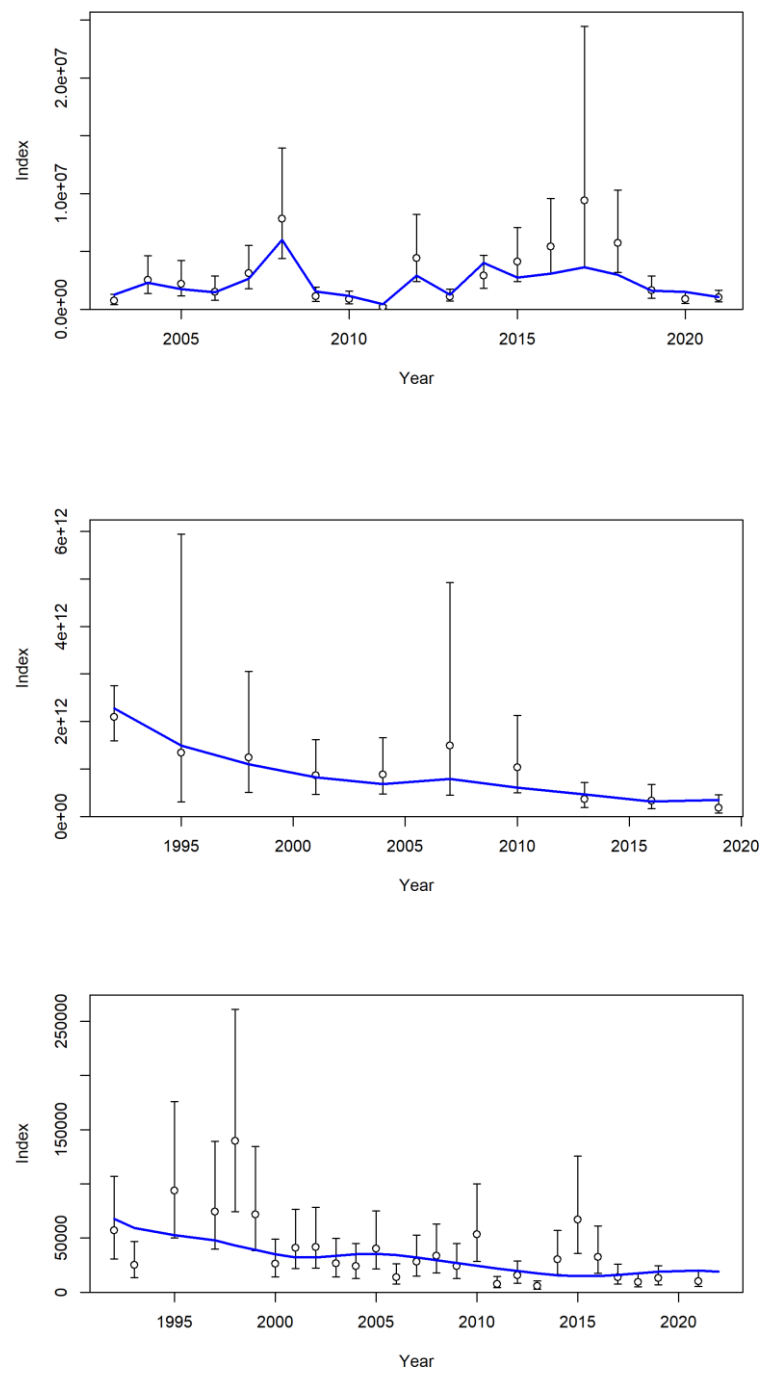


Figure 7.2.11.1: Western horse mackerel. Model fitting. Fitting of the model to the fisheries-independent indices. From top to bottom: IBTS, egg survey, PELACUS. Dots represent observations (with confidence intervals) and blue line the model.

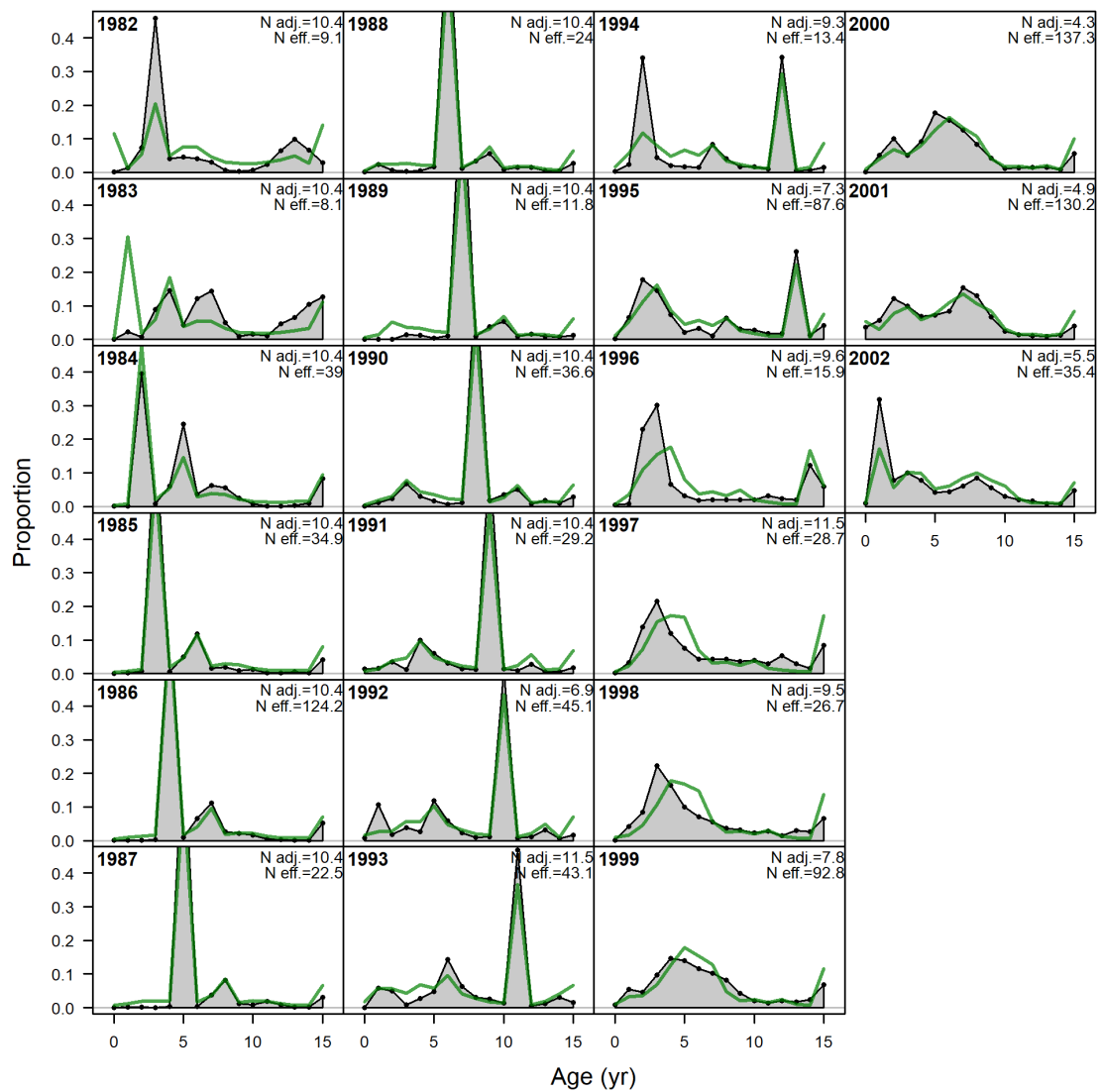


Figure 7.2.11.1 cont.: Western horse mackerel. Model fitting. Fitting of the model to the catch at age matrix from 1982 to 2002. Black joined dots represent observations and green line represents model.

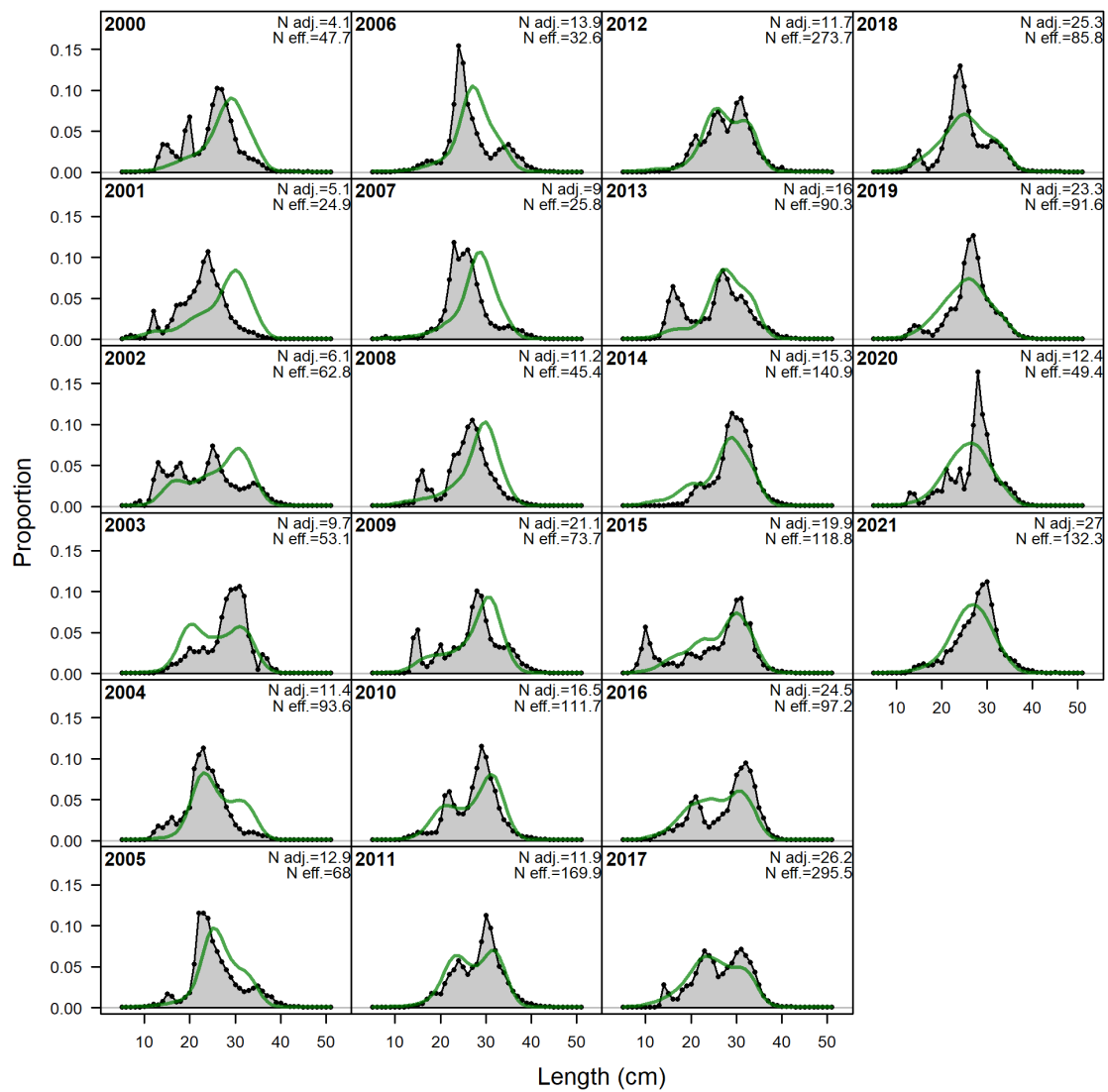


Figure 7.2.11.1 cont.: Western horse mackerel. Model fitting. Fitting of the model to the length composition of the landing data from 2000 to 2021.

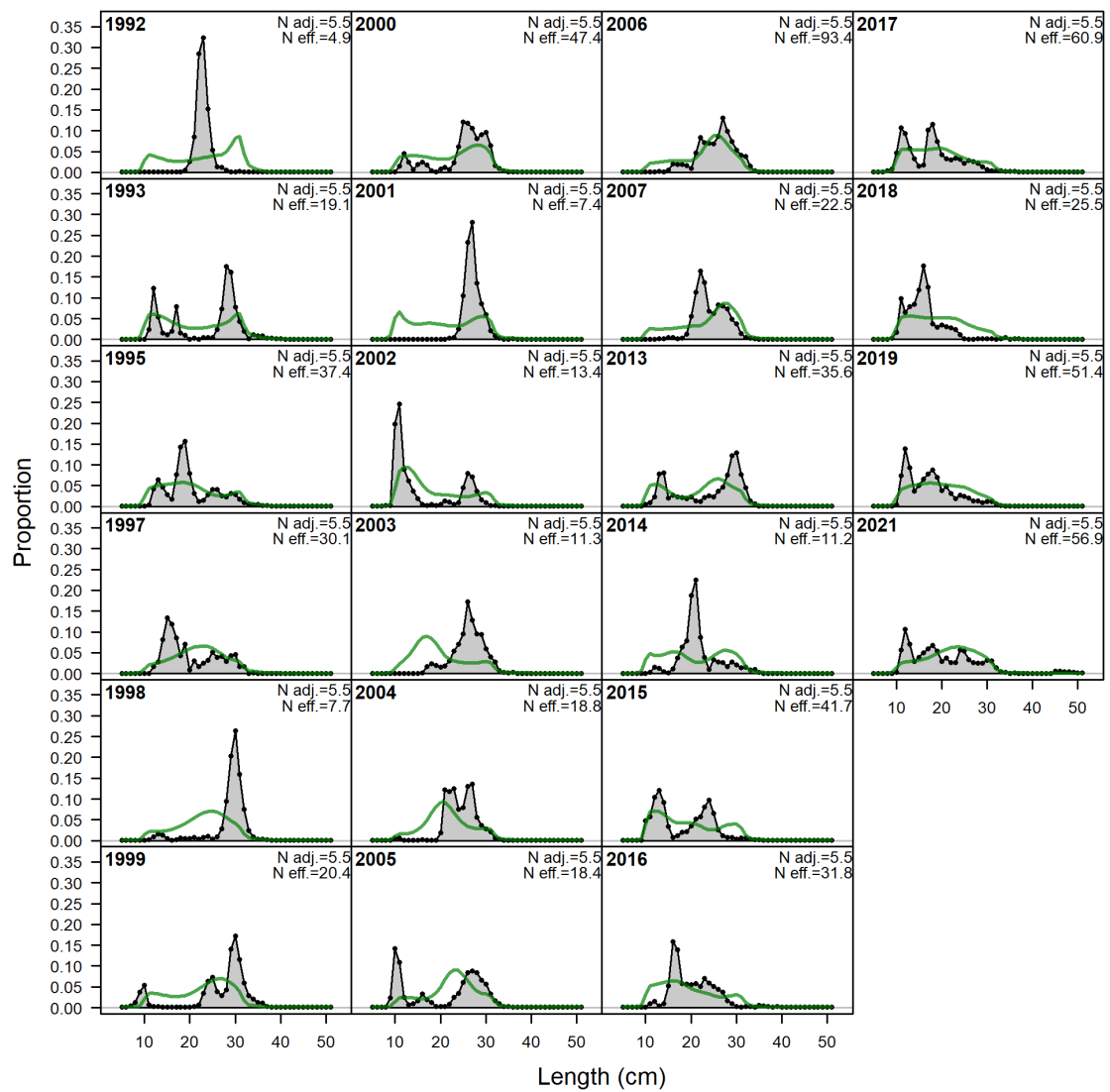
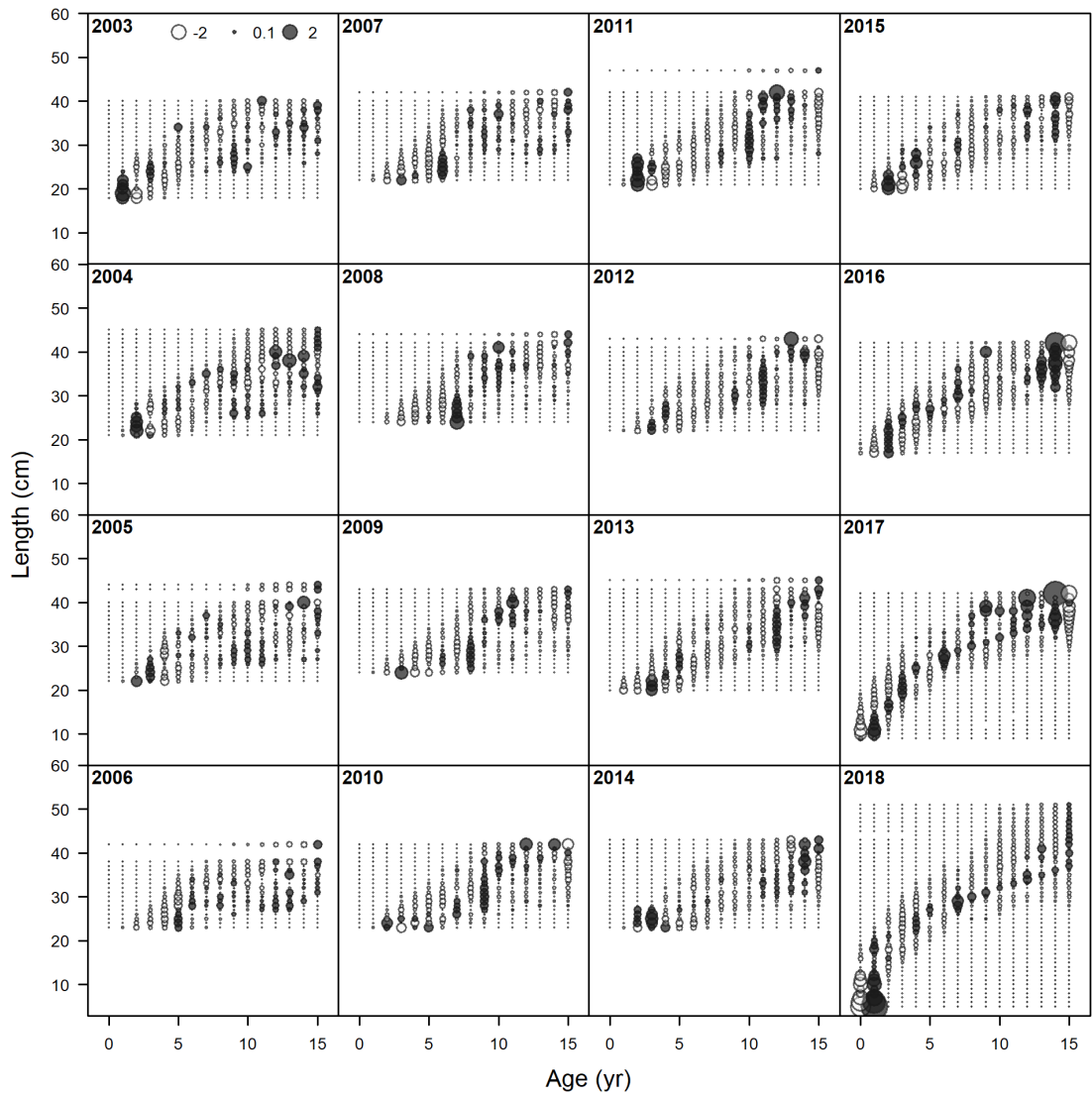


Figure 7.2.11.1 cont.: Western horse mackerel. Model fitting. Fitting of the model to the length composition of the acoustic survey.





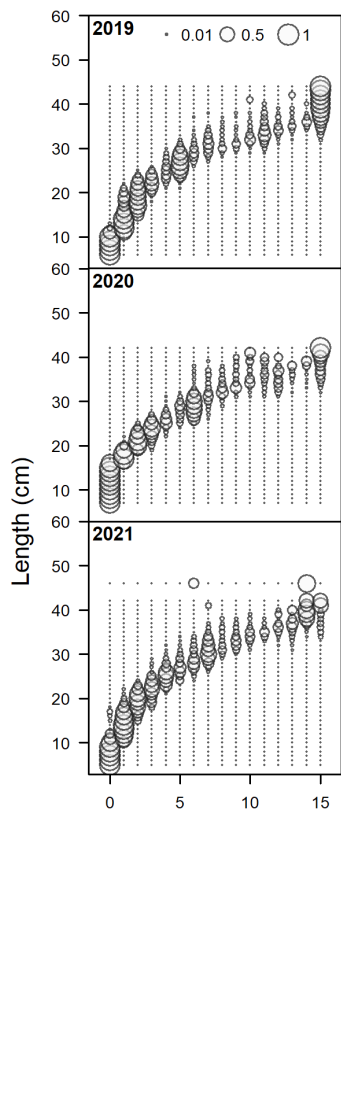


Figure 7.2.11.1 cont.: Western horse mackerel. Model fitting. Fitting of the model to the Age length comp of the catch.

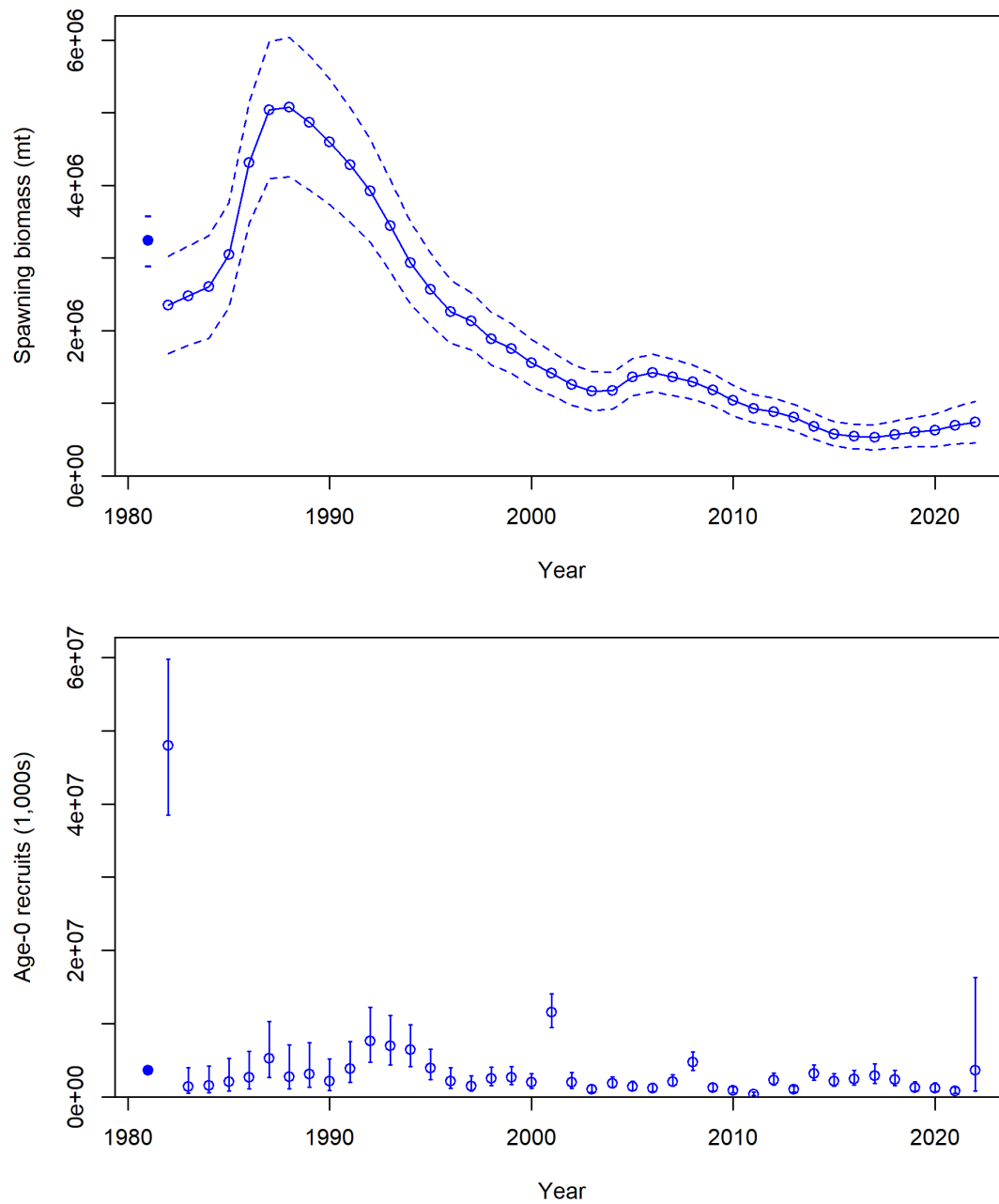


Figure 7.2.11.2: Western horse mackerel. Model results. Spawning stock biomass (0.5 of the overall SSB only is shown; plot on the top) and recruitment estimates (plot on the bottom) from the assessment model from 1982 to 2022. 95% CI are shown. Note this figure is a standard SS output. Whilst the y-axis denotes spawning biomass in mt, the axis values reflect the actual (data) values. Therefore, the axis values should be between 0 and 6 to correspond to the axis title.

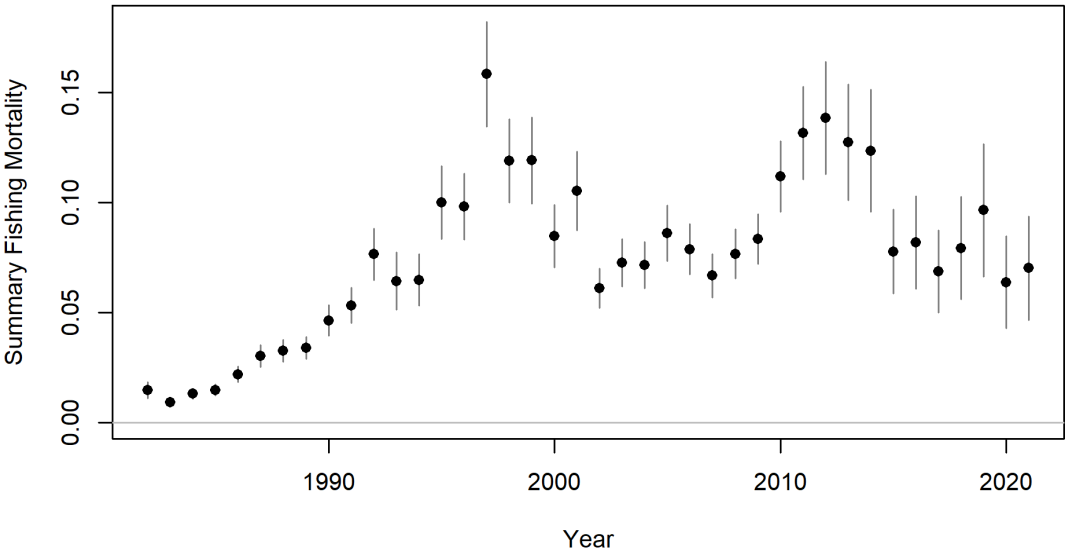


Figure 7.2.11.2 cont.: Western horse mackerel. Model results. Fishing mortality estimates (Fbar ages 1-10) from the assessment model from 1982 to 2021. 95% CI are shown.

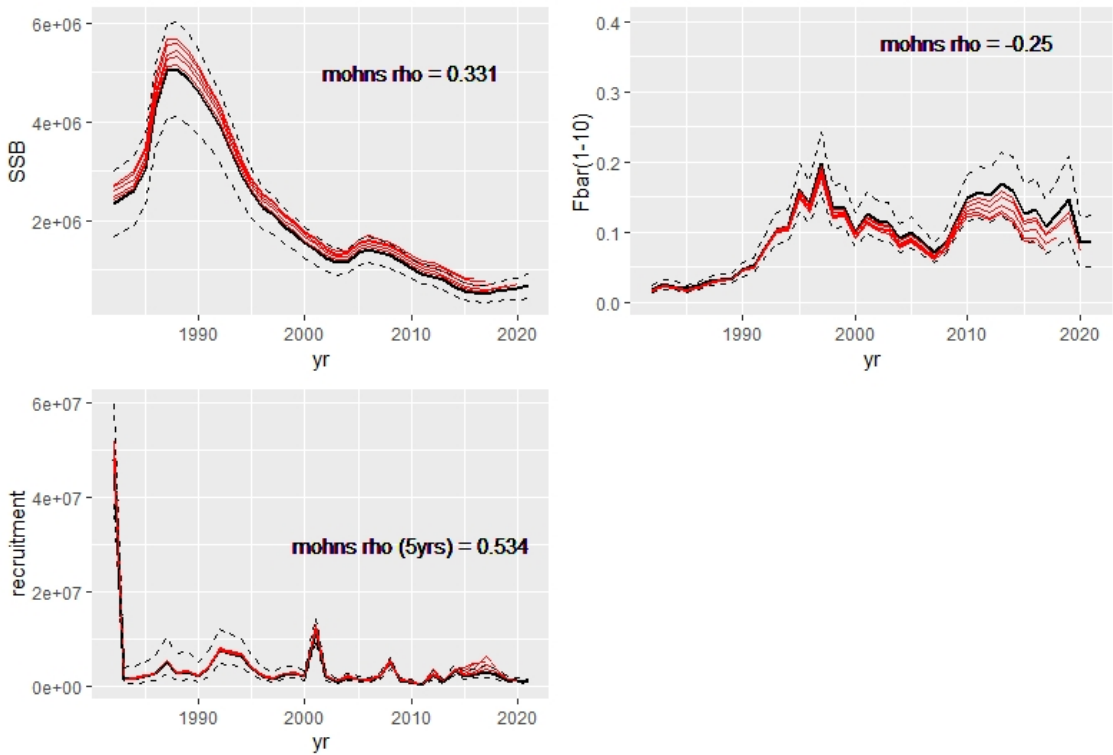


Figure 7.2.11.3: Western horse mackerel. 5 years of retrospective analysis for SSB, F and Recruitment. Dash lines are the 2022 assessment confidence intervals.



Figure 7.2.11.4: Western horse mackerel. Historical model assessment results. Note: since the 2017 assessment, SSB is estimated on 1st of January. Prior to 2017 SSB has been estimated in May (spawning time).

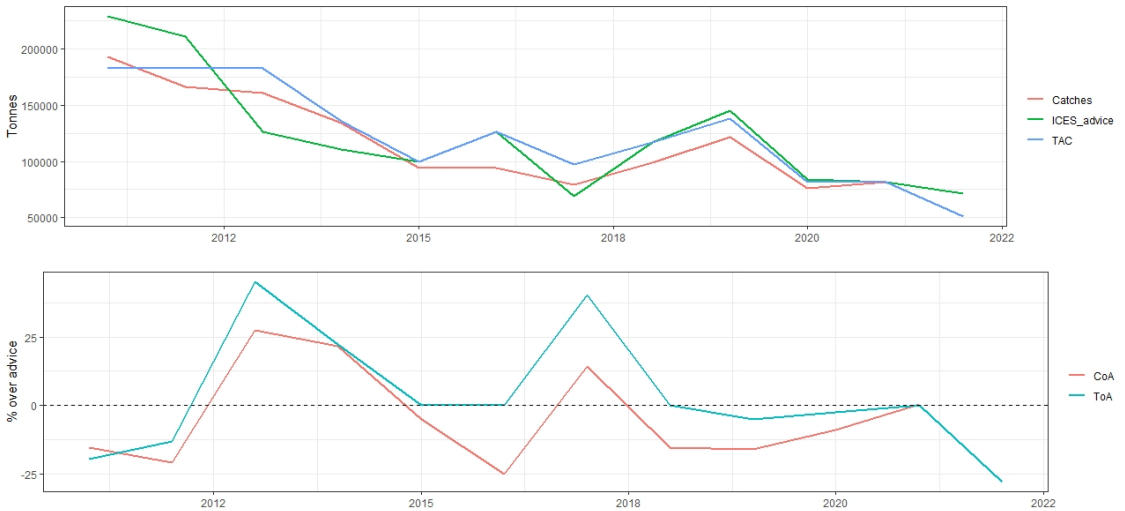
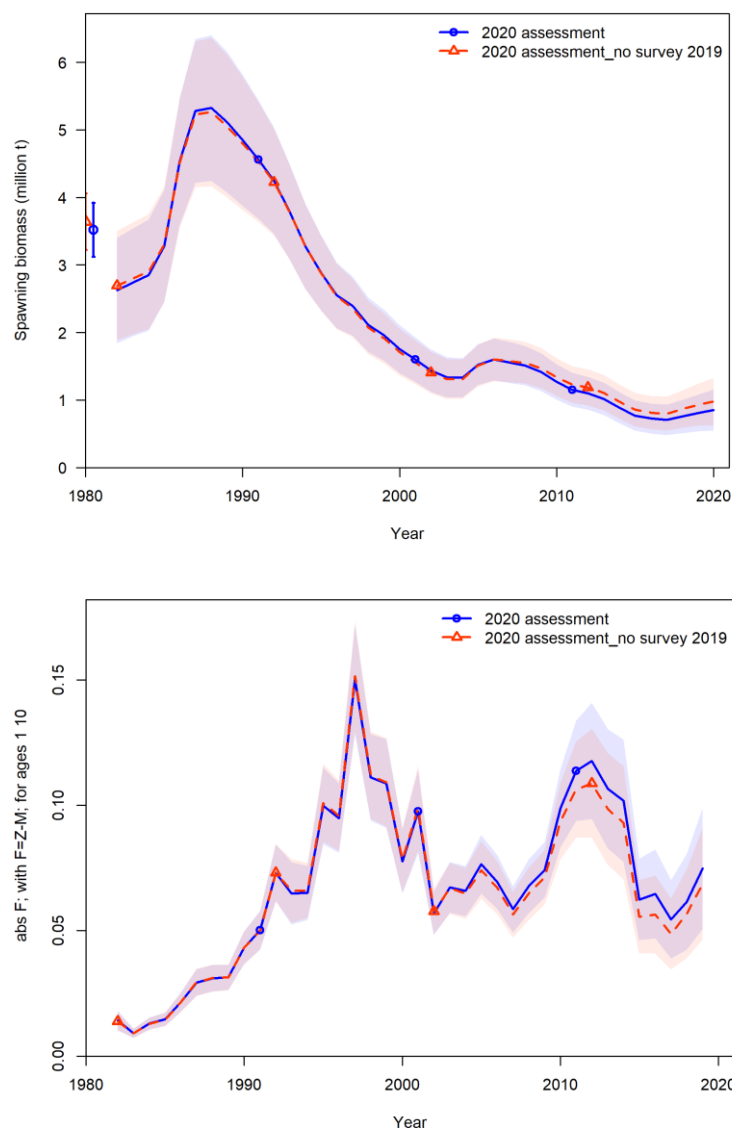


Figure 7.10.1. Western horse mackerel. Top: comparison of (max) scientific advice, TAC (or sum of unilateral quota) and Total Catch. Bottom: percentage deviation from ICES advice, CoA is Catch over Advice, ToA is TAC over Advice.



**Figure 7.13.1.** Sensitivity of the model to the PELACUS data. Spawning biomass and fishing mortality (ages 1-10) as estimated in the model conducted in 2020 (in blue) and in a model with the same setup but excluding the PELACUS data for 2019 (in red).