5 Western Horse Mackerel – Divisions IIa, IIIa (Western Part), IVa, Vb, VIa, VIIa–c, VIIe–k, AND VIIIa–e

5.1 ICES advice applicable to 2013 and 2014

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

For 2013 the TAC set in EU waters (EC 39/2013) was the following:

Areas in EU waters	TAC 2013	Stocks fished in this area
IIa, IVa, Vb, Subareas VI,VIIa-c, VIIe-k, VIIIabde, Vb, XII, XIV	157,989 t	Western stock & North Sea stock in IVa 1-2 quarters
IVb,c, VIId	37,950 t	North Sea stocks
Division VIIIc	25,011 t	Western stock

For 2014 the TAC set in EU waters (EC 43/2014) was the following:

Areas in EU waters	TAC 2014	Stocks fished in this area
IIa, IVa, Vb, Subareas VI,VIIa-c, VIIe-k, VIIIabde, Vb, XII, XIV	114,712 t	Western stock & North Sea stock in IVa 1-2 quarters
IVb,c, VIId	27,815 t	North Sea stocks
Division VIIIc	18,508 t	Western stock

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

All Quarters: IIa, Vb, VIa, VIIa-c, VIIe-k, VIIIa-e

Quarters 3&4: IIIa (west), IVa

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

All Quarters: IIIa (east), IVb-c, VIId

Quarters 1&2: IIIa (west), IVa

In 2013 ICES adviced on the basis of MSY approach that Western horse mackerel landings in 2014 should be no more than 110546 tonnes. The Western horse mackerel TAC for 2014 is 135420 tonnes, the TAC for EU waters only is 133220. The TAC should apply to the total distribution area of this stock. The EU horse mackerel catches in Division IIIa are taken outside the horse mackerel TACs.

5.1.1 The fishery in 2013

Information on the development of the fisheries by quarter and division is shown in Table 3.1.1 and 3.1.2 and in Figures 3.1.1.a–d. The total catch allocated to western horse mackerel in 2013 was 160686 t which is 12456 t less than in 2012 and 34686 t more than advised by ICES. The catches of horse mackerel by country and area are shown in Tables 5.1.1.1-5.

5.1.2 Estimates of discards

In 2013 discards data were presented by Spain, Germany, Netherlands and Ireland (who provided limited information).

Therefore, the amount of discards given in Table 3.3.1 are not representative of the total fishery. Based on the limited data available it is impossible to estimate the amount of discard in the horse mackerel fisheries (see section 1.3.3). No discard data for 2013 were used in the assessment.

5.1.3 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. The stock is distributed in Divisions IIa, Vb, IIIa, IVa, VIa, VIIa-c, VIIe-k and VIIIa-e. The stock is caught in these areas following the yearly distribution described in Section 3.3 (Figure 5.1.3.1). The western stock is considered a management unit and advised accordingly. At present there are no international agreed management measures. EU regulates the fishery by TAC. This TAC is now set in accordance with the distribution of the stock although catches in IIIa are taken outside the TAC.

5.2 Scientific data

5.2.1 Egg survey estimates

In 2013 a new egg survey was carried out in the western and southern spawning areas and a working document with preliminary results of the survey was distributed to WGWIDE members (Burns *et al.* 2013). Results were revised slightly by WGMEGS in early 2014.

The mean daily stage I egg production estimates (DEP) for each survey period plotted against the mid-period days is shown in figure 5.2.1. The results from previous surveys are also included in the figure for comparison. Period number and duration are the same as those used to estimate the western mackerel stock, as are the dates defining the start and end of spawning. The shape of the egg production curve suggests that some spawning may have continued after the survey ended. The daily egg production curve revealed a provisional estimate of total annual egg production of 3.97×10^{14}. This is a decrease of almost 64% on that observed in 2010 (1.09×10^{15}) and is one of the lowest estimates of annual egg production ever recorded for this species. The time series of egg production estimates is shown in Table 5.2.1.1.

5.2.2 Other surveys for western horse mackerel

Bottom trawl surveys

No new information was presented on bottom trawl surveys. These surveys could be considered in future to provide indices of recruitment or abundance for western horse mackerel. Further information can be found in the stock annex, and in ICES (2008/ACOM:13) and ICES (2009/RMC:04).

Acoustic surveys

Information was presented on VIIIc acoustic survey from Spain. Further information can be found in the stock annex and in ICES (2008/ACOM:13) and ICES (2006/LRC:18).

5.2.3 Effort and catch per unit effort

No new information was presented on effort and catch per unit effort. Further information can be found in the stock annex.

5.2.4 Catch in numbers

In 2013, the Netherlands (IVa,VIa,VIIb,c,e,h-k, VIIIb), Norway (IVa), Ireland (VIa and VIIb,), Germany (IV, VIa VIIb,c, e, h, j), Spain (VIIIb,c) and UK(England) (IVa, VIa, VIIb,e,h) provided catch in numbers at age. The catch sampled for age readings in 2013 covered 71%, 2012 covered 71% and 62% in 2011.

The total annual and quarterly catches in numbers for western horse mackerel in 2013 are shown in Table 5.2.4.1. The sampling intensity is discussed in Section 1.3.

The catch at age matrix, as used in the assessment, is given in Table 5.2.4.2, and illustrated in Figure 5.2.4.1. It shows the dominance of the 1982 year class in the catches since 1984 until it entered the plus group in 1996. Since 2002 the 2001 year class of horse mackerel which has now entered the plus group in 2012, 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.

5.2.5 Mean length at age and mean weight at age

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 2013 are shown in Tables 5.2.5.1 and 5.2.5.2. Weight at age time-series is shown in Figure 5.2.5.1.

Mean weight at age in the stock

Mean weights-at-age in the stock, as used in the assessment, are presented in Table 5.2.5.3. Weights for age two in 2012 and 2013 were assigned as 0.085kg, according to the stock annex as there were no weight samples available for this age group. Weight samples for age 3 were available only for area VIIj period 1, where the mean weight of 0.160 kg is much larger than seen before in the time series. Weight for age three in 2013 was therefore taken as the mean of 1995—2012. Weight at age time-series is shown in Figure 5.2.5.2. Further information can be found in the stock annex.

5.2.6 Maturity ogive

Maturity-at-age, as used in the assessment, is presented in Table 5.2.6.1. Further information can be found in the stock annex.

5.2.7 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.

5.2.8 Fecundity data

The potential fecundity data used in the assessment is listed in Table 5.2.8.1. The basis for specifying the realised fecundity 'prior', as used in the assessment (mean=1847 eggs per gram spawning female, CV=0.287), is given in the stock annex.

5.2.9 Data exploration

Within-cohort consistency of the catch-at-age matrix is investigated in Figure 5.2.9.1, which shows that the catch-at-age data contains information on year class strength that could form the basis for an age-structured model.

Log-catch curves are shown in Figure 5.2.9.2, along with the negative of the gradients fitted to ages 1—3 (bottom left plot), and ages 4—8 (bottom right plot). The general pattern of log-catches is increasing log-catch with age for the earlier years, indicating cohorts were not fully selected until they reached an advanced age, and the more usual decreasing log-catch for a wider range of ages in the most recent years (compared to earlier years), indicating selection has shifted towards younger fish over time. A requirement for interpreting the negative gradient as a proxy for total mortality is that catchability and selectivity-at-age remains stable within a cohort, so that any changes in the catch of a cohort are explained by changes in total mortality. The prevalence of negative values for the proxy (bottom plots of Figure 5.2.9.2) indicates that this requirement has not always been met for western horse mackerel catch data, and also indicates that a separable model with constant selectivity-at-age for the earliest data would not be appropriate.

5.2.10 Assessment model, diagnostics

The SAD (linked Separable-ADAPT VPA) model is used for the assessment of western horse mackerel. A description of the model can be found in the stock annex. The western horse mackerel assessment is presented as an update assessment and was conducted with a 6-year separable window as in recent assessments.

Fits to the available data are given in Figure 5.2.10.1, and model estimates with associated precision in Figures 5.2.10.2—3. Model estimates and residual patterns are similar to those presented in 2012 and 2013 (ICES 2012/ACOM:15 & ICES2013/ACOM:15). A deterioration of the model fit to the early data is apparent and could be related to the model assumption of constant fecundity. The model estimate of egg production is higher than the survey estimate; this is consistent with the observation that spawning may have continued beyond the survey period. A comparison with the 2013 assessment is discussed in Section 5.6.

Retrospective plots are shown for two cases. In the first case, 3-year retrospective plots were constructed for SSB, recruitment and F trajectories, and for selectivity-at-age, where the length of the separable window is fixed at six years (Figure 5.2.10.4.) Information on the distribution of the Dutch fleet presented to WGHMMP 2014 suggested that constant selection should not be assumed beyond 2006 therefore, only a three-year retrospective assessment is presented. The exclusion of the egg production data as the retrospective analysis is carried out has an effect back in the time-series estimates (not only for this set of retrospective plots, but for the one discussed below).

For the second case, 3-year retrospective plots were constructed as before, but this time the starting year of the separable window (2008) was kept constant, thus resulting in the separable window reducing in length as years were dropped. The reduced length of the separable window only allowed 3 years for the analysis, because a window any shorter than 3 years in length results in a large deterioration in the precision of model estimates. Results for the second set of retrospective plots are shown in Figure 5.2.10.5. The selectivity-at-age retrospective in Figure 5.2.10.5d suggests larger instability of selection as the separable window is shortened, causing greater uncertainty and deterioration in the precision of the model estimates, particularly in the younger age groups.

5.3 State of the Stock

5.3.1 Stock assessment

The SAD model with a separable window of 2008—2013 is presented as the final assessment model. Stock numbers-at-age and fishing mortality-at-age are given in Tables 5.3.1.1 and 5.3.1.2, and a stock-summary is provided in Table 5.3.1.3, and illustrated in Figure 5.3.1.1. SSB peaked in 1988 following the very strong 1982 year class. Subsequently SSB peaked following the moderate year classes in the early- to mid-90s and the moderate-to-strong year class of 2001 (a third of the size of the 1982 year class). Year classes following 2001 have been weak, 2010 recruitment in particular is the lowest in the time-series. 2008 year class is estimated as higher than the recent average. Fishing mortality has been increasing since 2007 as a result of increasing catches and decreasing biomass as the 2001 year-class was reduced. SSB in 2013 is estimated as the third lowest in the time-series.

5.4 Short-term forecast

A deterministic short-term forecast was conducted with the ICES standard software MFDP (Multi Fleet Deterministic Projection) version 1a.

Input

Table 5.4.1 lists the input data for the short term predictions. Weight at age in the stock and weight at age in the catch are the average of the 2011 to 2013. Selection (exploitation pattern) is based on F in 2013 from the most recent assessment and is the average of ages 1 to 10, which assumes a fixed selection in the period 2008—2013. Natural mortality is assumed to be 0.15 across all ages. The proportion mature for this stock has been constant since 1998 and values are copied from the assessment input.

As with last year the expected landings for the intermediate year were set to the level that corresponds to the 2014 TAC in EU waters, 133220t which is considered an appropriate estimate for the forecast.

Output

Detailed age disaggregated tables for an F status quo projection ($F = F_{2013}$) are shown in Table 5.4.2 and a range of predicted catch and SSB options from the short term forecast are presented in Table 5.4.3. The % TAC change in Table 5.4.3 corresponds to the total Western horse mackerel TAC of 135,420 t.

The management plan proposed by the Pelagic RAC in 2007 was recently evaluated (ICES 2013/ACOM:59) and, ICES considered that the HCR and reference points were not consistent with the precautionary approach.

5.5 Uncertainties in the assessment and forecast

Fishery-independent data for this stock is extremely limited, with only a single data point for egg production every three years. In addition, the assessment contains a fecundity model which links the egg production to SSB that could be improved if further evidence was obtained on the spawning biology of this stock which at present is considered an indeterminate spawner.

The reliability of this assessment depends on the reliability of the input data, and the extent to which model assumptions are violated. For example, simulation testing has shown that if there is an increasing trend in the realised fecundity parameter that is not

accounted for, then the model over-estimates SSB and recruitment, and underestimates fishing mortality and realised fecundity (ICES 2008/ACOM:13).

The model relies on a 'prior' distribution for realised fecundity (based on published values), which is used for scaling, and the inclusion of any additional information on realised fecundity would help to improve the reliability of the assessment. Estimates of F are considerably lower than the assumed value for natural mortality (M=0.15). Reviewers have commented that the assumed value for M should be investigated. However, there is no data available (such as tagging) that could assist in estimating M more accurately. Nevertheless, total mortality appears to be low, given the persistence of the 1982 year class in the catch data.

Decisions on the length of the separable window need to balance the precision of model estimates (windows that are too short result in less precise model estimates) with considerations of whether the separability assumption continues to hold (by considering information from the fishery and patterns in the log-catch residual plots).

Although some estimates on the uncertainty of the egg input data are available, they are not currently available in a form that can be included in the assessment model. This is one area that might need addressing in the future if a systematic estimation of likely error in the model is to be evaluated. The inclusion of independent estimates of the uncertainty of the egg production would improve the reliability of the assessment.

The precision of recruitment estimates for the most recent years is poor, with CVs of 29—56% for the most recent 5 years. This result is expected given the negligible input the first three age classes make to SSB and the limited catch data for recruits. This uncertainty increases as the assessment is updated without additional egg production survey data. The estimate for the 2001 year class at age 0 is the largest since 1982, with a CV of 21%.

The assessment could be improved by the inclusion of information such as survey tuning indices on the numbers at age in the stock. However, obtaining a reliable tuning series is likely to be hampered by the large geographic area in which the stock occurs and the strong migration patterns. It does not seem that changes to the modelling methodology alone will fundamentally solve this problem.

5.6 Comparison with previous assessment and forecast

A comparison of the update assessment with the 2013 assessment is shown in Figure 5.6.1. SSB, recruitment and F trajectories show a similar pattern. The large decrease in selectivity for younger age groups, particularly for the 1 and 2 year olds (see Figure 5.6.1), is largely due to the lack of information on these age groups which causes instability in the estimated selection pattern.

5.7 Management Options

5.7.1 MSY approach

In 2013 deterministic and stochastic equilibrium analyses were carried out using the 'plotMSY' software (WKFRAME 2010) to re-evaluate the Fmsy value estimated in 2010 for the western horse mackerel stock. With the inclusion of the most recent data the results, similar to those provided in 2010, suggest that the F_{msy} proxy of 0.13 remains valid. See WGWIDE 2011 for details, or refer to the stock annex.

5.7.2 Management plans and evaluations

In 2007 the Pelagic RAC, in collaboration with a group of scientists, developed and proposed a management plan for the Western Horse Mackerel stock. The plan sets a multiannual TAC using a harvest rule that comprises a fixed TAC component and one that varies with the trend in egg production as recorded during the previous 3 egg surveys. The TAC was set according to the following rule:

$$TAC_{y+1\text{ to }y+3} = 1.07\left[\frac{TAC_{ref}}{2} + \frac{TAC_{y-2\text{ to }y}sl}{2}\right]$$

where y is the year an egg survey becomes available, TAC_{ref} = 150kt and sl is a function of the slope of the most recent three egg abundance estimates from surveys such that

	slope	≤ -1.5	sl = 0
-1.5 <	slope	< 0	sl = 1-((1/-1.5)*slope)
0 ≤	slope	≤ 0.5	sl = 1+((0.4/0.5)*slope)
0.5 >	slope		sl = 1.4

A request from EU was posed to ICES at the end of 2012 to:

1) Fully evaluate the plan, and ascertain whether it is precautionary in the long term as well as in the short term.

2) Should the plan be found not to be precautionary in the long term, ICES is requested to identify reinforcements in the harvesting rules that would resolve the plan's shortcomings in that respect.

3) ICES is furthermore requested to identify what TAC should apply in 2013 in accordance with a revised harvesting rule under point 2 above.

Upon evaluation in 2013, ICES considered the plan not to be precautionary. However, the request was not fully addressed therefore, in December 2013 EU reiterated the need that ICES fully addressed the initial request (above). ICES convened a group Chaired by Ciaran Kelly (Ireland) and participants from the Marine Institute (Ireland), Cefas (UK England) and IMARES (the Netherlands) in response. Deadline to complete the work is October 2014.

Considerable progress has been made so far. A brief outline of developments follows.

Simulations were developed on two platforms:

Full feedback (FLR , ADMB)

FPRESS Stochastic simulation (R)

Conditioning was derived from the 2013 assessment (WGWIDE 2013) including updated catch information and the finalised 2013 egg survey result. The variance-covariance matrix from the assessment was used to generate 1000 populations, each with their own set of parameters.

Considerable attention was paid to the modelling of the stock and recruitment relationship. The plotMSY software (ICES-WGMG 2013) was used to derive the relative weights given to three stock recruit forms (49% to Beverton-Holt, 28% to Ricker and 23% to Hockeystick), which were then fitted in these proportions to ”historic” stock-recruit pairs from 1000 populations; in this way, the stock-recruit parameters (which included recruitment variability and serial correlation) were entirely consistent with

the associated population. In this process, the 1982 and 2001 year-classes were considered outliers (to be treated separately when modelling recruitment spikes) and not included in the stock-recruit fits.

In a second step, a spike year was modelled using a boxcar distribution (Skagen 2012) with a mean interval between spikes of 19 years (perios between the historic two high recruitment events). In the event of a spike there is a 50/50 chance of a 1982 or 2001 residual draw. The appropriate residual is added to the stock recruitment form for the current population (model iteration).

Initial simulations were carried out according to the following specifications:

- Long term (200 years), statistics from final 50 years
- Range of fishing mortalities from 0 to 0.2, no HCR
- Excluding/ including spikes
- Including serial correlation
- 100 iterations for full feedback model, 1000 for FPRESS model

Results from both platforms were fully comparable. Predicted yields, SSB and associated risks from population projections are presented in Figure 5.7.2.1 for illustration. The curves correspond to median and confidence intervals of mean values computed over the final 50 years in 200 years population projections. The plots are based on 100 iterations.

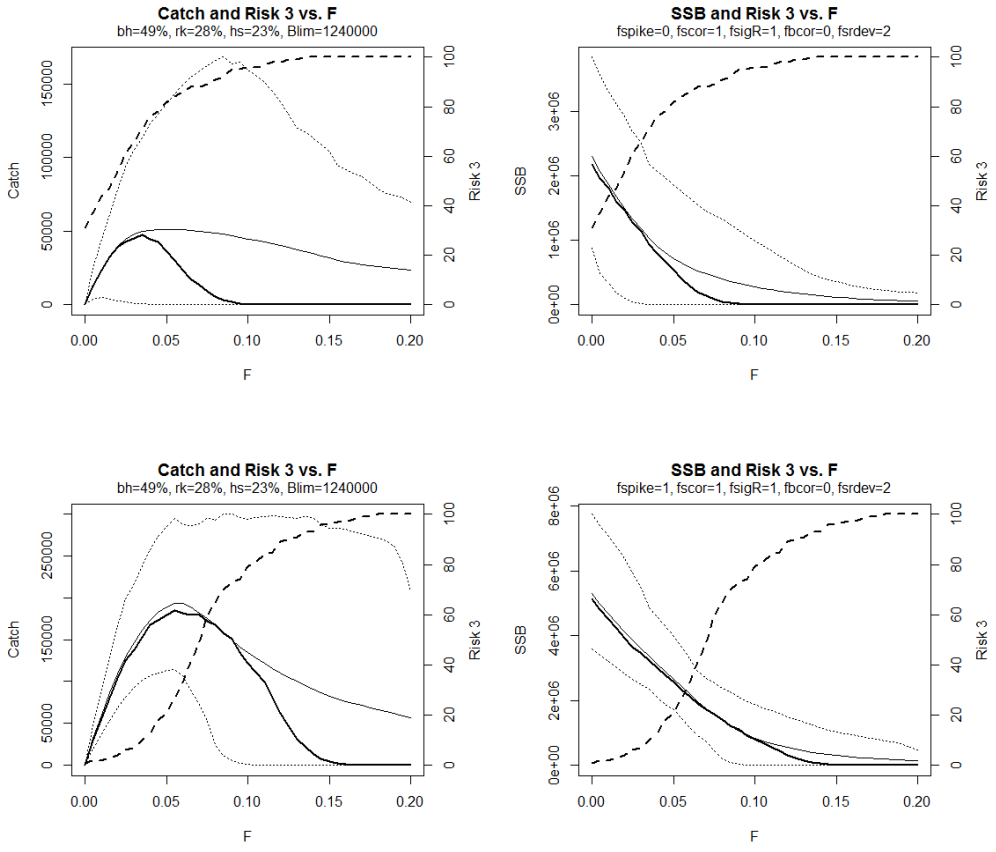

Figure 5.7.2 Western horse mackerel. Model Yield, SSB and Risk 3 vs F (med,10th & 90th pct) from projecting initial conditions forward 200 years, 100 iterations. The upper plots correspond to simulations with no recruitment spikes, results with recruitment spikes are shown on the bottom row.

These preliminary results illustrate that horse mackerel in the NEA Atlantic relies on spasmodic recruitment events to recover from exploitation. Without those recruitments and even in the absence of exploitation, the risk of SSB < B_{lim} can be quite high in particular years.

5.8 Management considerations

The 2001 year class has now entered the plus group and there are no detectable strong year classes entering the fishery. With the inclusion of the new 2013 egg survey estimate the perception of the stock as changed. However the declining trend in SSB and upward trajectory of F_{1-10} remains the same.

SSB in 2014 was estimated by the assessment at 609 865 tonnes, this is below the 1982 SSB previously estimated at 1.4Mt which was previously adopted as B_{lim}. A B_{pa} consistent with this is 1.8Mt and was proposed in 2008. However, B_{pa} is not used as a reference for management but rather the rule in the agreed management plan is used. There are currently no accepted biomass reference points for this stock following the revision of the assessment methodology and acceptance of the assessment in 2011.

The TAC has only been given for parts of the distribution and fishing areas (EU waters). The Working Group advises that the TAC should apply to all areas where western horse mackerel are caught. Note that sub-area VIIIc is now included in the Western stock distribution area. If (as planned) the management area limits are revised, measures should be taken to ensure that misreporting of juvenile catch taken in subareas VIIe,h and VIId (the latter then belonging to the North Sea stock management area) is effectively hindered. The mismatch between TAC and fishing areas and the fact that the TAC is only applied to EU waters has resulted in the catch prior to 2007 exceeding those advised by ICES.

The management plan proposed by the Pelagic RAC in 2007 was evaluated by ICES and considered to be precautionary in the short term. This plan makes use of the information available in the egg production surveys, and bases triennial TACs on the slope of the three previous egg production estimates. The rule proposed by the plan was used to set the TAC for 2008—2010 at 180kt. Using the finalised egg survey time-series the catch advice based on the MSY approach for 2015 is 137534t. It should be noted that the management plan assumes that all catches are taken against the TAC and, should the management and assessment areas be combined in the future, the TAC as set by the EU will not cover all fisheries.

5.9 Ecosystem considerations

Knowledge about the distribution of the western horse mackerel stock is gained from the egg surveys and the seasonal changes in the fishery. However, 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.

5.10 Regulations and their effects

There are no horse mackerel management agreements between EU and non EU countries. The TAC set by EU therefore only apply to EU waters and the EU fleet in international waters. The minimum landing size of horse mackerel by the EU fleet is 15cm (10% undersized allowed in the catches).

The stock allocations were changed in 2005 following the results of the HOMSIR project (Abaunza *et al.* 2003) and VIIIc now belongs to the western stock. Landings from VIId are now allocated to the North Sea horse mackerel.

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.

5.11 Changes in fishing technology and fishing patterns

The description of the fishery is given in Sections 3.1 and 5.2.1 and no large changes in fishing areas or patterns have taken place. However, there has been a gradual shift from an industrial fishery for meal and oil towards a human consumption fishery.

5.12 Changes in the environment

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

Since the strong 1982 year class of the western stock started to appear in the North Sea in 1987 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 (NEZ) later (October-November) the same year (Iversen *et al.* 2002, Iversen WD presented in ICES 2007/ACFM:31) has been noted in most years.

5.13 References

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Table 5.1.1.1. Horse mackerel general. Catches (t) in Subarea II. (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	91573	1068	-	950
Denmark	-	-	-	-	-	-	-	200
France	-2	-	-	-	-	-	55	-
Germany Fed. Rep.	64	12	+	-	-	-	-	-
Norway	6285	4770	9135	3200	4300	2100	4	11300
USSR / Russia (1992 -)	469	27	1298	172	-	-	700	1633
UK (England + Wales)	-	-	17		-	-	-	-
Total	6818	4809	11414	4487	13457	3168	759	14083

	1996	1997	1998	1999	2000	2001	2002	2003
Faroe Islands	1598	7993	1883	1323	2503	-	-	-
Denmark	-	-	17553	-		-	-	-
France	-	-	-	-		-	-	-
Germany	-	-	-	-		-	-	-
Norway	887	1170	234	2304	841	44	1321	22
Russia	881	648	345	121	843	16	3	2
UK (England + Wales)	-	-	-	-	-	-	-	-
Estonia	-	-	22	-	-	-	-	-
Total	3366	2617	2544	2557	1175	60	1324	24

	2004	2005	2006	2007	2008	2009	20101
Faroe Islands	-	-	3	-	-	-	29233
Denmark	-	-	-	-	-	-	-
France	-	-	-	-	-	-	-
Germany	-	-	-	-	-	-	-
Ireland	-	-	-	3664	-	-	-
Norway	42	176	27	-	572	1847	1364
Russia	-	-	-	-	-	-	-
UK (England + Wales)	-	-	-	-	-	-	-
Estonia	-	-	-	-	-	-	-

Total	42	176	30	366	572	1847	1656

[1]Preliminary.

[2]Included in Subarea IV.

[3]Includes catches in Div. Vb.

[4]Taken in Div. Vb

	2011	2012	20131
Faroe Islands	3494	-	
Denmark	-	-	
France	-	+	
Germany	-	-	
Ireland	-		
Netherlands	1	-	
Norway	298	66	30
Russia	-	-	
UK (England + Wales)	-	-	
Estonia	-	-	
Total	648	66	30

[1]Preliminary

[2]Included in IV.

[3]Includes catches in Div. Vb.

[4]Taken in Div. Vb.

Table 5.1.1.2. Horse mackerel general. Catches (t) in North Sea Subarea IV and Skagerrak Division IIIa 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	23730	22495	18652	7290	20323
Faroe Islands	260	-	-	-	-	-	-	-	-
France	292	421	567	366	827	298	2312	1892	7842
Germany Fed.Rep.	+	139	30	52	+	+	-	3	153
Ireland	1161	412	-	-	-	-	-	-	-
Netherlands	101	355	559	20293	824	1603	6003	8504	10603
Norway2	119	2292	7	322	3	203	776	117284	344254
Poland	-	-	-	2	94	-	-	-	-
Sweden	-	-	-	-	-	-	2	-	-
UK (Engl. + Wales)	11	15	6	4	-	71	3	339	373
UK (Scotland)	-	-	-	-	3	998	531	487	5749
USSR	-	-	-	-	489	-	-	-	-
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	648
Estonia	-	-	-	293	-		17	-	-
Faroe Islands	-	942	340	-	360	275	-	-	296
France	248	220	174	162	302		-	-	-
Germany Fed.Rep.	506	24695	5995	2801	1570	1014	1600	7	7603
Ireland	-	687	2657	2600	4086	415	220	1100	8152
Netherlands	14172	1970	3852	3000	2470	1329	5285	6205	37778
Norway	84161	117903	50000	96000	126800	94000	84747	14639	45314
Poland	-	-	-	-	-	-	-	-	-
Sweden	-	102	953	800	697	2087	-	95	232
UK (Engl. + Wales)	10	10	132	4	115	389	478	40	242
UK (N. Ireland)	-	-	350	-	-		-	-	-
UK (Scotland)	2093	458	7309	996	1059	7582	3650	2442	10511
USSR / Russia (1992 -)	-	-	-						
Unallocated + discards	124824	-3174	-7504	-2786	-3270	1511	-28	136	-31615
Total	112047	145062	77904	114133	140383	112580	98452	26125	79161

Country	1998	1999	2000	2001	2002	2003	2004	2005	20061
Belgium	19	21	19	19	1004	5	4	6	3
Denmark	2048	8006	4409	2288	1393	3774	8735	4258	1343
Estonia	22	-	-						
Faroe Islands	28	908	24	-	699	809		35	
France	379	60	49	48	-	392	174	3876	2380
Germany	4620	4071	3115	230	2671	3048	4905	1811	965
Ireland	-	404	103	375	72	93	379	753	2077
Lithuania									2354
Netherlands	3811	3610	3382	4685	6612	17354	21418	24679	20984
Norway	13129	44344	1246	7948	35368	20493	10709	24937	27200
Russia	-	-	2	-	-	-			
Sweden	3411	1957	1141	119	575	1074	665	239	491
UK (Engl. + Wales)	2	11	15	317	1191	1192	2552	1778	423
UK (Scotland)	3041	1658	3465	3161	255	1	1	22	314
Unallocated+discards	737	-325	14613	649	-149	-14009	-19103	-21830	-19623
Total	31247	64725	31583	19839	49691	34226	30435	40564	38911

[1]Preliminary.

[2] Includes Division IIa.

[3] Estimated from biological sampling.

[4] Assumed to be misreported.

[5] Includes 13 t from the German Democratic Republic.

[6] Includes a negative unallocated catch of -4,000 t.

Country	2007	2008	2009	2010	2011	2012	20131
Belgium	5	2	4	12	-	-	0
Denmark	329	59	279	75	20	9	9
Faroe Islands	3	55	-	81	-	-	-
France	457	943	-	173	2682	-	-
Germany, Fed.Rep.	93	1,167	1,299	242	-	--	20
Ireland	652	1,186	342	12	755	25	7
Netherlands	20,027	9,400	10,077	1,342	81	92	0
Lithuania	98	-	-	-	-	-	-
Norway	5.423	11652	70,745	11,082	13,409	3,183	6,566
Sweden	130	45	660	2	90	-	0
UK (Engl. + Wales)	2,966	-	-	-	-	-	16
UK (Scotland)	626	20	51	646	101	12	102
Unallocated +discards	-14,403	-9,151	-5,898	0	-	-	-
Total	16,407	15,377	78,595	13,667	14,725	3,321	6,721

[1]Preliminary.

[2]French catches landed in the Netherlands

Table 5.1.1.3 Horse mackerel general. Catches (t) in Subarea VI 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	44503	40003
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	-	-	-	-	-		-2	-2	-2
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	+	-	-	-	52
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	498
Norway	-	-	-	-	-	-	-	-	-
Spain	-2	-2	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	-69604	-51	-41326	-11523	837
Total	34870	20904	34456	40469	53942	69527	83595	81259	40145

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006
Denmark	-	-	-	-	-	-	-	-	-
Faroe Islands	-	-	-	-	-	-	-	-	-
France	221	25007	-	428	55	209	172	41	411
Germany	414	1031	209	265	149	1337	1413	1958	1025
Ireland	21608	31736	15843	20162	12341	20915	15702	12395	9780
Lithuania									2822

Netherlands	885	1139	687	600	450	847	3701	6039	1892
Spain	-	-	-	-	-	-	-	-	-
UK (Engl.+Wales)	10	344	41	91	-	46	5	52	-
UK (N.Ireland)	1132	-	-			453		210	82
UK (Scotland)	10447	4544	1839	3111	1192		377	62	43
Unallocated+disc.	98	1507	2038	-21	3	-553	559	1298	-304
Total	34815	65308	20657	24636	14190	23254	21929	22055	15751

Country	2007	2008	2009	2010	2011	2012	20131
Denmark	-	-	-	-	58	1131	433
Faroe Islands	-	573	-	1	-	-	-
France	-	74	-	-	2465	-	-
Germany	1835	5097	635	773	6508	672	8616
Ireland	20341	18786	16565	19985	23556	29283	19979
Lithuania	80	641	-	-	-	-	-
Netherlands	2177	3904	2332	1685	6353	12653	11078
Norway	2	20	27	18	48	2	-
Russia	-	-	-	-	-	-	-
Spain	-	-	-	-	-	-	-
UK (Engl. + Wales)	232	-	-	-	-	-	451
UK (Scotland)	38	588	243	89	2528	1232	2325
Unallocated+disc.	1474	-3781	-2057	62	230	2	0
Total	26279	25902	17776	22613	39528	44975	43266

[1]Preliminary. [2]Included in Subarea VII. [3]Includes Divisions IIIa, IVa,b and VIb.

[4]Includes a negative unallocated catch of -7000 t. [5]French catches landed in the Netherlands

Table 5.1.1.4. Horse mackerel general . Catches (t) in Subarea VII 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	14772	304082	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	275002	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	-	-	-	27201
Germany Fed.Rep.	7743	8109	12919	12951	15684	14828	17436	15949	28549
Ireland	12645	17887	19074	15568	16363	15281	58011	38455	43624
Netherlands	43582	111900	104107	109197	157110	92903	116126	114692	81464
Norway	-	-	-	-	-	-	-	-	-
Spain	14	16	113	106	54	29	25	33	-
UK (Engl. + Wales)	4488	13371	6436	7870	6090	12418	31641	28605	17464
UK (N.Ireland)	-	-	2026	1690	587	119	-	-	1093
UK (Scotland)	+	139	1992	5008	3123	9015	10522	11241	7931
USSR / Russia (1992-)	-	-	-	-	-	-	-	-	-
Unallocated + discards	28368	7614	24541	15563	40103	14057	68644	26795	58718
Total	135890	192196	201326	188135	221000	200256	330705	279100	326474

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006
Faroe Islands	-	-	550	-	-	-	-	3660	1201
Belgium	18	-	-	-	1	-	+	+	+
Denmark	25492	19223	13946	20574	10094	10867	11529	9939	6838
France	24223	-	20401	11049	6466	7199	8083	8469	7928
Germany	25414	15247	9692	8320	10812	13873	16352	10437	7139
Ireland	51720	25843	32999	30192	23366	13533	8470	20406	16841
Lithuania									3569
Netherlands	91946	56223	50120	46196	37605	48.222	41123	31156	35467

Spain	-	-	50	7	0	1	27	12	60
UK (Engl. + Wales)	12832	8885	2972	8901	5525	4186	7178	4752	2935
UK (N.Ireland)	-	-	-	-	-			217	142
UK (Scotland)	5095	4994	5152	1757	1461	268	1146	59	413
Unallocated+discards	12706	31239	1884	11046	2576	24897	18485	18368	19379
Total	249446	161654	137766	138042	97906	123046	112393	107475	101912

Country	2007	2008	2009	2010	2011	2012	20131
Faroe Islands	475	212	-	-	-	-	-
Belgium	+	+	1	24	2	+	14
Denmark	4806	1970	2710	5247	5831	2281	6373
France	6844	11008	-	899	74312	579	744
Germany	3.943	5700	14204	20404	14545	16391	15781
Ireland	8039	16293	23841	24490	14154	15893	15805
Lithuania	5585	4907	-	-	-	-	-
Netherlands	38034	43514	47741	75475	49207	53644	41562
Norway	-	-	-	40	-	-	-
Spain	-	11	6	6	-	58	-
Sweden	55	-	-	-	-	-	-
UK (Engl. + Wales)	9105	-	-	-	11688	12122	3388
UK (Scotland)	738	476	1123	1723	299	91	17
Unallocated+discards	15460	14656	-61	17534	-	3039	4401
Total	93084	98746	89565	145839	103156	104098	88085

[1]Preliminary.

[2]French catches landed in the Netherlands

Table 5.1.1.5. Horse mackerel general. Catches (t) in Subarea VIII 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	8690
Germany Fed. Rep.	-	-	80	62	-		-	-	-
Netherlands	-	6000	12437	9339	19000	7272	-	14187	2944
Spain	27170	25182	23733	27688	27921	25409	28349	29428	31081
UK (Engl.+Wales)	68	6	70	88	123	753	20	924	430
USSR/Russia (1992-)	-	-	-	-	-	-	-	-	-
Unallocated+discards	-	1500	2563	5011	700	2038	-	3583	-2944
Total	38686	43496	46396	54186	53709	35500	28709	48269	40930

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006
Denmark	1728	4818	2584	582	-	-		-	1513
France	1844	74	7	5316	13676	-	2161	3540	3944
Germany	3268	3197	3760	3645	2249	4908	72	4776	3325
Ireland	-	-	6485	1483	704	504	1882	1808	158
Lithuania									401
Netherlands	6604	22479	11768	36106	12538	1314	1047	6607	6073
Russia	-	-	-	-	-	6620			-
Spain	23599	24190	24154	23531	22110	24598	16245	16624	13874
UK (Engl. + Wales)	9	29	112	1092	157	982	516	838	821
UK (Scotland)	-	-	249	-	-	-		-	-
Unallocated+discards	1884	-8658	5093	4365	1705	2785	2202	7302	4013
Total	38936	46129	54212	76120	54560	41711	24125	41495	34122

Country	2007	2008	2009	2010	2011	2012	20131
Denmark	2687	3289	3109	632	200	581	14
France	10741	2848	-	-	3263	1216	2849
Germany	-	918	281	64	61	-	417
Ireland	694	246	-	-	-	39	-
Lithuania	-	-	-	-	-	-	-
Netherland	-	6269	1849	97	49		1057

Russia	-	-	-	-	-	7	-
Spain	13853	19840	21071	38740	34581	13502	22541
UK (Engl. + Wales)	-	-	-	-	28		104
UK (Scotland)	-	-	-	-	-	-	
Unallocated+discards	412	482	7045	3694		2057	0
Total	28387	33892	33355	43227	35245	17402	26983

[1]Preliminary.

[2]Included in Subarea VII.

[3]French catches landed in the Netherlands

Table 5.2.1.1. Western horse mackerel. The time series of egg production estimates (10^{-12} eggs).

Year	Total egg production
1983	513
1989	1762
1992	1712
1995	1265
1998	1136
2001	821
2004	889
2007	1640
2010	1093
2013	397

Table 5.2.4.1. Western Horse Mackerel stock. Catch in numbers (1000) at age by quarter and area in 2013

1Q Ages	IIa	IIIa	IVa	Vb	VIa	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk	VIIIa	VIIIb	VIIIc east	VIIIc west	VIIId	Total
0																				0
1									166	0	0				191	490	724	16015	0	17586
2									6690	0	0				20	51	258	881	0	7900
3							653		9508	0	0	414	173		90	37	326	523	0	11725
4					558		4364	12	11928	0	0	10020	1313		2293	1188	261	229	1	32167
5					5894		32006	897	13530	0	0	33463	4456		6556	1141	177	30	2	98151
6					2153		4175	12	1773	0	0	6333	1803		1346	486	136	6	0	18224
7					1076		2655	968	4135	0	0	1491	1286	10	319	119	87	5	0	12153
8					1039		2333	103	1506	0	0	2523	2184		465	11	79	7	0	10250
9					1615		3720	104	2324	0	0	450	1700		85	8	79	12	0	10099
10					1505		3332	1146	2879	0	0	2505	3035		486	73	66	30	0	15057
11					2415		1409	2485	957	0	0	1135	1347	41	242	88	48	41	0	10208
12					25791		19282	4566	1013	0	0	1145	4295	102	242	85	52	119	0	56693
13					3139		2500	2196	148	0	0	225	1278	41	52	28	34	190	0	9831
14					3572		4131	163	563	0	0		829	20	7	18	27	130	0	9461
15+					6912		1804	1188	207	0	0	347	1528	41	90	69	119	468	0	12776
Sum					55669		82366	13840	57326	0	1	60051	25227	256	12486	3893	2475	18685	5	332281

2Q Ages	IIa	IIIa	IVa	Vb	VIa	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk	VIIIa	VIIIb	VIIIc east	VIIIc west	VIIId	Total
0																				0
1									1287	1					768	6823	3877	20013	0	32770
2									443	0					236	2094	706	1124	0	4603
3									314	0					309	2743	509	744	0	4619
4					2		5	253	376	0	0	1	5210	31	148	1314	336	502	0	8178
5					18		29	1344	557	1	1	5	27589	263	50	445	293	300	1	30898
6					7		13	593	147	1	1	2	12275	15	52	458	384	270	1	14220
7					3		2	95	122	0	0	0	1913	46	29	261	291	254	0	3018
8					3		1	41	49	0	0	0	832	15	24	211	308	237	0	1721
9					5		1	24	66	0	0	0	500		22	197	351	213	0	1379
10					5		3	135	98	0	0	1	2790		21	190	371	245	0	3858
11					7		3	118	47	0	0	0	2454		19	171	316	184	0	3321
12					78		10	457	105	0	0	2	9461	15	21	188	345	278	0	10962
13					9		2	85	23	0	0	0	1762		17	148	264	302	0	2613
14					11		1	69	29	0	0	0	1431		12	109	195	207	0	2065
15+					21		1	65	31	0	0	0	1346		45	401	742	888	0	3541
Sum					168		71	3280	3694	5	3	13	67563	387	1773	15754	9287	25763	4	127766

3Q Ages	IIa	IIIa	IVa	Vb	VIa	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk	VIIIa	VIIIb	VIIIc east	VIIIc west	VIIId	Total
0													382		82	249	2086	63082	7	65887
1									31753	67	14	141	259		232	704	1129	11479	1	45779
2									7600	16	3	34	47		63	193	43	344	0	8342
3									1717	4	1	8	14		143	434	85	237	0	2642
4	0	0	71		77	0	17	11	920	2	0	4	10		149	452	104	304	0	2122
5	2	1	588		668	3	147	99	67	0	0	0	8		149	452	332	518	0	3037
6	2	1	534		336	2	74	50	13	0	0	0	7		124	376	463	367	0	2349
7	1	0	196		43	0	10	6	1	0	0	0	7		97	296	610	266	0	1533
8	1	0	196		10	0	2	2					5		60	183	469	206	0	1134
9	0	0	55		33	0	7	5	1	0	0	0	6		54	164	652	218	0	1196
10	0	0	125						1	0	0	0	12		73	221	1459	463	0	2355
11	0	0	109		33	0	7	5					10		41	126	1151	370	0	1854
12	4	2	1026		53	0	12	8					7		14	42	685	382	0	2235
13	1	0	180										5		9	28	583	311	0	1118
14	0	0	55										4		7	21	410	299	0	796
15+													20		27	83	1756	1548	0	3435
Sum	12	5	3136		1253	6	276	185	42074	89	18	187	802		1325	4022	12015	80395	10	145812

4Q Ages	IIa	IIIa	IVa	Vb	VIa	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk	VIIIa	VIIIb	VIIIc east	VIIIc west	VIIId	Total
0															137	1214	1337	24899	0	27586
1									16252	0	0	454	2		729	5949	798	16890	0	41075
2	0	0	41		74			0	6213	0	0	3679	17		658	1606	68	1370	0	13726
3	0	0	39		225		772	0	6286	0	0	1743	10		695	4136	140	1011	0	15056
4	3	2	672		7805		8106	0	9723	0	0	1299	31		641	3667	121	398	0	32468
5	15	10	3274		52337		30745	0	12364	0	0	6313	120		1230	1118	242	132	0	107901
6	16	11	3578		15473		6056	0	1942	0	0	1053	23		255	537	298	153	0	29395
7	5	3	1073		2954		2050	0		0	0	456	8		129	446	382	118	0	7625
8	2	2	544		1817		1359	0	317	0	0	4	4		47	293	291	97	0	4776
9	4	3	987		3318		2254	0			0	20	7		66	350	407	100	0	7516
10	5	3	1077		4017		1901	0					6		87	613	926	219	0	8854
11	8	5	1650		1119		528	0					2		58	476	738	186	0	4769
12	14	9	2993		17155		11561	0		0	0	4	34		145	249	441	177	0	32783
13	10	7	2253		2731		1357	0					4		35	191	379	140	0	7107
14	2	1	455		1557		928	0					3		21	121	266	133	0	3488
15+	2	1	418		852		658	0					2		59	462	1138	624	0	4216
Sum	87	58	19053		111433		68274	0	53098	2	1	15025	270		4991	21428	7971	46648	0	348340

1-4Q Ages	IIa	IIIa	IVa	Vb	VIa	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk	VIIIa	VIIIb	VIIIc east	VIIIc west	VIIId	Total
0													382		219	1463	3423	87981	7	93473
1									49459	69	14	595	261		1919	13966	6528	64397	2	137210
2	0	0	41		74			0	20945	16	4	3713	63		977	3944	1074	3718	0	34571
3	0	0	39		225		1425	0	17826	4	1	2165	197		1237	7350	1059	2515	0	34042
4	3	2	743		8442	0	12492	277	22947	3	1	11324	6564	31	3231	6620	822	1432	1	74935
5	17	11	3862		58917	3	62927	2340	26518	2	2	39782	32173	263	7986	3156	1043	981	4	239987
6	18	12	4112		17969	2	10317	655	3876	1	1	7388	14108	15	1777	1857	1282	797	1	64187
7	6	4	1269		4077	0	4716	1069	4258	0	0	1947	3214	57	575	1122	1371	643	0	24328
8	3	2	740		2869	0	3695	145	1872	0	0	2528	3025	15	596	697	1146	547	0	17881
9	5	3	1041		4971	0	5982	133	2392	0	0	470	2212		228	720	1490	543	0	20190
10	5	3	1203		5527		5236	1281	2978	0	0	2505	5842		667	1096	2822	958	1	30125
11	8	5	1759		3574	0	1948	2608	1004	0	0	1135	3812	41	361	861	2254	781	0	20152
12	18	11	4019		43078	0	30865	5031	1117	0	0	1150	13796	118	422	564	1522	957	1	102672
13	11	7	2433		5880		3859	2281	170	0	0	225	3050	41	113	395	1260	943	0	20668
14	2	1	510		5139		5061	232	592	0	0	0	2267	20	47	270	898	769	0	15809
15+	2	1	418		7785		2463	1253	238	0	0	348	2896	41	222	1015	3755	3529	1	23967
Sum	99	63	22189		168524	6	150987	17305	156191	96	23	75276	93863	643	20575	45097	31748	171490	19	954198

Table 5.2.4.2. Western horse mackerel. Catch-at-age (thousands of fish).

	0	1	2	3	4	5	6	7	8	9	10	11+
1982	0	3713	21072	134743	11515	13197	11741	8848	1651	414	1651	81385
1983	0	7903	2269	32900	53508	15345	44539	52673	17923	3291	5505	129139
1984	0	0	241360	4439	36294	149798	22350	38244	34020	14756	4101	58370
1985	0	1633	4901	602992	4463	41822	100376	12644	16172	6200	9224	40976
1986	0	0	0	1548	676208	8727	65147	109747	25712	21179	15271	56824
1987	0	99	493	0	2950	891660	2061	41564	90814	11740	9549	62776
1988	876	27369	6112	2099	4402	18968	941725	12115	39913	67869	9739	76096
1989	0	0	0	20766	18282	5308	14500	1276731	12046	59357	83125	78951
1990	0	20406	45036	138929	61442	33298	10549	20607	1384850	37011	70512	226294
1991	20632	33560	89715	23034	207751	143072	73730	25369	25584	1219646	23987	137131
1992	14887	229703	36331	80552	56275	256085	127048	49020	19053	23449	1103480	152305
1993	46	109152	94500	16738	62714	94711	317337	144610	70717	32693	4822	1309609
1994	3686	60759	911713	115729	53132	44692	38769	221970	106512	40799	42302	998180
1995	2702	165382	470498	424563	215468	59035	90832	35654	245230	119117	99495	1362342
1996	10729	19774	658727	860992	186306	85508	51365	55229	53379	57131	56962	729283
1997	4860	110145	465350	735919	410638	244328	119062	127658	134488	109962	109165	601196
1998	744	91505	184443	488662	360116	219650	157396	122583	81499	68264	50555	389594
1999	14822	97561	83714	176919	265820	254516	212225	187250	147328	77691	35635	252044
2000	637	78856	131112	52716	71779	150869	170393	177995	133290	61578	18010	168770
2001	58685	69430	246525	151707	98454	101344	116952	234832	203823	103968	36076	132706
2002	13707	461055	120106	164977	126329	64449	69828	94429	130285	85325	45798	150103
2003	1843	303721	585700	165666	152117	88944	57445	45596	49476	92758	50503	109994
2004	21246	140299	110976	474273	76136	103011	69844	43981	31618	49188	56109	63823
2005	1260	71508	170936	310085	531221	68559	74392	61641	43454	22304	27127	99898
2006	1901	49396	39439	41585	73860	501168	57299	39424	43667	17148	12274	102329
2007	4583	37208	39743	46218	63337	105042	336626	48066	27637	20155	8801	59268
2008	29912	76358	19219	41715	46963	74125	47740	294659	50621	36873	25725	73986
2009	46167	117519	46258	39576	33781	38393	55696	53917	248299	66292	41751	107948
2010	6806	82287	159023	93764	32789	31381	52379	104625	72210	269930	68571	129653
2011	1094	18864	59027	93167	46347	41372	35607	60798	63676	78422	246442	177090
2012	5350	48100	42654	64222	171285	56012	37917	28132	25608	45490	41255	278872
2013	93473	137210	34571	34042	74935	239987	64187	24328	17881	20190	30125	183268

Table 5.2.5.1. Western horse mackerel stock. Mean weight (kg) in catch at age by quarter and area in 2013

1Q Ages	IIa	IIIa	IVa	Vb	VIa	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk	VIIIa	VIIIb	VIIIc east	VIIIc west	VIIId	Mean
0																				
1									0.08	0.08	0.08				0.05	0.05	0.06	0.05	0.05	0.06
2									0.08	0.08	0.08				0.06	0.06	0.09	0.09	0.06	0.08
3					0.09		0.09		0.09	0.09	0.09	0.09	0.16		0.09	0.08	0.11	0.10	0.12	0.10
4			0.13		0.13		0.13	0.17	0.12	0.12	0.12	0.13	0.15		0.13	0.12	0.12	0.11	0.13	0.13
5			0.16		0.16		0.16	0.20	0.14	0.14	0.14	0.13	0.16		0.13	0.14	0.15	0.13	0.14	0.15
6			0.21		0.20		0.20	0.17	0.16	0.16	0.17	0.16	0.18		0.16	0.16	0.18	0.17	0.17	0.17
7			0.24		0.23		0.25	0.23	0.19	0.19	0.20	0.18	0.23	0.21	0.19	0.22	0.21	0.21	0.22	0.21
8			0.27		0.24		0.24	0.24	0.18	0.19	0.22	0.19	0.25		0.19	0.35	0.24	0.23	0.23	0.23
9			0.28		0.25		0.25	0.29	0.22	0.23	0.23	0.27	0.23		0.27	0.33	0.25	0.26	0.23	0.26
10			0.30		0.28		0.21	0.25	0.21	0.20	0.22	0.18	0.24		0.19	0.30	0.28	0.32	0.23	0.24
11			0.37		0.29		0.28	0.25	0.29	0.27	0.25	0.25	0.24	0.34	0.25	0.24	0.30	0.35	0.24	0.28
12			0.34		0.33		0.30	0.26	0.28	0.28	0.25	0.27	0.24	0.23	0.26	0.24	0.30	0.43	0.24	0.29
13			0.39		0.37		0.31	0.27	0.29	0.32	0.26	0.34	0.25	0.28	0.35	0.37	0.34	0.43	0.26	0.33
14			0.43		0.38		0.42	0.31	0.35	0.35	0.30		0.27	0.27	0.36	0.36	0.32	0.44	0.27	0.35
15+			0.46		0.41		0.42	0.24	0.49	0.37	0.33	0.24	0.32	0.31	0.28	0.37	0.38	0.48	0.31	0.36
Mean			0.30		0.26		0.25	0.24	0.21	0.20	0.19	0.20	0.23	0.27	0.20	0.22	0.22	0.25	0.19	

2Q Ages	IIa	IIIa	IVa	Vb	VIa	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk	VIIIa	VIIIb	VIIIc east	VIIIc west	VIIId	Mean
0																				
1									0.05	0.05					0.06	0.06	0.06	0.05	0.06	0.05
2									0.08	0.08					0.08	0.08	0.09	0.09	0.08	0.08
3									0.10	0.09					0.09	0.09	0.10	0.10	0.09	0.10
4					0.13		0.13	0.13	0.12	0.13	0.13	0.13	0.13	0.11	0.11	0.11	0.12	0.12	0.13	0.12
5					0.16		0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.15	0.15	0.16	0.15	0.14	0.15
6					0.21		0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.19	0.18	0.18	0.19	0.18	0.16	0.17
7					0.24		0.21	0.21	0.19	0.21	0.21	0.21	0.21	0.20	0.21	0.21	0.21	0.21	0.21	0.21
8					0.27		0.23	0.23	0.20	0.23	0.23	0.23	0.23	0.21	0.26	0.26	0.26	0.22	0.23	0.23
9					0.28		0.24	0.24	0.23	0.25	0.24	0.24	0.24		0.26	0.26	0.27	0.25	0.24	0.25
10					0.30		0.26	0.26	0.23	0.27	0.26	0.26	0.26		0.29	0.29	0.29	0.28	0.26	0.27
11					0.37		0.25	0.25	0.27	0.26	0.25	0.25	0.25		0.32	0.32	0.32	0.31	0.25	0.29
12					0.34		0.24	0.24	0.25	0.24	0.24	0.24	0.24	0.24	0.32	0.32	0.32	0.35	0.24	0.28
13					0.39		0.25	0.25	0.28	0.28	0.25	0.25	0.25		0.35	0.35	0.36	0.39	0.25	0.30
14					0.43		0.26	0.26	0.31	0.28	0.26	0.26	0.26		0.34	0.34	0.34	0.39	0.26	0.31
15+					0.46		0.23	0.23	0.36	0.33	0.23	0.23	0.23		0.35	0.35	0.36	0.44	0.25	0.32
Mean					0.30		0.22	0.22	0.20	0.20		0.22	0.22	0.18	0.23	0.23	0.23	0.24		

3Q Ages	IIa	IIIa	IVa	Vb	VIa	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk	VIIIa	VIIIb	VIIIc east	VIIIc west	VIIId	Mean
0													0.04		0.06	0.06	0.03	0.04	0.04	0.05
1									0.05	0.05	0.05	0.05	0.05		0.09	0.09	0.07	0.06	0.06	0.06
2									0.08	0.08	0.08	0.08	0.08		0.11	0.11	0.11	0.10	0.10	0.09
3									0.14	0.14	0.14	0.14	0.13		0.13	0.13	0.13	0.11	0.13	0.13
4	0.20	0.20	0.20		0.18	0.18	0.18	0.18	0.17	0.17	0.17	0.17	0.16		0.15	0.15	0.17	0.13	0.15	0.17
5	0.19	0.19	0.19		0.18	0.18	0.18	0.18	0.17	0.17	0.17	0.17	0.18		0.20	0.20	0.19	0.16	0.18	0.18
6	0.21	0.21	0.21		0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.21		0.24	0.24	0.20	0.19	0.21	0.20
7	0.22	0.22	0.22		0.22	0.22	0.22	0.22	0.26	0.26	0.26	0.26	0.23		0.25	0.25	0.22	0.21	0.23	0.23
8	0.23	0.23	0.23		0.23	0.23	0.23	0.23					0.23		0.27	0.27	0.23	0.22	0.23	0.24
9	0.25	0.25	0.25		0.22	0.22	0.22	0.22	0.24	0.24	0.24	0.24	0.26		0.29	0.29	0.25	0.25	0.26	0.25
10	0.25	0.25	0.25						0.33	0.33	0.33	0.33	0.27		0.30	0.30	0.27	0.27	0.27	0.29
11	0.29	0.29	0.29		0.22	0.22	0.22	0.22					0.30		0.32	0.32	0.30	0.32	0.30	0.28
12	0.30	0.30	0.30		0.22	0.22	0.22	0.22					0.34		0.36	0.36	0.33	0.37	0.34	0.29
13	0.24	0.24	0.24										0.37		0.39	0.39	0.35	0.39	0.37	0.33
14	0.31	0.31	0.31										0.38		0.38	0.38	0.36	0.41	0.38	0.35
15+													0.42		0.36	0.36	0.38	0.47	0.42	0.40
Mean	0.24	0.24	0.24		0.21	0.21	0.21	0.21	0.18	0.18	0.18	0.18	0.23		0.24	0.24	0.22	0.23	0.23	

4Q Ages	IIa	IIIa	IVa	Vb	VIa	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk	VIIIa	VIIIb	VIIIc east	VIIIc west	VIIId	Mean
0															0.07	0.07	0.03	0.05	0.05	0.05
1									0.06	0.06	0.06	0.09	0.09		0.09	0.10	0.07	0.07	0.07	0.08
2	0.17	0.17	0.17		0.11			0.11	0.10	0.10	0.10	0.10	0.10		0.10	0.11	0.11	0.10	0.10	0.12
3	0.21	0.21	0.21		0.12		0.14	0.13	0.14	0.14	0.14	0.13	0.13		0.13	0.13	0.13	0.11	0.12	0.15
4	0.23	0.23	0.23		0.15		0.17	0.16	0.18	0.17	0.17	0.15	0.16		0.14	0.13	0.15	0.11	0.14	0.17
5	0.25	0.25	0.25		0.18		0.19	0.19	0.18	0.17	0.17	0.16	0.18		0.17	0.17	0.18	0.17	0.16	0.19
6	0.27	0.27	0.27		0.21		0.21	0.21	0.21	0.19	0.19	0.15	0.19		0.18	0.24	0.20	0.19	0.18	0.21
7	0.30	0.30	0.30		0.26		0.24	0.25		0.16	0.16	0.16	0.22		0.21	0.26	0.22	0.21	0.21	0.23
8	0.33	0.33	0.33		0.26		0.25	0.25	0.27	0.26	0.26	0.21	0.25		0.27	0.27	0.23	0.22	0.24	0.27
9	0.33	0.33	0.33		0.25		0.25	0.25			0.19	0.19	0.25		0.28	0.30	0.25	0.25	0.27	0.26
10	0.33	0.33	0.33		0.27		0.25	0.26					0.25		0.31	0.32	0.27	0.27	0.29	0.29
11	0.33	0.33	0.33		0.29		0.26	0.28					0.26		0.34	0.35	0.30	0.31	0.31	0.31
12	0.36	0.36	0.36		0.30		0.25	0.28		0.25	0.23	0.23	0.25		0.27	0.38	0.33	0.36	0.35	0.30
13	0.37	0.37	0.37		0.31		0.24	0.28					0.24		0.34	0.40	0.36	0.39	0.37	0.33
14	0.46	0.46	0.46		0.33		0.25	0.29					0.24		0.35	0.41	0.36	0.41	0.38	0.37
15+	0.40	0.40	0.40		0.33		0.25	0.29					0.25		0.38	0.39	0.38	0.46	0.40	0.36
Mean	0.31	0.31	0.31		0.24		0.23	0.23	0.16	0.17	0.17	0.16	0.20		0.23	0.25	0.22	0.23	0.23	

1-4Q Ages	IIa	IIIa	IVa	Vb	VIa	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk	VIIIa	VIIIb	VIIIc east	VIIIc west	VIIId	Mean
0													0.04		0.07	0.07	0.03	0.04	0.04	0.05
1									0.05	0.05	0.05	0.08	0.05		0.08	0.08	0.06	0.05	0.06	0.06
2	0.17	0.17	0.17					0.11	0.08	0.08	0.08	0.10	0.09		0.10	0.09	0.09	0.09	0.09	0.11
3	0.21	0.21	0.21				0.11	0.13	0.11	0.14	0.14	0.12	0.16		0.12	0.11	0.11	0.11	0.11	0.14
4	0.23	0.23	0.23		0.18		0.15	0.13	0.14	0.16	0.15	0.13	0.14	0.11	0.13	0.13	0.13	0.12	0.13	0.16
5	0.24	0.24	0.24		0.18		0.17	0.17	0.16	0.15	0.15	0.14	0.15	0.14	0.14	0.16	0.17	0.16	0.14	0.17
6	0.26	0.26	0.26		0.19		0.20	0.16	0.18	0.17	0.16	0.16	0.16	0.19	0.17	0.20	0.20	0.18	0.17	0.20
7	0.29	0.29	0.28		0.22		0.25	0.23	0.19	0.20	0.20	0.18	0.22	0.20	0.21	0.24	0.22	0.21	0.22	0.23
8	0.31	0.31	0.30		0.23		0.25	0.23	0.20	0.23	0.22	0.19	0.24	0.21	0.21	0.27	0.24	0.22	0.23	0.24
9	0.32	0.32	0.32		0.22		0.25	0.28	0.22	0.25	0.23	0.26	0.23		0.28	0.29	0.26	0.25	0.24	0.27
10	0.32	0.33	0.32				0.22	0.25	0.21	0.26	0.25	0.18	0.25		0.22	0.31	0.28	0.27	0.25	0.26
11	0.33	0.33	0.33		0.22		0.27	0.25	0.29	0.26	0.25	0.25	0.25	0.34	0.28	0.33	0.30	0.32	0.27	0.29
12	0.34	0.35	0.34		0.22		0.28	0.25	0.28	0.24	0.24	0.27	0.24	0.23	0.27	0.34	0.33	0.37	0.25	0.29
13	0.36	0.36	0.36				0.28	0.27	0.29	0.28	0.25	0.34	0.25	0.28	0.35	0.38	0.36	0.40	0.29	0.32
14	0.45	0.45	0.45				0.39	0.29	0.34	0.29	0.26	0.26	0.26	0.27	0.36	0.37	0.36	0.41	0.30	0.35
15+	0.40	0.40	0.40				0.37	0.24	0.48	0.33	0.25	0.24	0.28	0.31	0.33	0.37	0.37	0.46	0.37	0.35
Mean	0.30	0.30	0.30		0.21		0.25	0.21	0.22	0.21	0.19	0.19	0.19	0.23	0.21	0.23	0.22	0.23	0.20	

Table 5.2.5.2. Western horse mackerel stock. Mean length (cm) in catch at age by quarter and area in 2013

1Q Ages	IIa	IIIa	IVa	Vb	VIa	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk	VIIIa	VIIIb	VIIIc east	VIIIc west	VIIId	Mean
0					0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1					0.00		0.00	0.00	21.31	21.31	21.31	0.00	0.00	0.00	17.47	17.47	18.88	17.28	17.47	10.89
2					0.00		0.00	0.00	21.77	21.80	21.77	0.00	0.00	0.00	19.66	19.66	22.51	21.84	19.66	12.05
3					0.00		22.45	0.00	22.79	22.83	22.87	22.50	26.50	0.00	22.25	20.96	23.57	23.10	24.14	18.14
4					25.69		25.56	27.50	24.86	25.07	25.24	25.47	27.17	0.00	25.35	24.87	24.64	24.09	25.70	23.66
5					27.58		27.27	29.47	25.79	25.91	26.24	26.00	28.08	0.00	26.05	26.73	26.64	25.07	26.49	24.81
6					30.11		29.45	27.50	26.87	26.98	27.54	27.04	28.81	0.00	27.09	27.39	28.20	27.93	27.70	25.90
7					31.17		31.99	32.00	27.95	27.88	28.73	27.58	31.25	30.50	28.01	30.55	29.86	29.83	30.04	29.81
8					32.43		31.29	30.95	28.27	28.40	30.08	28.56	31.81	0.00	28.63	35.61	31.31	30.72	30.73	28.49
9					32.80		32.09	33.43	29.75	29.92	30.51	31.50	31.20	0.00	31.63	34.98	31.85	32.34	31.25	29.52
10					33.58		30.35	32.19	29.10	28.89	30.13	28.50	31.48	0.00	28.76	33.01	32.78	34.52	30.72	28.86
11					35.63		32.70	31.60	31.42	31.04	31.42	30.49	31.77	35.00	30.59	31.18	33.87	35.63	31.41	32.41
12					34.90		33.64	32.71	31.37	31.79	31.73	32.39	31.71	31.40	32.25	31.38	33.81	38.24	31.78	32.79
13					36.47		33.88	32.98	31.50	32.90	32.37	34.50	32.28	33.00	34.88	36.31	35.12	38.30	32.52	34.07
14					37.40		37.42	33.89	33.67	33.67	33.26	0.00	33.05	33.50	36.11	36.11	34.39	38.61	33.11	32.44
15+					38.19		37.19	32.13	37.92	34.75	34.75	31.50	34.74	34.00	32.95	36.38	36.21	39.77	34.52	35.36
Mean					24.75		25.33	23.52	26.52	26.45	26.75	21.63	24.99	12.34	26.36	27.66	27.73	30.42	26.70	

2Q Ages	IIa	IIIa	IVa	Vb	VIa	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk	VIIIa	VIIIb	VIIIc east	VIIIc west	VIIIc west	Mean
					0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1					0.00		0.00	0.00	17.69	17.75	0.00	0.00	0.00	0.00	19.09	19.09	18.52	17.27	19.09	9.18
2					0.00		0.00	0.00	21.17	21.60	0.00	0.00	0.00	0.00	21.25	21.25	21.91	21.87	21.25	10.74
3					0.00		0.00	0.00	23.08	22.52	0.00	0.00	0.00	0.00	22.06	22.06	23.24	23.23	22.06	11.30
4					25.76		26.06	26.06	25.17	25.59	26.06	26.06	26.06	25.50	23.82	23.82	24.74	24.55	25.71	25.35
5					27.60		27.26	27.26	26.38	27.24	27.26	27.26	27.26	26.79	26.80	26.80	27.03	26.48	27.26	27.05
6					30.08		28.39	28.39	27.95	28.40	28.39	28.39	28.39	29.50	28.48	28.48	28.70	28.38	28.39	28.59
7					31.17		29.97	29.97	28.29	29.93	29.98	29.98	29.98	29.83	29.78	29.78	30.04	29.64	29.96	29.88
8					32.43		30.96	30.96	28.99	31.19	30.97	30.97	30.97	30.50	31.84	31.84	32.05	30.48	31.11	31.09
9					32.79		29.50	29.50	29.94	31.06	29.50	29.50	29.50	0.00	32.25	32.25	32.37	31.77	30.11	28.57
10					33.58		32.36	32.36	30.08	32.55	32.36	32.36	32.36	0.00	33.21	33.21	33.38	33.11	32.40	30.24
11					35.62		31.71	31.71	31.85	32.26	31.71	31.71	31.71	0.00	34.59	34.59	34.55	34.17	31.85	30.57
12					34.90		31.26	31.26	31.50	31.53	31.26	31.26	31.26	31.50	34.45	34.45	34.65	35.49	31.31	32.58
13					36.47		31.98	31.98	32.93	33.20	31.98	31.98	31.98	0.00	35.70	35.70	35.83	37.13	32.20	31.36
14					37.40		33.31	33.31	33.83	33.97	33.31	33.31	33.31	0.00	35.18	35.18	35.36	36.79	33.41	31.98
15+					38.19		32.01	32.01	35.41	34.90	32.01	32.01	32.01	0.00	35.45	35.45	35.90	38.31	32.62	31.88
Mean					24.75		22.80	22.80	26.52	27.11		22.80	22.80	10.85	27.75	27.75	28.02	29.46	26.80	

3Q Ages	IIa	IIIa	IVa	Vb	VIa	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk	VIIIa	VIIIb	VIIIc east	VIIIc west	VIIIc west	Mean
	0.00	0.00	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	16.02		19.36	19.36	15.34	16.04	16.02	6.38
1	0.00	0.00	0.00		0.00		0.00	0.00	17.67	17.67	17.67	17.67	17.99		22.01	22.01	19.66	18.49	18.76	11.85
2	0.00	0.00	0.00		0.00		0.00	0.00	20.74	20.74	20.74	20.74	20.91		23.47	23.47	23.44	23.15	23.27	13.79
3	0.00	0.00	0.00		0.00		0.00	0.00	24.49	24.49	24.49	24.49	24.58		25.33	25.33	25.05	23.86	24.80	15.43
4	28.50	28.50	28.50		28.50		28.50	28.50	27.35	27.35	27.35	27.35	26.84		26.44	26.44	27.59	25.53	26.25	27.47
5	28.51	28.51	28.51		28.58		28.58	28.58	26.57	26.57	26.57	26.57	28.23		29.49	29.49	28.66	27.11	28.29	28.05
6	29.41	29.41	29.41		29.27		29.27	29.27	27.17	27.17	27.17	27.17	29.61		31.06	31.06	29.42	28.64	29.65	29.01
7	30.70	30.70	30.70		30.74		30.74	30.74	30.50	30.50	30.50	30.50	30.58		31.90	31.90	30.39	29.69	30.58	30.71
8	31.22	31.22	31.22		31.50		31.50	31.50	0.00	0.00	0.00	0.00	30.93		32.55	32.55	30.62	30.34	30.93	23.51
9	32.50	32.50	32.50		30.50		30.50	30.50	29.50	29.50	29.50	29.50	32.06		33.42	33.42	31.84	31.82	32.07	31.35
10	30.94	30.94	30.94		0.00		0.00	0.00	33.50	33.50	33.50	33.50	32.75		33.88	33.88	32.70	32.41	32.75	26.57
11	33.50	33.50	33.50		30.50		30.50	30.50	0.00	0.00	0.00	0.00	33.89		34.63	34.63	33.69	34.34	33.90	24.82
12	33.44	33.44	33.44		30.88		30.88	30.88	0.00	0.00	0.00	0.00	35.31		35.90	35.90	34.80	36.25	35.34	25.40
13	31.37	31.37	31.37		0.00		0.00	0.00	0.00	0.00	0.00	0.00	36.31		36.88	36.88	35.84	37.14	36.31	19.59
14	32.50	32.50	32.50		0.00		0.00	0.00	0.00	0.00	0.00	0.00	36.66		36.77	36.77	35.99	37.57	36.66	19.87
15+	0.00	0.00	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	37.82		35.83	35.83	36.52	39.40	37.82	13.95
Mean	21.41	21.41	21.41		15.03		15.03	15.03	14.84	14.84	14.84	14.84	29.41		30.56	30.56	29.47	30.52	29.59	

4Q Ages	IIa	IIIa	IVa	Vb	VIa	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk	VIIIa	VIIIb	VIIIc east	VIIIc west	VIIIc west	Mean
	0.00	0.00	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00		19.70	19.70	15.40	17.37	17.36	5.60
1	0.00	0.00	0.00		0.00		0.00	0.00	19.43	19.52	19.53	22.45	22.45		22.50	22.51	19.76	19.70	20.37	13.01
2	24.50	24.50	24.50		24.50		0.00	24.50	22.21	22.42	22.46	22.82	22.82		23.07	23.72	23.66	23.23	23.11	22.00
3	28.00	28.00	28.00		24.52		25.59	25.38	25.04	25.03	24.98	24.77	24.96		24.84	24.87	24.83	23.94	24.70	25.47
4	27.60	27.60	27.60		26.83		27.53	27.21	27.25	27.23	27.13	26.28	27.28		25.85	25.42	26.55	24.15	25.57	26.69
5	28.90	28.90	28.90		28.58		28.77	28.65	27.80	27.55	27.53	27.06	28.35		27.54	27.71	28.38	27.43	27.19	28.08
6	29.80	29.80	29.80		29.89		29.87	29.88	28.75	28.33	28.32	27.63	29.39		28.96	31.06	29.37	28.65	28.79	29.27
7	30.80	30.80	30.80		32.23		31.48	31.88	0.00	27.50	27.53	27.53	30.45		29.93	32.08	30.37	29.73	29.84	28.31
8	32.50	32.50	32.50		31.77		32.08	31.90	30.50	30.49	30.49	29.50	32.04		32.57	32.75	30.62	30.35	31.41	31.50
9	32.10	32.10	32.10		31.72		31.95	31.82	0.00	0.00	28.86	28.86	31.91		32.95	33.82	31.86	31.86	32.50	27.78
10	32.30	32.30	32.30		32.58		31.85	32.31	0.00	0.00	0.00	0.00	31.84		34.03	34.56	32.71	32.55	33.28	24.54
11	32.30	32.30	32.30		33.21		32.61	32.99	0.00	0.00	0.00	0.00	32.60		35.29	35.52	33.71	34.28	34.35	25.09
12	33.40	33.40	33.40		33.40		31.86	32.73	0.00	30.50	30.04	30.00	31.85		32.84	36.65	34.81	36.08	35.53	31.03
13	33.40	33.40	33.40		34.01		31.29	33.02	0.00	0.00	0.00	0.00	31.30		35.04	37.45	35.87	37.00	36.48	25.73
14	35.50	35.50	35.50		34.25		31.66	33.15	0.00	0.00	0.00	0.00	31.61		35.71	37.58	36.03	37.59	36.76	26.30
15+	34.70	34.70	34.70		34.37		32.10	33.31	0.00	0.00	0.00	0.00	32.11		36.55	37.12	36.50	39.09	37.36	26.41
Mean	27.24	27.24	27.24		26.99		24.92	26.80	11.31	14.91	16.68	16.68	27.56		29.84	30.78	29.40	30.48	29.66	

1-4Q Ages	IIa	IIIa	IVa	Vb	VIa	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk	VIIIa	VIIIb	VIIIc east	VIIIc west	VIIIc west	Mean
	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.02	0.00	19.57	19.64	15.36	16.41	16.05	5.73
1	0.00	0.00	0.00		0.00	0.00	0.00	0.00	18.26	17.68	17.70	21.32	18.03	0.00	20.58	20.64	18.91	18.13	18.87	10.56
2	24.50	24.50	24.50		24.50	0.00	0.00	24.50	21.51	20.77	20.83	22.81	21.42	0.00	22.59	22.34	22.23	22.48	22.22	18.98
3	28.00	28.00	28.00		24.52	0.00	24.15	25.38	23.75	24.43	24.47	24.33	26.28	0.00	24.02	23.83	23.70	23.55	23.54	22.22
4	27.67	27.65	27.69		26.77	28.50	26.84	26.22	25.98	27.07	26.75	25.56	26.29	25.50	25.43	25.07	25.34	24.57	25.74	26.37
5	28.85	28.86	28.84		28.48	28.58	28.00	28.16	26.74	27.18	27.20	26.16	27.38	26.79	26.34	27.48	27.80	26.90	26.87	27.59
6	29.76	29.77	29.75		29.90	29.27	29.69	28.44	27.85	28.30	28.32	27.12	28.44	29.50	27.67	29.47	29.06	28.55	28.24	28.84
7	30.79	30.79	30.78		31.94	30.74	31.76	31.81	27.96	29.48	29.53	27.57	30.49	29.95	29.19	31.33	30.28	29.68	30.16	30.24
8	32.20	32.28	32.16		32.01	31.50	31.58	30.96	28.67	30.76	30.60	28.57	31.58	30.50	29.46	32.46	31.05	30.41	30.81	30.98
9	32.12	32.11	32.12		32.06	30.50	32.03	32.61	29.76	30.82	29.98	31.38	30.82	0.00	32.50	33.31	31.97	31.82	31.41	29.85
10	32.18	32.22	32.16		32.85	0.00	30.89	32.21	29.13	32.21	31.87	28.50	31.90	0.00	30.15	34.09	32.79	32.69	31.62	28.19
11	32.36	32.34	32.37		34.83	30.50	32.66	31.60	31.44	32.20	31.67	30.49	31.73	35.00	32.03	34.76	33.82	34.35	32.41	32.59
12	33.41	33.41	33.41		34.30	30.88	32.97	32.57	31.39	31.54	31.30	32.38	31.41	31.41	32.69	35.07	34.74	36.25	31.95	32.84
13	33.27	33.31	33.25		35.33	0.00	32.97	32.94	31.69	33.19	32.02	34.50	32.12	33.00	35.21	36.67	35.83	37.35	33.54	32.01
14	35.22	35.31	35.18		36.44	0.00	36.36	33.72	33.68	33.97	33.31	33.31	33.22	33.50	35.79	36.45	35.82	37.54	34.36	32.95
15+	34.70	34.70	34.70		37.77	0.00	35.83	32.12	37.60	34.90	32.41	31.50	33.49	34.00	34.77	36.31	36.38	39.12	36.18	33.14
Mean	27.19	27.20	27.18		27.61		25.36	26.45	26.59	27.16	26.75	26.59	28.16	19.32	28.62	29.93	29.07	29.50	28.37	

Table 5.2.5.3. Western horse mackerel. Stock weights-at-age (kg).

	0	1	2	3	4	5	6	7	8	9	10	11+
1982	0.000	0.000	0.050	0.080	0.207	0.232	0.269	0.280	0.292	0.305	0.369	0.352
1983	0.000	0.000	0.050	0.080	0.171	0.227	0.257	0.276	0.270	0.243	0.390	0.311
1984	0.000	0.000	0.050	0.077	0.122	0.155	0.201	0.223	0.253	0.246	0.338	0.287
1985	0.000	0.000	0.050	0.081	0.148	0.140	0.193	0.236	0.242	0.289	0.247	0.306
1986	0.000	0.000	0.050	0.080	0.105	0.134	0.169	0.195	0.242	0.292	0.262	0.342
1987	0.000	0.000	0.050	0.080	0.105	0.126	0.150	0.171	0.218	0.254	0.281	0.317
1988	0.000	0.000	0.050	0.080	0.105	0.126	0.141	0.143	0.217	0.274	0.305	0.366
1989	0.000	0.000	0.050	0.080	0.105	0.103	0.131	0.159	0.127	0.210	0.252	0.336
1990	0.000	0.000	0.050	0.080	0.105	0.127	0.135	0.124	0.154	0.174	0.282	0.345
1991	0.000	0.000	0.050	0.080	0.121	0.137	0.143	0.144	0.150	0.182	0.189	0.333
1992	0.000	0.000	0.050	0.080	0.105	0.133	0.151	0.150	0.158	0.160	0.182	0.287
1993	0.000	0.000	0.050	0.080	0.105	0.153	0.166	0.173	0.172	0.170	0.206	0.222
1994	0.000	0.000	0.050	0.080	0.105	0.147	0.185	0.169	0.191	0.191	0.190	0.235
1995	0.000	0.000	0.050	0.066	0.119	0.096	0.152	0.166	0.178	0.187	0.197	0.233
1996	0.000	0.000	0.050	0.095	0.118	0.129	0.148	0.172	0.183	0.185	0.202	0.238
1997	0.000	0.000	0.050	0.080	0.112	0.124	0.162	0.169	0.184	0.188	0.208	0.238
1998	0.000	0.000	0.050	0.090	0.108	0.129	0.142	0.151	0.162	0.174	0.191	0.215
1999	0.000	0.000	0.050	0.110	0.120	0.130	0.160	0.170	0.180	0.190	0.210	0.222
2000	0.000	0.000	0.050	0.087	0.108	0.148	0.170	0.173	0.193	0.202	0.257	0.260
2001	0.000	0.000	0.070	0.074	0.082	0.100	0.121	0.131	0.142	0.161	0.187	0.268
2002	0.000	0.000	0.050	0.109	0.120	0.135	0.146	0.153	0.177	0.206	0.216	0.275
2003	0.000	0.000	0.050	0.110	0.142	0.139	0.161	0.169	0.169	0.176	0.176	0.206
2004	0.000	0.000	0.050	0.104	0.114	0.127	0.142	0.157	0.168	0.166	0.178	0.213
2005	0.000	0.000	0.085	0.095	0.110	0.141	0.163	0.182	0.197	0.181	0.209	0.243
2006	0.000	0.000	0.085	0.098	0.095	0.113	0.167	0.157	0.164	0.205	0.195	0.229
2007	0.000	0.000	0.085	0.098	0.095	0.118	0.128	0.137	0.168	0.180	0.173	0.181
2008	0.000	0.000	0.085	0.107	0.128	0.142	0.153	0.160	0.169	0.188	0.263	0.217
2009	0.000	0.000	0.085	0.125	0.15	0.177	0.168	0.169	0.205	0.223	0.217	0.316
2010	0.000	0.050	0.070	0.084	0.114	0.149	0.171	0.182	0.187	0.206	0.221	0.268
2011	0.000	0.070	0.075	0.086	0.119	0.151	0.171	0.190	0.203	0.220	0.238	0.278
2012	0.000	0.000	0.085	0.077	0.093	0.138	0.165	0.185	0.207	0.236	0.231	0.274
2013	0.000	0.000	0.085	0.0941	0.135	0.147	0.163	0.218	0.240	0.231	0.249	0.248

Weight at age 3 is the average of the time series 1995-2012.

Table 5.2.6.1. Western horse mackerel. Maturity-at-age.

	0	1	2	3	4	5	6	7	8	9	10	11+
1982	0	0	0.40	0.80	1	1	1	1	1	1	1	1
1983	0	0	0.30	0.70	1	1	1	1	1	1	1	1
1984	0	0	0.10	0.60	0.85	1	1	1	1	1	1	1
1985	0	0	0.10	0.40	0.80	0.95	1	1	1	1	1	1
1986	0	0	0.10	0.40	0.60	0.90	1	1	1	1	1	1
1987	0	0	0.10	0.40	0.60	0.80	1	1	1	1	1	1
1988	0	0	0.10	0.40	0.60	0.80	1	1	1	1	1	1
1989	0	0	0.10	0.40	0.60	0.80	1	1	1	1	1	1
1990	0	0	0.10	0.40	0.60	0.80	1	1	1	1	1	1
1991	0	0	0.10	0.40	0.60	0.80	1	1	1	1	1	1
1992	0	0	0.10	0.40	0.60	0.80	1	1	1	1	1	1
1993	0	0	0.10	0.40	0.60	0.80	1	1	1	1	1	1
1994	0	0	0.10	0.40	0.60	0.80	1	1	1	1	1	1
1995	0	0	0.10	0.40	0.60	0.80	1	1	1	1	1	1
1996	0	0	0.10	0.40	0.60	0.80	1	1	1	1	1	1
1997	0	0	0.10	0.40	0.60	0.80	1	1	1	1	1	1
1998	0	0	0.05	0.25	0.70	0.95	1	1	1	1	1	1
1999	0	0	0.05	0.25	0.70	0.95	1	1	1	1	1	1
2000	0	0	0.05	0.25	0.70	0.95	1	1	1	1	1	1
2001	0	0	0.05	0.25	0.70	0.95	1	1	1	1	1	1
2002	0	0	0.05	0.25	0.70	0.95	1	1	1	1	1	1
2003	0	0	0.05	0.25	0.70	0.95	1	1	1	1	1	1
2004	0	0	0.05	0.25	0.70	0.95	1	1	1	1	1	1
2005	0	0	0.05	0.25	0.70	0.95	1	1	1	1	1	1
2006	0	0	0.05	0.25	0.70	0.95	1	1	1	1	1	1
2007	0	0	0.05	0.25	0.70	0.95	1	1	1	1	1	1
2008	0	0	0.05	0.25	0.70	0.95	1	1	1	1	1	1
2009	0	0	0.05	0.25	0.70	0.95	1	1	1	1	1	1
2010	0	0	0.05	0.25	0.70	0.95	1	1	1	1	1	1
2011	0	0	0.05	0.25	0.70	0.95	1	1	1	1	1	1
2012	0	0	0.05	0.25	0.70	0.95	1	1	1	1	1	1
2013	0	0	0.05	0.25	0.70	0.95	1	1	1	1	1	1

Table 5.2.8.1. Western horse mackerel. Potential fecundity (10^6 eggs) per kg spawning female vs. weight in kg.

	1987		1992		1995		1998		2000		2001		2001 (contd)	
	w	pfec.	w	pfec.	w	pfec.	w	pfec.	w	pfec.	w	pfec.	w	pfec.
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
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
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	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 5.3.1.1. Western horse mackerel. Final assessment. Numbers-at-age (thousands).

	0	1	2	3	4	5	6	7	8	9	10	11+
1982	67966200	810830	2034690	3854670	566839	508234	416305	329657	51916.3	58365.8	66774	3291580
1983	525368	58499000	694444	1731720	3192730	477200	425197	347425	275529	43153.1	49851.9	2813630
1984	1544370	452188	50343300	595608	1459980	2698370	396494	324650	250164	220522	34089	2172000
1985	2779520	1329250	389202	43106900	508526	1222950	2183530	320530	243948	183757	176116	1653230
1986	3906540	2392360	1142580	330442	36543100	433552	1013800	1786260	264152	194965	152409	1485790
1987	5209060	3362390	2059120	983428	282978	30825500	365065	812147	1435630	203504	148159	1258090
1988	2001600	4483480	2893940	1771840	846444	240825	25704600	312303	660461	1151410	164266	1126440
1989	2115060	1721980	3833580	2485170	1523090	724458	189682	21250400	257562	531435	928062	1040050
1990	1844010	1820450	1482120	3299590	2119740	1293980	618622	149809	17105900	210510	402342	1530790
1991	3364770	1587150	1547950	1233890	2711090	1767470	1082840	522666	109824	13438400	146851	1350660
1992	6183280	2876940	1334940	1249100	1040650	2140720	1388550	863610	426327	70790.7	10435100	1062740
1993	7327610	5308190	2263100	1115290	1000380	843490	1604950	1077260	697838	349267	39175.4	8770990
1994	7669080	6306890	4467530	1860200	944410	802849	638131	1086990	793049	535028	270286	6579640
1995	4471940	6597420	5372020	2999410	1493720	763568	649556	513277	729649	583768	422652	4904390
1996	2445460	3846530	5525020	4187240	2187730	1085760	602440	474809	408703	400504	391943	3426920
1997	2096320	2094870	3292390	4144300	2805210	1710150	855190	470871	357433	302252	291714	2773600
1998	3506020	1799810	1700890	2402060	2884280	2033500	1245270	625610	286849	182875	158134	1581850
1999	4177640	3016970	1464220	1292850	1614120	2148430	1546470	925788	424742	171283	94070.9	984714
2000	4422700	3581980	2506220	1182600	948633	1142680	1613050	1134170	623113	228896	75347.2	552183
2001	17247600	3806060	3009880	2035480	968967	749903	843543	1230280	811056	412659	139884	401605
2002	3785950	14790700	3211500	2361910	1611210	742657	551426	617543	841052	508990	258727	337151
2003	2788270	3245880	12302700	2652730	1879860	1269580	579419	409835	443919	603029	358932	415369
2004	1458000	2398180	2511980	10045700	2129530	1476890	1010220	445416	310447	336183	432976	565673
2005	959001	1235200	1934020	2059510	8206530	1762350	1175580	804696	342552	237854	243701	739591
2006	808081	824250	1002720	1509920	1484590	6567640	1453220	942810	635413	254514	184036	745040
2007	1355850	693758	663612	826456	1261020	1209270	5187860	1197640	774909	506393	203154	742284
2008	2770940	1162740	562604	534305	668459	1026610	943378	4152930	986226	641330	417158	775806
2009	1172140	2357220	952757	460830	429737	536981	813307	748119	3265080	790982	512492	957942
2010	438369	966041	1914330	773404	366099	340907	419043	635433	578573	2585270	623600	1165940
2011	530138	370993	756871	1498760	584752	276155	250410	308396	459998	435096	1930650	1348850
2012	1493810	455279	291760	594817	1139070	443422	204137	185447	224802	347798	326774	2485060
2013	2378928[1]	1280770	351249	224907	440279	840845	317362	146430	130494	165357	253760	2073830
2014		2015845	975384	267250	163524	319146	588787	222783	100608	94216.4	118308	1685550

1. Age 0 in 2013 is the geometric mean of the time-series 1983 to 2012

Table 5.3.1.2. Western horse mackerel. Final assessment. Fishing mortality-at-age.

	0	1	2	3	4	5	6	7	8	9	10	11+
1982	0.000	0.005	0.011	0.038	0.022	0.028	0.031	0.029	0.035	0.008	0.027	0.027
1983	0.000	0.000	0.004	0.021	0.018	0.035	0.120	0.178	0.073	0.086	0.126	0.126
1984	0.000	0.000	0.005	0.008	0.027	0.062	0.063	0.136	0.159	0.075	0.138	0.138
1985	0.000	0.001	0.014	0.015	0.010	0.038	0.051	0.043	0.074	0.037	0.058	0.058
1986	0.000	0.000	0.000	0.005	0.020	0.022	0.072	0.069	0.111	0.125	0.114	0.114
1987	0.000	0.000	0.000	0.000	0.011	0.032	0.006	0.057	0.071	0.064	0.072	0.072
1988	0.000	0.007	0.002	0.001	0.006	0.089	0.040	0.043	0.067	0.066	0.066	0.066
1989	0.000	0.000	0.000	0.009	0.013	0.008	0.086	0.067	0.052	0.128	0.101	0.101
1990	0.000	0.012	0.033	0.046	0.032	0.028	0.019	0.160	0.091	0.210	0.209	0.209
1991	0.007	0.023	0.065	0.020	0.086	0.091	0.076	0.054	0.289	0.103	0.193	0.193
1992	0.003	0.090	0.030	0.072	0.060	0.138	0.104	0.063	0.049	0.442	0.121	0.121
1993	0.000	0.022	0.046	0.016	0.070	0.129	0.240	0.156	0.116	0.106	0.142	0.142
1994	0.001	0.010	0.248	0.069	0.063	0.062	0.068	0.249	0.156	0.086	0.184	0.184
1995	0.001	0.027	0.099	0.166	0.169	0.087	0.163	0.078	0.450	0.248	0.291	0.291
1996	0.005	0.006	0.138	0.251	0.096	0.089	0.096	0.134	0.152	0.167	0.170	0.170
1997	0.003	0.058	0.165	0.212	0.172	0.167	0.163	0.346	0.520	0.498	0.512	0.512
1998	0.000	0.056	0.124	0.248	0.145	0.124	0.146	0.237	0.366	0.515	0.419	0.419
1999	0.004	0.035	0.064	0.160	0.195	0.137	0.160	0.246	0.468	0.671	0.520	0.520
2000	0.000	0.024	0.058	0.049	0.085	0.154	0.121	0.185	0.262	0.342	0.296	0.296
2001	0.004	0.020	0.092	0.084	0.116	0.157	0.162	0.230	0.316	0.317	0.324	0.324
2002	0.004	0.034	0.041	0.078	0.088	0.098	0.147	0.180	0.183	0.199	0.211	0.211
2003	0.001	0.106	0.053	0.070	0.091	0.079	0.113	0.128	0.128	0.181	0.164	0.164
2004	0.016	0.065	0.049	0.052	0.039	0.078	0.077	0.113	0.116	0.172	0.150	0.150
2005	0.001	0.059	0.098	0.177	0.073	0.043	0.071	0.086	0.147	0.107	0.127	0.127
2006	0.003	0.067	0.043	0.030	0.055	0.086	0.043	0.046	0.077	0.075	0.074	0.074
2007	0.004	0.060	0.067	0.062	0.056	0.098	0.073	0.044	0.039	0.044	0.048	0.048
2008	0.012	0.049	0.050	0.068	0.069	0.083	0.082	0.091	0.071	0.074	0.069	0.069
2009	0.043	0.058	0.059	0.080	0.082	0.098	0.097	0.107	0.083	0.088	0.082	0.082
2010	0.017	0.094	0.095	0.130	0.132	0.159	0.157	0.173	0.135	0.142	0.133	0.133
2011	0.002	0.090	0.091	0.124	0.127	0.152	0.150	0.166	0.130	0.136	0.127	0.127
2012	0.004	0.109	0.110	0.151	0.154	0.184	0.182	0.201	0.157	0.165	0.154	0.154
2013	0.000	0.122	0.123	0.169	0.172	0.206	0.204	0.225	0.176	0.185	0.173	0.173

Table 5.3.1.3. Western horse mackerel. Final assessment. Stock summary table.

	R (age 0) (thousands)	SSB (tons)	TSB (tons)	Catch (tons)	Yield/SSB	F(1-3)	F(4-8)	F(1-10)
1982	67966200	1793500	2065881	61197	0.034	0.018	0.029	0.023
1983	525368	1751440	2012066	90442	0.052	0.008	0.085	0.066
1984	1544370	1578190	4063910	96744	0.061	0.004	0.089	0.067
1985	2779520	2560780	4916190	103843	0.041	0.010	0.043	0.034
1986	3906540	3260710	5167265	145999	0.045	0.002	0.059	0.054
1987	5209060	3825420	5094097	187338	0.049	0.000	0.035	0.031
1988	2001600	4341700	4995857	214729	0.049	0.003	0.049	0.039
1989	2115060	3972900	4756338	296037	0.075	0.003	0.045	0.046
1990	1844010	3381820	4139592	398645	0.118	0.031	0.066	0.084
1991	3364770	3208300	3916191	357288	0.111	0.036	0.119	0.100
1992	6183280	2628440	3182752	394793	0.150	0.064	0.083	0.117
1993	7327610	2451510	3023893	458628	0.187	0.028	0.142	0.104
1994	7669080	2071500	2742362	413022	0.199	0.109	0.119	0.120
1995	4471940	1596110	2366581	538131	0.337	0.097	0.189	0.178
1996	2445460	1452480	2286748	420942	0.290	0.131	0.113	0.130
1997	2096320	1247460	2083908	471700	0.378	0.145	0.273	0.281
1998	3506020	1041410	1594940	326443	0.313	0.143	0.204	0.238
1999	4177640	987174	1440593	298076	0.302	0.086	0.241	0.266
2000	4422700	915603	1299626	196911	0.215	0.044	0.161	0.158
2001	17247600	634577	1094395	212090	0.334	0.065	0.196	0.182
2002	3785950	768187	1288939	194292	0.253	0.051	0.139	0.126
2003	2788270	843833	1842789	190183	0.225	0.076	0.108	0.111
2004	1458000	1019840	2119584	157627	0.155	0.055	0.085	0.091
2005	959001	1443810	2190517	181994	0.126	0.111	0.084	0.099
2006	808081	1447960	1869976	155094	0.107	0.047	0.061	0.060
2007	1355850	1327920	1618848	123408	0.093	0.063	0.062	0.059
2008	2770940	1432300	1710835	143106	0.100	0.056	0.079	0.071
2009	1172140	1506950	1821528	183400	0.122	0.066	0.093	0.083
2010	438369	1209140	1618153	218143	0.180	0.106	0.151	0.135
2011	530138	1099880	1447828	199593	0.181	0.102	0.145	0.129
2012	1493810	955397	1190722	173141	0.181	0.124	0.176	0.157
2013	2378928[1]	772334	964703	160686	0.208	0.138	0.197	0.175
2014		609865						

Note: the final estimate of SSB assumes the same F-at-age as in the preceding year

1. R(age 0) in 2013 is the geometric mean of the time series 1983 to 2012

Table 5.4.1. Western Horse Mackerel. Short term prediction: INPUT DATA

2014	Stock abundance	Natural mortality	Maturity ogive	Prop. Of F before spw.	Prop. Of M before spw.	Weights in the stock	Explotation pattern	Weights in the catch
0	2378928	0.15	0	0.45	0.45	0.000	0	0.033
1	2047562	0.15	0	0.45	0.45	0.023	0.122	0.062
2	975384	0.15	0.05	0.45	0.45	0.082	0.123	0.082
3	267250	0.15	0.25	0.45	0.45	0.086	0.169	0.102
4	163524	0.15	0.7	0.45	0.45	0.116	0.172	0.136
5	319146	0.15	0.95	0.45	0.45	0.145	0.206	0.16
6	588787	0.15	1	0.45	0.45	0.166	0.204	0.182
7	222783	0.15	1	0.45	0.45	0.198	0.225	0.208
8	100608	0.15	1	0.45	0.45	0.217	0.176	0.222
9	94216	0.15	1	0.45	0.45	0.229	0.185	0.239
10	118308	0.15	1	0.45	0.45	0.239	0.173	0.251
11	1685550	0.15	1	0.45	0.45	0.267	0.173	0.295

2015	Stock abundance	Natural mortality	Maturity ogive	Prop. Of F before spw.	Prop. Of M before spw.	Weights in the stock	Explotation pattern	Weights in the catch
0	2378928	0.15	0	0.45	0.45	0.000	0	0.033
1 .		0.15	0	0.45	0.45	0.023	0.122	0.062
2 .		0.15	0.05	0.45	0.45	0.082	0.123	0.082
3 .		0.15	0.25	0.45	0.45	0.086	0.169	0.102
4 .		0.15	0.7	0.45	0.45	0.116	0.172	0.136
5 .		0.15	0.95	0.45	0.45	0.145	0.206	0.16
6 .		0.15	1	0.45	0.45	0.166	0.204	0.182
7 .		0.15	1	0.45	0.45	0.198	0.225	0.208
8 .		0.15	1	0.45	0.45	0.217	0.176	0.222
9 .		0.15	1	0.45	0.45	0.229	0.185	0.239
10 .		0.15	1	0.45	0.45	0.239	0.173	0.251
11 .		0.15	1	0.45	0.45	0.267	0.173	0.295

2016	Stock abundance	Natural mortality	Maturity ogive	Prop. Of F before spw.	Prop. Of M before spw.	Weights in the stock	Explotation pattern	Weights in the catch
0	2378928	0.15	0	0.45	0.45	0.000	0	0.033
1 .		0.15	0	0.45	0.45	0.023	0.122	0.062
2 .		0.15	0.05	0.45	0.45	0.082	0.123	0.082
3 .		0.15	0.25	0.45	0.45	0.086	0.169	0.102
4 .		0.15	0.7	0.45	0.45	0.116	0.172	0.136
5 .		0.15	0.95	0.45	0.45	0.145	0.206	0.16
6 .		0.15	1	0.45	0.45	0.166	0.204	0.182
7 .		0.15	1	0.45	0.45	0.198	0.225	0.208
8 .		0.15	1	0.45	0.45	0.217	0.176	0.222
9 .		0.15	1	0.45	0.45	0.229	0.185	0.239
10 .		0.15	1	0.45	0.45	0.239	0.173	0.251
11 .		0.15	1	0.45	0.45	0.267	0.173	0.295

Table 5.4.2. Western Horse Mackerel Short term prediction single option table. Catch constraint of 133220 t in 2014 and F for 2015 and 2016. = F2013

Year:		2014 F multiplier	0.8785 Fbar:		0.1542				
Age	F	CatchNos	Yield	StockNos	Biomass	SSNos(Jan)	SSB(Jan)	SSNos(ST)	SSB(ST)
0	0	0	0	2378928	0	0	0	0	0
1	0.1072	193496	11997	2047562	47094	0	0	0	0
2	0.1081	92891	7617	975384	79981	48769	3999	43422	3561
3	0.1485	34303	3499	267250	22984	66813	5746	58416	5024
4	0.1511	21335	2902	163524	18969	114467	13278	99962	11596
5	0.181	49169	7867	319146	46276	303189	43962	261235	37879
6	0.1792	89905	16363	588787	97739	588787	97739	507716	84281
7	0.1977	37195	7737	222783	44111	222783	44111	190519	37723
8	0.1546	13409	2977	100608	21832	100608	21832	87721	19035
9	0.1625	13150	3143	94216	21575	94216	21575	81856	18745
10	0.152	15519	3895	118308	28276	118308	28276	103276	24683
11	0.152	221100	65224	1685550	450042	1685550	450042	1471384	392860
Total		781472	133220	8962046	878878	3343489	730560	2905507	635385

Year:		2015 F multiplier	1 Fbar:		0.1755				
Age	F	CatchNos	Yield	StockNos	Biomass	SSNos(Jan)	SSB(Jan)	SSNos(ST)	SSB(ST)
0	0	0	0	2378928	0	0	0	0	0
1	0.122	218711	13560	2047562	47094	0	0	0	0
2	0.123	170420	13974	1583246	129826	79162	6491	70011	5741
3	0.169	109034	11121	753538	64804	188385	16201	163193	14035
4	0.172	29159	3966	198289	23001	138802	16101	120079	13929
5	0.206	20974	3356	121009	17546	114958	16669	97942	14202
6	0.204	39380	7167	229221	38051	229221	38051	195466	32447
7	0.225	79484	16533	423629	83879	423629	83879	357848	70854
8	0.176	23634	5247	157361	34147	157361	34147	135890	29488
9	0.185	11663	2787	74189	16989	74189	16989	63808	14612
10	0.173	10190	2558	68929	16474	68929	16474	59604	14245
11	0.173	197174	58166	1333695	356097	1333695	356097	1153272	307924
Total		909824	138436	9369596	827909	2808331	601099	2417112	517476

Year:		2016 F multiplier	1 Fbar:		0.1755				
Age	F	CatchNos	Yield	StockNos	Biomass	SSNos(Jan)	SSB(Jan)	SSNos(ST)	SSB(ST)
0	0	0	0	2378928	0	0	0	0	0
1	0.122	218711	13560	2047562	47094	0	0	0	0
2	0.123	167912	13769	1559944	127915	77997	6396	68980	5656
3	0.169	174358	17785	1204997	103630	301249	25907	260965	22443
4	0.172	80547	10954	547729	63537	383410	44476	331691	38476
5	0.206	24906	3985	143699	20836	136514	19795	116307	16864
6	0.204	14562	2650	84763	14071	84763	14071	72281	11999
7	0.225	30186	6279	160884	31855	160884	31855	135902	26909
8	0.176	43729	9708	291156	63181	291156	63181	251428	54560
9	0.185	17856	4267	113584	26011	113584	26011	97689	22371
10	0.173	7846	1969	53071	12684	53071	12684	45891	10968
11	0.173	150127	44287	1015463	271129	1015463	271129	878091	234450
Total		930740	129214	9601780	781942	2618092	515503	2259227	444696

Table 5.4.3. Western Horse Mackerel. Short term prediction; single area management option table. OPTION: Catch constraint 133220 t in 2014 (EU TAC). The % TAC change corresponds to the total Western horse mackerel TAC of 135420 t.

2014				
Biomass	SSB	FMult	FBar	Landings
878878	635385	0.8785	0.1542	133220

2015					2016			
TSB	SSB	FMult	FBar	Landings	Biomass	SSB	SSB	TAC
827909	561864	0	0	0	912871	576528	3%	-100%
.	557257	0.1	0.0176	14909	898752	561734	1%	-89%
.	552688	0.2	0.0351	29569	884872	547323	-1%	-78%
.	548157	0.3	0.0527	43987	871227	533286	-3%	-68%
.	543664	0.4	0.0702	58165	857812	519612	-5%	-57%
.	539208	0.5	0.0878	72108	844623	506293	-7%	-47%
.	534789	0.6	0.1053	85820	831657	493319	-8%	-37%
.	530407	0.7	0.1229	99304	818910	480681	-10%	-27%
.	528664	0.74	0.1299	104636	813871	475718	-11%	-23%
.	527361	0.77	0.1351	108611	810115	472030	-12%	-20%
.	526061	0.8	0.1404	112566	806377	468370	-12%	-17%
.	525196	0.82	0.1439	115192	803896	465947	-13%	-15%
.	521751	0.9	0.158	125609	794056	456378	-14%	-7%
.	518328	0.98	0.172	135887	784348	447008	-16%	0%
.	517476	1	0.1755	138436	781942	444696	-16%	2%
.	513238	1.1	0.1931	151051	770032	433317	-18%	12%
.	511552	1.14	0.2001	156039	765324	428848	-19%	15%
.	509453	1.19	0.2088	162227	759484	423327	-20%	20%
.	509034	1.2	0.2106	163458	758321	422232	-21%	21%
.	504865	1.3	0.2282	175661	746808	411433	-23%	30%
.	500731	1.4	0.2457	187662	735488	400913	-25%	39%
.	496631	1.5	0.2633	199467	724358	390666	-27%	47%
.	492564	1.6	0.2808	211077	713415	380683	-29%	56%
.	488532	1.7	0.2984	222496	702655	370958	-32%	64%
.	484533	1.8	0.3159	233727	692076	361484	-34%	73%
.	480567	1.9	0.3335	244775	681673	352254	-36%	81%
.	476634	2	0.351	255641	671445	343263	-39%	89%

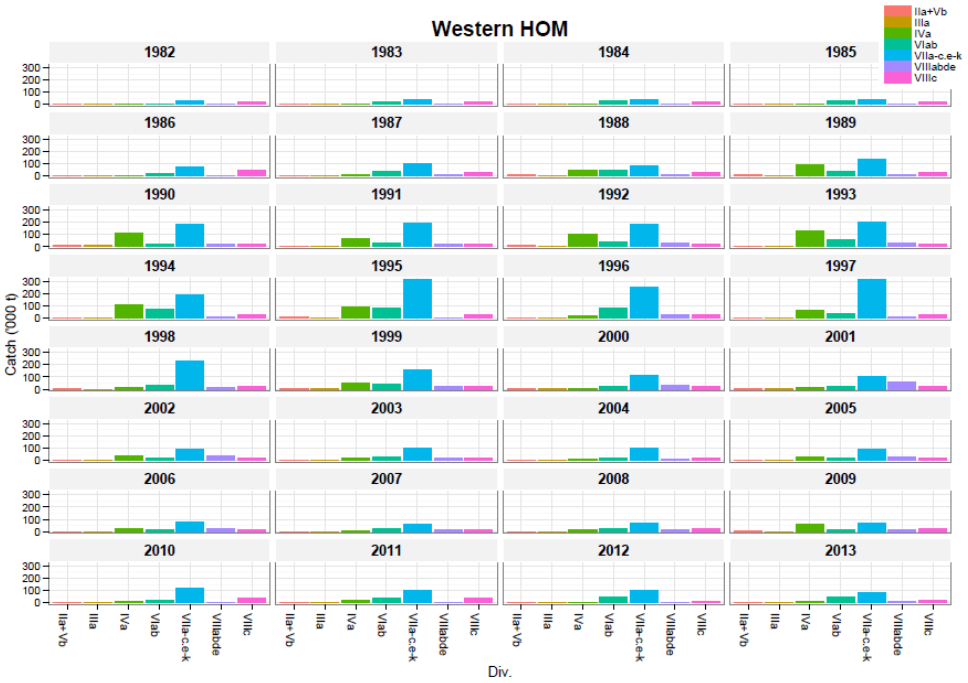

Figure 5.1.3.1. Western horse mackerel. Catch by ICES Division for 1982-2013

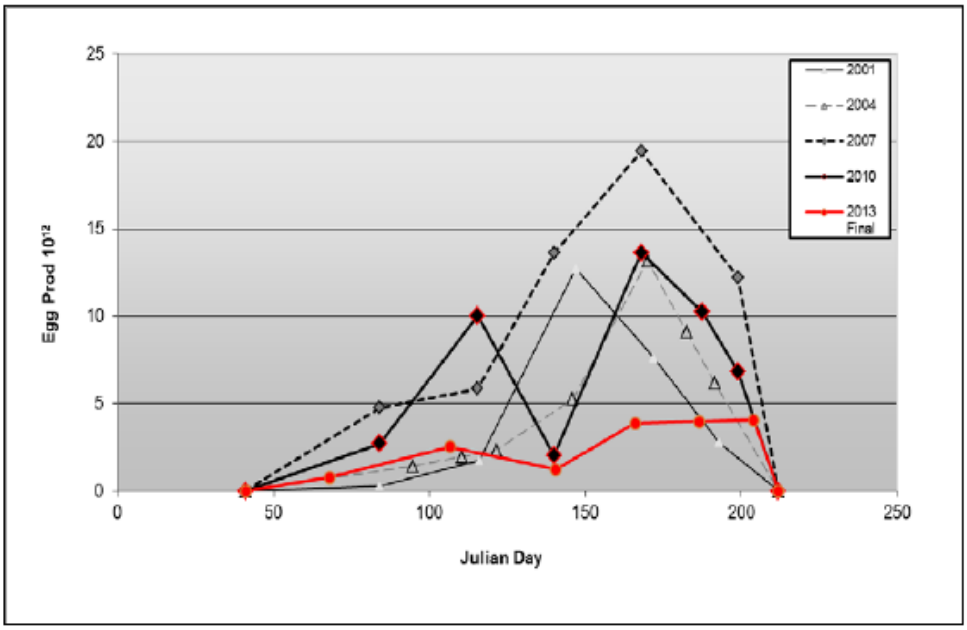

Figure 5.2.1: Western horse mackerel. Provisional annual egg production curve for western horse mackerel. The curves for 2001, 2004, 2007 and 2010 are included for comparison.

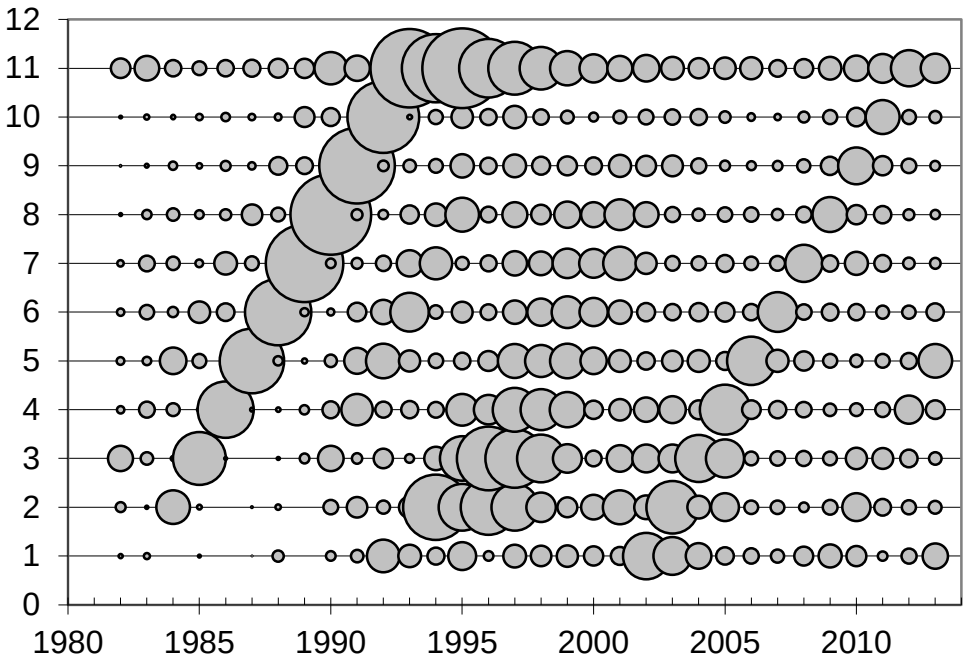

Figure 5.2.4.1: Western horse mackerel. Catch-at-age matrix, expressed as numbers (thousands). The area of bubbles is proportional to the catch number. Note that age 11 is a plus group.

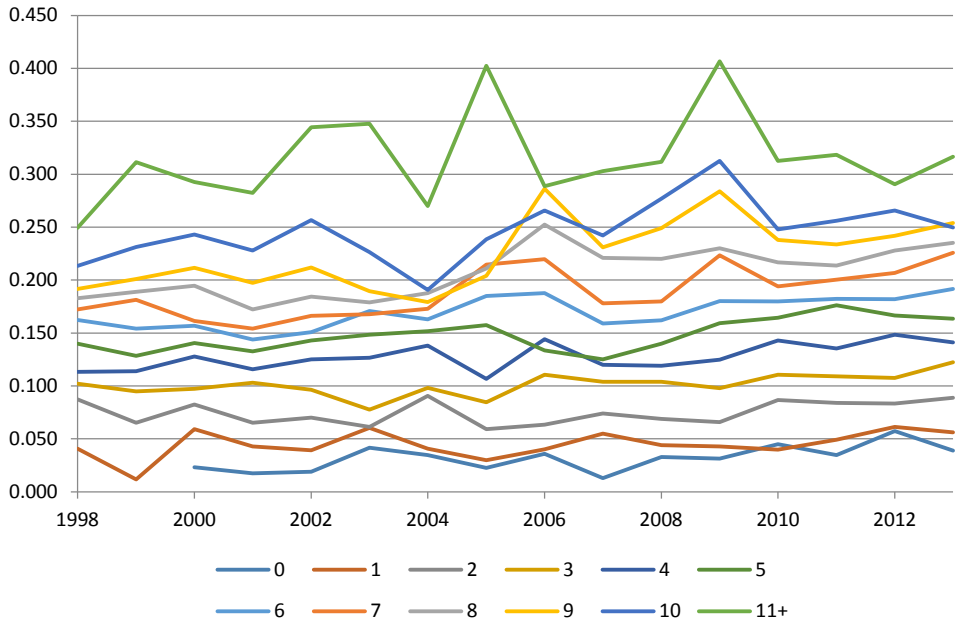

Figure 5.2.5.1: Western horse mackerel. Weight in the catch (kg) by year.

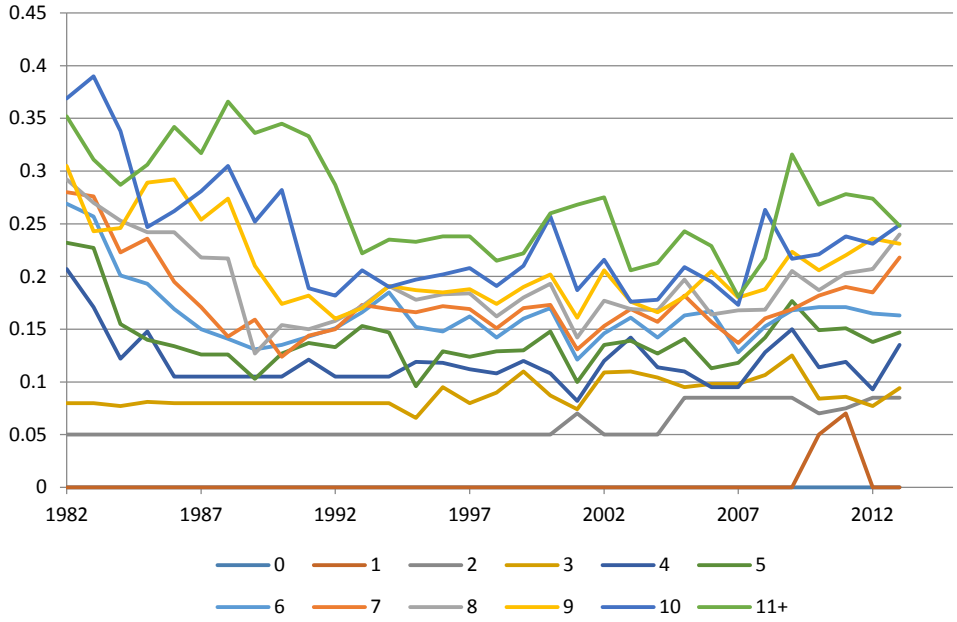

Figure 5.2.5.2: Western horse mackerel. Weight in the stock (kg) by year.

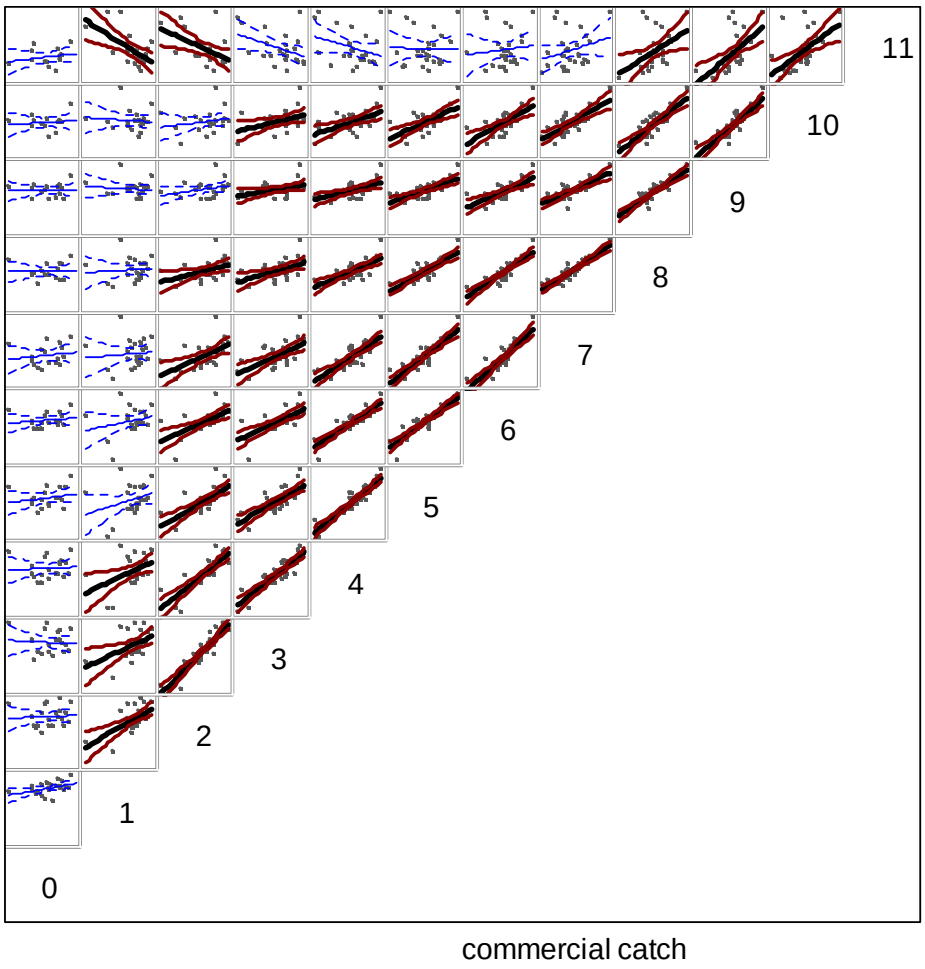

Figure 5.2.9.1: Western horse mackerel. Data exploration. Within-cohort consistency in the catch-at-age matrix, shown by plotting the log-catch of a cohort at a particular age against the log-catch of the same cohort at subsequent ages. Thick lines represent a significant (p<0.05) regression and the curved lines are approximate 95% confidence intervals.

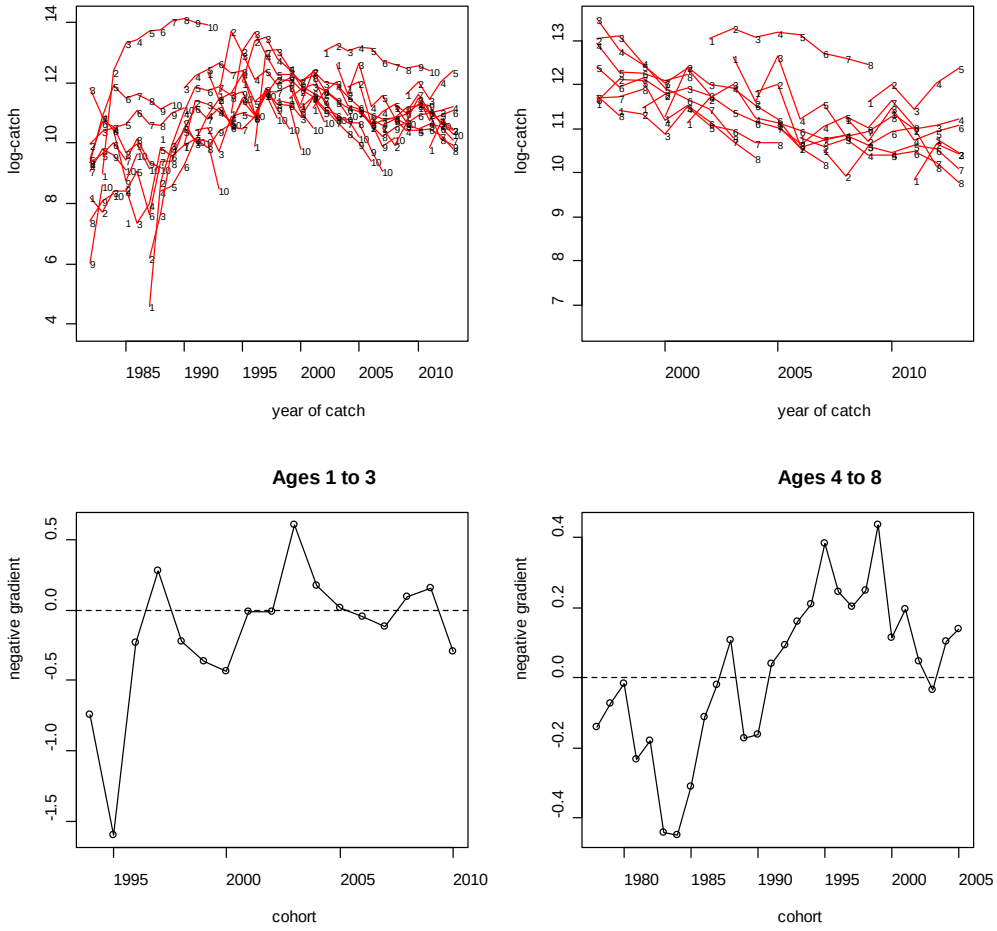

Figure 5.2.9.2: Western horse mackerel. Data exploration. Log-catch cohort curves (top row shows the full time series on the left, and the most recent period for ages 1-8 on the right) and the associated negative gradients for each cohort across the reference fishing mortality of ages 1-3 (bottom left) and 4-8 (bottom right).

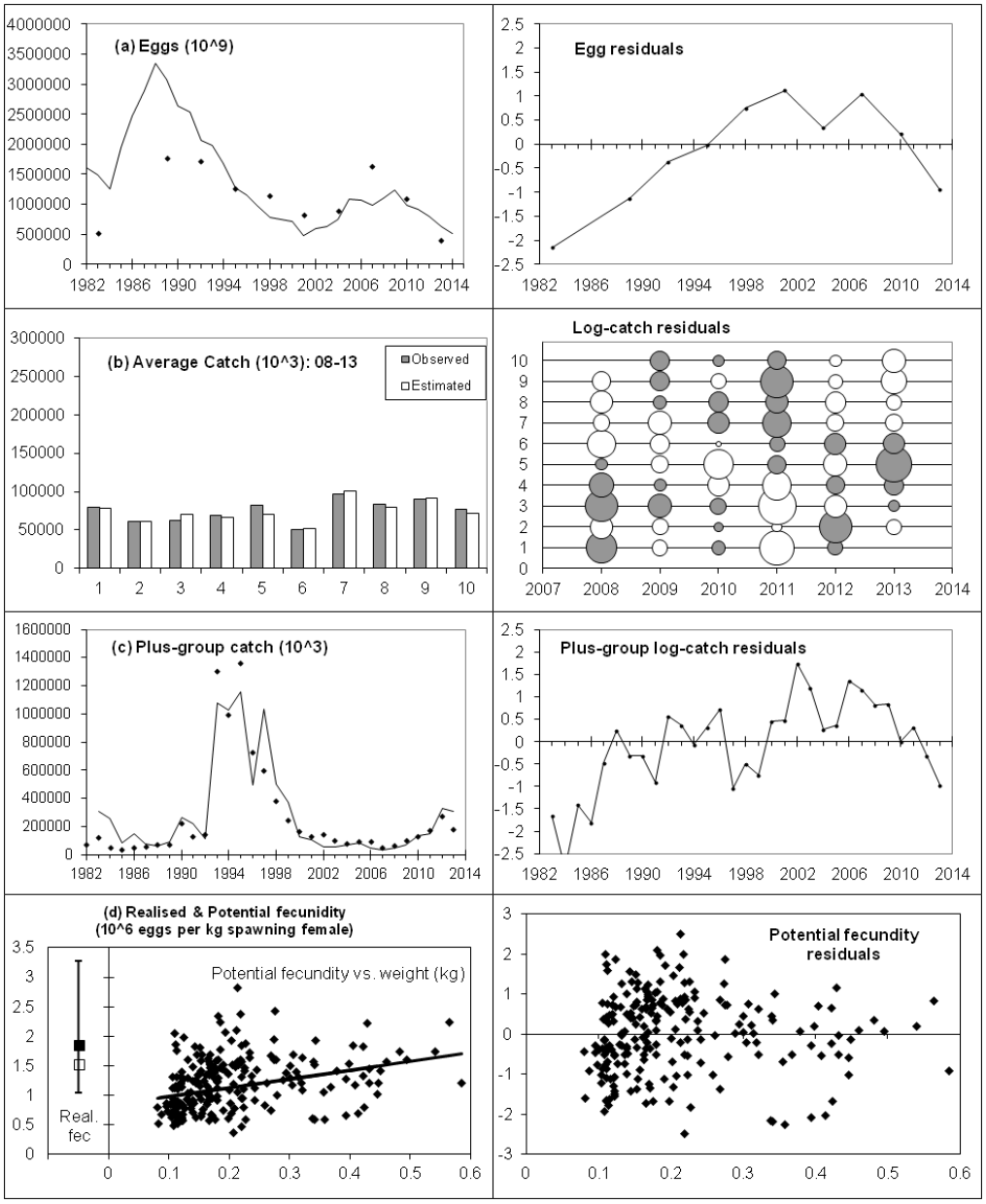

Figure 5.2.10.1: Western horse mackerel. SAD model with 2008-2013 separable window. Model fits to data for the five components of the likelihood, corresponding to (a) the egg estimates, (b) the catches in the separable period, (c) to the catches in the plus-group, and (d) population-mean realised fecundity (left of y-axis) and potential fecundity (right of y-axis). The left-hand column of plots shows the actual fit to the data (average catches are shown in (b) for ease of presentation), and the right-hand column normalised residuals, of the form: $\ln X - \ln \widehat{X} / \sigma$. In the residual plot for (b), the area of a bubble reflects the size of the residual, with the maximum absolute size given in the top right of the plot. In the residual plot for (d), only the potential fecundity residuals are shown (there is only one residual for the population-mean realised fecundity). The final SSB estimate assumes the same fishing mortality as in the previous year.

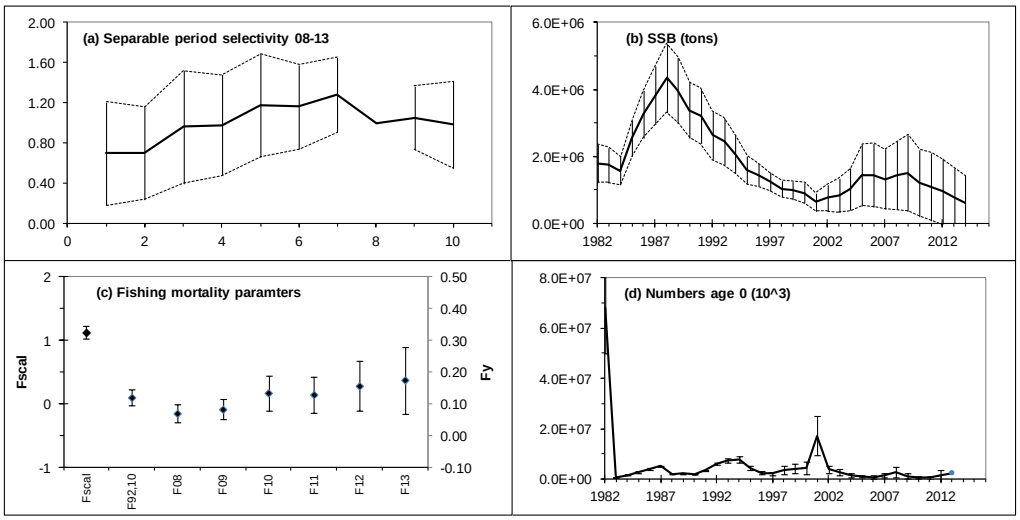

Figure 5.2.10.2: Western horse mackerel. Model with 2008-2013 separable window. Plots of (a) the selectivity pattern, (b) the SSB trajectory, (c) fishing mortality parameters (the scaling parameter F_{scal}, fishing mortality at age 10 in 1992, $F_{92,10}$, and the fishing mortality year effects for the separable period, F_y), and (d) numbers at age 0. The error bars are two standard deviations (indicating roughly 95% confidence bounds). The final SSB estimate assumes the same fishing mortality as in the previous year.

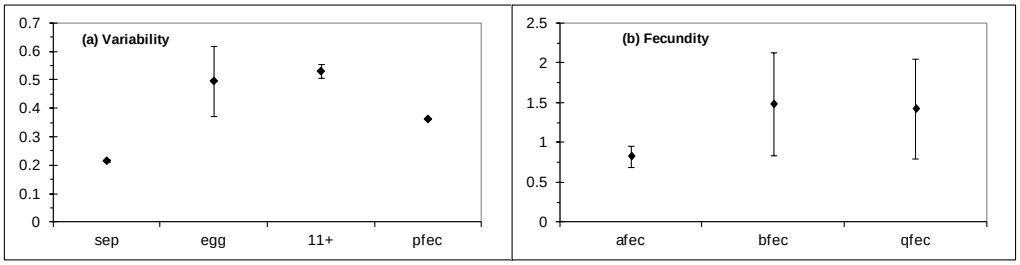

Figure 5.2.10.3: Western horse mackerel. Model with 2008-2013 separable window. Estimates for some key parameters, with (a) corresponding to variability parameters, plotted as standard deviations, for four components of the likelihood (σ_{sep}, σ_{egg}, σ_{11+} and σ_{pfec}), and (b) the fecundity parameters a_{fec}, b_{fec}, q_{fec}. The error bars are two standard deviations (indicating roughly 95% confidence bounds).

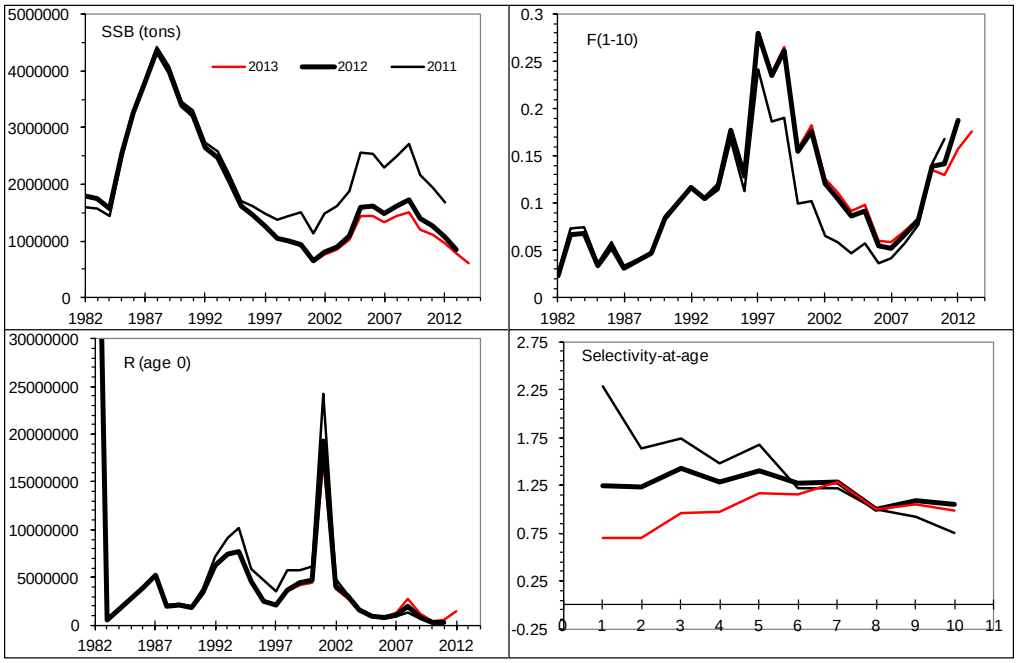

Figure 5.2.10.4: Western horse mackerel. 2-year retrospective bias for the case where the length of the separable window is kept at 6 years (the year shown is the final year shown of the window). Trajectories of SSB, F(1-10), Recruitment (age 0) and selectivity-at-age.

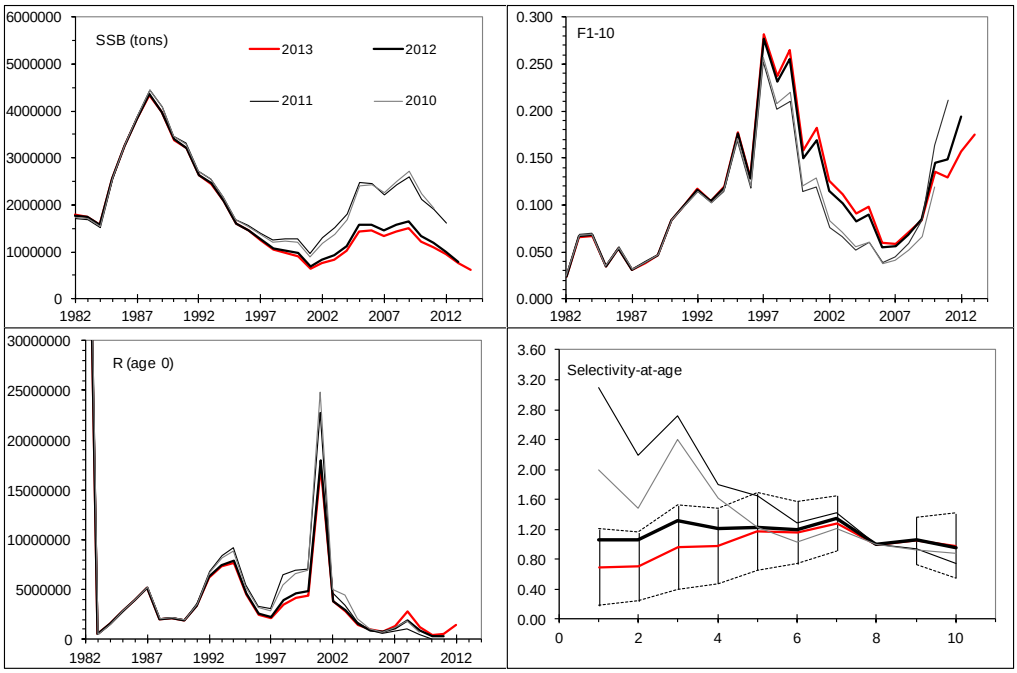

Figure 5.2.10.5: Western horse mackerel. 3-year retrospective bias for the case where the starting year of the separable window is kept at 2008, so that the window decreases in length as more years are dropped (the year shown is the final year of the window). Trajectories of SSB, F(1-10), recruitment (age 0) and selectivity-at-age including confidence bounds from the 2014 assessment.

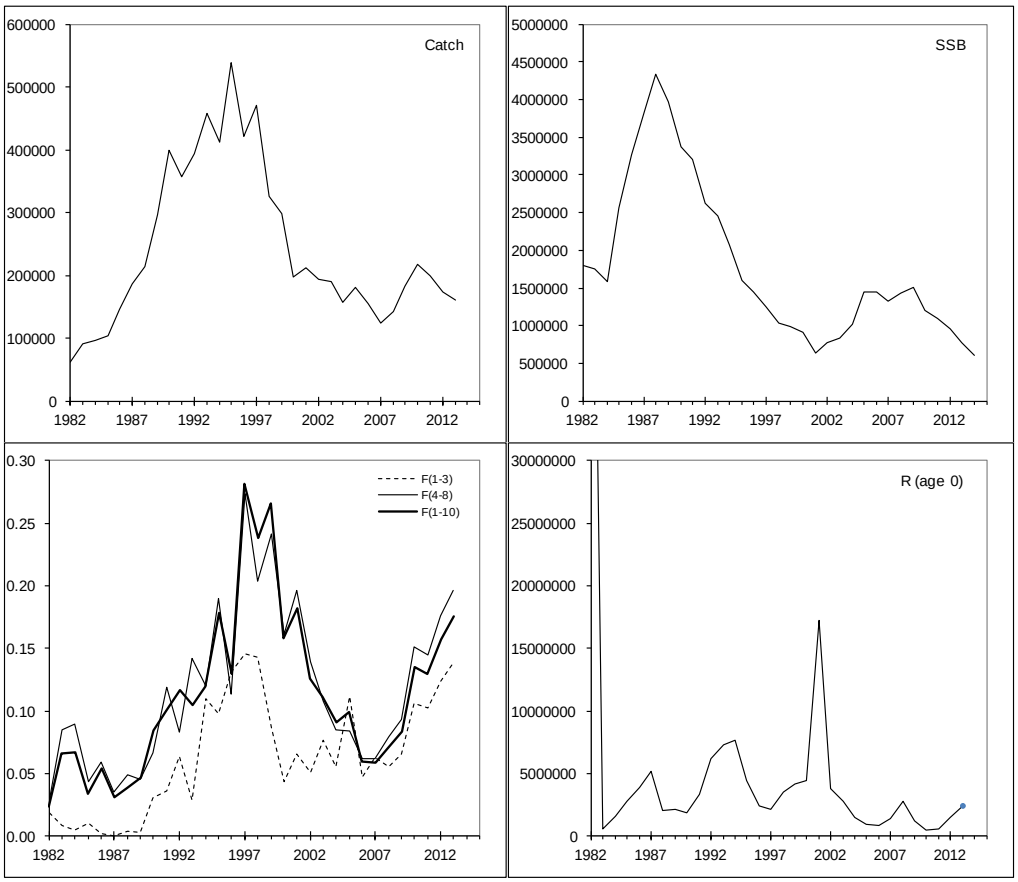

Figure 5.3.1.1: Western horse mackerel. Final assessment stock summary. Plots of catch, SSB, recruitment (age 0) and fishing mortality (average for 1-3, 4-8 and 1-10). SSB and catch are in tons, and recruitment is in thousands. The final SSB estimate assumes the same fishing mortality as in the previous year. Recruitment in 2013 is the geometric mean of the time series excluding 1982.

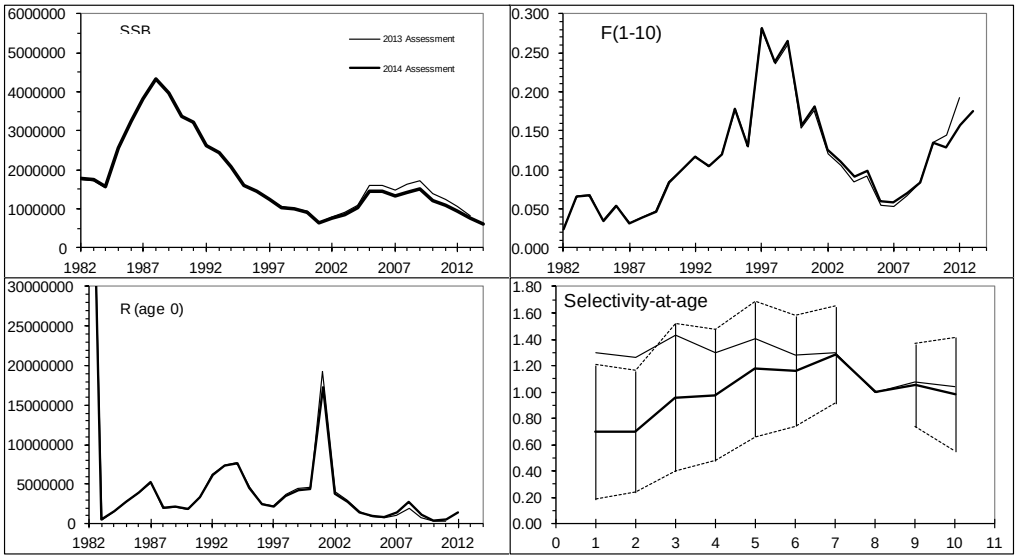

Figure 5.6.1: Western horse mackerel. Comparison of the final assessment this year with that of last year. Plots of SSB, recruitment (age 0), fishing mortality (average for ages 1-10) and selectivity-at-age for the separable period (2007-2012 for the 2013 assessment, and 2008-2013 for the 2014 assessment). SSB values are in tons, and recruitment is in thousands.