7 Horse mackerel (*Trachurus trachurus*) in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c,e–k (the Northeast Atlantic)

7.1 TAC and ICES advice applicable to 2020 and 2021

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

For 2020 the TAC was the following (EU 2020/123):

Areas	TAC 2020	Stocks fished in this area
2.a, 4.a, 5.b, 6, 7.a-c, 7.e-k, 8.abde, 12, 14	70 617 t	Western stock and North Sea stock in 4.a 1–2 quarters
4.b,c, 7.d	13 763 t	North Sea stocks
Division 8.c	11 179 t	Western 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 and 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

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 2020, ICES advised on the basis of MSY approach that Western horse mackerel catches in 2021 should be no more than 81 376 tonnes. The Western horse mackerel TAC for 2021 is 81 375 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 2020

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–5.1.1.d. The total catch allocated to Western horse mackerel in 2020 was 76 422 tonnes which is 48 525 tonnes less than in 2019 and 4954 t less than ICES advice. The catches of horse mackerel by country and area are shown in Tables 7.1.1.1–7.1.1.5 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 2020, most countries have submitted discard information. Countries that reported discard estimates for horse mackerel were Denmark, France, Ireland, Spain, UK (England and Wales) and UK (Scotland). 2020 discard estimates for Germany, the Netherlands and Norway are considered to be equal to zero. Total discards for Western horse mackerel were 2741 tonnes, equal to 3.6 % in weight of the total catches, a decrease compared with 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 spawns in the Bay of Biscay, and in UK and Irish waters. After spawning, parts of the stock migrate northwards into the Norwegian Sea and the North Sea, where they are fished in the third and fourth quarter (for Area 4.a, only catches taken in quarters 3 and 4 are considered to be from the Western stock). The 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. The geographical catch distribution is described in Section 5.3 (and Figure 7.1.3.1). The Western stock is considered a management unit and advised accordingly. The stock is regulated by TAC, which is set in accordance with the distribution of the stock, although catches in Division 3.a are taken outside the TAC.

7.2 Scientific data

7.2.1 Egg survey estimates

The most recent mackerel and horse mackerel egg survey was carried out in 2019 and a presentation with the final results were given during the WGWIDE meeting by the survey coordinator in 2020 (O'Hea et al. 2019).

The time-series of egg production estimates for western horse mackerel is presented in Table 7.2.1.1 and Figure 7.2.1.1. Total Annual Egg Production (TAEP) estimated in 2019 was the lowest production in the historic time-series. Concern has been expressed as to whether the MEGS surveys are capturing the horse mackerel spawning sufficiently. WGMEGS has been considering if horse mackerel spawning had shifted to even later in the yea or if the reduction in egg numbers has been in response to the poor status of the stock resulting in a patchier distribution of eggs (ICES, 2021a).

The ICES Working Group on Mackerel and Horse Mackerel Egg Surveys (WGMEGS; ICES, 2021a) met in April 2021 to plan the 2022 Mackerel and Horse Mackerel Egg Survey for the

Western horse mackerel stock. The provisional survey plan of the 2022 mackerel and horse mackerel egg survey, as agreed during last the WGMEGS meeting (ICES, 2021a), is presented in Table 8.6.1.1.1.

Fecundity parameters

Horse mackerel sampling will again be directed at the DEPM method and will be conducted in survey Periods 6 and 7, June and July. Sampling will be carried out as described in the survey protocols (ICES, 2019), but it should emphasize the need to collect enough samples for fecundity analyses.

With the current low stock size of Western horse mackerel, it is increasingly difficult to catch adult horse mackerel and WGMEGS therefore has put out specific requests to other survey groups asking them to collect adult horse mackerel samples from their surveys during May and June 2022 (ICES, 2021a).

7.2.2   Other surveys for Western horse mackerel

Bottom-trawl surveys

A bottom-trawl survey index for recruitment was available for 2020.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 2020. 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 2017b). The updated values are shown in Figure 7.2.2.1 (middle panel) and the indices estimated in 2018–2021 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 issue 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 is close to the lowest values of the time-series.

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 cover 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. The estimate for 2021 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 2021).

The biomass estimated by the PELACUS survey was high in the 90s, reaching the maximum value in 1998 (139 395 t). Biomass values are lower in the 21st 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 2020, the Netherlands (4.a, 6.a, 7.befgj), Ireland (6.a, 7.bgj, 8.a), Norway (4.a), Spain (8.bc) and UK (England; 6.a, 7.bj) provided catch in numbers-at-age (Figure 7.2.4.1). The catch sampled for

age readings in 2020 covered 51% of the total reported catch. This reduction (from 69% in 2018 and 2019) is primarily 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. Catch in number-at-length were available from the Netherlands (4.a, 6.a, 7.befgj), Ireland (6.a, 7.bgj, 8.a), Spain (6.a, 7.bcghj, 8.bc) and UK (England; 6.a, 7.bgj) as well as from France (8.a) and Scotland (6.a).

The total annual and quarterly catches in number for western horse mackerel in 2020 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 2020.

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 202 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 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 1.5.4 of this report.

The Pelagic Freezer-trawler Association (PFA) provided an annual report on the self-sampling programme that started in 2015. Currently, all members (17 vessels in 2020) 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 2017–2021 (up to 27/07/2021) covered 243 fishing trips with 3446 hauls, a total catch of 141 548 tonnes and 153 307 individual length measurements. The main sampled areas were ICES divisions 6.a, 7.b and 7.d. The data analysis shows that horse mackerel has a wide range in the length distributions in the catch. Median lengths in divisions 6.a, 7.b and 7.j have fluctuated between 26.2 and 31.3 cm (with one low median length of 23.3 cm in 27.6.a in 2018). In ICES divisions 27.7.d and 27.7.h, median lengths in the catch are smaller and fluctuated between 21.3 and 24.6 cm.

There is also an industry-science collaboration aimed at improving the knowledge of gonad development of mackerel and horse mackerel. Samples were taken by the fishing industry (PFA vessels) on both targeted and bycatches 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. Unfortunately, the final report on the analyses was not yet available for WGWIDE 2021 although it is expected to be ready soon.

Additionally, genetic samples have been also collected from 7.d and 7.e by the PFA on board of commercial vessels in autumn 2020, as well as from 4.a during the NS-IBTS in Q3. The goal of this study is to identify the stock identity in mixed areas, but the analyses have not been carried out yet (see section 1.12.4).

7.2.10 Data exploration

The length frequency distributions of the landings for the entire fleet included in the model are shown in Figures 7.2.10.1–7.2.10.2. The length distributions available for 2015–2020 show a considerable amount of very small fish, mostly from Spanish catches. The main mode of the distribution continuously increased since 2004 to 2017. It has decreased in recent years, 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 2020 assessment, with the inclusion of the 2020 estimates for the IBTS recruitment index, the 2020 length frequency distribution of the landings, and the 2020 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). As in last year 's assessment, the length and age distributions were tuned using the Francis reweighting approach instead of using the McAllister and Ianelli approach, which did not perform well here in 2020.

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. Recruitment estimates were unchanged from 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 suboptimal and it does not capture the small fish observed in recent years.

The 2021 assessment shows strong retrospective patterns, with a few peels falling outside the confidence intervals of SSB and recruitment 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 on the limit of the tolerance threshold with 0.24 for SSB and -0.189 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 2020 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 (594 977 t), increasing slightly in recent years. In 2021, SSB is estimated to be just above 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 1983–2020. Recruitment in 2019 and 2020 was low again.

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 2020 (0.071) was the lowest value in the time-series since 2007 and it was just below F_{MSY} (0.074).

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 2020 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 WG had access to the landings from January-July 2021 for some of the main fleets participating in the fishery (the Netherlands, Ireland, UK, France, and Germany). Based on the high catch uptake from these fleets for the first half of the year (around 65%, whereas in 2018–2020 they only caught around 40% of their TAC for that time of the year), the expected landings for the intermediate year were set at 100% of the TAC (81 375 t). 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 are 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 are 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 realized fecundity with a constant number of eggs/kg independently of the individual weight. However, Western horse mackerel is is 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 summarized 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 ~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 2022 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. The HCR analyses

represented two different assessment methods (SS3 and SAM) and two different HCR evaluation tools (*EqSim* and SAM HCR). Both HCR evaluation tools are of the 'short-cut' type with appropriate conditioning of the uncertainties in the assessment based on historical CV and autocorrelation in line with the recommendations from ICES workshops WKMSYREF3 and WKMSYREF4. The evaluations followed the guidelines from WKGMSE2 (ICES, 2019b) and WKREBUILD (ICES, 2020). Overall, the results of the different HCR tools and the different assessment inputs gave comparable results, although there were some differences in the absolute levels. Given that the *EqSim* with SS3 evaluation is closest to the ICES advisory practice, this was used as the basis for the suggested rebuilding plan by the PELAC. The proposed rebuilding plan and the scientific evaluation that underpins it have been reviewed by ICES (2021c). This rebuilding plan has not been currently approved by the European Commission and the UK.

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, although a higher amount of age 1–2 year old fish have been observed in the catches in the past 4–5 years.

Following the MSY approach, the advice for 2022 is catches in 2022 should be no more than 71 138 tonnes. This catch advice is 12.6% lower than in 2021 due to both the assumptions for the forecast (higher catches assumed for the interim year, which leads to lower biomass for the short-term forecast) and a downward revision in the perception of the stock biomass from the assessment.

A TAC has only been agreed for parts of the distribution and fishing areas (EU and UK waters). The Working Group advises that the TAC should apply to all areas and fleets catching Western horse mackerel. Note that Subarea 8.c is included in the ICES advice for Western horse mackerel.

7.9   Ecosystem considerations

Knowledge of 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 similar changing trend in the distribution of Western horse mackerel as for NEA 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 HOMSIR 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 1.12.4 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 is 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 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 last year 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	-[2]	-[2]
Germany Fed.Rep	-	+	-	-	-	-	-	-
Norway	-	-	-	412	22	78	214	3272
USSR	-	-	-	-	-	-	-	-

Total	-	+	-	412	23	79	214	3311

	1988	1989	1990	1991	1992	1993	1994	1995
Faroe Islands	-	-	9643	1115	9157[3]	1068	-	950
Denmark	-	-	-	-	-	-	-	200
France	-[2]	-	-	-	-	-	55	-
Germany Fed. Rep.	64	12	+	-	-	-	-	-
Norway	6285	4770	9135	3200	4300	2100	4	11 300
USSR / Russia (1992 -)	469	27	1298	172	-	-	700	1633
UK (England + Wales)	-	-	17		-	-	-	-
Total	6818	4809	11 414	4487	13 457	3168	759	14 083

	1996	1997	1998	1999	2000	2001	2002	2003
Faroe Islands	1598	799[3]	188[3]	132[3]	-	-	-	
Denmark	-	-	1755[3]	-	-	-	-	
France	-	-	-	-	-	-	-	
Germany	-	-	-	-	-	-	-	
Norway	887	1170	234	2304	841	44	1321	22
Russia	881	554	345	121	78	16	3	2
UK (England + Wales)	-	-	-	-	-	-	-	-
Estonia	-	78	22	-	-	-	-	-
Total	3366	2601	2544	2557	919	60	1324	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	1847	1364	298

Russia	-	-	-	-		-		-	-	-
UK (England + Wales)	-	-	-	-		-		-	-	-
Estonia	-	-	-	-		-		-	-	-
Total	42	176	27	0		572		1847	1586	-

	2012	2013	2014	2015	2016	2017	2018	2019	2020[1]
Faroe Islands	-	-	-	-	-	-	-	-	-
Denmark	-	-	-	-	-	-	-	-	-
France	+	-	-	-	-	-	-	-	-
Germany	-	-	-	-	-	-	-	-	-
Ireland	-	-	-	-	-	-	-	-	-
Netherlands	-	-	107	-	-	-	-	-	-
Norway	66	30	302	10	45	5	718	867	290
Russia	-	-		-	-	-	-	-	-
UK (England + Wales)	-	-		-	-	-	-	-	-
Estonia	-	-		-	-	-	-	-	-
Total	66	30	409	10	45	5	718	867	290

[1]Preliminary
[2]Included in 4.
[3]Includes catches in Div. 5.b.
[4]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	3576	1612	1590	23 730	22 495	18 652	7290	20 323
Faroe Is-lands	260	-	-	-	-	-	-	-	-
France	292	421	567	366	827	298	2312	1891	7841
Germany Fed.Rep.	+	139	30	52	+	+	-	3	153
Ireland	1161	412	-	-	-	-	-	-	-
Netherlands	101	355	559	20292	824	1602	6002	8503	10 603
Norway2	119	2292	7	322	2	203	776	11 7283	344 253
	-	-	-	2	94	-	-	-	-
Poland	-	-	-	-	-	-	2	-	-
Sweden	11	15	6	4	-	71	3	339	373
	-	-	-	-	3	998	531	487	5749

UK (Engl. + Wales)	-	-	-	-	489	-	-	-	-
UK (Scotland)									
USSR									
Total	**2151**	**7253**	**2788**	**4420**	**25987**	**24238**	**20808**	**20895**	**62877**

Country	1989	1990	1991	1992	1993	1994	1995	1996	1997
Belgium	10	13	-	+	74	57	51	28	-
Denmark	23329	20605	6982	7755	6120	3921	2432	1433	976
Estonia	-	-	-	293	-	-	17	-	-
Faroe Islands	-	942	340	-	360	275	-	-	296
France	248	220	174	162	302	-	-	-	-
Germany Fed.Rep.	506	2469[4]	5995	2801	1570	1014	1600	7	37
Ireland	-	687	2657	2600	4086	415	220	1100	8152
Netherlands	14172	1970	3852	3000	2470	1329	5285	6205	52
Norway	84161	117903	50000	96000	126800	94000	84747	14639	43888
Poland	-	-	-	-	-	-	-	-	-
Sweden	-	102	953	800	697	2087	-	95	1761
UK (Engl. + Wales)	10	10	132	4	115	389	478	40	10
UK (N. Ireland)	-	-	350	-	-	-	-	-	-
UK (Scotland)	2093	458	7309	996	1059	7582	3650	2442	10511
USSR / Russia (1992 -)	-	-	-	-	-	-	-	-	-
Unallocated+discards	12482[3]	-317[3]	-750[3]	-278[5]	-3270	1511	-28	136	-31615[6]
Total	**112047**	**145062**	**77904**	**114133**	**140383**	**112580**	**98452**	**26125**	**34068**

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006
Belgium	19	21	-	-	-	-	-	-	-
Denmark	2048	2026	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	4620	4072	0	0	4	534	0	44	1
Ireland	-	404	32	332	11	93	378	-	-
Lithuania	-	-	-	-	-	-	-	-	-
Netherlands	4548	3285	10	1	0	36	0	0	0
Norway	13129	44344	1141	7912	34843	20349	10687	24733	27087
Russia	-	-	2	-	-	-	-	-	-
Sweden	1761	1957	1009	68	561	1002	567	216	0
UK (Engl. + Wales)	1	12	-	-	-	-	0	-	-
UK (Scotland)	3041	1658	3054	3161	252	0	0	22	61
Unallocated+discards	737	-325	10	0	0	-36	0	0	0
Total	30311	58422	5338	11572	36395	23079	11756	25267	27210

[1] **Includes Division 2.a.** [2] **Estimated from biological sampling.** [3] **Assumed to be misreported.** [4] **Includes 13 t from the German Democratic Republic.** [5] **Includes a negative unallocated catch of -4000 t.** [6] **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*
Denmark	37	7	21	289	183	22
Faroe Islands	0	0	67	0	6	-
France	12	4	1	2	98	0
Germany Fed.Rep.	6	28	1	1	5	0.5
Ireland	8	-	-	-	-	-
Netherlands	-	0	14	7	72	1
Lithuania	12	130	-	-	-	0
Norway	8887	8765	9880	8601	8154	10376
Sweden	10	0	41	23	323	83
UK (Engl. + Wales)	134	13	4	0	-	0
UK (Scotland)	36	14	-	-	50	-
Unallocated +discards	32	97	87	162**	339	1239
Total	9175	9057	10117	9085	9144	11700

[1]**Preliminary   ** 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	2785	7	-	-	-	769	1655
Faroe Islands	-	-	1248	-	-	4014	1992	4450[2]	4000[2]
France	45	454	4	10	14	13	12	20	10
Germany Fed. Rep.	5550	10212	2113	4146	130	191	354	174	615
Ireland	-	-	-	15086	13858	27102	28125	29743	27872
Netherlands	2385	100	50	94	17500	18450	3450	5750	3340
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	1427	138	1027	7834
USSR.	-	-	-	-	-	-	-	-	-
Unallocated + disc						-19168	-13897	-7255	-
Total	8724	11134	6283	19381	31716	33025	20455	35157	45842

Country	1989	1990	1991	1992	1993	1994	1995	1996	1997
Denmark	973	615	-	42	-	294	106	114	780
Faroe Islands	3059	628	255	-	820	80	-	-	-
France	2	17	4	3	+	-	-	-	53
Germany Fed. Rep.	1162	2474	2500	6281	10023	1430	1368	943	229
Ireland	19493	15911	24766	32994	44802	65564	120124	87872	22474
Netherlands	1907	660	3369	2150	590	341	2326	572	1335
Norway	-	-	-	-	-	-	-	-	-
Spain	-[1]	-[1]	1	3	-	-	-	-	-
UK (Engl. + Wales)	44	145	1229	577	144	109	208	612	56
UK (N.Ireland)	-	-	1970	273	-	-	-	-	767
UK (Scotland)	1737	267	1640	86	4523	1760	789	2669	14452
USSR/Russia (1992-)	-	44	-	-	-	-	-	-	-
Unallocated + disc.	6493	143	-1278	-1940	-6960[3]	-51	-41326	-11523	837

Country	1989	1990	1991	1992	1993	1994	1995	1996	1997
Total	34870	20904	34456	40469	53942	69527	83595	81259	40983

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

[1]Included in Subarea 7. [2]Includes Divisions 3.a 4.a b and 6.b. [3]Includes a negative unallocated catch of -7000 t.

Country	2007	2008	2009	2010	2011	2012	2013	2014	2015
Denmark					58	1131	433	856	3045
Faroe Islands		573		66					
France		73			246			195	65
Germany	1835	5097	635	773	6508	671	8616	4194	1980
Ireland	20010	18751	16596	19985	23556	29282	19979	15745	10894
Lithuania	80	641							
Netherlands	2177	3904	2332	1684	6353	12653	11078	8580	6211
Norway	2	20	27	18	48	2			
Spain	0								
UK (Engl. + Wales)	332			463			451	18	58
UK (N.Ireland)				59	198		2325	1579	1204
UK (Scotland)	38	588	243	89	2528	1231	385	1277	696
Unallocated+disc.	0	0	0	0	230	2	-	123	
Total	24474	29648	19833	23136	39726	44973	43266	32567	24153

Country	2016	2017	2018	2019	2020[1]
Denmark		3462	4982	6467	2267
Faroe Islands		113		20	
France	23	1025	197	550	3
Germany	4069	2884	2779	1418	0
Ireland	15381	15123	17959	21109	9187
Lithuania	2510				
Netherlands	9246	5497	11921	14421	5202
Norway					
Spain					
UK (Engl. + Wales)		66	32	830	817
UK (N.Ireland)	0		1026	1907	1229
UK (Scotland)	956			627	331**

Country	2016	2017	2018	2019	2020[1]
Unallocated+disc.		116	55	129	108
Total	32186	28286	38950	47480	19146

[1]Preliminary. ** 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	5045	3099	877	993	732	1477	30408	27368	33202
France	1983	2800	2314	1834	2387	1881	3801	2197	1523
Germany Fed.Rep.	2289	1079	12	1977	228	-	5	374	4705
Ireland	-	16	-	-	65	100	703	15	481
Netherlands	23002	25000	27500	34350	38700	33550	40750	69400	43560
Norway	394	-	-	-	-	-	-	-	-
Spain	50	234	104	142	560	275	137	148	150
UK (Engl. + Wales)	12933	2520	2670	1230	279	1630	1824	1228	3759
UK (Scotland)	1	-	-	-	1	1	+	2	2873
USSR	-	-	-	-	-	120	-	-	-
Total	45697	34749	33478	40526	42952	39034	77628	100734	90253

Country	1989	1990	1991	1992	1993	1994	1995	1996	1997
Faroe Islands	-	28	-	-	-	-	-	-	-
Belgium	-	+	-	-	-	1	-	-	18
Denmark	34474	30594	28888	18984	16978	41605	28300	43330	60412
France	4576	2538	1230	1198	1001	-	-	-	30571
Germany Fed.Rep.	7743	8109	12919	12951	15684	14828	17436	15949	28267
Ireland	12645	17887	19074	15568	16363	15281	58011	38455	43624
Netherlands	43582	111900	104107	109197	157110	92903	116126	114692	131701
Norway	-	-	-	-	-	-	-	-	-
Spain	14	16	113	106	54	29	25	33	6
UK (Engl. + Wales)	4488	13371	6436	7870	6090	12418	31641	28605	17464

Country	1989	1990	1991	1992	1993	1994	1995	1996	1997
UK (N.Ireland)	-	-	2026	1690	587	119	-	-	1093
UK (Scotland)	+	139	1992	5008	3123	9015	10522	11241	7902
Unallocated + discards	28368	7614	24541	15563	4010	14057	68644	26795	58718
Total	135890	192196	201326	188135	221000	200256	330705	279100	379776

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006
Faroe Islands	-	-		550	-	-	3750	3660	
Belgium	-	-	-	-		-			
Denmark	25492	19166	13794	20574	10094	10499	11619	9939	6838
France	22095	25007	20401	9401	5220	5010	5726	7108	6680
Germany	24012	13392	9045	7583	10212	13319	16259	9582	6511
Ireland	48860	25816	32869	29897	23366	13533	8469	20405	16841
Lithuania	-	-							3606
Netherlands	95753	63091	44806	37733	32123	38808	32130	26424	29165
Spain	-	58	50	7	11	1	27	12	3
UK (Engl. + Wales)	11925	7249	4391	5913	4393	3411	4097	2670	2754
UK (N.Ireland)	27	-	546	868	475	384	209		21
UK (Scotland)	5095	4994	5142	1757	1461	268	1146	59	365
Unallocated+discards	12706	31239	-9515	2888	434	17146	16553	11875	4679
Total	245965	190012	121530	117170	87788	102379	99985	91733	77463

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[1]		
Denmark	314	1057	1031	690	3198		
France	551	595	1067	907	1486		
Germany	7313	4077	1401	7673	952		
Ireland	12193	7857	7169	7753	7870		
Lithuania	86						
Netherlands	14415	8445	14009	15159	9036		
Poland				127	1000		
Spain	0		0	1	6		
UK (Engl. + Wales)	820	478	2410	2862	679**		
UK (Scotland)					3		
UK (Northern Ireland)				52	0	2	
Unallocated+discards	1692	830	548	918	311		
Total	37384	23340	27687	36062	24544		

[1]Preliminary. [2]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	3283	2793
France	3361	3711	3.073	2643	2489	4305	3534	3983	4502
Netherlands	-	-	-	-	_2	_2	_2	_2	-
Spain	34134	36362	19610	25580	23119	23292	40334	30098	26629
UK (Engl.+Wales)	-	+	1	-	1	143	392	339	253
USSR	-	-	-	-	20	-	656	-	-
Total	37495	40073	22684	28223	25629	27740	45362	37703	34177

Country	1989	1990	1991	1992	1993	1994	1995	1996	1997
Denmark	6729	5726	1349	5778	1955	-	340	140	729
France	4719	5082	6164	6220	4010	28	-	7	8564
Germany Fed. Rep.	-	-	80	62	-		-	-	-
Netherlands	-	6000	12437	9339	19000	7272	-	14187	-
Spain	27170	25182	23733	27688	27921	25409	28349	29428	31082
UK (Engl.+Wales)	68	6	70	88	123	753	20	924	430
Unallocated+discards	-	1500	2563	5011	700	2038	-	3583	-2944
Total	38686	43496	46396	54186	53709	35500	28709	48269	37861

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006
Denmark	1728	4769	2584	582					1513
France	1844	74	7	5316	13676	4908	2161	3540	3944
Germany	3268	3197	3760	3645	2293	504	72	4776	3326
Ireland	-	-	6485	1483	704	1314	1882	1808	158
Lithuania	-	-							401
Netherlands	8123	13821	11769	35106	12538	6620	1047	6372	6073
Spain	23599	24461	24154	23531	24752	24598	16245	16624	13874
UK (Engl. + Wales)	9	28	121	1092	1578	982	516	838	821
UK (Scotland)	-	-	249						
Unallocated+discards	1884	-8658	5093	4365	1705	2785	2202	7302	4013

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total	40455	37692	54222	75120	57246	41711	24125	41260	34122

Country	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Denmark	2687	3289	3109	632	200	581	14			
France	10741	2848			326	1218	2849	2277	1618	2219
Germany		918	281	64	61		417	19	49	4
Ireland	694					39			0	32
Netherlands	211	6269	1848	98	49	7	1057	526	635	1
Spain	14265	19840	21071	38742	34581	13502	22542	19443	13072	14235
UK (Engl. + Wales)		120	224	112	28		104	35	72	9
Unallocated+dis-cards		67	913	7412	417	431	2055	182	9314	6643
Total	28598	33352	27447	47060	35662	15777	29039	22483	24760	23143

Country	2017	2018	2019	2020[1]		
Denmark	1		422			
France	2303	2176	2914	728		
Germany	210	554	144	2		
Ireland	580	219	36	332		
Netherlands	313	6	3	0.5		
Spain	14901	20362	25775	19163		
UK (Engl. + Wales)		2	344			
Unallocated+discards	2907	1921	1755	1104		
Total	21213	25240	31396	20742		

[1]Preliminary. [2]Included in Subarea 7. [3]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^{12} eggs).

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

Table 7.2.2.1. Western horse mackerel. Time series of recruitment index estimated from the IBTS Surveys (2003–2020) in 2019–2021.

Year	Index 2021		Index 2020	Index 2019
	Mean	CV		
2003	732297	0.30	724708	684217
2004	2453310	0.31	2439512	2295299
2005	2151351	0.33	2148828	2027050
2006	1499811	0.33	1482969	1397314
2007	3121579	0.29	3088715	2886675
2008	7481365	0.30	7272792	6888222
2009	1148964	0.27	1135301	1061126
2010	864772	0.30	860652	808159
2011	178188	0.35	180361	169028
2012	4339882	0.31	4356450	4102691
2013	1111210	0.24	1092849	1034260
2014	2931963	0.24	2922237	2688011
2015	4060794	0.27	4030569	3789317
2016	5280009	0.29	5216531	4913923
2017	9460399	0.47	9450737	8855563

Year	Index 2021		Index 2020	Index 2019
	Mean	CV		
2018	5657414	0.29	4000271	3750158
2019	1637102	0.29	1636554	
2020	878485	0.27		

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
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

Year	Biomass	CV
2017	13845	0.32
2018	9270	0.32
2019	13075	0.32
2020	NA	NA
2021	10233	0.32

Table 7.2.4.1. Western Horse Mackerel stock. Catch in numbers (thousands) at age by quarter and area in 2020 (15 = 15+ group)

Q1

Age	27.2.a	27.6.a	27.7.b	27.7.c	27.7.e	27.7.f	27.7.g	27.7.h	27.7.j	27.7.j.2	27.7.k	27.8.a	27.8.b	27.8.c.e	27.8.c.w	27.8.d	27.8.e	Total
0												245	21	22	101	1	0	390
1												921	2064	114	378	3	0	3482
2	5	80	1140	0	75	0	66	4	625	1258	0	398	1934	196	163	1	0	5946
3	126	7301	1579	0	133	0	866	6	858	1759	0	75	69	43	31	0	0	12846
4	57	3817	381	0	125	0	339	1	109	548	0	50	8	16	20	0	0	5472
5	85	4399	3398	0	28	0	54	3	372	2730	0	70	7	11	28	0	0	11185
6	585	40042	27346	0	128	0	120	17	2522	14430	0	118	11	14	27	0	0	85358
7	40	2510	3167	0	13	0	54	2	323	2161	0	85	9	11	26	0	0	8399
8	23	1825	1977	0	9	0	0	1	257	1484	0	188	12	14	33	0	0	5826
9	5	457	507	0	2	0	0	0	100	303		75	9	8	24	0	0	1491
10	8	584	448	0	2	0	0	0	73	380		117	5	5	19	0	0	1641
11	7	614	355	0	2	0	0	0	97	189		172	17	17	40	0	0	1511
12	38	3502	2389	0	9	0	0	2	312	1490	0	369	15	14	45	0	0	8186
13	4	355	245	0	1	0	0	0	28	73		134	16	13	46	0	0	915
14	2	161	7		0		0	0	14	42		94	9	8	26	0	0	362
15	31	2820	975	0	5	0	0	1	229	1137	0	292	14	12	49	0	0	5566
sum	1017	68467	43915	0	530	0	1499	38	5918	27983	0	3402	4221	518	1057	9	1	158576

Q2

Age	27.2.a	27.6.a	27.7.b	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										183	28	0	300	1995	2	2507
1										708	989	0	6047	7733	6	15484
2			0	0	0	0	0	0	2	266	997	0	743	2902	2	4912
3	52	1	1	3	0	0	0	0	14	35	35	0	94	386	0	622
4	29	1	6	3	0	0	0	0	13	48	21	0	136	520	0	777
5	30	1	3	14	0	2	2	2	487	74	31	0	192	814	1	1653
6	302	6	63	88	2	11	10	15	1288	52	44	0	233	573	0	2690
7	18	0	5	11	0	1	1	2	163	43	33	0	175	468	0	924
8	14	0	7	8	0	1	1	1	248	43	42	0	305	470	0	1141
9	4	0	1	2	0	0	0	0	115	21	9	0	243	228	0	624
10	4	0	0	2	0	0	0	0	9	11	3	0	70	115	0	215
11	5	0	0	2	0	0	0	0	217	49	26	0	937	530	0	1767
12	28	1	2	9	0	1	1	1	254	62	36	0	1114	679	1	2190
13	3	0	0	1	0	0	0	0	4	65	59	0	1419	715	1	2267
14	1	0	3	0	0	0	0	0	1	37	28	0	789	404	0	1264
15	23	0	7	6	0	1	1	1	446	70	106	0	1331	767	1	2758
sum	513	10	99	147	4	19	17	25	3262	1766	2487	0	14130	19299	16	41794

Table 7.2.4.1 cont. Western Horse Mackerel stock. Catch in numbers (thousands) at age by quarter and area in 2020 (15 = 15+ group)

Q3

Age	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	27.8.a	27.8.b	27.8.c	27.8.c.e	27.8.c.w	27.8.d	Total
0														519	945	2	3067	6838	0	11372
1														1265	923	3	6750	16673	0	25615
2	0	6	543	0	2	684	12	163	49	34	4	10	1399	398	195	11	2143	5364	0	11016
3	3	71	6372	3	2	884	15	210	63	44	5	13	1808	107	36	2	515	1469	0	11621
4	1	25	2215	1	0	58	1	14	4	3	0	1	120	115	24	2	892	1548	0	5024
5	3	56	5007	2	0	107	2	25	8	5	1	2	219	173	39	2	1436	2337	0	9423
6	11	237	21252	10	1	602	10	143	43	30	3	9	1232	120	35	0	809	1643	0	26192
7	1	19	1710	1	0	62	1	15	4	3	0	1	128	112	27	0	681	1551	0	4317
8	0	6	560	0	0	52	1	12	4	3	0	1	107	107	23	0	460	1487	0	2824
9	0	1	83	0	0	9	0	2	1	0	0	0	18	69	18	0	133	984	0	1319
10	0	3	236	0	0	2	0	1	0	0	0	0	5	46	15	0	26	669	0	1002
11	0	1	127	0	0	21	0	5	2	1	0	0	43	89	8	0	15	1245	0	1559
12	0	3	244	0	0	38	1	9	3	2	0	1	78	85	5	0	8	1154	0	1631
13	0	0	18	0	0	1	0	0	0	0	0	0	3	105	6	0	8	1404	0	1545
14	0	0	9	0	0	1	0	0	0	0	0	0	3	58	3	0	4	780	0	860
15	0	2	188	0	0	29	0	7	2	1	0	0	60	101	6	0	7	1356	0	1761
sum	20	431	38564	18	6	2552	44	607	183	126	13	37	5221	3471	2308	22	16954	46505	0	117081

Q4

Age	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	Total
0															495	3119	0	52	4322	0	7987
1															944	3206	0	834	8238	0	13221
2	0	33	90	427	1	303	0	29	73	2704	8095	102	40	557	435	745	0	1003	3838	0	18473
3	1	804	2216	5202	1	428	0	39	100	2212	11684	139	55	810	104	123	4	542	1046	0	25511
4	0	364	1004	1847	0	102	0	5	13	127	576	18	7	267	105	87	8	363	1017	0	5910
5	0	543	1497	4045	0	483	0	16	41	52	101	56	22	1138	160	194	9	519	1445	0	10321
6	3	3720	10258	17827	3	4743	0	109	278	184	243	386	153	6907	107	240	1	324	949	0	46436
7	0	252	695	1412	0	446	0	14	35	19	168	48	19	675	100	308	1	322	887	0	5402
8	0	149	411	493	0	184	0	9	23	12	44	31	12	650	92	336	0	313	812	0	3570
9	0	34	95	79	0	20	0	2	5	3	1	7	3	74	53	275	0	235	467	0	1352
10	0	51	139	202	0	20	0	2	5	3	1	7	3	72	45	255	0	210	399	0	1415
11	0	47	130	118	0	90	0	1	4	2	1	5	2	78	30	133	0	122	271	0	1035
12	0	244	673	297	0	172	0	9	24	13	13	33	13	495	27	41	0	44	241	0	2341
13	0	24	67	25	0	8	0	1	2	1	1	3	1	34	7	20	0	22	60		275
14	0	11	31	12	0	2		0	0	0	0	1	0	20	5	14	0	13	48		158
15	0	196	541	233	0	49	0	5	12	7	10	17	7	120	17	12	0	21	147	0	1393
sum	6	6473	17847	32219	6	7051	0	240	614	5338	20939	852	337	11898	2725	9108	23	4939	24186	0	144800

Table 7.2.4.1 cont. Western Horse Mackerel stock. Catch in numbers (thousands) at age by quarter and area in 2020 (15 = 15+ group)

all Q Age	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	27.8.a	27.8.b	27.8.c	27.8.c.e	27.8.c.w	27.8.d	27.8.e	Total
0																1441	4112	2	3442	13256	3	0	22256
1																3838	7182	3	13745	33023	10	0	57801
2	5	39	633	520	2	2127	0	40	311	2753	8195	110	675	3215	0	1497	3871	11	4084	12266	4	0	40360
3	182	875	8588	12800	3	2891	0	54	448	2275	12594	150	926	4390	0	322	264	6	1194	2931	1	0	50895
4	87	389	3219	5801	0	547	0	6	155	131	919	19	117	948	0	317	140	10	1408	3106	1	0	17318
5	118	599	6503	8643	1	3992	0	18	109	60	162	61	398	4575	0	477	270	11	2159	4624	1	0	32781
6	901	3958	31510	59231	4	32755	0	119	645	230	404	417	2698	23857	0	397	331	1	1380	3192	1	0	162029
7	59	271	2405	4015	0	3682	0	15	74	24	226	52	345	3127	0	340	377	1	1189	2931	1	0	19134
8	38	155	971	2373	0	2221	0	10	52	16	47	34	272	2489	0	430	412	0	1092	2802	1	0	13415
9	9	35	178	548	0	536	0	2	11	3	2	7	103	510		218	311	0	619	1704	0	0	4799
10	13	53	375	804	0	471	0	2	9	3	2	7	77	466		218	277	0	312	1203	0	0	4292
11	12	48	256	749	0	467	0	2	12	4	2	6	99	528		340	184	0	1090	2086	1	0	5888
12	67	247	917	3888	0	2602	0	10	52	16	16	36	328	2317	0	543	98	0	1180	2119	1	0	14437
13	7	25	85	389	0	254	0	1	4	1	1	3	29	113		311	102	0	1462	2226	1	0	5012
14	3	11	39	177	0	12	0	0	1	0	0	1	14	66		194	54	0	815	1258	1	0	2647
15	54	198	729	3125	0	1060	0	5	30	9	12	18	237	1763	0	480	138	0	1371	2319	1	0	11550
sum	1556	6904	56411	103062	12	53617	0	284	1912	5525	22583	920	6317	48364	0	11364	18124	45	36541	91047	25	1	464614

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
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

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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
2010	4331	68198	122386	69381	29371	30496	51312	110033	73973	285281	70041	34486	24421	14887	14942	44201
2011	1136	17035	61864	106032	51259	35380	38626	59428	59031	61017	239472	88764	29187	17731	9783	35379
2012	5350	48100	42653	64221	171284	56012	37917	28132	25608	45490	41255	162118	50523	24043	11621	30567
2013	94165	138663	34651	34171	76847	248958	67370	25070	18447	20746	31217	20836	106242	21316	16279	24536
2014	19215	26080	83034	34591	28200	62102	152650	56679	21786	16441	23876	23654	24509	57284	25197	23878
2015	85629	108174	25416	51631	31604	24613	46201	118679	27331	12698	10883	12584	11794	7272	48586	15935
2016	133936	168323	97368	18662	31033	18762	14519	22754	80818	19004	10531	10298	14703	16212	18451	62769

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2017	104771	135690	26426	132175	34464	49849	23046	14115	22170	52786	12603	6491	6110	6919	7284	33718
2018	25736	107004	42957	54376	257565	43887	39837	14438	8809	19014	44833	10875	8065	4589	3645	35529
2019	7643	53043	59271	50945	52717	280292	42996	38021	16292	12752	19572	33296	10418	4690	3940	30219
2020	22256	57801	40360	50895	17318	32781	162029	19134	13415	4799	4292	5888	14437	5012	2647	11550

Table 7.2.4.3. Western horse mackerel. Marginal age-distribution.

year	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
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 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

year	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
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
Timing	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
Sex	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
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
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
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

year	2003*	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
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
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
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
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
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
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
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
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
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
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
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
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
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
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

*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
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

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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
2004	0	0	2	28	65	108	35	9	6	10	11	4	0	0	0	1
2004	0	0	1	2	36	73	50	9	9	21	5	7	0	1	0	2
2004	0	0	0	1	10	32	20	7	13	16	4	6	2	0	0	1
2004	0	0	0	0	2	4	11	5	8	8	12	3	4	0	1	2
2004	0	0	0	0	0	2	2	0	3	4	3	3	2	0	0	3
2004	0	0	0	0	0	1	1	0	3	1	1	3	1	1	1	6

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2004	0	0	0	0	0	0	1	0	0	3	0	2	0	1	0	3
2004	0	0	0	0	0	0	0	0	0	3	1	1	2	1	0	7
2004	0	0	0	0	0	0	0	1	0	3	1	2	1	0	2	3
2004	0	0	0	0	0	0	0	0	1	0	3	0	2	1	1	5
2004	0	0	0	0	0	0	0	0	0	0	1	1	3	0	0	3
2004	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
2004	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2
2004	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
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

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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
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

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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
2006	0	0	0	0	0	0	1	0	0	2	2	3	4	3	3	6
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
2006	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	4
2006	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3
2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
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

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2007	0	0	0	0	27	9	234	2	0	0	0	0	0	0	0	0
2007	0	0	0	0	7	7	334	9	2	0	0	0	1	0	0	0
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
2007	0	0	0	0	0	0	54	22	34	28	15	13	9	16	6	14
2007	0	0	0	0	0	0	22	9	18	25	9	7	6	6	8	15
2007	0	0	0	0	0	0	8	7	8	17	2	3	1	8	6	24
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
2007	0	0	0	0	0	0	0	0	2	3	3	3	1	4	4	15
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
2007	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	14
2007	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3
2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
2008	0	0	0	0	2	1	0	4	0	0	0	0	0	0	0	0

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2008	0	0	0	0	14	19	4	52	1	0	0	0	0	0	0	0
2008	0	0	0	0	14	46	13	197	3	1	0	0	0	0	0	0
2008	0	0	0	0	7	29	15	353	1	7	1	0	1	0	0	0
2008	0	0	0	0	5	18	9	391	9	8	2	2	0	1	1	0
2008	0	0	0	0	0	6	5	358	27	18	7	3	2	1	4	3
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
2008	0	0	0	0	0	0	0	1	1	8	11	6	7	3	4	20
2008	0	0	0	0	0	0	0	2	0	0	8	4	6	0	10	18
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

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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
2009	0	0	0	0	0	0	1	3	154	25	21	15	6	4	7	19
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
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
2009	0	0	0	0	0	0	0	0	2	2	7	8	3	3	1	18
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

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2009	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	6
2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
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2011	0	0	7	2	0	0	0	0	0	0	0	0	0	0	0	0
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2012	0	0	0	20	51	0	0	0	0	0	0	0	0	0	0	0
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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	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	1	6	5	0	0	0	0	0	0	0	0	0	0
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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
2013	0	0	0	0	4	103	47	6	5	6	6	2	19	1	1	0
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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	0	0	2	2	2	0	49	6	3	9
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2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4
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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
2014	0	0	6	17	10	16	27	2	1	0	0	0	0	0	0	0
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	0	0	0	1	0	3	4	16	8	5
2014	0	0	0	0	0	0	0	0	0	0	2	0	2	13	4	5
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2014	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	3
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
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
2015	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	2	2	1	0	0	0	0	0	0	0	0	0	0	0
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2015	0	0	0	8	12	13	11	16	0	0	0	0	0	0	0	0
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2015	0	0	0	3	4	3	18	82	3	1	1	0	0	0	1	0
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2015	0	0	0	0	0	0	12	75	11	3	0	0	4	4	15	5
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2015	0	0	0	0	0	0	2	20	7	4	5	7	9	3	51	7
2015	0	0	0	0	0	1	0	9	0	10	6	5	10	4	43	12
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2015	0	0	0	0	0	0	0	0	0	2	2	1	2	1	32	9
2015	0	0	0	0	0	0	0	1	0	0	0	1	3	2	18	4
2015	0	0	0	0	0	0	0	0	0	0	1	0	2	1	5	5
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2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1
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2016	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	22	1	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	21	3	2	0	0	0	0	0	0	0	0	0	0	0
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

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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
2016	0	0	0	0	4	0	2	1	1	0	0	0	0	0	0	0
2016	0	0	0	0	1	1	4	4	5	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	2	12	12	0	0	0	1	0	0	0
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
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2016	0	0	0	0	0	0	0	1	0	0	0	0	3	6	5	7
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2016	0	0	0	0	0	0	0	0	0	0	0	0	1	3	9	3
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	7
2016	0	0	0	0	0	0	0	0	0	2	0	0	0	1	6	5
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
2017	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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2017	10	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	10	91	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	10	46	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	10	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	4	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	29	10	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	22	34	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	23	74	3	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	19	79	35	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	7	40	70	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	1	22	98	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	8	97	2	0	0	0	0	0	0	0	0	0	0	0
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

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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
2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2017	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
2018	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2018	9	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	13	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	14	118	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	3	160	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	2	68	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	18	43	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	18	76	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	11	83	8	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	0	54	42	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	0	56	31	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	0	66	24	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	0	55	61	19	0	0	0	0	0	0	0	0	0	0	0	0
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

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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
2018	0	0	0	0	0	0	0	0	0	1	5	1	4	7	3	79
2018	0	0	0	0	0	0	0	0	0	0	1	0	4	6	5	37
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	32
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	9
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
2019	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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
2019	0	0	0	2	63	404	119	48	6	3	1	1	0	0	0	0
2019	0	0	0	2	28	219	103	88	22	4	6	5	0	0	0	0
2019	0	0	0	1	7	98	78	93	78	38	8	26	3	0	0	3
2019	0	0	0	0	2	40	42	110	33	75	49	61	7	0	0	3
2019	0	0	0	0	0	14	24	75	19	22	110	96	12	5	2	14
2019	0	0	0	0	0	2	8	53	17	11	54	136	29	3	2	38

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2019	0	0	0	0	0	1	3	25	15	8	17	88	68	22	7	56
2019	0	0	0	0	0	1	1	10	9	8	15	45	35	37	21	71
2019	0	0	0	0	0	0	0	0	5	1	8	24	10	12	34	60
2019	0	0	0	0	0	0	1	0	2	1	2	13	8	3	11	71
2019	0	0	0	0	0	0	0	1	0	2	2	8	2	4	2	54
2019	0	0	0	0	0	0	0	0	0	0	0	2	1	2	0	34
2019	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	18
2019	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	8
2019	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	9
2019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
2019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
2020	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2020	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	0	38	1	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	0	56	29	3	0	0	0	0	0	0	0	0	0	0	0	0
2020	0	24	107	16	0	0	0	0	0	0	0	0	0	0	0	0
2020	0	4	203	40	0	1	0	0	0	0	0	0	0	0	0	0
2020	0	4	136	75	6	0	0	0	0	0	0	0	0	0	0	0
2020	0	0	97	111	10	1	0	0	0	0	0	0	0	0	0	0
2020	0	0	21	109	16	2	1	0	0	0	0	0	0	0	0	0
2020	0	0	12	89	66	23	14	0	0	0	0	0	0	0	0	0
2020	0	0	0	58	76	35	83	3	0	0	0	0	0	0	0	0
2020	0	0	1	24	69	60	185	11	0	0	0	0	0	0	0	0
2020	0	0	0	1	40	101	333	25	3	0	1	0	0	0	0	0
2020	0	0	0	3	6	121	321	31	17	0	0	0	0	0	0	0
2020	0	0	0	0	5	58	322	68	24	2	4	0	4	0	0	0
2020	0	0	0	0	4	23	197	102	49	15	8	10	12	0	0	0

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2020	1	0	0	0	0	4	74	62	113	18	10	19	41	5	0	6
2020	0	0	0	0	0	1	21	29	72	99	15	18	54	2	3	16
2020	0	0	0	0	0	0	6	21	39	35	77	24	56	8	4	28
2020	0	0	0	0	0	0	7	9	24	16	40	25	36	11	3	33
2020	0	0	0	0	0	0	6	15	9	19	8	27	24	15	4	39
2020	0	0	0	0	0	0	4	8	9	5	8	15	31	8	1	28
2020	0	0	0	0	0	0	2	0	2	6	3	6	6	13	10	16
2020	0	0	0	0	0	0	0	1	0	2	5	6	0	0	8	12
2020	0	0	0	0	0	0	0	0	0	2	2	4	4	0	0	10
2020	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	5
2020	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2

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

year		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
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		34	42	50	40	47	53	57	37	46	87	68	49	48	66	63	82	101	108	104	96	51
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	0.000	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
	7	0.000	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
	8	0.000	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
	9	0.000	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
	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	0.000	0.059	0.001	0.000	0.000	0.000	0.000
	11	0.000	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
	12	0.001	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
	13	0.018	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
	14	0.035	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
	15	0.034	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
	16	0.025	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

year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
17	0.019	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
18	0.016	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
19	0.053	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
20	0.070	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
21	0.022	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
22	0.023	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
23	0.031	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
24	0.054	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
25	0.086	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
26	0.106	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
27	0.105	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
28	0.086	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
29	0.065	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
30	0.041	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
31	0.025	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
32	0.024	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
33	0.017	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
34	0.016	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

year		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	35	0.012	0.004	0.027	0.004	0.008	0.027	0.035	0.016	0.010	0.036	0.020	0.031	0.025	0.020	0.030	0.021	0.041	0.028	0.018	0.017	0.021
	36	0.008	0.003	0.022	0.023	0.006	0.020	0.027	0.013	0.009	0.029	0.011	0.020	0.018	0.015	0.019	0.010	0.028	0.015	0.010	0.009	0.016
	37	0.004	0.001	0.014	0.018	0.006	0.014	0.020	0.011	0.007	0.021	0.007	0.014	0.013	0.014	0.012	0.006	0.014	0.008	0.005	0.005	0.007
	38	0.002	0.001	0.008	0.006	0.002	0.013	0.017	0.010	0.004	0.012	0.005	0.009	0.007	0.010	0.007	0.005	0.005	0.003	0.003	0.003	0.004
	39	0.000	0.000	0.005	0.004	0.001	0.006	0.008	0.005	0.003	0.009	0.004	0.005	0.003	0.005	0.006	0.002	0.003	0.002	0.001	0.001	0.002
	40	0.000	0.000	0.004	0.000	0.000	0.005	0.006	0.004	0.002	0.005	0.003	0.004	0.005	0.002	0.003	0.002	0.001	0.001	0.001	0.001	0.001
	41	0.000	0.000	0.002	0.000	0.000	0.002	0.003	0.002	0.001	0.003	0.002	0.002	0.001	0.003	0.001	0.001	0.000	0.000	0.000	0.000	0.001
	42	0.000	0.000	0.001	0.000	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000
	43	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	44	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
	45	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
	46	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
	47	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
	48	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
	49	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
	50	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
	51	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

Table 7.2.4.6. Western horse mackerel. Catch-at-length distribution from the PELACUS survey.

year		1992	1993	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	5.08	5.08
Fleet		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Sex		0	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	0
Sample number		10	10	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	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	0.000	0.000
	7	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
	8	0.000	0.000	0.000	0.000	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	0.000	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	0.000	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	0.000	0.024	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	0.000	0.128	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	0.000	0.055	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	0.000	0.016	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	0.000	0.011	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	0.000	0.020	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	0.000	0.081	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	1992	1993	1995	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2013	2014	2015	2016	2017	2018	2019	2021
18	0.000	0.015	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	0.004	0.009	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	0.026	0.000	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	0.089	0.002	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	0.298	0.000	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	0.337	0.003	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	0.159	0.003	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	0.055	0.003	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	0.013	0.023	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	0.011	0.077	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	0.004	0.183	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	0.000	0.168	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	0.001	0.080	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	0.001	0.045	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	0.000	0.019	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	0.000	0.002	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	0.000	0.012	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	0.000	0.007	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

year	1992	1993	1995	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2013	2014	2015	2016	2017	2018	2019	2021
36	0.000	0.008	0.002	0.000	0.003	0.011	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.001	0.000	0.000	0.000
37	0.000	0.002	0.001	0.000	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.000
38	0.000	0.002	0.000	0.000	0.000	0.001	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
39	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	0.001	0.000	0.000	0.000	0.000
40	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
41	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
42	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	0.000
43	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	0.000
44	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	0.000
45	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	0.006
46	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	0.005
47	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	0.004
48	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	0.003
49	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	0.002
50	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	0.001
51	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	0.000

Table 7.2.5.1. Western horse mackerel stock. Mean weight (kg) in catch-at-age by quarter and area in 2020 (15 = 15+ group) Jens

Q1 Weight	27.2.a	27.6.a	27.7.b	27.7.c	27.7.e	27.7.f	27.7.g	27.7.h	27.7.j	27.7.j.2	27.7.k	27.8.a	27.8.b	27.8.c.e	27.8.c.w	27.8.d	27.8.e	Total
0												0.026	0.026	0.026	0.026	0.026	0.026	0.026
1												0.036	0.034	0.039	0.036	0.036	0.036	0.035
2	0.131	0.131	0.074	0.074	0.065	0.074	0.051	0.074	0.074	0.074	0.074	0.065	0.054	0.070	0.065	0.065	0.065	0.067
3	0.102	0.089	0.096	0.096	0.083	0.096	0.079	0.096	0.096	0.096	0.096	0.133	0.103	0.106	0.133	0.133	0.133	0.091
4	0.134	0.117	0.179	0.153	0.111	0.153	0.123	0.153	0.153	0.149	0.153	0.167	0.154	0.152	0.167	0.167	0.167	0.127
5	0.176	0.166	0.169	0.182	0.143	0.182	0.164	0.182	0.182	0.177	0.182	0.197	0.193	0.185	0.195	0.195	0.195	0.170
6	0.183	0.177	0.185	0.193	0.185	0.193	0.166	0.193	0.194	0.191	0.193	0.257	0.223	0.216	0.246	0.246	0.246	0.182
7	0.220	0.229	0.239	0.234	0.234	0.234	0.179	0.234	0.239	0.228	0.234	0.286	0.254	0.244	0.282	0.282	0.282	0.233
8	0.268	0.275	0.240	0.253	0.253	0.253	0.253	0.253	0.265	0.250	0.253	0.322	0.270	0.265	0.296	0.296	0.296	0.258
9	0.287	0.287	0.284	0.294	0.294	0.294	0.294	0.294	0.307	0.278	0.294	0.320	0.302	0.306	0.323	0.323	0.323	0.288
10	0.273	0.295	0.262	0.278	0.278	0.278	0.278	0.278	0.295	0.292	0.278	0.441	0.361	0.360	0.375	0.375	0.375	0.297
11	0.310	0.316	0.293	0.305	0.305	0.305	0.305	0.305	0.319	0.288	0.305	0.390	0.315	0.317	0.335	0.335	0.335	0.316
12	0.315	0.316	0.306	0.298	0.298	0.298	0.298	0.298	0.312	0.284	0.298	0.385	0.360	0.358	0.368	0.368	0.368	0.311
13	0.338	0.339	0.318	0.314	0.314	0.314	0.314	0.314	0.303	0.301	0.314	0.395	0.394	0.393	0.394	0.394	0.394	0.342
14	0.365	0.367	0.338	0.338	0.338	0.338	0.338	0.338	0.364	0.344	0.338	0.405	0.374	0.372	0.378	0.378	0.378	0.375
15	0.346	0.349	0.342	0.360	0.360	0.360	0.360	0.360	0.378	0.370	0.360	0.458	0.479	0.481	0.483	0.483	0.483	0.361

Q2 Weight	27.2.a	27.6.a	27.7.b	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										0.026	0.026	0.026	0.026	0.026	0.026	0.026
1										0.041	0.043	0.041	0.026	0.041	0.041	0.035
2			0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.062	0.048	0.062	0.051	0.062	0.062	0.057
3	0.084	0.084	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.132	0.118	0.132	0.132	0.132	0.132	0.126
4	0.112	0.112	0.152	0.146	0.146	0.146	0.146	0.146	0.146	0.179	0.164	0.179	0.168	0.179	0.179	0.173
5	0.162	0.162	0.175	0.175	0.175	0.175	0.175	0.175	0.237	0.205	0.188	0.205	0.195	0.205	0.205	0.212
6	0.175	0.175	0.197	0.186	0.186	0.186	0.186	0.186	0.222	0.238	0.203	0.238	0.212	0.238	0.238	0.217
7	0.232	0.232	0.245	0.236	0.236	0.236	0.236	0.236	0.292	0.258	0.214	0.258	0.226	0.258	0.258	0.255
8	0.277	0.277	0.294	0.251	0.251	0.251	0.251	0.251	0.330	0.282	0.239	0.282	0.246	0.282	0.282	0.281
9	0.288	0.288	0.292	0.292	0.292	0.292	0.292	0.292	0.357	0.303	0.283	0.303	0.277	0.303	0.303	0.302
10	0.301	0.301	0.277	0.277	0.277	0.277	0.277	0.277	0.277	0.393	0.347	0.393	0.317	0.393	0.393	0.359
11	0.318	0.318	0.311	0.311	0.311	0.311	0.311	0.311	0.351	0.324	0.307	0.324	0.307	0.324	0.324	0.318
12	0.316	0.316	0.301	0.301	0.301	0.301	0.301	0.301	0.322	0.366	0.362	0.366	0.358	0.366	0.366	0.356
13	0.339	0.339	0.313	0.313	0.313	0.313	0.313	0.313	0.313	0.393	0.397	0.393	0.392	0.393	0.393	0.392
14	0.368	0.368	0.426	0.355	0.355	0.355	0.355	0.355	0.355	0.375	0.381	0.375	0.370	0.375	0.375	0.372
15	0.350	0.350	0.340	0.360	0.360	0.360	0.360	0.360	0.364	0.483	0.495	0.483	0.486	0.483	0.483	0.464

Table 7.2.5.1 cont. Western horse mackerel stock. Mean weight (kg) in catch-at-age by quarter and area in 2020 (15 = 15+ group)

Q3 Weight	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	27.8.a	27.8.b	27.8.c	27.8.c.e	27.8.c.w	27.8.d	Total
0														0.026	0.026	0.036	0.026	0.026	0.026	0.026
1														0.044	0.050	0.055	0.055	0.044	0.044	0.047
2	0.131	0.131	0.131	0.131	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.073	0.079	0.088	0.074	0.074	0.073	0.077
3	0.121	0.121	0.121	0.121	0.098	0.098	0.098	0.098	0.098	0.098	0.098	0.098	0.098	0.137	0.124	0.129	0.140	0.137	0.137	0.118
4	0.171	0.171	0.171	0.171	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.176	0.171	0.176	0.182	0.176	0.176	0.174
5	0.188	0.188	0.188	0.188	0.219	0.219	0.219	0.219	0.219	0.219	0.219	0.219	0.219	0.202	0.203	0.195	0.207	0.202	0.202	0.196
6	0.199	0.199	0.199	0.199	0.223	0.223	0.223	0.223	0.223	0.223	0.223	0.223	0.223	0.245	0.243	0.207	0.242	0.247	0.245	0.205
7	0.202	0.202	0.202	0.202	0.235	0.235	0.235	0.235	0.235	0.235	0.235	0.235	0.235	0.275	0.272	0.205	0.260	0.278	0.275	0.242
8	0.238	0.238	0.238	0.238	0.284	0.284	0.284	0.284	0.284	0.284	0.284	0.284	0.284	0.293	0.303	0.293	0.287	0.295	0.293	0.282
9	0.280	0.280	0.280	0.280	0.353	0.353	0.353	0.353	0.353	0.353	0.353	0.353	0.353	0.326	0.328	0.326	0.311	0.330	0.326	0.325
10	0.201	0.201	0.201	0.201	0.292	0.292	0.292	0.292	0.292	0.292	0.292	0.292	0.292	0.364	0.355	0.364	0.357	0.368	0.364	0.327
11	0.268	0.268	0.268	0.268	0.324	0.324	0.324	0.324	0.324	0.324	0.324	0.324	0.324	0.333	0.345	0.333	0.362	0.338	0.333	0.332
12	0.286	0.286	0.286	0.286	0.289	0.289	0.289	0.289	0.289	0.289	0.289	0.289	0.289	0.365	0.366	0.365	0.371	0.367	0.365	0.349
13	0.313	0.313	0.313	0.313	0.329	0.329	0.329	0.329	0.329	0.329	0.329	0.329	0.329	0.395	0.395	0.395	0.398	0.396	0.395	0.395
14	0.313	0.313	0.313	0.313	0.310	0.310	0.310	0.310	0.310	0.310	0.310	0.310	0.310	0.376	0.376	0.376	0.381	0.378	0.376	0.377
15	0.292	0.292	0.292	0.292	0.361	0.361	0.361	0.361	0.361	0.361	0.361	0.361	0.361	0.490	0.490	0.490	0.491	0.493	0.490	0.463

Q4 Weight	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	Total
0															0.026	0.026	0.026	0.028	0.026	0.026	0.026
1															0.051	0.051	0.051	0.056	0.051	0.051	0.051
2	0.131	0.131	0.131	0.131	0.074	0.074	0.074	0.074	0.074	0.070	0.076	0.074	0.074	0.074	0.073	0.078	0.073	0.096	0.074	0.073	0.077
3	0.102	0.102	0.102	0.120	0.096	0.097	0.096	0.096	0.096	0.097	0.098	0.096	0.096	0.099	0.135	0.124	0.158	0.137	0.138	0.135	0.105
4	0.134	0.134	0.134	0.168	0.153	0.165	0.153	0.153	0.153	0.159	0.150	0.153	0.153	0.177	0.176	0.173	0.183	0.169	0.175	0.176	0.160
5	0.176	0.176	0.176	0.187	0.178	0.197	0.178	0.178	0.178	0.146	0.200	0.178	0.178	0.205	0.203	0.211	0.194	0.195	0.202	0.203	0.190
6	0.183	0.183	0.183	0.197	0.192	0.211	0.192	0.192	0.192	0.187	0.211	0.192	0.192	0.215	0.251	0.272	0.198	0.252	0.251	0.251	0.199
7	0.220	0.220	0.220	0.203	0.232	0.221	0.232	0.232	0.232	0.232	0.169	0.232	0.232	0.245	0.281	0.302	0.197	0.295	0.281	0.281	0.238
8	0.268	0.268	0.268	0.242	0.247	0.266	0.247	0.247	0.247	0.247	0.233	0.247	0.247	0.257	0.309	0.317	0.309	0.314	0.309	0.309	0.280
9	0.287	0.287	0.287	0.281	0.284	0.284	0.284	0.284	0.284	0.284	0.284	0.284	0.284	0.305	0.341	0.343	0.341	0.346	0.341	0.341	0.330
10	0.273	0.273	0.273	0.210	0.278	0.278	0.278	0.278	0.278	0.278	0.278	0.278	0.278	0.285	0.384	0.367	0.384	0.370	0.384	0.384	0.331
11	0.310	0.310	0.310	0.276	0.287	0.270	0.287	0.287	0.287	0.287	0.287	0.287	0.287	0.290	0.412	0.402	0.412	0.407	0.412	0.412	0.354
12	0.315	0.315	0.315	0.297	0.296	0.298	0.296	0.296	0.296	0.296	0.288	0.296	0.296	0.274	0.404	0.426	0.404	0.434	0.404	0.404	0.316
13	0.338	0.338	0.338	0.325	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.323	0.444	0.464	0.444	0.462	0.444	0.444	0.378
14	0.365	0.365	0.365	0.336	0.335	0.335	0.335	0.335	0.335	0.335	0.335	0.335	0.335	0.299	0.476	0.503	0.476	0.502	0.477	0.476	0.415
15	0.346	0.346	0.346	0.313	0.358	0.358	0.358	0.358	0.358	0.358	0.320	0.358	0.358	0.352	0.476	0.512	0.702	0.567	0.476	0.476	0.362

Table 7.2.5.1 cont. Western horse mackerel stock. Mean weight (kg) in catch-at-age by quarter and area in 2020 (15 = 15+ group)

all Q Weight	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	27.8.a	27.8.b	27.8.c	27.8.c.e	27.8.c.w	27.8.d	27.8.e	Total
0																0.026	0.026	0.035	0.026	0.026	0.026	0.026	0.026
1																0.043	0.045	0.054	0.042	0.045	0.039	0.036	0.044
2	0.131	0.131	0.131	0.131	0.075	0.075	0.074	0.075	0.072	0.070	0.076	0.074	0.074	0.075	0.074	0.069	0.058	0.088	0.075	0.071	0.063	0.065	0.073
3	0.097	0.103	0.116	0.102	0.097	0.097	0.096	0.097	0.093	0.097	0.096	0.096	0.096	0.097	0.096	0.135	0.118	0.150	0.137	0.137	0.133	0.133	0.105
4	0.127	0.136	0.160	0.134	0.157	0.174	0.153	0.154	0.120	0.159	0.140	0.153	0.153	0.159	0.153	0.175	0.170	0.182	0.177	0.176	0.175	0.167	0.154
5	0.173	0.177	0.185	0.176	0.194	0.174	0.181	0.182	0.178	0.155	0.188	0.178	0.182	0.192	0.182	0.202	0.207	0.194	0.203	0.203	0.202	0.195	0.186
6	0.181	0.184	0.193	0.183	0.203	0.189	0.193	0.195	0.197	0.194	0.198	0.192	0.194	0.201	0.193	0.249	0.258	0.200	0.239	0.247	0.241	0.246	0.191
7	0.223	0.219	0.207	0.220	0.233	0.236	0.234	0.233	0.234	0.233	0.173	0.233	0.239	0.235	0.234	0.277	0.291	0.199	0.264	0.276	0.267	0.282	0.238
8	0.271	0.267	0.251	0.268	0.261	0.243	0.251	0.250	0.257	0.255	0.236	0.247	0.264	0.262	0.253	0.308	0.307	0.293	0.283	0.297	0.288	0.296	0.271
9	0.287	0.286	0.283	0.287	0.306	0.285	0.290	0.289	0.301	0.297	0.299	0.285	0.306	0.302	0.294	0.326	0.340	0.325	0.311	0.330	0.314	0.323	0.312
10	0.282	0.269	0.228	0.273	0.279	0.263	0.278	0.278	0.279	0.279	0.279	0.278	0.295	0.290	0.278	0.411	0.366	0.372	0.357	0.376	0.381	0.375	0.318
11	0.313	0.309	0.289	0.310	0.309	0.290	0.300	0.295	0.308	0.303	0.306	0.290	0.318	0.317	0.305	0.368	0.378	0.336	0.319	0.344	0.329	0.335	0.327
12	0.315	0.314	0.307	0.315	0.294	0.305	0.297	0.295	0.296	0.295	0.289	0.296	0.312	0.286	0.298	0.381	0.389	0.368	0.361	0.371	0.367	0.368	0.323
13	0.339	0.338	0.333	0.338	0.316	0.314	0.314	0.314	0.315	0.315	0.314	0.303	0.309	0.314		0.396	0.410	0.395	0.393	0.397	0.394	0.394	0.383
14	0.366	0.365	0.353	0.365	0.324	0.354	0.337	0.332	0.331	0.328	0.329	0.335	0.363	0.329	0.338	0.393	0.410	0.378	0.372	0.381	0.376	0.378	0.377
15	0.348	0.346	0.332	0.346	0.360	0.343	0.359	0.359	0.359	0.359	0.327	0.359	0.377	0.367	0.360	0.469	0.495	0.682	0.487	0.488	0.483	0.483	0.401

Table 7.2.5.2. Western horse mackerel stock. Mean length (cm) in catch-at-age by quarter and area in 2020 (15 = 15+ group)

Q1 cm	27.2.a	27.6.a	27.7.b	27.7.c	27.7.e	27.7.f	27.7.g	27.7.h	27.7.j	27.7.j.2	27.7.k	27.8.a	27.8.b	27.8.c.e	27.8.c.w	27.8.d	27.8.e	Total
0												14.3	14.3	14.3	14.3	14.3	14.3	14.3
1												15.9	15.6	16.4	15.9	15.9	15.9	15.7
2	25.4	25.4	21.6	21.6	20.7	21.6	19.0	21.6	21.6	21.6	21.6	19.3	18.4	20.0	19.3	19.3	19.3	20.3
3	24.0	23.4	23.3	23.4	22.4	23.4	22.0	23.4	23.4	23.4	23.4	24.9	22.9	23.1	24.9	24.9	24.9	23.3
4	26.2	25.4	28.7	26.9	24.3	26.9	25.1	26.9	26.9	27.1	26.9	26.9	26.2	26.1	26.9	26.9	26.9	25.8
5	28.5	28.1	28.7	28.9	26.6	28.9	28.0	28.9	28.9	28.7	28.9	28.4	28.2	27.8	28.3	28.3	28.3	28.4
6	28.9	28.7	29.0	29.3	28.8	29.3	27.8	29.3	29.4	29.2	29.3	31.2	29.6	29.3	30.5	30.5	30.5	28.9
7	30.5	30.8	31.1	30.9	30.9	30.9	28.0	30.9	31.1	30.7	30.9	32.2	30.8	30.4	32.0	32.0	32.0	30.9
8	32.4	32.6	31.6	31.8	31.8	31.8	31.8	31.8	32.3	31.7	31.8	33.7	31.6	31.4	32.6	32.6	32.6	32.0
9	33.1	33.1	33.2	33.6	33.6	33.6	33.6	33.6	34.5	33.1	33.6	33.5	32.8	32.9	33.5	33.5	33.5	33.2
10	32.3	33.2	32.0	32.7	32.7	32.7	32.7	32.7	33.1	33.3	32.7	37.6	34.8	34.8	35.3	35.3	35.3	33.2
11	33.9	34.1	33.7	33.7	33.7	33.7	33.7	33.7	34.6	33.1	33.7	35.8	33.3	33.3	34.0	34.0	34.0	34.1
12	34.1	34.2	34.3	33.7	33.7	33.7	33.7	33.7	34.4	33.1	33.7	35.9	34.9	34.8	35.2	35.2	35.2	34.1
13	34.9	34.9	34.4	34.4	34.4	34.4	34.4	34.4	33.6	34.6	34.4	36.0	35.9	35.9	35.9	35.9	35.9	34.9
14	36.0	36.1	35.4	35.4	35.4	35.4	35.4	35.4	36.9	35.5	35.4	36.4	35.2	35.2	35.4	35.4	35.4	36.0
15	35.2	35.3	35.7	35.9	35.9	35.9	35.9	35.9	36.4	36.0	35.9	38.0	38.3	38.4	38.4	38.4	38.4	35.7

Q2 cm	27.2.a	27.6.a	27.7.b	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										14.5	14.5	14.5	14.5	14.5	14.5	14.5
1										16.6	17.1	16.6	14.4	16.6	16.6	15.8
2			19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.2	17.7	19.2	17.9	19.2	19.2	18.7
3	23.2	23.2	22.0	22.0	22.0	22.0	22.0	22.0	22.0	24.7	24.0	24.7	24.8	24.7	24.7	24.5
4	25.2	25.2	26.1	26.8	26.8	26.8	26.8	26.8	26.8	27.6	26.8	27.6	27.0	27.6	27.6	27.3
5	27.9	27.9	28.7	28.7	28.7	28.7	28.7	28.7	29.8	28.9	28.0	28.9	28.4	28.9	28.9	29.0
6	28.6	28.6	28.8	29.0	29.0	29.0	29.0	29.0	29.7	30.3	28.8	30.3	29.1	30.3	30.3	29.6
7	30.9	30.9	31.2	31.0	31.0	31.0	31.0	31.0	32.0	31.1	29.2	31.1	29.7	31.1	31.1	30.9
8	32.6	32.6	31.9	31.8	31.8	31.8	31.8	31.8	33.2	32.1	30.4	32.1	30.7	32.1	32.1	31.9
9	33.1	33.1	33.5	33.5	33.5	33.5	33.5	33.5	35.3	32.9	32.1	32.9	31.9	32.9	32.9	32.9
10	33.4	33.4	32.6	32.6	32.6	32.6	32.6	32.6	32.6	35.9	34.4	35.9	33.3	35.9	35.9	34.8
11	34.1	34.1	33.9	33.9	33.9	33.9	33.9	33.9	34.5	33.6	33.0	33.6	33.0	33.6	33.6	33.4
12	34.2	34.2	33.9	33.9	33.9	33.9	33.9	33.9	34.0	35.1	34.9	35.1	34.8	35.1	35.1	34.8
13	34.9	34.9	34.4	34.4	34.4	34.4	34.4	34.4	34.4	35.9	36.0	35.9	35.8	35.9	35.9	35.8
14	36.1	36.1	38.5	36.1	36.1	36.1	36.1	36.1	36.1	35.3	35.5	35.3	35.1	35.3	35.3	35.2
15	35.3	35.3	35.6	35.9	35.9	35.9	35.9	35.9	35.8	38.4	38.7	38.4	38.4	38.4	38.4	38.0

Table 7.2.5.2 cont. Western horse mackerel stock. Mean length (cm) in catch-at-age by quarter and area in 2020 (15 = 15+ group)

Q3 cm	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	27.8.a	27.8.b	27.8.c	27.8.c.e	27.8.c.w	27.8.d	Total
0														14.4	14.4	16.2	14.5	14.4	14.4	14.4
1														17.1	18.0	18.4	18.6	17.1	17.1	17.5
2	25.4	25.4	25.4	25.4	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	20.3	20.9	21.8	20.6	20.3	20.3	20.9
3	24.9	24.9	24.9	24.9	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	25.1	24.2	24.6	25.1	25.1	25.1	24.5
4	27.9	27.9	27.9	27.9	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.4	27.1	27.4	27.8	27.4	27.4	27.7
5	29.0	29.0	29.0	29.0	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	28.7	28.7	28.4	28.9	28.7	28.7	29.0
6	29.5	29.5	29.5	29.5	30.3	30.3	30.3	30.3	30.3	30.3	30.3	30.3	30.3	30.5	30.5	28.9	30.5	30.6	30.5	29.7
7	29.9	29.9	29.9	29.9	30.5	30.5	30.5	30.5	30.5	30.5	30.5	30.5	30.5	31.7	31.6	28.9	31.2	31.8	31.7	30.9
8	31.5	31.5	31.5	31.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.8	32.5	32.3	32.5	32.5	32.3
9	33.2	33.2	33.2	33.2	35.3	35.3	35.3	35.3	35.3	35.3	35.3	35.3	35.3	33.6	33.7	33.6	33.2	33.8	33.6	33.7
10	29.5	29.5	29.5	29.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	34.9	34.7	34.9	34.7	35.0	34.9	33.7
11	32.7	32.7	32.7	32.7	33.9	33.9	33.9	33.9	33.9	33.9	33.9	33.9	33.9	33.9	34.3	33.9	34.8	34.0	33.9	33.9
12	33.4	33.4	33.4	33.4	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	35.0	35.0	35.0	35.2	35.0	35.0	34.6
13	34.5	34.5	34.5	34.5	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.9	35.9	35.9	36.0	36.0	35.9	35.9
14	34.5	34.5	34.5	34.5	34.2	34.2	34.2	34.2	34.2	34.2	34.2	34.2	34.2	35.3	35.3	35.3	35.4	35.4	35.3	35.3
15	33.8	33.8	33.8	33.8	35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7	38.6	38.6	38.6	38.6	38.6	38.6	37.9

Q4 cm	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	Total
0															14.4	14.3	14.4	14.8	14.4	14.4	14.4
1															18.0	18.2	18.0	18.7	18.0	18.0	18.1
2	25.4	25.4	25.4	25.4	21.6	21.6	21.6	21.6	21.6	21.3	21.7	21.6	21.6	21.6	20.3	20.9	20.3	22.3	20.3	20.3	21.4
3	24.0	24.0	24.0	24.8	23.4	23.4	23.4	23.4	23.4	23.5	23.4	23.4	23.4	23.5	25.0	24.2	26.5	25.2	25.1	25.0	23.9
4	26.2	26.2	26.2	26.9	27.6	26.9	26.9	26.9	26.9	27.0	26.5	26.9	26.9	28.1	27.5	27.2	27.8	27.0	27.4	27.5	27.1
5	28.5	28.5	28.5	29.0	28.8	29.5	28.8	28.8	28.8	28.1	29.2	28.8	28.8	29.7	28.8	29.1	28.4	28.3	28.7	28.8	28.9
6	28.9	28.9	28.9	29.5	29.3	30.0	29.3	29.3	29.3	28.8	29.9	29.3	29.3	30.1	30.8	31.6	28.5	30.8	30.8	30.8	29.5
7	30.5	30.5	30.5	30.0	30.8	30.4	30.8	30.8	30.8	30.8	26.8	30.8	30.8	31.4	32.0	32.8	28.5	32.5	32.0	32.0	30.9
8	32.4	32.4	32.4	31.6	31.7	32.5	31.7	31.7	31.7	31.7	30.9	31.7	31.7	32.0	33.1	33.3	33.1	33.2	33.1	33.1	32.5
9	33.1	33.1	33.1	33.2	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	34.0	34.2	34.2	34.2	34.3	34.2	34.2	34.0
10	32.3	32.3	32.3	29.8	32.7	32.7	32.7	32.7	32.7	32.7	32.7	32.7	32.7	33.1	35.6	35.0	35.6	35.1	35.6	35.6	33.9
11	33.9	33.9	33.9	32.9	33.4	32.7	33.4	33.4	33.4	33.4	33.4	33.4	33.4	33.5	36.5	36.1	36.5	36.3	36.5	36.5	34.9
12	34.1	34.1	34.1	33.7	33.7	33.8	33.7	33.7	33.7	33.7	33.4	33.7	33.7	32.7	36.5	36.8	36.5	37.0	36.5	36.5	34.1
13	34.9	34.9	34.9	34.7	34.4	34.4	34.4	34.4	34.4	34.4	34.4	34.4	34.4	34.7	37.4	37.9	37.4	37.9	37.4	37.4	35.9
14	36.0	36.0	36.0	35.2	35.3	35.3	35.3	35.3	35.3	35.3	35.3	35.3	35.3	33.8	38.4	38.9	38.4	38.9	38.4	38.4	37.0
15	35.2	35.2	35.2	34.4	35.9	35.9	35.9	35.9	35.9	35.9	34.7	35.9	35.9	35.7	38.5	39.2	43.5	40.4	38.5	38.5	35.6

Table 7.2.5.2 cont. Western horse mackerel stock. Mean length (cm) in catch-at-age by quarter and area in 2020 (15 = 15+ group)

all Q cm	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	27.8.a	27.8.b	27.8.c	27.8.c.e	27.8.c.w	27.8.d	27.8.e	Total
0																14.4	14.3	16.1	14.5	14.4	14.4	14.3	14.4
1																16.9	17.3	18.3	16.7	17.2	16.4	15.9	17.1
2	25.4	25.4	25.4	25.4	21.6	21.6	21.6	21.6	21.4	21.3	21.7	21.6	21.6	21.6	21.6	19.8	18.8	21.8	20.5	20.1	19.3	19.3	20.8
3	23.8	24.1	24.7	24.0	23.4	23.4	23.4	23.4	23.1	23.5	23.3	23.4	23.4	23.4	23.4	25.0	23.8	25.9	25.1	25.1	24.8	24.9	23.9
4	25.9	26.3	27.4	26.2	27.0	28.3	26.9	26.9	24.8	27.0	26.0	26.9	26.9	27.4	26.9	27.4	27.1	27.7	27.5	27.4	27.4	26.9	26.9
5	28.4	28.6	28.9	28.5	29.3	28.8	28.9	28.9	28.5	28.3	28.8	28.8	28.9	29.1	28.9	28.7	28.9	28.4	28.7	28.7	28.7	28.3	28.8
6	28.8	28.9	29.3	28.9	29.7	29.2	29.3	29.4	29.4	29.1	29.3	29.3	29.4	29.6	29.3	30.8	31.0	28.7	30.3	30.6	30.4	30.5	29.2
7	30.6	30.5	30.1	30.5	30.7	31.0	30.9	30.8	30.8	30.8	27.1	30.8	31.1	30.9	30.9	31.8	32.3	28.6	31.3	31.8	31.4	32.0	30.9
8	32.5	32.3	31.9	32.4	32.0	31.7	31.8	31.8	32.0	31.9	31.0	31.8	32.3	32.0	31.8	33.1	32.9	32.5	32.1	32.6	32.3	32.6	32.2
9	33.1	33.1	33.2	33.1	33.9	33.2	33.5	33.4	33.8	33.7	33.7	33.3	34.4	33.8	33.6	33.6	34.1	33.6	33.1	33.8	33.2	33.5	33.5
10	32.7	32.2	30.5	32.3	32.7	32.0	32.7	32.7	32.7	32.7	32.7	32.7	33.1	33.2	32.7	36.5	35.0	35.2	34.7	35.3	35.5	35.3	33.6
11	33.9	33.8	33.3	33.9	33.7	33.5	33.7	33.5	33.7	33.6	33.7	33.5	34.6	33.8	33.7	35.1	35.3	34.0	33.4	34.2	33.8	34.0	34.0
12	34.1	34.1	33.9	34.1	33.5	34.2	33.7	33.7	33.6	33.6	33.4	33.7	34.3	33.1	33.7	35.7	35.7	35.1	34.9	35.2	35.1	35.2	34.3
13	34.9	34.9	34.8	34.9	34.5	34.4	34.4	34.4	34.5	34.9	34.5	34.4	34.7	34.4	34.4	36.0	36.3	35.9	35.8	36.0	35.9	35.9	35.7
14	36.0	36.0	35.7	36.0	34.8	35.9	35.3	35.1	35.1	35.0	35.0	35.3	36.9	34.9	35.4	35.9	36.3	35.4	35.2	35.5	35.3	35.4	35.5
15	35.2	35.2	34.8	35.2	35.8	35.8	35.9	35.9	35.8	35.9	34.9	35.9	36.3	35.9	35.9	38.2	38.7	43.0	38.5	38.5	38.4	38.4	36.6

Table 7.2.5.3. Western horse mackerel. Catch weights-at-age (kg), from Q1 and Q2 data.

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

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

	0	1	2	3	4	5	6	7	8	9	10	11+
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

	0	1	2	3	4	5	6	7	8	9	10	11+
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
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

Table 7.2.8.1. Western horse mackerel. Potential fecundity (10^6 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.

	1987		1992		1995		1998		2000		2001		2001 (cont)	
1	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
2	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
3	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
4	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
5	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
6	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
7	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
8	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
9	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
10	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
11	0.32	1.647	0.135	0.793	0.22	1.324			0.393	1.279	0.101	0.853	0.144	1.265
12	0.273	1.956	0.131	1.039	0.236	1.221			0.393	0.668	0.106	1.133	0.171	0.956
13	0.212	2.83	0.136	1.06	0.261	1.21			0.413	0.694	0.107	0.935	0.121	0.607
14	0.268	1.687	0.138	1.489	0.245	1.445			0.421	1.339	0.107	0.494	0.122	0.689
15	0.32	1.088	0.147	1.214	0.306	1.693			0.423	0.798	0.11	0.85	0.139	0.915
16	0.318	1.208	0.151	1.158	0.314	1.312			0.445	1.03	0.111	0.67	0.153	0.943
17	0.343	1.933	0.16	1.349	0.46	1.575			0.446	1.208	0.103	0.632	0.154	0.709
18	0.378	1.429	0.165	1.359	0.449	1.43			0.152	0.643	0.111	0.547	0.156	0.773

	1987		1992		1995	1998	2000		2001		2001 (cont)	
19	0.404	1.849	0.165	0.945			0.165	0.579	0.118	0.88	0.162	1.158
20	0.428	2.236	0.167	1			0.175	0.596	0.107	0.944	0.174	1.389
21	0.398	1.538	0.168	1.545			0.179	0.997	0.104	0.724	0.175	1.426
22	0.431	1.223	0.18	1.299			0.19	0.744	0.111	0.86	0.179	1.248
23	0.432	1.465	0.174	1.487			0.197	0.613	0.11	0.728	0.179	1.236
24	0.421	1.843	0.178	1.594			0.203	0.702	0.111	0.544	0.18	2.353
25	0.481	1.757	0.185	1.475			0.219	0.472	0.129	0.935	0.184	2.255
26	0.494	1.611	0.195	1.41			0.223	0.806	0.114	0.901	0.139	0.931
27	0.54	1.754	0.203	1.937			0.227	0.606	0.114	0.557	0.161	1.037
28	0.564	2.255	0.205	1.534			0.289	1.273	0.151	1.377	0.162	0.893
29	0.585	1.221	0.213	1.577			0.294	1.395	0.153	1.596	0.169	0.691
30			0.222	0.958			0.3	1.305	0.154	1.699	0.18	1.609
31			0.275	2.444					0.103	0.679	0.185	1.776
32									0.12	1.14	0.211	2.102
33									0.12	0.631	0.224	1.466
34									0.121	0.834	0.162	0.849
35									0.144	0.626	0.17	0.668
36									0.116	0.668	0.187	1.453

	1987	1992	1995	1998	2000	2001		2001 (cont)	
37						0.118	1.194	0.198	1.371
38						0.112	0.779	0.219	1.847
39						0.126	0.782	0.22	1.578
40						0.139	1.244	0.201	0.878
41						0.119	1.212	0.206	1.196
42						0.109	0.755	0.223	1.115
43						0.122	0.841	0.225	1.43
44						0.131	0.929	0.233	1.724
45	8					0.135	0.862	0.241	1.131
46						0.142	1.834	0.219	0.96
47						0.146	1.689	0.237	1.33
48						0.148	1.357	0.241	0.918
49						0.151	1.817	0.34	0.605
50						0.164	1.631	0.407	1.189
51						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	47836900	1224800	2508310	5767780	1065790	1377590	1251940	752509	489208	437032	407175	470482	564493	707171	403839	258724	229811	203001	178882	157708	1174820

year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1983	1506360	41138300	1050670	2142280	4901320	901783	1162120	1054260	633103	411396	367440	342303	395503	474520	594447	339464	217481	193176	170640	150365	1120100
1984	1618940	1295010	35245400	894754	1811780	4120630	755036	970653	879452	527798	342867	306190	285222	329540	395370	495288	282836	181201	160950	142173	1058520
1985	2127570	1391930	1109950	30043000	757875	1526320	3458410	632296	811919	735217	441117	286521	255855	238326	275352	330354	413838	236323	151401	134481	1003230
1986	2659390	1829580	1193880	947683	25516700	640806	1286540	2909760	531476	682139	617558	370485	240630	214869	200146	231238	277426	347534	198459	127144	955422
1987	5227420	2286430	1567970	1017420	802401	21485400	537501	1076700	2432270	444004	569712	515708	309362	200924	179411	167115	193075	231640	290176	165705	903891
1988	2828290	4492990	1957240	1332670	857669	671669	17897500	446460	892982	2015780	367846	471913	427144	256224	166407	148588	138404	159902	191841	240319	885819
1989	3172420	2430540	3843680	1661100	1120710	715617	557387	14804800	368692	736831	1662640	303347	389131	352198	211262	137204	122511	114113	131839	158171	928487
1990	2213230	2726170	2079000	3261050	1396150	934424	593360	460650	12214400	303926	607154	1369770	249889	320540	290109	174016	113014	100910	93993	108592	895053
1991	3917750	1900710	2326150	1753880	2715350	1149580	763457	482586	373756	9898750	246170	491643	1109020	202307	259495	234855	140871	91487	81689	76089	812460
1992	7659570	3363580	1620000	1957330	1454190	2223110	932988	616429	388597	300565	7955340	197780	394942	890818	162496	208425	188631	113144	73480	65610	713647
1993	6961380	6567500	2852190	1347130	1591500	1159880	1749720	728580	479399	301606	233059	6165760	153254	305993	690143	125885	161463	146127	87648	56922	603652
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	59644	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	16800	444126	167758

year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
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
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
2020	1083960	1160330	2135440	2137200	1294770	862859	920631	213963	360089	37155	72459	70397	195208	55967	25966	23423	23373	9719	15133	62148	42886

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

year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1982	0.001	0.003	0.008	0.013	0.017	0.020	0.022	0.023	0.023	0.023	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.024
1983	0.001	0.005	0.011	0.018	0.023	0.028	0.030	0.031	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.033	0.033	0.033	0.033	0.033	0.033
1984	0.001	0.004	0.010	0.016	0.021	0.025	0.027	0.029	0.029	0.029	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030
1985	0.001	0.003	0.008	0.013	0.018	0.021	0.023	0.024	0.024	0.024	0.024	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025
1986	0.001	0.004	0.010	0.016	0.022	0.026	0.028	0.029	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030
1987	0.001	0.005	0.013	0.021	0.028	0.033	0.036	0.037	0.038	0.038	0.038	0.038	0.038	0.038	0.039	0.039	0.039	0.039	0.039	0.039	0.039
1988	0.002	0.006	0.014	0.023	0.031	0.037	0.040	0.041	0.042	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043
1989	0.002	0.006	0.014	0.024	0.032	0.037	0.041	0.042	0.043	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044
1990	0.002	0.009	0.020	0.033	0.044	0.052	0.057	0.059	0.060	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061
1991	0.003	0.010	0.023	0.037	0.050	0.059	0.064	0.067	0.068	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069
1992	0.004	0.015	0.034	0.057	0.076	0.089	0.097	0.101	0.103	0.104	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105
1993	0.005	0.020	0.045	0.075	0.100	0.118	0.128	0.133	0.136	0.137	0.138	0.138	0.138	0.139	0.139	0.139	0.139	0.139	0.139	0.139	0.139
1994	0.005	0.020	0.047	0.077	0.104	0.122	0.132	0.138	0.141	0.142	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143	0.143
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

year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
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
2013	0.008	0.030	0.068	0.113	0.151	0.177	0.192	0.201	0.205	0.206	0.207	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208
2014	0.007	0.028	0.064	0.105	0.141	0.166	0.180	0.188	0.192	0.193	0.194	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195	0.195
2015	0.006	0.022	0.050	0.083	0.111	0.130	0.141	0.147	0.150	0.152	0.152	0.153	0.153	0.153	0.153	0.153	0.153	0.153	0.153	0.153	0.153
2016	0.006	0.022	0.051	0.085	0.114	0.134	0.145	0.151	0.154	0.156	0.157	0.157	0.157	0.157	0.157	0.157	0.157	0.157	0.157	0.157	0.157
2017	0.005	0.018	0.042	0.069	0.093	0.109	0.118	0.123	0.126	0.127	0.127	0.128	0.128	0.128	0.128	0.128	0.128	0.128	0.128	0.128	0.128

year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
2018	0.005	0.021	0.048	0.079	0.106	0.125	0.136	0.141	0.144	0.146	0.146	0.147	0.147	0.147	0.147	0.147	0.147	0.147	0.147	0.147	0.147
2019	0.006	0.024	0.055	0.091	0.122	0.144	0.156	0.163	0.166	0.168	0.168	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169
2020	0.003	0.014	0.031	0.052	0.069	0.081	0.088	0.092	0.094	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095

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	47836900	3144430	2469210	61197	0.0248	0.008	0.021	0.018
1983	1506360	3644310	2587600	90442	0.0350	0.011	0.029	0.024
1984	1618940	4270810	2702620	96244	0.0356	0.010	0.026	0.022
1985	2127570	4843100	3134920	96343	0.0307	0.008	0.022	0.018
1986	2659390	5250280	4372860	137499	0.0314	0.010	0.027	0.023
1987	5227420	5434110	5087090	187338	0.0368	0.013	0.034	0.029
1988	2828290	5414920	5122550	210989	0.0412	0.014	0.038	0.032
1989	3172420	5256650	4916890	209583	0.0426	0.015	0.039	0.033
1990	2213230	5016550	4654220	275968	0.0593	0.021	0.054	0.046
1991	3917750	4662660	4339050	287438	0.0662	0.023	0.061	0.051
1992	7659570	4301480	3981390	393631	0.0989	0.035	0.094	0.078
1993	6961380	3893680	3503640	453246	0.1294	0.047	0.123	0.103
1994	6385880	3514220	2992100	412291	0.1378	0.048	0.127	0.107

Year	Recruit (thousands)	Total Biomass	Spawning biomass	Catch	Yield/SSB	Fbar(1-3)	Fbar(4-8)	Fbar(1-10)
1995	3836720	3248070	2629550	538950	0.2050	0.071	0.188	0.158
1996	2155970	2890570	2315190	422396	0.1824	0.062	0.164	0.137
1997	1497210	2633790	2179160	534673	0.2454	0.088	0.231	0.194
1998	2574170	2234260	1927560	325340	0.1688	0.060	0.158	0.132
1999	2711470	2009570	1784670	298992	0.1675	0.061	0.160	0.134
2000	1999390	1794360	1585430	202732	0.1279	0.045	0.119	0.100
2001	11846100	1707190	1439890	229081	0.1591	0.056	0.148	0.124
2002	2179360	1661210	1287020	196120	0.1524	0.051	0.135	0.113
2003	1064110	1682780	1197440	191856	0.1602	0.050	0.133	0.111
2004	1949000	1697580	1204550	159742	0.1326	0.040	0.105	0.088
2005	1481480	1704380	1400640	182001	0.1299	0.044	0.115	0.097
2006	1231430	1643210	1464720	155827	0.1064	0.037	0.099	0.083
2007	1956800	1568880	1411860	123356	0.0874	0.030	0.080	0.067
2008	4945330	1516110	1349390	143349	0.1062	0.037	0.098	0.082
2009	1277190	1453060	1247790	183782	0.1473	0.052	0.137	0.115
2010	938294	1355040	1105300	203112	0.1838	0.063	0.167	0.140
2011	344757	1227270	991969	193698	0.1953	0.066	0.175	0.146
2012	2417070	1094660	944091	169859	0.1799	0.064	0.169	0.141

Year	Recruit (thousands)	Total Biomass	Spawning biomass	Catch	Yield/SSB	Fbar(1-3)	Fbar(4-8)	Fbar(1-10)
2013	1053240	977448	868583	165258	0.1903	0.070	0.185	0.155
2014	3375470	871492	744841	136360	0.1831	0.066	0.173	0.145
2015	2396120	814045	640294	98419	0.1537	0.051	0.136	0.114
2016	2777670	818210	606453	98810	0.1629	0.053	0.140	0.117
2017	3633800	847879	594977	82961	0.1394	0.043	0.114	0.095
2018	2968230	916541	642427	101682	0.1583	0.049	0.130	0.109
2019	1356420	976690	691329	124947	0.1807	0.057	0.150	0.126
2020	1083960	1002650	734333	76422	0.1041	0.032	0.085	0.071

Table 7.4.1. Western Horse Mackerel. Short term prediction: INPUT DATA. *geometric mean of the recruitment time series from 1983 to 2020. ** from assessment output

Age	N	Mat	M	PF	PM	Stock weight at age**
0	1083960	0.000	0.150	0	0	0.0043
1	1160330	0.000	0.150	0	0	0.0182
2	2135440	0.047	0.150	0	0	0.0420
3	2137200	0.269	0.150	0	0	0.0726
4	1294770	0.731	0.150	0	0	0.1062
5	862859	0.953	0.150	0	0	0.1399
6	920631	0.993	0.150	0	0	0.1718
7	213963	0.999	0.150	0	0	0.2008

Age	N	Mat	M	PF	PM	Stock weight at age**
8	360089	1.000	0.150	0	0	0.2264
9	37155.4	1.000	0.150	0	0	0.2485
10	72459.4	1.000	0.150	0	0	0.2673
11	70396.5	1.000	0.150	0	0	0.2831
12	195208	1.000	0.150	0	0	0.2962
13	55967.1	1.000	0.150	0	0	0.3070
14	25965.7	1.000	0.150	0	0	0.3159
15	23423.3	1.000	0.150	0	0	0.3232
16	23373.3	1.000	0.150	0	0	0.3292
17	9719.2	1.000	0.150	0	0	0.3340
18	15133.1	1.000	0.150	0	0	0.3379
19	62147.7	1.000	0.150	0	0	0.3410
20	42886.4	1.000	0.150	0	0	0.3458

Table 7.4.2. Western Horse Mackerel. Short term prediction; single area management option table. Assumption: Catch 2021: 81 375 t (100% of 2021 TOTAL TAC).

Scenarios	F_{factor}	F_{bar}	Catch_2021	Catch_2022	SSB_2022	SSB_2023	Change_SSB_2022-2023(%)	Change_Catch_2021-2022(%)
B2023=B_{pa}	cannot be reached even by setting F to 0							
F=0	0.000	0.000	81375	0	912868	1008671	10.49	-100.00
	0.100	0.007	81375	8987	912868	1000341	9.58	-88.96

Scenarios	F_{factor}	F_{bar}	Catch_2021	Catch_2022	SSB_2022	SSB_2023	Change_SSB_2022-2023(%)	Change_Catch_2021-2022(%)
	0.200	0.014	81375	17902	912868	992081	8.68	-78.00
	0.300	0.021	81375	26744	912868	983892	7.78	-67.13
	0.400	0.028	81375	35515	912868	975772	6.89	-56.36
PELAC HCR	0.404	0.029	81375	36423	912868	974909	6.80	-55.24
	0.500	0.035	81375	44215	912868	967721	6.01	-45.67
	0.600	0.043	81375	52844	912868	959738	5.13	-35.06
	0.700	0.050	81375	61404	912868	951823	4.27	-24.54
	0.800	0.057	81375	69895	912868	943975	3.41	-14.11
$FmsyXSSB22byMSYB_{trig}$	0.815	0.058	81375	71138	912868	942827	3.28	-12.58
	0.900	0.064	81375	78317	912868	936194	2.56	-3.76
F_{stq}	0.981	0.070	81375	85078	912868	929950	1.87	4.55
	1.000	0.071	81375	86672	912868	928478	1.71	6.51
FMSY	1.043	0.074	81375	90214	912868	925208	1.35	10.86
	1.100	0.078	81375	94959	912868	920828	0.87	16.69
Fp05	1.113	0.079	81375	96038	912868	919832	0.76	18.02
	1.200	0.085	81375	103179	912868	913243	0.04	26.79
	1.300	0.092	81375	111333	912868	905722	-0.78	36.81
	1.400	0.099	81375	119421	912868	898265	-1.60	46.75

Scenarios	F_{factor}	F_{bar}	Catch_2021	Catch_2022	SSB_2022	SSB_2023	Change_SSB_2022-2023(%)	Change_Catch_2021-2022(%)
F_{lim}	1.451	0.103	81375	123540	912868	894468	-2.02	51.82
	1.500	0.106	81375	127444	912868	890871	-2.41	56.61
	1.600	0.114	81375	135402	912868	883540	-3.21	66.39
	1.700	0.121	81375	143297	912868	876271	-4.01	76.09
	1.800	0.128	81375	151128	912868	869063	-4.80	85.72
	1.900	0.135	81375	158896	912868	861916	-5.58	95.26
	2.000	0.142	81375	166601	912868	854830	-6.36	104.73
B2023=B_{lim}	2.292	0.163	81375	188749	912868	834480	-8.59	131.95

7.16   Figures
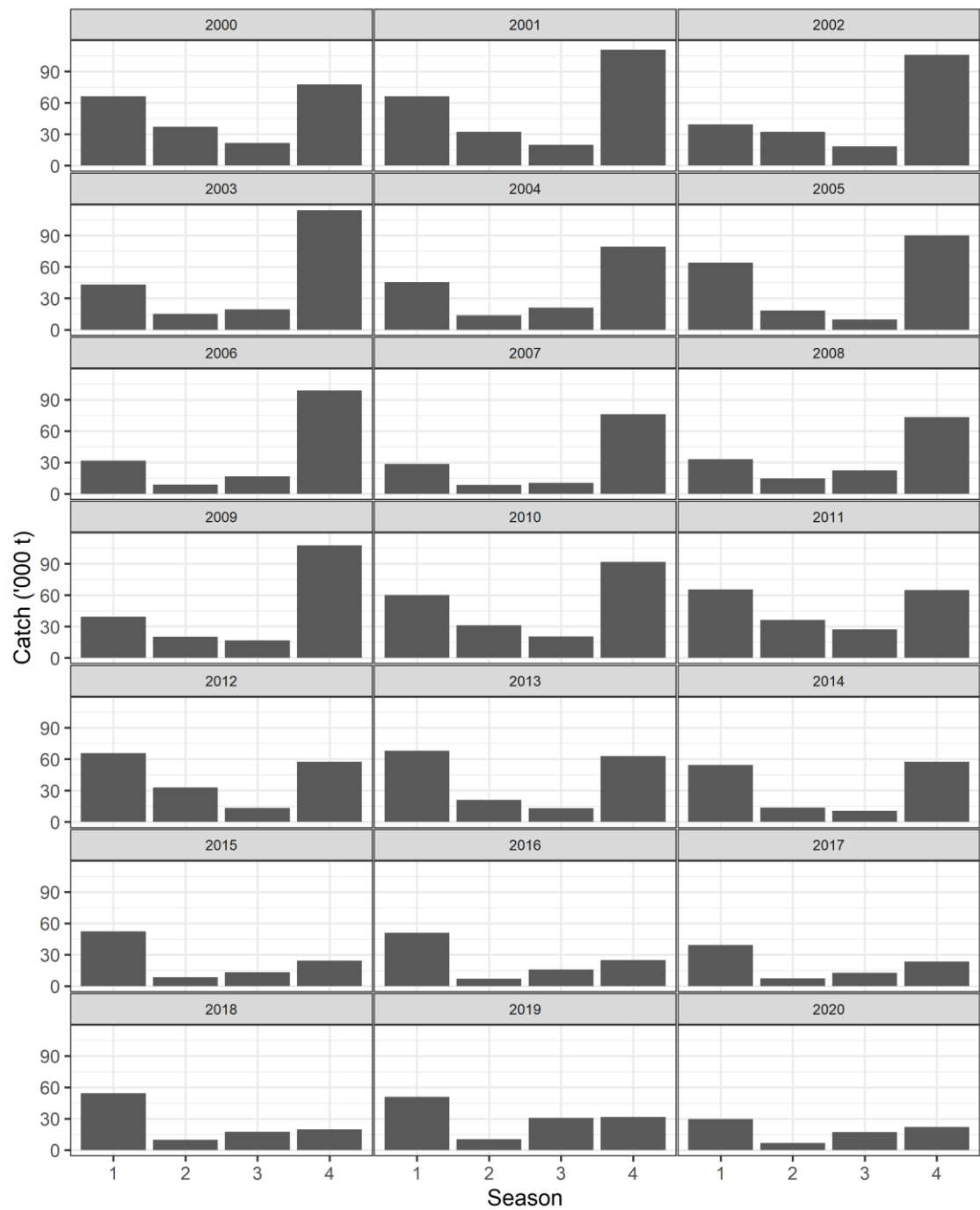
Figure 7.1.1.1: Western horse mackerel. Catch by quarter and year for 2000–2020.

Western HOM catches by Category
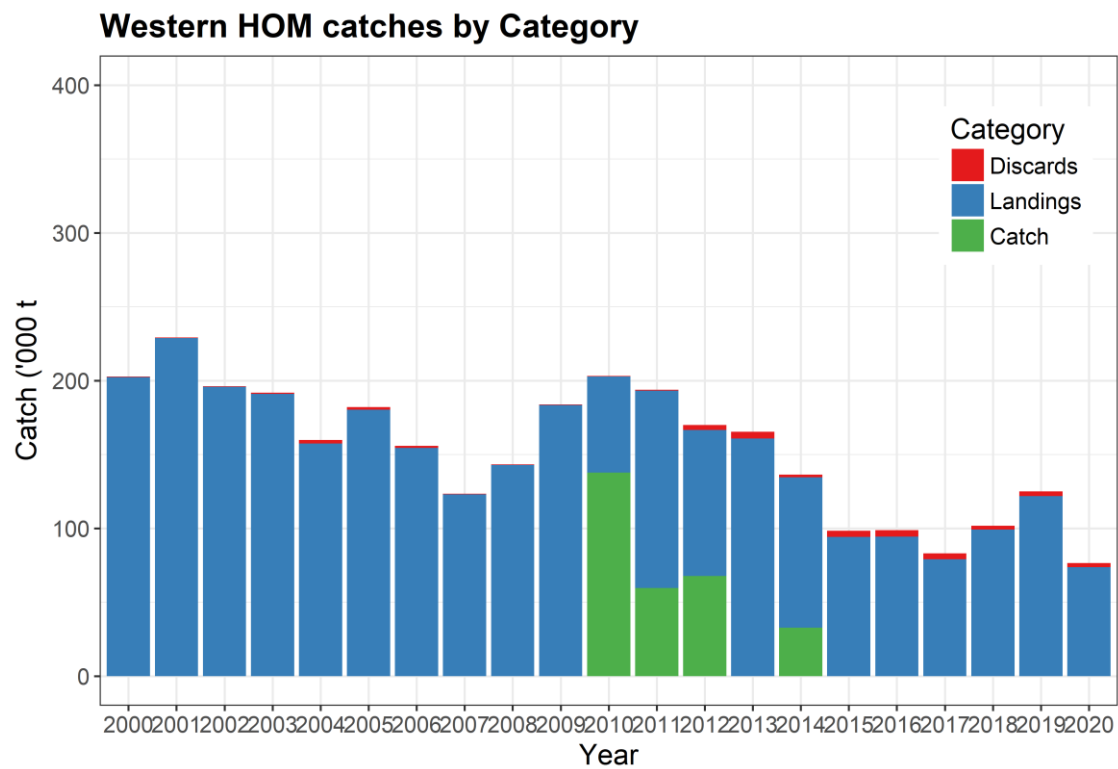
Figure 7.1.2.1. Western horse mackerel. Catch categories since 2000.
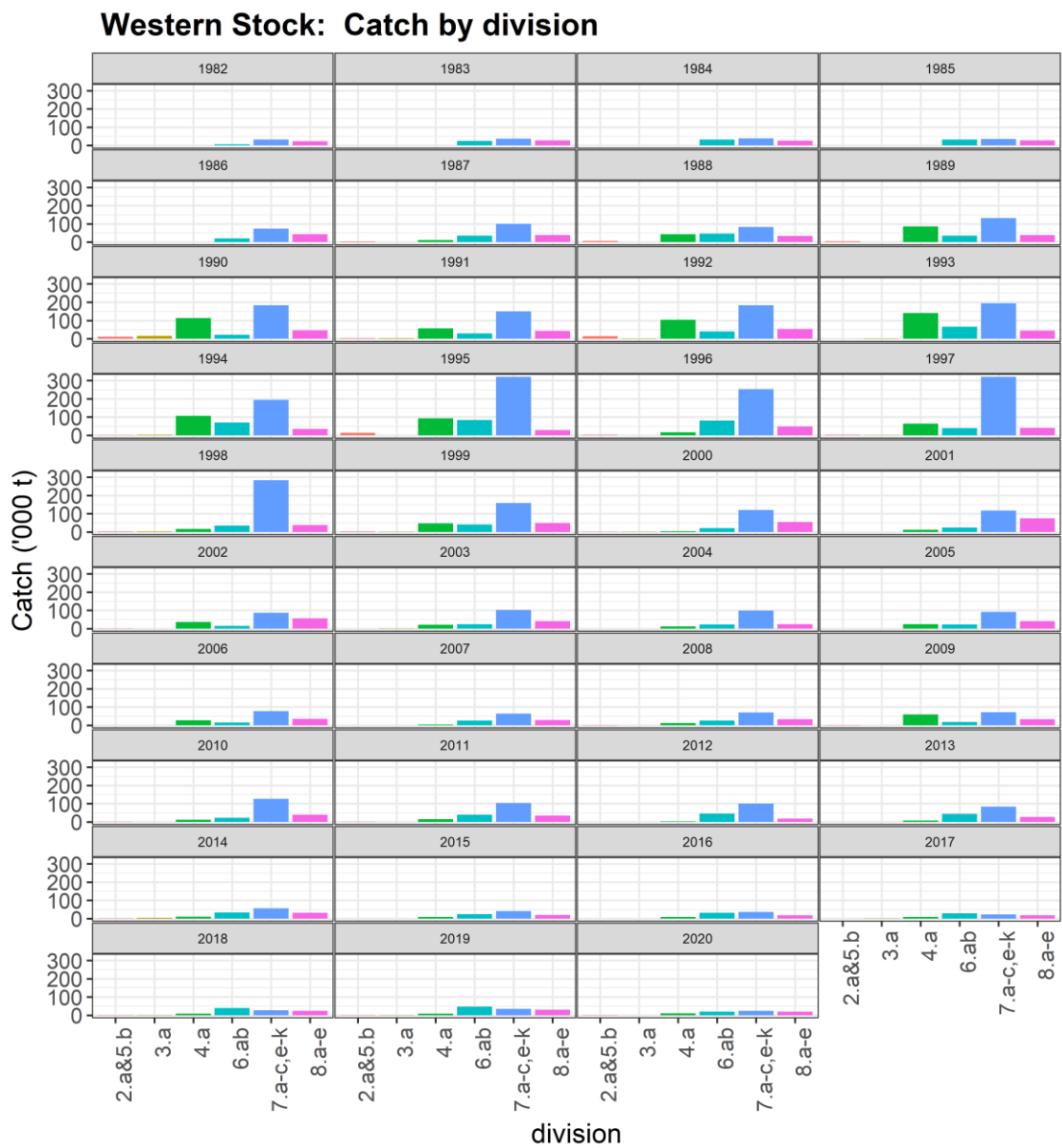
Figure 7.1.3.1: Western horse mackerel. Catch by ICES Division and year for 1982-2020.
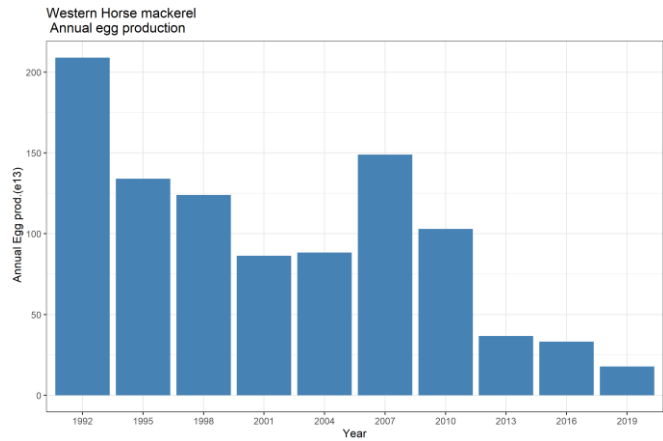
Figure 7.2.1.1. Total Annual Egg Production estimates for western horse mackerel stock. 1992–2019.
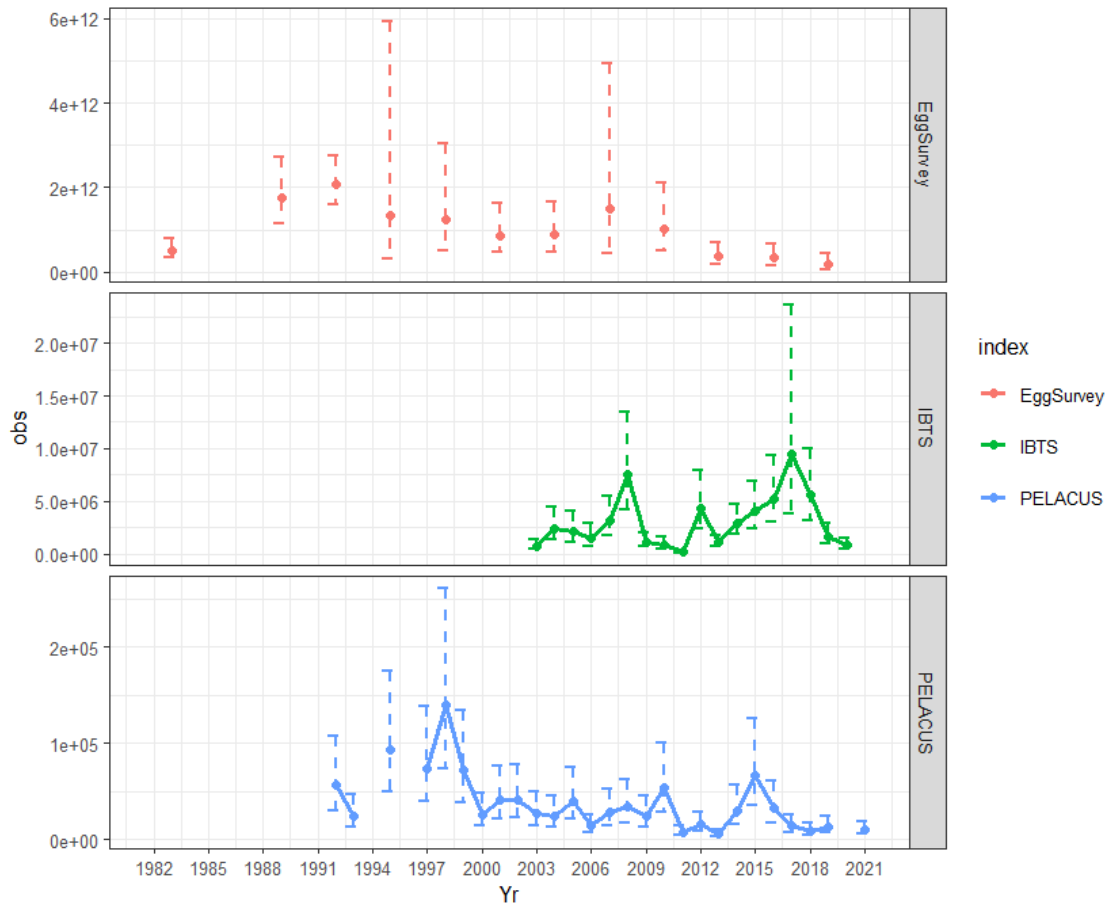
Figure 7.2.2.1: Western horse mackerel. Trend of the fisheries independent indices of abundance used in the assessment of Western Horse mackerel. Top: Spawning index from egg survey; middle: recruitment index from IBTS survey; bottom: biomass estimates from PELACUS acoustic survey. Confidence intervals are shown as well.

2020 Western Stock: cat@ge by division
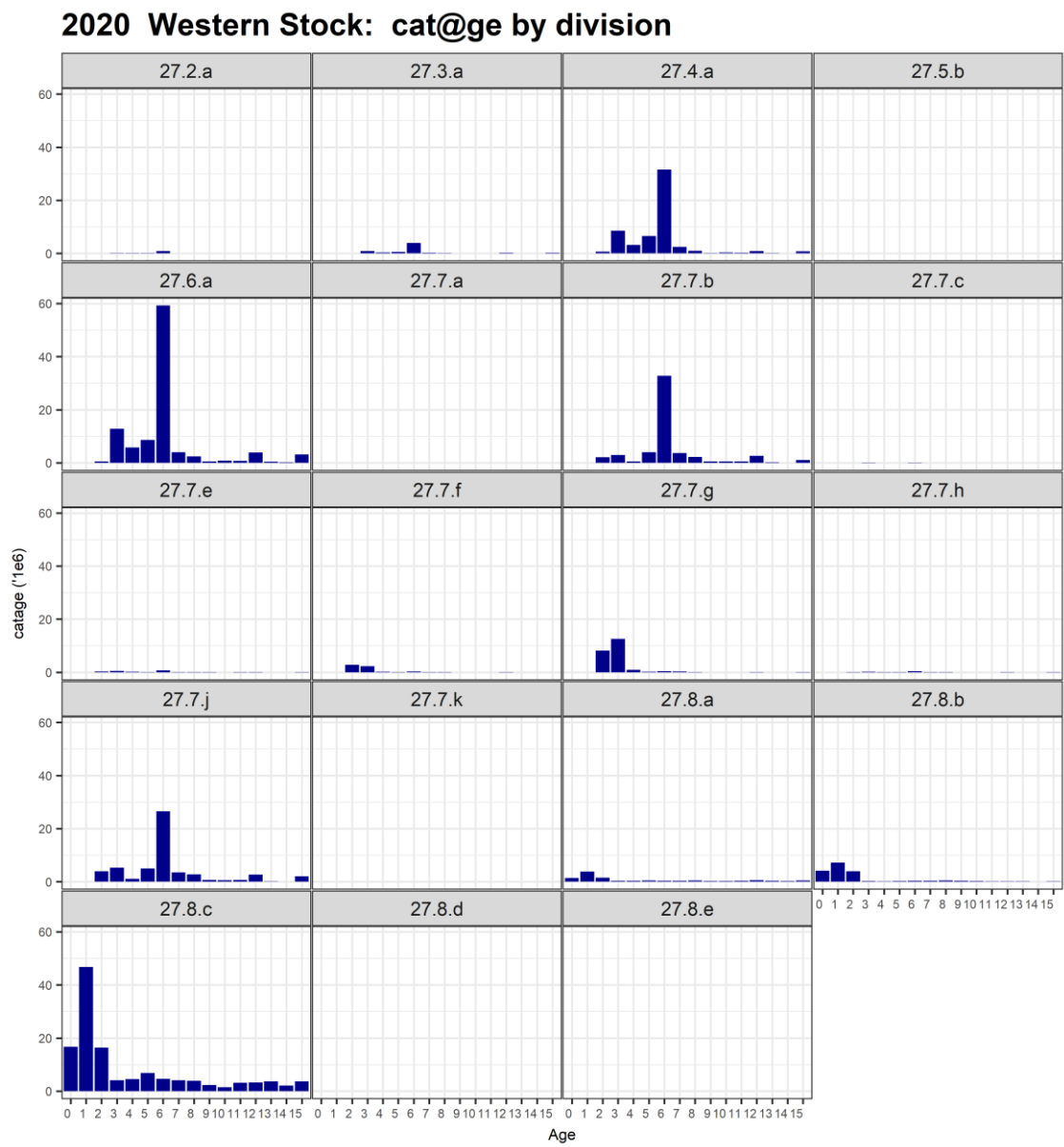
Figure 7.2.4.1: Western horse mackerel. Catch-at-age (millions) by ICES division in 2020.
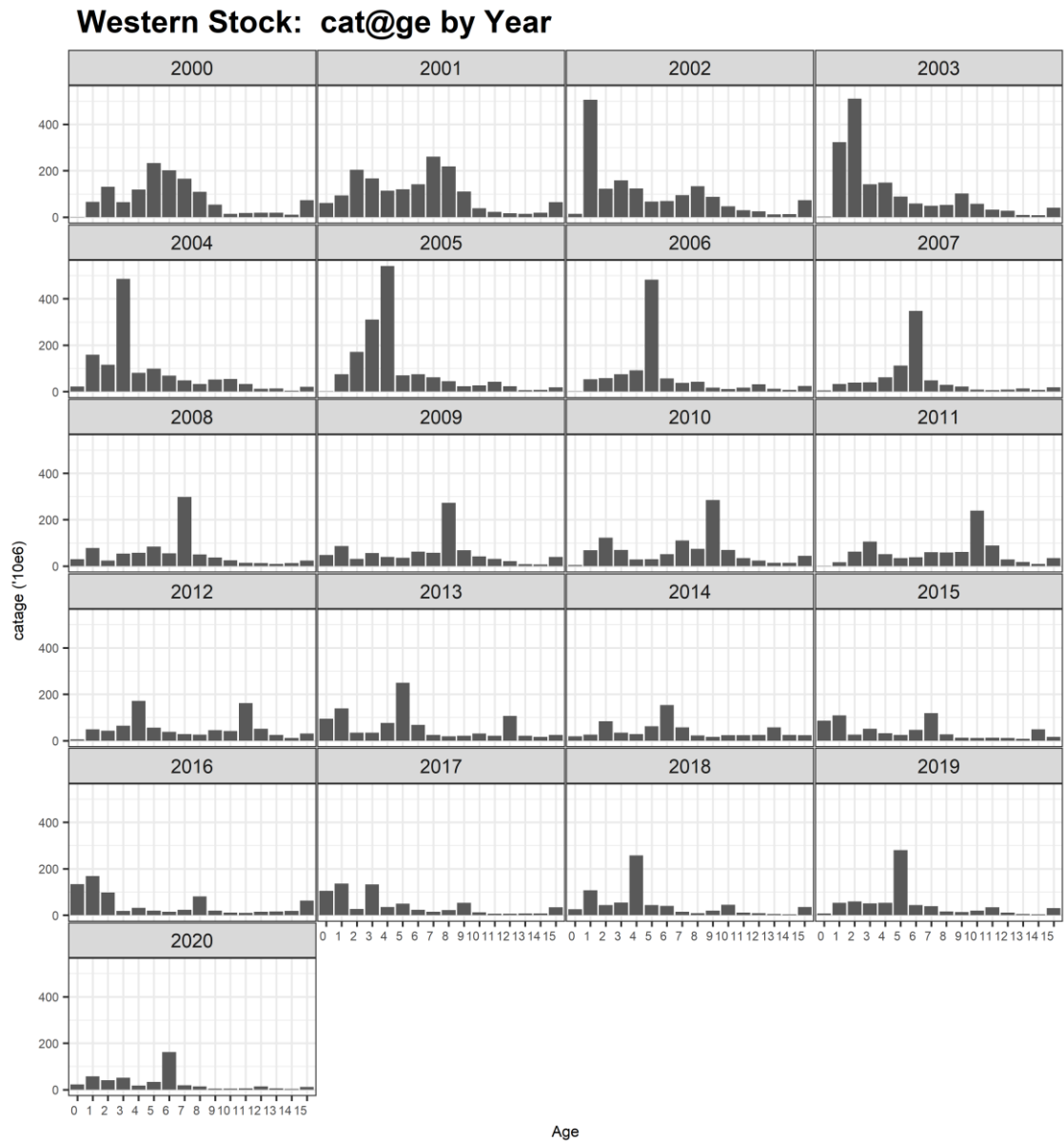
Figure 7.2.4.2: Western horse mackerel. Catch-at-age (millions) by Year.
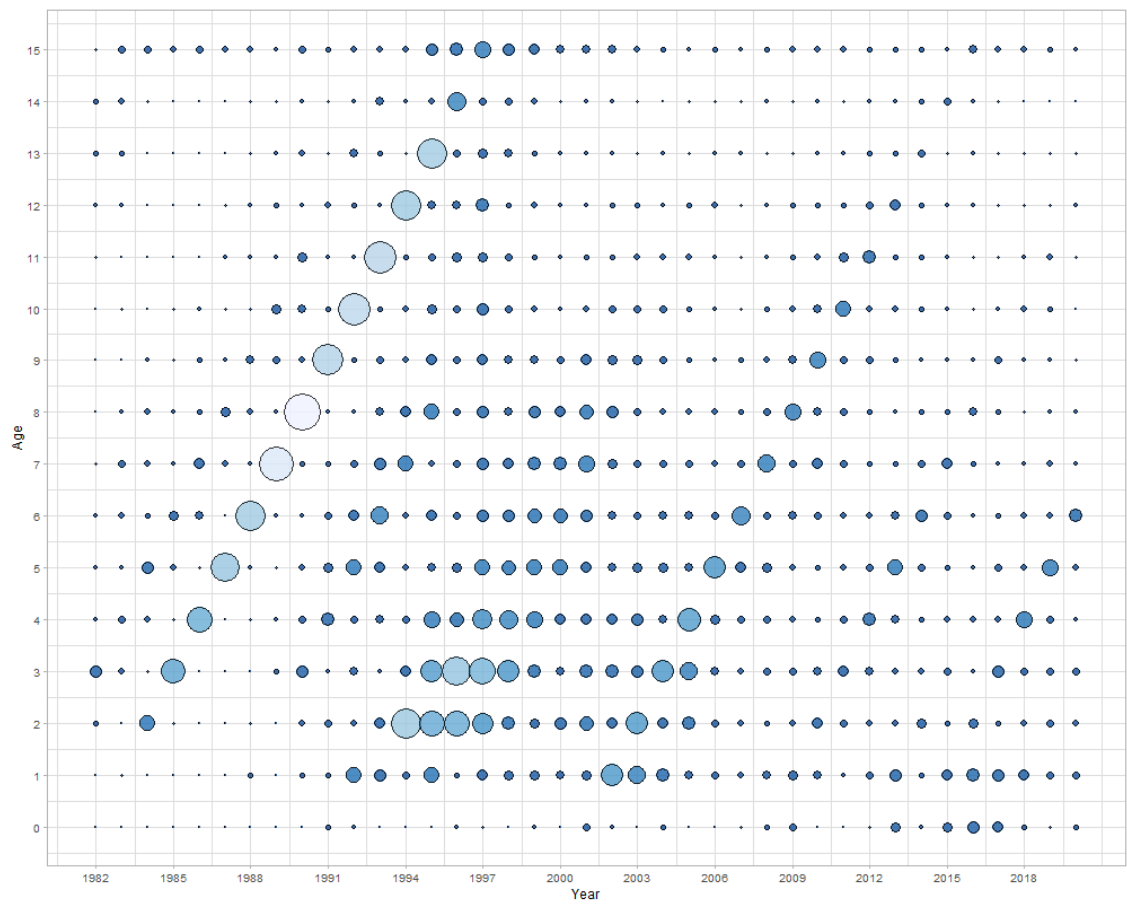
Figure 7.2.4.3: Western horse mackerel. Catch-at-age - the area of bubbles is proportional to the catch number. Age 15 is a plus group.

Weight at age - 1st & 2nd quarter
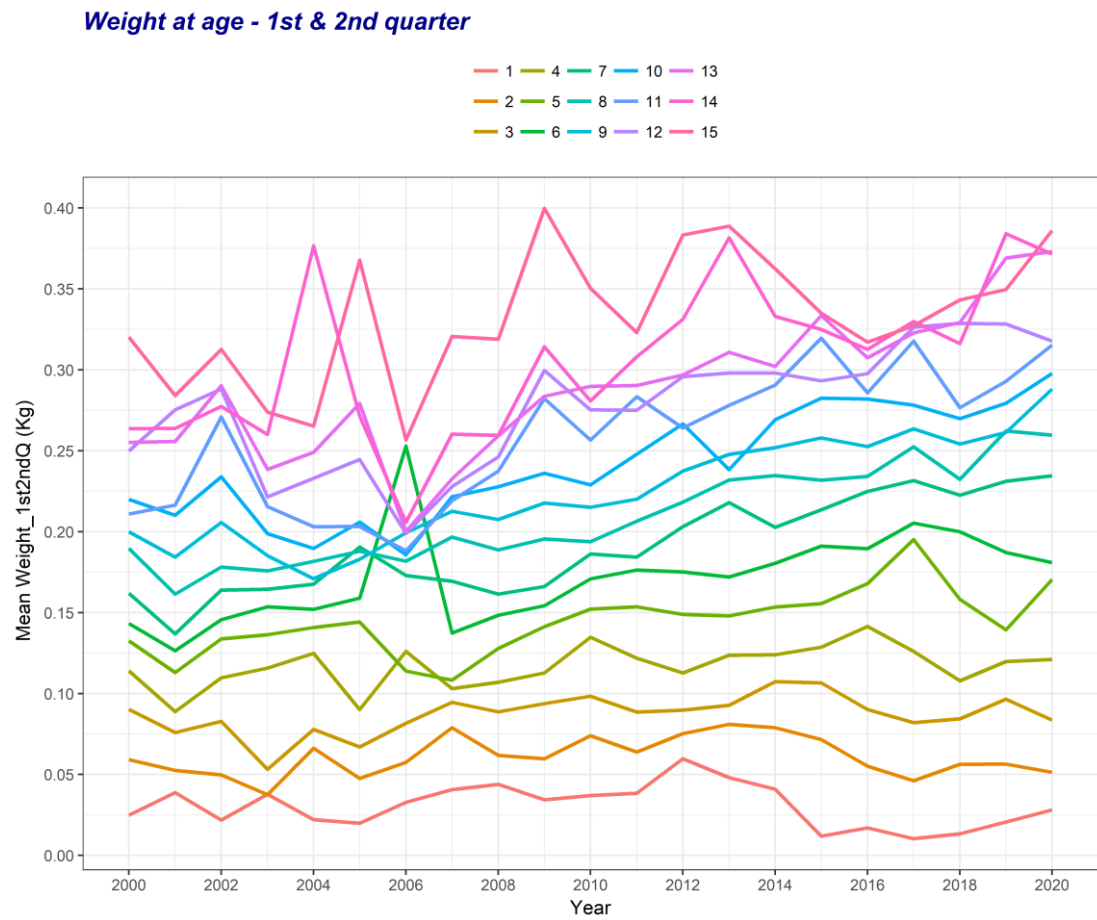
Figure 7.2.5.1: Western horse mackerel. Weight at age in the catch (kg) by year.
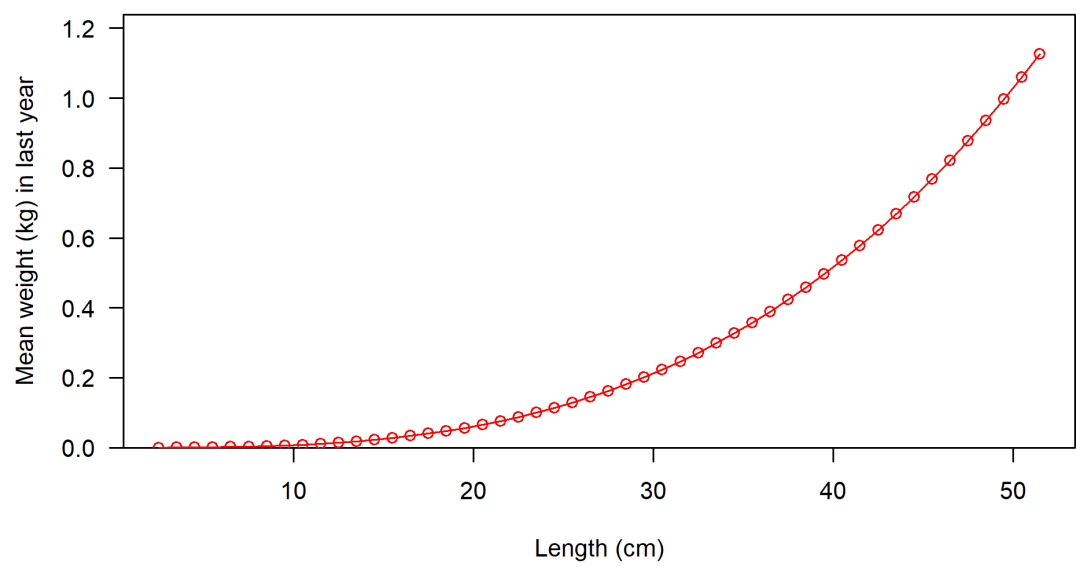
Figure 7.2.5.2: Western horse mackerel. Weight at length in the stock (kg) as estimated by the stock assessment.
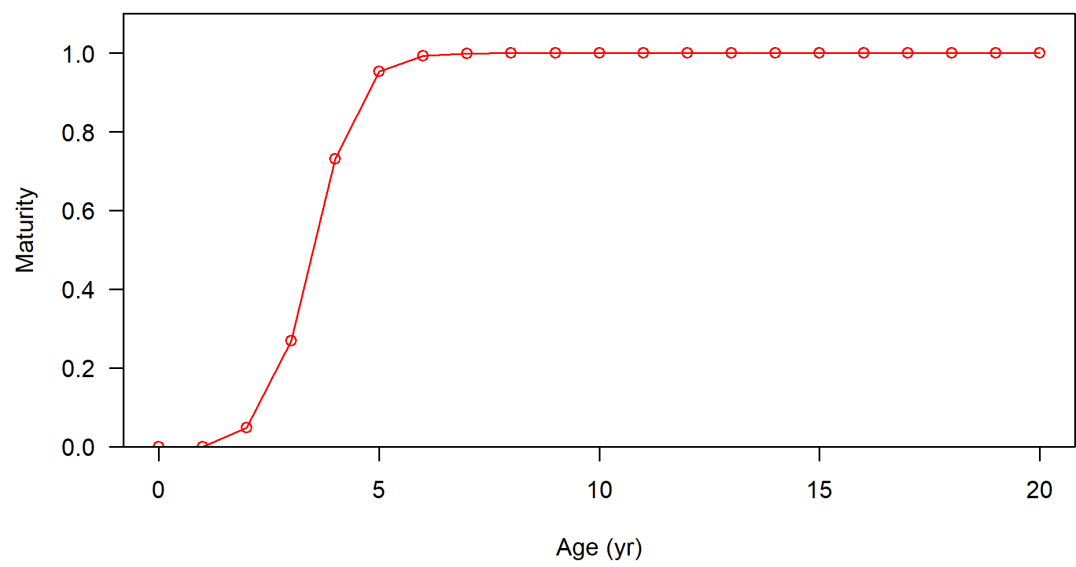
Figure 7.2.6.1: Western horse mackerel. Maturity at age as used in the assessment model.
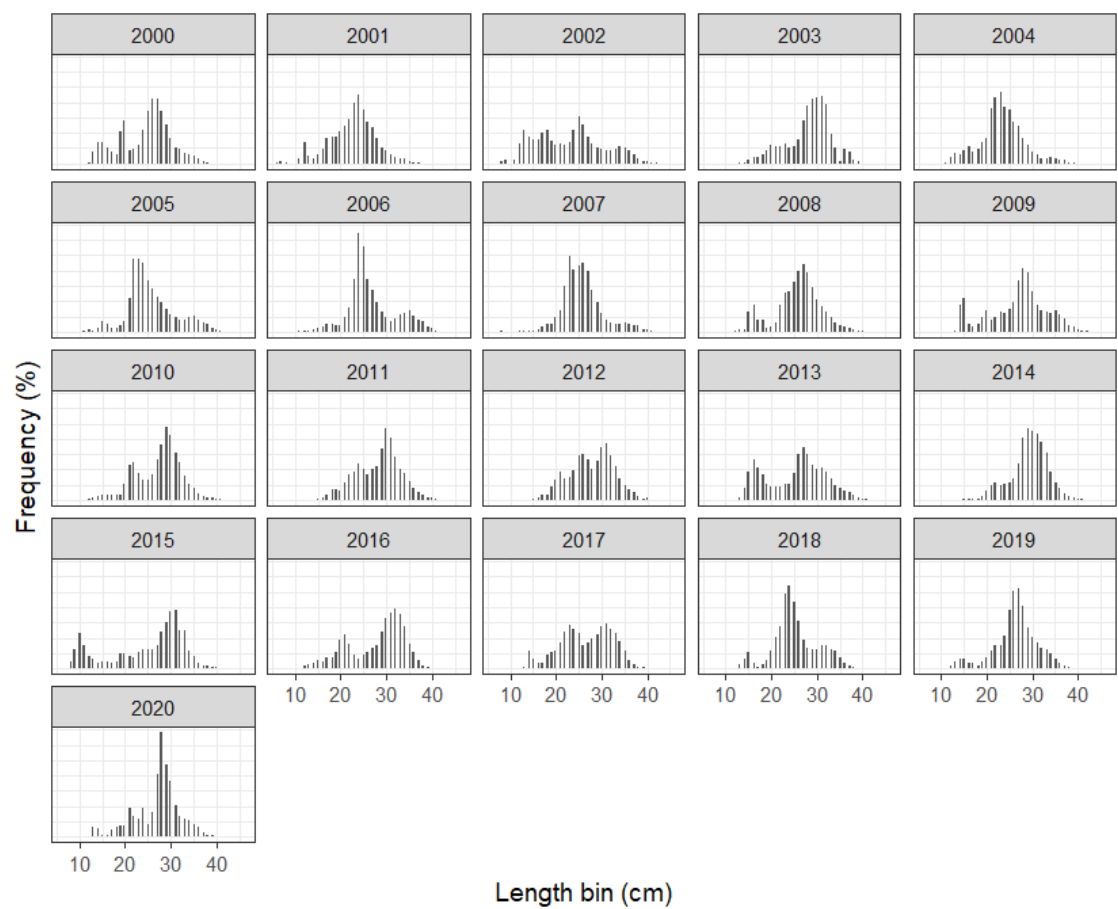
Figure 7.2.10.1: Western horse mackerel. Length frequency distribution of the landing data as used in the assessment model.
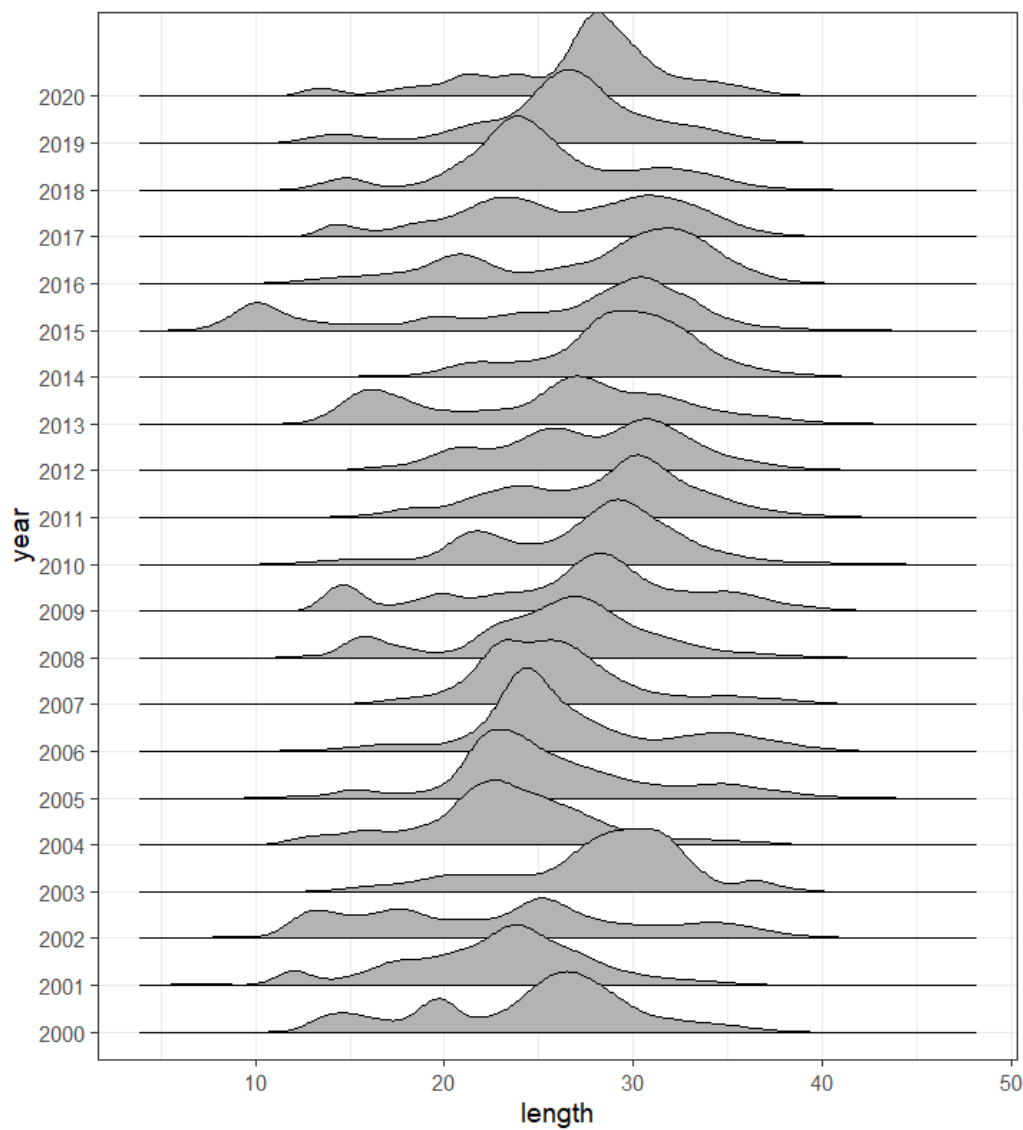
Figure 7.2.10.2: Western horse mackerel. Stacked length frequency distribution of the landing data as used in the assessment model.
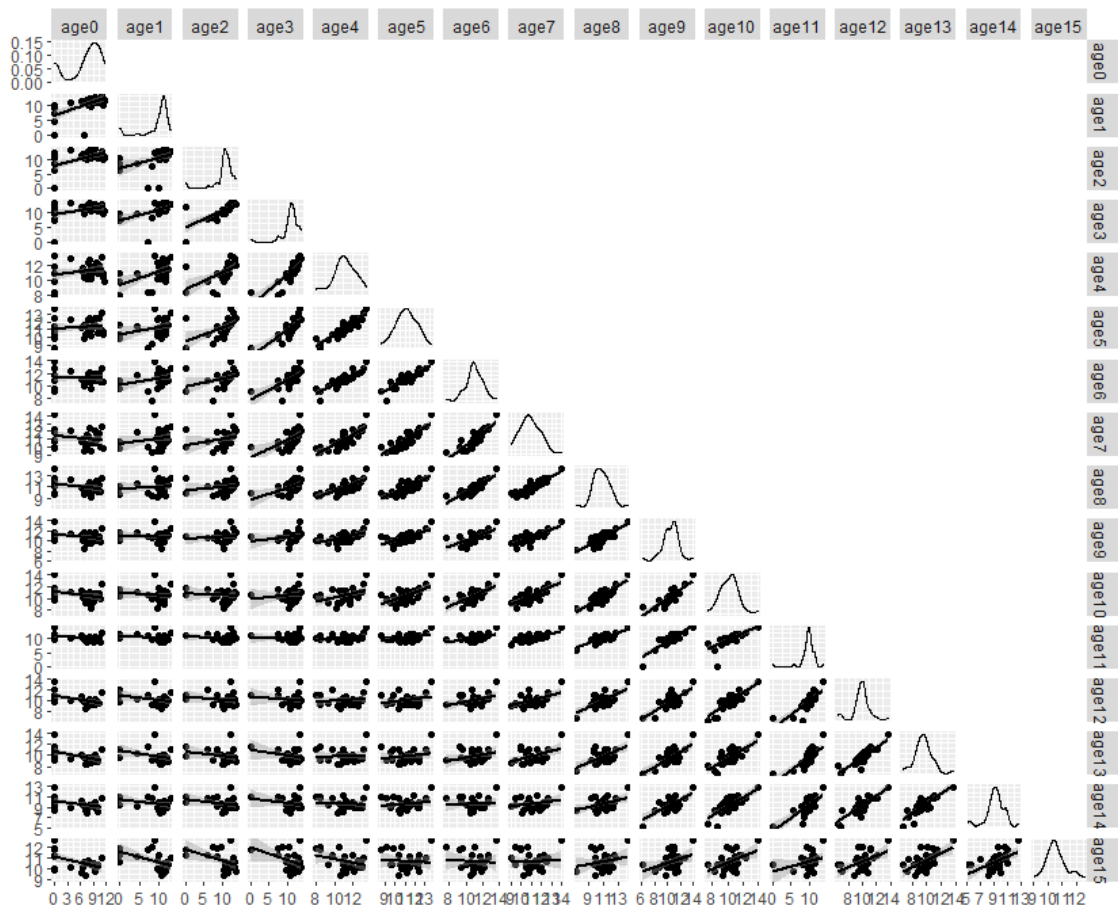
Figure 7.2.10.3: Western horse mackerel. Within-cohort consistency in the catch-at-age matrix, shown by plotting the log-catch of a cohort at a particular age against the log-catch of the same cohort at subsequent ages.
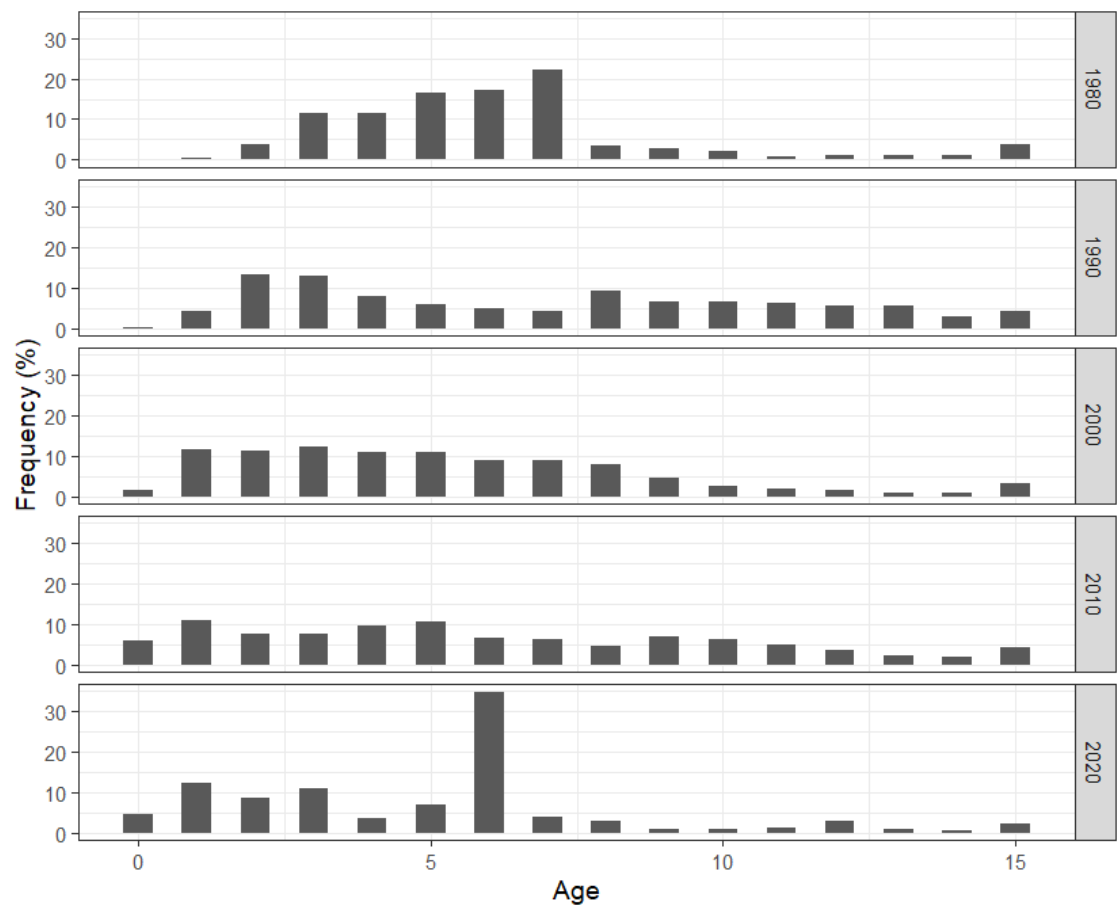
Figure 7.2.10.4: Western horse mackerel. Catch numbers at age composition by decade.
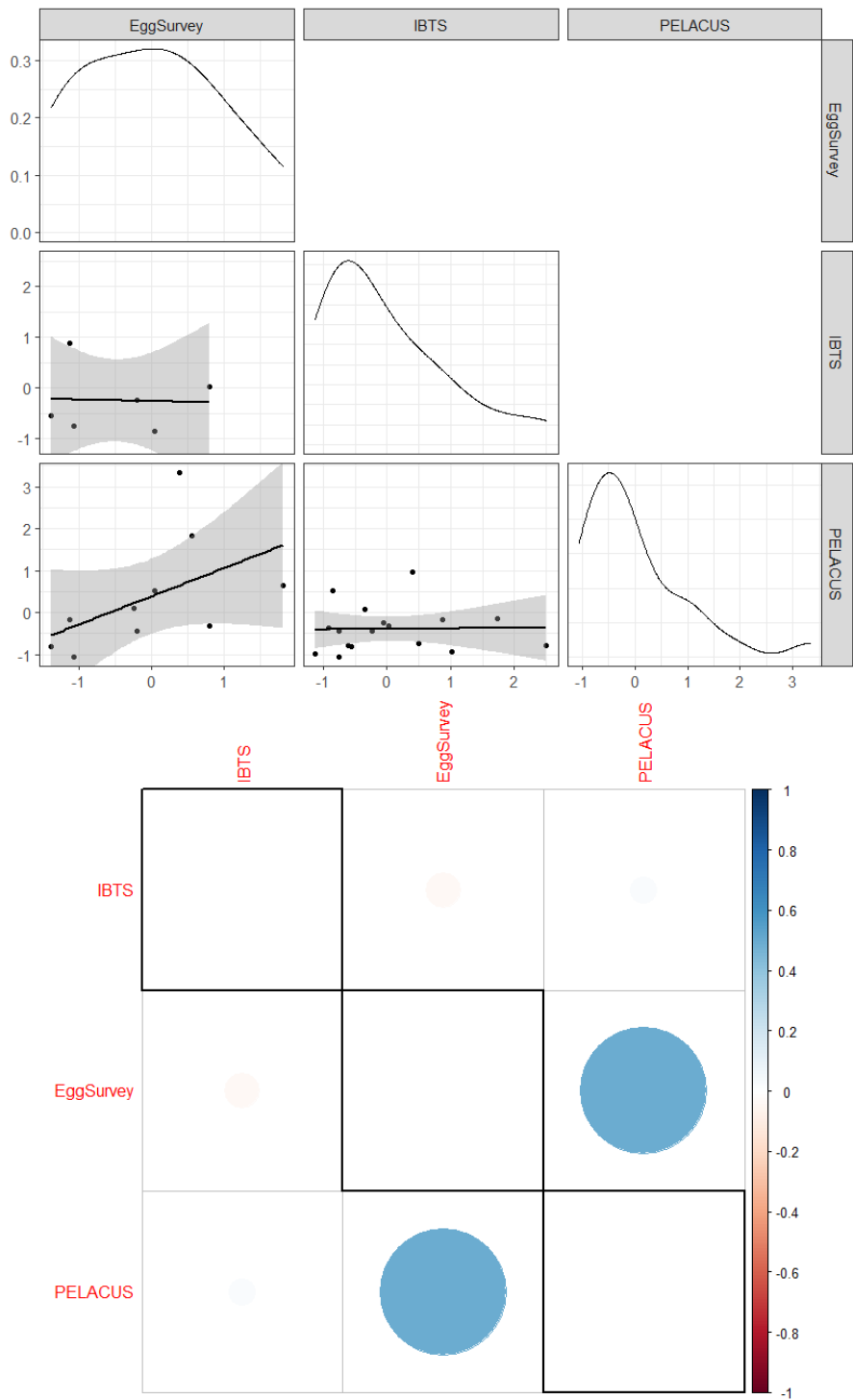
Figure 7.2.10.5: Western horse mackerel. Data exploration. Correlation plots between indices of abundance (including 2020 data points).
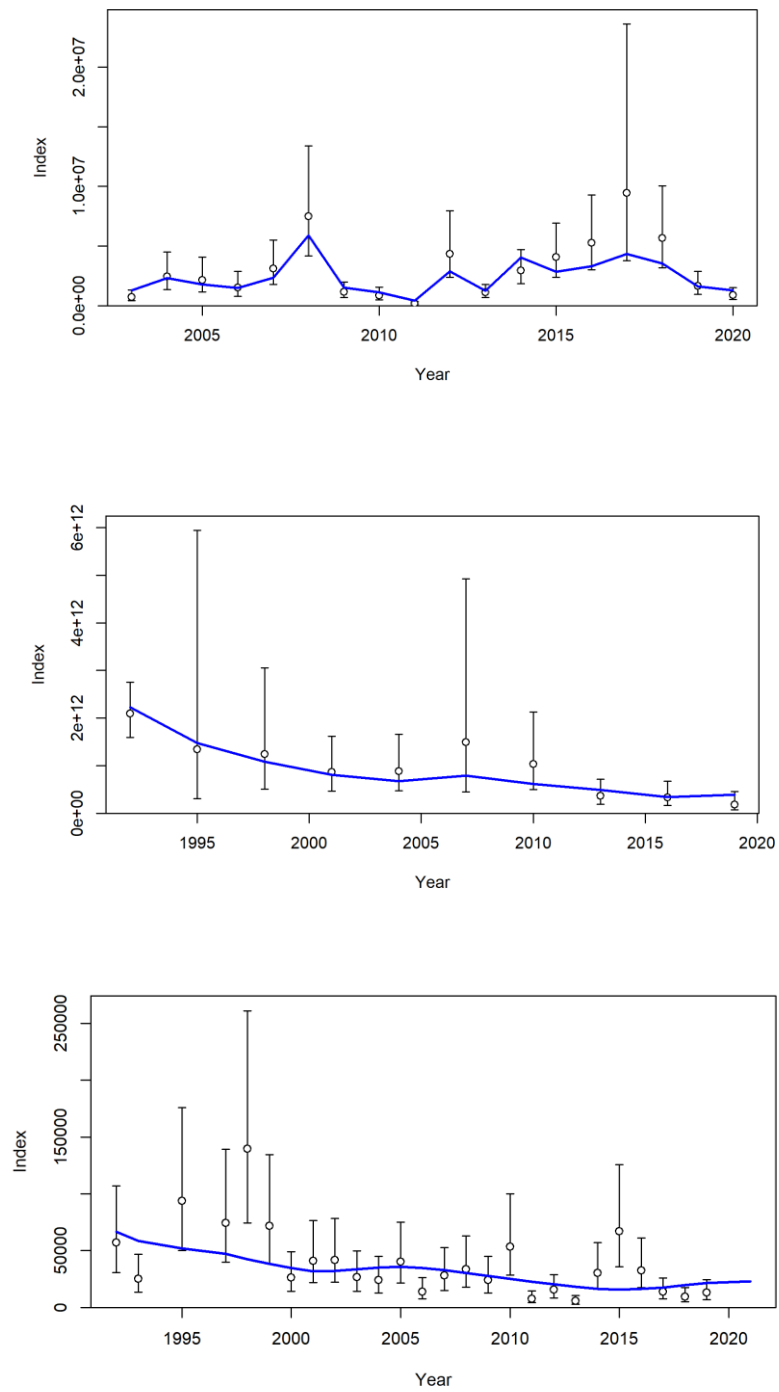
Figure 7.2.11.1: Western horse mackerel. Model fitting. Fitting of the model to the fisheries-independent indices. From top to bottom: IBTS, egg survey, PELACUS.
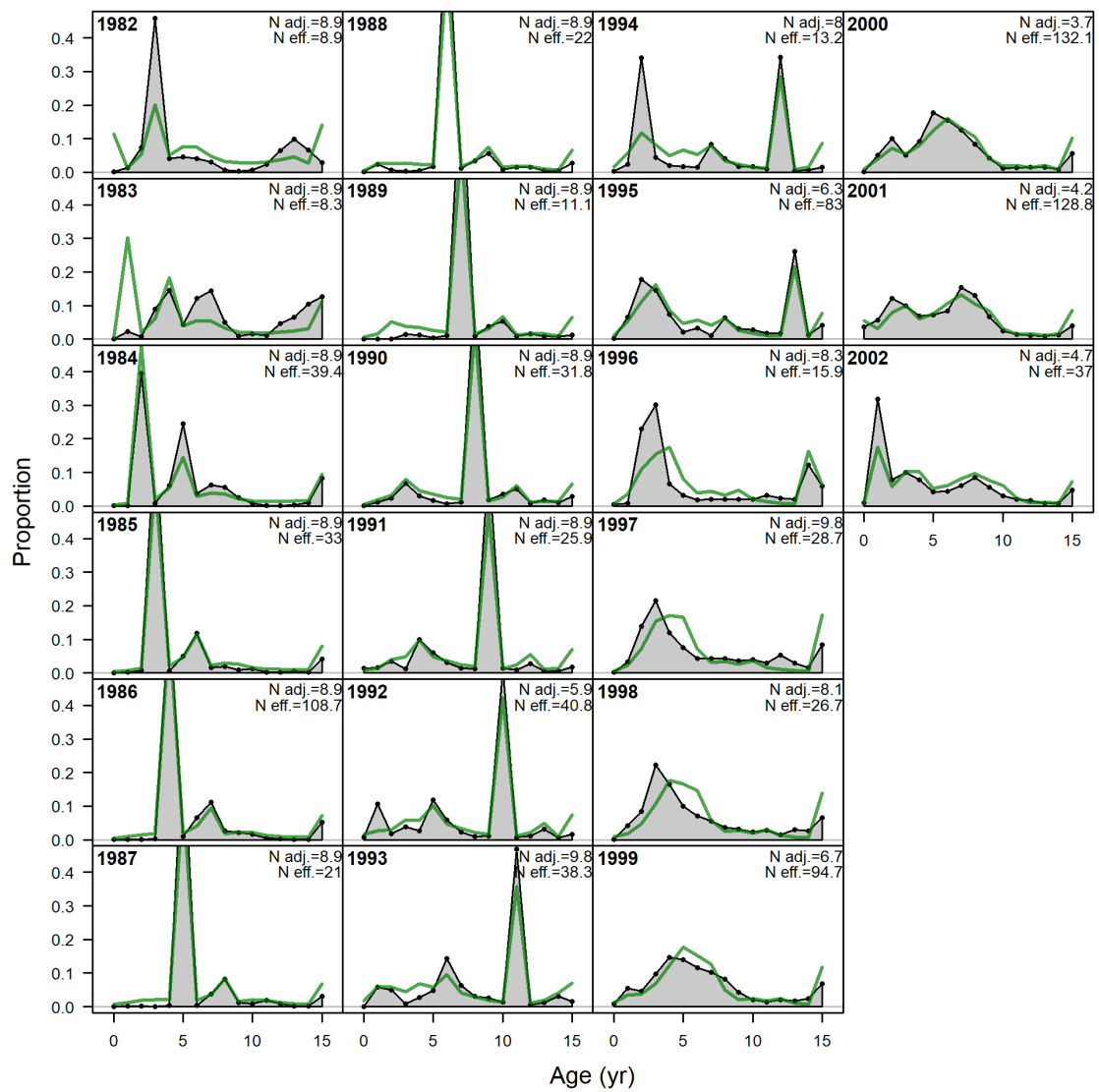
Figure 7.2.11.1 cont.: Western horse mackerel. Model fitting. Fitting of the model to the catch at age matrix from 1982 to 2002.
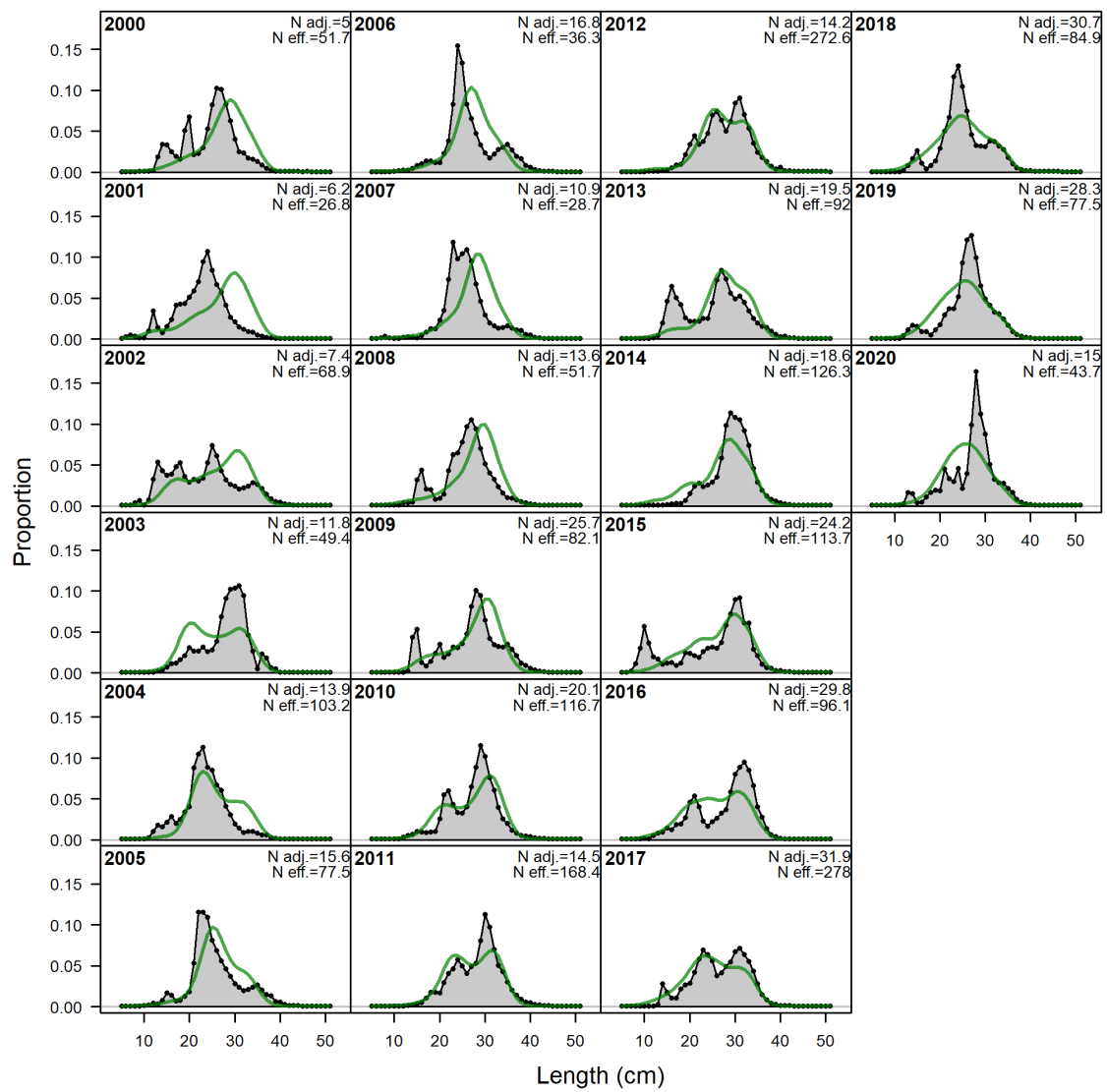
Figure 7.2.11.1 cont.: Western horse mackerel. Model fitting. Fitting of the model to the length composition of the landing data from 2002 to 2020.
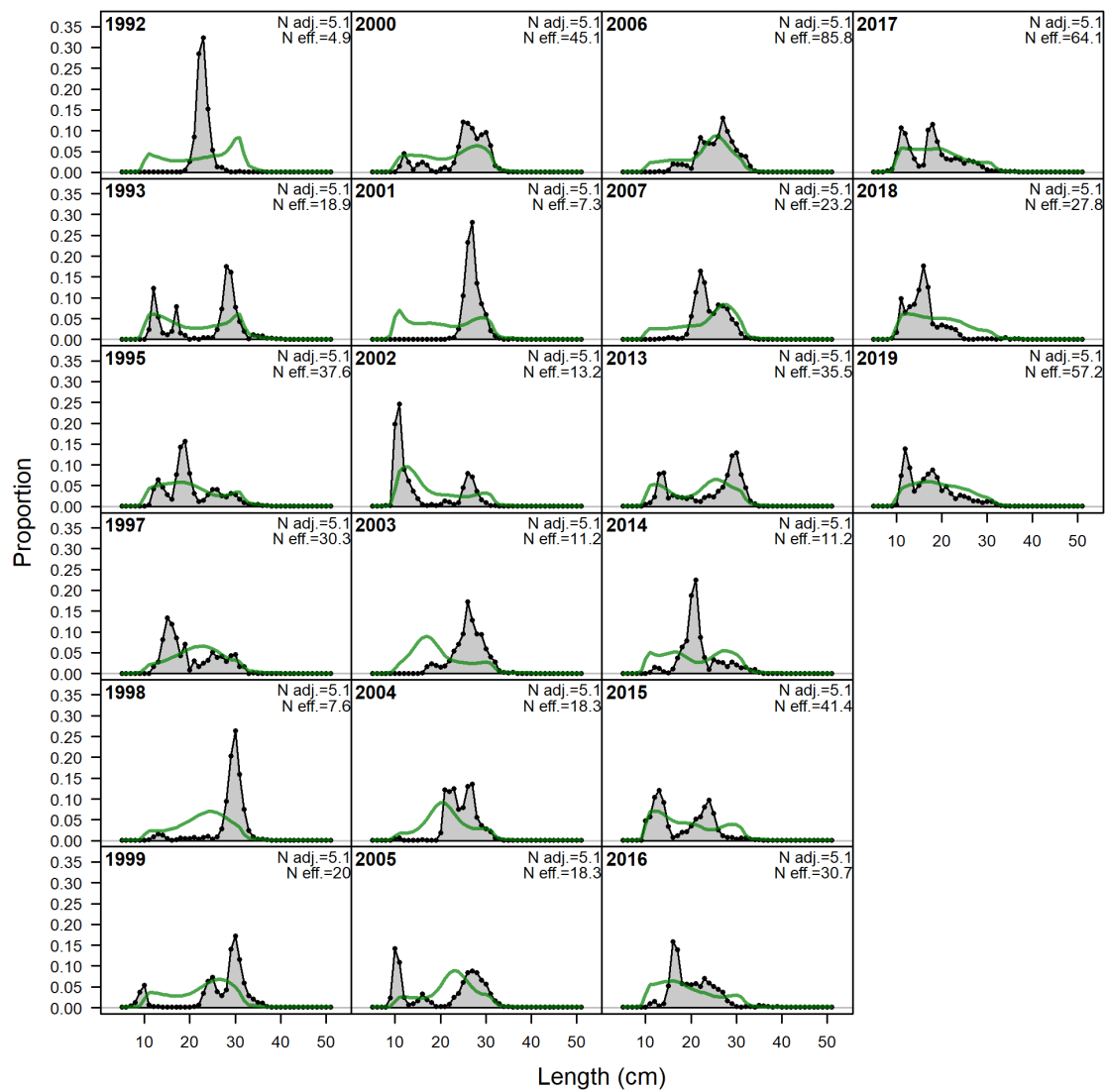
Figure 7.2.11.1 cont.: Western horse mackerel. Model fitting. Fitting of the model to the length composition of the acoustic survey.
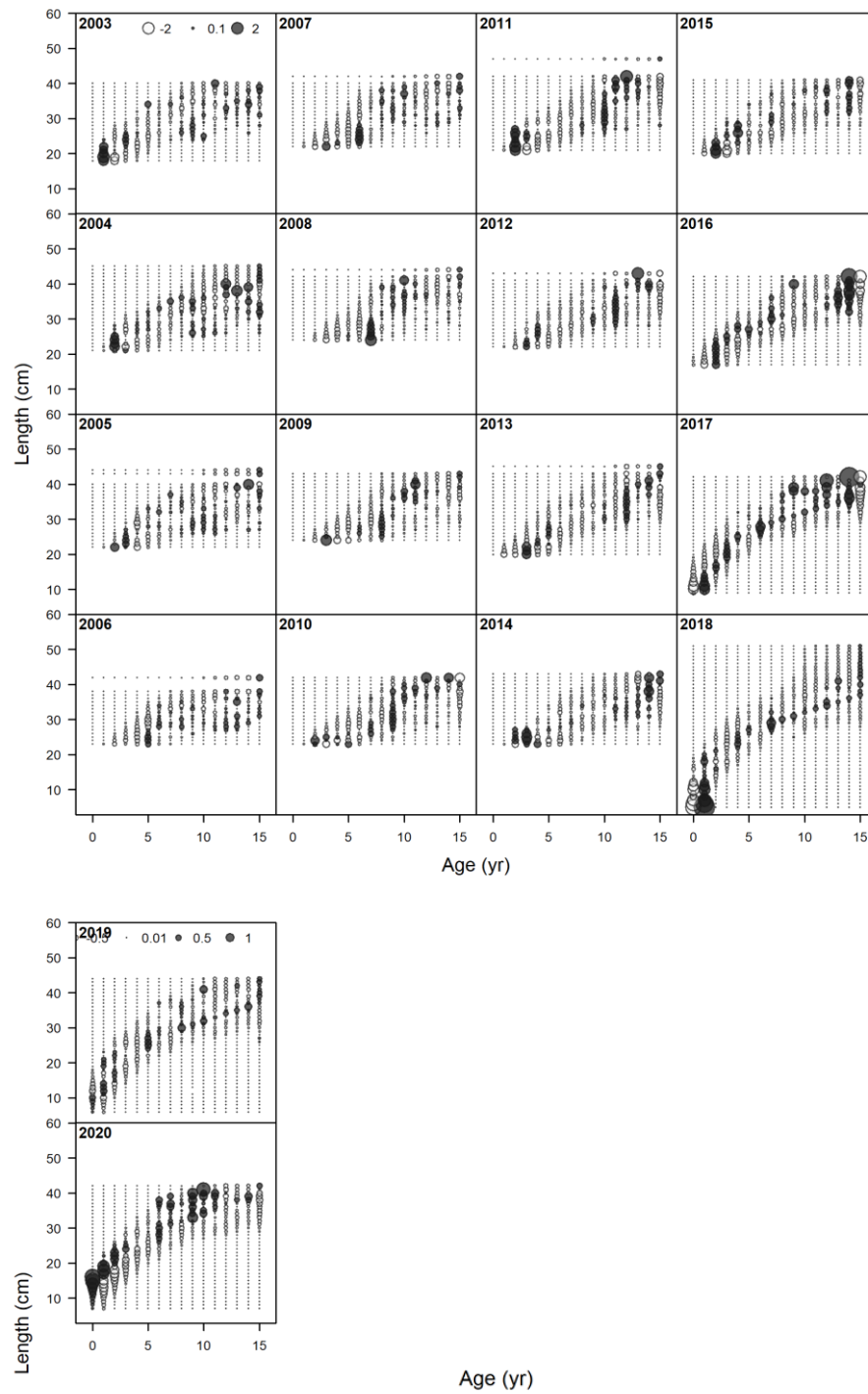
Figure 7.2.11.1 cont.: Western horse mackerel. Model fitting. Fitting of the model to the Age length comp of the catch.
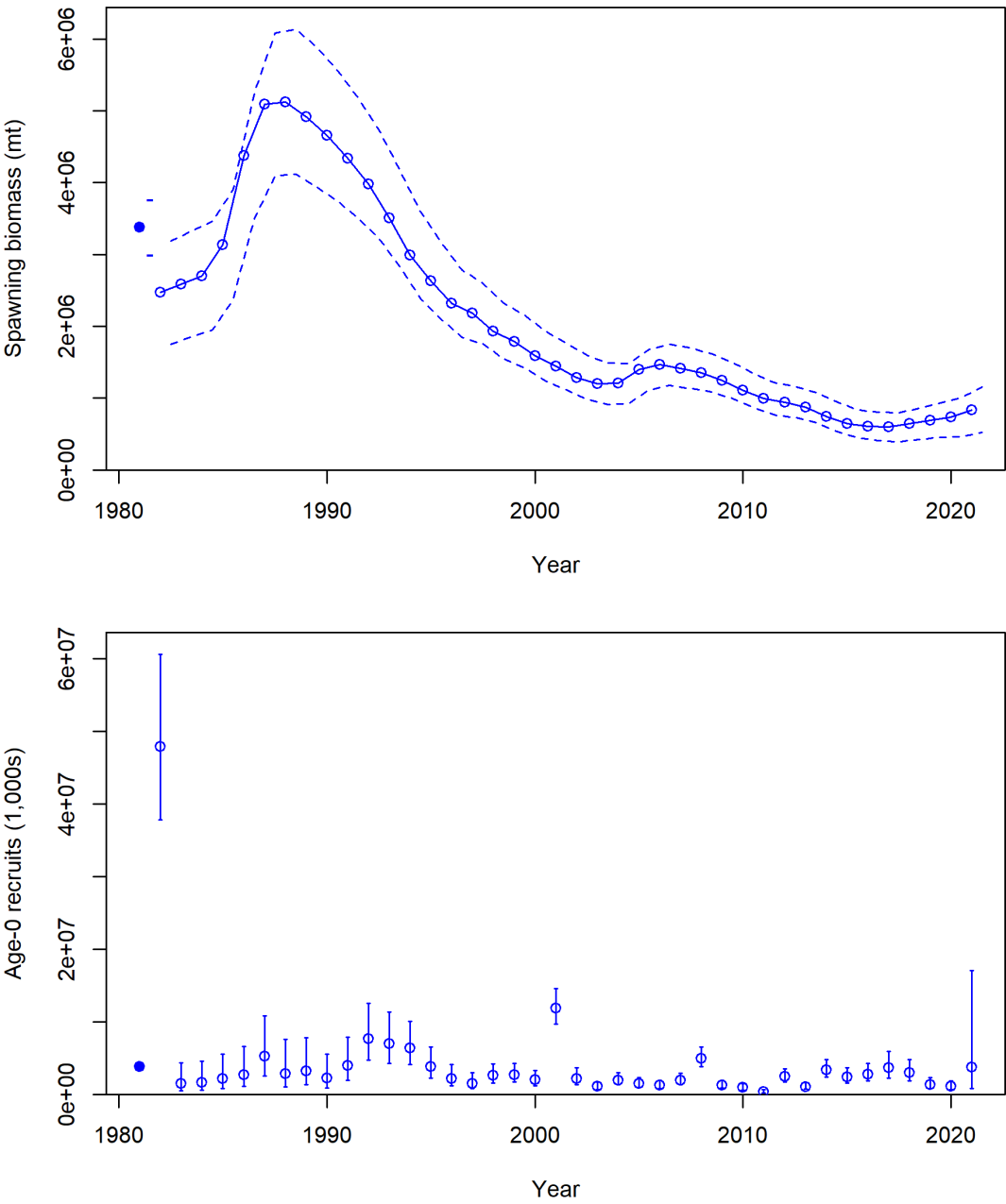
Figure 7.2.11.2: Western horse mackerel. Model results. Spawning stock biomass (0.5 of the overall SSB only is shown; plot on the top) and recruitment estimates (plot on the bottom) from the assessment model from 1982 to 2021. 95% CI are shown.
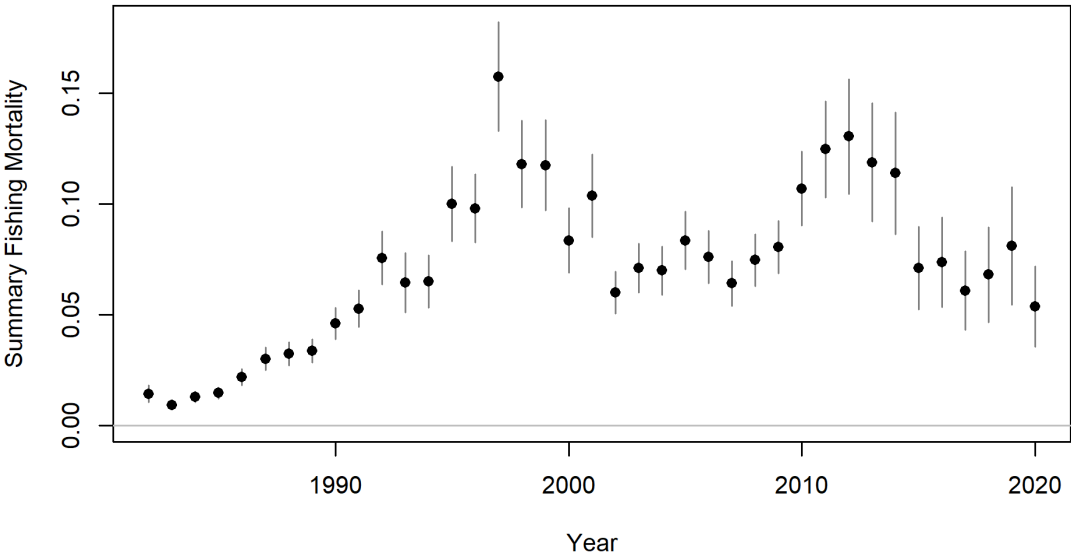
Figure 7.2.11.2 cont.: Western horse mackerel. Model results. Fishing mortality estimates (Fbar ages 1–10) from the assessment model from 1982 to 2020. 95% CI are shown.
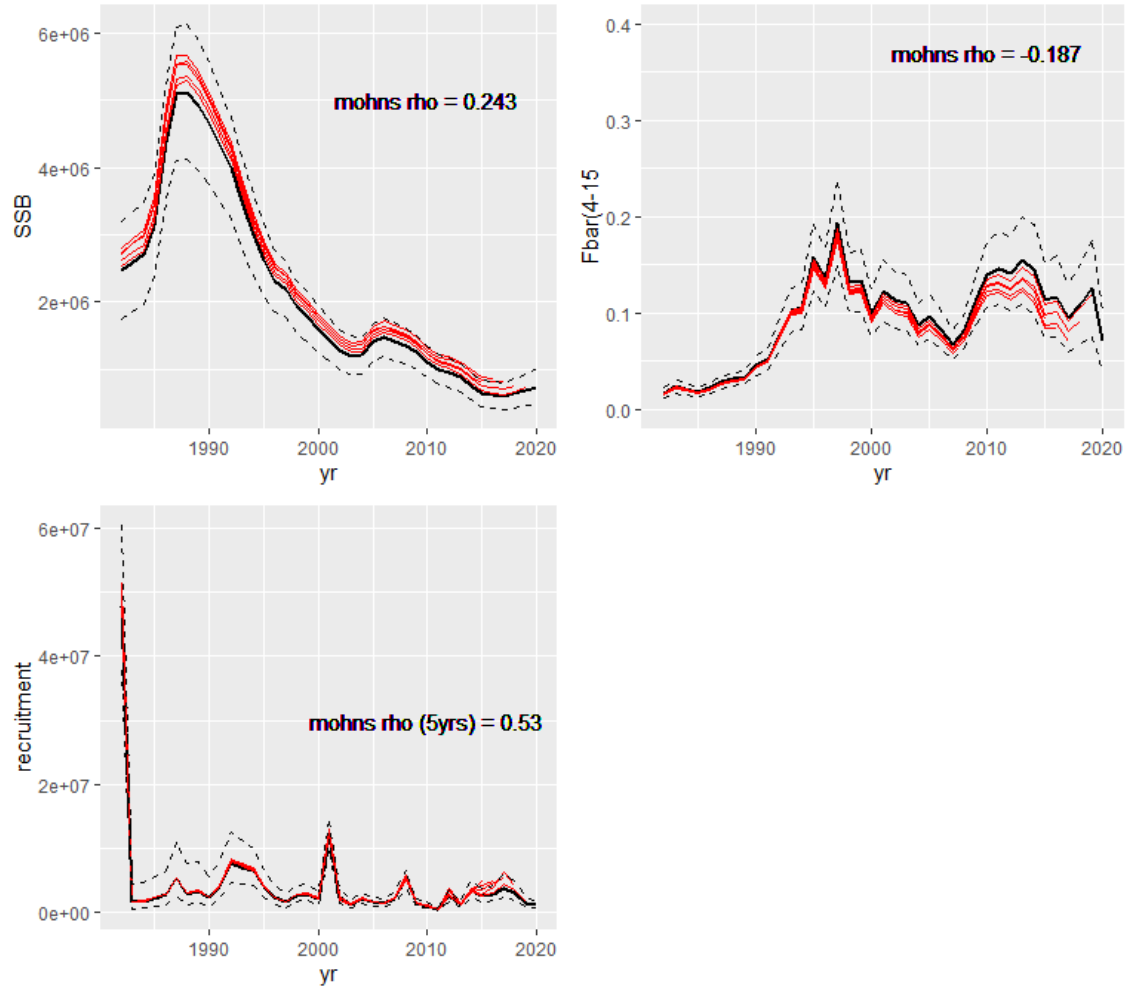
Figure 7.2.11.3: Western horse mackerel. Retrospective analysis. 5 years of retrospective analysis for SSB, F and Recruitment, and F. Dash lines are the 2021 assessment confidence intervals.
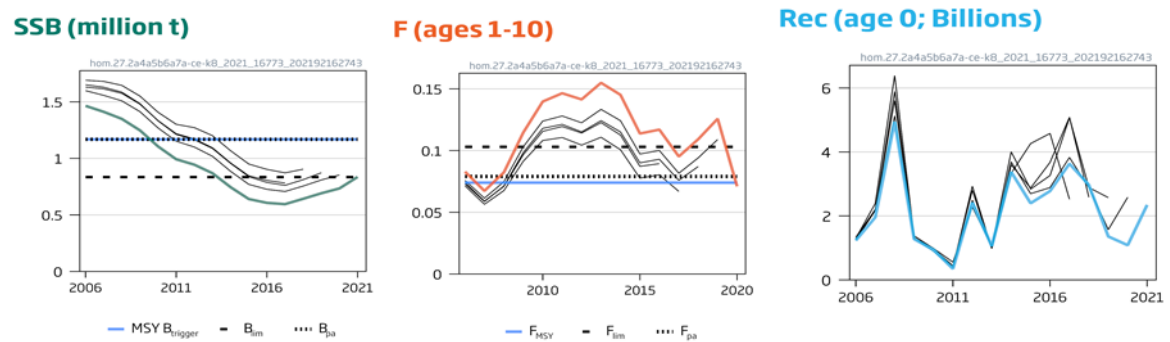
Figure 7.2.11.4: Western horse mackerel. Model results. Historical assessment results. Note: since the 2017 assessment, SSB is estimated on 1st of January. Prior to 2017 SSB has been estimated in May (spawning time).
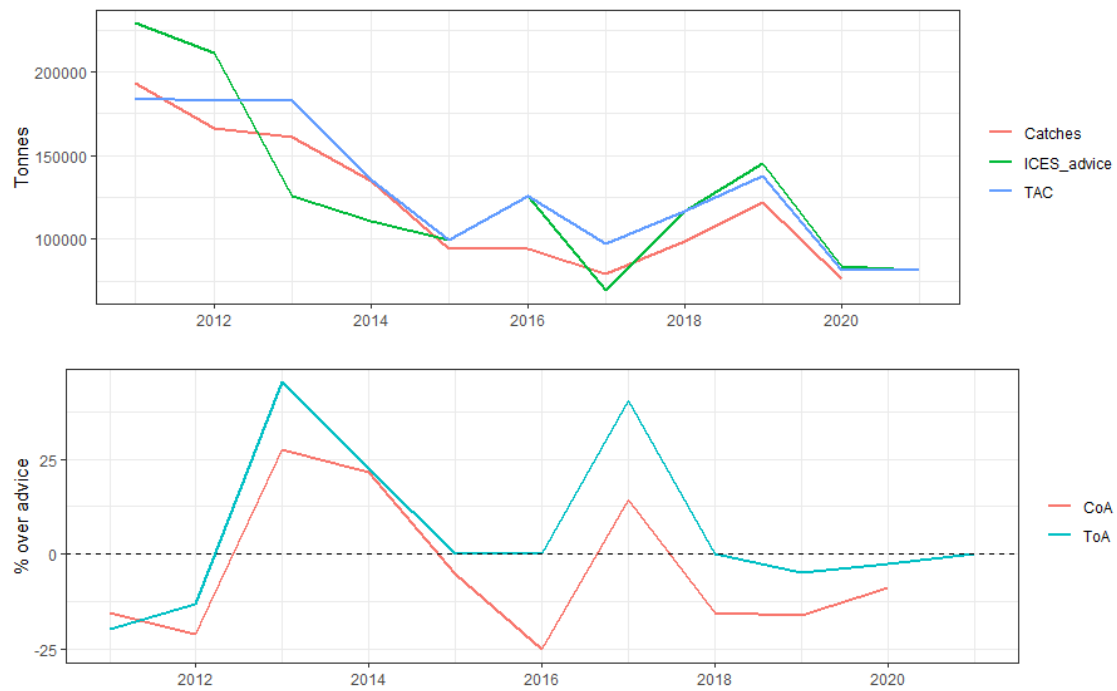
Figure 7.10.1. Western horse mackerel. Top: comparison of (max) scientific advice, TAC (or sum of unilateral quota) and Total Catch. Bottom: percentage deviation from ICES advice, CoA is Catch over Advice, ToA is TAC over Advice.
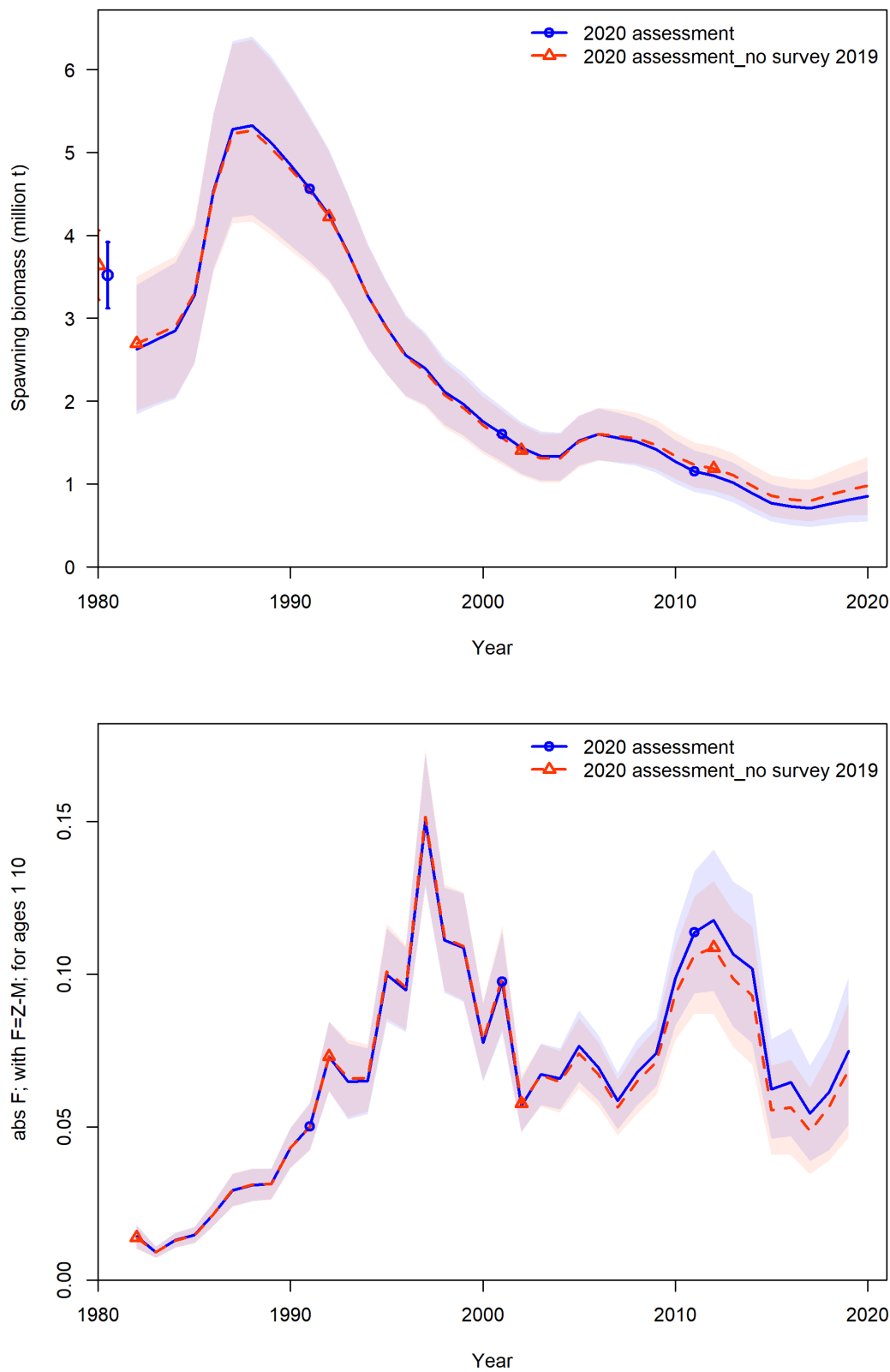
Figure 7.13.1. Sensitivity of the model to the PELACUS data. Spawning biomass and fishing mortality (ages 1–10) as estimated in the model conducted in 2020 (in blue) and in a model with the same setup but excluding the PELACUS data for 2019 (in red).