3 Herring in Division 3.a and subdivisions 22–24, spring spawners [update assessment]

3.1 The Fishery

3.1.1 Advice and management applicable to 2018 and 2019

ICES advised in 2018 on the basis of the MSY approach. This corresponds to zero catch in 2019 (ICES CM 2018/ACOM:07).

The EU and Norway agreement on a herring TAC for 2018 was 48 427 t in Division 3.a for the human consumption fleet and a bycatch ceiling of 6659 t to be taken in the small mesh fishery. For 2019, the EU and Norway agreement on herring TACs in Division 3.a was 29 326 t for the human consumption fleet and a bycatch ceiling of 6659 t to be taken in the small mesh fishery.

Prior to 2006, no separate TAC for subdivisions 22–24 was set. In 2018, a TAC of 17 309 t was set on the Western Baltic stock component. The TAC for 2019 was set at 9001 t.

3.1.2 Landings in 2018

Herring caught in Division 3.a are a mixture of North Sea Autumn Spawners (NSAS) and Western Baltic Spring Spawners (WBSS). This section gives the landings of both NSAS and WBSS but the stock assessment applies only to the spring spawners.

Landings from 1989 to 2018 are given in Table 3.1.1 and Figure 3.1.1. In 2018, the total landings in Division 3.a and subdivisions 22–24 have overall increased to 42 250 t. Landings in 2018 decreased by 14% in the Skagerrak, by 12% in the Kattegat and by 28% in subdivisions 22–24. As in previous years the 2018 landing data are calculated by fleet according to the fleet definitions used when setting TACs.

3.1.2.1 Fleets

One of the unresolved issues from the benchmark in 2018 was the definition of the fleets, which differs between years and countries (ICES WKPELA, 2018).

The definition of the fleets in the EU TAC and quota regulation, since 1998 (e.g. EU 2017/127 and 2016/1903)

Fleet C: Catches of herring in Kattegat and Skagerrak taken in fisheries using nets with mesh sizes equal to or larger than 32 mm.

Fleet D: Exclusively for catches of herring in Kattegat and Skagerrak taken as bycatch in fisheries using nets with mesh sizes smaller than 32 mm.

Fleet F: Not defined directly in the regulation, but landings from subdivisions 22–24. Most of the catches are taken in a directed fishery for herring and some as bycatch in a directed sprat fishery

The definition used by HAWG, since 2010

Fleet C: Directed fishery for herring in Kattegat and Skagerrak in which trawlers (with 32 mm minimum mesh size) and purse seiners participate. Since 2010 this fleet also includes the Swedish fishery with mesh sizes less than 32 mm, since an earlier change in the Swedish industrial fishery

implies that there is no difference in age structure of the landings between vessels using different mesh sizes since both are basically targeting herring for human consumption.

Fleet D: Bycatch of herring in Kattegat and Skagerrak in the industrial fleet and only including Danish landings. Covering all fisheries with mesh sizes less than 32 mm e.g. the sprat fishery, but also including other fisheries where herring is landed as bycatch e.g. Norway pout and blue whiting fisheries.

Fleet F: Landings from subdivisions 22–24. Most of the catches are taken in a directed fishery for herring and some as bycatch in a directed sprat fishery.

In Table 3.1.2 the landings are given for 2003 to 2018 in thousands of tonnes by fleet (as defined by HAWG) and quarter.

The text table below gives the TACs and Quotas (t) for the fishery by the C- and D-fleets in Division 3.a and for the F-fleet in subdivisions 22–24.

	TAC	DK	GER	FI	PL	SWE	EC	NOR
		2018						
Div. 3.a fleet-C	48 427	20 255	324	200		21 189	41 768	6459
Div. 3.a fleet-D	6659	5692	51			916	6659	
SD 22–24 fleet-F	17 309	2426	9551	1	2252	3079	17 309	17 309
% of 3.a fleet-C can be taken in 4 EU waters							-50%	
% of 3.a fleet-C can be taken in 4 Norwegian waters								-50%
	TAC	**DK**	**GER**	**FI**	**PL**	**SWE**	**EC**	**NOR**
		2019						
Div. 3.a fleet-C	29 326	12 325	197	0		12 893	25 415	3 911
Div. 3.a fleet-D	6659	5692	51			916	6659	
SD 22–24 fleet-F	9 001	1 262	4 966	1	1 171	1 601	9 001	
% of 3.a fleet-C can be taken in 4 EU waters							-50%	
% of 3.a fleet-C can be taken in 4 Norwegian waters								-50%

3.1.3 Regulations and their effects

Before 2009, HAWG has calculated a substantial part of the catch reported as taken in Division 3.a in fleet C actually has been taken in Area 4. These catches have been allocated to the North Sea stock and accounted for under the A-fleet. Misreported catches have been moved to the appropriate stock for the assessment. However, from 2009 and on onwards, information from both the industry and VMS estimates suggest that this pattern of misreporting of catches into Division 3.a does no longer occur. Thus no catches were moved out of Division 3.a to the North Sea for catches taken in 2018.

Regulations allowing quota transfers from Division 3.a to the North Sea were introduced as an incentive to decrease misreporting of the fishery, and the percentage has gradually been reduced until 2010. Since 2011 the EU-Norway agreement allowed 50% of the Division 3.a quotas for human consumption (Fleet C) to be taken in the North Sea. The optional transfer of quotas from one management area to another introduces uncertainty for catch predictions and thus influence the quality of the stock projections. To decrease the uncertainty industry agreed in the 2013 benchmark to inform HAWG prior to the meeting of the assumed transfer in the intermediate year. In the last few years this information has proved to be highly valuable and consistent with the realised distribution of the catches. For the fishery in 2019 the industry (Pelagic RAC) informed HAWG that about 52% of the predicted catches in the C-fleet will be taken in Division 3.a.

The quota for the C fleet and the bycatch TAC for the D fleet (see above) are set for the NSAS and the WBSS stocks together. The implication for the catch of NSAS must also be taken into account when setting quotas for the fleets that exploit these stocks.

3.1.4 Changes in fishing technology and fishing patterns

The amount of WBSS herring caught in the D-fleet was reduced from a typical catch of 1107 t in 2016 to 151 t in 2018. This was caused by an early in the year closure of the sprat fishery as agreed between fishers and the Danish regulation authorities due to problems with bycatch issues.

3.1.5 Winter rings vs. ages

To avoid confusion and facilitate comparability among herring stocks with different "spawning style" (i.e. NSAS) the age of WBSS, as well as other HAWG herring stocks, is specified in terms of winter rings (wr) throughout the entire assessment and advice. In the case of WBSS perfect correspondence exists between wr and age with no actual risk of confusion, so that a wr 1 is also an age 1 WBSS herring.

3.2 Biological composition of the landings

Table 3.2.1 and Table 3.2.2 show the total catch in numbers and mean weight-at-age in the catch for herring by quarter and fleet landed from Skagerrak and Kattegat, respectively. The total catch in numbers and mean weights-at-age for herring landed from subdivisions 22–24 are shown in Table 3.2.3.

In 2018, a small correction was made to the number at age in subdivision 24 1st quarter 2017. In 2017 a small amount of 0 wr was reported caught in this stratum. The estimates were based on a single fish and after re-evaluation the fish was judged to be 1 wr. This correction also influenced the mean weight at age in the stock.

The 42 250 t of landed herring were submitted stratified by area, fleet and quarter, resulting in 66 strata with landings. 30 of these strata were sampled – accounting for 96% of the landings – and in general strata with the majority of the landings were well sampled. A minor number of strata had less than 3 samples, but in general the landings were minor and in total these only account for 7556 t (Table 3.2.4). Un-sampled strata accounted in total for 1792 t and samples from either other nations or adjacent areas and quarters were used to estimate catch in numbers and mean weight-at-age (Table 3.2.5).

Based on the proportions of spring- and autumn-spawners in the landings, catches were split between NSAS and WBSS (Table 3.2.6 and the stock annex for more details).

The total numbers and mean weight-at-age of the WBSS and NSAS landed from Kattegat, Skagerrak, and Division 3.a respectively were then estimated by quarter and fleet (tables 3.2.7–3.2.12).

The total catch, expressed as SOP, of the WBSS taken in the North Sea + Division 3.a in 2018 was estimated to be 20 066 t, which represents an increase of 11% compared to 2016 (Table 3.2.13).

Total catches of WBSS from the North Sea, Division 3.a, and subdivisions 22–24 respectively, by quarter, were estimated for 2018 (Table 3.2.14). Additionally, the total catches of WBSS in numbers and tonnes, divided between the North Sea and Division 3.a and subdivisions 22–24 respectively for 1993–2018, are presented in tables 3.2.15 and 3.2.16.

The total catch of NSAS in Division 3.a amounted to 3372 t in 2018, which represents the third lowest value in the 26 year time series (Table 3.2.17).

The catches of WBSS from Subarea 4.aE and the catches of NSAS from Division 3.a in 2018 were reallocated to the appropriate stocks as shown in the text table below:

Stock	Catch reallocation	Tonnes
WBSS	4.aE (A-fleet)	2164
NSAS	3.a (C+D-fleet)	3372

3.2.1 Quality of Catch Data and Biological Sampling Data

No quantitative estimates of discards were available to the Working Group. However, the amount of discards for 2018 is assumed to be insignificant, as in previous years.

Table 3.2.4 shows the number of fish aged by country, area, fishery and quarter. The overall sampling in 2018 meets the recommended level of one sample per 1000 t landed per quarter and the coverage of areas, times of the year and gear (mesh size). Fortunately occasional lack of national sampling of catches by quarter and area has been covered by similar fisheries in other countries.

Splitting of catches into WBSS (Spring spawners) and NSAS (Autumn spawners) in Division 3.a were based on Danish and Swedish analyses of otolith micro-structure of hatch type and extended with discriminant analysis of otolith shape calibrated with hatch type and applied on production samples with classification parameters: herring otolith metrics as well as age, length and ICES Subdivision (see Stock Annex). The total sample size for hatch type was 1424 with 26% of the samples in Subdivision 20 (Skagerrak) and 74% in Subdivision 21 (Kattegat). There were no split samples available for the second quarter.

No samples for split of commercial catches in the transfer area in Division 4.a East were available in 2018. The split was therefor based on 724 Norwegian vertebral count (VC) observations from scientific cruises and commercial catches in the period 2008–2016, and from 424 vs counts from the HERAS in the 3rd quarter of 2018. The applied method was based on the average VC by age group and quarters 1–4 as described in the Stock Annex.

There are clear indications from weight at age of mixing with Central Baltic herring in catches from SD 24 throughout the year from most of the countries. However, the catches are dominated by the German directed fishery in the spawning areas where mixing is likely to be minimum. Catch data are not corrected for this mixing neither potential catches of Western Baltic Spring Spawning herring from SD 25–26.

3.3 Fishery-independent Information

3.3.1 German Autumn Acoustic Survey (GERAS) in subdivisions 21-24

As a part of Baltic International Acoustic Survey (BIAS); the German autumn acoustic survey (GERAS) was carried out with R/V "SOLEA" between 1–19 October 2018 in the Western Baltic, covering subdivisions 21, 22, 23 and 24. A survey report is given in the report of the 'ICES Working Group of International Pelagic Surveys' (ICES WGIPS, 2019). In the western Baltic, the distribution areas of two stocks, the Western Baltic Spring Spawning herring (WBSSH) and the Central Baltic herring (CBH) overlap. Survey results indicated in the recent years that in SD 24, which is part of the WBSSH management area, a considerable fraction of CBH is present and correspondingly erroneously allocated to WBSSH stock indices (ICES 2013/ACOM:46). Accordingly, a stock separation function (SF) based on growth parameters in 2005 to 2010 has been developed to quantify the proportion of CBH and WBSSH in the area (Gröhsler *et al.*, 2013; Gröhsler *et al.*, 2016). The estimates of the growth parameters based on baseline samples of WBSSH and CBH in 2011–2017 and in 2018 (despite the occurrence of some CBH in the GERAS baseline samples of WBSSH in SD 21 and 23) support the applicability of the SF (Oeberst *et al.*, 2013 – WD for HAWG 2013; Oeberst *et al.*, 2014 – WD for WGIPS 2014; Oeberst *et al.*, 2015 – WD for WGIPS 2015; Oeberst et al., 2016 – WD for WGBIFS 2016, Oeberst et al., 2017 – WD for WGIPS 2017; Gröhsler, T. and Schaber, M., 2018 – WD for WGBIFS 2018 Gröhsler, T. and Schaber, M., 2019 – WD for WGBIFS 2019). Thus, the SF was applied to correct the GERAS index for WBSS from 2005–2018.

Individual mean weight, total numbers and biomass by age as estimated from the GERAS are presented in Table 3.3.1. The Western Baltic spring spawning herring stock index in 2017 was estimated to be 3.2 x 10^9 fish or about 65.1 x 10^3 tonnes in subdivisions 21–24. Compared to previous results, the present estimates of herring show a further significant decrease in biomass. The biomass index in 2018 represents the second record low in the 24 year time series (with a difference of only 9000 tonnes compared to the former record low in 2009).

The time series has been revised in 2008 (ICES 2008/ACOM:02) to include the southern part of SD 21. The years 1991–1993 were excluded from the assessment due to different recording method and 2001 was also excluded from the assessment since SD 23 was not covered during that year (ICES 2008/ACOM:02).
Age (wr) classes (1–4) are included in the assessment.

3.3.2 Herring Summer Acoustic Survey (HERAS) in Division 3.a

The Herring acoustic survey (HERAS) was conducted from 25 June to 10 July 2018 and covered the Skagerrak and the Kattegat. The 2018 estimate of Western Baltic spring-spawning herring was 130 tonnes and 1,074 million herring. Compared to the value in 2018, the 2018 estimates represent a decrease of 57% in numbers and of 56% in biomass. The stock biomass is dominated by 1–4 winter ring (62%). The present numbers of older herring (3+ group) in the stock decreased to 51% of the average of the whole times series (2018: 744 million; mean 1991–2018: 1468 million). The results from the HERAS index are summarised in Table 3.3.2.

The 1999 survey was excluded from the assessment due to different survey area coverage.
Ages (wr) 3–6 are used in the assessment.

3.3.3 Larvae Surveys (N20)

Herring larvae surveys (Greifswalder Bodden and adjacent waters; SD 24) were conducted in the western Baltic at weekly intervals during the 2018 spawning season (March–June). The larval index was defined as the total number of larvae that reach the length of 20 mm (N20; Table 3.3.3; Oeberst *et al.,* 2009). With an estimated product of 1563 million larvae, the 2018 N20 recruitment index is in similar dimensions as the previous year and more than double as high as the record low of 2016. However, the value is only in the range of about 1/5 of the time series mean thus not countering the decreasing trend of larval production observed in the system during the past two decades.
The larval index is used as recruitment index (age (wr) 0) in the assessment.

3.3.4 IBTS/BITS Q1 and Q3-Q4

Since the recent benchmark (ICES, WKPELA 2018), the IBTS and the BITS data are combined according to the standardization methodology proposed by Berg *et al.,* (2014), (hauls showed in Figure 3.3.1). In addition to the standardization model, two extra modelling steps are included, which consist of splitting the survey length and age data by stock using subsamples of stock-identified individuals. First, the length distributions are split by haul into WBSS / non-WBSS. Next the individual age samples are split into WBSS / non-WBSS. This gives a stock-specific ALK, which is used to convert the split length distributions from the first step into numbers-at-age by haul. The following equation describes the model considered for both the presence/absence and positive parts of the Delta-Lognormal model:

$$g(\mu_i) = \text{Year}(i) + \text{Gear}(i) + f_1(\text{lon}_i; \text{lat}_i) + f_2(\text{Depth}_i) + f_3(\text{time}_i) + \log(\text{HaulDur}_i)$$

where Gear(i) and Year(i) maps the i^{th} haul to categorical gear/year effects for each age group.
Age (wr) classes (1–3) and (2-3) are included in the assessment from the surveys in Q1 and Q3-4.

3.4 Mean weights-at-age and maturity-at-age

Mean weights at age in the catch in the 1st quarter were used as estimates of mean weight at age in the stock (Table 3.6.3).

The maturity ogive of WBSS applied in HAWG has been assumed constant between years and has been the same since 1991 (ICES 1992/Assess:13), although large year-to-year variations in the percentage mature have been observed (Gröhsler and Müller, 2004). Maturity ogive has been

investigated in the recent benchmark assessment of WBSS (ICES 2013/ACOM:46). WKPELA in 2013 decided to carry on with the application of the constant maturity ogive vector for WBSS.

The same maturity ogive was used as in the last year assessment (ICES CM 2018/ACOM:07):

W-rings	0	1	2	3	4	5	6	7	8+
Maturity	0.00	0.00	0.20	0.75	0.90	1.00	1.00	1.00	1.00

3.5 Recruitment

Indices of recruitment of 0-ringer WBSS for 2018 were available from the N20 larval surveys (see Section 3.3.3).

The strong correlation of the N20 with the 1-wr group of the GERAS ($R^2 = 0.7$, Figure 3.5.1), which also shows a good internal consistency with the GERAS 2-wr group, indicates that the N20 is a good proxy for the strength of the new incoming year class. Since 2010, the N20 recruitment index lies below the long-term average (1992–2018: 5828 million). The 2016 N20 recruitment index represents the sixth record low in the 27 year time series (Table 3.3.3).

3.6 Assessment of Western Baltic spring spawners in Division 3.a and subdivisions 22–24

3.6.1 Input data

All input data can be found in tables 3.6.1–3.6.8.

Only the input landings data differs between the single and multi-fleet model – the rest of the input files are the same for both models.

3.6.1.1 Landings data

Catch in numbers at age from 1991 to 2018 were available for Subdivision 27.4.a (East, fleet A), Division 27.3.a (fleet C and D, respectively) and subdivisions 27.3.c–27.3.d.24 (fleet F) (Table 3.6.1.a–f). Years before 1991 are excluded due to lack of reliable data for splitting spawning type and also due to a large change in fishing pattern caused by changes in the German fishing fleets (ICES 2008/ACOM:02).

Mean weights at age in the catch vary annually and are available for the same period as the catch in numbers (Table 3.6.2.a–f; Figure 3.6.1.1). Proportions at age thus reflect the combined variation in weight at age and numbers at age (Figures 3.6.1.2 and 3.6.1.3).

3.6.1.2 Biological data

Estimates of the mean weight of individuals in the stock (Table 3.6.3 (Q1) and Figure 3.6.1.4) are available for all years considered.

Natural mortality was assumed constant over time and equal to 0.3, 0.5, and 0.2 for 0-ringers, 1-ringers, and 2+ -ringers respectively (Table 3.6.4). The estimates of natural mortality were derived as a mean for the years 1977–1995 from the Baltic MSVPA (ICES 1997/J:2) as no new values were available as confirmed in the recent benchmark.

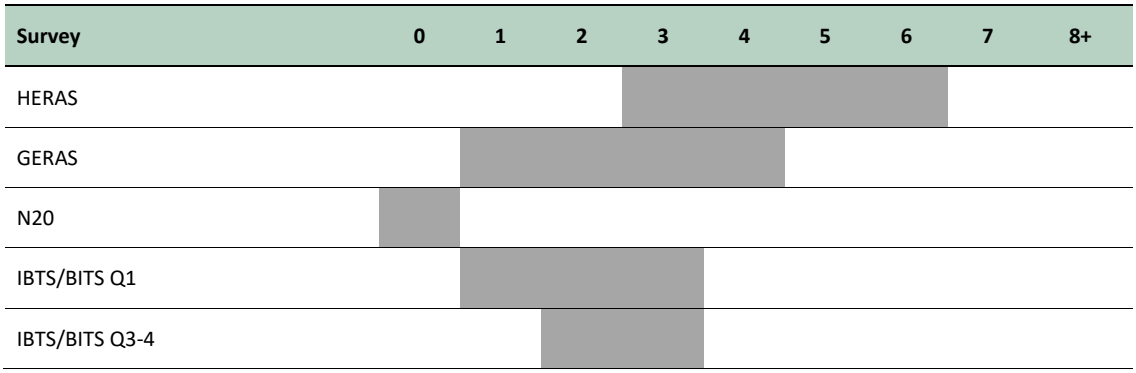
The percentage of individuals that are mature is assumed constant over time (Table 3.6.5): ages (wr) 0–1 are assumed to be all immature, ages (wr) 2–4 are 20%, 75% and 90% mature respectively, and all older ages are 100% mature.

The proportions of fishing mortality and natural mortality before spawning are 0.1 and 0.25 respectively and are assumed to be constant over time (Table 3.6.6–7). The difference between these two values is due to differences in the seasonal patterns of fishing and natural mortality.

3.6.1.3 Surveys

Surveys indices used in the both model runs can be found in tables 3.6.8a–e.

According to the last benchmark of WBSS (ICES WKPELA, 2018), the following age (w-rings) classes (in grey) are used from each survey to tune the assessment of this stock:



3.6.2 Assessment method

Since the 2018 benchmark (ICES WKPELA, 2018), the WBSS assessment is based on the state-space multi-fleet assessment model SAM. The assessment model presents one fishing mortality matrix for each of the four fleets fishing WBSS herring (A, C, D, and F). The model is designed to handle fleet disaggregated catches which are available only from year 2000 while the model is run over the time period 1991–2018. The current implementation is an R-package based on Template Model Builder (TMB) and can be found at https://github.com/fishfollower/SAM (branch "multi").

The benchmark found highly consistent estimates of SSB, F and Recruitment as well as combined age selections between the multi- and the single-fleet SAM using comparable model settings.

For this year's update assessment, the corresponding single fleet version is available with a configuration as close as possible to the multi-fleet model. The single fleet model output is represented as an overlay in the SSB, F, recruitment and total catch plots in the multi-fleet output. Both the multi-fleet (WBSS_HAWG_2019) and the single fleet (WBSS_HAWG_2019_sf) outputs are available at www.stockassessment.org.

Details of the software version employed are given in Table 3.6.9.

3.6.3 Assessment configuration

The model configuration was set as specified in Table 3.6.10.

3.6.4 Final run

The results of the assessment are given in tables 3.6.11–3.6.14. The estimated SSB for 2018 is 74 132 [55 092, 99 751 (95% CI)] t. The mean fishing mortality (ages 3–6) is estimated as 0.416 [0.297, 0.584 (95% CI)] yr^{-1}.

After a marked decline from almost 300 000 t in the early 1990s to a low of about 120 000 t in the late 1990s, the SSB of this stock stabilised above 100 000 t in the early 2000s (Figure 3.6.4.1). After a small peak in 2006 coinciding with the maturing of the last major year-class, the SSB has declined up to 2011 with the lowest SSB (69 kt) observed in the time series. SSB has only slightly increased in the following period up to 90 kt in 2015 and then has declined to 74 kt in 2018, which is the lowest SSB since 2013.

Fishing mortality on this stock was high in the mid-1990s, reaching a maximum of over 0.6 yr^{-1}. In 1999–2009, $F_{3–6}$ stabilised between 0.5 and 0.6. In 2010 and 2011, $F_{3–6}$ decreased significantly to a value of approx. 0.36 yr^{-1}, where it stabilized for few years until increasing again above 0.4 since 2016. (Table 3.6.11, Figure 3.6.4.2).

Recruitment has been decreasing overall since 2000 and the 2018 estimate of 954 391 thousands is the lowest on record (Tables 3.6.11, Figure 3.6.4.3). The stock-recruitment plot for the WBSS stock (Figure 3.6.4.4) shows three distinct periods of recruitment with an early period of high recruitments varying between 3 and 5 billion coinciding with a declining SSB from 300 kt to 120 kt in the years 1991–1998 and no signs of density-dependence. This is followed by a distinct decline in recruitment to values below 2 billion at a relatively constant spawning stock biomass between 120 and 160 kt over the period from 1998–2006. In the most recent period, from 2007 to 2018 recruitment has varied from about 2 billion to less than 1 billion at SSB between 74 kt and 105 kt, with a worrying trend of declining recruitment in the latest years from 2013 to 2018.

The total catch is well fitted (Figure 3.6.4.5) but also the catch per fleet (Figure 3.6.4.6) except for the fleet A where some observations are outside the confidence interval of the estimated catch.

The estimated partial fishing mortalities show remarkable differences between the four fleets reflecting the targeted ages of the individual fisheries, increasing with age for the A-fleet and the F-fleet, whereas distinct peaks are found for the C-fleet and the D-fleet at ages 2 and 1 wr respectively (Figure 3.6.4.7). For all fleets except the C-fleet there is a decreasing trend in F for the last three decades. The corresponding selectivity pattern for the F-fleet is relatively stable throughout the time period of the assessment, whereas the D-fleet has a tendency of shifting its highest selectivity from age 1 to age 2 (wr) in later years. Total fishing mortality on the WBSS stock increased with herring age (Figure 3.6.4.8). It decreased over time but showed an increase in the past 4 years.

The model was constrained to have the same selectivity for the two oldest ages (wr) 7+ in all fleets. The fishing mortality was assumed to be independent across ages for the A-fleet. The estimated correlation parameter in the F random walk for the C-fleet was estimated to a very high value, which caused convergence problems in initial runs, it was therefore assigned a fixed high value in the subsequent assessment runs resulting in parallel selection patterns.

The estimated survey catchability is rather different among the surveys. The HERAS and the GERAS surveys are relatively constant over the applied ages (wr) 3–6 and 1–4 respectively. Whereas both IBTS Q1 and Q3.4 surveys show, sharp declines with increasing ages 1–3 and 2–3, respectively (Figure 3.6.4.9).

Interpretation of the different catchability patterns is complex, and likely a number of reasons including ontogenetic differences in the spatial distribution and behaviour of the different age classes at the time of the surveys may affect their relative availability to the different samplings.

The surveys present some strong correlations notably between the older ages (Figure 3.6.4.10). The same is observed for fleets C and F. The tracking of each cohort can be observed in Figure 3.6.4.11.

The F-fleet has a lower observation variance than the GERAS and the fleet C, and the IBTS Q3.4 surveys variance is lower than the HERAS, the IBTS Q1 and the N20. Both the D-fleet and the A-fleet have very high observation variances (Figure 3.6.4.12).

Inspection of model diagnostics shows the occurrence of high residuals in some years (i.e. 2009 and 2018 in the GERAS and 2013–2014 in HERAS; Figure 3.6.4.13). Overall, the agreement between the data and the fitted model appears acceptable throughout the data sources, which are most influential in the model.

Residuals for catch in different fleets generally show poorer fit to the youngest year-classes 0–1 wr (Figure 3.6.4.13). Further, the fit by fleet to some degree follows the amount of catches in the fleets with increasingly better fit from A-fleet, D-fleet, C-fleet to the F-fleet (figures 3.6.4.13–3.6.4.17). The fit to the combined fleets in the beginning of the time series follows the observations to some degree except for the two youngest age classes 0–1 wr, which exhibit a rather poor fit. (Figure 3.6.4.18).

The individual survey diagnostics show some differences in how the model fit the different survey data, and the level of fitting is widely in agreement with the estimated observation variance for each data component (figures 3.6.4.19–24). In general, a similar fit is found for all included ages (wr) 3–6 of the HERAS index (Figure 3.6.4.19). The GERAS appears to fit slightly better for the ages (wr) 3–4 than for the younger ages (Figure 3.6.4.20). In recent years, GERAS shows a clear drop in indices for ages (wr) 2–4 that was poorly fitted in the last year assessment (ICES, 2018). In this year assessment, while the estimated indices for ages (wr) 2–4 are not as low as the observed ones, a clear decrease is seen (Figure 3.6.4.20) and residuals in 2018 are larger (Figure 3.6.4.13). The N20 pics up the negative trend in the observations of the recruitment index (Figure 3.6.4.21) however still with negative residuals by the end of the time series (Figure 3.6.4.13). Poorer fit is observed for the IBTS+BITS-Q1 for all ages (wr) 1–3, over the entire time series (Figure 3.6.4.22) and likewise to the IBTS+BITS-Q3.4 for the two ages (wr) 2–3 (Figure 3.6.4.23) with large positive residuals for age (wr) 2 in recent years (Figure 3.6.4.13).

Retrospective analysis suggests that the assessment method gives a consistent perception of the stock until the 2017 assessment but the 2018 SSB estimates differ from the estimates from the previous assessment years (Figure 3.6.4.24). The SSB has a Mohn's rho of 13% and the retrospective estimates are within the confidence interval of this year SSB estimates. Average fishing mortality retrospective is within the confidence bounds for F (Mohn's rho = -7%, Figure 3.6.4.25) and the retrospective for recruitment is acceptable having a Mohn's rho =- 7%, with little bias and two outliers (Figure 3.6.4.26). Changes from year to year retrospective are very tight for total catch (Figure 3.6.4.27). The difference between the 2018 assessment estimates and the 2019 ones seems to be mainly due to the GERAS survey that pushes the stock down due to very low indices for ages 2–4 in 2018. Indeed, for the single fleet model, leaving out the GERAS survey from the dataset induces an increase in the perception of the stock with increasing SSB in recent year (Figures 3.6.4.28–31). However, this pattern is less obvious in the multi-fleet model (figures 3.6.4.32–35). The reason for this difference may be that disaggregating the catch into fleets in the multi-fleet model gives relatively more weight to the catch than in the single fleet model (four observation errors with specific estimated variance vs. one in the single fleet) and therefore the effect of GERAS is less strong in the multi-fleet model.

3.7 State of the stock

The stock was benchmarked in 2018 with a substantial increase in the chosen value of B_{lim} and a slight downwards revision of the SSB levels. The stock has decreased consistently from mid 2000s to a historical low in 2011. With the new B_{lim} the stock has been in a state of impaired recruitment since 2007.

The 2018 benchmark calculated a new F_{MSY} of 0.31. Fishing mortality ($F_{3–6}$) was reduced between 2009 and 2011 from above 0.50 to 0.37. $F_{3–6}$ has then remained stable slightly above F_{MSY} until 2015 (~0.36) but shows an increase in recent years with an estimated $F_{3–6}$ in 2018 well above F_{MSY} (0.416).

Recruitment has be declining in the last five years with a historical low value in 2018 of 954 391 thousands (Tables 3.6.11, Figure 3.6.4.3).

The lower level of fishing mortality since 2011 has allowed a slight increase in SSB (from 70 kt in 2011 to 90 kt in 2015) despite the general low recruitment level, but since the strong 2013 year-class, recruitment has declined to historic low values that will not support a rebuilding of the stock with present levels of fishing mortalities.

3.8 Comparison with previous years perception of the stock

The table below summarises the differences between the current and the previous year's assessment. The addition of the 2018 data resulted in a change in the perception of the stock compared to last year's assessment. While the recent estimates of recruitment are more optimistic in the current assessment (+11%), F appears to be larger than previously estimated (+17 to +20%) and SSB smaller (-16 to -24%).

In this year's assessment, recruitment for the 2013 year-class was estimated to be 1 743 986 thousands compared to 1 946 458 thousands in the 2018 assessment. This decrease in recruitment induced a decrease in the SSB estimates in the following years compared to the 2018 assessment. This change in the perception of the stock resulted in an increase in the fishing mortality estimates since 2013 to satisfy the observed catches. The change in the perception of the stock is supported by all surveys but mainly GERAS (see 3.6.4).

Parameter	Assessment in 2018	Assessment in 2019	Difference 2019/2018 (+/-)%
SSB (t) 2016	102 294	88 443	-15.66%
$F_{(3–6)}$ 2016	0.334	0.402	16.92%
Recr. ('000) 2016	934 898	1 054 035	11.30%
SSB (t) 2017	104 170	83 895	-24.17%
$F_{(3–6)}$ 2017	0.332	0.416	20.19%

3.9 Short term predictions

Short term projections are possible both as stochastic and deterministic forecasts. While SAM runs with parameter values represented by percentiles, forecasts in multi-fleet SAM have to switch to a representation by means and standard deviations in order for catches in the individual fleets to add up the totals predicted. However, to be in line with the median representation, all values would have to be recalculated back from the representation by means. Although statistically correct, the HAWG did not want to perform these operations without a prior scrutinising of the effects on the presentation of the advice. Therefore, HAWG in line with all other assessments of the working group calculated deterministic predictions using that forecast option of the multi-fleet SAM and following the settings in the stock annex.

3.9.1 Input data

In the short term predictions recruitment (0-winter ring, wr) is assumed to be constant, and it is calculated as the geometric mean of the last five years prior the last year model estimate (i.e. for the 2019 assessment, recruitment for the forecasts was calculated on the period 2013–2017). For all older ages, the stock numbers are projected forward from the last data year to the intermediate year according to the estimated total mortalities based on fleet wise expected catches and natural mortalities. The mean weight-at-age in the catch and in the stock as well as the maturity ogive were calculated as the arithmetic averages over the last five years of the assessment (2014–2018). Based on earlier considerations in the herring working group, the different periods were chosen to reflect recent levels in recruitment and weights.

3.9.2 Intermediate year 2019

A catch constraint was assumed for the intermediate year (2019). Predicted 2019 catch by fleet is summarised in the Table below and depends on two main assumptions:

- Both NSAS and WBSS herring stocks are caught in the divisions 3.a (C and D-fleets) and 4.aE (A-fleet) whereas the subdivision 22–24 catch (F-fleet) is assumed to be only WBSS herring.
- The C- and D-fleets do not use their entire TAC.

Fleets	TAC 2019 NSAS+WBSS (t)	TAC WBSS (t)	TAC WBSS given utilization (t)
A	385 008	1545	100% = 1545
C	29 326	81% = 23 754	52% = 12 352
D	6659	44% = 2930	16% = 469
F	9001	9001	100% = 9001
Total	429 994	37 230	23 367

The amount of WBSS taken in Division 4.aE by the A-fleet in 2019 is assumed equal to the average over the last 3 years (2016–2018) corresponding to 1545 t.

The expected catch of WBSS in Division 3.a was calculated assuming the same WBSS proportions in the catch of each fleet in 2019 as the average of 2016–2018 in Division 3.a. This resulted in 81%

of the C-fleet catch being WBSS herring. In addition, the EU–Norway agreement allows an optional transfer of 50% of the human consumption (C-fleet) TAC for herring in Division 3.a into the Area 4 in the North Sea (A-fleet). Based on information from the Pelagic Advisory Council (AC) and last year's value, ICES assumes a 48% TAC transfer in 2019 so that the TAC utilisation for the C-fleet in Division 3.a is assumed 52%.

Forty four percent of the D-fleet 2019 catch is assumed to be WBSS herring (average NSAS/WBSS split 2016–2018). In addition, the proportion of the TAC taken in the small meshed fishery (D-fleet) has varied largely during the last 6 years from a maximum of 94% to the minimum of 6% recorded in 2017 and 2018 due to choke species effects of restricting whiting quotas. The problems with bycatches under the landings obligation may persist and 16% utilisation of the TAC in 2019 for the D-fleet is assumed as the average utilisation over the last 3 years.

The catch by the F-fleet fishing for human consumption in subdivisions 22–24 is usually very close to the TAC (9001 t) and an utilisation of 100% is assumed for the intermediate year.

Misreporting of catches from the North Sea into Division 3.a is no longer assumed to occur after 2008. Therefore, no account was taken in the compilations.

These assumptions give the expected catch by fleet summing up to a total of 23 367 t WBSS in 2019.

3.9.3 Catch scenarios for 2020

The output of the short-term prediction, based on a catch constraint in the intermediate year 2019 of 23 367 t is given in tables 3.9.1–3.9.14.

Different catch options for 2020 were explored with fleet-wise selection patterns and deterministic forecasts. To most closely resemble current WBSS management, a constraint is added to the forecasts so that, after the intermediate year, all scenarios (except the constant 2019 TAC and F = 0 scenarios) assume the F fleet gets 50% of the total catch for WBSS herring.

3.9.4 Exploring a range of total WBSS catches for 2020 (advice year)

ICES gives advice according to the F_{MSY} approach for the WBSS stock. Because SSB in 2019 is below B_{lim}, ICES advises a zero catch for 2020. None of the catch scenarios for 2020, including zero catch, is expected to bring SSB above B_{lim} in 2021. Besides requested standard scenarios HAWG also calculated the potential development of the stock projections until 2022 with different low F scenarios, where $F_{2021} = F_{2020}$. The highest fishing mortality that brings SSB above B_{lim} in 2022 will be F = 0.05 with a yield of 5301 t in 2020. The TAC for 2019 was set according to the agreed management rule between EU and Norway, however, ICES has not evaluated the rule after the 2018 benchmark revised the reference points for this stock. ICES advises that a recovery plan be developed for the WBSS stock, taking advantage of the fleet-wise analysis and projection for this stock.

Table	Basis	Total catch (2020)	$F_{3–6}$ (2020)	SSB* (2020)	SSB* (2021)	% SSB change **	% advice change ***
	ICES advice basis						
3.9.2	MSY approach: F = 0 ‘ {$SSB_{2019} < B_{lim}$}	0	0	76 273	101 269	33%	
	Other scenarios						
3.9.3	MAP 2018^: F = F_{MSY} (0.310) × SSB_{y-1}/MSY $B_{trigger}$	15 704	0.144	75 137	86 888	16%	
3.9.4	MAP 2018^: F = $F_{MSYlower}$ (0.216) × (SSB_{y-1}/MSY $B_{trigger}$)	11 123	0.1	75 482	91 026	21%	
3.9.5	MAP 2018^: F = $F_{MSY\ upper}$ (0.379) × (SSB_{y-1}/MSY $B_{trigger}$)	18 922	0.176	74 886	83 997	12%	
3.9.6	F = F_{MSY} (0.310)	31 428	0.31	73 848	73 111	-1%	
3.9.7	F = F_{pa} (0.350)	34 878	0.35	73 541	70 130	-5%	
3.9.8	F = F_{lim} (0.450)	42 984	0.45	72 779	63 222	-13%	
	SSB (2021) = B_{lim} ^^	0	0	76 273	101 269	33%	
	SSB (2021) = B_{pa} ^^	0	0	76 273	101 269	33%	
	SSB (2021) = MSY $B_{trigger}$ ^^	0	0	76 273	101 269	33%	
3.9.9	F = F_{2019} (0.238)	24 897	0.238	74 404	78 820	6%	
3.9.10	F = 0 {SSB_{2022} = 132 063 t} ^^^^	0	0	76 273	101 269	33%	
3.9.11	F = 0.05 {SSB_{2022} = 134 648 t} ^^^	5 301	0.05	75 877	96 189	27%	
3.9.12	F = 0.1 {SSB_{2022} = 122 673 t} ^^^	10 359	0.1	75 483	91 383	21%	
3.9.13	F = 0.15 {SSB_{2022} = 111 881 t} ^^^	15 186	0.15	75 092	86 838	16%	
3.9.14	Constant 2019 TAC^^^^	23 367	0.222	74 532	80 342	8%	

‘ There is no catch option for 2020 that is consistent with a stock recovering to above B_{lim}.

*** For spring-spawning stocks, the SSB is determined at spawning time and is influenced by fisheries and natural mortality between 1 January and spawning time (April).**

**** SSB (2021) relative to SSB (2020).**

***** The advice catch in 2019 was 0 tonne.**

^ Revised Baltic MAP (2018) which refers to most recent reference points. As SSB is currently (2018) below MSY $B_{trigger}$, the F_{lower} and F_{upper} values in the MAP are adjusted by the SSBy–1/MSY $B_{trigger}$ ratio.

^^ The B_{lim} and B_{pa} cannot be achieved in 2020 even with zero catch advice.

^^^ To explore potential development of the stock, projections until 2022 with different low F scenarios are provided, where F2021 = F2020.

^^^^ Assumptions for 2019 catches kept constant for 2020–2021. These include a 48% transfer of the C-fleet TAC to the North Sea.

3.10 Reference points

The WBSS stock was benchmarked in 2018 (ICES WKPELA, 2018) with subsequent changes of reference points. B_{lim} was revised from 90 000 to 120 000 t to take account of the new perception that recruitment is impaired when the spawning-stock biomass (SSB) is below 120 000 t. B_{pa} and MSY $B_{trigger}$ were subsequently set to 150 000 t. Using the eqSim software F_{MSY} was estimated to 0.31, F_{lim} 0.45 (5% risk to B_{lim}) and F_{pa} 0.35. The values were based on stochastic simulation of recruitment generated on a combination of Beverton & Holt, Ricker and segmented regression (ICES 2014/ACOM:64).

3.11 Quality of the Assessment

The stock was benchmarked in 2018 (ICES, 2018), which led to a change in perception for the entire time series. The 2019 assessment shows a downward revision in the SSB estimates in recent years compared to the 2018 assessment, which is supported by all the surveys, especially GerAS (see 3.6.4).

The herring assessed in subdivisions 20–24 is a complex mixture of populations predominantly spawning in spring, but with local components spawning also in autumn and winter. The population dynamics and the relative contribution of these components is presently unknown but are likely to affect the precision of the assessment. Moreover, mixing between WBSS and central Baltic herring in subdivisions 22–24 may contribute to uncertainty in the assessment.

Inter-annual variability in the herring migration patterns and in the distribution of the fisheries (including the optional transfer of quotas between divisions 3.a and 4) certainly add uncertainty to the assessment and forecasts of this meta-population. Since these cannot be predicted, recent average proportions between stocks are assumed in projections.

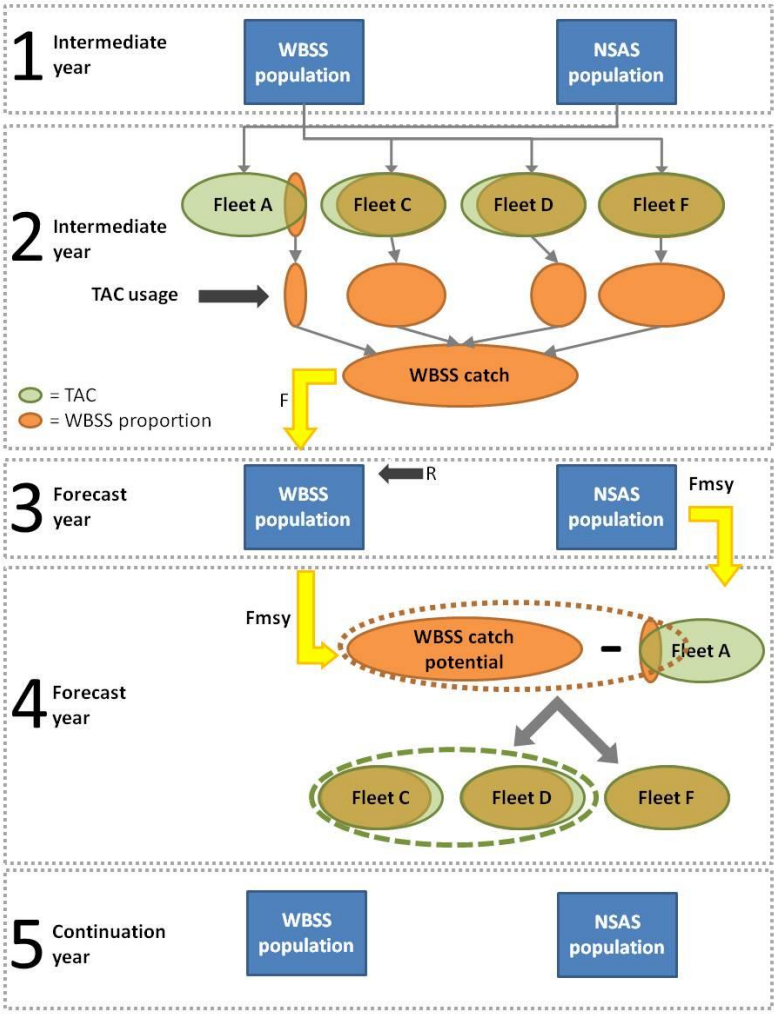
3.12 Management Considerations

Quotas in Division 3.a

The quota for the C-fleet and the bycatch quota for the D-fleet are set for both stocks of North Sea autumn spawners (NSAS) and Western Baltic spring spawners (WBSS) together (see Section 2.7). Fifty percent of the EU and Norwegian quotas for human consumption can optionally be transferred from Division 3.a and taken in Area 4 as NSAS in 2018. ICES assumes that a transfer of 48% will be applied in 2019 (cf. part 3.9).

ICES catch predictions versus management TAC

ICES gives advice on catch scenarios for the entire distribution of the NSAS and WBSS herring stocks separately whereas herring is managed by areas (see the following text diagram). The procedure of setting TACs in ICES Division 3.a and SD22–24 takes into account the occurrence of different fleets catches of both WBSS and NSAS herring utilization of TACs and the proportion of NSAS and WBSS that mix in the areas. In the flowchart below a schematic is presented:



Box 1: Each year estimations of the WBSS and NSAS stock size are made using a stock assessment model. Stock size estimation together with the estimated pattern of harvesting is used as the starting point for the short term forecast.

Box 2: To derive at a TAC proposal in the forecast year first the intermediate year (the year where the TAC has already been agreed on) catches need to be resolved. Four different fleets catch WBSS the A-fleet (within the 4.a East area where they take it as a mixture of mainly NSAS and partly WBSS) the C- and D-fleet (within the 3.a area where they take it as a mixture of mainly WBSS and partly NSAS) and the F-fleet (within area 22–24 where they only take WBSS). Each of these fleets target herring taking into account a fleet share of the total TAC. Only part of this TAC is WBSS catches and not all fleets utilize their full TAC fleet share. This results in an estimate of the intermediate year WBSS catches. Given WBSS stock size and these intermediate year catches the fishing mortality that the WBSS stock is exploited at can be estimated.

Box 3: Based on the estimated fishing mortality we can now calculate the survivors from the intermediate year to the forecast year assuming an incoming constant recruitment. The calculation of the stock size January 1st in the forecast year is needed to project catches in the forecast year.

Box 4: The management rule for the C-fleet TAC uses the potential WBSS catches calculated from the F_{MSY} advice plus a fraction of the NSAS LTMP TAC to define the total TAC in ICES Division 3.a as well as SD22–24 (see Application of the management rule below). Dependent on the relative development of the NSAS and WBSS stocks and the quota transfer from the C-fleet to the A-fleet the realised WBSS catches may deviate from the predictions based on F_{MSY}.

Box 5: The TAC advice from box 4 is taken into the political arena. The result of this will be taken into account to calculate the WBSS population again the year after. Hence box 5 is similar to box 1.

Application of the management rule for the herring fishery for human consumption in Division 3.a

ICES has not evaluated the agreed management rule after revision of reference points in the 2018 benchmark.

The agreed management rule has since 2014 been the basis for setting the C-fleet TAC in Division 3.a, and is calculated as the sum of 41% of the WBSS MSY advised catch and 5.7% of the North Sea herring management plan determined TAC for the A-fleet, with a further associated TAC constraint of +/- 15% for the C-fleet.

However, given the new B_{lim}, the stock has been below SSB for ten years raising serious concerns about the status of the WBSS stock. According to a safety clause, which was part of the TAC-setting procedure evaluation, the procedure itself therefore should not be applied and it should be re-evaluated.

3.13 Ecosystem considerations

Herring in Division 3.a and subdivisions 22–24 is a migratory stock. There are feeding migrations from the Western Baltic into more saline waters of Division 3.a and the eastern parts of Division 4.a. There are indications from parasite infections that yet unknown proportions of stock components spawning at the southern coast in the Baltic Sea may perform similar migrations (Podolska *et al.,* 2006). Herring in Division 3.a and subdivisions 22–24 migrate back to Rügen area (SD 24) and other spawning areas at the beginning of the winter. Moreover, there are recent indications that Central Baltic herring perform migrations into Subdivision 24 (Gröhsler *et al.,* 2013).

Similar to the NSAS, the WBSS has produced a series of poor year classes in the last one and a half decade and the trend continues to decline. An earlier analysis on different Baltic herring stocks showed that the Baltic Sea Index (BSI) reflecting Sea Surface Temperature (SST) was the main predictor for the recruitment of WBSS (Cardinale *et al.* 2009), however at the moment there is no understanding of the mechanisms driving this relationship. At the current stage there are no indications of systematic changes in growth or age at maturity that could be related to environmental variability, as well as there is no clear study that linked WBSS recruitment to the abundance of prey and/or predators. The low recruitment phase appears to have been initiated before the observed occurrence of *Mnemiopsis leidyi* (Ctenophore) in the Western Baltic (Kube *et al.*, 2007). The specific reasons for this low recruitment are unknown. Further investigation of the causes of the poor recruitment will require targeted research projects.

3.14 Changes in the Environment

There are no evident changes in the environment in the last decade that are thought to strongly affect productivity, migration patterns or growth of WBSS. There are indications that higher SST observed in the last decades might affect recruitment negatively, although the analyses were not conclusive (Cardinale *et al.,* 2009).

Table 3.1.1 Western Baltic herring. Total catch (both WBSS and NSAS) in 1989–2018 (1000 tonnes). (Data provided by Working Group members 2019).

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Skagerrak															
Denmark	47.4	62.3	58.7	64.7	87.8	44.9	43.7	28.7	14.3	10.3	10.1	16.0	16.2	26.0	15.5
Faroe Islands															
Germany															0.7
Lithuania															
Norway	1.6	5.6	8.1	13.9	24.2	17.7	16.7	9.4	8.8	8.0	7.4	9.7			
Sweden	47.9	56.5	54.7	88.0	56.4	66.4	48.5	32.7	32.9	46.9	36.4	45.8	30.8	26.4	25.8
Total	96.9	124.4	121.5	166.6	168.4	129.0	108.9	70.8	56.0	65.2	53.9	71.5	47.0	52.3	42.0
Kattegat															
Denmark	57.1	32.2	29.7	33.5	28.7	23.6	16.9	17.2	8.8	23.7	17.9	18.9	18.8	18.6	16.0
Sweden	37.9	45.2	36.7	26.4	16.7	15.4	30.8	27.0	18.0	29.9	14.6	17.3	16.2	7.2	10.2
Total	95.0	77.4	66.4	59.9	45.4	39.0	47.7	44.2	26.8	53.6	32.5	36.2	35.0	25.9	26.2
Subdivisions 22+24															
Denmark	21.7	13.6	25.2	26.9	38.0	39.5	36.8	34.4	30.5	30.1	32.5	32.6	28.3	13.1	6.1
Germany	56.4	45.5	15.8	15.6	11.1	11.4	13.4	7.3	12.8	9.0	9.8	9.3	11.4	22.4	18.8
Poland	8.5	9.7	5.6	15.5	11.8	6.3	7.3	6.0	6.9	6.5	5.3	6.6	9.3		4.4
Sweden	6.3	8.1	19.3	22.3	16.2	7.4	15.8	9.0	14.5	4.3	2.6	4.8	13.9	10.7	9.4
Total	92.9	76.9	65.9	80.3	77.1	64.6	73.3	56.7	64.7	49.9	50.2	53.3	62.9	46.2	38.7
Subdivision 23															
Denmark	1.5	1.1	1.7	2.9	3.3	1.5	0.9	0.7	2.2	0.4	0.5	0.9	0.6	4.6	2.3
Sweden	0.1	0.1	2.3	1.7	0.7	0.3	0.2	0.3	0.1	0.3	0.1	0.1	0.2		0.2
Total	1.6	1.2	4.0	4.6	4.0	1.8	1.1	1.0	2.3	0.7	0.6	1.0	0.8	4.6	2.6
Grand Total	**286.4**	**279.9**	**257.8**	**311.4**	**294.9**	**234.4**	**231.0**	**172.7**	**149.8**	**169.4**	**137.2**	**162.0**	**145.7**	**128.9**	**109.5**

Year	2004	2005	2006**	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018*
Skagerrak															
Denmark	11.8	14.8	5.2	3.6	3.9	12.7	5.3	3.6	3.2	4.9	6.4	4.1	3.6	2.7	0.9
Faroe Islands		0.4			0.0	0.6	0.4					0.5	0.3	0.4	0.1
Germany	0.5	0.8	0.6	0.5	1.6	0.3	0.1	0.1	0.6	0.2	0.1	0.1	0.1	0.1	0.2
Lithuania							0.4								
Netherlands												0.03			
Norway				3.5	4.0	3.3	3.3	0.1	0.4	3.0	2.0	2.5	3.9	3.3	3.4
Sweden	21.8	32.5	26.0	19.4	16.5	12.9	17.4	9.5	16.2	16.7	12.6	12.9	13.3	11.9	11.3
Total	34.1	48.5	31.8	26.9	26.0	29.7	27.0	13.2	20.5	24.8	21.2	20.1	21.2	18.5	16.0
Kattegat															
Denmark	7.6	11.1	8.6	9.2	7.0	4.9	7.6	5.2	6.3	3.9	4.3	4.0	2.4	0.9	1.3
Sweden	9.6	10.0	10.8	11.2	5.2	3.6	2.7	1.7	0.8	2.6	3.4	3.8	6.2	7.4	6.0
Germany						0.6	0.0								
Total	17.2	21.1	19.4	20.3	12.2	9.1	10.3	6.8	7.1	6.5	7.7	7.7	8.7	8.3	7.3
Subdivisions 22+24															
Denmark	7.3	5.3	1.4	2.8	3.1	2.1	0.8	3.1	4.1	5.1	4.3	4.5	5.7	5.6	4.5
Finland															0.001
Germany	18.5	21.0	22.9	24.6	22.8	16.0	12.2	8.2	11.2	14.6	10.2	13.3	14.4	14.7	11.3
Poland	5.5	6.3	5.5	2.9	5.5	5.2	1.8	1.8	2.4	3.1	2.4	2.6	2.9	3.3	1.8
Sweden	9.9	9.2	9.6	7.2	7.0	4.1	2.0	2.2	2.7	2.1	1.1	1.5	1.7	2.3	0.9
Total	41.2	41.8	39.4	37.6	38.5	27.4	16.8	15.3	20.4	24.8	18.0	21.9	24.7	25.9	18.5
Subdivision 23															
Denmark	0.1	1.8	1.8	2.9	5.3	2.8	0.1***	0.03	0.04	0.04	0.05	0.03	0.03	0.3	0.1
Sweden	0.3	0.4	0.7		0.3	0.8	0.9	0.5	0.7	0.6	0.3	0.2	0.3	0.4	0.4
Total	0.4	2.2	2.5	2.9	5.7	3.6	1.0	0.6	0.7	0.7	0.4	0.2	0.4	0.6	0.5
Grand Total	**92.8**	**113.6**	**93.0**	**87.7**	**82.3**	**69.9**	**55.2**	**35.9**	**48.8**	**56.7**	**47.2**	**50.0**	**55.0**	**53.3**	**42.2**

***Preliminary data**

****2000 t of Danish catches are missing (HAWG 2007)**

*****3103 t officially reported catches (HAWG 2011)**

Table 3.1.2 Western Baltic herring. Catch (SOP) in 2004–2018 by fleet and quarter (1000 t). (both WBSS and NSAS)

Year	Quarter	Div. IIIa		SD 22-24	Div. IIIa + SD 22-24	Year	Quarter	Div. IIIa		SD 22-24	Div. IIIa + SD 22-24
		Fleet C	Fleet D	Fleet F	Total			Fleet C	Fleet D	Fleet F	Total
2004	1	13.5	2.8	20.4	36.7	2012	1	4.5	1.8	14.0	20.3
	2	2.8	3.3	10.4	16.5		2	0.3	0.7	2.5	3.5
	3	8.2	10.8	2.4	21.4		3	12.3	1.7	1.1	15.0
	4	5.9	5.0	8.6	19.4		4	5.2	1.1	3.5	9.9
	Total	30.3	22.0	41.7	93.9		Total	22.3	5.4	21.1	48.8
2005	1	16.6	6.1	20.4	43.1	2013	1	8.5	0.8	11.7	20.9
	2	3.4	1.9	15.6	20.9		2	1.7	0.6	8.5	10.8
	3	23.4	3.4	1.9	28.7		3	8.4	1.0	1.1	10.4
	4	12.0	2.6	5.8	20.5		4	9.8	0.5	4.3	14.7
	Total	55.4	14.1	43.7	113.3		Total	28.4	2.9	25.5	56.7
2006	1	15.3	5.9	15.1	36.2	2014	1	6.2	0.2	10.8	17.3
	2	2.6	0.1	17.2	19.9		2	2.3	0.5	2.3	5.1
	3	15.7	0.8	3.0	19.5		3	10.7	2.4	0.8	14.0
	4	8.3	2.4	6.5	17.3		4	5.7	0.8	4.4	10.9
	Total	41.9	9.3	41.9	93.0		Total	24.9	4.0	18.3	47.2
2007	1	7.7	3.0	18.8	29.5	2015	1	9.0	1.9	14.2	25.1
	2	3.8	0.1	10.5	14.4		2	1.0	0.1	2.8	3.9
	3	22.4	0.8	1.7	24.9		3	7.5	1.5	0.9	9.9
	4	7.7	1.8	9.5	18.9		4	4.1	2.8	4.3	11.1
	Total	41.6	5.7	40.5	87.7		Total	21.6	6.3	22.1	50.0
2008	1	8.2	3.9	18.4	30.5	2016	1	7.9	0.7	15.5	24.0
	2	2.7	0.3	11.3	14.3		2	0.4	0.3	3.5	4.1
	3	14.9	0.6	6.0	21.5		3	15.7	1.3	1.4	18.5
	4	6.5	1.0	8.4	16.0		4	3.4	0.3	4.7	8.3
	Total	32.3	5.9	44.1	82.3		Total	27.4	2.5	25.1	55.0
2009	1	11.1	2.7	19.5	33.2	2017	1	7.5	0.0	16.8	24.3
	2	3.1	0.1	6.8	10.1		2	0.2	0.1	3.4	3.6
	3	14.3	0.9	1.4	16.6		3	12.1	0.1	1.0	13.2
	4	6.0	0.7	3.3	10.0		4	6.6	0.3	5.3	12.2
	Total	34.5	4.3	31.0	69.9		Total	26.4	0.4	26.5	53.3
2010	1	8.4	1.1	10.2	19.8	2018	1	10.0	0.0	12.0	21.9
	2	3.9	0.7	5.4	10.1		2	0.2	0.1	3.4	3.8
	3	13.4	0.4	0.4	14.3		3	10.2	0.1	0.2	10.6
	4	9.2	0.1	1.8	11.1		4	2.5	0.1	3.4	6.0
	Total	35.0	2.3	17.9	55.2		Total	22.9	0.4	19.0	42.2
2011	1	7.0	0.5	7.8	15.3						
	2	0.5	0.2	4.1	4.8						
	3	6.5	1.0	0.8	8.3						
	4	3.4	0.9	3.2	7.4						
	Total	17.4	2.6	15.8	35.9						

Table 3.2.1 Western Baltic spring spawning herring. Catch in numbers (mill.), mean weight (g.) and SOP (t) by age as W-ringers and quarter (both WBSS and NSAS).
Division: Skagerrak Year: 2018 Country: ALL

		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
1	1	0.78	34			0.78	34
	2	88.63	52			88.63	52
	3	2.73	74			2.73	74
	4	1.04	91			1.04	91
	5	0.52	119			0.52	119
	6	0.13	174			0.13	174
	7	0.13	175			0.13	175
	8+						
	Total	93.96		0.00		93.96	
	SOP		4,995		0		4,995
		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
2	1	0.03	34	0.52	23	0.55	23
	2	3.81	52	1.56	42	5.36	49
	3	0.12	74	0.06	48	0.18	65
	4	0.04	91			0.04	91
	5	0.02	119			0.02	119
	6	0.01	174			0.01	174
	7	0.01	175			0.01	175
	8+						
	Total	4.04		2.14		6.17	
	SOP		215		80		295
		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
3	0			1.27	8	1.27	8
	1	5.66	65	0.55	42	6.21	63
	2	13.80	115	0.02	77	13.81	115
	3	8.52	135			8.52	135
	4	11.07	163			11.07	163
	5	15.58	181			15.58	181
	6	4.34	190			4.34	190
	7	2.74	187			2.74	187
	8+	2.18	202			2.18	202
	Total	63.89		1.84		65.72	
	SOP		9,510		35		9,545
		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
4	0			0.54	11	0.54	11
	1	8.55	57	0.03	44	8.58	57
	2	2.57	84			2.57	84
	3	0.50	135			0.50	135
	4	0.54	171			0.54	171
	5	0.91	187			0.91	187
	6	0.23	198			0.23	198
	7	0.14	190			0.14	190
	8+	0.04	226			0.04	226
	Total	13.47		0.57		14.04	
	SOP		1,114		7		1,121
		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
Total	0	0.00	0	1.81	9	1.81	9
	1	15.02	59	1.10	33	16.12	57
	2	108.80	60	1.57	42	110.37	60
	3	11.87	120	0.06	48	11.94	120
	4	12.69	157			12.69	157
	5	17.03	179			17.03	179
	6	4.70	190			4.70	190
	7	3.01	187			3.01	187
	8+	2.22	203			2.22	203
	Total	175.35		4.54		179.89	
	SOP		15,834		122		15,956

Table 3.2.2 Western Baltic spring spawning herring. Catch in numbers (mill.), mean weight (g.) and SOP (t) by age as W-ringers and quarter (both WBSS and NSAS).
Division: Kattegat Year: 2018 Country: ALL

		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
1	1	5.08	29	0.03	23	5.11	29
	2	87.75	48	0.08	42	87.83	48
	3	4.68	73	0.00	48	4.69	73
	4	1.07	100			1.07	100
	5	1.07	118			1.07	118
	6	0.13	113			0.13	113
	7						
	8+	0.27	168			0.27	168
	Total	100.06		0.11		100.17	
	SOP		4,959		4		4,964
		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
2	1	0.0010	29	0.22	23	0.2172	23
	2	0.0175	48	0.65	42	0.6660	42
	3	0.0009	73	0.03	48	0.0280	49
	4	0.0002	100			0.0002	100
	5	0.0002	118			0.0002	118
	6	0.0000	113			0.0000	113
	7						
	8+	0.0001	168			0.0001	168
	Total	0.0200		0.89		0.9116	
	SOP		0.991		33.448		34.439
		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
3	0			2.81	8	2.81	8
	1	2.93	59	1.23	42	4.16	54
	2	3.23	68	0.04	77	3.26	68
	3	0.36	82			0.36	82
	4	0.44	109			0.44	109
	5	0.69	187			0.69	187
	6	0.38	210			0.38	210
	7	0.11	178			0.11	178
	8+	0.11	188			0.11	188
	Total	8.25		4.08		12.33	
	SOP		718		77		795
		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
4	0	0.10	22	10.07	11	10.18	11
	1	13.51	55	0.49	44	14.00	55
	2	5.16	81			5.16	81
	3	0.84	110			0.84	110
	4	0.51	124			0.51	124
	5	0.28	149			0.28	149
	6	0.06	119			0.06	119
	7	0.04	215			0.04	215
	8+						
	Total	20.50		10.56		31.07	
	SOP		1,380		129		1,509
		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
Total	0	0.10	22	12.89	10	12.99	10
	1	21.53	50	1.96	40	23.49	49
	2	96.16	50	0.76	44	96.92	50
	3	5.88	79	0.03	48	5.91	79
	4	2.02	108			2.02	108
	5	2.04	145			2.04	145
	6	0.58	178			0.58	178
	7	0.15	187			0.15	187
	8+	0.38	174			0.38	174
	Total	128.83		15.64		144.48	
	SOP		7,059		243		7,302

Table 3.2.3 Western Baltic spring spawning herring. Catch in numbers (mill.), mean weight (g.) and SOP (t) by age as W-ringers and quarter (WBSS).
Subdivisions: 22–24 Year: 2018 Country: ALL

		Sub-division 22		Sub-division 23		Sub-division 24		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
1	0								
	1	38.98	12			5.40	16	44.37	12
	2	0.40	37	0.01	144	11.21	42	11.62	42
	3	0.16	94	0.01	162	22.54	86	22.71	86
	4	0.11	114	0.03	174	12.26	111	12.40	111
	5	0.33	147	0.06	186	33.05	144	33.45	144
	6	0.10	159	0.02	207	9.40	155	9.52	155
	7	0.08	173	0.01	210	4.75	169	4.83	169
	8+	0.04	190	0.00	232	2.56	187	2.61	187
	Total	40.21		0.14		101.17		141.51	
	SOP		584		25		11,347		11,957
		Sub-division 22		**Sub-division 23**		**Sub-division 24**		**Total**	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
2	1	0.00	44			0.72	21	0.72	21
	2	0.00	55	0.0001	144	1.34	50	1.34	50
	3	0.00	97	0.0001	162	4.94	67	4.94	67
	4	0.00	146	0.0001	174	5.01	85	5.01	85
	5	0.04	150	0.0003	186	10.25	126	10.30	126
	6	0.06	160	0.0001	207	4.74	123	4.79	123
	7	0.04	165	0.0001	210	3.20	138	3.24	139
	8+	0.02	176	0.0000	232	1.60	152	1.62	153
	Total	0.16		0.0007		31.80		31.96	
	SOP		26		0.1		3,402		3,428
		Sub-division 22		**Sub-division 23**		**Sub-division 24**		**Total**	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
3	0					0.10	11	0.10	11
	1	0.0000	46			0.92	29	0.92	29
	2	0.0002	55	0.05	144	0.20	41	0.24	61
	3	0.0001	76	0.05	162	0.26	42	0.31	61
	4	0.0002	133	0.13	174	0.60	42	0.72	65
	5	0.0012	150	0.24	186	0.06	63	0.31	161
	6	0.0017	160	0.07	207	0.38	51	0.45	74
	7	0.0011	165	0.05	210	0.10	68	0.15	112
	8+	0.0005	176	0.01	232	0.04	83	0.05	107
	Total	0.0051		0.58		2.65		3.24	
	SOP		0.8		106		105		212
		Sub-division 22		**Sub-division 23**		**Sub-division 24**		**Total**	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
4	0					0.27	18	0.27	18
	1	0.00	46			2.36	49	2.36	49
	2	0.00	55	0.03	140	5.22	74	5.25	75
	3	0.00	75	0.13	139	6.55	108	6.68	109
	4	0.00	132	0.72	179	4.21	123	4.93	131
	5	0.01	150	0.89	209	6.32	150	7.22	158
	6	0.02	160	0.06	209	1.41	153	1.50	156
	7	0.01	165			0.61	176	0.62	176
	8+	0.01	176	0.01	241	0.22	104	0.23	111
	Total	0.06		1.84		27.17		29.08	
	SOP		9		353		3,033		3,395
		Sub-division 22		**Sub-division 23**		**Sub-division 24**		**Total**	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
Total	0					0.37	16	0.37	16
	1	38.98	12			9.40	26	48.38	14
	2	0.41	38	0.09	143	17.96	52	18.46	52
	3	0.16	94	0.19	146	34.28	87	34.64	87
	4	0.12	116	0.87	178	22.07	106	23.06	108
	5	0.39	148	1.20	203	49.69	141	51.27	143
	6	0.18	160	0.14	208	15.93	143	16.26	143
	7	0.13	170	0.06	210	8.66	157	8.84	158
	8+	0.07	185	0.02	237	4.42	170	4.51	170
	Total	40.43		2.56		162.79		205.79	
	SOP		620		485		17,887		18,992

Table 3.2.4 Western Baltic spring spawning herring. Samples of commercial catch by quarter and area for 2018 available to the Working Group.

	Country	Fleet	Quarter	Landings ('000 tons)	Numbers of samples	Numbers of fish meas.	Numbers of fish aged
Skagerrak	Denmark	C	1	0.00001	No data available		
		C	2	0.00003	No data available		
		C	3	0.47449	No data available		
		C	4	0.26170	No data available		
	Total	Total		0.73623	0	0	0
	Denmark	D	1	0.000		-	
		D	2	0.080	No data available		
		D	3	0.035	No data available		
		D	4	0.007	No data available		
	Total	Total		0.122	0	0	0
	Germany	C	1	0.000		-	
		C	2	0.000		-	
		C	3	0.104	No data available		
		C	4	0.102	No data available		
	Total	Total		0.206			
	Norway	C	1	0.017	No data available		
		C	2	0.191	No data available		
		C	3	3.069	1	100	50
		C	4	0.133	No data available		
	Total	Total		3.411	1	100	50
	Faroe Islands	C	1	0.000		-	
		C	2	0.000		-	
		C	3	0.149	No data available		
		C	4	0.000		-	
	Total	Total		0.149	0	0	0
	Sweden	C	1	4.978	12	725	723
		C	2	0.023	No data available		
		C	3	5.713	10	679	677
		C	4	0.618	1	165	165
	Total	Total		11.332	23	1,569	1,565
Kattegat	Denmark	C	1	0.047	No data available		
		C	2	0.001	No data available		
		C	3	0.440	1	189	48
		C	4	0.527	6	1,328	312
	Total	Total		1.015	7	1,517	360
	Denmark	D	1	0.004	1	33	33
		D	2	0.033	No data available		
		D	3	0.077	6	116	116
		D	4	0.129	8	329	241
	Total	Total		0.243	15	478	390
	Sweden	C	1	4.912	15	750	748
		C	2	0.000		-	
		C	3	0.278	1	54	54
		C	4	0.853	4	400	400
	Total	Total		6.044	20	1,204	1,202

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Table 3.2.4 (continued) Western Baltic spring spawning herring. Samples of commercial catch by quarter and area for 2018 available to the Working Group.

	Country	Fleet	Quarter	Landings ('000 tons)	Numbers of samples	Numbers of fish meas.	Numbers of fish aged
Subdivision 22	**Denmark**	**F**	**1**	0.469	7	396	209
		F	**2**	0.012	No data available		
		F	**3**	0.000	No data available		
		F	**4**	0.002	No data available		
	Total	**Total**		0.484	7	396	209
	Sweden	**F**	**1**	0.000		-	
		F	**2**	0.000		-	
		F	**3**	0.000		-	
		F	**4**	0.000		-	
	Total	**Total**		0.000	0	0	0
	Germany	**F**	**1**	0.1149	1	339	70
		F	**2**	0.0135	4	1,538	218
		F	**3**	0.0005	No data available		
		F	**4**	0.0074	No data available		
	Total	**Total**		0.1363	5	1,877	288
Subdivision 23	**Denmark**	**F**	**1**	0.000	No data available		
		F	**2**	0.000	No data available		
		F	**3**	0.024	1	177	60
		F	**4**	0.046	1	101	51
	Total	**Total**		0.069	2	278	111
	Sweden	**F**	**1**	0.025	No data available		
		F	**2**	0.000		-	
		F	**3**	0.083	No data available		
		F	**4**	0.308	2	52	52
	Total	**Total**		0.416	2	52	52
Subdivision 24	**Denmark**	**F**	**1**	3.328	4	702	214
		F	**2**	0.015	1	172	58
		F	**3**	0.001	No data available		
		F	**4**	0.659	7	1,006	156
	Total	**Total**		4.003	12	1,880	428
	Finland	**F**	**1**	0.001	No data available		
		F	**2**	0.000		-	
		F	**3**	0.000		-	
		F	**4**	0.000		-	
	Total	**Total**		0.001	0	0	0
	Germany	**F**	**1**	7.5213	13	5,048	1,069
		F	**2**	2.4715	8	3,122	548
		F	**3**	0.0001	No data available		
		F	**4**	1.1749	1	349	119
	Total	**Total**		11.1679	22	8,519	1,736
	Poland	**F**	**1**	0.104	1	194	54
		F	**2**	0.916	1	820	132
		F	**3**	0.103	1	1,021	100
		F	**4**	0.650	1	451	126
	Total	**Total**		1.773	4	2,486	412
	Sweden	**F**	**1**	0.393	7	776	774
		F	**2**	0.000	No data available		
		F	**3**	0.000	No data available		
		F	**4**	0.549	5	666	665
	Total	**Total**		0.943	12	1,442	1,439
Total	**Skagerrak**	**C**	**1-4**	**15.834**	**24**	**1,669**	**1,615**
		D	**1-4**	**0.122**	**0**	**0**	**0**
	Kattegat	**C**	**1-4**	**7.059**	**27**	**2,721**	**1,562**
		D	**1-4**	**0.243**	**15**	**478**	**390**
	Subdivision 22	**F**	**1-4**	**0.620**	**12**	**2,273**	**497**
	Subdivision 23	**F**	**1-4**	**0.485**	**4**	**330**	**163**
	Subdivision 24	**F**	**1-4**	**17.887**	**50**	**14,327**	**4,015**
	Total	**Total**	**1-4**	**42.250**	**132**	**21,798**	**8,242**

Table 3.2.5 Western Baltic spring spawning herring. Samples of catch by quarter and area used to estimate catch in numbers and mean weight at age as W-ringers for 2018.

	Country	Quarter	Fleet	Sampling
Skagerrak	**Denmark**	**1**	**C**	Sweden Q1 27.3.a.20 fleet-C
		2	**C**	Sweden Q1 27.3.a.20 fleet-C
		3	**C**	Sweden Q3 27.3.a.20 fleet-C
		4	**C**	Sweden Q3 27.3.a.20 fleet-C
	Germany	**1**	**C**	No landings
		2	**C**	No landings
		3	**C**	Sweden Q3 27.3.a.20 fleet-C
		4	**C**	Sweden Q3 27.3.a.20 fleet-C
	Sweden	**1**	**C**	Sweden Q1 27.3.a.20 fleet-C
		2	**C**	Sweden Q1 27.3.a.20 fleet-C
		3	**C**	Sweden Q3 27.3.a.20 fleet-C
		4	**C**	Sweden Q4 27.3.a.20 fleet-C
	Denmark	**1**	**D**	No landings
		2	**D**	Denmark Q1 27.3.a.21 fleet-D
		3	**D**	Denmark Q3 27.3.a.21 fleet-D
		4	**D**	Denmark Q4 27.3.a.21 fleet-D
	Netherlands	**1**	**C**	No landings
		2	**C**	No landings
		3	**C**	No landings
		4	**C**	No landings
	Faroe Islands	**1**	**C**	No landings
		2	**C**	No landings
		3	**C**	Sweden Q3 27.3.a.20 fleet-C
		4	**C**	No landings
	Norway	**1**	**C**	Sweden Q1 27.3.a.20 fleet-C
		2	**C**	Sweden Q1 27.3.a.20 fleet-C
		3	**C**	Norway Q3 27.3.a.20 fleet-C
		4	**C**	Sweden Q3 27.3.a.20 fleet-C
Kattegat	**Denmark**	**1**	**C**	Sweden Q1 27.3.a.21 fleet-C
		2	**C**	Sweden Q1 27.3.a.21 fleet-C
		3	**C**	Denmark Q3 27.3.a.21 fleet-C
		4	**C**	Denmark Q4 27.3.a.21 fleet-C
	Sweden	**1**	**C**	Sweden Q1 27.3.a.21 fleet-C
		2	**C**	Sweden Q1 27.3.a.21 fleet-C
		3	**C**	Sweden Q3 27.3.a.21 fleet-C
		4	**C**	Sweden Q4 27.3.a.21 fleet-C
	Germany	**1**	**C**	No landings
		2	**C**	No landings
		3	**C**	No landings
		4	**C**	No landings
	Denmark	**1**	**D**	Denmark Q1 27.3.a.21 fleet-D
		2	**D**	Denmark Q1 27.3.a.21 fleet-D
		3	**D**	Denmark Q3 27.3.a.21 fleet-D
		4	**D**	Denmark Q4 27.3.a.21 fleet-D
Subdivision 22	**Denmark**	**1**	**F**	Denmark Q1 27.3.c.22 fleet-F
		2	**F**	Germany Q2 27.3.c.22 fleet-F
		3	**F**	Germany Q3 27.3.c.22 fleet-F
		4	**F**	Germany Q4 27.3.c.22 fleet-F
	Sweden	**1**	**F**	No landings
		2	**F**	No landings
		3	**F**	No landings
		4	**F**	No landings
	Germany	**1**	**F**	Germany Q1 27.3.c.22 fleet-F (WD Gröhsler)
		2	**F**	Germany Q2 27.3.c.22 fleet-F (WD Gröhsler)
		3	**F**	German sampling as in WD Gröhsler
		4	**F**	German sampling as in WD Gröhsler

Fleet C = Human consumption, Fleet D = Industrial catch, Fleet F = All catch from Subdivisions 22–24.

Continued on next page

Table 3.2.5 (continued) Western Baltic spring spawning herring. Samples of catch by quarter and area used to estimate catch in numbers and mean weight at age as W-ringers for 2018.

	Country	Quarter	Fleet	Sampling
Subdivision 23	**Denmark**	**1**	**F**	Denmark Q3 27.3.b.23 fleet-F
		2	**F**	Denmark Q3 27.3.b.23 fleet-F
		3	**F**	Denmark Q3 27.3.b.23 fleet-F
		4	**F**	Denmark Q4 27.3.b.23 fleet-F
	Sweden	**1**	**F**	Denmark Q3 27.3.b.23 fleet-F
		2	**F**	No landings
		3	**F**	Denmark Q3 27.3.b.23 fleet-F
		4	**F**	Sweden Q4 27.3.b.23 fleet-F
Subdivision 24	**Denmark**	**1**	**F**	Denmark Q1 27.3.d.24 fleet-F
		2	**F**	Denmark Q1 27.3.d.24 fleet-F
		3	**F**	Denmark Q4 27.3.d.24 fleet-F
		4	**F**	Denmark Q4 27.3.d.24 fleet-F
	Finland	**1**	**F**	Germany Q1 27.3.d.24 fleet-F
		2	**F**	No landings
		3	**F**	No landings
		4	**F**	No landings
	Germany	**1**	**F**	Germany Q1 27.3.d.24 fleet-F
		2	**F**	Germany Q2 27.3.d.24 fleet-F
		3	**F**	German sampling as in WD Gröhsler
		4	**F**	Germany Q4 27.3.d.24 fleet-F
	Poland	**1**	**F**	Poland Q1 27.3.d.24 fleet-F
		2	**F**	Poland Q2 27.3.d.24 fleet-F
		3	**F**	Poland Q3 27.3.d.24 fleet-F
		4	**F**	Poland Q4 27.3.d.24 fleet-F
	Sweden	**1**	**F**	Sweden Q1 27.3.d.24 fleet-F
		2	**F**	Germany Q2 27.3.d.24 fleet-F
		3	**F**	Sweden Q4 27.3.d.24 fleet-F
		4	**F**	Sweden Q4 27.3.d.24 fleet-F

Fleet C = Human consumption, Fleet D = Industrial catch, Fleet F = All catch from Subdivisions 22–24.

Table 3.2.6 Western Baltic spring spawning herring. Proportion of North Sea autumn spawners (NSAS) and Western Baltic spring spawners (WBSS) given in % in Skagerrak and Kattegat by age as W-ringers and quarter. Year: 2018

		Skagerrak			Kattegat		
Quarter	W-rings	NSAS	WBSS	n	NSAS	WBSS	n
1	1	50.00%	50.00%	6	93.94%	6.06%	45
	2	9.80%	90.20%	51	16.97%	83.03%	78
	3	14.29%	85.71%	21	2.91%	97.09%	35
	4	12.50%	87.50%	8	0.00%	100.00%	8
	5	4.62%	95.38%	3	0.00%	100.00%	8
	6	4.62%	95.38%	1	0.00%	100.00%	1
	7	4.62%	95.38%	1	0.00%	100.00%	0
	8+	4.62%	95.38%	0	0.00%	100.00%	2
		Skagerrak			Kattegat		
Quarter	W-rings	NSAS	WBSS	n	NSAS	WBSS	n
2	1	50.00%	50.00%	0	93.94%	6.06%	0
	2	9.80%	90.20%	0	16.97%	83.03%	0
	3	14.29%	85.71%	0	2.91%	97.09%	0
	4	12.50%	87.50%	0	0.00%	100.00%	0
	5	4.62%	95.38%	0	0.00%	100.00%	0
	6	4.62%	95.38%	0	0.00%	100.00%	0
	7	4.62%	95.38%	0	0.00%	100.00%	0
	8+	4.62%	95.38%	0	0.00%	100.00%	0
		Skagerrak			Kattegat		
Quarter	W-rings	NSAS	WBSS	n	NSAS	WBSS	n
3	0	98.73%	1.27%	0	98.73%	1.27%	79
	1	40.00%	60.00%	50	54.72%	45.28%	53
	2	20.41%	79.59%	49	26.71%	73.29%	24
	3	6.12%	93.88%	49	0.00%	100.00%	4
	4	14.29%	85.71%	14	0.00%	100.00%	6
	5	4.55%	95.45%	22	37.50%	62.50%	24
	6	3.85%	96.15%	6	0.00%	100.00%	14
	7	3.85%	96.15%	6	3.85%	96.15%	4
	8	3.85%	96.15%	2	3.85%	96.15%	4
		Skagerrak			Kattegat		
Quarter	W-rings	NSAS	WBSS	n	NSAS	WBSS	n
4	0	98.73%	1.27%	0	97.75%	2.25%	222
	1	36.00%	64.00%	50	40.36%	59.64%	260
	2	9.37%	90.63%	32	6.32%	93.68%	100
	3	6.12%	93.88%	0	2.37%	97.63%	34
	4	14.29%	85.71%	0	0.00%	100.00%	25
	5	4.55%	95.45%	0	2.94%	97.06%	17
	6	3.85%	96.15%	0	2.94%	97.06%	3
	7	3.85%	96.15%	0	2.94%	97.06%	2
	8	3.85%	96.15%	0	2.94%	97.06%	1

when *n for an age <12 data were borrowed according to the below table
borrowing either a mean of age groups or ages borrowed individually

Q	ages	Skagerrak	ages	Kattegat
1	5-8+	mean(4-8+)	5-8+	mean(5-8+)
2	1-8+	Q1 Sk(age)	1-8+	Q1 Ka(age)
3	6-8+	mean(6-8+)	7-8+	mean(6-8+)
4	3-8+	Q3 Sk(age)	5-8+	mean(5-8+)

Table 3.2.7 Western Baltic spring spawning herring. Catch in numbers (mill.), mean weight (g.) and SOP (t) by age as W-ringers, quarter and fleet. North Sea Autumn spawners
Division: Kattegat Year: 2018 Country: All

		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
1	1	4.78	29	0.03	23	4.80	29
	2	14.89	48	0.01	42	14.91	48
	3	0.14	73	0.00	48	0.14	73
	4					0.00	
	5					0.00	
	6					0.00	
	7					0.00	
	8+					0.00	
	Total	19.80		0.04		19.84	
	SOP		856.3		1.1		857.5
		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
2	1	0.0010	29	0.20	23	0.20	23
	2	0.00298	48	0.11	42	0.11	42
	3	0.00003	73	0.00	48	0.00	49
	4					0.00	
	5					0.00	
	6					0.00	
	7					0.00	
	8+					0.00	
	Total	0.004		0.31		0.32	
	SOP		0.2		9.3		9.4
		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
3	0			2.78	8	2.78	8
	1	1.61	59	0.67	42	2.28	54
	2	0.86	68	0.01	77	0.87	68
	3					0.00	
	4					0.00	
	5	0.26	187			0.26	187
	6					0.00	
	7	0.00	178			0.00	178
	8+	0.00	188			0.00	188
	Total	2.73		3.46		6.19	
	SOP		202.6		51.4		253.9
		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
4	0	0.10	22	9.85	11	9.95	11
	1	5.45	55	0.20	44	5.65	55
	2	0.33	81			0.33	81
	3	0.02	110			0.02	110
	4					0.00	
	5	0.01	149			0.01	149
	6	0.00	119			0.00	119
	7	0.00	215			0.00	215
	8+					0.00	
	Total	5.91		10.04		15.96	
	SOP		334.4		113.7		448.1
		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
Total	0	0.10	22	12.62	10	12.73	10
	1	11.83	45	1.10	38	12.93	45
	2	16.08	49	0.13	44	16.22	49
	3	0.16	78	0.001	48	0.16	78
	4	0.00		0.00		0.00	
	5	0.27	186	0.00		0.27	186
	6	0.002	119	0.00		0.00	119
	7	0.01	186	0.00		0.01	186
	8+	0.00	188	0.00		0.00	188
	Total	28.45		13.86		42.31033	
	SOP		1,393.5		175.4		1,569.0

Table 3.2.8 Western Baltic spring spawning herring. Catch in numbers (mill.), mean weight (g.) and SOP (t) by age as W-ringers, quarter and fleet. North Sea Autumn spawners
Division: Skagerrak Year: 2018 Country: All

		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
1	1	0.39	34			0.39	34
	2	8.69	52			8.69	52
	3	0.39	74			0.39	74
	4	0.13	91			0.13	91
	5	0.02	119			0.02	119
	6	0.01	174			0.01	174
	7	0.01	175			0.01	175
	8+					0.00	
	Total	9.63		0.00		9.63	
	SOP		506.2		0.0		506.2
		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
2	1	0.02	34	0.26	23	0.28	23
	2	0.37	52	0.15	42	0.53	49
	3	0.02	74	0.01	48	0.03	65
	4	0.01	91			0.01	91
	5	0.00	119			0.00	119
	6	0.00	174			0.00	174
	7	0.00	175			0.00	175
	8+					0.00	
	Total	0.41		0.42		0.83	
	SOP		21.7		12.7		34.5
		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
3	0			1.25	8	1.25	8
	1	2.26	65	0.22	42	2.48	63
	2	2.82	115	0.00	77	2.82	115
	3	0.52	135			0.52	135
	4	1.58	163			1.58	163
	5	0.71	181			0.71	181
	6	0.17	190			0.17	190
	7	0.11	187			0.11	187
	8+	0.08	202			0.08	202
	Total	8.25		1.48		9.72	
	SOP		995.9		19.6		1,015.5
		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
4	0			0.53	11	0.53	11
	1	3.08	57	0.01	44	3.09	57
	2	0.24	84			0.24	84
	3	0.03	135			0.03	135
	4	0.08	171			0.08	171
	5	0.04	187			0.04	187
	6	0.01	198			0.01	198
	7	0.01	190			0.01	190
	8+	0.00	226			0.00	226
	Total	3.48		0.54		4.03	
	SOP		224.5		6.1		230.6
		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
Total	0	0.00		1.78	9	1.78	9
	1	5.75	59	0.49	32	6.24	56
	2	12.12	67	0.16	43	12.27	67
	3	0.96	109	0.01	48	0.97	109
	4	1.79	158	0.00		1.79	158
	5	0.78	179	0.00		0.78	179
	6	0.18	190	0.00		0.18	190
	7	0.12	187	0.00		0.12	187
	8+	0.09	203	0.00		0.09	203
	Total	21.78		2.44		24.21	
	SOP		1,748.3		38.5		1,786.8

Table 3.2.9 Western Baltic spring spawning herring. Catch in numbers (mill.), mean weight (g.) and SOP (t) by age as W-ringers, quarter and fleet. Baltic Spring spawners
Division: Kattegat Year: 2018 Country: All

		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
1	1	0.31	29	0.00	23	0.31	29
	2	72.86	48	0.07	42	72.93	48
	3	4.55	73	0.00	48	4.55	73
	4	1.07	100			1.07	100
	5	1.07	118			1.07	118
	6	0.13	113			0.13	113
	7					0.00	
	8+	0.27	168			0.27	168
	Total	80.26		0.07		80.33	
	SOP		4,103.1		3.0		4,106.1
		Fleet C		**Fleet D**		**Total**	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
2	1	0.0001	29	0.01	23	0.01	23
	2	0.01	48	0.54	42	0.55	42
	3	0.0009	73	0.03	48	0.03	49
	4	0.0002	100			0.00	100
	5	0.0002	118			0.00	118
	6	0.0000	113			0.00	113
	7					0.00	
	8+	0.0001	168			0.00	168
	Total	0.016		0.58		0.59	
	SOP		0.8		24.2		25.0
		Fleet C		**Fleet D**		**Total**	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
3	0			0.04	8	0.04	8
	1	1.33	59	0.56	42	1.89	54
	2	2.37	68	0.03	77	2.39	68
	3	0.36	82			0.36	82
	4	0.44	109			0.44	109
	5	0.43	187			0.43	187
	6	0.38	210			0.38	210
	7	0.11	178			0.11	178
	8+	0.11	188			0.11	188
	Total	5.52		0.62		6.13	
	SOP		515.2		25.4		540.6
		Fleet C		**Fleet D**		**Total**	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
4	0	0.00	22	0.23	11	0.23	11
	1	8.06	55	0.29	44	8.35	55
	2	4.83	81			4.83	81
	3	0.82	110			0.82	110
	4	0.51	124			0.51	124
	5	0.27	149			0.27	149
	6	0.06	119			0.06	119
	7	0.04	215			0.04	215
	8+					0.00	
	Total	14.59		0.52		15.11	
	SOP		1,046.0		15.1		1,061.1
		Fleet C		**Fleet D**		**Total**	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
Total	0	0.00	22	0.26	10	0.26	10
	1	9.69	55	0.86	42	10.56	54
	2	80.08	50	0.63	43	80.71	50
	3	5.72	79	0.03	48	5.75	79
	4	2.02	108	0.00		2.02	108
	5	1.77	139	0.00		1.77	139
	6	0.58	178	0.00		0.58	178
	7	0.14	187	0.00		0.14	187
	8+	0.37	173	0.00		0.37	173
	Total	100.38		1.79		102.17	
	SOP		5,665.1		67.7		5,732.9

Table 3.2.10 Western Baltic spring spawning herring. Catch in numbers (mill.), mean weight (g.) and SOP (t) by age as W-ringers, quarter and fleet. Baltic Spring spawners
Division: Skagerrak Year: 2018 Country: All

		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
1	1	0.39	34			0.39	34
	2	79.94	52			79.94	52
	3	2.34	74			2.34	74
	4	0.91	91			0.91	91
	5	0.50	119			0.50	119
	6	0.12	174			0.12	174
	7	0.12	175			0.12	175
	8+					0.00	
	Total	84.33		0.00		84.33	
	SOP		4,488.9		0		4,488.9
		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
2	1	0.02	34	0.26	23	0.28	23
	2	3.43	52	1.40	42	4.84	49
	3	0.10	74	0.06	48	0.16	65
	4	0.04	91			0.04	91
	5	0.02	119			0.02	119
	6	0.01	174			0.01	174
	7	0.01	175			0.01	175
	8+					0.00	
	Total	3.62		1.72		5.34	
	SOP		192.8		67.5		260.3
		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
3	0			0.02	8	0.02	8
	1	3.39	65	0.33	42	3.73	63
	2	10.98	115	0.01	77	10.99	115
	3	8.00	135			8.00	135
	4	9.48	163			9.48	163
	5	14.87	181			14.87	181
	6	4.17	190			4.17	190
	7	2.64	187			2.64	187
	8+	2.10	202			2.10	202
	Total	55.64		0.36		56.00	
	SOP		8,514.3		14.9		8,529.2
		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
4	0			0.01	11	0.01	11
	1	5.47	57	0.02	44	5.49	57
	2	2.33	84			2.33	84
	3	0.47	135			0.47	135
	4	0.46	171			0.46	171
	5	0.87	187			0.87	187
	6	0.22	198			0.22	198
	7	0.13	190			0.13	190
	8+	0.04	226			0.04	226
	Total	9.99		0.02		10.01	
	SOP		889.9		0.8		890.7
		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
Total	0	0.00		0.02	9	0.02	9
	1	9.27	59	0.61	34	9.88	57
	2	96.69	60	1.42	42	98.10	59
	3	10.91	121	0.06	48	10.97	121
	4	10.90	157	0.00		10.90	157
	5	16.26	179	0.00		16.26	179
	6	4.52	190	0.00		4.52	190
	7	2.90	187	0.00		2.90	187
	8+	2.14	203	0.00		2.14	203
	Total	153.58		2.10		155.68	
	SOP		14,085.8		83.3		14,169.1

Table 3.2.11 Western Baltic spring spawning herring. Catch in numbers (mill.), mean weight (g.) and SOP (t) by age as W-ringers, quarter and fleet. North Sea Autumn spawners
Division: 3.a Year: 2018 Country: All

		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
1	1	5.17	29	0.03	23	5.19	29
	2	23.58	49	0.01	42	23.59	49
	3	0.53	74	0.00	48	0.53	74
	4	0.13	91			0.13	91
	5	0.02	119			0.02	119
	6	0.01	174			0.01	174
	7	0.01	175			0.01	175
	8+					0.00	
	Total	29.43		0.04		29.47	
	SOP		1,362.5		1.1		1,363.7
		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
2	1	0.02	33	0.46	23	0.48	23
	2	0.38	51	0.26	42	0.64	48
	3	0.02	74	0.01	48	0.03	65
	4	0.01	91			0.01	91
	5	0.0010	119			0.0010	119
	6	0.0003	174			0.0003	174
	7	0.0003	175			0.0003	175
	8+					0.00	
	Total	0.42		0.74		1.15	
	SOP		21.9		22.0		43.9
		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
3	0			4.03	8	4.03	8
	1	3.87	62	0.90	42	4.76	58
	2	3.68	104	0.01	77	3.69	104
	3	0.52	135			0.52	135
	4	1.58	163			1.58	163
	5	0.97	183			0.97	183
	6	0.17	190			0.17	190
	7	0.11	187			0.11	187
	8+	0.09	202			0.09	202
	Total	10.98		4.94		15.92	
	SOP		1,198.5		71.0		1,269.5
		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
4	0	0.10	22	10.38	11	10.48	11
	1	8.53	56	0.21	44	8.74	56
	2	0.57	82			0.57	82
	3	0.05	125			0.05	125
	4	0.08	171			0.08	171
	5	0.05	181			0.05	181
	6	0.01	185			0.01	185
	7	0.01	195			0.01	195
	8+	0.002	226			0.002	226
	Total	9.40		10.59		19.98	
	SOP		558.9		119.8		678.7
		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
Total	0	0.10	22	14.41	10	14.51	10
	1	17.58	50	1.59	36	19.17	48
	2	28.20	57	0.29	44	28.49	57
	3	1.12	105	0.01	48	1.13	104
	4	1.79	158	0.00		1.79	158
	5	1.04	181	0.00		1.04	181
	6	0.18	189	0.00		0.18	189
	7	0.12	187	0.00		0.12	187
	8+	0.09	202	0.00		0.09	202
	Total	50.23		16.29		66.52	
	SOP		3,141.8		213.9		3,355.7

Table 3.2.12 Western Baltic spring spawning herring. Catch in numbers (mill.), mean weight (g.) and SOP (t) by age as W-ringers, quarter and fleet. Baltic Spring spawners
Division: 3.a Year: 2017 Country: All

		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
1	1	0.70	31	0.00	23	0.70	31
	2	152.80	50	0.07	42	152.87	50
	3	6.88	74	0.00	48	6.89	74
	4	1.98	96			1.98	96
	5	1.57	118			1.57	118
	6	0.26	142			0.26	142
	7	0.12	175			0.12	175
	8+	0.27	168			0.27	168
	Total	164.58		0.07		164.65	
	SOP		8,592.0		3.0		8,595.0
		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
2	1	0.02	34	0.27	23	0.29	23
	2	3.45	51	1.94	42	5.39	48
	3	0.10	74	0.08	48	0.18	63
	4	0.04	91			0.04	91
	5	0.02	119			0.02	119
	6	0.01	174			0.01	174
	7	0.01	175			0.01	175
	8+	0.00	168			0.00	168
	Total	3.64		2.30		5.93	
	SOP		193.6		91.7		285.3
		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
3	0			0.05	8	0.05	8
	1	4.72	63	0.89	42	5.61	60
	2	13.35	107	0.04	77	13.39	107
	3	8.36	133			8.36	133
	4	9.92	161			9.92	161
	5	15.30	181			15.30	181
	6	4.55	192			4.55	192
	7	2.74	187			2.74	187
	8+	2.20	202			2.20	202
	Total	61.15		0.98		62.13	
	SOP		9,029		40.4		9,069.8
		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
4	0	0.00	22	0.23	11	0.24	11
	1	13.53	56	0.31	44	13.84	56
	2	7.16	82			7.16	82
	3	1.29	119			1.29	119
	4	0.97	146			0.97	146
	5	1.14	178			1.14	178
	6	0.28	181			0.28	181
	7	0.17	196			0.17	196
	8+	0.04	226			0.04	226
	Total	24.58		0.54		25.12	
	SOP		1,935.9		15.9		1,951.8
		Fleet C		Fleet D		Total	
Quarter	W-rings	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
Total	0	**0.00**	**22**	**0.29**	**10**	0.29	10
	1	**18.97**	**57**	**1.47**	**38**	20.44	56
	2	**176.76**	**55**	**2.05**	**43**	178.81	55
	3	**16.63**	**107**	**0.09**	**48**	16.72	106
	4	**12.91**	**149**	**0.00**		12.91	149
	5	**18.03**	**175**	**0.00**		18.03	175
	6	**5.10**	**189**	**0.00**		5.10	189
	7	**3.04**	**187**	**0.00**		3.04	187
	8+	**2.51**	**198**	**0.00**		2.51	198
	Total	253.96		3.89		257.85	
	SOP		**19,750.9**		**151.0**		19,901.9

multifleet assessment input

Table 3.2.13 Western Baltic spring spawning herring. Total catch in numbers (mill) and mean weight (g), SOP (tonnes) of *Western Baltic Spring spawners* in Division 3.a and the North Sea in the years 1993–2018.

Year/	W-rings	0	1	2	3	4	5	6	7	8+	Total
1993	Numbers	161.25	371.50	315.82	219.05	94.08	59.43	40.97	21.71	8.22	1,292.03
	Mean W.	15.1	25.9	81.4	127.5	150.1	171.1	195.9	209.1	239.0	
	SOP	2,435	9,612	25,696	27,936	14,120	10,167	8,027	4,541	1,966	104,498
1994	Numbers	60.62	153.11	261.14	221.64	130.97	77.30	44.40	14.39	8.62	972.19
	Mean W.	20.2	42.6	94.8	122.7	150.3	168.7	194.7	209.9	220.2	
	SOP	1,225	6,524	24,767	27,206	19,686	13,043	8,642	3,022	1,898	106,013
1995	Numbers	50.31	302.51	204.19	97.93	90.86	30.55	21.28	12.01	7.24	816.86
	Mean W.	17.9	41.5	97.8	138.0	163.1	198.5	207.0	228.8	234.3	
	SOP	902	12,551	19,970	13,517	14,823	6,065	4,404	2,747	1,696	76,674
1996	Numbers	166.23	228.05	317.74	75.60	40.41	30.63	12.58	6.73	5.63	883.60
	Mean W.	10.5	27.6	90.1	134.9	164.9	186.6	204.1	208.5	220.2	
	SOP	1,748	6,296	28,618	10,197	6,665	5,714	2,568	1,402	1,241	64,449
1997	Numbers	25.97	73.43	158.71	180.06	30.15	14.15	4.77	1.75	2.31	491.31
	Mean W.	19.2	49.7	76.7	127.2	154.4	175.8	184.4	192.0	208.0	
	SOP	498	3,648	12,176	22,913	4,656	2,489	879	337	480	48,075
1998	Numbers	36.26	175.14	315.15	94.53	54.72	11.19	8.72	2.19	2.09	699.98
	Mean W.	27.8	51.3	71.5	108.8	142.6	171.7	194.4	184.2	230.0	
	SOP	1,009	8,980	22,542	10,287	7,804	1,922	1,695	403	481	55,121
1999	Numbers	41.34	190.29	155.67	122.26	43.16	22.21	4.42	3.02	2.40	584.77
	Mean W.	11.5	51.0	83.6	114.9	121.2	145.2	169.6	123.8	152.3	
	SOP	477	9,698	13,012	14,048	5,232	3,225	749	373	366	47,179
2000	Numbers	114.83	318.22	302.10	99.88	50.85	18.76	8.21	1.35	1.40	915.60
	Mean W.	22.6	31.9	67.4	107.7	140.2	170.0	157.0	185.0	210.1	
	SOP	2,601	10,145	20,357	10,756	7,131	3,189	1,288	249	294	56,010
2001	Numbers	121.68	36.63	208.10	111.08	32.06	19.67	9.84	4.17	2.42	545.65
	Mean W.	9.0	51.2	76.2	108.9	145.3	171.4	188.2	187.2	203.3	
	SOP	1,096	1,875	15,863	12,093	4,657	3,371	1,852	780	492	42,079
2002	Numbers	69.63	577.69	168.26	134.60	53.09	12.05	7.48	2.43	2.02	1,027.26
	Mean W.	10.2	20.4	78.2	117.7	143.8	169.8	191.9	198.2	215.5	
	SOP	709	11,795	13,162	15,848	7,632	2,046	1,435	481	435	53,544
2003	Numbers	52.11	63.02	182.53	65.45	64.37	21.47	6.26	4.35	1.81	461.38
	Mean W.	13.0	37.4	76.5	113.3	132.7	142.2	153.5	169.9	162.2	
	SOP	678	2,355	13,957	7,416	8,540	3,053	961	740	294	37,994
2004	Numbers	25.67	209.34	96.02	93.98	18.24	16.84	4.51	1.51	0.59	466.71
	Mean W.	27.1	43.2	81.9	117.1	145.4	157.4	170.7	184.4	187.1	
	SOP	695	9,047	7,869	11,005	2,652	2,651	769	279	111	35,078
2005	Numbers	95.3	96.9	203.3	75.4	46.9	9.3	11.5	3.5	1.4	543.51
	Mean W.	14.1	54.9	85.6	121.6	148.3	162.7	176.3	178.3	200.6	
	SOP	1,341	5,319	17,415	9,163	6,961	1,519	2,028	618	282	44,645
2006 c	Numbers	7.3	104.1	115.6	114.2	48.9	55.7	11.1	10.3	5.2	472.49
	Mean W.	16.6	36.9	82.9	113.0	142.5	175.2	198.2	209.5	220.0	
	SOP	121	3,847	9,584	12,907	6,972	9,765	2,199	2,159	1,134	48,688
2007	Numbers	1.6	103.9	90.9	36.9	30.8	12.8	9.4	6.2	2.7	295.22
	Mean W.	25.2	65.6	85.0	115.7	138.4	159.2	190.8	178.6	211.9	
	SOP	41	6,816	7,723	4,269	4,265	2,035	1,802	1,114	567	28,632
2008	Numbers	4.9	101.8	71.1	38.9	13.5	15.1	7.7	4.5	1.3	258.80
	Mean W.	19.2	71.5	91.1	114.5	142.2	171.2	181.4	200.0	196.4	98.02
	SOP	94	7,281	6,472	4,456	1,917	2,590	1,402	900	256	25,368
2009	Numbers	14.8	149.6	132.3	45.9	24.4	10.9	7.8	7.7	5.3	398.63
	Mean W.	13.4	52.0	90.3	118.6	167.5	181.4	213.9	228.9	259.5	90.89
	SOP	199	7,783	11,946	5,436	4,094	1,974	1,669	1,757	1,371	36,230
2010	Numbers	9.1	48.6	106.1	45.2	20.8	8.6	5.9	7.2	5.9	257.38
	Mean W.	8.2	59.3	84.7	129.8	165.9	196.2	221.8	234.3	257.2	106.71
	SOP	75	2,878	8,991	5,870	3,445	1,686	1,311	1,696	1,513	27,465
2011	Numbers	6.2	83.1	29.9	21.0	13.4	6.0	3.0	1.0	1.1	164.56
	Mean W.	8.4	33.7	89.0	120.4	140.2	170.2	185.9	216.3	211.8	72.57
	SOP	52	2,797	2,660	2,522	1,878	1,020	554	222	237	11,941
2012	Numbers	1.5	30.5	94.3	20.7	9.5	7.1	4.2	2.2	8.6	178.68
	Mean W.	9.3	47.0	76.1	134.2	165.1	182.0	204.1	222.0	225.6	98.24
	SOP	14	1,434	7,180	2,780	1,570	1,290	858	495	1,931	17,553
2013	Numbers		12.0	51.7	71.4	11.3	4.4	1.4	0.5	1.0	153.62
	Mean W.		59.5	94.2	131.8	162.6	195.0	207.8	247.9	238.1	119.29
	SOP		716	4,872	9,409	1,830	848	290	118	242	18,325
2014	Numbers	25.3	31.5	22.4	24.2	44.6	7.6	4.6	2.3	2.9	165.42
	Mean W.	9.3	52.2	98.5	137.4	178.2	199.2	211.7	225.1	227.0	114.98
	SOP	236	1,647	2,203	3,332	7,942	1,513	964	524	659	19,020
2015	Numbers	3.3	57.8	59.9	21.0	14.1	14.6	4.9	2.7	3.9	182.10
	Mean W.	16.0	31.8	67.9	115.2	152.4	172.8	193.4	198.7	212.9	84.28
	SOP	53	1,838	4,067	2,418	2,150	2,521	939	532	830	15,348
2016	Numbers	23.9	27.2	161.7	43.0	13.3	12.1	13.2	3.6	6.6	304.65
	Mean W.	7.1	40.1	63.8	126.1	160.7	175.1	200.8	212.8	235.0	86.08
	SOP	170	1,091	10,312	5,426	2,142	2,119	2,661	765	1,539	26,224
2017	Numbers	1.4	48.4	42.2	42.8	34.2	10.2	10.9	7.4	2.9	200.41
	Mean W.	30.5	44.1	61.3	113.2	141.8	162.8	171.2	182.9	169.9	98.93
	SOP	44	2,137	2,585	4,848	4,844	1,668	1,863	1,345	493	19,827
2018	Numbers	0.3	20.5	179.1	17.6	15.2	22.3	6.8	3.9	3.1	268.88
	Mean W.	10.3	55.7	55.3	109.3	154.4	179.7	195.0	194.9	206.4	82.07
	SOP	3	1,140	9,902	1,927	2,346	4,007	1,334	761	647	22,066

Data for 1995 to 2001 was revised in 2003.
[c] values have been corrected in 2007.

Table 3.2.14 Western Baltic spring spawning herring. Catch in numbers (mill.), mean weight (g.) and SOP (t) by age as W-ringers, quarter and fleet. Western Baltic Spring spawners. (values from the North Sea, see tables 2.2.1–2.2.5)
Division: 4 + 3.a + 22–24 Year: 2018 Country: All

Quarter	W-rings	Division IV		Division IIIa		Subdivision 22-24		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
1	0							0.00	
	1	0.0000	88.00	0.70	31.46	44.37	12.23	45.07	12.53
	2	0.000	109.50	152.87	49.64	11.62	41.53	164.49	49.06
	3	0.000	125.00	6.89	73.60	22.71	85.65	29.60	82.84
	4	0.001	154.40	1.98	95.94	12.40	111.17	14.38	109.07
	5	0.002	174.10	1.57	117.98	33.45	144.36	35.02	143.18
	6	0.000	190.20	0.26	142.45	9.52	154.74	9.78	154.41
	7			0.12	175.10	4.83	169.42	4.96	169.56
	8+			0.27	167.60	2.61	187.17	2.87	185.35
	Total	0.004		164.65		141.51		306.17	
	SOP		0.6		8,595.0		11,956.7		20,552.3
Quarter	W-rings	Division IV		Division IIIa		Subdivision 22-24		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
2	1	0.014	88.00	0.29	23.29	0.72	20.65	1.03	22.28
	2	0.229	123.00	5.39	48.08	1.34	49.82	6.96	50.88
	3	0.103	149.00	0.18	62.60	4.94	67.02	5.22	68.48
	4	0.431	169.00	0.04	90.75	5.01	85.41	5.48	92.02
	5	0.804	185.00	0.02	118.79	10.30	126.11	11.12	130.36
	6			0.01	173.60	4.79	123.49	4.80	123.54
	7	0.021	208.00	0.01	175.10	3.24	138.71	3.26	139.21
	8+			0.00	167.60	1.62	152.74	1.62	152.74
	Total	1.601		5.93		31.96		39.50	
	SOP		270.6		285.3		3,428.1		3,984.0
Quarter	W-rings	Division IV		Division IIIa		Subdivision 22-24		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
3	0			0.05	8.14	0.10	11.22	0.15	10.15
	1	0.02	104.00	5.61	59.73	0.92	28.68	6.55	55.46
	2	0.10	137.80	13.39	106.64	0.24	60.65	13.73	106.05
	3	0.80	164.40	8.36	132.59	0.31	61.22	9.46	132.95
	4	1.80	186.00	9.92	160.65	0.72	64.61	12.45	158.76
	5	3.46	200.30	15.30	181.28	0.31	160.82	19.07	184.41
	6	1.68	213.40	4.55	191.75	0.45	74.26	6.68	189.33
	7	0.84	224.00	2.74	186.83	0.15	111.97	3.73	192.21
	8+	0.53	238.91	2.20	201.65	0.05	107.20	2.78	207.20
	Total	9.23		62.13		3.24		74.60	
	SOP		1,848.8		9,069.8		212.0		11,130.6
Quarter	W-rings	Division IV		Division IIIa		Subdivision 22-24		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
4	0			0.24	10.78	0.27	17.59	0.51	14.42
	1			13.84	55.85	2.36	49.41	16.20	54.91
	2			7.16	81.72	5.25	74.51	12.41	78.67
	3			1.29	119.04	6.68	108.78	7.97	110.44
	4	0.042	184.00	0.97	146.50	4.93	131.37	5.94	134.21
	5			1.14	177.92	7.22	157.68	8.36	160.44
	6	0.066	213.00	0.28	181.20	1.50	155.80	1.84	161.68
	7			0.17	195.90	0.62	175.93	0.79	180.17
	8+	0.092	237.52	0.04	225.70	0.23	111.35	0.37	156.20
	Total	0.201		25.12		29.08		54.40	
	SOP		43.8		1,951.8		3,395.4		5,391.0
Quarter	W-rings	**Division IV**		Division IIIa		**Subdivision 22-24**		**Total**	
		Numbers	**Mean W.**	Numbers	Mean W.	**Numbers**	**Mean W.**	Numbers	Mean W.
Total	0	**0.00**		0.29	10.31	**0.37**	**15.90**	0.655	13.44
	1	**0.03**	**96.43**	20.44	55.62	**48.38**	**14.48**	68.850	26.73
	2	**0.33**	**127.50**	178.81	55.14	**18.46**	**51.77**	197.598	54.95
	3	**0.90**	**162.63**	16.72	106.47	**34.64**	**87.24**	52.255	94.69
	4	**2.28**	**182.73**	12.91	149.46	**23.06**	**108.43**	38.254	126.70
	5	**4.27**	**197.41**	18.03	175.50	**51.27**	**142.67**	73.574	153.89
	6	**1.74**	**213.38**	5.10	188.67	**16.26**	**143.41**	23.098	158.68
	7	**0.86**	**223.62**	3.04	186.83	**8.84**	**157.66**	12.745	169.08
	8+	**0.62**	**238.70**	2.51	198.42	**4.51**	**170.05**	7.642	184.97
	Total	11.03		257.85		205.79		474.672	
	SOP		**2,163.7**		19,901.9		**18,992.2**		41,057.8

single fleet assessment input
multifleet assessment input

Table 3.2.15 Western Baltic spring spawning herring. Total catch in numbers (mill) of Western Baltic Spring Spawners in Division 3.a + North Sea + Subdivisions 22–24 in the years 1993–2018.

Year	W-rings / Area	0	1	2	3	4	5	6	7	8+	Total
1993	**Div. IV+Div. IIIa**	161.3	371.5	315.8	219.0	94.1	59.4	41.0	21.7	8.2	1130.8
	Subdiv. 22-24	44.9	159.2	180.1	196.1	166.9	151.1	61.8	42.2	16.3	973.7
1994	**Div. IV+Div. IIIa**	60.6	153.1	261.1	221.6	131.0	77.3	44.4	14.4	8.6	911.6
	Subdiv. 22-24	202.6	96.3	103.8	161.0	136.1	90.8	74.0	35.1	24.5	721.6
1995	**Div. IV+Div. IIIa**	50.3	302.5	204.2	97.9	90.9	30.6	21.3	12.0	7.2	816.9
	Subdiv. 22-24	491.0	1,358.2	233.9	128.9	104.0	53.6	38.8	20.9	13.2	1951.5
1996	**Div. IV+Div. IIIa**	166.2	228.1	317.7	75.6	40.4	30.6	12.6	6.7	5.6	883.6
	Subdiv. 22-24	4.9	410.8	82.8	124.1	103.7	99.5	52.7	24.0	19.5	917.1
1997	**Div. IV+Div. IIIa**	26.0	73.4	158.7	180.1	30.2	14.2	4.8	1.8	2.3	491.3
	Subdiv. 22-24	350.8	595.2	130.6	96.9	45.1	29.0	35.1	19.5	21.8	973.2
1998	**Div. IV+Div. IIIa**	36.3	175.1	315.1	94.5	54.7	11.2	8.7	2.2	2.1	700.0
	Subdiv. 22-24	513.5	447.9	115.8	88.3	92.0	34.1	15.0	13.2	12.0	818.4
1999	**Div. IV+Div. IIIa**	41.3	190.3	155.7	122.3	43.2	22.2	4.4	3.0	2.4	584.8
	Subdiv. 22-24	528.3	425.8	178.7	123.9	47.1	33.7	11.1	6.5	3.7	830.5
2000	**Div. IV+Div. IIIa**	114.83	318.22	302.10	99.88	50.85	18.76	8.21	1.35	1.40	915.6
	Subdiv. 22-24	37.7	616.3	194.3	86.7	77.8	53.0	30.1	12.4	9.3	1079.9
2001	**Div. IV+Div. IIIa**	121.7	36.6	208.1	111.1	32.1	19.7	9.8	4.2	2.4	545.6
	Subdiv. 22-24	634.6	486.5	280.7	146.8	76.0	48.7	29.3	14.1	4.3	1721.0
2002	**Div. IV+Div. IIIa**	69.6	577.7	168.3	134.6	53.1	12.0	7.5	2.4	2.0	1027.3
	Subdiv. 22-24	80.6	81.4	113.6	186.7	119.2	45.1	31.1	11.4	6.3	675.4
2003	**Div. IV+Div. IIIa**	52.1	63.0	182.5	64.0	62.2	20.3	5.9	3.8	1.6	455.5
	Subdiv. 22-24	1.4	63.9	82.3	95.8	125.1	82.2	22.9	13.1	7.0	493.6
2004	**Div. IV+Div. IIIa**	25.7	209.3	96.0	94.0	18.2	16.8	4.5	1.5	0.6	466.7
	Subdiv. 22-24	217.9	248.4	101.8	70.8	75.0	74.4	44.5	13.4	10.4	856.5
2005	**Div. IV+Div. IIIa**	95.3	96.9	203.3	75.4	46.9	9.3	11.5	3.5	1.4	543.5
	Subdiv. 22-24	11.6	207.6	115.9	102.5	83.5	51.3	54.2	27.8	11.2	665.5
2006 c	**Div. IV+Div. IIIa**	7.3	104.1	115.6	114.2	48.9	55.7	11.1	10.3	5.2	472.5
	Subdiv. 22-24	0.6	44.8	72.1	119.0	101.7	43.0	31.4	22.1	12.2	446.8
2007	**Div. IV+Div. IIIa**	1.6	103.9	90.9	36.9	30.8	12.8	9.4	6.2	2.7	295.2
	Subdiv. 22-24	19.0	668.5	158.3	169.7	112.8	65.1	24.6	5.9	1.8	1206.8
2008	**Div. IV+Div. IIIa**	4.9	101.8	71.1	38.9	13.5	15.1	7.7	4.5	1.3	258.8
	Subdiv. 22-24	19.0	668.5	158.3	169.7	112.8	65.1	24.6	5.9	1.8	1206.8
2009	**Div. IV+Div. IIIa**	14.8	149.6	132.3	45.9	24.4	10.9	7.8	7.7	5.3	398.6
	Subdiv. 22-24	5.9	31.5	110.7	55.5	45.5	37.2	31.9	13.2	7.2	338.7
2010	**Div. IV+Div. IIIa**	9.1	48.6	106.1	45.2	20.8	8.6	5.9	7.2	5.9	257.4
	Subdiv. 22-24	3.3	26.5	31.3	39.3	28.5	22.4	13.9	8.0	7.5	180.6
2011	**Div. IV+Div. IIIa**	6.2	83.1	29.9	21.0	13.4	6.0	3.0	1.0	1.1	164.6
	Subdiv. 22-24	5.6	15.5	16.4	17.8	35.9	21.6	19.6	11.2	8.2	152.0
2012	**Div. IV+Div. IIIa**	1.5	30.5	94.3	20.7	9.5	7.1	4.2	2.2	8.6	178.7
	Subdiv. 22-24	0.5	46.3	36.5	43.8	37.8	28.4	14.0	9.0	8.4	224.6
2013	**Div. IV+Div. IIIa**		12.0	51.7	71.4	11.3	4.4	1.4	0.5	1.0	153.6
	Subdiv. 22-24	1.0	60.6	37.1	43.3	55.9	28.7	25.3	11.5	11.0	274.5
2014	**Div. IV+Div. IIIa**	25.3	31.5	22.4	24.2	44.6	7.6	4.6	2.3	2.9	165.4
	Subdiv. 22-24	5.8	35.3	37.7	42.1	37.5	19.0	11.2	6.5	6.2	201.4
2015	**Div. IV+Div. IIIa**	3.3	57.8	59.9	21.0	14.1	14.6	4.9	2.7	3.9	182.1
	Subdiv. 22-24	26.7	46.2	72.8	38.5	48.4	29.8	14.9	7.9	9.1	294.3
2016	**Div. IV+Div. IIIa**	23.9	27.2	161.7	43.0	13.3	12.1	13.2	3.6	6.6	304.6
	Subdiv. 22-24	20.0	22.3	37.2	93.9	45.7	30.5	17.4	10.5	8.3	285.8
2017	**Div. IV+Div. IIIa**	1.4	48.4	42.2	42.8	34.2	10.2	10.9	7.4	2.9	200.4
	Subdiv. 22-24	0.1	9.4	32.8	38.5	78.3	38.5	26.9	13.5	10.2	248.3
2018	**Div. IV+Div. IIIa**	0.3	20.5	179.1	17.6	15.2	22.3	6.8	3.9	3.1	268.9
	Subdiv. 22-24	0.4	48.4	18.5	34.6	23.1	51.3	16.3	8.8	4.5	205.8

Data for 1995–2001 for the North Sea and Division 3.a was revised in 2003.

[C] values have been corrected in 2007.

Table 3.2.16 Western Baltic spring spawning herring. Mean weight (g) and SOP (t) of *Western Baltic Spring Spawners* in Division 3.a + North Sea + Subdivisions 22–24 in the years 1993–2018.

Year	W-rings / Area	0	1	2	3	4	5	6	7	8+	SOP
1993	**Div. IV+Div. IIIa**	15.1	25.9	81.4	127.5	150.1	171.1	195.9	209.1	239.0	104,498
	Subdiv. 22-24	16.2	24.5	44.5	73.6	94.1	122.4	149.4	168.5	178.7	80,512
1994	**Div. IV+Div. IIIa**	20.2	42.6	94.8	122.7	150.3	168.7	194.7	209.9	220.2	106,013
	Subdiv. 22-24	12.9	28.2	54.2	76.4	95.0	117.7	133.6	154.3	173.9	66,425
1995	**Div. IV+Div. IIIa**	17.9	41.5	97.8	138.0	163.1	198.5	207.0	228.8	234.3	76,674
	Subdiv. 22-24	9.3	16.3	42.8	68.3	88.9	125.4	150.4	193.3	207.4	74,157
1996	**Div. IV+Div. IIIa**	10.5	27.6	90.1	134.9	164.9	186.6	204.1	208.5	220.2	64,449
	Subdiv. 22-24	12.1	22.9	45.8	74.0	92.1	116.3	120.8	139.0	182.5	56,817
1997	**Div. IV+Div. IIIa**	19.2	49.7	76.7	127.2	154.4	175.8	184.4	192.0	208.0	48,075
	Subdiv. 22-24	30.4	24.7	58.4	101.0	120.7	155.2	181.3	197.1	208.8	67,513
1998	**Div. IV+Div. IIIa**	27.8	51.3	71.5	108.8	142.6	171.7	194.4	184.2	230.0	55,121
	Subdiv. 22-24	13.3	26.3	52.2	78.6	103.0	125.2	150.0	162.1	179.5	51,911
1999	**Div. IV+Div. IIIa**	11.5	51.0	83.6	114.9	121.2	145.2	169.6	123.8	152.3	47,179
	Subdiv. 22-24	11.1	26.9	50.4	81.6	112.0	148.4	151.4	167.8	161.0	50,060
2000	**Div. IV+Div. IIIa**	22.6	31.9	67.4	107.7	140.2	170.0	157.0	185.0	210.1	56,010
	Subdiv. 22-24	16.5	22.2	42.8	80.4	123.5	133.2	143.4	155.4	151.4	53,904
2001	**Div. IV+Div. IIIa**	9.0	51.2	76.2	108.9	145.3	171.4	188.2	187.2	203.3	42,079
	Subdiv. 22-24	12.9	22.3	46.8	69.0	93.5	150.8	145.1	146.3	153.1	63,724
2002	**Div. IV+Div. IIIa**	10.2	20.4	78.2	117.7	143.8	169.8	191.9	198.2	215.5	53,544
	Subdiv. 22-24	10.8	27.3	57.8	81.7	108.8	132.1	186.6	177.8	157.7	52,647
2003	**Div. IV+Div. IIIa**	13.0	37.4	76.5	112.7	132.1	140.8	151.9	167.4	158.2	37,075
	Subdiv. 22-24	22.4	25.8	46.4	75.3	95.2	117.2	125.9	157.1	162.6	40,315
2004	**Div. IV+Div. IIIa**	27.1	43.2	81.9	117.1	145.4	157.4	170.7	184.4	187.1	35,078
	Subdiv. 22-24	3.7	14.3	47.4	77.7	96.4	125.5	150.4	165.8	151.0	41,736
2005	**Div. IV+Div. IIIa**	14.1	54.9	85.6	121.6	148.3	162.7	176.3	178.3	200.6	50,765
	Subdiv. 22-24	13.6	14.2	48.3	73.3	89.3	115.5	143.6	159.9	170.2	37,013
2006 c	**Div. IV+Div. IIIa**	16.6	36.9	82.9	113.0	142.5	175.2	198.2	209.5	220.0	25,965
	Subdiv. 22-24	21.2	34.0	56.7	84.0	102.2	125.3	143.9	175.8	170.0	70,911
2007	**Div. IV+Div. IIIa**	25.2	65.6	85.0	115.7	138.4	159.2	190.8	178.6	211.9	28,632
	Subdiv. 22-24	11.9	27.8	57.3	74.9	106.3	121.3	140.8	162.7	185.5	39,548
2008	**Div. IV+Div. IIIa**	19.2	71.5	91.1	114.5	142.2	171.2	181.4	200.0	196.4	25,368
	Subdiv. 22-24	16.3	49.5	65.2	88.1	110.5	133.2	140.3	156.7	172.2	43,116
2009	**Div. IV+Div. IIIa**	13.4	52.0	90.3	118.6	167.5	181.4	213.9	228.9	259.5	36,230
	Subdiv. 22-24	10.5	28.3	48.1	90.5	123.7	145.2	160.4	171.2	181.8	31,032
2010	**Div. IV+Div. IIIa**	8.2	59.3	84.7	129.8	165.9	196.2	221.8	234.3	257.2	27,465
	Subdiv. 22-24	12.2	22.2	52.2	87.1	119.8	154.8	170.6	191.9	194.1	17,917
2011	**Div. IV+Div. IIIa**	8.4	33.7	89.0	120.4	140.2	170.2	185.9	216.3	211.8	11,941
	Subdiv. 22-24	12.4	23.0	55.1	78.1	113.2	136.6	147.6	161.2	168.0	15,830
2012	**Div. IV+Div. IIIa**	9.3	47.0	76.1	134.2	165.1	182.0	204.1	222.0	225.6	17,553
	Subdiv. 22-24	18.1	15.9	55.0	95.4	115.1	150.3	167.6	177.4	191.2	21,095
2013	**Div. IV+Div. IIIa**		59.5	94.2	131.8	162.6	195.0	207.8	247.9	238.1	18,325
	Subdiv. 22-24	13.7	17.8	54.1	86.8	129.4	136.9	145.3	159.1	179.8	25,504
2014	**Div. IV+Div. IIIa**	9.3	52.2	98.5	137.4	178.2	199.2	211.7	225.1	227.0	19,020
	Subdiv. 22-24	16.5	30.0	59.0	82.3	122.1	158.4	156.0	163.0	175.5	18,338
2015	**Div. IV+Div. IIIa**	16.0	31.8	67.9	115.2	152.4	172.8	193.4	198.7	212.9	15,348
	Subdiv. 22-24	7.1	15.9	50.4	79.3	107.6	144.7	170.6	135.6	149.4	22,144
2016	**Div. IV+Div. IIIa**	7.1	40.1	63.8	126.1	160.7	175.1	200.8	212.8	235.0	26,224
	Subdiv. 22-24	10.3	34.1	51.7	84.6	95.0	129.5	160.4	168.1	169.2	25,073
2017	**Div. IV+Div. IIIa**	30.5	44.1	61.3	113.2	141.8	162.8	171.2	182.9	169.9	19,827
	Subdiv. 22-24	18.1	34.3	57.7	82.8	117.9	123.5	137.6	147.5	139.8	26,513
2018	**Div. IV+Div. IIIa**	10.3	55.7	55.3	109.3	154.4	179.7	195.0	194.9	206.4	22,066
	Subdiv. 22-24	15.9	14.5	51.8	87.2	108.4	142.7	143.4	157.7	170.1	18,992

Data for 1995–2001 for the North Sea and Division 3.a was revised in 2003.

[c] values have been corrected in 2007.

Table 3.2.17 Western Baltic spring spawning herring. Transfers of *North Sea autumn spawners* from Div. 3.a to the North Sea. Numbers (millions) and mean weight (g), SOP (tonnes) in 1993–2018.

Year	W-Rings	0	1	2	3	4	5	6	7	8+	Total
1993	**Number**	2,795.4	2,032.5	237.6	26.5	7.7	3.6	2.7	2.2	0.7	5,109.0
	Mean W.	12.5	28.6	79.7	141.4	132.3	233.4	238.5	180.6	203.1	
	SOP	34,903	58,107	18,939	3,749	1,016	850	647	390	133	118,734
1994	**Number**	481.6	1,086.5	201.4	26.9	6.0	2.9	1.6	0.4	0.2	1,807.5
	Mean W.	16.0	42.9	83.4	110.7	138.3	158.6	184.6	199.1	213.9	
	SOP	7,723	46,630	16,790	2,980	831	460	287	75	37	75,811
1995	**Number**	1,144.5	1,189.2	161.5	13.3	3.5	1.1	0.6	0.4	0.3	2,514.4
	Mean W.	11.2	39.1	88.3	145.7	165.5	204.5	212.2	236.4	244.3	
	SOP	12,837	46,555	14,267	1,940	573	225	133	86	65	76,680
1996	**Number**	516.1	961.1	161.4	17.0	3.4	1.6	0.7	0.4	0.3	1,661.9
	Mean W.	11.0	23.4	80.2	126.6	165.0	186.5	216.1	216.3	239.1	
	SOP	5,697	22,448	12,947	2,151	565	307	145	77	66	44,403
1997	**Number**	67.6	305.3	131.7	21.2	1.7	0.8	0.2	0.1	0.1	528.7
	Mean W.	19.3	47.7	68.5	124.4	171.5	184.7	188.7	188.7	192.4	
	SOP	1,304	14,571	9,025	2,643	285	146	40	16	25	28,057
1998	**Number**	51.3	745.1	161.5	26.6	19.2	3.0	3.1	1.2	0.5	1,011.6
	Mean W.	27.4	56.4	79.8	117.8	162.9	179.7	197.2	178.9	226.3	
	SOP	1,409	41,994	12,896	3,137	3,136	547	608	211	108	64,045
1999	**Number**	598.8	303.0	148.6	47.2	13.4	6.2	1.2	0.5	0.5	1,119.4
	Mean W.	10.4	50.5	87.7	113.7	137.4	156.5	188.1	187.3	198.8	
	SOP	6,255	15,297	13,037	5,369	1,841	974	230	90	92	43,186
2000	**Number**	235.3	984.3	116.0	21.9	22.9	7.5	3.3	0.6	0.1	1,391.8
	Mean W.	21.3	28.5	76.1	108.8	163.1	190.3	183.9	189.4	200.2	
	SOP	5,005	28,012	8,825	2,377	3,731	1,436	601	114	13	50,115
2001	**Number**	807.8	563.6	150.0	17.2	1.4	0.3	0.5	0.0	0.0	1,540.8
	Mean W.	8.7	49.4	75.3	108.2	130.1	147.1	219.1	175.8	198.1	
	SOP	7,029	27,849	11,300	1,856	177	43	109	8	5	48,376
2002	**Number**	478.5	362.6	56.7	5.6	0.7	0.2	0.1	0.0	0.0	904.5
	Mean W.	12.2	38.0	100.6	121.5	142.7	160.9	178.7	177.4	218.6	
	SOP	5,859	13,790	5,705	684	106	26	21	8	5	26,205
2003	**Number**	21.6	445.0	182.3	13.0	16.2	1.8	1.1	1.2	0.2	682.4
	Mean W.	20.5	33.7	67.0	123.2	150.3	163.5	190.2	214.6	186.8	
	SOP	442	14,992	12,219	1,606	2,436	293	213	264	33	32,498
2004	**Number**	88.4	70.9	179.9	20.7	6.0	9.7	1.8	2.0	0.9	380.4
	Mean W.	22.5	55.3	70.2	120.6	140.9	151.7	170.6	186.6	178.5	
	SOP	1,993	3,921	12,638	2,498	851	1,479	312	367	154	24,214
2005	**Number**	96.4	307.5	159.2	16.2	5.4	2.4	2.3	0.5	0.2	589.9
	Mean W.	16.5	50.5	71.0	105.9	154.6	173.5	184.5	200.2	208.9	
	SOP	1,595	15,527	11,304	1,712	828	412	420	95	34	31,927
2006	**Number**	35.1	150.1	50.2	10.2	3.3	3.3	0.6	0.4	0.2	253.3
	Mean W.	14.3	53.5	79.2	117.6	140.2	185.5	190.4	215.6	206.9	
	SOP	503	8,035	3,975	1,200	456	620	107	81	37	15,015
2007	**Number**	67.7	189.3	76.9	2.1	0.4	1.4	0.3	0.6	0.0	338.7
	Mean W.	26.7	62.6	71.1	108.1	124.4	151.7	183.7	174.7	153.8	
	SOP	1,807	11,857	5,464	224	55	219	48	110	3	19,788
2008	**Number**	85.7	86.6	72.0	1.9	0.3	0.1	0.1	0.3	0.1	247.0
	Mean W.	16.2	57.6	86.4	109.1	138.7	167.7	175.4	203.1	197.7	
	SOP	1,386	4,986	6,222	205	35	25	10	67	13	12,949
2009	**Number**	116.8	77.5	7.0	0.4	0.2	0.0	0.0	0.0	0.1	202.0
	Mean W.	9.4	59.8	101.0	81.3	206.4	0.0	0.0	0.0	268.5	
	SOP	1,095	4,635	710	29	46	0	0	0	28	6,542
2010	**Number**	48.6	197.0	43.3	0.3	0.1	0.1	0.0	0.1	0.0	289.6
	Mean W.	7.5	50.6	76.8	122.3	149.3	191.3	221.5	216.3	204.5	
	SOP	364	9,975	3,325	35	22	19	4	13	3	13,759
2011	**Number**	203.8	35.4	61.5	3.2	0.3	0.2	0.1	0.1	0.0	304.6
	Mean W.	7.5	35.1	83.6	113.3	133.9	191.5	193.2	234.3	248.3	
	SOP	1,524	1,244	5,137	364	37	33	23	22	5	8,388
2012	**Number**	145.83	174.74	43.05	1.85	1.14	0.19	0.20	0.11	0.03	367.1
	Mean W.	12.29	39.70	66.75	123.69	169.16	174.56	199.39	219.78	215.93	
	SOP	1,792	6,937	2,873	229	193	33	39	24	6	12,128
2013	**Number**	0.90	86.19	85.82	2.39	0.36	0.28				175.9
	Mean W.	33.66	75.39	74.64	133.88	160.14	200.37				
	SOP	30	6,498	6,405	320	57	56				13,367
2014	**Number**	284.74	61.13	80.21	5.90	0.54	0.50	0.17	0.03	0.06	433.3
	Mean W.	8.98	56.96	73.62	108.56	162.38	190.94	209.02	221.12	227.82	
	SOP	2,557	3,482	5,905	641	88	95	36	6	13	12,823
2015	**Number**	30.71	169.58	97.57	6.96	1.25	4.89	1.11	1.20	0.35	313.6
	Mean W.	15.79	29.72	68.01	132.87	157.09	179.85	195.87	197.22	214.93	
	SOP	485	5,040	6,636	925	197	880	218	238	75	14,692
2016	**Number**	133.30	23.33	47.56	5.95	0.53	0.30	0.22	0.03	0.06	211.3
	Mean W.	6.74	37.42	59.01	123.13	149.08	156.65	207.97	209.50	234.59	
	SOP	899	873	2,807	733	79	47	46	7	15	5,506
2017	**Number**	0.15	75.99	34.43	6.91	2.97	1.20	0.07	0.05	0.03	121.8
	Mean W.	30.81	48.55	67.62	102.48	138.67	172.88	170.96	184.78	161.99	
	SOP	5	3,690	2,328	709	412	208	12	8	5	7,375
2018	**Number**	14.51	19.17	28.49	1.13	1.79	1.04	0.18	0.12	0.09	66.5
	Mean W.	10.05	48.67	57.48	102.82	155.48	179.69	189.49	186.69	202.12	
	SOP	146	933	1,638	116	279	187	35	22	17	3,372

Corrections for the years 1991–1998 was made in HAWG 2001, but are NOT included in the North Sea assessment.

Table 3.3.1 Western Baltic spring spawning herring. German acoustic survey (GERAS) on the Spring Spawning Herring in Subdivisions 21 (Southern Kattegat, 41G0–42G2) – 24 in autumn 1993–2018 (September/October).

Year	1993	1994	1995	1996	1997	1998	1999	2000	* 2001	** 2002	2003	2004	*** 2005
W-rings/Numbers in millions													
0	893.140	5,474.540	5,107.780	1,833.130	2,859.220	2,490.090	5,993.820	1,008.910	2,477.972	4,102.595	3,776.780	2,554.680	3,055.595
1	491.880	415.730	1,675.340	1,439.460	1,955.400	801.350	1,338.710	1,429.880	1,125.716	837.557	1,238.480	968.860	750.199
2	436.550	883.810	328.610	590.010	738.180	678.530	287.240	453.980	1,226.932	421.396	222.530	592.360	590.756
3	529.670	559.720	357.960	434.090	394.530	394.070	232.510	328.960	844.088	575.358	217.270	346.230	295.659
4	403.400	443.730	353.850	295.170	162.430	236.830	155.950	201.590	366.841	341.120	260.350	163.150	142.778
5	125.140	189.420	253.510	305.550	118.910	100.190	51.940	78.930	131.430	63.678	96.960	143.320	78.541
6	55.290	60.400	126.760	119.260	99.290	50.980	8.130	38.610	85.690	24.520	38.040	79.030	79.018
7	28.030	23.510	46.430	46.980	33.280	23.640	1.470	5.920	19.471	9.690	8.580	22.600	25.564
8+	12.940	2.330	27.240	18.910	47.850	9.330	2.100	4.190	9.683	13.380	9.890	11.770	15.013
Total	2,976.040	8,053.190	8,277.480	5,082.560	6,409.090	4,785.010	8,071.870	3,550.970	6,287.823	6,389.293	5,868.880	4,882.000	5,033.123
3+ group	1,154.470	1,279.110	1,165.750	1,219.960	856.290	815.040	452.100	658.200	1,457.203	1,027.746	631.090	766.100	636.573
W-rings/Biomass ('000 tonnnes)													
0	12.765	66.889	58.540	16.564	28.497	23.760	71.814	13.784	31.163	38.209	33.928	23.074	32.794
1	19.520	14.466	58.620	46.643	76.396	39.899	51.117	57.530	48.177	34.165	44.791	35.885	29.790
2	21.696	40.972	20.939	29.127	43.461	50.085	22.016	28.431	75.879	29.957	16.089	34.542	46.478
3	33.838	40.749	30.091	31.035	35.942	35.280	27.484	27.740	77.137	56.769	22.008	27.726	31.876
4	25.674	43.038	40.104	21.174	22.291	28.049	16.664	24.065	37.936	40.360	34.167	18.364	20.414
5	12.695	24.198	27.268	37.141	16.743	11.430	6.768	9.259	18.458	9.029	14.561	17.348	12.772
6	7.058	12.313	14.915	16.056	13.998	6.157	0.867	5.620	13.267	3.497	5.715	12.225	13.820
7	2.269	5.294	9.269	6.101	5.333	3.716	0.350	1.210	3.866	1.075	1.343	3.413	5.111
8+	1.781	0.627	6.570	2.930	10.636	2.170	0.458	0.757	2.101	1.908	1.615	1.991	3.447
Total	137.296	248.545	266.316	206.771	253.297	200.547	197.537	168.395	307.984	214.967	174.218	174.568	196.503
3+ group	83.315	126.218	128.217	114.438	104.943	86.802	52.590	68.651	152.765	112.637	79.410	81.067	87.441
W-rings/Mean weight (g)													
0	14.3	12.2	11.5	9.0	10.0	9.5	12.0	13.7	12.6	9.3	9.0	9.0	10.7
1	39.7	34.8	35.0	32.4	39.1	49.8	38.2	40.2	42.8	40.8	36.2	37.0	39.7
2	49.7	46.4	63.7	49.4	58.9	73.8	76.6	62.6	61.8	71.1	72.3	58.3	78.7
3	63.9	72.8	84.1	71.5	91.1	89.5	118.2	84.3	91.4	98.7	101.3	80.1	107.8
4	63.6	97.0	113.3	71.7	137.2	118.4	106.9	119.4	103.4	118.3	131.2	112.6	143.0
5	101.4	127.7	107.6	121.6	140.8	114.1	130.3	117.3	140.4	141.8	150.2	121.0	162.6
6	127.7	203.9	117.7	134.6	141.0	120.8	106.6	145.5	154.8	142.6	150.2	154.7	174.9
7	81.0	225.2	199.6	129.9	160.2	157.2	237.9	204.5	198.6	110.9	156.6	151.0	199.9
8+	137.7	269.1	241.2	154.9	222.3	232.6	217.9	180.7	217.0	142.6	163.3	169.2	229.6
Total	46.1	30.9	32.2	40.7	39.5	41.9	24.5	47.4	49.0	33.6	29.7	35.8	39.0

Year	*** 2006	*** 2007	*** 2008	*** 2009	*** 2010	*** 2011	*** 2012	*** 2013	*** 2014	**** 2015	***** 2016	*** 2017	*** 2018
W-rings/Numbers in millions													
0	4,159.311	2,588.922	2,150.306	2,821.022	4,561.405	2,929.434	4,103.180	8,996.225	5,473.400	888.081	2,638.277	1,290.650	2,635.830
1	940.892	558.851	392.737	270.959	534.633	1,206.762	755.034	893.837	769.320	440.738	493.366	463.940	428.530
2	226.959	260.402	165.347	95.866	305.540	360.354	294.242	456.204	242.590	509.769	155.417	145.360	89.280
3	279.618	117.412	166.301	43.553	214.539	210.455	193.974	307.567	279.650	221.344	196.061	123.230	41.160
4	212.201	76.782	102.018	17.761	107.364	115.984	124.548	262.908	332.660	129.795	60.953	137.500	20.240
5	139.813	43.919	82.174	9.016	85.635	57.840	70.135	87.114	317.240	95.579	30.490	46.550	17.570
6	97.261	12.144	29.727	3.227	47.140	50.844	45.017	32.684	211.600	86.150	14.980	21.230	4.940
7	66.937	9.262	11.443	1.947	25.021	29.234	22.520	22.565	85.630	47.093	3.300	2.130	1.060
8+	27.789	8.839	9.262	1.704	15.309	14.774	21.404	11.300	56.590	37.886	0.000	1.790	1.100
Total	6,150.781	3,676.532	3,109.314	3,265.055	5,896.586	4,975.682	5,630.054	11,070.405	7,768.680	2,456.435	3,592.844	2,232.380	3,239.710
3+ group	823.619	268.357	400.924	77.208	495.007	479.131	477.597	724.139	1,283.370	617.846	305.784	332.430	86.070
W-rings/Biomass ('000 tonnnes)													
0	42.958	25.202	23.699	29.449	36.791	35.064	46.955	85.185	61.640	8.179	24.072	13.623	32.010
1	38.230	22.782	17.602	10.473	21.336	46.384	29.825	38.404	30.369	16.822	18.553	18.296	18.825
2	18.013	20.202	10.446	7.069	24.593	29.560	20.380	30.587	21.490	38.573	10.579	10.159	5.797
3	31.946	11.366	15.297	4.433	23.540	24.382	22.068	27.349	32.448	22.841	18.068	11.511	3.323
4	31.253	9.679	11.077	1.961	15.193	16.361	18.653	27.350	58.819	15.196	5.859	17.427	1.785
5	24.876	6.724	11.584	1.385	15.433	9.867	11.450	10.934	63.755	14.581	3.417	6.711	2.239
6	17.959	2.001	4.823	0.616	9.018	8.391	7.985	4.849	45.705	14.304	1.723	3.175	0.719
7	13.431	1.703	1.756	0.384	4.728	5.295	4.448	3.751	18.709	8.433	0.450	0.257	0.182
8+	6.344	1.798	1.303	0.284	3.013	3.015	3.876	1.821	13.498	7.108	0.000	0.190	0.203
Total	225.010	101.456	97.588	56.055	153.646	178.320	165.640	230.231	346.433	146.035	82.722	81.349	65.083
3+ group	125.809	33.270	45.840	9.064	70.926	67.312	68.480	76.055	232.933	82.462	29.518	39.271	8.451
W-rings/Mean weight (g)													
0	10.3	9.7	11.0	10.4	8.1	12.0	11.4	9.5	11.3	9.2	9.1	10.6	12.1
1	40.6	40.8	44.8	38.7	39.9	38.4	39.5	43.0	39.5	38.2	37.6	39.4	43.9
2	79.4	77.6	63.2	73.7	80.5	82.0	69.3	67.0	88.6	75.7	68.1	69.9	64.9
3	114.2	96.8	92.0	101.8	109.7	115.9	113.8	88.9	116.0	103.2	92.2	93.4	80.7
4	147.3	126.1	108.6	110.4	141.5	141.1	149.8	104.0	176.8	117.1	96.1	126.7	88.2
5	177.9	153.1	141.0	153.6	180.2	170.6	163.3	125.5	201.0	152.5	112.1	144.2	127.4
6	184.6	164.8	162.2	190.9	191.3	165.0	177.4	148.4	216.0	166.0	115.0	149.5	145.6
7	200.6	183.8	153.5	197.4	189.0	181.1	197.5	166.2	218.5	179.1	136.4	120.5	172.0
8+	228.3	203.4	140.7	166.9	196.8	204.1	181.1	161.1	238.5	187.6	-	106.4	184.2
Total	36.6	27.6	31.4	17.2	26.1	35.8	29.4	20.8	44.6	59.5	23.0	36.4	20.1

small revision in 2015

small revision in 2017

(<0.5 %)

small revision in 2018

* incl. mean for Sub-division 23, which was not covered by RV SOLEA

** incl. mean for Sub-division 21, which was not covered by RV SOLEA

***** excl. Central Baltic Herring in SD 24 (SD 23) based on SF (Gröhsler et al. 2013)**

****** excl. Central Baltic Herring in SD 22, SD 24 (SD 23) based on SF & excl. mature herring in SD 23 (stages>=6)**

******* excl. Central Baltic Herring in SD 22, SD 24 (SD 23) based on SF**

Table 3.3.2 Western Baltic spring spawning herring. Acoustic surveys (HERAS) on the Western Baltic Spring Spawning Herring in the North Sea/Division 3.a in 1991–2018 (July).

Year	1991	* 1992	* 1993	* 1994	* 1995	* 1996	1997	1998	** 1999	2000	2001	2002	2003	2004
W-rings/Numbers in millions														
0		3,853	372	964										
1		277	103	5	2,199	1,091	128	138	1,367	1,509	66	3,346	1,833	1,669
2	1,864	2,092	2,768	413	1,887	1,005	715	1,682	1,143	1,891	641	1,577	1,110	930
3	1,927	1,799	1,274	935	1,022	247	787	901	523	674	452	1,393	395	726
4	866	1,593	598	501	1,270	141	166	282	135	364	153	524	323	307
5	350	556	434	239	255	119	67	111	28	186	96	88	103	184
6	88	197	154	186	174	37	69	51	3	56	38	40	25	72
7	72	122	63	62	39	20	80	31	2	7	23	18	12	22
8+	10	20	13	34	21	13	77	53	1	10	12	17	5	18
Total	5,177	10,509	5,779	3,339	6,867	2,673	2,088	3,248	3,201	4,696	1,481	7,002	3,807	3,926
3+ group	5,177	4,287	2,536	1,957	2,781	577	1,245	1,428	691	1,295	774	2,079	864	1,328
W-rings/Biomass ('000 tonnes)														
0		34.3	1	8.7										
1		26.8	7	0.4	77.4	52.9	4.7	7.1	74.8	61.4	3.5	137.2	79.0	63.9
2	177.1	169.0	139	33.2	108.9	87.0	52.2	136.1	101.6	138.1	55.8	107.2	91.5	75.6
3	219.7	206.3	112	114.7	102.6	27.6	81.0	84.8	59.5	68.8	51.2	126.9	41.4	89.4
4	116.0	204.7	69	76.7	145.5	17.9	21.5	35.2	14.7	45.3	21.5	55.9	41.7	41.5
5	51.1	83.3	65	41.8	33.9	17.8	9.8	13.1	3.4	25.1	17.9	12.8	13.9	29.3
6	19.0	36.6	26	38.1	27.4	5.8	9.8	6.9	0.5	10.0	6.9	7.4	4.2	11.7
7	13.0	24.4	16	13.1	6.7	3.3	14.9	4.8	0.3	1.4	4.7	3.5	2.0	4.1
8+	2.0	5.0	2	7.8	3.8	2.7	13.6	9.0	0.1	1.3	2.7	3.1	0.9	3.2
Total	597.9	756.1	436.5	325.8	506.2	215.1	207.5	297.0	254.9	351.4	164.2	454.0	274.5	318.8
3+ group	420.9	560.3	291.0	292.3	319.9	75.2	150.6	153.7	78.5	151.9	104.9	209.6	104.0	179.3
W-rings/Mean weight (g)														
0		8.9	4.0	9.0										
1		96.8	66.3	80.0	35.2	48.5	36.9	51.9	54.7	40.7	54.0	41.0	43.1	38.3
2	95.0	80.8	50.1	80.3	57.7	86.6	73.0	80.9	88.9	73.1	87.0	68.0	82.5	81.3
3	114.0	114.7	87.9	122.7	100.4	111.9	103.0	94.1	113.8	102.2	113.2	91.1	104.9	123.2
4	134.0	128.5	116.2	153.0	114.6	126.8	129.6	124.7	109.1	124.4	140.5	106.6	128.8	135.2
5	146.0	149.8	149.9	175.1	132.9	149.4	145.0	118.7	120.0	135.4	185.2	145.8	134.2	159.4
6	216.0	185.7	169.6	205.0	157.2	157.3	143.1	135.8	179.9	179.2	182.6	186.5	165.4	162.9
7	181.0	199.7	256.9	212.0	172.9	166.8	185.6	156.4	179.9	208.8	206.3	198.7	167.2	191.6
8+	200.0	252.0	164.2	230.3	183.1	212.9	178.0	168.0	181.7	135.2	226.9	183.4	170.3	178.0
Total	115.6	123.9	75.8	100.2	73.7	80.5	99.4	91.4	78.5	74.8	110.9	64.8	72.1	81.2

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
W-rings/Numbers in millions														
0				112				1		314	2	203	1	
1	2,687	2,081	3,918	5,852	565	999	2,980	1,018	49	513	1,949	425	696	106
2	1,342	2,217	3,621	1,160	398	511	473	1,081	627	415	1,244	255	424	224
3	464	1,780	933	843	205	254	259	236	525	176	446	381	661	271
4	201	490	499	333	161	115	163	87	53	248	224	99	401	175
5	103	180	154	274	82	65	70	76	30	28	171	40	94	169
6	84	27	34	176	86	24	53	33	12	37	82	40	53	50
7	37	10	26	45	39	28	22	14	8	26	89	12	52	35
8+	21	0.1	14	44	65	34	46	60	15	42	115	28	92	44
Total	**4,939**	**6,786**	**9,199**	**8,839**	**1,601**	**2,030**	**4,066**	**2,606**	**1,319**	**1,799**	**4,322**	**1,483**	**2,474**	**1,074**
3+ group	**910**	**2,487**	**1,660**	**1,715**	**638**	**520**	**613**	**506**	**643**	**557**	**1,127**	**600**	**1,353**	**744**
W-rings/Biomass ('000 tonnes)														
0								0.0		1.0	0.03	1.00	0.00	
1	105.9	112.6	193.2	284.4	26.8	53.0	90.0	44.0	3.0	26.0	61.5	16.0	31.0	4.0
2	100.1	160.5	273.4	100.9	48.8	34.0	47.0	87.0	51.0	48.0	106.2	20.0	41.0	19.0
3	46.6	158.6	90.9	101.8	30.6	28.0	31.0	26.0	59.0	21.0	54.7	51.0	101.0	28.0
4	28.9	56.3	59.6	47.1	29.4	17.0	25.0	12.0	7.0	43.0	33.8	15.0	63.0	25.0
5	16.5	23.7	18.5	45.3	17.5	11.0	12.0	13.0	4.0	6.0	30.3	7.0	16.0	28.0
6	14.9	4.1	4.6	30.9	21.4	5.0	10.0	6.0	2.0	8.0	16.7	8.0	10.0	9.0
7	7.5	1.6	2.6	9.4	10.6	6.0	5.0	3.0	1.0	6.0	17.7	3.0	11.0	7.0
8+	4.9	0.0	1.9	8.7	19.8	8.0	10.0	14.0	3.0	11.0	25.2	6.0	20.0	10.0
Total	325.3	517.5	644.7	628.5	204.9	162.0	230.0	205.0	130.0	169.0	346.0	126.0	293.0	130.0
3+ group	119.3	244.4	178.2	243.2	129.3	75.0	93.0	74.0	76.0	95.0	178.3	90.0	221.0	107.0
W-rings/Mean weight (g)														
0				6.3				3.0		4.3	14.2	4.0	23.0	
1	39.4	54.1	49.3	48.6	47.5	52.7	30.2	42.9	58.1	51.6	31.5	37.0	45.0	42.0
2	74.6	72.4	75.5	87.0	122.7	65.8	98.8	80.4	80.8	114.9	85.4	79.0	97.1	82.9
3	100.5	89.1	97.4	120.8	149.1	111.4	121.2	110.6	111.7	122.4	122.7	134.0	153.4	104.6
4	143.7	114.8	119.5	141.4	182.9	150.9	150.6	142.9	128.5	175.0	150.9	151.0	157.3	145.4
5	160.9	131.6	120.0	165.5	213.3	175.6	168.7	170.8	138.3	210.6	177.1	173.0	173.4	164.9
6	177.7	153.2	136.6	175.6	248.3	198.0	190.8	182.0	157.2	220.2	202.3	194.0	182.0	172.6
7	202.3	169.2	101.5	208.5	272.1	215.9	211.0	194.0	155.5	213.3	198.9	214.0	202.7	187.3
8+	229.2	178.0	138.3	196.7	304.7	234.8	228.5	228.6	198.5	244.1	218.9	215.0	221.2	236.4
Total	65.9	76.3	70.1	71.1	128.0	79.8	56.6	78.5	97.9	94.6	80.1	50.0	118.8	121.3

* revised in 1997

**the survey only covered the Skagerrak area by Norway. Additional estimates for the Kattegat area were added (see ICES 2000/ACFM:10, Table 3.5.8)

Table 3.3.3 Western Baltic spring spawning herring. N20 Larval Abundance Index. Estimation of 0-Group herring reaching 20 mm in length in Greifswalder Bodden and adjacent waters (March/April to June).

Year	N20 (millions)
1992	1,060
1993	3,044
1994	12,515
1995	7,930
1996	21,012
1997	4,872
1998	16,743
1999	20,364
2000	3,026
2001	4,845
2002	11,324
2003	5,507
2004	5,640
2005	3,887
2006	3,774
2007*	1,829
2008*	1,622
2009	6,464
2010	7,037
2011	4,444
2012	1,140
2013	3,021
2014	539
2015	2,478
2016	442
2017	1,247
2018	1563

* small revision during HAWG 2010

Table 3.6.1.a WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet - Fleet A.* Catch in number (CANUM, thousands).

	0	1	2	3	4	5	6	7	8
2000	0	0	8161	9752	10223	5660	2466	605	778
2001	0	454	11344	10224	6123	7151	2664	1556	410
2002	0	0	7589	14825	10583	3349	2877	969	620
2003	0	0	30	3130	5992	3502	1167	1305	605
2004	0	0	15140	27898	3520	4110	1002	456	146
2005	0	0	6569	17434	12680	2573	3787	1084	714
2006	0	129	3514	8783	13962	22370	5102	5258	3055
2007	0	0	74	2627	1253	596	806	377	613
2008	0	0	70	87	167	77	81	182	35
2009	0	0	1017	2075	3375	1423	1733	4471	3144
2010	0	26	32	518	985	389	518	270	1018
2011	0	0	63	442	400	235	69	109	298
2012	0	0	16	214	359	0	1432	0	7395
2013	0	0	53	409	172	494	312	67	645
2014	0	34	2451	3369	5406	802	2116	1045	1573
2015	0	20	95	868	1404	3872	1837	1446	2170
2016	0	20	1209	4109	1033	1137	1182	689	1210
2017	0	2.858	46.79	2368	1013	245.2	90.16	108.3	136.3
2018	0	28.6	329.8	900.6	2277	4270	1744	860.9	623.1

Table 3.6.1.b WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet - Fleet C.* Catch in number (CANUM, thousands).

	0	1	2	3	4	5	6	7	8
2000	59181	209579	294752	99060	55666	20361	7311	978	772
2001	2924	22479	184831	97597	25224	12059	5979	1672	882
2002	1207	108742	133960	118066	40768	8532	4442	1459	1345
2003	4704	27998	155177	57513	54639	16425	4427	2786	1051
2004	6559	78442	56286	42645	9927	7987	2586	671	290
2005	5318	62322	175515	53573	30534	6613	7336	2142	692
2006	2105	41760	91008	86554	29334	26306	4849	4390	1833
2007	230	90083	79527	31939	26596	11189	7371	5701	1931
2008	824	92818	60484	34255	12424	14454	7281	4175	1121
2009	442	91310	119936	41373	20153	9000	5845	3043	1921
2010	230	41741	96890	42943	17084	7087	4177	2768	2739
2011	89	41858	28489	19924	12990	5756	2913	915	822
2012	0	15350	81497	20357	9152	7091	2774	2230	1166
2013	0	6260	40605	68642	10640	3858	1085	409	372
2014	49	23096	16886	18895	39169	6795	2439	1283	1329
2015	115	17357	47337	19590	12579	10401	3016	1232	1727
2016	0	13761	146136	38528	12298	10290	12066	2906	5340
2017	1427	47128	36117	40438	33155	10000	10792	7246	2762
2018	2.36	18967	176762	16634	12912	18031	5096	3041	2511

Table 3.6.1.c WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet - Fleet D.* Catch in number (CANUM, thousands).

	0	1	2	3	4	5	6	7	8
2000	58480	109337	13888	5033	555	156	87	18	10
2001	118759	13695	11926	3256	711	460	1197	938	1130
2002	68427	468952	26715	1707	1742	169	160	0	53
2003	47410	35021	27318	4810	3741	1543	665	263	158
2004	19111	130900	24598	23435	4794	4746	918	387	156
2005	90002	35287	21250	4344	3718	149	377	238	0
2006	1551	47777	17551	14152	3926	5720	652	428	234
2007	1395	13772	11277	2346	2960	997	1270	161	133
2008	4079	8946	10511	4583	888	598	366	141	148
2009	14358	58292	11338	2404	913	457	224	164	219
2010	8879	6826	8183	202	310	83	0	0	0
2011	6080	41200	1317	590	0	0	0	0	0
2012	1521	15193	12792	138	0	0	0	0	0
2013	0	5770	11071	2313	444	0	0	0	0
2014	25267	8397	3039	1979	0	0	0	0	0
2015	3195	40377	12506	526	121	313	0	0	0
2016	23879	13397	14390	391	0	674	0	0	0
2017	0	1294	6017	18.3	0	0	0	0	0
2018	285.3	1471	2047	85.05	0	0	0	0	0

Table 3.6.1.d WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet - Fleet F.* Catch in number (CANUM, thousands).

	0	1	2	3	4	5	6	7	8
2000	37749	616321	194300	86731	77777	52964	30056	12428	9291
2001	634631	498179	283245	147601	75897	47807	28743	13928	4188
2002	80637	81436	113576	186714	119192	45110	31053	11414	6310
2003	1374	63857	82330	95798	125060	82178	22858	13098	7006
2004	217885	248412	101789	70788	74972	74400	44450	13363	10422
2005	11586	207562	115890	102482	83461	51304	54195	27767	11214
2006	650	44762	72070	118995	101731	43005	31364	22110	12157
2007	9095	68189	93857	106993	96054	52215	20752	15017	12082
2008	4707	73668	68438	98131	75655	70738	37572	13260	18475
2009	5934	31481	110715	55478	45495	37211	31948	13230	7244
2010	3285	26490	31314	39307	28455	22420	13894	7958	7505
2011	5643	15458	16413	17831	35934	21639	19649	11212	8214
2012	479	46311	36497	43760	37810	28353	13964	9008	8440
2013	1029	60576	37098	43312	55919	28716	25322	11498	10987
2014	5840	35272	37735	42119	37499	19023	11196	6541	6186
2015	26670	46242	72781	38506	48439	29846	14860	7857	9120
2016	20012	22342	37247	93863	45681	30535	17423	10455	8256
2017	51.79	9435	32839	38541	78328	38496	26936	13463	10170
2018	367.8	48383	18459	34635	23065	51273	16259	8843	4507

Table 3.6.2.a WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet - Fleet A.* Weight at age as W-ringers in the catch (WECA, kg).

	0	1	2	3	4	5	6	7	8
2000	0.0000	0.0000	0.1407	0.1652	0.1839	0.2070	0.2024	0.2176	0.2663
2001	0.0000	0.0790	0.1275	0.1514	0.1784	0.1884	0.1982	0.2208	0.2666
2002	0.0000	0.0000	0.1431	0.1542	0.1652	0.1864	0.1976	0.2075	0.2235
2003	0.0000	0.0000	0.1014	0.1356	0.1414	0.1632	0.1752	0.1846	0.1923
2004	0.0000	0.0000	0.1206	0.1328	0.1639	0.1659	0.1748	0.1843	0.2079
2005	0.0000	0.0000	0.1071	0.1539	0.1676	0.1793	0.1887	0.1864	0.2084
2006	0.0000	0.0247	0.1246	0.1488	0.1641	0.1752	0.2140	0.2243	0.2367
2007	0.0000	0.0000	0.1566	0.1482	0.1565	0.1850	0.1858	0.1993	0.2248
2008	0.0000	0.0000	0.1418	0.1647	0.1657	0.1680	0.1922	0.1994	0.2158
2009	0.0000	0.0000	0.1381	0.1701	0.2111	0.2110	0.2481	0.2484	0.2845
2010	0.0000	0.0678	0.1323	0.1573	0.2003	0.2056	0.2109	0.2190	0.2352
2011	0.0000	0.0000	0.1497	0.1670	0.1828	0.2078	0.2130	0.2106	0.2188
2012	0.0000	0.0000	0.1396	0.1846	0.2053	0.0000	0.2131	0.0000	0.2264
2013	0.0000	0.0000	0.1350	0.1542	0.2143	0.1956	0.2206	0.2433	0.2530
2014	0.0000	0.1036	0.1478	0.1595	0.1666	0.1957	0.1997	0.2116	0.2215
2015	0.0000	0.1147	0.1367	0.1436	0.1624	0.1809	0.2028	0.2040	0.2161
2016	0.0000	0.1218	0.1213	0.1537	0.1742	0.1819	0.2099	0.2198	0.2247
2017	0.0000	0.1013	0.1231	0.1460	0.1660	0.1801	0.2001	0.1973	0.2109
2018	0.0000	0.0964	0.1275	0.1626	0.1827	0.1974	0.2134	0.2236	0.2387

Table 3.6.2.b WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet - Fleet C.* Weight at age as W-ringers in the catch (WECA, kg).

	0	1	2	3	4	5	6	7	8
2000	0.0216	0.0402	0.0685	0.1072	0.1390	0.1600	0.1463	0.1767	0.1554
2001	0.0244	0.0644	0.0744	0.1049	0.1377	0.1623	0.1906	0.1682	0.1987
2002	0.0095	0.0453	0.0856	0.1129	0.1382	0.1633	0.1887	0.1921	0.2132
2003	0.0130	0.0554	0.0808	0.1136	0.1327	0.1407	0.1553	0.1652	0.1473
2004	0.0237	0.0569	0.0736	0.1133	0.1392	0.1546	0.1677	0.1870	0.1774
2005	0.0230	0.0667	0.0863	0.1121	0.1413	0.1565	0.1711	0.1748	0.1926
2006	0.0262	0.0560	0.0842	0.1103	0.1343	0.1744	0.1816	0.1922	0.1962
2007	0.0472	0.0708	0.0881	0.1142	0.1379	0.1587	0.1912	0.1775	0.2078
2008	0.0362	0.0740	0.0925	0.1149	0.1421	0.1712	0.1809	0.1999	0.1967
2009	0.0227	0.0740	0.0902	0.1153	0.1605	0.1772	0.2039	0.2015	0.2247
2010	0.0279	0.0662	0.0880	0.1280	0.1592	0.1942	0.2109	0.2117	0.2257
2011	0.0215	0.0509	0.0910	0.1208	0.1389	0.1687	0.1853	0.2170	0.2093
2012	0.0000	0.0662	0.0818	0.1340	0.1635	0.1820	0.1994	0.2220	0.2206
2013	0.0000	0.0937	0.0994	0.1324	0.1628	0.1949	0.2041	0.2487	0.2123
2014	0.0141	0.0633	0.1046	0.1411	0.1798	0.1996	0.2221	0.2361	0.2336
2015	0.0175	0.0409	0.0747	0.1145	0.1500	0.1706	0.1877	0.1924	0.2089
2016	0.0000	0.0563	0.0659	0.1236	0.1595	0.1807	0.1999	0.2112	0.2374
2017	0.0305	0.0449	0.0673	0.1113	0.1410	0.1624	0.1710	0.1827	0.1679
2018	0.0216	0.0570	0.0553	0.1068	0.1495	0.1755	0.1887	0.1868	0.1984

Table 3.6.2.c WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet - Fleet D.* Weight at age as W-ringers in the catch (WECA, kg).

	0	1	2	3	4	5	6	7	8
2000	0.0236	0.0161	0.0658	0.1304	0.1549	0.1669	0.1937	0.0804	0.1499
2001	0.0086	0.0287	0.0564	0.0940	0.1276	0.1440	0.1540	0.1655	0.1840
2002	0.0102	0.0146	0.0230	0.1363	0.1427	0.1700	0.1797	0.0000	0.1790
2003	0.0130	0.0229	0.0516	0.0951	0.1184	0.1102	0.1043	0.1469	0.1469
2004	0.0282	0.0350	0.0772	0.1053	0.1448	0.1548	0.1746	0.1800	0.1855
2005	0.0135	0.0340	0.0738	0.1093	0.1402	0.1490	0.1531	0.1727	0.0000
2006	0.0142	0.0245	0.0721	0.1123	0.1368	0.1824	0.1961	0.2195	0.2047
2007	0.0215	0.0316	0.0624	0.0997	0.1355	0.1502	0.1915	0.1682	0.2107
2008	0.0158	0.0465	0.0826	0.1102	0.1396	0.1717	0.1884	0.2042	0.1896
2009	0.0132	0.0176	0.0871	0.1296	0.1607	0.1728	0.2103	0.2068	0.2058
2010	0.0077	0.0166	0.0399	0.0940	0.0410	0.1110	0.0000	0.0000	0.0000
2011	0.0082	0.0162	0.0448	0.0711	0.0000	0.0000	0.0000	0.0000	0.0000
2012	0.0093	0.0275	0.0398	0.0852	0.0000	0.0000	0.0000	0.0000	0.0000
2013	0.0000	0.0224	0.0748	0.1114	0.1378	0.0000	0.0000	0.0000	0.0000
2014	0.0093	0.0216	0.0244	0.0643	0.0000	0.0000	0.0000	0.0000	0.0000
2015	0.0159	0.0279	0.0415	0.0971	0.2840	0.1470	0.0000	0.0000	0.0000
2016	0.0071	0.0234	0.0375	0.0805	0.0000	0.0780	0.0000	0.0000	0.0000
2017	0.0000	0.0150	0.0250	0.0750	0.0000	0.0000	0.0000	0.0000	0.0000
2018	0.0102	0.0385	0.0427	0.0480	0.0000	0.0000	0.0000	0.0000	0.0000

Table 3.6.2.d WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet - Fleet F.* Weight at age as W-ringers in the catch (WECA, kg).

	0	1	2	3	4	5	6	7	8
2000	0.0165	0.0222	0.0428	0.0804	0.1235	0.1332	0.1434	0.1554	0.1514
2001	0.0129	0.0221	0.0467	0.0689	0.0933	0.1504	0.1445	0.1455	0.1522
2002	0.0108	0.0273	0.0578	0.0817	0.1088	0.1321	0.1866	0.1778	0.1577
2003	0.0224	0.0258	0.0464	0.0753	0.0952	0.1172	0.1259	0.1571	0.1626
2004	0.0037	0.0143	0.0474	0.0777	0.0964	0.1255	0.1504	0.1658	0.1510
2005	0.0136	0.0142	0.0483	0.0733	0.0893	0.1156	0.1436	0.1599	0.1702
2006	0.0212	0.0340	0.0567	0.0840	0.1022	0.1253	0.1439	0.1758	0.1700
2007	0.0119	0.0278	0.0573	0.0749	0.1063	0.1213	0.1407	0.1627	0.1855
2008	0.0163	0.0369	0.0649	0.0877	0.1103	0.1332	0.1406	0.1583	0.1748
2009	0.0105	0.0283	0.0480	0.0905	0.1238	0.1452	0.1604	0.1712	0.1818
2010	0.0122	0.0222	0.0522	0.0871	0.1198	0.1548	0.1706	0.1919	0.1941
2011	0.0124	0.0230	0.0551	0.0781	0.1132	0.1366	0.1476	0.1612	0.1680
2012	0.0181	0.0159	0.0550	0.0954	0.1151	0.1503	0.1676	0.1774	0.1912
2013	0.0137	0.0178	0.0541	0.0868	0.1294	0.1369	0.1453	0.1591	0.1798
2014	0.0165	0.0300	0.0590	0.0823	0.1221	0.1584	0.1560	0.1630	0.1755
2015	0.0071	0.0159	0.0504	0.0793	0.1076	0.1447	0.1706	0.1356	0.1494
2016	0.0103	0.0341	0.0517	0.0846	0.0950	0.1295	0.1604	0.1681	0.1692
2017	0.0220	0.0342	0.0577	0.0828	0.1179	0.1235	0.1376	0.1475	0.1398
2018	0.0159	0.0145	0.0518	0.0872	0.1084	0.1427	0.1434	0.1577	0.1701

Table 3.6.3 WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* Weight at age as W-ringers in the stock (WEST, kg).

	0	1	2	3	4	5	6	7	8
1991	0.0001	0.0308	0.0528	0.0787	0.1041	0.1245	0.1449	0.1594	0.1640
1992	0.0001	0.0203	0.0451	0.0818	0.1075	0.1313	0.1593	0.1710	0.1869
1993	0.0001	0.0156	0.0402	0.0967	0.1079	0.1409	0.1672	0.1827	0.1891
1994	0.0001	0.0186	0.0529	0.0836	0.1077	0.1392	0.1566	0.1768	0.2028
1995	0.0001	0.0130	0.0459	0.0708	0.1327	0.1674	0.1892	0.2097	0.2338
1996	0.0001	0.0182	0.0546	0.0905	0.1170	0.1197	0.1538	0.1467	0.1280
1997	0.0001	0.0131	0.0515	0.1063	0.1333	0.1662	0.1943	0.2090	0.2264
1998	0.0001	0.0221	0.0558	0.0829	0.1128	0.1338	0.1678	0.1683	0.1843
1999	0.0001	0.0211	0.0567	0.0870	0.1081	0.1480	0.1601	0.1439	0.1504
2000	0.0001	0.0140	0.0431	0.0837	0.1250	0.1436	0.1629	0.1650	0.1831
2001	0.0001	0.0169	0.0509	0.0783	0.1159	0.1690	0.1763	0.1681	0.1805
2002	0.0001	0.0164	0.0637	0.0905	0.1239	0.1736	0.1983	0.1980	0.2036
2003	0.0001	0.0144	0.0445	0.0793	0.1051	0.1268	0.1506	0.1729	0.1847
2004	0.0001	0.0131	0.0456	0.0811	0.1092	0.1440	0.1628	0.1932	0.2076
2005	0.0001	0.0126	0.0514	0.0800	0.1066	0.1322	0.1573	0.1677	0.1820
2006	0.0001	0.0185	0.0621	0.0953	0.1174	0.1659	0.1710	0.1858	0.1871
2007	0.0001	0.0150	0.0550	0.0800	0.1140	0.1430	0.1710	0.1750	0.1880
2008	0.0001	0.0180	0.0680	0.0860	0.1100	0.1390	0.1430	0.1410	0.1580
2009	0.0001	0.0230	0.0520	0.0900	0.1300	0.1560	0.1740	0.1850	0.1990
2010	0.0001	0.0140	0.0626	0.0974	0.1283	0.1618	0.1813	0.2023	0.2045
2011	0.0001	0.0090	0.0580	0.0950	0.1260	0.1560	0.1730	0.1850	0.1920
2012	0.0001	0.0120	0.0500	0.0920	0.1140	0.1580	0.1780	0.1910	0.2010
2013	0.0001	0.0140	0.0560	0.0950	0.1290	0.1430	0.1610	0.1790	0.1990
2014	0.0001	0.0160	0.0520	0.0810	0.1300	0.1650	0.1740	0.1900	0.2050
2015	0.0001	0.0150	0.0490	0.0880	0.1160	0.1570	0.1800	0.1690	0.1940
2016	0.0001	0.0138	0.0415	0.0811	0.1057	0.1366	0.1735	0.1824	0.1903
2017	0.0001	0.0177	0.0479	0.0815	0.1181	0.1324	0.1558	0.1731	0.1751
2018	0.0001	0.0125	0.0491	0.0828	0.1091	0.1432	0.1544	0.1696	0.1853

Table 3.6.4 WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* Natural mortality (NATMOR).

	0	1	2	3	4	5	6	7	8
1991	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
1992	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
1993	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
1994	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
1995	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
1996	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
1997	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
1998	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
1999	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
2000	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
2001	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
2002	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
2003	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
2004	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
2005	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
2006	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
2007	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
2008	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
2009	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
2010	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
2011	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
2012	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
2013	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
2014	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
2015	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
2016	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
2017	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
2018	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2

Table 3.6.5 WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* Proportion mature (MATPROP).

	0	1	2	3	4	5	6	7	8
1991	0	0	0.2	0.75	0.9	1	1	1	1
1992	0	0	0.2	0.75	0.9	1	1	1	1
1993	0	0	0.2	0.75	0.9	1	1	1	1
1994	0	0	0.2	0.75	0.9	1	1	1	1
1995	0	0	0.2	0.75	0.9	1	1	1	1
1996	0	0	0.2	0.75	0.9	1	1	1	1
1997	0	0	0.2	0.75	0.9	1	1	1	1
1998	0	0	0.2	0.75	0.9	1	1	1	1
1999	0	0	0.2	0.75	0.9	1	1	1	1
2000	0	0	0.2	0.75	0.9	1	1	1	1
2001	0	0	0.2	0.75	0.9	1	1	1	1
2002	0	0	0.2	0.75	0.9	1	1	1	1
2003	0	0	0.2	0.75	0.9	1	1	1	1
2004	0	0	0.2	0.75	0.9	1	1	1	1
2005	0	0	0.2	0.75	0.9	1	1	1	1
2006	0	0	0.2	0.75	0.9	1	1	1	1
2007	0	0	0.2	0.75	0.9	1	1	1	1
2008	0	0	0.2	0.75	0.9	1	1	1	1
2009	0	0	0.2	0.75	0.9	1	1	1	1
2010	0	0	0.2	0.75	0.9	1	1	1	1
2011	0	0	0.2	0.75	0.9	1	1	1	1
2012	0	0	0.2	0.75	0.9	1	1	1	1
2013	0	0	0.2	0.75	0.9	1	1	1	1
2014	0	0	0.2	0.75	0.9	1	1	1	1
2015	0	0	0.2	0.75	0.9	1	1	1	1
2016	0	0	0.2	0.75	0.9	1	1	1	1
2017	0	0	0.2	0.75	0.9	1	1	1	1
2018	0	0	0.2	0.75	0.9	1	1	1	1

Table 3.6.6 WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* Fraction of harvest before spawning (FPROP).

	0	1	2	3	4	5	6	7	8
1991	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1992	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1993	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1994	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1995	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1996	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1997	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1998	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1999	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2000	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2001	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2002	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2003	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2004	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2005	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2006	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2007	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2008	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2009	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2010	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2011	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2012	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2013	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2014	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2015	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2016	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2017	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2018	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Table 3.6.7 WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* Fraction of natural mortality before spawning (MPROP).

	0	1	2	3	4	5	6	7	8
1991	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
1992	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
1993	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
1994	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
1995	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
1996	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
1997	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
1998	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
1999	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2000	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2001	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2002	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2003	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2004	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2005	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2006	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2007	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2008	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2009	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2010	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2011	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2012	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2013	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2014	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2015	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2016	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2017	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2018	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25

Table 3.6.8.a WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* Survey indices: HERAS (number).

	3	4	5	6
1991	1927000	866000	350000	88000
1992	1799000	1593000	556000	197000
1993	1274000	598000	434000	154000
1994	935000	501000	239000	186000
1995	1022000	1270000	255000	174000
1996	247000	141000	119000	37000
1997	787000	166000	67000	69000
1998	901000	282000	111000	51000
1999	NA	NA	NA	NA
2000	673600	363900	185700	55600
2001	452300	153100	96400	37600
2002	1392800	524300	87500	39500
2003	394600	323400	103400	25200
2004	726000	306900	183700	72100
2005	463500	201300	102500	83600
2006	1780400	490000	180400	27000
2007	933000	499000	154000	34000
2008	843000	333000	274000	176000
2009	205000	161000	82000	86000
2010	254000	115000	65000	24000
2011	259000	163000	70000	53000
2012	236000	87000	76000	33000
2013	525000	53000	30000	12000
2014	176000	248000	28000	37000
2015	446000	224000	171000	82000
2016	381000	99000	40000	40000
2017	661000	401000	94000	53000
2018	271000	175000	169000	50000

Table 3.6.8.b WESTERN BALTIC SPRING SPAWNING HERRING, continued. *Multi fleet.* Survey indices: GerAS (number in thousands).

	1	2	3	4
1994	415730	883810	559720	443730
1995	1675340	328610	357960	353850
1996	1439460	590010	434090	295170
1997	1955400	738180	394530	162430
1998	801350	678530	394070	236830
1999	1338710	287240	232510	155950
2000	1429880	453980	328960	201590
2001	NA	NA	NA	NA
2002	837549	421393	575356	341119
2003	1238480	222530	217270	260350
2004	968860	592360	346230	163150
2005	750199	590756	295659	142778
2006	940892	226959	279618	212201
2007	558851	260402	117412	76782
2008	392737	165347	166301	102018
2009	270959	95866	43553	17761
2010	534633	305540	214539	107364
2011	1206762	360354	210455	115984
2012	755034	294242	193974	124548
2013	893837	456204	307567	262908
2014	769320	242590	279650	332660
2015	440738	509769	221344	129795
2016	493366	155417	196061	60953
2017	463940	145360	123230	137500
2018	428530	89280	41160	20240

Table 3.6.8.c WESTERN BALTIC SPRING SPAWNING HERRING, continued. *Multi fleet* .Survey indices: N20 (number in millions).

	0
1992	1060
1993	3044
1994	12515
1995	7930
1996	21012
1997	4872
1998	16743
1999	20364
2000	3026
2001	4845
2002	11324
2003	5507
2004	5640
2005	3887
2006	3774
2007	1829
2008	1622
2009	6464
2010	7037
2011	4444
2012	1140
2013	3021
2014	539
2015	2478
2016	442
2017	1247
2018	1563

Table 3.6.8.d WESTERN BALTIC SPRING SPAWNING HERRING, continued. *Multi fleet.* Survey indices: IBTS+BITS-Q1 (number per hour).

	1	2	3
2002	1685921	66568	15361
2003	677316	137968	4606
2004	397528	79234	16531
2005	281731	135149	8461
2006	171192	34974	8390
2007	259420	40925	4085
2008	226275	38457	4944
2009	760622	45336	1568
2010	330962	87048	12069
2011	217289	78029	15795
2012	419748	91357	4881
2013	206366	87070	17144
2014	179149	20326	4118
2015	364206	74560	2527
2016	246559	116596	7753
2017	570307	80518	13972
2018	128716	72751	3773

Table 3.6.8.e WESTERN BALTIC SPRING SPAWNING HERRING, continued. *Multi fleet.* Survey indices: IBTS+BITS-Q3.4 (number per hour).

	2	3
2002	3994	1727
2003	7980	1839
2004	4164	1592
2005	4376	790
2006	3412	1557
2007	4432	805.2
2008	2900	1520
2009	3984	726.1
2010	4688	1430
2011	3458	845.1
2012	7288	1065
2013	6334	1842
2014	1540	1585
2015	12370	1788
2016	9957	2785
2017	6436	1973
2018	7455	1198

Table 3.6.9 WESTERN BALTIC SPRING SPAWNING HERRING. SAM software version.

Multi fleet:

Model version: [0.5.4 , 0.5.4 , 0.5.4]

Model SHA: [e2a30d42316c , e2a30d42316c , e2a30d42316c]

Table 3.6.10 WESTERN BALTIC SPRING SPAWNING HERRING. Multi fleet. SAM configuration settings.

```
# Configuration saved: Tue Feb 13 12:34:28 2018
# Where a matrix is specified rows corresponds to fleets and columns to ages.
# Same number indicates same parameter used
# Numbers (integers) starts from zero and must be consecutive
$minAge
# The minimium age class in the assessment
 0
$maxAge
# The maximum age class in the assessment
 8
$maxAgePlusGroup
# Is last age group considered a plus group (1 yes, or 0 no).
 1
$keyLogFsta
# Coupling of the fishing mortality states (nomally only first row is used).
 -1  0  1  2  3  4  5  6  6
  7  8  9 10 11 12 13 14 14
 15 16 17 18 19 20 21 22 22
 23 24 25 26 27 28 29 30 30
 -1 -1 -1 -1 -1 -1 -1 -1 -1
 -1 -1 -1 -1 -1 -1 -1 -1 -1
 -1 -1 -1 -1 -1 -1 -1 -1 -1
 -1 -1 -1 -1 -1 -1 -1 -1 -1
 -1 -1 -1 -1 -1 -1 -1 -1 -1
 -1 -1 -1 -1 -1 -1 -1 -1 -1
$corFlag
# Correlation of fishing mortality across ages (0 independent, 1 compound symmetry, or 2 AR(1)
 0 2 2 2
$keyLogFpar
# Coupling of the survey catchability parameters (nomally first row is not used, as that is covered by fishing
mortality).
-1  -1  -1  -1  -1  -1  -1
        -1  -1
-1  -1  -1  -1  -1  -1  -1
        -1  -1
-1  -1  -1  -1  -1  -1  -1
        -1  -1
-1  -1  -1  -1  -1  -1  -1
        -1  -1
-1  -1  -1  0   1   2   3
        -1  -1
-1  4   5   6   7   -1  -1
        -1  -1
 8  -1  -1  -1  -1  -1  -1
        -1  -1
-1  9   10  11  -1  -1  -1
        -1  -1
-1  -1  12  13  -1  -1  -1
        -1  -1
-1  -1  -1  -1  -1  -1  -1
        -1  -1
```

continued

Table 3.6.10- WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* SAM configuration settings.

```
$keyQpow
# Density dependent catchability power parameters (if any).
 -1 -1 -1 -1 -1 -1 -1 -1 -1
 -1 -1 -1 -1 -1 -1 -1 -1 -1
 -1 -1 -1 -1 -1 -1 -1 -1 -1
 -1 -1 -1 -1 -1 -1 -1 -1 -1
 -1 -1 -1 -1 -1 -1 -1 -1 -1
 -1 -1 -1 -1 -1 -1 -1 -1 -1
 -1 -1 -1 -1 -1 -1 -1 -1 -1
 -1 -1 -1 -1 -1 -1 -1 -1 -1
 -1 -1 -1 -1 -1 -1 -1 -1 -1
 -1 -1 -1 -1 -1 -1 -1 -1 -1
$keyVarF
# Coupling of process variance parameters for log(F)-process (nomally only first row is used)
 -1  0  0  0  0  0  0  0  0
  1  1  1  1  1  1  1  1  1
  2  2  2  2  2  2  2  2  2
  3  3  3  3  3  3  3  3  3
 -1 -1 -1 -1 -1 -1 -1 -1 -1
 -1 -1 -1 -1 -1 -1 -1 -1 -1
 -1 -1 -1 -1 -1 -1 -1 -1 -1
 -1 -1 -1 -1 -1 -1 -1 -1 -1
 -1 -1 -1 -1 -1 -1 -1 -1 -1
 -1 -1 -1 -1 -1 -1 -1 -1 -1
$keyVarLogN
# Coupling of process variance parameters for log(N)-process
 0 1 1 1 1 1 1 1 1
$keyVarObs
# Coupling of the variance parameters for the observations.
                -1              0              1              1              1              1
                 1              1              1
                 2              3              4              4              4              4
                 4              4              4
                 5              6              6              6              6              6
                 6              6              6
                 7              8              8              8              8              8
                 8              8              8
                -1             -1             -1              9              9              9
                 9             -1             -1
                -1             10             10             10             10             -1
                -1             -1             -1
                11             -1             -1             -1             -1             -1
                -1             -1             -1
                -1             12             12             12             -1             -1
                -1             -1             -1
                -1             -1             13             13             -1             -1
                -1             -1             -1
                -1             -1             -1             -1             -1             -1
                -1             -1             -1
$obsCorStruct
# Covariance structure for each fleet ("ID" independent, "AR" AR(1), or "US" for unstructured). | Possible values
are: "ID" "AR" "US"
 "ID" "AR" "ID" "AR" "AR" "AR" "ID" "AR" "US" "NA"
```

continued

Table 3.6.10 WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* SAM configuration settings.

```
$keyCorObs
# Coupling of correlation parameters can only be specified if the AR(1) structure is chosen above.
# NA's indicate where correlation parameters can be specified (-1 where they cannot).
#0-1 1-2 2-3 3-4 4-5 5-6 6-7 7-8
 NA  NA  NA  NA  NA  NA  NA  NA
 3   3   3   3   4   4   4   4
 NA  NA  NA  NA  NA  NA  NA  NA
 3   3    3   3  4   4   4   4
 -1  -1  -1  0  0  1  -1  -1
 -1  2  1  0  -1  -1  -1  -1
 -1  -1  -1  -1  -1  -1  -1  -1
 -1  2  1  -1  -1  -1  -1  -1
 -1  -1  NA  -1  -1  -1  -1  -1
 -1  -1  -1  -1  -1  -1  -1  -1
$stockRecruitmentModelCode
# Stock recruitment code (0 for plain random walk, 1 for Ricker, and 2 for Beverton-Holt).
 0
$noScaledYears
# Number of years where catch scaling is applied.
 0
$keyScaledYears
# A vector of the years where catch scaling is applied.

$keyParScaledYA
# A matrix specifying the couplings of scale parameters (nrow = no scaled years, ncols = no ages).
$fbarRange
# lowest and higest age included in Fbar
 3 6
$keyBiomassTreat
# To be defined only if a biomass survey is used (0 SSB index, 1 catch index, and 2 FSB index).
 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1
$obsLikelihoodFlag
# Option for observational likelihood | Possible values are: "LN" "ALN"
 "LN" "LN" "LN" "LN" "LN" "LN" "LN" "LN" "LN" "LN"

$fixVarToWeight
# If weight attribute is supplied for observations this option sets the treatment (0 relative weight, 1 fix variance
to weight).
 0
```

Table 3.6.11 WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* Stock summary - Estimated recruitment (1000), spawning stock biomass (SSB) (tons), average fishing mortality and total stock biomass (TSB) (tons).

Year	$R_{(age\ 0)}$	Low	High	SSB	Low	High	$F_{bar(3–6)}$	Low	High	TSB	Low	High
1991	4994620	3840771	6495110	297743	243137	364614	0.490	0.390	0.617	593376	501032	702739
1992	3542228	2823683	4443621	292363	243576	350921	0.523	0.438	0.624	506385	433303	591795
1993	3004215	2344313	3849874	274789	230037	328247	0.560	0.477	0.656	438432	374855	512793
1994	4456350	3472205	5719437	221515	186391	263259	0.592	0.507	0.692	365959	314514	425820
1995	4132201	3270593	5220793	190874	160150	227491	0.614	0.526	0.717	310882	267681	361056
1996	4186672	3325467	5270907	131122	110988	154908	0.626	0.534	0.733	274398	237783	316652
1997	3474711	2685029	4496643	148064	125219	175078	0.614	0.526	0.718	280206	242093	324320
1998	4623046	3659476	5840333	120878	102496	142556	0.602	0.517	0.702	266555	231021	307554
1999	4896152	3935234	6091709	121711	103214	143523	0.576	0.493	0.674	272034	236687	312661
2000	2921274	2324862	3670689	122677	104350	144224	0.580	0.498	0.676	256410	223269	294470
2001	2822649	2298761	3465930	136818	116982	160017	0.568	0.486	0.664	277696	241921	318763
2002	2694436	2183779	3324505	164949	141056	192890	0.533	0.453	0.625	294439	256279	338282
2003	2894969	2349207	3567520	129138	110356	151118	0.506	0.428	0.600	222932	194373	255686
2004	1976097	1585086	2463565	129940	111175	151873	0.499	0.425	0.588	221749	193512	254106
2005	1747738	1426297	2141622	119352	102382	139135	0.509	0.437	0.593	208597	181824	239311
2006	1352125	1098553	1664228	132111	113193	154191	0.520	0.447	0.605	223781	194888	256959
2007	1446726	1180408	1773130	104839	89580	122697	0.531	0.456	0.619	171371	148965	197146
2008	1189959	967196	1464028	86646	74402	100905	0.531	0.449	0.628	152469	133355	174324
2009	1155814	933572	1430963	80833	69388	94166	0.505	0.427	0.597	141308	123827	161258
2010	1593242	1272694	1994526	75973	65286	88408	0.437	0.368	0.519	126606	110627	144893
2011	1403676	1146518	1718514	69299	59508	80700	0.368	0.301	0.450	115018	100362	131816
2012	1152037	916988	1447335	70821	60753	82558	0.361	0.302	0.432	124242	108255	142590
2013	1743986	1298427	2342439	83044	70988	97148	0.354	0.295	0.426	140170	121422	161812
2014	1247045	977042	1591663	89459	75831	105538	0.345	0.284	0.419	148422	128372	171603
2015	1014505	778367	1322280	90109	75905	106972	0.367	0.298	0.451	150846	129126	176219
2016	1054035	769034	1444655	88443	73246	106793	0.402	0.315	0.513	135468	113683	161426
2017	1057849	702464	1593028	83895	66603	105676	0.416	0.311	0.557	130734	105897	161398
2018	954391	512215	1778279	74132	55092	99751	0.416	0.297	0.584	114957	88016	150145

Table 3.6.12.a WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* Estimated fishing mortality - Sum all fleets.

Year Age	0	1	2	3	4	5	6	7	8
1991	0.027	0.212	0.344	0.394	0.459	0.515	0.594	0.667	0.667
1992	0.026	0.211	0.360	0.416	0.487	0.550	0.638	0.721	0.721
1993	0.033	0.242	0.387	0.444	0.521	0.588	0.686	0.775	0.775
1994	0.039	0.269	0.415	0.471	0.551	0.621	0.726	0.820	0.820
1995	0.063	0.352	0.451	0.494	0.571	0.641	0.750	0.847	0.847
1996	0.048	0.299	0.434	0.492	0.579	0.658	0.774	0.880	0.880
1997	0.050	0.295	0.419	0.478	0.566	0.646	0.767	0.883	0.883
1998	0.054	0.304	0.420	0.471	0.556	0.633	0.750	0.873	0.873
1999	0.036	0.244	0.395	0.451	0.532	0.606	0.717	0.839	0.839
2000	0.028	0.221	0.388	0.449	0.535	0.610	0.725	0.851	0.851
2001	0.029	0.219	0.369	0.431	0.522	0.599	0.720	0.844	0.844
2002	0.028	0.211	0.353	0.405	0.490	0.562	0.673	0.793	0.793
2003	0.025	0.200	0.331	0.381	0.465	0.535	0.645	0.762	0.762
2004	0.025	0.199	0.315	0.370	0.459	0.528	0.641	0.757	0.757
2005	0.017	0.176	0.320	0.379	0.471	0.538	0.649	0.766	0.766
2006	0.017	0.186	0.356	0.403	0.483	0.545	0.648	0.756	0.756
2007	0.013	0.171	0.357	0.410	0.496	0.558	0.660	0.763	0.763
2008	0.013	0.171	0.364	0.411	0.496	0.558	0.657	0.752	0.752
2009	0.014	0.187	0.380	0.401	0.472	0.528	0.619	0.704	0.704
2010	0.008	0.135	0.309	0.342	0.409	0.457	0.540	0.613	0.613
2011	0.006	0.104	0.237	0.276	0.344	0.389	0.465	0.530	0.530
2012	0.006	0.098	0.218	0.262	0.336	0.385	0.461	0.522	0.522
2013	0.006	0.097	0.211	0.253	0.330	0.380	0.455	0.514	0.514
2014	0.006	0.094	0.210	0.249	0.321	0.370	0.439	0.495	0.495
2015	0.007	0.113	0.245	0.270	0.342	0.393	0.462	0.521	0.521
2016	0.006	0.117	0.284	0.310	0.377	0.428	0.494	0.554	0.554
2017	0.005	0.110	0.292	0.328	0.390	0.441	0.505	0.562	0.562
2018	0.005	0.111	0.295	0.330	0.391	0.442	0.503	0.557	0.557

Table 3.6.12.b WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* Estimated fishing mortality - Fleet A.

Year Age	0	1	2	3	4	5	6	7	8
1991	0.000	0.000	0.002	0.012	0.015	0.017	0.021	0.026	0.026
1992	0.000	0.000	0.002	0.012	0.015	0.017	0.021	0.027	0.027
1993	0.000	0.000	0.002	0.012	0.015	0.017	0.022	0.028	0.028
1994	0.000	0.000	0.002	0.012	0.015	0.017	0.022	0.029	0.029
1995	0.000	0.000	0.002	0.012	0.015	0.017	0.022	0.030	0.030
1996	0.000	0.000	0.002	0.012	0.015	0.017	0.023	0.031	0.031
1997	0.000	0.000	0.002	0.012	0.015	0.017	0.023	0.033	0.033
1998	0.000	0.000	0.002	0.012	0.015	0.017	0.023	0.035	0.035
1999	0.000	0.000	0.002	0.012	0.015	0.018	0.023	0.037	0.037
2000	0.000	0.000	0.002	0.012	0.016	0.018	0.024	0.039	0.039
2001	0.000	0.000	0.002	0.011	0.016	0.018	0.024	0.039	0.039
2002	0.000	0.000	0.002	0.011	0.015	0.017	0.023	0.039	0.039
2003	0.000	0.000	0.001	0.011	0.015	0.016	0.022	0.038	0.038
2004	0.000	0.000	0.001	0.010	0.014	0.014	0.021	0.036	0.036
2005	0.000	0.000	0.001	0.009	0.013	0.013	0.021	0.036	0.036
2006	0.000	0.000	0.001	0.008	0.012	0.012	0.020	0.035	0.035
2007	0.000	0.000	0.001	0.007	0.011	0.010	0.018	0.031	0.031
2008	0.000	0.000	0.001	0.006	0.010	0.008	0.017	0.028	0.028
2009	0.000	0.000	0.001	0.006	0.009	0.008	0.017	0.028	0.028
2010	0.000	0.000	0.001	0.005	0.009	0.007	0.016	0.026	0.026
2011	0.000	0.000	0.001	0.005	0.008	0.006	0.016	0.024	0.024
2012	0.000	0.000	0.001	0.005	0.008	0.006	0.016	0.022	0.022
2013	0.000	0.000	0.001	0.005	0.008	0.006	0.016	0.023	0.023
2014	0.000	0.000	0.001	0.005	0.008	0.007	0.017	0.025	0.025
2015	0.000	0.000	0.001	0.005	0.008	0.007	0.017	0.026	0.026
2016	0.000	0.000	0.001	0.005	0.008	0.007	0.016	0.025	0.025
2017	0.000	0.000	0.001	0.005	0.008	0.007	0.016	0.024	0.024
2018	0.000	0.000	0.001	0.005	0.008	0.008	0.016	0.024	0.024

Table 3.6.12.c - WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* Estimated fishing mortality - Fleet C

Year Age	0	1	2	3	4	5	6	7	8
1991	0.000	0.047	0.166	0.136	0.111	0.099	0.095	0.094	0.094
1992	0.000	0.050	0.175	0.144	0.118	0.105	0.100	0.099	0.099
1993	0.000	0.053	0.185	0.152	0.125	0.111	0.106	0.105	0.105
1994	0.000	0.057	0.199	0.164	0.134	0.119	0.114	0.113	0.113
1995	0.000	0.060	0.210	0.173	0.141	0.126	0.120	0.119	0.119
1996	0.000	0.058	0.204	0.167	0.137	0.122	0.116	0.115	0.115
1997	0.000	0.055	0.193	0.159	0.130	0.116	0.110	0.109	0.109
1998	0.000	0.056	0.196	0.161	0.132	0.117	0.112	0.111	0.111
1999	0.000	0.055	0.194	0.160	0.130	0.116	0.111	0.110	0.110
2000	0.000	0.055	0.193	0.159	0.130	0.116	0.110	0.109	0.109
2001	0.000	0.049	0.173	0.142	0.116	0.104	0.099	0.098	0.098
2002	0.000	0.049	0.173	0.142	0.116	0.104	0.099	0.098	0.098
2003	0.000	0.043	0.151	0.124	0.101	0.090	0.086	0.085	0.085
2004	0.000	0.035	0.122	0.101	0.082	0.073	0.070	0.069	0.069
2005	0.000	0.041	0.143	0.118	0.096	0.086	0.082	0.081	0.081
2006	0.000	0.049	0.170	0.140	0.114	0.102	0.097	0.096	0.096
2007	0.000	0.052	0.183	0.150	0.123	0.109	0.104	0.103	0.103
2008	0.000	0.055	0.191	0.157	0.129	0.115	0.109	0.108	0.108
2009	0.000	0.059	0.208	0.171	0.140	0.125	0.119	0.118	0.118
2010	0.000	0.054	0.190	0.156	0.128	0.114	0.109	0.108	0.108
2011	0.000	0.040	0.139	0.114	0.093	0.083	0.079	0.079	0.079
2012	0.000	0.033	0.117	0.097	0.079	0.070	0.067	0.066	0.066
2013	0.000	0.029	0.102	0.084	0.069	0.061	0.058	0.058	0.058
2014	0.000	0.031	0.108	0.089	0.073	0.065	0.062	0.061	0.061
2015	0.000	0.035	0.123	0.101	0.083	0.074	0.070	0.070	0.070
2016	0.000	0.049	0.171	0.141	0.115	0.103	0.098	0.097	0.097
2017	0.000	0.057	0.199	0.164	0.134	0.119	0.114	0.113	0.113
2018	0.000	0.058	0.202	0.166	0.136	0.121	0.116	0.115	0.115

Table 3.6.12.d - WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* Estimated fishing mortality - Fleet D

Year Age	0	1	2	3	4	5	6	7	8
1991	0.016	0.051	0.017	0.008	0.004	0.003	0.005	0.004	0.004
1992	0.014	0.041	0.014	0.007	0.004	0.003	0.004	0.003	0.003
1993	0.021	0.062	0.020	0.010	0.005	0.004	0.005	0.004	0.004
1994	0.026	0.080	0.025	0.012	0.006	0.004	0.006	0.005	0.005
1995	0.050	0.158	0.047	0.020	0.009	0.006	0.009	0.006	0.006
1996	0.035	0.103	0.030	0.013	0.006	0.004	0.006	0.005	0.005
1997	0.037	0.103	0.029	0.012	0.006	0.004	0.006	0.005	0.005
1998	0.041	0.116	0.033	0.013	0.006	0.004	0.006	0.005	0.005
1999	0.024	0.064	0.020	0.008	0.004	0.003	0.004	0.003	0.003
2000	0.016	0.042	0.014	0.005	0.003	0.002	0.003	0.003	0.003
2001	0.018	0.050	0.019	0.008	0.005	0.005	0.009	0.010	0.010
2002	0.018	0.057	0.021	0.007	0.004	0.003	0.004	0.003	0.003
2003	0.016	0.060	0.031	0.014	0.009	0.008	0.010	0.008	0.008
2004	0.016	0.068	0.043	0.023	0.014	0.012	0.012	0.009	0.009
2005	0.009	0.040	0.026	0.012	0.007	0.005	0.004	0.003	0.003
2006	0.008	0.049	0.043	0.023	0.013	0.013	0.011	0.009	0.009
2007	0.005	0.031	0.030	0.015	0.008	0.009	0.008	0.007	0.007
2008	0.005	0.032	0.033	0.014	0.005	0.006	0.005	0.006	0.006
2009	0.007	0.054	0.048	0.014	0.004	0.004	0.003	0.003	0.003
2010	0.003	0.021	0.016	0.003	0.000	0.000	0.000	0.000	0.000
2011	0.001	0.013	0.008	0.001	0.000	0.000	0.000	0.000	0.000
2012	0.001	0.012	0.009	0.001	0.000	0.000	0.000	0.000	0.000
2013	0.001	0.014	0.017	0.002	0.000	0.000	0.000	0.000	0.000
2014	0.001	0.013	0.014	0.001	0.000	0.000	0.000	0.000	0.000
2015	0.002	0.027	0.031	0.003	0.000	0.000	0.000	0.000	0.000
2016	0.001	0.017	0.022	0.001	0.000	0.000	0.000	0.000	0.000
2017	0.000	0.004	0.005	0.000	0.000	0.000	0.000	0.000	0.000
2018	0.000	0.003	0.005	0.000	0.000	0.000	0.000	0.000	0.000

Table 3.6.12.e - WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* Estimated fishing mortality - Fleet F

Year Age	0	1	2	3	4	5	6	7	8
1991	0.011	0.113	0.159	0.237	0.328	0.395	0.473	0.544	0.544
1992	0.011	0.120	0.169	0.252	0.351	0.425	0.513	0.591	0.591
1993	0.012	0.127	0.180	0.270	0.377	0.456	0.553	0.638	0.638
1994	0.012	0.132	0.188	0.283	0.396	0.480	0.584	0.674	0.674
1995	0.013	0.135	0.193	0.290	0.406	0.493	0.600	0.693	0.693
1996	0.013	0.139	0.198	0.299	0.421	0.514	0.629	0.728	0.728
1997	0.013	0.136	0.195	0.295	0.416	0.509	0.628	0.736	0.736
1998	0.012	0.132	0.189	0.286	0.403	0.494	0.610	0.722	0.722
1999	0.012	0.124	0.179	0.271	0.383	0.469	0.579	0.688	0.688
2000	0.011	0.124	0.179	0.272	0.387	0.475	0.588	0.700	0.700
2001	0.011	0.119	0.175	0.269	0.385	0.473	0.588	0.698	0.698
2002	0.010	0.105	0.157	0.245	0.355	0.439	0.548	0.653	0.653
2003	0.009	0.097	0.147	0.233	0.340	0.421	0.527	0.630	0.630
2004	0.009	0.097	0.149	0.237	0.348	0.429	0.537	0.643	0.643
2005	0.009	0.095	0.149	0.240	0.354	0.434	0.542	0.646	0.646
2006	0.008	0.089	0.142	0.232	0.344	0.418	0.519	0.616	0.616
2007	0.008	0.088	0.144	0.238	0.355	0.430	0.529	0.621	0.621
2008	0.008	0.084	0.139	0.234	0.352	0.429	0.526	0.610	0.610
2009	0.007	0.073	0.123	0.210	0.319	0.391	0.481	0.554	0.554
2010	0.006	0.061	0.103	0.177	0.272	0.336	0.415	0.479	0.479
2011	0.005	0.052	0.089	0.155	0.242	0.300	0.370	0.428	0.428
2012	0.005	0.053	0.091	0.160	0.250	0.309	0.378	0.433	0.433
2013	0.005	0.053	0.092	0.162	0.253	0.313	0.381	0.433	0.433
2014	0.005	0.050	0.087	0.154	0.241	0.298	0.360	0.409	0.409
2015	0.005	0.052	0.090	0.160	0.251	0.312	0.375	0.425	0.425
2016	0.005	0.051	0.090	0.162	0.253	0.317	0.380	0.431	0.431
2017	0.005	0.050	0.088	0.159	0.248	0.314	0.375	0.425	0.425
2018	0.005	0.050	0.087	0.158	0.246	0.313	0.371	0.418	0.418

Table 3.6.13 - WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* Estimated stock numbers at age

Year Age	0	1	2	3	4	5	6	7	8
1991	4994620	4038068	2224444	1882555	930749	565330	169222	50680	17225
1992	3542228	3633694	1974043	1295106	1040321	479862	275737	76996	28818
1993	3004215	2559018	1806525	1119318	705523	522434	225700	119294	42294
1994	4456350	2124513	1216170	1018802	580691	347199	236468	92873	60949
1995	4132201	3206989	987145	649441	533794	267367	154653	93111	55316
1996	4186672	2866299	1373342	516011	322248	246379	114815	59835	52103
1997	3474711	2962036	1283619	737858	257955	146702	103191	43234	38322
1998	4623046	2419112	1335824	691050	377637	119788	63347	38593	27590
1999	4896152	3256134	1072965	714066	354101	179109	51733	24723	22288
2000	2921274	3537911	1552326	587459	370617	171616	80307	20723	16611
2001	2822649	2080789	1725163	871579	303087	177744	75916	32094	13061
2002	2694436	2027765	995229	978877	472807	145169	80442	29769	16017
2003	2894969	1927662	997820	566183	534587	238800	67358	33694	16926
2004	1976097	2115708	960310	590429	316185	273675	114903	29008	19242
2005	1747738	1414362	1059363	581960	333121	163850	131957	49776	18487
2006	1352125	1274935	706236	630405	333682	169634	79484	56019	26028
2007	1446726	976824	646563	402046	340762	171607	78771	35079	31137
2008	1189959	1066907	492654	371050	216954	168798	81822	33339	25354
2009	1155814	867890	550821	279555	198901	108907	78077	35040	22685
2010	1593242	833844	436318	306303	154406	102442	52818	33657	23547
2011	1403676	1180495	437100	260108	176959	83932	53720	25308	25135
2012	1152037	1032210	657141	281883	160209	102505	46643	27762	24305
2013	1743986	838529	562871	441787	177078	93940	56596	24228	25328
2014	1247045	1315245	451557	369587	285285	102699	52736	29428	24565
2015	1014505	918454	750014	299880	234844	165992	58554	27721	27320
2016	1054035	740328	496479	491326	187232	136851	90031	30174	27009
2017	1057849	779493	397635	298736	301847	105514	73898	44314	26778
2018	954391	785232	429157	241251	170043	171417	55844	36731	32596

Table 3.6.14.a - WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* Predicted catch in numbers - Sum fleets

	0	1	2	3	4	5	6	7	8
1991	115143.85	647736.81	643672.84	613948.60	342269.57	227230.90	76051.46	24909.60	8466.32
1992	77887.58	579320.76	595502.77	443072.04	402904.36	203535.37	131219.63	40146.44	15025.92
1993	86026.80	467140.53	584000.71	407006.15	289484.38	234322.18	113697.82	65745.86	23309.32
1994	148758.06	429357.34	419456.23	390656.39	250429.43	163087.03	124745.88	53511.82	35117.91
1995	219718.04	837414.12	369426.20	260796.31	237696.37	129266.16	83980.51	55126.28	32749.68
1996	170505.31	641939.32	493668.64	205516.99	144723.28	120990.89	63490.69	36231.53	31549.74
1997	148756.29	653278.23	447270.91	285933.25	113420.00	70864.83	56490.80	26186.07	23211.27
1998	210270.44	549938.39	467044.28	265002.62	163737.99	57035.86	34178.72	23255.89	16625.83
1999	150584.74	598901.15	353474.58	262849.33	148073.46	82378.57	26986.33	14503.76	13075.61
2000	70133.35	589457.01	501656.63	215171.71	155600.65	79354.74	42199.30	12279.97	9843.10
2001	70450.50	344429.48	533363.73	307410.91	124236.84	80640.96	39614.28	18895.44	7689.51
2002	64092.60	325129.12	295391.40	327478.96	183922.77	62568.19	39836.00	16713.90	8992.85
2003	62416.07	292664.21	280276.46	179539.17	198597.01	98617.98	32208.81	18316.85	9201.50
2004	41955.97	320660.33	258509.86	181889.96	115412.24	111175.86	54187.07	15539.64	10307.94
2005	26312.32	189531.83	287672.66	183052.76	124396.23	67557.92	62867.77	26945.91	10007.96
2006	19336.02	181080.65	213036.77	211083.52	128825.74	71689.06	38340.40	30463.23	14154.36
2007	16348.70	127804.46	194508.99	136449.64	134295.75	73830.94	38543.03	19190.82	17034.14
2008	12851.29	139399.93	150915.35	126208.41	85483.99	72590.30	39896.81	18059.62	13734.30
2009	13596.70	123960.86	175786.23	93104.80	75429.21	44907.03	36540.76	18172.99	11765.12
2010	11528.80	86807.34	113700.57	87719.71	51623.14	37335.93	22071.15	15612.35	10922.86
2011	7785.18	95031.85	88751.38	60923.70	50246.77	26372.37	19626.22	10309.83	10239.57
2012	6105.53	78376.22	123817.08	62857.98	44384.85	31662.36	16807.65	11084.09	9704.09
2013	9167.43	62926.66	103280.18	95054.89	47957.97	28580.44	20079.70	9513.68	9945.69
2014	6222.23	95309.16	82016.15	78658.01	75749.62	30615.72	18212.93	11260.56	9399.88
2015	5891.92	80401.71	158713.61	68802.80	66116.98	52360.85	21178.64	11098.80	10938.55
2016	5538.19	67001.93	120024.96	128437.54	58024.53	46970.11	34887.05	12877.10	11526.51
2017	4618.04	65846.66	97626.83	82398.20	96960.66	37425.32	29344.02	19255.07	11635.53
2018	4164.73	66787.36	106175.61	66873.56	54686.57	60928.32	22142.54	15870.56	14084.11

Table 3.6.14.b - WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* Predicted catch in numbers - Fleet A

	0	1	2	3	4	5	6	7	8
1991	0.00	11.74	3813.84	20239.28	12387.52	8686.22	3188.94	1185.30	402.86
1992	0.00	10.57	3385.87	13903.77	13861.23	7330.07	5263.25	1854.74	694.19
1993	0.00	7.44	3095.72	12057.60	9458.96	7959.15	4373.53	2957.87	1048.67
1994	0.00	6.18	2084.58	10925.16	7889.62	5282.00	4660.33	2373.93	1557.93
1995	0.00	9.32	1691.65	6971.93	7270.59	4094.04	3099.12	2458.75	1460.71
1996	0.00	8.33	2350.89	5527.54	4408.17	3805.97	2333.25	1657.04	1442.92
1997	0.00	8.61	2196.43	7874.86	3537.72	2271.89	2113.49	1278.78	1133.51
1998	0.00	7.03	2288.06	7335.06	5211.63	1878.72	1296.09	1215.47	868.95
1999	0.00	9.47	1838.24	7591.61	4915.41	2846.53	1072.06	816.27	735.90
2000	0.00	10.29	2657.50	6216.12	5253.13	2753.13	1706.48	711.21	570.07
2001	0.00	6.27	2847.18	8983.70	4271.24	2803.97	1630.81	1118.56	455.20
2002	0.00	5.90	1516.71	9800.61	6464.85	2184.41	1690.65	1038.74	558.89
2003	0.00	5.57	1335.33	5416.06	7012.09	3342.35	1358.50	1146.45	575.92
2004	0.00	6.23	1248.73	5444.56	3970.86	3543.85	2212.42	937.18	621.66
2005	0.00	4.36	1244.32	4923.25	3995.15	1939.05	2467.12	1586.80	589.35
2006	0.00	4.20	712.60	4730.53	3669.73	1816.04	1409.59	1744.35	810.49
2007	0.00	3.26	533.30	2611.72	3324.87	1531.25	1288.19	968.34	859.52
2008	0.00	3.66	349.40	2070.98	1908.27	1288.20	1230.93	838.09	637.37
2009	0.00	3.13	349.50	1455.35	1676.69	760.86	1165.86	891.75	577.31
2010	0.00	3.21	239.25	1466.78	1213.25	640.51	760.54	785.88	549.83
2011	0.00	4.69	218.15	1172.24	1298.25	474.73	750.28	534.78	531.14
2012	0.00	4.33	308.03	1221.60	1126.97	532.27	674.36	555.04	485.93
2013	0.00	3.80	268.39	1925.21	1226.40	529.85	826.99	500.74	523.48
2014	0.00	6.58	228.46	1689.34	2041.56	627.90	793.28	658.18	549.42
2015	0.00	4.93	375.78	1404.23	1684.93	1085.82	878.01	644.08	634.78
2016	0.00	4.17	255.27	2382.01	1346.29	915.24	1314.42	686.08	614.12
2017	0.00	4.49	200.11	1478.37	2180.28	714.32	1037.00	955.47	577.38
2018	0.00	4.66	219.26	1190.43	1262.81	1204.68	804.46	805.05	714.43

Table 3.6.14.c - WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* Predicted catch in numbers - Fleet C

	0	1	2	3	4	5	6	7	8
1991	887.74	147021.76	308782.12	218026.79	89093.36	48522.84	13864.25	4118.16	1399.69
1992	664.25	139417.06	287875.94	157691.16	104760.38	43342.46	23776.36	6585.00	2464.62
1993	596.76	103867.40	277719.53	143792.48	75012.77	49839.71	20558.50	10777.74	3821.11
1994	952.92	92657.14	199937.75	140120.71	66164.42	35512.56	23097.86	8998.09	5905.13
1995	928.94	146850.99	169802.94	93533.47	63733.61	28666.34	15837.13	9457.75	5618.71
1996	913.71	127519.08	229991.48	72317.03	37424.39	25689.07	11433.07	5909.99	5146.31
1997	719.11	125133.07	204851.69	98457.63	28502.38	14547.79	9771.64	4060.81	3599.49
1998	970.58	103634.65	215980.14	93440.00	42289.50	12040.09	6080.21	3674.24	2626.74
1999	1019.29	138351.69	172158.48	95802.13	39340.40	17858.87	4925.69	2334.85	2104.94
2000	606.08	149824.93	248303.35	78567.83	41043.68	17056.40	7621.47	1950.81	1563.68
2001	523.54	78984.37	249072.41	105037.67	30202.49	15884.82	6476.96	2716.07	1105.30
2002	499.36	76912.82	143583.56	117879.08	47078.16	12963.48	6857.70	2517.49	1354.53
2003	468.91	64080.93	127106.32	60092.63	46843.34	18752.63	5048.28	2505.11	1258.45
2004	259.07	57138.39	100361.16	51290.10	22630.22	17537.54	7024.63	1759.23	1166.95
2005	268.79	44687.38	128590.30	58818.90	27781.77	12243.93	9410.01	3521.62	1307.96
2006	246.80	47646.11	100478.09	74843.31	32750.75	14933.18	6679.71	4671.23	2170.43
2007	283.22	39090.76	98092.40	50950.42	35732.47	16147.30	7077.24	3127.54	2776.06
2008	244.05	44681.17	77990.16	49100.55	23770.42	16601.20	7684.81	3107.33	2363.12
2009	257.77	39439.89	94091.46	39972.23	23575.62	11594.20	7939.71	3536.24	2289.35
2010	324.78	34715.32	68699.06	40312.60	16825.71	10020.87	4934.22	3120.24	2183.01
2011	208.99	36134.81	51492.20	25507.19	14317.76	6085.88	3717.58	1737.85	1726.00
2012	144.86	26758.99	66053.74	23545.15	11025.05	6317.50	2742.86	1619.91	1418.23
2013	191.05	18975.69	49648.15	32342.30	10669.45	5066.79	2912.13	1236.96	1293.13
2014	144.59	31478.07	42039.12	28572.37	18161.27	5854.13	2868.34	1588.21	1325.78
2015	134.00	24993.28	78985.25	26257.40	16951.20	10735.16	3614.39	1698.00	1673.48
2016	193.67	27851.97	71108.25	58737.90	18514.78	12145.71	7632.19	2538.57	2272.32
2017	225.72	33933.98	65288.86	41033.73	34360.74	10790.41	7221.34	4297.95	2597.18
2018	206.88	34712.54	71479.49	33622.74	19644.67	17792.91	5539.07	3616.01	3208.98

Table 3.6.14.d - WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* Predicted catch in numbers - Fleet D

	0	1	2	3	4	5	6	7	8
1991	68487.87	159277.74	33274.14	14272.67	3525.85	1603.68	698.42	167.76	57.02
1992	43001.67	116039.36	24930.26	8449.06	3474.02	1229.79	1059.71	242.34	90.70
1993	54695.65	121770.51	32266.18	9952.70	3102.93	1711.42	1089.33	462.64	164.02
1994	100451.64	128360.75	27495.86	10922.90	3021.70	1315.46	1306.73	407.83	267.64
1995	174101.72	370232.48	40712.44	11612.54	4283.82	1473.97	1186.63	545.82	324.26
1996	123184.49	220694.49	36569.73	6062.03	1770.27	974.90	660.60	275.43	239.84
1997	110253.70	229838.95	33291.63	8015.65	1289.27	528.28	545.67	187.91	166.56
1998	160673.68	210094.69	39321.78	7866.07	1910.40	428.35	327.11	166.26	118.86
1999	100877.76	159149.03	19211.11	5039.48	1140.86	423.70	183.20	76.76	69.20
2000	40745.85	114407.73	19048.57	2850.19	846.65	296.31	214.40	50.49	40.47
2001	43062.29	80218.79	29104.92	6303.02	1358.82	779.86	637.49	281.99	114.76
2002	40968.79	88417.97	18609.40	6217.54	1594.54	370.86	269.61	77.67	41.79
2003	39538.81	88028.00	27694.94	7161.31	4280.66	1676.39	593.01	237.97	119.55
2004	26489.63	109701.50	36463.00	11927.41	4037.44	2994.10	1292.62	247.03	163.86
2005	12819.55	43366.34	24697.32	6359.74	1989.85	748.07	520.15	137.52	51.08
2006	9577.00	48123.92	27129.43	12944.45	3974.82	2042.77	814.60	453.51	210.72
2007	5964.32	23674.23	17294.33	5383.97	2442.37	1394.61	580.38	237.09	210.44
2008	4689.66	26872.52	14320.40	4522.12	1054.38	926.89	369.82	169.86	129.17
2009	6613.52	36205.70	23326.55	3592.11	683.79	383.76	182.16	104.52	67.66
2010	3486.40	13453.36	6095.68	783.14	54.95	28.20	6.69	5.66	3.96
2011	1688.56	11548.50	3230.45	241.44	10.89	4.00	1.41	1.19	1.18
2012	1049.17	9402.95	5531.23	252.31	6.90	3.51	0.88	1.04	0.91
2013	1521.51	9498.85	8509.59	836.36	15.07	6.08	1.56	1.24	1.30
2014	1061.87	13008.04	5586.48	464.98	12.62	5.32	1.04	1.10	0.92
2015	1579.98	19015.36	20793.83	754.47	24.42	30.42	2.78	2.03	2.00
2016	1045.04	10052.16	9920.71	635.91	8.85	17.56	3.25	1.84	1.65
2017	209.89	2167.18	1876.82	76.98	2.73	2.90	0.93	1.26	0.76
2018	185.13	2080.71	1995.33	61.67	1.40	4.07	0.71	1.13	1.00

Table 3.6.14.e - WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* Predicted catch in numbers - Fleet F

	0	1	2	3	4	5	6	7	8
1991	45768.24	341425.57	297802.74	361409.86	237262.84	168418.16	58299.85	19438.38	6606.75
1992	34221.66	323853.77	279310.70	263028.05	280808.73	151633.05	101120.31	31464.36	11776.41
1993	30734.39	241495.18	270919.28	241203.37	201909.72	174811.90	87676.46	51547.61	18275.52
1994	47353.50	208333.27	189938.04	228687.62	173353.69	120977.01	95680.96	41731.97	27387.21
1995	44687.38	320321.33	157219.17	148678.37	162408.35	95031.81	63857.63	42663.96	25346.00
1996	46407.11	293717.42	224756.54	121610.39	101120.45	90520.95	49063.77	28389.07	24720.67
1997	37783.48	298297.60	206931.16	171585.11	80090.63	53516.87	44060.00	20658.57	18311.71
1998	48626.18	236202.02	209454.30	156361.49	114326.46	42688.70	26475.31	18199.92	13011.28
1999	48687.69	301390.96	160266.75	154416.11	102676.79	61249.47	20805.38	11275.88	10165.57
2000	28781.42	325214.06	231647.21	127537.57	108457.19	59248.90	32656.95	9567.46	7668.88
2001	26864.67	185220.05	252339.22	187086.52	88404.29	61172.31	30869.02	14778.82	6014.25
2002	22624.45	159792.43	131681.73	193581.73	128785.22	47049.44	31018.04	13080.00	7037.64
2003	22408.35	140549.71	124139.87	106869.17	140460.92	74846.61	25209.02	14427.32	7247.58
2004	15207.27	153814.21	120436.97	113227.89	84773.72	87100.37	43657.40	12596.20	8355.47
2005	13223.98	101473.75	133140.72	112950.87	90629.46	52626.87	50470.49	21699.97	8059.57
2006	9512.22	85306.42	84716.65	118565.23	88430.44	52897.07	29436.50	23594.14	10962.72
2007	10101.16	65036.21	78588.96	77503.53	92796.04	54757.78	29597.22	14857.85	13188.12
2008	7917.58	67842.58	58255.39	70514.76	58750.92	53774.01	30611.25	13944.34	10604.64
2009	6725.41	48312.14	58018.72	48085.11	49493.11	32168.21	27253.03	13640.48	8830.80
2010	7717.62	38635.45	38666.58	45157.19	33529.23	26646.35	16369.70	11700.57	8186.06
2011	5887.63	47343.85	33810.58	34002.83	34619.87	19807.76	15156.95	8036.01	7981.25
2012	4911.50	42209.95	51924.08	37838.92	32225.93	24809.08	13389.55	8908.10	7799.02
2013	7454.87	34448.32	44854.05	59951.02	36047.05	22977.72	16339.02	7774.74	8127.78
2014	5015.77	50816.47	34162.09	47931.32	55534.17	24128.37	14550.27	9013.07	7523.76
2015	4177.94	36388.14	58558.75	40386.70	47456.43	40509.45	16683.46	8754.69	8628.29
2016	4299.48	29093.63	38740.73	66681.72	38154.61	33891.60	25937.19	9650.61	8638.42
2017	4182.43	29741.01	30261.04	39809.12	60416.91	25917.69	21084.75	14000.39	8460.21
2018	3772.72	29989.45	32481.53	31998.72	33777.69	41926.66	15798.30	11448.37	10159.70

Table 3.9.1 - WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* Input table for short term predictions

2018						
wr	N	M	Mat	PM	PF	SWt
0	954391	0.3	0.00	0.25	0.1	0.0001
1	785232	0.5	0.00	0.25	0.1	0.0125
2	429157	0.2	0.20	0.25	0.1	0.0491
3	241251	0.2	0.75	0.25	0.1	0.0828
4	170043	0.2	0.90	0.25	0.1	0.1091
5	171417	0.2	1.00	0.25	0.1	0.1432
6	55844	0.2	1.00	0.25	0.1	0.1544
7	36731	0.2	1.00	0.25	0.1	0.1696
8+	32596	0.2	1.00	0.25	0.1	0.1853

2019						
wr	N	M	Mat	PM	PF	SWt
0	1223484	0.3	0.00	0.25	0.1	0.0001
1		0.5	0.00	0.25	0.1	0.0150
2		0.2	0.20	0.25	0.1	0.0479
3		0.2	0.75	0.25	0.1	0.0829
4		0.2	0.90	0.25	0.1	0.1158
5		0.2	1.00	0.25	0.1	0.1468
6		0.2	1.00	0.25	0.1	0.1675
7		0.2	1.00	0.25	0.1	0.1768
8+		0.2	1.00	0.25	0.1	0.1899

2020						
wr	N	M	Mat	PM	PF	SWt
0	1223484	0.3	0.00	0.25	0.1	0.0001
1		0.5	0.00	0.25	0.1	0.0150
2		0.2	0.20	0.25	0.1	0.0479
3		0.2	0.75	0.25	0.1	0.0829
4		0.2	0.90	0.25	0.1	0.1158
5		0.2	1.00	0.25	0.1	0.1468
6		0.2	1.00	0.25	0.1	0.1675
7		0.2	1.00	0.25	0.1	0.1768
8+		0.2	1.00	0.25	0.1	0.1899

Input units are thousands and kg

M =	Natural mortality
MAT =	Maturity ogive
PF =	Proportion of F before spawning
PM =	Proportion of M before spawning
SWt =	Weight in stock (kg)

N_{2018} wr 0-8+:	Populations numbers from the assessment
$N_{2019/2020}$ wr 0:	Geometric Mean of wr 0 for the years 2013-2017
Natural Mortality (M):	Constant
Weight in the Stock 2019-2020 (SWt):	Average for 2014-2018

Table 3.9.2 - WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* Forecast table. MSY approach (zero catch)

Year	2018	2019	2020	2021	2022
fbar:Estimate	0.416	0.238	0.000	0.000	0.000
fbar:low	0.416	0.238	0.000	0.000	0.000
fbar:high	0.416	0.238	0.000	0.000	0.000
rec:Estimate	954391	1223484	1223484	1223484	1223484
rec:low	954391	1223484	1223484	1223484	1223484
rec:high	954391	1223484	1223484	1223484	1223484
ssb:Estimate	74132	69743	76273	101269	132063
ssb:low	74132	69743	76273	101269	132063
ssb:high	74132	69743	76273	101269	132063
catch:Estimate	36561	23367	0	0	0
catch:low	36561	23367	0	0	0
catch:high	36561	23367	0	0	0

Per fleet

Year	2018	2019	2020	2021	2022
Fleet A : Estimate	990	1545	0	0	0
Fleet C : Estimate	16302	12352	0	0	0
Fleet D : Estimate	155	469	0	0	0
Fleet F : Estimate	19114	9001	0	0	0

Table 3.9.3 - WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* Forecast table. MAP 2018: F = F_{MSY}(0.31) * SSBy-1/MSY $B_{trigger}$

Year	2018	2019	2020	2021	2022
fbar:Estimate	0.416	0.238	0.144	0.155	0.180
fbar:low	0.416	0.238	0.144	0.155	0.180
fbar:high	0.416	0.238	0.144	0.155	0.180
rec:Estimate	954391	1223484	1223484	1223484	1223484
rec:low	954391	1223484	1223484	1223484	1223484
rec:high	954391	1223484	1223484	1223484	1223484
ssb:Estimate	74132	69743	75138	87270	100826
ssb:low	74132	69743	75138	87270	100826
ssb:high	74132	69743	75138	87270	100826
catch:Estimate	36561	23367	14619	18227	23649
catch:low	36561	23367	14619	18227	23649
catch:high	36561	23367	14619	18227	23649

Per fleet

Year	2018	2019	2020	2021	2022
Fleet A : Estimate	990	1545	820	1003	1346
Fleet C : Estimate	16302	12352	6250	7814	10129
Fleet D : Estimate	155	469	239	297	350
Fleet F : Estimate	19114	9001	7309	9114	11825

Table 3.9.4 - WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* Forecast table. MAP 2018: F = $F_{MSY\ lower}$ (0.216) * SSBy-1/MSY $B_{trigger}$

Year	2018	2019	2020	2021	2022
fbar:Estimate	0.416	0.238	0.100	0.109	0.131
fbar:low	0.416	0.238	0.100	0.109	0.131
fbar:high	0.416	0.238	0.100	0.109	0.131
rec:Estimate	954391	1223484	1223484	1223484	1223484
rec:low	954391	1223484	1223484	1223484	1223484
rec:high	954391	1223484	1223484	1223484	1223484
ssb:Estimate	74132	69743	75483	91298	109170
ssb:low	74132	69743	75483	91298	109170
ssb:high	74132	69743	75483	91298	109170
catch:Estimate	36561	23367	10359	13568	18846
catch:low	36561	23367	10359	13568	18846
catch:high	36561	23367	10359	13568	18846

Per fleet

Year	2018	2019	2020	2021	2022
Fleet A : Estimate	990	1545	584	762	1112
Fleet C : Estimate	16302	12352	4427	5807	8045
Fleet D : Estimate	155	469	168	215	266
Fleet F : Estimate	19114	9001	5180	6784	9423

Table 3.9.5 - WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* Forecast table. MAP 2018: F = $F_{MSY\ upper}$ (0.379) *SSBy-1/MSY $B_{trigger}$

Year	2018	2019	2020	2021	2022
fbar:Estimate	0.416	0.238	0.176	0.189	0.213
fbar:low	0.416	0.238	0.176	0.189	0.213
fbar:high	0.416	0.238	0.176	0.189	0.213
rec:Estimate	954391	1223484	1223484	1223484	1223484
rec:low	954391	1223484	1223484	1223484	1223484
rec:high	954391	1223484	1223484	1223484	1223484
ssb:Estimate	74132	69743	74889	84458	95186
ssb:low	74132	69743	74889	84458	95186
ssb:high	74132	69743	74889	84458	95186
catch:Estimate	36561	23367	17609	21329	26339
catch:low	36561	23367	17609	21329	26339
catch:high	36561	23367	17609	21329	26339

Per fleet

Year	2018	2019	2020	2021	2022
Fleet A : Estimate	990	1545	984	1156	1459
Fleet C : Estimate	16302	12352	7531	9154	11306
Fleet D : Estimate	155	469	289	355	404
Fleet F : Estimate	19114	9001	8805	10664	13170

Table 3.9.6 - WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* Forecast table. F = F_{MSY} = 0.31

Year	2018	2019	2020	2021	2022
fbar:Estimate	0.416	0.238	0.310	0.310	0.310
fbar:low	0.416	0.238	0.310	0.310	0.310
fbar:high	0.416	0.238	0.310	0.310	0.310
rec:Estimate	954391	1223484	1223484	1223484	1223484
rec:low	954391	1223484	1223484	1223484	1223484
rec:high	954391	1223484	1223484	1223484	1223484
ssb:Estimate	74132	69743	73852	73874	76971
ssb:low	74132	69743	73852	73874	76971
ssb:high	74132	69743	73852	73874	76971
catch:Estimate	36561	23367	29215	29824	30807
catch:low	36561	23367	29215	29824	30807
catch:high	36561	23367	29215	29824	30807

Per fleet

Year	2018	2019	2020	2021	2022
Fleet A : Estimate	990	1545	1608	1518	1538
Fleet C : Estimate	16302	12352	12510	12857	13330
Fleet D : Estimate	155	469	491	537	535
Fleet F : Estimate	19114	9001	14608	14912	15404

Table 3.9.7 - WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* Forecast table. F = F_{pa} = 0.35

Year	2018	2019	2020	2021	2022
fbar:Estimate	0.416	0.238	0.350	0.350	0.350
fbar:low	0.416	0.238	0.350	0.350	0.350
fbar:high	0.416	0.238	0.350	0.350	0.350
rec:Estimate	954391	1223484	1223484	1223484	1223484
rec:low	954391	1223484	1223484	1223484	1223484
rec:high	954391	1223484	1223484	1223484	1223484
ssb:Estimate	74132	69743	73546	70975	72021
ssb:low	74132	69743	73546	70975	72021
ssb:high	74132	69743	73546	70975	72021
catch:Estimate	36561	23367	32413	32085	32415
catch:low	36561	23367	32413	32085	32415
catch:high	36561	23367	32413	32085	32415

Per fleet

Year	2018	2019	2020	2021	2022
Fleet A : Estimate	990	1545	1775	1602	1564
Fleet C : Estimate	16302	12352	13883	13850	14058
Fleet D : Estimate	155	469	548	591	585
Fleet F : Estimate	19114	9001	16206	16042	16207

Table 3.9.8 - WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* Forecast table. F = F_{lim} = 0.45

Year	2018	2019	2020	2021	2022
fbar:Estimate	0.416	0.238	0.450	0.450	0.450
fbar:low	0.416	0.238	0.450	0.450	0.450
fbar:high	0.416	0.238	0.450	0.450	0.450
rec:Estimate	954391	1223484	1223484	1223484	1223484
rec:low	954391	1223484	1223484	1223484	1223484
rec:high	954391	1223484	1223484	1223484	1223484
ssb:Estimate	74132	69743	72786	64257	61199
ssb:low	74132	69743	72786	64257	61199
ssb:high	74132	69743	72786	64257	61199
catch:Estimate	36561	23367	39917	36641	35148
catch:low	36561	23367	39917	36641	35148
catch:high	36561	23367	39917	36641	35148

Per fleet

Year	2018	2019	2020	2021	2022
Fleet A : Estimate	990	1545	2162	1741	1554
Fleet C : Estimate	16302	12352	17112	15866	15326
Fleet D : Estimate	155	469	685	714	694
Fleet F : Estimate	19114	9001	19959	18321	17574

Table 3.9.9 - WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* Forecast table. F = F_{2019} =0.238

Year	2018	2019	2020	2021	2022
fbar:Estimate	0.416	0.238	0.238	0.238	0.238
fbar:low	0.416	0.238	0.238	0.238	0.238
fbar:high	0.416	0.238	0.238	0.238	0.238
rec:Estimate	954391	1223484	1223484	1223484	1223484
rec:low	954391	1223484	1223484	1223484	1223484
rec:high	954391	1223484	1223484	1223484	1223484
ssb:Estimate	74132	69743	74407	79426	86916
ssb:low	74132	69743	74407	79426	86916
ssb:high	74132	69743	74407	79426	86916
catch:Estimate	36561	23367	23157	25008	26943
catch:low	36561	23367	23157	25008	26943
catch:high	36561	23367	23157	25008	26943

Per fleet

Year	2018	2019	2020	2021	2022
Fleet A : Estimate	990	1545	1285	1318	1430
Fleet C : Estimate	16302	12352	9909	10755	11606
Fleet D : Estimate	155	469	384	431	436
Fleet F : Estimate	19114	9001	11579	12504	13472

Table 3.9.10 - WESTERN BALTIC SPRING SPAWNING HERRING. Multi fleet. Forecast table. F = 0

Year	2018	2019	2020	2021	2022
fbar:Estimate	0.416	0.238	0.000	0.000	0.000
fbar:low	0.416	0.238	0.000	0.000	0.000
fbar:high	0.416	0.238	0.000	0.000	0.000
rec:Estimate	954391	1223484	1223484	1223484	1223484
rec:low	954391	1223484	1223484	1223484	1223484
rec:high	954391	1223484	1223484	1223484	1223484
ssb:Estimate	74132	69743	76273	101269	132063
ssb:low	74132	69743	76273	101269	132063
ssb:high	74132	69743	76273	101269	132063
catch:Estimate	36561	23367	0	0	0
catch:low	36561	23367	0	0	0
catch:high	36561	23367	0	0	0

Per fleet

Year	2018	2019	2020	2021	2022
Fleet A : Estimate	990	1545	0	0	0
Fleet C : Estimate	16302	12352	0	0	0
Fleet D : Estimate	155	469	0	0	0
Fleet F : Estimate	19114	9001	0	0	0

Table 3.9.11 - WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* Forecast table. F = 0.05

Year	2018	2019	2020	2021	2022
fbar:Estimate	0.416	0.238	0.050	0.050	0.050
fbar:low	0.416	0.238	0.050	0.050	0.050
fbar:high	0.416	0.238	0.050	0.050	0.050
rec:Estimate	954391	1223484	1223484	1223484	1223484
rec:low	954391	1223484	1223484	1223484	1223484
rec:high	954391	1223484	1223484	1223484	1223484
ssb:Estimate	74132	69743	75877	96189	120704
ssb:low	74132	69743	75877	96189	120704
ssb:high	74132	69743	75877	96189	120704
catch:Estimate	36561	23367	5301	6665	8115
catch:low	36561	23367	5301	6665	8115
catch:high	36561	23367	5301	6665	8115

Per fleet

Year	2018	2019	2020	2021	2022
Fleet A : Estimate	990	1545	301	384	501
Fleet C : Estimate	16302	12352	2264	2847	3449
Fleet D : Estimate	155	469	85	102	107
Fleet F : Estimate	19114	9001	2651	3333	4058

Table 3.9.12 - WESTERN BALTIC SPRING SPAWNING HERRING. Multi fleet. Forecast table. F = 0.1

Year	2018	2019	2020	2021	2022
fbar:Estimate	0.416	0.238	0.100	0.100	0.100
fbar:low	0.416	0.238	0.100	0.100	0.100
fbar:high	0.416	0.238	0.100	0.100	0.100
rec:Estimate	954391	1223484	1223484	1223484	1223484
rec:low	954391	1223484	1223484	1223484	1223484
rec:high	954391	1223484	1223484	1223484	1223484
ssb:Estimate	74132	69743	75483	91383	110440
ssb:low	74132	69743	75483	91383	110440
ssb:high	74132	69743	75483	91383	110440
catch:Estimate	36561	23367	10359	12500	14706
catch:low	36561	23367	10359	12500	14706
catch:high	36561	23367	10359	12500	14706

Per fleet

Year	2018	2019	2020	2021	2022
Fleet A : Estimate	990	1545	584	703	873
Fleet C : Estimate	16302	12352	4427	5349	6275
Fleet D : Estimate	155	469	168	198	205
Fleet F : Estimate	19114	9001	5180	6250	7353

Table 3.9.13 - WESTERN BALTIC SPRING SPAWNING HERRING. Multi fleet. Forecast table. F = 0.15

Year	2018	2019	2020	2021	2022
fbar:Estimate	0.416	0.238	0.150	0.150	0.150
fbar:low	0.416	0.238	0.150	0.150	0.150
fbar:high	0.416	0.238	0.150	0.150	0.150
rec:Estimate	954391	1223484	1223484	1223484	1223484
rec:low	954391	1223484	1223484	1223484	1223484
rec:high	954391	1223484	1223484	1223484	1223484
ssb:Estimate	74132	69743	75092	86838	101160
ssb:low	74132	69743	75092	86838	101160
ssb:high	74132	69743	75092	86838	101160
catch:Estimate	36561	23367	15186	17594	20028
catch:low	36561	23367	15186	17594	20028
catch:high	36561	23367	15186	17594	20028

Per fleet

Year	2018	2019	2020	2021	2022
Fleet A : Estimate	990	1545	851	967	1143
Fleet C : Estimate	16302	12352	6493	7543	8576
Fleet D : Estimate	155	469	248	287	295
Fleet F : Estimate	19114	9001	7593	8797	10014

Table 3.9.14 - WESTERN BALTIC SPRING SPAWNING HERRING. *Multi fleet.* Forecast table. Constant 2019 TAC

Year	2018	2019	2020	2021	2022
fbar:Estimate	0.416	0.238	0.222	0.202	0.182
fbar:low	0.416	0.238	0.222	0.202	0.182
fbar:high	0.416	0.238	0.222	0.202	0.182
rec:Estimate	954391	1223484	1223484	1223484	1223484
rec:low	954391	1223484	1223484	1223484	1223484
rec:high	954391	1223484	1223484	1223484	1223484
ssb:Estimate	74132	69743	74532	80342	89893
ssb:low	74132	69743	74532	80342	89893
ssb:high	74132	69743	74532	80342	89893
catch:Estimate	36561	23367	23367	23367	23367
catch:low	36561	23367	23367	23367	23367
catch:high	36561	23367	23367	23367	23367

Per fleet

Year	2018	2019	2020	2021	2022
Fleet A : Estimate	990	1545	1545	1545	1545
Fleet C : Estimate	16302	12352	12352	12352	12352
Fleet D : Estimate	155	469	469	469	469
Fleet F : Estimate	19114	9001	9001	9001	9001

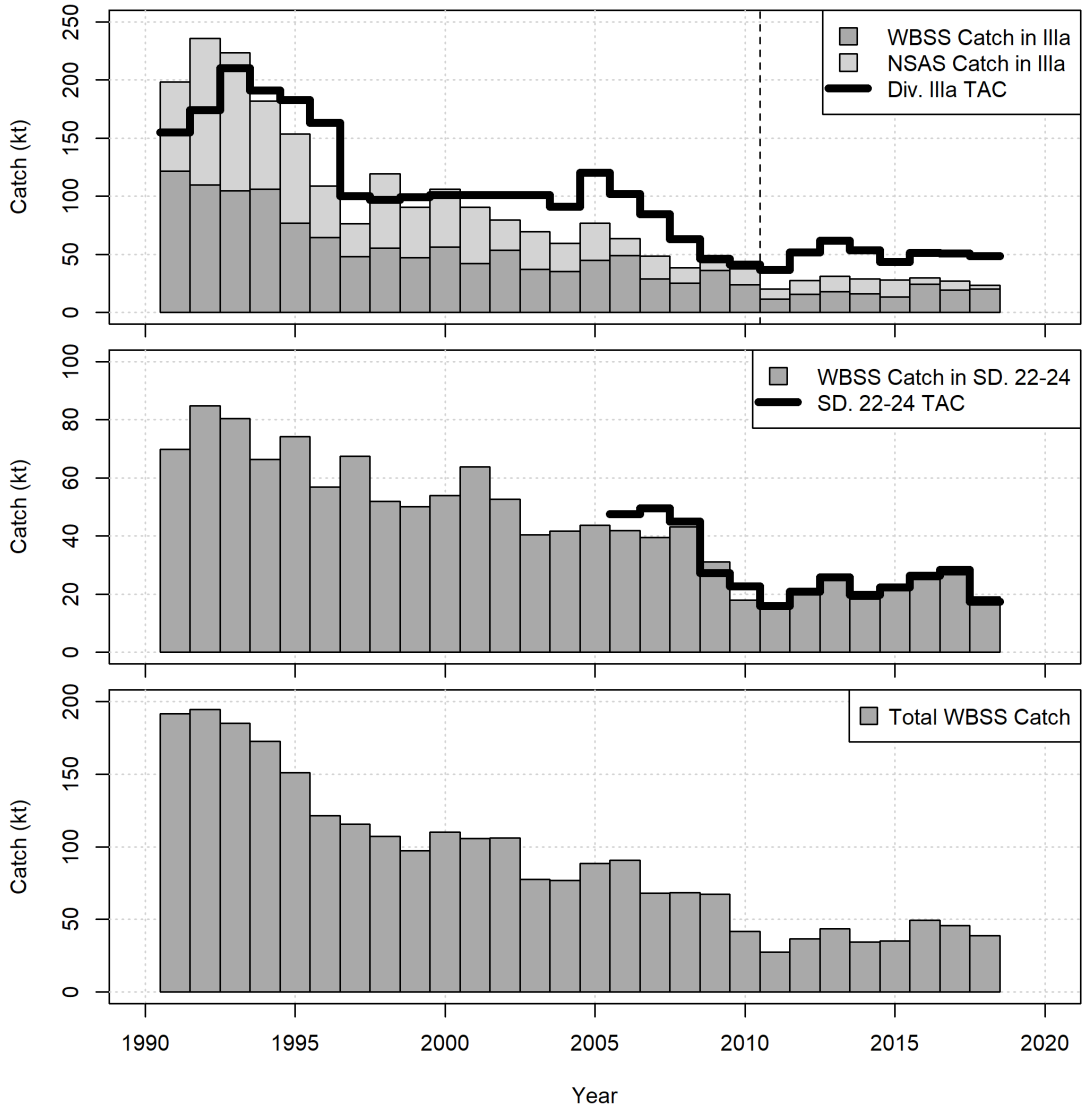

Figure 3.1.1 Western Baltic Spring Spawning Herring. CATCH and TACs (1000 t) by area. Note, the TAC for IIIa excludes the bycatch TAC, while the CATCH includes the bycatch

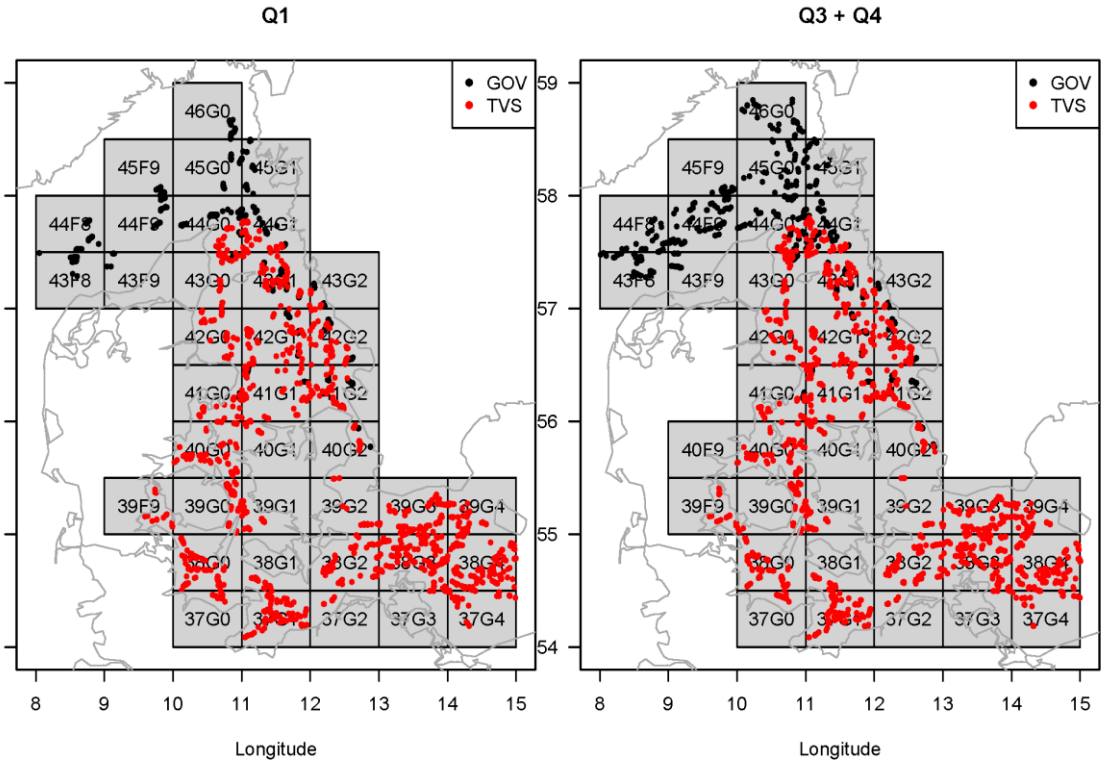

Figure 3.3.1 WESTERN BALTIC SPRING SPAWNING HERRING. Map showing the hauls used in the calculation of the IBTS+BITS-Q1 and IBTS+BITS-Q3.3 indices. Hauls colored by gear type.

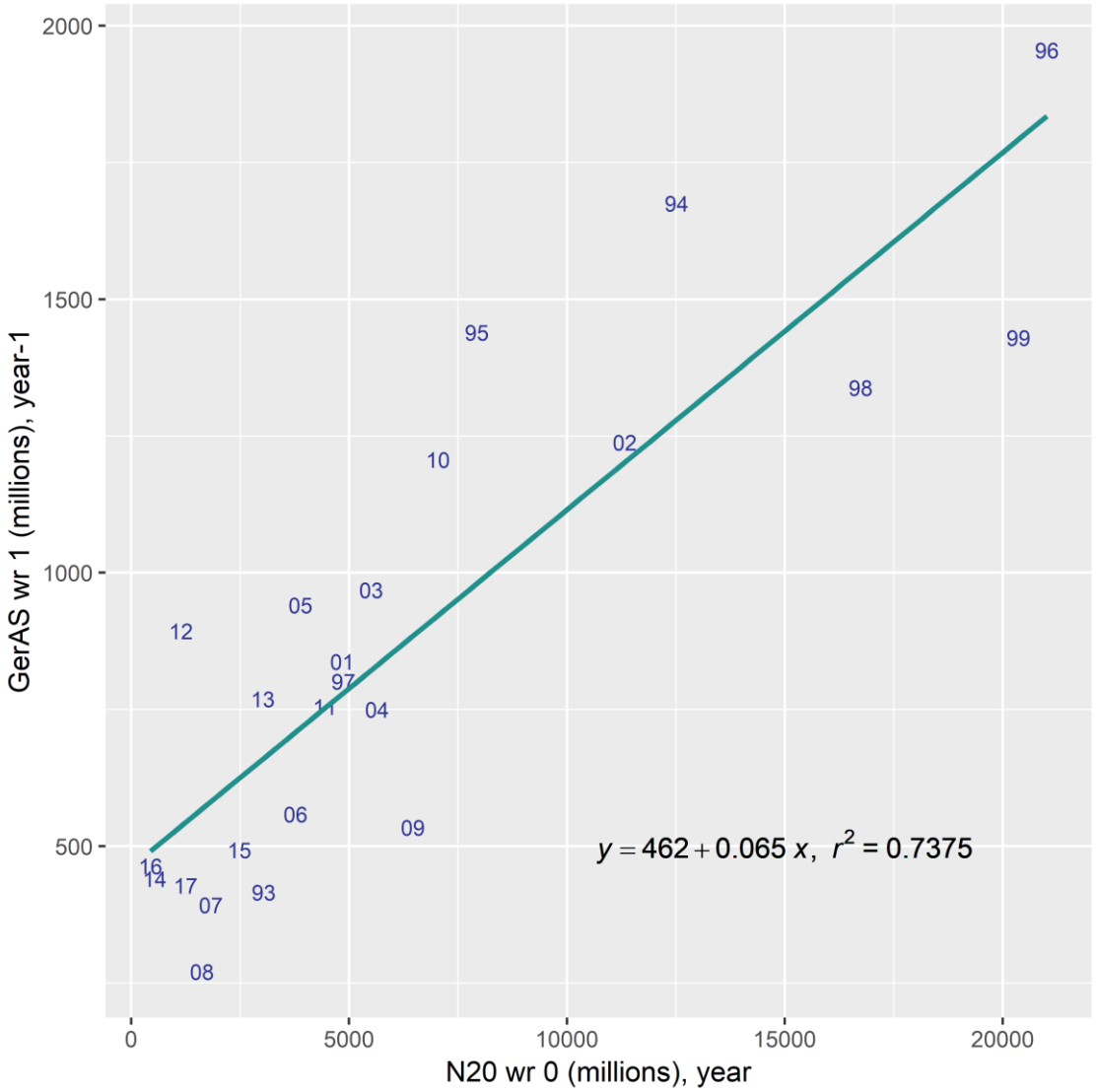

Figure 3.5.1 WESTERN BALTIC SPRING SPAWNING HERRING. Correlation of 1 wr herring from GERAS with the N20 larvae index. Note the year lag between surveys. Labels show the year of the N20.

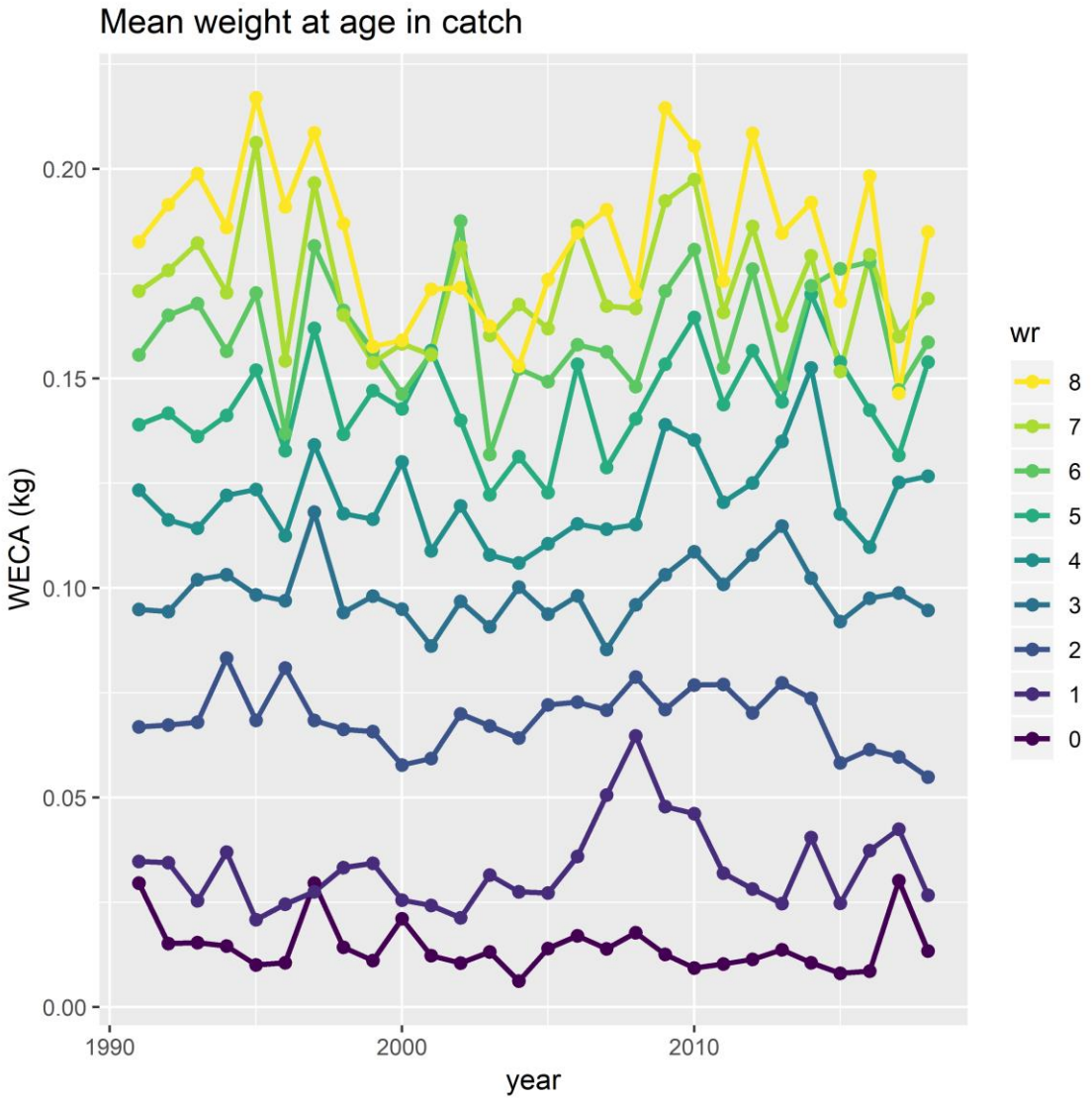

Figure 3.6.1.1 WESTERN BALTIC SPRING SPAWNING HERRING. Weight (kg) at age as W-ringers (wr) in the catch (WECA).

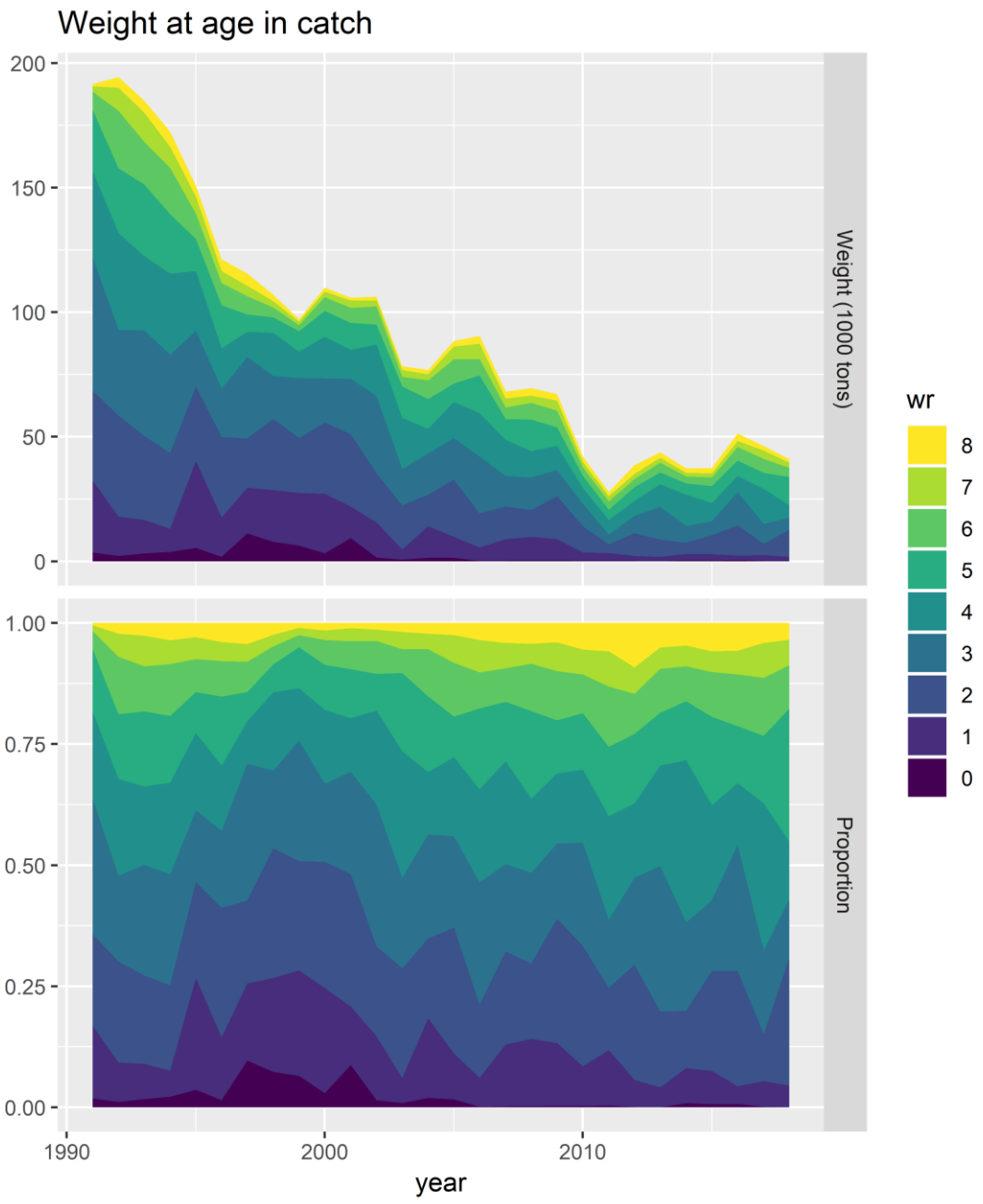

Figure 3.6.1.2 WESTERN BALTIC SPRING SPAWNING HERRING. Catch in weight. Upper panel: Catch in weight (1000 tons) at age as W-ringers (wr). Lower panel: Proportion (by weight) of a given age as W-ringers (wr) in the catch.

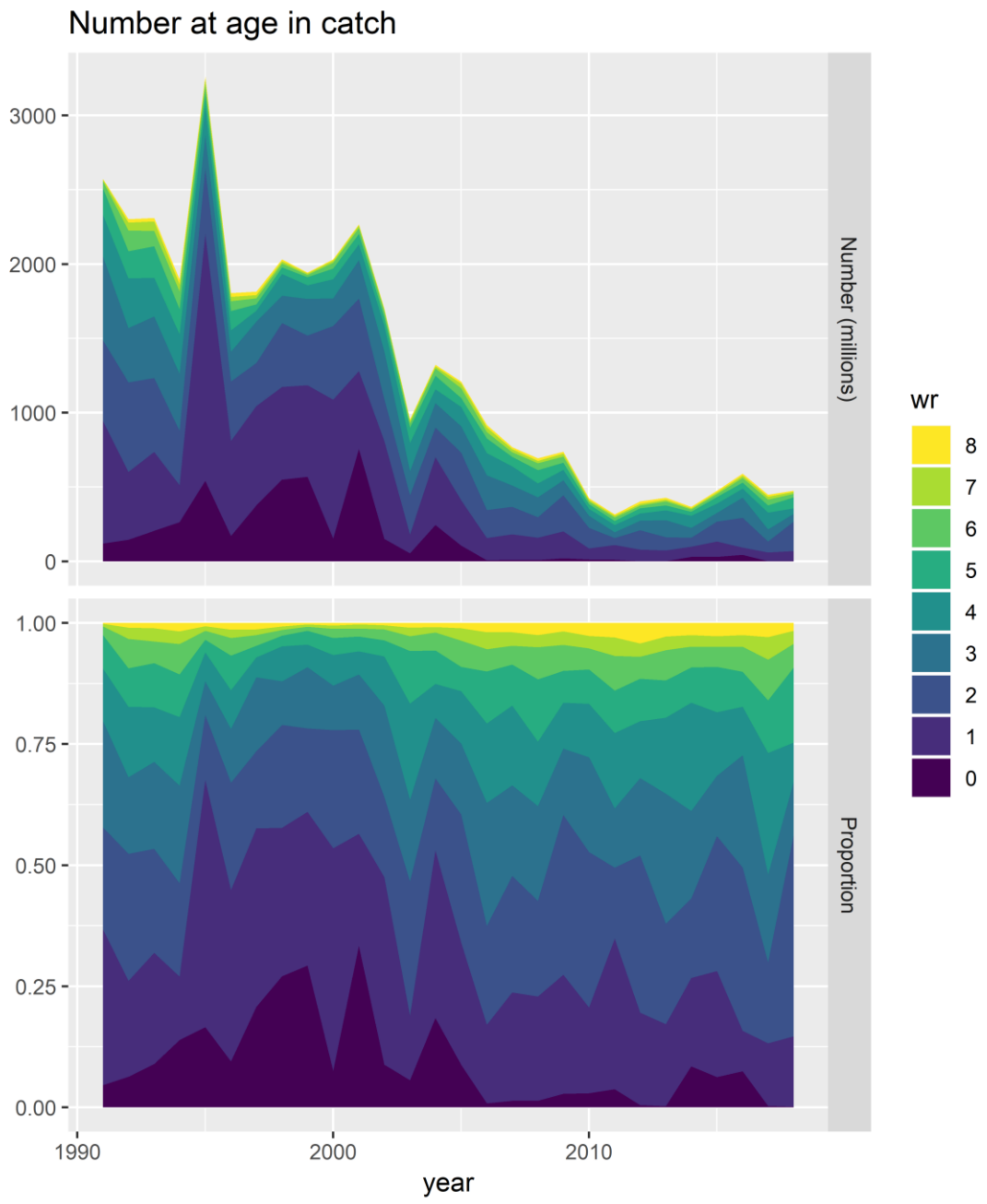

Figure 3.6.1.3 WESTERN BALTIC SPRING SPAWNING HERRING. Catch in Numbers. Upper panel: Catch in numbers (millions) at age as W-ringers (wr). Lower panel: Proportion (by number) of a given age as W-ringers (wr) in the catch.

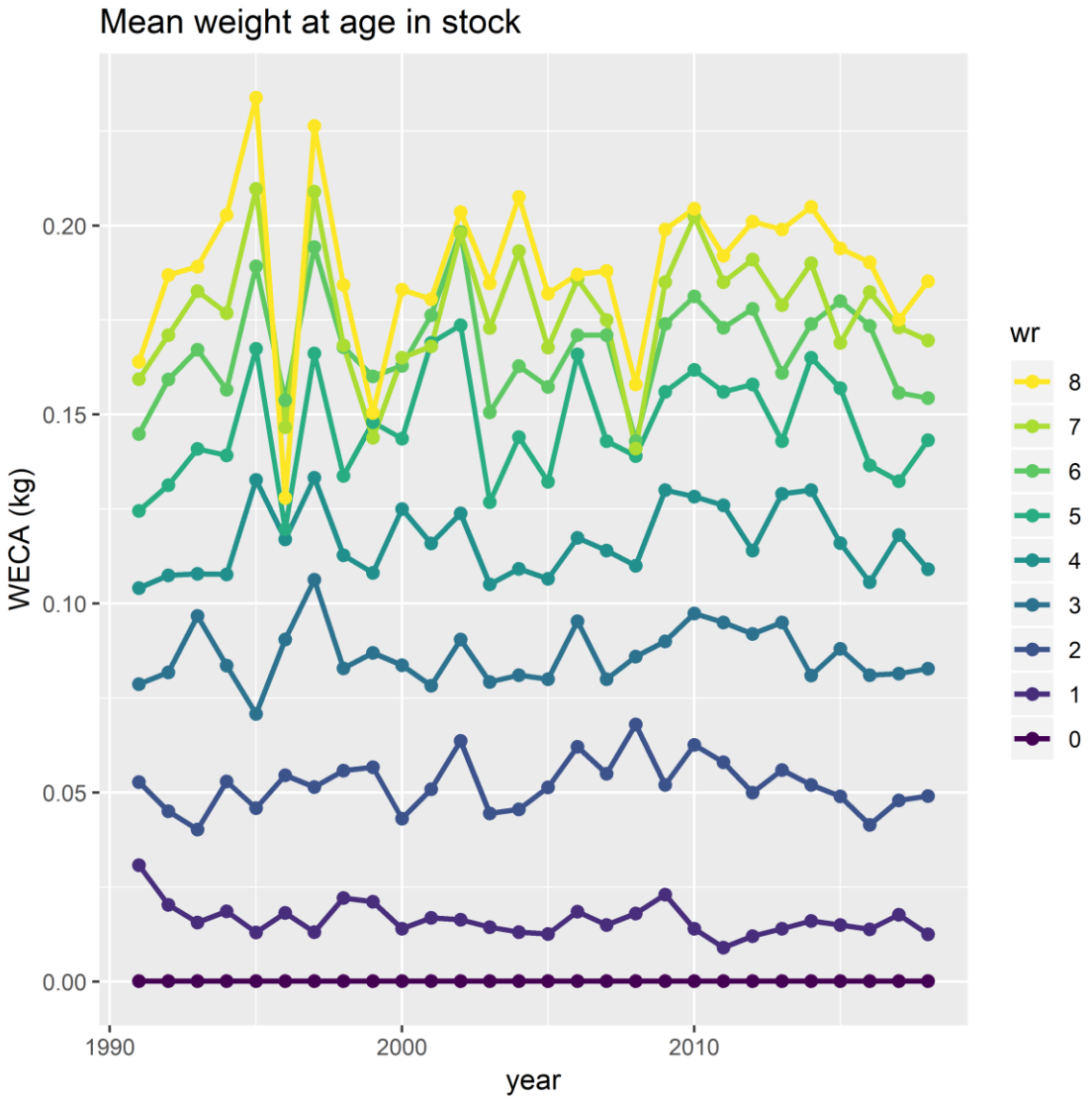

Figure 3.6.1.4 WESTERN BALTIC SPRING SPAWNING HERRING. Weight (kg) at age as W-ringers (wr) in the catch (WEST).

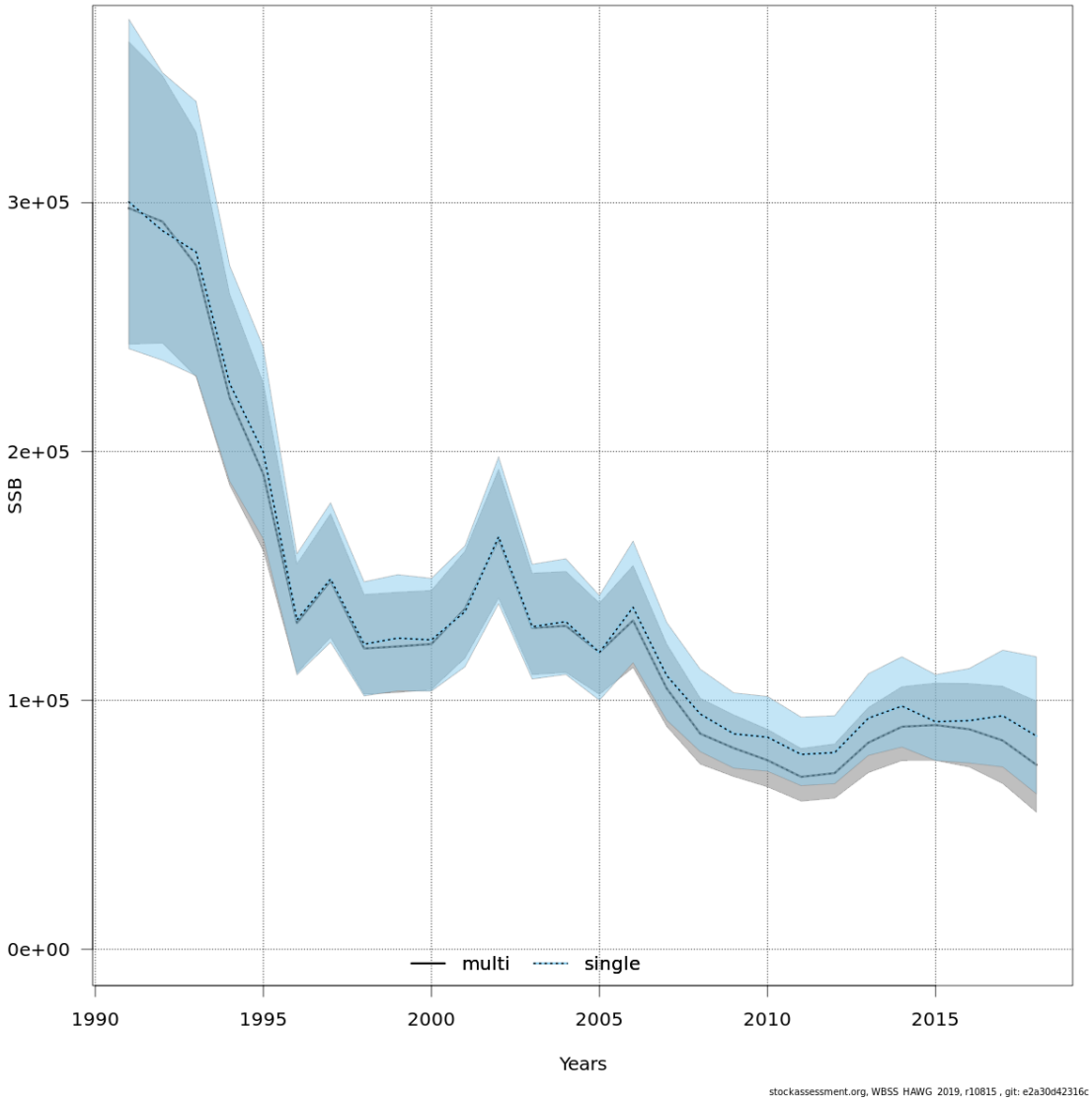

Figure 3.6.4.1 WESTERN BALTIC SPRING SPAWNING HERRING. Stock summary plot. Spawning stock biomass (SSB). Estimates from the WBSS multi fleet (multi) and the WBSS single fleet (single) assessment runs and point wise 95% confidence intervals are shown by line and shaded area.

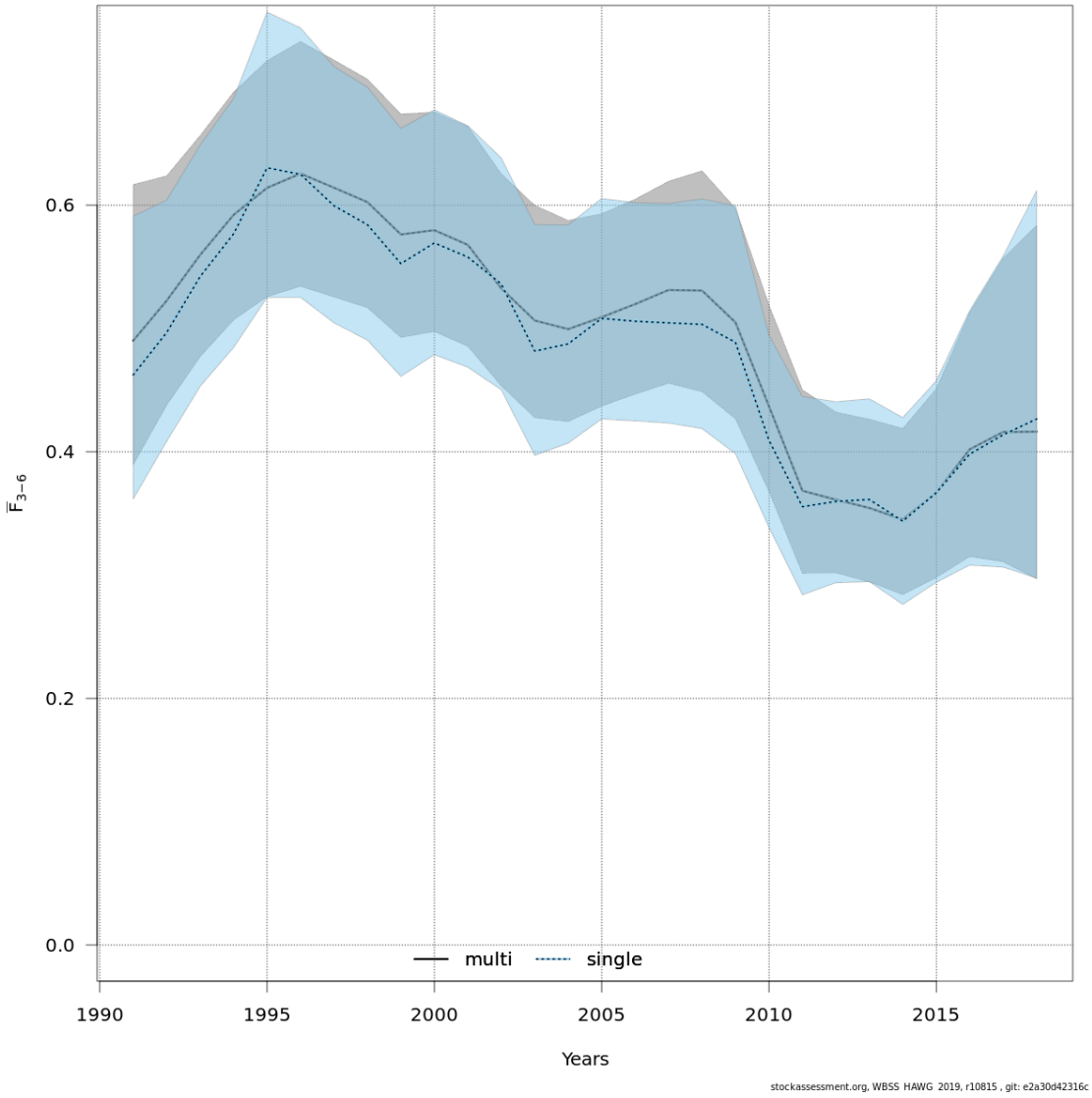

Figure 3.6.4.2 WESTERN BALTIC SPRING SPAWNING HERRING. Stock summary plot. Average fishing mortality (F) for the shown age range. Estimates from the WBSS multi fleet (multi) and the WBSS single fleet (single) assessment runs and point wise 95% confidence intervals are shown by line and shaded area.

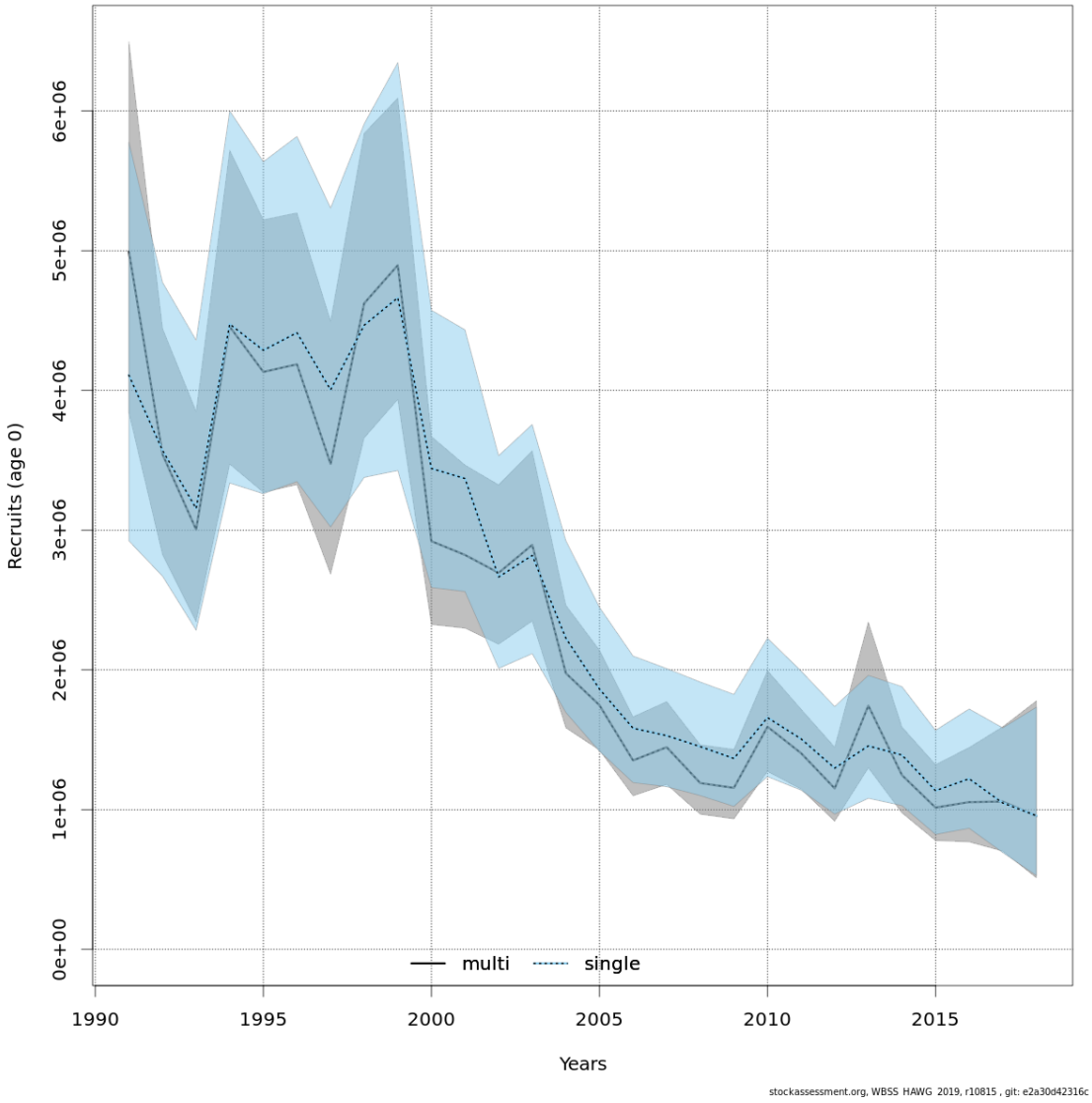

Figure 3.6.4.3 WESTERN BALTIC SPRING SPAWNING HERRING. Stock summary plot. Yearly recruitment (age 0 equal 0 W-ringers). Estimates from the WBSS multi fleet (multi) and the WBSS single fleet (single) assessment runs and point wise 95% confidence intervals are shown by line and shaded area.

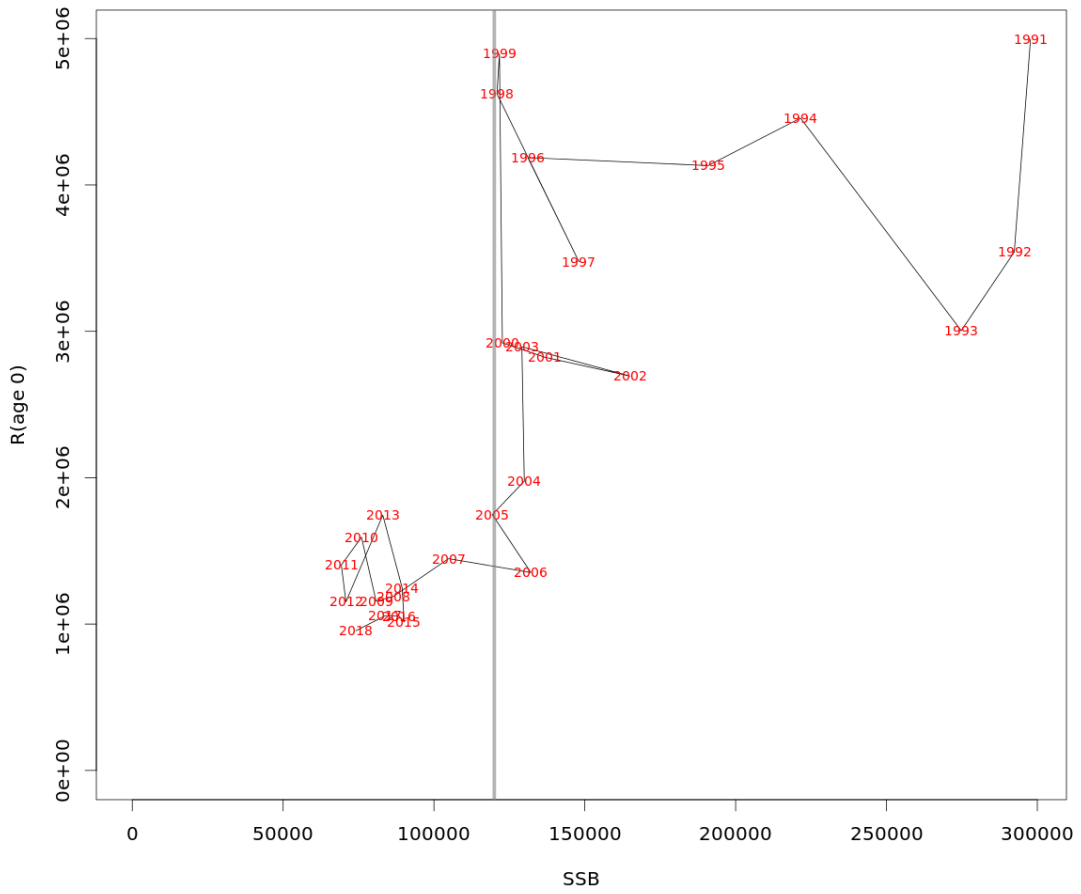

Figure 3.6.4.4 WESTERN BALTIC SPRING SPAWNING HERRING. Recruitment at age 0-wr (in thousands) is plotted against spawning stock biomass (tonnes) as estimated by the assessment.

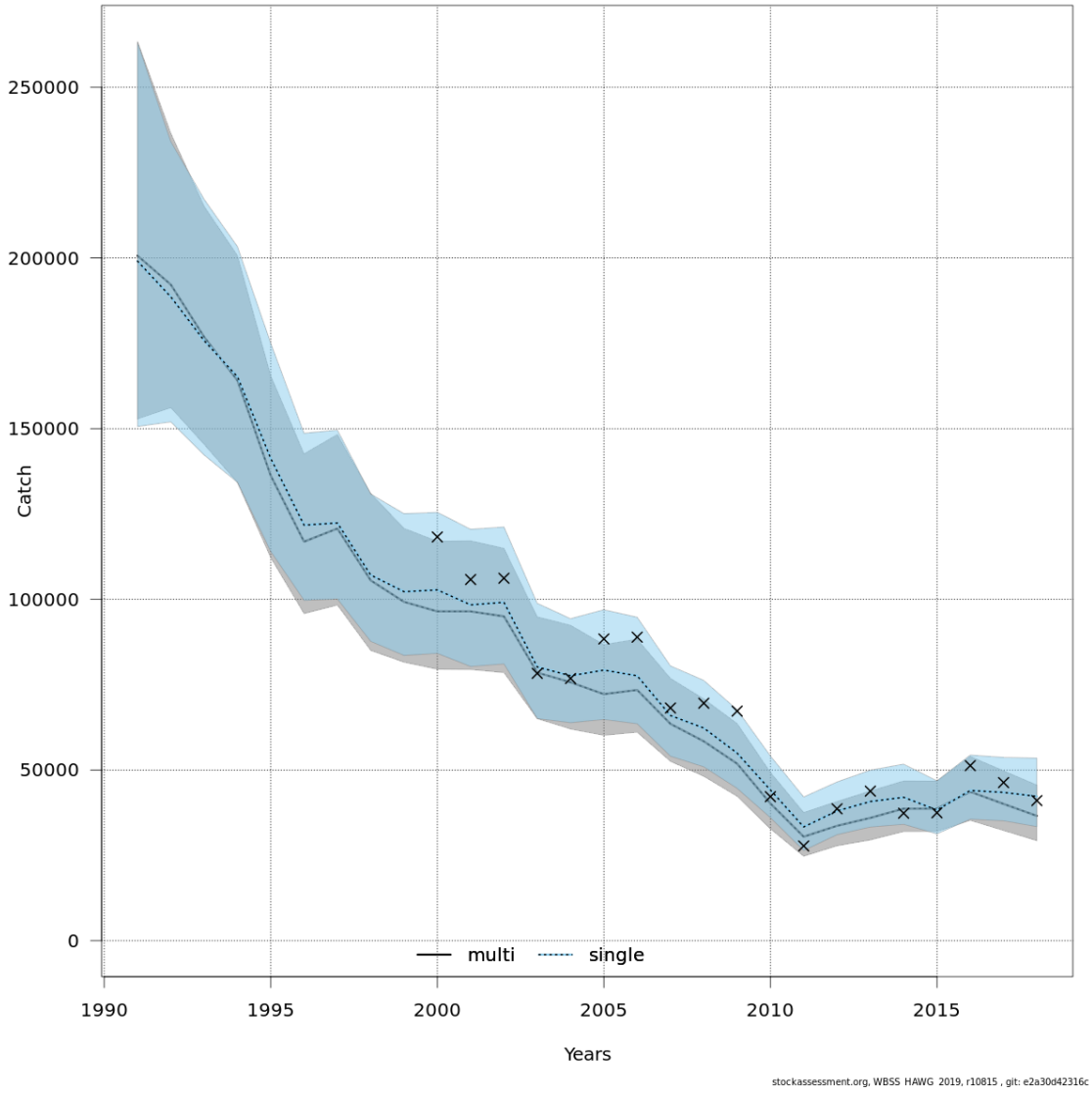

Figure 3.6.4.5 WESTERN BALTIC SPRING SPAWNING HERRING. Total catch in weight (tons). Prediction from the WBSS multi fleet (multi) and the WBSS single fleet (single) assessment runs and point wise 95% confidence intervals are shown by line and shaded area. The yearly observed total catch weight (crosses) are calculated sum of catch per fleet.

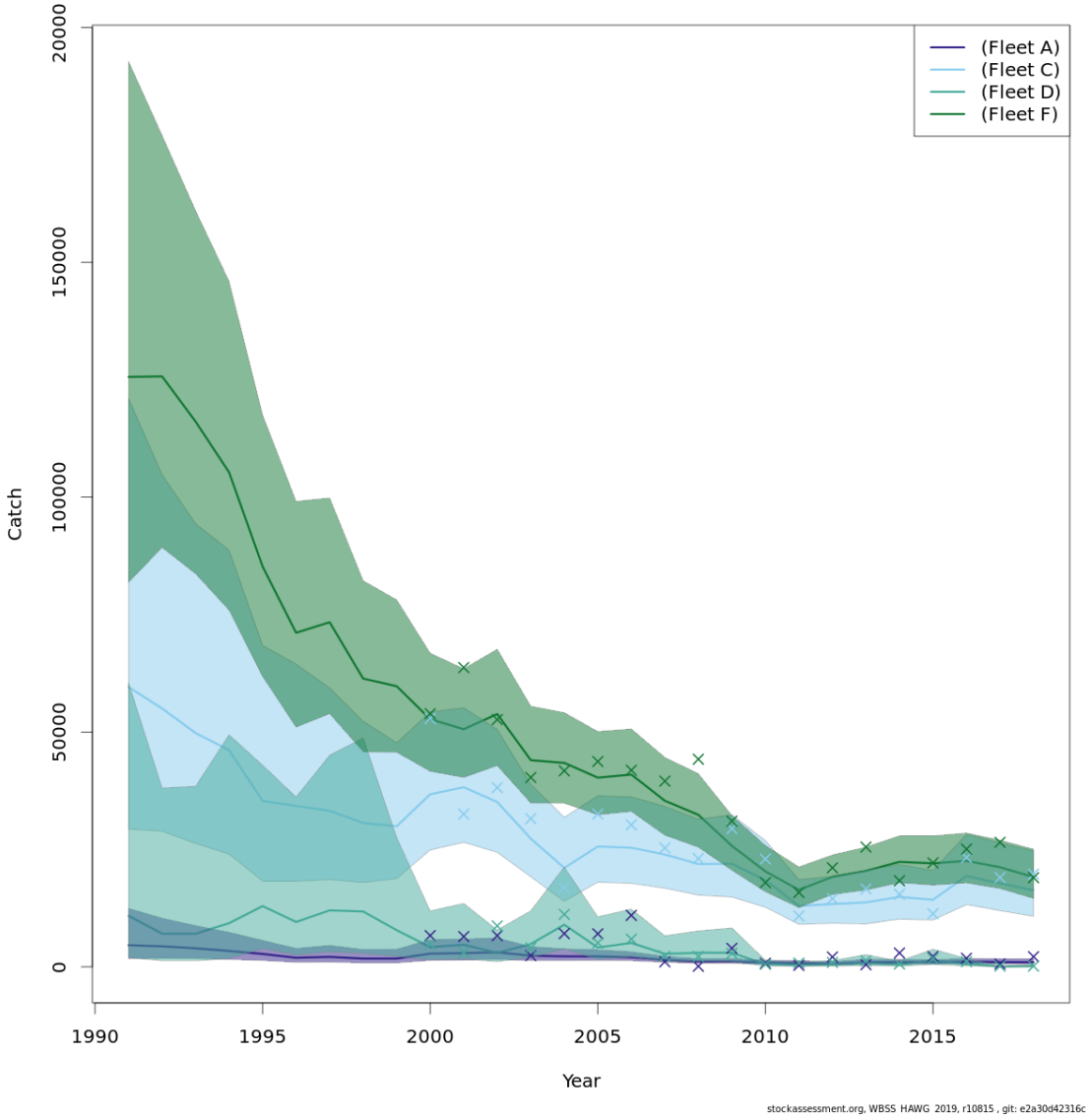

Figure 3.6.4.6 WESTERN BALTIC SPRING SPAWNING HERRING. Total catch in weight (tons) by fleet. Prediction from the WBSS multi fleet assessment run and point wise 95% confidence intervals are shown by line and shaded area. The plot also show the observed total catch weight per fleet (crosses)

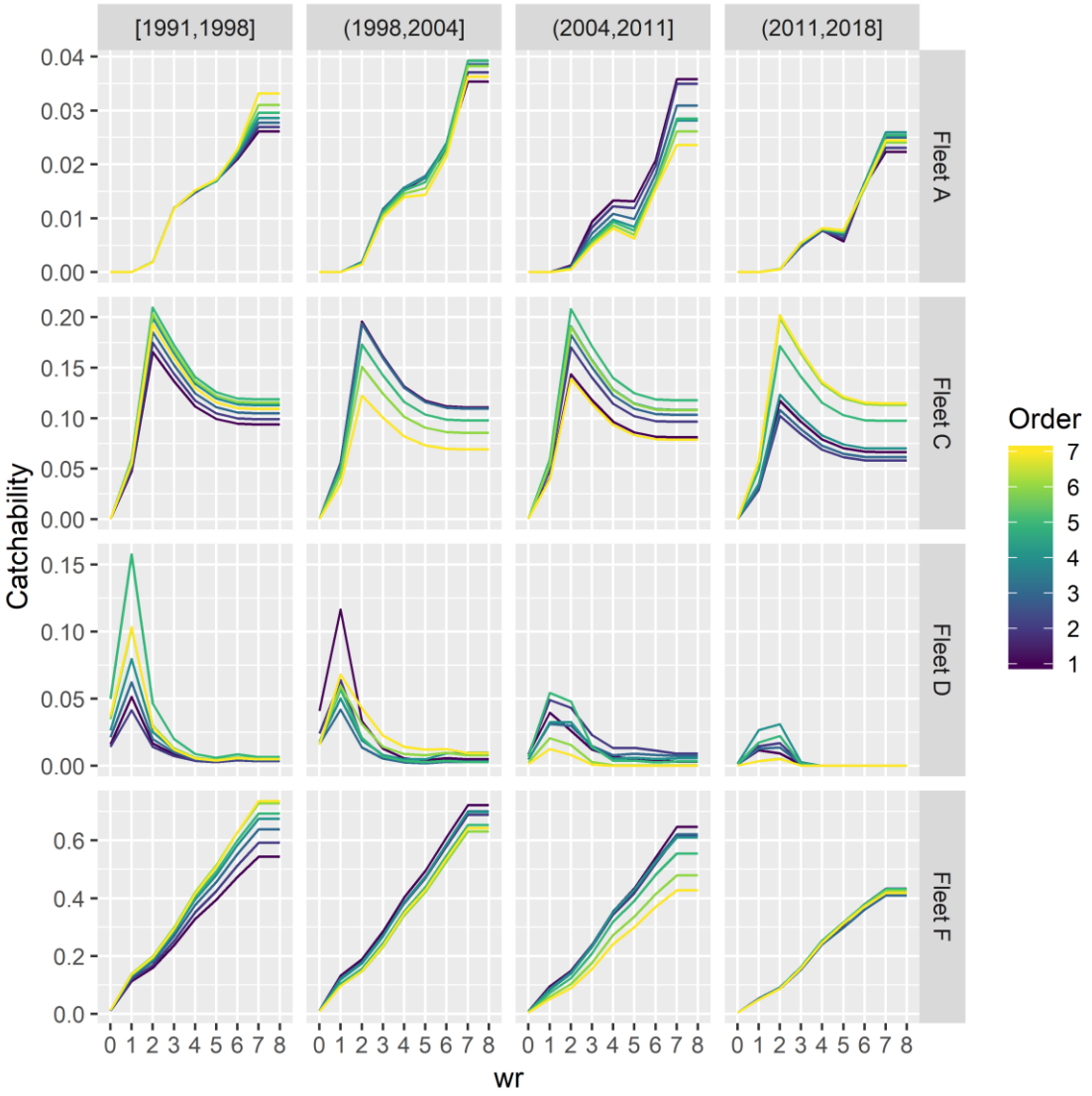

Figure 3.6.4.7 WESTERN BALTIC SPRING SPAWNING HERRING. Estimated selection pattern at age as W-ringers (wr) per fleet and year. Order: 1 equal 1st year in the respective time span.

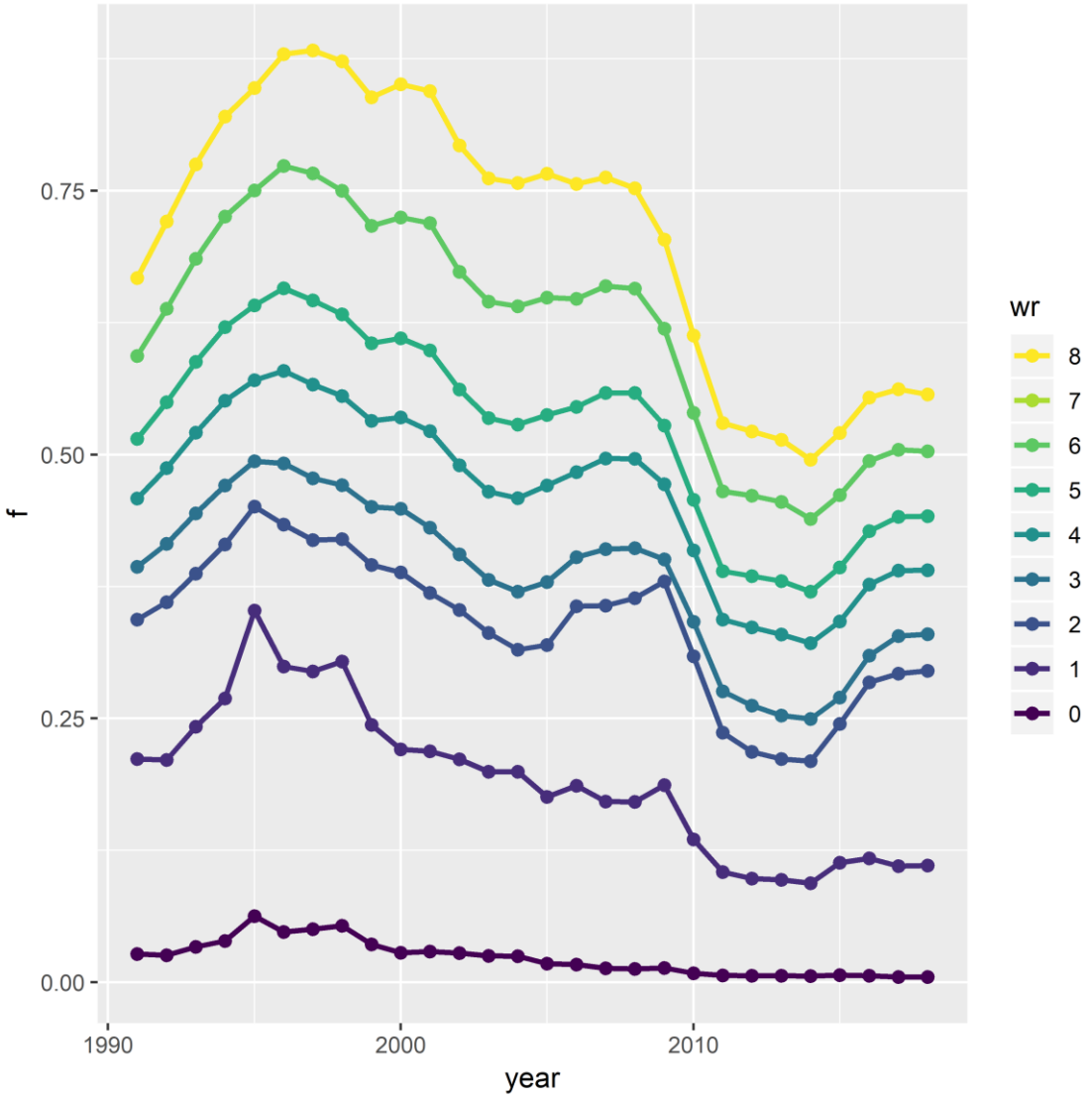

Figure 3.6.4.8 Western Baltic Spring Spawning Herring. Time-series of estimated fishing mortality-at-age as W-ringers (wr)

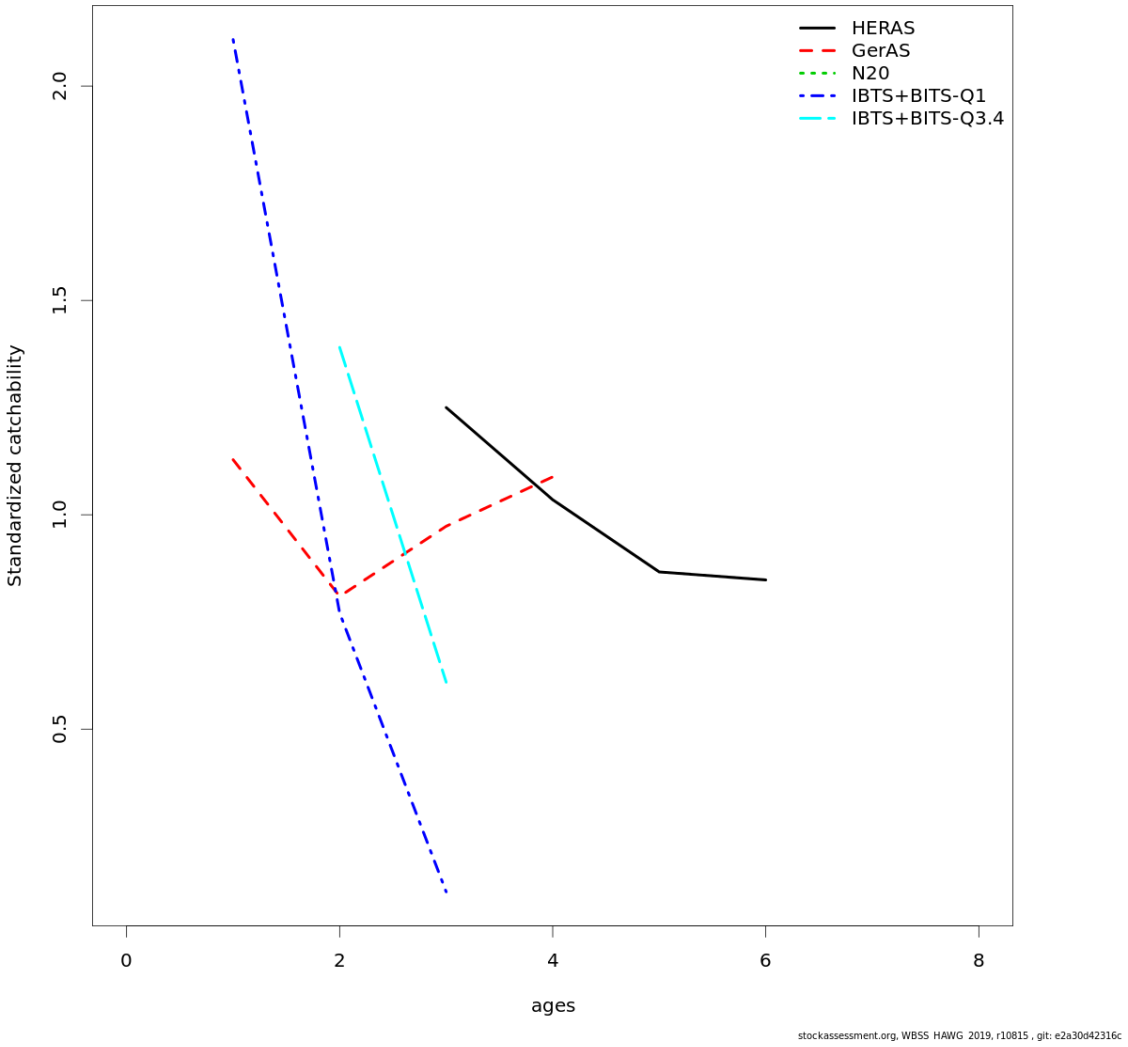

Figure 3.6.4.9 Western Baltic Spring Spawning Herring. Estimated survey catchabilities. N20 only covers an age 0 and therefore no line

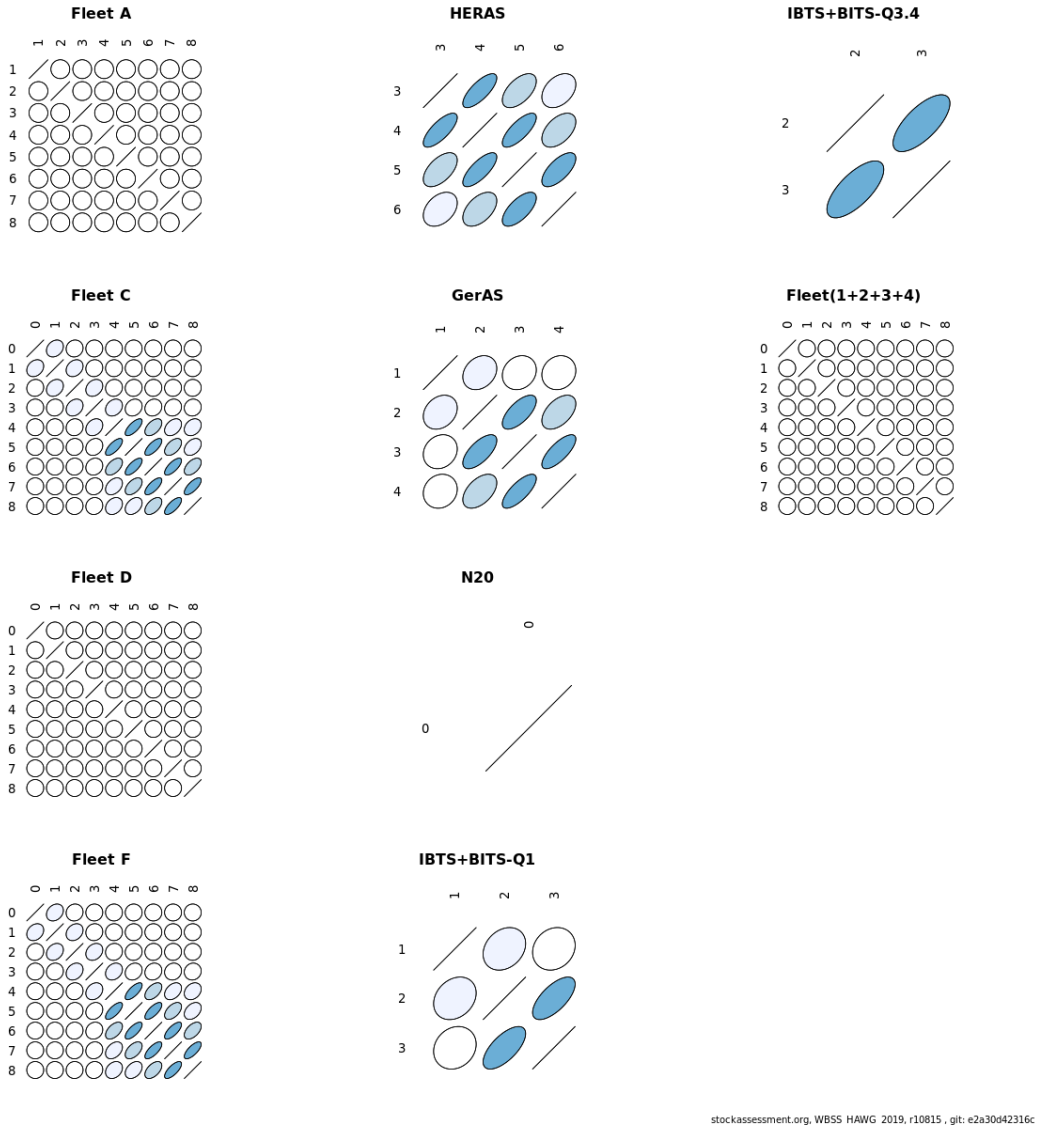

Figure 3.6.4.10 WESTERN BALTIC SPRING SPAWNING HERRING. Estimates correlations between age groups for each fleet.

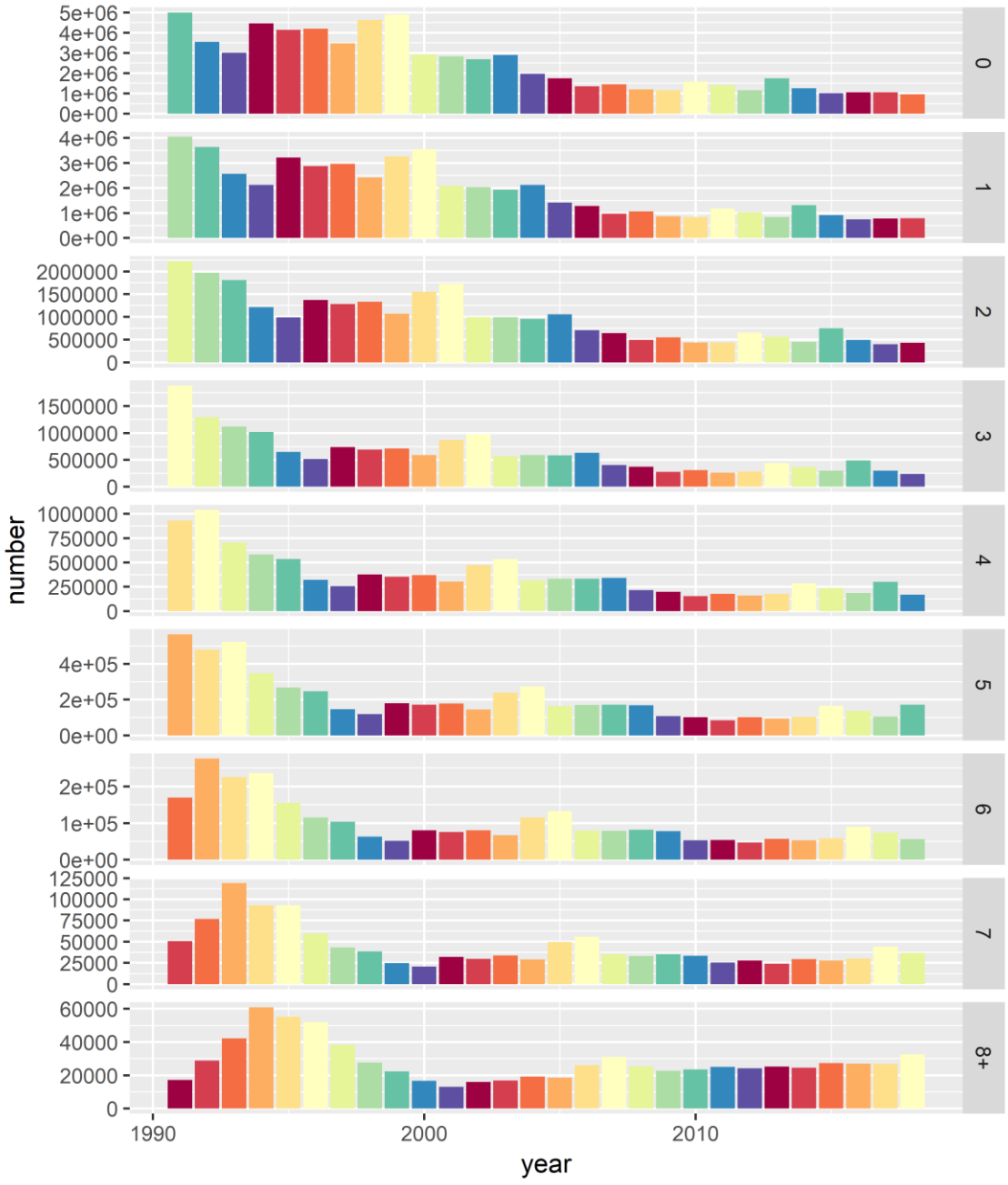

Figure 3.6.4.11 WESTERN BALTIC SPRING SPAWNING HERRING. Estimated age distribution in the stock. Colours represent a cohort

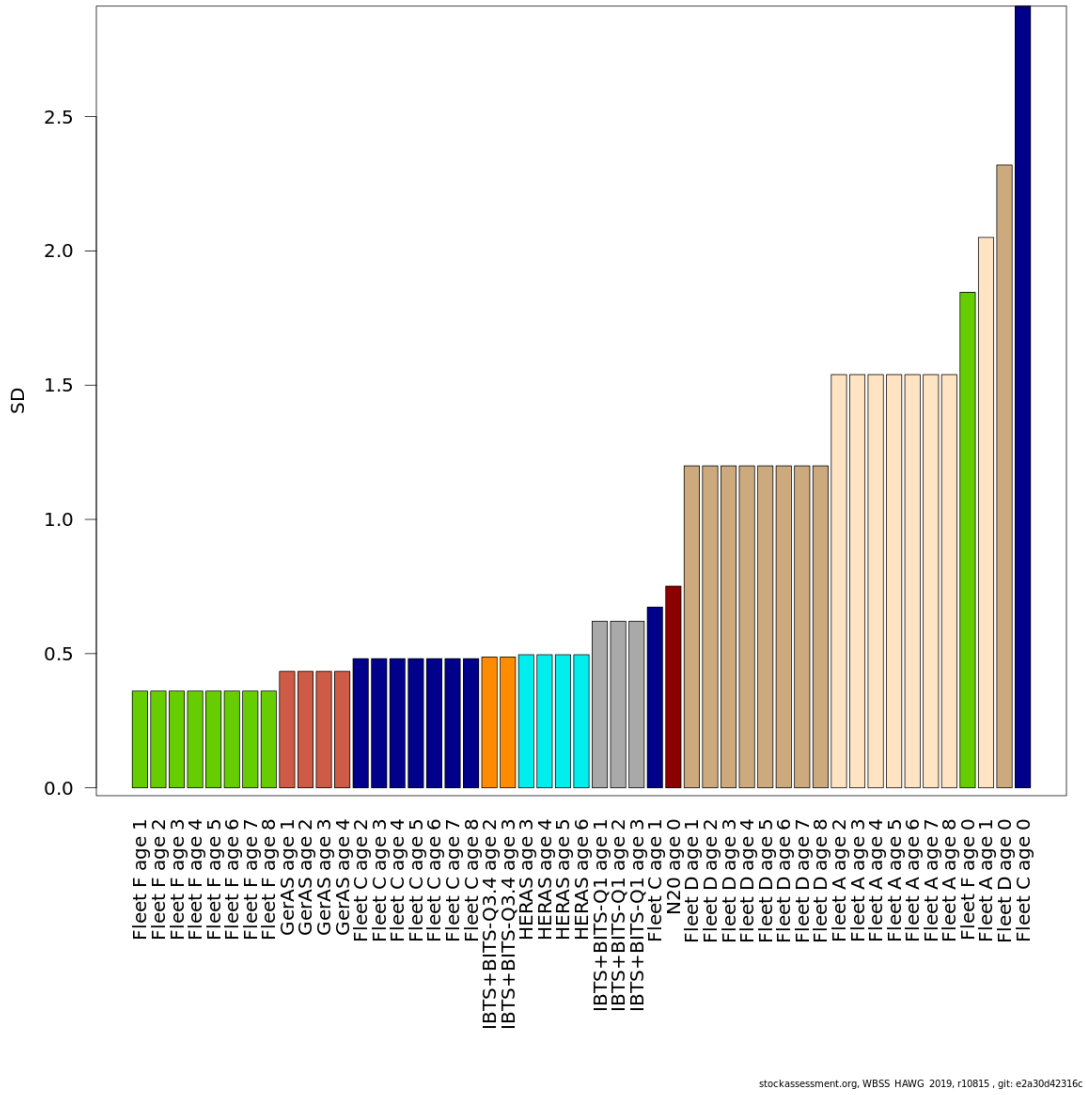

Figure 3.6.4.12 WESTERN BALTIC SPRING SPAWNING HERRING. Estimated observation variance in the WBSS multi fleet assessment run.

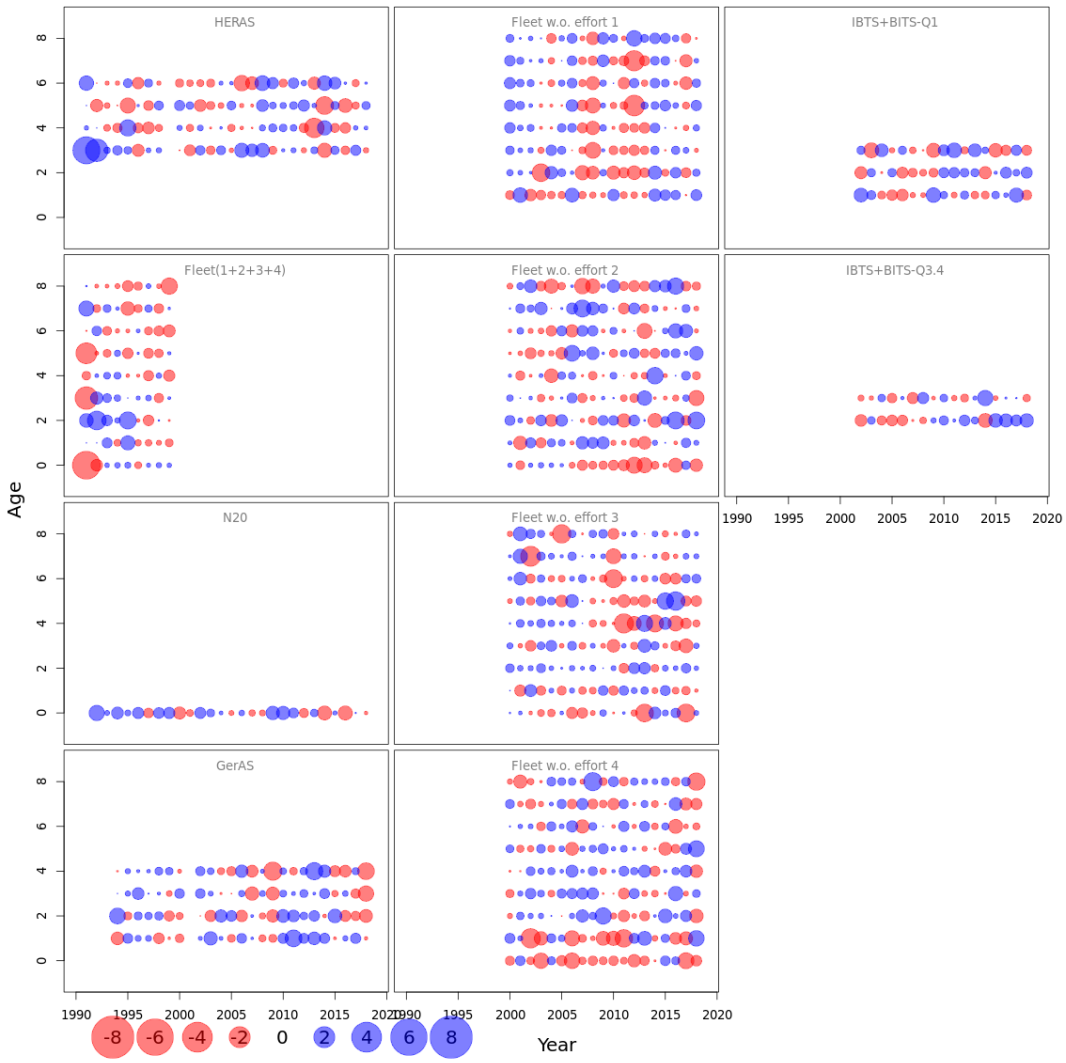

Figure 3.6.4.13 WESTERN BALTIC SPRING SPAWNING HERRING. BUBBLE PLOT. Standardized one-observation-ahead residuals from multi fleet run.

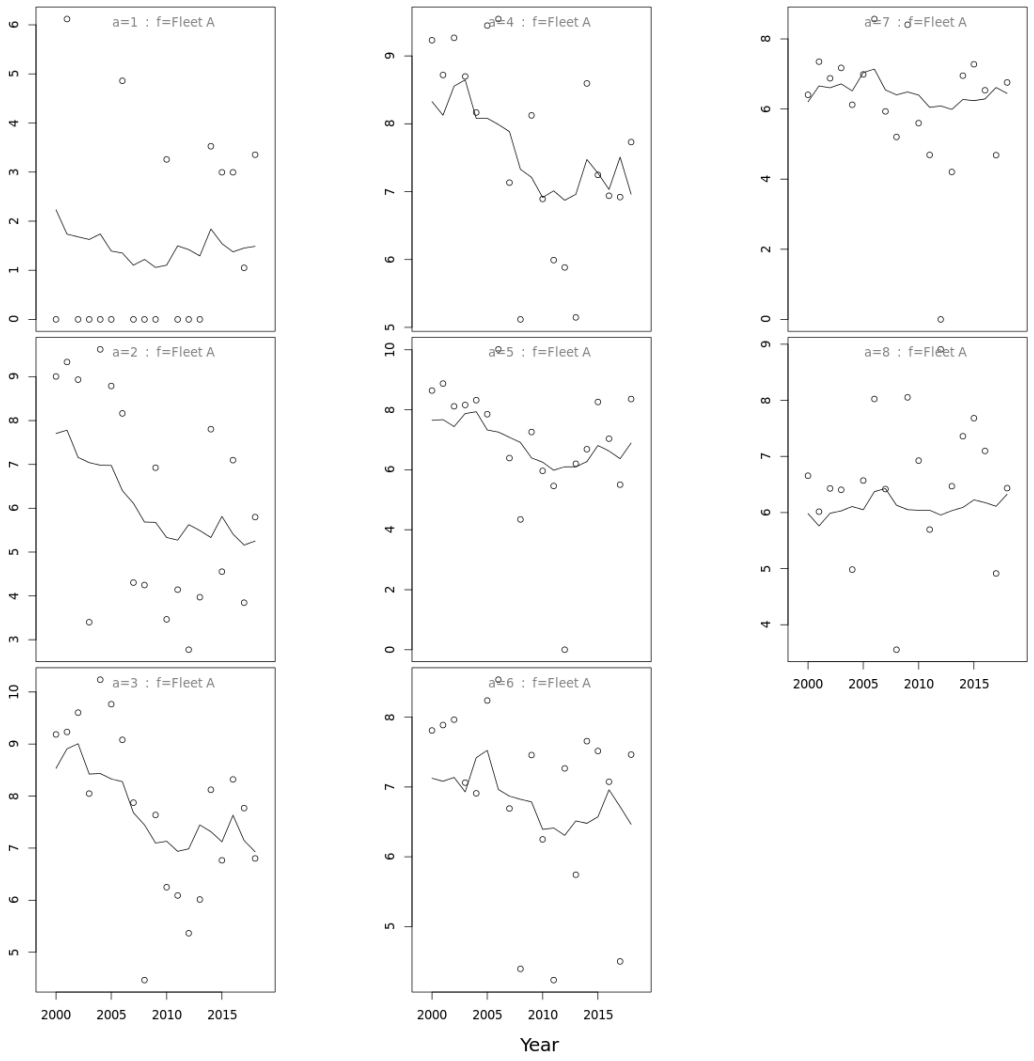

Figure 3.6.4.14 WESTERN BALTIC SPRING SPAWNING HERRING. Diagnostics of commercial catches fit per fleet. Fleet A. Plot of predicted (line) and observed (points) catches (log scale) per W-ringers (a) and year.

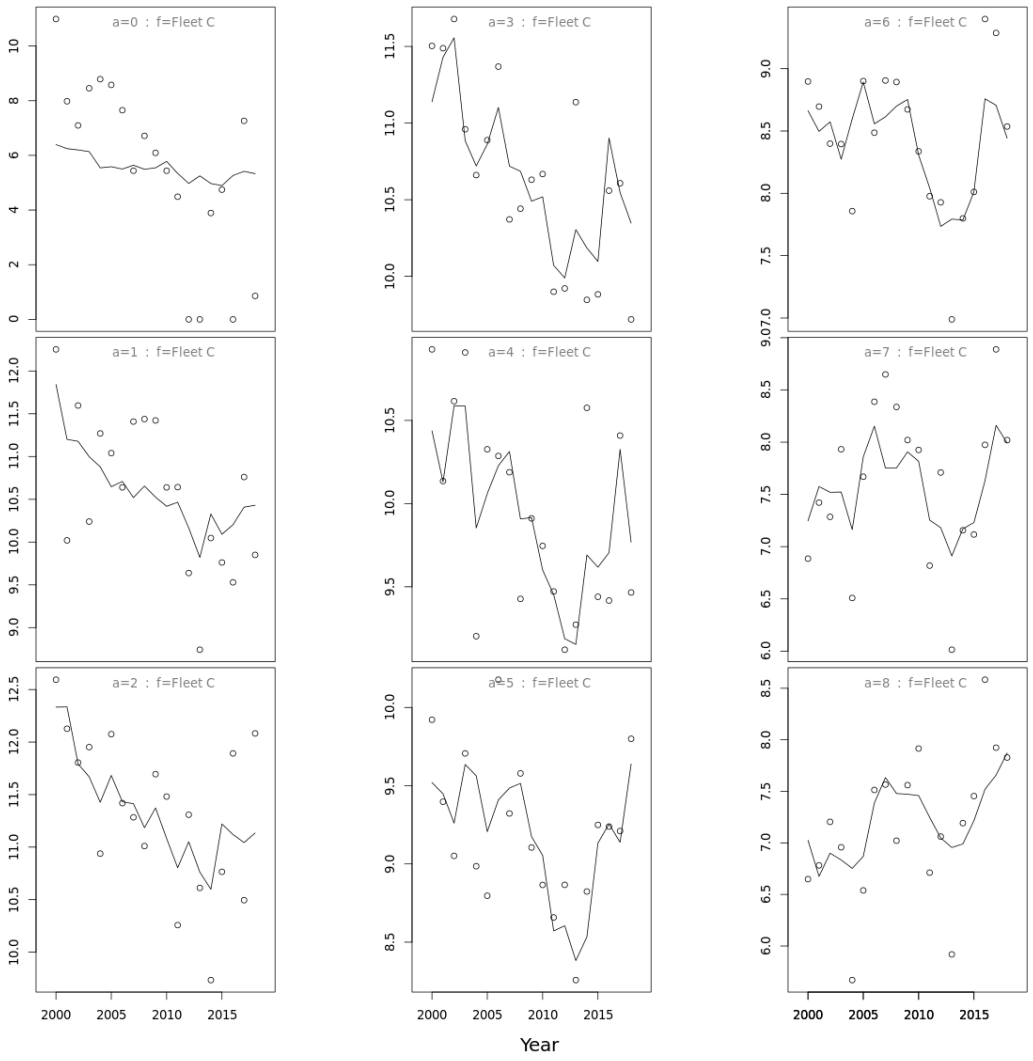

Figure 3.6.4.15 WESTERN BALTIC SPRING SPAWNING HERRING. Diagnostics of commercial catches fit per fleet. Fleet C. Plot of predicted (line) and observed (points) catches (log scale) per W-ringers (a) and year.

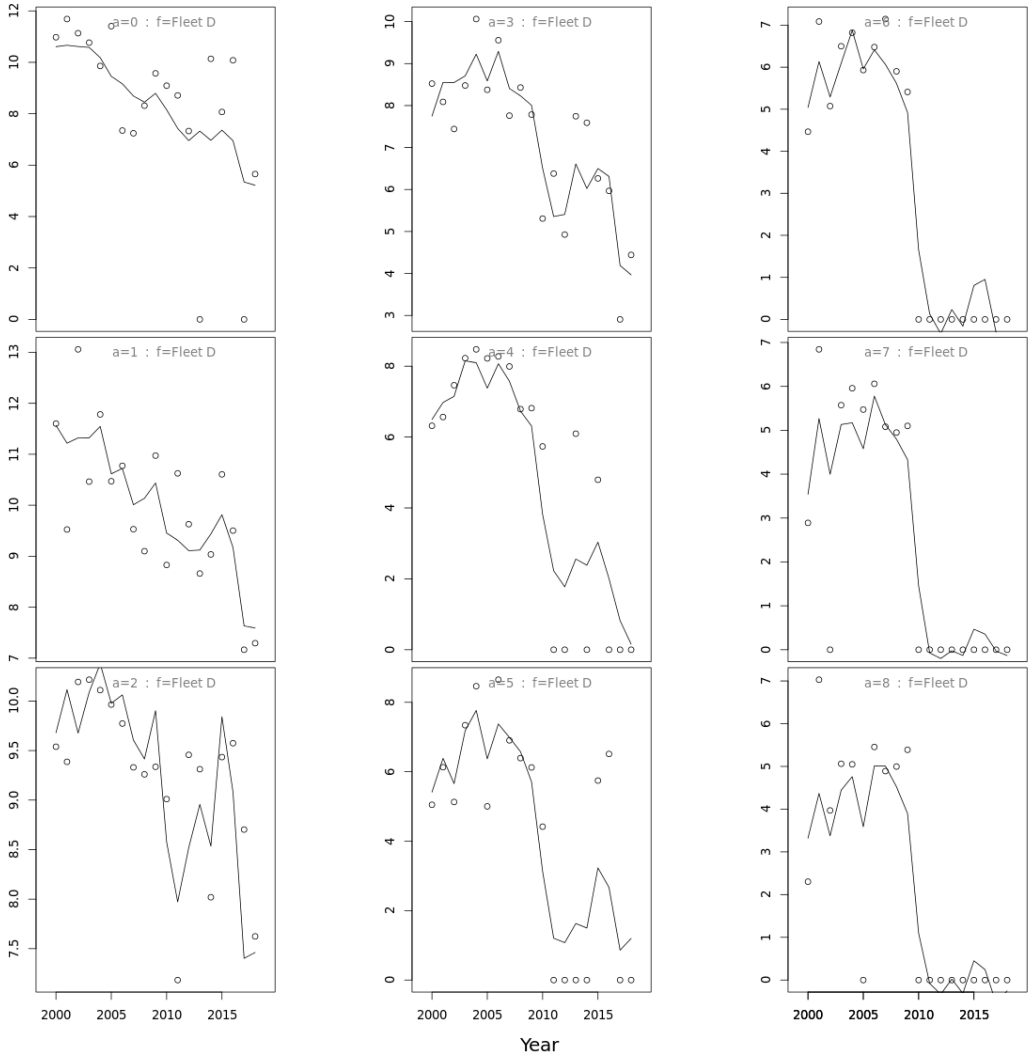

Figure 3.6.4.16 WESTERN BALTIC SPRING SPAWNING HERRING. Diagnostics of commercial catches fit per fleet. Fleet D. Plot of predicted (line) and observed (points) catches (log scale) per W-ringers (a) and year.

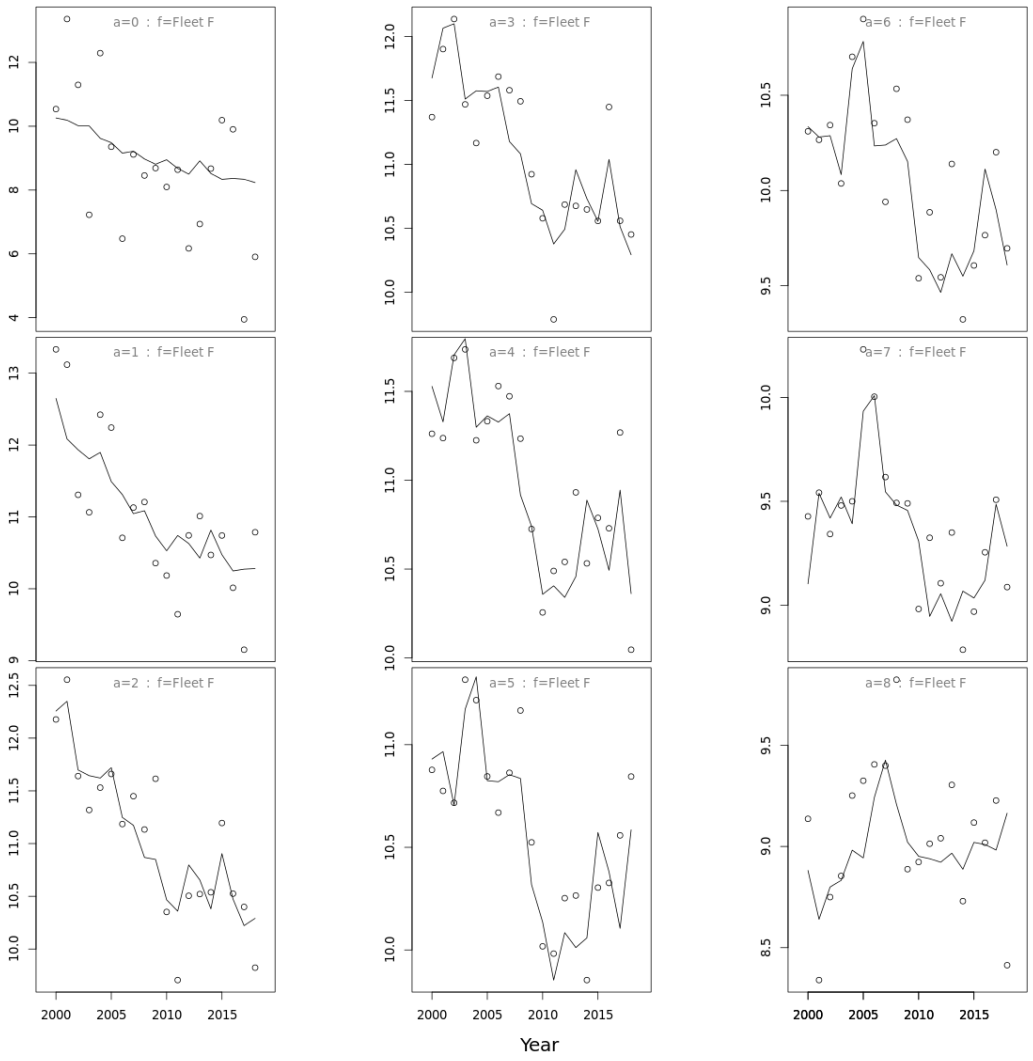

Figure 3.6.4.17 WESTERN BALTIC SPRING SPAWNING HERRING. Diagnostics of commercial catches fit per fleet. Fleet F. Plot of predicted (line) and observed (points) catches (log scale) per W-ringers (a) and year.

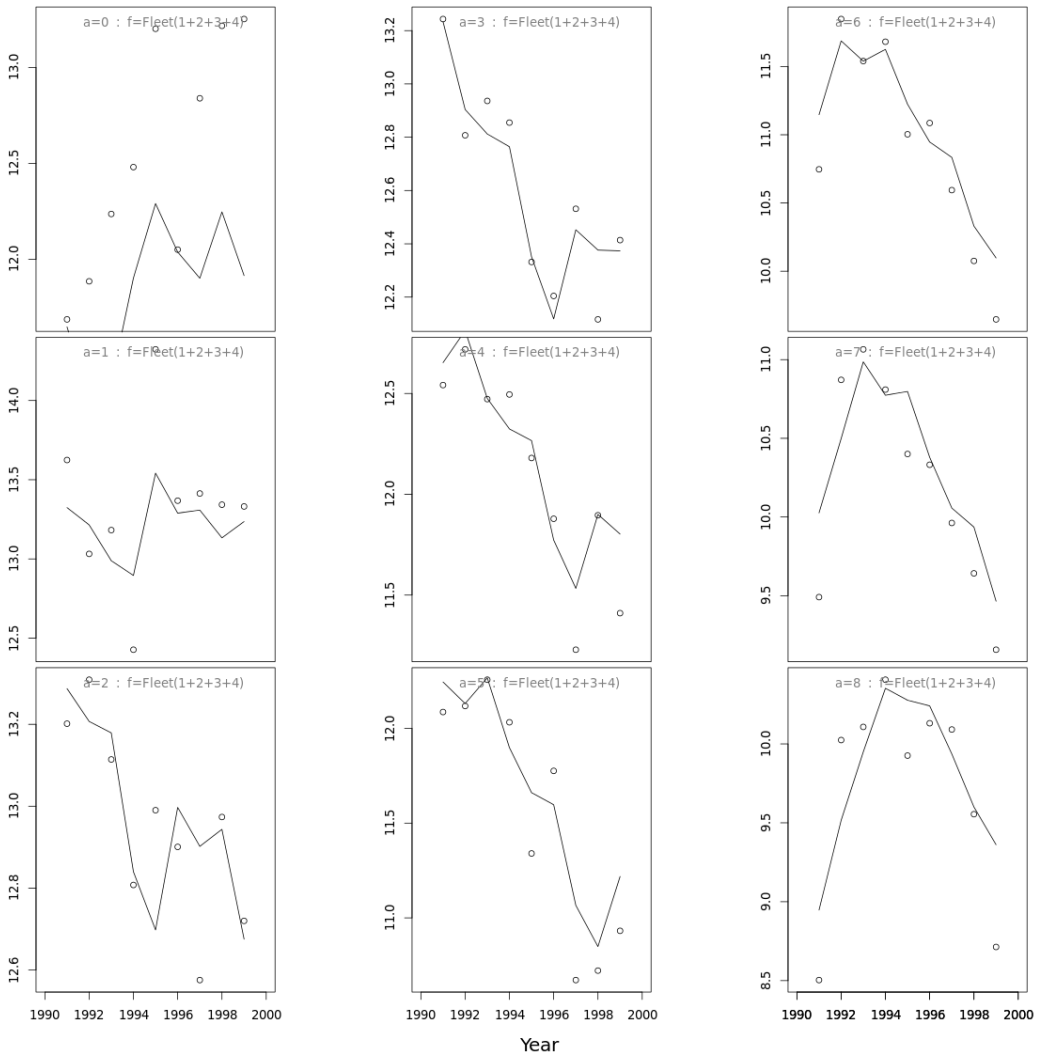

Figure 3.6.4.18 WESTERN BALTIC SPRING SPAWNING HERRING. Diagnostics of commercial catches fit per fleet. Sum of fleets Plot of predicted (line) and observed (points) catches (log scale) per W-ringers (a) and year.

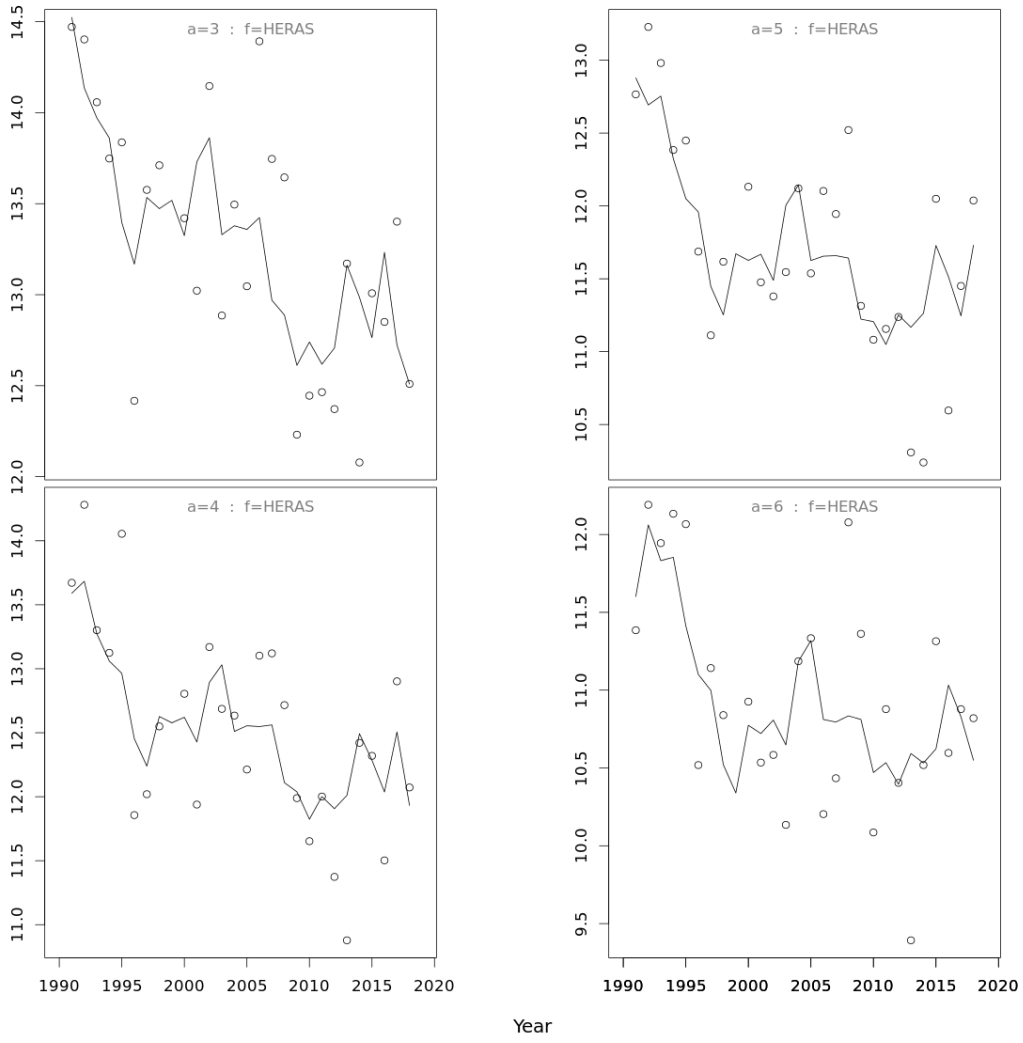

Figure 3.6.4.19 WESTERN BALTIC SPRING SPAWNING HERRING. Diagnostics of the HERAS index. Plot of predicted (line) and observed (points) index (log scale) per W-ringers (a) and year.

Figure 3.6.4.20 WESTERN BALTIC SPRING SPAWNING HERRING. Diagnostics of the GerAs index. Plot of predicted (line) and observed (points) index (log scale) per W-ringers (a) and year.

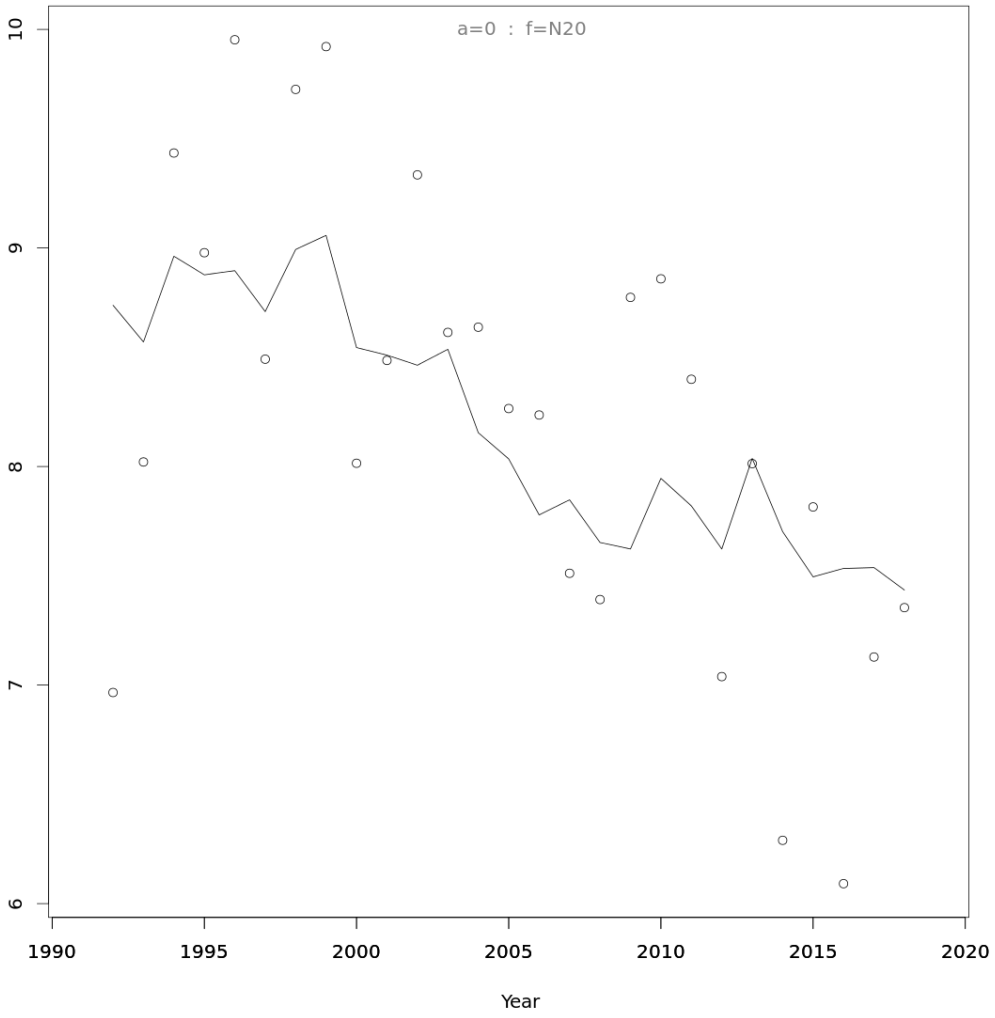

Figure 3.6.4.21 WESTERN BALTIC SPRING SPAWNING HERRING. Diagnostics of the N20 index. Plot of predicted (line) and observed (points) index (log scale) per W-ringers (a) and year.

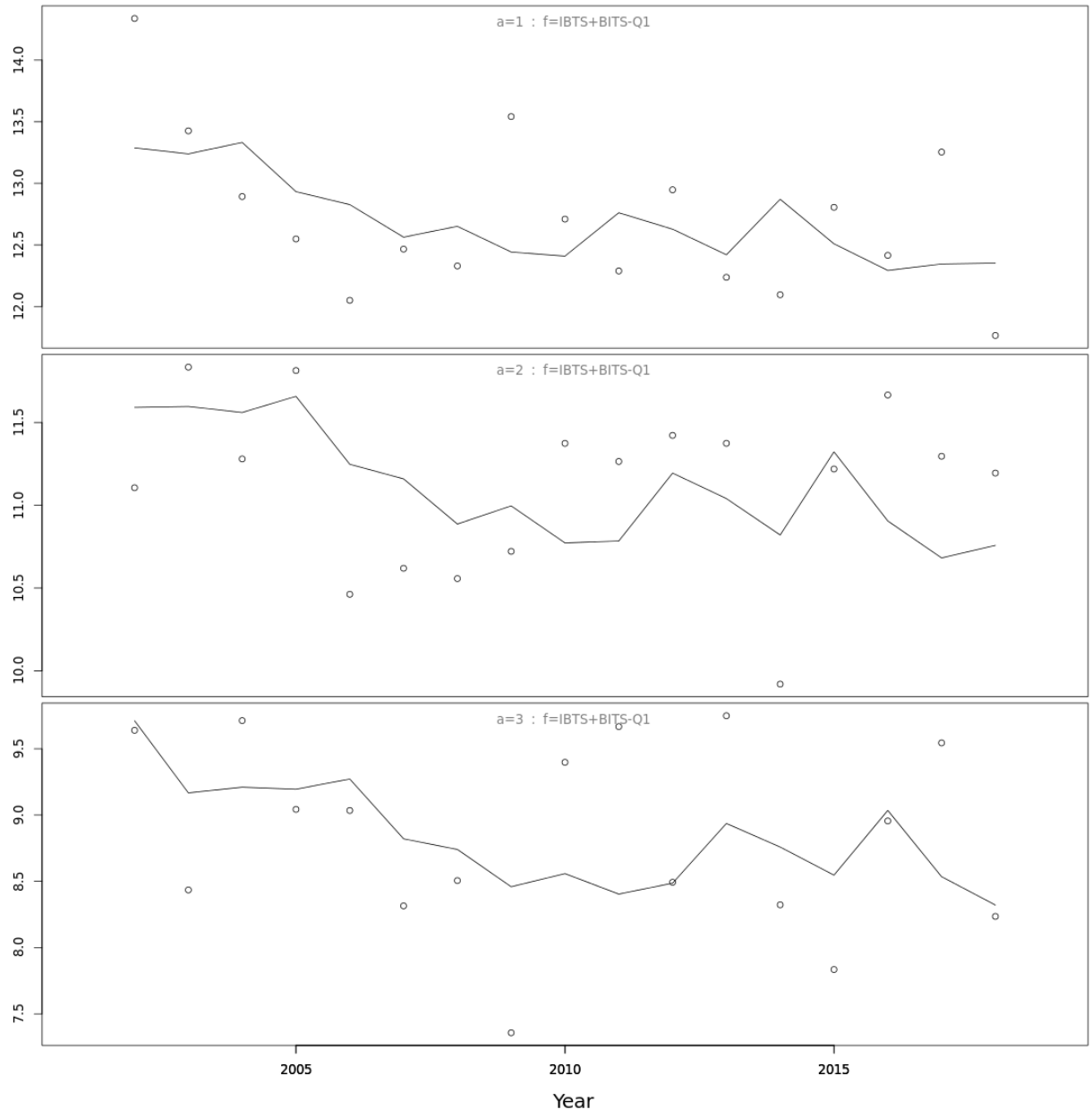

Figure 3.6.4.22 WESTERN BALTIC SPRING SPAWNING HERRING. Diagnostics of the IBTS+BITS-Q1 index. Plot of predicted (line) and observed (points) index (log scale) per W-ringers (a) and year.

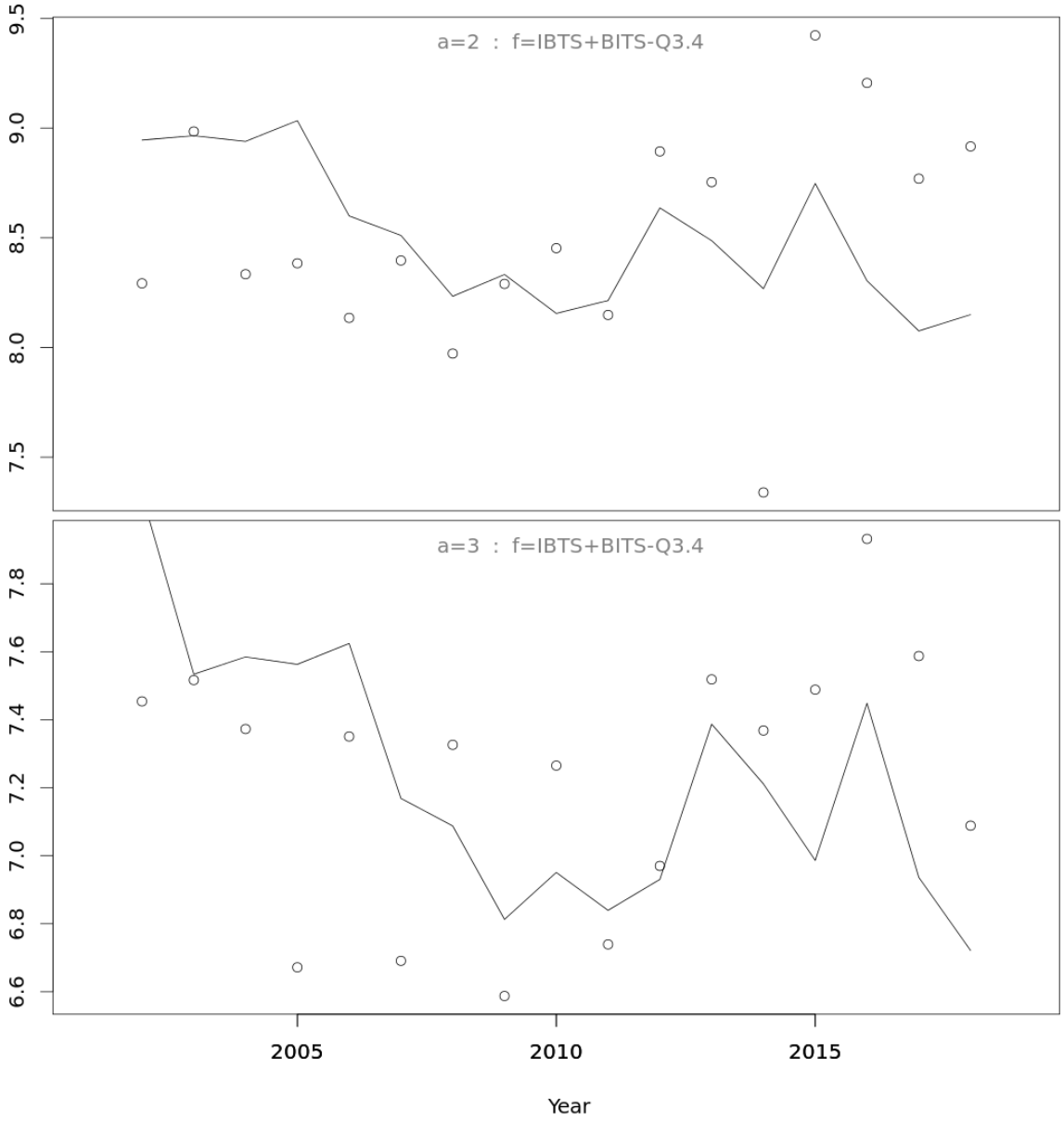

Figure 3.6.4.23 WESTERN BALTIC SPRING SPAWNING HERRING. Diagnostics of the IBTS+BITS-Q3.4 index. Plot of predicted (line) and observed (points) index (log scale) per W-ringers (a) and year.

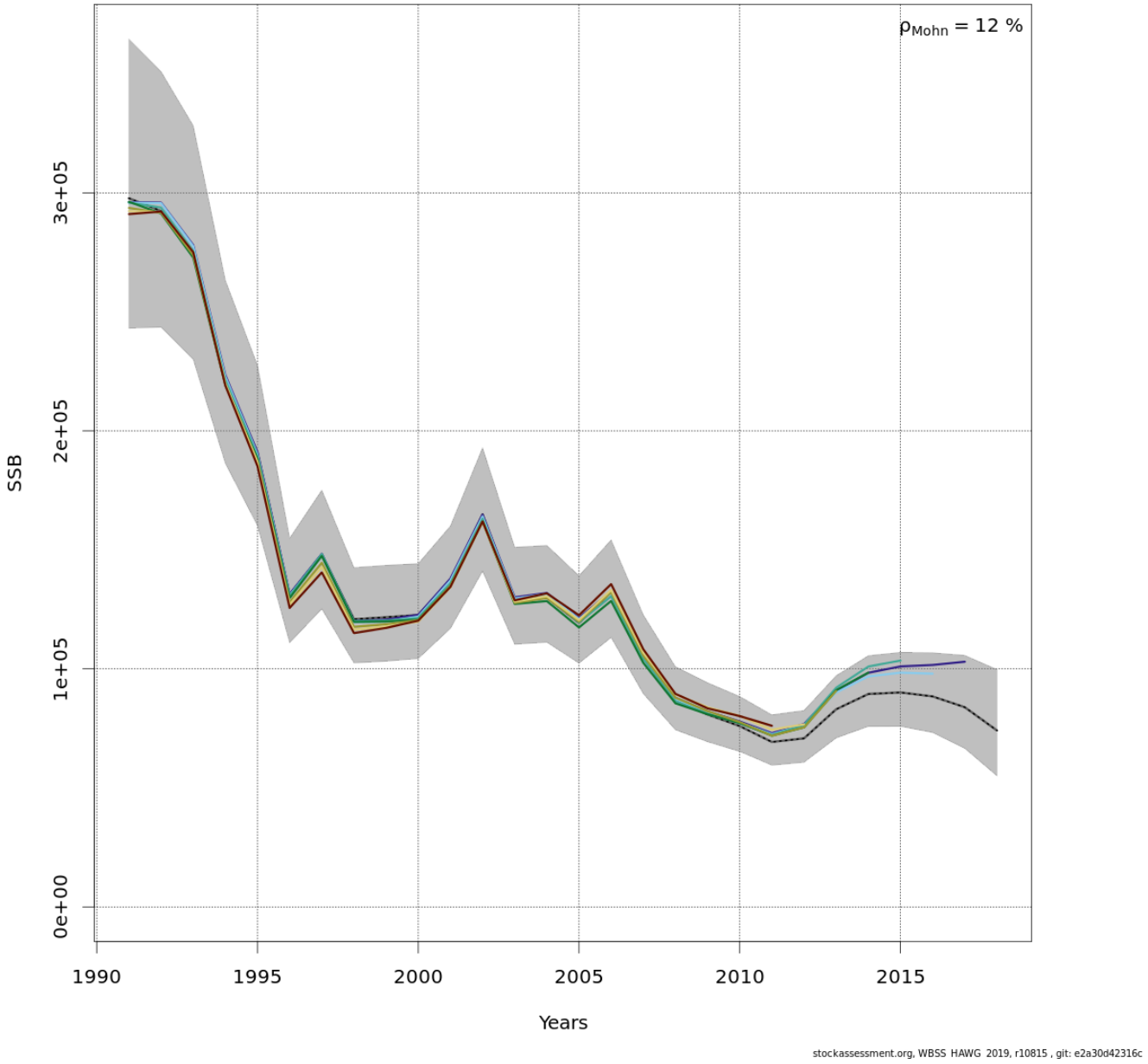

Figure 3.6.4.24 WESTERN BALTIC SPRING SPAWNING HERRING. Analytical retrospective pattern over 5 years from multi fleet run. Spawning stock biomass.

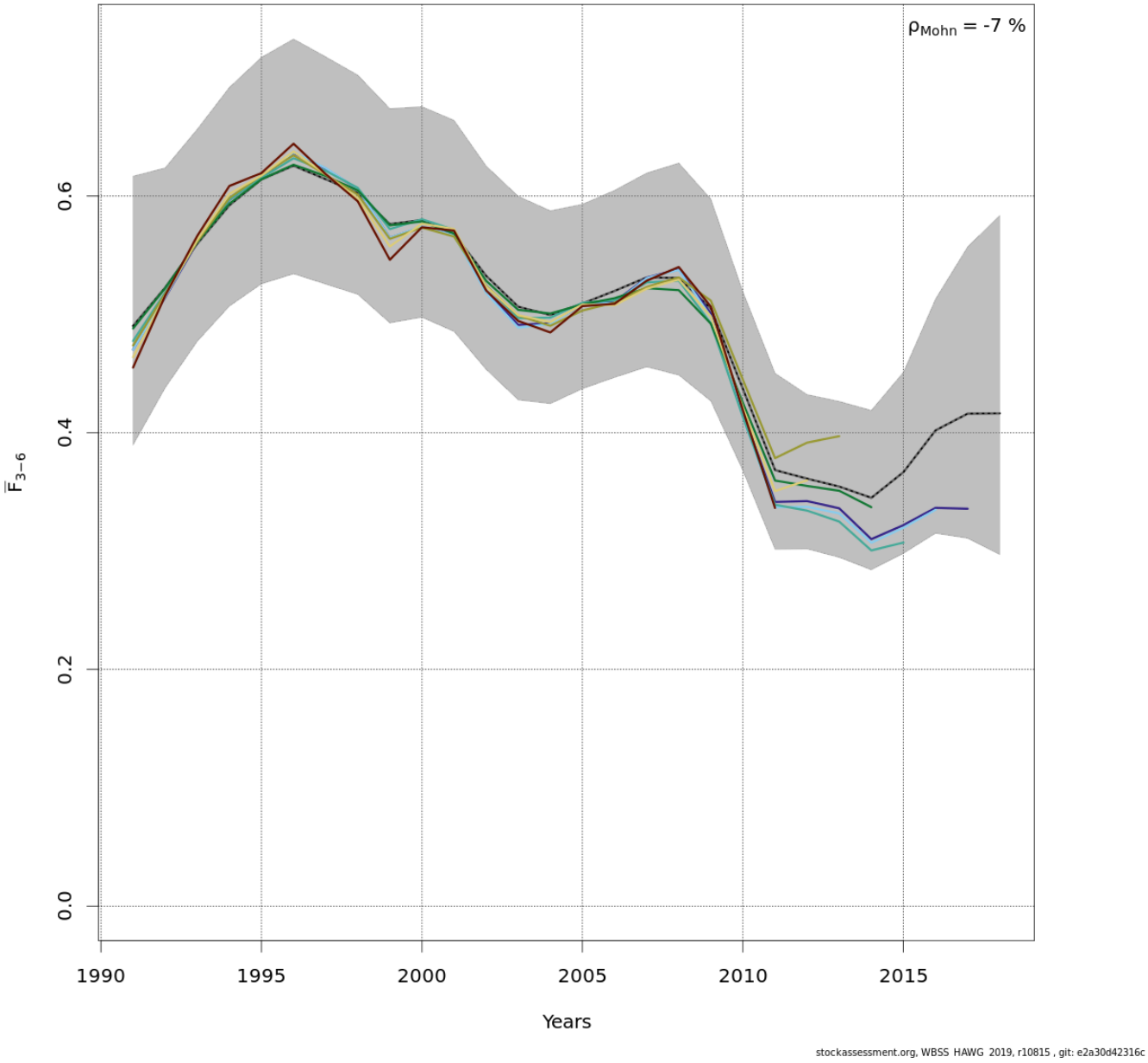

Figure 3.6.4.25 WESTERN BALTIC SPRING SPAWNING HERRING. Analytical retrospective pattern over 5 years from multi fleet run. Average fishing mortality for the shown age range.

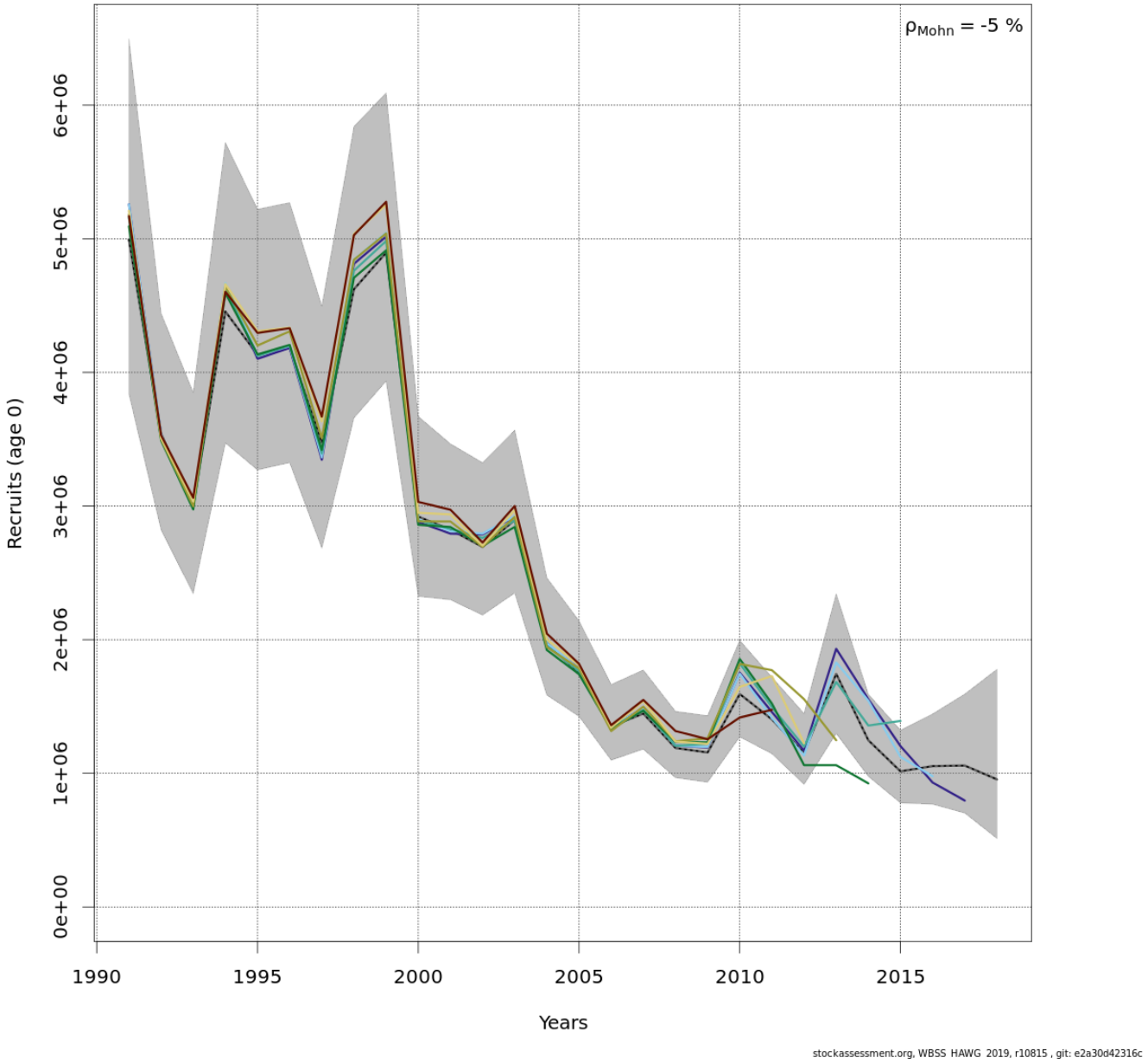

Figure 3.6.4.26 WESTERN BALTIC SPRING SPAWNING HERRING. Analytical retrospective pattern over 5 years from multi fleet run. Recruitment.

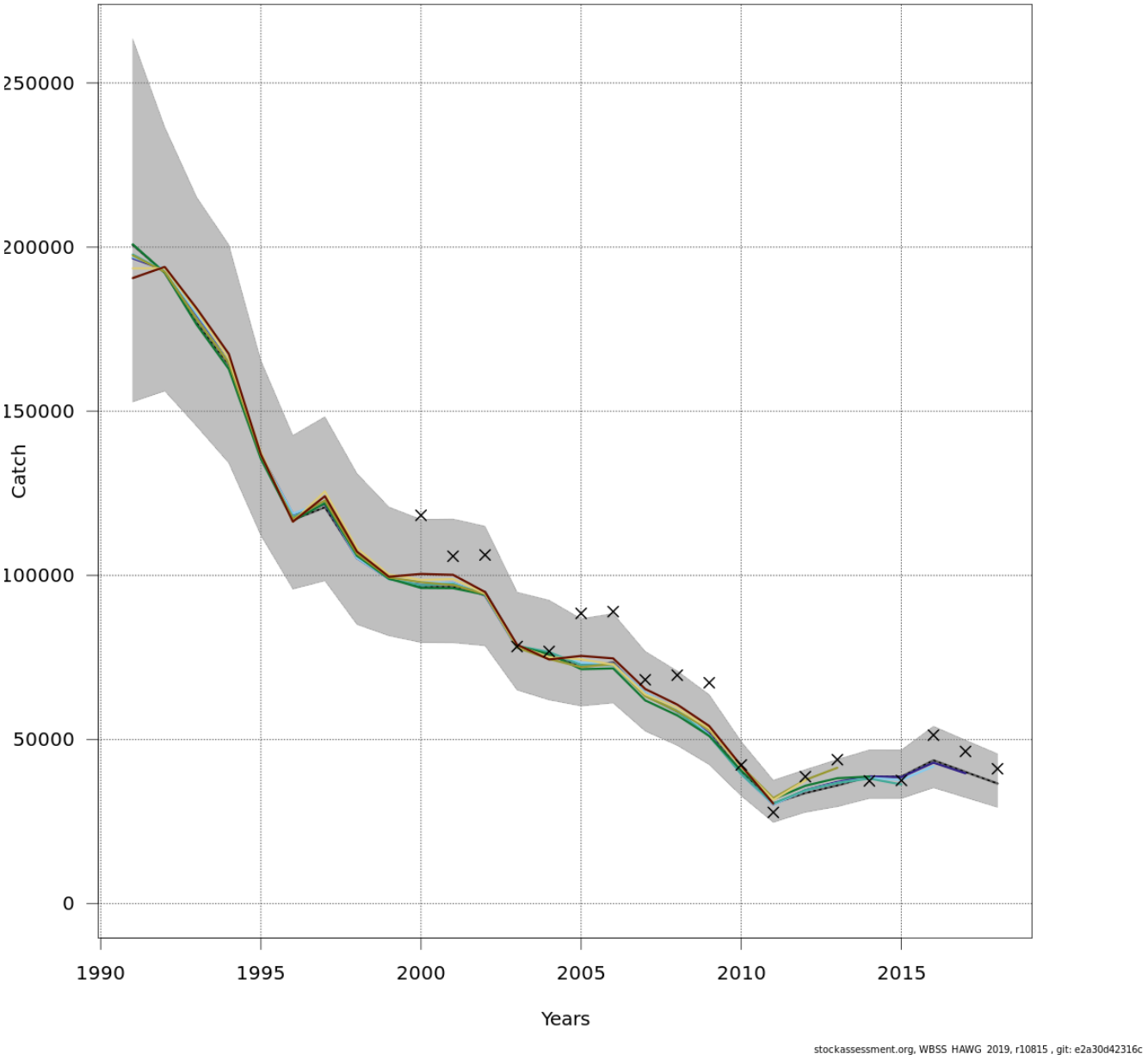

Figure 3.6.4.27 WESTERN BALTIC SPRING SPAWNING HERRING. Analytical retrospective pattern over 5 years from multi fleet run. Catch.

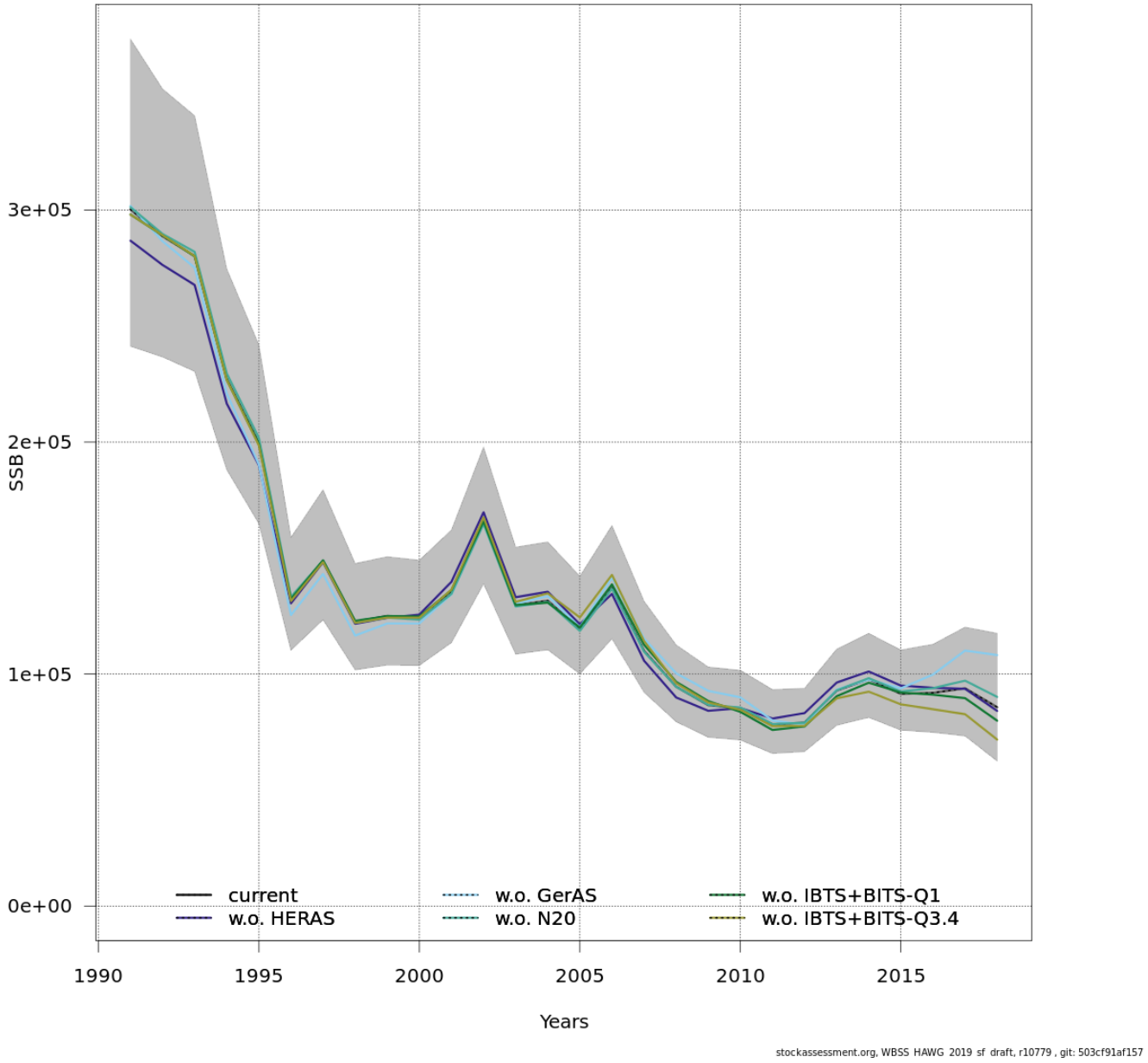

Figure 3.6.4.28 WESTERN BALTIC SPRING SPAWNING HERRING. Leave-one out from single fleet run. Spawning stock biomass.

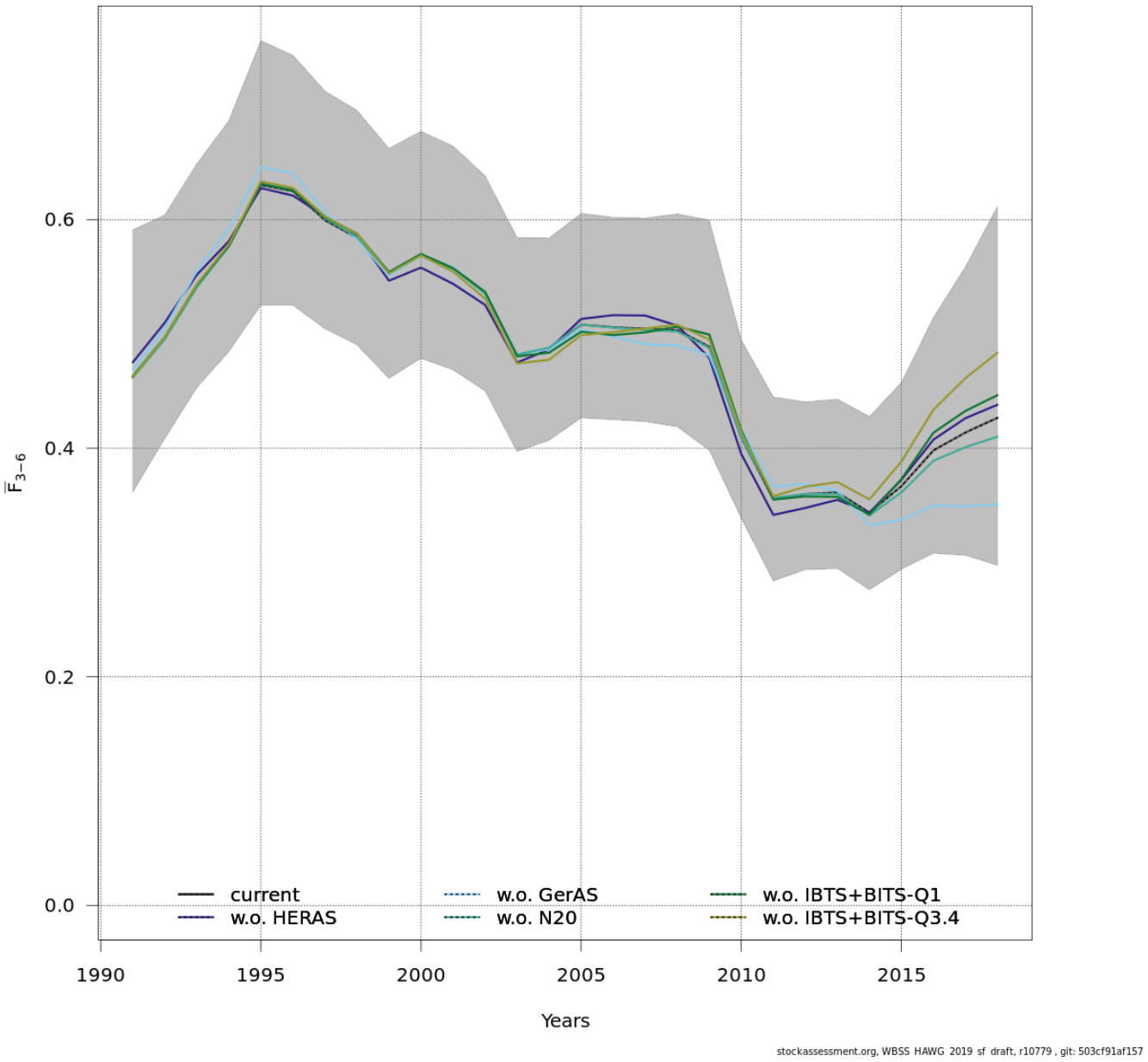

Figure 3.6.4.29 WESTERN BALTIC SPRING SPAWNING HERRING. Leave-one out from single fleet run. Average fishing mortality for the shown age range.

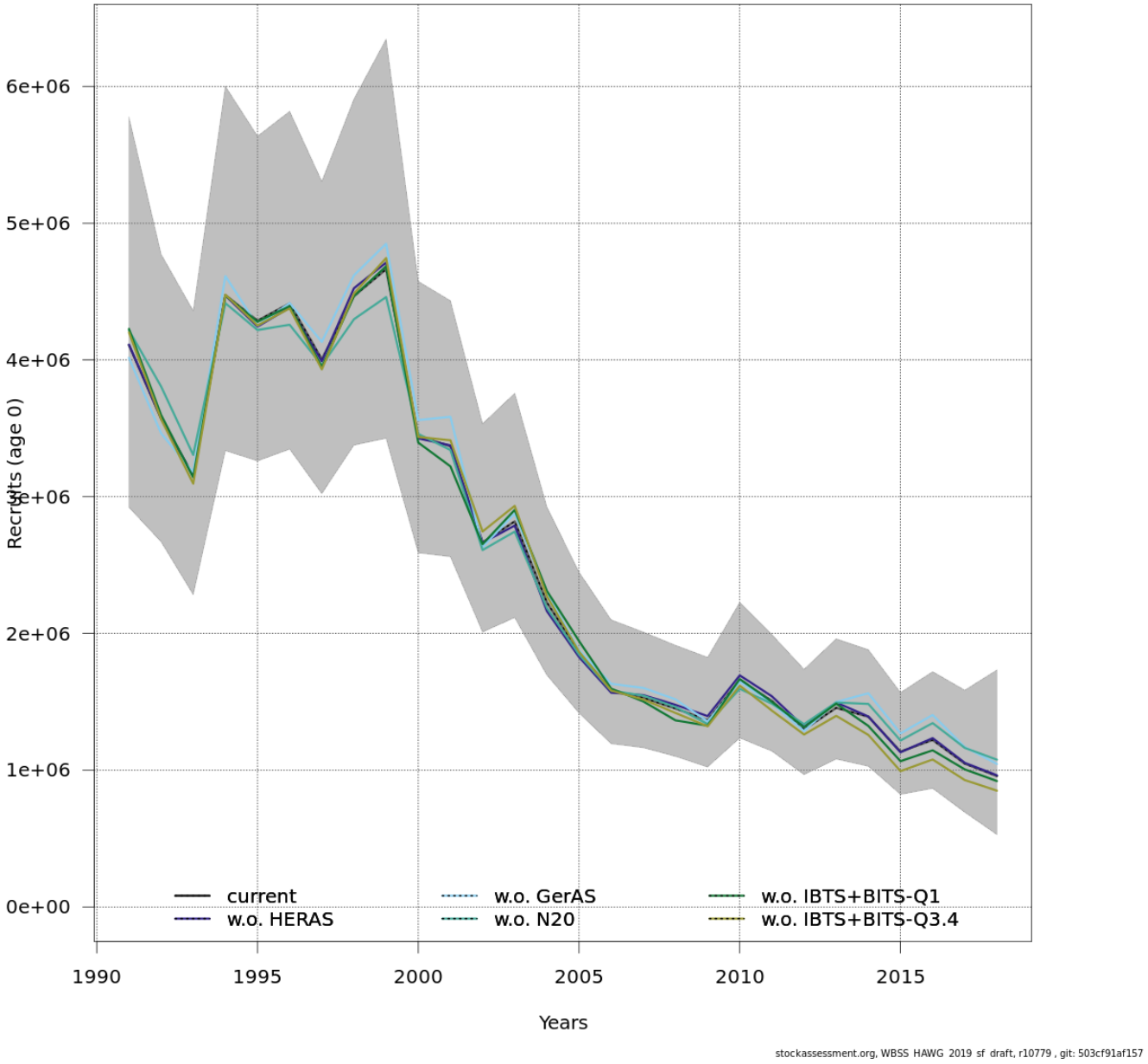

Figure 3.6.4.30 WESTERN BALTIC SPRING SPAWNING HERRING. Leave-one out from single fleet run. Recruitment.

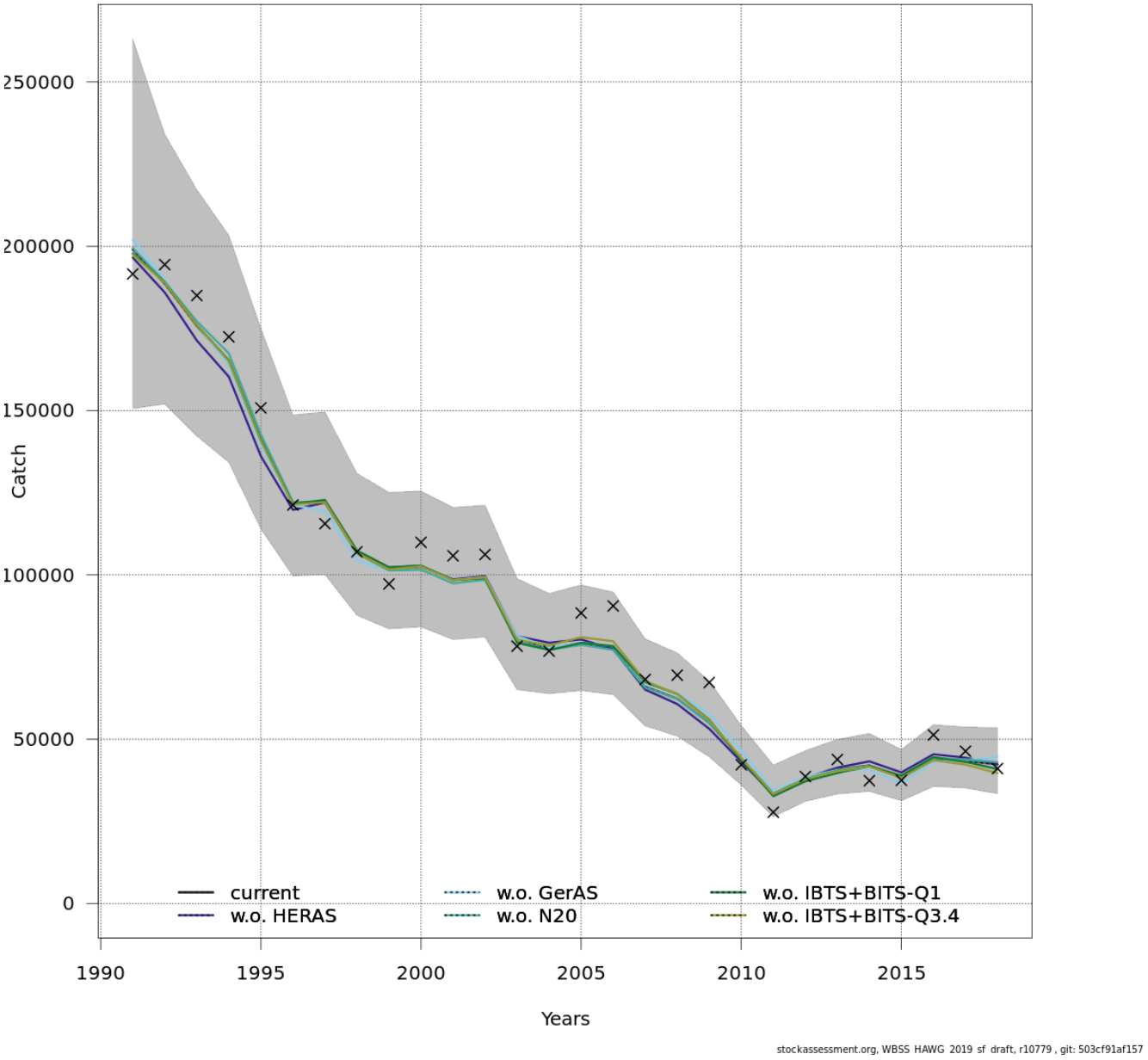

Figure 3.6.4.31 WESTERN BALTIC SPRING SPAWNING HERRING. Leave-one out from single fleet run. Catch.

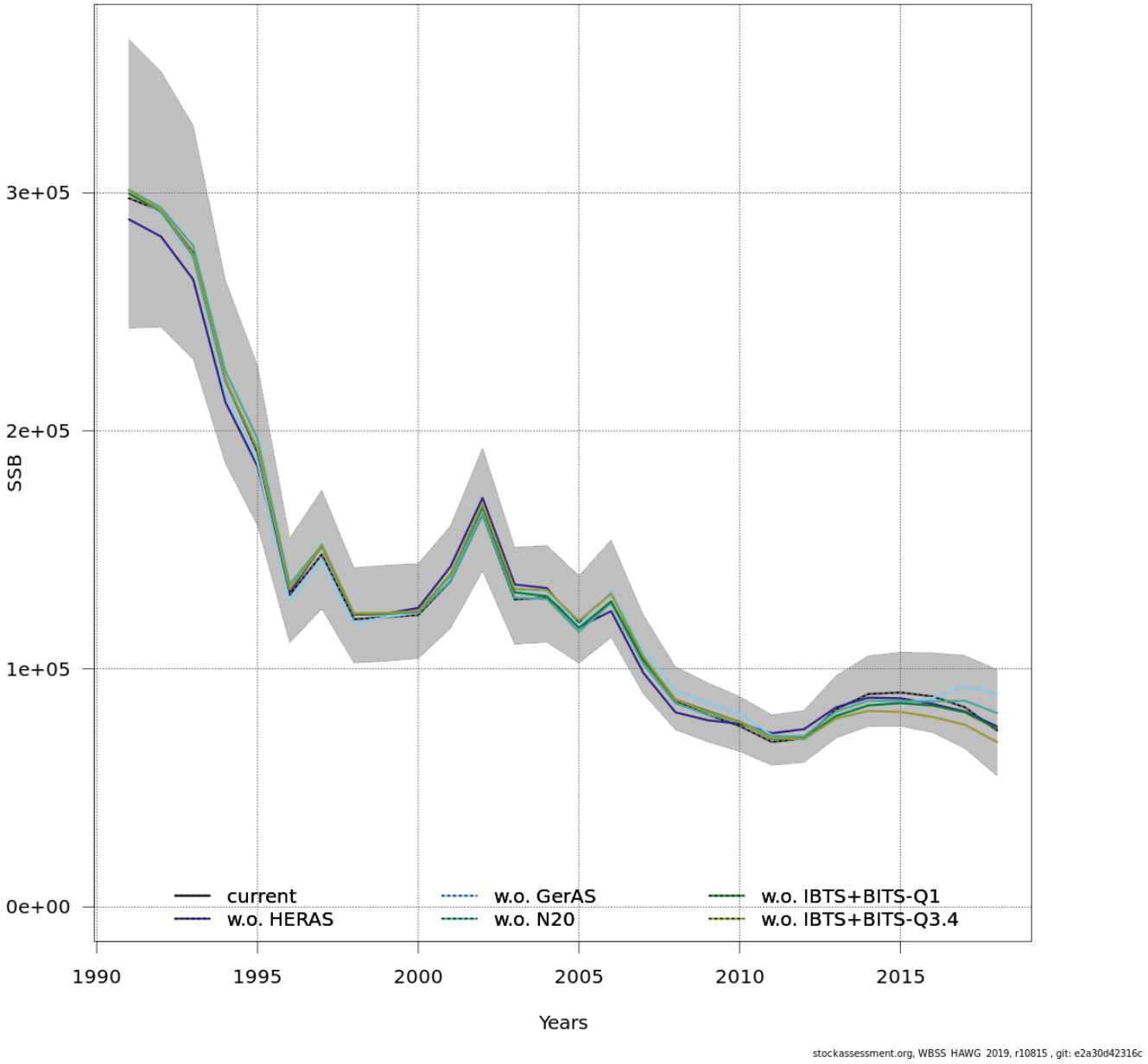

Figure 3.6.4.32 WESTERN BALTIC SPRING SPAWNING HERRING. Leave-one out from multi fleet run. Spawning stock biomass.

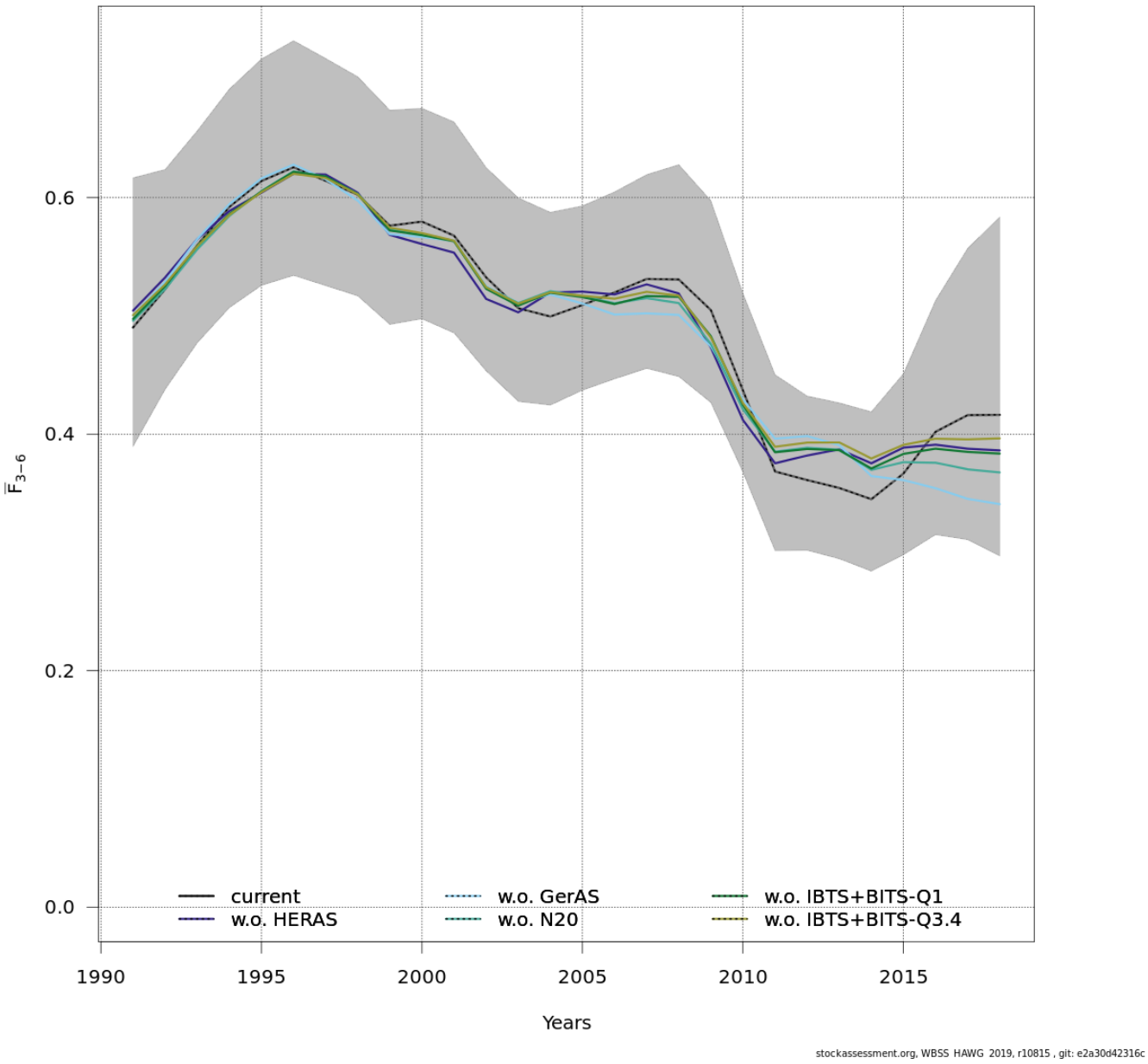

Figure 3.6.4.33 WESTERN BALTIC SPRING SPAWNING HERRING. Leave-one out from multi fleet run. Average fishing mortality for the shown age range.

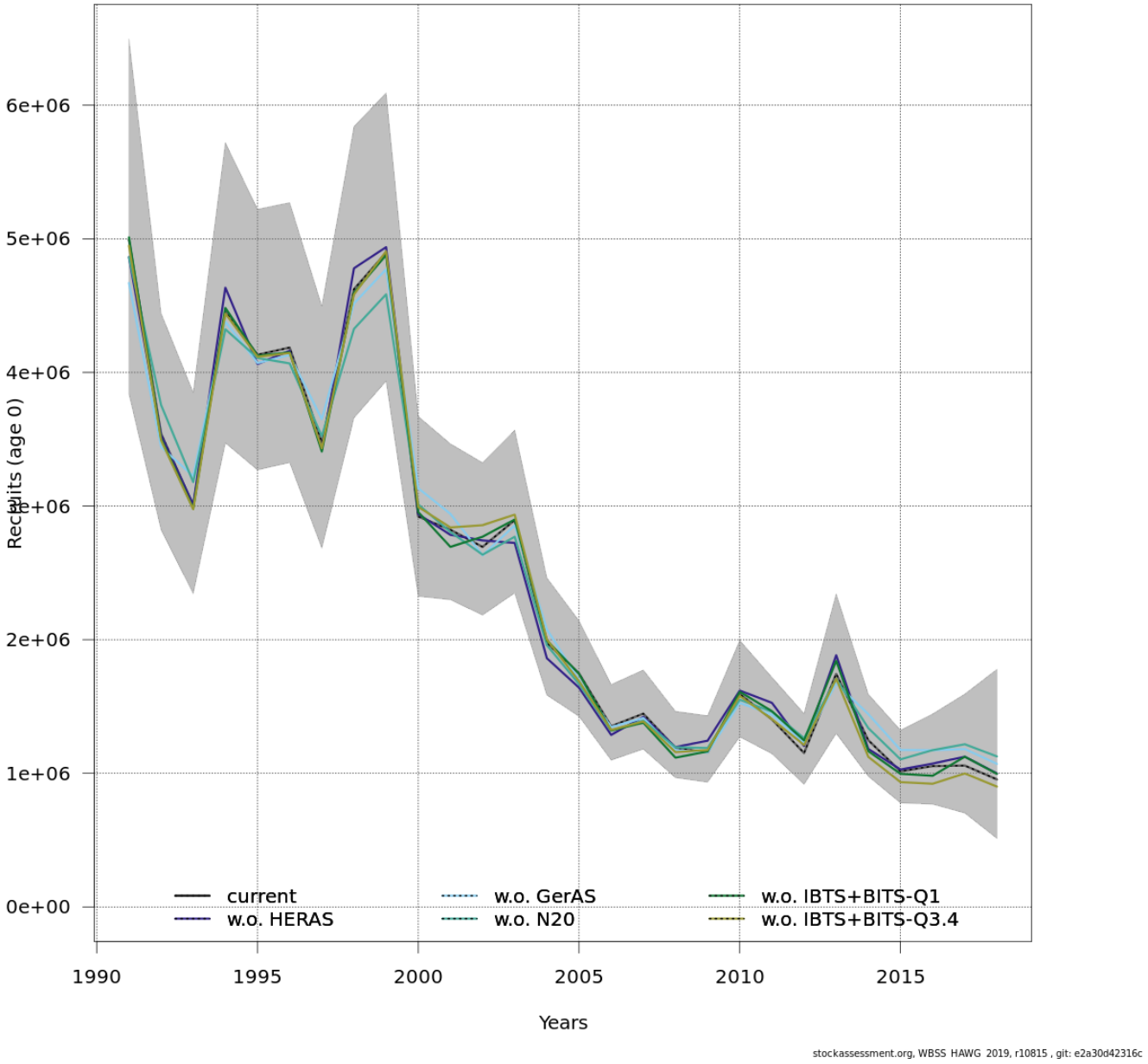

Figure 3.6.4.34 WESTERN BALTIC SPRING SPAWNING HERRING. Leave-one out from multi fleet run. Recruitment.

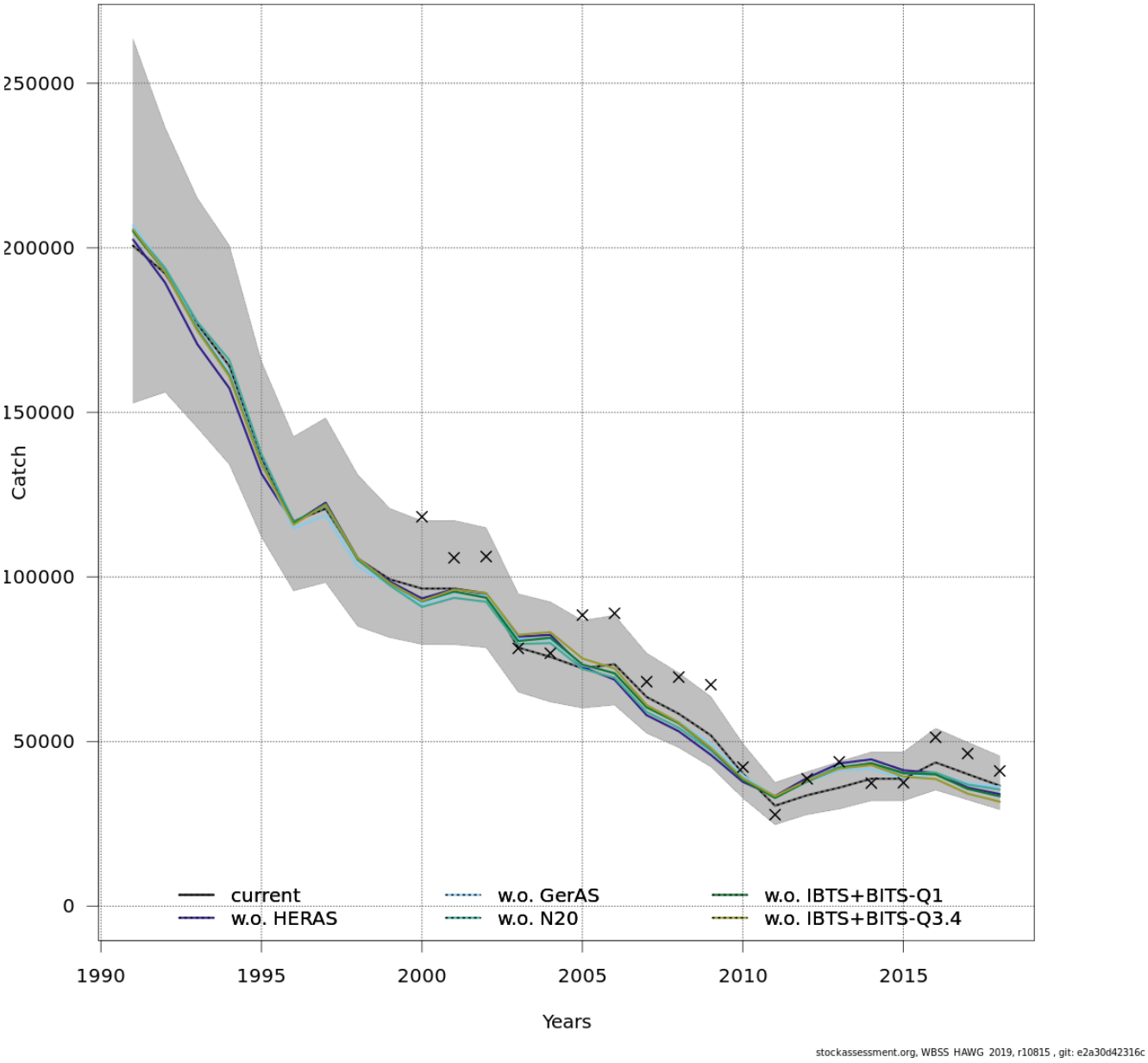

Figure 3.6.4.35 WESTERN BALTIC SPRING SPAWNING HERRING. Leave-one out from multi fleet run. Catch.