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 2021 and 2022

ICES advised in 2021 on the basis of the MSY approach. This corresponds to zero catch in 2022 (ICES 2021).

The EU and Norway agreement on a herring TAC for 2021 was 21 604 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 2022, the EU and Norway agreed on herring TACs in Division 3.a corresponding to 25021 t for the human consumption fleet (21684 t for EU and 3337 t for Norway) and a bycatch ceiling of 6659 t for the small mesh fishery (only EU). The agreement also states that of these overall fishing opportunities no more than 1136 t of herring would be taken in Division 3.a with the possibility to transfer up to 100% of the human consumption TAC from 3.a to the North Sea and up to 50% for the bycatch small mesh fishery (see Council Regulation (EU) 2021/1888) for more specifics on area limitations on the transfer within the North Sea).

Prior to 2006, no separate TAC for subdivisions 22–24 was set. In 2021, a TAC of 1 575 t was set on the Western Baltic stock component. The TAC for 2022 was set at 788 t.

3.1.2 Landings in 2021

Herring caught in Division 3.a are a mixture of mainly 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 WBSS.

Landings from 1989 to 2021 are given in Table 3.1.1 and Figure 3.1.1. In 2021, the total landings in Division 3.a and subdivisions 22–24 have decreased to 14 918 t. Landings in 2021 decreased by 29% in the Skagerrak, by 6% in the Kattegat and by 60% in subdivisions 22–24. As in previous years the 2021 landing data are calculated by fleet according to the fleet definitions used by the working group (see section 3.1.3).

3.1.3 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. This fleet also includes the Swedish fishery with mesh sizes less than 32 mm assuming that there is no difference in age structure of the landings between vessels using different mesh sizes.

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, sandeel 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 2004 to 2021 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
2021								
Div. 3.a fleet-C	21 604	9 800	145			9 498	18 723	2 881
Div. 3.a fleet-D	6 659	5 692	51			916	6 659	
SD 22–24 fleet-F	1 575	221	869	0	205	280	1 575	
% 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%
% of 3.a fleet-D can be taken in 4	50%							
	TAC	DK	GER	FI	PL	SWE	EC	NOR
2022								
Div. 3.a fleet-C	1 136	554	8			407	969	167
Div. 3.a fleet-D	6 659	5 692	51			916	6 659	
SD 22–24 fleet-F	788	110	435	0	103	140	788	
% of 3.a fleet-C can be taken in 4 EU waters							-100%	
% of 3.a fleet-C can be taken in 4 Norwegian waters								-100%
% of 3.a fleet-D can be taken in 4	50%							

3.1.4 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 Subarea 4. These catches have been allocated to the North Sea stock and accounted for under the A-fleet at earlier HAWG meetings. Misreported catches

have been moved to the appropriate stock for the assessment. However, from 2009 and on-wards, information from both the industry and VMS estimates suggest that this pattern of misreporting of catches into Division 3.a does no longer occur. Therefore, no catches were moved out of Division 3.a to the North Sea for catches taken in 2020.

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 realized distribution of the catches.

In 2021 and 2022, following the agreed record from the bilateral consultations between the EU and Norway for Skagerrak, the C-fleet inter-area flexibility from Division 3.a to Subarea 4 has been increased to 100%, and a flexibility of 50% has been given to the D-fleet, in order to protect WBSS herring. In addition, in 2022, EU and Norway committed to limit overall herring catches in Division 3.a to 969 t and 167 t, respectively.

The quota for the C fleet and the bycatch TAC for the D fleet are set for the NSAS and the WBSS stocks together. The implication for the catch of NSAS must also be considered when setting quotas for the fleets that exploit these stocks.

3.1.5 Changes in fishing technology and fishing patterns

The amount of WBSS herring taken as bycatch in the D-fleet has been varying between years depending on the utilization of the bycatch TAC and the proportion of WBSS in the catches. In 2021 the amount of WBSS taken was 35 t, which is the lowest recorded catch. However, the TAC utilization was 2.1% being also the lowest recorded utilization. Prediction of TAC utilization is further complicated by the merging of the sprat stocks in 3.a and the North Sea (ICES 2018) with a common management and the optional transfer of 50% of the herring bycatch quota from the D-fleet in 3.a to the B-fleet in the North Sea.

3.1.6 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

Tables 3.2.1 and 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.

The 14 918 t of landed herring were submitted stratified by area, fleet, and quarter, resulting in 57 strata with landings. 22 of these strata were sampled - accounting for 86% of the landings. Some strata with relatively large amounts of landings were unsampled, but the main problem being that fleet C only was sampled in the third quarter in Skagerrak (Table 3.2.4). Furter, it seems like it is getting more and more difficult for countries to sample the trawler landings in

the F fleet. Unsampled strata accounted in total for 2 038 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 the sum of the two (Division 3.a) respectively were then estimated by quarter and fleet (Tables 3.2.7–3.2.12).

In 2022, the age composition for the A-fleet in the transfer area was taken directly from the transfer area rather than from the entire Division 4aE given that samples were available in the Norwegian catches.

The total catch, expressed as SOP, of the WBSS taken in the North Sea + Division 3.a in 2020 was estimated to be 12 579 t, which represents a decrease of 31% compared to 2020 (Table 3.2.13).

Total catches of WBSS from the North Sea, Division 3.a, and subdivisions 22–24 by quarter, were estimated to be 14 180 for 2021 (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 1993–2021, are presented in tables 3.2.15 and 3.2.16.

The total catch of NSAS in Division 3.a amounted to 4 244 t in 2021, which represents the second lowest value in the 28-year time-series (Table 3.2.17).

The catches of WBSS from Subdivision 4.aE and the catches of NSAS from Division 3.a in 2021 were reallocated to the appropriate stocks as shown in the text table below:

Stock	Catch reallocation	Tonnes
WBSS	4.aE (A-fleet)	3 505
NSAS	3.a (C+D-fleet)	4244

3.2.1 Quality of Catch Data and Biological Sampling Data

No quantitative estimates of discards were available to the Working Group from all countries. During the 2022 meeting one country checked their estimated discard of herring in the demersal, *Nephrops* and shrimp fisheries in SD 20-24, and for 2020 the estimated discard constituted 1% of the landings, so an insignificant amount. Therefore, the overall amount of discards for 2021 is assumed to be insignificant, as in previous years.

Table 3.2.4 shows the number of fishes aged by country, area, fishery, and quarter. The overall sampling in 2021 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). Occasional lack of national sampling of catches by quarter and area has been covered by similar fisheries in other countries, but as mentioned in the section before, only a single quarter and area combination was sampled in the D fleet.

Splitting of catches into WBSS (Spring spawners) and NSAS (Autumn spawners) in Division 3.a were based on Swedish analyses of otolith micro-structure (OM) of hatch type and genetic analyses for Danish catches from 2022. Different components of NSAS herring spawn at different times of the year, the three northern components spawn in autumn and are assigned to OM hatch month 9, whereas the Downs components spawning during winter in the Eastern Channel assigned to OM hatch month 12. Herring are predominantly spawning during spring in the western Baltic, the Kattegat and the Skagerrak and are assigned to the OM hatch month 4, however smaller stock components from the Western Baltic Sea and Baltic Sea also spawn in autumn and

winter, which leads to an assignment to OM hatch month 9 and 12, respectively. This would hence lead to an erroneous assumption that these Western Baltic Sea and Baltic Sea autumn and winter spawners belonged to the NSAS stock. Moreover, winter-hatched individuals have traditionally been assigned differently in Danish and Swedish samples, where OM hatch month 12 has been assigned to WBSS in Sweden and to NSAS in Denmark. The samples from the IBTS have been split according to the Danish perception of stock affiliation. However, since the implementation of splitting by genetic markers, these issues have been resolved.

For Danish data, a genetic stock identification method was used to classify individual fish to genetic stock origin. The total sample size for hatch type was 2028 (674 Danish and 1354 Swedish) with 70% of the samples in Subdivision 20 (Skagerrak) and 30% in Subdivision 21 (Kattegat). Sampling from the Danish fishery had a lower coverage of quarters and subdivisions than sampling of the Swedish fishery. Proportions of WBSS in sampled age classes were weighted by the national catches in the respective quarters and subdivisions. The sampling did not cover all age classes and thus proportions were estimated using information from relevant adjacent age classes, or from cruises in the same quarter and subdivision. Proportions were estimated for commercial catch by country, wr, quarter, and subdivision by a logistic mixed effects regression model. The model included wr, subdivision, quarter, and cruise as fixed effects and had a random intercept varying by trip/haul[1]. Both commercial and survey samples from both countries were used in the analysis. Total composition estimates per wr, quarter, and subdivision were calculated as a weighted average of the country-wise estimates. Total estimates were only calculated for combinations of wr, quarter, and subdivision with catches. For combinations with Danish or Swedish catches, the country-wise estimates were weighted by the catches. For combinations without Danish and Swedish catches, country-wise estimates were weighted by the sum of catches for the relevant quarter and subdivision.

Random samples of 175 individual herring from Norwegian commercial catches in the "transfer area" in 4.aE are analyzed for size at age distribution and stock affiliation based on a genetic stock identification method using an extended SNP panel (82 markers where 53 are included also in the panel used for Danish samples). A common baseline with small deviations was used for stock identification for Danish and Norwegian samples. Based on expected vertebral series counts, genetic stock origin was converted to NSAS/WBSS to continue the historical time series. Catches from the so called "transfer area" are split into proportions of NSAS and WBSS by quarter and wr based on a logistic mixed effects regression model.

A total of 88 253 tonnes of herring was caught in the transfer area in 2021, with catches constituting 74% in quarter 2 and 20% in quarter 3, however with only four samples (40, 42, 45, and 48 fish) from quarter 2 being available for calculating stock proportions.

For quarter 2 and 3, the same split was applied based on the combined samples from HERAS and the fishery in the transfer area (251 fish). This was done under the assumption that the fishery is restricted to the same period as HERAS in June and July and would catch similar proportions of the two stocks in this period. The regression model included a B-spline on wr with 5 knots and additional dummy variables for commercial samples wr 1, 2, and 3 to account for different selectivities. Finally, a random intercept varying by trip/haul was included.

Due to lack of sampling data in 2021 the split for quarters 1 and 4 had to be carried over from 2020. Quarter 1 and 4 estimates from 2020 were based on data from the time-series of samples

1In the R formula syntax, the regression model is ~ bs(wr,3) + bs(wr,3) * SubDivision + bs(wr,3) * Cruise + bs(wr,3) * Quarter + wr0Quarter + (1|TripID), where bs(-,3) is a B-spline with 3 knots, and wr0Quarter is a factor with a level per quarter for 0 wr and a combined level for 1+ wr. Winter rings were capped at 8 in the analysis.

from the commercial fishery with respectively 48 (from 2016 Q1) and 342 herring (from Q4 in 2008, 2012 and 2014) available for the analysis.

Based on the splitting method, 3505 tonnes of WBSS herring were caught in the transfer area in 2021.

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 were not corrected for this mixing neither for potential catches of Western Baltic Spring-spawning herring in 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 8–28 October 2021 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, 2022). In the western Baltic, the distribution areas of two stocks, the Western Baltic Spring Spawning (WBSS) herring and the Central Baltic herring (CBH) overlap. Survey results indicated in the recent years that in SD 24, which is part of the WBSS herring management area, a considerable fraction of CBH is present and correspondingly erroneously allocated to WBSS 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 WBSS herring in the area (Gröhsler et al., 2013; Gröhsler et al., 2016). The estimates of the growth parameters from baseline samples of WBSS and CBH in 2011-2018 and 2020-2021 support the applicability of the SF (Oeberst et al., 2013; WD/WGIPS Oeberst et al., 2014, 2015; WD/WGBIFS Oeberst et al., 2016, 2017; WD/WGBIFS Gröhsler and Schaber, 2018, 2019; WD/WGIPS Gröhsler and Schaber 2021, WD/WGIPS Gröhsler and Schaber 2022). The applicability of the SF could not be test-ed in 2019 due some higher degree of mixing of CBH/WBSS in the baseline area of WBSS herring in SDs 21 and 23.

The age-length distribution of herring in SD 21 and in SD 22 in 2021 indicated also some contribution of fish of CBH origin. Besides the standard procedure to use the SF in SD 24 and in SD 23/39G2 (since biological samples of that rectangle were also used to raise the corresponding mean NASC values in the SD 24 area of the rectangle), the SF was accordingly also applied in SD 21 and SD 22 in 2021.

Haul 32 (41G2, SD 23) targeting a large aggregation of herring yielded a substantial sample of almost exclusively large herring that were spawning (maturity 6). Since the herring could not be allocated to WBSS, both the hydroacoustic data from that aggregation as well as the biological data from haul 32 were removed from the further analysis for producing a biomass and abundance estimate for WBSS. Genetic samples have been taken and are currently being analysed to identify stock origin of that herring.

Individual mean weight, total numbers and biomass by age as estimated from the GERAS-Index (covering the standard survey area, which generally excludes 43G1/43G2 in SD 21 and 37G3/37G4 in SD 24) are presented in Table 3.3.1. The Western Baltic spring spawning herring GERAS-Index in 2021 was estimated to be 0.8×10^9 fish or about 29.3×10^3 tonnes in subdivisions 21–24. The biomass index in 2021 represents the lowest in the time series.

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 and the North Sea

The Herring acoustic survey (HERAS) was conducted from 21 June to 6 July 2021 and covered the Skagerrak and the Kattegat and the North Sea. The 2020 estimate of Western Baltic spring-spawning herring was 105 x 10^3 tonnes and 0.911 million herring. Compared to the values in 2020, the 2021 estimates represent a decrease of 48 % in numbers and of 35% in biomass. The stock biomass is dominated by 2-4 winter ring (79%). The present numbers of older herring (3+ group) in the stock only represent 45% of the average of the whole times series till 2020 (2021: 649 million; mean 1991–2020: 1411 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 Sea at weekly intervals during the 2021 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 2 751 million larvae, the 2021 N20 recruitment index is more than 10 times higher than that of the record low in 2020 and the highest value since 2015 (for further details see WD Polte and Gröhsler, HAWG 2021).

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 Figures 3.3.1-3.3.2). 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 (limited to the IBTS and not for the BITS). 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. Stock proportions for these splitting are based on otolith microstructure from the IBTS samples by assuming that only OM4 (Spring-spawning) contribution to the WBSS fraction, while OM9 and OM12 (Autumn and Winter spawning) are considered non-WBSS. The following equation describes the model considered for both the presence/absence and positive parts of the Delta-Lognormal model:

$g(\mu i) = Year(i) + Gear(i) + f1(loni; lati) + f2(Depthi) + f3(timei) + log(HaulDuri)$

where Gear(i) and Year(i) maps the ith haul to categorical gear/year effects for each age group.

Age (wr) classes (1–3) and (2-3) from the surveys in Q1 and Q3-4 are included in the assessment

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 3.2.14).

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 2021 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 ($R^2 = 0.75$, 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 (1992–2021: 5 389 million). The 2021 N20 recruitment index is more than 10 times higher than that of the record low in 2020 and the highest value since 2015 (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 and weights data differ 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 2021 were available for Subdivision 27.4.aEast (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–d). 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–d; 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 (taken from weights in catches in 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 both the 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:

Survey	0	1	2	3	4	5	6	7	8+
HERAS				■	■	■	■		
GERAS		■	■	■	■	■			
N20	■								
IBTS/BITS Q1		■	■	■	■				
IBTS/BITS Q3-4			■	■	■				

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 1991–2021. 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"), more details in Nielsen et al. 2021.

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.

The disaggregation of the fishing catches in the multi-fleet SAM can bring problems of convergence due to the increase of zeros in the fleet observed catches, which are ignored by the model since zeros cannot be fitted with a lognormal distribution. It is therefore important to compare the outputs of both the single and the multi-fleet models every year and check that the results are consistent between the models. For this year 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_2022) and the single fleet (WBSS_HAWG_2022_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.

During the 2020 assessment, problems of convergence occurred with the multifleet model when adding the 2019 data due to difficulties estimating the variance parameter of the F process for the C-fleet (logSdLogFsta). Coupling the variance parameters for all fleets so only one logSdLogFsta parameter is estimated as a first run and then running the model with the original configuration removed the problem of convergence in 2020. However, this year, this was not enough to solve convergence problems.

During the 2018 benchmark it was chosen to replace missing data in catches at age for all fleets by a small value (1 tonne). In addition to the method described in the previous paragraph, removing this constraint for the C-fleet and letting the model handling the zeros as missing data enabled the convergence of the 2021 assessment model.

There was no problem of convergence in 2022 in the multifleet model.

3.6.4 Final run

The results of the assessment are given in Tables 3.6.11–3.6.14. The estimated SSB for 2021 is 62 765 [44 766, 88 002 (95% CI)] t. The mean fishing mortality (ages 3–6) is estimated as 0.149 [0.080, 0.277 (95% CI)] yr-1. This means that the F_{3-6} is estimated to be below F_{MSY} and F_{pa}, and below F_{lim}.

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 was above 120 000 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 a SSB of 69.3 kt. SSB has only slightly increased in the following period up to 83.7 kt in 2015 and then has declined to 54.4 kt in 2019, which is the lowest SSB of the time-series. A slight increase in SSB was then estimated since 2020 to around 62.8 kt in 2021.

Fishing mortality on this stock was high in the mid-1990s, reaching a maximum of 0.66 yr-1 in 1996. In 1999–2009, F_{3-6} stabilized between 0.45 and 0.61. In 2010 and 2011, F_{3-6} decreased significantly to a value of 0.40 and 0.31 yr-1, respectively. It stabilized between 0.31 and 0.43 yr-1 for few years until it increased again above 0.49 yr-1 from 2016 to 2018. F_{3-6} then decreased to 0.30 yr-1 in 2019, 0.18 yr-1 in 2020 and then 0.15 in 2021, which is the lowest estimated F_{3-6} of the entire time series (Table 3.6.11, Figure 3.6.4.2).

Recruitment was the highest (~3-5 billion) at the beginning of the time-series (1991-1999) and has been decreasing overall since 1999. The 2020 estimate of 550 822 thousands is the lowest on record and the estimate in 2021 has slightly increased to 609 230 thousands (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 1991–1999 and no signs of density-dependence. This is followed by a distinct decline in recruitment to values below 3 billion at a relatively constant spawning-stock biomass between 120 and 160 kt over the period from 2000–2006. In the most recent period, from 2007 to 2021 recruitment has varied from about 1.5 billion to less than 1 billion at SSB between 54 kt and 110 kt, with a trend of declining recruitment in 2017-2020 and some slight increased recruitment in 2021.

The total catch is well fitted (Figure 3.6.4.5) as well as 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. In 2021, the model started to accommodate the large catches of the A-fleet in 2019 and 2020 by an increase in the upper limit of the confidence interval on the catches for this fleet. This year, the 2021 catch of the A-fleet is well fitted.

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). The fishing mortality increases in the recent years for the A-fleet. The C-fleet shows a variable F over time with a peak in F in 2017-2018 and a decrease in F since. There is a clear decrease in F for the D- and F-fleet in recent years. The selectivity pattern for the D-fleet has a tendency of shifting its highest selectivity from age 2 to age 3 (wr) in later years. Total fishing mortality on the WBSS stock increased with herring age (Figure 3.6.4.8). It decreased overall over time but showed an increase in 2014-2018 and a decrease again up to 2021, well below F_{MSY} in 2020-2021.

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 (see $corFlag in Table 3.6.10). 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 during the benchmark, and 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+BITS-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 (ages 1-8+) has a lower observation variance than the GERAS and the HERAS, the C-fleet (ages 2-8+) is lower than the IBTS+BITS- Q3.4 surveys variance, the IBTS+BITS-Q1 and the N20. Both the D-fleet and the A-fleet have very high observation variances, as well as the age 0 for all fishing fleets (Figure 3.6.4.12).

Residuals for catch in different fleets generally show poorer fit to the youngest year-classes 0–1 wr (Figure 3.6.4.13). The A-fleet shows large positive residuals in 2018-2020 showing that the model underestimates the catches-at-age in those years. The inverse is observed for the C-fleet with large negative residuals in 2019 for ages 3-8+, showing an overestimation of the catches for these ages. The F-fleet presents large negative residuals for ages 0-1 over the entire time-series. 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 at 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).

Inspection of model diagnostics shows the occurrence of high residuals in some years (i.e., 2009 and 2018-2021 in the GERAS and 1991 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. 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 3.6.4.19–23). In general, a similar fit is found for all included ages (wr) 3–6 of the HERAS index (Figure 3.6.4.19). In recent years, GERAS shows a clear drop in observed indices for ages (wr) 1–4 that are poorly fitted and show therefore large negative residuals (Figures 3.6.13 and 3.6.4.20). The model picks up the overall negative trend of the recruitment index (N20) and is conservative on

the high index value estimated in 2021 which is the largest observed since 2013 (Figure 3.6.4.21). 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 patterns are of the same order of magnitude as last year assessment (Figure 3.6.4.24-27). The SSB has a 5 years Mohn's rho of 21% (compared to 20% in 2021) but the retrospective estimates are considerably improved for the 1- to 3-year peels remaining inside the confidence intervals of the SSB estimates. Average fishing mortality retrospective estimates are also outside the confidence bounds for F for the 4 to 5-year peels (Mohn's rho = -14% compared to -13% in the 2021 assessment, Figure 3.6.4.25). The retrospective for recruitment is acceptable having a Mohn's rho = 11% (7% in 2021, Figure 3.6.4.26). Retrospective is very small for total catch (Figure 3.6.4.27).

This year the age composition for the A-fleet was taken directly from the transfer area rather than from the entire Division 4aE given that samples were available in the Norwegian catches. Sensitivity runs were performed for both the single and multifleet models and are available on stockassessment.org (WBSS_HAWG_2022_sf_4aE, WBSS_HAWG_2022_4aE respectively). No makeable differences were present for the multifleet models and the age composition from the Norwegian catches (main fleet) is believed to be more representative of the composition available in the transfer area than the one in Division 4aE. It was therefore agreed to take the assessment with age compositions from the transfer area forwards as final assessment.

Since the 2019 assessment, the GERAS survey indices have been the most influential of all surveys on the estimated decrease in the stock. While the GERAS indices are still low in 2021 and continue to show the largest contribution to the estimated SSB level, the small SSB increase in 2021 appear independent from any individual specific survey (Figures 3.6.4.28–31).

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 2019 (Tables 3.6.11, Figure 3.6.4.1). With the new B_{lim} (120 kt) the stock has been in a state of impaired recruitment since 2007 but 2021 is showing a small sign of recovery.

The 2018 benchmark calculated a new F_{MSY} of 0.31. Fishing mortality ($F_{3–6}$) was reduced between 2008 and 2011 from 0.58 to 0.31 (Tables 3.6.11, Figure 3.6.4.2). $F_{3–6}$ has then remained stable above F_{MSY} until 2015 (0.34-0.43) but showed an increase in 2016-2018 with an estimated $F_{3–6}$ between 0.49 and 0.51. $F_{3–6}$ has decreased since 2019 from 0.30 to 0.15 in 2021, which is the lowest $F_{3–6}$ on records.

Recruitment has been declining since 2014 with a historical low value in 2020 of 550 822 thousands (Tables 3.6.11, Figure 3.6.4.3). Recruitment increased to 609 230 thousands in 2021, possibly due to a cold winter in 2020-2021. Despite the increase in 2021, recruitment is still low compared to the average of the time series. Low fishing mortality should continue to support a slow rebuilding of the stock given the present levels of low recruitment.

3.8 Comparison with previous years perceptions of the stock

The table below summarizes the differences between the current and the previous year assessment. The addition of the 2021 data resulted in a negative change in the perception of the stock

back in time compared to last year assessment of around 6-7%. The recent estimates of recruitment have however drastically increased by 19 % in the current assessment and F appears to be larger than previously estimated in 2019 (+3.9%) but smaller in 2020 (-5.5%).

Parameter	Assessment in 2021	Assessment in 2022	Difference (2022-[illegible])
SSB (t) 2019	57 841	54 388	-6.35%
$F_{(3-6)}$ 2019	0.288	0.300	3.94%
Recr. ('000) 2019	676 518	839 747	19.4%
SSB (t) 2020	58 434	54 606	-7.01%
$F_{(3-6)}$ 2020	0.193	0.182	-5.52%

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 scrutinizing 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 mean of the last five years prior the last year model estimate (i.e., for the 2022 assessment, recruitment for the forecasts was calculated on the period 2016–2020, see Table 3.9.1). 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 (2017–2021). Based on earlier considerations in HAWG, the different periods were chosen to reflect recent levels in recruitment and weights.

3.9.2 Intermediate year 2022

A catch constraint was assumed for the intermediate year (2022). Predicted 2022 catch by fleet is summarized in the table below and depends on two main assumptions:

- Both NSAS and WBSS herring stocks are caught in the Division 3.a (C and D-fleets) and Subdivision 4.aE (A-fleet) whereas the subdivision 22–24 catch (F-fleet) is assumed to only be WBSS herring.
- The F-fleet utilizes its entire TAC in Subdivision 22-24

Fleets	TAC 2022 NSAS+WBSS (t)	Predicted 2022 WBSS catch (t)	Predicted 2022 WBSS catch explained (t)
A	427 628	6 142	1.36% (427628+25021-(969+167))
C	25 021	733	64.5% (969+167)
D	6 659	0	Considered negligible
F	788	788	100% 2022 TAC
Total	460 096	7 663	

In the past assessments, the amount of WBSS taken in the transfer area by the A-fleet in the intermediate year was assumed equal to the observed average A-fleet catch over the last 3 years. This year, it was chosen to make the assumption for the A-fleet in 2022 consistent with what is usually assumed for the NSAS advice. This assumption results in a total catch of WBSS herring of 6 142 t corresponding to the sum of the A-fleet TAC (427 628 t) and what is transferred from the C-fleet in Division 3.a to the North Sea (23 885 t), scaled by the 3-year average proportion of WBSS in A-fleet catch (1.36%, 2019-2021).

In 2022, 100% of the herring quotas for the Division 3.a can be transferred to the North Sea, against 50% the previous years. This results in an important change in the assumed proportion of each fleet in the total WBSS catch compared to what was observed in 2021. This is discussed further in part 3.12. The Council Regulation (EU) 2022/109 stipulates that the catches in Division 3.a should be limited to 1 136 t (969 t of EU catches + 167 t of Norwegian catches) in 2022 as the sum of directed and bycatch fisheries. Given the recent downward trends in the observed D-fleet catches, ICES considers that the bycatch in the D-fleet will be negligible in 2022 and it was therefore set to zero in the forecast. The 1136 t are assumed to be taken by the C-fleet in 2022 and was scaled by the 3-year average proportion of WBSS in the C-fleet catch (64.5%, 2019-2021).

The catch by the F-fleet fishing for human consumption in Subdivisions 22–24 is usually very close to the TAC and a utilization of 100% is assumed for the intermediate year, hence 788 t.

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 7 663 t of WBSS herring in 2022.

3.9.3 Catch scenarios for 2023–2025

The inputs and outputs of the short-term predictions are based on a catch constraint in the intermediate year 2022 of 7 663 t and are given in Tables 3.9.1–3.9.17.

Different catch options for the years after the intermediate year were explored with fleet-wise selection patterns and deterministic forecasts. In the past forecasts, to most closely resemble current WBSS management, a constraint was added to the forecasts so that, after the intermediate year, for all scenarios (except for the constant intermediate year TAC, the F = 0 and the catch for bycatch fleets only scenarios) the F-fleet is assumed to get 50% of the total catch of WBSS herring. This year, this constraint was removed since it is considered now not representative of the WBSS management where most of the catch in Division 3.a can now be transferred to the North Sea and the A-fleet is now catching most WBSS herring, while the F-fleet catch keeps decreasing due to the decrease in TAC in Subdivisions 22–24.

3.9.4 Exploring a range of total WBSS catches for 2023 (advice year) to 2025

ICES gives advice according to the F_{MSY} approach for the WBSS stock. Because the forecasted SSB in 2024 is below B_{lim} even when F=0, ICES advises a zero catch for 2023.

None of the catch scenarios for 2023, including zero catch, is expected to bring SSB above B_{lim} in 2024. For the past 2 years, besides requested standard scenarios HAWG also calculated the potential development of the stock projections until 2025 with different low F scenarios, where F2024 = F2023. None of these scenarios, even when F = 0, can bring the SSB above B_{lim} in 2025.

Since 2020, two new scenarios were requested by ACOM for zero catch advice stocks: (1) the "Catch for bycatch fleets only" scenario, and (2) a scenario where the biomass is constant between the advice year and the year after that. The first scenario is given in the Table below. Similarly, to last year the latter scenario was not run for the following reasons. For a stock with SSB calculated on the 1st of January (and the final year of assessment being 2021), this can be easily done because SSB in 2023 only depends on F in 2022 and F is estimated given a TAC constraint so is the same for all forecast scenarios. As a result, all scenarios tested in the short-term forecast would have the same SSB in 2023 and the F in 2023 can be estimated to obtain a SSB in 2024 equal to 2023. For WBSS, there are complications to this calculation because the advice is annual (Jan-Dec) but the SSB is calculated and reported at spawning time (spring). This means that SSB in 2023 is in fact the result of catches assumed (agreed TACs) for the intermediate year (2022) and some catches in the first months of 2023. In other words, the SSB in 2023 depends on F in 2022 but also on a fraction of the F in 2023, which is the advice year. What to assume for the first months of 2023 is the real issue here. For instance, if a zero catch is assumed in 2023 according to the advice, it will be uninformative because the table of advice would still only show the average F in 2023 (so F = 0). If an F that makes SSB 2023 = SSB 2022 is assumed for 2023, it will be an unrealistic high F needed to compensate for the low catches assumed in 2022. Given the reasons described above, the constant SSB between 2023 and 2024 scenario could not be meaningfully run for WBSS herring and is not included among the catch scenarios presented by the EG.

Table	Basis	Total catch	$F_{3–6}$	SSB* (2023)	SSB* (2024)	% SSB change	% advice
ICES advice basis							
3.9.2	MSY approach: zero	0	0	80 978	95 882	18	0
Other scenarios							
3.9.3	MAP^: F = F_{MSY} ×	19 391	0.147	79 256	79 224	0	
3.9.4	MAP^: F = F_{MSY} lower ×	14 025	0.102	79 772	83 745	5	
3.9.5	MAP^: F = F_{MSY} upper ×	23 085	0.179	78 880	76 152	-3	
3.9.6	F= FMSY	36 088	0.310	77 401	65 861	-15	
3.9.7	F = Fpa	44 481	0.410	76 296	59 278	-22	
3.9.8	F = Flim	47 526	0.450	75 860	56 930	-25	
	SSB (2022) = Blim ^^						
	SSB (2022) = Bpa ^^						
	SSB (2022) = MSY Btrigger ^^						
3.9.9	F = F_{2022}	9 073	0.064	80 221	88 093	10	
3.9.15	Catch for bycatch	6 142	0.039	80 475	90 852	13	

* 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 (2024) relative to SSB (2023).

*** The advised catch in 2021 was 0 tonnes.

^ Because SSB_{2022} is below MSY Btrigger, the FMSY, FMSY lower, and FMSY upper values in the MAP are adjusted by the SSB_{2022}/MSY Btrigger ratio.

^^ Blim and Bpa cannot be achieved in 2024, even with zero catch advice.

^^^ Only the A-fleet that targets North Sea autumn-spawning (NSAS) herring and therefore catches WBSS herring as bycatch in the eastern part of the North Sea, assuming the same catch as in the intermediate year 2022. The D-fleet that is bycatch fleet has zero catch because of the intermediate year assumption (C- and F-fleets are directed WBSS fisheries so have zero catch in this scenario).

Table	Basis	Total catch (2023)	Total catch (2024)	F3–6 (2023)	SSB* (2023)	SSB* (2024)	SSB* (2025)	% SSB change (2023–2024)	% SSB change (2024–2025)
Medium-term catch scenarios									
3.9.10	F = 0	0	0	0	80 978	95 882	111 989	18	17
3.9.17	F = 0.01	1 488	1 856	0.010	80 859	94 594	109 348	17	16
3.9.16	F = 0.025	3 670	4 466	0.025	80 681	92 713	105 581	15	14
3.9.11	F = 0.05	7 177	8 395	0.050	80 385	89 708	99 777	12	11
3.9.12	F = 0.01	13 742	14 913	0.100	79 799	84 145	89 698	5	7
3.9.13	F = 0.15	19 767	20 008	0.150	79 218	79 114	81 275	0	3
3.9.14	Constant catch 2022–2024 **	7 662	7 662	0.054	80 345	89 405	100 170	11	12

* 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).

** It is assumed that the fleets' 2022 catches are kept constant for 2023–2024.

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 FMSY was estimated to 0.31, F_{lim} 0.45 (5% risk to B_{lim}) and F_{pa} 0.41 (since 2020, $F_{pa}=F_{p05}$; ICES, 2021). 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. Similarly, to last year, the 2022 assessment is very consistent with the 2021 assessment.

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 currently 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 of the herring migration patterns and 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. It is expected that the implementation of genetic stock separation (which allows for identifying these smaller stock components) will improve data on their contributions to subdivisions 20-22 in years to come.

3.12 Considerations on the 2022 advice

This year assessment shows an SSB consistent with last year's assessment. Recruitment is still low but has slightly increased in 2021 (609 230 thousands). Under these conditions the stock is not expected to increase above B_{lim} in the short-term (2024) nor in the medium-term (2025) for any level of fishing mortality (SSB_{2025} = 111 989 t assuming F = 0).

To explore the potential development of the stock, projections until 2025 with different low F scenarios are provided in the Table in section 3.9.4. The development of a rebuilding plan for this stock remains a high priority and it is recommended by HAWG.

The EU–Norway TAC-setting procedure used for herring in Division 3.a (EU–Norway, 2013) calculates the TAC for the combined WBSS and NSAS stocks in the C-fleet as 41% of the ICES MSY advice for WBSS plus 5.7% of the TAC for the A-fleet (see section 3.13 for more details). However, according to a safety clause in the procedure, the method should not apply if serious concerns exist about the status of one of the two stocks, which is the case given the severe overexploitation of the WBSS stock.

This stock is caught across three different management units, and recovery will be impaired if catches of this stock are not minimized in all units. Based on agreed catches for 2022 and assumptions on stock mixing, it is predicted that around 80% of the total WBSS catches will be taken in Division 4.a in 2022. For the other two areas, catch shares in 2022 are predicted to be around 10% for subdivisions 20–21 and 10% for subdivisions 22–24.

The Council Regulation (EU) 2022/109 stipulates that the catches in Division 3.a should be limited to 1136 t in 2022 as the sum of directed and bycatch fisheries. Given the recent downward trends in the observed D-fleet catches, ICES considers that the bycatch in the D-fleet will be negligible in 2022 and it was therefore set to zero in the forecast. The 1136 t are assumed to be taken by the C-fleet in 2022.

In 2022, 100% of the herring quotas for the Division 3.a can be transferred to the North Sea, against 50% the previous years. This results in an important change in the assumed proportion of each fleet in the total WBSS catch compared to what was observed in 2021. The predicted catch for the C-fleet in 2022, which has been the fleet catching most of WBSS herring in the past 2 years, is drastically reduced compared to 2021. The A-fleet is now predicted to catch most of WBSS herring in 2022 and this is carried forward in the catch projections. Predicted catches of WBSS herring by the A-fleet are particularly uncertain, notably if the quotas are transferred from Division 3.a to the eastern part of the North Sea where both WBSS and North Sea autumn-spawning (NSAS) herring mix.

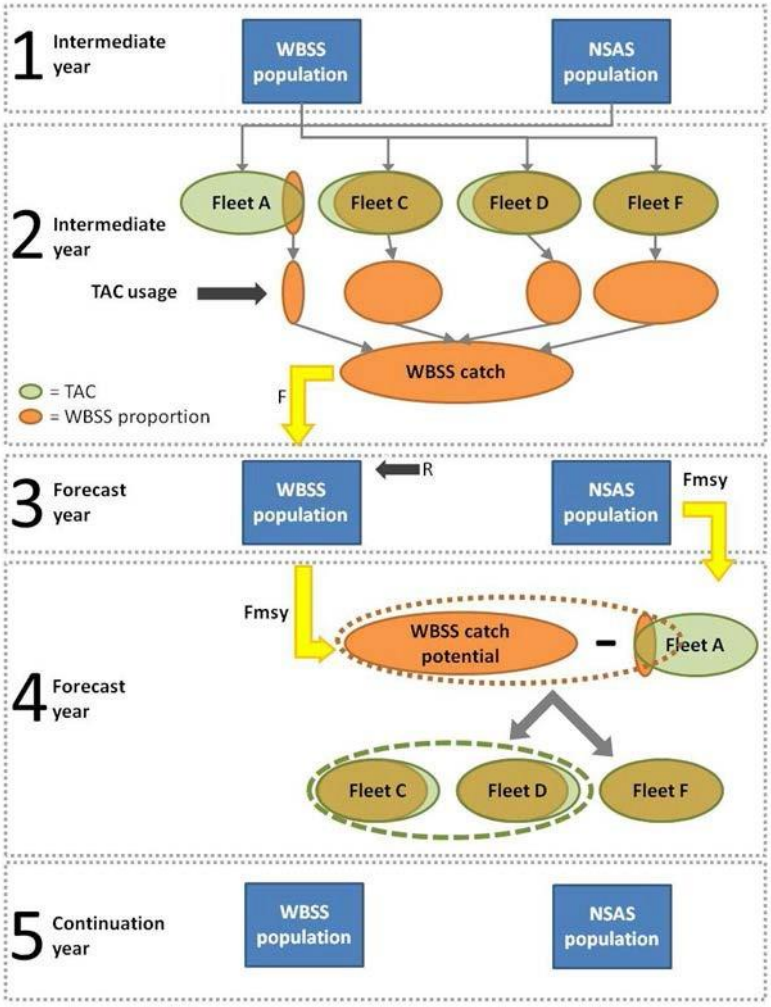
3.13 Management Considerations

3.13.1 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). Since 2011, 50% of the EU and Norwegian quotas for human consumption can optionally be transferred from Division 3.a and taken in Subarea 4. In 2021, the transfer was increased to 100%, effective in 2022. ICES assumes that most of the quotas in Division 3.a will be transferred in 2022 resulting in a maximum catch of NSAS and WBSS herring of 1 136 t in Division 3.a (cf. part 3.9).

3.13.2 ICES catch predictions vs. 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 SD 22–24 takes into account the occurrence of different fleet's 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 transfer area where they take it as a mixture of mainly NSAS and partly WBSS), the C- and D-fleet (within the Division 3.a where they take it as a mixture of mainly WBSS and NSAS), and the F-fleet (within SDs 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 FMSY advice plus a fraction of the NSAS 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 realized WBSS catches may deviate from the predictions based on FMSY.

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.

3.13.3 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 TAC for the A-fleet.

However, given the new B_{lim}, the stock has been below B_{lim} since 2018 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.

3.14 Ecosystem considerations

3.14.1 Migration

Herring in Division 3.a and subdivisions 22–24 is a migratory stock. There are feeding migrations from the Western Baltic Sea into the more saline waters of Division 3.a and to 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), and this notion is corroborated with genetic data. Herring in Division 3.a and subdivisions 22–24 migrate back to the Rügen area (SD 24) and other spawning areas at the beginning of winter. Moreover, there are recent indications that Central Baltic herring perform migrations into Subdivision 24 (Gröhsler et al., 2013; Bekkevold et al. in review).

Overwintering is considered to take place in the Öresund (Nielsen et al., 2001). However, recent observations on the acoustic surveys (Gröhsler and Schaber, 2018) indicate changes in distribution and it is currently unclear whether fish still aggregate in the shallow parts of the Sound or whether the density of herring accumulating in the area has changed overall. Whatever the temporal limitation of this survey is and whatever the cause for this observation might be, it may underline the need to validate the multiple-decade-old information on WBSS herring migration patterns.

Similar to the NSAS, the WBSS has produced a series of poor year classes in the last one and a half decade and the declining trend continues. 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 link 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.

3.14.2 Predation

Predation on larval herring by gelatineous plankton (*Aurelia aurita*) in the Western Baltic Sea was described to a be a major impact on recruitment strength of the population in the 1980s (Möller, 1984). Currently, in the inshore nursery grounds around Rügen the bloom of *A. aurita* is rather seasonally decoupled from major larval production periods as the jelly fish occur in large quantities during summer (July-Sept.). The same is true for the invading ctenophore *Mnemiopsis leidyi*, that appears from August on (Polte and Kotterba, pers. obs.). The seasonal peaks of jelly fish blooms, however, might be subjected to change and should be kept under close surveillance as in the past two years *A. aurita* became more abundant during June therefore increasing the temporal overlap with WBSS larvae (Polte, pers. obs. RHLS).

Besides this potential predator, in Greifswald Bay there is evidently significant predation pressure on herring eggs by three-spined sticklebacks and- to a lower percentage by juv. Perch (*Perca fluviliatis*) and 9-spined stickleback, *Pungitius pungitius* (Kotterba *et al.*, 2014; Kotterba *et al.*, 2017a). In contrast the predation on larvae by the sticklebacks was found rather minor (Kotterba *et al.*, 2017b). Unfortunately, there are no historical baseline data available on stickleback densities in the system, but they are considered to have increased speculatively by a trophic cascade including overfishing of predators (Bergstrom *et al.*, 2015).

The non-indigenous goby (*Neogobius melanostomus*) has reached extremely high abundances in the coastal Baltic Sea during recent years (Kornis *et al.*, 2012). It has been suspected to significantly increase predation pressure on herring eggs. However, a recent study revealed a minor effect by juvenile gobies that would ingest eggs when encountered but *N. melanostomus* in general is rather specialized on mollusc-prey and additionally there is a temporal mismatch among the juvenile gobies and the herring spawning period (Wiegleb *et al.*, 2018).

3.14.3 Eutrophication

Estuarine WBSS herring spawning grounds in the Western Baltic Sea are still subject of increased nutrient levels and steady input of agricultural discharge. The resulting increased turbidity leads to a strict vertical limitation of perennial macrophytes in Greifswald Bay to the very littoral zone with a growth limit of about 3.5 m (Kanstinger *et al.*, 2018). The major spawning zone in the system is considered to be located in a range of 1-2 m water depth (Moll, 2018). Besides a potential reduction in spawning beds the depth limitation evidently results in increased exposure against storm-induced turbulence and consequently increased herring egg mortality (Moll *et al.*, 2018).

Although spring-spawning herring facultative selects other spawning substrates for egg deposition (e.g., stones), the complexity of spawning substrate as provided by macrophytes promotes egg survival by unknown mechanisms (von Nordheim *et al.*, 2018). Additionally, increased blooms of filamentous algae (*Pilayella littoralis*) promoted by elevated nutrient levels in synergy with warming spring temperatures cause significant herring egg mortality (von Nordheim *et al.*, 2020)

3.15 Changes in the Environment

3.15.1 Climate drivers

There is ample indication that prevailing winter temperature- as expressed by the Baltic Sea Index (BSI) - significantly affect recruitment strength of WBSS herring (Cardinale et al., 2009; Gröger et al., 2014). The exact ecological mechanisms causing this link remain widely unknown. How-

ever, for larval herring production in Greifswald Bay it could be shown that the optimal temperature window for embryonic development (Peck et al., 2012) is very important for reproduction success and tends to have contracted in recent years (Dodson et al., 2019). There are strong indications that according to recent mild winter regimes the seasonal timing of spawning migration and reproduction has shifted, and those phenology changes are responsible for limited reproduction success as expressed by larval productivity in Greifswald Bay reflected by the abundance of 1-year juveniles in the outer Western Baltic Sea as expressed by the GERAS 1-wr abundance index (Polte et al., 2021). As currently the initial hatching cohorts are not resulting in significant numbers of larval survivors beyond the critical period after yolk-sac consumption, later cohorts are contributing most to recent recruitment patterns (Polte et al., 2014). However, this might overall result in low recruitment compared to earlier years when the larvae of initial cohorts drove the numbers of survivors. Additionally, those later cohorts (hatching mid-April-early May) are exposed to a suite of different stressors: If the seasonal SST curve is steep and the shallow water heats fast during spring, those larvae are increasingly encountering physiological limits. Moyano et al. (2020) could recently show that WBSS larvae develop cardiac arrhythmia beyond an SST threshold of 16°C and that the number of days above this threshold increased in Greifswald Bay during past decades. Besides those direct temperature effects, synergistic effects of eutrophication and warming (see Eutrophication above) lead to multiple cascades affecting egg survival of those later cohorts in particular.

Table 3.1.1 Western Baltic spring spawning herring. Total catch (both WBSS and NSAS) in 1989–2021 (1000 tonnes). (Data provided by Working Group members in HAWG 2022).

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
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	11.8
Faroe Islands																
Germany															0.7	0.5
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	21.8
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	34.1
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	7.6
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	9.6
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	17.2
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	7.3
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	18.5
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	5.5
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	9.9
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	41.2
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	0.1
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	0.3
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	0.4
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**	**92.8**

Year	2005	2006 **	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021*
Skagerrak																	
Denmark	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	0.6	3.2	2.9
Faroe Islands	0.4			0.0	0.6	0.4					0.5	0.3	0.4	0.1			

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	
Germany	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	0.1	0.2	0.1
Lithuania						0.4											
Nether-lands											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	2.5	2.1	1.1
Sweden	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	8.5	9.1	6.1
Total	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	11.7	14.5	10.3
Kattegat																	
Denmark	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	1.5	0.7	0.2
Sweden	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	1.7	2.6	2.8
Germany					0.6	0.0											
Total	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	3.2	3.2	3.1
Subdivi-sions 22+24																	
Denmark	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	2.0	0.6	0.1
Finland														0.001			
Germany	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	5.6	2.1	0.8
Poland	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	1.1	0.6	0.2
Sweden	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	0.7	0.2	0.1
Total	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	9.5	3.5	1.3
Subdivi-sion 23																	
Denmark	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	0.01	0.001	0.01
Sweden	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	0.4	0.5	0.3
Total	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	0.4	0.5	0.3
Grand To-tal	**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**	**24.7**	**21.7**	**14.9**

***Preliminary data**

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

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

Table 3.1.2 Western Baltic spring spawning herring. Catch (SOP) in 2004-2021 by fleet & 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	2013	1	8.5	0.8	11.7	20.9
	2	2.8	3.3	10.4	16.5		2	1.7	0.6	8.5	10.8
	3	8.2	10.8	2.4	21.4		3	8.4	1.0	1.1	10.4
	4	5.9	5.0	8.6	19.4		4	9.8	0.5	4.3	14.7
	Total	30.3	22.0	41.7	93.9		Total	28.4	2.9	25.5	56.7
2005	1	16.6	6.1	20.4	43.1	2014	1	6.2	0.2	10.8	17.3
	2	3.4	1.9	15.6	20.9		2	2.3	0.5	2.3	5.1
	3	23.4	3.4	1.9	28.7		3	10.7	2.4	0.8	14.0
	4	12.0	2.6	5.8	20.5		4	5.7	0.8	4.4	10.9
	Total	55.4	14.1	43.7	113.3		Total	24.9	4.0	18.3	47.2
2006	1	15.3	5.9	15.1	36.2	2015	1	9.0	1.9	14.2	25.1
	2	2.6	0.1	17.2	19.9		2	1.0	0.1	2.8	3.9
	3	15.7	0.8	3.0	19.5		3	7.5	1.5	0.9	9.9
	4	8.3	2.4	6.5	17.3		4	4.1	2.8	4.3	11.1
	Total	41.9	9.3	41.9	93.0		Total	21.6	6.3	22.1	50.0
2007	1	7.7	3.0	18.8	29.5	2016	1	7.9	0.7	15.5	24.0
	2	3.8	0.1	10.5	14.4		2	0.4	0.3	3.5	4.1
	3	22.4	0.8	1.7	24.9		3	15.7	1.3	1.4	18.5
	4	7.7	1.8	9.5	18.9		4	3.4	0.3	4.7	8.3
	Total	41.6	5.7	40.5	87.7		Total	27.4	2.5	25.1	55.0
2008	1	8.2	3.9	18.4	30.5	2017	1	7.5	0.0	16.8	24.3
	2	2.7	0.3	11.3	14.3		2	0.2	0.1	3.4	3.6
	3	14.9	0.6	6.0	21.5		3	12.1	0.1	1.0	13.2
	4	6.5	1.0	8.4	16.0		4	6.6	0.3	5.3	12.2
	Total	32.3	5.9	44.1	82.3		Total	26.4	0.4	26.5	53.3
2009	1	11.1	2.7	19.5	33.2	2018	1	10.0	0.0	12.0	21.9
	2	3.1	0.1	6.8	10.1		2	0.2	0.1	3.4	3.8
	3	14.3	0.9	1.4	16.6		3	10.2	0.1	0.2	10.6
	4	6.0	0.7	3.3	10.0		4	2.5	0.1	3.4	6.0
	Total	34.5	4.3	31.0	69.9		Total	22.9	0.4	19.0	42.2
2010	1	8.4	1.1	10.2	19.8	2019	1	4.4	0.1	6.0	10.5
	2	3.9	0.7	5.4	10.1		2	0.5	0.0	0.4	1.0

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
	3	13.4	0.4	0.4	14.3		3	6.5	0.2	0.3	7.0
	4	9.2	0.1	1.8	11.1		4	3.1	0.0	3.1	6.3
	Total	35.0	2.3	17.9	55.2		Total	14.6	0.4	9.8	24.7
2011	1	7.0	0.5	7.8	15.3	2020	1	4.3	0.0	2.0	6.3
	2	0.5	0.2	4.1	4.8		2	0.3	0.1	0.2	0.6
	3	6.5	1.0	0.8	8.3		3	9.5	0.6	0.4	10.5
	4	3.4	0.9	3.2	7.4		4	2.7	0.2	1.4	4.4
	Total	17.4	2.6	15.8	35.9		Total	16.9	0.9	4.0	21.7
2012	1	4.5	1.8	14.0	20.3	2021	1	4.4	0.0	0.5	4.9
	2	0.3	0.7	2.5	3.5		2	1.1	0.0	0.2	1.3
	3	12.3	1.7	1.1	15.0		3	6.5	0.1	0.1	6.7
	4	5.2	1.1	3.5	9.9		4	1.1	0.1	0.9	2.0
	Total	22.3	5.4	21.1	48.8		Total	13.2	0.1	1.6	14.9

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: 2021** **Country: ALL**

Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
1	1	1.76	25.6			1.76	25.6
	2	31.73	58.4			31.73	58.4
	3	3.36	73.1			3.36	73.1
	4	0.30	96.0			0.30	96.0
	5						
	6						
	7						
	8+	0.11	154.5			0.11	155
	Total	37.26		0.00		37.26	
	SOP		2,190		0		2,190
Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
	0				45.3	1.18	30.1
	1	0.91	25.6	0.27	45.3	16.55	58.4
	2	16.48	58.4	0.07	67.3	1.75	73.1

Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
2	3	1.75	73.1			0.15	96.0
	4	0.15	96.0				
	5						
	6						
	7					0.06	154.5
	8+	0.06	154.5			0.0004	130.0
	Total	19.35		0.34		19.69	
	SOP		1,137		17		1,154

Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
3	0						
	1	10.03	55.0	0.81	45.3	10.84	54.3
	2	14.64	126.3	0.20	67.3	14.85	125.5
	3	7.76	133.9			7.76	133.9
	4	7.52	159.4			7.52	159.4
	5	3.85	171.6			3.85	171.6
	6	3.18	196.5			3.18	196.5
	7	1.34	206.5			1.34	206.5
	8+	1.53	201.3			1.53	201.3
	Total	49.84		1.02		50.86	
	SOP		6,507		51		6,557

Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
4	0	8.39	10.8			8.39	10.8
	1	1.65	51.7	0.06	45.3	1.71	51.4
	2	0.60	119.8	0.02	67.3	0.61	118.4
	3	0.20	136.2			0.20	136.2
	4	0.19	161.9			0.19	161.9
	5	0.11	174.2			0.11	174.2
	6	0.10	203.8			0.096	203.8
	7	0.04	226.3			0.04	226.3
	8+	0.03	189.1			0.03	189.1
	Total	11.30		0.08		11.38	

Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
	SOP		359		4		363
Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
Total	0	8.39	10.8			8.39	10.8
	1	14.35	49.1	1.15	45.3	15.50	48.8
	2	63.45	74.6	0.29	67.3	63.74	74.6
	3	13.07	110.2			13.07	110.2
	4	8.16	156.0			8.16	156.0
	5	3.96	171.6			3.96	171.6
	6	3.27	196.8			3.27	196.8
	7	1.38	207.1			1.38	207.1
	8+	1.73	196.5			1.73	196.5
	Total	117.75		1.43		119.2	
	SOP		10,192		71		10,263

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: 2021 Country: ALL

Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
1	1	0.91	22.8	0.08	45	0.98	24.5
	2	34.80	51.4	0.02	67	34.82	51.4
	3	4.16	73.4			4.16	73.4
	4	0.64	112.9			0.64	112.9
	5	0.09	81.1			0.09	81.1
	6						
	7						
	8+						
	Total	40.59		0.10		40.68	
	SOP		2,193.542		5		2,198.272
Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
	0						
	1	0.0048	22.8	0.03	45.3	0.0387	42.5

Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
2	2	0.1857	51.4	0.01	67.3	0.1941	52.1
	3	0.0222	73.4			0.0222	73.4
	4	0.00340	112.9			0.0034	112.9
	5	0.00048	81.1			0.0005	81.1
	6						
	7						
	8+						
	Total	0.2166		0.04		0.2588	
	SOP		11.7		2		14

Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
3	0						
	1						
	2						
	3	0.00	193.9			0.00	193.9
	4	0.03	169.8			0.03	169.8
	5	0.05	177.5			0.05	177.5
	6	0.03	181.6			0.03	181.6
	7	0.01	194.8			0.01	194.8
	8+	0.01	183.3			0.01	183.3
	Total	0.13		0.00		0.13	
	SOP		24		0		24

Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
4	0						
	1			0.97	45.3	0.97	45.3
	2			0.24	67.3	0.24	67.3
	3	0.07	193.9			0.07	193.9
	4	0.92	169.8			0.92	169.8
	5	1.63	177.5			1.63	177.5
	6	1.06	181.6			1.06	181.6
	7	0.35	194.8			0.35	194.8
	8+	0.21	183.3			0.212	183.3

Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
	Total	4.24		1.21		5.46	
	SOP		759		60		819

Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
Total	0						
	1	0.91	22.8	1.08	45.3	1.99	35.0
	2	34.99	51.4	0.27	67.3	35.26	51.5
	3	4.25	75.5			4.25	75.5
	4	1.59	146.9			1.59	146.9
	5	1.77	172.6			1.77	172.6
	6	1.09	181.6			1.09	181.6
	7	0.36	194.8			0.36	194.8
	8+	0.22	183.3			0.219	183.3
	Total	45.18		1.35		46.53	
	SOP		2,987		67		3,055

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: 2021 Country: ALL

Quarter	W-rings	Sub-division 22		Sub-division 23		Sub-division 24		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
1	0								
	1	0.002	16.2			0.35	16.2	0.35	16.2
	2	0.004	52.5	0.02	133.1	0.64	52.5	0.67	55.4
	3	0.005	74.9	0.12	149.7	0.73	73.4	0.85	83.9
	4	0.009	120.1	0.14	164.2	0.40	121.6	0.54	132.2
	5	0.04	147.4	0.06	165.9	0.33	131.9	0.43	138.0
	6	0.03	155.7	0.01	187.3	0.53	178.3	0.57	177.3
	7	0.00	164.7	0.01	212.7	0.35	180.5	0.36	181.4
	8+	0.01	169.9	0.01	172.4	0.40	184.5	0.43	183.7
	Total	0.10		0.37		3.73		4.21	
	SOP		15		60		416		491

Quarter	W-rings	Sub-division 22		Sub-division 23		Sub-division 24		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.

Quarter	W-rings	Sub-division 22		Sub-division 23		Sub-division 24		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
2	1	0.00003	16.2			0.054	16.2	0.054	16.2
	2	0.002	56.0	0.002	133.1	0.12	52.1	0.13	53.6
	3	0.011	77.8	0.01	149.7	0.16	71.1	0.18	76.2
	4	0.007	95.2	0.01	164.2	0.11	111.4	0.13	115.5
	5	0.01	113.7	0.006	165.9	0.14	135.6	0.16	135.1
	6	0.01	145.8	0.001	187.3	0.21	160.4	0.22	159.9
	7	0.01	154.9	0.001	212.7	0.19	157.5	0.19	157.7
	8+	0.008	164.1	0.001	172.4	0.29	167.1	0.30	167.0
	Total	0.05		0.035		1.27		1.36	
	SOP		7		5.5		161		173

Quarter	W-rings	Sub-division 22		Sub-division 23		Sub-division 24		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
3	0	0.0000	20.1			0.00	20.1	0.00	20.1
	1	0.00001	38.4			0.01	38.4	0.01	38.4
	2	0.0002	62.5	0.02	133.1	0.06	83.1	0.07	93.7
	3	0.0005	71.7	0.07	149.7	0.11	106.7	0.19	123.7
	4	0.0006	106.2	0.09	164.2	0.09	135.2	0.17	149.4
	5	0.001	122.6	0.04	165.9	0.04	149.8	0.08	157.1
	6	0.001	157.3	0.01	187.3	0.03	170.6	0.04	173.6
	7	0.0008	164.4	0.01	212.7	0.02	181.8	0.03	189.8
	8+	0.001	169.7	0.01	172.4	0.01	185.6	0.02	177.7
	Total	0.006		0.24		0.36		0.60	
	SOP		0.9		38		44		83

Quarter	W-rings	Sub-division 22		Sub-division 23		Sub-division 24		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
4	0	0.000002	20.1			0.04	19.1	0.04	19.1
	1	0.00001	38.4			0.18	38.2	0.18	38.2
	2	0.0003	57.4	0.07	133.1	0.83	81.3	0.90	85.5
	3	0.001	74.3	0.35	149.7	1.62	105.6	1.98	113.5
	4	0.003	121.8	0.41	164.2	1.27	134.0	1.68	141.3
	5	0.009	142.0	0.19	165.9	0.64	148.2	0.83	152.1
	6	0.02	160.3	0.04	187.3	0.45	169.0	0.50	170.1
	7	0.01	165.4	0.04	212.7	0.29	176.8	0.34	180.5

Quarter	W-rings	Sub-division 22		Sub-division 23		Sub-division 24		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
	8+	0.02	169.6	0.04	172.4	0.13	180.8	0.19	178.1
	Total	0.05		1.14		5.45		6.64	
	SOP		9		182		663		853
Quarter	W-rings	Sub-division 22		Sub-division 23		Sub-division 24		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
Total	0	0.000004	20.1			0.04	19.1	0.04	19.1
	1	0.002	16.3			0.59	23.0	0.59	23.0
	2	0.006	54.0	0.12	133.1	1.65	67.9	1.77	72.2
	3	0.017	76.6	0.55	149.7	2.62	94.6	3.19	104.1
	4	0.020	111.3	0.64	164.2	1.87	130.0	2.53	138.6
	5	0.06	139.3	0.29	165.9	1.15	142.0	1.50	146.5
	6	0.06	155.2	0.06	187.3	1.22	171.7	1.33	171.6
	7	0.02	162.5	0.06	212.7	0.85	174.2	0.93	176.3
	8+	0.04	168.5	0.06	172.4	0.83	177.9	0.92	177.1
	Total	0.22		1.78		10.81		12.81	
	SOP		31		286		1,284		1,601

Table 3.2.4 Western Baltic spring spawning herring. Samples of commercial catch by quarter and area for 2021 available to the Working Group. 1/2

Area	Country	Fleet	Quarter	Landings ('000 tons)	Numbers of samples	Numbers of fish meas.	Numbers of fish aged
Skagerrak	**Denmark**	**C**	**1**	0.032	No data available		
		C	**2**	0.175	No data available		
		C	**3**	2.529	7	584	297
		C	**4**	0.059	No data available		
	Total	**Total**		2.794	7	584	297
	Denmark	**D**	**1**	0.000	-		
		D	**2**	0.017	No data available		
		D	**3**	0.051	2	10	10
		D	**4**	0.004	No data available		
	Total	**Total**		0.071	2	10	10
	Germany	**C**	**1**	0.000	-		
		C	**2**	0.000	-		

Area	Country	Fleet	Quarter	Landings ('000 tons)	Numbers of samples	Numbers of fish meas.	Numbers of fish aged
		C	3	0.000		-	
		C	4	0.143		No data available	
	Total	Total		0.143			
	Norway	C	1	0.142		No data available	
		C	2	0.949		No data available	
		C	3	0.000		-	
		C	4	0.031		No data available	
	Total	Total		1.122	0	0	0
	Faroe Islands	C	1	0.000		-	
		C	2	0.000		-	
		C	3	0.000		-	
		C	4	0.000		-	
	Total	Total		0.000	0	0	0
	Sweden	C	1	2.016	5	620	619
		C	2	0.013		No data available	
		C	3	3.978	6	430	428
		C	4	0.126	8	262	262
	Total	Total		6.133	19	1,312	1,309
Kattegat	Denmark	C	1	0.129		No data available	
		C	2	0.011		No data available	
		C	3	0.001		No data available	
		C	4	0.002		No data available	
	Total	Total		0.143	0	0	0
	Denmark	D	1	0.005		No data available	
		D	2	0.002		No data available	
		D	3	0.000		No data available	
		D	4	0.060		No data available	
	Total	Total		0.067	0	0	0
	Sweden	C	1	2.064	13	875	875
		C	2	0.001		No data available	
		C	3	0.023		No data available	
		C	4	0.757	1	60	60
	Total	Total		2.845	14	935	935

Table 3.2.4 (continued) Western Baltic spring spawning herring. Samples of commercial catch by quarter and area for 2021 available to the Working Group. 2/2

Area	Country	Fleet	Quarter	Landings ('000 tons)	Numbers of samples	Numbers of fish meas.	Numbers of fish aged
Subdivision 22	**Denmark**	**F**	**1**	0.0004	No data available		
		F	**2**	0.002	1	100	100
		F	**3**	0.001	No data available		
		F	**4**	0.006	No data available		
	Total	**Total**		0.009	1	100	100
	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**	0.014	5	1,094	169
		F	**2**	0.004	3	958	145
		F	**3**	0.000	No data available		
		F	**4**	0.003	No data available		
	Total	**Total**		0.022	8	2,052	314
Subdivision 23	**Denmark**	**F**	**1**	0.000	No data available		
		F	**2**	0.004		-	
		F	**3**	0.0001		-	
		F	**4**	0.001		-	
	Total	**Total**		0.005	0	0	0
	Sweden	**F**	**1**	0.060	No data available		
		F	**2**	0.002	No data available		
		F	**3**	0.038	No data available		
		F	**4**	0.181	1	61	61
	Total	**Total**		0.281	1	61	61
Subdivision 24	**Denmark**	**F**	**1**	0.107	2	243	102
		F	**2**	0.009	4	681	212
		F	**3**	0.000	2	301	102
		F	**4**	0.022	6	982	327
	Total	**Total**		0.138	14	2207	743
	Finland	**F**	**1**	0.000		-	
		F	**2**	0.000		-	

Area	Country	Fleet	Quarter	Landings ('000 tons)	Numbers of samples	Numbers of fish meas.	Numbers of fish aged
		F	3	0.000		-	
		F	4	0.000		-	
	Total	Total		0.000	0	0	0
	Germany	F	1	0.246	9	1,598	312
		F	2	0.087	5	1,051	171
		F	3	0.00005		No data available	
		F	4	0.488	6	1,624	640
	Total	Total		0.8217	20	4,273	1,123
	Poland	F	1	0.061	2	490	117
		F	2	0.065	3	625	160
		F	3	0.044		-	
		F	4	0.079		-	
	Total	Total		0.249	5	1115	277
	Sweden	F	1	0.002		No data available	
		F	2	0.000		-	
		F	3	0.0003		No data available	
		F	4	0.073	1	65	65
	Total	Total		0.075	1	65	65
Total	**Skagerrak**	**C**	**1-4**	**10.192**	**26**	**1,896**	**1,606**
		D	**1-4**	**0.071**	**2**	**10**	**10**
	Kattegat	**C**	**1-4**	**2.987**	**14**	**935**	**935**
		D	**1-4**	**0.067**	**0**	**0**	**0**
	Subdivision 22	**F**	**1-4**	**0.031**	**9**	**2,152**	**414**
	Subdivision 23	**F**	**1-4**	**0.286**	**1**	**61**	**61**
	Subdivision 24	**F**	**1-4**	**1.284**	**40**	**7,660**	**2,208**
	Total	**Total**	**1-4**	**14.918**	**92**	**12,714**	**5,234**

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 2021. 1/2

	Country	Quarter	Fleet	Sampling
Skagerrak	**Denmark**	**1**	**C**	Sweden 27.3.a.20 fleetC Q1
		2	**C**	Sweden 27.3.a.20 fleetC Q1
		3	**C**	Sampling
		4	**C**	Denmark 27.3.a.20 fleetC Q3
	Germany	**1**	**C**	No landings
		2	**C**	No landings
		3	**C**	No landings
		4	**C**	Denmark 27.3.a.20 fleetC Q3
	Sweden	**1**	**C**	Sampling
		2	**C**	Sweden 27.3.a.20 fleetC Q1
		3	**C**	Sampling
		4	**C**	Sampling
	Denmark	**1**	**D**	No landings
		2	**D**	Denmark 27.3.a.20 fleetD Q3
		3	**D**	Sampling
		4	**D**	Denmark 27.3.a.20 fleetD Q3
	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**	No landings
		4	**C**	No landings
	Norway	**1**	**C**	Sweden 27.3.a.20 fleetC Q1
		2	**C**	Sweden 27.3.a.20 fleetC Q1
		3	**C**	Denmark 27.3.a.20 fleetC Q3
		4	**C**	Denmark 27.3.a.20 fleetC Q3
Kattegat	**Denmark**	**1**	**C**	Sweden 27.3.a.21 fleetC Q1
		2	**C**	Sweden 27.3.a.21 fleetC Q1
		3	**C**	Sweden 27.3.a.21 fleetC Q4
		4	**C**	Sweden 27.3.a.21 fleetC Q4
	Sweden	**1**	**C**	Sampling

	Country	Quarter	Fleet	Sampling
		2	**C**	Sweden 27.3.a.21 fleetC Q1
		3	**C**	Sweden 27.3.a.21 fleetC Q4
		4	**C**	Sampling
	Germany	**1**	**C**	No landings
		2	**C**	No landings
		3	**C**	No landings
		4	**C**	No landings
	Denmark	**1**	**D**	Denmark 27.3.a.20 fleetD Q3
		2	**D**	Denmark 27.3.a.20 fleetD Q3
		3	**D**	No landings
		4	**D**	Denmark 27.3.a.20 fleetD Q3
Subdivision 22	**Denmark**	**1**	**F - active**	No landings
		2	**F - active**	Denmark 27.3.d.24 fleetF - active Q1
		3	**F - active**	No landings
		4	**F - active**	No landings
	Denmark	**1**	**F - passive**	Germany 27.3.c.22 fleetF - passive Q1
		2	**F - passive**	Sampling
		3	**F - passive**	Germany 27.3.c.22 fleetF - passive Q3
		4	**F - passive**	Germany 27.3.c.22 fleetF - passive Q4
	Sweden	**1**	**F**	No landings
		2	**F**	No landings
		3	**F**	No landings
		4	**F**	No landings
	Germany	**1**	**F - active**	Denmark 27.3.d.24 fleetF - active Q1
		2	**F - active**	Denmark 27.3.d.24 fleetF - active Q1
		3	**F - active**	National imputation (see WD)
		4	**F - active**	National imputation (see WD)
	Germany	**1**	**F - passive**	Sampling
		2	**F - passive**	Sampling
		3	**F - passive**	National imputation (see WD Gröhsler)
		4	**F - passive**	National imputation (see WD Gröhsler)

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

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 2021. 2/2

	Country	Quarter	Fleet	Sampling
Subdivision 23	**Denmark**	**1**	**F - passive**	No landings
		2	**F - passive**	Sweden 27.3.b.23 fleetF Q4
		3	**F - passive**	Sweden 27.3.b.23 fleetF Q4
		4	**F - passive**	Sweden 27.3.b.23 fleetF Q4
	Sweden	**1**	**F**	Sweden 27.3.b.23 fleetF Q4
		2	**F**	Sweden 27.3.b.23 fleetF Q4
		3	**F**	Sweden 27.3.b.23 fleetF Q4
		4	**F**	Sampling
Subdivision 24	**Denmark**	**1**	**F - active**	Sampling
		2	**F - active**	Denmark 27.3.d.24 fleetF - active Q1
		3	**F - active**	Germany 27.3.d.24 fleetF - active Q4
		4	**F - active**	Sampling
	Denmark	**1**	**F - passive**	No landings
		2	**F - passive**	Sampling
		3	**F - passive**	Sampling
		4	**F - passive**	Sampling
	Finland	**1**	**F**	No landings
		2	**F**	No landings
		3	**F**	No landings
		4	**F**	No landings
	Germany	**1**	**F - active**	Denmark 27.3.d.24 fleetF - active Q1
		2	**F - active**	Denmark 27.3.d.24 fleetF - active Q1
		3	**F - active**	No landings
		4	**F - active**	Sampling
		1	**F - passive**	Sampling
		2	**F - passive**	Sampling
		3	**F - passive**	National imputation (see WD Gröhsler)
		4	**F - passive**	National imputation (see WD Gröhsler)
	Poland	**1**	**F - active**	Denmark 27.3.d.24 fleetF - active Q1
		2	**F - active**	Denmark 27.3.d.24 fleetF - active Q1
		3	**F - active**	Germany 27.3.d.24 fleetF - active Q4
		4	**F - active**	Germany 27.3.d.24 fleetF - active Q4

Poland	**1**	**F - passive**	Sampling
	2	**F - passive**	Sampling
	3	**F - passive**	No landings
	4	**F - passive**	No landings
Sweden	**1**	**F**	Denmark 27.3.d.24 fleetF - active Q1
	2	**F**	No landings
	3	**F**	Germany 27.3.d.24 fleetF - active Q4
	4	**F**	Sampling

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: 2021

		Skagerrak			Kattegat		
Quarter	**W-rings**	**NSAS**	**WBSS**	**n**	**NSAS**	**WBSS**	**n**
1	1	95.36%	4.64%	105	89.82%	10.18%	70
	2	44.11%	55.89%	121	32.75%	67.25%	99
	3	11.72%	88.28%	112	9.15%	90.85%	61
	4	6.09%	93.91%	23	4.82%	95.18%	17
	5			4	4.61%	95.39%	2
	6			8			0
	7			4			0
	8+	8.51%	91.49%	4			0
		Skagerrak			**Kattegat**		
Quarter	**W-rings**	**NSAS**	**WBSS**	**n**	**NSAS**	**WBSS**	**n**
2	1	91.64%	8.36%	19	81.69%	18.31%	0
	2	15.76%	84.24%	12	9.85%	90.15%	0
	3	5.54%	94.46%	9	3.93%	96.07%	0
	4	7.10%	92.90%	10	5.31%	94.69%	0
	5			3	6.44%	93.56%	0
	6			2			0
	7			0			0
	8+	0.00%	100.00%	0			0
		Skagerrak			**Kattegat**		
Quarter	**W-rings**	**NSAS**	**WBSS**	**n**	**NSAS**	**WBSS**	**n**
3	0			71			58
	1	94.56%	5.44%	285			82

Quarter	W-rings	Skagerrak			Kattegat		
		NSAS	WBSS	n	NSAS	WBSS	n
	2	51.04%	48.96%	207			66
	3	22.16%	77.84%	149	11.46%	88.54%	49
	4	14.09%	85.91%	87	7.89%	92.11%	23
	5	11.48%	88.52%	41	6.33%	93.67%	11
	6	8.81%	91.19%	31	4.27%	95.73%	16
	7	5.11%	94.89%	14	1.78%	98.22%	4
	8	1.66%	98.34%	19	0.47%	99.53%	5
Quarter	W-rings	Skagerrak			Kattegat		
		NSAS	WBSS	n	NSAS	WBSS	n
4	0	82.33%	17.67%	52			0
	1	65.23%	34.77%	22	65.74%	34.26%	0
	2	87.75%	12.25%	0	80.35%	19.65%	0
	3	81.20%	18.80%	0	42.32%	57.68%	1
	4	63.85%	36.15%	0	29.23%	70.77%	11
	5	44.51%	55.49%	0	17.91%	82.09%	20
	6	39.88%	60.12%	0	12.90%	87.10%	13
	7	62.07%	37.93%	0	15.04%	84.96%	4
	8	95.18%	4.82%	0	33.62%	66.38%	2

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: 2021** **Country: All**

Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
1	1	0.82	22.8	0.07	45.3	0.88	24.5
	2	11.40	51.4	0.01	67.3	11.40	51.4
	3	0.38	73.4			0.38	73.4
	4	0.03	112.9			0.03	112.9
	5	0.004	81.1			0.004	81
	6					0.00	
	7					0.00	
	8+					0.00	
	Total	12.63		0.07		12.70	
	SOP		636.0		3.5		639.5

Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
2	0					0.00	
	1	0.0040	22.8	0.03	45.3	0.03	42.5
	2	0.0183	51.4	0.001	67.3	0.02	52.1
	3	0.00087	73.4			0.0009	73.4
	4	0.00018	112.9			0.0002	112.9
	5	0.00003	81.1			0.00003	81.1
	6					0.00	
	7					0.00	
	8+					0.00	
	Total	0.023		0.03		0.05	
	SOP		1.12		1.3		2.4
Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
3	0					0.00	
	1					0.00	
	2					0.00	
	3	0.0003	193.9			0.0003	193.9
	4	0.002	169.8			0.002	169.8
	5	0.003	177.5			0.003	177.5
	6	0.001	181.6			0.001	181.6
	7	0.0002	194.8			0.0002	194.8
	8+	0.00003	183.3			0.00003	183.3
	Total	0.01		0.00		0.01	
	SOP		1.3		0.0		1.3
Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
	0					0.00	
	1			0.64	45	0.64	45.3
	2			0.20	67	0.20	67.3
	3	0.03	193.9			0.03	193.9
	4	0.27	169.8			0.27	169.8

Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
4	5	0.29	177.5			0.29	177.5
	6	0.136	181.6			0.14	181.6
	7	0.05	194.8			0.05	194.8
	8+	0.071	183.3			0.07	183.3
	Total	0.85		0.83		1.69	
	SOP		151.4		42.1		193.5
Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
Total	0	0.00		0.00		0.00	
	1	0.82	22.8	0.73	45.3	1.55	33.4
	2	11.41	51.4	0.20	67.3	11.62	51.7
	3	0.41	82.4	0.00		0.41	82.4
	4	0.30	164.0	0.00		0.30	164.0
	5	0.30	176.2	0.00		0.30	176.2
	6	0.14	181.6	0.00		0.14	181.6
	7	0.05	194.8	0.00		0.05	194.8
	8+	0.07	183.3	0.00		0.07	183.3
	Total	13.51		0.94		14.44	
	SOP		790		47		837

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: 2021** **Country: All**

Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
1	1	1.68	25.6			1.68	25.6
	2	14.00	58.4			14.00	58.4
	3	0.39	73.1			0.39	73.1
	4	0.02	96.0			0.02	96.0
	5					0.00	
	6					0.00	
	7					0.00	
	8+	0.01	154.5			0.01	154.5
	Total	16.10		0.00		16.10	

Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
	SOP		892.4		0.0		892.4
Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
2	0					0.00	
	1	0.84	25.6	0.25	45.3	1.09	30.1
	2	2.60	58.4	0.01	67.3	2.61	58.4
	3	0.10	73.1			0.10	73.1
	4	0.011	96.0			0.01	96.0
	5					0.00	
	6					0.00	
	7					0.00	
	8+	0.000000003	154.5			0.000000003	154.5
	Total	3.54		0.26		3.80	
	SOP		181.2		11.9		193.1
Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
3	0					0.00	
	1	9.48	55.0	0.77	45.3	10.25	54.3
	2	7.47	126.3	0.10	67.3	7.58	125.5
	3	1.72	133.9			1.72	133.9
	4	1.06	159.4			1.06	159.4
	5	0.44	171.6			0.44	171.6
	6	0.28	196.5			0.28	196.5
	7	0.07	206.5			0.07	206.5
	8+	0.03	201.3			0.03	
	Total	20.55		0.87		21.43	
	SOP		2,014.5		41.8		2,051.2
Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
	0	6.91	10.8			6.91	10.8
	1	1.07	51.7	0.04	45.3	1.11	51.4
	2	0.53	119.8	0.01	67.3	0.54	
	3	0.17	136.2			0.17	

Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
4	4	0.12	161.9			0.12	
	5	0.05	174.2			0.05	
	6	0.04	203.8			0.04	
	7	0.02	226.3			0.02	
	8+	0.03	189.1			0.03	
	Total	8.93		0.05		8.99	
	SOP		262.2		2.7		131.9
Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
Total	0	6.91	10.8	0.00		6.91	10.8
	1	13.07	49.1	1.06	45.3	14.13	48.8
	2	24.59	80.3	0.13	67.3	24.72	80.3
	3	2.38	121.5	0.00		2.38	121.5
	4	1.21	158.1	0.00		1.21	158.1
	5	0.49	171.8	0.00		0.49	171.8
	6	0.32	197.4	0.00		0.32	197.4
	7	0.09	211.7	0.00		0.09	211.7
	8+	0.06	188.8	0.00		0.06	188.8
	Total	49.12		1.18		50.31	
	SOP		3,350.3		56.5		3,407

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.
Western Baltic Spring spawners **Division: Kattegat** **Year: 2021** **Country: All**

Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
1	1	0.09	22.8	0.01	45.3	0.10	24.5
	2	23.40	51.4	0.01	67.3	23.42	51.4
	3	3.78	73.4			3.78	73.4
	4	0.61	112.9			0.61	112.9
	5	0.09	81.1			0.09	81.1
	6					0.00	
	7					0.00	
	8+					0.00	

Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
	Total	27.96		0.02		27.98	
	SOP		1,557.5		1.2		1,558.7
Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
2	1	0.0009	22.8	0.01	45.3	0.01	42.5
	2	0.17	51.4	0.01	67.3	0.18	52.1
	3	0.02	73.4			0.02	73.4
	4	0.00	112.9			0.00	112.9
	5	0.0004	81.1			0.0004	81.1
	6					0.00	
	7					0.00	
	8+					0.00	
	Total	0.193		0.01		0.21	
	SOP		10.59		0.8		11.4
Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
3	0					0.00	
	1					0.00	
	2					0.00	
	3	0.00	193.9			0.00	193.9
	4	0.03	170			0.03	169.8
	5	0.05	178			0.05	177.5
	6	0.03	182			0.03	181.6
	7	0.01	195			0.01	
	8+	0.01	183			0.01	183.3
	Total	0.12		0.00		0.12	
	SOP		22.3		0.0		20.2
Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
	0					0.00	
	1			0.33	45.3	0.33	45
	2			0.05	67.3	0.05	67
	3	0.04	193.9			0.04	194

Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
4	4	0.65	169.8			0.65	170
	5	1.34	177.5			1.34	178
	6	0.92	181.6			0.92	182
	7	0.30	194.8			0.30	195
	8+	0.14	183.3			0.14	183
	Total	3.39		0.38		3.77	
	SOP		607		18		625.5
Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
Total	0	0.00		0.00		0.00	
	1	0.09	22.8	0.35	45.3	0.44	40.5
	2	23.57	51.4	0.07	67.3	23.64	51.4
	3	3.84	74.8	0.00		3.84	74.8
	4	1.28	142.8	0.00		1.28	142.8
	5	1.47	171.9	0.00		1.47	171.9
	6	0.95	181.6	0.00		0.95	181.6
	7	0.31	194.8	0.00		0.31	194.8
	8+	0.15	183.3	0.00		0.15	183.3
	Total	31.67116		0.41		32.09	
	SOP		2,197.6		20.3		2,217.9

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.
Western Baltic Spring spawners **Division: Skagerrak** **Year: 2021** **Country: All**

Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
1	1	0.08	25.6			0.08	25.6
	2	17.74	58.4			17.74	58.4
	3	2.97	73.1			2.97	73.1
	4	0.28	96.0			0.28	96.0
	5					0.00	
	6					0.00	
	7					0.00	
	8+	0.10	154.5			0.10	

Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
	Total	21.16		0.00		21.16	
	SOP		1,297.3		0		1,281.3
Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
2	1	0.08	25.6	0.02	45.3	0.10	30.1
	2	13.88	58.4	0.06	67.3	13.94	58.4
	3	1.65	73.1			1.65	73.1
	4	0.14	96.0			0.14	96.0
	5					0.00	
	6					0.00	
	7					0.00	
	8+	0.06	154.5			0.0585	154.5
	Total	15.81		0.08		15.89	
	SOP		955.8		4.9		960.7
Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
3	0					0.00	
	1	0.55	55.0	0.04	45.3	0.59	54.3
	2	7.17	126.3	0.10	67.3	7.27	125.5
	3	6.04	133.9			6.04	133.9
	4	6.46	159.4			6.46	159.4
	5	3.41	171.6			3.41	171.6
	6	2.90	196.5			2.90	196.5
	7	1.27	206.5			1.27	206.5
	8+	1.50	201.3			1.50	201.3
	Total	29.29		0.14		29.43	
	SOP		4,492.3		8.7		4,501.0
Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
	0	1.48	10.8			1.48	10.8
	1	0.57	51.7	0.02	45.3	0.59	51.4
	2	0.07	119.8	0.00	67.3	0.08	118.4
	3	0.04	136.2			0.04	136.2

Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
4	4	0.07	161.9			0.07	161.9
	5	0.06	174.2			0.06	174.2
	6	0.06	203.8			0.06	203.8
	7	0.01	226.3			0.01	226.3
	8+	0.00	189.1			0.00	189.1
	Total	2.37		0.02		2.39	
	SOP		96.5		1.1		94.3
Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
Total	0	1.48	10.8	0.00		1.48	10.8
	1	1.28	49.9	0.09	45.3	1.36	49.6
	2	38.86	71.0	0.16	67.3	39.02	71.0
	3	10.69	107.7	0.00		10.69	107.7
	4	6.95	155.6	0.00		6.95	155.6
	5	3.47	171.6	0.00		3.47	171.6
	6	2.95	196.7	0.00		2.95	196.7
	7	1.28	206.7	0.00		1.28	206.7
	8+	1.66	196.8	0.00		1.66	196.8
	Total	68.63		0.25		68.88	
	SOP		6,841.9		14.6		6,857

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: 2021** **Country: All**

Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
1	1	2.49	24.7	0.07	45.3	2.56	25.2
	2	25.39	55.3	0.01	67.3	25.40	55.3
	3	0.77	73.2			0.77	73.2
	4	0.05	106.7			0.05	106.7
	5	0.00	81.1			0.00	81.1
	6					0.00	
	7					0.00	
	8+	0.01	154.5			0.01	154.5

Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
	Total	28.72		0.07		28.80	
	SOP		1,528.4		3.5		1,531.9
Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
2	0					0.00	
	1	0.84	25.6	0.28	45.3	1.12	30.5
	2	2.61	58.4	0.01	67.3	2.63	58.4
	3	0.10	73.1			0.10	73.1
	4	0.011	96.3			0.01	96.3
	5	0.000	81.1			0.00	81.1
	6					0.00	
	7					0.00	
	8+	0.000000003	154.5			0.000000003	154.5
	Total	3.56		0.29		3.85	
	SOP		182.3		13.3		195.6
Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
3	0					0.00	
	1	9.48	55.0	0.77	45.3	10.25	54.3
	2	7.47	126.3	0.10	67.3	7.58	125.5
	3	1.72	133.9			1.72	133.9
	4	1.062	159.4			1.06	159.4
	5	0.45	171.6			0.45	171.6
	6	0.28	196.5			0.28	196.5
	7	0.07	206.5			0.07	206.5
	8+	0.03	201.3			0.03	201.3
	Total	20.56		0.87		21.43	
	SOP		2,015.8		41.8		2,057.6
Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
	0	6.91	10.8			6.91	10.8
	1	1.07	51.7	0.68	45.3	1.75	49.2
	2	0.53	119.8	0.21	67.3	0.73	104.8

Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
4	3	0.20	145.2			0.20	145.2
	4	0.39	167.3			0.39	167.3
	5	0.34	177.0			0.34	177.0
	6	0.17	186.46			0.17	186.5
	7	0.08	204.68			0.08	204.7
	8+	0.10	184.95			0.10	185.0
	Total	9.78		0.89		10.67	
	SOP		413.7		44.8		458.4
Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
Total	0	6.91	10.8	0.00		6.91	10.8
	1	13.89	47.5	1.79	45.3	15.69	47.3
	2	36.01	71.2	0.33	67.3	36.34	71.1
	3	2.79	115.8	0.00		2.79	115.8
	4	1.51	159.3	0.00		1.51	159.3
	5	0.79	173.5	0.00		0.79	173.5
	6	0.46	192.6	0.00		0.46	192.6
	7	0.15	205.5	0.00		0.15	205.5
	8+	0.13	185.9	0.00		0.13	185.9
	Total	62.63		2.12		64.75	
	SOP		4,140.1		103.4		4,244

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.
Western Baltic Spring spawners Division: 3.a Year: 2021 Country: All

Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
1	1	0.17	24.1	0.01	45.3	0.18	25.0
	2	41.14	54.4	0.01	67.3	41.15	54.4
	3	6.74	73.3			6.74	73.3
	4	0.88	107.6			0.88	107.6
	5	0.09	81.1			0.09	81.1
	6					0.00	
	7					0.00	

Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
	8+	0.10	154.5			0.10	154.5
	Total	49.13		0.02		49.15	
	SOP		2,854.8		1.2		2,856.0
Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
2	1	0.08	25.6	0.03	45.3	0.11	30.9
	2	14.05	58.3	0.06	67.3	14.11	58.4
	3	1.67	73.1			1.67	73.1
	4	0.15	96.4			0.15	96.4
	5	0.0004	81.1			0.0004	81.1
	6					0.00	
	7					0.00	
	8+	0.06	154.5			0.0585	154.5
	Total	16.00		0.09		16.09	
	SOP		966.4		5.6		972.1
Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
3	0					0.00	
	1	0.55	55.0	0.04	45.3	0.59	54.3
	2	7.17	126.3	0.10	67.3	7.27	125.5
	3	6.04	134.0			6.04	134.0
	4	6.49	159.5			6.49	159.5
	5	3.46	171.6			3.46	171.6
	6	2.93	196.4			2.93	196.4
	7	1.28	206.4			1.28	206.4
	8+	1.51	201.2			1.51	201.2
	Total	29.41		0.14		29.56	
	SOP		4,515		8.7		4,523.2
Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
	0	1.48	10.8			1.48	10.8
	1	0.57	51.7	0.35	45.3	0.93	49.2
	2	0.07	119.8	0.05	67.3	0.12	98.6

Quarter	W-rings	Fleet C		Fleet D		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
4	3	0.08	166.1			0.08	166.1
	4	0.72	169.0			0.72	169.0
	5	1.40	177.4			1.40	177.4
	6	0.98	182.9			0.98	182.9
	7	0.31	196.3			0.31	196.3
	8+	0.14	183.4			0.14	183.4
	Total	5.76		0.40		6.16	
	SOP		703.7		19.4		723.1

Quarter	W-rings	**Fleet C**		**Fleet D**		**Total**	
		Numbers	**Mean W.**	**Numbers**	**Mean W.**	Numbers	Mean W.
Total	0	**1.48**	**10.8**	**0.00**		1.48	10.8
	1	**1.37**	**48.0**	**0.43**	**45.3**	1.80	47.4
	2	**62.43**	**63.6**	**0.23**	**67.3**	62.66	63.6
	3	**14.53**	**99.0**	**0.00**		14.53	99.0
	4	**8.23**	**153.6**	**0.00**		8.23	153.6
	5	**4.94**	**171.7**	**0.00**		4.94	171.7
	6	**3.91**	**193.0**	**0.00**		3.91	193.0
	7	**1.59**	**204.4**	**0.00**		1.59	204.4
	8+	**1.81**	**195.7**	**0.00**		1.81	195.7
	Total	100.30		0.66		100.96	
	SOP		**9,039.4**		**34.9**		9,074

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 1993–2021.

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

Year/	W-rings	0	1	2	3	4	5	6	7	8+	Total
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

Year/	W-rings	0	1	2	3	4	5	6	7	8+	Total
	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
2019	Numbers	5.3	38.2	59.2	21.0	8.2	9.7	11.1	3.0	2.6	158.51
	Mean W.	20.0	52.8	85.0	118.9	138.4	166.1	183.3	193.9	211.4	98.35
	SOP	106	2,019	5,036	2,502	1,138	1,619	2,035	577	557	15,589
2020	Numbers	10.8	36.6	54.9	23.3	17.1	7.8	13.6	8.3	5.7	178.18
	Mean W.	13.6	47.1	67.1	132.5	160.7	180.8	186.1	199.3	204.8	101.94
	SOP	146	1,723	3,681	3,094	2,753	1,406	2,536	1,663	1,160	18,163
2021	Numbers	1.5	2.2	63.8	17.3	15.6	9.4	5.8	2.7	4.1	122.29
	Mean W.	10.8	60.2	64.9	107.1	156.4	169.8	186.8	194.9	196.1	102.87
	SOP	16	132	4,138	1,856	2,436	1,597	1,082	525	796	12,579

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)
North Sea + Div. 3.a + SD 22–24 Year: 2021 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	0.00001	116.00	0.18	25.02	0.35	16.17	0.54	19.18
	2	0.004	134.00	41.15	54.42	0.67	55.44	41.83	54.45
	3	0.006	145.00	6.74	73.27	0.85	83.90	7.59	74.51
	4	0.003	155.00	0.88	107.59	0.54	132.16	1.43	117.04
	5	0.011	163.00	0.09	81.10	0.43	138.04	0.53	129.30
	6	0.002	168.00			0.57	177.32	0.58	177.29
	7					0.36	181.41	0.36	181.41
	8+	0.006	182.00	0.10	154.50	0.43	183.71	0.53	178.06
	Total	0.031		49.15		4.21		53.39	
	SOP		4.9		2,856.0		491.1		3,352.0
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	0.363	116.00	0.11	30.93	0.05	16.17	0.52	88.39
	2	1.009	134.00	14.11	58.36	0.13	53.64	15.25	63.33
	3	2.576	145.00	1.67	73.10	0.18	76.17	4.43	115.06
	4	6.764	155.00	0.15	96.37	0.13	115.55	7.04	153.05
	5	4.115	163.00	0.00	81.10	0.16	135.10	4.27	161.96
	6	1.704	168.00			0.22	159.88	1.92	167.08
	7	1.015	176.00			0.19	157.74	1.21	173.06
	8+	1.756	184.43	0.06	154.50	0.30	167.04	2.11	181.17
	Total	19.301		16.09		1.36		36.75	
	SOP		3,058.6		972.1		172.9		4,203.6
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					0.002	20.10	0.002	20.10
	1	0.03	158.00	0.59	54.26	0.01	38.38	0.63	59.16
	2	0.08	187.00	7.27	125.47	0.07	93.69	7.42	125.84
	3	0.21	202.00	6.04	133.95	0.19	123.72	6.44	135.90
	4	0.56	214.00	6.49	159.46	0.17	149.35	7.22	163.45
	5	0.34	224.00	3.46	171.64	0.08	157.07	3.88	175.97

Quarter	W-rings	Division IV		Division IIIa		Subdivision 22-24		Total	
		Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.	Numbers	Mean W.
	6	0.14	232.00	2.93	196.38	0.04	173.61	3.11	197.73
	7	0.08	241.00	1.28	206.41	0.03	189.76	1.39	208.18
	8+	0.15	251.32	1.51	201.25	0.02	177.74	1.67	205.45
	Total	1.60		29.56		0.60		31.76	
	SOP		350.6		4,523.2		83.2		4,957.1

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			1.48	10.80	0.04	19.06	1.52	11.02
	1			0.93	49.24	0.18	38.20	1.10	47.46
	2			0.12	98.58	0.90	85.53	1.02	87.10
	3			0.08	166.13	1.98	113.49	2.06	115.54
	4	0.011	200.70	0.72	169.05	1.68	141.31	2.41	149.83
	5			1.40	177.36	0.83	152.05	2.23	167.91
	6	0.040	215.90	0.98	182.91	0.50	170.13	1.52	179.56
	7			0.31	196.28	0.34	180.49	0.65	188.08
	8+	0.341	234.92	0.14	183.36	0.19	178.09	0.67	208.16
	Total	0.392		6.16		6.64		13.20	
	SOP		90.9		723.1		853.4		1,667.4

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**		1.48	10.80	**0.04**	**19.10**	1.525	11.03
	1	**0.39**	**119.26**	1.80	47.36	**0.59**	**23.02**	2.790	52.34
	2	**1.10**	**138.01**	62.66	63.64	**1.77**	**72.19**	65.524	65.11
	3	**2.79**	**149.32**	14.53	98.99	**3.19**	**104.11**	20.520	106.64
	4	**7.34**	**159.58**	8.23	153.61	**2.53**	**138.56**	18.105	153.93
	5	**4.47**	**167.69**	4.94	171.68	**1.50**	**146.52**	10.909	166.58
	6	**1.89**	**173.81**	3.91	193.00	**1.33**	**171.64**	7.124	183.93
	7	**1.10**	**181.02**	1.59	204.41	**0.93**	**176.35**	3.619	190.12
	8+	**2.25**	**196.47**	1.81	195.67	**0.92**	**177.14**	4.984	192.60
	Total	21.33		100.96		12.81		135.100	
	SOP		**3,505.1**		9,074.4		**1,600.5**		14,180.0

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 North Sea + Div. 3.a + SD 22–24 in the years 1993–2021.

Year	W-rings / Area	0	1	2	3	4	5	6	7	8+	Total
1993	Div. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	69.6	577.7	168.3	134.6	53.1	12.0	7.5	2.4	2.0	1027.3

Year	W-rings / Area	0	1	2	3	4	5	6	7	8+	Total
	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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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
2006c	Div. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	1.5	30.5	94.3	20.7	9.5	7.1	4.2	2.2	8.6	178.7

Year	W-rings / Area	0	1	2	3	4	5	6	7	8+	Total
	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. 4+Div. 3.a		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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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
2019	Div. 4+Div. 3.a	5.3	38.2	59.2	21.0	8.2	9.7	11.1	3.0	2.6	158.5
	Subdiv. 22-24	0.3	6.9	20.7	15.6	13.3	10.3	15.9	6.0	3.5	92.4
2020	Div. 4+Div. 3.a	10.8	36.6	54.9	23.3	17.1	7.8	13.6	8.3	5.7	178.2
	Subdiv. 22-24	0.0	1.7	2.5	4.6	4.7	6.7	4.1	5.3	1.6	31.2
2021	Div. 4+Div. 3.a	1.5	2.2	63.8	17.3	15.6	9.4	5.8	2.7	4.1	122.3
	Subdiv. 22-24	0.0	0.6	1.8	3.2	2.5	1.5	1.3	0.9	0.9	12.8

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 North Sea + Div. 3.a + SD22–24 in the years 1993–2021.

Year	W-rings / Area	0	1	2	3	4	5	6	7	8+	SOP
1993	Div. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	10.2	20.4	78.2	117.7	143.8	169.8	191.9	198.2	215.5	53,544

Year	W-rings / Area	0	1	2	3	4	5	6	7	8+	SOP
	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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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
2006c	Div. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	9.3	47.0	76.1	134.2	165.1	182.0	204.1	222.0	225.6	17,553

Year	W-rings / Area	0	1	2	3	4	5	6	7	8+	SOP
	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. 4+Div. 3.a		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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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. 4+Div. 3.a	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
2019	Div. 4+Div. 3.a	20.0	52.8	85.0	118.9	138.4	166.1	183.3	193.9	211.4	15,589
	Subdiv. 22-24	16.7	30.7	56.9	83.7	123.6	139.6	165.6	138.3	166.7	9,831
2020	Div. 4+Div. 3.a	13.6	47.1	67.1	132.5	160.7	180.8	186.1	199.3	204.8	18,163
	Subdiv. 22-24	18.5	38.3	69.1	87.3	111.3	145.5	155.9	172.1	171.0	3,966
2021	Div. 4+Div. 3.a	10.8	60.2	64.9	107.1	156.4	169.8	186.8	194.9	196.1	12,579
	Subdiv. 22-24	19.1	23.0	72.2	104.1	138.6	146.5	171.6	176.3	177.1	1,601

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 1993–2021.

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	

Year	W-Rings	0	1	2	3	4	5	6	7	8+	Total
	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

Year	W-Rings	0	1	2	3	4	5	6	7	8+	Total
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
2019	**Number**	23.72	101.32	19.84	4.56	0.10	0.13	0.07	0.01	0.003	149.8
	Mean W.	11.66	41.00	62.01	84.37	116.20	118.10	164.56	202.20	158.50	
	SOP	277	4,154	1,230	385	12	15	11	2	0.4	6,087
2020	**Number**	79.43	26.58	44.16	5.27	2.18	0.30	0.61	0.80	0.001	159.3
	Mean W.	13.49	36.49	65.71	138.58	168.38	174.62	199.24	216.74	137.84	
	SOP	1,072	970	2,902	730	367	53	122	173	0.1	6,388
2021	**Number**	6.91	15.69	36.34	2.79	1.51	0.79	0.46	0.15	0.135	64.8
	Mean W.	10.80	47.26	71.13	115.75	159.30	173.46	192.63	205.52	185.88	
	SOP	75	741	2,585	323	241	137	88	30	25.0	4,244

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 1993–2021 (September/October).

								*	**			***	***	***
Year	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
W-rings/Numbers in millions														
0	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	4,159.311	2,588.922
1	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	940.892	558.851
2	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	226.959	260.402
3	559.720	357.960	434.090	394.530	394.070	232.510	328.960	844.088	575.358	217.270	346.230	295.659	279.618	117.412
4	443.730	353.850	295.170	162.430	236.830	155.950	201.590	366.841	341.120	260.350	163.150	142.778	212.201	76.782
5	189.420	253.510	305.550	118.910	100.190	51.940	78.930	131.430	63.678	96.960	143.320	78.541	139.813	43.919
6	60.400	126.760	119.260	99.290	50.980	8.130	38.610	85.690	24.520	38.040	79.030	79.018	97.261	12.144
7	23.510	46.430	46.980	33.280	23.640	1.470	5.920	19.471	9.690	8.580	22.600	25.564	66.937	9.262
8+	2.330	27.240	18.910	47.850	9.330	2.100	4.190	9.683	13.380	9.890	11.770	15.013	27.789	8.839
Total	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	6,150.781	3,676.532
3+ group	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	823.619	268.357
W-rings/Biomass ('000 tonnnes)														
0	66.889	58.540	16.564	28.497	23.760	71.814	13.784	31.163	38.209	33.928	23.074	32.794	42.958	25.202
1	14.466	58.620	46.643	76.396	39.899	51.117	57.530	48.177	34.165	44.791	35.885	29.790	38.230	22.782
2	40.972	20.939	29.127	43.461	50.085	22.016	28.431	75.879	29.957	16.089	34.542	46.478	18.013	20.202
3	40.749	30.091	31.035	35.942	35.280	27.484	27.740	77.137	56.769	22.008	27.726	31.876	31.946	11.366
4	43.038	40.104	21.174	22.291	28.049	16.664	24.065	37.936	40.360	34.167	18.364	20.414	31.253	9.679
5	24.198	27.268	37.141	16.743	11.430	6.768	9.259	18.458	9.029	14.561	17.348	12.772	24.876	6.724
6	12.313	14.915	16.056	13.998	6.157	0.867	5.620	13.267	3.497	5.715	12.225	13.820	17.959	2.001
7	5.294	9.269	6.101	5.333	3.716	0.350	1.210	3.866	1.075	1.343	3.413	5.111	13.431	1.703
8+	0.627	6.570	2.930	10.636	2.170	0.458	0.757	2.101	1.908	1.615	1.991	3.447	6.344	1.798
Total	248.545	266.316	206.771	253.297	200.547	197.537	168.395	307.984	214.967	174.218	174.568	196.503	225.010	101.456
3+ group	126.218	128.217	114.438	104.943	86.802	52.590	68.651	152.765	112.637	79.410	81.067	87.441	125.809	33.270
W-rings/Mean weight (g)														
0	12.2	11.5	9.0	10.0	9.5	12.0	13.7	12.6	9.3	9.0	9.0	10.7	10.3	9.7
1	34.8	35.0	32.4	39.1	49.8	38.2	40.2	42.8	40.8	36.2	37.0	39.7	40.6	40.8
2	46.4	63.7	49.4	58.9	73.8	76.6	62.6	61.8	71.1	72.3	58.3	78.7	79.4	77.6

								*	**			***	***	***
Year	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
W-rings/Numbers in millions														
3	72.8	84.1	71.5	91.1	89.5	118.2	84.3	91.4	98.7	101.3	80.1	107.8	114.2	96.8
4	97.0	113.3	71.7	137.2	118.4	106.9	119.4	103.4	118.3	131.2	112.6	143.0	147.3	126.1
5	127.7	107.6	121.6	140.8	114.1	130.3	117.3	140.4	141.8	150.2	121.0	162.6	177.9	153.1
6	203.9	117.7	134.6	141.0	120.8	106.6	145.5	154.8	142.6	150.2	154.7	174.9	184.6	164.8
7	225.2	199.6	129.9	160.2	157.2	237.9	204.5	198.6	110.9	156.6	151.0	199.9	200.6	183.8
8+	269.1	241.2	154.9	222.3	232.6	217.9	180.7	217.0	142.6	163.3	169.2	229.6	228.3	203.4
Total	30.9	32.2	40.7	39.5	41.9	24.5	47.4	49.0	33.6	29.7	35.8	39.0	36.6	27.6

	***	***	***	***	***	***	***	****	*****	***	***	&	&&	&&&
Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
W-rings/Numbers in millions														
0	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	1,816.647	1,028.745	439.285
1	392.737	270.959	534.633	1,206.762	755.034	893.837	769.320	440.738	493.366	463.940	428.530	247.870	185.814	158.368
2	165.347	95.866	305.540	360.354	294.242	456.204	242.590	509.769	155.417	145.360	89.280	122.948	82.236	144.638
3	166.301	43.553	214.539	210.455	193.974	307.567	279.650	221.344	196.061	123.230	41.160	47.727	66.046	49.942
4	102.018	17.761	107.364	115.984	124.548	262.908	332.660	129.795	60.953	137.500	20.240	24.244	21.600	22.420
5	82.174	9.016	85.635	57.840	70.135	87.114	317.240	95.579	30.490	46.550	17.570	17.488	15.890	9.390
6	29.727	3.227	47.140	50.844	45.017	32.684	211.600	86.150	14.980	21.230	4.940	16.802	7.590	2.780
7	11.443	1.947	25.021	29.234	22.520	22.565	85.630	47.093	3.300	2.130	1.060	1.540	3.210	3.180
8+	9.262	1.704	15.309	14.774	21.404	11.300	56.590	37.886	0.000	1.790	1.100	0.600	1.370	0.240
Total	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	2,295.867	1,412.500	830.243
3+ group	400.924	77.208	495.007	479.131	477.597	724.139	1,283.370	617.846	305.784	332.430	86.070	108.402	115.706	87.952
W-rings/Biomass ('000 tonnes)														
0	23.699	29.449	36.791	35.064	46.955	85.185	61.640	8.179	24.072	13.623	32.010	23.081	12.550	4.784
1	17.602	10.473	21.336	46.384	29.825	38.404	30.369	16.822	18.553	18.296	18.825	9.767	7.617	6.855
2	10.446	7.069	24.593	29.560	20.380	30.587	21.490	38.573	10.579	10.159	5.797	6.761	5.313	9.002
3	15.297	4.433	23.540	24.382	22.068	27.349	32.448	22.841	18.068	11.511	3.323	3.630	5.413	4.337
4	11.077	1.961	15.193	16.361	18.653	27.350	58.819	15.196	5.859	17.427	1.785	2.700	2.207	2.454
5	11.584	1.385	15.433	9.867	11.450	10.934	63.755	14.581	3.417	6.711	2.239	2.625	2.009	1.186
6	4.823	0.616	9.018	8.391	7.985	4.849	45.705	14.304	1.723	3.175	0.719	2.673	1.134	0.336
7	1.756	0.384	4.728	5.295	4.448	3.751	18.709	8.433	0.450	0.257	0.182	0.260	0.497	0.350

								*	**			***	***	***
Year	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
W-rings/Numbers in millions														
8+	1.303	0.284	3.013	3.015	3.876	1.821	13.498	7.108	0.000	0.190	0.203	0.060	0.230	0.038
Total	97.588	56.055	153.646	178.320	165.640	230.231	346.433	146.035	82.722	81.349	65.083	51.557	36.969	29.342
3+ group	45.840	9.064	70.926	67.312	68.480	76.055	232.933	82.462	29.518	39.271	8.451	11.948	11.490	8.701
W-rings/Mean weight (g)														
0	11.0	10.4	8.1	12.0	11.4	9.5	11.3	9.2	9.1	10.6	12.1	12.7	12.2	10.9
1	44.8	38.7	39.9	38.4	39.5	43.0	39.5	38.2	37.6	39.4	43.9	39.4	41.0	43.3
2	63.2	73.7	80.5	82.0	69.3	67.0	88.6	75.7	68.1	69.9	64.9	55.0	64.6	62.2
3	92.0	101.8	109.7	115.9	113.8	88.9	116.0	103.2	92.2	93.4	80.7	76.1	82.0	86.8
4	108.6	110.4	141.5	141.1	149.8	104.0	176.8	117.1	96.1	126.7	88.2	111.4	102.2	109.5
5	141.0	153.6	180.2	170.6	163.3	125.5	201.0	152.5	112.1	144.2	127.4	150.1	126.4	126.4
6	162.2	190.9	191.3	165.0	177.4	148.4	216.0	166.0	115.0	149.5	145.6	159.1	149.4	120.7
7	153.5	197.4	189.0	181.1	197.5	166.2	218.5	179.1	136.4	120.5	172.0	168.7	154.9	110.0
8+	140.7	166.9	196.8	204.1	181.1	161.1	238.5	187.6	-	106.4	184.2	100.3	167.9	156.7
Total	31.4	17.2	26.1	35.8	29.4	20.8	44.6	59.5	23.0	36.4	20.1	22.5	26.2	35.3

small revision in 2015

small revision in 2017

*incl. mean for Sub-division 23, which was not covered by RV SOLEA (<0.5 %)

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

small revision in 2018

***** 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**

& excl. Central Baltic Herring in SDs 21-24 based on SF

&& excl. Central Baltic Herring in SDs 21 and SD 24 (SD 23) based on SF

&&& excl. Central Baltic Herring in SDs 21-22 and SD 24 (SD 23) based on SF and excl. hydroacoustic data/biological data from haul 32 (41G2, SD 23), incl. almost exclusively large herring that were spawning (stage=6).

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 1991–2021 (July).

Year	1991	1992 *	1993 *	1994 *	1995 *	1996 *	1997	1998	1999 **	2000	2001	2002	2003	2004	2005	2006
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	2,687	2,081
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	1,342	2,217
3	1,927	1,799	1,274	935	1,022	247	787	901	523	674	452	1,393	395	726	464	1,780
4	866	1,593	598	501	1,270	141	166	282	135	364	153	524	323	307	201	490
5	350	556	434	239	255	119	67	111	28	186	96	88	103	184	103	180
6	88	197	154	186	174	37	69	51	3	56	38	40	25	72	84	27
7	72	122	63	62	39	20	80	31	2	7	23	18	12	22	37	10
8+	10	20	13	34	21	13	77	53	1	10	12	17	5	18	21	0.1
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	3,927	4,936	6,786
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	910	2,487
W-rings/Biomass ('000 tonnnes)																
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	105.9	112.6
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	100.1	160.5
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	46.6	158.6
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	28.9	56.3
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	16.5	23.7
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	14.9	4.1
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	7.5	1.6
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	4.9	0.0
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	325.3	517.5
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	119.3	244.4

		*	*	*	*	*			**							
Year	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
W-rings/Numbers in millions																
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	39.4	54.1
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	74.6	72.4
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	100.5	89.1
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	143.7	114.8
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	160.9	131.6
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	177.7	153.2
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	202.3	169.2
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	229.2	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	65.9	76.3

Year	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
W-rings/Numbers in millions															
0		112				1		314	2	203	1		2	9	0
1	3,918	5,852	565	999	2,980	1,018	49	513	1,949	425	696	106	418	815	26
2	3,621	1,160	398	511	473	1,081	627	415	1,244	255	424	224	591	274	245
3	933	843	205	254	259	236	525	176	446	381	661	271	315	225	275
4	499	333	161	115	163	87	53	248	224	99	401	175	109	180	203
5	154	274	82	65	70	76	30	28	171	40	94	169	67	74	52
6	34	176	86	24	53	33	12	37	82	40	53	50	52	77	49
7	26	45	39	28	22	14	8	26	89	12	52	35	19	64	22
8+	14	44	65	34	46	60	15	42	115	28	92	44	13	46	39
Total	**9,199**	**8,839**	**1,601**	**2,030**	**4,066**	**2,606**	**1,319**	**1,799**	**4,322**	**1,483**	**2,474**	**1,074**	**1,586**	**1,764**	**911**
3+ group	**1,660**	**1,715**	**638**	**520**	**613**	**506**	**643**	**557**	**1,127**	**600**	**1,353**	**744**	**575**	**666**	**640**

		*	*	*	*	*			**							
Year	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
W-rings/Numbers in millions																
W-rings/Biomass ('000 tonnnes)																
0						0.0		1.0	0.03	1.0	0.0		0.0	0.0	0.0	
1	193.2	284.4	26.8	53.0	90.0	44.0	3.0	26.0	61.5	16.0	31.0	4.0	15.0	35.0	1.0	
2	273.4	100.9	48.8	34.0	47.0	87.0	51.0	48.0	106.2	20.0	41.0	19.0	49.0	23.0	21.0	
3	90.9	101.8	30.6	28.0	31.0	26.0	59.0	21.0	54.7	51.0	101.0	28.0	32.0	29.0	30.0	
4	59.6	47.1	29.4	17.0	25.0	12.0	7.0	43.0	33.8	15.0	63.0	25.0	15.0	26.0	23.0	
5	18.5	45.3	17.5	11.0	12.0	13.0	4.0	6.0	30.3	7.0	16.0	28.0	12.0	13.0	9.0	
6	4.6	30.9	21.4	5.0	10.0	6.0	2.0	8.0	16.7	8.0	10.0	9.0	9.0	13.0	8.0	
7	2.6	9.4	10.6	6.0	5.0	3.0	1.0	6.0	17.7	3.0	11.0	7.0	3.0	13.0	5.0	
8+	1.9	8.7	19.8	8.0	10.0	14.0	3.0	11.0	25.2	6.0	20.0	10.0	3.0	9.0	8.0	
Total	644.7	628.5	204.9	162.0	230.0	205.0	130.0	169.0	346.0	126.0	293.0	130.0	138.0	161.0	105.0	
3+ group	178.2	243.2	129.3	75.0	93.0	74.0	76.0	95.0	178.3	90.0	221.0	107.0	74.0	103.0	83.0	
W-rings/Mean weight (g)																
0		6.3				3.0		4.3	14.2	4.0	23.0		4.0	4.6		
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	35.8	43.2	54.4	
2	75.5	87.0	122.7	65.8	98.8	80.4	80.8	114.9	85.4	79.0	97.1	82.9	82.7	85.2	86.9	
3	97.4	120.8	149.1	111.4	121.2	110.6	111.7	122.4	122.7	134.0	153.4	104.6	102.1	127.0	107.4	
4	119.5	141.4	182.9	150.9	150.6	142.9	128.5	175.0	150.9	151.0	157.3	145.4	139.6	145.2	112.5	
5	120.0	165.5	213.3	175.6	168.7	170.8	138.3	210.6	177.1	173.0	173.4	164.9	170.8	178.5	168.8	
6	136.6	175.6	248.3	198.0	190.8	182.0	157.2	220.2	202.3	194.0	182.0	172.6	178.6	171.9	169.1	
7	101.5	208.5	272.1	215.9	211.0	194.0	155.5	213.3	198.9	214.0	202.7	187.3	187.5	201.0	212.0	
8+	138.3	196.7	304.7	234.8	228.5	228.6	198.5	244.1	218.9	215.0	221.2	236.4	221.8	198.7	209.0	
Total	70.1	71.1	128.0	79.8	56.6	78.5	97.9	94.6	80.1	50.0	118.8	121.3	87.2	91.7	115.2	

* 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	1,563
2019	1,317
2020	239
2021	2,751

* 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
2019	0	7599	6239	4857	2750	7257	9687	2650	2583
2020	0	1812	3204	5845	7536	1219	10720	5325	4587
2021	0	393.8	1096	2794	7339	4469	1887	1100	2250

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
2019	5231	29648	52720	16127	5473	2488	1414	326	54.23
2020	10315	32689	49813	16558	9210	6368	2864	3022	1071
2021	1482	1370	62429	14535	8234	4939	3907	1594	1811

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
2019	75.4	985.6	279.9	61.46	0	0	0	0	0
2020	462.8	2107	1881	944.4	384.9	190.1	40.66	0	6.787
2021	0	434.9	226.5	0	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
2019	270.3	6881	20667	15565	13301	10333	15868	6034	3517
2020	30.67	1690	2487	4580	4673	6707	4148	5326	1579
2021	42.55	591.9	1772	3192	2531	1501	1331	926.2	923.2

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	0.1037	0.1478	0.1595	0.1666	0.1957	0.1997	0.2116	0.2215
2015	0.0000	0.1147	0.1367	0.1436	0.1625	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
2019	0.0000	0.0722	0.1309	0.1582	0.1599	0.1792	0.1873	0.1959	0.2124
2020	0.0000	0.1050	0.1275	0.1457	0.1597	0.1698	0.1829	0.1934	0.2072
2021	0.0000	0.1193	0.1380	0.1493	0.1596	0.1677	0.1738	0.1810	0.1965

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	0.0663	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
2019	0.0201	0.0487	0.0798	0.1073	0.1275	0.1277	0.1556	0.1784	0.1616
2020	0.0138	0.0435	0.0620	0.1289	0.1634	0.1848	0.1994	0.2095	0.1949
2021	0.0108	0.0480	0.0636	0.0990	0.1536	0.1717	0.1930	0.2044	0.1957

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	0.1101	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	0.1101	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
2019	0.0120	0.0279	0.0397	0.0645	0.0000	0.0000	0.0000	0.0000	0.0000
2020	0.0095	0.0531	0.0979	0.1147	0.1164	0.1168	0.1158	0.0000	0.1300
2021	0.0000	0.0453	0.0673	0.0000	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	0.0257	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	0.1747
2009	0.0105	0.0283	0.0481	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
2019	0.0167	0.0307	0.0569	0.0837	0.1236	0.1396	0.1656	0.1383	0.1667
2020	0.0185	0.0383	0.0691	0.0873	0.1113	0.1455	0.1559	0.1721	0.1710
2021	0.0191	0.0230	0.0722	0.1041	0.1386	0.1465	0.1716	0.1763	0.1771

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	0.0131	0.0459	0.0708	0.1327	0.1674	0.1892	0.2097	0.2338
1996	0.0001	0.0181	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	0.0871	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
2019	0.0001	0.0256	0.0568	0.0771	0.1190	0.1481	0.1705	0.1778	0.1910
2020	0.0001	0.0238	0.0484	0.0781	0.1039	0.1465	0.1644	0.1686	0.1809
2021	0.0001	0.0192	0.0544	0.0745	0.1170	0.1293	0.1773	0.1814	0.1781

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
2019	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
2020	0.3	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
2021	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
2019	0	0	0.2	0.75	0.9	1	1	1	1
2020	0	0	0.2	0.75	0.9	1	1	1	1
2021	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
2019	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2020	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2021	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
2019	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2020	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2021	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 in thousands)**

	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
2019	315000	109000	67000	52000
2020	225000	180000	74000	77000
2021	275000	203000	52000	49000

TABLE 3.6.8.b WESTERN BALTIC SPRING SPAWNING HERRING
***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
2019	247870	122948	47727	24244
2020	185814	82236	66046	21600
2021	158368	144638	49942	22420

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

	0
1992	1060000
1993	3044000
1994	12515000
1995	7930000
1996	21012000
1997	4872000
1998	16743000
1999	20364000
2000	3026000
2001	4845000
2002	11324000
2003	5507000
2004	5640000
2005	3887000
2006	3774000
2007	1829000
2008	1622000
2009	6464000
2010	7037000
2011	4444000
2012	1140000
2013	3021000
2014	539000
2015	2478000
2016	442000
2017	1247000
2018	1563000
2019	1317000
2020	239000
2021	2751000

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

	1	2	3
2002	1045654	54550	10678
2003	642200	118519	3053
2004	290805	66533	11892
2005	187588	108625	6635
2006	144891	28465	5965
2007	222906	30955	3039
2008	161902	29000	3669
2009	571168	35698	1047
2010	291304	72528	8501
2011	147210	63866	11249
2012	291325	71455	3422
2013	184291	68128	12154
2014	143235	17888	2725
2015	244250	54514	1924
2016	195417	90784	5460
2017	447070	67306	11218
2018	96400	59785	2453
2019	391309	37485	4605
2020	357498	80377	5143
2021	345683	127508	7099

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

	2	3
2002	3197	1400
2003	6542	1487
2004	3457	1225
2005	3581	631.5
2006	2643	1201
2007	3637	622.3
2008	2271	1217
2009	3277	565.7
2010	4033	1251
2011	2701	660.3
2012	5626	792
2013	5499	1439
2014	1341	1413
2015	9467	1321
2016	8869	2069
2017	5674	1542
2018	5832	1089
2019	9943	3234
2020	9124	2527
2021	8641	1760

TABLE 3.6.9 WESTERN BALTIC SPRING SPAWNING HERRING
***Multi fleet/*SAM software version**

Model version: [0.5.4 , 0.5.4 , 0.5.4]

Model SHA: [3c872568b9d7 , 3c872568b9d7 , 3c872568b9d7]

TABLE 3.6.10 WESTERN BALTIC SPRING SPAWNING HERRING 1/2
***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
$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
```

continued

TABLE 3.6.10 - WESTERN BALTIC SPRING SPAWNING HERRING 2/2
$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"
$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	Fbar (3-6)	Low	High	TSB	Low	High
1991	5037767	3883893	6534448	294145	240485	359778	0.429	0.311	0.590	591282	499712	699631
1992	3616981	2870641	4557363	301866	247819	367698	0.508	0.392	0.658	520728	441025	614834
1993	3024804	2343977	3903383	285247	234948	346314	0.580	0.447	0.752	453282	382161	537639
1994	4505757	3512008	5780695	225394	185870	273322	0.601	0.467	0.775	371093	313624	439092
1995	4177252	3303589	5281963	193228	158414	235693	0.600	0.455	0.791	313442	264433	371534
1996	4163472	3306420	5242679	132731	110050	160086	0.664	0.514	0.856	277023	237031	323763
1997	3473011	2703111	4462194	145701	120967	175493	0.635	0.492	0.819	276843	235928	324853
1998	4610783	3626141	5862794	117839	98741	140632	0.618	0.476	0.802	261908	225187	304617
1999	4948162	3922340	6242272	118531	99288	141503	0.515	0.397	0.670	266321	229353	309248
2000	3027959	2408357	3806967	123786	103914	147458	0.571	0.453	0.721	258256	222182	300187
2001	2746047	2208664	3414180	136674	115870	161213	0.614	0.488	0.771	279314	241566	322961
2002	2775373	2219597	3470312	159829	135505	188518	0.489	0.388	0.618	285590	246919	330318
2003	2983774	2386756	3730129	129623	109287	153743	0.445	0.352	0.561	222581	191989	258047
2004	2064899	1649260	2585285	134779	114065	159255	0.497	0.386	0.640	229826	198719	265802
2005	1762657	1401261	2217260	122478	103601	144795	0.531	0.422	0.668	215088	185124	249900
2006	1345815	1057685	1712435	134187	112186	160501	0.468	0.375	0.585	227319	193139	267547
2007	1404787	1102204	1790437	110775	92390	132817	0.533	0.425	0.668	179160	151522	211839
2008	1152732	914390	1453199	89997	75629	107095	0.580	0.463	0.727	156201	132897	183593
2009	1129287	905064	1409059	79847	67731	94129	0.528	0.409	0.682	138902	119583	161341
2010	1462341	1169351	1828742	73802	62903	86589	0.402	0.309	0.523	122489	106277	141175
2011	1354293	1083599	1692610	69344	58404	82333	0.311	0.240	0.401	113416	97100	132474
2012	1187034	950561	1482334	72453	61583	85242	0.386	0.293	0.507	124128	107179	143758
2013	1683600	1276677	2220223	80066	68156	94057	0.411	0.310	0.545	135979	117774	156996

Year	R(age 0)	Low	High	SSB	Low	High	Fbar (3-6)	Low	High	TSB	Low	High
2014	1146962	883669	1488703	82432	68629	99011	0.344	0.257	0.461	139635	119850	162687
2015	919966	707551	1196150	83726	68518	102309	0.431	0.336	0.552	142713	119648	170225
2016	832966	632450	1097055	79359	64556	97558	0.486	0.372	0.634	123340	101068	150521
2017	924380	699933	1220799	72396	60263	86973	0.510	0.372	0.700	113555	95190	135464
2018	813549	588524	1124615	60775	49335	74869	0.509	0.368	0.703	95351	78921	115202
2019	839747	570178	1236763	54388	41386	71476	0.300	0.215	0.417	97063	76077	123836
2020	550822	332631	912136	54606	40314	73964	0.182	0.118	0.281	92971	70274	122999
2021	609230	315073	1178016	62765	44766	88002	0.149	0.080	0.277	97357	70477	134490

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	0.026	0.205	0.323	0.357	0.406	0.450	0.502	0.548	0.548
1992	0.026	0.221	0.354	0.405	0.475	0.536	0.617	0.686	0.686
1993	0.034	0.260	0.391	0.453	0.540	0.612	0.714	0.797	0.797
1994	0.041	0.287	0.411	0.469	0.561	0.632	0.743	0.826	0.826
1995	0.068	0.367	0.442	0.479	0.559	0.626	0.735	0.812	0.812
1996	0.046	0.317	0.444	0.509	0.615	0.702	0.829	0.923	0.923
1997	0.047	0.307	0.429	0.486	0.582	0.669	0.802	0.923	0.923
1998	0.052	0.317	0.434	0.479	0.567	0.652	0.774	0.917	0.917
1999	0.035	0.243	0.382	0.412	0.474	0.542	0.634	0.759	0.759
2000	0.028	0.236	0.400	0.442	0.524	0.604	0.716	0.861	0.861
2001	0.032	0.254	0.412	0.461	0.560	0.649	0.784	0.926	0.926
2002	0.026	0.200	0.346	0.375	0.446	0.517	0.620	0.735	0.735
2003	0.024	0.185	0.321	0.343	0.406	0.467	0.562	0.668	0.668
2004	0.025	0.204	0.338	0.374	0.455	0.523	0.637	0.755	0.755
2005	0.017	0.179	0.340	0.393	0.491	0.558	0.682	0.811	0.811
2006	0.016	0.174	0.343	0.368	0.437	0.487	0.581	0.685	0.685
2007	0.013	0.170	0.362	0.409	0.501	0.559	0.663	0.763	0.763
2008	0.013	0.178	0.385	0.437	0.543	0.614	0.727	0.822	0.822
2009	0.015	0.191	0.386	0.404	0.491	0.555	0.663	0.747	0.747
2010	0.007	0.119	0.292	0.310	0.375	0.420	0.504	0.570	0.570
2011	0.005	0.087	0.228	0.241	0.290	0.323	0.389	0.441	0.441
2012	0.005	0.097	0.241	0.278	0.358	0.408	0.498	0.561	0.561
2013	0.006	0.103	0.248	0.290	0.380	0.437	0.535	0.609	0.609
2014	0.005	0.088	0.226	0.253	0.318	0.364	0.442	0.514	0.514
2015	0.006	0.120	0.278	0.306	0.392	0.463	0.562	0.680	0.680
2016	0.006	0.116	0.304	0.344	0.433	0.525	0.642	0.808	0.808
2017	0.005	0.101	0.302	0.356	0.444	0.554	0.688	0.901	0.901
2018	0.004	0.097	0.293	0.349	0.437	0.555	0.695	0.963	0.963
2019	0.002	0.064	0.211	0.226	0.262	0.315	0.397	0.593	0.593
2020	0.001	0.054	0.184	0.163	0.172	0.174	0.220	0.348	0.348
2021	0.001	0.042	0.157	0.140	0.147	0.140	0.167	0.264	0.264

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	0.004	0.019	0.016	0.018	0.017	0.016	0.016
1992	0.000	0.000	0.004	0.019	0.016	0.018	0.017	0.018	0.018
1993	0.000	0.000	0.004	0.019	0.016	0.017	0.019	0.019	0.019
1994	0.000	0.000	0.004	0.018	0.017	0.017	0.020	0.021	0.021
1995	0.000	0.000	0.004	0.019	0.018	0.018	0.021	0.022	0.022
1996	0.000	0.000	0.004	0.018	0.018	0.020	0.023	0.025	0.025
1997	0.000	0.000	0.004	0.018	0.018	0.020	0.023	0.032	0.032
1998	0.000	0.000	0.004	0.018	0.019	0.022	0.023	0.039	0.039
1999	0.000	0.000	0.004	0.019	0.019	0.025	0.025	0.045	0.045
2000	0.000	0.000	0.004	0.018	0.022	0.028	0.029	0.048	0.048
2001	0.000	0.000	0.004	0.017	0.022	0.029	0.032	0.048	0.048
2002	0.000	0.000	0.003	0.016	0.021	0.027	0.030	0.047	0.047
2003	0.000	0.000	0.002	0.015	0.019	0.023	0.027	0.043	0.043
2004	0.000	0.000	0.002	0.016	0.018	0.021	0.024	0.036	0.036
2005	0.000	0.000	0.002	0.013	0.018	0.018	0.024	0.039	0.039
2006	0.000	0.000	0.001	0.010	0.014	0.016	0.022	0.042	0.042
2007	0.000	0.000	0.001	0.007	0.010	0.009	0.017	0.029	0.029
2008	0.000	0.000	0.001	0.004	0.008	0.006	0.013	0.023	0.023
2009	0.000	0.000	0.001	0.004	0.008	0.006	0.014	0.031	0.031
2010	0.000	0.000	0.000	0.004	0.007	0.004	0.013	0.024	0.024
2011	0.000	0.000	0.000	0.003	0.006	0.003	0.013	0.018	0.018
2012	0.000	0.000	0.000	0.003	0.006	0.003	0.016	0.016	0.016
2013	0.000	0.000	0.000	0.004	0.006	0.004	0.018	0.020	0.020
2014	0.000	0.000	0.001	0.005	0.008	0.007	0.023	0.032	0.032
2015	0.000	0.000	0.001	0.006	0.009	0.010	0.026	0.044	0.044
2016	0.000	0.000	0.001	0.008	0.011	0.012	0.027	0.050	0.050
2017	0.000	0.000	0.001	0.009	0.013	0.013	0.026	0.057	0.057
2018	0.000	0.000	0.002	0.011	0.019	0.019	0.035	0.100	0.100
2019	0.000	0.000	0.003	0.014	0.025	0.025	0.048	0.140	0.140
2020	0.000	0.000	0.003	0.016	0.035	0.026	0.057	0.152	0.152
2021	0.000	0.000	0.003	0.016	0.038	0.030	0.053	0.133	0.133

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	0.001	0.037	0.143	0.109	0.087	0.079	0.074	0.075	0.075
1992	0.001	0.037	0.144	0.110	0.088	0.079	0.074	0.075	0.075
1993	0.001	0.038	0.145	0.111	0.088	0.080	0.075	0.076	0.076
1994	0.001	0.039	0.150	0.115	0.091	0.082	0.078	0.078	0.078
1995	0.001	0.040	0.155	0.119	0.095	0.085	0.080	0.081	0.081
1996	0.001	0.040	0.156	0.119	0.095	0.086	0.081	0.082	0.082
1997	0.001	0.041	0.158	0.121	0.096	0.087	0.082	0.083	0.083
1998	0.001	0.043	0.167	0.128	0.102	0.092	0.087	0.087	0.087
1999	0.001	0.046	0.177	0.136	0.108	0.097	0.092	0.093	0.093
2000	0.001	0.048	0.185	0.141	0.113	0.102	0.096	0.097	0.097
2001	0.001	0.046	0.178	0.136	0.108	0.098	0.092	0.093	0.093
2002	0.001	0.046	0.176	0.134	0.107	0.097	0.091	0.092	0.092
2003	0.001	0.042	0.162	0.124	0.099	0.089	0.084	0.085	0.085
2004	0.001	0.037	0.145	0.110	0.088	0.079	0.075	0.076	0.076
2005	0.001	0.040	0.154	0.118	0.094	0.085	0.080	0.081	0.081
2006	0.001	0.044	0.168	0.129	0.103	0.092	0.087	0.088	0.088
2007	0.001	0.046	0.176	0.134	0.107	0.097	0.091	0.092	0.092
2008	0.001	0.048	0.183	0.140	0.112	0.101	0.095	0.096	0.096
2009	0.001	0.050	0.192	0.146	0.117	0.105	0.099	0.100	0.100
2010	0.001	0.047	0.182	0.139	0.111	0.100	0.094	0.095	0.095
2011	0.001	0.040	0.154	0.118	0.094	0.085	0.080	0.081	0.081
2012	0.001	0.036	0.138	0.106	0.084	0.076	0.072	0.072	0.072
2013	0.001	0.034	0.129	0.099	0.079	0.071	0.067	0.068	0.068
2014	0.001	0.035	0.134	0.102	0.081	0.073	0.069	0.070	0.070
2015	0.001	0.038	0.147	0.112	0.089	0.081	0.076	0.077	0.077
2016	0.001	0.047	0.180	0.137	0.110	0.099	0.093	0.094	0.094
2017	0.001	0.051	0.198	0.151	0.121	0.109	0.103	0.104	0.104
2018	0.001	0.050	0.192	0.147	0.117	0.106	0.100	0.101	0.101
2019	0.001	0.042	0.163	0.125	0.099	0.090	0.084	0.085	0.085
2020	0.001	0.041	0.159	0.121	0.097	0.087	0.082	0.083	0.083
2021	0.001	0.038	0.147	0.112	0.090	0.081	0.076	0.077	0.077

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	0.014	0.042	0.017	0.008	0.004	0.003	0.004	0.003	0.003
1992	0.012	0.032	0.013	0.007	0.003	0.003	0.004	0.003	0.003
1993	0.017	0.046	0.018	0.009	0.004	0.003	0.004	0.004	0.004
1994	0.024	0.066	0.026	0.012	0.006	0.004	0.006	0.005	0.005
1995	0.051	0.146	0.054	0.023	0.010	0.007	0.009	0.007	0.007
1996	0.027	0.073	0.027	0.011	0.005	0.004	0.005	0.005	0.005
1997	0.030	0.076	0.027	0.011	0.005	0.004	0.005	0.004	0.004
1998	0.035	0.092	0.032	0.012	0.006	0.004	0.005	0.005	0.005
1999	0.022	0.056	0.021	0.008	0.004	0.003	0.004	0.003	0.003
2000	0.014	0.036	0.013	0.005	0.002	0.002	0.003	0.003	0.003
2001	0.018	0.052	0.022	0.009	0.005	0.005	0.009	0.010	0.010
2002	0.016	0.051	0.020	0.007	0.004	0.003	0.004	0.003	0.003
2003	0.016	0.058	0.032	0.014	0.009	0.008	0.009	0.008	0.008
2004	0.016	0.068	0.044	0.022	0.014	0.012	0.012	0.009	0.009
2005	0.008	0.035	0.024	0.011	0.006	0.005	0.004	0.003	0.003
2006	0.009	0.051	0.044	0.022	0.013	0.013	0.011	0.009	0.009
2007	0.005	0.032	0.030	0.014	0.007	0.008	0.007	0.007	0.007
2008	0.005	0.035	0.034	0.013	0.005	0.006	0.005	0.005	0.005
2009	0.008	0.065	0.054	0.016	0.004	0.004	0.003	0.004	0.004
2010	0.002	0.021	0.015	0.003	0.000	0.000	0.000	0.000	0.000
2011	0.001	0.012	0.007	0.001	0.000	0.000	0.000	0.000	0.000
2012	0.001	0.011	0.008	0.001	0.000	0.000	0.000	0.000	0.000
2013	0.001	0.016	0.016	0.002	0.000	0.000	0.000	0.000	0.000
2014	0.001	0.013	0.012	0.001	0.000	0.000	0.000	0.000	0.000
2015	0.002	0.032	0.031	0.003	0.000	0.000	0.000	0.000	0.000
2016	0.001	0.021	0.021	0.002	0.000	0.000	0.000	0.000	0.000
2017	0.000	0.004	0.004	0.000	0.000	0.000	0.000	0.000	0.000
2018	0.000	0.003	0.004	0.000	0.000	0.000	0.000	0.000	0.000
2019	0.000	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000
2020	0.000	0.007	0.010	0.001	0.000	0.000	0.000	0.000	0.000
2021	0.000	0.001	0.001	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	0.126	0.159	0.221	0.298	0.350	0.407	0.453	0.453
1992	0.013	0.152	0.192	0.270	0.368	0.437	0.522	0.590	0.590
1993	0.016	0.176	0.224	0.314	0.431	0.512	0.616	0.698	0.698
1994	0.016	0.182	0.231	0.324	0.447	0.528	0.640	0.722	0.722
1995	0.016	0.180	0.228	0.319	0.437	0.516	0.624	0.701	0.701
1996	0.018	0.204	0.257	0.360	0.496	0.592	0.720	0.812	0.812
1997	0.017	0.190	0.240	0.336	0.463	0.558	0.691	0.804	0.804
1998	0.016	0.182	0.231	0.321	0.441	0.533	0.659	0.786	0.786
1999	0.012	0.141	0.180	0.250	0.343	0.416	0.513	0.618	0.618
2000	0.013	0.152	0.198	0.278	0.387	0.473	0.588	0.714	0.714
2001	0.013	0.156	0.209	0.299	0.424	0.518	0.651	0.776	0.776
2002	0.009	0.104	0.146	0.217	0.314	0.391	0.495	0.593	0.593
2003	0.007	0.085	0.124	0.189	0.279	0.348	0.442	0.532	0.532
2004	0.008	0.098	0.147	0.226	0.335	0.412	0.526	0.634	0.634
2005	0.009	0.104	0.161	0.251	0.374	0.451	0.574	0.689	0.689
2006	0.006	0.079	0.129	0.207	0.307	0.366	0.461	0.546	0.546
2007	0.007	0.092	0.155	0.254	0.376	0.445	0.547	0.635	0.635
2008	0.008	0.095	0.168	0.280	0.419	0.501	0.614	0.698	0.698
2009	0.006	0.076	0.140	0.237	0.362	0.440	0.547	0.613	0.613
2010	0.004	0.051	0.094	0.165	0.257	0.315	0.396	0.450	0.450
2011	0.003	0.035	0.067	0.119	0.190	0.235	0.297	0.343	0.343
2012	0.004	0.049	0.094	0.169	0.268	0.329	0.410	0.472	0.472
2013	0.004	0.054	0.103	0.186	0.295	0.362	0.450	0.520	0.520
2014	0.003	0.040	0.079	0.145	0.228	0.284	0.350	0.412	0.412
2015	0.004	0.049	0.100	0.186	0.293	0.372	0.460	0.559	0.559
2016	0.004	0.049	0.103	0.197	0.313	0.414	0.522	0.664	0.664
2017	0.003	0.046	0.099	0.195	0.310	0.431	0.559	0.739	0.739
2018	0.003	0.044	0.095	0.190	0.302	0.431	0.560	0.762	0.762
2019	0.001	0.019	0.043	0.087	0.138	0.200	0.264	0.367	0.367
2020	0.000	0.005	0.012	0.025	0.041	0.061	0.080	0.113	0.113
2021	0.000	0.003	0.006	0.012	0.020	0.029	0.038	0.054	0.054

TABLE 3.6.13 WESTERN BALTIC SPRING SPAWNING HERRING
***Multi fleet/*Estimated stock numbers (1000) at age**

Year Age	0	1	2	3	4	5	6	7	8
1991	5037767	4152778	2239405	1862514	911484	552464	162679	48586	17471
1992	3616981	3678060	2039685	1331057	1065594	493743	286494	81333	31694
1993	3024804	2613813	1820583	1160759	734482	541210	234687	126478	46702
1994	4505757	2125920	1220799	1030078	595191	356466	238525	93840	63764
1995	4177252	3250180	974352	651334	545249	269338	157759	92122	56231
1996	4163472	2882002	1372791	515736	326682	253669	117700	62026	53977
1997	3473011	2951702	1266816	732587	254314	143062	100889	41997	38294
1998	4610783	2414609	1313562	676886	372650	116532	60610	36131	26194
1999	4948162	3255370	1053379	690433	345108	174883	49380	23238	19985
2000	3027959	3592662	1552176	582806	370368	177661	83383	21561	16553
2001	2746047	2153338	1726248	864024	301813	179311	78829	33835	13145
2002	2775373	1956179	989075	940780	458408	138649	77355	28793	15425
2003	2983774	1989547	972501	565107	528195	242975	66992	34143	17346
2004	2064899	2194123	1006436	582702	328116	285598	124875	31355	21498
2005	1762657	1475163	1099716	598788	327059	170573	138030	54387	20318
2006	1345815	1286753	732135	645666	340977	161972	81578	56435	27295
2007	1404787	970641	660367	423381	362093	184187	78626	38920	34023
2008	1152732	1039066	488296	377572	228986	178658	88045	33020	28098
2009	1129287	838937	535355	271283	196606	110295	77871	35312	22072
2010	1462341	812239	419821	295943	149795	99535	52179	31757	22589
2011	1354293	1084369	432245	254364	176318	84095	54134	26031	24847
2012	1187034	997377	614624	281027	161848	107610	49906	30065	26749
2013	1683600	863737	542561	405647	174044	92688	57884	25063	26565
2014	1146962	1279410	460539	343726	252354	95835	49269	27715	23428
2015	919966	844825	737972	300941	217459	145261	55348	25751	25566
2016	832966	672344	451363	471612	182513	119665	72387	25952	21634
2017	924380	610232	361438	264258	283448	98103	58273	30378	17463
2018	813549	691398	334816	217889	144543	154834	47149	23740	15594
2019	839747	599352	378496	201297	127075	76002	73095	19691	11957
2020	550822	630942	340672	247216	126752	82485	45375	40514	14276
2021	609230	402039	371783	230754	170687	85325	57280	29710	31433

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	113689.08	642575.03	612280.36	556371.63	299755.72	197116.86	63248.50	20208.01	7266.73
1992	81278.90	608531.20	604953.29	442208.19	398834.38	202630.35	130566.87	40041.95	15603.34
1993	87330.67	504343.69	591924.43	424814.09	304616.57	245793.18	119116.45	69241.46	25567.25
1994	156993.37	451218.37	416244.86	389270.12	255449.85	166271.59	124884.72	52838.65	35903.53
1995	239281.94	876402.85	358540.05	252560.21	234586.43	125313.98	82453.97	51530.71	31454.37
1996	162578.11	671920.36	501510.14	208794.98	150529.14	128036.50	66656.98	37744.30	32846.14
1997	139583.64	669355.49	449348.32	285317.56	112554.92	69849.22	55952.59	25684.43	23420.08
1998	202806.54	566561.22	472764.65	261340.21	162314.64	56092.20	32914.63	22215.18	16105.64
1999	148314.85	593466.78	336823.46	235086.49	130627.93	73481.46	23316.77	12671.04	10897.39
2000	72865.74	634280.36	515984.95	210709.91	152296.56	81453.33	43197.30	12858.31	9871.63
2001	76484.51	408986.76	591451.00	323335.39	130863.44	86841.58	43722.32	21218.92	8243.64
2002	60849.38	297098.17	288294.34	294216.02	165043.12	56172.63	36065.49	15368.76	8233.52
2003	60341.74	281332.76	265170.34	163417.60	175451.96	90538.43	28926.75	16951.39	8612.29
2004	43585.44	339435.91	289343.46	182438.71	119662.25	116030.53	58896.31	16827.26	11537.74
2005	25418.77	200807.12	316094.58	194428.53	126493.56	72573.86	68261.94	30663.83	11455.29
2006	18375.32	171400.01	213108.21	199133.68	120674.30	62465.78	36092.22	28601.46	13832.99
2007	15841.59	125764.24	201331.98	142698.77	142630.26	78663.62	38254.37	21105.98	18450.54
2008	13188.00	140934.02	157798.14	134735.04	96164.03	81832.69	45642.83	18784.80	15984.52
2009	14334.76	122196.00	174147.69	90588.46	76266.62	46844.76	37872.97	18948.73	11844.23
2010	9168.06	74237.16	103593.24	77470.16	46174.90	33544.16	20456.12	13833.74	9839.80
2011	5521.18	73040.20	84336.50	52522.40	43008.33	22462.44	17039.32	9132.00	8716.66
2012	5562.90	74395.38	126787.82	66249.58	47393.88	34906.90	19170.29	12670.73	11273.28
2013	8360.12	68581.00	115862.73	99315.15	53502.94	31804.81	23506.48	11246.38	11920.29
2014	4606.59	87480.83	89580.30	74287.69	66589.80	28318.12	17275.42	11041.43	9333.79
2015	5108.76	78142.88	175785.90	77709.81	69062.11	52717.82	23595.22	12821.20	12729.30
2016	4130.51	60435.30	116403.27	135574.72	63596.17	48513.88	34478.32	14800.82	12338.46
2017	3616.42	47347.40	91685.09	78609.18	101367.80	41743.60	29332.34	18818.85	10818.18
2018	3032.46	51671.30	82569.29	63603.11	51199.17	66186.91	24018.32	15738.03	10337.58
2019	1666.58	29598.61	67940.88	39172.06	28612.44	20144.37	23948.47	9317.76	5657.87
2020	701.09	26535.26	53293.58	34979.14	19135.58	12605.31	8724.94	12064.15	4251.10
2021	483.41	12970.53	49589.80	28087.27	22025.68	10541.36	8447.08	6766.22	7158.59

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	10.46	8149.37	31695.61	13023.30	9088.34	2428.05	710.24	255.40
1992	0.00	9.27	7436.91	22232.77	15200.33	7843.94	4505.69	1301.68	507.23
1993	0.00	6.59	6571.66	19720.69	10782.78	8509.60	3920.73	2183.73	806.34
1994	0.00	5.36	4414.66	17019.67	9353.20	5594.28	4276.40	1740.48	1182.64
1995	0.00	8.19	3514.03	10933.65	8722.31	4399.55	3039.11	1839.09	1122.58
1996	0.00	7.26	4903.76	8567.62	5297.56	4447.24	2401.48	1409.11	1226.24
1997	0.00	7.44	4512.55	12060.90	4156.45	2597.20	2121.86	1184.94	1080.48
1998	0.00	6.08	4727.41	10950.43	6311.82	2344.33	1260.59	1260.06	913.52
1999	0.00	8.20	3806.70	11549.27	6012.46	3975.78	1095.77	926.19	796.55
2000	0.00	9.05	5577.05	9511.70	7251.02	4428.54	2132.71	916.63	703.72
2001	0.00	6.10	5683.05	13017.96	6004.13	4571.88	2228.51	1440.71	559.72
2002	0.00	4.87	2620.21	13703.07	8504.57	3306.86	2094.63	1211.51	649.04
2003	0.00	4.72	1715.16	7681.89	9071.04	4995.28	1619.24	1310.80	665.96
2004	0.00	5.40	2115.18	8187.20	5351.60	5254.59	2693.70	1012.98	694.56
2005	0.00	4.11	2011.44	7102.63	5225.18	2769.18	2982.49	1887.57	705.15
2006	0.00	4.37	955.94	5712.52	4438.30	2323.20	1590.86	2100.04	1015.68
2007	0.00	3.32	493.23	2548.67	3296.07	1544.53	1207.94	996.23	870.89
2008	0.00	3.80	270.39	1487.91	1605.21	994.84	1039.29	675.99	575.22
2009	0.00	3.53	261.67	1036.06	1438.78	568.16	1012.90	964.59	602.93
2010	0.00	4.19	143.92	963.53	967.41	400.72	632.74	696.13	495.15
2011	0.00	6.17	127.47	755.19	980.27	259.76	616.00	419.88	400.79
2012	0.00	6.93	170.46	806.36	863.61	253.06	725.61	426.78	379.71
2013	0.00	8.13	198.39	1344.52	987.71	368.01	950.00	459.46	486.99
2014	0.00	18.31	265.69	1551.56	1915.63	597.86	1020.06	800.08	676.34
2015	0.00	17.72	473.43	1613.58	1848.22	1323.75	1263.62	1001.64	994.46
2016	0.00	20.47	402.79	3241.34	1747.10	1262.46	1718.18	1144.63	954.20
2017	0.00	26.91	371.63	2264.30	3240.74	1171.91	1331.13	1535.56	882.73
2018	0.00	49.94	529.21	2154.28	2409.52	2615.16	1460.05	2056.79	1351.01
2019	0.00	72.99	964.96	2563.14	2836.12	1702.26	3129.12	2338.02	1419.68
2020	0.00	99.73	1041.45	3477.71	3910.67	1924.91	2290.22	5183.75	1826.62
2021	0.00	70.08	1135.69	3228.27	5705.83	2318.84	2681.00	3350.52	3544.82

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	2910.42	119313.74	271443.40	175237.17	69119.24	37920.68	10546.04	3181.20	1143.95
1992	2098.12	106098.16	248175.39	125718.57	81121.54	34023.29	18645.87	5346.37	2083.34
1993	1771.08	76094.36	223453.92	110609.18	56417.53	37631.00	15412.38	8389.14	3097.67
1994	2727.51	63949.35	154554.11	101299.78	47198.88	25591.63	16175.07	6427.15	4367.21
1995	2619.90	101232.82	127481.76	66235.48	44728.54	20005.75	11069.27	6528.22	3984.83
1996	2620.27	90069.67	180187.35	52616.98	26886.98	18904.21	8285.85	4410.06	3837.76
1997	2215.78	93493.31	168394.91	75709.51	21205.24	10801.76	7196.14	3025.37	2758.65
1998	3112.34	80832.57	183948.93	73767.50	32787.93	9286.80	4563.58	2747.46	1991.87
1999	3541.67	115421.59	155682.90	79497.27	32103.98	14739.27	3932.61	1869.03	1607.41
2000	2260.65	132751.74	238436.68	69805.12	35859.66	15587.64	6913.72	1805.40	1386.05
2001	1969.88	76515.40	255654.22	99692.72	28135.89	15144.63	6291.37	2727.25	1059.55
2002	1970.89	68825.03	145128.53	107525.13	42325.35	11597.81	6114.25	2298.56	1231.41
2003	1952.95	64620.17	132371.12	59824.41	45127.15	18799.80	4896.92	2520.80	1280.71
2004	1204.02	63616.90	123053.90	55304.06	25100.17	19776.34	8166.98	2071.40	1420.27
2005	1095.10	45523.20	142634.00	60347.64	26585.81	12554.52	9596.68	3819.64	1426.93
2006	913.92	43332.10	103102.75	70763.01	30172.37	12983.25	6178.20	4317.39	2088.09
2007	996.64	34119.75	96817.20	48347.06	33402.67	15395.08	6210.03	3105.16	2714.48
2008	852.40	38037.49	74361.19	44821.12	21970.88	15535.45	7235.42	2741.10	2332.48
2009	872.23	32048.13	84835.62	33539.99	19658.55	9997.17	6671.32	3055.84	1910.11
2010	1073.70	29528.54	63523.28	34901.16	14277.65	8597.96	4259.68	2618.85	1862.76
2011	840.78	33441.06	56032.91	25621.82	14325.46	6187.56	3762.70	1827.85	1744.72
2012	661.79	27671.42	72079.17	25564.98	11862.57	7139.76	3127.29	1903.40	1693.48
2013	879.13	22467.44	59841.92	34672.56	11978.42	5773.32	3404.81	1489.50	1578.75
2014	618.52	34352.52	52354.86	30295.96	17915.52	6158.49	2990.25	1699.45	1436.62
2015	544.46	24857.20	91511.33	28974.27	16879.83	10210.64	3675.25	1727.58	1715.20
2016	604.18	24152.63	67546.19	54993.01	17199.12	10221.41	5844.05	2116.66	1764.52
2017	738.40	24091.10	59065.78	33715.08	29263.01	9185.04	5158.26	2716.50	1561.60
2018	631.06	26523.10	53274.31	27049.73	14514.11	14097.75	4058.28	2064.33	1355.96
2019	552.49	19566.99	51780.55	21417.95	10913.23	5913.54	5374.08	1462.66	888.14
2020	352.12	20024.27	45381.44	25599.76	10590.70	6243.46	3245.18	2927.39	1031.54
2021	361.38	11855.52	46202.94	22264.17	13277.40	6010.91	3812.09	1997.72	2113.57

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	62342.05	133877.68	34226.10	13844.96	3358.65	1504.29	603.22	150.56	54.14
1992	37461.87	92100.15	24760.65	7934.89	3209.03	1123.40	913.56	221.48	86.31
1993	45158.63	93020.37	30151.19	9188.44	2873.35	1570.00	944.82	429.50	158.59
1994	92455.42	107037.38	28280.12	10904.09	3046.38	1320.87	1209.87	395.30	268.60
1995	179949.24	349667.57	46610.69	13301.79	5049.56	1716.81	1318.03	614.09	374.84
1996	96508.84	160188.86	32760.50	5329.16	1598.10	903.72	577.03	255.29	222.16
1997	88128.35	170388.51	30124.38	7211.98	1168.12	480.76	469.94	167.65	152.87
1998	137401.47	166982.35	37411.74	7496.29	1874.03	424.37	301.24	155.25	112.55
1999	93291.27	140226.89	19484.80	4984.14	1146.18	434.04	171.42	72.20	62.10
2000	36821.38	100543.52	18809.46	2747.47	824.57	305.47	206.82	49.51	38.01
2001	43223.68	85761.80	33541.74	7108.95	1488.74	861.15	654.45	292.27	113.55
2002	37953.83	75999.18	18194.76	6016.49	1518.03	358.25	248.03	73.91	39.59
2003	40136.07	88871.50	27953.79	7302.97	4139.84	1696.37	558.91	233.39	118.58
2004	27912.83	113499.13	39438.16	11716.62	4002.56	3062.29	1344.94	262.04	179.67
2005	11401.21	39961.96	23250.88	5826.40	1697.58	709.18	491.56	140.37	52.44
2006	10005.88	50641.65	28719.50	12964.50	3852.74	1873.54	809.46	456.57	220.82
2007	5922.69	24343.28	17701.10	5403.14	2375.09	1361.53	528.12	245.56	214.66
2008	4814.97	28321.13	14631.40	4524.05	1068.98	922.17	380.76	161.20	137.17
2009	7588.93	41474.97	25718.87	3831.73	739.32	408.45	199.01	113.02	70.65
2010	3062.77	13045.63	5591.75	715.91	52.77	26.04	6.78	5.27	3.75
2011	1459.83	10046.54	2922.35	218.27	11.63	3.96	1.42	1.10	1.05
2012	1000.96	8892.75	4689.13	232.51	7.82	3.73	0.96	1.02	0.91
2013	1506.41	10500.87	7578.15	698.13	16.79	6.24	1.78	1.30	1.38
2014	948.30	13432.38	5112.95	391.92	13.64	5.03	1.10	1.07	0.90
2015	1596.66	21264.16	20177.35	769.14	31.21	28.12	3.47	2.39	2.37
2016	871.79	10912.74	8394.35	643.75	13.81	17.42	3.85	2.23	1.85
2017	154.21	1731.88	1310.86	66.03	4.38	3.29	1.11	1.19	0.69
2018	117.49	1736.66	1099.13	54.88	2.55	5.77	1.17	1.23	0.81
2019	79.27	1019.27	852.86	42.84	2.59	3.43	2.26	1.15	0.70
2020	152.55	3699.95	3084.38	263.72	19.32	28.88	9.54	11.55	4.07
2021	16.20	207.79	239.79	13.82	1.63	2.18	1.11	0.98	1.03

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	48436.61	389373.15	298461.49	335593.89	214254.53	148603.55	49671.19	16166.01	5813.24
1992	41718.91	410323.62	324580.34	286321.96	299303.48	159639.72	106501.75	33172.42	12926.46
1993	40400.96	335222.37	331747.66	285295.78	234542.91	198082.58	98838.52	58239.09	21504.65
1994	61810.44	280226.28	228995.97	260046.58	195851.39	133764.81	103223.38	44275.72	30085.08
1995	56712.80	425494.27	180933.57	162089.29	176086.02	99191.87	67027.56	42549.31	25972.12
1996	63449.00	421654.57	283658.53	142281.22	116746.50	103781.33	55392.62	31669.84	27559.98
1997	49239.51	405466.23	246316.48	190335.17	86025.11	55969.50	46164.65	21306.47	19428.08
1998	62292.73	318740.22	246676.57	169125.99	121340.86	44036.70	26789.22	18052.41	13087.70
1999	51481.91	337810.10	157849.06	139055.81	91365.31	54332.37	18116.97	9803.62	8431.33
2000	33783.71	400976.05	253161.76	128645.62	108361.31	61131.68	33944.05	10086.77	7743.85
2001	31290.95	246703.46	296571.99	203515.76	95234.68	66263.92	34547.99	16758.69	6510.82
2002	20924.66	152269.09	122350.84	166971.33	112695.17	40909.71	27608.58	11784.78	6313.48
2003	18252.72	127836.37	103130.27	88608.33	117113.93	65046.98	21851.68	12886.40	6547.04
2004	14468.59	162314.48	124736.22	107230.83	85207.92	87937.31	46690.69	13480.84	9243.24
2005	12922.46	115317.85	148198.26	121151.86	92984.99	56540.98	55191.21	24816.25	9270.77
2006	7455.52	77421.89	80330.02	109693.65	82210.89	45285.79	27513.70	21727.46	10508.40
2007	8922.26	67297.89	86320.45	86399.90	103556.43	60362.48	30308.28	16759.03	14650.51
2008	7520.63	74571.60	68535.16	83901.96	71518.96	64380.23	36987.36	15206.51	12939.65
2009	5873.60	48669.37	63331.53	52180.68	54429.97	35870.98	29989.74	14815.28	9260.54
2010	5031.59	31658.80	34334.29	40889.56	30877.07	24519.44	15556.92	10513.49	7478.14
2011	3220.57	29546.43	25253.77	25927.12	27690.97	16011.16	12659.20	6883.17	6570.10
2012	3900.15	37824.28	49849.06	39645.73	34659.88	27510.35	15316.43	10339.53	9199.18
2013	5974.58	35604.56	48244.27	62599.94	40520.02	25657.24	19149.89	9296.12	9853.17
2014	3039.77	39677.62	31846.80	42048.25	46745.01	21556.74	13264.01	8540.83	7219.93
2015	2967.64	32003.80	63623.79	46352.82	50302.85	41155.31	18652.88	10089.59	10017.27
2016	2654.54	25349.46	40059.94	76696.62	44636.14	37012.59	26912.24	11537.30	9617.89
2017	2723.81	21497.51	30936.82	42563.77	68859.67	31383.36	22841.84	14565.60	8373.16
2018	2283.91	23361.60	27666.64	34344.22	34272.99	49468.23	18498.82	11615.68	7629.80
2019	1034.82	8939.36	14342.51	15148.13	14860.50	12525.14	15443.01	5515.93	3349.35
2020	196.42	2711.31	3786.31	5637.95	4614.89	4408.06	3180.00	3941.46	1388.87
2021	105.83	837.14	2011.38	2581.01	3040.82	2209.43	1952.88	1417.00	1499.17

TABLE 3.9.1 WESTERN BALTIC SPRING SPAWNING HERRING. Input table for short term predictions.

2021						
wr	N	M	Mat	PM	PF	SWt
0	609230	0.3	0.00	0.25	0.1	0.0001
1	402040	0.5	0.00	0.25	0.1	0.0192
2	371783	0.2	0.20	0.25	0.1	0.0544
3	230754	0.2	0.75	0.25	0.1	0.0745
4	170687	0.2	0.90	0.25	0.1	0.1170
5	85325	0.2	1.00	0.25	0.1	0.1293
6	57280	0.2	1.00	0.25	0.1	0.1773
7	29710	0.2	1.00	0.25	0.1	0.1814
8+	31433	0.2	1.00	0.25	0.1	0.1781
2022						
wr	N	M	Mat	PM	PF	SWt
0	792293	0.3	0.00	0.25	0.1	0.0001
1		0.5	0.00	0.25	0.1	0.0198
2		0.2	0.20	0.25	0.1	0.0513
3		0.2	0.75	0.25	0.1	0.0788
4		0.2	0.90	0.25	0.1	0.1134
5		0.2	1.00	0.25	0.1	0.1399
6		0.2	1.00	0.25	0.1	0.1645
7		0.2	1.00	0.25	0.1	0.1741
8+		0.2	1.00	0.25	0.1	0.1821
2023						
wr	N	M	Mat	PM	PF	SWt
0	792293	0.3	0.00	0.25	0.1	0.0001
1		0.5	0.00	0.25	0.1	0.0198
2		0.2	0.20	0.25	0.1	0.0513
3		0.2	0.75	0.25	0.1	0.0788
4		0.2	0.90	0.25	0.1	0.1134
5		0.2	1.00	0.25	0.1	0.1399
6		0.2	1.00	0.25	0.1	0.1645
7		0.2	1.00	0.25	0.1	0.1741
8+		0.2	1.00	0.25	0.1	0.1821

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_{2021} wr 0–8+:	Populations numbers from the assessment
$N_{2022/2023}$ wr 0:	Average of wr 0 for the years 2016–2020
Natural Mortality (M):	Constant
Weight in the Stock 2022–2023 (SWt):	Average for 2017–2021

TABLE 3.9.2 WESTERN BALTIC SPRING SPAWNING HERRING
***Multi fleet*/Forecast table. MSY approach (zero catch, F = 0)**

Year	2021	2022	2023	2024	2025
fbar:Estimate	0.149	0.064	0.000	0.000	0.000
fbar:low	0.149	0.064	0.000	0.000	0.000
fbar:high	0.149	0.064	0.000	0.000	0.000
rec:Estimate	609230	792293	792293	792293	792293
rec:low	609230	792293	792293	792293	792293
rec:high	609230	792293	792293	792293	792293
ssb:Estimate	62765	71011	80978	95882	111989
ssb:low	62765	71011	80978	95882	111989
ssb:high	62765	71011	80978	95882	111989
catch:Estimate	15546	7662	0	0	0
catch:low	15546	7662	0	0	0
catch:high	15546	7662	0	0	0

Per fleet

Year	2021	2022	2023	2024	2025
Fleet A : Estimate	3508	6142	0	0	0
Fleet C : Estimate	10119	733	0	0	0
Fleet D : Estimate	24	0	0	0	0
Fleet F : Estimate	1895	788	0	0	0

TABLE 3.9.3 WESTERN BALTIC SPRING SPAWNING HERRING
***Multi fleet*/Forecast table. MAP 2018: F=FMSY(0.31)*SSBy-1/MSYBtrigger**

Year	2021	2022	2023	2024	2025
fbar:Estimate	0.149	0.064	0.147	0.164	0.164
fbar:low	0.149	0.064	0.147	0.164	0.164
fbar:high	0.149	0.064	0.147	0.164	0.164
rec:Estimate	609230	792293	792293	792293	792293
rec:low	609230	792293	792293	792293	792293
rec:high	609230	792293	792293	792293	792293
ssb:Estimate	62765	71011	79256	79224	80143
ssb:low	62765	71011	79256	79224	80143
ssb:high	62765	71011	79256	79224	80143
catch:Estimate	15546	7662	19391	21686	22149
catch:low	15546	7662	19391	21686	22149
catch:high	15546	7662	19391	21686	22149

Per fleet

Year	2021	2022	2023	2024	2025
Fleet A : Estimate	3508	6142	15618	17363	17747
Fleet C : Estimate	10119	733	1764	2059	2143
Fleet D : Estimate	24	0	0	0	0
Fleet F : Estimate	1895	788	2008	2265	2258

TABLE 3.9.4 WESTERN BALTIC SPRING SPAWNING HERRING
***Multi fleet*/Forecast table. MAP 2018: F=FMSYlower(0.216)*SSBy-1/MSYBtrigger**

Year	2021	2022	2023	2024	2025
fbar:Estimate	0.149	0.064	0.102	0.115	0.121
fbar:low	0.149	0.064	0.102	0.115	0.121
fbar:high	0.149	0.064	0.102	0.115	0.121
rec:Estimate	609230	792293	792293	792293	792293
rec:low	609230	792293	792293	792293	792293
rec:high	609230	792293	792293	792293	792293
ssb:Estimate	62765	71011	79772	83745	87795
ssb:low	62765	71011	79772	83745	87795
ssb:high	62765	71011	79772	83745	87795
catch:Estimate	15546	7662	14025	16849	18865
catch:low	15546	7662	14025	16849	18865
catch:high	15546	7662	14025	16849	18865

Per fleet

Year	2021	2022	2023	2024	2025
Fleet A : Estimate	3508	6142	11323	13590	15280
Fleet C : Estimate	10119	733	1254	1516	1683
Fleet D : Estimate	24	0	0	0	0
Fleet F : Estimate	1895	788	1448	1744	1902

TABLE 3.9.5 WESTERN BALTIC SPRING SPAWNING HERRING
***Multi fleet*/Forecast table. MAP 2018: F=FMSYupper(0.379)*SSBy-1/MSYBtrigger**

Year	2021	2022	2023	2024	2025
fbar:Estimate	0.149	0.064	0.179	0.199	0.192
fbar:low	0.149	0.064	0.179	0.199	0.192
fbar:high	0.149	0.064	0.179	0.199	0.192
rec:Estimate	609230	792293	792293	792293	792293
rec:low	609230	792293	792293	792293	792293
rec:high	609230	792293	792293	792293	792293
ssb:Estimate	62765	71011	78880	76152	75303
ssb:low	62765	71011	78880	76152	75303
ssb:high	62765	71011	78880	76152	75303
catch:Estimate	15546	7662	23085	24572	23643
catch:low	15546	7662	23085	24572	23643
catch:high	15546	7662	23085	24572	23643

Per fleet

Year	2021	2022	2023	2024	2025
Fleet A : Estimate	3508	6142	18562	19567	18801
Fleet C : Estimate	10119	733	2127	2422	2415
Fleet D : Estimate	24	0	0	0	0
Fleet F : Estimate	1895	788	2396	2582	2428

TABLE 3.9.6 WESTERN BALTIC SPRING SPAWNING HERRING
***Multi fleet*/Forecast table. F=FMSY=0.31**

Year	2021	2022	2023	2024	2025
fbar:Estimate	0.149	0.064	0.310	0.310	0.310
fbar:low	0.149	0.064	0.310	0.310	0.310
fbar:high	0.149	0.064	0.310	0.310	0.310
rec:Estimate	609230	792293	792293	792293	792293
rec:low	609230	792293	792293	792293	792293
rec:high	609230	792293	792293	792293	792293
ssb:Estimate	62765	71011	77401	65861	61838
ssb:low	62765	71011	77401	65861	61838
ssb:high	62765	71011	77401	65861	61838
catch:Estimate	15546	7662	36088	30159	28128
catch:low	15546	7662	36088	30159	28128
catch:high	15546	7662	36088	30159	28128

Per fleet

Year	2021	2022	2023	2024	2025
Fleet A : Estimate	3508	6142	28829	23560	21780
Fleet C : Estimate	10119	733	3482	3372	3408
Fleet D : Estimate	24	0	0	0	0
Fleet F : Estimate	1895	788	3777	3227	2941

TABLE 3.9.7 WESTERN BALTIC SPRING SPAWNING HERRING
***Multi fleet*/Forecast table. F=Fpa=0.41**

Year	2021	2022	2023	2024	2025
fbar:Estimate	0.149	0.064	0.410	0.410	0.410
fbar:low	0.149	0.064	0.410	0.410	0.410
fbar:high	0.149	0.064	0.410	0.410	0.410
rec:Estimate	609230	792293	792293	792293	792293
rec:low	609230	792293	792293	792293	792293
rec:high	609230	792293	792293	792293	792293
ssb:Estimate	62765	71011	76296	59278	53441
ssb:low	62765	71011	76296	59278	53441
ssb:high	62765	71011	76296	59278	53441
catch:Estimate	15546	7662	44481	33646	30065
catch:low	15546	7662	44481	33646	30065
catch:high	15546	7662	44481	33646	30065

Per fleet

Year	2021	2022	2023	2024	2025
Fleet A : Estimate	3508	6142	35369	25892	22796
Fleet C : Estimate	10119	733	4430	4115	4101
Fleet D : Estimate	24	0	0	0	0
Fleet F : Estimate	1895	788	4681	3640	3169

TABLE 3.9.8 WESTERN BALTIC SPRING SPAWNING HERRING
***Multi fleet*/Forecast table. F=Flim=0.45**

Year	2021	2022	2023	2024	2025
fbar:Estimate	0.149	0.064	0.450	0.450	0.450
fbar:low	0.149	0.064	0.450	0.450	0.450
fbar:high	0.149	0.064	0.450	0.450	0.450
rec:Estimate	609230	792293	792293	792293	792293
rec:low	609230	792293	792293	792293	792293
rec:high	609230	792293	792293	792293	792293
ssb:Estimate	62765	71011	75860	56930	50619
ssb:low	62765	71011	75860	56930	50619
ssb:high	62765	71011	75860	56930	50619
catch:Estimate	15546	7662	47526	34667	30569
catch:low	15546	7662	47526	34667	30569
catch:high	15546	7662	47526	34667	30569

Per fleet

Year	2021	2022	2023	2024	2025
Fleet A : Estimate	3508	6142	37724	26522	22992
Fleet C : Estimate	10119	733	4791	4383	4349
Fleet D : Estimate	24	0	0	0	0
Fleet F : Estimate	1895	788	5012	3763	3228

TABLE 3.9.9 WESTERN BALTIC SPRING SPAWNING HERRING
***Multi fleet*/Forecast table. F=F2022=0.064**

Year	2021	2022	2023	2024	2025
fbar:Estimate	0.149	0.064	0.064	0.064	0.064
fbar:low	0.149	0.064	0.064	0.064	0.064
fbar:high	0.149	0.064	0.064	0.064	0.064
rec:Estimate	609230	792293	792293	792293	792293
rec:low	609230	792293	792293	792293	792293
rec:high	609230	792293	792293	792293	792293
ssb:Estimate	62765	71011	80221	88093	96763
ssb:low	62765	71011	80221	88093	96763
ssb:high	62765	71011	80221	88093	96763
catch:Estimate	15546	7662	9073	10387	11843
catch:low	15546	7662	9073	10387	11843
catch:high	15546	7662	9073	10387	11843

Per fleet

Year	2021	2022	2023	2024	2025
Fleet A : Estimate	3508	6142	7341	8436	9702
Fleet C : Estimate	10119	733	799	886	964
Fleet D : Estimate	24	0	0	0	0
Fleet F : Estimate	1895	788	934	1065	1177

TABLE 3.9.10 WESTERN BALTIC SPRING SPAWNING HERRING
***Multi fleet*/Forecast table. F=0**

Year	2021	2022	2023	2024	2025
fbar:Estimate	0.149	0.064	0.000	0.000	0.000
fbar:low	0.149	0.064	0.000	0.000	0.000
fbar:high	0.149	0.064	0.000	0.000	0.000
rec:Estimate	609230	792293	792293	792293	792293
rec:low	609230	792293	792293	792293	792293
rec:high	609230	792293	792293	792293	792293
ssb:Estimate	62765	71011	80978	95882	111989
ssb:low	62765	71011	80978	95882	111989
ssb:high	62765	71011	80978	95882	111989
catch:Estimate	15546	7662	0	0	0
catch:low	15546	7662	0	0	0
catch:high	15546	7662	0	0	0

Per fleet

Year	2021	2022	2023	2024	2025
Fleet A : Estimate	3508	6142	0	0	0
Fleet C : Estimate	10119	733	0	0	0
Fleet D : Estimate	24	0	0	0	0
Fleet F : Estimate	1895	788	0	0	0

TABLE 3.9.11 WESTERN BALTIC SPRING SPAWNING HERRING
***Multi fleet*/Forecast table. F=0.05**

Year	2021	2022	2023	2024	2025
fbar:Estimate	0.149	0.064	0.050	0.050	0.050
fbar:low	0.149	0.064	0.050	0.050	0.050
fbar:high	0.149	0.064	0.050	0.050	0.050
rec:Estimate	609230	792293	792293	792293	792293
rec:low	609230	792293	792293	792293	792293
rec:high	609230	792293	792293	792293	792293
ssb:Estimate	62765	71011	80385	89708	99777
ssb:low	62765	71011	80385	89708	99777
ssb:high	62765	71011	80385	89708	99777
catch:Estimate	15546	7662	7177	8395	9739
catch:low	15546	7662	7177	8395	9739
catch:high	15546	7662	7177	8395	9739

Per fleet

Year	2021	2022	2023	2024	2025
Fleet A : Estimate	3508	6142	5811	6833	8004
Fleet C : Estimate	10119	733	628	704	771
Fleet D : Estimate	24	0	0	0	0
Fleet F : Estimate	1895	788	738	858	964

TABLE 3.9.12 WESTERN BALTIC SPRING SPAWNING HERRING
***Multi fleet*/Forecast table. F=0.1**

Year	2021	2022	2023	2024	2025
fbar:Estimate	0.149	0.064	0.100	0.100	0.100
fbar:low	0.149	0.064	0.100	0.100	0.100
fbar:high	0.149	0.064	0.100	0.100	0.100
rec:Estimate	609230	792293	792293	792293	792293
rec:low	609230	792293	792293	792293	792293
rec:high	609230	792293	792293	792293	792293
ssb:Estimate	62765	71011	79799	84145	89698
ssb:low	62765	71011	79799	84145	89698
ssb:high	62765	71011	79799	84145	89698
catch:Estimate	15546	7662	13742	14913	16319
catch:low	15546	7662	13742	14913	16319
catch:high	15546	7662	13742	14913	16319

Per fleet

Year	2021	2022	2023	2024	2025
Fleet A : Estimate	3508	6142	11096	12042	13257
Fleet C : Estimate	10119	733	1228	1330	1424
Fleet D : Estimate	24	0	0	0	0
Fleet F : Estimate	1895	788	1418	1541	1639

TABLE 3.9.13 WESTERN BALTIC SPRING SPAWNING HERRING
***Multi fleet*/Forecast table. F=0.15**

Year	2021	2022	2023	2024	2025
fbar:Estimate	0.149	0.064	0.150	0.150	0.150
fbar:low	0.149	0.064	0.150	0.150	0.150
fbar:high	0.149	0.064	0.150	0.150	0.150
rec:Estimate	609230	792293	792293	792293	792293
rec:low	609230	792293	792293	792293	792293
rec:high	609230	792293	792293	792293	792293
ssb:Estimate	62765	71011	79218	79114	81275
ssb:low	62765	71011	79218	79114	81275
ssb:high	62765	71011	79218	79114	81275
catch:Estimate	15546	7662	19767	20008	20840
catch:low	15546	7662	19767	20008	20840
catch:high	15546	7662	19767	20008	20840

Per fleet

Year	2021	2022	2023	2024	2025
Fleet A : Estimate	3508	6142	15918	16027	16731
Fleet C : Estimate	10119	733	1801	1893	1988
Fleet D : Estimate	24	0	0	0	0
Fleet F : Estimate	1895	788	2048	2088	2120

TABLE 3.9.14 WESTERN BALTIC SPRING SPAWNING HERRING
***Multi fleet*/Forecast table. Constant 2022 TAC**

Year	2021	2022	2023	2024	2025
fbar:Estimate	0.149	0.064	0.054	0.046	0.039
fbar:low	0.149	0.064	0.054	0.046	0.039
fbar:high	0.149	0.064	0.054	0.046	0.039
rec:Estimate	609230	792293	792293	792293	792293
rec:low	609230	792293	792293	792293	792293
rec:high	609230	792293	792293	792293	792293
ssb:Estimate	62765	71011	80345	89405	100170
ssb:low	62765	71011	80345	89405	100170
ssb:high	62765	71011	80345	89405	100170
catch:Estimate	15546	7662	7662	7662	7662
catch:low	15546	7662	7662	7662	7662
catch:high	15546	7662	7662	7662	7662

Per fleet

Year	2021	2022	2023	2024	2025
Fleet A : Estimate	3508	6142	6142	6142	6142
Fleet C : Estimate	10119	733	733	733	733
Fleet D : Estimate	24	0	0	0	0
Fleet F : Estimate	1895	788	788	788	788

TABLE 3.9.15 WESTERN BALTIC SPRING SPAWNING HERRING
***Multi fleet*/Forecast table. Catch for bycatch fleets only**

Year	2021	2022	2023	2024	2025
fbar:Estimate	0.149	0.064	0.039	0.033	0.027
fbar:low	0.149	0.064	0.039	0.033	0.027
fbar:high	0.149	0.064	0.039	0.033	0.027
rec:Estimate	609230	792293	792293	792293	792293
rec:low	609230	792293	792293	792293	792293
rec:high	609230	792293	792293	792293	792293
ssb:Estimate	62765	71011	80475	90852	102935
ssb:low	62765	71011	80475	90852	102935
ssb:high	62765	71011	80475	90852	102935
catch:Estimate	15546	7662	6142	6142	6142
catch:low	15546	7662	6142	6142	6142
catch:high	15546	7662	6142	6142	6142

Per fleet

Year	2021	2022	2023	2024	2025
Fleet A : Estimate	3508	6142	6142	6142	6142
Fleet C : Estimate	10119	733	0	0	0
Fleet D : Estimate	24	0	0	0	0
Fleet F : Estimate	1895	788	0	0	0

TABLE 3.9.16 WESTERN BALTIC SPRING SPAWNING HERRING
***Multi fleet*/Forecast table. F = 0.025**

Year	2021	2022	2023	2024	2025
fbar:Estimate	0.149	0.064	0.025	0.025	0.025
fbar:low	0.149	0.064	0.025	0.025	0.025
fbar:high	0.149	0.064	0.025	0.025	0.025
rec:Estimate	609230	792293	792293	792293	792293
rec:low	609230	792293	792293	792293	792293
rec:high	609230	792293	792293	792293	792293
ssb:Estimate	62765	71011	80681	92713	105581
ssb:low	62765	71011	80681	92713	105581
ssb:high	62765	71011	80681	92713	105581
catch:Estimate	15546	7662	3670	4466	5354
catch:low	15546	7662	3670	4466	5354
catch:high	15546	7662	3670	4466	5354

Per fleet

Year	2021	2022	2023	2024	2025
Fleet A : Estimate	3508	6142	2976	3650	4426
Fleet C : Estimate	10119	733	318	362	403
Fleet D : Estimate	24	0	0	0	0
Fleet F : Estimate	1895	788	376	454	525

TABLE 3.9.17 WESTERN BALTIC SPRING SPAWNING HERRING
***Multi fleet*/Forecast table. F = 0.01**

Year	2021	2022	2023	2024	2025
fbar:Estimate	0.149	0.064	0.010	0.010	0.010
fbar:low	0.149	0.064	0.010	0.010	0.010
fbar:high	0.149	0.064	0.010	0.010	0.010
rec:Estimate	609230	792293	792293	792293	792293
rec:low	609230	792293	792293	792293	792293
rec:high	609230	792293	792293	792293	792293
ssb:Estimate	62765	71011	80859	94594	109348
ssb:low	62765	71011	80859	94594	109348
ssb:high	62765	71011	80859	94594	109348
catch:Estimate	15546	7662	1488	1856	2272
catch:low	15546	7662	1488	1856	2272
catch:high	15546	7662	1488	1856	2272

Per fleet

Year	2021	2022	2023	2024	2025
Fleet A : Estimate	3508	6142	1208	1520	1885
Fleet C : Estimate	10119	733	128	148	166
Fleet D : Estimate	24	0	0	0	0
Fleet F : Estimate	1895	788	152	188	222

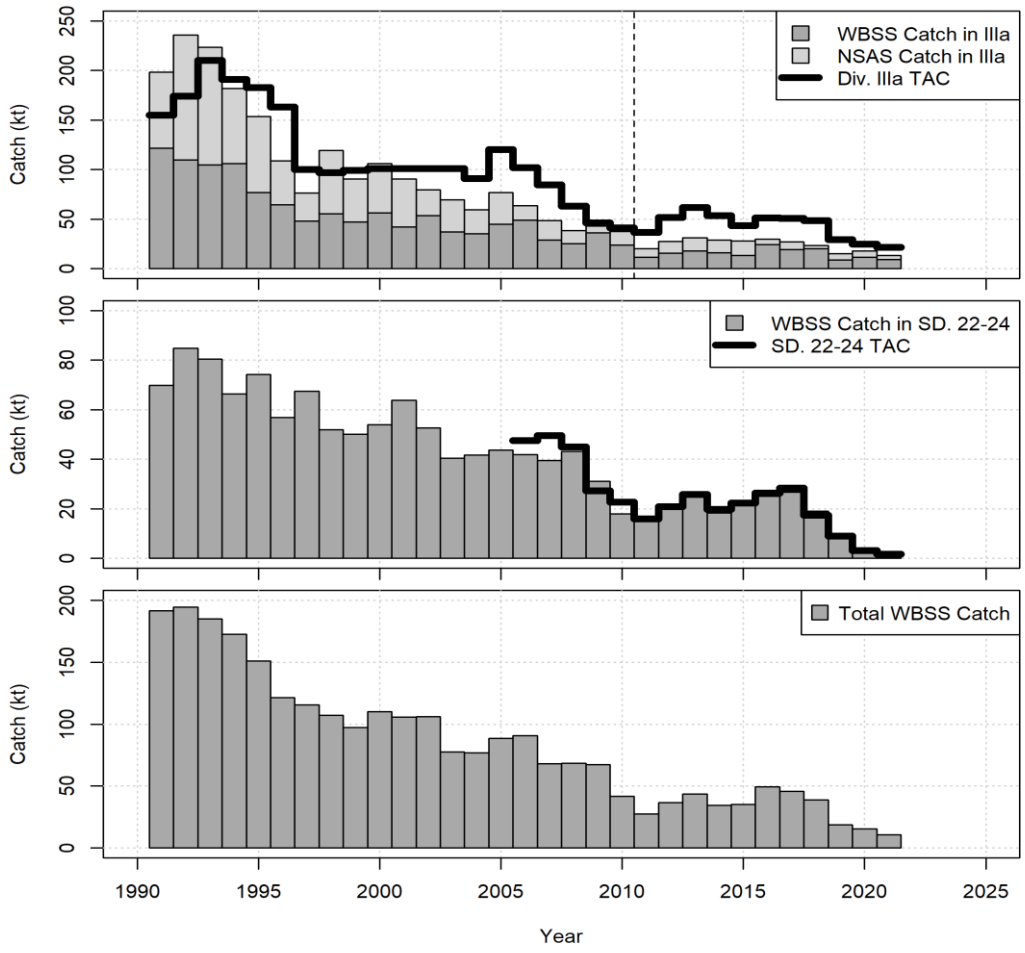


Figure 3.1.1 Western Baltic Spring Spawning Herring. CATCH and TACs (1000 t) by area. Note, the TAC for Division 3.a excludes the by-catch TAC, while the CATCH includes the by-catch.

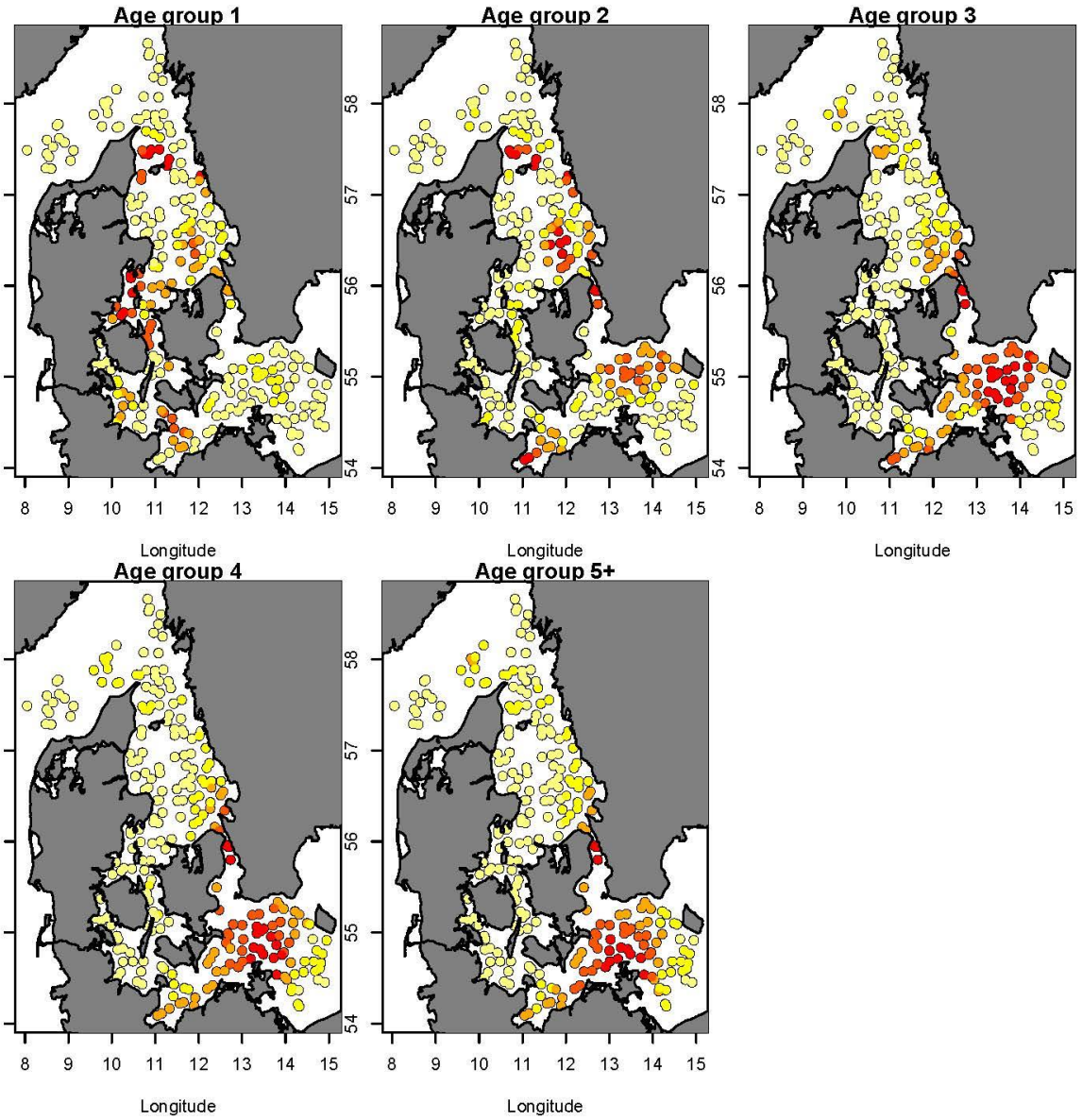


Figure 3.3.1 WESTERN BALTIC SPRING SPAWNING HERRING. Map showing distribution of hauls and the density of fish per age in the IBTS+BITS-Q1 survey.

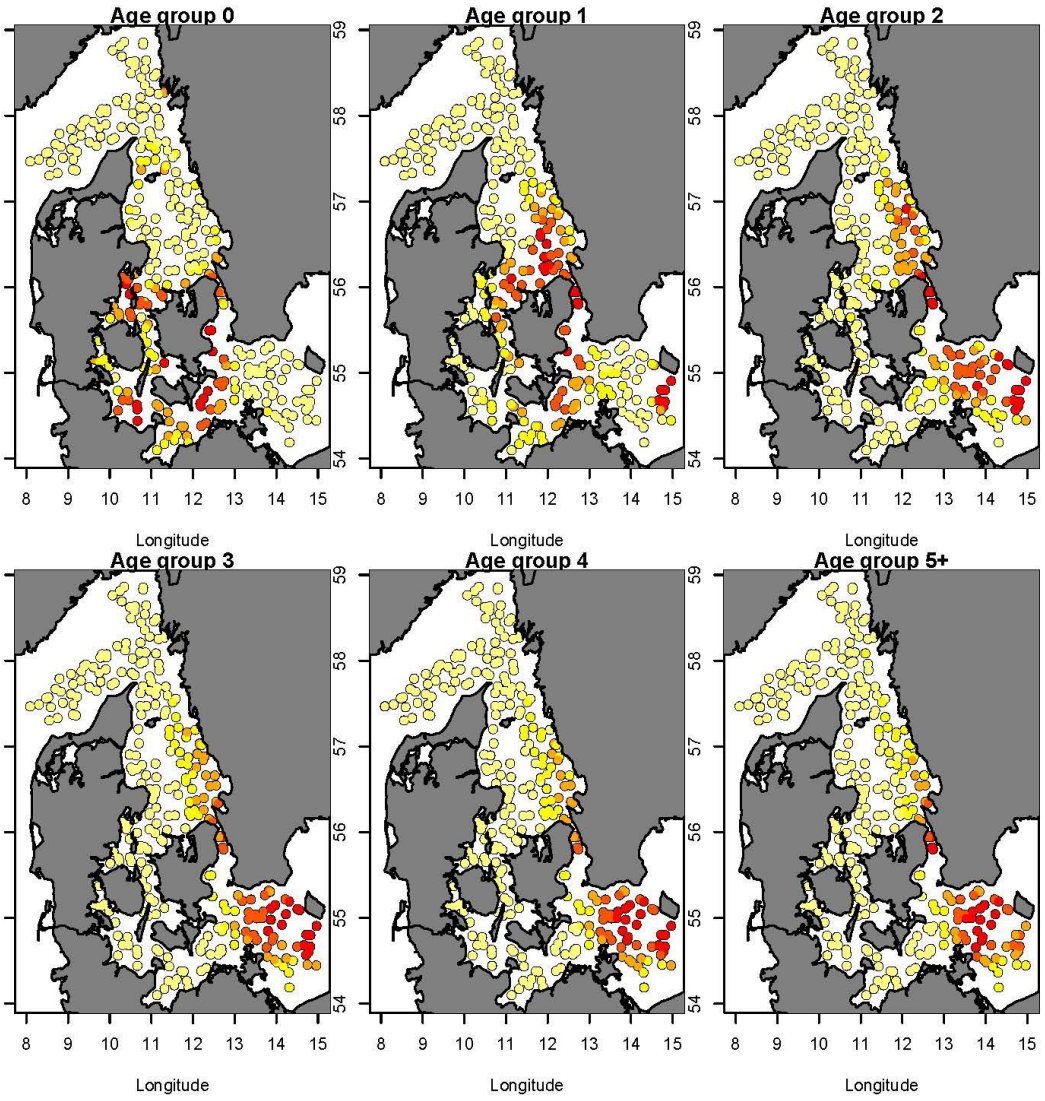


Figure 3.3.2 WESTERN BALTIC SPRING SPAWNING HERRING. Map showing distribution of hauls and the density of fish per age in the IBTS+BITS-Q3.4 survey.

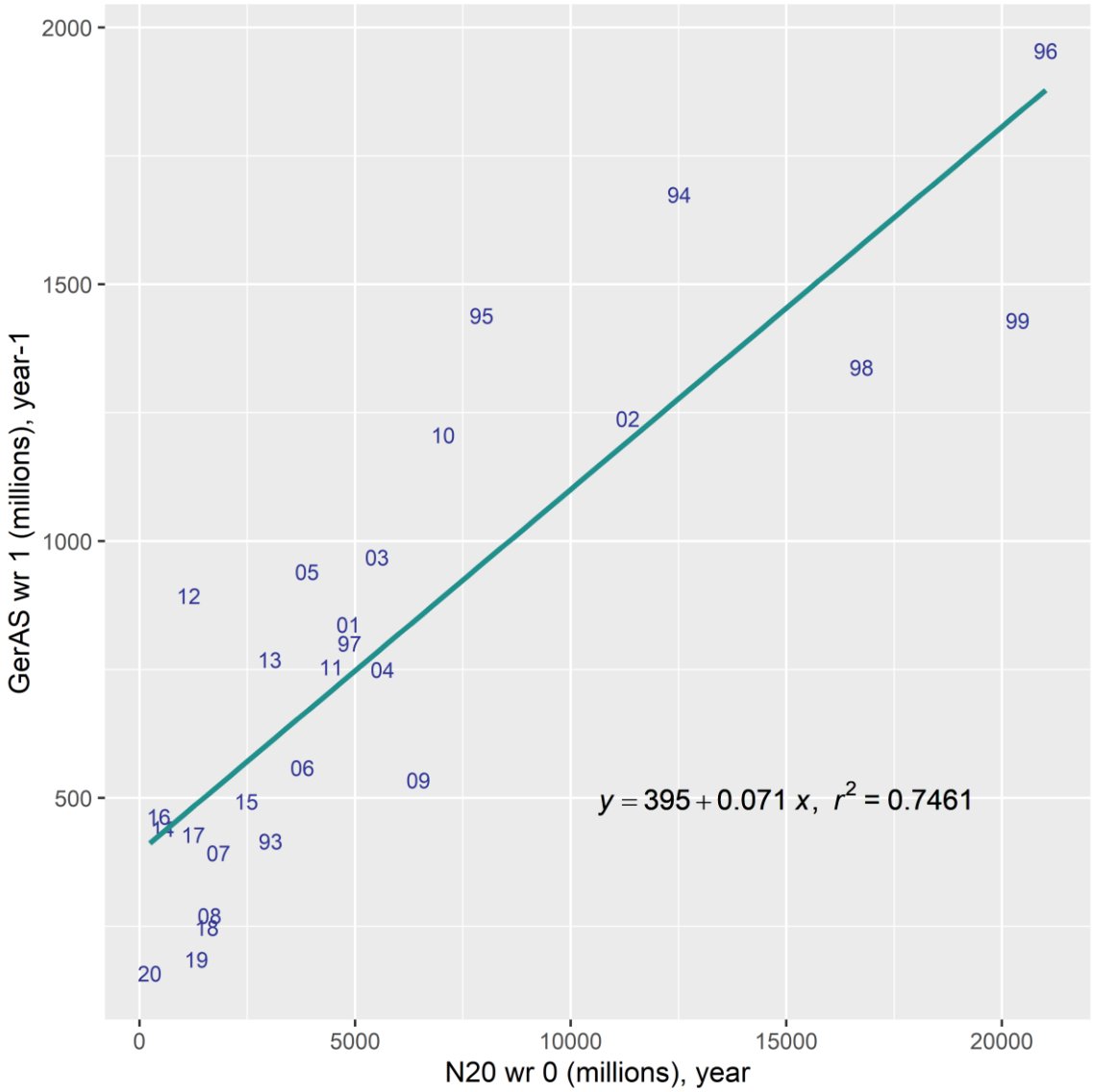


Figure 3.5.1 WESTERN BALTIC SPRING SPAWNING HERRING. Correlation of 1 wr herring from GERAS with the N20 larvae index. Note the year lag between surveys. Labels show the year of the N20.

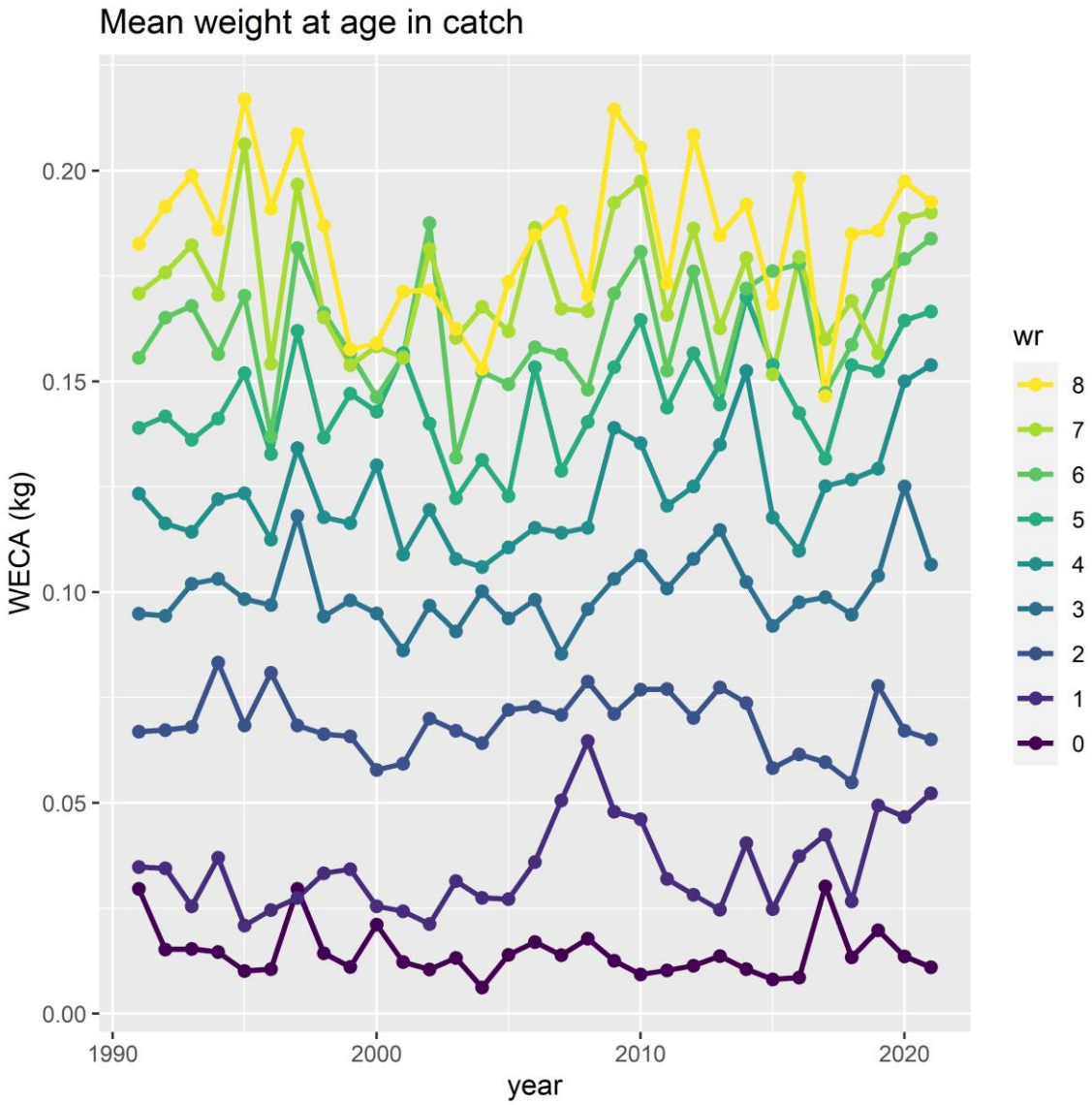


Figure 3.6.1.1 WESTERN BALTIC SPRING SPAWNING HERRING. Weight (kg) at age as W-ringers (wr) in the catch (WECA).

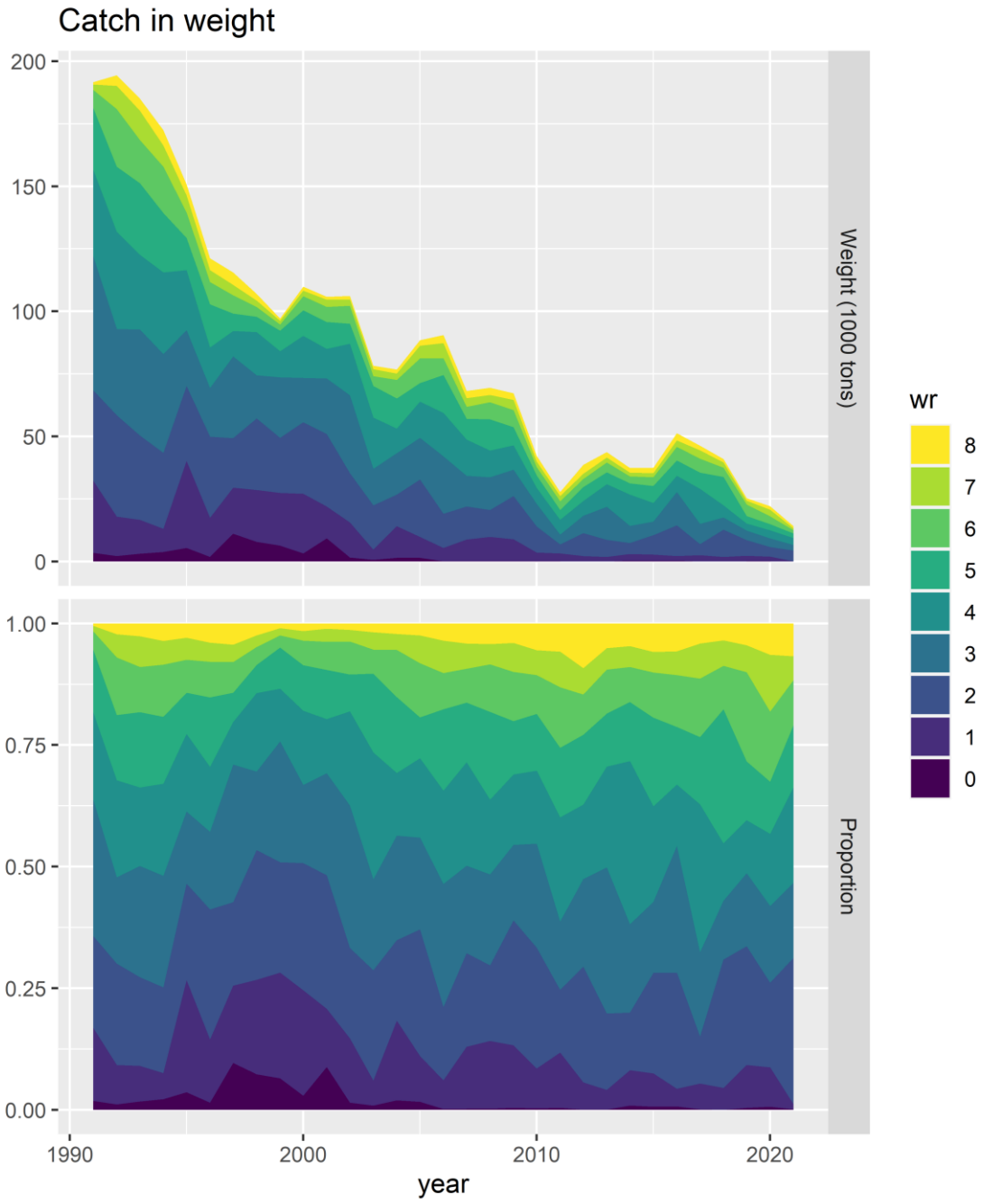


Figure 3.6.1.2 WESTERN BALTIC SPRING SPAWNING HERRING. Catch in weight. Upper panel: Catch in weight (1000 tons) at age as W-ringers (wr). Lower panel: Proportion (by weight) of a given age as W-ringers (wr) in the catch.

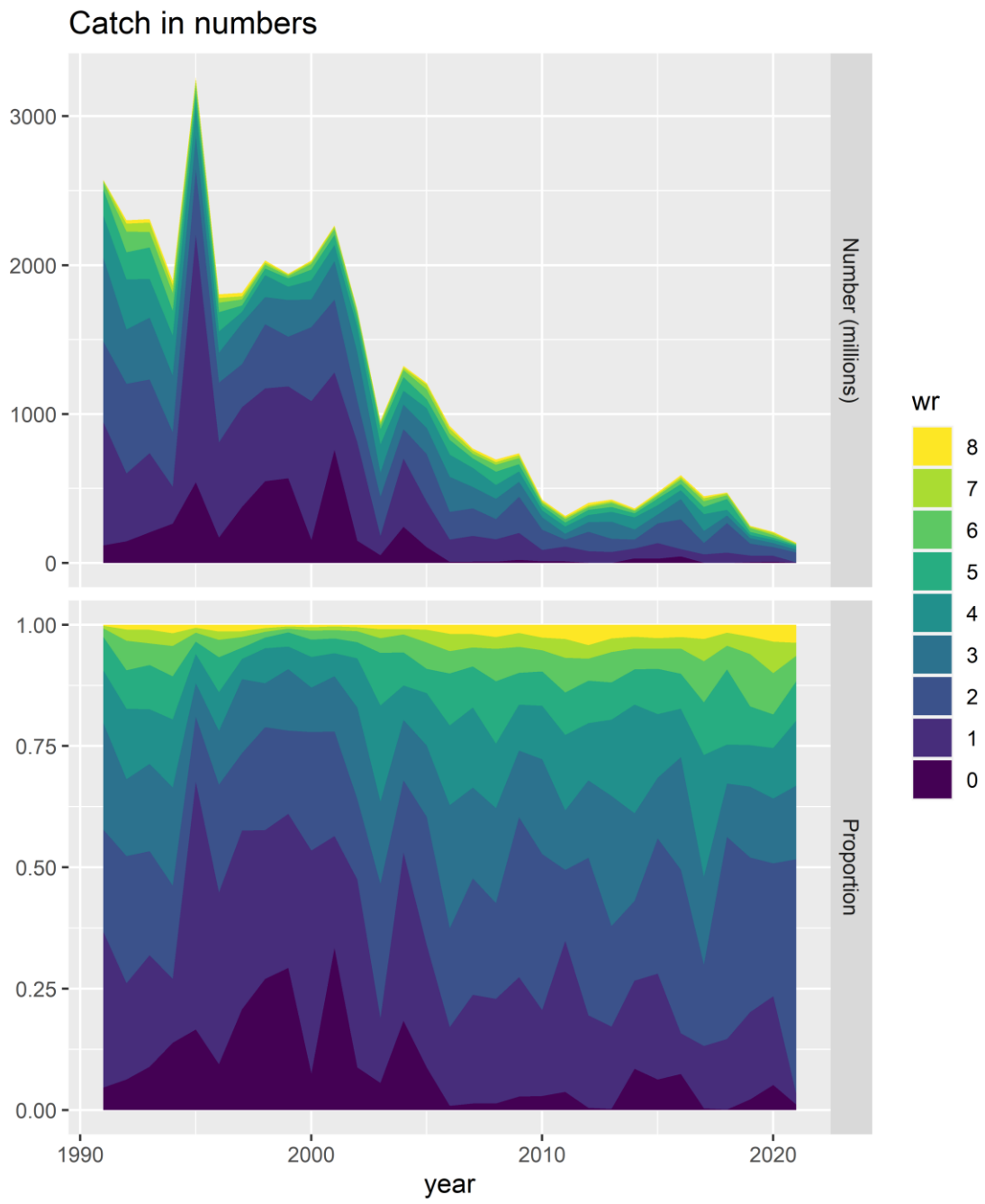


Figure 3.6.1.3 WESTERN BALTIC SPRING SPAWNING HERRING. Catch in Numbers. Upper panel: Catch in numbers (millions) at age as W-ringers (wr). Lower panel: Proportion (by number) of a given age as W-ringers (wr) in the catch.

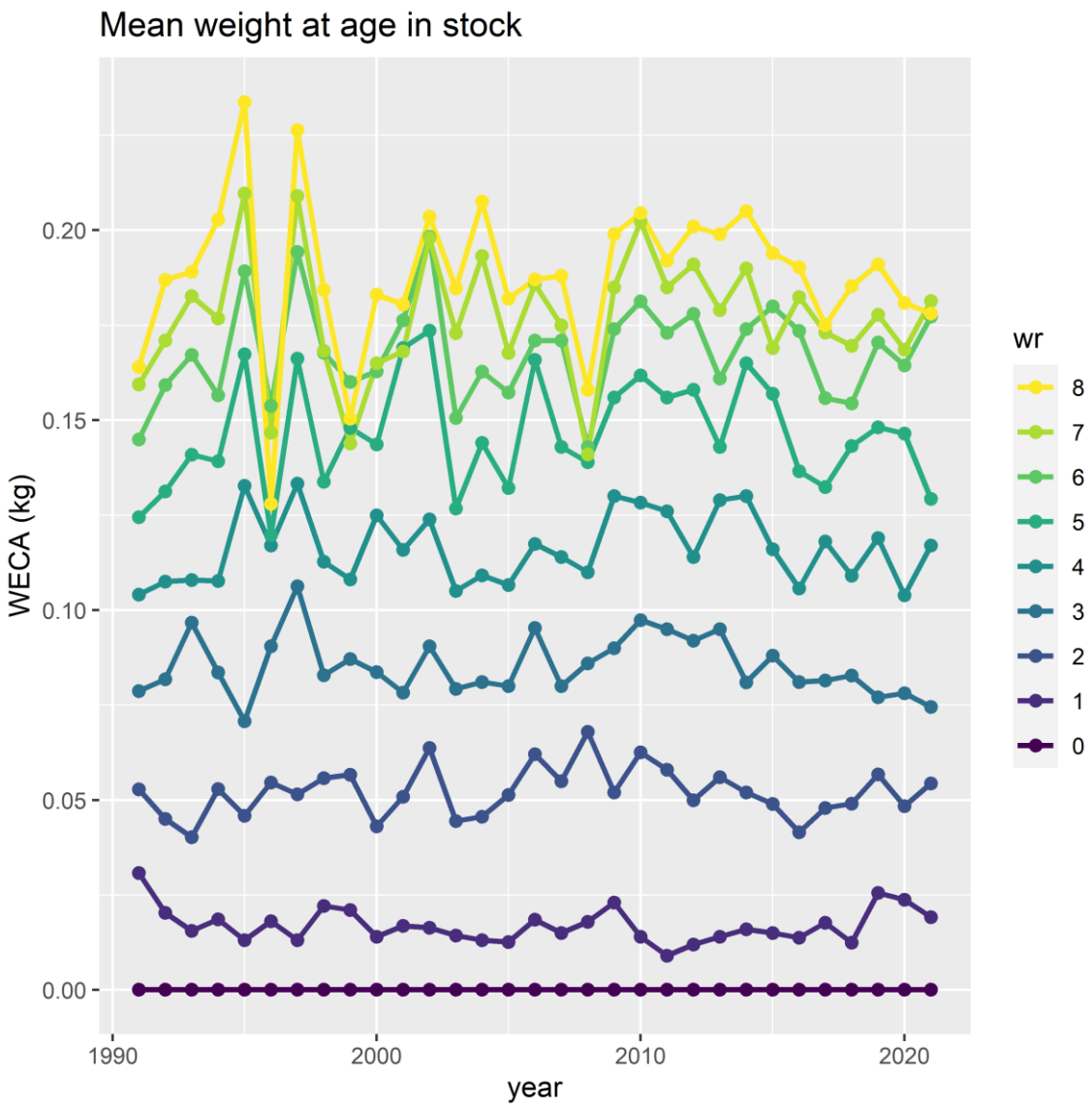


Figure 3.6.1.4 WESTERN BALTIC SPRING SPAWNING HERRING. Weight (kg) at age as W-ringers (wr) in the stock (WEST).

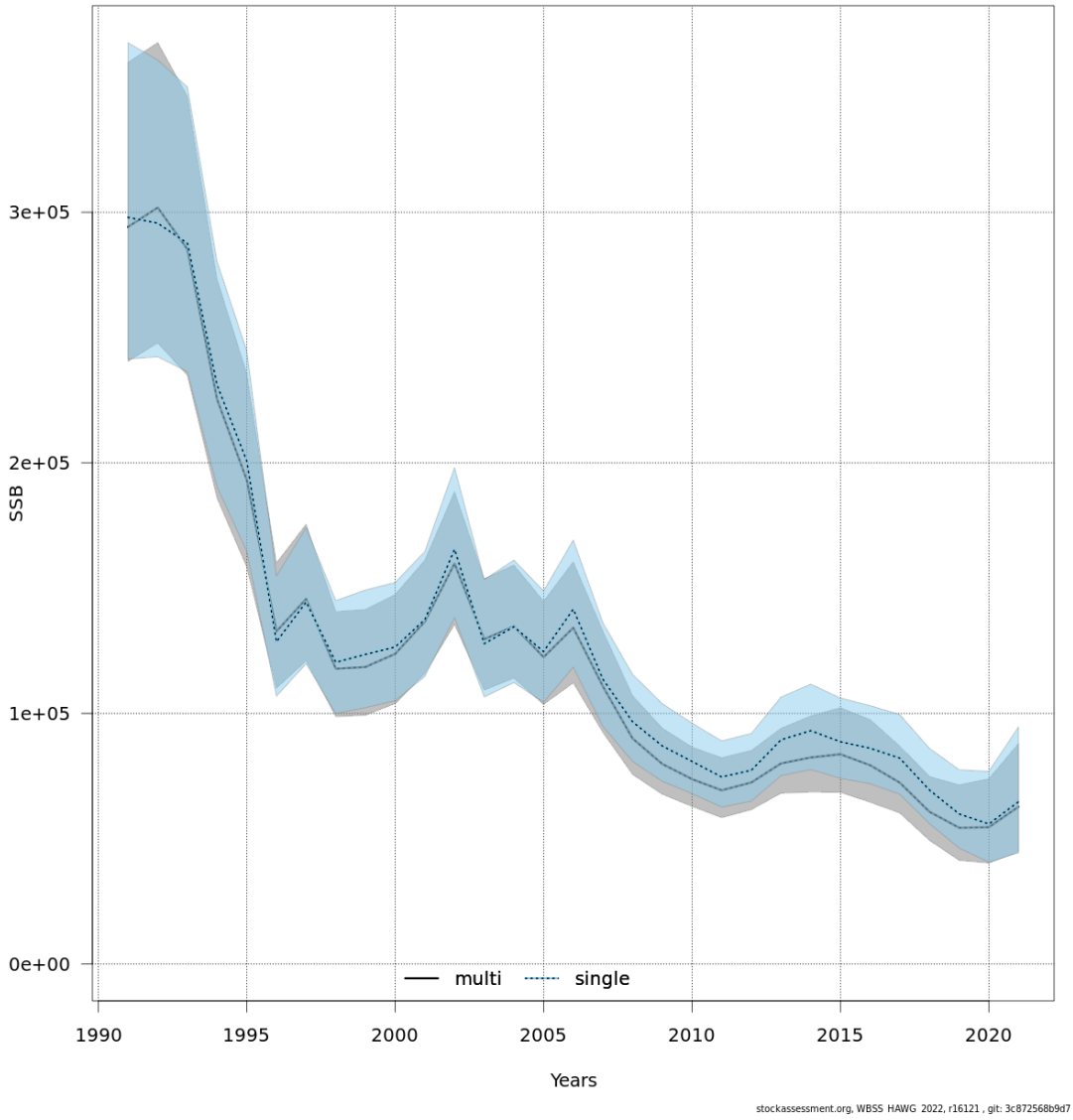


Figure 3.6.4.1 WESTERN BALTIC SPRING SPAWNING HERRING. Stock summary plot. Spawning stock biomass (SSB). Estimates from the WBSS multi fleet (multi) and the WBSS single fleet (single) assessment runs and point wise 95% confidence intervals are shown by line and shaded area.

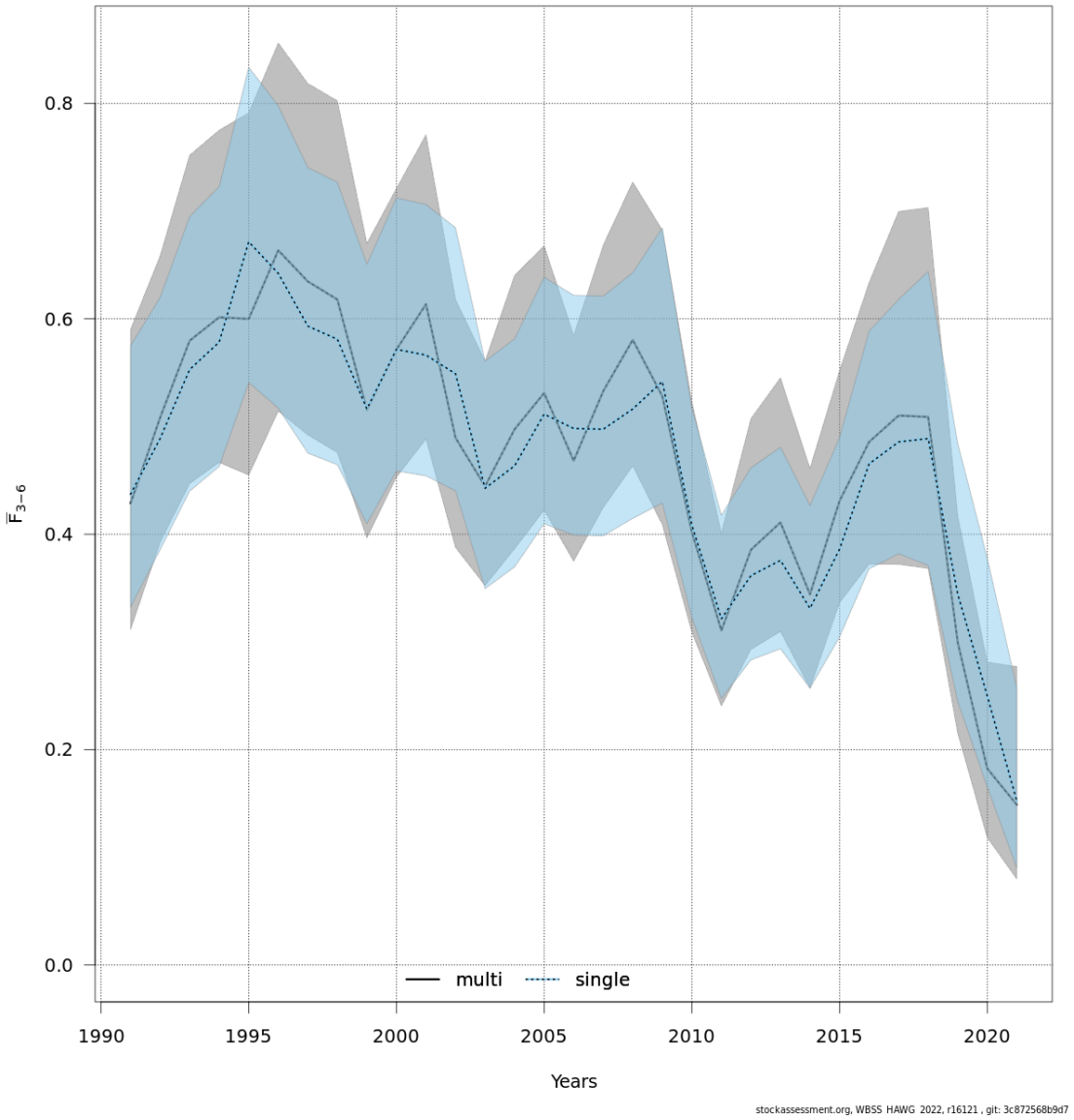


Figure 3.6.4.2 WESTERN BALTIC SPRING SPAWNING HERRING. Stock summary plot. Average fishing mortality (F) for the shown age range. Estimates from the WBSS multi fleet (multi) and the WBSS single fleet (single) assessment runs and point wise 95% confidence intervals are shown by line and shaded area.

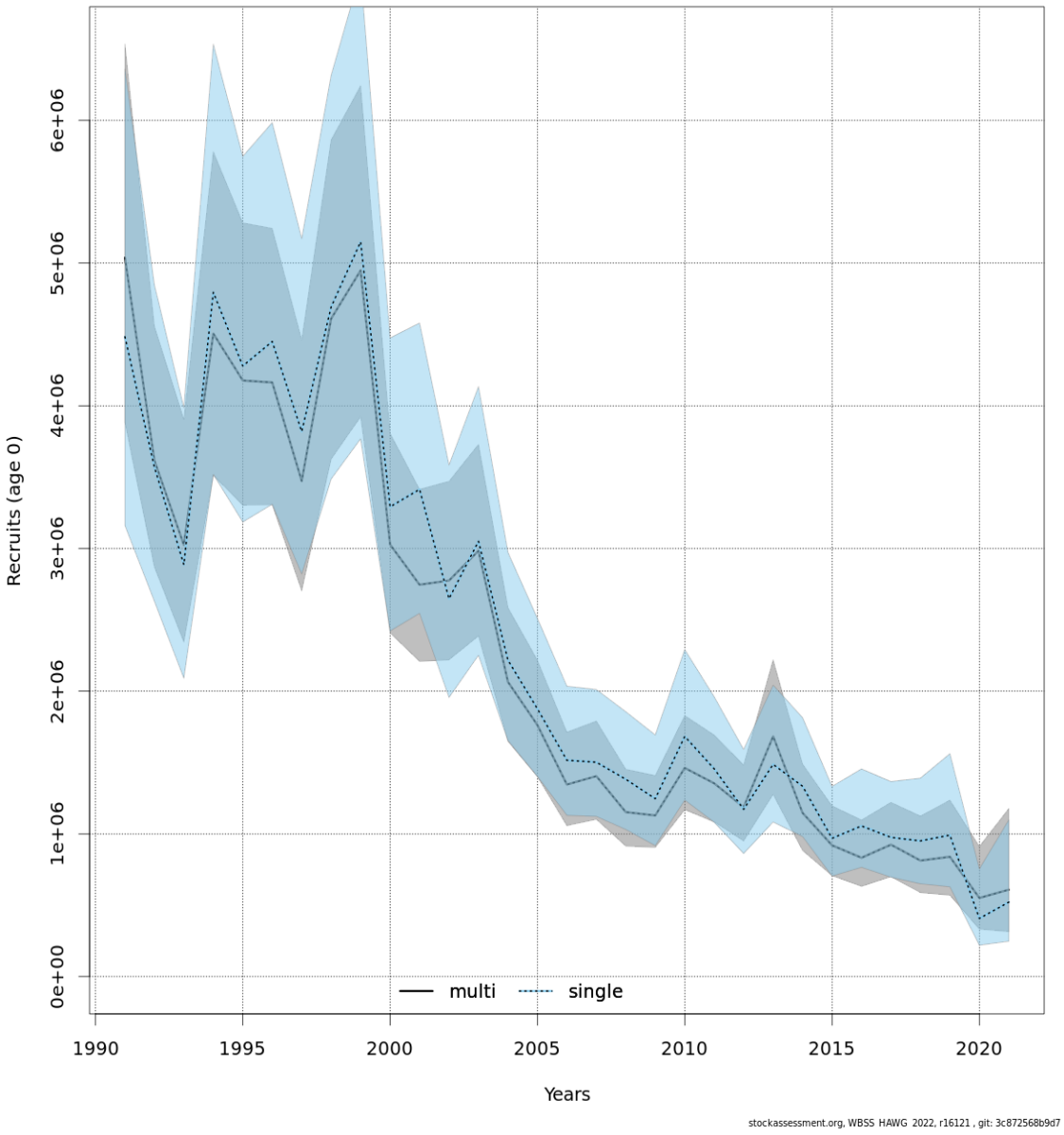


Figure 3.6.4.3 WESTERN BALTIC SPRING SPAWNING HERRING. Stock summary plot. Yearly recruitment (age 0 equal 0 W-ringers). Estimates from the WBSS multi fleet (multi) and the WBSS single fleet (single) assessment runs and point wise 95% confidence intervals are shown by line and shaded area.

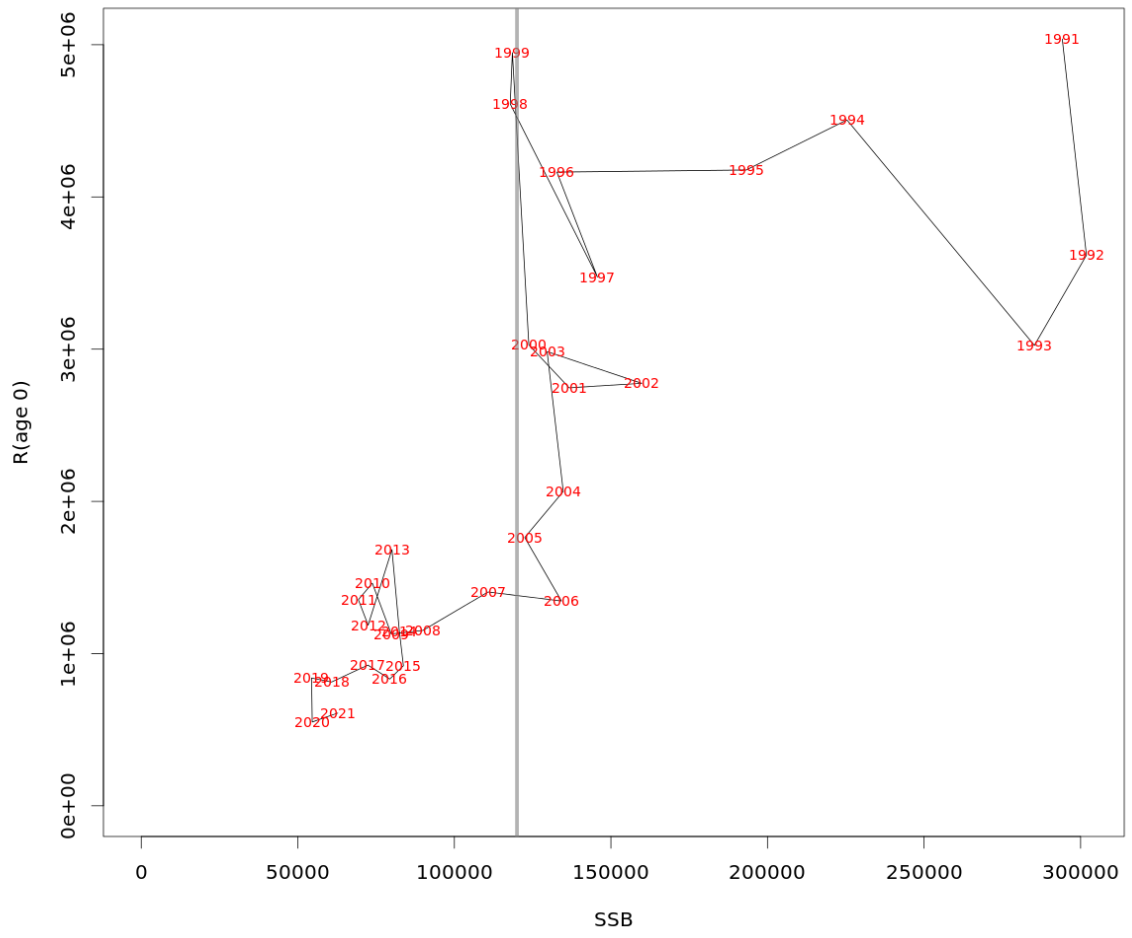


Figure 3.6.4.4 WESTERN BALTIC SPRING SPAWNING HERRING. Recruitment at age 0-wr (in thousands) is plotted against spawning stock biomass (tonnes) as estimated by the assessment.

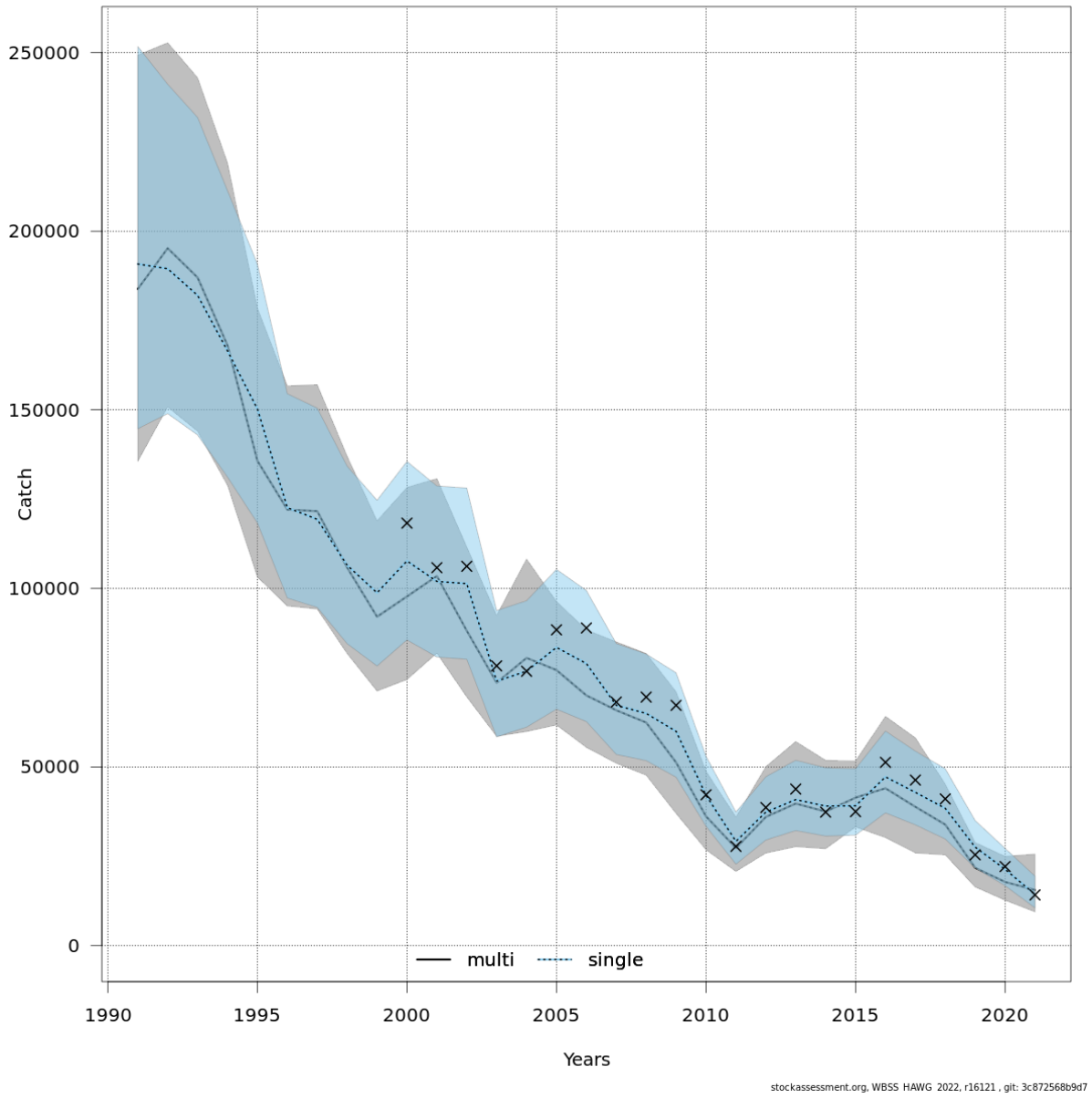


Figure 3.6.4.5 WESTERN BALTIC SPRING SPAWNING HERRING. Total catch in weight (tonnes). Prediction from the WBSS multi fleet (multi) and the WBSS single fleet (single) assessment runs and point wise 95% confidence intervals are shown by line and shaded area. The yearly observed total catch weight (crosses)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

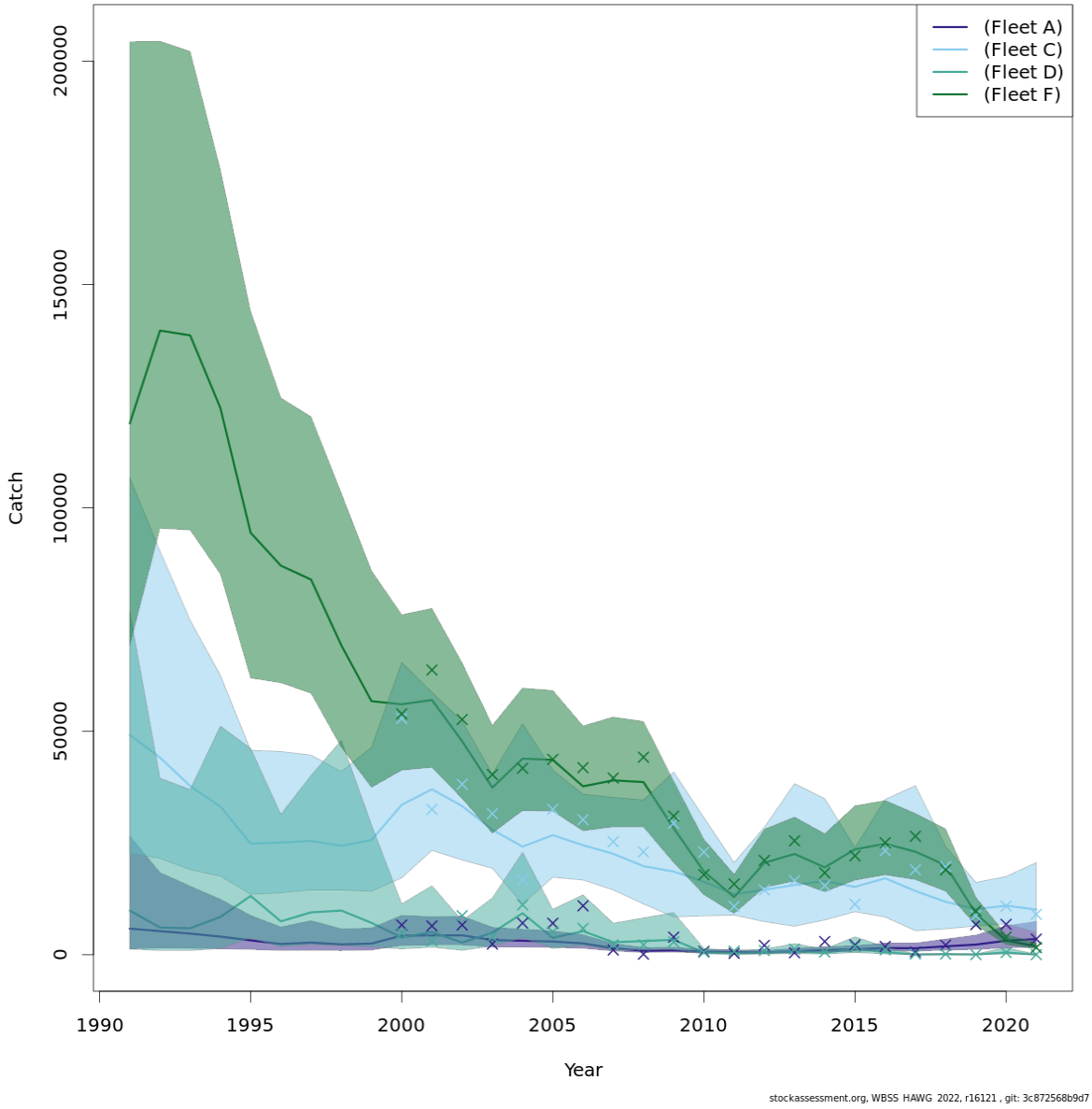


Figure 3.6.4.6 WESTERN BALTIC SPRING SPAWNING HERRING. Total catch in weight (tonnes) by fleet. Prediction from the WBSS multi fleet assessment run and point wise 95% confidence intervals are shown by line and shaded area. The plot also shows the observed total catch weight per fleet (crosses).

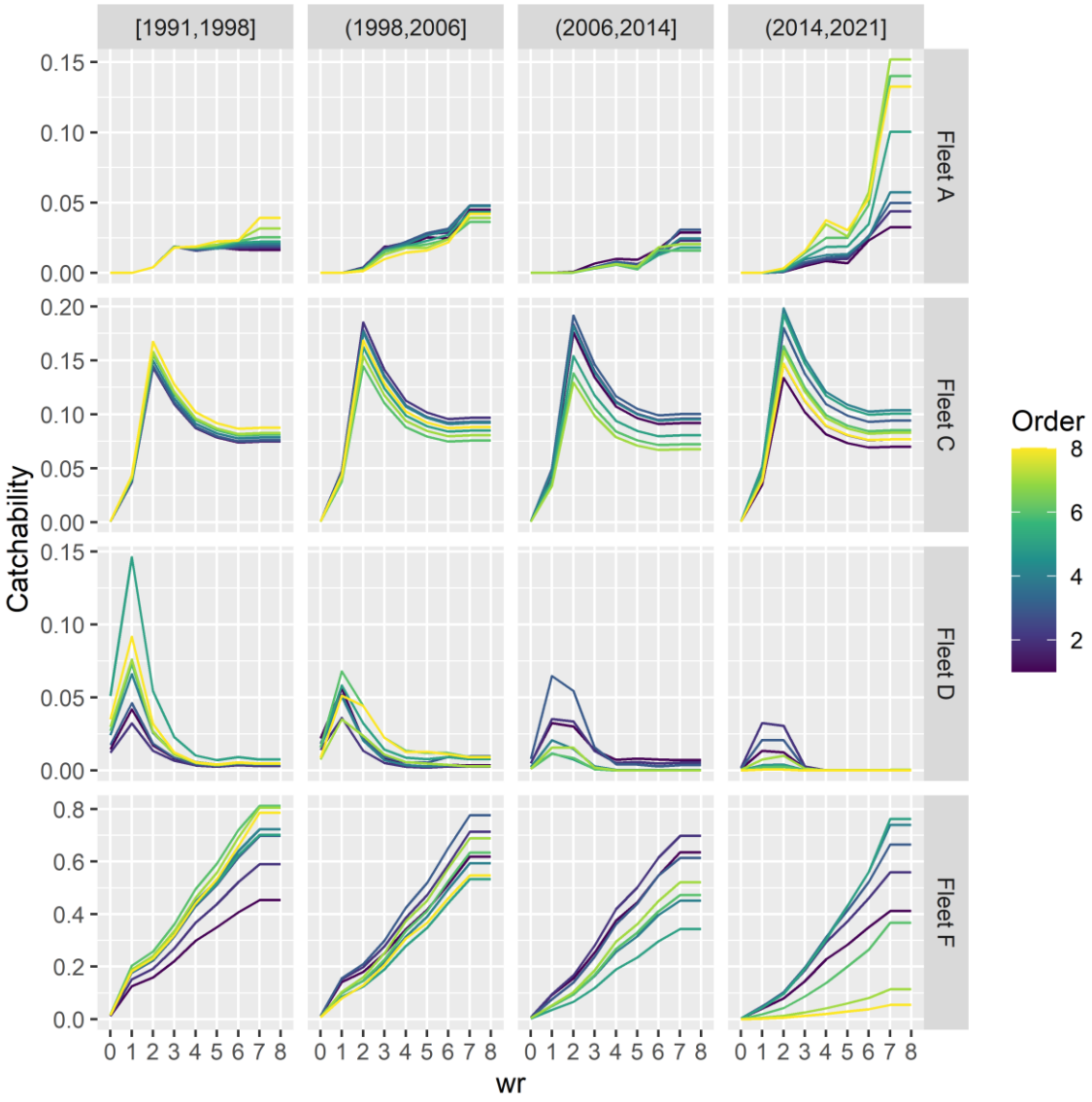


Figure 3.6.4.7 WESTERN BALTIC SPRING SPAWNING HERRING. Estimated selection pattern at age as W-ringers (wr) per fleet and year. Order: 1 equal 1st year in the respective time span.

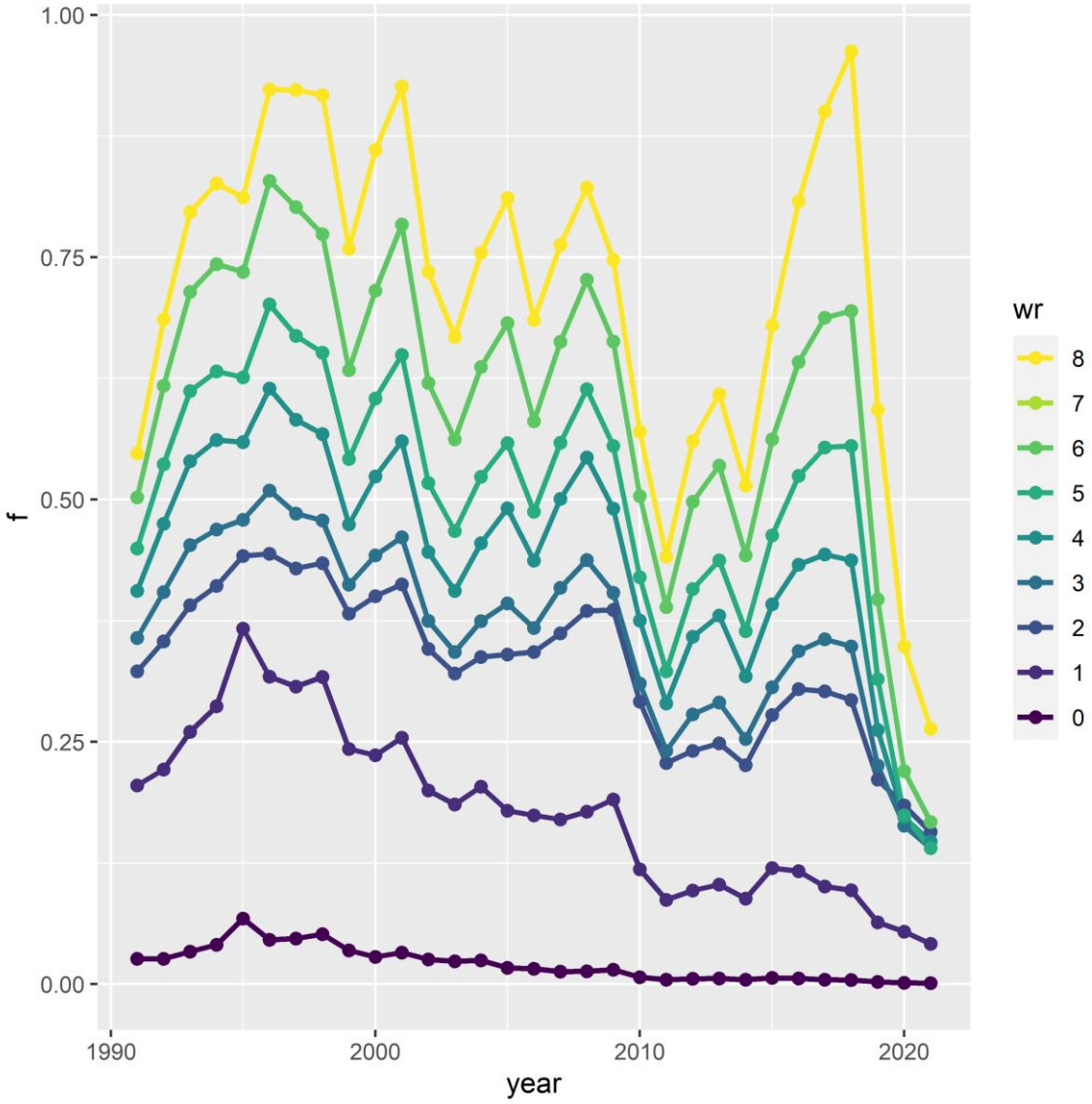


Figure 3.6.4.8 **Western Baltic Spring Spawning Herring. Time-series of estimated fishing mortality-at-age as W-ringers (wr).**

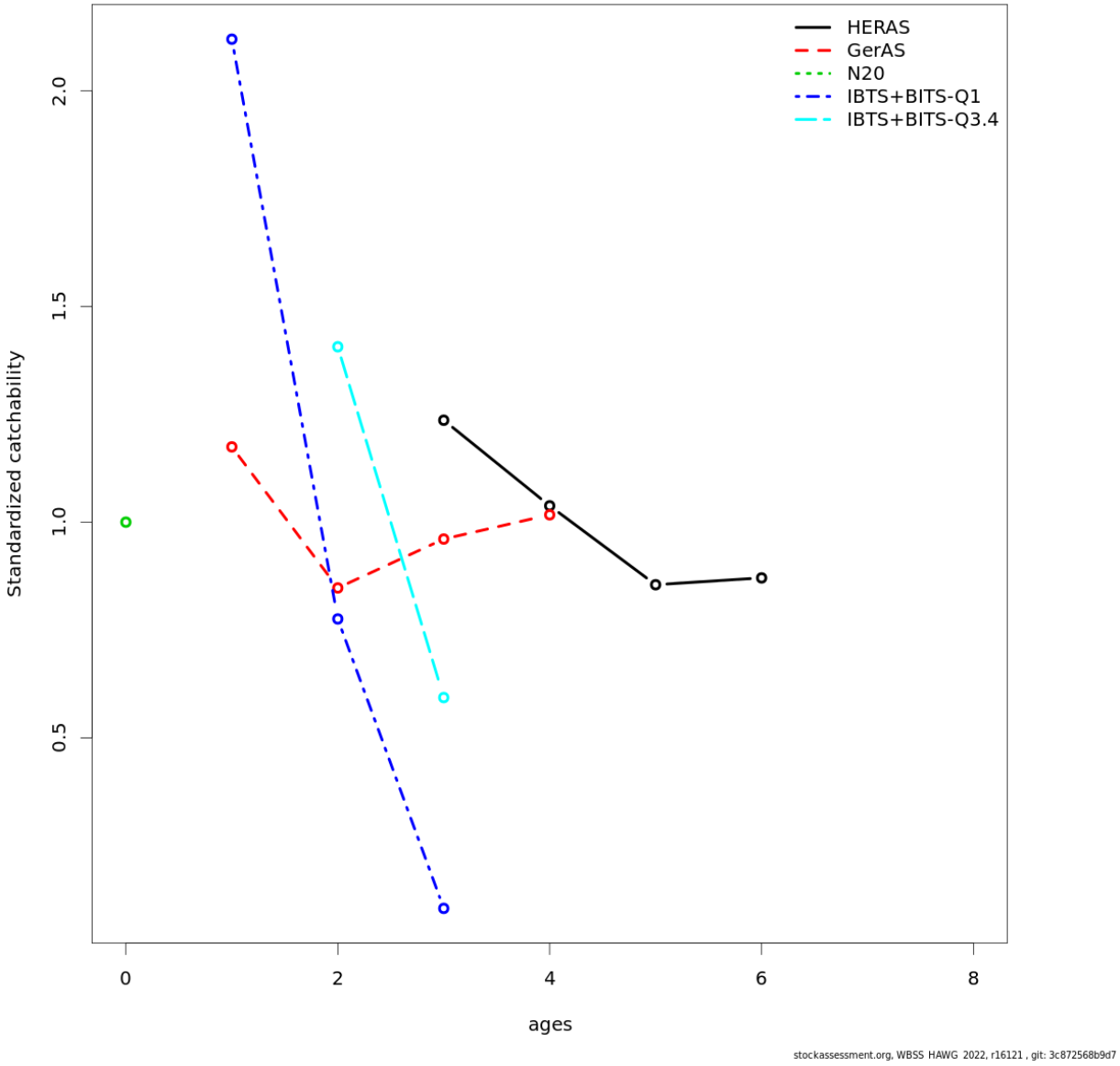


Figure 3.6.4.9 Western Baltic Spring Spawning Herring. Estimated survey catchabilities. N20 only covers age 0 (wr) and therefore only shows one point.

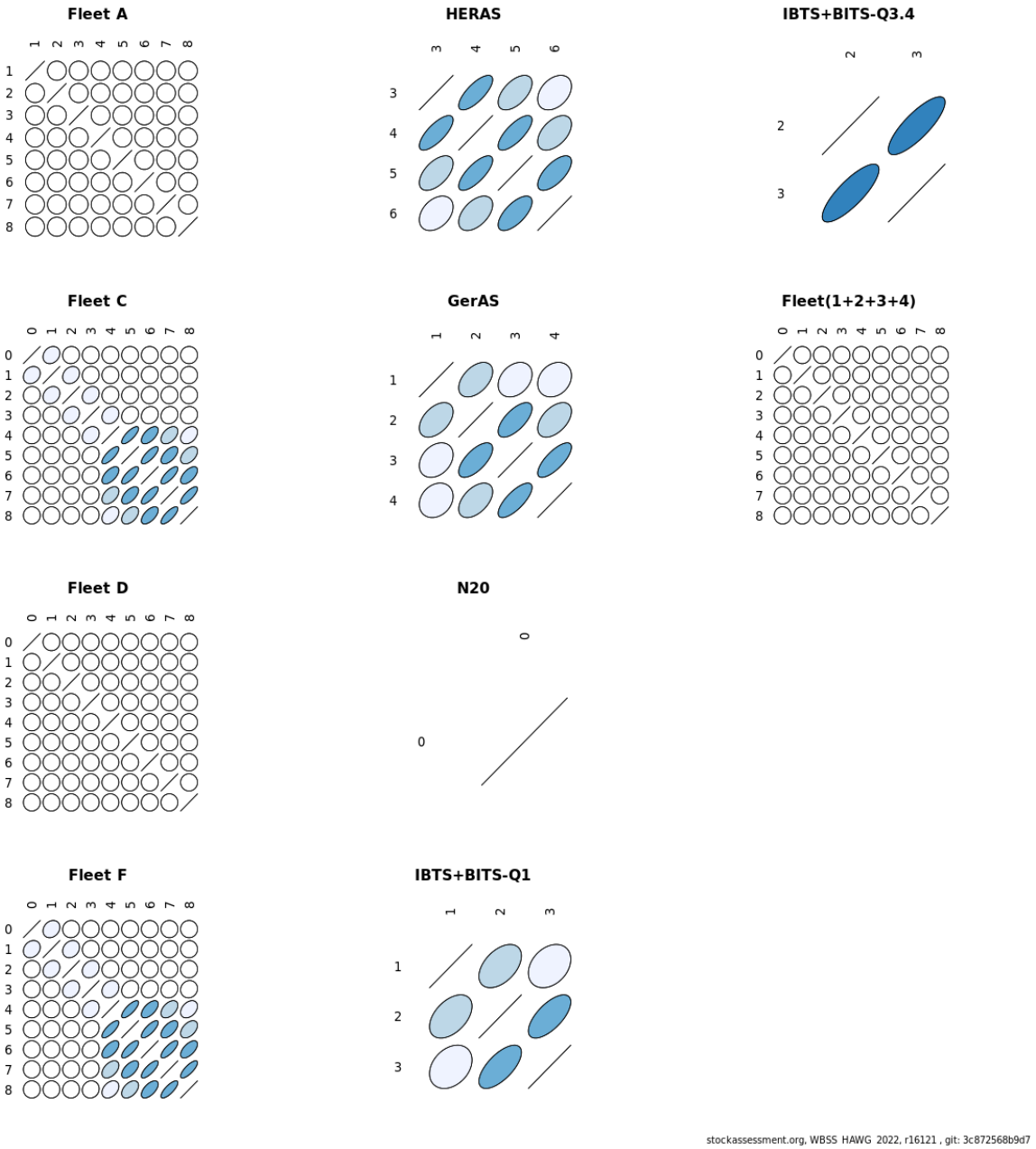


Figure 3.6.4.10 WESTERN BALTIC SPRING SPAWNING HERRING. Estimates correlations between age groups (wr) for each fleet.

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

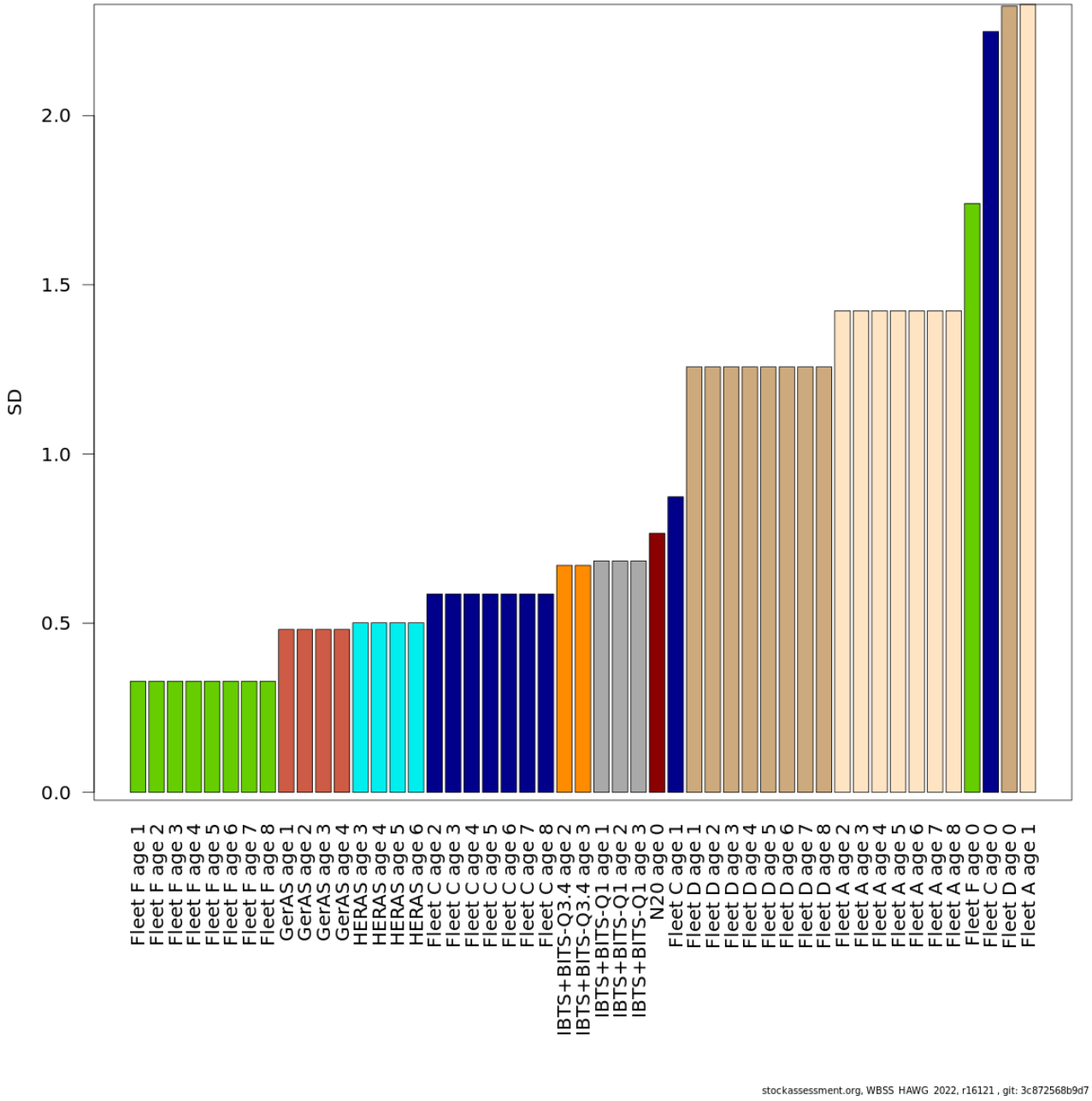


Figure 3.6.4.12 WESTERN BALTIC SPRING SPAWNING HERRING. Estimated observation variance in the WBSS multi fleet assessment run.

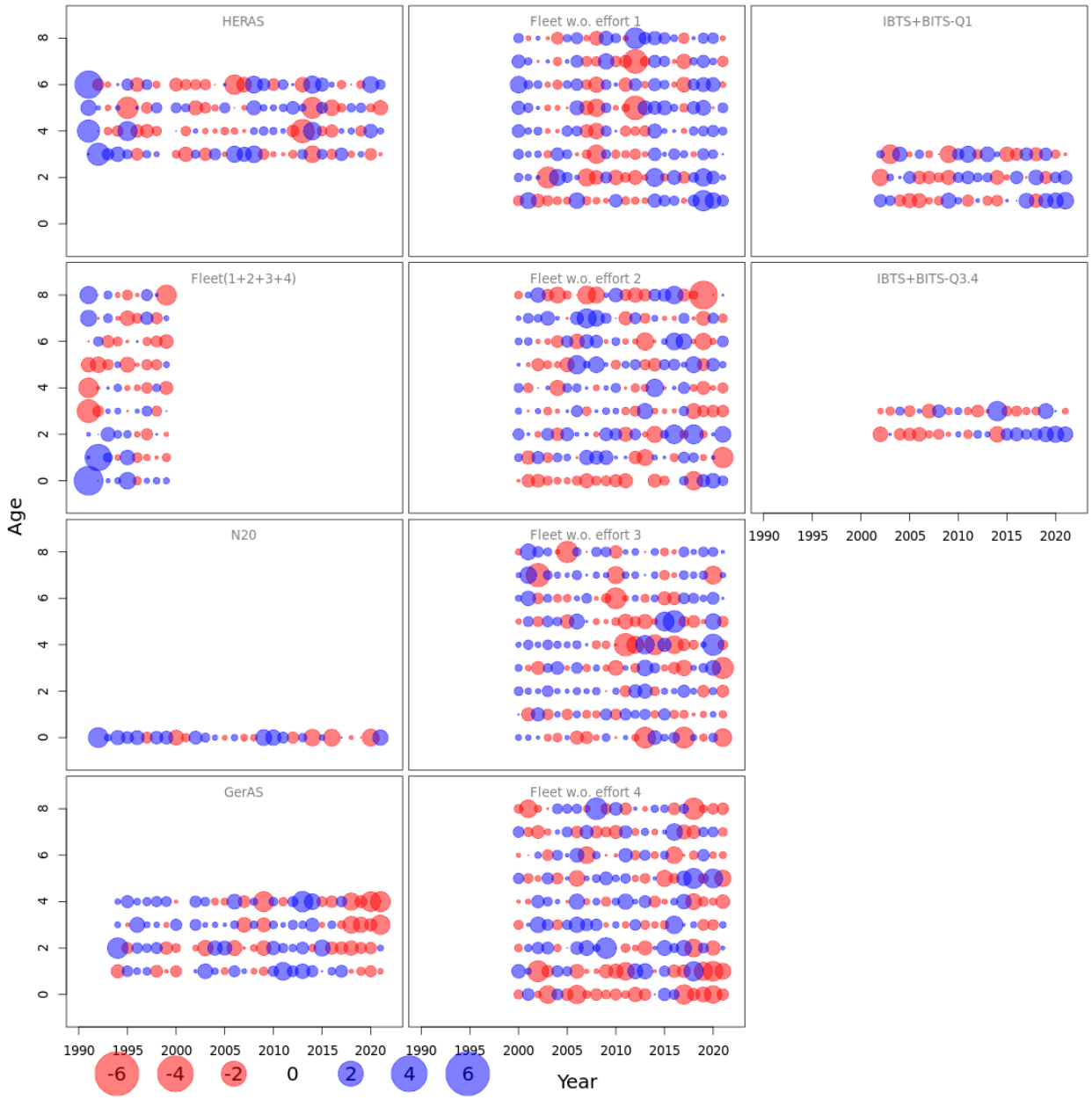


Figure 3.6.4.13 WESTERN BALTIC SPRING SPAWNING HERRING. BUBBLE PLOT. Standardized one-observation-ahead residuals from multi fleet run.

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.

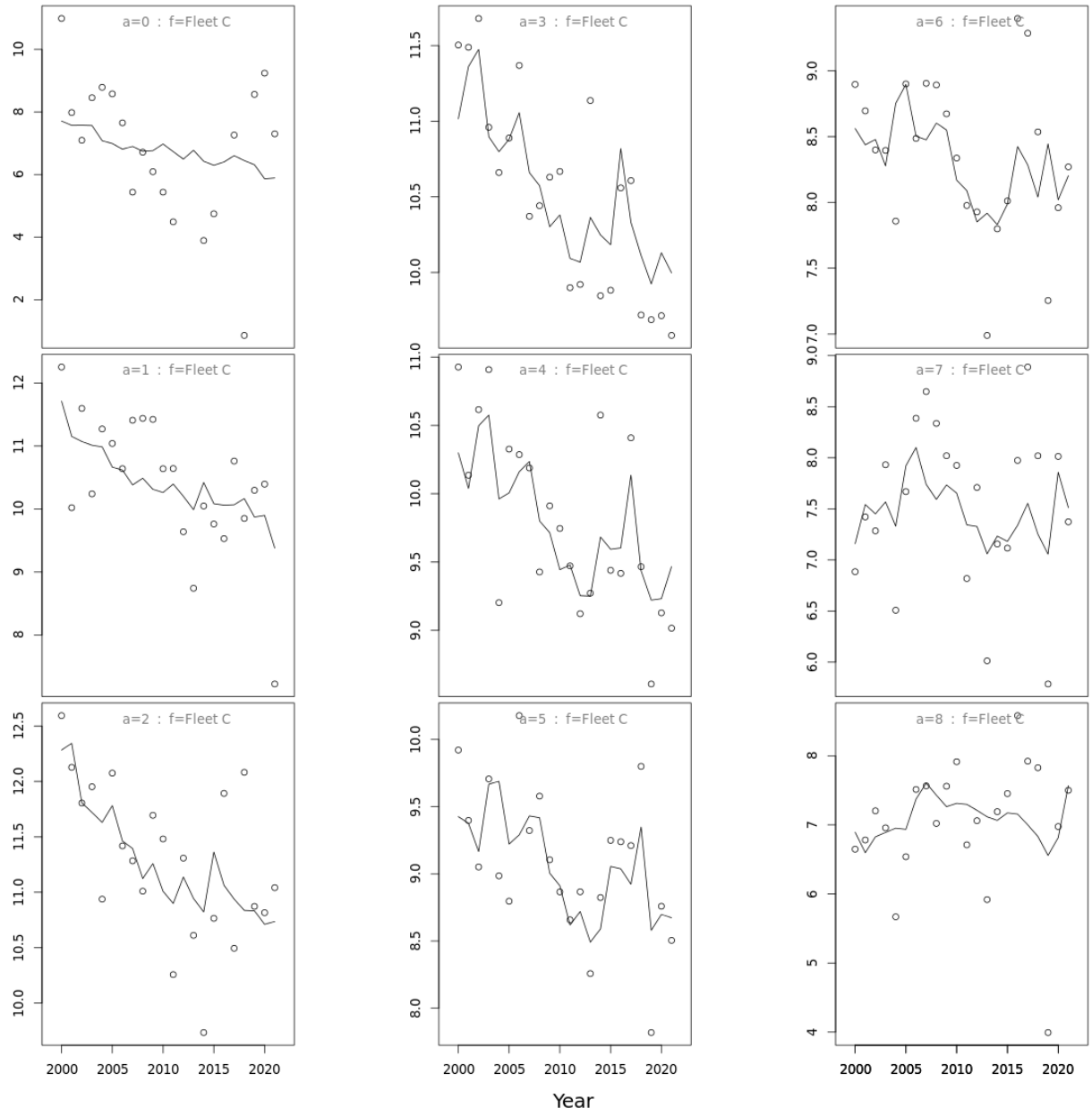


Figure 3.6.4.15 WESTERN BALTIC SPRING SPAWNING HERRING. Diagnostics of commercial catches fit per fleet. Fleet C. Plot of predicted (line) and observed (points) catches (log scale) per W-ringers (a) and year.

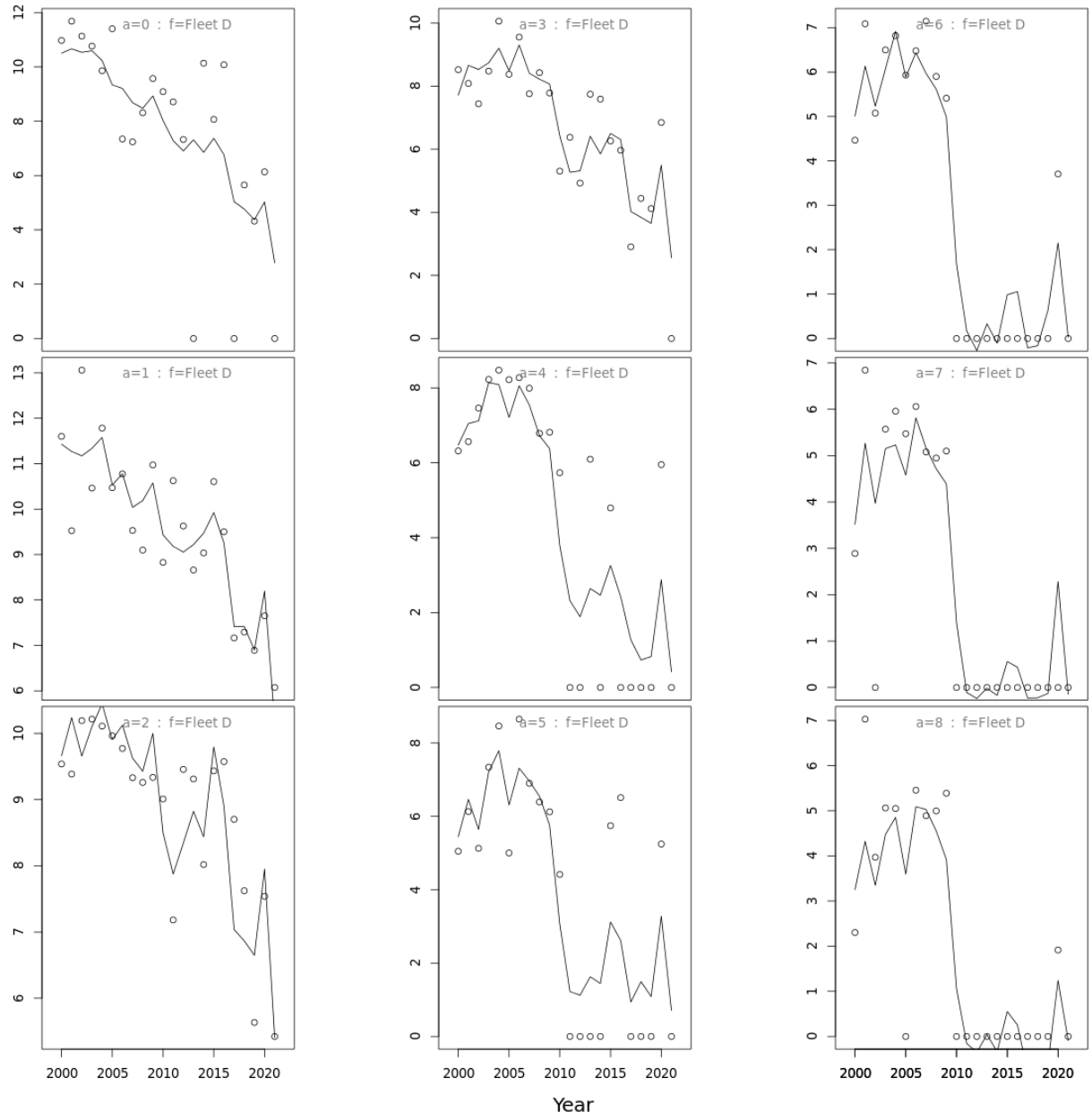


Figure 3.6.4.16 WESTERN BALTIC SPRING SPAWNING HERRING. Diagnostics of commercial catches fit per fleet. Fleet D. Plot of predicted (line) and observed (points) catches (log scale) per W-ringers (a) and year.

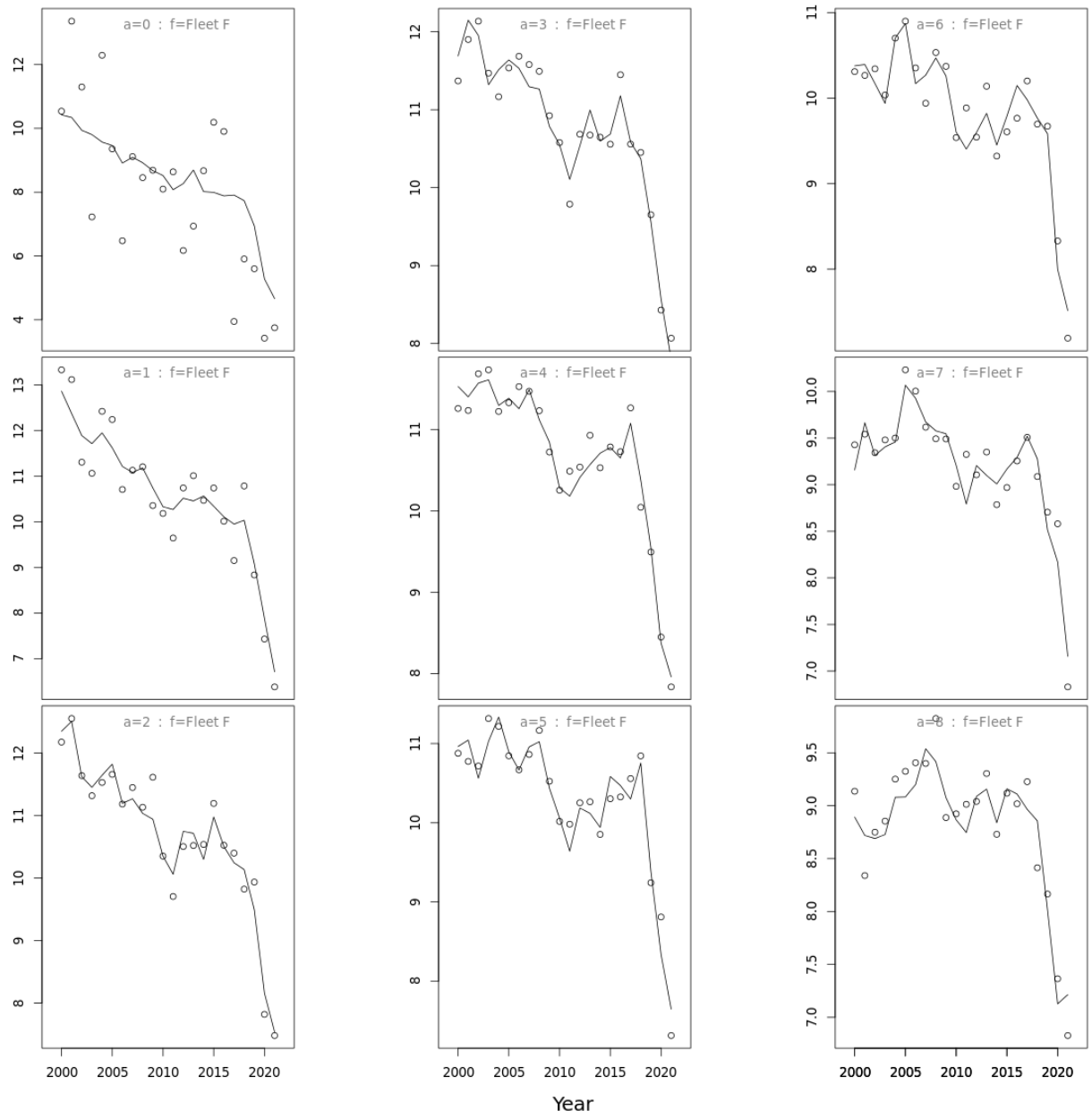


Figure 3.6.4.17 WESTERN BALTIC SPRING SPAWNING HERRING. Diagnostics of commercial catches fit per fleet. Fleet F. Plot of predicted (line) and observed (points) catches (log scale) per W-ringers (a) and year.

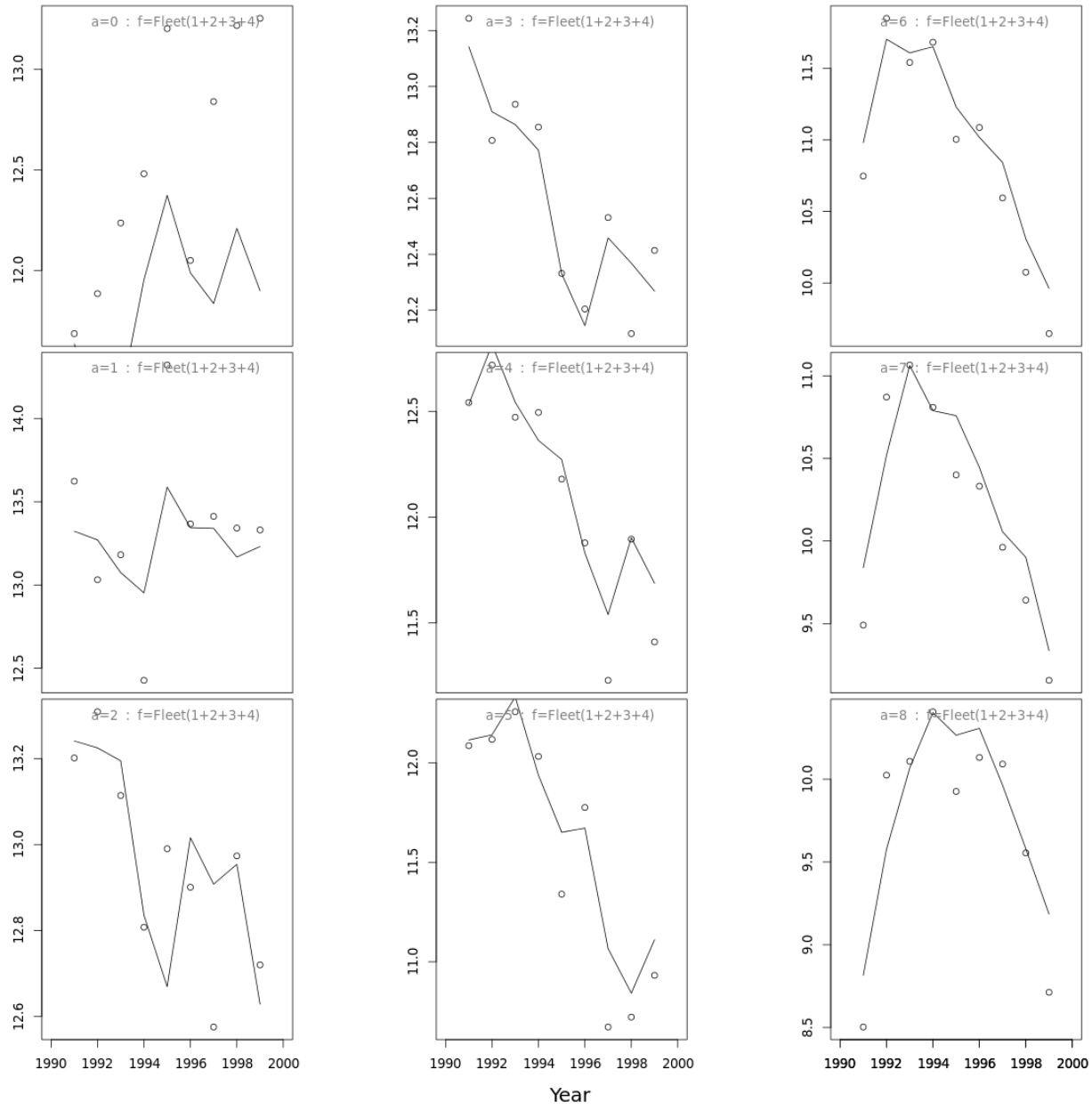


Figure 3.6.4.18 WESTERN BALTIC SPRING SPAWNING HERRING. Diagnostics of commercial catches fit per fleet. sum of fleets Plot of predicted (line) and observed (points) catches (log scale) per W-ringers (a) and year.

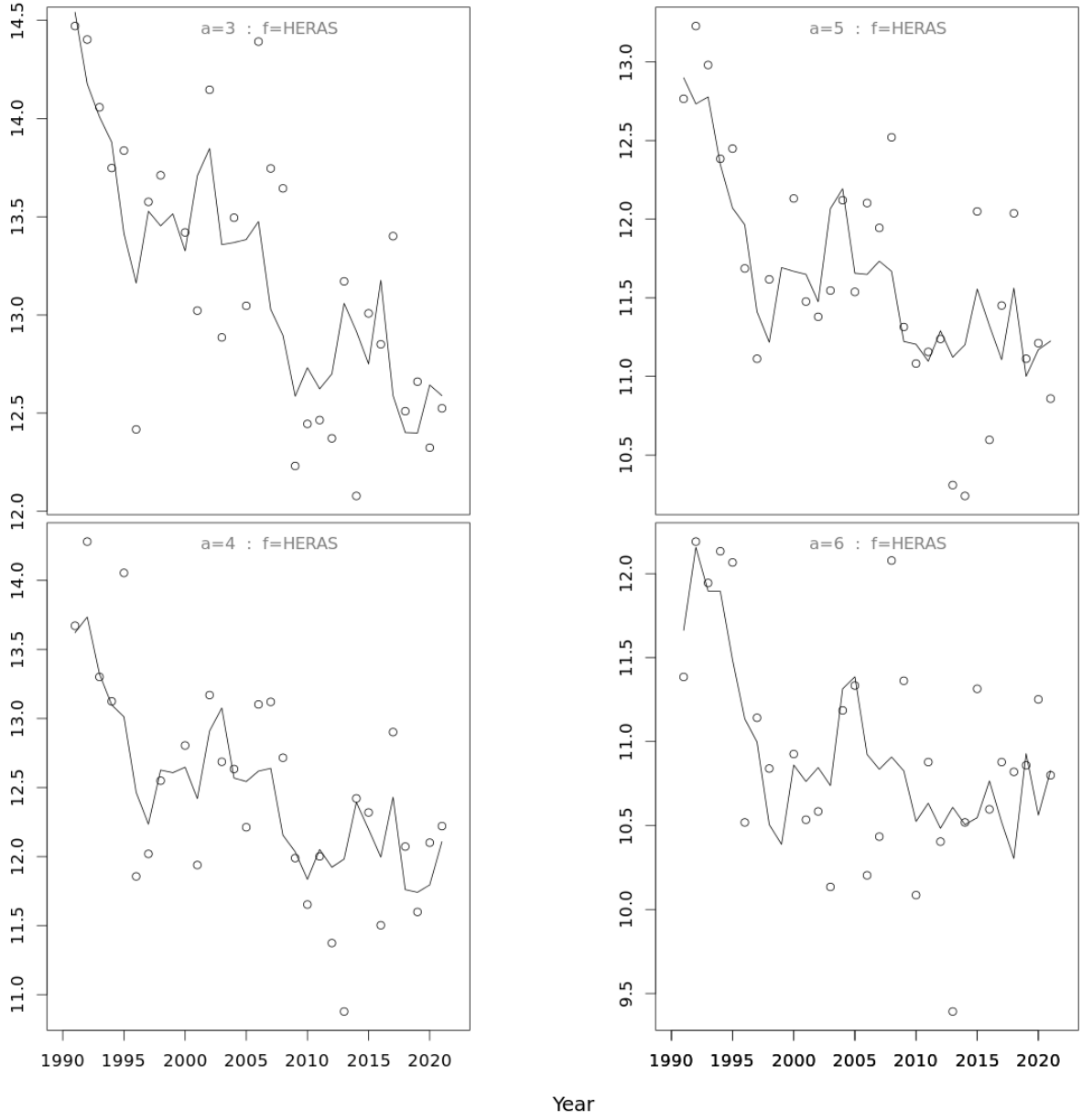


Figure 3.6.4.19 WESTERN BALTIC SPRING SPAWNING HERRING. Diagnostics of the HERAS index. Plot of predicted (line) and observed (points) index (log scale) per W-ringers (a) and year.

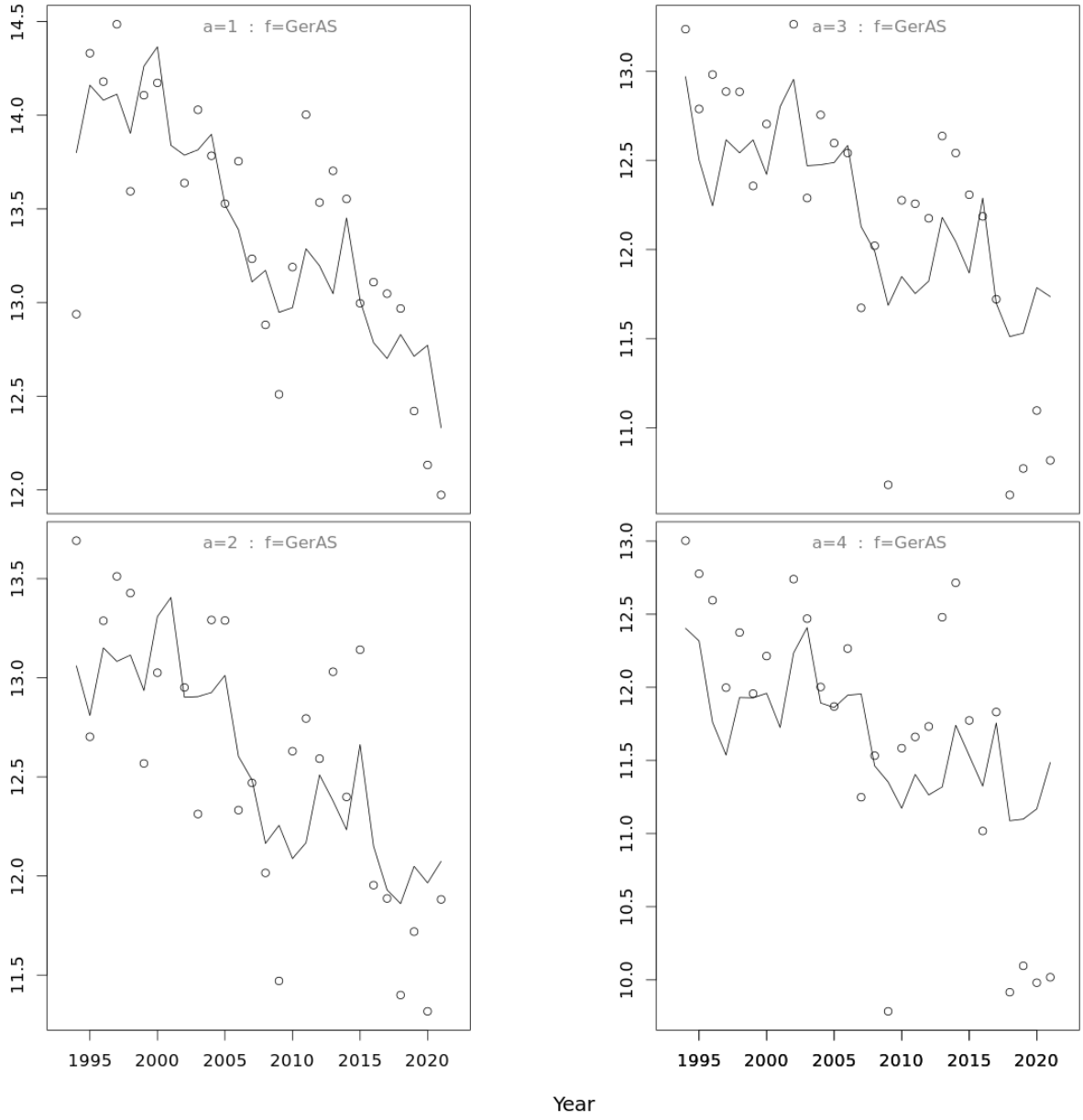


Figure 3.6.4.20 WESTERN BALTIC SPRING SPAWNING HERRING. Diagnostics of the GERAS-index. Plot of predicted (line) and observed (points) index (log scale) per W-ringers (a) and year.

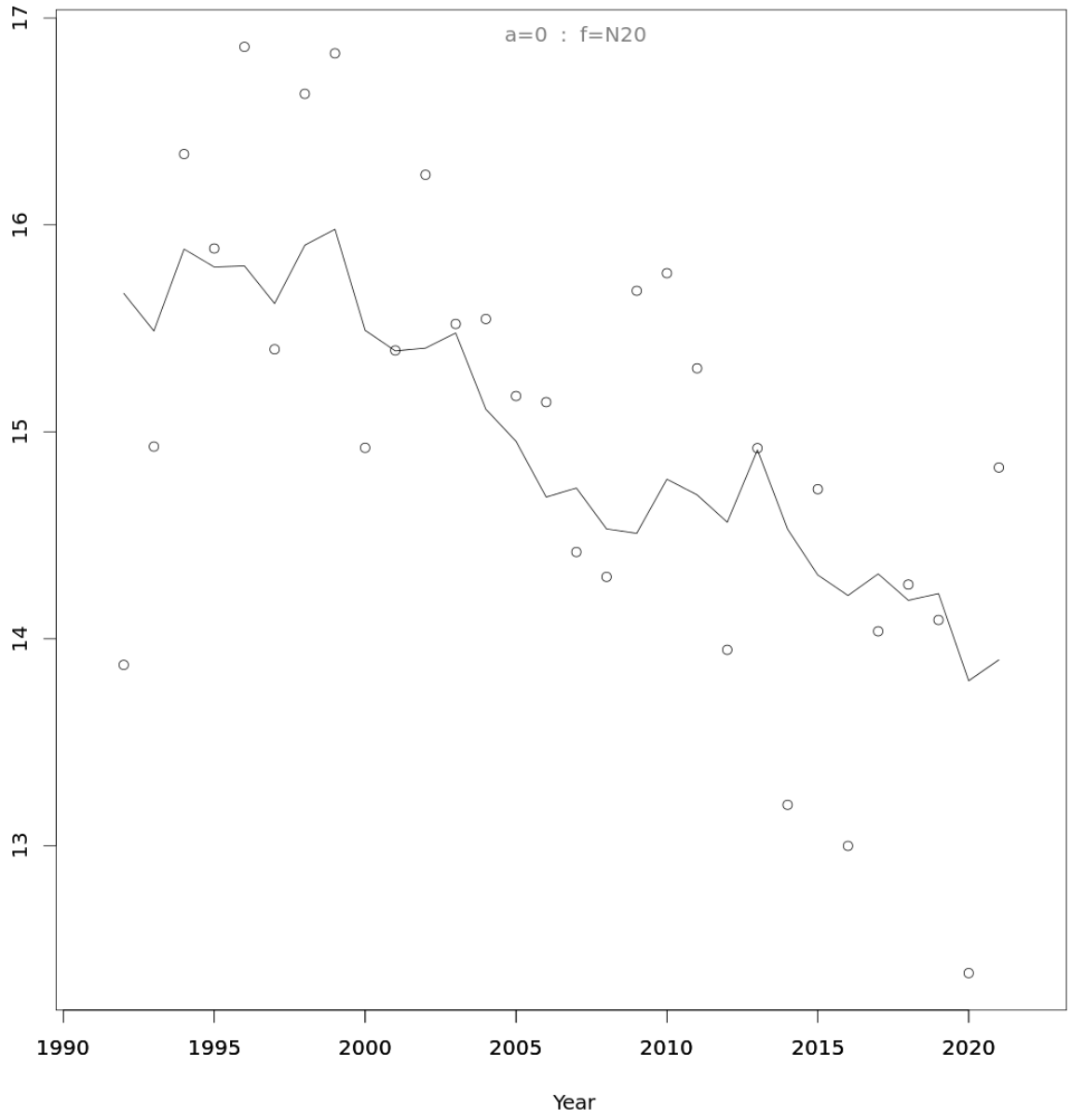


Figure 3.6.4.21 WESTERN BALTIC SPRING SPAWNING HERRING. Diagnostics of the N20 index. Plot of predicted (line) and observed (points) index (log scale) per W-ringers (a) and year.

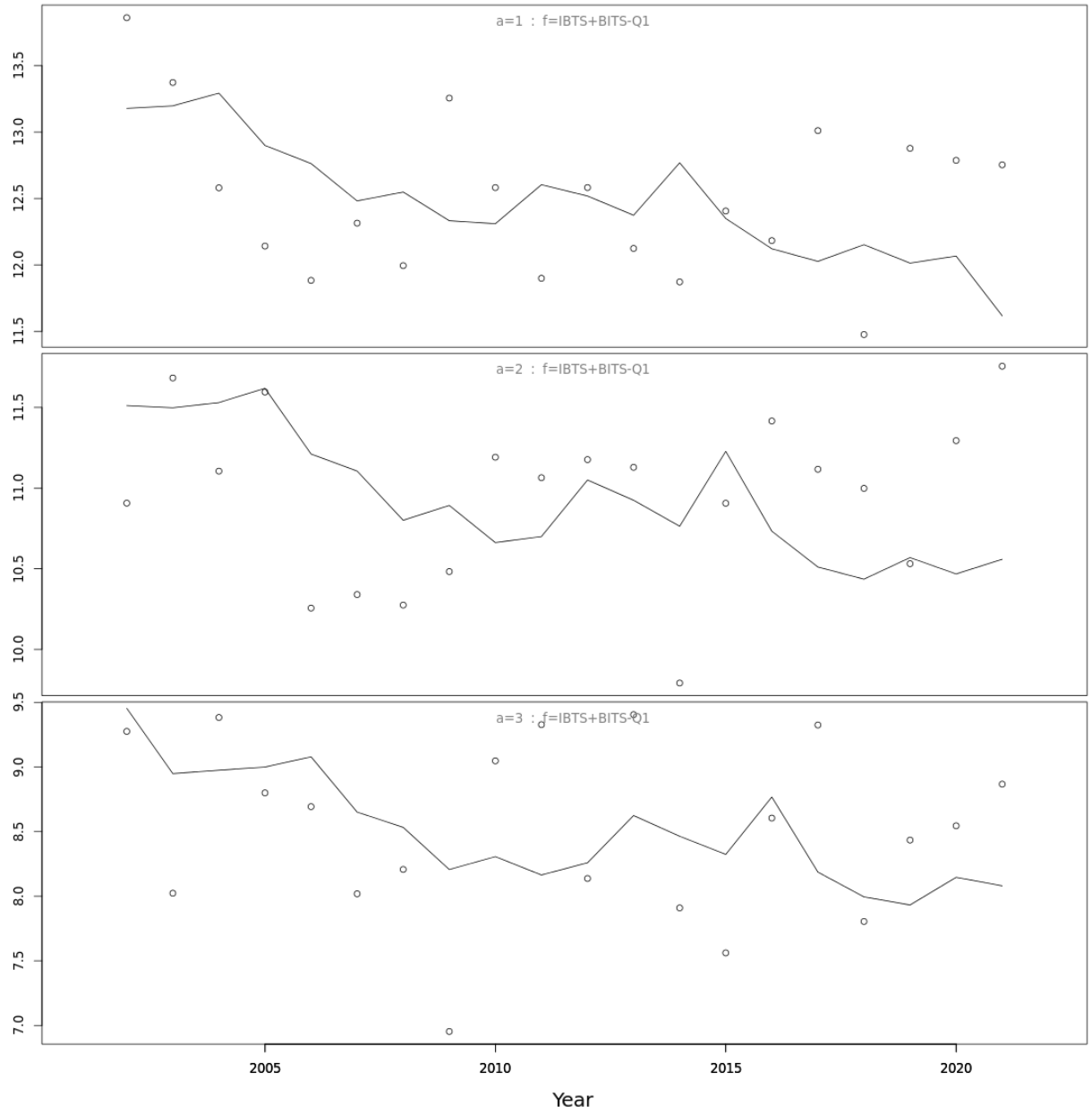


Figure 3.6.4.22 WESTERN BALTIC SPRING SPAWNING HERRING. Diagnostics of the IBTS+BITS-Q1 index. Plot of predicted (line) and observed (points) index (log scale) per W-ringers (a) and year.

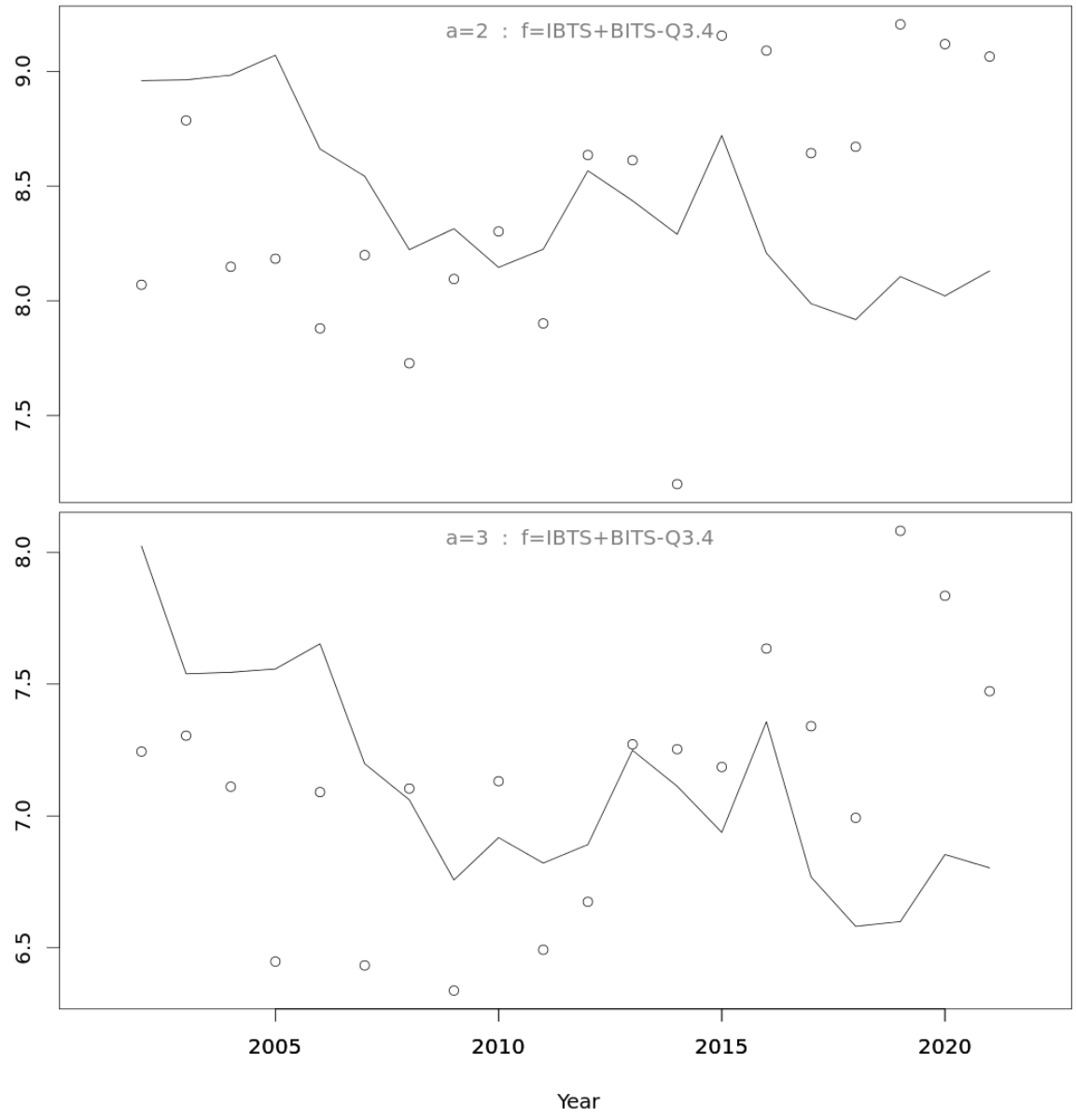


Figure 3.6.4.23 WESTERN BALTIC SPRING SPAWNING HERRING. Diagnostics of the IBTS+BITS-Q3.4 index. Plot of predicted (line) and observed (points) index (log scale) per W-ringers (a) and year.

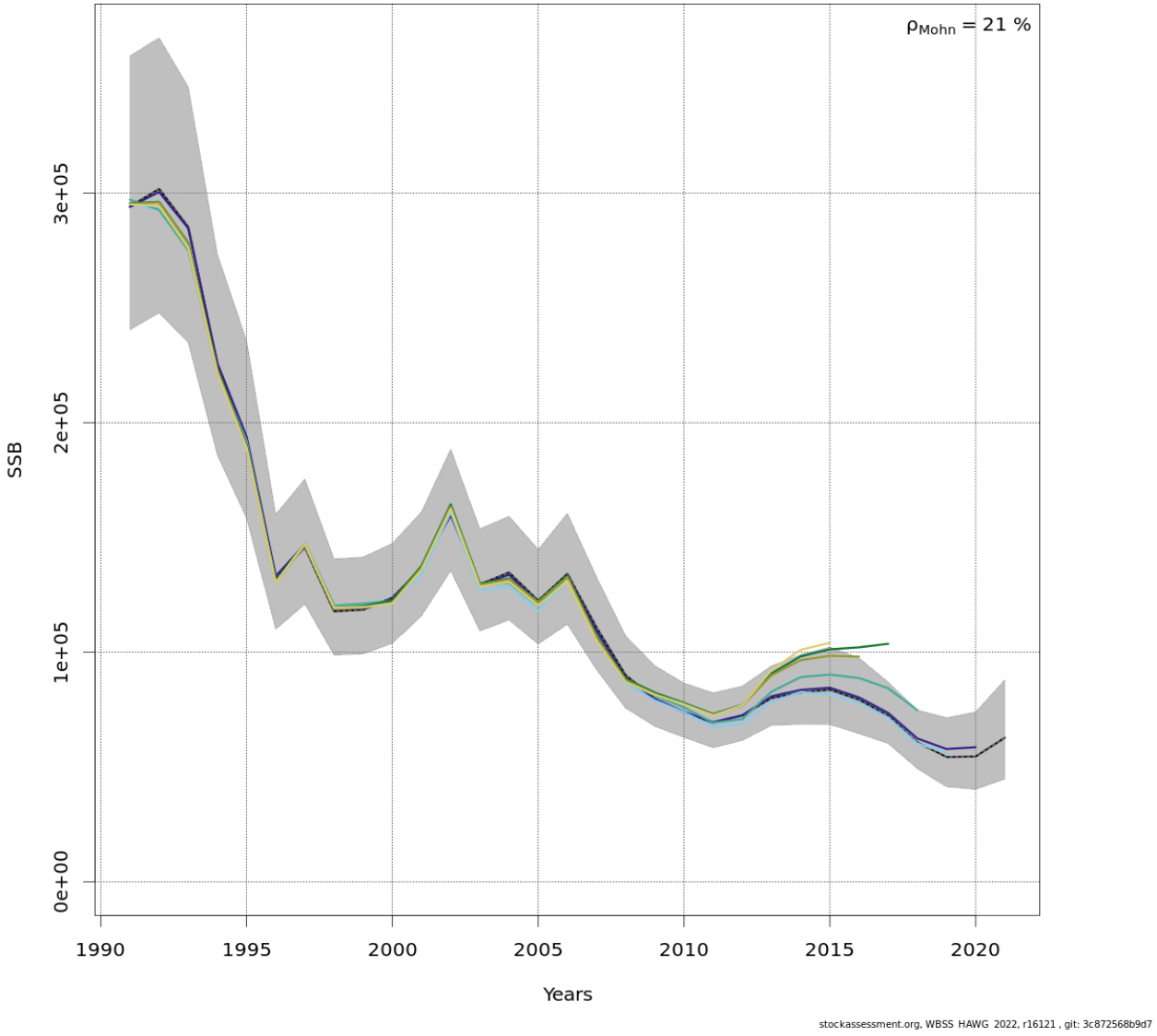


Figure 3.6.4.24 WESTERN BALTIC SPRING SPAWNING HERRING. Analytical retrospective pattern over 5 years from multi fleet run. Spawning stock biomass.

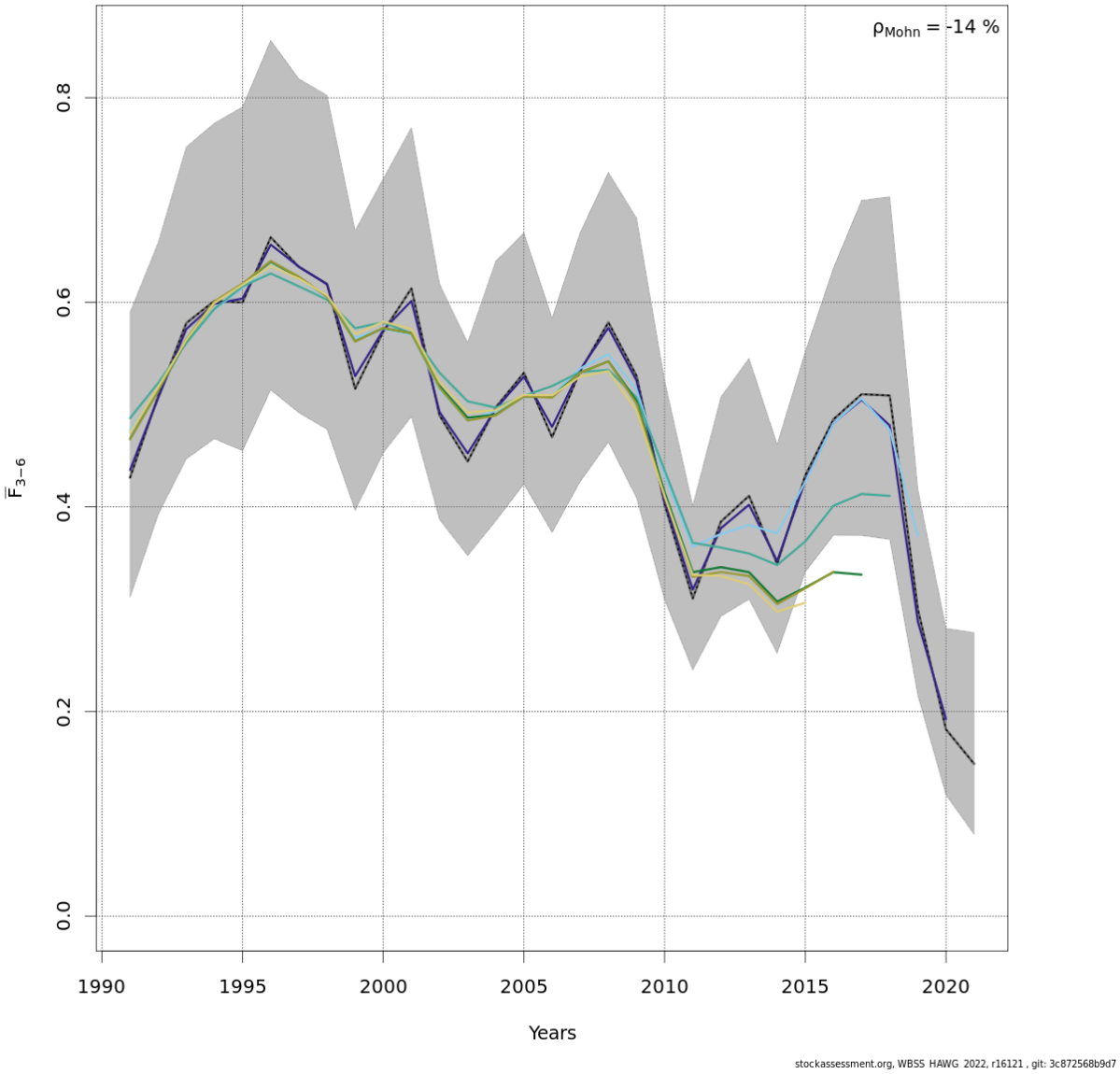


Figure 3.6.4.25 WESTERN BALTIC SPRING SPAWNING HERRING. Analytical retrospective pattern over 5 years from multi fleet run. Average fishing mortality for the shown age range.

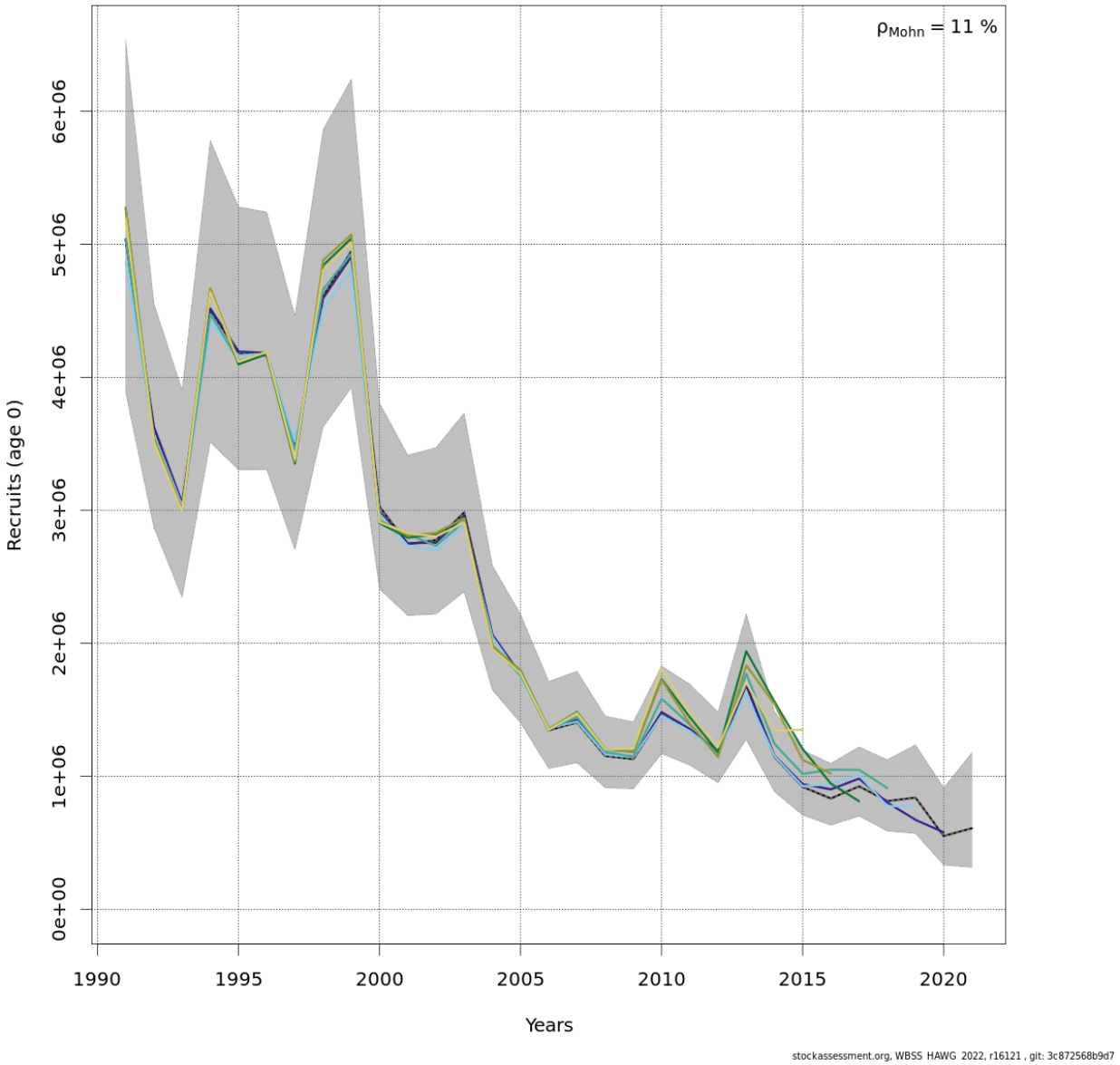


Figure 3.6.4.26 WESTERN BALTIC SPRING SPAWNING HERRING. Analytical retrospective pattern over 5 years from multi fleet run. Recruitment.

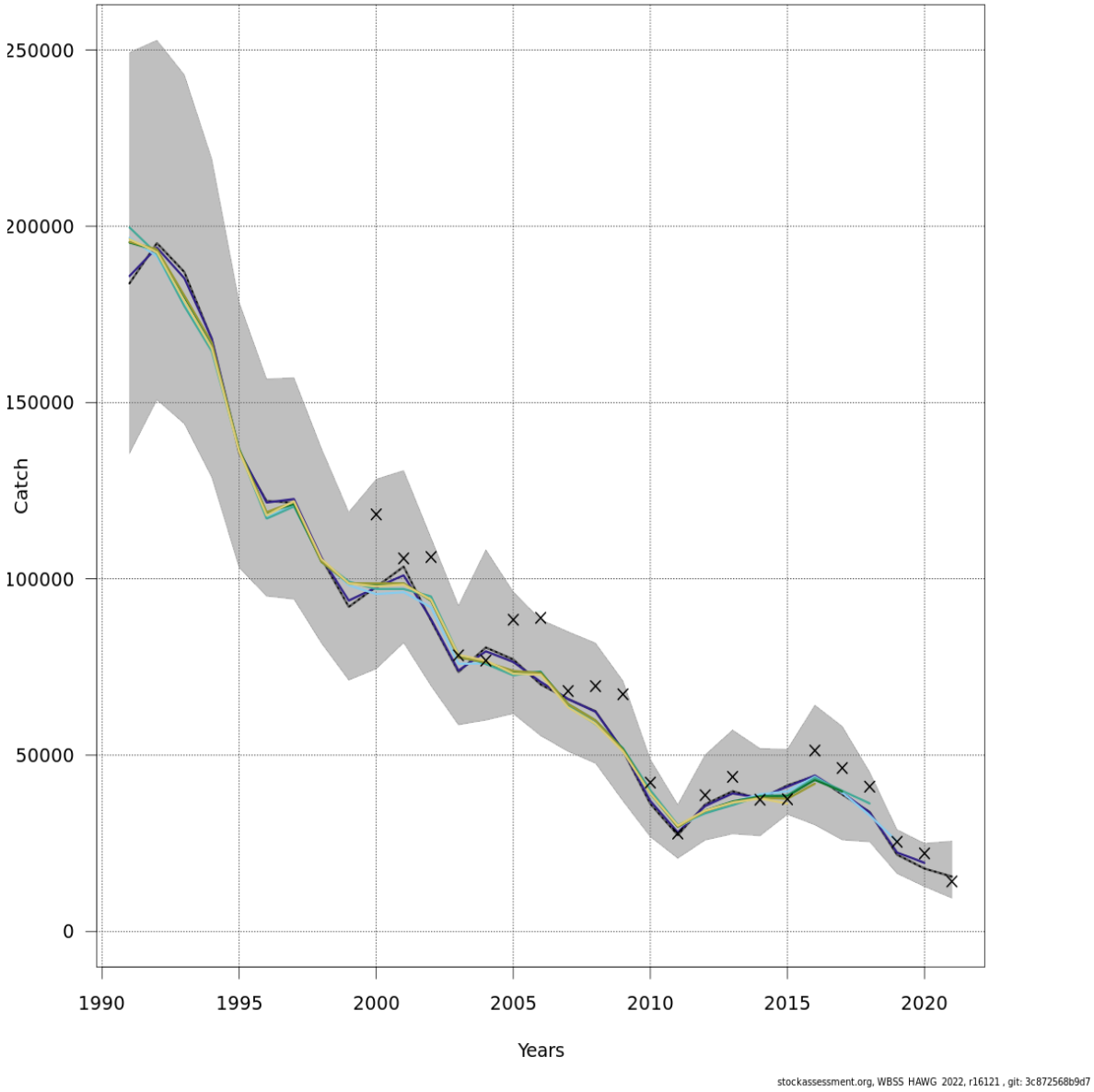


Figure 3.6.4.27 WESTERN BALTIC SPRING SPAWNING HERRING. Analytical retrospective pattern over 5 years from multi fleet run. Catch.

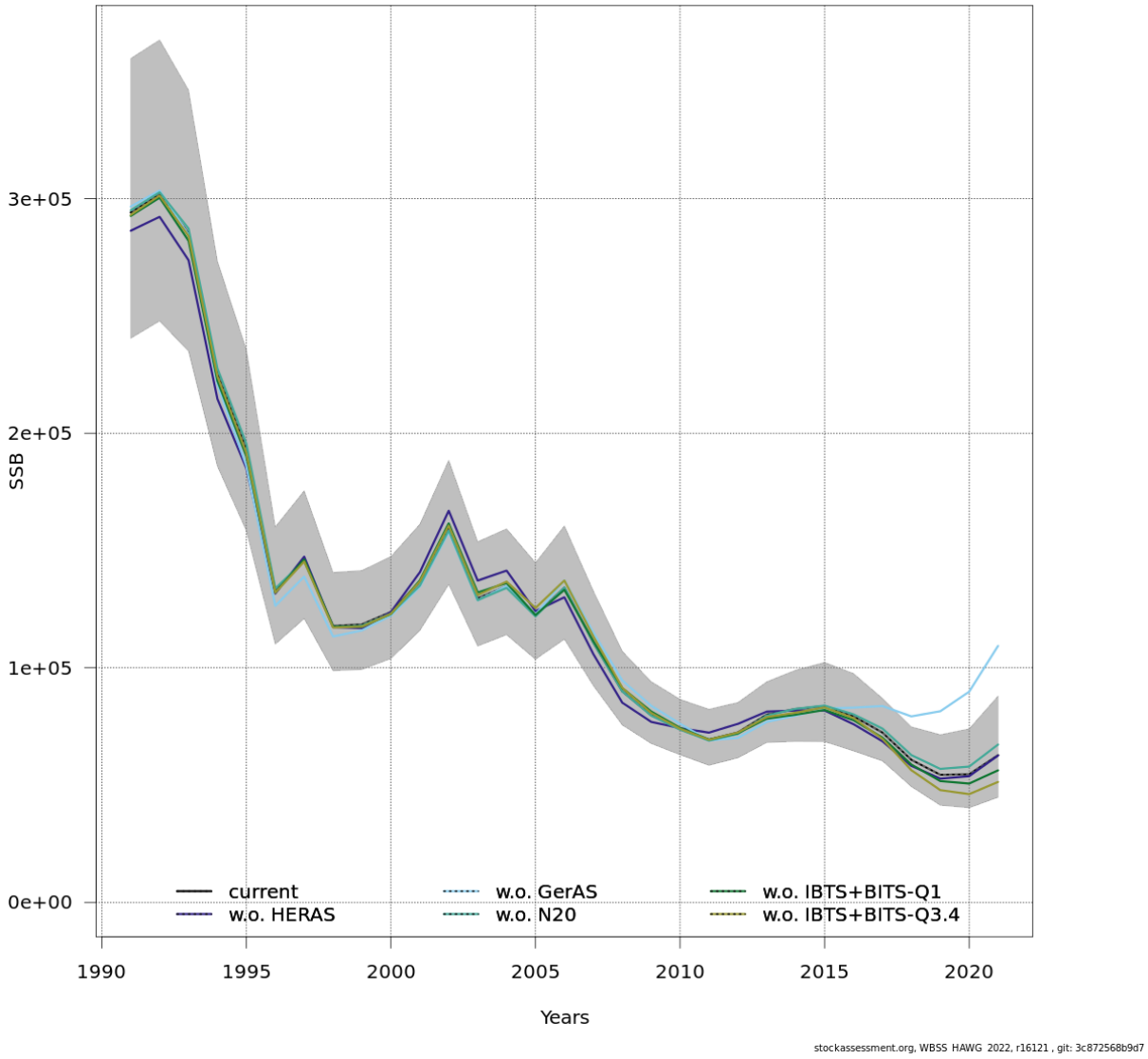


Figure 3.6.4.28 WESTERN BALTIC SPRING SPAWNING HERRING. Leave-one out from multi fleet run. Spawning stock biomass.

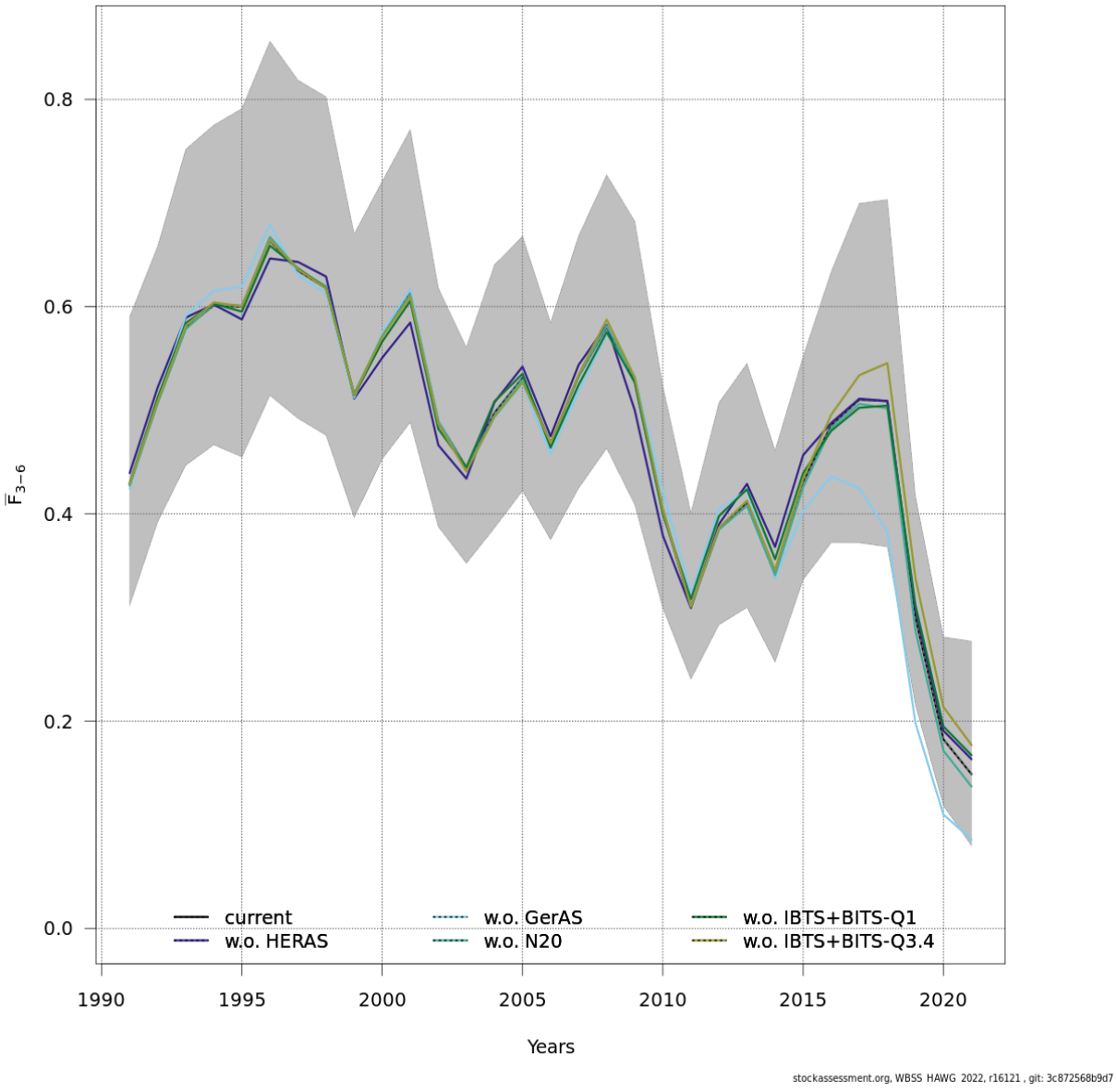


Figure 3.6.4.29 WESTERN BALTIC SPRING SPAWNING HERRING. Leave-one out from multi fleet run. Average fishing mortality for the shown age range.

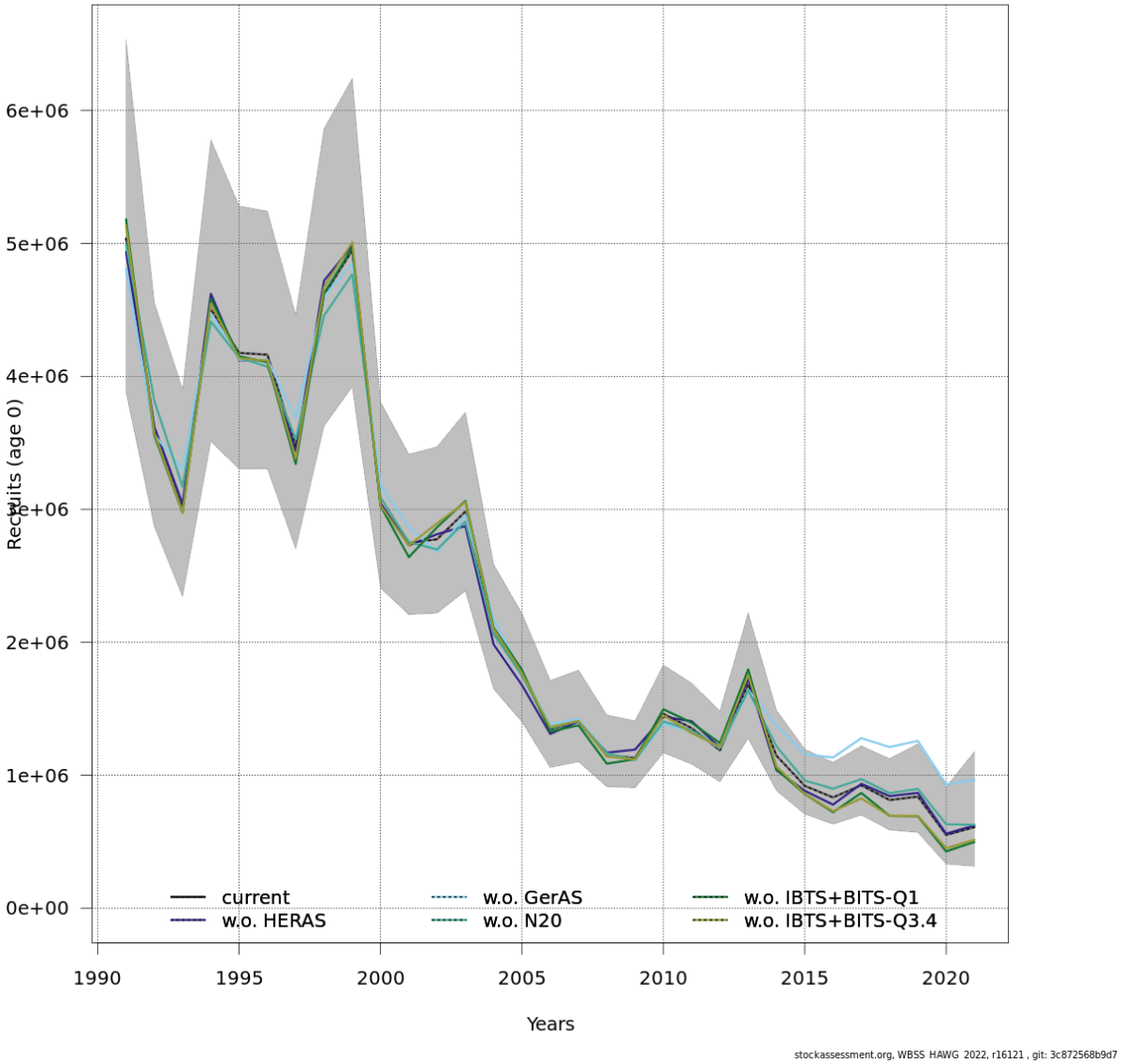


Figure 3.6.4.30 WESTERN BALTIC SPRING SPAWNING HERRING. Leave-one out from multi fleet run. Recruitment.

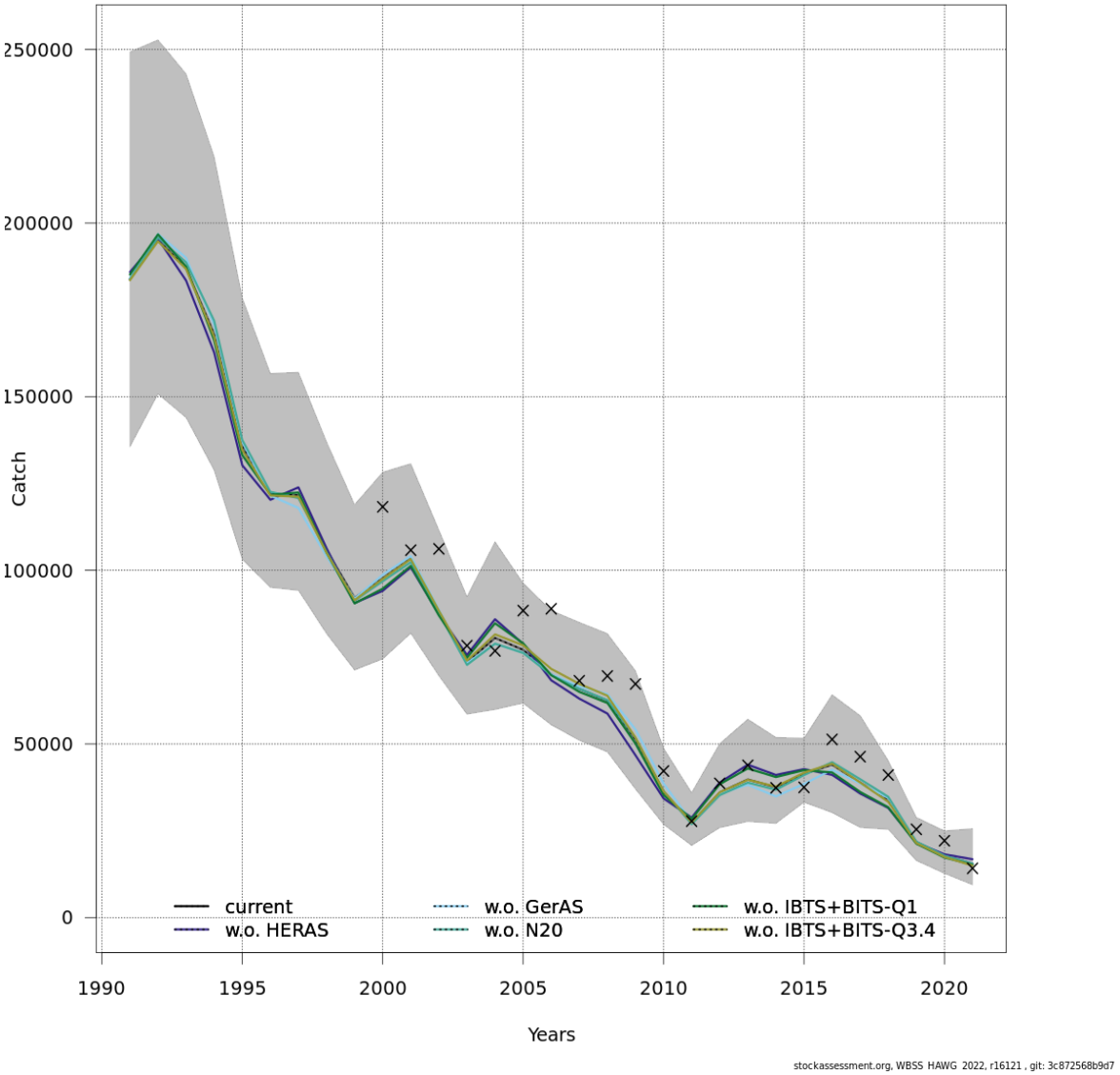


Figure 3.6.4.31 WESTERN BALTIC SPRING SPAWNING HERRING. Leave-one out from multi fleet run. Catch.