

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 rings” 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 2019

The Working Group estimates of landings from 1991–2019 are given in Table 5.1.2. The catch has declined from 19 000 t in 2006 to 1495 t in 2018. Catches increased in 2019 to 1690 t. There is a monitoring TAC in place for the combined stocks in 6.a and 7.b–c. In 2019 the majority of the quota taken close inshore. Catches over time are shown in Figure 5.1.1.

In 2019 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 2019 was allocated on a similar basis to 2016–2018. 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 and information from the industry

The monitoring TAC, introduced in 2016 and continued in 2019, 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 2019 opened up earlier than in 2018 to facilitate the large RSW vessels to catch the fish off-shore but the herring were already inshore at this stage. In 2019 there was also a fishery in January for the first time in recent years.

For 2020 it was agreed that there would be additional data collection in January, February, March and April to determine the extent of spawning during these months. Information provided by the Irish industry reported for January, February and March 2020, very good marks of herring in all the bays around the Donegal coast. Similar reports are available for Lough Foyle, Lough Swilly and all areas of Donegal Bay such as Inver Bay and the approaches to Killybegs. The unanimous view of all the fishers involved in the monitoring fishery in 6.a south, 7 b.c is that they have encountered large quantities of herring along the Donegal coast particularly in period mid-October to mid-March (main period November, December and January) over the last three years. The view is that herring shoals have increased from the 2018/2019 season compared to 2019/2020.

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 1992 in Table 5.1.4. In 2019, the fishery was dominated by 1- 5-ringers accounting for 84% of the catch (Table 5.1.4). Smaller proportions of 6-9 ringers are evident in the catch data and account for 16% of the total. 3 ringers are the dominant age class 24% followed 2 ringers (20%), 1 (15%), 5 (14%), 4 (11%). 2019 is the first year since 2012 1 ringers are well represented in the catch-at-age data. Strong cohorts that were present in 2018 as 4 and 5 ringers were not as strong in 2019.

Proportion-at-age in the catches from the fishery are similar to the catches from the MSHAS for most years. In 2019 the proportions of 1 ringers was higher in the catch than the acoustic survey for the first time. Peak can be seen at 3 and 5 winter rings in both data sources (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 are shown in Table 5.1.7.

Mixing of autumn, winter and spring spawners takes place in this area which may lead to ageing difficulties regarding counting of winter rings.

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 2018 as well as maintaining coverage of the original survey area in 6.a.N.

5.1.3.2 Industry acoustic survey in 2019

An acoustic survey of Atlantic herring *Clupea harengus* was conducted in ICES areas 6aS/7b in Dec 2019 using the research vessel RV *Celtic Voyager* and the fishing vessel MFV *Ros Ard SO745* <http://hdl.handle.net/10793/1498>. This survey is the fourth in a time-series that is hoped will be developed into a long-term index of spawning/prespawning herring in 6aS/7b. The survey design is based on the predicted distribution of this winter spawning herring in this area. Poor weather negatively impacted the survey in 2019, resulting in fewer transect miles completed and fewer strata areas covered than planned. In total, approximately 600nmi of cruise track was completed using 96 transects. This resulted in a total area coverage of approximately 606 nmi², a significant reduction compared to recent years. Parallel transect spacing was set at 3.5nmi for the Donegal Bay strata. Tightly spaced zig-zag transects were used in a relatively small area in Lough Swilly. A Simrad ES-120 7CD (120 kHz) split-beam echosounder was used to collect acoustic raw data. The transducer was mounted on a towed body from the *Celtic Voyager* in Donegal Bay and was pole mounted from the *Ros Ard* in Lough Swilly. Very strong herring marks were evident in Lough Swilly in deepest part of the channel. The herring marks continued for many miles in the upper Swilly, an area where boats in the monitoring fishery had also concentrated effort. There were some herring marks in discrete areas around Drumanoo Head, Bruckless Bay and Inver Bay in the Donegal Bay Strata. Biological samples from the monitoring fishery of herring were used to augment the samples from the survey. Herring samples were taken from boats fishing in Lough Swilly and Inver Bay as close spatially and temporally as possible to the survey in these areas. Herring were dominated overall by 1- and 2-wr fish, (52% of the overall numbers) followed by relatively strong 3- and 5-wr cohorts. The total-stock biomass (TSB) estimate of herring for the combined 6aS/7b area was 25,289 tonnes (Lough Swilly = 19,697 tonnes, Donegal Bay = 5,591 tonnes). This is considered to be a minimum estimate of herring in the 6aS/7b survey area at the time of the survey, and a significant decrease on the previous 3 years surveys. The reduction in the survey area completed as a consequence of the poor weather resulted in the survey not containing the stock in 2019. However, the overall CV estimate on biomass and abundance for the survey area completed is low (~0.17) in 2019. This is driven by

the improved survey design in Lough Swilly, with reduced transect spacing and increased transect miles in this strata. The CV for the Donegal Bay strata is relatively high (0.63), this is mostly caused by the over-reliance on a few acoustic marks of herring in Bruckless and Inver Bays in particular and many transects with little or no herring marks. The survey in 2019 had to be altered due to weather, requiring a change in design and approach. However, the template of focusing on discrete areas was generally successful and may provide a template for future designs, particularly when reduced effort is necessary during poor weather or resource limits.

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 2019 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 most age classes in 2019 relative to 2018.

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 2019 relative to 2018 for younger ages and increased slightly for some older 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-ringings 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. 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.aN, 6.aS and 7.b–c concluded that the assessment would be a combined stock assessment. Details of the combined assessment for 6.a and 7.b–c are outlined in Section 4. No separate assessment is presented in 2020.

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 (6a, 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 6a/7bc is currently being examined using genetics and morphometric techniques. This project will be completed in late 2020. The results of this project will provide information on stock identity and will be used to inform the assessment of herring in this area. It is anticipated that when these results are available it will be possible to carry out a full benchmark on these stocks

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 favourably 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.5 and 7.b–c. Estimated Herring catches in tonnes, 1991–2019. 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.5 and 7.b–c. Estimated Herring catches in tonnes, 1991–2019 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
France		
Germany Fed. Rep.		
Ireland	970	1625
Netherlands		65
UK (N. Ireland)		
UK (England + Wales)		
UK (Scotland)		
Total landings	970	1690
Unallocated/ area misreported	525	
Discards		
WG catch	1495	1690

Table 5.1.3. Herring in divisions 6.a.S and 7.b–c. Catch in numbers-at-age (winter rings) from 1970–2019.

	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

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+
1993	0%	10%	11%	21%	12%	7%	33%	4%	3%
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%

Table 5.1.5. Herring in divisions 6.a.5 and 7.b–c. Mean weights-at-age in the catches 1970–2019.

	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

Table 5.1.6. Herring in divisions 6.a.5 and 7.b–c. Mean weights-at-age in the stock at spawning time 1970–2019.

	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	0.063	0.098	0.124	0.149	0.164	0.166	0.180	0.180	0.175

Table 5.1.7. Herring in divisions 6.a.S and 7.b–c. Sampling intensity of catches in 2019.

Year	Quarter	Landings (t)	No. Samples	No. aged	No. Measured	Aged/1000 t
6.a.S	1	235	5	358	869	1527
6.a.S	4	1391	26	1992	6382	1433

Total	1625	31	2350	7275	1446
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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	22,386
*reduced survey area			

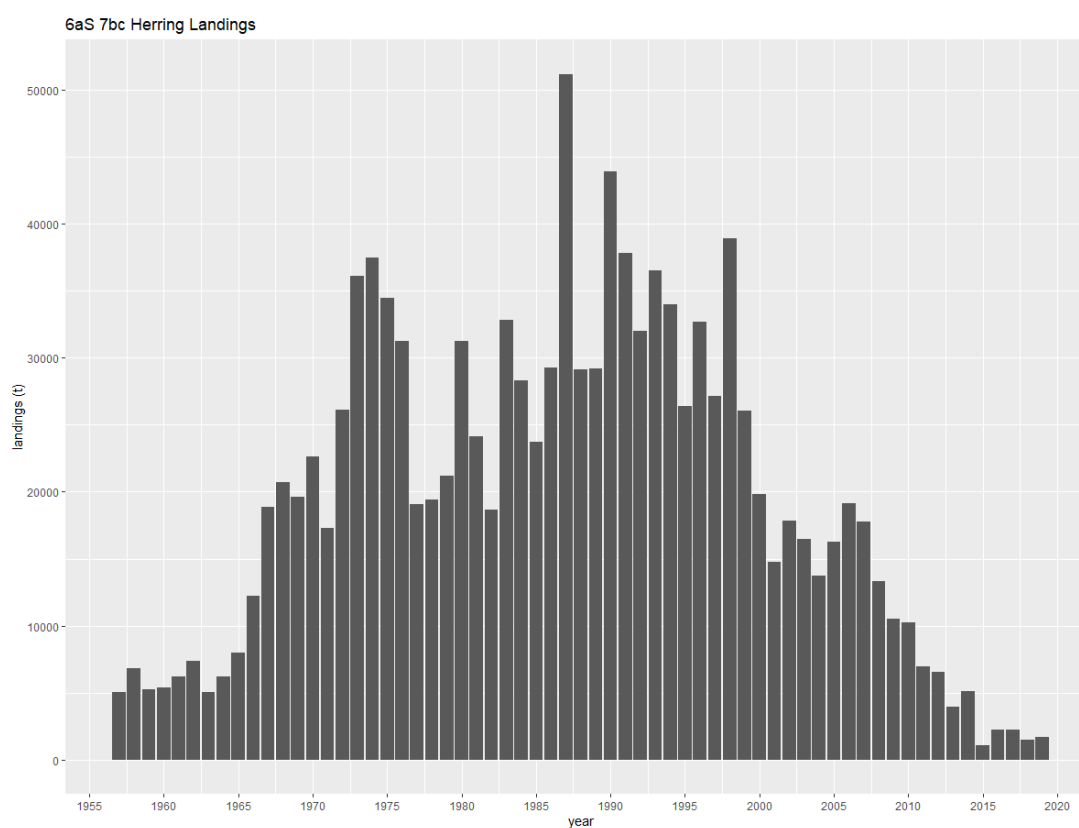


Figure 5.1.1. Herring in divisions 6.a.S and 7.b-c. Working group estimate of catches from 1957–2019.

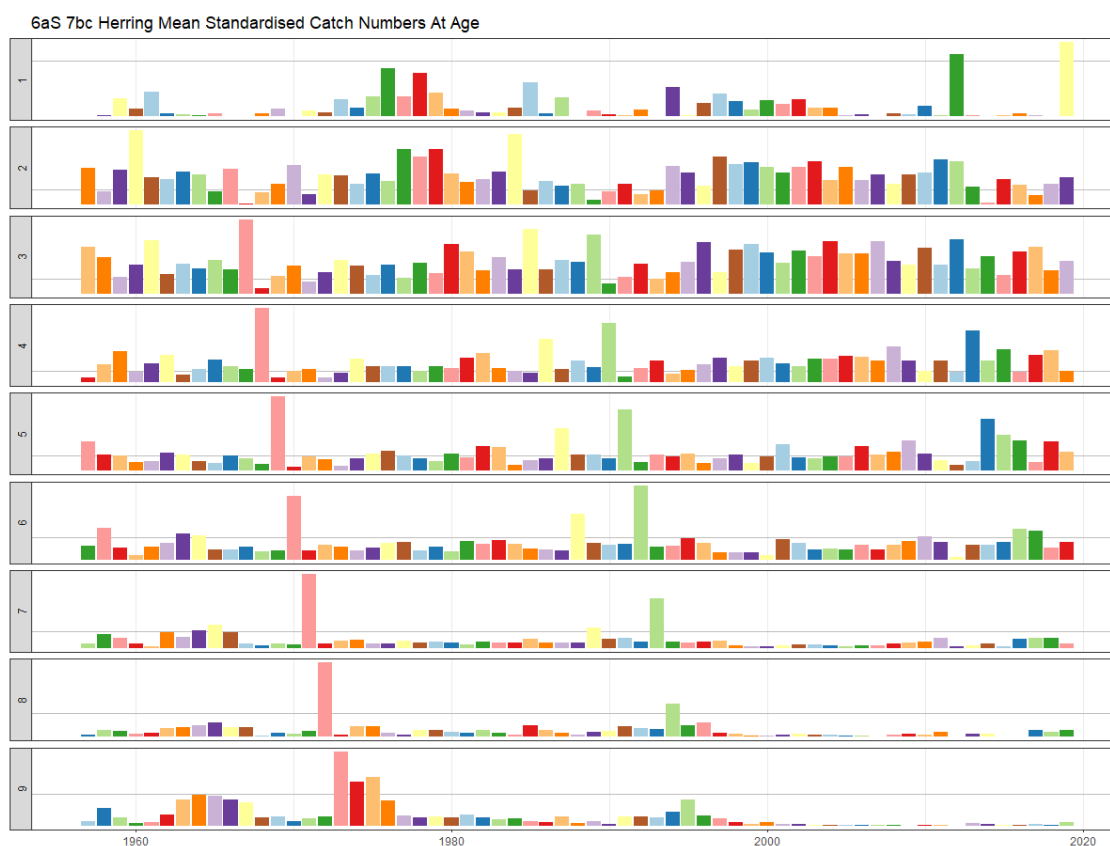


Figure 5.1.2. Herring in divisions 6.a.S and 7.b-c. catch numbers-at-age standardized by year for the fishery 1957–2019.

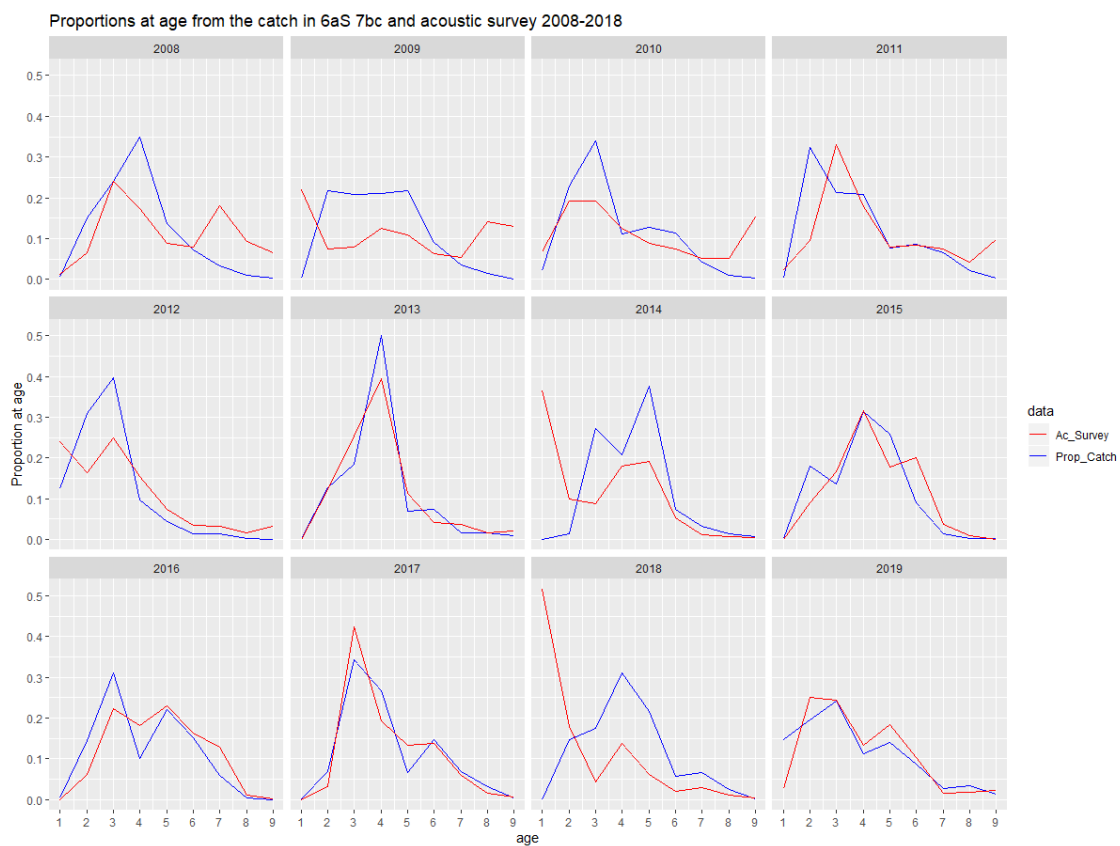


Figure 5.1.4. Herring in divisions 6.a.S and 7.b–c. Percentages-at-age in the 6aS/7.b–c catch and 6aS/7.b–c Malin Shelf acoustic survey (MSHAS) 2008-2019.

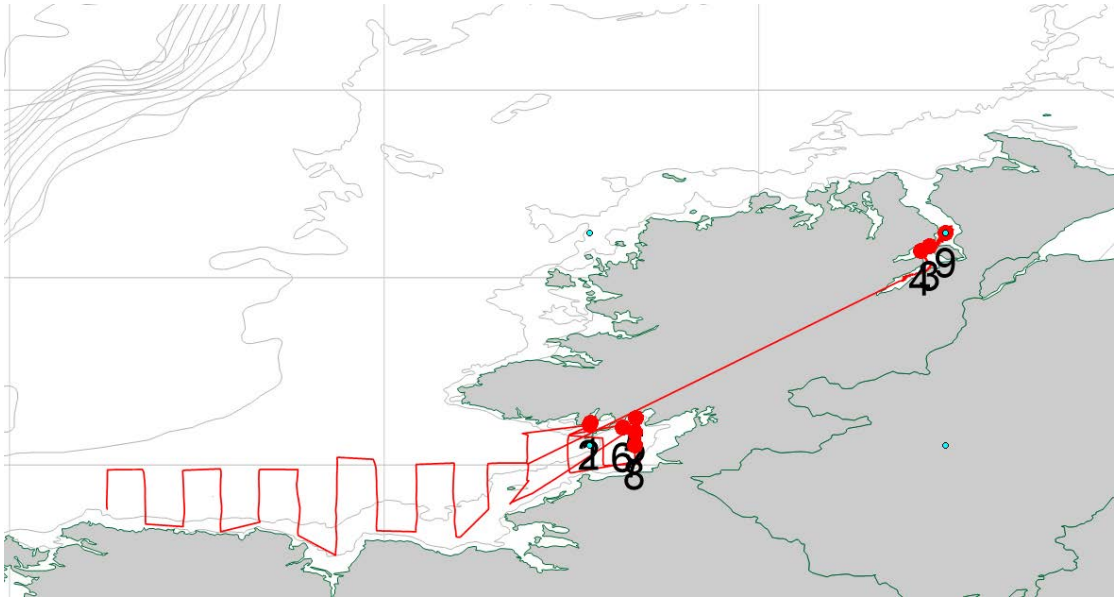


Figure 5.1.5. Herring in divisions 6.a.S and 7.b-c. Acoustic survey in 2019: distribution of biological samples obtained in 6aS.

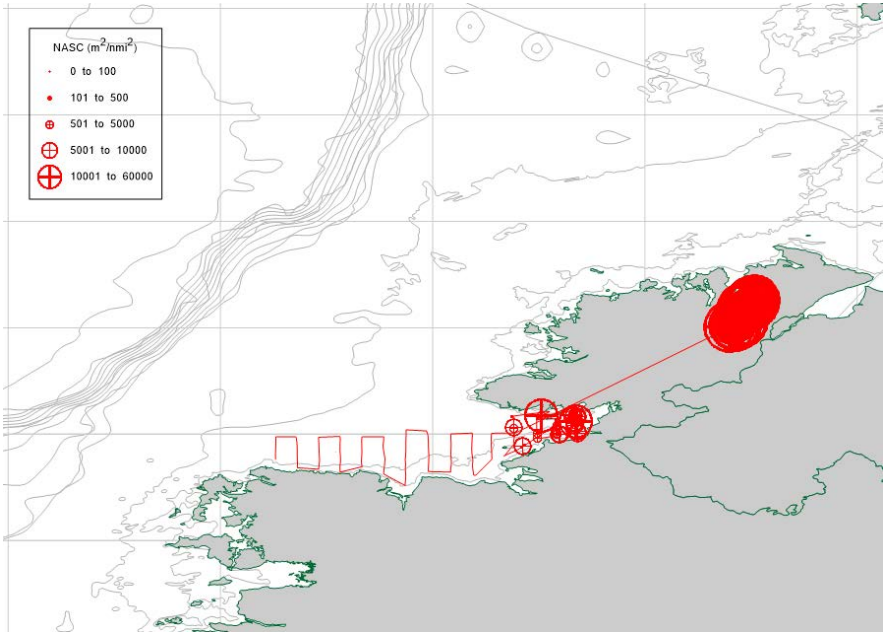


Figure 5.1.6. Herring in division 6.a.S and 7.b-c. Acoustic survey in 2019: NASC of herring.

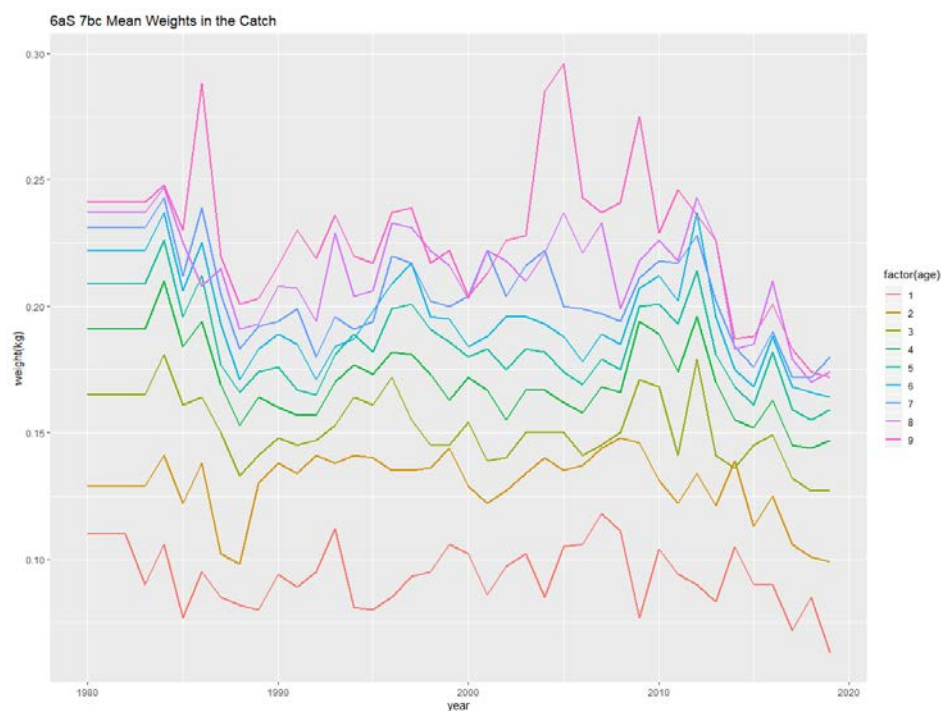


Figure 5.1.7. Herring in divisions 6.a.S and 7.b–c. Mean weights in the catch (kg) by age in winter rings (1980–2019). Prior to 1981 weights were fixed.

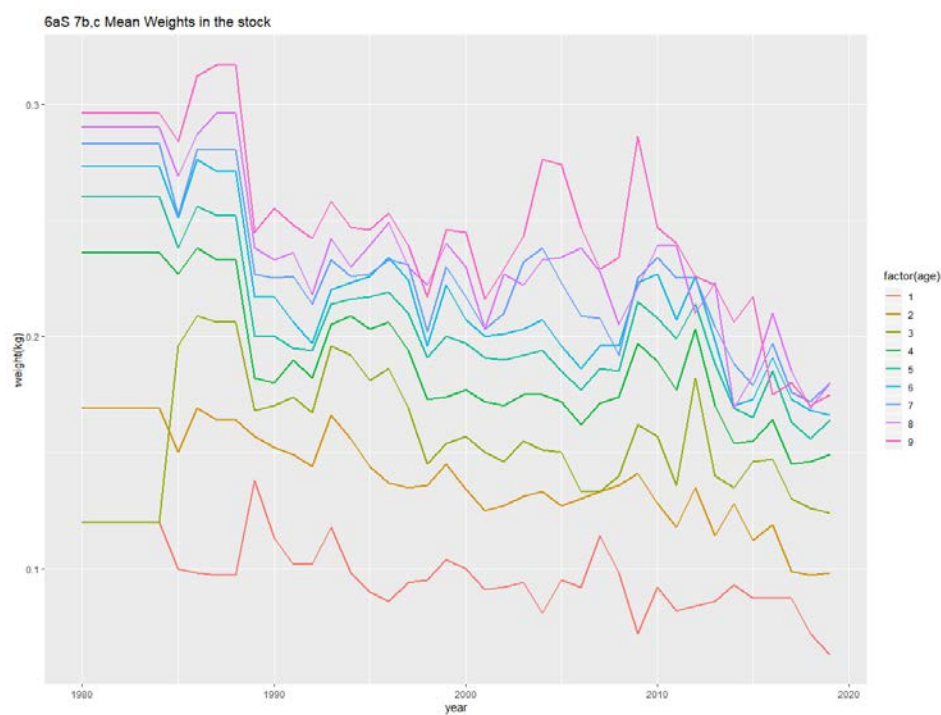


Figure 5.1.8. Herring in divisions 6.a.S and 7.b–c. Mean weights in the stock (kg) at spawning time by age in winter rings (1980–2019). Prior to 1981 weights were fixed.

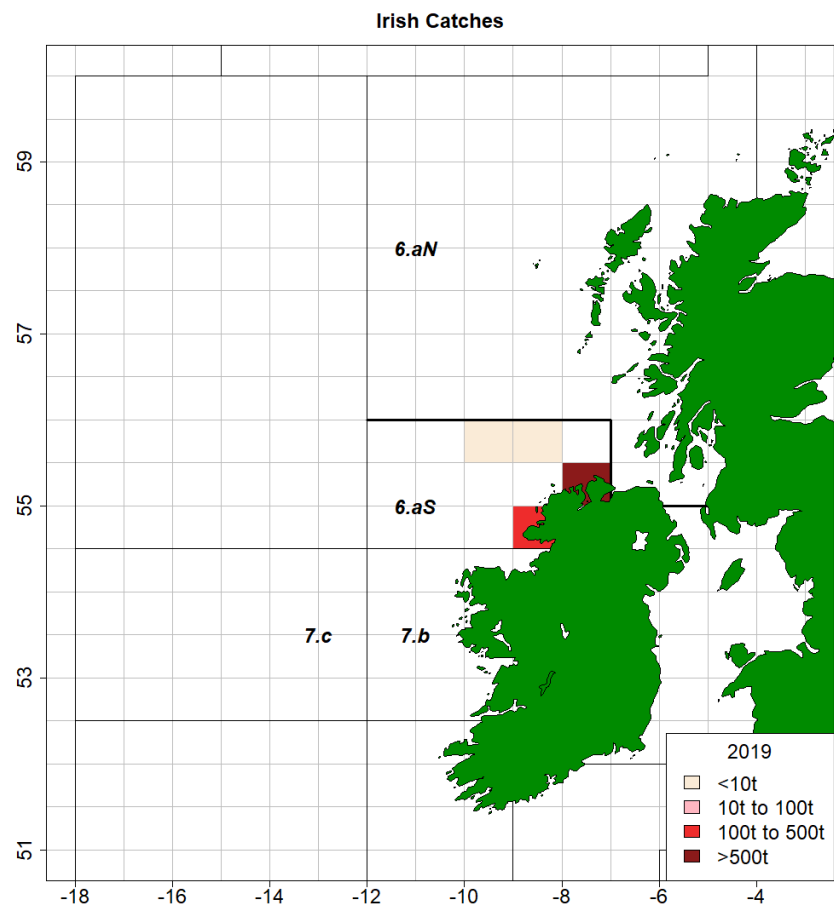


Figure 5.1.9. Herring in divisions 6.a.S and 7.b–c. Irish catches in 2019.

5.2 Herring in Division 6.a (North)

Since 2015 this stock has been combined with herring in 6.aS 7.b–c (Section 5.1) for assessment and advisory purposes. Prior to 2015 6.aN existed as a distinct management unit since 1982 when it was separated from 6.aS 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 2019

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.aN 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.aN 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).

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.aN and 6.aS 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.aN (Figure 5.2.2). Areas 2 and 4 are considered to be active spawning areas and Area 1 a prespawning 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 based on evidence from 2017 from local creel fishers catches of herring on the east side of the North Minch.

Each of the five vessels involved in the survey were assigned specific objectives and provided with a vessel-specific survey manual describing the aims methods and sampling protocols and data recording templates. Systematic acoustic surveys were conducted in areas 2-5 in 6.aN. Samples for genetic data were taken from any samples containing fish where the maturity stage indicated they were close to spawning.

A limited discard derogation was granted to the vessels during the period of the scientific survey to account for any bycatch of other species and any non-retained catches that could not be landed in marketable condition this particularly being the case for the three Scottish refrigerated-sea-water (RSW) vessels.

All Scottish vessels completed their scientific survey duties prior to undertaking any commercial activity. In 2019, evidence of lack of herring on the ground resulted in the Scottish fleet not taking their allocated quota. Alternative arrangements were agreed for vessels to get paid for their work with allocation of scientific quota of other species.

Details of the survey are reported in WGIPS ICES (2020) and Mackinson *et al.* (2020).

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 states *‘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 2019

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.

Implementation of the scientific monitoring fishery in 2019 resulted in the 6.aN TAC being split between the six participating pelagic vessels.

The 2019 official catches of herring in 6.aN total 1739 t compared with the 4170 t monitoring TAC. This included 181 t caught outwith the monitoring fishery primarily as bycatch during the mackerel fishery. There were 3.83 t of non-retained herring catch during the monitoring survey in 2019 under the discard derogation and 2.52 t of other species (Mackinson *et al.*, 2020).

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

Implementation of the scientific monitoring fishery in 2016–2019 resulted in the 6.aN TAC being split between the six participating pelagic vessels. In previous years the TAC would have been taken by a larger number of vessels.

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 ($n = 9$) were used to allocate the age distribution for the 6.aN catches used in the assessment. This number of samples falls short of the requirements for the monitoring fishery as advised by ICES (ICES 2016). The requirement is 1 sample per 120t catch (assuming 1 sample per haul and a haul being on average 120t) meaning a total catch of 1522t in the monitoring fishery should have generated 13 samples. 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. 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 same principles described in that document were followed in 2019.

The 2013 year class (5-ringers in 2019) continue to be prominent both in the catch in 6.aN and in the MSHAS_N acoustic survey index (30% of the catch, 31% of MSHAS_N index figures 5.2.3 and 5.2.4 Table 5.2.5). This year class are also coming through clearly in the neighbouring North Sea autumn spawning stock. This year 1-wr herring was observed in the largest number since 2011 in the catches (15%). Prior to 2011 these were a steady component of the catches (although very small in some years), recently they have only appeared sporadically in the catches. 1-wr herring are observed in the acoustic survey data in 6.aN intermittently only and are rarely representative of year-class strength.

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 2019 survey values are shown in tables 5.2.4 and 5.2.5.

Full details of the 2019 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	04 July–24 July	2 3 4 5 6
Scotia (SCO) MXHR6	27 June–19 July	1 91 (North of 58°30'N) 101 111 121

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 at a historic low at 76 kt in 2019 a significant decrease from the estimate of 152 kt in 2018 (Table 5.2.5).

The proportions of each year class in the catch and the survey are shown in Figure 5.2.5. The large proportion of 5-ringers (2013 year class) observed in the catches was also evident in the

acoustic survey results. The acoustic survey encountered only a very small proportion herring above age 7 (wr) similar to the pattern in the catches.

In 2018, a large proportion of the stock was made up of 1 and 2 winter ring fish (2015 and 2016 year class). These year classes were prominent again this year in the 2019 survey as 2 and 3 winter ringers (29% of total abundance).

WGIPS noted that the results for the 2019 acoustic survey in 6aN was compromised by very little biological sampling. Although the overall biomass are thought to be accurate, the stock composition might not be as samples from the adjacent North Sea survey was used to inform this for the Northern most strata.

5.2.3.2 Acoustic survey- 6.a Herring industry–science survey 2019

An acoustic survey was undertaken 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 pre-spawning/ spawning herring in 6.aN.

Similar to 2018, a notable feature of the 2019 was a predominance in Area 5 (East side of Lewis) of young herring mixed with sprat. Horse mackerel were also recorded again, often in close proximity with herring marks and mixed diffuse aggregations of sprat. Mackerel were found in abundance distributed throughout the area, being caught in every survey haul. Total herring biomass was estimated to be 76 000 t (Table 5.2.6, figures 5.2.6, 5.2.7 and 5.2.8). The survey methods and results were reviewed by ICES WGIPS (2020) who conclude that while the survey provided a reliable estimate of the minimum biomass of mature herring at age observed in survey areas, it did not provide a reliable estimate of the minimum spawning biomass, because many fish sampled in 2019 were still in the maturing stage, and because in area 2 in particular the lack of any biological samples meant that biological data had to be inferred from another survey area. The survey provides a fourth datapoint 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 2020a) and are given in Table 5.2.4 (for the current year). The weights-at-age in the stock in 2019 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 2019 were also similar for all age groups compared to recent years. .

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 2019 the level of maturity for 2 winter ring fish continued the decreasing trend observed since 2017 to only 36% mature. 3 winter ring fish were 95% which is in line with 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 2019 the proportion of 3-ringers was low in the catches but 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.aN 6.aS 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 2020 assessment for 6.a (combined) and 7.b–c are outlined in Section 5.6 of this report.

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. The 2008 year class appears to be the only strong year class since 2000 from both the catch data and acoustic survey (Figure 5.2.3). The 2013 year class (5-wr in 2019) was strong in the 2016 catches and again in the 2017, 2018 and 2019 in both the catches and survey. 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 the last couple of years.

The acoustic survey index has been decreasing steadily since 2008. Although the 2017 and 2018 estimates were nearly double of 2016 the stock still remains at a very low level compared to the time-series overall and the 2020 value was the lowest on record for this stock.

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 B_{lim} value. The working group advocates maintaining separate management of each component.

A monitoring TAC of 4170 t was instated since 2016 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 programme has recorded occasional catches of seals and zero catches of cetaceans in the past. The Scottish pelagic discard observer programme 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.aN. 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 1991–2019. 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
Denmark	39	71
Faroes		
France	7	46**
Germany	17	2
Ireland	84	37
Lithuania		
Norway	4	3
Netherlands	1000	653
UK	2911	928
Unallocated		
Discards*		
Total	4063	1739
Area-Misreported		
WG Estimate	4063	1739
Source (WG)	2019	2020

* 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 2019.

Country	Quarter	Sampled Catch (t)	Official Catch (t)	No. Hauls	No. of samples	No. measured	No. aged	SOP
UK (Sco)	Q1	0	11	-	-	-	-	0%
	Q3	170	170	3	3	521	184	100%
	Q4	0	5	-	-	-	-	0%
UK (NI)	Q4	0	19	-	-	-	-	0%
UK(E&W)	Q4	723	723	8	4	922	295	100%
Ireland	Q1	0	27	-	-	-	-	0%
	Q4	0	10	-	-	-	-	0%
Netherlands	Q1	0	19	-	-	-	-	0%
	Q3	629	629	9	2*	200	90*	100%
	Q4	0	5	-	-	-	-	0%
Denmark	Q1	0	45	-	-	-	-	0%
	Q4	0	26	-	-	-	-	0%
Others	All	0	5	-	-	-	-	0%
Total		1522	1739	20	9	1643	569	88%

*4 hauls were fully sampled, however due to uncertainty surrounding the quality of the data from 2 of these only 2 hauls were used in the raising of commercial catches.

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

Units: Thousands

Units : thousands

year

age 1957 1958 1959 1960 1961 1962 1963 1964 1965 1966 1967

1 6496 15616 53092 3561 13081 55048 11796 26546 299483 211675 207947

2 74622 30980 67972 102124 45195 92805 78247 82611 19767 500853 27416

3 58086 145394 35263 60290 61619 22278 53455 70076 62642 33456 218689

4 25762 39070 116390 22781 33125 67454 11859 26680 59375 60502 37069

5 33979 24908 24946 48881 22501 44357 40517 7283 22265 40908 39246

6 19890 27630 17332 11631 12412 19759 26170 24227 5120 19344 29793

7 8885 17405 16999 10347 5345 24139 8687 18637 22891 5563 11770

8 1427 9857 7372 6346 4814 6147 13662 8797 18925 17811 5533

9 4423 7159 8595 4617 2582 7082 6088 15103 19531 27083 25799

year

age 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978

1 220255 37706 238226 207711 534963 51170 309016 172879 69053 34836 22525
 2 94438 92561 99014 335083 621496 235627 124944 202087 319604 47739 46284
 3 20998 71907 253719 412816 175137 808267 151025 89066 101548 95834 20587
 4 159122 23314 111897 302208 54205 131484 519178 63701 35502 22117 40692
 5 13988 211243 27741 101957 66714 63071 82466 188202 25195 10083 6879
 6 23582 21011 142399 25557 25716 54642 49683 30601 76289 12211 3833
 7 15677 42762 21609 154424 10342 18242 34629 12297 10918 20992 2100
 8 6377 26031 27073 16818 55763 6506 22470 13121 3914 2758 6278
 9 10814 26207 24082 31999 16631 32223 21042 13698 12014 1486 1544

year

age	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1	247	2692	36740	13304	81923	2207	40794	33768	19463	1708	6216
2	142	279	77961	250010	77810	188778	68845	154963	65954	119376	36763
3	77	95	105600	72179	92743	49828	148399	86072	45463	41735	109501
4	19	51	61341	93544	29262	35001	17214	118860	32025	28421	18923
5	13	13	21473	58452	42535	14948	15211	18836	50119	19761	18109
6	8	9	12623	23580	27318	11366	6631	18000	8429	28555	7589
7	4	8	11583	11516	14709	9300	6907	2578	7307	3252	15012
8	1	1	1309	13814	8437	4427	3323	1427	3508	2222	1622
9	0	0	1326	4027	8484	1959	2189	1971	5983	2360	3505

year

age	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	14294	26396	5253	17719	1728	266	1952	1193	9092	7635	4511.46
2	40867	23013	24469	95288	36554	82176	37854	55810	74167	35252	22960.61
3	40779	25229	24922	18710	40193	30398	30899	34966	34571	93910	21825.16
4	74279	28212	23733	10978	6007	21272	9219	31657	31905	25078	51420.22
5	26520	37517	21817	13269	7433	5376	7508	23118	22872	13364	15504.75
6	13305	13533	33869	14801	8101	4205	2501	17500	14372	7529	9002.21
7	9878	7581	6351	19186	10515	8805	4700	10331	8641	3251	3897.69
8	21456	6892	4317	4711	12158	7971	8458	5213	2825	1257	1835.56
9	5522	4456	5511	3740	10206	9787	31108	9883	3327	1089	576.39

year

age	2001	2002	2003	2004	2005	2006	2007	2008
1	147.07	992.20	56.11	0.00	182.50	132.46	130.75	0.00
2	83318.40	38481.61	33331.96	7235.79	9632.71	6691.49	34326.00	7898.43
3	15368.56	93975.05	46865.58	23483.32	23236.71	9186.07	17754.83	13039.08
4	9569.99	9014.40	53766.66	29421.79	20602.39	13644.88	6555.14	5427.59
5	25175.08	18113.71	7462.98	48394.28	10237.93	41067.79	14264.99	3219.52
6	9544.89	28016.08	4344.55	4151.94	9783.17	27781.86	30566.16	5688.56
7	6813.78	9040.10	12818.38	8100.36	1014.99	20972.98	21517.07	14832.27
8	4741.98	1547.87	9187.62	9023.67	1194.95	3041.71	13585.45	8142.31
9	1028.78	1422.68	1407.96	4265.93	1430.76	5088.99	4242.60	8968.60

year

age	2009	2010	2011	2012	2013	2014	2015	2016
1	1923.62	10074.12	1667.19	979.53	0.00	0.00	231.18	12
2	11508.54	20339.85	40587.92	14952.63	13681.14	8705.73	10854.96	8148
3	10475.63	16331.31	15782.93	46647.39	18181.74	15144.82	13937.56	3341
4	16586.96	9957.96	10333.90	9704.45	53116.88	21063.66	15716.60	3197
5	8332.17	14608.15	7190.29	8097.30	11681.99	42229.47	19386.70	2791
6	5688.68	6322.33	5071.43	6311.66	7093.01	7130.95	21621.33	2821

7	7514.70	4322.24	3164.16	3873.67	5098.64	2944.09	6397.35	3148
8	11793.98	5388.91	2611.38	1129.80	4324.63	2854.21	1932.73	739
9	9443.85	13199.28	7225.68	4013.80	5031.77	3511.43	1250.55	431
year								
age	2017	2018	2019					
1	0.00	0.00	1504.48					
2	1122.16	1508.98	1333.57					
3	11929.71	3215.53	1035.12					
4	4082.50	6873.26	2007.72					
5	2075.35	5253.61	3100.51					
6	1443.79	3068.25	1003.19					
7	1416.35	844.50	214.54					
8	767.37	852.31	79.03					
9	273.34	680.89	42.01					

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 6a (N) part not including Clyde and North Channel of the MSHAS survey in July 2019.

Age (ring)	Numbers	Biomass	Maturity	Weight (g)	Length (cm)
0	0	0.0	0.00	0.0	0.0
1	3	0.3	0.00	98.1	22.2
2	50	5.8	0.36	117.0	23.4
3	77	11.6	0.95	149.8	25.4
4	41	7.4	1.00	179.0	27.0
5	137	26.8	1.00	195.8	27.8
6	86	17.6	1.00	205.4	28.2
7	14	3.1	1.00	216.9	29.0
8	16	3.6	1.00	223.5	29.3
9+	20	4.3	1.00	218.1	28.9
Immature	39	4		114.3	23.1
Mature	406	76		187.7	27.4
Total	445	81	0.91	181.3	27.0

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
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Table 5.2.6. Total Abundance and overall biological composition of herring in 6.a North from the industry acoustic survey on FV Pathway in 2019. (Figures in bold are weighted averages based on the numbers in each age group.)

Age (yr)	Numbers (mill)	Biomass (kt)	Maturity	Mean Weight (g)	Mean Length (cm)
0	263	2.7	0.00	10.4	11.3
1	131	1.5	0.00	11.3	11.7
2	449	31.5	0.01	70.2	19.9
3	156	16.9	0.60	108.2	22.5
4	22	3.8	1.00	177.9	26.5
5	74	15.9	1.00	215.0	28.1
6	15	3.4	1.00	230.6	29.1
7	0	0.1	1.00	256.0	32.0
8	1	0.3	1.00	262.3	30.7
9+	0	0.0			
Immature	902	41		45.7	16.3
Mature	209	35		167.0	25.6
Total	1112	76	0.19	68.5	18.1

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

Units : kg

year

age 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

2 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

4 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

6 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

8 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

year

age 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

2 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

4 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

6 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 0.000 0.000

year

age 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

year

age 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

year

age 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 0.06366667 0.064
 2 0.1296 0.135 0.1675 0.172 0.151 0.162 0.132 0.150 0.15500000 0.108
 3 0.1538 0.166 0.1830 0.191 0.206 0.194 0.160 0.183 0.16500000 0.158
 4 0.1665 0.185 0.1914 0.208 0.223 0.227 0.208 0.189 0.20200000 0.180
 5 0.1802 0.192 0.1951 0.214 0.233 0.239 0.236 0.206 0.21000000 0.206
 6 0.1911 0.204 0.1951 0.214 0.231 0.248 0.245 0.217 0.23600000 0.214
 7 0.2125 0.211 0.2021 0.221 0.232 0.258 0.238 0.214 0.24300000 0.231
 8 0.2030 0.224 0.2034 0.224 0.232 0.226 0.222 0.218 0.24500000 0.244
 9 0.2284 0.231 0.2138 0.238 0.238 0.212 0.253 0.215 0.25400000 0.264

year

age 2015 2016 2017 2018 2019

1 0.06373333 0.0638 0.0638 0.0478 0.098
 2 0.15500000 0.1370 0.1350 0.1100 0.117
 3 0.18300000 0.1400 0.1700 0.1550 0.149
 4 0.19500000 0.1750 0.1810 0.1761 0.179
 5 0.20400000 0.2020 0.1980 0.1901 0.196
 6 0.21100000 0.2080 0.1990 0.2097 0.205
 7 0.21700000 0.2090 0.2140 0.2094 0.217
 8 0.21500000 0.2100 0.2230 0.2180 0.224
 9 0.22000000 0.2420 0.2360 0.2222 0.218

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

Units : kg

year												
age	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
year												
age	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
year												
age	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
year												
age	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	
year												
age	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	0.1580	0.1667	0.1705	0.1726	0.1549	0.1550	0.1469	0.1441		

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

year

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

Table 5.2.9. Herring in 6.a (North). Proportion mature.

Units : NA

year

[illegible]

year

[illegible]

year

[illegible]

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

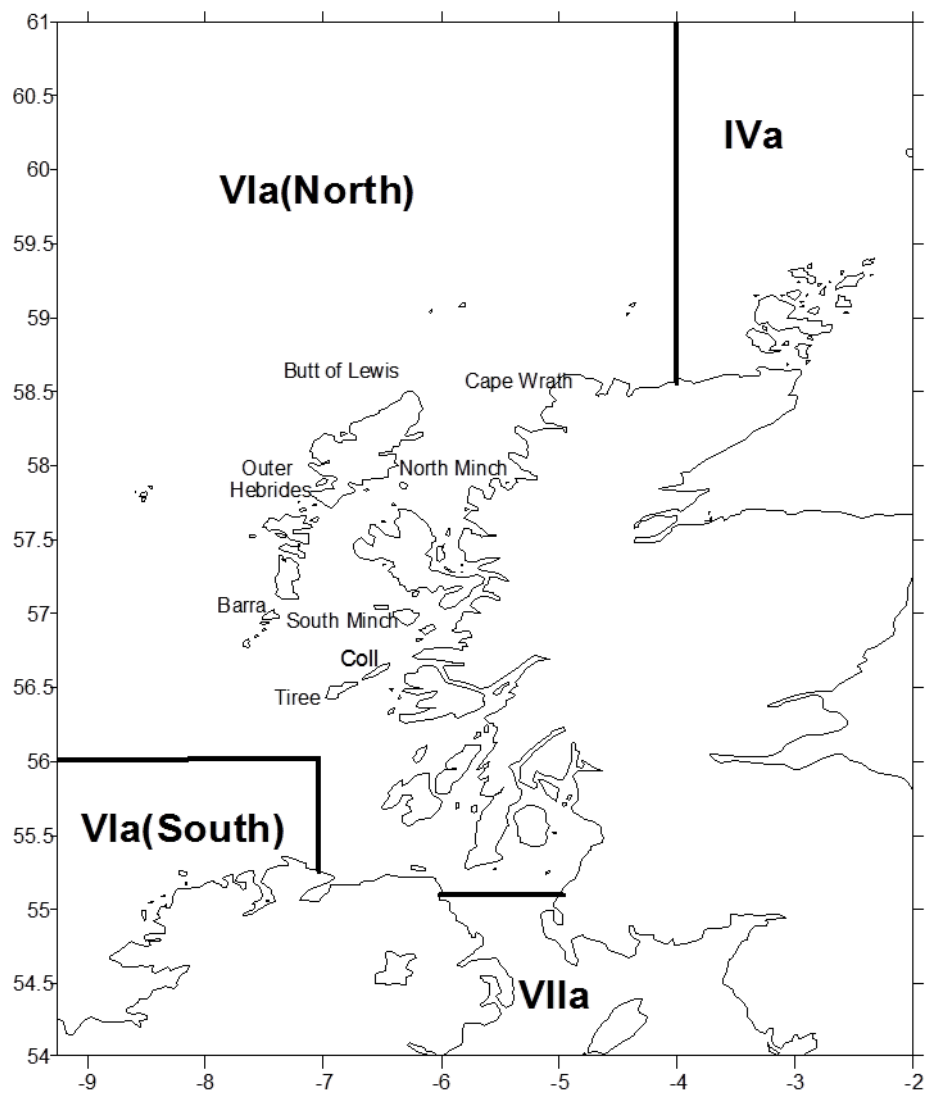


Figure 5.2.1. Location of ICES area 6.a (North) and adjacent areas with place names.

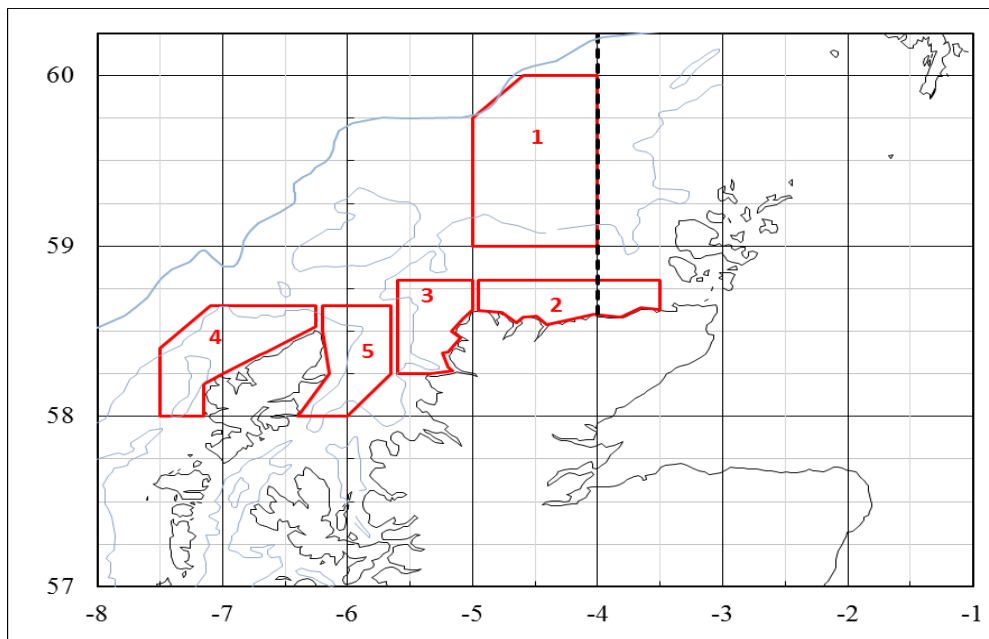


Figure 5.2.2. Planned survey areas used in the 6.a North surveys. Area 1- North prespawning mixing area Area 2 -East of cape Wrath Area 3 – The Minch Area 4 – Outer Hebrides Area 5 – east Minch.

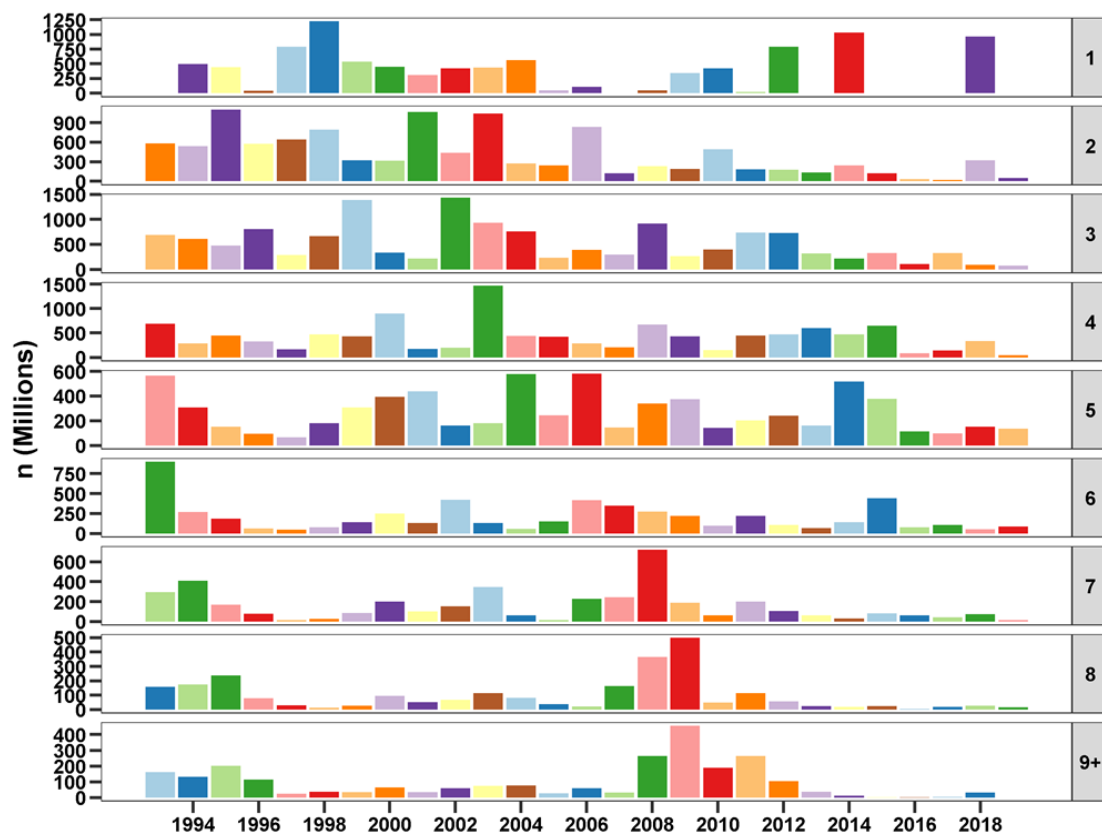


Figure 5.2.3. Herring in 6.a (North). West of Scotland (6.aN) autumn spawning herring subset from MSHAS indices (millions) by age (winter rings) and year from the acoustic surveys 1993–2019. Age 9+ includes ages 9 and older.

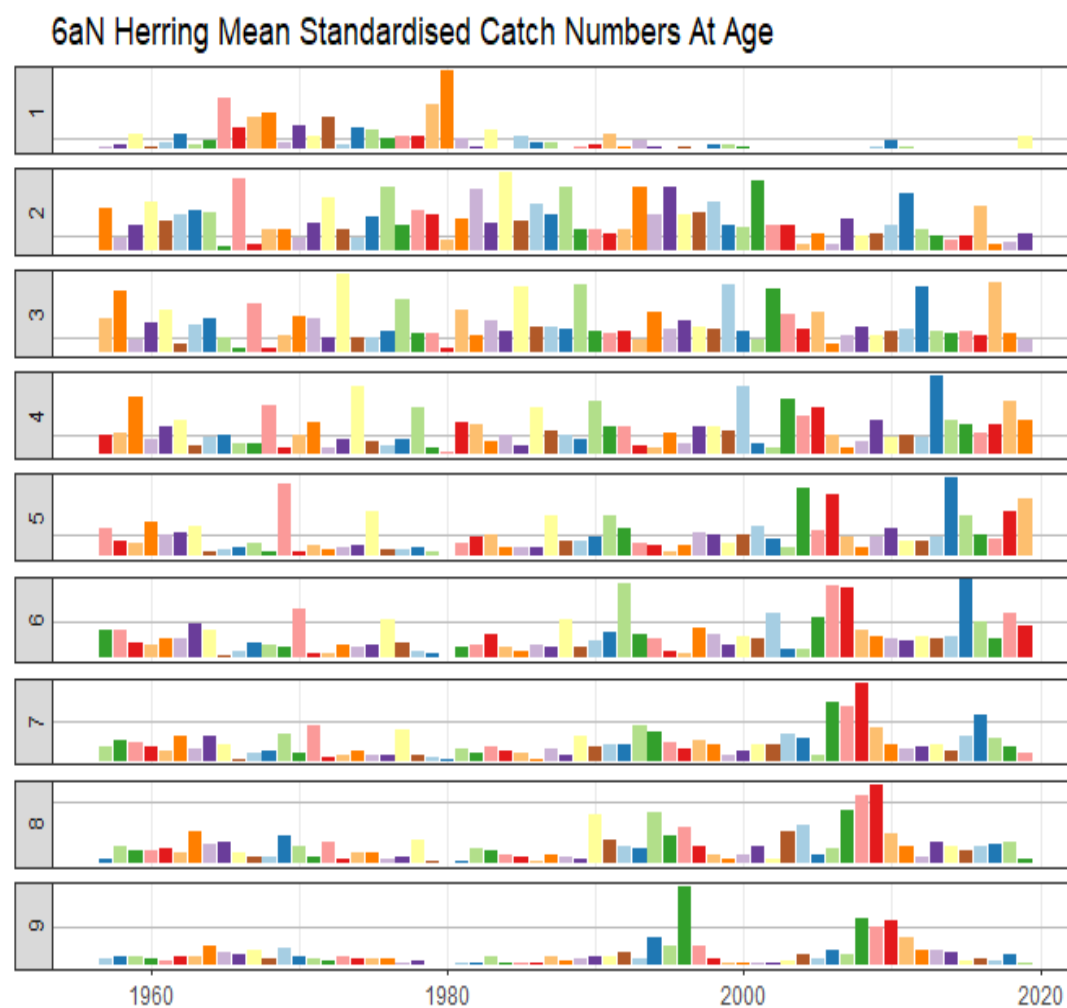


Figure 5.2.4. Herring in 6.a (North). Mean standardized catch numbers-at-age standardized by age 1957 to 2019

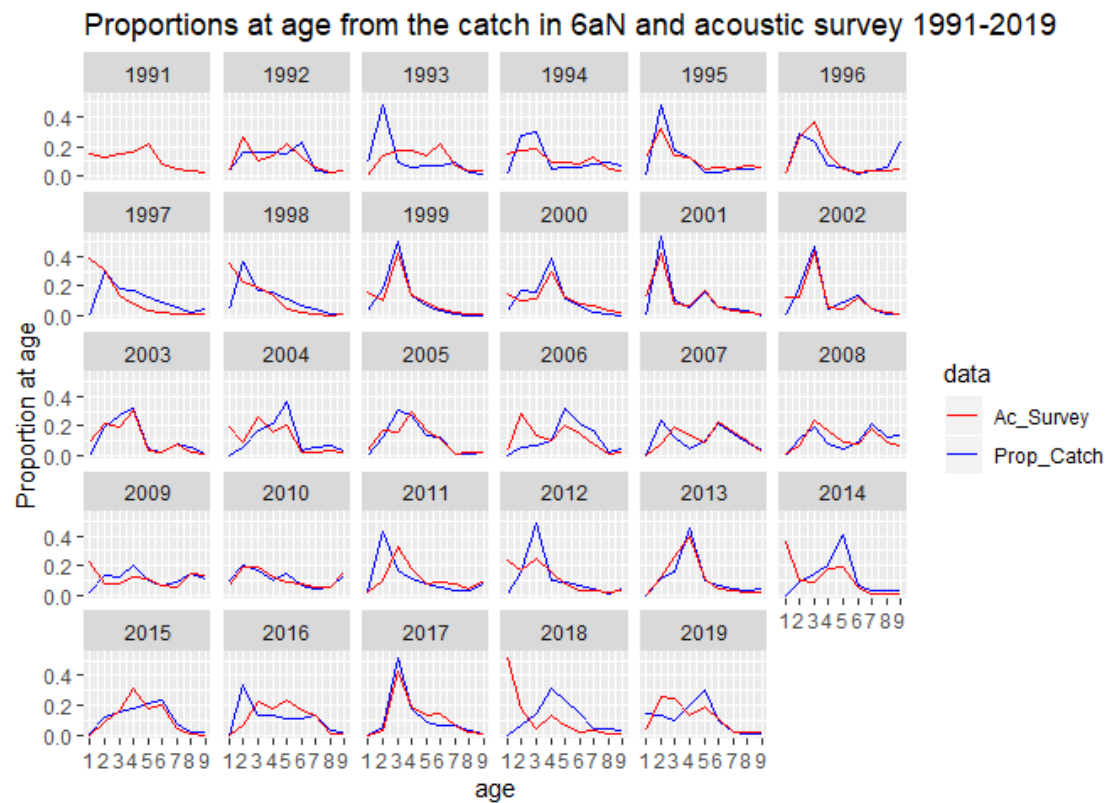


Figure 5.2.5. Herring in 6.a (North). Comparison of the proportions-at-age by year class in the acoustic survey and the catch 1991-2019

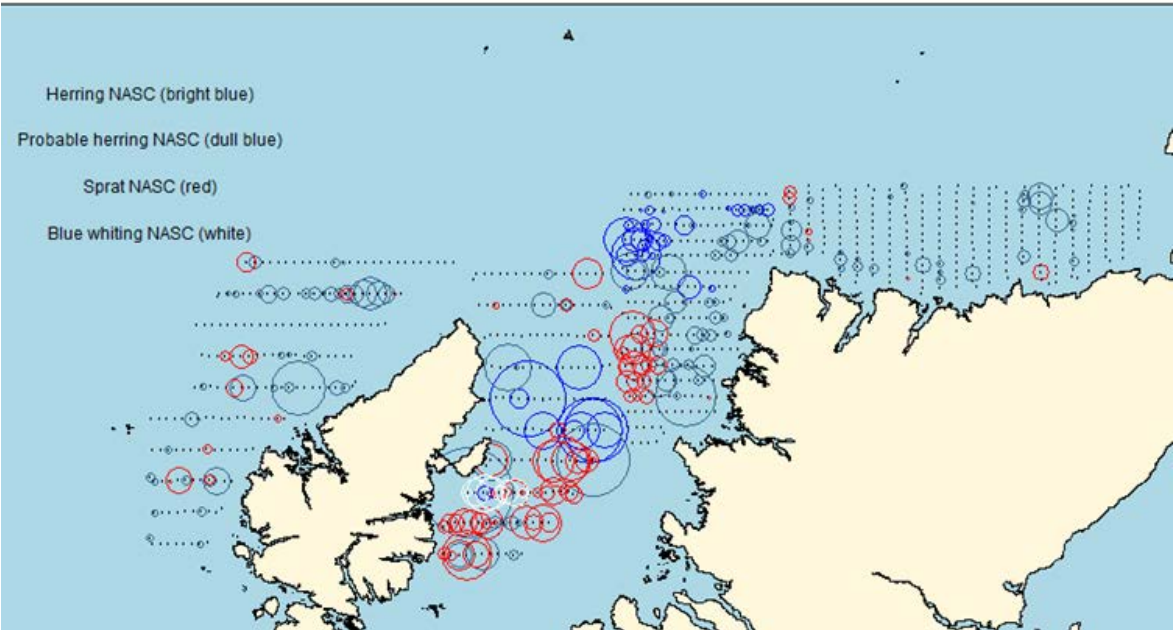
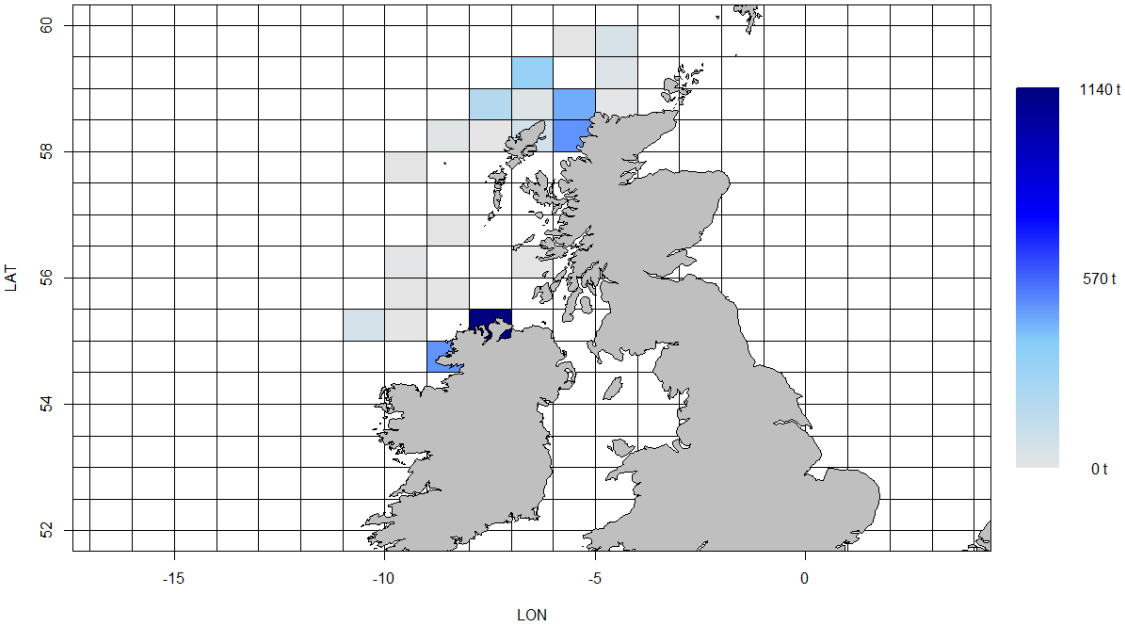


Figure 5.2.6. Relative acoustic densities (NASC m2/mn2) of all fish marks for Pathway recorded during the 2019 6.aN herring industry-science survey. (details in WGIPS 2020).



Herring in 6.a (North). Herring catches in tonnes in all quarters in 2019 by statistical rectangle. WG estimates.