5 Herring (*Clupea harengus*) in divisions 6.a (South), 7.b–c, and 6.a (North), separate

5.1 Herring in divisions 6.a (South) and 7.b-c

Since 2015, this stock has been combined with herring in 6.a.N (Section 5.2) for assessment and advisory purposes. This management unit existed since 1982, when it was separated from 6.a.N. Until that time, 7.b–c was also a separate management unit. The stock comprises autumn, winter, and spring-spawning components.

The WG noted that the use of "age", "winter rings", "rings" and "ringers" still causes confusion outside the group (and sometimes even among WG members). The WG tries to avoid this by consequently using "rings", "ringers", "winter ringers" or "wr" instead of "age" throughout this section. However, if the word "age" is used it is qualified in brackets with one of the ring designations. It should be observed that, for autumn and winter spawning stocks, there is a difference of one year between "age" and "rings", which is not the case for spring spawners. Further elaboration on the rationale behind this, specific to Area 6.a.S, 7.b–c autumn, winter and spring spawners, can be found in the Stock Annex. It is the responsibility of any user of age-based data for any of these herring stocks to consult the stock annex and if in doubt consult a relevant member of the Working Group.

5.1.1 The Fishery

5.1.1.1 Advice and management applicable to 2019 and 2020

In 2016 ICES advised TAC of 0 t and that a stock recovery plan be developed for herring stocks in 6.a and 7.b–c stocks (ICES, 2016a). However, in February 2016, the European Commission asked ICES to advise on a TAC of sufficiently small size to allow ongoing collection of fisheries-dependent data. In June 2016, ICES advised on a scientific monitoring TAC of 1360 t for this stock (ICES, 2016b). The EC set a TAC slightly higher than this advice, at 1630 t was established by the EC (EU 2016/0203) for 2016-2019. The TAC for 2020 was reduced in line with the advised value given in 2016 to 1360 t.

Rebuilding plan

A revised proposed rebuilding plan for both 6.a.N and 6.a.S, 7.b–c stocks combined was reviewed by HAWG 2018 (ICES 2018, Annex 9). While the plan was considered to provide a framework for recovery of these combined stocks, it was considered unlikely that the revised proposed plan can aid the recovery of the combined stocks by 2020 as recent poor recruitments hamper a speedy recovery. Furthermore, ICES ACOM considered that further quantitative evaluation would be required to be used as the basis for advice.

5.1.1.2 Catches in 2020

The Working Group estimates of landings from 1991–2020 are given in Table 5.1.2. The catch has declined from 19 000 t in 2006 to 1220 t in 2020.There is a monitoring TAC in place for the combined stocks in 6.a and 7.b–c. In 2020 the majority of the quota taken close inshore. Catches over time are shown in Figure 5.1.1.

In 2020 the majority of the catch was taken in the fourth quarter with subdivision 6.aS accounting for the vast majority of catch (Figure 5.1.9).

5.1.1.3 Regulations and their effects

Within the Irish fishery, the monitoring TAC in 2020 was allocated on a similar basis to 2016-2019. The quota was allocated, to a wide spectrum of small and large vessels. This resulted in more fishing opportunities across the fleet.

5.1.1.4 Changes in fishing pattern

The monitoring TAC, introduced in 2016 and continued in 2020, has led to a change in the pattern of the fishery. In previous years, larger vessels dominated in the fishery and took their quotas often in one haul, in a somewhat opportunistic basis. The monitoring TAC is now allocated to vessels in six different categories from over 24 m down to under 12 m. The Herring fishery in 2020 opened on 2 November and was concentrated in 6.a.S, primarily in two statistical rectangles. This was similar to the 2019 fishery. In 2020 there was a fishery in January and February to allow for additional data collection. Information provided by the Irish industry reported very good marks of herring in all the bays around the Donegal coast in quarter 1 2020. Similar reports are available for Lough Foyle, Lough Swilly and all areas of Donegal Bay such as Inver Bay and the approaches to Killybegs.

5.1.2 Biological composition of the catch

5.1.2.1 Catch-at-age

Catch-at-age data for this fishery are shown in Table 5.1.3 and Figure 5.1.2 and in percentage terms since 1994 in Table 5.1.4. In 2020, the fishery was dominated by 1- 5-ringers accounting for 90% of the catch (Table 5.1.4). Smaller proportions of 6-9 ringers are evident in the catch data and account for 10% of the total. 2 ringers are the dominant age class 45% followed 3 ringers (24%), 4 (15%), 5 (5%). 2019 was the first year since 2012 that 1 ringers are well represented in the catch-at-age data. These have followed through as 2 ringers in 2020.

The proportion-at-age in the catches from the fishery are similar to the catches from the MSHAS for most years. In 2020 the proportions of 1 ringers was higher in the acoustic survey than the catch while in 2019 a higher proportion of 1 ringers were found in the catch (Figure 5.1.4).

5.1.2.2 Quality of the catch and biological data

The 6.a.S/7.b–c stock is well sampled, there have been sufficient samples to achieve the precision level sought by the ICES advice on the monitoring fishery since 2016. The numbers of samples and the associated biological data collected by Ireland are shown in Table 5.1.7.

5.1.3 Fishery-independent Information

5.1.3.1 Acoustic Surveys

The Irish Marine Institute conducted acoustic surveys in 6.a.S and 7.b–c on the west and north-west coasts of Ireland between 1994 and 2007 at various times of the year. An acoustic survey has been carried out in Division 6.a.N in June–July since 1991 by Marine Scotland Science. It originally covered an area bounded by the 200 m depth contour and 4°W in the north and west and extended south to 56°N, it had provided an age-disaggregated index of abundance as the sole tuning index for the analytical assessment of 6.a.N herring since 2002 (ICES, 2015b). In 2008, it was decided that these surveys should be expanded into a larger coordinated summer survey on recommendation from WESTHER, HAWG and SGHERWAY (Hatfield *et al.*, 2007; ICES, 2007; ICES, 2010a). The Scottish 6.a.N survey was augmented with the participation of the Irish Marine Institute and the area was expanded to cover all of ICES divisions 6.a and 7.b. The Malin Shelf Herring Acoustic Survey (MSHAS), as it is now known, has covered this increased geographical

area in the period 2008 to 2020 as well as maintaining coverage of the original survey area in 6.a.N.

5.1.3.2 6As/7b Industry acoustic survey in 2020

The 6aS/7b survey design changed in 2020 compared with previous years in that only 6 core areas with prior knowledge of herring distribution from the monitoring fishery were targeted for surveying. This was largely based on the results from ICES WKHASS (ICES 2020) and from lessons learned in the previous surveys in this area from 2016-2019. This design resulted in a much reduced survey area compared to previous years, but with better coverage of most of the important inshore bays where the monitoring fishery takes place. The survey design objective remained the same; to capture the distribution of winter spawning herring in the 6aS/7b area. The timing of surveys in the core areas was flexible from the outset by design. It was decided that greater flexibility would allow for a targeted spatial and temporal approach which avoided the inevitable poor weather that can happen in this area during this time of the year and which lead to reduced survey effort in 2019, but also to some extent in 2017 and 2018. Using smaller vessels allowed surveys to be conducted in shallow inshore areas where herring are known to inhabit during this time of the year. In 6aS/7b herring were distributed similar to the surveys in 2016-2019. Herring were again found in shallow areas close inshore with the overall distribution dominated by aggregations of herring in a few discrete areas. The 2- and 3-wr age class of herring accounted for 54% of the overall numbers in 2020. All of the 6 designated core areas were surveyed, all areas important to the monitoring fishery. Total biomass estimates of herring recorded during the survey in 6aS/7b was 45 046 t. The inshore distribution of herring generally makes containment of the stock difficult in this area, however, the improved survey design, particularly in Lough Foyle and Lough Swilly resulted in a much lower measure of uncertainty (CV), compared to previous years. The CV on the estimates of abundance and biomass was within expected values for an acoustic survey and has benefitted from the change of survey design used. The flexible survey design and focusing on discreet areas was generally successful and should provide a template for future survey designs.

5.1.4 Mean weights-at-age and maturity-at-age

5.1.4.1 Mean Weights-at-Age

The mean weights-at-age (kg) in the catches in 2020 are presented in Figure 5.1.7. In recent years there was a decrease in mean weights relative to the late 1990s. Over the longer time-series there is little trend over time, but they have dropped for all age classes in 2020 relative to 2019.

The mean weights in the stock at spawning time have been calculated from samples taken during the main spawning period that extends from October to February (Figure 5.1.8). The mean weights in the stock have dropped in 2020 relative to 2019 for all ages.

5.1.4.2 Maturity Ogive

One ringers are considered to be immature. All older ages are assumed to be 100% mature.

5.1.5 Recruitment

There is little information on terminal year recruitment in the catch-at-age data and there are as yet no recruitment indices from the surveys. Numbers of 1-ringers in the catches vary widely but, with the exception of 2012 (2010 cohort), have been consistently low. In 2019, however 1 ringers represented a significant proportion (15%) of the catch-at-age. In 2020 the number of 1-ringers in the catch was lower than 2019 but higher than 2013-2018. Since the mid-1990s recruitment has been low, based on exploratory assessments.

5.1.5.1 Stock Assessment of 6.a (South) and 7.b–c

The ICES, WKWEST 2015 benchmark workshop (ICES, 2015) for the herring stocks in 6.a.N, 6.a.S and 7.b–c concluded that the assessment would be a combined stock assessment. Details of the combined assessment for all of 6.a and 7.b–c are outlined in Section 4 of this report. No separate assessment for herring in 6a (South) and 7.b-c is presented in 2021.

5.1.5.2 State of the stock

Not analytically determined.

5.1.6 Short-term projections

Not undertaken.

5.1.7 Medium-term simulations

Not undertaken.

5.1.8 Long-term simulations

Not undertaken.

5.1.9 Precautionary and yield based reference points

Not determined.

5.1.10 Quality of the assessment

Not ascertained.

5.1.11 Management considerations

There is no new information to alter the previous perception that this stock.

Fishing mortality has been kept low to allow rebuilding. The monitoring TAC should be maintained allowing sampling to continue.

The combined assessment (6.a, 7b,c) shows SSB and recruitment at very low levels. F has reduced since the introduction of the monitoring TAC in 2016. The working group advocates maintaining separate management of each component.

The population structure of herring stocks in 6.a/7bc was examined in an EASME funded project using genetics, body morphometric and otolith shape techniques. This project was completed late 2020 and the final report published in April 2021 (Farrell *et al.*, 2021). The genetic assignments developed during this project will be used as the basis for splitting survey indices into the different populations. This results of this will be presented at the benchmark data meeting late 2021.

5.1.12 Environment

5.1.12.1 Ecosystem considerations

Grainger (1978; 1980) found significant negative correlations between sea surface temperature (SST) and catches from the west of Ireland component of this stock at a time-lag of 3–4 years

later. This indicates that recruitment responds favorably to cooler temperatures. Cannaby and Hosrevoglu (2009) present long time-series of sea surface temperature for this stock area, showing an increasing trend. Their data when compared with herring biology and fisheries data show that strong historic herring recruitments/fisheries correspond to cooler temperatures (Clarke *et al.*, WD 02 to HAWG 2012).

5.1.12.2 Changes in the environment

Since the mid-1990s the AMO has been in a positive phase, indicating warmer sea temperatures in this area. In recent year the AMO has mostly been in a positive phase, see: http://www.esrl.noaa.gov/psd/data/timeseries/AMO/. Warmer temperatures associated with positive AMO are considered detrimental to herring recruitment.

Table 5.1.2. Herring in divisions 6.a.S and 7.b–c. Estimated Herring catches in tonnes, 1991–2020. These data do not in all cases correspond to the official statistics and cannot be used for management purposes.

Country	1991	1992	1993	1994	1995	1996	1997	1998	1999
France	-	-	-	-	-	-	-	-	-
Germany, Fed. Rep.	-	250	-	-	11	-	-	-	-
Ireland	22500	26000	27600	24400	25450	23800	24400	25200	16325
Netherlands	600	900	2500	2500	1207	1800	3400	2500	1868
UK (N. Ireland)	-	-	-	-	-	-	-	-	-
UK (England + Wales)	-	-	-	50	24	-	-	-	-
UK (Scotland)	+	-	200	-	-	-	-	-	-
Total landings	23100	27150	30300	26950	26692	25600	27800	27700	18193
Unallocated/ area misreported	11200	4600	6250	6250	1100	6900	-700	11200	7916
Discards	3400	100	250	700	-	-	50		-
WG catch	37700	31850	36800	33900	27792	32500	27150	38900	26109

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008
France	-	-	515	-	-	-	-	-	-
Germany, Fed. Rep.	-	-	-		-	-	-	-	-
Ireland	10164	11278	13072	12921	10950	13351	14840	12662	10237
Netherlands	1234	2088	366	-	64	-	353	13	-
UK (N. Ireland)	-	-	-	-	-	-	-	-	-
UK (England + Wales)	-	-	-	-	-	-	-	-	-
UK (Scotland)	-	-	-	-	-	-	6	-	-
Total landings	11398	13366	13953	12921	11014	13351	15199	12675	10237
Unallocated/ area misreported	8448	1390	3873	3581	2813	2880	4000	5116	3103
Discards	-	-	-	-	-	-	-	-	-
WG catch	19846	14756	17826	16502	13827	16231	19199	17791	13340

Table 5.1.2. Herring in divisions 6.a.S and 7.b–c. Estimated Herring catches in tonnes, 1991–2020 continued

Country	2019	2010	2011	2012	2013	2014	2015	2016	2017
France	-	-	-	-	-	-	-	-	-
Germany, Fed. Rep.	-	-	-	-	-	-	-	-	-
Ireland	8533	7513	4247	3791	1460	2933	73	1171	1707
Netherlands	-	-	-	-	40	-	+	72	-
UK (N. Ireland)	-	-	-	-	-	-	-	-	-
UK (England + Wales)	-	-	-	-	-	-	-	-	-
UK (Scotland)	-	-	-	-	-	-	5	-	-
Total landings	8533	7513	4247	3791	1500	2933	78	1243	1707
Unallocated/ area misreported	1935	2728	2672	2780	2468	2163	1000	971	520
Discards	-	-	-	-	-	-	-	-	-
WG catch	10 468	10 241	6919	6571	3968	5096	1078	2214	2227

Country	2018	2019	2020
France			
Germany Fed. Rep.			
Ireland	970	1625	1138
Netherlands		65	3
UK (N. Ireland)			
UK (England + Wales)			
UK (Scotland)			
Total landings	970	1690	1141
Unallocated/ area misreported	525		79
Discards			
WG catch	1495	1690	1220

Table 5.1.3. Herring in divisions 6.a.S and 7.b–c. Catch in numbers-at-age (winter rings) from 1970–2020.

	1	2	3	4	5	6	7	8	9
1970	135	35114	26007	13243	3895	40181	2982	1667	1911
1971	883	6177	7038	10856	8826	3938	40553	2286	2160
1972	1001	28786	20534	6191	11145	10057	4243	47182	4305
1973	6423	40390	47389	16863	7432	12383	9191	1969	50980
1974	3374	29406	41116	44579	17857	8882	10901	10272	30549
1975	7360	41308	25117	29192	23718	10703	5909	9378	32029
1976	16613	29011	37512	26544	25317	15000	5208	3596	15703
1977	4485	44512	13396	17176	12209	9924	5534	1360	4150
1978	10170	40320	27079	13308	10685	5356	4270	3638	3324
1979	5919	50071	19161	19969	9349	8422	5443	4423	4090
1980	2856	40058	64946	25140	22126	7748	6946	4344	5334
1981	1620	22265	41794	31460	12812	12746	3461	2735	5220
1982	748	18136	17004	28220	18280	8121	4089	3249	2875
1983	1517	43688	49534	25316	31782	18320	6695	3329	4251
1984	2794	81481	28660	17854	7190	12836	5974	2008	4020
1985	9606	15143	67355	12756	11241	7638	9185	7587	2168
1986	918	27110	27818	66383	14644	7988	5696	5422	2127
1987	12149	44160	80213	41504	99222	15226	12639	6082	10187
1988	0	29135	46300	41008	23381	45692	6946	2482	1964
1989	2241	6919	78842	26149	21481	15008	24917	4213	3036
1990	878	24977	19500	151978	24362	20164	16314	8184	1130
1991	675	34437	27810	12420	100444	17921	14865	11311	7660
1992	2592	15519	42532	26839	12565	73307	8535	8203	6286
1993	191	20562	22666	41967	23379	13547	67265	7671	6013
1994	11709	56156	31225	16877	21772	13644	8597	31729	10093
1995	284	34471	35414	18617	19133	16081	5749	8585	14215
1996	4776	24424	69307	31128	9842	15314	8158	12463	6472

	1	2	3	4	5	6	7	8	9
1997	7458	56329	25946	38742	14583	5977	8351	3418	4264
1998	7437	72777	80612	38326	30165	9138	5282	3434	2942
1999	2392	51254	61329	34901	10092	5887	1880	1086	949
2000	4101	34564	38925	30706	13345	2735	1464	690	1602
2001	2316	21717	21780	17533	18450	9953	1741	1027	508
2002	4058	32640	37749	18882	11623	10215	2747	1605	644
2003	1731	32819	28714	24189	9432	5176	2525	923	303
2004	1401	15122	32992	19720	9006	4924	1547	975	323
2005	209	28123	30896	26887	10774	5452	1348	858	243
2006	598	22036	36700	30581	21956	9080	2418	832	369
2007	76	24577	43958	23399	13738	5474	1825	231	131
2008	483	12265	19661	28483	11110	5989	2738	745	267
2009	202	12574	12077	12096	12574	5239	2040	853	17
2010	1271	13507	20127	6541	7588	6780	2563	661	189
2011	121	14207	9315	9114	3386	3780	2871	980	95
2012	5142	12844	16387	4042	1776	553	541	103	21
2013	61	3118	4532	12238	1665	1792	425	382	202
2014	34	465	8825	6735	12146	2406	1045	437	204
2015	27	1842	598	2553	1699	685	96	9	0
2016	69	1983	4252	1369	3025	2085	824	43	9
2017	30	1051	5241	4078	1025	2250	1061	480	76
2018	6	1567	1838	3280	2288	613	700	260	29
2019	1995	2627	3259	1509	1895	1166	381	464	171
2020	140	5164	2683	1703	597	684	265	98	48

Table 5.1.4. Herring in divisions 6.a.S and 7.b–c. Percentage age composition (winter rings).

Year	1	2	3	4	5	6	7	8	9+
1994	6%	28%	15%	8%	11%	7%	4%	16%	5%
1995	0%	23%	23%	12%	13%	11%	4%	6%	9%
1996	3%	13%	38%	17%	5%	8%	4%	7%	4%
1997	5%	34%	16%	23%	9%	4%	5%	2%	3%
1998	3%	29%	32%	15%	12%	4%	2%	1%	1%
1999	1%	30%	36%	21%	6%	3%	1%	1%	1%
2000	3%	27%	30%	24%	10%	2%	1%	1%	1%
2001	2%	23%	23%	18%	19%	10%	2%	1%	1%
2002	3%	27%	31%	16%	10%	9%	2%	1%	1%
2003	2%	31%	27%	23%	9%	5%	2%	1%	0%
2004	2%	18%	38%	23%	10%	6%	2%	1%	0%
2005	0%	27%	29%	26%	10%	5%	1%	1%	0%
2006	0%	18%	29%	25%	18%	7%	2%	1%	0%
2007	0%	22%	39%	21%	12%	5%	2%	0%	0%
2008	1%	15%	24%	35%	14%	7%	3%	1%	0%
2009	0%	22%	21%	21%	22%	9%	4%	1%	0%
2010	2%	23%	34%	11%	13%	11%	4%	1%	0%
2011	0%	32%	21%	21%	8%	9%	7%	2%	0%
2012	12%	31%	40%	10%	4%	1%	1%	0%	0%
2013	0%	13%	19%	50%	7%	7%	2%	2%	1%
2014	0%	1%	27%	21%	38%	7%	3%	1%	1%
2015	0%	25%	8%	34%	23%	9%	1%	0%	0%
2016	0%	15%	31%	10%	22%	15%	6%	0%	0%
2017	0%	7%	34%	27%	7%	15%	7%	3%	0%
2018	0%	15%	17%	31%	22%	6%	7%	2%	0%
2019	15%	20%	24%	11%	14%	9%	3%	3%	1%
2020	1%	45%	24%	15%	5%	6%	2%	1%	0%

Table 5.1.5. Herring in divisions 6.a.S and 7.b–c. Mean weights-at-age in the catches 1970–2020.

	1	2	3	4	5	6	7	8	9+
1970	0.110	0.129	0.165	0.191	0.209	0.222	0.231	0.237	0.241
1971	0.110	0.129	0.165	0.191	0.209	0.222	0.231	0.237	0.241
1972	0.110	0.129	0.165	0.191	0.209	0.222	0.231	0.237	0.241
1973	0.110	0.129	0.165	0.191	0.209	0.222	0.231	0.237	0.241
1974	0.110	0.129	0.165	0.191	0.209	0.222	0.231	0.237	0.241
1975	0.110	0.129	0.165	0.191	0.209	0.222	0.231	0.237	0.241
1976	0.110	0.129	0.165	0.191	0.209	0.222	0.231	0.237	0.241
1977	0.110	0.129	0.165	0.191	0.209	0.222	0.231	0.237	0.241
1978	0.110	0.129	0.165	0.191	0.209	0.222	0.231	0.237	0.241
1979	0.110	0.129	0.165	0.191	0.209	0.222	0.231	0.237	0.241
1980	0.110	0.129	0.165	0.191	0.209	0.222	0.231	0.237	0.241
1981	0.110	0.129	0.165	0.191	0.209	0.222	0.231	0.237	0.241
1982	0.110	0.129	0.165	0.191	0.209	0.222	0.231	0.237	0.241
1983	0.090	0.129	0.165	0.191	0.209	0.222	0.231	0.237	0.241
1984	0.106	0.141	0.181	0.210	0.226	0.237	0.243	0.247	0.248
1985	0.077	0.122	0.161	0.184	0.196	0.206	0.212	0.225	0.230
1986	0.095	0.138	0.164	0.194	0.212	0.225	0.239	0.208	0.288
1987	0.085	0.102	0.150	0.169	0.177	0.193	0.205	0.215	0.220
1988		0.098	0.133	0.153	0.166	0.171	0.183	0.191	0.201
1989	0.080	0.130	0.141	0.164	0.174	0.183	0.192	0.193	0.203
1990	0.094	0.138	0.148	0.160	0.176	0.189	0.194	0.208	0.216
1991	0.089	0.134	0.145	0.157	0.167	0.185	0.199	0.207	0.230
1992	0.095	0.141	0.147	0.157	0.165	0.171	0.180	0.194	0.219
1993	0.112	0.138	0.153	0.170	0.181	0.184	0.196	0.229	0.236
1994	0.081	0.141	0.164	0.177	0.189	0.187	0.191	0.204	0.220
1995	0.080	0.140	0.161	0.173	0.182	0.198	0.194	0.206	0.217

	1	2	3	4	5	6	7	8	9+
1996	0.085	0.135	0.172	0.182	0.199	0.209	0.220	0.233	0.237
1997	0.093	0.135	0.155	0.181	0.201	0.217	0.217	0.231	0.239
1998	0.095	0.136	0.145	0.173	0.191	0.196	0.202	0.222	0.217
1999	0.106	0.144	0.145	0.163	0.186	0.195	0.200	0.216	0.222
2000	0.102	0.129	0.154	0.172	0.180	0.184	0.204	0.203	0.204
2001	0.086	0.122	0.139	0.167	0.183	0.188	0.222	0.222	0.213
2002	0.097	0.127	0.140	0.155	0.175	0.196	0.204	0.218	0.226
2003	0.102	0.134	0.150	0.167	0.183	0.196	0.216	0.210	0.228
2004	0.085	0.140	0.150	0.167	0.182	0.193	0.222	0.221	0.285
2005	0.105	0.135	0.150	0.162	0.174	0.188	0.200	0.237	0.296
2006	0.106	0.137	0.141	0.158	0.169	0.178	0.199	0.221	0.243
2007	0.118	0.144	0.145	0.168	0.179	0.189	0.197	0.233	0.237
2008	0.1108	0.1478	0.1503	0.1663	0.1745	0.1845	0.1938	0.1990	0.2407
2009	0.077	0.146	0.171	0.194	0.200	0.207	0.211	0.218	0.275
2010	0.104	0.131	0.168	0.189	0.201	0.212	0.218	0.226	0.229
2011	0.094	0.122	0.141	0.174	0.193	0.202	0.217	0.218	0.246
2012	0.09	0.134	0.179	0.196	0.214	0.237	0.228	0.243	0.236
2013	0.083	0.121	0.141	0.170	0.181	0.196	0.202	0.226	0.226
2014	0.105	0.139	0.136	0.155	0.168	0.175	0.184	0.183	0.187
2015	0.090	0.113	0.145	0.152	0.161	0.168	0.176	0.185	0.188
2016	0.09	0.125	0.149	0.163	0.182	0.188	0.19	0.21	0.201
2017	0.072	0.106	0.132	0.145	0.159	0.168	0.172	0.179	0.183
2018	0.085	0.101	0.127	0.144	0.155	0.166	0.172	0.170	0.174
2019	0.063	0.099	0.127	0.147	0.159	0.164	0.180	0.174	0.172
2020	0.059	0.091	0.109	0.121	0.134	0.146	0.152	0.158	0.168

Table 5.1.6. Herring in divisions 6.a.S and 7.b–c. Mean weights-at-age in the stock at spawning time 1970–2020.

	1	2	3	4	5	6	7	8	9+
1970	0.120	0.169	0.210	0.236	0.260	0.273	0.283	0.290	0.296
1971	0.120	0.169	0.210	0.236	0.260	0.273	0.283	0.290	0.296
1972	0.120	0.169	0.210	0.236	0.260	0.273	0.283	0.290	0.296
1973	0.120	0.169	0.210	0.236	0.260	0.273	0.283	0.290	0.296
1974	0.120	0.169	0.210	0.236	0.260	0.273	0.283	0.290	0.296
1975	0.120	0.169	0.210	0.236	0.260	0.273	0.283	0.290	0.296
1976	0.120	0.169	0.210	0.236	0.260	0.273	0.283	0.290	0.296
1977	0.120	0.169	0.210	0.236	0.260	0.273	0.283	0.290	0.296
1978	0.120	0.169	0.210	0.236	0.260	0.273	0.283	0.290	0.296
1979	0.120	0.169	0.210	0.236	0.260	0.273	0.283	0.290	0.296
1980	0.120	0.169	0.210	0.236	0.260	0.273	0.283	0.290	0.296
1981	0.120	0.169	0.210	0.236	0.260	0.273	0.283	0.290	0.296
1982	0.120	0.169	0.210	0.236	0.260	0.273	0.283	0.290	0.296
1983	0.120	0.169	0.210	0.236	0.260	0.273	0.283	0.290	0.296
1984	0.120	0.169	0.210	0.236	0.260	0.273	0.283	0.290	0.296
1985	0.100	0.150	0.196	0.227	0.238	0.251	0.252	0.269	0.284
1986	0.098	0.169	0.209	0.238	0.256	0.276	0.280	0.287	0.312
1987	0.097	0.164	0.206	0.233	0.252	0.271	0.280	0.296	0.317
1988	0.097	0.164	0.206	0.233	0.252	0.271	0.280	0.296	0.317
1989	0.138	0.157	0.168	0.182	0.200	0.217	0.227	0.238	0.245
1990	0.113	0.152	0.170	0.180	0.200	0.217	0.225	0.233	0.255
1991	0.102	0.149	0.174	0.190	0.195	0.206	0.226	0.236	0.248
1992	0.102	0.144	0.167	0.182	0.194	0.197	0.214	0.218	0.242
1993	0.118	0.166	0.196	0.205	0.214	0.220	0.223	0.242	0.258
1994	0.098	0.156	0.192	0.209	0.216	0.223	0.226	0.230	0.247
1995	0.090	0.144	0.181	0.203	0.217	0.226	0.227	0.239	0.246
1996	0.086	0.137	0.186	0.206	0.219	0.234	0.233	0.249	0.253

	1	2	3	4	5	6	7	8	9+
1997	0.094	0.135	0.169	0.194	0.210	0.224	0.231	0.230	0.239
1998	0.095	0.136	0.145	0.173	0.191	0.196	0.202	0.222	0.217
1999	0.104	0.145	0.154	0.174	0.200	0.222	0.230	0.240	0.246
2000	0.100	0.134	0.157	0.177	0.197	0.207	0.217	0.230	0.245
2001	0.091	0.125	0.150	0.172	0.191	0.200	0.203	0.203	0.216
2002	0.092	0.127	0.146	0.170	0.190	0.201	0.210	0.227	0.229
2003	0.094	0.131	0.155	0.175	0.192	0.203	0.232	0.222	0.243
2004	0.081	0.133	0.151	0.175	0.194	0.207	0.238	0.233	0.276
2005	0.095	0.127	0.15	0.172	0.185	0.196	0.223	0.234	0.274
2006	0.092	0.130	0.133	0.162	0.177	0.186	0.209	0.238	0.247
2007	0.114	0.133	0.133	0.171	0.186	0.196	0.208	0.228	0.229
2008	0.098	0.136	0.140	0.174	0.185	0.196	0.192	0.205	0.234
2009	0.072	0.141	0.162	0.197	0.215	0.223	0.225	0.221	0.286
2010	0.092	0.128	0.157	0.189	0.208	0.227	0.234	0.239	0.247
2011	0.082	0.118	0.136	0.177	0.199	0.207	0.225	0.239	0.240
2012	0.084	0.135	0.182	0.203	0.214	0.226	0.225	0.21	0.226
2013	0.074	0.114	0.140	0.170	0.188	0.198	0.204	0.223	0.222
2014	0.093	0.128	0.135	0.154	0.169	0.170	0.188	0.169	0.206
2015	0.077	0.112	0.146	0.155	0.165	0.173	0.179	0.183	0.217
2016	0.078	0.119	0.147	0.164	0.185	0.191	0.197	0.21	0.175
2017	0.064	0.099	0.130	0.145	0.163	0.173	0.176	0.185	0.180
2018	0.072	0.097	0.126	0.146	0.156	0.168	0.172	0.169	0.170
2019	0.062	0.098	0.124	0.149	0.164	0.166	0.180	0.180	0.175
2020	0.056	0.088	0.110	0.125	0.144	0.154	0.157	0.164	0.168

Table 5.1.7. Herring in divisions 6.a.S and 7.b–c. Sampling intensity of catches in 2020.

Year	Quarter	Landings (t)	No. Samples	No. aged	No. Measured	Aged/1000 t
6.a.S	1	121	8	309	1859	2554
6.a.S	4	1092	38	2301	10866	2107
7.b	1	4	0	0	0	0
Total		1217	46	2610	12725	2145

Table 5.1.8. Herring in divisions 6.a.S and 7.b–c. Details of acoustic surveys dedicated to the 6a.S/7.b–c stock alone.

Year	Type	Biomass	SSB
1994	Feeding phase	-	353772
1995	Feeding phase	137670	125800
1996	Feeding phase	34290	12550
1997	-	-	-
1998	-	-	-
1999	Autumn	23762	22788
2000	Autumn	21000	20500
2001	Autumn	11100	9800
2002	Winter	8900	7200
2003	Winter	10300	9500
2004	Winter	41700	41399
2005	Winter	71253	66138
2006	Winter	27770	27200
2007	Winter	14222	13974
2016	Winter	35475	35475
2017	Winter	40646	40646
2018	Winter	50145	49523
2019*	Winter	25289	22386
2020**	Winter	45046	44107

***reduced survey area**

**** Survey design changed significantly compared to other years, only 6 core areas covered**

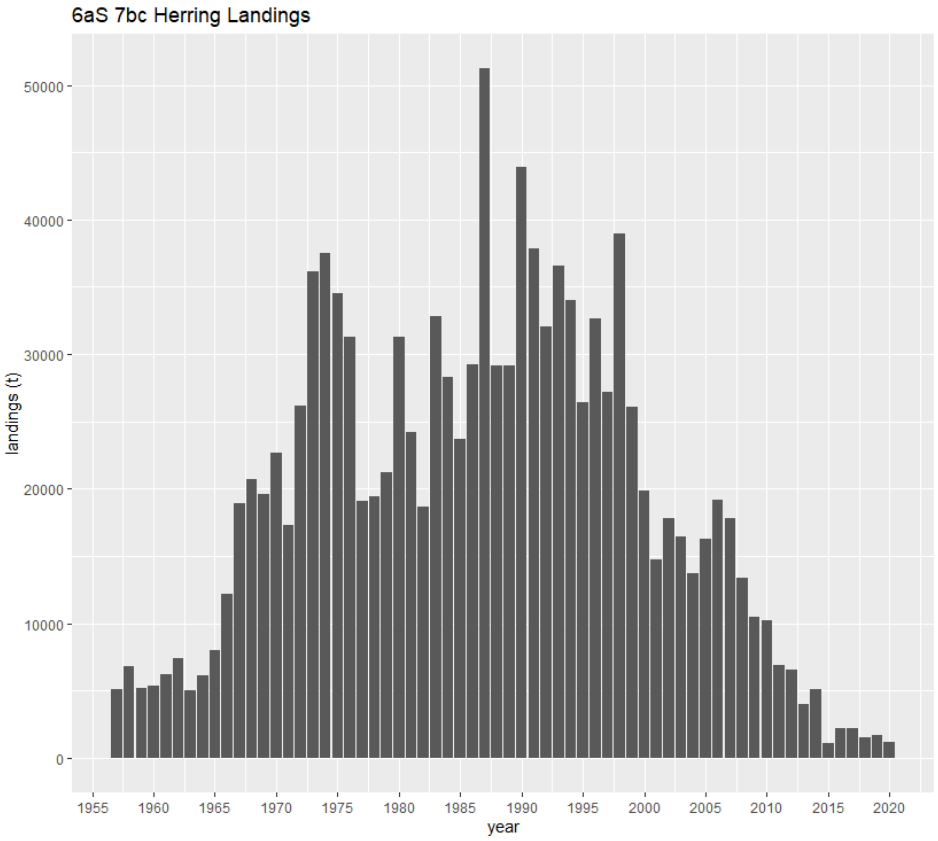

Figure 5.1.1. Herring in divisions 6.a.S and 7.b–c. Working group estimate of catches from 1957–2020.

Figure 5.1.2. Herring in divisions 6.a.S and 7.b–c. catch numbers-at-age standardized by year for the fishery 1957–2020.

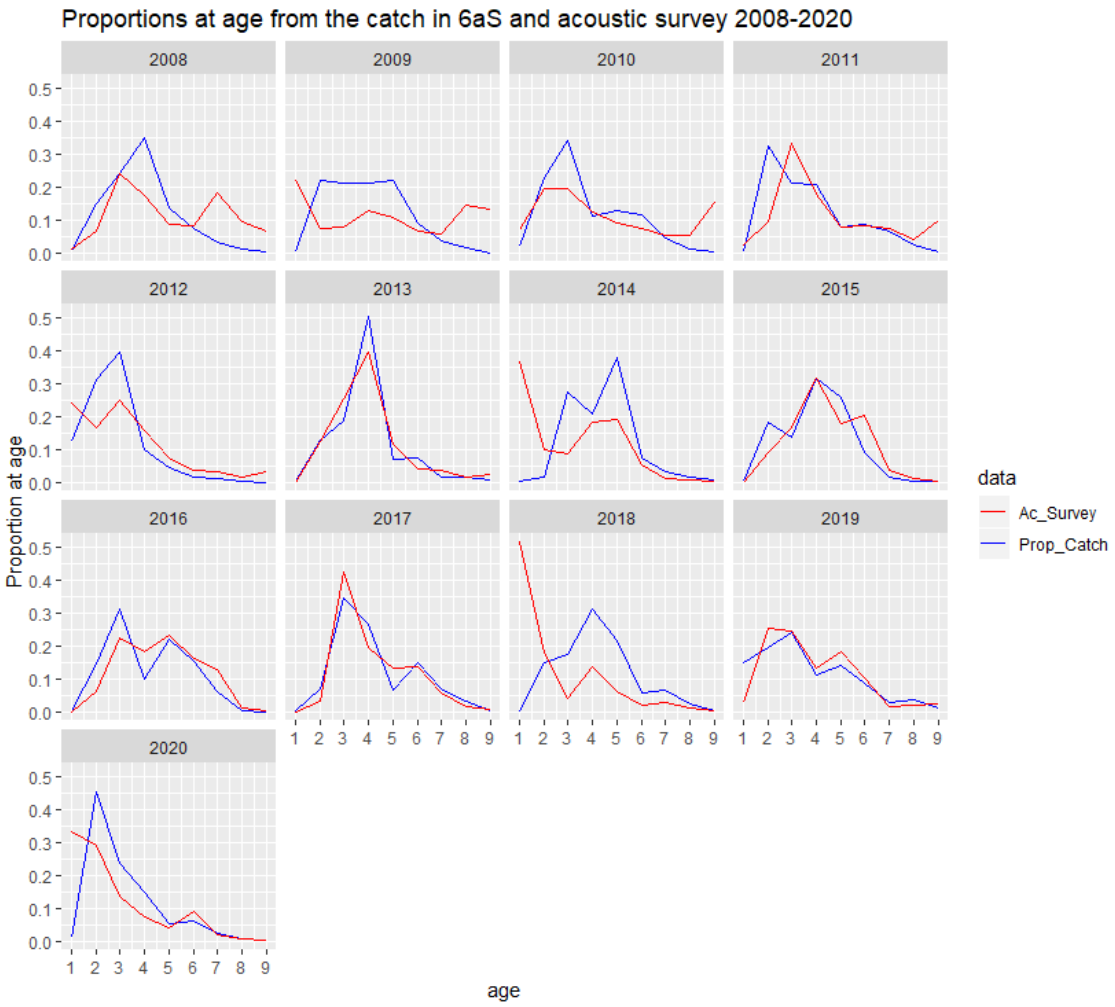

Figure 5.1.4. Herring in divisions 6.a.S and 7.b–c. Percentages-at-age in the 6aS/7.b–c catch and 6aS/7.b–c Malin Shelf acoustic survey (MSHAS) 2008-2020.

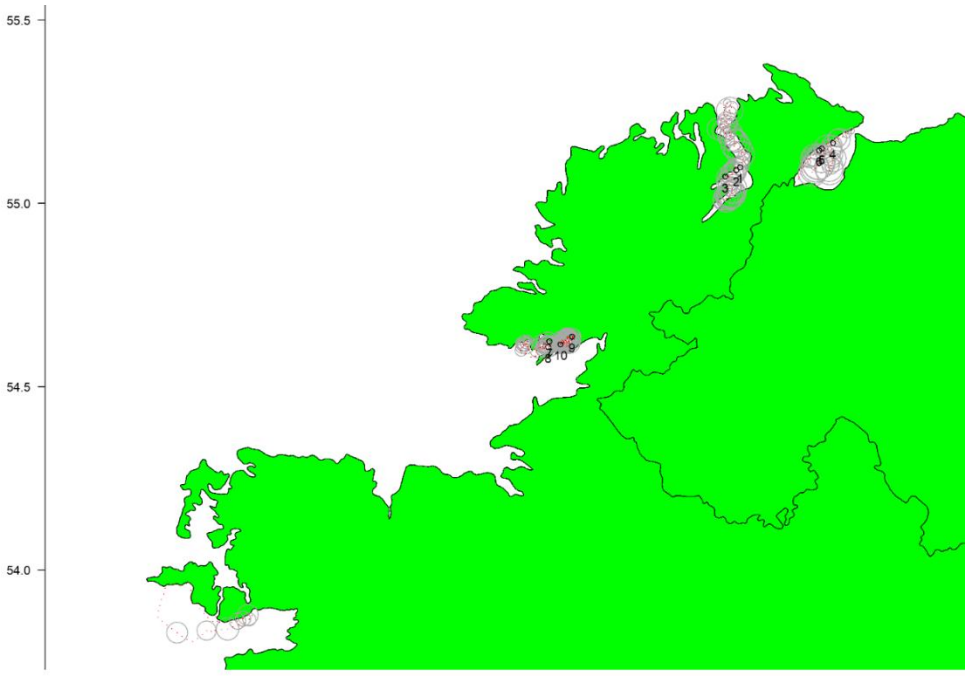

Figure 5.1.5. 6.a.S/7.b industry acoustic survey in 2020: Distribution of biological samples obtained in 6.a.S/7.b - all samples were inshore from the monitoring fishery taking place at the same time.

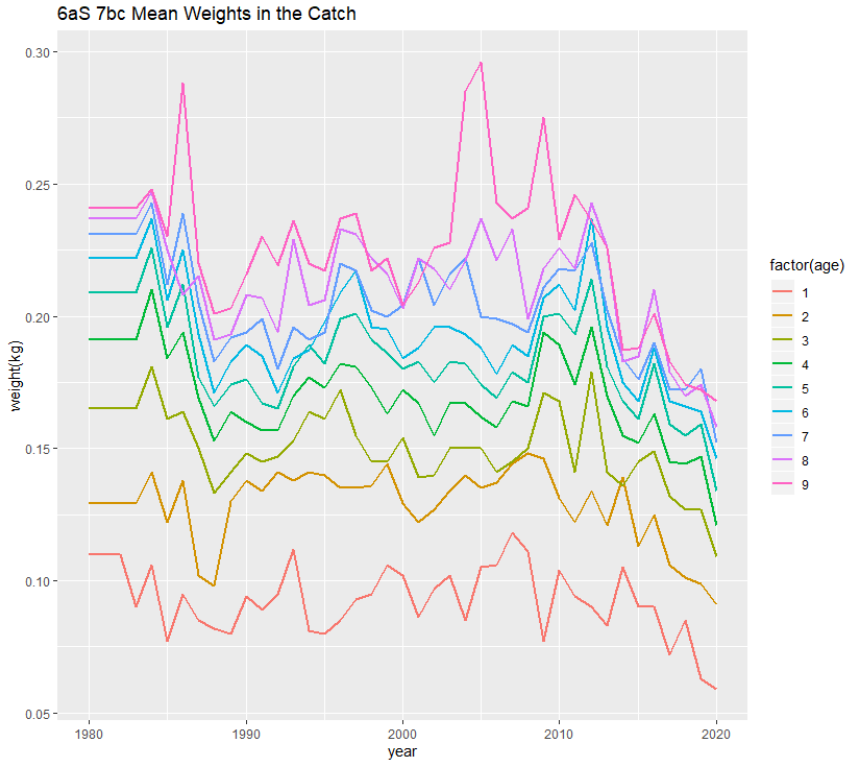

Figure 5.1.7. Herring in divisions 6.a.S and 7.b–c. Mean weights in the catch (kg) by age in winter rings (1980–2020). Prior to 1981 weights were fixed.

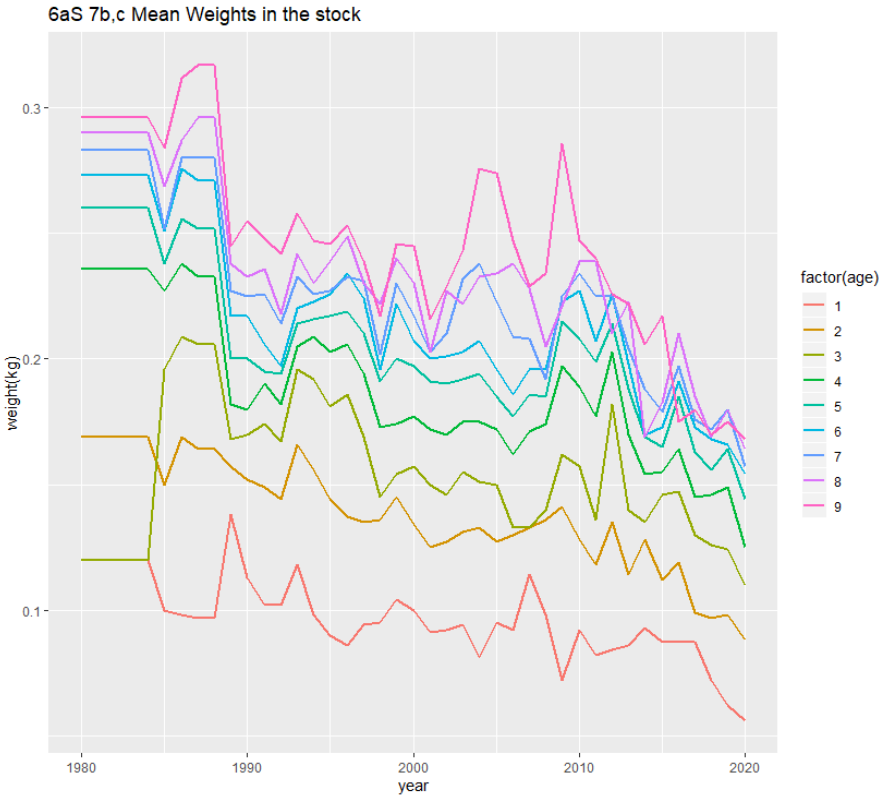

Figure 5.1.8. Herring in divisions 6.a.S and 7.b–c. Mean weights in the stock (kg) at spawning time by age in winter rings (1980–2020). Prior to 1981 weights were fixed.

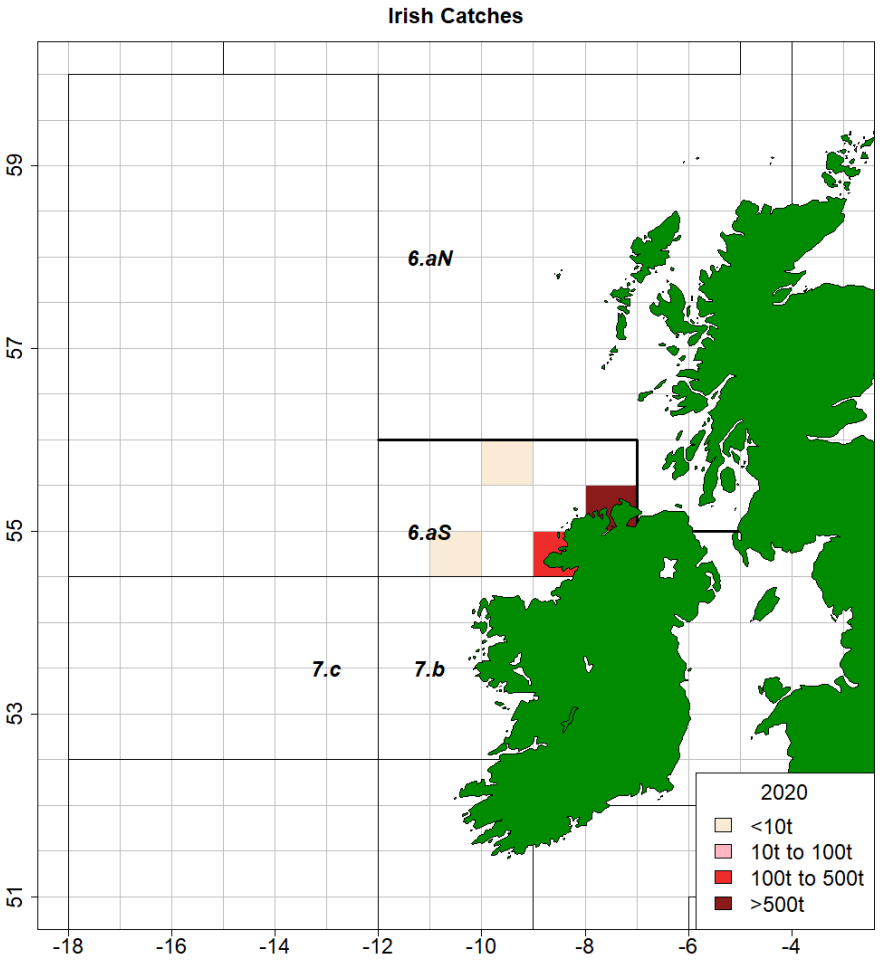

Figure 5.1.9. Herring in divisions 6.a.S and 7.b–c. Irish catches in 2020.

5.2 Herring in Division 6.a (North)

Since 2015 this stock has been combined with herring in 6.a.S 7.b–c (Section 5.1) for assessment and advisory purposes. Prior to 2015 6.a.N existed as a distinct management unit since 1982 when it was separated from 6.a.S 7.b–c.

The location of the area occupied by the stock is shown in Figure 5.2.1. For assessment purposes the stock is considered as an autumn spawning stock only despite spring-spawning components occurring in the area.

The WG noted that the use of "age" "winter rings" "rings" and "ringers" still causes confusion outside the group (and sometimes even among WG members). The WG tries to avoid this by consequently using "rings" "ringers" "winter ringers" or "wr" instead of "age" throughout this section. However if the word "age" is used it is qualified in brackets with one of the ring designations. It should be observed that for autumn and winter spawning stocks there is a difference of one year between "age" and "rings" which is not the case for spring spawners. Further elaboration on the rationale behind this specific to Division 6.aN autumn spawners can be found in the Stock Annex. It is the responsibility of any user of age-based data for any of these herring stocks to consult the stock annex and if in doubt consult a relevant member of the Working Group.

5.2.1 The Fishery

5.2.1.1 Advice and management applicable to 2020

Since 2016 ICES has advised a TAC of 0 t for the combined stock and that a stock recovery plan be developed for herring stocks in 6.a and 7.b–c (ICES 2018a). In 2016 the European Commission asked ICES to provide advice on a TAC of sufficiently small size to allow ongoing collection of fisheries-dependent data. ICES advised on a scientific monitoring TAC of 3480 t for the 6.a.N stock component (ICES 2016) aiming to take 29 catch samples. Furthermore it was stipulated the data should be collected in a way that (i) satisfied standard length age and reproductive monitoring purposes by EU Member States for ICES and (ii) ensured that sufficient spawning-specific samples were available for morphometric and genetic analyses as agreed by the Pelagic Advisory Council monitoring scheme 2016 (Pelagic Advisory Council 2016).

The EC set a monitoring TAC for the 6.a.N stock component slightly higher than this advice at 4170 t (EU 2016/0203) and the same for 2017 (EU 2017/127), 2018 (EU 2018/120), and 2019 ((EU) 2019/124). This was reduced to 4840 t, split of 3480 t in 6.a.N and 1360 t in 6.a.S and 7.b-c (EU 2020/123).

5.2.1.2 The monitoring fishery

The industry–science survey aim is to improve the knowledge base for the spawning components of herring in 6.a.N and 6.a.S 7.b–c and submit relevant data to ICES to assist in assessing the herring stocks and contribute to establishing a rebuilding plan.

Utilizing ICES advice on the monitoring fishery (ICES 2016) together with the experience from 2016 a review of spawning areas and timing and discussions with fishing skippers four areas were selected for surveying in 6.a.N. Areas 2 and 4 are considered to be active spawning areas and Area 1 a pre-spawning aggregation area that contains an unknown mixture of stocks of Western and potentially North Sea herring where a large proportion of catches has been taken in the years prior to 2016 (ICES 2016). Area 5 was a new addition for 2018 and 2019 based on evidence from 2017 from local creel fishers catches of herring on the east side of the North Minch.

Following the guidance arising from WKHASS (ICES 2020c), the survey area in 2020 focused on two principal spawning areas (Figure 5.2.2), with timing planned to coincide with the known spawning period. The new strata 1 and 2 are reduced version of previous area 2 and 3 and correspond to regions that have been covered consistently since 2016. Moreover, refocusing the survey to these new strata means that it is now possible to provide a consistency the survey time-series, which will be necessary for developing time-series indices relevant for assessment purposes. (section 5.2.3.2)

Following a proposal from industry to ensure that commercial catches in 6aN in 2020 were reduced to a bare minimum, the only removal of herring was limited to sample hauls during the acoustic surveys, and 1 commercial haul that was taken outside of the survey area (section 5.2.1.4)

Details of the survey are reported in WGIPS ICES (2021) and Mackinson *et al*. (2021).

5.2.1.3 Stock recovery plan

The Pelagic Advisory Council submitted a revised proposed rebuilding plan for both 6.aN and 6.a.S 7.b–c stocks combined which was reviewed by HAWG 2018 (ICES 2018 Annex 9)). However, ICES ACOM considered that further quantitative evaluation would be required to be used as the basis for advice. ICES advice in 2019 stated *'ICES still considers it important to develop a stock recovery plan for herring in divisions 6.a and 7.b–c, but given the large changes in perception of the stock, fishing pressure and recruitment together with the continued uncertainty in the quality of the assessment, the requirement for a rebuilding plan (or plans) are considered to be better addressed during a full benchmark, anticipated for 2021'.*

5.2.1.4 Catches in 2020

Historically catches have been taken from this area by Scottish and Northern Irish pelagic refrigerated seawater (RSW) trawlers and an international freezer-trawler fishery including vessels from the Netherlands Germany and England. The details of these fleets are described in the Stock Annex.

The available 6.a.N monitoring 2020 TAC was not fully utilized in 2020, following pro-active efforts by industry to reduce catches to bare minimum.

The 2020 catches of herring in 6.a.N total 177 t compared with the 3480 t monitoring TAC. There were 0.3 t of non-retained herring catch during the monitoring survey in 2020 under the discard derogation and 0.26 t of other species (Mackinson *et al*., 2021).

5.2.1.5 Regulations and their affects

There are no new changes to the regulations relevant to the fishery in 6.aN.

5.2.1.6 Changes in fishing technology and fishing pattern

Following a proposal from industry to ensure that commercial catches in 6aN in 2020 were reduced to a bare minimum, the only removal of herring form 6aN was limited to sample hauls during the acoustic surveys, and 1 commercial haul that was taken outside of the survey area.

5.2.2 Biological Composition of the Catch

Catch and sample data by country and by period (quarter) are detailed in tables 5.2.1 and 5.2.2. Biological data sampled from commercial hauls (n = 2) were used to allocate the age distribution for the 6.a.N catches used in the assessment. These samples both came from the Netherlands, with catches taken in quarter 3. The samples were used to allocate catch-at-age (winter rings) (using the sample number weighting) to un-sampled catches in the same or adjacent quarters. Biological parameters for catches in quarter 1 were taken from samples collected in 6a(S). The allocation of age distributions to un-sampled catches and the calculation of total international catch-at-age and mean weight-at-age in the catches were done following established raising methods. A detailed description of the process in 2016 can be found in (WD02 HAWG 2017)). The principles described in that document were followed in 2020 as far as possible. While this number of samples meets the requirements for the monitoring fishery as advised by ICES (ICES 2016) of 1 sample per 120 t catch, catches in quarters 1 and 4, and those by all other fleets, were unsampled. Caution should be applied when comparing trends in biological composition of the catch with other years when sampling was more comprehensive.

Catches in 2020 are too low and too sparsely sampled to interpret trends in specific year classes, relative to preceding years (figures 5.2.3 and 5.2.4 Table 5.2.5).

5.2.3 Fishery-independent Information

5.2.3.1 Acoustic survey-MSHAS_N

The survey values for number- weight- and proportion mature-at-age in the stock were revised in 2009 and reported in the 2010 HAWG (see Section 5.6.1 in HAWG ICES 2010). The 2020 survey values are shown in tables 5.2.4 and 5.2.5.

Full details of the 2020 survey are available in the Report of the Working Group for International Pelagic Surveys (WGIPS ICES 2020 Annex 5b).

Vessel	Period	Strata
Celtic Explorer (IRL) EIGB	23 June–12 July	2 3 4 5 6
Scotia (SCO) MXHR6	03 July –26 July	1 91 (North of 58□30'N) 101 111 121

In 2020 the spawning-stock-biomass estimate for the acoustic survey in the area historically used for the 6.a (North) spawning-stock-biomass (Table 5.2.4) was 158 kt, an increase on the historic low of 76 kt seen in 2019.

The proportions of each year class in the catch and the survey are shown in Figure 5.2.5. The large proportion of 6-ringers (2013 year class) observed in the acoustic survey results of previous years is still evident. The acoustic survey encountered only a very small proportion herring above age 7 (wr).

In 2019, a large proportion of the stock was made up of 1 winter ring fish (2018 year class). These were prominent again this year in the 2020 survey as 2 winter ringers (29% of total abundance), along with large numbers of 1 winter ring herring (2019 year class).

5.2.3.2 Acoustic survey- 6.aN herring industry–science survey 2020

Two industry vessels were used to undertake acoustic surveys on spawning ground in September (the 6aSPAWN survey) to collect acoustic data and information on the size and age of herring required to generate an age-disaggregated acoustic estimate of the biomass of prespawning/ spawning herring in 6.a.N.

In 2020, the presence of spawning-ready adult herring marks was low, but an abundance of immature, mainly age 1 fish was found in the strata 1 covering the North Minch. In strata 2 on the North coast, very few marks were seen and no samples hauls were made. One feature of the 2020 survey was an apparent 'cleanness' or separation of acoustic mark, compared to the mixed assemblages encountered in the previous two years. Total biomass estimates of herring recorded during the two survey vessels was 33 – 44 kt (Table 5.2.6, Figure 5.2.6).

The survey methods and results were reviewed by ICES WGIPS (2021) who conclude that while the survey provided a reliable estimate the minimum biomass of age 1 (immature) and mature herring at age observed in survey areas during the survey period, but did not provide a reliable estimate of the minimum spawning biomass, because there were no fish sampled in 2020 were in stage 3 or 4 (spawning ready/ spawning), and because of limited sampling coverage in space and time. The survey provides a fifth data point in a new survey series, the details of and utility of which will be explored during the next benchmark.

5.2.4 Mean Weights-at-age and Maturity-at-age

5.2.4.1 Mean weight-at-age

Weights-at-age in the stock are obtained from the West of Scotland part of the Malin Shelf herring acoustic survey (WGIPS ICES 2021a) and are given in Table 5.2.4 (for the current year). The weights-at-age in the stock in 2020 were similar for all age groups compared to last year (Table 5.2.7). Overall there is a trend of decreasing weights-at-age in the stock for all ages over the last ten years.

Weights in the catch (Table 5.2.8) in 2020 were lower for all age groups compared to recent years, however this is likely an artefact of low sampling levels and use of data from 6.a(S).

5.2.4.2 Maturity ogive

The maturity ogive is obtained from the West of Scotland part of the Malin Shelf herring acoustic survey (Table 5.2.4, WGIPS ICES 2020a). The survey provides estimated values for the period 1992–2019 (Table 5.2.9). In 2020 the level of maturity for 2 winter ring fish continued the trend of later maturation observed since 2017, with only 46% mature. 3 winter ring fish were 75% which is below average of the time-series. At age 4 and above maturity levels were 100%.

5.2.5 Recruitment

There are no specific recruitment indices for this stock. This year both catches and the acoustic survey recorded catches of 1-ringers. Typically the encounter of this age group occurs only incidentally in the survey but has in the past been a small but stable component of the catches. The first reliable appearance of a cohort appears at 3-ring in both the catch and the survey for this stock. In 2020 the proportion of 3-ringers was moderate in the survey (Figure 5.2.4).

5.2.6 Assessment of 6.a (North) Herring

5.2.6.1 Stock Assessment

The ICES WKWEST 2015 Benchmark Workshop (ICES 2015/ACOM:34) for the herring stocks in 6.a.N, 6.a.S, and 7.b–c concluded that a combined stock assessment for these two stocks should be undertaken until it is possible to provide survey indices segregated by stock. Data for this stock were examined in detail by the benchmark group WKWEST (ICES 2015/ACOM:34). Further changes to the assessment input data sources and the assessment were carried out in early 2019 during an interbenchmark procedure ((IBPher6a7bc, ICES 2019). Details of the 2021 assessment for 6.a (combined) and 7.b–c are outlined in Section 4.6 of this report. A benchmark for herring in 6.a, 7.b-c will take place in early 2022.

5.2.6.2 State of the stock

Not determined.

5.2.7 Short-term Projections

5.2.7.1 Deterministic short-term projections

Not undertaken.

5.2.7.2 Yield-per-recruit

Not undertaken.

5.2.8 Precautionary and Yield Based Reference Points

Not determined.

5.2.9 Quality of the Assessment

Not relevant.

5.2.10 Management Considerations

Recruitment has been at a low level since 1998 and even lower since 2013, however there are indications of stronger year classes in 2018 and 2019 (Figure 5.2.3). The 2013 year class (6-wr in 2020) has remained relatively strong in the catches and survey since 2016. This year class was also exceptionally large in the neighbouring North Sea herring stock. There is an almost complete absence in the stock of 7, 8, and 9+ winter ring fish in both the catches and the acoustic survey in recent years.

The acoustic survey index has been decreasing steadily since 2008. Although the 2020 estimates represent a doubling on the 2019 values – the lowest observed in the time-series - the stock remains at a very low level compared to the long-term average.

The overall meta-population (the two stocks in 6.a and 7.b–c) is not in a healthy state and is estimated to be well below the possible candidate B_{lim} values. The working group advocates maintaining separate management of each component.

A monitoring TAC of 4170 t was implemented during 2016-2019, and reduced to 3480 t in 2020, to allow sampling for stock separation and maintaining the time-series of catch composition.

5.2.11 Ecosystem Considerations

Herring fisheries tend to be clean with little bycatch of other fish. Observers monitor some of the fleets. Scottish discard observer programs since 1999 and more recently Dutch observers indicate that discarding of herring in these directed fisheries is at a low level. The Scottish discard observer program has recorded occasional catches of seals and zero catches of cetaceans in the past. The Scottish pelagic discard observer program is no longer active. It was terminated in 2011.

Herring are an important prey species in the ecosystem west of the British Isles and one of the dominant planktivorous fish in 6.a.N. Bird mammal and stocks of larger predatory fish in the region rely on healthy productive herring populations.

5.2.12 Changes in the Environment

Temperatures in this area have been increasing over the last number of decades (Baxter *et al.*, 2008). There are indications that salinity is also increasing (ICES 2006/LRC:03). It is considered that this may have implications for herring. There is evidence that similar environmental changes have affected the North Sea herring and contributed to the recent changes in productivity of that stock (ICES 2007/ACFM:11).

Table 5.2.1. Herring in 6.a (North). Catch in tonnes by country 1991–2020. These figures do not in all cases correspond to the official statistics and cannot be used for management purposes.

Country	1991	1992	1993	1994	1995	1996	1997	1998	1999
Faroes	482			274					
France	1168	119	818	5087	3672	2297	3093	1903	463
Germany	6450	5640	4693	7938	3733	7836	8873	8253	6752
Ireland	8000	7985	8236	6093	3548	9721	1875	11199	7915
Netherlands	7979	8000	6132	8183	7808	9396	9873	8483	7244
Norway	3318	2389	7447	30676	4840	6223	4962	5317	2695
UK	32628	32730	32602	-4287	42661	46639	44273	42302	36446
Unallocated	-10597	-5485	-3753	700	-4541	-17753	-8015	-11748	-8155
Discards*	1180	200					62	90	
Total	50608	51578	56175	54664	61271	64359	64995	65799	61514
Area-Misreported	-22079	-22593	-24397	-30234	-32146	-38254	-29766	-32446	-23623
WG Estimate	28529	28985	31778	24430	29575	26105	35233	33353	29736
Source (WG)	1993	1994	1995	1996	1997	1997	1998	1999	2000

*** Unraised discards.**

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008
Faroes			800	400	228	1810	570	484	927
France	870	760	1340	1370	625	613	701	703	564
Germany	4615	3944	3810	2935	1046	2691	3152	1749	2526
Ireland	4841	4311	4239	3581	1894	2880	4352	5129	3103
Netherlands	4647	4534	4612	3609	8232	5132	7008	8052	4133
Norway									
UK	22816	21862	20604	16947	17706	17494	18284	17618	13963
Unallocated		277**	6244**	2820**	3490**				
Discards*					123	772	163		
Total	37789	35688**	41649**	31662**	33344**	31392	34230	33735	25216
Area-Misreported	-14627**	-10437**	-8735	-3581	-6885**	-17263	-6884	-4119	-9162
WG Estimate	23162**	25251**	32914	28081**	26459**	14129	27346	29616	16054
Source (WG)	2001	2002	2003	2004	2005	2006	2007	2008	2009

*** Unraised discards.**

**** Revised at WKWEST 2015.**

Country	2009	2010	2011	2012	2013	2014	2015	2016	2017
Denmark								23	
Faroes	1544	70				360			
France	1049	511	504	244	586	589			
Germany	27	3583	3518	1829	4025	3354	3292	1028	
Ireland	1935	2728	3956	3451	3124	2632	1799	569	10
Lithuania						770			
Norway							0.98		
Netherlands	5675	3600	1684	3523	1775	1641	956	300	829
UK	11076	12018	11696	12249	15906	16769	15260	3254	3356
Unallocated									
Discards*		95			30				
Total	21306	22510	21358	21296	25446	26115	21307	5174	4201
Area-Misreported	-2798	-2728	-3599	-2780	-2468	-4088	-2506	-450	
WG Estimate	18508	19877	17759	18516	22978	22027	18801	4724	4201
Source (WG)	2010	2011	2012	2013	2014	2015	2016	2017	2018

*** Unraised discards.**

Country	2018	2019	2020
Denmark	39	71	
Faroes			4
France	7	46**	
Germany	17	2	
Ireland	84	37	37
Lithuania			
Norway	4	3	
Netherlands	1000	653	85
UK	2911	928	51
Unallocated			
Discards*			
Total	4063	1739	177
Area-Misreported			
WG Estimate	4063	1739	177
Source (WG)	2019	2020	2021

*** Unraised discards. **From ICES preliminary catch statistics database.**

Table 5.2.2. Herring in 6.a (North). Catch and sampling effort by nation in the fishery in 2020.

Country	Quarter	Sampled Catch (t)	Official Catch (t)	No. Hauls	No. of samples	No. meas-ured	No. aged	SOP
UK (Sco)	Q1	0	6	-	-	-	-	0%
	Q4	0	2	-	-	-	-	0%
UK (NI)	Q4	0	43	-	-	-	-	0%
Ireland	Q1	0	29	-	-	-	-	0%
	Q4	0	8	-	-	-	-	0%
Netherlands	Q3	64	64	2	2	276	50	100%
	Q4	0	21	-	-	-	-	0%
Others		0	4	-	-	-	-	0%
Total		64	177	2	2	276	50	100%

Table 5.2.3. Herring in 6.a (North). Catch in number. Units: Thousands

Year	1	2	3	4	5	6	7	8	9+
1957	6496	74622	58086	25762	33979	19890	8885	1427	4423
1958	15616	30980	145394	39070	24908	27630	17405	9857	7159
1959	53092	67972	35263	116390	24946	17332	16999	7372	8595
1960	3561	102124	60290	22781	48881	11631	10347	6346	4617
1961	13081	45195	61619	33125	22501	12412	5345	4814	2582
1962	55048	92805	22278	67454	44357	19759	24139	6147	7082
1963	11796	78247	53455	11859	40517	26170	8687	13662	6088
1964	26546	82611	70076	26680	7283	24227	18637	8797	15103
1965	299483	19767	62642	59375	22265	5120	22891	18925	19531
1966	211675	500853	33456	60502	40908	19344	5563	17811	27083
1967	207947	27416	218689	37069	39246	29793	11770	5533	25799
1968	220255	94438	20998	159122	13988	23582	15677	6377	10814
1969	37706	92561	71907	23314	211243	21011	42762	26031	26207
1970	238226	99014	253719	111897	27741	142399	21609	27073	24082
1971	207711	335083	412816	302208	101957	25557	154424	16818	31999
1972	534963	621496	175137	54205	66714	25716	10342	55763	16631

Year	1	2	3	4	5	6	7	8	9+
1973	51170	235627	808267	131484	63071	54642	18242	6506	32223
1974	309016	124944	151025	519178	82466	49683	34629	22470	21042
1975	172879	202087	89066	63701	188202	30601	12297	13121	13698
1976	69053	319604	101548	35502	25195	76289	10918	3914	12014
1977	34836	47739	95834	22117	10083	12211	20992	2758	1486
1978	22525	46284	20587	40692	6879	3833	2100	6278	1544
1979	247	142	77	19	13	8	4	1	0
1980	2692	279	95	51	13	9	8	1	0
1981	36740	77961	105600	61341	21473	12623	11583	1309	1326
1982	13304	250010	72179	93544	58452	23580	11516	13814	4027
1983	81923	77810	92743	29262	42535	27318	14709	8437	8484
1984	2207	188778	49828	35001	14948	11366	9300	4427	1959
1985	40794	68845	148399	17214	15211	6631	6907	3323	2189
1986	33768	154963	86072	118860	18836	18000	2578	1427	1971
1987	19463	65954	45463	32025	50119	8429	7307	3508	5983
1988	1708	119376	41735	28421	19761	28555	3252	2222	2360
1989	6216	36763	109501	18923	18109	7589	15012	1622	3505
1990	14294	40867	40779	74279	26520	13305	9878	21456	5522
1991	26396	23013	25229	28212	37517	13533	7581	6892	4456
1992	5253	24469	24922	23733	21817	33869	6351	4317	5511
1993	17719	95288	18710	10978	13269	14801	19186	4711	3740
1994	1728	36554	40193	6007	7433	8101	10515	12158	10206
1995	266	82176	30398	21272	5376	4205	8805	7971	9787
1996	1952	37854	30899	9219	7508	2501	4700	8458	31108
1997	1193	55810	34966	31657	23118	17500	10331	5213	9883
1998	9092	74167	34571	31905	22872	14372	8641	2825	3327
1999	7635	35252	93910	25078	13364	7529	3251	1257	1089
2000	4511	22960	21825	51420	15504	9002	3897	1835	576
2001	147	83318	15368	9569	25175	9544	6813	4741	1028
2002	992	38481	93975	9014	18113	28016	9040	1547	1422

Year	1	2	3	4	5	6	7	8	9+
2003	56	33331	46865	53766	7462	4344	12818	9187	1407
2004	0	7235	23483	29421	48394	4151	8100	9023	4265
2005	182	9632	23236	20602	10237	9783	1014	1194	1430
2006	132	6691	9186	13644	41067	27781	20972	3041	5088
2007	130	34326	17754	6555	14264	30566	21517	13585	4242
2008	0	7898	13039	5427	3219	5688	14832	8142	8968
2009	1923	11508	10475	16586	8332	5688	7514	11793	9443
2010	10074	20339	16331	9957	14608	6322	4322	5388	13199
2011	1667	40587	15782	10333	7190	5071	3164	2611	7225
2012	979	14952	46647	9704	8097	6311	3873	1129	4013
2013	0	13681	18181	53116	11681	7093	5098	4324	5031
2014	0	8705	15144	21063	42229	7130	2944	2854	3511
2015	231	10854	13937	15716	19386	21621	6397	1932	1250
2016	12	8148	3341	3197	2791	2821	3148	739	431
2017	0	1122	11929	4082	2075	1443	1416	767	273
2018	0	1508	3215	6873	5253	3068	844	852	680
2019	1504	1333	1035	2007	3100	1003	214	79	42
2020	145	110	206	234	156	191	118	11	20

Table 5.2.4. Herring in 6.a (North). Total numbers (millions) biomass (thousands of tonnes) mean weights mean lengths and fraction mature by winter ring of herring in the 6.a (N) part not including Clyde and North Channel of the MSHAS survey in July 2020.

Age (ring)	Numbers	Biomass	Maturity	Weight (g)	Length (cm)
0	0	0.0	0.00	0.0	0.0
1	657	41.9	0.00	63.7	19.4
2	579	73.2	0.46	126.3	24.1
3	274	41.3	0.75	150.5	25.3
4	150	25.6	1.00	170.7	26.4
5	83	15.3	1.00	184.3	27.1
6	178	36.0	1.00	201.9	28.0
7	38	8.1	1.00	214.6	28.5
8	13	2.8	1.00	216.5	28.8
9+	10	2.4	1.00	231.1	29.6
Immature	1039	88		85.2	21.0
Mature	943	157.902		167.4	26.2
Total	1982	246	0.48	124.3	23.5

Table 5.2.5. Herring in 6.a (North). Estimates of abundance and SSB for the time-series of the West of Scotland acoustic survey in 6.a (N) not including Clyde and North Channel. Since 2008 this index comes from a spatial subset of the MSHAS survey. Thousands of fish at-age and spawning biomass (SSB tonnes). N.B. In this table "age" refers to number of rings (winter rings in the otolith).

Year/Age	1	2	3	4	5	6	7	8	9+	SSB
1991	338312	294484	327902	367830	488288	176348	98741	89830	58043	410 000
1992	74310	503430	210980	258090	414750	240110	105670	56710	63440	351 460
1993	2357	579320	689510	688740	564850	900410	295610	157870	161450	845 452
1994	494150	542080	607720	285610	306760	268130	406840	173740	131880	533 740
1995	441200	1103400	473300	450300	153000	187200	169200	236700	201700	452 300
1996	41220	576460	802530	329110	95360	60600	77380	78190	114810	370 300
1997	792320	641860	286170	167040	66100	49520	16280	28990	24440	175 000
1998	1221700	794630	666780	471070	179050	79270	28050	13850	36770	375 890
1999	534200	322400	1388000	432000	308000	138700	86500	27600	35400	460 200
2000	447600	316200	337100	899500	393400	247600	199500	95000	65000	444 900
2001	313100	1062000	217700	172800	437500	132600	102800	52400	34700	359 200
2002	424700	436000	1436900	199800	161700	424300	152300	67500	59500	548 800
2003	438800	1039400	932500	1471800	181300	129200	346700	114300	75200	739 200
2004	564000	274500	760200	442300	577200	55700	61800	82200	76300	395 900
2005	50200	243400	230300	423100	245100	152800	12600	39000	26800	222 960
2006	112300	835200	387900	284500	582200	414700	227000	21700	59300	471 700
2007	-	126000	294400	202500	145300	346900	242900	163500	32100	298 860
2008	47840	232570	911950	668870	339920	272230	720860	365890	263740	788 200
2009	345821	186741	264040	430293	373499	219033	186558	499695	456039	578 800
2010	119788	493908	483152	171452	163436	93289	64076	53116	223311	308 055
2011	22239	184919	733384	451487	204324	219863	198768	112646	263185	457 900
2012	792479	179425	728758	471381	240832	107492	106779	56071	104571	374 913
2013	-	136931	319711	599897	161597	69341	60566	24302	37398	256 089
2014	1031086	243227	217650	469032	519032	143402	30318	18677	11449	272 000
2015	0	121640	324964	649835	377636	442135	83103	22556	2086	387 000
2016	0	29593	108126	87773	111676	79130	62045	5530	957	87 907
2017	0	23287	325407	147112	101785	104599	44927	13004	4569	139 000
2018	964099	322798	92037	330580	152548	50636	72276	26636	12549	152 000
2019	3423	49913	77088	41128	137031	85553	14485	16319	19903	76 146
2020	657378	579031	274156	149760	82797	178119	37644	12815	10495	157 902

Table 5.2.6a. Total Abundance and overall biological composition of herring in 6.a North from the industry acoustic survey on FV Ocean Star in 2020. (Figures in bold are weighted averages based on the numbers in each age group.)

Age (WR)	Numbers (mill)	Biomass (kt)	Maturity	Weight (g)	Length (cm)
0	1	0	0.00	27.49	15.00
1	170	12	0.01	69.87	20.39
2	82	11	0.81	133.03	24.51
3	38	6	1.00	156.10	25.82
4	25	5	0.97	202.94	27.71
5	19	4	1.00	207.36	27.88
6	17	4	1.00	221.19	29.27
7	10	2	1.00	212.21	29.06
8	0	0	0.00	0.00	0.00
9	1	0	1.00	245.00	31.00
Immature	185	14		**75.05**	**20.75**
Mature	178	30		**169.17**	**26.31**
Spawning	0	0			
Total	363	44	**0.49**	**121.09**	**23.47**

Table 5.2.6b. Total Abundance and overall biological composition of herring in 6.a North from the industry acoustic survey on FV Alida in 2020. (Figures in bold are weighted averages based on the numbers in each age group.)

Age (WR)	Numbers (mill)	Biomass (kt)	Maturity	Weight (g)	Length (cm)
0	1	0	0.00	27.26	15.00
1	119	8	0.02	70.76	20.41
2	63	8	0.82	133.41	24.46
3	26	4	1.00	156.85	25.76
4	20	4	0.95	195.37	27.36
5	17	4	1.00	212.98	28.09
6	12	2	0.88	207.60	28.06
7	7	2	1.00	217.94	29.38
8	0	0	0.00	0.00	0.00
9	1	0	1.00	245.00	31.00
Immature	131	10		76.02	20.88
Mature	134	23		169.33	26.11
Spawning	0	0			
Total	266	33	0.51	123.20	23.52

Table 5.2.7. Herring in 6.a (North). Weights-at-age in the stock. Units: kg year

age/year	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
1	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090
2	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164
3	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208
4	0.233	0.233	0.233	0.233	0.233	0.233	0.233	0.233	0.233	0.233	0.233	0.233
5	0.246	0.246	0.246	0.246	0.246	0.246	0.246	0.246	0.246	0.246	0.246	0.246
6	0.252	0.252	0.252	0.252	0.252	0.252	0.252	0.252	0.252	0.252	0.252	0.252
7	0.258	0.258	0.258	0.258	0.258	0.258	0.258	0.258	0.258	0.258	0.258	0.258
8	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.269
9	0.292	0.292	0.292	0.292	0.292	0.292	0.292	0.292	0.292	0.292	0.292	0.292

age/year	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
1	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090
2	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164
3	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208
4	0.233	0.233	0.233	0.233	0.233	0.233	0.233	0.233	0.233	0.233	0.233	0.233
5	0.246	0.246	0.246	0.246	0.246	0.246	0.246	0.246	0.246	0.246	0.246	0.246
6	0.252	0.252	0.252	0.252	0.252	0.252	0.252	0.252	0.252	0.252	0.252	0.25
7	0.258	0.258	0.258	0.258	0.258	0.258	0.258	0.258	0.258	0.258	0.258	0.258
8	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.269
9	0.292	0.292	0.292	0.292	0.292	0.292	0.292	0.292	0.292	0.292	0.000	0.000

age/year	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
1	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.068
2	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.152
3	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.186
4	0.233	0.233	0.233	0.233	0.233	0.233	0.233	0.233	0.233	0.233	0.233	0.206
5	0.246	0.246	0.246	0.246	0.246	0.246	0.246	0.246	0.246	0.246	0.246	0.233
6	0.252	0.252	0.252	0.252	0.252	0.252	0.252	0.252	0.252	0.252	0.252	0.253
7	0.258	0.258	0.258	0.258	0.258	0.258	0.258	0.258	0.258	0.258	0.258	0.273
8	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.299
9	0.292	0.292	0.292	0.292	0.292	0.292	0.292	0.292	0.292	0.292	0.292	0.302

age/year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1	0.073	0.052	0.042	0.045	0.054	0.066	0.054	0.062	0.062	0.062	0.064	0.059
2	0.164	0.150	0.144	0.140	0.142	0.138	0.137	0.141	0.132	0.153	0.138	0.138
3	0.196	0.192	0.191	0.180	0.180	0.176	0.166	0.173	0.170	0.177	0.176	0.159
4	0.206	0.220	0.202	0.209	0.199	0.194	0.188	0.183	0.190	0.198	0.190	0.180
5	0.225	0.221	0.225	0.219	0.213	0.214	0.203	0.194	0.198	0.212	0.204	0.189
6	0.234	0.233	0.227	0.222	0.222	0.226	0.219	0.204	0.212	0.215	0.213	0.202
7	0.253	0.241	0.247	0.229	0.231	0.234	0.225	0.211	0.220	0.225	0.217	0.213
8	0.259	0.270	0.260	0.242	0.242	0.225	0.235	0.222	0.236	0.243	0.223	0.214
9	0.276	0.296	0.293	0.263	0.263	0.249	0.245	0.230	0.254	0.259	0.228	0.206

age/year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
1	0.0751	0.075	0.0750	0.055	0.059	0.068	0.057	0.066	0.0637	0.064
2	0.1296	0.135	0.1675	0.172	0.151	0.162	0.132	0.150	0.1550	0.108
3	0.1538	0.166	0.1830	0.191	0.206	0.194	0.160	0.183	0.1650	0.158
4	0.1665	0.185	0.1914	0.208	0.223	0.227	0.208	0.189	0.2020	0.180
5	0.1802	0.192	0.1951	0.214	0.233	0.239	0.236	0.206	0.2100	0.206
6	0.1911	0.204	0.1951	0.214	0.231	0.248	0.245	0.217	0.2360	0.214
7	0.2125	0.211	0.2021	0.221	0.232	0.258	0.238	0.214	0.2430	0.231
8	0.2030	0.224	0.2034	0.224	0.232	0.226	0.222	0.218	0.2450	0.244
9	0.2284	0.231	0.2138	0.238	0.238	0.212	0.253	0.215	0.2540	0.264

age/year	2015	2016	2017	2018	2019	2020
1	0.064	0.064	0.064	0.048	0.098	0.064
2	0.155	0.137	0.135	0.110	0.117	0.126
3	0.183	0.140	0.170	0.155	0.149	0.151
4	0.195	0.175	0.181	0.176	0.179	0.171
5	0.204	0.202	0.198	0.190	0.196	0.184
6	0.211	0.208	0.199	0.210	0.205	0.202
7	0.217	0.209	0.214	0.209	0.217	0.215
8	0.215	0.210	0.223	0.218	0.224	0.217
9	0.220	0.242	0.236	0.222	0.218	0.231

Table 5.2.8. Herring in 6.a (North). Weights-at-age in the catch.Units: kg year

age/year	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
1	0.079	0.079	0.079	0.079	0.079	0.079	0.079	0.079	0.079	0.079	0.079	0.079
2	0.104	0.104	0.104	0.104	0.104	0.104	0.104	0.104	0.104	0.104	0.104	0.104
3	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130
4	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158
5	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164
6	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170
7	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180
8	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183
9	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185	0.185

age/year	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
1	0.079	0.079	0.079	0.079	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090
2	0.104	0.104	0.104	0.104	0.121	0.121	0.121	0.121	0.121	0.121	0.121	0.121
3	0.130	0.130	0.130	0.130	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158
4	0.158	0.158	0.158	0.158	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175
5	0.164	0.164	0.164	0.164	0.186	0.186	0.186	0.186	0.186	0.186	0.186	0.186
6	0.170	0.170	0.170	0.170	0.206	0.206	0.206	0.206	0.206	0.206	0.206	0.206
7	0.180	0.180	0.180	0.180	0.218	0.218	0.218	0.218	0.218	0.218	0.218	0.218
8	0.183	0.183	0.183	0.183	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
9	0.185	0.185	0.185	0.185	0.224	0.224	0.224	0.224	0.224	0.224	0.000	0.000

age/year	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
1	0.090	0.080	0.080	0.080	0.069	0.113	0.073	0.080	0.082	0.079	0.084	0.091
2	0.121	0.140	0.140	0.140	0.103	0.145	0.143	0.112	0.142	0.129	0.118	0.119
3	0.158	0.175	0.175	0.175	0.134	0.173	0.183	0.157	0.145	0.173	0.160	0.183
4	0.175	0.205	0.205	0.205	0.161	0.196	0.211	0.177	0.191	0.182	0.203	0.196
5	0.186	0.231	0.231	0.231	0.182	0.215	0.220	0.203	0.190	0.209	0.211	0.227
6	0.206	0.253	0.253	0.253	0.199	0.230	0.238	0.194	0.213	0.224	0.229	0.219
7	0.218	0.270	0.270	0.270	0.213	0.242	0.241	0.240	0.216	0.228	0.236	0.244
8	0.224	0.284	0.284	0.284	0.223	0.251	0.253	0.213	0.204	0.237	0.261	0.256
9	0.224	0.295	0.295	0.295	0.231	0.258	0.256	0.228	0.243	0.247	0.271	0.256

age/year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
1	0.089	0.083	0.106	0.081	0.089	0.097	0.076	0.0834	0.0490	0.1066	0.0609
2	0.128	0.142	0.142	0.134	0.136	0.138	0.130	0.1373	0.1398	0.1464	0.1448
3	0.158	0.167	0.181	0.178	0.177	0.159	0.158	0.1637	0.1628	0.1625	0.1593
4	0.197	0.190	0.191	0.210	0.205	0.182	0.175	0.1829	0.1828	0.1728	0.1690
5	0.206	0.195	0.198	0.230	0.222	0.199	0.191	0.2014	0.1922	0.1595	0.1852
6	0.228	0.201	0.214	0.233	0.223	0.218	0.210	0.2147	0.1959	0.1780	0.1997
7	0.223	0.244	0.208	0.262	0.219	0.227	0.225	0.2394	0.2047	0.1863	0.1942
8	0.262	0.234	0.227	0.247	0.238	0.212	0.223	0.2812	0.2245	0.2449	0.1854
9	0.263	0.266	0.277	0.291	0.263	0.199	0.226	0.2526	0.2716	0.2802	0.2938

age/year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1	0.0000	0.1084	0.0908	0.1152	0.0000	0.1121	0.0818	0.0613	0.0725	0.0000
2	0.1541	0.1327	0.1667	0.1705	0.1726	0.1549	0.1550	0.1469	0.1441	0.1580
3	0.1732	0.1632	0.1676	0.1881	0.2060	0.2141	0.1883	0.1894	0.1894	0.1746
4	0.1948	0.1845	0.1929	0.1968	0.2310	0.2379	0.2129	0.2178	0.2076	0.1965
5	0.2160	0.2108	0.2076	0.2105	0.2309	0.2457	0.2337	0.2340	0.2161	0.2020
6	0.2197	0.2258	0.2251	0.2214	0.2489	0.2535	0.2394	0.2388	0.2261	0.2124
7	0.1986	0.2341	0.2443	0.2161	0.2529	0.2599	0.2369	0.2470	0.2408	0.2304
8	0.1885	0.2556	0.2615	0.2618	0.2840	0.2549	0.2400	0.2463	0.2817	0.2343
9	0.3030	0.2496	0.2750	0.3030	0.2877	0.2730	0.2549	0.2522	0.2467	0.2476

age	2014	2015	2016	2017	2018	2019	2020
1	0.0000	0.0769	0.100	0.000	0.000	0.089	0.074
2	0.1451	0.1425	0.144	0.137	0.126	0.129	0.125
3	0.1877	0.1795	0.178	0.167	0.151	0.148	0.115
4	0.2030	0.2059	0.204	0.187	0.174	0.182	0.147
5	0.2279	0.2136	0.219	0.204	0.190	0.199	0.180
6	0.2449	0.2307	0.229	0.213	0.208	0.210	0.192
7	0.2608	0.2386	0.237	0.221	0.218	0.220	0.210
8	0.2614	0.2454	0.251	0.233	0.238	0.257	0.140
9	0.2835	0.2685	0.257	0.249	0.246	0.244	0.222

Table 5.2.9. Herring in 6.a (North). Proportion mature. Units: NA year

age/ year	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57
3	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

age	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57
3	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

age	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.57	0.57	0.57	0.57	0.57	0.47	0.93	0.59	0.21	0.76	0.55	0.85	0.57	0.45	0.93
3	0.96	0.96	0.96	0.96	0.96	1.00	0.96	0.93	0.98	0.94	0.95	0.97	0.98	0.92	0.99
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

age	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.92	0.76	0.83	0.84	0.81	1.00	0.98	0.70	0.79	0.46	0.85	0.52	0.18	0.58	0.97	0.89
3	1.00	1.00	0.97	1.00	0.97	1.00	1.00	1.00	1.00	0.92	1.00	0.81	0.73	0.92	0.99	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	1.00	0.98	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

age	2018	2019	2020
1	0.00	0.00	0.00
2	0.48	0.36	0.46
3	0.91	0.95	0.75
4	0.98	1.00	1.00
5	0.98	1.00	1.00
6	1.00	1.00	1.00
7	1.00	1.00	1.00
8	1.00	1.00	1.00
9	1.00	1.00	1.00

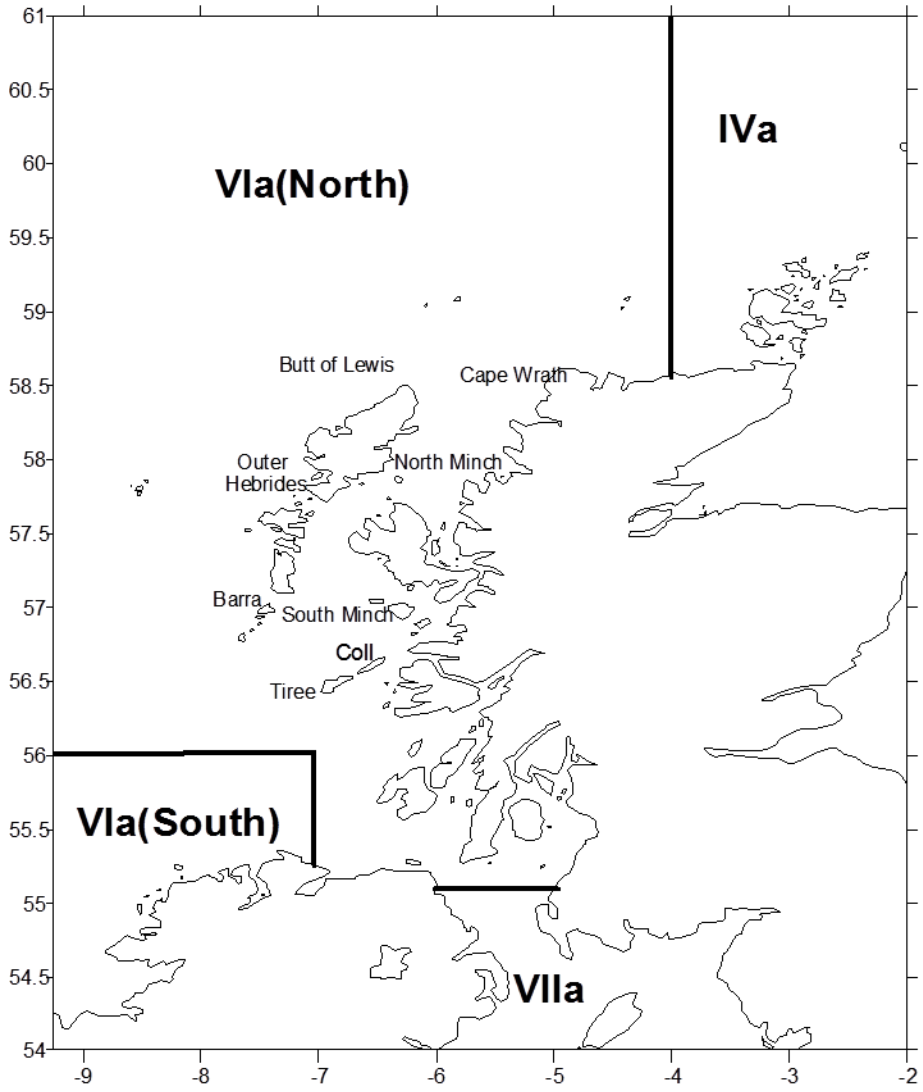

Figure 5.2.1. Location of ICES area 6.a (North) and adjacent areas with place names.

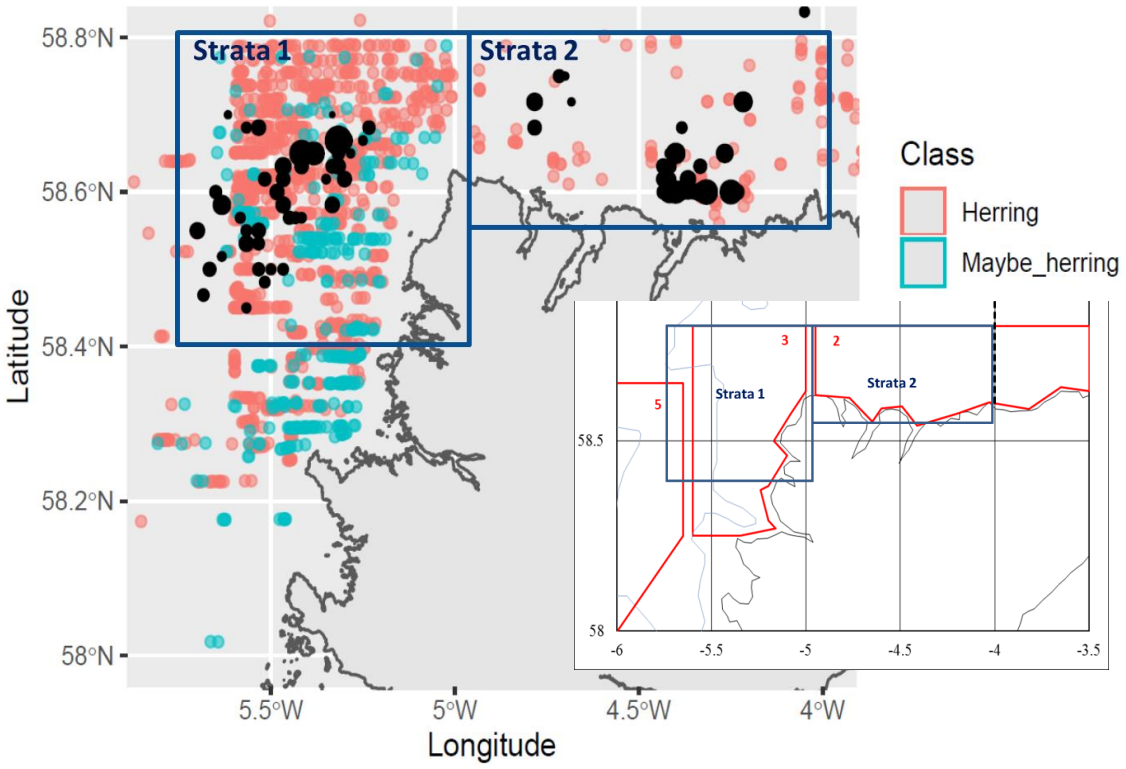

Figure 5.2.2. Acoustic survey recordings of herring and 'maybe herring' marks and locations of commercial catches 2016-2019 in the newly defined Strata 1 and 2, showing overlap with previous survey Areas 2,3,5 (inset) and noting that the distribution of catches reflect spawning grounds. Catches (black dots) scaled proportionally. Acoustic marks are not scaled and denote location only.

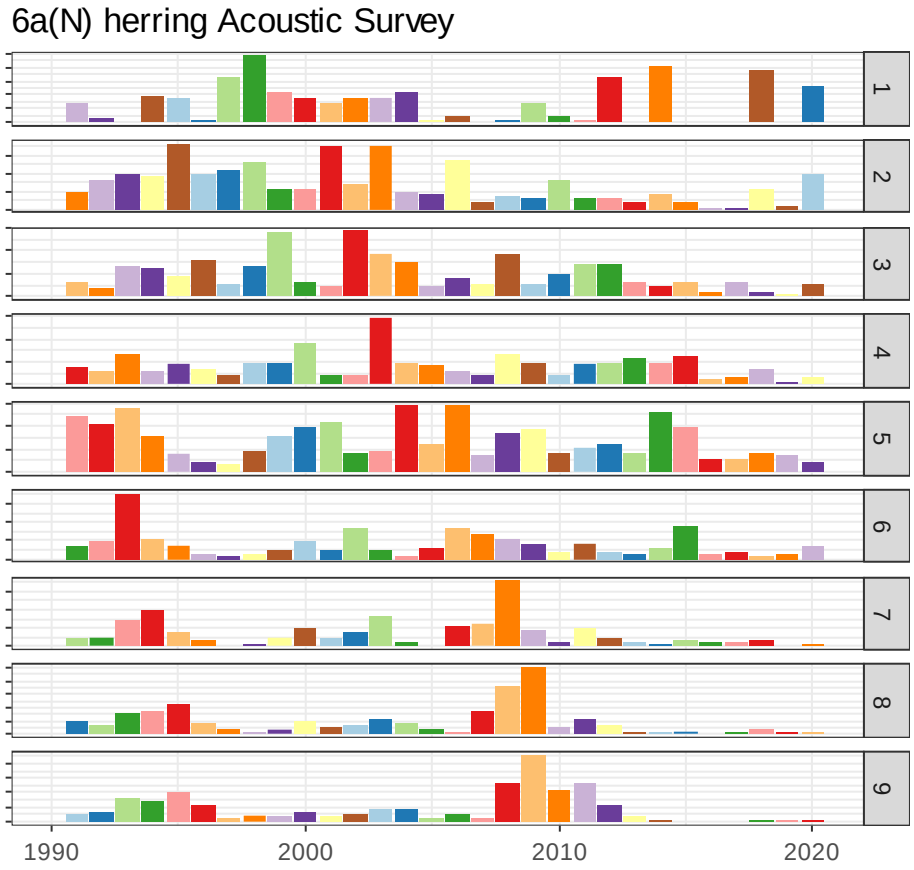

Figure 5.2.3. Herring in 6.a (North). West of Scotland (6.aN) autumn spawning herring subset from MSHAS indices (millions) by age (winter rings) and year from the acoustic surveys 1991–2020. Age 9 includes ages 9 and older.

Figure 5.2.4. Herring in 6.a (North). Mean standardized catch numbers-at-age standardized by age 1957 to 2020. Age 9 includes fish at 9+.

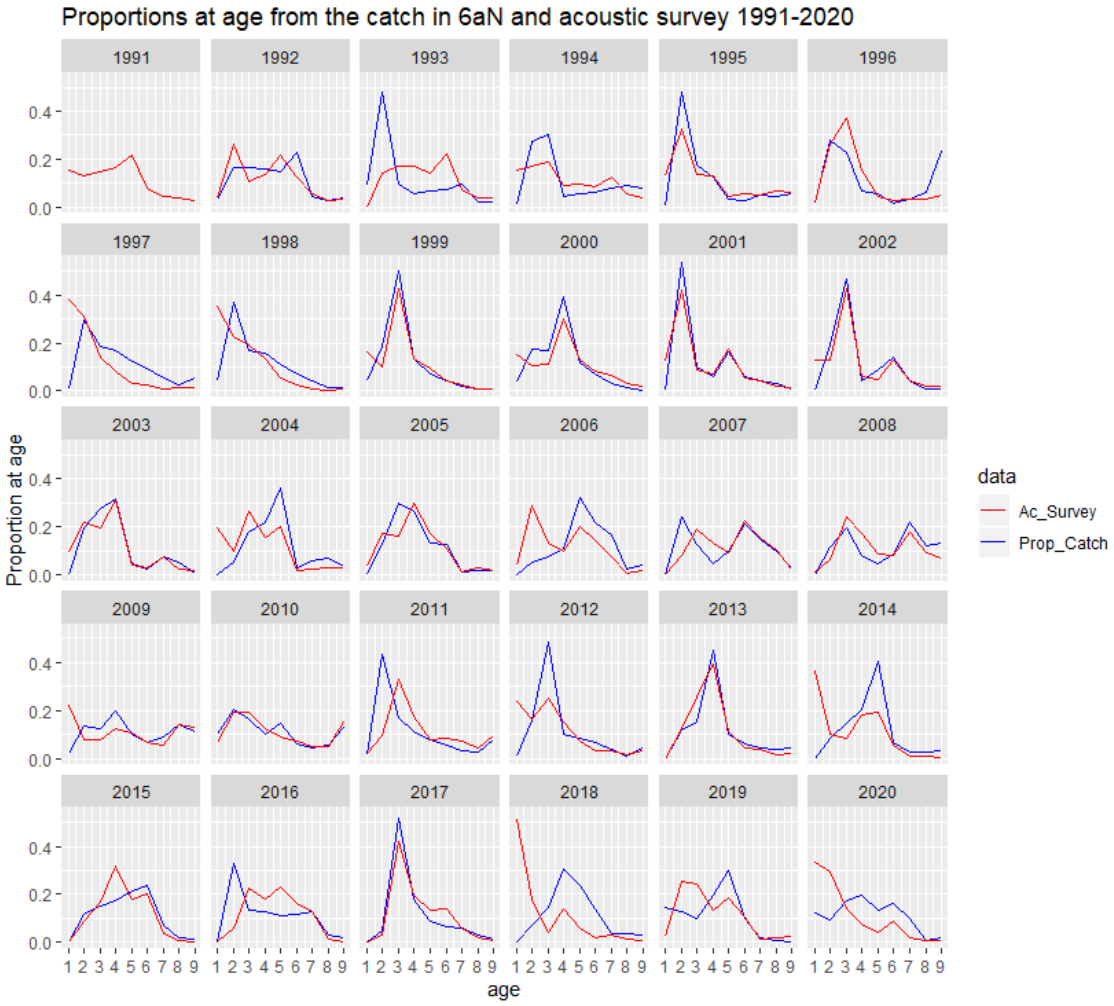

Figure 5.2.5. Herring in 6.a (North). Comparison of the proportions-at-age by year class in the acoustic survey and the catch 1991-2020

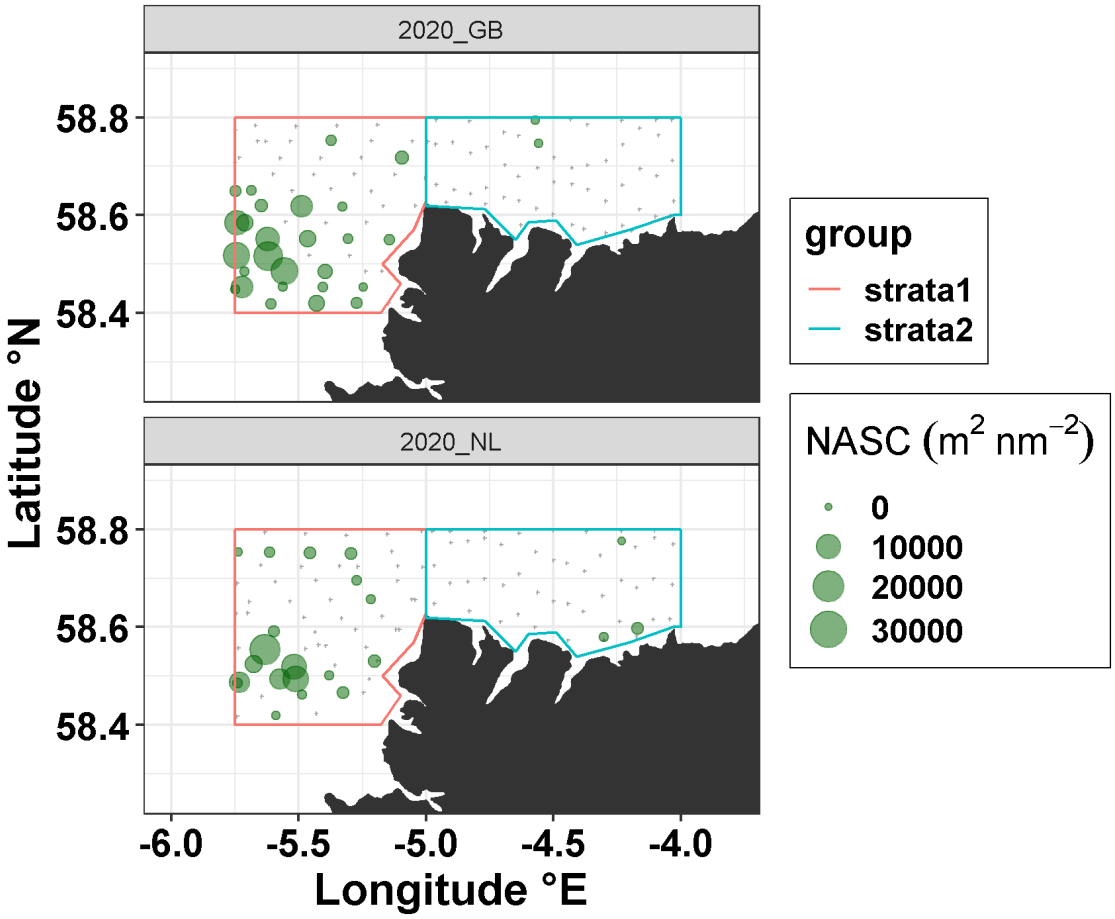

Figure 5.2.6. Relative acoustic densities (NASC m2/mn2) of all fish marks for FV Ocean Star (GB) and FV Alida (NL) recorded during the 2020 6.aN herring industry–science survey. (details in WGIPS 2021).

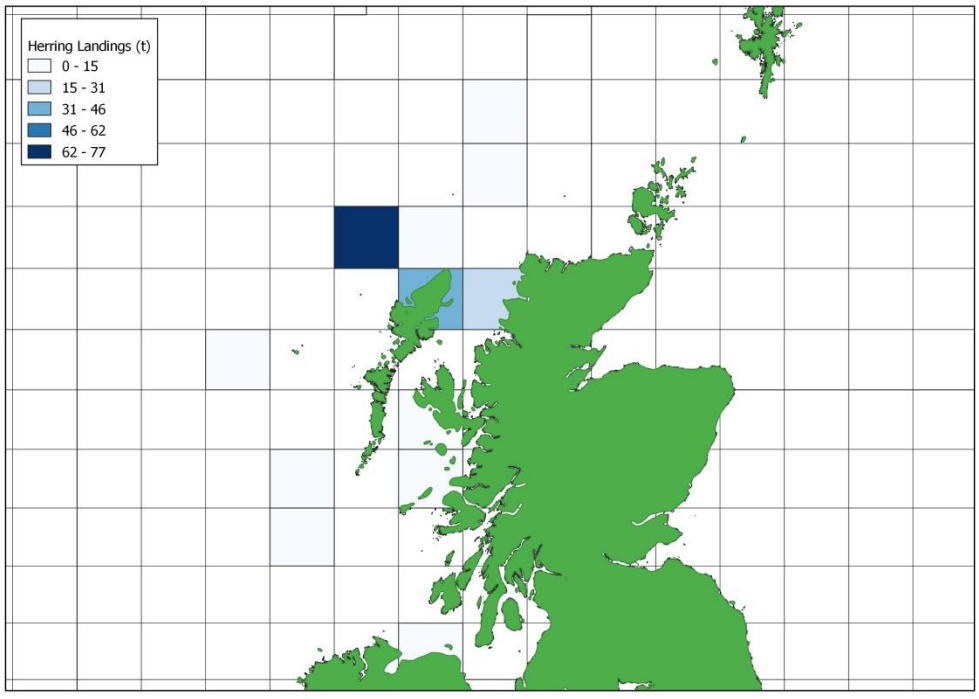

Figure 5.2.7. Herring in 6.a.