Council

CNL(20)10

Report of the ICES Advisory Committee

NORTH ATLANTIC SALMON STOCKS

Introduction

Main tasks

At its 2019 Statutory Meeting, ICES resolved (C. Res. 2019/2/FRSG17) that the Working Group on North Atlantic Salmon (WGNAS; chaired by Martha Robertson, Canada) will meet 24 March–2 April 2020 in Copenhagen, Denmark. Due to the coronavirus disease (COVID-19), the working group met via web conference to address questions posed to ICES by the North Atlantic Salmon Conservation Organization (NASCO).

The table below identifies the sections of the report that provide response to the questions posed by NASCO in the Terms of Reference (ToR).

ToR	Question	Section
1	With respect to Atlantic salmon in the North Atlantic area:	sal.oth.nasco
1.1	provide an overview of salmon catches and landings by country, including unreported catches, catch-and-release, and production of farmed and ranched Atlantic salmon in 2019[1];	
1.2	provide a compilation of tag releases by country in 2019.	
2	With respect to Atlantic salmon in the North-East Atlantic Commission area:	sal.neac.all
2.1	describe the key events of the 2019 fisheries[2];	
2.2	review and report on the development of age-specific stock conservation limits, including updating the time-series of the number of river stocks with established CLs by jurisdiction;	
2.3	describe the status of the stocks, including updating the time-series of trends in the number of river stocks, meeting CLs by jurisdiction.	
3	With respect to Atlantic salmon in the North American Commission area:	sal.nac.all
3.1	describe the key events of the 2019 fisheries (including the fishery at Saint Pierre and Miquelon)[2];	
3.2	update age-specific stock conservation limits based on new information as available, including updating the time-series of the number of river stocks with established CLs by jurisdiction;	
3.3	describe the status of the stocks, including updating the time-series of trends in the number of river stocks, meeting CLs by jurisdiction.	
4	With respect to Atlantic salmon in the West Greenland Commission area:	sal.wgc.all
4.1	describe the key events of the 2019 fisheries[2];	
4.2	describe the status of the stocks[3].	

[1] With regard to question 1.1 for the estimates of unreported catch, the information provided should, where possible, indicate the location of the unreported catch in the following categories: in-river, estuarine, and coastal. Numbers of salmon caught and released in recreational fisheries should be provided.
[2] In the responses to questions 2.1, 3.1, and 4.1, ICES is requested to provide details of catch, gear, effort, composition, and origin of the catch and rates of exploitation. For homewater fisheries, the information provided should indicate the location of the catch in the following categories: in-river, estuarine, and coastal. Information on any other sources of fishing mortality for salmon is also requested (for 4.1, if any new phone surveys are conducted, ICES should review the results and advise on the appropriateness for incorporating resulting estimates of unreported catch into the assessment process).
[3] In response to question 4.2, ICES is requested to provide a brief summary of the status of North American and Northeast Atlantic salmon stocks. The detailed information on the status of these stocks should be provided in response to questions 2.3 and 3.3.

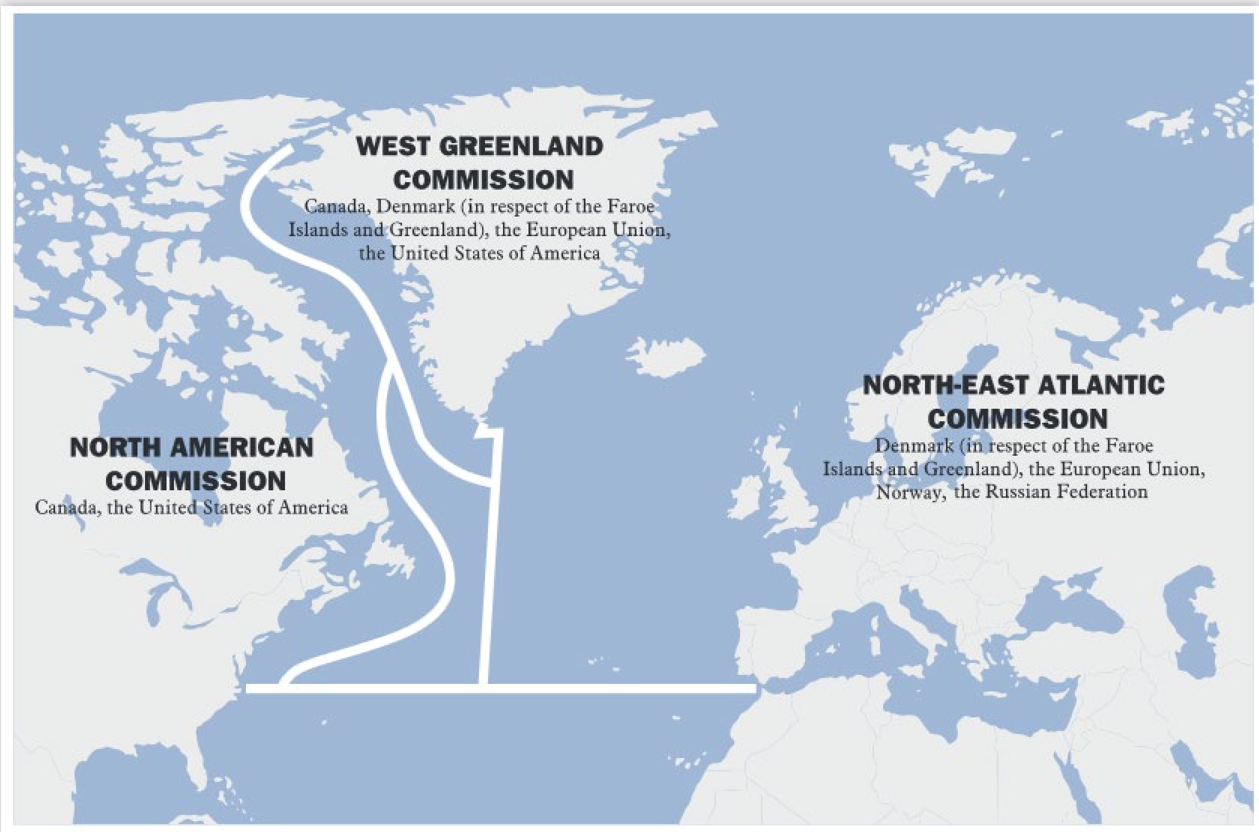
In response to the Terms of Reference, WGNAS considered 25 working documents. A complete list of acronyms and abbreviations used in this report is provided in Annex 1. References cited are indicated in Annex 2.

Please note that for practical reasons, Tables 5–8 are found at the end of this document on pages 13–22, immediately preceding the annexes.

Management framework for salmon in the North Atlantic

This advice has been produced by ICES in response to the Terms of Reference posed by the North Atlantic Salmon Conservation Organization (NASCO), pursuant to its role in international management of salmon fisheries. NASCO was set up in 1984 by international convention (the Convention for the Conservation of Salmon in the North Atlantic Ocean), with a responsibility for the conservation, restoration, enhancement, and rational management of wild salmon in the North Atlantic. Although sovereign states retain their role in the regulation of salmon fisheries for salmon originating from their own rivers, distant-water salmon fisheries, such as those at Greenland and the Faroe Islands, which take salmon originating from rivers of another party, are regulated by NASCO under the terms of the Convention. NASCO has six Parties at present that are signatories to the Convention, including the EU, representing its Member States.

NASCO's three commission areas, the North American Commission (NAC), the West Greenland Commission (WGC), and the North-East Atlantic Commission (NEAC), are shown in the map below. The islands of Saint Pierre and Miquelon (French territory in North America), located off the south coast of Newfoundland, are not part of the NAC, but France (in respect of Saint Pierre and Miquelon) participates as an observer to NASCO. The mid-Atlantic area is not covered by any of the three NASCO commissions; however, under Article 4 of the NASCO Convention, NASCO provides a forum for consultation and cooperation on matters concerning the salmon stocks in this area.



Management objectives

NASCO's objective is:

"..to contribute through consultation and co-operation to the conservation, restoration, enhancement, and rational management of salmon stocks… taking into account the best scientific evidence available…".

NASCO further stated that "the Agreement on the Adoption of a Precautionary Approach states that an objective for the management of salmon fisheries is to provide the diversity and abundance of salmon stocks", and NASCO's Standing Committee on the Precautionary Approach interpreted this as having "to maintain both the productive capacity and diversity of salmon stocks" (NASCO, 1998).

NASCO's Action Plan for Application of the Precautionary Approach (NASCO, 1998) provides an interpretation of how this is to be achieved:

- "Management measures should be aimed at maintaining all stocks above their conservation limits by the use of management targets".

- "Socio-economic factors could be taken into account in applying the precautionary approach to fisheries management issues".
- "The precautionary approach is an integrated approach that requires, *inter alia*, that stock rebuilding programmes (including as appropriate, habitat improvements, stock enhancement, and fishery management actions) be developed for stocks that are below conservation limits".

Reference points and application of precaution

Atlantic salmon has characteristics of short-lived fish stocks; mature abundance is sensitive to annual recruitment because the adult spawning stock consists of only few age groups. Incoming recruitment is often the main component of the fishable stock. For such fish stocks, ICES maximum sustainable yield (MSY) approach is aimed at achieving a target escapement (MSY $B_{escapement}$, the minimum amount of biomass left to spawn). No catch should be allowed unless this escapement can be achieved. The escapement level should be set such that there is a low risk of future recruitment being impaired.

For salmon, this approach has led to defining river-specific conservation limits (CLs), as equivalent to MSY $B_{escapement}$. ICES considers that to be consistent with the MSY and the precautionary approach, fisheries should only be carried out on salmon from rivers where stocks have been shown to be at full reproductive capacity. Furthermore, due to differences in the status of individual stocks within stock complexes, mixed-stock fisheries present particular threats.

In many counties/jurisdictions, CLs are now defined, using stock–recruitment relationships and the corresponding CLs are not updated annually. In other jurisdictions, where such relationships are not available, stock–recruitment proxies are used to define the CLs and these may vary from year-to-year as new data are added. NASCO has adopted the CLs as limit reference points (NASCO, 1998). CLs are used in reference to spawners. When referring to abundance prior to fisheries in the ocean (pre-fishery abundance, PFA), the CLs are adjusted to account for natural mortality, and the adjusted value is referred to as the spawner escapement reserve (SER).

Management targets have not yet been defined for all North Atlantic salmon stocks. Where there are no specific management objectives, the MSY approach shall apply:

- ICES considers that if the lower bound of the 90% confidence interval of the current estimate of spawners is above the CL, then the stock is at full reproductive capacity (equivalent to a probability of at least 95% of meeting the CL).
- When the lower bound of the confidence interval is below the CL, but the midpoint is above, then ICES considers the stock to be at risk of suffering reduced reproductive capacity.
- Finally, when the midpoint is below the CL, ICES considers the stock to suffer reduced reproductive capacity.

For catch advice on the mixed-stock fishery at West Greenland (catching non-maturing one-sea-winter (1SW) fish from North America and non-maturing 1SW fish from Southern NEAC [NEAC–S]), NASCO has, as part of an agreed management plan, adopted a risk-based approach with a 75% probability of simultaneous attainment of management objectives in seven assessment regions (ICES, 2003). NASCO uses the same approach for catch advice for the mixed-stock fishery, affecting six assessment regions for the North American stock complex. ICES notes that the choice of a 75% probability of simultaneous attainment in six or seven stock assessment regions is approximately equivalent to a 95% probability of attainment in each individual unit (ICES, 2013).

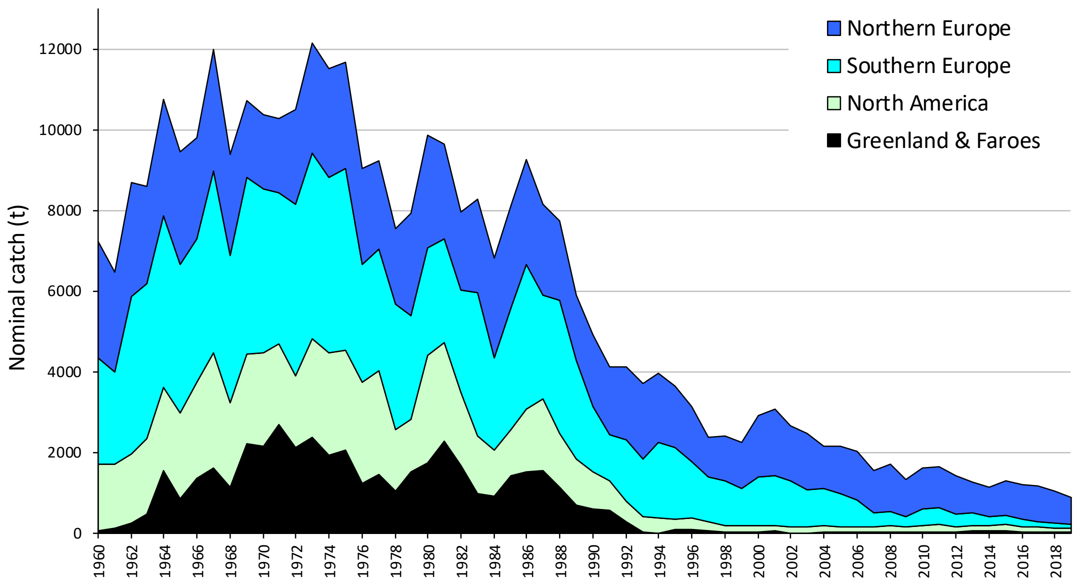
There is no formally agreed management plan for the fishery at the Faroe Islands. However, ICES has developed a risk-based framework for providing catch advice for fish exploited in this fishery (mainly multi-sea-winter (MSW) fish from NEAC countries). Catch advice is provided at both the stock complex and country level, with catch options tables providing the probability of meeting CLs in the individual stock complexes or countries, as well as in all the stock complexes or countries simultaneously. ICES has recommended (ICES, 2013) that management decisions should be based principally on a 95% probability of attainment of CLs in each stock complex/country individually. The simultaneous attainment probability may also be used as a guide, but managers should be aware that this probability will generally be quite low when large numbers of management units are used.

NASCO 1.1 Catches of North Atlantic salmon

Nominal catches of salmon

In this document, catches are equivalent to harvest (i.e. removals) and do not include released fish in the recreational fishery. Details on the catches are reported in Tables 5–7. Caught and released fish are reported separately in Table 8.

Reported total nominal catches of salmon in four North Atlantic regions from 1960 to 2019 are shown in Figure 1. Nominal catches reported by country are provided in Table 5. Catch statistics in the North Atlantic include fish-farm escapees, and in some Northeast Atlantic countries also ranched fish. The reported total nominal catch for 2019 was 868 tonnes, the lowest in the time-series.



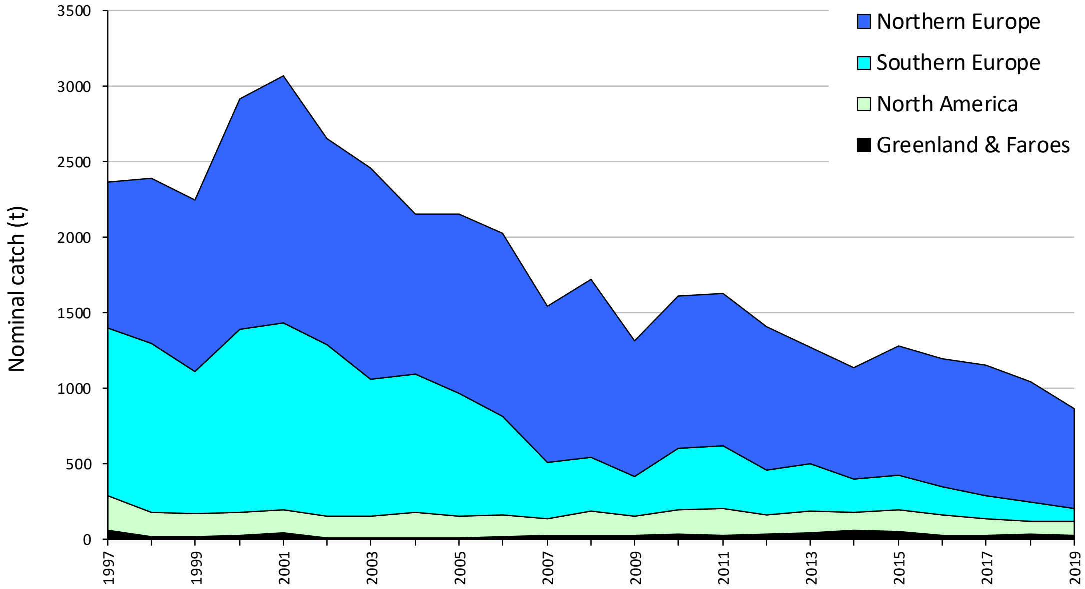


Figure 1 Total reported nominal catch of salmon (tonnes round fresh weight) in four North Atlantic regions, 1960–2019 (top) and 1997–2019 (bottom).

Icelandic catches have traditionally been separated into wild and ranched, reflecting the fact that Iceland has been the main North Atlantic country where large-scale ranching has been undertaken, with the specific intention of harvesting all returns at the release site and with no prospect of wild spawning success. The release of smolts for commercial ranching purposes ceased in 1998 in Iceland, but ranching for angling fisheries in two Icelandic rivers continued into 2019 (Table 5). Catches in Sweden are also separated into wild and ranched over the entire time-series. The latter fish represent adult salmon, originating from hatchery-reared smolts that have been released under programmes to mitigate hydropower impacts. These fish are also exploited very heavily in home waters and have no possibility to spawn naturally in the wild. While ranching does occur in some other countries, it is on a much smaller scale. The ranched components in Iceland and Sweden have therefore been included in the nominal harvest.

Table 1 Reported catches (in tonnes) for the three NASCO commission areas for 2010–2019, including some updated values.

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
NEAC	1414	1419	1250	1080	954	1081	1028	1011	927	743
NAC	156	182	129	143	122	144	140	113	80	95
WGC	40	28	33	47	58	57	27	28	40	30
Total	1610	1629	1412	1269	1134	1282	1195	1152	1047	868

NASCO requested that the nominal catches in homewater fisheries be partitioned according to whether the catch is taken in coastal, estuarine, or in-river fisheries (Table 2).

Table 2 The 2019 nominal catches (in tonnes) for the NEAC and NAC commission areas.

Area	Coastal		Estuarine		In-River		Total
	Weight	%	Weight	%	Weight	%	Weight
NEAC 2019	241	32	24	3	478	64	743
NAC 2019	8	9	38	40	49	51	95

Coastal, estuarine, and in-river catch data aggregated by Commission area are presented in Figure 2. In Northern NEAC (NEAC–N), an increasing proportion and weight of the nominal catch was taken in coastal fisheries from 2015 to 2018, followed by a decrease in 2019. There are no coastal fisheries in Iceland, Denmark, or Finland. At the beginning of the time-series, about half the catch was reported from coastal fisheries and half from in-river fisheries, whereas since 2008, coastal fisheries catches represent around 30–40% of the total. In NEAC–S, coastal fisheries made up the largest component of the catch until 2009. Since then, the majority of the catch has been from in-river fisheries, reflecting widespread measures to reduce exploitation. There was no coastal catch in NEAC–S in 2019. In NAC, two-thirds of the total catch has been reported from in-river fisheries, except in 2018 and 2019, when it was about half of the total catch; the catch in coastal fisheries has been relatively small throughout the time-series (13 tonnes or less).

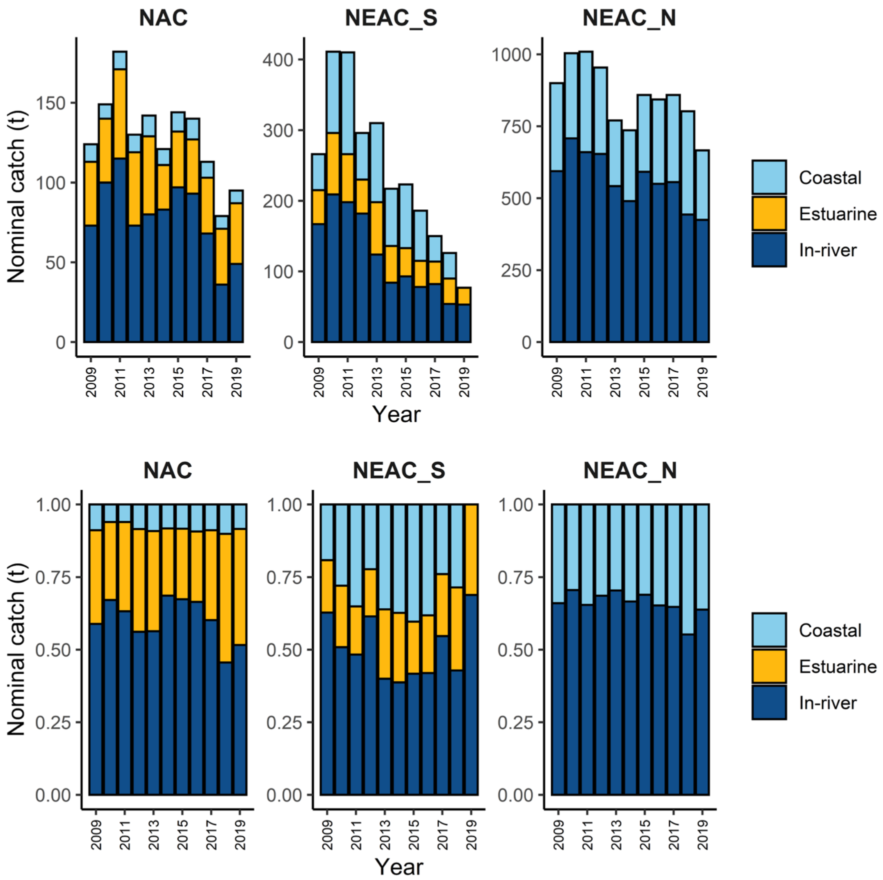


Figure 2 Nominal catches (tonnes; top panels) and percentages of the nominal catches (bottom panels) reported from coastal, estuarine, and in-river fisheries for the NAC area, and for the Northern (NEAC–N) and Southern (NEAC–S) NEAC areas, 2009–2019. Note that scales of vertical axes in the top panels vary.

There is considerable variability in the distribution of the catch among individual countries (Figure 3 and Table 6). In most countries, the majority of the catch is now reported from in-river fisheries and, across the time-series, the coastal catches have declined markedly. However, nominal catches from in-river fisheries have also declined in many countries as a result of increasing use of catch-and-release in angling fisheries.

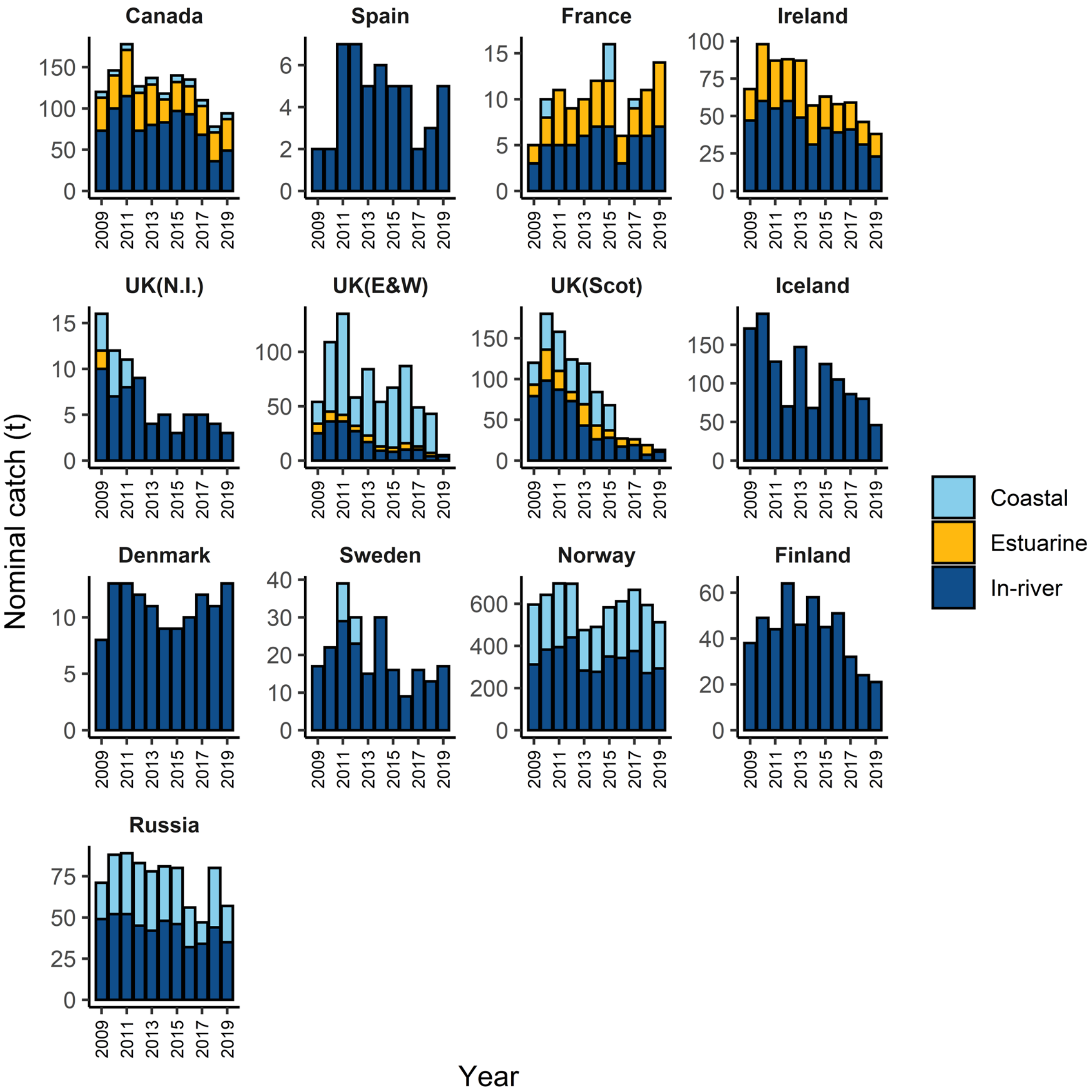


Figure 3 Nominal catch (tonnes) by country taken in coastal, estuarine, and riverine fisheries, 2009–2019. Note that scales on the *y*-axes vary. The USA is not included because there has been no catch. 100% of the fishery at Saint Pierre and Miquelon and at West Greenland occurs in coastal areas. These catches are not shown.

Unreported catches

The total unreported catch in NASCO areas in 2019 was estimated at 258 tonnes. No estimates were provided for Russia, France, Spain, or St Pierre and Miquelon in 2019. The unreported catch in the NEAC area in 2019 was estimated at 237 tonnes, and for the West Greenland and North American commission areas at 10 tonnes and 12 tonnes, respectively.

Table 3 Unreported catch (in tonnes) by NASCO Commission area in the last ten years.

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
NEAC	357	382	363	272	256	298	298	318	279	237
NAC	26	29	31	24	21	17	27	25	24	12
WGC	10	10	10	10	10	10	10	10	10	10
Total	393	421	403	306	287	325	335	353	313	258

The 2019 unreported catch by country is provided in Table 7. Unreported catch data were not provided by category (coastal, estuarine, and in-river). Over recent years, efforts have been made to reduce the level of unreported catch in a number of countries.

Catch-and-release

The practice of catch-and-release (C&R) in angling fisheries has become increasingly common as a salmon management/conservation measure in light of the widespread decline in salmon abundance in the North Atlantic. In some areas of Canada and USA, C&R became widely applied as a management measure in 1984, and in recent years it has been introduced in many European countries, both as a result of statutory regulation and through voluntary practice.

The nominal catches do not include salmon that have been caught and released. Table 8 presents C&R information from 1991 to 2019 for countries that provide records; C&R may also be practised in other countries, while not being formally recorded. There are large differences in the percentage of the total angling catch that is released. In 2019, it ranged from 20% in Sweden and Norway to 92% in UK (Scotland), reflecting varying management practices and angler attitudes among countries. Within countries, the percentage of released fish has increased over time. There is also evidence from some countries that larger MSW fish are released in higher proportions than smaller fish. Overall, more than 162 000 salmon were reported to have been released in the North Atlantic area in 2019.

Farming and sea ranching of Atlantic salmon

The provisional estimate of farmed Atlantic salmon production in the North Atlantic area for 2019 was 1 750 000 tonnes (Figure 4). The production of farmed salmon in this area has exceeded one million tonnes since 2009. Norway and UK (Scotland) continue to produce the majority of the farmed salmon in the North Atlantic (78% and 11%, respectively). Farmed salmon production in 2019 was above the previous five-year mean in all countries, with the exception of Canada (production in 2018 estimated from 2017 data) and Spain. Spain reported its production of farmed salmon to ICES with a time-series from 2015 (no data for 2018): production in 2019 was 12 tonnes and the maximum was 25 tonnes in 2017. Data for UK (Northern Ireland) since 2001 and data for the east coast of US are not publicly available; this is also the case for some regions within countries in some years.

Worldwide production of farmed Atlantic salmon has been in excess of one million tonnes since 2001 and over two million tonnes since 2012. The worldwide production in 2019 is provisionally estimated at 2 504 000 tonnes (Figure 4), which is higher than in 2018 and the previous five-year mean (2 332 000 tonnes). Production outside the North Atlantic is estimated to have accounted for one-third of the total worldwide production in 2019, dominated by Chile (81%).

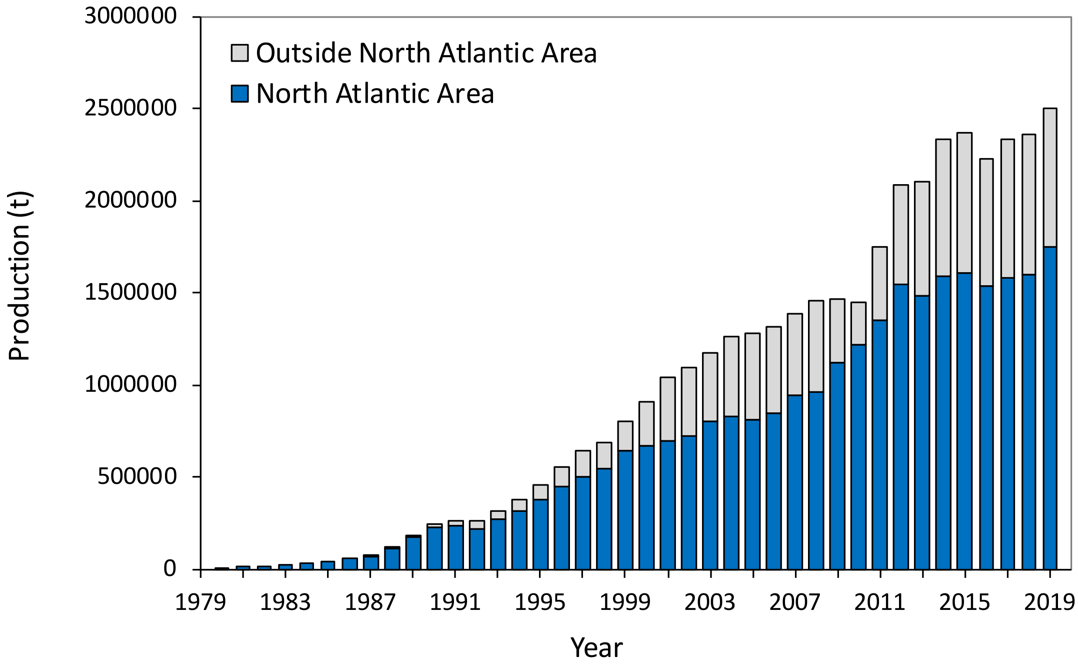


Figure 4 Worldwide production of farmed Atlantic salmon, 1980 to 2019.

The reported nominal catch of Atlantic salmon in the North Atlantic was in the order of 0.03% of the worldwide production of farmed Atlantic salmon in 2019.

The total harvest of ranched Atlantic salmon in countries bordering the North Atlantic was 26 tonnes in 2019, all taken in Iceland (14.8 tonnes), Sweden (7.7 tonnes), and Ireland (3.6 tonnes; Figure 5). No estimate was made of the ranched salmon production in Norway, as catches have been very low in recent years (< 1 tonne), or in UK (Northern Ireland), where the proportion of ranched fish has not been assessed since 2008.

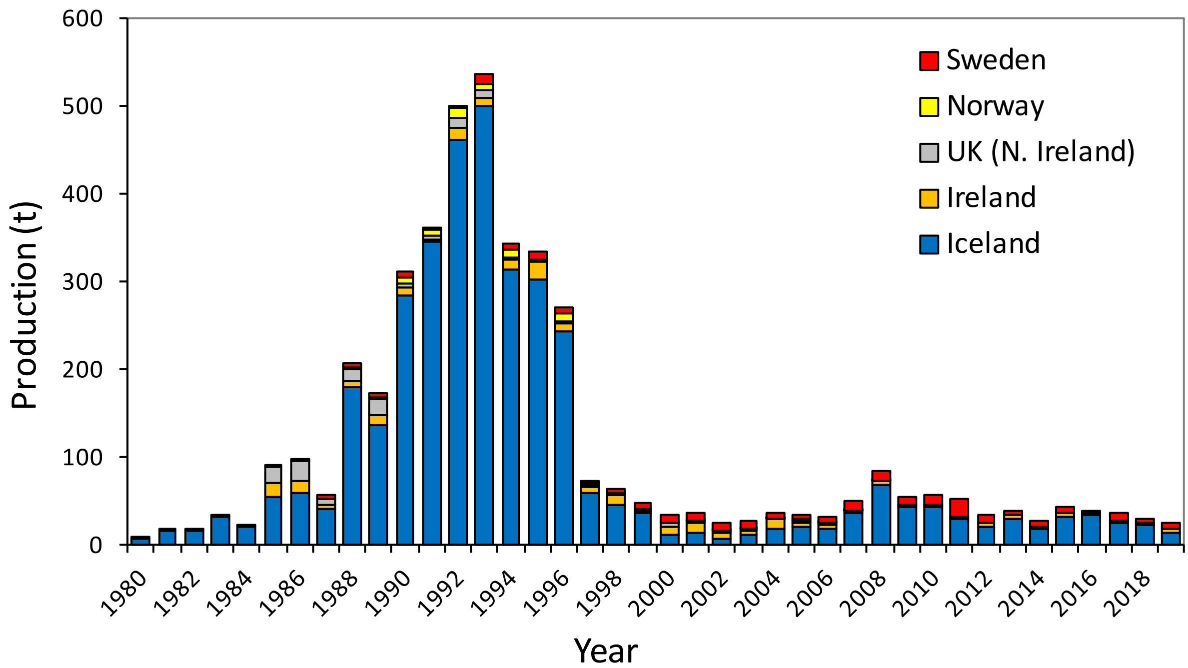


Figure 5 Harvest of ranched Atlantic salmon (tonnes round fresh weight) in the North Atlantic, 1980–2019.

NASCO 1.2 Provision of a compilation of tag releases by country in 2019

Data on releases of tagged, fin-clipped, and other marked salmon in 2019 are compiled as a separate report (ICES, 2020). In summary (Table 4):

- Approximately 2.2 million salmon were marked in 2019, reduced from the 2.7 million salmon marked in 2018.
- The adipose clip was the most commonly used primary marker (1.73 million), with coded wire microtags (CWT) (0.282 million) being the next most common primary marker.
- Most marks or tags were applied to hatchery-origin juveniles (2.08 million), while 13 933 hatchery adults, 93 165 wild juveniles, and 6629 wild adults were also marked.
- The use of PIT tags, data storage tags (DSTs), and radio and/or sonic transmitting tags (pingers) has increased in recent years. In 2019, 161 705 salmon were tagged with these tag types (Table 4), an increase from the number in 2018 (135 157 salmon). ICES noted that not all electronic tags were being reported in the tag compilation. Tag users should be encouraged to include these tags or tagging programmes in the tag compilation, as it greatly facilitates identification of the origin of tags recovered in fisheries or tag-scanning programmes in other jurisdictions. A previous section (PIT tag-screening programmes) recommends the creation, on a European scale, of a database recording, and programmes using, PIT tags.

Since 2003, ICES has reported information on markers being applied to farmed salmon to facilitate tracing the origin of farmed salmon captured in the wild in the case of escape events. In the US, genetic “marking” procedures have been adopted where broodstock are genetically screened. The resulting database is used to match genotyped escaped farmed salmon to a specific parental mating pair and subsequent hatchery of origin, stocking group, and marine site from which the salmon escaped. This has also been applied in Iceland: in the 2018 and 2019 fisheries, 15 out of 18 farmed escapees could be traced to the pens they escaped from, by matching their genotypes to known parental genotypes, and a further two could be traced to foreign broodstocks.

Table 4 Summary of the number of Atlantic salmon tagged and marked in 2019 – “Hatchery” and “Wild” juvenile refer to smolts and parr.

Country	Origin	Primary tag or mark			Other internal[1]	Total
		Microtag	External mark[2]	Adipose clip		
Canada	Hatchery Adult	0	1044	47	432	1523
	Hatchery Juvenile	0	339	0	0	339
	Wild Adult	0	1527	0	268	1795
	Wild Juvenile	0	4918	9626	3073	17 617
	Total	**0**	**7828**	**9673**	**3773**	**21 274**
Denmark	Hatchery Adult	0	0	0	0	0
	Hatchery Juvenile	0	0	283 000	0	283 000
	Wild Adult	0	573	0	0	573
	Wild Juvenile	0	500	0	0	500
	Total	**0**	**1073**	**283 000**	**0**	**284 073**
France	Hatchery Adult	0	0	10 000	0	10 000
	Hatchery Juvenile[3]	0	0	0	0	0
	Wild Adult[3]	0	0	0	291	291
	Wild Juvenile	0	0	0	5483	5483
	Total	**0**	**0**	**10 000**	**5774**	**15 774**
Iceland	Hatchery Adult	0	0	0	0	0
	Hatchery Juvenile	80 448	0	0	0	80 448
	Wild Adult	0	142	0	29	171
	Wild Juvenile	4425	0	0	1533	5958
	Total	**84 873**	**142**	**0**	**1562**	**86 577**

Country	Origin	Primary tag or mark			Other internal[1]	Total
		Microtag	External mark[2]	Adipose clip		
Ireland	Hatchery Adult	0	0	0	0	0
	Hatchery Juvenile	170 097	0	0	0	170 097
	Wild Adult	0	0	0	0	0
	Wild Juvenile	10 183	0	0	3137	13 320
	Total	**180 280**	**0**	**0**	**3137**	**183 417**
Norway	Hatchery Adult	0	0	0	0	0
	Hatchery Juvenile	0	7328	0	108 187	115 515
	Wild Adult	0	451	0	0	451
	Wild Juvenile	0	390	0	22 108	22 498
	Total	**0**	**8169**	0	**130 295**	**138 464**
Russia	Hatchery Adult	0	0	0	0	0
	Hatchery Juvenile	0	0	567 430	0	567 430
	Wild Adult	0	1424	0	0	1424
	Wild Juvenile	0	0	0	0	0
	Total	**0**	**1424**	**567 430**	**0**	**568 854**
Spain	Hatchery Adult	0	0	0	0	0
	Hatchery Juvenile	0	0	145 534	0	145 534
	Wild Adult	0	0	0	0	0
	Wild Juvenile	0	0	0	0	0
	Total	**0**	**0**	**145 534**	**0**	**145 534**
Sweden	Hatchery Adult	0	0	0	0	0
	Hatchery Juvenile	0	0	141 628	0	141 628
	Wild Adult	0	0	0	0	0
	Wild Juvenile	499	0	0	0	499
	Total	**499**	**0**	**141 628**	**0**	**142 127**
UK (England and Wales)	Hatchery Adult	0	0	0	0	0
	Hatchery Juvenile	0	0	4960	0	4960
	Wild Adult	0	360	0	0	360
	Wild Juvenile	4022	0	10 184	169	14 375
	Total	**4022**	**360**	**15 144**	**169**	**19695**
UK (Northern Ireland)	Hatchery Adult	0	0	0	0	0
	Hatchery Juvenile	12 300	0	31 279	0	43 579
	Wild Adult	0	0	0	0	0
	Wild Juvenile	0	0	0	0	0
	Total	**12 300**	**0**	**31 279**	**0**	**43 579**
UK (Scotland)	Hatchery Adult	0	0	0	0	0
	Hatchery Juvenile	0	0	47 568	0	47 568
	Wild Adult	0	336	0	7	343
	Wild Juvenile	0	0	0	12 436	12 436
	Total	**0**	**336**	**47 568**	**12 443**	**60 347**
Germany	Hatchery Adult	0	0	0	0	0
	Hatchery Juvenile	0	0	119 030	0	119 030
	Wild Adult	0	0	1	0	1
	Wild Juvenile	0	0	16	349	365
	Total	**0**	**0**	**119 047**	**349**	**119 396**
Greenland[3]	Hatchery Adult	0	0	0	0	0
	Hatchery Juvenile	0	20	0	4	24
	Wild Adult	0	0	0	0	0
	Wild Juvenile	0	0	0	0	0
	Total	**0**	**20**	**0**	**4**	**24**

Country	Origin	Primary tag or mark			Other internal[1]	Total
		Microtag	External mark[2]	Adipose clip		
USA	Hatchery Adult	0	0	0	2410	2410
	Hatchery Juvenile	0	0	362 836	508	363 344
	Wild Adult	0	19	34	1167	1220
	Wild Juvenile	0	0	0	114	114
	Total	**0**	**19**	**362 870**	**4199**	**367 088**
All countries	Hatchery Adult	0	1044	10 047	2842	13 933
	Hatchery Juvenile	262 845	7687	1 703 265	108 699	2 082 496
	Wild Adult	0	4832	35	1762	6629
	Wild Juvenile	19 129	5808	19 826	48 402	93 165
	Total	**281 974**	**19 371**	**1 733 173**	**161 705**	**2 196 223**

1) Includes other internal tags (PIT, ultrasonic, radio, DST, etc.).
2) Includes Carlin, spaghetti, streamers, VIE, etc.
3) Individuals tagged in Greenland by the Atlantic Salmon Federation; detailed in Canada's Tag report.

Table 5 Total reported nominal catch of salmon by country (in tonnes round fresh weight), 1960–2019 (2019 values include provisional data).

Year	NAC Area			NEAC (N. Area)								NEAC (S. Area)						Faroes and Greenland				Total reported nominal catch	Unreported catches	
	Canada (1)	USA	St. P&M (2)	Norway (3)	Russia (4)	Iceland		Sweden		Denmark	Finland	Ireland (7,8)	UK (E & W)	UK (N.Ire.) (8,9)	UK (Scot.)	France (10)	Spain (11)	Faroes (12)	East Grld.	West Grld. (13)	Other (14)		NASCO areas (15)	International waters (16)
						Wild	Ranch (5)	Wild	Ranch (6)															
1960	1636	1	-	1659	1100	100	-	40	0	-	-	743	283	139	1443	-	33	-	-	60	-	7237	-	-
1961	1583	1	-	1533	790	127	-	27	0	-	-	707	232	132	1185	-	20	-	-	127	-	6464	-	-
1962	1719	1	-	1935	710	125	-	45	0	-	-	1459	318	356	1738	-	23	-	-	244	-	8673	-	-
1963	1861	1	-	1786	480	145	-	23	0	-	-	1458	325	306	1725	-	28	-	-	466	-	8604	-	-
1964	2069	1	-	2147	590	135	-	36	0	-	-	1617	307	377	1907	-	34	-	-	1539	-	10759	-	-
1965	2116	1	-	2000	590	133	-	40	0	-	-	1457	320	281	1593	-	42	-	-	861	-	9434	-	-
1966	2369	1	-	1791	570	104	2	36	0	-	-	1238	387	287	1595	-	42	-	-	1370	-	9792	-	-
1967	2863	1	-	1980	883	144	2	25	0	-	-	1463	420	449	2117	-	43	-	-	1601	-	11991	-	-
1968	2111	1	-	1514	827	161	1	20	0	-	-	1413	282	312	1578	-	38	5	-	1127	403	9793	-	-
1969	2202	1	-	1383	360	131	2	22	0	-	-	1730	377	267	1955	-	54	7	-	2210	893	11594	-	-
1970	2323	1	-	1171	448	182	13	20	0	-	-	1787	527	297	1392	-	45	12	-	2146	922	11286	-	-
1971	1992	1	-	1207	417	196	8	17	1	-	-	1639	426	234	1421	-	16	-	-	2689	471	10735	-	-
1972	1759	1	-	1578	462	245	5	17	1	-	32	1804	442	210	1727	34	40	9	-	2113	486	10965	-	-
1973	2434	3	-	1726	772	148	8	22	1	-	50	1930	450	182	2006	12	24	28	-	2341	533	12670	-	-
1974	2539	1	-	1633	709	215	10	31	1	-	76	2128	383	184	1628	13	16	20	-	1917	373	11877	-	-
1975	2485	2	-	1537	811	145	21	26	0	-	76	2216	447	164	1621	25	27	28	-	2030	475	12136	-	-
1976	2506	1	3	1530	542	216	9	20	0	-	66	1561	208	113	1019	9	21	40	< 1	1175	289	9327	-	-
1977	2545	2	-	1488	497	123	7	9	1	-	59	1372	345	110	1160	19	19	40	6	1420	192	9414	-	-
1978	1545	4	-	1050	476	285	6	10	0	-	37	1230	349	148	1323	20	32	37	8	984	138	7682	-	-
1979	1287	3	-	1831	455	219	6	11	1	-	26	1097	261	99	1076	10	29	119	< 0.5	1395	193	8118	-	-
1980	2680	6	-	1830	664	241	8	16	1	-	34	947	360	122	1134	30	47	536	< 0,5	1194	277	10127	-	-
1981	2437	6	-	1656	463	147	16	25	1	-	44	685	493	101	1233	20	25	1025	< 0.5	1264	313	9954	-	-
1982	1798	6	-	1348	364	130	17	24	1	-	54	993	286	132	1092	20	10	606	< 0.5	1077	437	8395	-	-
1983	1424	1	3	1550	507	166	32	27	1	-	58	1656	429	187	1221	16	23	678	< 0.5	310	466	8755	-	-
1984	1112	2	3	1623	593	139	20	39	1	-	46	829	345	78	1013	25	18	628	< 0.5	297	101	6912	-	-
1985	1133	2	3	1561	659	162	55	44	1	-	49	1595	361	98	913	22	13	566	7	864	-	8108	-	-
1986	1559	2	3	1598	608	232	59	52	2	-	37	1730	430	109	1271	28	27	530	19	960	-	9255	315	-

Year	NAC Area			NEAC (N. Area)								NEAC (S. Area)						Faroes and Greenland				Total reported nominal catch	Unreported catches	
	Canada (1)	USA	St. P&M (2)	Norway (3)	Russia (4)	Iceland		Sweden		Denmark	Finland	Ireland (7,8)	UK (E & W)	UK (N.Ire.) (8,9)	UK (Scot.)	France (10)	Spain (11)	Faroes (12)	East Grld.	West Grld. (13)	Other (14)		NASCO areas (15)	International waters (16)
						Wild	Ranch (5)	Wild	Ranch (6)															
1987	1784	1	2	1385	564	181	40	43	4	-	49	1239	302	56	922	27	18	576	< 0.5	966	-	8159	2788	-
1988	1310	1	2	1076	420	217	180	36	4	-	36	1874	395	114	882	32	18	243	4	893	-	7737	3248	-
1989	1139	2	2	905	364	141	136	25	4	-	52	1079	296	142	895	14	7	364	-	337	-	5904	2277	-
1990	911	2	2	930	313	141	285	27	6	13	60	567	338	94	624	15	7	315	-	274	-	4925	1890	180–350
1991	711	1	1	876	215	129	346	34	4	3	70	404	200	55	462	13	11	95	4	472	-	4106	1682	25–100
1992	522	1	2	867	167	174	462	46	3	10	77	630	171	91	600	20	11	23	5	237	-	4119	1962	25–100
1993	373	1	3	923	139	157	499	44	12	9	70	541	248	83	547	16	8	23	-	-	-	3696	1644	25–100
1994	355	0	3	996	141	136	313	37	7	6	49	804	324	91	649	18	10	6	-	-	-	3945	1276	25–100
1995	260	0	1	839	128	146	303	28	9	3	48	790	295	83	588	10	9	5	2	83	-	3629	1060	-
1996	292	0	2	787	131	118	243	26	7	2	44	685	183	77	427	13	7	-	0	92	-	3136	1123	-
1997	229	0	2	630	111	97	59	15	4	1	45	570	142	93	296	8	4	-	1	58	-	2364	827	-
1998	157	0	2	740	131	119	46	10	5	1	48	624	123	78	283	8	4	6	0	11	-	2395	1210	-
1999	152	0	2	811	103	111	35	11	5	1	62	515	150	53	199	11	6	0	0	19	-	2247	1032	-
2000	153	0	2	1176	124	73	11	24	9	5	95	621	219	78	274	11	7	8	0	21	-	2912	1269	-
2001	148	0	2	1267	114	74	14	25	7	6	126	730	184	53	251	11	13	0	0	43	-	3069	1180	-
2002	148	0	2	1019	118	90	7	20	8	5	93	682	161	81	191	11	9	0	0	9	-	2654	1039	-
2003	141	0	3	1071	107	99	11	15	10	4	78	551	89	56	192	13	9	0	0	9	-	2457	847	-
2004	161	0	3	784	82	112	18	13	7	4	39	489	111	48	245	19	7	0	0	15	-	2157	686	-
2005	139	0	3	888	82	129	21	9	6	8	47	422	97	52	215	11	13	0	0	15	-	2155	700	-
2006	137	0	3	932	91	93	17	8	6	2	67	326	80	29	192	13	11	0	0	22	-	2028	670	-
2007	112	0	2	767	63	93	36	6	10	3	58	85	67	30	171	11	9	0	0	25	-	1548	475	-
2008	158	0	4	807	73	132	69	8	10	9	71	89	64	21	161	12	9	0	0	26	-	1721	443	-
2009	126	0	3	595	71	126	44	7	10	8	36	68	54	16	121	4	2	0	1	26	-	1318	343	-
2010	153	0	3	642	88	147	42	9	13	13	49	99	109	12	180	10	2	0	2	38	-	1610	393	-
2011	179	0	4	696	89	98	30	20	19	13	44	87	136	10	159	11	7	0	0	27	-	1629	421	-
2012	126	0	3	696	82	50	20	21	9	12	64	88	58	9	124	10	7	0	1	33	-	1412	403	-
2013	137	0	5	475	78	116	31	10	4	11	46	87	84	4	119	11	5	0	0	47	-	1269	306	-
2014	118	0	4	490	81	51	18	24	6	9	58	57	54	5	84	12	6	0	0	58	-	1134	287	-
2015	140	0	4	583	80	94	31	9	7	9	45	63	68	3	68	16	5	0	1	56	-	1282	325	-

Year	NAC Area			NEAC (N. Area)								NEAC (S. Area)						Faroes and Greenland				Total reported nominal catch	Unreported catches	
	Canada (1)	USA	St. P&M (2)	Norway (3)	Russia (4)	Iceland		Sweden		Denmark	Finland	Ireland (7,8)	UK (E & W)	UK (N.Ire.) (8,9)	UK (Scot.)	France (10)	Spain (11)	Faroes (12)	East Grld.	West Grld. (13)	Other (14)		NASCO areas (15)	International waters (16)
						Wild	Ranch (5)	Wild	Ranch (6)															
2016	135	0	5	612	56	71	34	6	3	9	51	58	86	4	27	6	5	0	2	26	-	1195	335	-
2017	110	0	3	666	47	62	24	6	10	12	32	59	49	5	27	10	2	0	0	28	-	1152	353	-
2018	79	0	1	594	80	59	22	9	4	11	24	46	42	4	19	10	3	0	1	39	-	1047	311	-
2019	94	0	1	513	57	31	15	9	8	13	21	39	5	3	13	13	5	0	1	28	-	868	258	-
Mean																								
2014–2018	116	0	3	589	69	67	26	11	6	10	42	57	60	4	45	11	4	0	1	41	-	1162	322	-
2009–2018	130	0	3	605	75	87	30	12	8	11	45	71	74	7	93	10	4	0	1	38	-	1305	348	-

Key:

1. Includes estimates of some local sales and prior to 1984, bycatch.
2. Saint Pierre and Miquelon is a self-governing territorial overseas collectivity of France, located in North America, off the south coast of Newfoundland.
3. Before 1966, sea trout and sea charr were included (5% of total).
4. Values from 1991 to 2000 do not include catches taken in the recreational (rod) fishery.
5. From 1990, catch includes fish ranched for both commercial and angling purposes.
6. Catches from hatchery-reared smolts, released under programmes to mitigate hydropower development schemes; returning fish unable to spawn in the wild and exploited heavily.
7. Improved reporting of rod catches in 1994, and data derived from carcass tagging and logbooks from 2002.
8. Catch on River Foyle allocated 50% Ireland and 50% Northern Ireland.
9. Angling catch (derived from carcass tagging and logbooks) first included in 2002.
10. Data for France include some unreported catches.
11. Spanish data until 2018 (inclusive), weights estimated from mean weight of fish caught in Asturias (80–90% of Spanish catch). Weight for 2019 for all Spain, supplied via data call.
12. Between 1991 and 1999, there was only a research fishery at Faroes. In 1997 and 1999, no fishery was conducted; the commercial fishery resumed in 2000, but has not operated since 2001.
13. Includes catches made in the West Greenland area by Norway, Faroes, Sweden, and Denmark in 1965–1975.
14. Includes catches in Norwegian Sea by vessels from Denmark, Sweden, Germany, Norway, and Finland.
15. No unreported catch estimate available for Canada in 2007 and 2008. Data for Canada in 2009, 2010, and 2019 are incomplete. No unreported catch estimate available for Russia since 2008.
16. Estimates refer to season ending in given year.

Table 6 The catches (tonnes round fresh weight) and % of the nominal catches by country/jurisdiction taken in coastal, estuarine, and in-river fisheries, 2000–2019 (2019 values include provisional data).

Country	Year	Coastal		Estuarine		In-river		Total
		tonnes	% of total	tonnes	% of total	tonnes	% of total	tonnes
Canada	2000	2	2	29	19	117	79	148
	2001	3	2	28	20	112	78	143
	2002	4	2	30	20	114	77	148
	2003	5	3	36	27	96	70	137
	2004	7	4	46	29	109	67	161
	2005	7	5	44	32	88	63	139
	2006	8	6	46	34	83	60	137
	2007	6	5	36	32	70	63	112
	2008	9	6	47	32	92	62	147
	2009	7	6	40	33	73	61	119
	2010	6	4	40	27	100	69	146
	2011	7	4	56	31	115	65	178
	2012	8	6	46	36	73	57	127
	2013	8	6	49	36	80	58	137
	2014	7	6	28	24	83	71	118
	2015	8	6	35	25	97	69	140
	2016	8	6	34	25	93	69	135
	2017	7	6	35	32	68	62	110
	2018	7	9	35	45	36	46	79
	2019	7	7	38	40	49	52	94
Finland	1996	0	0	0	0	44	100	44
	1997	0	0	0	0	45	100	45
	1998	0	0	0	0	48	100	48
	1999	0	0	0	0	63	100	63
	2000	0	0	0	0	96	100	96
	2001	0	0	0	0	126	100	126
	2002	0	0	0	0	94	100	94
	2003	0	0	0	0	75	100	75
	2004	0	0	0	0	39	100	39
	2005	0	0	0	0	47	100	47
	2006	0	0	0	0	67	100	67
	2007	0	0	0	0	59	100	59
	2008	0	0	0	0	71	100	71
	2009	0	0	0	0	38	100	38
	2010	0	0	0	0	49	100	49
	2011	0	0	0	0	44	100	44
	2012	0	0	0	0	64	100	64
	2013	0	0	0	0	46	100	46
	2014	0	0	0	0	58	100	58
	2015	0	0	0	0	45	100	45
	2016	0	0	0	0	51	100	51
	2017	0	0	0	0	32	100	32
	2018	0	0	0	0	24	100	24
	2019	0	0	0	0	21	100	21

Country	Year	Coastal		Estuarine		In-river		Total
		tonnes	% of total	tonnes	% of total	tonnes	% of total	tonnes
France	1996	0	0	4	31	9	69	13
	1997	0	0	3	38	5	63	8
	1998	1	13	2	25	5	63	8
	1999	0	0	4	35	7	65	11
	2000	0	4	4	35	7	61	11
	2001	0	4	5	44	6	53	11
	2002	2	14	4	30	6	56	12
	2003	0	0	6	44	7	56	13
	2004	0	0	10	51	9	49	19
	2005	0	0	4	38	7	62	11
	2006	0	0	5	41	8	59	13
	2007	0	0	4	42	6	58	11
	2008	1	5	5	39	7	57	12
	2009	0	4	2	34	3	62	5
	2010	2	22	3	26	5	52	10
	2011	0	3	6	54	5	43	11
	2012	0	1	4	44	5	55	10
	2013	0	3	4	40	6	57	11
	2014	0	2	5	43	7	55	12
	2015	4	23	5	32	7	45	16
	2016	0	2	3	45	3	52	6
	2017	1	5	3	36	6	59	10
	2018	0	0	5	47	6	53	11
	2019	0	0	7	51	7	49	13
Iceland	1996	11	9	0	0	111	91	122
	1997	0	0	0	0	156	100	156
	1998	0	0	0	0	164	100	164
	1999	0	0	0	0	147	100	147
	2000	0	0	0	0	85	100	85
	2001	0	0	0	0	88	100	88
	2002	0	0	0	0	97	100	97
	2003	0	0	0	0	110	100	110
	2004	0	0	0	0	130	100	130
	2005	0	0	0	0	149	100	149
	2006	0	0	0	0	111	100	111
	2007	0	0	0	0	129	100	129
	2008	0	0	0	0	200	100	200
	2009	0	0	0	0	171	100	171
	2010	0	0	0	0	190	100	190
	2011	0	0	0	0	128	100	128
	2012	0	0	0	0	70	100	70
	2013	0	0	0	0	147	100	147
	2014	0	0	0	0	68	100	68
	2015	0	0	0	0	125	100	125
	2016	0	0	0	0	105	100	105
	2017	0	0	0	0	86	100	86
	2018	0	0	0	0	80	100	80
	2019	0	0	0	0	46	100	46

Country	Year	Coastal		Estuarine		In-river		Total
		tonnes	% of total	tonnes	% of total	tonnes	% of total	tonnes
Ireland	1996	440	64	134	20	110	16	684
	1997	380	67	100	18	91	16	571
	1998	433	69	92	15	99	16	624
	1999	335	65	83	16	97	19	515
	2000	440	71	79	13	102	16	621
	2001	551	75	109	15	70	10	730
	2002	514	75	89	13	79	12	682
	2003	403	73	92	17	56	10	551
	2004	342	70	76	16	71	15	489
	2005	291	69	70	17	60	14	421
	2006	206	63	60	18	61	19	327
	2007	0	0	31	37	52	63	83
	2008	0	0	29	33	60	67	89
	2009	0	0	21	31	47	69	68
	2010	0	0	38	39	60	61	99
	2011	0	0	32	37	55	63	87
	2012	0	0	28	32	60	68	88
	2013	0	0	38	44	49	56	87
	2014	0	0	26	46	31	54	57
	2015	0	0	21	33	42	67	63
	2016	0	0	19	33	39	67	58
	2017	0	0	18	31	41	69	59
	2018	0	0	15	33	31	67	46
	2019	0	0	15	39	23	61	39
Norway	1996	520	66	0	0	267	34	787
	1997	394	63	0	0	235	37	629
	1998	410	55	0	0	331	45	741
	1999	483	60	0	0	327	40	810
	2000	619	53	0	0	557	47	1176
	2001	696	55	0	0	570	45	1266
	2002	596	58	0	0	423	42	1019
	2003	597	56	0	0	474	44	1071
	2004	469	60	0	0	316	40	785
	2005	463	52	0	0	424	48	888
	2006	512	55	0	0	420	45	932
	2007	427	56	0	0	340	44	767
	2008	382	47	0	0	425	53	807
	2009	284	48	0	0	312	52	595
	2010	260	41	0	0	382	59	642
	2011	302	43	0	0	394	57	696
	2012	255	37	0	0	440	63	696
	2013	192	40	0	0	283	60	475
	2014	213	43	0	0	277	57	490
	2015	233	40	0	0	350	60	583
	2016	269	44	0	0	343	56	612
	2017	290	44	0	0	376	56	666
	2018	323	54	0	0	271	46	594
	2019	219	43	0	0	293	57	513

Country	Year	Coastal		Estuarine		In-river		Total
		tonnes	% of total	tonnes	% of total	tonnes	% of total	tonnes
Russia	1996	64	49	21	16	46	35	131
	1997	63	57	17	15	32	28	111
	1998	55	42	2	2	74	56	131
	1999	48	47	2	2	52	51	102
	2000	64	52	15	12	45	36	124
	2001	70	61	0	0	44	39	114
	2002	60	51	0	0	58	49	118
	2003	57	53	0	0	50	47	107
	2004	46	56	0	0	36	44	82
	2005	58	70	0	0	25	30	82
	2006	52	57	0	0	39	43	91
	2007	31	50	0	0	31	50	63
	2008	33	45	0	0	40	55	73
	2009	22	31	0	0	49	69	71
	2010	36	41	0	0	52	59	88
	2011	37	42	0	0	52	58	89
	2012	38	46	0	0	45	54	82
	2013	36	46	0	0	42	54	78
	2014	33	41	0	0	48	59	81
	2015	34	42	0	0	46	58	80
	2016	24	42	0	0	32	58	56
	2017	13	28	0	0	34	72	47
	2018	36	45	0	0	44	55	80
	2019	22	38	0	0	35	62	57
Spain	1996	0	0	0	0	7	100	7
	1997	0	0	0	0	4	100	4
	1998	0	0	0	0	4	100	4
	1999	0	0	0	0	6	100	6
	2000	0	0	0	0	7	100	7
	2001	0	0	0	0	13	100	13
	2002	0	0	0	0	9	100	9
	2003	0	0	0	0	7	100	7
	2004	0	0	0	0	7	100	7
	2005	0	0	0	0	13	100	13
	2006	0	0	0	0	11	100	11
	2007	0	0	0	0	9	100	9
	2008	0	0	0	0	9	100	9
	2009	0	0	0	0	2	100	2
	2010	0	0	0	0	2	100	2
	2011	0	0	0	0	7	100	7
	2012	0	0	0	0	7	100	7
	2013	0	0	0	0	5	100	5
	2014	0	0	0	0	6	100	6
	2015	0	0	0	0	5	100	5
	2016	0	0	0	0	5	100	5
	2017	0	0	0	0	2	100	2
	2018	0	0	0	0	3	100	3
	2019	0	0	0	0	5	100	5

Country	Year	Coastal		Estuarine		In-river		Total
		tonnes	% of total	tonnes	% of total	tonnes	% of total	tonnes
Sweden	1996	19	58	0	0	14	42	33
	1997	10	56	0	0	8	44	18
	1998	5	33	0	0	10	67	15
	1999	5	31	0	0	11	69	16
	2000	10	30	0	0	23	70	33
	2001	9	27	0	0	24	73	33
	2002	7	25	0	0	21	75	28
	2003	7	28	0	0	18	72	25
	2004	3	16	0	0	16	84	19
	2005	1	7	0	0	14	93	15
	2006	1	7	0	0	13	93	14
	2007	0	1	0	0	16	99	16
	2008	0	1	0	0	18	99	18
	2009	0	3	0	0	17	97	17
	2010	0	0	0	0	22	100	22
	2011	10	26	0	0	29	74	39
	2012	7	24	0	0	23	76	30
	2013	0	0	0	0	15	100	15
	2014	0	0	0	0	30	100	30
	2015	0	0	0	0	16	100	16
	2016	0	0	0	0	9	100	9
	2017	0	0	0	0	16	100	16
	2018	0	0	0	0	13	100	13
	2019	0	0	0	0	17	100	17
UK (England and Wales)	1996	83	45	42	23	58	31	183
	1997	81	57	27	19	35	24	142
	1998	65	53	19	16	38	31	123
	1999	101	67	23	15	26	17	150
	2000	157	72	25	12	37	17	219
	2001	129	70	24	13	31	17	184
	2002	108	67	24	15	29	18	161
	2003	42	47	27	30	20	23	89
	2004	39	35	19	17	53	47	111
	2005	32	33	28	29	36	37	97
	2006	30	37	21	26	30	37	80
	2007	24	36	13	20	30	44	67
	2008	22	34	8	13	34	53	64
	2009	20	37	9	16	25	47	54
	2010	64	59	9	8	36	33	109
	2011	93	69	6	5	36	27	136
	2012	26	45	5	8	27	47	58
	2013	61	73	6	7	17	20	84
	2014	41	75	4	8	9	17	54
	2015	55	82	4	6	8	12	68
	2016	71	82	6	6	10	11	86
	2017	36	73	3	7	10	19	49
	2018	36	84	3	8	4	8	42
	2019	0	0	1	11	4	89	5

Country	Year	Coastal		Estuarine		In-river		Total
		tonnes	% of total	tonnes	% of total	tonnes	% of total	tonnes
UK (Northern Ireland)	1999	44	83	9	17	na	na	53
	2000	63	82	14	18	na	na	77
	2001	41	77	12	23	na	na	53
	2002	40	49	24	29	18	22	81
	2003	25	45	20	35	11	20	56
	2004	23	48	11	22	14	29	48
	2005	25	49	13	25	14	26	52
	2006	13	45	6	22	9	32	29
	2007	6	21	6	20	17	59	30
	2008	4	19	5	22	12	59	21
	2009	4	24	2	15	10	62	16
	2010	5	39	0	0	7	61	12
	2011	3	24	0	0	8	76	10
	2012	0	0	0	0	9	100	9
	2013	0	1	0	0	4	99	4
	2014	0	0	0	0	5	100	5
	2015	0	0	0	0	3	100	3
	2016	0	0	0	0	5	100	5
	2017	0	0	0	0	5	100	5
	2018	0	0	0	0	4	100	4
	2019	0	0	0	0	3	100	3
UK (Scotland)	1996	129	30	80	19	218	51	427
	1997	79	27	33	11	184	62	296
	1998	60	21	28	10	195	69	283
	1999	35	18	23	11	141	71	199
	2000	76	28	41	15	157	57	274
	2001	77	30	22	9	153	61	251
	2002	55	29	20	10	116	61	191
	2003	87	45	23	12	83	43	193
	2004	67	27	20	8	160	65	247
	2005	62	29	27	12	128	59	217
	2006	57	30	17	9	119	62	193
	2007	40	24	17	10	113	66	171
	2008	38	24	11	7	112	70	161
	2009	27	22	14	12	79	66	121
	2010	44	25	38	21	98	54	180
	2011	48	30	23	15	87	55	159
	2012	40	32	11	9	73	59	124
	2013	50	42	26	22	43	36	119
	2014	41	49	17	20	26	31	84
	2015	31	45	9	14	28	41	68
	2016	0	0	10	37	17	63	27
	2017	0	0	7	27	19	73	26
	2018	0	0	12	63	7	37	19
	2019	0	0	2	14	11	86	13

Country	Year	Coastal		Estuarine		In-river		Total
		tonnes	% of total	tonnes	% of total	tonnes	% of total	tonnes
Denmark	2008	0	1	0	0	9	99	9
	2009	0	0	0	0	8	100	8
	2010	0	1	0	0	13	99	13
	2011	0	0	0	0	13	100	13
	2012	0	0	0	0	12	100	12
	2013	0	0	0	0	11	100	11
	2014	0	0	0	0	9	100	9
	2015	0	0	0	0	9	100	9
	2016	0	0	0	0	10	100	10
	2017	0	1	0	0	12	99	12
	2018	0	1	0	0	11	99	11
	2019	0	1	0	0	13	99	13

Table 7 Estimates of unreported catches by various methods in tonnes by country within national EEZs in the Northeast Atlantic, North American, and West Greenland Commissions of NASCO for 2019.

Commission area	Country	Unreported catch (tonnes)	Unreported as % of total North Atlantic catch (unreported + reported)	Unreported as % of national catch (unreported + reported)
NEAC	Denmark	5	0.4	28
NEAC	Finland	3	0.3	12
NEAC	Iceland	1	0.1	2
NEAC	Ireland	4	0.4	9
NEAC	Norway	220	19.5	30
NEAC	Sweden	2	0.1	9
NEAC	UK (England and Wales)	1	0.1	13
NEAC	UK (Northern Ireland)	0.3	0.0	8
NEAC	UK (Scotland)	1	0.1	9
NAC	USA	0	0.0	0
NAC	Canada	12	1.0	11
WGC	Greenland	10	0.9	25
Total unreported catch*		258	22.9	
Total reported catch of North Atlantic salmon		869		

* No unreported catch estimates are available for France, Spain, St Pierre and Miquelon, or Russia in 2019.

Table 8 Numbers of fish caught and released in rod fisheries along with the % of the total rod catch (released + retained) for countries in the North Atlantic, where records are available, 1991–2019. Values for 2019 are provisional.

Year	Canada (4)		USA		Iceland		Russia (1)		UK (England and Wales)		UK (Scotland)		Ireland		UK (N. Ireland) (2)		Denmark		Sweden		Norway (3)	
	Total	% of total rod catch	Total	% of total rod catch	Total	% of total rod catch	Total	% of total rod catch	Total	% of total rod catch	Total	% of total rod catch	Total	% of total rod catch	Total	% of total rod catch	Total	% of total rod catch	Total	% of total rod catch	Total	% of total rod catch
1991	22167	28	239	50			3211	51														
1992	37803	29	407	67			10120	73														
1993	44803	36	507	77			11246	82	1448	10												
1994	52887	43	249	95			12056	83	3227	13	6595	8										
1995	46029	46	370	100			11904	84	3189	20	12151	14										
1996	52166	41	542	100	669	2	10745	73	3428	20	10413	15										
1997	50009	50	333	100	1558	5	14823	87	3132	24	10944	18										
1998	56289	53	273	100	2826	7	12776	81	4378	30	13464	18										
1999	48720	50	211	100	3055	10	11450	77	4382	42	14849	28										
2000	64482	56	0	-	2918	11	12914	74	7470	42	21072	32										
2001	59387	55	0	-	3611	12	16945	76	6143	43	27724	38										
2002	50924	52	0	-	5985	18	25248	80	7658	50	24058	41										
2003	53645	55	0	-	5361	16	33862	81	6425	56	29170	55										
2004	62316	57	0	-	7362	16	24679	76	13211	48	46279	50					255	19				
2005	63005	62	0	-	9224	17	23592	87	11983	56	46165	55	2553	12			606	27				
2006	60486	62	1	100	8735	19	33380	82	10959	56	47669	55	5409	22	302	18	794	65				
2007	41192	58	3	100	9691	18	44341	90	10917	55	55670	61	15113	44	470	16	959	57				
2008	54887	53	61	100	17178	20	41881	86	13035	55	53366	62	13563	38	648	20	2033	71			5512	5
2009	52151	59	0	-	17514	24			9096	58	48436	67	11422	39	847	21	1709	53			6696	6
2010	55895	53	0	-	21476	29	14585	56	15012	60	78459	70	15142	40	823	25	2512	60			15041	12
2011	71358	57	0	-	18593	32			14406	62	65330	73	12688	38	1197	36	2153	55	424	5	14303	12
2012	43287	57	0	-	9752	28	4743	43	11952	65	63628	74	11891	35	5014	59	2153	55	404	6	18611	14
2013	50630	59	0	-	23133	34	3732	39	10458	70	54003	80	10682	37	1507	64	1932	57	274	9	15953	15
2014	41613	54	0	-	13616	41	8479	52	7992	78	37355	82	6537	37	1065	50	1918	61	982	15	20281	19
2015	65440	64	0	-	21914	31	7028	50	8113	79	46837	84	9383	37	111	100	2989	70	647	18	25433	19
2016	68925	65	0	-	22751	43	10793	76	9700	80	50186	90	10934	43	280	100	3801	72	362	17	25198	21
2017	57357	66	0	-	19667	42	10110	77	11255	83	45652	90	12562	45	126	100	4435	69	590	17	25924	21
2018	56011	82	0	-	19409	43	10799	73	6857	88	35066	93	8729	43	3247	49	4613	79	557	19	22024	22
2019	46335	70	0	-	14136	52	12762	74	7990	89	43739	92	7769	48	4106	61	3913	70	678	20	21178	20
Mean																						
2014–2018	57869	66	0	-	19471	40	9442	66	8783	82	43019	88	9629	41	966	80	3551	70	628	17	23772	20
% change; recent year relative to mean																						
	−20	6	-	-	−27	32	35	13	−9	9	2	5	−19	17	325	−24	10	0	8	16	−11	−1

Key:

1. Since 2009, data are either unavailable or incomplete; however, catch-and-release is considered to have remained at similar high levels as previously.
2. Data for 2006–2009, 2014 is for the Department of Culture, Arts and Leisure area only; the values from 2010 are a total for UK (Northern Ireland). Data for 2015, 2016, and 2017 are for River Bush only.
3. The statistics were collected on a voluntary basis, the numbers reported must be viewed as a minimum.
4. Released fish in the kelt fishery of New Brunswick are not included in the totals for Canada.

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Annex 1 Glossary of acronyms and abbreviations

1SW (*one-sea-winter*). Maiden adult salmon that has spent one winter at sea.

2SW (*two-sea-winter*). Maiden adult salmon that has spent two winters at sea.

ACOM (*ICES Advisory Committee*). The Committee works on the basis of scientific assessment prepared in ICES expert groups. The advisory process includes peer review of the assessment before it can be used as the basis for advice. The Advisory Committee has one member from each ICES Member Country under the direction of an independent chair, appointed by the Council.

CL, i.e. S_{lim} (*conservation limit*). Demarcation of undesirable stock levels or levels of fishing activity; the ultimate objective of fisheries management will be to ensure a high probability of undesirable levels being avoided.

C&R (*catch-and-release*). Catch-and-release is a practice within recreational fishing intended as a technique of conservation. After capture, the fish are unhooked and returned to the water before experiencing serious exhaustion or injury. Using barbless hooks, it is often possible to release the fish without removing it from the water (a slack line is frequently sufficient).

CWT (*coded wire tag*). The CWT is a length of magnetized stainless steel wire, 0.25 mm in diameter. The tag is marked with rows of numbers, denoting specific batch or individual codes. Tags are cut from rolls of wire by an injector that hypodermically implants them into suitable tissue. The standard length of a tag is 1.1 mm.

DNA (*deoxyribonucleic acid*). DNA is a nucleic acid that contains the genetic instructions used in the development and functioning of all known living organisms (with the exception of RNA – Ribonucleic Acid viruses). The main role of DNA molecules is the long-term storage of information. DNA is often compared to a set of blueprints, like a recipe or a code, since it contains the instructions needed to construct other components of cells, such as proteins and RNA molecules.

DST *(data storage tag*). A miniature data logger that is attached to fish and other marine animals, measuring salinity, temperature, and depth.

EEZ *(Exclusive Economic Zone*). EEZ is a concept adopted at the Third United Nations Conference on the Law of the Sea, whereby a coastal state assumes jurisdiction over the exploration and exploitation of marine resources in its adjacent section of the continental shelf, taken to be a band extending 200 miles from the shore.

ICES (*International Council for the Exploration of the Sea*). A global organization that develops science and advice to support the sustainable use of the oceans through the coordination of oceanic and coastal monitoring and research, and advising international commissions and governments on marine policy and management issues.

MSY (*maximum sustainable yield*). The largest average annual catch that may be taken from a stock continuously without affecting the catch of future years. A constant long-term MSY is not a reality in most fisheries, where stock sizes vary with the strength of year classes moving through the fishery.

MSW (*multi-sea-winter*). A MSW salmon is an adult salmon that has spent two or more winters at sea and may be a repeat spawner.

NAC (*North American Commission*). The North American Atlantic Commission of NASCO or the North American Commission area of NASCO.

NASCO (*North Atlantic Salmon Conservation Organization*). An international organization, established by an inter-governmental convention in 1984. The objective of NASCO is to conserve, restore, enhance, and rationally manage the fisheries of Atlantic salmon through international cooperation, taking account of the best available scientific information.

NEAC (*North-East Atlantic Commission*). The North-East Atlantic Commission of NASCO or the North-East Atlantic Commission area of NASCO.

NEAC–N (*North-East Atlantic Commission – northern area*). The northern portion of the North-East Atlantic Commission area of NASCO.

NEAC–S (*North-East Atlantic Commission – southern area*). The southern portion of the North-East Atlantic Commission area of NASCO.

PFA (*pre-fishery abundance*). The numbers of salmon estimated to be alive in the ocean from a particular stock at a specified time. In the previous version of the stock complex Bayesian PFA forecast model, two productivity parameters are calculated, for the *maturing* (PFAm) and *non-maturing* (PFAnm) components of the PFA. In the updated version only one productivity parameter is calculated; this parameter is used to calculate total PFA, which is then split into PFAm and PFAnm based upon the *proportion of PFAm* (p.PFAm).

PIT (*passive integrated transponder*). PIT tags use radio frequency identification technology. PIT tags lack an internal power source. They are energized on encountering an electromagnetic field emitted from a transceiver. The tag's unique identity code is programmed into the microchip's nonvolatile memory.

SER (*spawning escapement reserve*). The CL increased to take account of natural mortality between the recruitment date (assumed to be the 1st of January) and the date of return to home waters.

S_{lim}, i.e. CL (*conservation limit*). Demarcation of undesirable stock levels or levels of fishing activity; the ultimate objective when managing fisheries of these stocks will be to ensure that there is a high probability that the undesirable levels are avoided.

S_{MSY} (*spawners for maximum sustainable yield*). The spawner abundance that generates recruitment at a level that provides a maximum exploitable yield (recruitment minus spawners).

VIE (Visible Implant Elastomer). VIE is injected into fish to identify individuals by colour or tag position.

WGC (*West Greenland Commission*). The West Greenland Commission of NASCO or the West Greenland Commission area of NASCO.

WGNAS (*Working Group on North Atlantic Salmon*). ICES working group responsible for the annual assessment of the status of salmon stocks across the North Atlantic and formulating catch advice for NASCO.

Annex 2 References

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Atlantic salmon from the Northeast Atlantic

Summary of advice for fishing season 2020/2021

ICES advises that when the Framework of Indicators (FWI) was applied in early 2020, a full reassessment was not required and the 2018 ICES advice remains valid: "when the MSY approach is applied there are no mixed-stock fisheries options on the NEAC complexes at the Faroes for the fishing seasons 2018/2019 to 2020/2021". 2020 marks the final year of NASCO's three year decision regarding the salmon fishery in the Faroese Waters (NASCO, 2018).

The FWI previously developed in support of the multiyear catch advice was revised in 2018. ICES recommended that, since the zero catch options at Faroes are the result of the current status of both Southern NEAC stock complexes (i.e. maturing and non-maturing sea age groups) and the Northern NEAC maturing stock complex, the FWI applied in January 2019 and 2020 should be based only on these three stock complexes (ICES, 2018). NASCO agreed that this revised FWI would be used in these years.

ICES advises that when the MSY approach is applied, fishing should only take place on salmon from rivers where stocks have been shown to be at full reproductive capacity. Mixed-stock fisheries present particular threats, and should be managed based on the individual status of all stocks exploited in the fishery.

NASCO 2.1NASCO has asked ICES to describe the key events of the 2019 fisheries

No significant changes in gear type used were reported in the NEAC area in 2019.

No fishery for salmon has been prosecuted at the Faroes after 2000.

New regulatory provisions approved for UK (England) in December 2018 substantially reduced the exploitation of salmon in 2019. The measures included the closure of most net fisheries, including all driftnet fisheries and mandatory release of salmon caught in net fisheries authorized to operate for sea trout.

The reported nominal catch in the NEAC area in 2019 is 743 t, with 77 t reported in the Southern NEAC and 666 t in the Northern NEAC areas. Estimates of unreported catches in the NEAC area were 237 t in total. As in previous years, the location of catches differed between Southern NEAC and Northern NEAC (Table 1). In 2019, in-river fisheries accounted for 68% of the catches in Southern NEAC, 32% came from estuarine fisheries, and 0% from coastal fisheries. In Northern NEAC, on the other hand, coastal fisheries accounted for 36% of the catches, with the remaining 64% of the catches coming from in-river fisheries.

Table 1 Salmon catches (in tonnes) and location of catches in the NEAC areas in 2019.

Salmon catches	Southern NEAC	Northern NEAC	Faroes	Total NEAC
2019 nominal catch (tonnes)	77	666	0	743
Catch as per cent of NEAC total	10	90	0	100
Unreported catch (tonnes)	6	231	-	237
Location of catches	Southern NEAC	Northern NEAC	Faroes	Total NEAC
% in-river	68	64	-	64
% in estuaries	32	0	-	3
% coastal	0	36	-	33

The NEAC area has seen a general reduction in catches since the 1980s (Figure 1, Table 2). This reflects the decline in fishing effort as a consequence of management measures, as well as a reduction in the size of stocks. The nominal catch for 2019 (743 t) was below that in 2018 (927 t), and the lowest in the time-series in both areas. The catch in Southern NEAC, which constituted around two-thirds of the total NEAC catch in the early 1970s, has been lower than that of Northern NEAC since 1999 (Figure 1).

1SW salmon constituted 44% of the total catch in Northern NEAC in 2019 (Figure 2). For the Southern NEAC countries, the overall percentage of 1SW fish in the catch in 2019 was estimated at 63%.

The contribution of escaped farmed salmon to national catches in the NEAC area in 2019 was generally low in most countries, and similar to the values that have been reported in previous years. Estimates of farmed fish in Norwegian angling catches were in the lower range of observed values in the time-series (3%), while the proportion estimated in Norwegian river populations in the autumn showed an increase on the previous year (7%). No current data are available for the proportion of farmed salmon in coastal fisheries. Small numbers of escaped farmed salmon were also reported from catches in Icelandic and Scottish rivers (6 and 20 fish, respectively) in 2019.

Estimated exploitation rates have decreased since the early 1980s in both the Northern and Southern NEAC areas (Figure 3). The exploitation rates on 1SW and MSW salmon have become similar, with higher exploitation rates in Northern NEAC at around 40% compared to 10% in Southern NEAC.

Estimates of the number of salmon caught and released in angling fisheries are not complete for all NEAC countries. There are large differences between countries in the percentage of the total angling catch that is released: in 2019 this ranged from 20% in Sweden to 92% in UK (Scotland), reflecting varying management practices and angler attitudes among these countries. Catch and release mortality estimates are also available for some countries, but these are not included in the nominal catch.

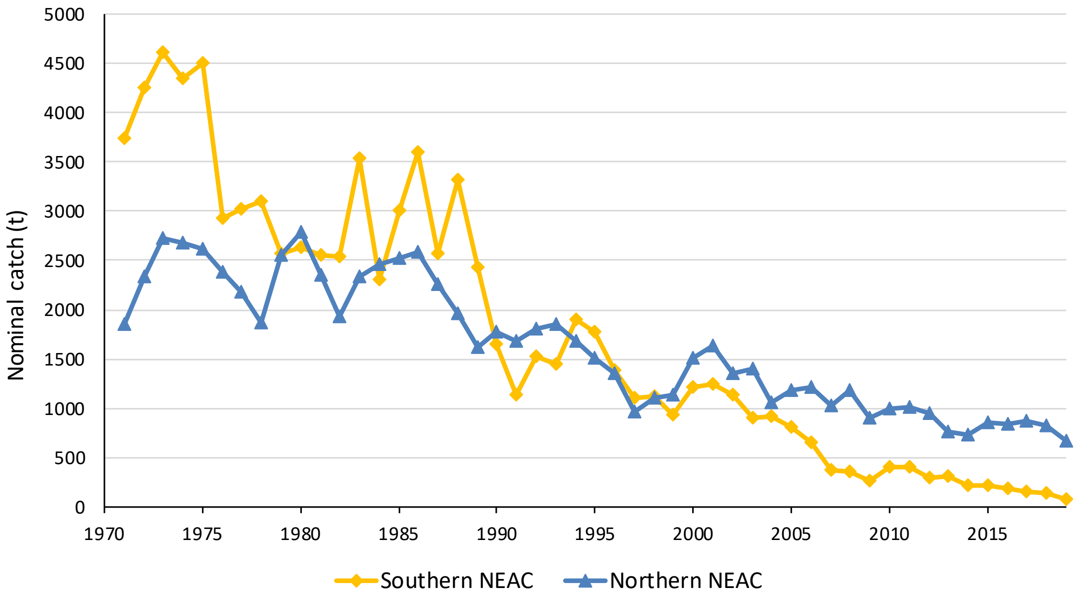

Figure 1 Nominal catches of salmon in the Southern NEAC and Northern NEAC areas (1971–2019).

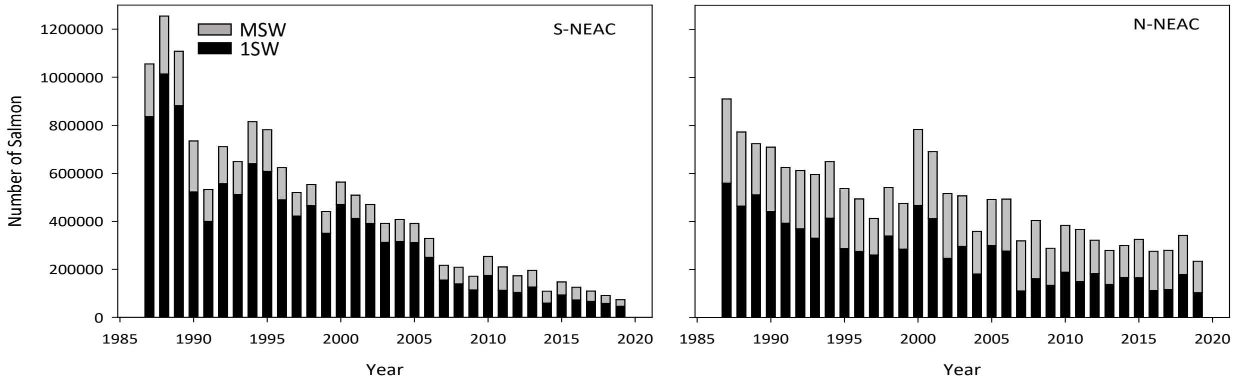

Figure 2 Number of 1SW (black bar) and MSW (grey bar) salmon in the total catch for Southern NEAC (left) and Northern NEAC (right) areas, 1987–2019.

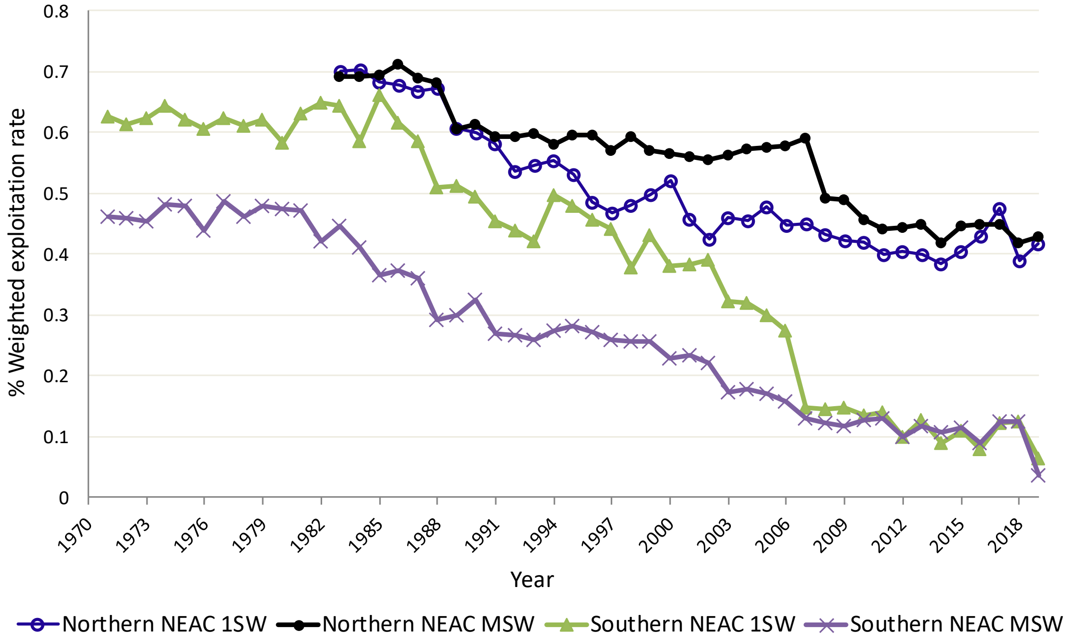

Figure 3 Exploitation rates of 1SW and MSW salmon in homewater fisheries in the Northern (1983–2019) and Southern (1971–2019) NEAC areas.

Table 2 Nominal catch of salmon in the NEAC area (in tonnes, round fresh weight), 1960 to 2019 (2019 values are provisional).

Year	Southern NEAC	Northern NEAC[1]	Faroes[2]	Other catches in international waters	Total reported catch	Unreported catches	
						NEAC area[3]	International waters[4]
1960	2641	2899	-	-	5540	-	-
1961	2276	2477	-	-	4753	-	-
1962	3894	2815	-	-	6709	-	-
1963	3842	2434	-	-	6276	-	-
1964	4242	2908	-	-	7150	-	-
1965	3693	2763	-	-	6456	-	-
1966	3549	2503	-	-	6052	-	-
1967	4492	3034	-	-	7526	-	-
1968	3623	2523	5	403	6554	-	-
1969	4383	1898	7	893	7181	-	-
1970	4048	1834	12	922	6816	-	-
1971	3736	1846	-	471	6053	-	-
1972	4257	2340	9	486	7092	-	-

Year	Southern NEAC	Northern NEAC[1]	Faroes[2]	Other catches in international waters	Total reported catch	Unreported catches	
						NEAC area[3]	International waters[4]
1973	4604	2727	28	533	7892	-	-
1974	4352	2675	20	373	7420	-	-
1975	4500	2616	28	475	7619	-	-
1976	2931	2383	40	289	5643	-	-
1977	3025	2184	40	192	5441	-	-
1978	3102	1864	37	138	5141	-	-
1979	2572	2549	119	193	5433	-	-
1980	2640	2794	536	277	6247	-	-
1981	2557	2352	1025	313	6247	-	-
1982	2533	1938	606	437	5514	-	-
1983	3532	2341	678	466	7017	-	-
1984	2308	2461	628	101	5498	-	-
1985	3002	2531	566	-	6099	-	-
1986	3595	2588	530	-	6713	-	-
1987	2564	2266	576	-	5406	2554	-
1988	3315	1969	243	-	5527	3087	-
1989	2433	1627	364	-	4424	2103	-
1990	1645	1775	315	-	3735	1779	180–350
1991	1145	1677	95	-	2917	1555	25–100
1992	1523	1806	23	-	3352	1825	25–100
1993	1443	1853	23	-	3319	1471	25–100
1994	1896	1684	6	-	3586	1157	25–100
1995	1775	1503	5	-	3283	942	-
1996	1392	1358	-	-	2750	947	-
1997	1112	962	-	-	2074	732	-
1998	1120	1099	6	`	2225	1108	-
1999	934	1139	0	-	2073	887	-
2000	1210	1518	8	-	2736	1135	-
2001	1242	1634	0	-	2876	1089	-
2002	1135	1360	0	-	2496	946	-
2003	908	1394	0	-	2303	719	-
2004	919	1059	0	-	1978	575	-
2005	809	1189	0	-	1998	605	-
2006	650	1217	0	-	1867	604	-
2007	373	1036	0	-	1408	465	-
2008	355	1178	0	-	1533	433	-
2009	266	898	0	-	1164	317	-
2010	411	1003	0	-	1414	357	-
2011	410	1009	0	-	1419	382	-
2012	295	955	0	-	1250	363	-
2013	310	770	0	-	1080	272	-
2014	218	736	0	-	954	256	-
2015	223	859	0	-	1081	298	-
2016	186	842	0	-	1028	298	-
2017	151	856	0		1011	318	-
2018	125	802	0	-	927	277	-
2019	77	666	0		743	237	-
Average							
2014–2018	180	820	0	-	1000	289	-
2009–2018	259	873	0	-	1133	314	-

[1] All Icelandic catches have been included in Northern NEAC.
[2] Since 1991, fishing carried out at the Faroes has only been for research purposes.
[3] No unreported catch estimate available for Russia since 2008.
[4] Estimates refer to season ending in the given year.

NASCO 2.2 NASCO has asked ICES to review and report on the development of age-specific stock conservation limits

River-specific conservation limits (CLs) (in terms of either egg or spawner requirements) for both 1SW and MSW salmon have been estimated for stocks in most countries/jurisdictions in the NEAC area (France, Ireland, UK (England and Wales), UK (Northern Ireland), Finland, Norway, and Sweden). Preliminary results are also available for a small number of rivers in Russia. Where sufficient numbers of CL estimates are available for individual rivers, these are summed to provide estimates at a country/jurisdiction level. For countries/jurisdictions that have not applied this approach (Russia, UK (Scotland), and Iceland), an interim approach was used to estimate national CLs. This approach is based on the establishment of pseudo stock–recruitment relationships for salmon stocks that are updated annually; as a result the CLs may change slightly year to year.

In UK (Scotland), further progress has been made in establishing CLs at the scale of the river stock, or on groups of smaller neighbouring rivers where angling data are not yet available by river. A new approach to defining river-specific CLs has been developed using a Bayesian hierarchical modelling framework. This was used to define CLs for 11 Scottish rivers with stock and recruitment data. By pooling information from multiple rivers and incorporating information about local environmental covariates, CL estimates have also been transferred to other rivers without such data, to a total number of 173 areas assessed annually. Investigations are continuing to determine whether alternative stock–recruitment relationships and additional river covariates can improve the current model.

In Iceland, during 2018–2019, CLs were set for 12 rivers, mostly in West Iceland. All of these are important salmon fisheries that contribute around 33% of the total annual rod catch of wild salmon.

To provide catch advice to NASCO, CLs are required for stock complexes. These were derived either by summing individual river CLs to country/jurisdiction level, or by taking overall CLs as provided by the model, and then summing to the level of the four NEAC stock complexes. Spawner escapement reserves (SERs) are CLs (expressed in terms of spawner numbers), adjusted to take account of natural mortality (M = 0.03 per month) between 1 January of the first winter at sea and return time to homewaters for each of the maturing (6–9 months) and non-maturing (16–21 months) 1SW salmon components from the Northern NEAC and Southern NEAC stock complexes.

National stocks within the NEAC area are combined into two geographic groups for the provision of management advice for the distant-water fisheries at West Greenland and the Faroes. The Northern group consists of Russia, Finland, Norway, Sweden, and the northeastern region of Iceland. The Southern group consists of UK (Scotland), UK (England and Wales), UK (Northern Ireland), Ireland, France, and the southwestern region of Iceland.

CLs and SERs are provided for the four stock complexes, defined as two sea ages per geographic group (Table 3), by summing country/jurisdiction CLs to the level of the four NEAC stock complexes.

Table 3 Conservation limits (CL) and spawner escapement reserves (SER) for the four salmon stock complexes (combination of regional group and sea age) in the NEAC area in 2019.

Regional group	Age group	CL (number)	SER (number)
Northern NEAC	1SW	133 245	168 843
	MSW	119 687	204 939
Southern NEAC	1SW	593 735	754 678
	MSW	295 781	502 353

For the nine countries/jurisdictions where river-specific CLs are available, time-series indicating the development in the definition of river-specific CLs, the number of rivers annually assessed against CLs, and the number of rivers that annually meet or exceed CLs (based on spawner numbers, after fisheries) are provided in Figure 4. This figure illustrates the increase in the number of CLs established within individual countries/jurisdictions. Iceland has (since 2018–2019) thirteen rivers with established CLs, of which one river has been assessed annually since 2000. Ten of the 17-year time-series have been below the CL, and four out of the past five years have been above the CL. The time-series for the river in Iceland assessed since 2000 is not included in Figure 4 or Table 4.

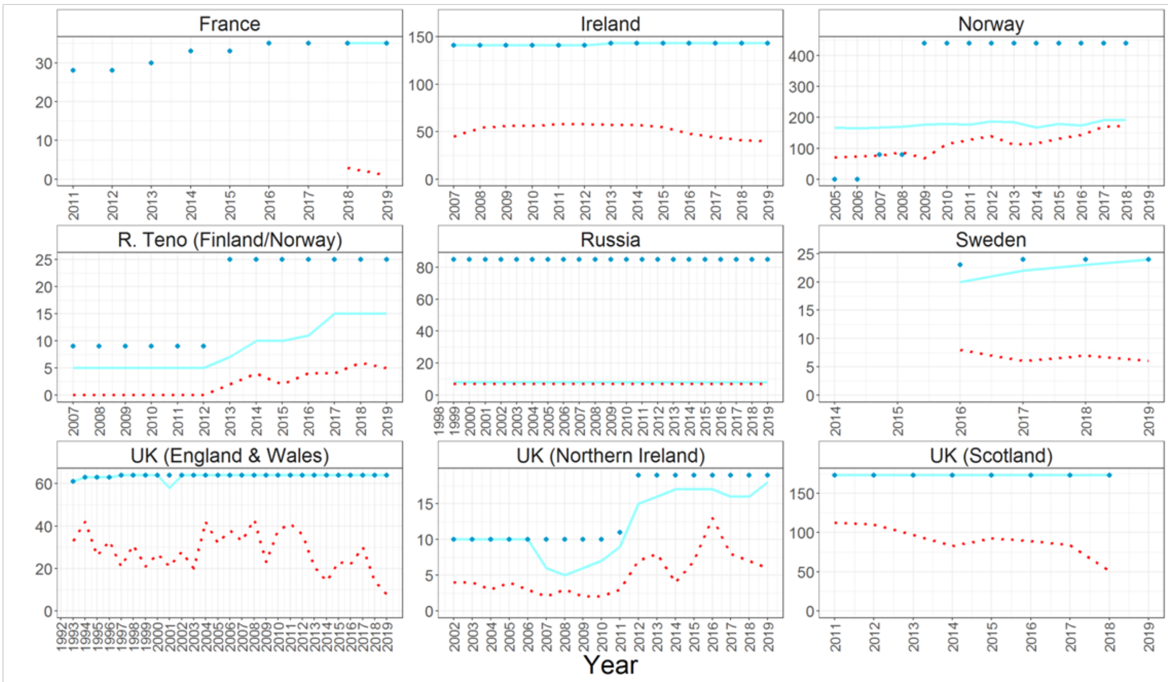

Figure 4 Time-series of countries/jurisdictions in the NEAC area to 2019 (2018 for Norway and UK Scotland), showing the number of rivers with established CLs and trends in the number of stocks meeting CLs (•–•–• number of rivers with established CLs; — number of rivers assessed for attainment of CLs; . . . . . . number of rivers meeting or exceeding CLs). Note: data for France prior to 2018 are currently under review.

NASCO 2.3 NASCO has asked ICES to describe the status of the stocks

Recruitment, expressed as pre-fishery abundance (PFA; split by maturing and non-maturing 1SW salmon, at 1 January of the first winter at sea) is estimated by geographic groups (Northern NEAC and Southern NEAC), and individual country/jurisdiction, and assessed relative to the spawner escapement reserve (SER).

The assessment of PFA against SER for the four complexes over the time-series is shown in Figure 5, and by country/jurisdiction for the most recent year in Figure 6. The time-series of returns and spawners against CLs are shown by sea age groups for the Northern NEAC and Southern NEAC complexes (Figure 5), and for 2019 by individual countries/jurisdictions for 1SW maturing and MSW (1SW non-maturing at the PFA stage) salmon (Figure 6). These assessments show the same broad contrasts between Northern and Southern NEAC stocks seen in the stock complex data.

PFA relative to SER

For Northern NEAC PFAs of both maturing 1SW and non-maturing 1SW salmon show a general decline over the time period (since 1983), with the decline being more marked in the maturing 1SW stock (Tables 5 and 6, Figure 5). Both stock complexes have, however, been at full reproductive capacity prior to the distant-water fisheries (i.e. meeting the SER with at least 95% probability) throughout the time-series. In the most recent year, both maturing and non-maturing 1SW salmon in all Northern NEAC countries were at full reproductive capacity with the exception of Finland/Norway (River Teno/Tana), Iceland, and Russia where maturing 1SW salmon were at risk of suffering or suffering reduced reproductive capacity (Figure 6).

For Southern NEAC PFAs of maturing 1SW and of non-maturing 1SW salmon (Tables 5 and 6, Figure 5) demonstrate broadly similar declining trends over the time period (since 1971). Both stock complexes were at full reproductive capacity prior to distant-water fisheries throughout the early part of the time-series. However, in most years since the early 1990s, the non-maturing 1SW stock has either been at risk of suffering or suffering reduced reproductive capacity before any fisheries took place. The maturing 1SW stock, on the other hand, was first assessed as being at risk of suffering reduced reproductive capacity in 2009, and has been either at risk of suffering or suffering reduced reproductive capacity in the majority of the years since then. With the exception of UK (Northern Ireland), the maturing 1SW salmon in all Southern NEAC countries/jurisdictions in the most recent year were suffering reduced reproductive capacity (Figure 6); UK (Northern Ireland) was at full reproductive capacity. For the non-maturing 1SW salmon, stocks are either at risk of suffering or suffering reduced reproductive capacity prior to distant-water fisheries in most countries, except UK (England and Wales) and France where stocks are assessed to be at full reproductive capacity (Figure 6).

Spawners relative to CLs

In the Northern NEAC stock complex 1SW spawners have been at full reproductive capacity (i.e. meeting the CL with at least 95% probability) throughout the time-series. However, spawners have been at reduced levels since 2007 (Figure 5). MSW spawners have been at full reproductive capacity since 2006. Both 1SW and MSW stock complexes were at full reproductive capacity in 2019, although 1SW spawners were among the lowest in the time-series. In Northern NEAC countries, 1SW spawners in 2019 were at full reproductive capacity in Sweden and Norway, but at risk of suffering reduced reproductive capacity in Russia, and suffering reduced reproductive capacity in Iceland and Finland/Norway (River Teno/Tana) (Figure 7). MSW spawners in 2019 were at full reproductive capacity in Norway and Sweden, at risk of suffering reduced reproductive capacity in Iceland and Russia, and suffering reduced reproductive capacity in Finland/Norway (River Teno/Tana) (Figure 8).

For the Southern NEAC, there has been a progressive decline in 1SW spawner numbers (Figure 5). This sea age group has been either at risk of suffering or suffering reduced reproductive capacity for most of the time-series, and has been suffering reduced reproductive capacity consistently over the last six years. MSW spawners in Southern NEAC declined up to the late 1990s but have increased since this time. However, this sea age group has been either at risk of suffering or suffering reduced reproductive capacity in most years throughout the time-series. In 2019, Southern NEAC MSW spawners were suffering reduced reproductive capacity. In Southern NEAC countries/jurisdictions, 1SW spawners in 2019 were suffering reduced reproductive capacity, except for stocks in UK (Northern Ireland) that were at full reproductive capacity (Figure 7). MSW spawners in 2019 were either at risk of suffering or suffering reduced reproductive capacity, except for stocks in UK (England and Wales) that were at full reproductive capacity (Figure 8).

Trends in rivers meeting CLs

In the NEAC area, nine jurisdictions currently assess salmon stocks using river-specific CLs (Figure 4 and Table 4). The attainment of CLs is assessed based on spawners, after fisheries.

Table 4 Summary of the attainment of CLs in 2019 (2018 for Norway and UK [Scotland]) and trends based on all available data in the NEAC area. Further details can be found in ICES (2020).

Country /Jurisdiction	Number of rivers with CLs	Number of rivers assessed for compliance	Number of rivers attaining CL	% of assessed rivers attaining CL	Trend statement
Northern NEAC					
Russia	85	8	7	88	No trend
Finland/Norway (Teno/Tana)	25	15	5	33	Stable
Norway	439	193	171	89	Increasing
Sweden	24	24	6	25	Stable (data for 2016 to 2019 only)
Iceland	13	1	1	100	Not applicable as only one river assessed
Southern NEAC					
UK (Scotland)	173	173	51	29	Decreasing
UK (Northern Ireland)	19	18	6	33	Decreasing
UK (England and Wales)	64	64	8	13	Decreasing
Ireland	143	143	40	28	Decreasing
France	35	35	1	3	No trend (2018 and 2019 data only)

Marine survival

Return rate estimates, a proxy for marine survival, are derived for a limited number of rivers, of different time-series duration. Despite management measures aimed at reducing exploitation in recent years, there has been an overall declining trend since 1980 in the return rates of 1SW wild and hatchery-origin smolts in both Northern and Southern NEAC areas, indicating poor survival of 1SW salmon in the marine environment (Figure 9).

A declining trend is not evident for the 2SW wild components in either area (no data are available for hatchery-origin 2SW return rates for Southern NEAC and no estimates are provided for other MSW categories).

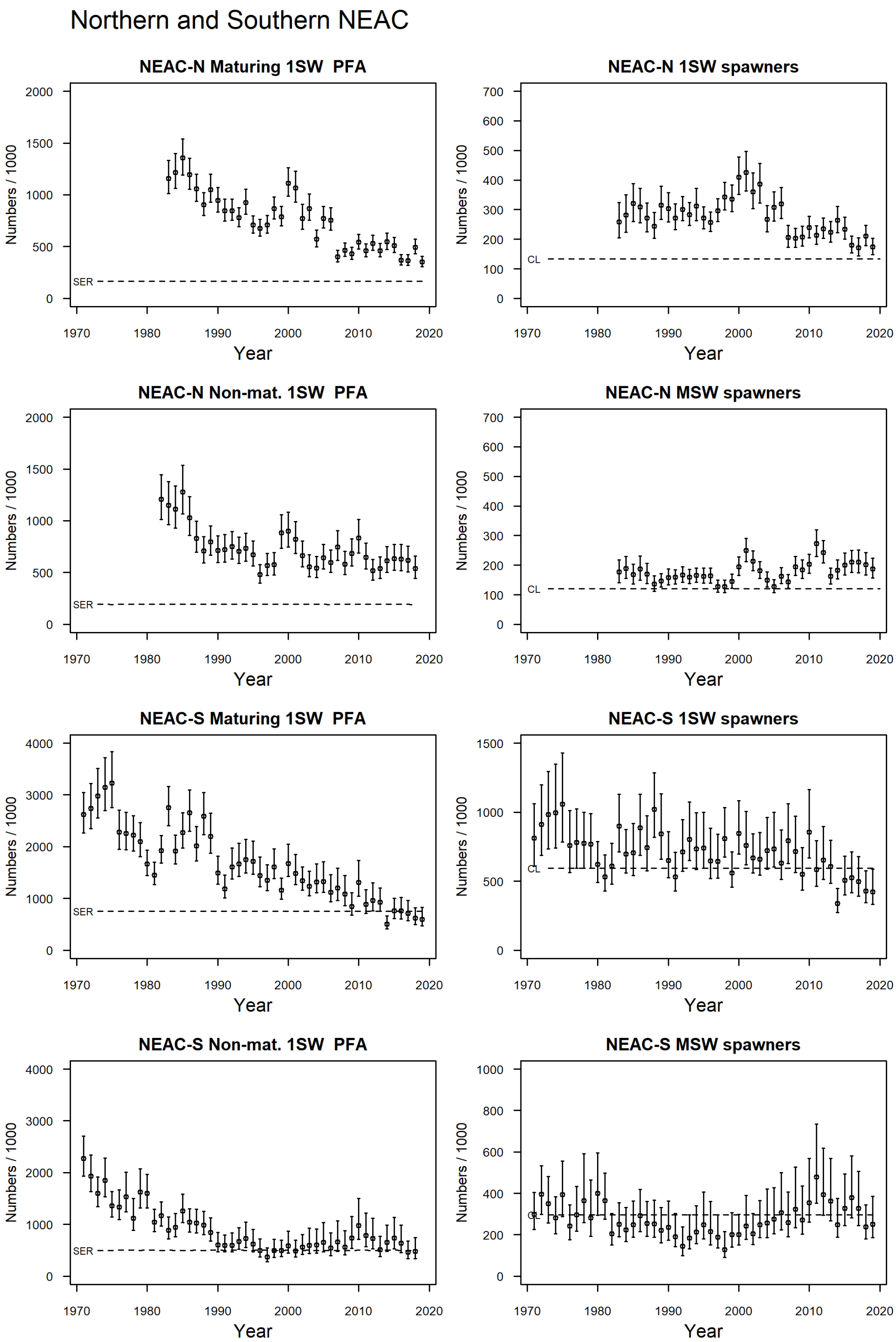

Figure 5 Pre-fishery abundance (PFA – recruits; left panels) and spawners (right panels), with 90% confidence limits, for maturing 1SW (spawning as 1SW) and non-maturing 1SW (spawning as MSW) salmon in Northern NEAC (NEAC-N) and Southern NEAC (NEAC-S). The dashed horizontal lines in the left panels are the respective 2019 spawning escapement reserve (SER) values, and in the right panels the conservation limit (CL) values.

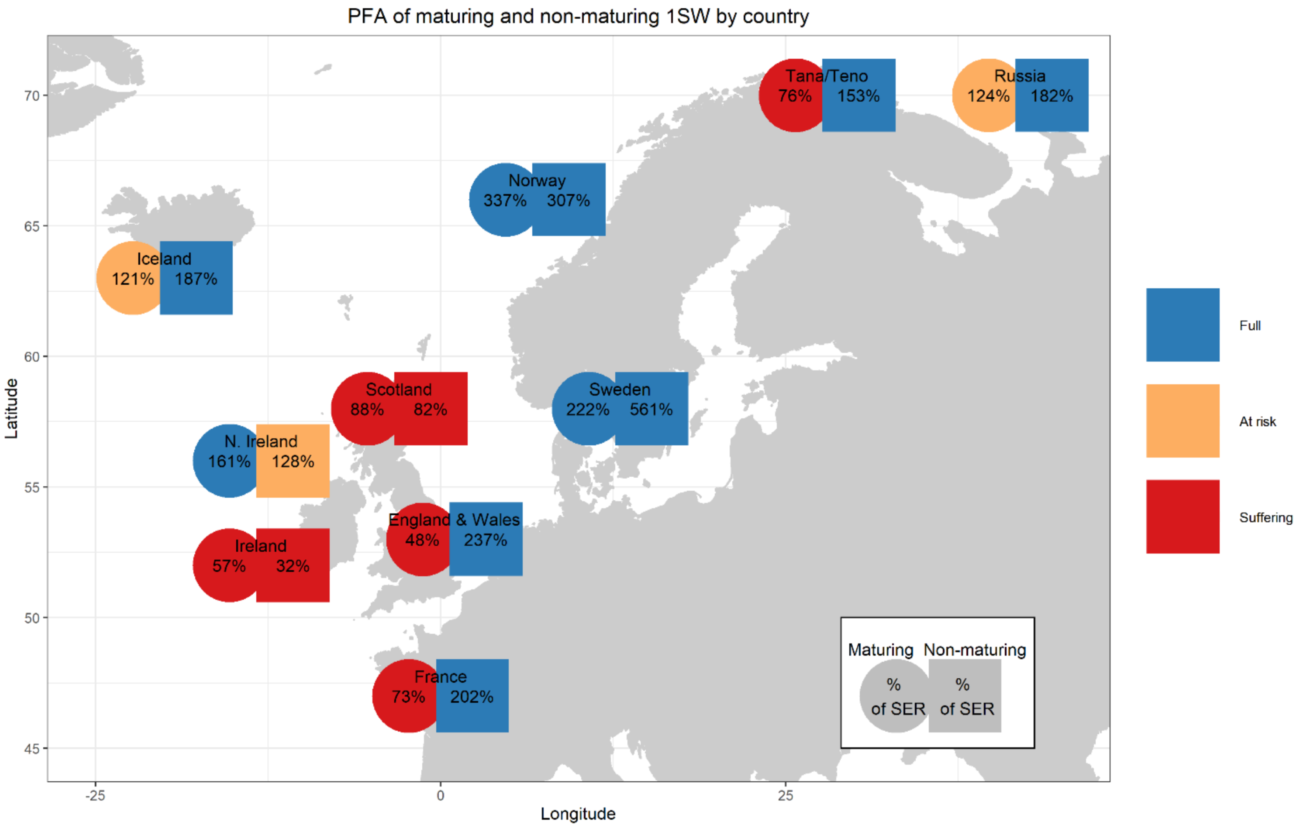

Figure 6 PFA of maturing (for 2019) and non-maturing (for 2018) as percentage of the respective spawner escapement reserve (% of SER). The percentage of SER is based on the median of the Monte Carlo distribution. The colour shading represents the three stock status designations: Full (at full reproductive capacity: the 5th percentile of the spawner estimate is above the SER); At risk (at risk of suffering reduced reproductive capacity: median spawner estimate is above the SER, but the 5th percentile is below); and Suffering (suffering reduced reproductive capacity: median spawner estimate is below the SER).

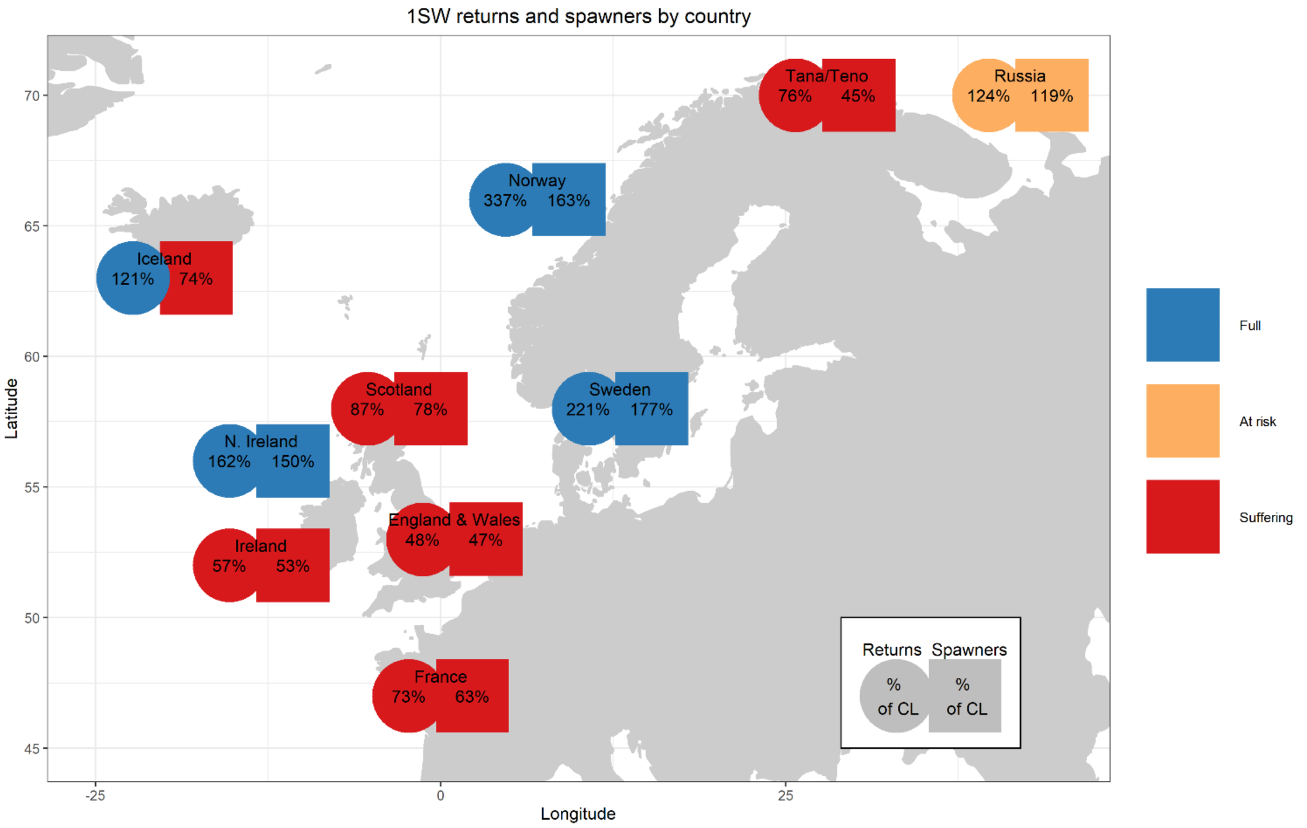

Figure 7 1SW returns and spawners as percentage of respective conservation limit (% of CL) for 2019. The percentage of CL is based on the median of the Monte Carlo distribution. The colour shading represents the three stock status designations: Full (at full reproductive capacity: the 5th percentile of the spawner estimate is above the CL); At risk (at risk of suffering reduced reproductive capacity: median spawner estimate is above the CL, but the 5th percentile is below); and Suffering (suffering reduced reproductive capacity: median spawner estimate is below the CL).

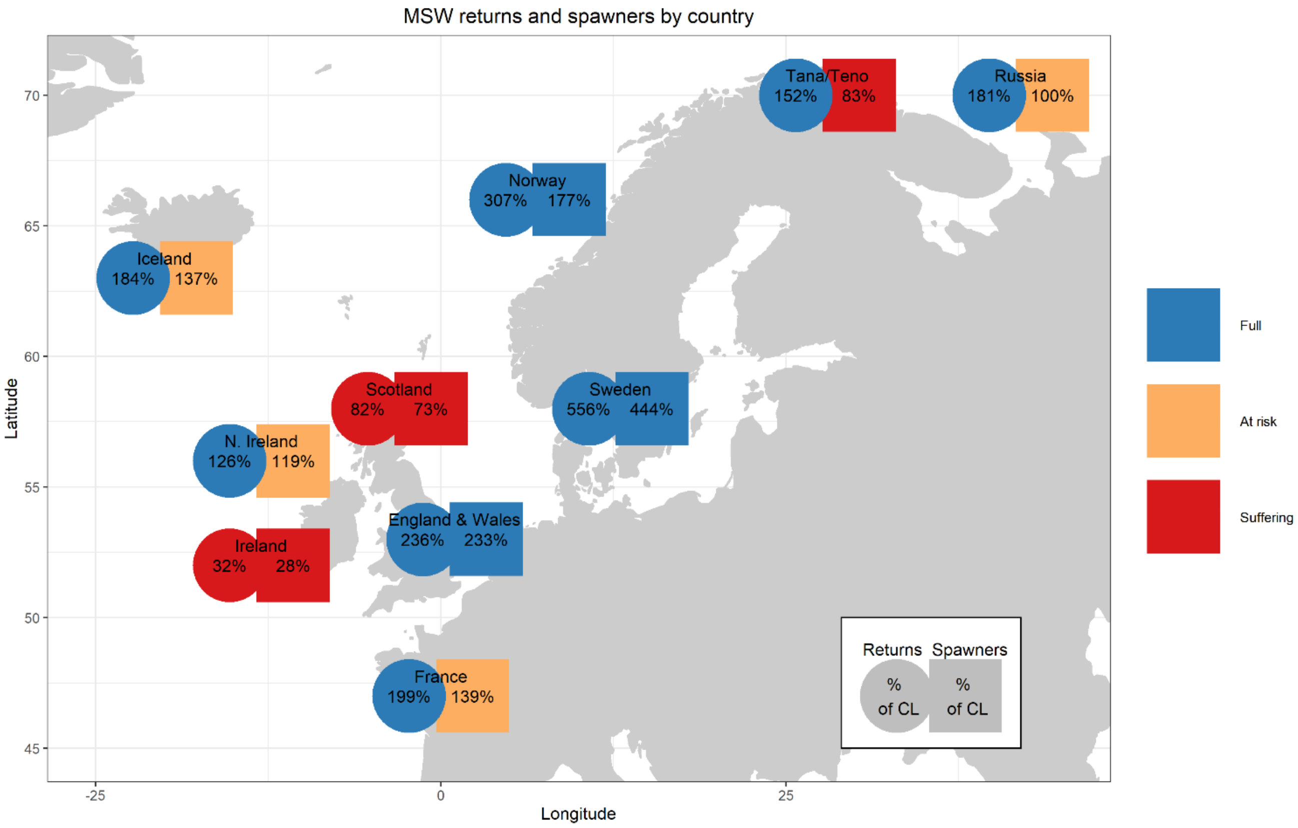

Figure 8 MSW returns and spawners as percentage of respective conservation limit (% of CL) for 2019. The percentage of CL is based on the median of the Monte Carlo distribution. The colour shading represents the three stock status designations: Full (at full reproductive capacity: the 5th percentile of the spawner estimate is above the CL); At risk (at risk of suffering reduced reproductive capacity: median spawner estimate is above the CL, but the 5th percentile is below); and Suffering (suffering reduced reproductive capacity: median spawner estimate is below the CL).

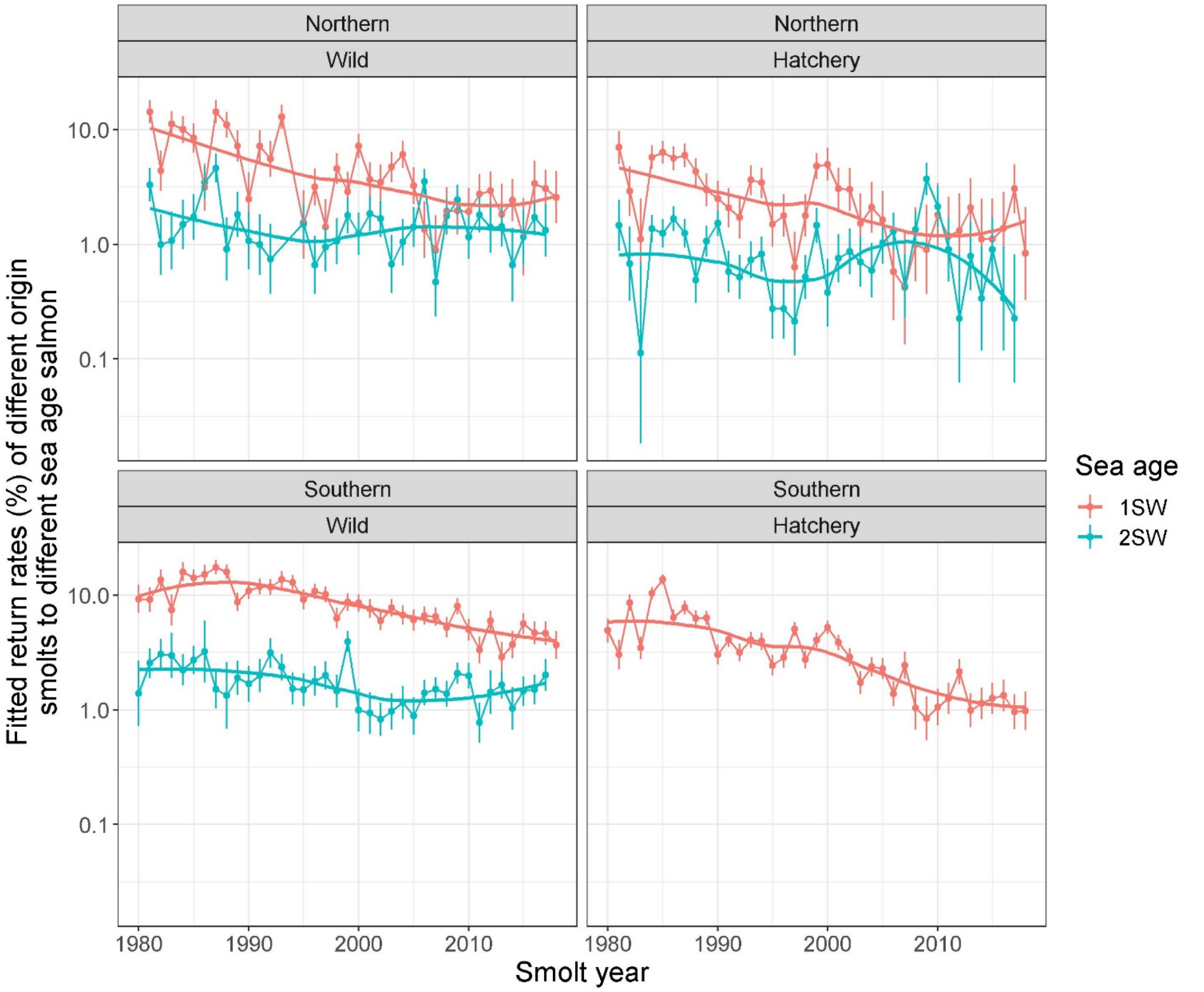

Figure 9 Return rates: Annual least squared (marginal mean) estimates of return rates (%) of wild (left-hand panels) and hatchery origin smolts (right-hand panels) to 1SW (red) and 2SW (blue) salmon to Northern (top panels) and Southern NEAC areas (bottom panels). For most rivers in Southern NEAC, the values are returns to the coast prior to the homewater coastal fisheries. Annual means derived from a general linear model analysis of rivers in a region with a quasi-Poisson distribution (log-link function). Error bars are standard errors. Note the *y*-axis is on a log scale.

Table 5 Estimated pre-fishery abundance (by number, median values) of maturing 1SW salmon (potential 1SW returns) by NEAC country/jurisdiction and year. Bold values represent the median estimate of pre-fishery abundance (PFA) by year.

Year	Northern NEAC								Southern NEAC									NEAC Area		
	Finland	Iceland N&E	Norway	Russia	Sweden	**Total**			France	Iceland S&W	Ireland	UK (EW)	UK (NI)	UK (SCO)	**Total**			**Total**		
						5%	**50%**	95%							5%	**50%**	95%	5%	**50%**	95%
1971	29799	11710			22142				65109	77427	1346109	105662	222745	779079	2263523	**2618121**	3041925			
1972	115615	10722		150717	17620				128285	62661	1436013	101567	194560	784420	2351969	**2736059**	3217416			
1973	53779	12831		222521	21856				79072	67110	1558831	120461	170568	960354	2558079	**2982993**	3512767			
1974	74655	12755		220898	31493				36909	47641	1772385	149418	185862	927516	2695026	**3141899**	3720778			
1975	88694	15586		339733	34382				73579	74282	1966513	153166	153041	778847	2754468	**3224520**	3834131			
1976	80718	15685		236793	19273				67378	58519	1338560	103410	106319	591607	1950392	**2284554**	2702887			
1977	45694	21691		150625	8765				51909	60401	1156429	116662	104638	750361	1940097	**2260973**	2661327			
1978	43527	22010		152622	10367				53005	78576	1009600	133156	135882	786410	1917722	**2222543**	2596003			
1979	39073	21102		211375	10648				60813	72607	928979	127316	95592	791971	1807405	**2102411**	2467818			
1980	31182	3324		150683	13705				127263	33313	707956	120422	121889	530697	1443890	**1664234**	1935870			
1981	28099	16705		125517	25023				101197	43117	381118	126982	96677	685647	1268653	**1452495**	1700979			
1982	16896	7767		109983	22044				62734	44124	774854	108683	138221	772841	1680312	**1920880**	2212927			
1983	40858	11387	889701	183206	29416	1011815	**1159107**	1330206	66589	55737	1365668	157985	193871	893333	2405374	**2754407**	3165297	3496079	**3918880**	4410005
1984	44253	4135	928497	195818	41397	1062739	**1217480**	1399730	109647	34005	713411	136523	76053	825026	1668660	**1915074**	2224747	2801960	**3139812**	3532995
1985	58359	27974	944984	269736	49133	1190706	**1356072**	1540243	40899	55290	1181419	136523	98081	744656	1974399	**2276293**	2657979	3245156	**3641682**	4107976
1986	46231	34992	825043	230624	51423	1052395	**1193438**	1354423	63274	90441	1326234	158976	111155	868956	2300633	**2655212**	3094558	3423964	**3852744**	4361577
1987	55928	20660	691292	245293	40946	939197	**1060015**	1199376	110644	56294	853503	164795	61021	728129	1729351	**2017803**	2392793	2730540	**3082462**	3511957
1988	32888	29757	634125	169501	34423	800476	**902473**	1020457	37818	100993	1156154	225050	142215	888097	2230753	**2585515**	3042949	3088626	**3490978**	3999209
1989	71594	16039	698679	251692	10012	927711	**1050671**	1200038	20899	56487	831373	152088	136205	975356	1876890	**2195484**	2650763	2870603	**3253087**	3758509
1990	71708	12023	628592	208386	23287	835999	**946541**	1071935	35198	51784	520195	108444	112932	642838	1280584	**1493525**	1820469	2169461	**2446420**	2813145
1991	70330	17407	546713	177715	29234	745970	**844606**	958454	25241	57353	371571	107182	63114	545906	1012078	**1186809**	1451521	1805915	**2038922**	2343966
1992	99252	32812	460466	218949	32440	755758	**848395**	957832	45903	65557	536684	112208	127322	694392	1373474	**1608972**	1974846	2176153	**2464867**	2858048
1993	66835	27058	460854	188137	32169	694175	**779602**	875042	65172	64162	437088	155657	148877	766083	1425180	**1669127**	2069964	2167971	**2452649**	2881132
1994	37293	8624	626494	222301	25025	811146	**923811**	1053539	51834	53002	558977	172961	102327	778815	1493312	**1748119**	2138359	2366825	**2682030**	3108337
1995	37027	22556	408421	200208	36488	631209	**708891**	797956	17472	65470	625228	132044	95171	761498	1465619	**1716184**	2104024	2141650	**2431111**	2844311
1996	57094	12089	310800	271990	21660	602678	**677348**	765193	21261	56553	581251	97852	98501	570100	1228837	**1446127**	1798143	1872801	**2127318**	2502399
1997	52047	16498	359453	267408	9881	628663	**708174**	800262	11011	41228	581751	87971	116475	495137	1155807	**1349378**	1653811	1823578	**2061536**	2392784
1998	65067	28141	467855	293356	7949	767879	**867290**	978433	21271	56404	608031	95813	252998	552175	1386846	**1610186**	1955346	2203078	**2482883**	2859213
1999	95813	14295	433974	225551	12543	700430	**786928**	886621	7146	45839	566880	76436	66086	377231	985940	**1157211**	1397479	1728437	**1948492**	2230053
2000	103652	14973	718190	248053	22903	985760	**1112333**	1260045	18608	40678	786225	116798	97093	587521	1422706	**1674221**	2047137	2471975	**2793436**	3214915
2001	75319	13637	617835	334429	14232	927627	**1065107**	1229615	15805	36399	626363	101283	77274	608455	1267927	**1487460**	1848730	2259503	**2562319**	2970011
2002	46670	23495	378463	304561	13748	668424	**773138**	909491	36426	45356	546913	95361	137058	458481	1164988	**1342480**	1609902	1886938	**2122519**	2443554

Year	Northern NEAC								Southern NEAC									NEAC Area		
	Finland	Iceland N&E	Norway	Russia	Sweden	**Total**			France	Iceland S&W	Ireland	UK (EW)	UK (NI)	UK (SCO)	**Total**			**Total**		
						5%	**50%**	95%							5%	**50%**	95%	5%	**50%**	95%
2003	45859	12531	525479	271114	7452	753364	**867572**	1007342	23831	54463	538891	73937	85941	437410	1056245	**1234890**	1522804	1864956	**2112023**	2437465
2004	19502	33809	317747	189638	6263	498003	**571524**	658407	28738	54362	395072	132989	82406	598437	1113466	**1317397**	1667864	1656197	**1894810**	2266903
2005	42922	30174	470486	216733	6127	678474	**772873**	887651	18696	80403	394767	108217	103261	599576	1123426	**1326907**	1713097	1851618	**2107441**	2527375
2006	70382	31717	381157	261223	6790	657972	**756906**	874072	26159	56656	301452	105997	69961	536583	938424	**1121450**	1462311	1649563	**1886462**	2246468
2007	20618	23582	213223	140932	2118	351367	**403158**	465674	20577	64991	308566	101391	103778	554492	961298	**1204007**	1581436	1347090	**1611152**	2003731
2008	22150	21502	267351	146155	3279	406064	**464585**	535533	20180	78767	323636	100177	65187	449175	864938	**1086486**	1440952	1314114	**1556776**	1924206
2009	39241	34660	214119	137504	3503	379312	**431659**	491832	5847	88733	262557	63014	40577	347039	678298	**843406**	1109388	1090530	**1277936**	1560645
2010	31605	27626	317867	156449	5942	477101	**542645**	618924	19521	91060	346164	125109	40428	630253	1043926	**1306783**	1737797	1564200	**1853625**	2301677
2011	35883	22992	223554	167392	6511	402719	**459545**	525558	13515	63940	300949	84378	29266	358022	710805	**888661**	1172566	1150895	**1353442**	1650395
2012	62052	11925	248496	195391	7185	464258	**529905**	610131	14615	36352	309121	48574	66561	442550	759989	**961090**	1300501	1265415	**1495122**	1853019
2013	35817	28333	234135	151486	4198	400521	**459104**	530701	20403	108457	261294	67556	74256	352196	756137	**927913**	1199284	1193307	**1392131**	1681396
2014	50866	13371	320006	143562	12411	472652	**546575**	631818	17983	26724	160419	39511	33911	206785	411789	**508607**	659206	921545	**1060338**	1240639
2015	31683	37579	281896	149003	3949	444294	**509708**	589535	16760	74363	226551	49487	36115	323175	612522	**760640**	1005862	1094516	**1276179**	1538136
2016	24649	16022	218548	106176	2147	325085	**370608**	424229	15019	43639	229075	52725	68066	313930	604946	**758725**	1018407	961254	**1132770**	1402944
2017	15772	15635	287974	38364	5744	319566	**365853**	423635	19084	45765	250039	37741	57206	270374	568222	**714356**	963952	917447	**1083283**	1343346
2018	39914	16640	295066	128244	9415	431574	**495194**	571002	16016	39297	180188	45787	49923	256443	494752	**618715**	821410	962165	**1119126**	1341087
2019	13034	8759	230580	92355	5444	308753	**353992**	407071	16393	23564	154339	32777	38238	306080	468591	**595550**	825305	807533	**952077**	1194462
10 yr mean	34128	19888	265812	132842	6295	404652	**463313**	533260	16931	55316	241814	58364	49397	345981	643168	**804104**	1070429	1083828	**1271809**	1554710

Table 6 Estimated pre-fishery abundance (by numbers, median values) of non-maturing 1SW salmon (potential MSW returns) by NEAC country/jurisdiction and year. Estimates for 2019 will only be available in 2020 for this component.

Year	Northern NEAC								Southern NEAC									NEAC Area		
	Finland	Iceland N&E	Norway	Russia	Sweden	Total			France	Iceland S&W	Ireland	UK (EW)	UK (NI)	UK (SCO)	Total			Total		
						5%	**50%**	95%							5%	**50%**	95%	5%	**50%**	95%
1971	49354	27147		267065	4630				62011	65618	398522	379655	32831	1318927	1931030	**2274298**	2703564			
1972	75040	25408		430224	7023				39178	59237	380197	279270	28883	1136583	1630288	**1936920**	2339306			
1973	118315	23864		398338	4881				23659	51070	409345	213720	31226	853884	1340893	**1596675**	1914796			
1974	150834	26431		429706	3262				33905	54281	445585	261786	25930	1013690	1533195	**1853531**	2279308			
1975	116703	21700		367377	4514				30522	46780	341356	180548	18047	728596	1145875	**1360536**	1635790			
1976	82191	29766		254181	2439				21038	45373	277198	177665	17629	784253	1094994	**1338495**	1669498			
1977	42695	38143		218553	2626				22653	58678	252156	163981	22753	998126	1241468	**1534684**	2005102			
1978	44643	25481		199467	4340				20637	37786	210815	86213	16263	739476	890914	**1123122**	1503920			
1979	51939	36149		345508	8765				40654	53647	245415	229315	21248	1019811	1320370	**1629564**	2074413			
1980	67204	14393		239643	5748				30708	37002	193431	307114	17766	997520	1316558	**1599018**	1967221			
1981	80849	16020		214276	10202				21180	26565	124451	145044	24613	691317	863822	**1041442**	1290949			
1982	83065	12231	833009	269713	7232	1011007	**1208721**	1445799	20856	42760	208630	150172	33139	700733	966816	**1165497**	1435119	2012260	**2378890**	2832371
1983	66712	14697	808343	251149	7566	962400	**1151372**	1378838	27088	35861	143254	109788	13446	551398	721059	**888862**	1143395	1718568	**2048718**	2458198
1984	65186	9915	755440	276160	4128	930114	**1113588**	1337635	20770	26245	153564	150086	17166	566268	764428	**943058**	1210497	1727973	**2065744**	2488978
1985	57483	25389	908535	280689	3842	1067787	**1278941**	1535829	24758	22339	191161	217373	19391	775016	1036988	**1263092**	1581587	2145219	**2546536**	3046227
1986	71116	26203	704792	215182	7406	860668	**1028659**	1234173	16092	19911	227879	181581	10444	574234	857503	**1041962**	1305410	1748729	**2074703**	2488872
1987	47832	16682	560147	197555	6632	695755	**831725**	997283	31476	21997	168282	216035	26705	550232	837223	**1029582**	1297649	1562540	**1867334**	2243579
1988	48332	14407	426195	197181	19625	594282	**707851**	845007	18345	19806	161246	185261	21535	569508	807240	**987324**	1253114	1422962	**1703497**	2048287
1989	50733	14955	477653	241846	10497	667054	**798061**	950673	14680	19501	73207	197545	19501	514117	676777	**848608**	1123998	1371976	**1657397**	2025643
1990	64130	10353	393712	231258	13286	595737	**715481**	855260	12670	19280	99916	89234	10099	364752	473306	**604621**	841955	1091128	**1330129**	1635945
1991	60033	15000	412788	213766	17908	603163	**723114**	868070	16593	21437	83822	75253	22379	367296	471791	**593548**	795526	1097184	**1323723**	1610963
1992	62871	16916	395817	253163	20117	630881	**750850**	894892	8180	10585	78161	77011	52643	360832	469047	**599369**	833617	1128623	**1361007**	1673233
1993	59617	14356	387083	225314	15346	588210	**704422**	842236	14421	17074	113752	97596	18637	402797	521083	**674397**	935317	1136173	**1388532**	1721306
1994	40015	9220	416396	257707	7810	610910	**732411**	879232	7118	17595	110172	98186	15854	467456	555135	**726515**	1044561	1193595	**1470540**	1855820
1995	36467	11940	413166	194416	12538	562443	**670804**	804661	12811	11378	76167	103689	17359	387131	468357	**617331**	906208	1056431	**1299013**	1650413
1996	42447	6651	266346	154539	8868	399071	**481195**	577220	6570	12566	96702	63900	21429	282410	376008	**497873**	718152	796097	**986492**	1247009
1997	40778	9702	319556	192167	4900	473147	**569567**	682762	5435	7801	55673	41014	29458	226814	283445	**373475**	547281	775512	**952477**	1180917
1998	48123	11140	340625	168773	3489	476940	**574718**	693374	11403	15153	85898	81632	13358	262519	365918	**492609**	711593	870648	**1073636**	1353935
1999	91662	6519	472313	295859	12411	733261	**882474**	1059565	8006	4137	106956	83798	16380	265916	381870	**497592**	698861	1143804	**1390258**	1697571
2000	110432	7494	555472	206986	14772	747128	**898594**	1081472	9664	7257	97645	91599	11097	358335	443719	**590483**	870603	1226504	**1500061**	1875612
2001	97110	7071	480795	225277	10086	685041	**821978**	991395	8700	7847	110802	81275	13906	251306	374818	**489566**	693820	1088189	**1321277**	1621399
2002	69708	7448	426174	157997	2440	554085	**665254**	803436	12625	12534	116923	105491	8503	287416	423798	**560752**	804876	1007753	**1235649**	1547699

Year	Northern NEAC								Southern NEAC									NEAC Area		
	Finland	Iceland N&E	Norway	Russia	Sweden	**Total**			France	Iceland S&W	Ireland	UK (EW)	UK (NI)	UK (SCO)	**Total**			**Total**		
						5%	**50%**	95%							5%	**50%**	95%	5%	**50%**	95%
2003	31775	7339	387063	121630	7439	460423	**557047**	671423	23353	10121	64259	88948	8987	384044	434908	**594059**	930115	926816	**1162440**	1541551
2004	26303	9052	354824	146211	5036	450439	**542385**	653644	14275	8965	82716	96762	11299	374485	446526	**602987**	910800	926706	**1154791**	1502261
2005	38799	8670	449157	139483	5200	536687	**642723**	772800	14337	7400	60810	87756	8915	457786	473176	**654186**	1036227	1045514	**1309976**	1740229
2006	56311	8365	382963	145551	4879	501958	**598822**	716958	13632	4564	42531	84023	9232	377829	396901	**544606**	839376	931532	**1155626**	1496162
2007	56595	10735	441339	228963	6858	618719	**746059**	902781	15046	5217	31640	92153	7199	501252	477454	**666565**	1067797	1137974	**1429071**	1887271
2008	24403	8652	346732	194157	6054	480183	**581684**	705147	7031	8080	39911	71370	7309	414477	411645	**561494**	881869	923670	**1155523**	1513403
2009	39062	12319	381639	241076	7051	563609	**682688**	826982	5753	16708	36947	104609	10668	545466	535780	**734149**	1152395	1136926	**1431770**	1896875
2010	30188	13767	530192	240577	16591	687135	**835750**	1010291	16157	8505	40463	177688	13703	701342	710249	**980879**	1499154	1448086	**1830502**	2414287
2011	36328	7769	466615	117593	18856	534453	**648109**	785164	12800	4843	35500	137750	32222	541026	571267	**785255**	1219735	1146228	**1450226**	1926919
2012	34949	8855	328383	134477	8000	426444	**516621**	625376	13207	13379	40379	135075	10240	499653	530559	**731464**	1123133	991490	**1257448**	1677410
2013	38124	10656	337726	133280	17189	442786	**540148**	653227	16416	8218	34107	91351	5570	340268	376490	**510179**	766668	851162	**1059016**	1365564
2014	36573	10196	426655	125747	11716	503670	**613443**	749438	18636	7478	36053	148705	7185	416233	481270	**657364**	990085	1022785	**1282177**	1663800
2015	39171	14291	469051	107130	4595	522508	**636277**	770599	7972	10668	35292	194416	13344	452272	532104	**740044**	1137375	1096410	**1388272**	1834941
2016	28353	8059	474215	99102	19271	518936	**631878**	770191	9059	9063	32499	152726	10745	398265	457195	**635695**	989027	1016419	**1278402**	1682460
2017	17415	8796	446582	130640	12730	507136	**619035**	754478	13560	9687	32833	146346	10151	227680	337479	**461492**	677450	876790	**1086288**	1373413
2018	24978	5796	376841	103677	25864	443216	**540672**	661077	18950	4520	25176	121132	7636	290029	340547	**476599**	742835	816474	**1026473**	1337197
10 yr avg.	32514	10050	423790	143330	14186	514989	**626462**	760683	13251	9307	34925	140980	12147	441224	487294	**671312**	1029786	1040277	**1309057**	1717287

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Annex 1 Glossary of acronyms and abbreviations

1SW *(one-sea-winter).* Maiden adult salmon that has spent one winter at sea.

2SW (*two-sea-winter*). Maiden adult salmon that has spent two winters at sea.

CL (or **CLs**)**, i.e. S_{lim}** *(conservation limit).* Demarcation of undesirable stock levels or levels of fishing activity; the ultimate objective when managing stocks and regulating fisheries will be to ensure that there is a high probability that undesirable levels are avoided.

FWI *(Framework of Indicators).* The FWI is a tool used to indicate if any significant change in the status of stocks used to inform the previously provided multi-annual management advice has occurred.

ICES (*International Council for the Exploration of the Sea*).

MSY (*maximum sustainable yield*). The largest average annual catch that may be taken from a stock continuously without affecting the catch of future years; a constant long-term MSY is not a reality in most fisheries, where stock sizes vary with the strength of year classes moving through the fishery.

MSW (*multi-sea-winter*). A MSW salmon is an adult salmon which has spent two or more winters at sea and may be a repeat spawner.

NASCO (*North Atlantic Salmon Conservation Organization*). An international organization, established by an inter-governmental convention in 1984. The objective of NASCO is to conserve, restore, enhance, and rationally manage Atlantic salmon through international cooperation, taking account of the best available scientific information.

NEAC (*North East Atlantic Commission).* The commission within NASCO with responsibility for Atlantic salmon in the Northeast Atlantic.

PFA *(pre-fishery abundance).* The numbers of salmon estimated to be alive in the ocean from a particular stock at a specified time.

SER *(spawning escapement reserve).* The CL increased to take account of natural mortality between the recruitment date (assumed to be 1st January) and the date of return to homewaters.

Annex 2 Scientific basis

ICES stock data category	1 (ICES, 2019a).
Assessment type	Run–reconstruction models and Bayesian forecasts, taking into account uncertainties in data and process error. Results presented in a risk analysis framework.
Input data	Nominal catches (by sea-age class) for commercial and recreational fisheries. Estimates of unreported/illegal catches. Estimates of exploitation rates. Natural mortalities (from earlier assessments).
Discards and bycatch	Discard data are included in risk-based framework for the Faroes fishery. Not relevant for other NEAC assessments.
Indicators	Framework of Indicators (FWI) is used to indicate if a significant change has occurred in the status of stocks in intermediate years where multi-annual management advice applies.
Other information	Advice subject to annual review. Stock annex developed in 2014 and updated in 2019 (ICES, 2019b).
Working group	Working Group on North Atlantic Salmon (WGNAS) (ICES, 2020).

Atlantic salmon from North America

Summary of the advice for 2020

ICES advises that when the Framework of Indicators (FWI) was applied in early 2020, a full reassessment was not required and the 2018 ICES advice remains valid. Consequently, in line with the management objectives agreed by the North Atlantic Salmon Conservation Organization (NASCO) and consistent with the MSY approach, there are no mixed-stock fishery options on 1SW non-maturing and 2SW salmon components from North American stocks in 2020. 2020 marks the final year of NASCO's three year multi-annual regulatory measure for fishing Atlantic salmon at West Greenland (NASCO, 2018).

ICES advises that when the MSY approach is applied, fishing should only take place on salmon from rivers where stocks are at full reproductive capacity. Mixed-stock fisheries present particular threats, and should be managed based on the individual status of all stocks exploited in the fishery.

NASCO 3.1 Describe the key events of the 2019 fisheries (including the fishery at Saint Pierre and Miquelon)

The provisional catch of Atlantic salmon in eastern North America in 2019 was estimated at 95.1 tonnes (t), of which 93.8 t was reported from Canada, 1.3 t from France (Islands of Saint Pierre and Miquelon, located off the southern coast of Newfoundland), and 0 t from USA (Tables 1 and 2; Figure 1). There were no commercial or recreational fisheries for Atlantic salmon in USA in 2019. The dramatic decline in harvested tonnage since 1980 is in large part the result of the reductions in commercial fisheries effort, with the closure of the Newfoundland commercial fishery in 1992, the Labrador commercial fishery in 1998, and the Québec commercial fishery in 2000. All commercial fisheries for Atlantic salmon remained closed in Canada in 2019.

Unreported catch in 2019 was estimated at 11.6 t for Canada and 0 t for USA. France (Islands of Saint Pierre and Miquelon) did not provide an unreported catch value.

The assessment regions for North America are shown in Figure 2.

Three groups exploited salmon in Canada in 2019: indigenous people, residents fishing for food in Labrador, and recreational fishers. No rivers in the Gulf of St Lawrence (henceforth called "Gulf") and Scotia–Fundy regions were opened for retention in recreational fisheries. Mandatory catch-and-release measures were in effect during the period 2015–2019 in the recreational fisheries for the Gulf region. Fishing regulations in Québec limited the retention of small (< 63 cm, fork length) and large salmon (≥ 63 cm – MSW and repeat spawners) to 16 of 114 rivers, and the retention of small salmon only to 56 rivers. Nine rivers were opened to catch-and-release only, and 33 rivers were closed to salmon fishing. Retention of small salmon was only allowed in rivers which were open for recreational fisheries in Newfoundland and Labrador.

For Canada in 2019, 7% of the harvests were taken in coastal areas, entirely from Labrador. The harvest from France (Islands of Saint Pierre and Miquelon) was entirely from coastal areas. Overall for eastern North America in 2019, 40% of the harvests were in-river, 52% from estuaries, and 8% from coastal areas.

Exploitation rates of both large salmon and small salmon (mostly 1SW) remained relatively stable until 1984 and 1992, then declined sharply with the introduction of restrictive management measures (Figure 3). Declines continued in the 1990s. In the last few years, exploitation rates have remained among the lowest in the time-series.

Total recreational catch for Canada in 2019 was 66 575 salmon (45 293 small and 21 282 large salmon), 70% of which were released (26 237 small and 20 098 large salmon).

Table 1 Salmon catches and catch locations in the NAC area in 2019. Catches of NAC-origin salmon at Greenland are reported in the West Greenland Commission area (in tonnes, t).

	Canada					St Pierre & Miquelon	USA	North America
	Commercial	Indigenous	Labrador resident	Recreational	Total			
2019 reported harvests	0	54	2	38	94	1	0	95
% of NAC total	-	57	2	40	99	1	0	100
Unreported catch (t)	-				12	na	0	12
Location of catches								
% in-river					52	0	-	52
% in estuaries					41	0	-	40
% coastal					7	100	-	8

Table 2 Total reported nominal harvest (in tonnes, round fresh weight) of salmon in home waters in North America for Canada (small salmon, large salmon, and total), for USA, and for France (Saint Pierre and Miquelon [SPM]), from 1980 to 2019. The 2018 values were finalized and the 2019 values are provisional.

Year	Canada			USA	SPM
	Small salmon	Large salmon	Total		
1980	917	1763	2680	6	-
1981	818	1619	2437	6	-
1982	716	1082	1798	6	-
1983	513	911	1424	1	3
1984	467	645	1112	2	3
1985	593	540	1133	2	3
1986	780	779	1559	2	3
1987	833	951	1784	1	2
1988	677	633	1310	1	2
1989	549	590	1139	2	2
1990	425	486	911	2	2
1991	341	370	711	1	1
1992	199	323	522	1	2
1993	159	214	373	1	3
1994	139	216	355	0	3
1995	107	153	260	0	1
1996	138	154	292	0	2
1997	103	126	229	0	2
1998	87	70	157	0	2
1999	88	64	152	0	2
2000	95	58	153	0	2
2001	86	61	148	0	2
2002	99	49	148	0	2
2003	81	60	141	0	3
2004	94	68	161	0	3
2005	83	56	139	0	3
2006	82	55	137	0	3
2007	63	49	112	0	2
2008	100	57	158	0	4
2009	74	52	126	0	3
2010	100	53	153	0	3
2011	110	69	179	0	4
2012	74	52	126	0	3
2013	72	66	137	0	5
2014	77	41	118	0	4
2015	86	54	140	0	4
2016	79	56	135	0	5
2017	55	55	110	0	3
2018	39	39	78	0	1
2019	48	46	94	0	1

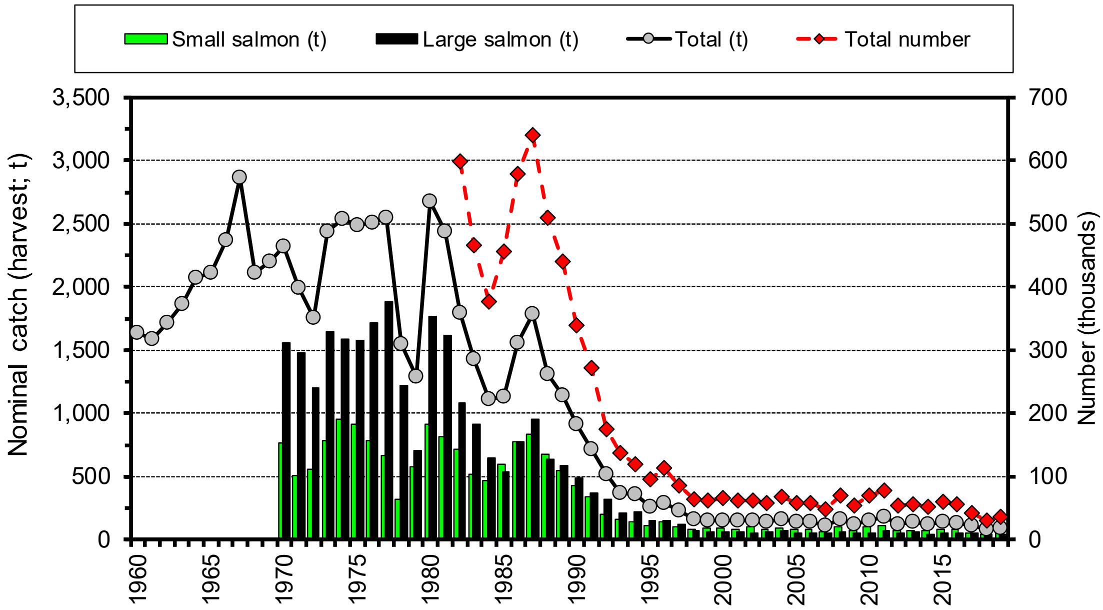

Figure 1 Nominal catch (harvest; t) of small (< 63 cm) and large salmon in Canada (combined harvests in USA and Saint Pierre and Miquelon are ≤ 6 t in any year), from 1960 to 2019.

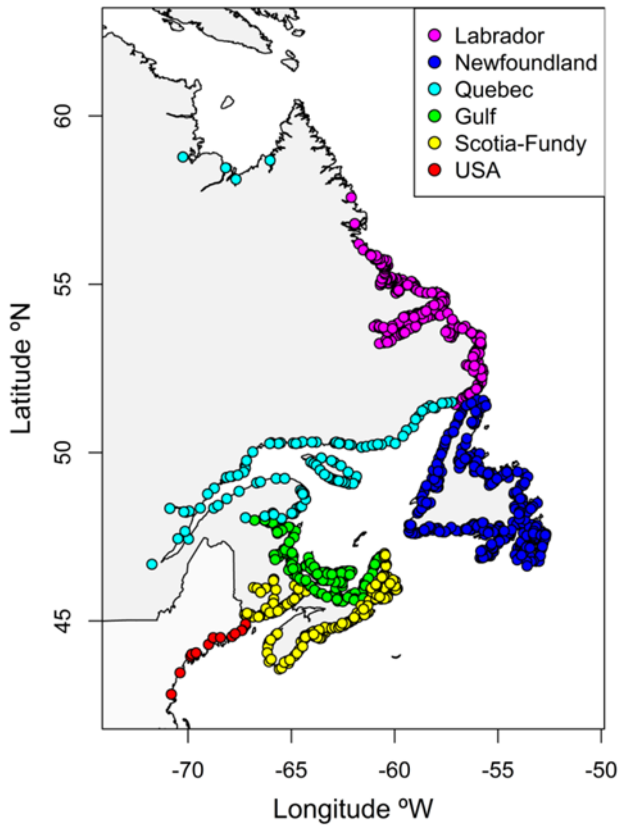

Figure 2 Assessment regions for salmon in the North American Commission area. Dots indicate locations of salmon rivers.

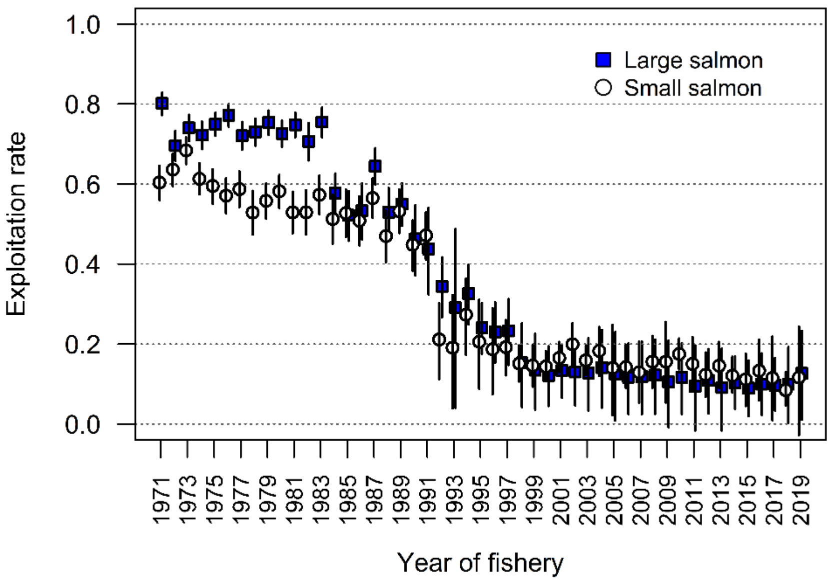

Figure 3 Exploitation rates in North America on small (1SW) (< 63 cm) and large (MSW and repeat spawners) salmon, from 1971 to 2019.

Origin and composition of catches

In the past, salmon from both Canada and the USA were taken in the commercial fisheries of eastern Canada. Sampling programmes of current marine fisheries (Labrador subsistence and Saint Pierre and Miquelon [SPM]) are used to monitor the stock composition of these mixed-stock fisheries.

The stock composition of Atlantic salmon in the Labrador subsistence and SPM mixed-stock fisheries was determined using a single nucleotide polymorphism (SNP) panel range-wide baseline that allows accurate individual assignment to one of 21 North American or ten European reporting groups (Jeffery *et al.*, 2018; ICES, 2019a) (Figure 4). The accuracy of assignment accounting for bias in the SNP analyses was 90%. The reporting groups from the genetic assignments do not correspond directly to the regions used by ICES to characterize stock status and to provide catch advice. Assessment of stock status and provision of catch advice is not possible at the scale of the genetic groups, because historical catch reporting is available at a jurisdictional scale that is broader than the genetic reporting groups. However, the genetic reporting groups can be aligned to the assessment regions (Figure 4).

Assessment region	Genetic Reporting group	Group acronym
Quebec (North) Labrador	Ungava	UNG
	Labrador Central	LAC
	Lake Melville	MEL
	Labrador South	LAS
Quebec	St Lawrence North Shore Lower	QLS
	Anticosti	ANT
	Gaspé Peninsula	GAS
	Quebec City Region	QUE
Gulf Scotia–Fundy	Gulf of St Lawrence	GUL
	Inner Bay of Fundy	IBF
	Eastern Nova Scotia	ENS
	Western Nova Scotia	WNS
	Saint John River & Aquaculture	SJR
Newfoundland	Northern Newfoundland	NNF
	Western Newfoundland	WNF
	Newfoundland 1	NF1
	Newfoundland 2	NF2
	Fortune Bay	FTB
	Burin Peninsula	BPN
	Avalon Peninsula	AVA
USA	Maine, United States	USA

Assessment region	Genetic Reporting Group	Group Acronym
Europe	Spain	SPN
	France	FRN
	European Broodstock	EUB
	United Kingdom/Ireland	BRI
	Barents-White seas	BAR
	Baltic Sea	BAL
	Southern Norway	SNO
	Northern Norway	NNO
	Iceland	ICE
	Greenland	GL

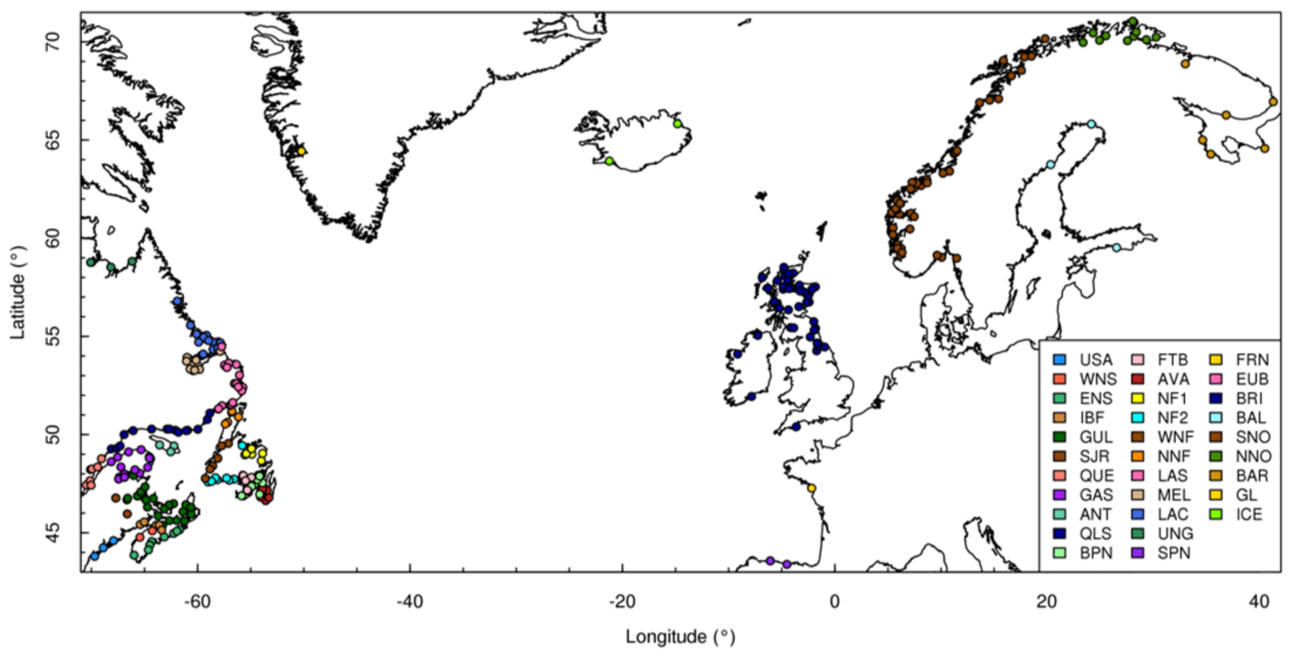

Figure 4 Map of sample locations used in the range-wide genetic baseline (single nucleotide polymorphisms [SNPs]) for Atlantic salmon, which provided 21 North America and ten European genetic reporting groups (labelled and identified by colour) and correspondence between genetic reporting groups and assessment regions for eastern North America (upper table). The EUB (European Broodstock) reporting group is not represented on the map.

Labrador fishery origin and composition of the catches

In 2019, 485 of 867 tissue samples from the Labrador subsistence salmon fisheries were analysed using the SNP panel. The percentage of the catch that was processed in 2019 for stock origin (4%) is less than the percentage of the catch sampled (6% by number); this is due to resource constraints. However, emphasis was placed on genotyping samples from the coastal areas (Salmon Fishing Areas [SFAs] 1A and 2) where interception of non-local stocks has been more prevalent in the past. As in previous years, the estimated origin of the samples was dominated (> 98%) by the Labrador genetic reporting groups. Although two samples of USA origin salmon were detected in 2017, none were detected in 2018 or in 2019. The dominance of the Labrador genetic reporting groups is consistent with previous analyses conducted for the period 2006–2018 which assigned > 95% of the harvest to Labrador groups. Assignment of harvest within the three Labrador genetic reporting groups suggest largely local harvest within salmon fishing areas (Figure 5).

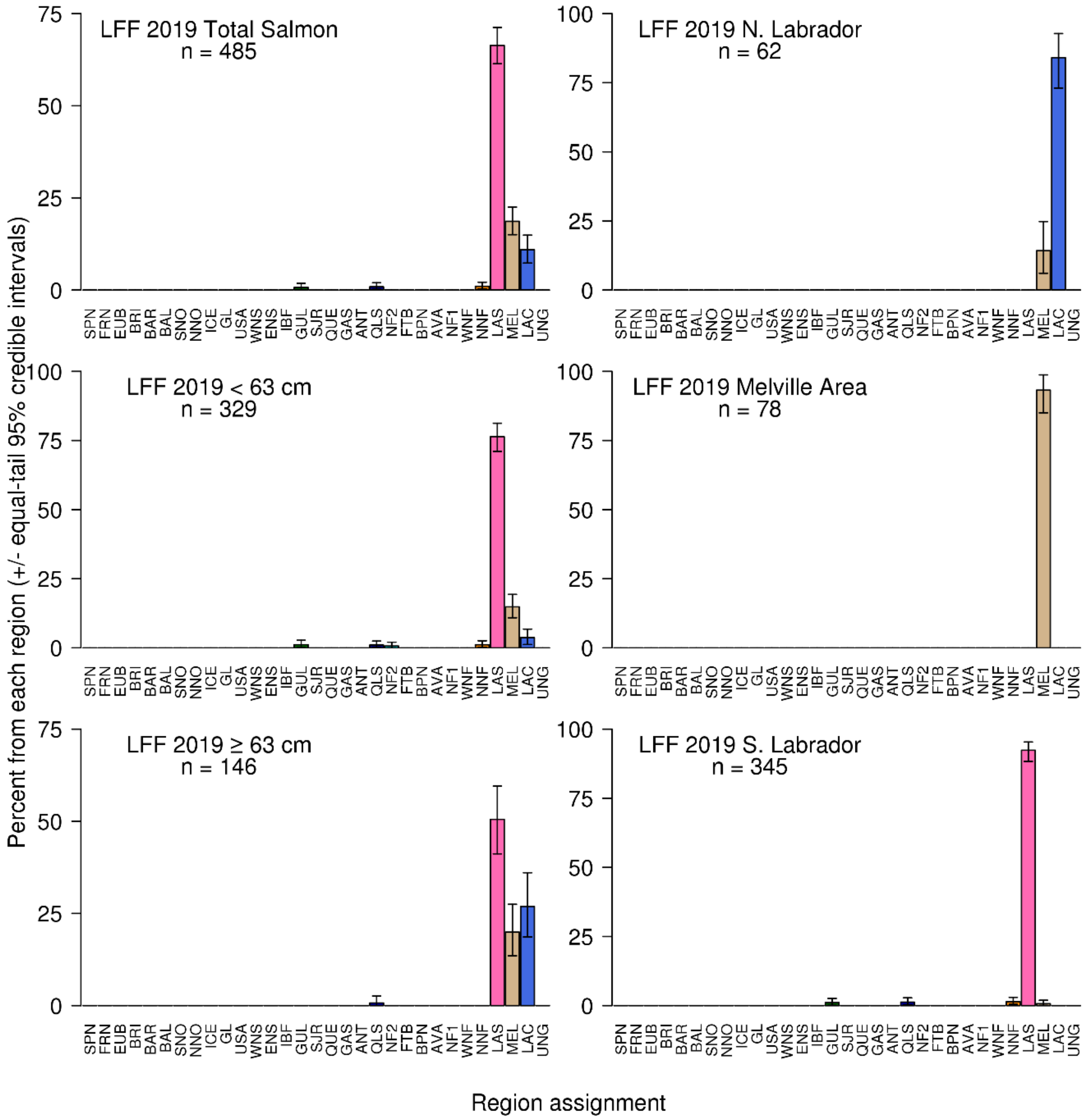

Figure 5 Percentages of Labrador subsistence fishery samples, assigned to SNP-derived regional groups of the North Atlantic for the 2019 fishery year, by size group (left) and by area (right).

Saint Pierre and Miquelon (SPM) fishery origin and composition of the catches

In 2019, 63 samples collected from the Saint Pierre and Miquelon fishery were analysed using the SNP panel range-wide baseline (12% of catch by number). Small salmon (< 63 cm fork length) represented 70% of the samples analyses, in contrast to 2017 and 2018 when samples of the catch were dominated (92% and 93%) by small salmon. Regional analysis using the SNP panel showed the consistent dominance of three genetic reporting groups; 42% Gulf of St Lawrence, 30% Gaspé Peninsula, and 24% for Newfoundland reporting groups, consistent with previous studies (ICES, 2019a; Bradbury *et al.,* 2016) (Figure 6).

The Saint Pierre and Miquelon harvest of Atlantic salmon has been dominated by small salmon in recent years (ICES, 2019a). There was no information on how the samples were collected in 2019 or if they were representative of the total catch. ICES (2018) reported on a consistent increase in the proportion of the samples assigned to the Newfoundland regional groups with increasing proportions of small salmon in the samples from the fishery, emphasizing the importance of having representative sampling of the fishery catches in order to assess the impacts of this mixed-stock fishery on stocks in North America.

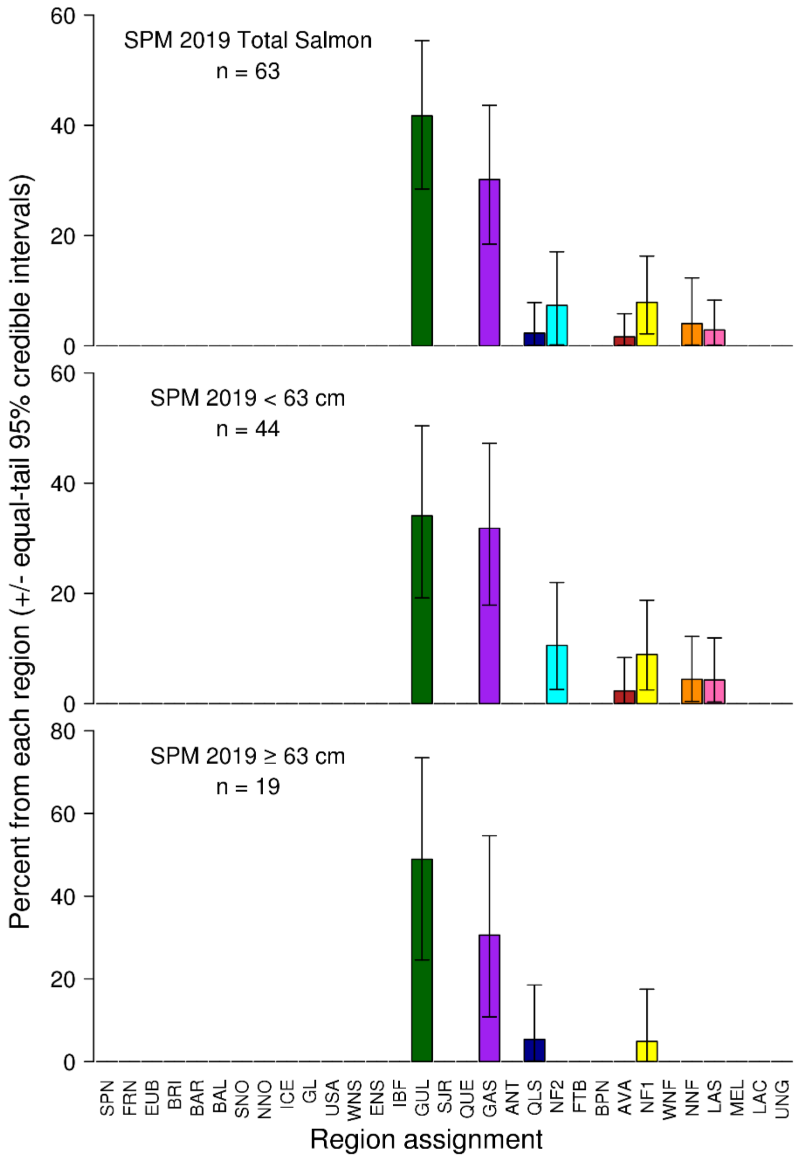

Figure 6 Percentages of the Saint Pierre and Miquelon (SPM) fishery samples assigned to SNP derived genetic reporting groups of the North Atlantic for the 2019 fishery year.

NASCO 3.2 Update age-specific stock conservation limits based on new information as available, including updating the time-series of the number of river stocks with established CLs by jurisdiction

Limit reference points were revised for some areas in North America by Fisheries and Oceans Canada (DFO, 2009; 2012; 2017; 2018) and the Province of Québec (Dionne *et al.*, 2015; MFFP, 2016). As a result of these revisions, the 2SW conservation limit (CL) for the Gulf region decreased 38% from the previous value, whereas the Québec value increased slightly (9%) (ICES, 2019a). No other changes to the 2SW CLs or the management objectives were made from those identified previously (ICES, 2015).

In addition, rebuilding management objectives have been defined for Scotia–Fundy and USA. For Scotia–Fundy, the management objective is based on an increase of 25% in returns of 2SW salmon from the mean return in the base years 1992 to 1996. For USA, the management objective is to achieve 2SW adult returns of 4549 individuals or greater (Table 3).

Table 3 2SW CLs and management objectives for the regional groups in North America in 2019.

Country and Commission area	Assessment regional group	2SW conservation limit (number of fish)	2SW Management objective (number of fish)
Canada	Labrador	34746	
	Newfoundland	4022	
	Québec	32085	
	Southern Gulf of St Lawrence	18737	
	Scotia–Fundy	24705	10976
	Total	114295	
USA		29199	4549
North American Commission		143494	

In Canada, conservation limits (CLs) were first established in 1991 for 74 rivers. Since then the number of rivers with defined CLs increased to 266 in 1997, and to 498 since 2018 (Figure 7). Conservation limits have been established for 33 river stocks in USA since 1995 (Figure 7).

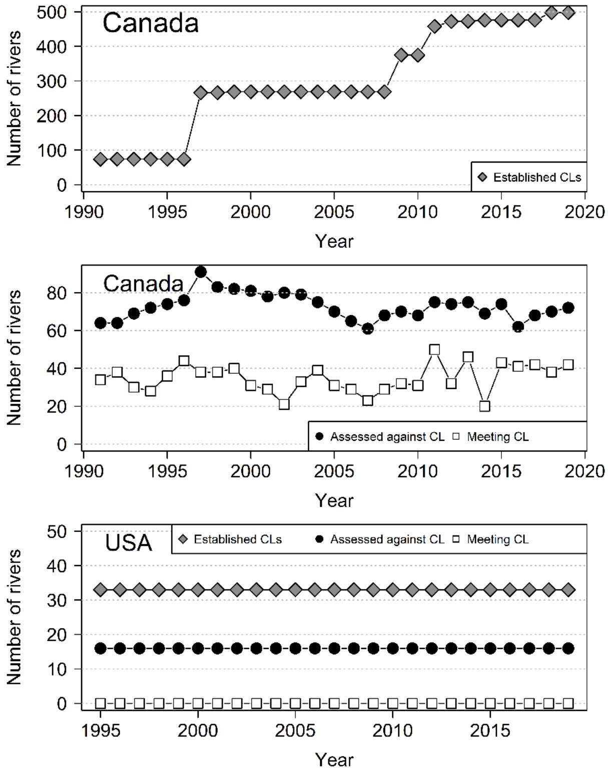

Figure 7 Time-series for Canada and the USA showing the number of rivers with established CLs, the number of rivers assessed, and the number of assessed rivers meeting CLs, for the period 1991 to 2019. Further details can be found in ICES (2020).

NASCO 3.3 Describe the status of the stocks, including updating the time-series of trends in the number of river stocks meeting CLs by jurisdiction

Stock status is presented for six assessment regions (Figure 2) and overall for North America.

Returns of small (1SW), large (MSW and repeat spawners), and 2SW salmon (a subset of large) to each region are estimated by the methods reported by ICES (1993). The 2SW component of the returns of large salmon was determined using the sea-age composition of one or more indicator stocks. Returns are the number of salmon that returned to the geographic region, including fish caught by home water commercial fisheries, except in the case of the Newfoundland and Labrador regions where returns do not include landings in commercial and subsistence fisheries.

The non-maturing component of 1SW salmon, destined to be 2SW returns (excluding 3SW and repeat spawners) is the estimated number of salmon in the North Atlantic on 1 August of their second summer at sea. The pre-fishery abundance (PFA) estimates account for returns to rivers, fisheries at sea in North America, fisheries at West Greenland, and are corrected for natural mortality. Harvests of North American origin salmon in the fishery at Faroes are not included. As the PFA estimate for potential 2SW salmon requires an estimate of returns to rivers, the most recent year for which an estimate of PFA is available is 2018. Maturing 1SW salmon are in some areas (particularly Newfoundland) a major component of salmon stocks, and their abundance when combined with that of the 2SW age group provides an index of the majority of a cohort.

The total estimate of returns of small salmon to North America in 2019 (332 100) was 22% lower than the finalized value in 2018 and the eighth lowest of the 49-year time-series (Figure 8). Returns of small salmon in 2019 decreased from the previous year in Labrador (59%) but increased in Newfoundland (81%) and Scotia–Fundy (189%). Small salmon returns in 2019 were among the lowest (third to sixth lowest of 49 years) for Québec, Gulf, and Scotia–Fundy. Returns of small salmon to Labrador (117 500) and Newfoundland (171 400) combined represented 87% of the total returns of small salmon to North America in 2019.

The total estimate of returns of large salmon to North America in 2019 (103 900) was 15% lower than in the finalized value for 2018. Returns of large salmon in 2019 decreased from the previous year in Labrador (41%), Gulf (43%), and Scotia–Fundy (52%), but increased in Québec (9%), Newfoundland (136%), and USA (109%). Large salmon returns in 2019 were the second lowest of the 49-year time-series for Gulf and Scotia–Fundy and the fourth lowest for Québec (Figure 9). Returns of large salmon to Labrador (27 100), Québec (31 000), and Gulf (19 700) combined represented 75% of the total returns of large salmon to North America in 2019.

The total estimate of 2SW salmon returns (subset of returns of large salmon) to North America in 2019 (59 900) was 28% lower than in 2018 (82 900; Figure 10). The 2SW salmon returns to NAC in 2019 were the second lowest on record (49 years), and were particularly low in Québec (fourth lowest), Gulf, and Scotia–Fundy (second lowest). Although the estimated 2SW returns in Labrador were thirteenth highest in the 49-year time-series, the returns were the second lowest of the most recent ten years. Three assessment regions (Labrador, Québec, and Gulf) collectively accounted for 92% of the returns of 2SW salmon to North America in 2019.

In 2019, the estimates (median) of 2SW salmon returns to rivers and spawners were below CLs (suffering reduced reproductive capacity) in all six assessment regions; the percentages of respective 2SW CLs attained by spawners ranged from 3% in Scotia–Fundy to 77% in the Gulf (Figure 11). Particularly large deficits relative to CLs and rebuilding management objectives are noted in the Scotia–Fundy and USA regions.

River-specific assessments are provided for 86 rivers in 2019. Egg depositions by all sea ages combined in 2019 exceeded or equaled the river-specific CLs in 42 of the 86 assessed rivers (49%) and were at or less than 50% of CLs in 28 rivers (33%) (Figure 12). The number of rivers assessed annually in Canada has ranged from 61 to 91, and the annual percentages of these rivers achieving CL has ranged from 26% to 67% (59% in 2019) with no temporal trend (Figure 7). Sixteen rivers in the USA are assessed against CL attainment annually, with none meeting CLs to date (Figure 7).

Estimates of PFA (defined as the number of maturing and non-maturing 1SW salmon) suggest continued low abundance of North American salmon (Figure 10). The PFA in the Northwest Atlantic has oscillated around a generally declining trend since the 1970s, with a period of persistent low abundance since the early 1990s. During the period 1993 to 2018, the PFA averaged 605 000 fish, less than half of the average abundance (1 232 000 fish) during the period 1971 to 1992. The PFA of maturing and non-maturing 1SW salmon in 2018 was estimated at 551 700 fish. Abundance declined by 66% over the time-series, from a peak of 1 705 000 fish in 1975 (Figure 13).

Despite major changes in fisheries management two to three decades ago, and increasingly more restrictive fisheries measures since then, returns of salmon have remained near historical lows, with the exception of those in Labrador and Newfoundland. All salmon populations within USA and the Scotia–Fundy regions have been, or are being considered for, listing under country-specific species-at-risk legislation. The continued low abundance of salmon stocks in USA and in three regions of Canada (Scotia–Fundy, Gulf, and Québec), despite significant fishery reductions, strengthens the conclusions that factors acting on survival in the first and second years at sea at both local and broad ocean scales are constraining the abundance of salmon. Declines in smolt production in some rivers of eastern North America are now being observed and may also be contributing to lower adult abundance.

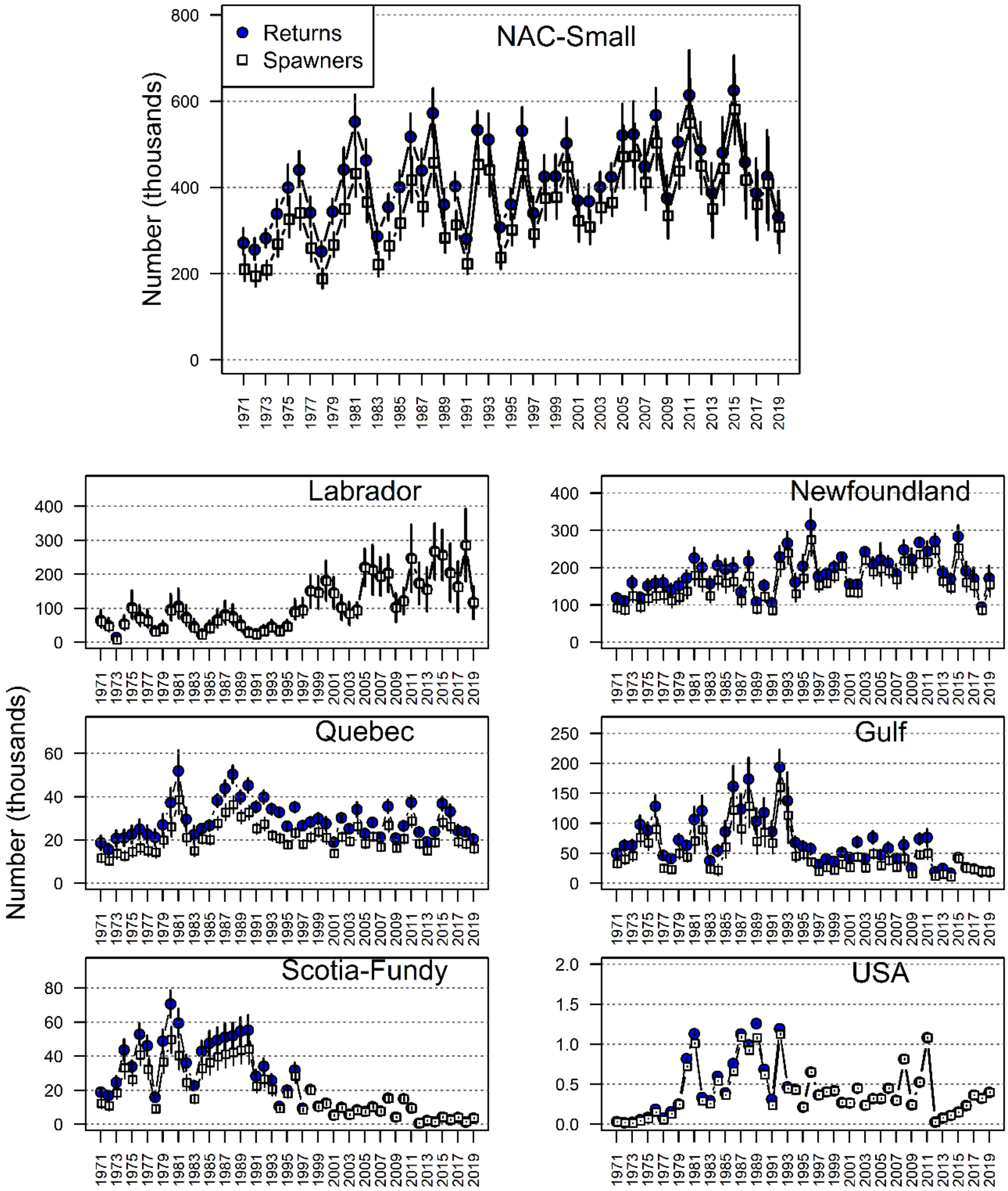

Figure 8 Estimated (median, 5th to 95th percentile range) returns (shaded circles) and spawners (open squares) of small salmon (primarily 1SW) for eastern North America overall and for each of the six regions, 1971 to 2019.

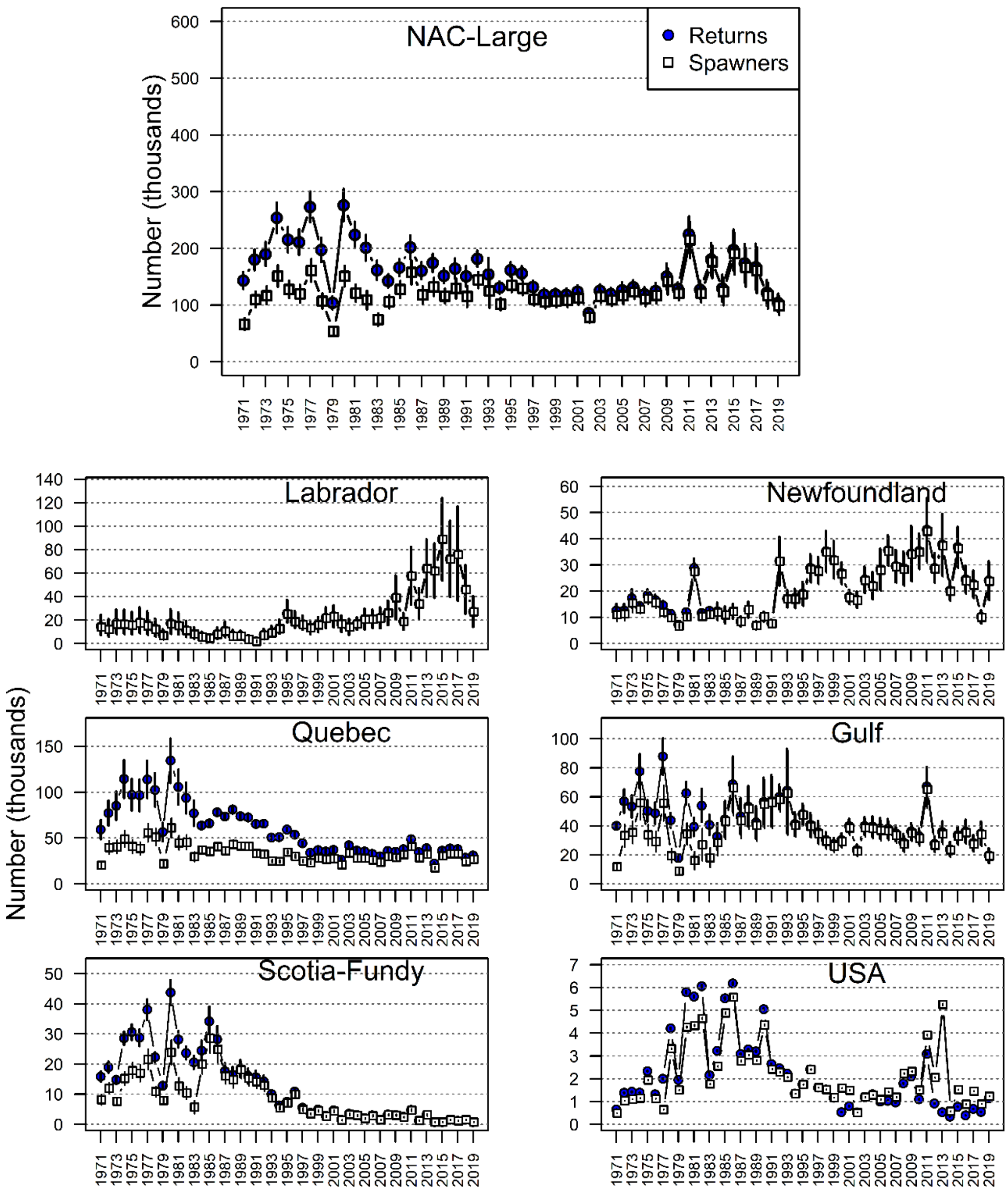

Figure 9 Estimated (median, 5th to 95th percentile range) returns (shaded circles) and spawners (open squares) of large salmon (primarily MSW and repeat spawners) for eastern North America overall and for each of the six regions, 1971 to 2019.

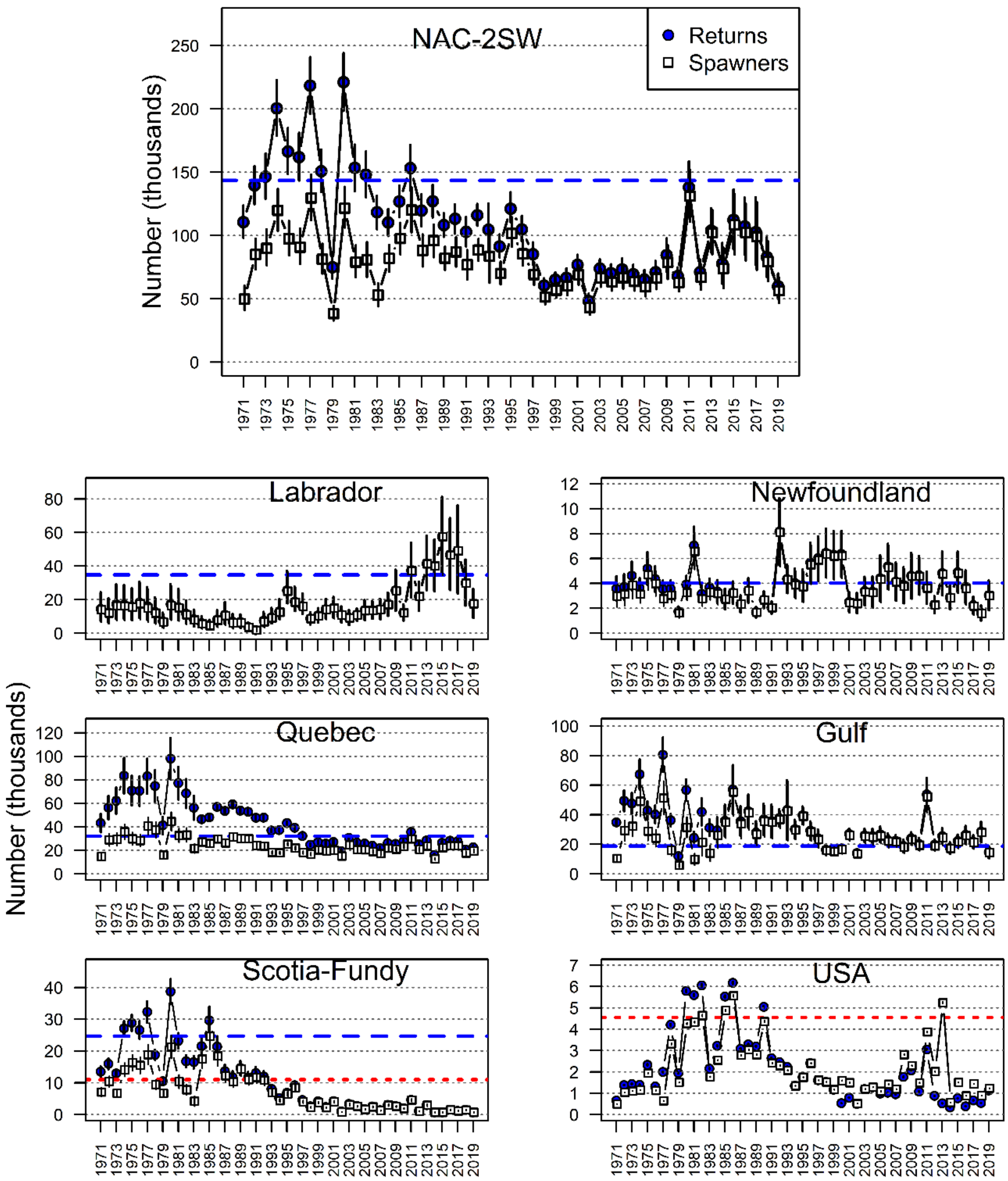

Figure 10 Estimated (median, 5th to 95th percentile range) returns (shaded circles) and spawners (open squares) of 2SW salmon for eastern North America overall and for each of the six regions. The dashed line is the corresponding 2SW CL; the 2SW CL (29 199 fish) is off scale in the plot for USA. The dotted lines in the Scotia–Fundy and USA panels are the region-specific management objectives. For USA, estimated spawners exceed the estimated returns in some years as a result of adult stocking restoration efforts, 1971 to 2019.

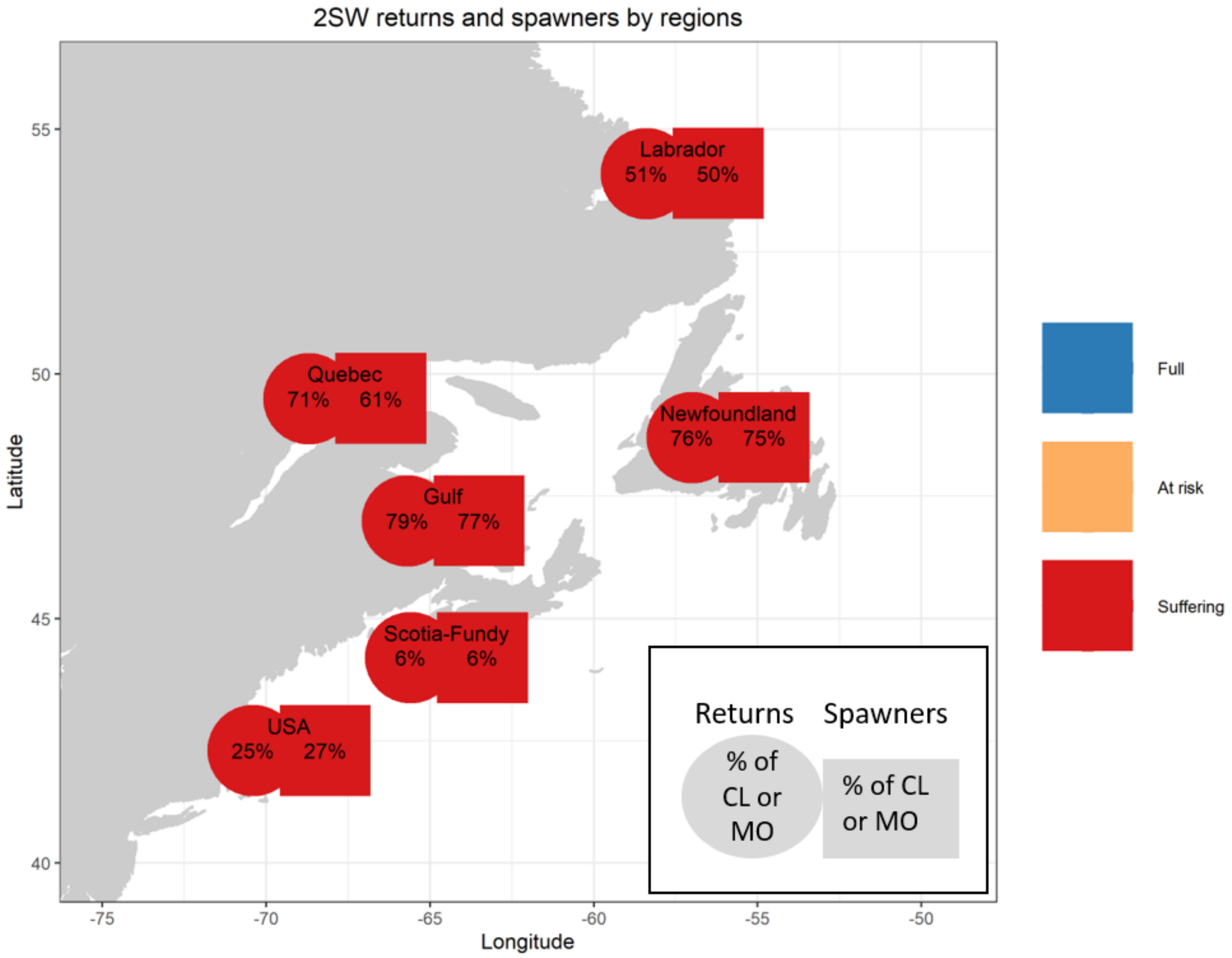

Figure 11 Estimated returns (circle symbol) and spawners (square symbol) of 2SW salmon in 2019 to six regions of North America relative to the stock status categories. The percentage of the 2SW CLs for the four northern regions and to the rebuilding management objectives (MO) for the two southern areas are shown based on the median of the Monte Carlo distribution. The colour shading, which in this case is relevant for red only as all stocks in these regions are categorized as suffering reduced reproductive capacity, is interpreted as follows: blue refers to the stock being at full reproductive capacity (median and 5th percentile of the Monte Carlo distributions are above the CL), orange refers to the stock being at risk of suffering reduced reproductive capacity (median is above but the 5th percentile is below the CL), and red refers to the stock suffering reduced reproductive capacity (the median is below the CL).

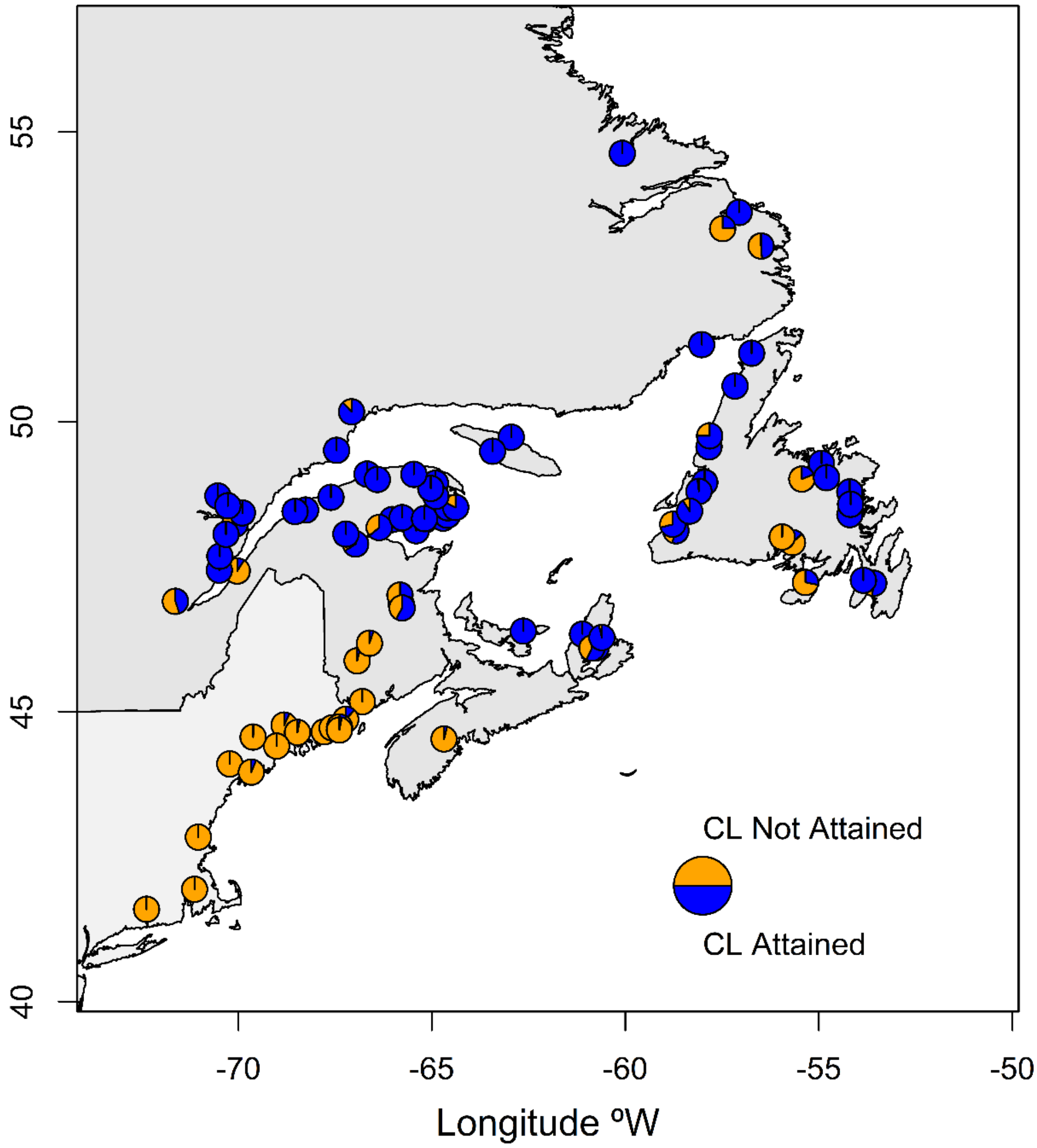

Figure 12 Degree of attainment for the river-specific conservation egg requirement (CL) in the 86 rivers of the North American Commission area assessed in 2019. Three rivers in the USA are not shown because they were partially assessed, but they are considered not to have attained CLs in 2019.

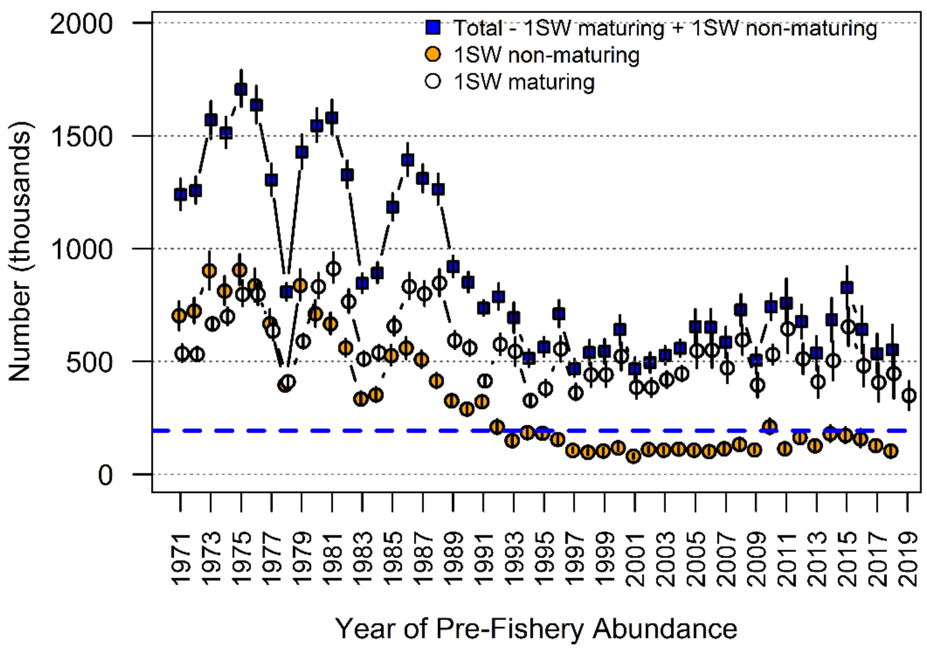

Figure 13 Estimated (median, 5th to 95th percentile range) pre-fishery abundance (PFA) for 1SW maturing, 1SW non-maturing, and total cohort of 1SW salmon for North America. The dashed blue horizontal line is the corresponding sum of the 2SW conservation limits for North America, corrected for 11 months of natural mortality, against which 1SW non-maturing abundance is assessed.

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Annex 1 Glossary of acronyms and abbreviations

1SW *(one-sea-winter).* Maiden adult salmon that have spent one winter at sea.
2SW *(two-sea-winter).* Maiden adult salmon that have spent two winters at sea.
3SW *(three-sea-winter).* Maiden adult salmon that have spent three winters at sea.
CL, i.e. S_{lim} *(conservation limit).* Demarcation of undesirable stock levels or levels of fishing activity; the ultimate objective when managing stocks and regulating fisheries will be to ensure that there is a high probability that undesirable levels are avoided.
FWI *(Framework of Indicators).* The FWI is a tool used to indicate if any significant change in the status of stocks used to inform the previously provided multi-annual management advice has occurred.
ICES (*International Council for the Exploration of the Sea*).
NAC (*North American Commission*). A commission under NASCO.
NASCO (*North Atlantic Salmon Conservation Organization*).
PFA *(pre-fishery abundance).* The numbers of salmon estimated to be alive in the ocean from a particular stock at a specified time.
SFA (*Salmon Fishing Area*). The 23 areas for which Fisheries and Oceans Canada (DFO) manages the salmon fisheries.
SPM (*the islands of Saint Pierre and Miquelon [France]*).

Annex 2 Basis of the assessment

ICES stock data category	1 (ICES, 2019b).
Assessment type	Run-reconstruction models and Bayesian forecasts, taking into account uncertainties in the data.
Input data	Nominal catches (by sea-age class) for commercial, indigenous, and recreational fisheries. Estimates of unreported/illegal catches. Estimates of exploitation rates. Natural mortalities (from earlier assessments).
Discards and bycatch	It is illegal to retain salmon that are incidentally captured in fisheries not directed at salmon (no bycatch). In the directed recreational fishery, mortality from catch and release is accounted for in the regional assessments to estimate spawners. There is no accounting of discarding mortality in non-salmon directed fisheries.
Indicators	The Framework of Indicators is used to indicate whether a significant change has occurred in the status of stocks in intermediate years where multiannual management advice applies.
Other information	Advice subject to annual review. A stock annex was developed in 2014 and updated in 2019 (ICES, 2019c).
Working group	Working Group on North Atlantic Salmon (WGNAS) (ICES, 2020).

Atlantic salmon at West Greenland

Summary of the advice for 2020

ICES advises that when the Framework of Indicators (FWI) was applied in early 2020, a full reassessment was not required and the 2018 ICES advice remains valid (ICES, 2018). Consequently, in line with the management objectives agreed by the North Atlantic Salmon Conservation Organization (NASCO) and consistent with the MSY approach, there are no mixed-stock fishery options at West Greenland for the fishing year 2020. 2020 marks the final year of NASCO's three-year multi-annual regulatory measure for fishing Atlantic salmon at West Greenland (NASCO, 2018).

NASCO 4.1 Describe the key events of the 2019 fishery, including details of catch, gear, effort, composition and origin of the catch, rates of exploitation, and location of the catch as in-river, estuarine, and coastal

Fishing for salmon at Greenland is currently allowed, using hook, fixed gillnets, and driftnets along the entire coast (Figure 1). The commercial fishery for export closed in 1998; the fishery for internal use, however, continues to date. Since 2002, licensed commercial fishers have only been allowed to sell salmon to hotels, institutions, local markets, and factories when factory landings were allowed. People fishing for private consumption only were not required to have a licence until 2018, and are prohibited from selling salmon. The Government of Greenland unilaterally set the quotas for the fisheries from 2012 to 2017 (Table 1). Specific annual factory quotas were set at 35 tonnes (t) for 2012 and 2013, and 30 t in 2014. Licensed fishers were permitted to sell to factories during these years, although the export ban persisted. The Government of Greenland set annual quotas for the 2015–2017 fisheries for all components of the fishery (private, commercial, and factory landings) at 45 t, but stated that any overharvest in a particular year would result in an equal reduction in the quota the following year. As a result of an overharvest in 2015, the 2016 quota was set at 32 t by Greenland. The quota for 2017 remained at 45 t. Factory landings were not permitted in 2016 and 2017.

In 2018, the Government of Greenland set an annual quota for the 2018–2020 fisheries to 30 t, as agreed by all parties of the West Greenland Commission of NASCO. A 10 t quota was allocated for the private fishery, with the balance (20 t) for the commercial fishery. Within the regulatory measure, the Government of Greenland agreed to continue its ban on the export of both wild Atlantic salmon and its products from Greenland, and to prohibit landings and sales to fish-processing factories. As in the previous agreement, they also agreed the fishery should be restricted to run from 15 August to no later than 31 October each year, and that any overharvest in a particular year would result in an equal reduction in the total allowable catch in the following year. The regulatory measure also set out a number of provisions aimed at improving the monitoring, management control, and surveillance of the fishery. These include a new requirement for all fishers (private and commercial) to obtain a licence to fish for Atlantic salmon, an agreement to collect catch and fishing activity data from all fishers, and mandatory reporting requirements. The measure also stated that as a condition of the licence, all fishers would be required to allow samplers from the NASCO sampling programme to take samples of their catches upon request.

Catches of Atlantic salmon at West Greenland (Figure 2 and Table 1) increased through the 1960s, reached a peak in reported harvest of approximately 2700 t in 1971, and then decreased until the closure of the commercial fishery for export in 1998. Catches are reported from all six NAFO divisions, and proportions vary annually (Table 2). A total salmon catch of 29.8 t was reported for the 2019 fishery, a decrease from the 2018 catch (39.9 t), but an overharvest of 10.3 t over the 19.5 t quota (Table 2). The 2019 quota was reduced from 30 t to 19.5 t due to overharvest in 2018. In 2019, commercial landings represented the majority of the harvest at 22.0 t (74.0%) and the remaining 7.7 t was for private use, compared to 32.5 t and 7.4 t, respectively in 2018 (Table 3). In 2018 and 2019, the percentage of commercial landings reported for private use dropped to 0.4% and 0.3%, respectively, compared to an average of 44% from 1997 to 2017. Reported commercial and private landings by NAFO/ICES areas in 2019 are presented in Table 4. The number of licences issued, the number of fishers who reported, and the number of reports received have increased greatly since 2017, a result of both the new regulations requiring all fishers to obtain a licence and the mandatory reporting requirements.

The fishery was closed on 25 September 2019 as 19.5 t of landings had been registered; this number was later revised to 29.8 t, resulting in an overharvest of 10.3 t for the 2019 fishery. The Greenlandic authorities indicated a further 10 t of unreported harvest.

An adjustment for some of the unreported catch has been carried out since 2002 by two approaches: comparisons of the sampling programme statistics and reported landings (adjusted landings [survey]), and utilizing results from the previously implemented phone surveys (adjusted landings [sampling]). Adjusted landings (sampling) are estimated by comparing the weight of salmon observed by the sampling teams and the corresponding community-specific reported landings for the entire fishing season. Sampling is not random and only occurs during part of the fishing season; it is therefore not representative of the total unreported catch. Adjusted landings (survey) are estimated from results of phone surveys, conducted after the fishing seasons 2014 to 2016, to gain further information on inconsistencies in the reported catch data. Adjusted landings (survey) are added to the adjusted landings (sampling) and reported landings to estimate the landings for assessment. Landings for assessment do not replace the official reported statistics (Table 5).

The international sampling programme continued in 2019 (Figure 1). A summary of the biological characteristics of the 2019 catch is presented in Table 6. In 2019, 71.5% of the salmon sampled were determined to be of North American origin and 28.5% of European origin (Figure 3); approximately 6800 (20.3 t) North American and 2600 (8.1 t) fish of European origin were harvested in 2019 (Figure 4). The total number of fish harvested in 2019 (9400) is a decrease from the estimated number harvested in 2018 (13 200). The origin of salmon harvested at West Greenland in 2019 has been estimated based on an updated genetic range-wide baseline (using Single Nucleotide Polymorphisms [SNPs]). This baseline, based on samples from 189 rivers (Jeffery *et al.*, 2018), was updated in 2018 (ICES, 2018) and can discriminate salmon from 21 North American and 10 European genetic reporting groups (Figure 5). The North American contributions to the West Greenland fishery are dominated by the Gaspé Peninsula, Gulf of St Lawrence, and Labrador South genetic reporting groups (65%; Table 7). The Northeast Atlantic contributions were dominated by the United Kingdom/Ireland genetic reporting group (99%). There are smaller, but consistent contributions to the harvest for a number of other genetic reporting groups. Results are similar to those reported for the 2017 and 2018 fisheries (ICES, 2019a, 2019b). A single sample, based on the individual assignment method, was identified as having originated from the Greenland genetic reporting group (Kapisillit River) in 2018, but no samples were identified in 2019.

Table 1 Nominal catches of salmon at West Greenland since 1960 (tonnes, round fresh weight) by participating nations. For Greenlandic vessels specifically, all catches up to 1968 were taken with set gillnets only, and catches after 1968 were taken with set gillnets and driftnets. All non-Greenlandic vessel catches from 1969 to 1975 were harvested with driftnets. The quota figures applied to Greenlandic vessels only, and parenthetical entries identify when quotas did not apply to all sectors of the fishery.

Year	Norway	Faroes	Sweden	Denmark	Greenland	Total	Quota	Comments
1960	-	-	-	-	60	60		
1961	-	-	-	-	127	127		
1962	-	-	-	-	244	244		
1963	-	-	-	-	466	466		
1964	-	-	-	-	1539	1539		
1965	-	36	-	-	825	858		Norwegian harvest figures not available, but known to be less than Faroese catch.
1966	32	87	-	-	1251	1370		
1967	78	155	-	85	1283	1601		
1968	138	134	4	272	579	1127		
1969	250	215	30	355	1360	2210		
1970	270	259	8	358	1244	2139		Greenlandic total includes 7 t caught by longlines in the Labrador Sea.
1971	340	255	-	645	1449	2689	-	
1972	158	144	-	401	1410	2113	1100	
1973	200	171	-	385	1585	2341	1100	
1974	140	110	-	505	1162	1917	1191	
1975	217	260	-	382	1171	2030	1191	
1976	-	-	-	-	1175	1175	1191	
1977	-	-	-	-	1420	1420	1191	
1978	-	-	-	-	984	984	1191	
1979	-	-	-	-	1395	1395	1191	
1980	-	-	-	-	1194	1194	1191	
1981	-	-	-	-	1264	1264	1265	Quota set to a specific opening date for the fishery.

Year	Norway	Faroes	Sweden	Denmark	Greenland	Total	Quota	Comments
1982	-	-	-	-	1077	1077	1253	Quota set to a specific opening date for the fishery.
1983	-	-	-	-	310	310	1191	
1984	-	-	-	-	297	297	870	
1985	-	-	-	-	864	864	852	
1986	-	-	-	-	960	960	909	
1987	-	-	-	-	966	966	935	
1988	-	-	-	-	893	893	840	1988–1990 quota was 2520 t, with a 1 August opening date. Annual catches were not to exceed an annual average (840 t) by more than 10%. Quota adjusted to 900 t in 1989 and 924 t in 1990 for later opening dates.
1989	-	-	-	-	337	337	900	
1990	-	-	-	-	274	274	924	
1991	-	-	-	-	472	472	840	
1992	-	-	-	-	237	237	258	Quota set by Greenlandic authorities.
1993	-	-	-	-			89	The fishery was suspended. NASCO adopted a new quota allocation model.
1994	-	-	-	-			137	Fishery suspended and quotas were bought out.
1995	-	-	-	-	83	83	77	Quota advised by NASCO.
1996	-	-	-	-	92	92	174	Quota set by Greenlandic authorities.
1997	-	-	-	-	58	58	57	Private (non-commercial) catches to be reported after 1997.
1998	-	-	-	-	11	11	20	Fishery restricted to catches used for internal consumption in Greenland.
1999	-	-	-	-	19	19	20	
2000	-	-	-	-	21	21	20	
2001	-	-	-	-	43	43	114	Final quota calculated according to the *ad hoc* management system.
2002	-	-	-	-	9	9	55	Quota bought out; quota represented the maximum allowable catch (no factory landings allowed), and higher catch figures based on sampling programme information are used for the assessments.
2003	-	-	-	-	9	9		Quota set to nil (no factory landings allowed); fishery restricted to catches used for internal consumption in Greenland, and higher catch figures based on sampling programme information are used for the assessments.
2004	-	-	-	-	15	15		Same as previous year.
2005	-	-	-	-	15	15		Same as previous year.
2006	-	-	-	-	22	22		Quota set to nil (no factory landings allowed) and fishery restricted to catches used for internal consumption in Greenland.
2007	-	-	-	-	25	25		Quota set to nil (no factory landings allowed); fishery restricted to catches used for internal consumption in Greenland, and higher catch figures based on sampling programme information are used for the assessments.
2008	-	-	-	-	26	26		Same as previous year.
2009	-	-	-	-	26	26		Same as previous year.
2010	-	-	-	-	40	40		No factory landings allowed and fishery restricted to catches used for internal consumption in Greenland.
2011	-	-	-	-	28	28		Same as previous year.

Year	Norway	Faroes	Sweden	Denmark	Greenland	Total	Quota	Comments
2012	-	-	-	-	33	33	(35)	Unilateral decision made by Greenland for a 35 t quota for factory landings only; fishery restricted to catches used for internal consumption in Greenland, and higher catch figures based on sampling programme information are used for the assessments.
2013	-	-	-	-	47	47	(35)	Same as previous year.
2014	-	-	-	-	58	58	(30)	Unilateral decision made by Greenland to allow factory landings with a 30 t quota for factory landings only; fishery restricted to catches used for internal consumption in Greenland, and higher catch figures based on sampling programme information and phone surveys are used for the assessments.
2015	-	-	-	-	57	57	45	Unilateral decision made by Greenland to set a 45 t quota for all sectors of the fishery; fishery restricted to catches used for internal consumption in Greenland, and higher catch figures based on sampling programme information and phone surveys are used for the assessments.
2016	-	-	-	-	27	27	32	Unilateral decision made by Greenland to reduce the previously set 45 t quota for all sectors of the fishery to 32 t based on the average of the 2015 fishery; fishery restricted to catches used for internal consumption in Greenland, and higher catch figures based on sampling programme information and phone surveys are used for the assessments.
2017	-	-	-	-	28	28	45	Unilateral decision made by Greenland to set a 45 t quota for all sectors of the fishery; fishery restricted to catches used for internal consumption in Greenland, and higher catch figures based on sampling programme information are used for the assessments.
2018	-	-	-	-	40	40	30	No factory landings allowed and fishery restricted to catches used for internal consumption in Greenland.
2019	-	-	-	-	30	30	19.5	No change from previous year.

Table 2 Annual distribution of nominal catches (t) at Greenland by NAFO division (when known). NAFO divisions are shown in Figure 2. Since 2005, gutted weights have been reported and converted to total weight by a factor of 1.11. Rounding issues are evident for some totals.

Year	NAFO Division						Unknown	West Greenland	East Greenland	Total
	1A	1B	1C	1D	1E	1F				
1960							60	60		60
1961							127	127		127
1962							244	244		244
1963	1	172	180	68	45			466		466
1964	21	326	564	182	339	107		1539		1539
1965	19	234	274	86	202	10	36	861		861
1966	17	223	321	207	353	130	87	1338		1338
1967	2	205	382	228	336	125	236	1514		1514
1968	1	90	241	125	70	34	272	833		833
1969	41	396	245	234	370		867	2153		2153
1970	58	239	122	123	496	207	862	2107		2107
1971	144	355	724	302	410	159	560	2654		2654
1972	117	136	190	374	385	118	703	2023		2023
1973	220	271	262	440	619	329	200	2341		2341
1974	44	175	272	298	395	88	645	1917		1917
1975	147	468	212	224	352	185	442	2030		2030
1976	166	302	262	225	182	38		1175		1175
1977	201	393	336	207	237	46	-	1420	6	1426
1978	81	349	245	186	113	10	-	984	8	992
1979	120	343	524	213	164	31	-	1395	+	1395
1980	52	275	404	231	158	74	-	1194	+	1194
1981	105	403	348	203	153	32	20	1264	+	1264
1982	111	330	239	136	167	76	18	1077	+	1077
1983	14	77	93	41	55	30	-	310	+	310
1984	33	116	64	4	43	32	5	297	+	297
1985	85	124	198	207	147	103	-	864	7	871
1986	46	73	128	203	233	277	-	960	19	979
1987	48	114	229	205	261	109	-	966	+	966
1988	24	100	213	191	198	167	-	893	4	897
1989	9	28	81	73	75	71	-	337	-	337
1990	4	20	132	54	16	48	-	274	-	274
1991	12	36	120	38	108	158	-	472	4	476
1992	-	4	23	5	75	130	-	237	5	242
1993*	-	-	-	-	-	-	-	-	-	-
1994*	-	-	-	-	-	-	-	-	-	-
1995	+	10	28	17	22	5	-	83	2	85
1996	+	+	50	8	23	10	-	92	+	92
1997	1	5	15	4	16	17	-	58	1	59
1998	1	2	2	4	1	2	-	11	-	11
1999	+	2	3	9	2	2	-	19	+	19
2000	+	+	1	7	+	13	-	21	-	21
2001	+	1	4	5	3	28	-	43	-	43
2002	+	+	2	4	1	2	-	9	-	9
2003	1	+	2	1	1	5	-	9	-	9
2004	3	1	4	2	3	2	-	15	-	15
2005	1	3	2	1	3	5	-	15	-	15
2006	6	2	3	4	2	4	-	22	-	22
2007	2	5	6	4	5	2	-	25	-	25
2008	4.9	2.2	10.0	1.6	2.5	5.0	0	26.2	0	26.2
2009	0.2	6.2	7.1	3.0	4.3	4.8	0	25.6	0.8	26.3
2010	17.3	4.6	2.4	2.7	6.8	4.3	0	38.1	1.7	39.6
2011	1.8	3.7	5.3	8.0	4.0	4.6	0	27.4	0.1	27.5
2012	5.4	0.8	15.0	4.6	4.0	3.0	0	32.6	0.5	33.1
2013	3.1	2.4	17.9	13.4	6.4	3.8	0	47.0	0.0	47.0

Year	NAFO Division						Unknown	West Greenland	East Greenland	Total
	1A	1B	1C	1D	1E	1F				
2014	3.6	2.8	13.8	19.1	15.0	3.4	0	57.8	0.1	57.9
2015	0.8	8.8	10.0	18.0	4.2	14.1	0	55.9	1.0	56.8
2016	0.8	1.2	7.3	4.6	4.5	7.3	0	25.7	1.5	27.1
2017	1.1	1.7	9.3	6.9	3.2	5.6	0	27.8	0.3	28.0
2018	2.4	5.7	13.7	8.2	4.2	4.8	0	39.0	0.8	39.9
2019	0.8	3.0	4.4	8.0	4.8	7.3	0	28.3	1.4	29.8

* The fishery was suspended.
+ Small catches, < 5 t.
- No catch.

Table 3 Reported 2018 and 2019 catches by fisher. Licences for private fishers were introduced in 2018. Entries of 0.0 represent reported values of < 0.1. Note: Due to rounding, numbers presented may not add up precisely to the totals indicated.

Licence status	Landings type	Reported 2018 catch (t)	Reported 2019 catch (t)
Licensed	Commercial (from commercial fishers)	32.5	21.8
	Private use (from commercial fishers)	0.1	0.1
	Commercial use (from private fishers)	0.0	0.2
	Private use (from private fishers)	7.2	7.6
	Total commercial catch	32.5	22.0
	Total private use catch	7.4	7.7
	Total catch	39.9	29.8

Table 4 Reported landings (t) by licence type, landing category, the number of fishers reporting, and the total number of landing reports received in 2019. Empty cells identify categories with no reported landings and 0.0 entries represent reported values of < 0.1. Note: Due to rounding, numbers presented may not add up precisely to the totals indicated.

NAFO/ICES	Licence type	No. of fishers	No. of reports	Commercial	Private	Total
NAFO 1A	Private	42	60		0.1	0.1
	Commercial	54	105	0.7		0.7
	TOTAL	**96**	**165**	**0.7**	**0.1**	**0.8**
NAFO 1B	Private	35	62	0.1	0.4	0.5
	Commercial	34	126	2.5	0.0	2.6
	TOTAL	**70**	**191**	**2.6**	**0.4**	**3.0**
NAFO 1C	Private	29	40	0.1	0.2	0.3
	Commercial	88	176	4.0	0.0	4.0
	TOTAL	**117**	**216**	**4.1**	**0.3**	**4.4**
NAFO 1D	Private	136	176	0.0	1.2	1.3
	Commercial	33	98	6.7	0.0	6.8
	TOTAL	**169**	**274**	**6.8**	**1.2**	**8.0**
NAFO 1E	Private	31	106		2.0	2.0
	Commercial	23	110	2.8	0.0	2.9
	TOTAL	**54**	**216**	**2.8**	**2.0**	**4.8**
NAFO 1F	Private	70	228	0.0	2.8	2.9
	Commercial	38	145	4.5		4.5
	TOTAL	**108**	**373**	**4.5**	**2.8**	**7.3**
ICES Subarea 14	Private	18	65		1.0	1.0
	Commercial	6	31	0.5		0.5
	TOTAL	**24**	**96**	**0.5**	**1.0**	**1.4**
ALL	Private	361	737	0.2	7.6	7.9
	Commercial	276	791	21.8	0.1	21.9
	TOTAL	**638**	**1531**	**22.0**	**7.7**	**29.8**

Table 5 Reported landings and adjusted landings (t) for the assessment of Atlantic salmon at West Greenland, 2002–2019. The total adjusted landings do not include the unreported catch (10 t per year since 2000).

Year	Reported landings (West Greenland)	Adjustment to landings (Sampling)	Adjustment to landings (Survey)	Total adjusted landings
2002	9.0	0.7	-	9.8
2003	8.7	3.6	-	12.3
2004	14.7	2.5	-	17.2
2005	15.3	2.0	-	17.3
2006	23.0	0.0	-	23.0
2007	24.6	0.2	-	24.8
2008	26.1	2.5	-	28.6
2009	25.5	2.5	-	28.0
2010	37.9	5.1	-	43.1
2011	27.4	0.0	-	27.4
2012	32.6	2.0	-	34.6
2013	46.9	0.7	-	47.7
2014	57.7	0.6	12.2	70.5
2015	55.9	0.0	5.0	60.9
2016	25.7	0.3	4.2	30.2
2017	27.8	0.3	-	28.0
2018	39.0	0.0	-	39.0
2019	28.3	0.0	-	28.3

Table 6 Summary of biological characteristics of catches of Atlantic salmon at West Greenland in 2019 (NA = North America, E = Europe).

River-age distribution (%) by origin								
Continent of origin	1	2	3	4	5	6	7	8
NA	0.6	26.9	32.5	25.4	13.7	0.8	0	0
E	7.5	60.5	24.2	7.5	0.4	0	0	0

Length and weight by origin and sea age								
Continent of origin	1 SW		2 SW		Previous spawners		All sea ages	
	Fork length	Whole	Fork length	Whole	Fork length	Whole	Fork	Whole
NA	63.9	2.93	78.4	6.62	72.1	4.01	64.4	3.01
E	63.4	2.89	76.8	6.27	62.1	2.76	62.3	2.83

Continent of origin (%)	
North America	Europe
71.5	28.5

Sea-age composition (%) by continent of origin			
Continent of origin	1SW	2SW	Previous spawners
NA	95.9	1.4	2.7
E	97.9	1.7	0.3

Table 7 Bayesian estimates of mixture composition for the West Greenland Atlantic salmon fishery, by region and overall for 2019. Baseline locations refer to regional reporting groups identified in Figure 5. Sample locations are identified by NAFO divisions. Mean estimates are provided with 95% credible interval in parentheses. Estimates of mixture contributions not supported by significant individual assignments (P > 0.8) are represented as zero.

Regional group	COO	NAFO 1B	NAFO 1C	NAFO 1E	NAFO 1F	Overall
Baltic Sea	EUR	0	0	0	0	0
Barents/White seas	EUR	0	0	0	0	0
European broodstock	EUR	0	0	0	0	0
France	EUR	0	0.2 (0.0, 0.9)	0	0	0.1 (0.0, 0.3)
Greenland	EUR	0	0	0	0	0
Iceland	EUR	0	0	0	0	0
Northern Norway	EUR	0	0	0	0	0
Southern Norway	EUR	0	0	0	0	0
Spain	EUR	0.5 (0.0, 1.6)	0	0	0.4 (0.0, 1.5)	0.2 (0.0, 0.6)
United Kingdom/Ireland	EUR	13.5 (10.2, 17.2)	40.7 (36.1, 45.4)	51.7 (35.8, 67.3)	24.0 (18.9, 29.5)	28.2 (25.6, 31.0)
Anticosti	NA	0	1.5 (0.5, 2.9)	0.0 (0.0, 0.0)	1.6 (0.4, 3.7)	0.9 (0.4, 1.7)
Avalon Peninsula	NA	0	0	0	0	0
Burin Peninsula	NA	0	0	0	0	0
Eastern Nova Scotia	NA	0	0	0	0.9 (0.1, 2.5)	0.4 (0.1, 0.9)
Fortune Bay	NA	0	0	0	0	0
Gaspé Peninsula	NA	20.1 (15.7, 24.7)	15.3 (11.8, 19.2)	24.8 (12.2, 40.1)	20.8 (15.4, 26.7)	18.6 (16.1, 21.2)
Gulf of St Lawrence	NA	19.2 (14.9, 23.8)	12.1 (8.9, 15.6)	2.8 (0.0, 10.8)	14.3 (9.8, 19.3)	14.2 (12.0, 16.6)
Inner Bay of Fundy	NA	0	0	0	0	0
Labrador central	NA	7.0 (3.8, 10.9)	5.0 (2.8, 7.6)	7.3 (0.3, 18.1)	3.3 (1.3, 6.2)	5.4 (3.9, 7.2)
Labrador south	NA	19.1 (14.6, 23.9)	11.8 (8.6, 15.3)	0	12.6 (8.7, 17.2)	13.5 (11.4, 15.8)
Lake Melville	NA	1.6 (0.3, 3.7)	1.5 (0.5, 3.1)	0	0	1.5 (0.8, 2.6)
Maine, United States	NA	1.7 (0.6, 3.4)	1.4 (0.5, 2.8)	0	3.2 (1.4, 5.8)	1.9 (1.2, 2.9)
Newfoundland 1	NA	0.6 (0.1, 1.6)	0	0	2.1 (0.5, 4.3)	0.7 (0.2, 1.4)
Newfoundland 2	NA	0.8 (0.1, 2.1)	0	0	0.9 (0.1, 2.5)	0.9 (0.4, 1.6)
Northern Newfoundland	NA	0	0	0	0.4 (0.0, 1.5)	0.1 (0.0, 0.4)
Quebec City Region	NA	2.6 (0.7, 5.0)	1.9 (0.7, 3.7)	0	3.5 (1.1, 6.8)	2.3 (1.3, 3.7)
St John River & aquaculture	NA	0	0	0	0	0
St Lawrence N. Shore Lower	NA	4.4 (2.4, 7.0)	2.3 (1.0, 4.1)	7.8 (1.2, 18.8)	2.9 (1.1, 5.5)	3.7 (2.6, 5.0)
Ungava	NA	6.6 (4.3, 9.4)	2.1 (1.0, 3.7)	0	6.1 (3.4, 9.4)	4.6 (3.4, 5.9)
Western Newfoundland	NA	2.2 (0.9, 4.1)	3.0 (1.5, 5.1)	0	2.3 (0.7, 4.6)	2.3 (1.4, 3.4)
Western Nova Scotia	NA	0	0	0	0	0

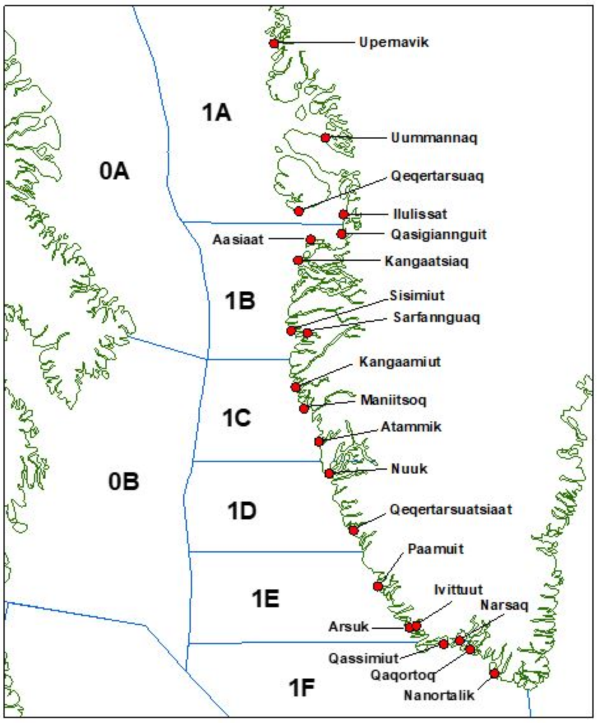

Figure 1 Map of communities in West Greenland, where Atlantic salmon have historically been landed and the corresponding NAFO divisions (1A–1F). In 2019, samples were obtained from Sisimiut (1B), Maniitsoq (1C), Nuuk (1D), and Qaqortoq (1F).

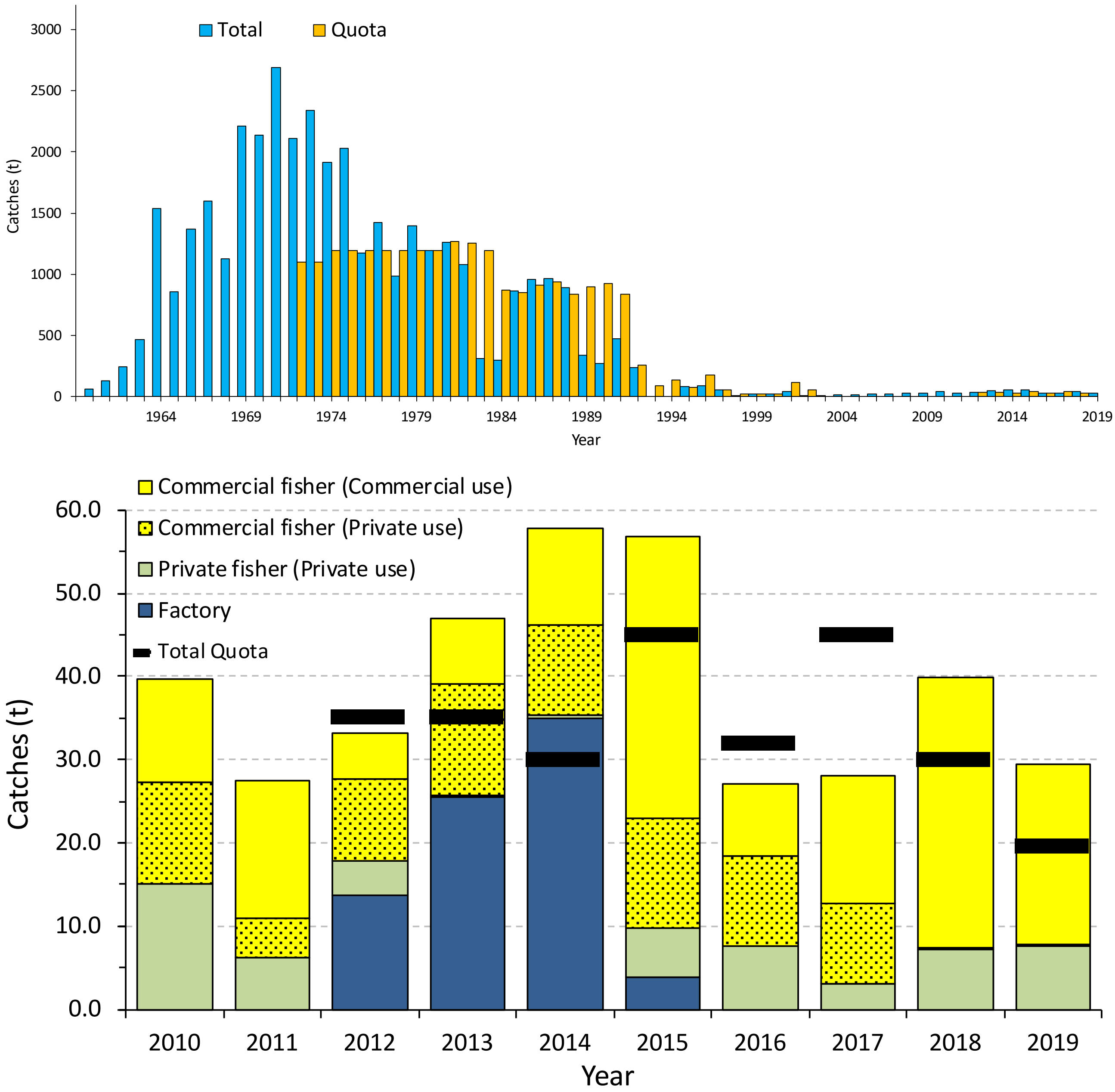

Figure 2 Nominal landings and commercial quotas (tonnes, round fresh weight) of salmon at West Greenland from 1960 to 2019 (upper panel). Landings from 2010 to 2019 are also displayed by landing type (lower panel). No quotas were set for 2002–2011 and the quotas for 2012–2014 were for factory landings only.

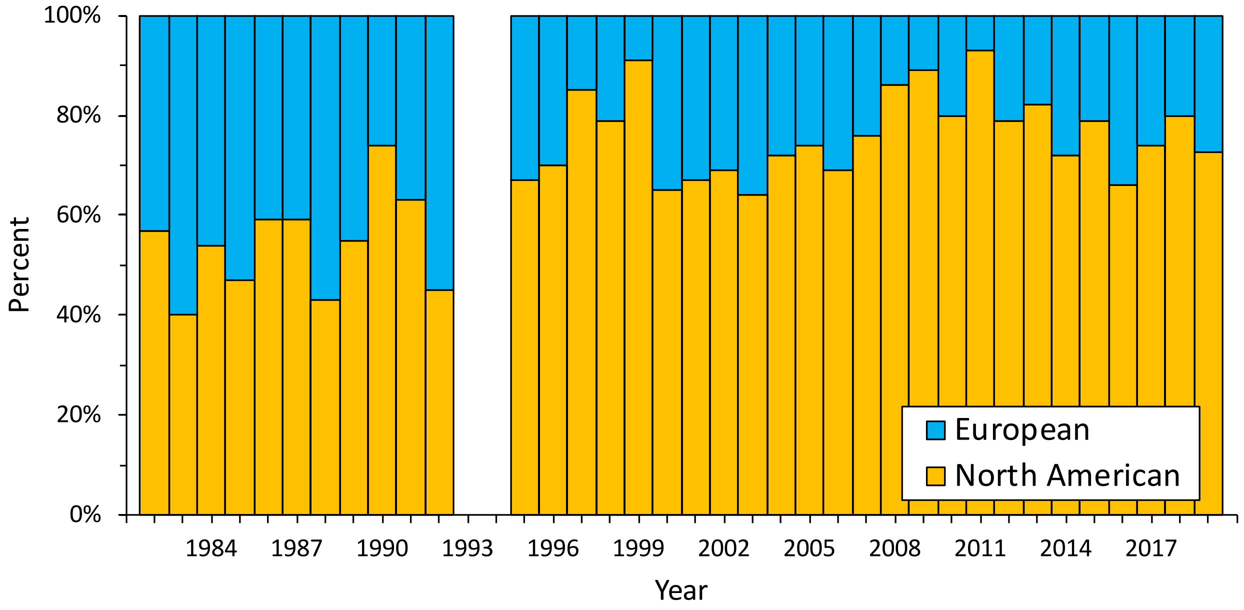

Figure 3 Estimated percent of continental origin of Atlantic salmon, harvested at West Greenland from 1982 to 2019.

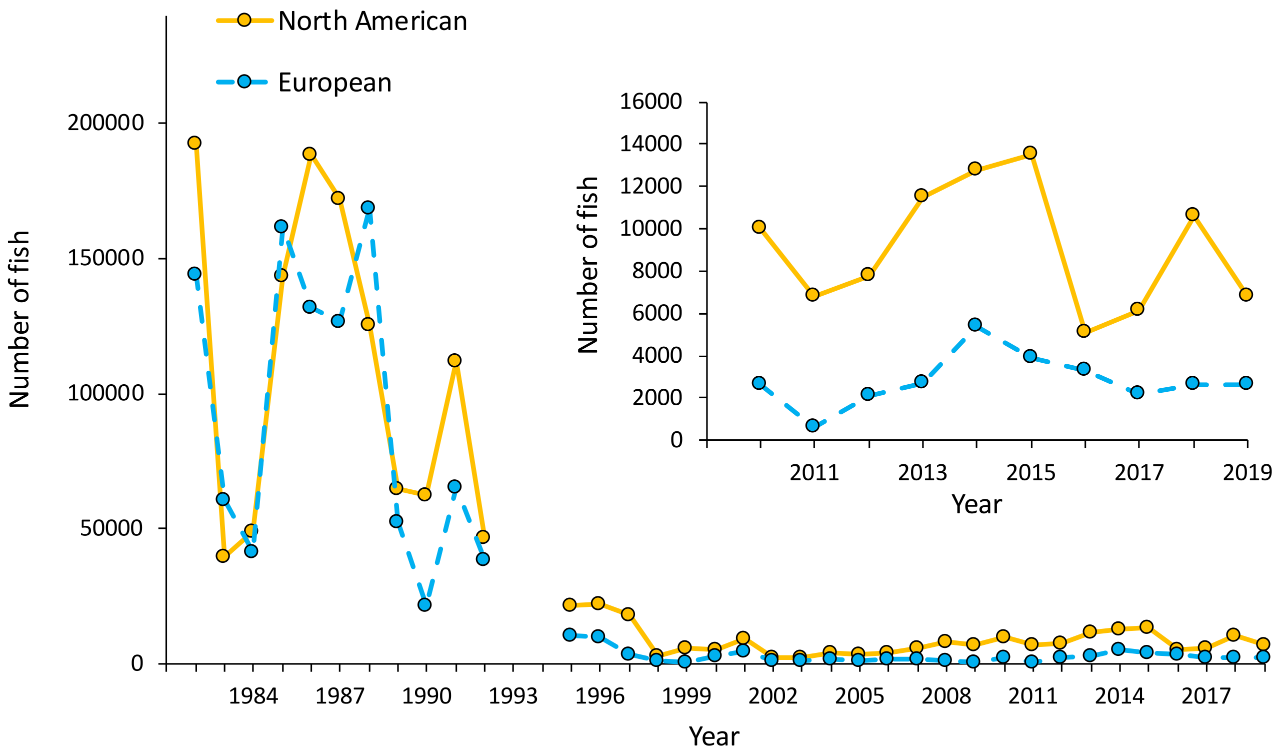

Figure 4 Number of North American and European Atlantic salmon, caught at West Greenland in 1982–2019 and 2010–2019 (inset). Estimates are based on continent of origin by NAFO division, weighted by catch (weight) in each division. Unreported catch is not included.

ICES REGION	REGIONAL GROUP	GROUP ACRONYM
Quebec (North)	Ungava	UNG
Labrador	Labrador central	LAC
	Lake Melville	MEL
	Labrador South	LAS
Quebec	St Lawrence North Shore Lower	QLS
	Anticosti	ANT
	Gaspé Peninsula	GAS
	Quebec City Region	QUE
Gulf	Gulf of St Lawrence	GUL
Scotia–Fundy	Inner Bay of Fundy	IBF
	Eastern Nova Scotia	ENS
	Western Nova Scotia	WNS
	Saint John River & aquaculture	SJR
Newfoundland	Northern Newfoundland	NNF
	Western Newfoundland	WNF
	Newfoundland 1	NF1
	Newfoundland 2	NF2
	Fortune Bay	FTB
	Burin Peninsula	BPN
	Avalon Peninsula	AVA
USA	Maine, United States	USA

ICES REGION	REGIONAL GROUP	GROUP ACRONYM
Europe	Spain	SPN
	France	FRN
	European broodstock	EUB
	United Kingdom/Ireland	BRI
	Barents/White seas	BAR
	Baltic Sea	BAL
	Southern Norway	SNO
	Northern Norway	NNO
	Iceland	ICE
	Greenland	GL

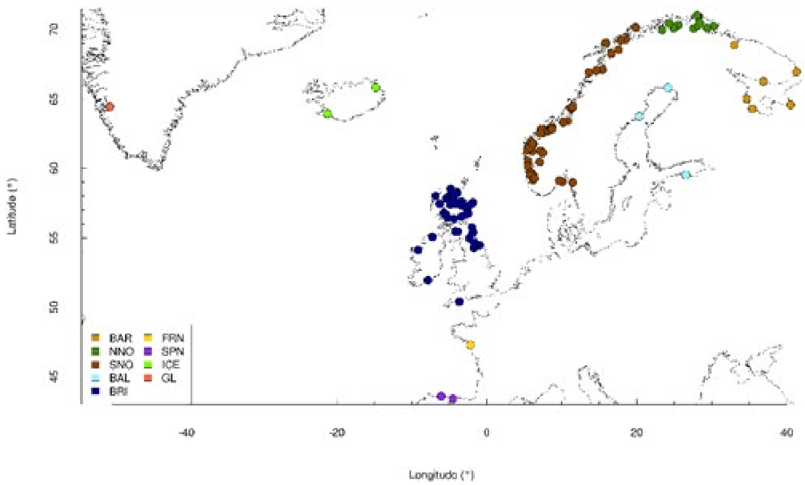

Figure 5 Regional group and codes from the SNP-based genetic baseline (upper table) and location maps for North America (left) and Europe (right). The EUB (European broodstock) regional group does not have a geographic location and therefore is not represented on the map.

NASCO 4.2 Describe the status of the stocks

Recruitment (pre-fishery abundance) estimates of non-maturing 1SW salmon at Greenland show continued low abundance compared to historical levels and are currently below the spawner escapement reserves (SER) for the North American Commission (NAC; Figure 6) and Southern NEAC (Figure 7) stock complexes.

In 2019, the median estimates of spawners were below the conservation limits (CLs; suffering reduced reproductive capacity) for 2SW salmon in all six regions of NAC, and for MSW salmon in Southern NEAC (Figure 8). Particularly large deficits relative to CLs and rebuilding management objectives are noted in the NAC Scotia–Fundy and USA regions.

The exploitation rate (catch in Greenland divided by pre-fishery abundance [PFA]) in 2018 was 12.9% for NAC fish and 0.7% for Southern NEAC fish (Figure 9). Despite major changes in fisheries management in the past few decades and increasingly more restrictive fisheries measures, returns have remained near historical lows. It is likely, therefore, that other factors besides fisheries are constraining production.

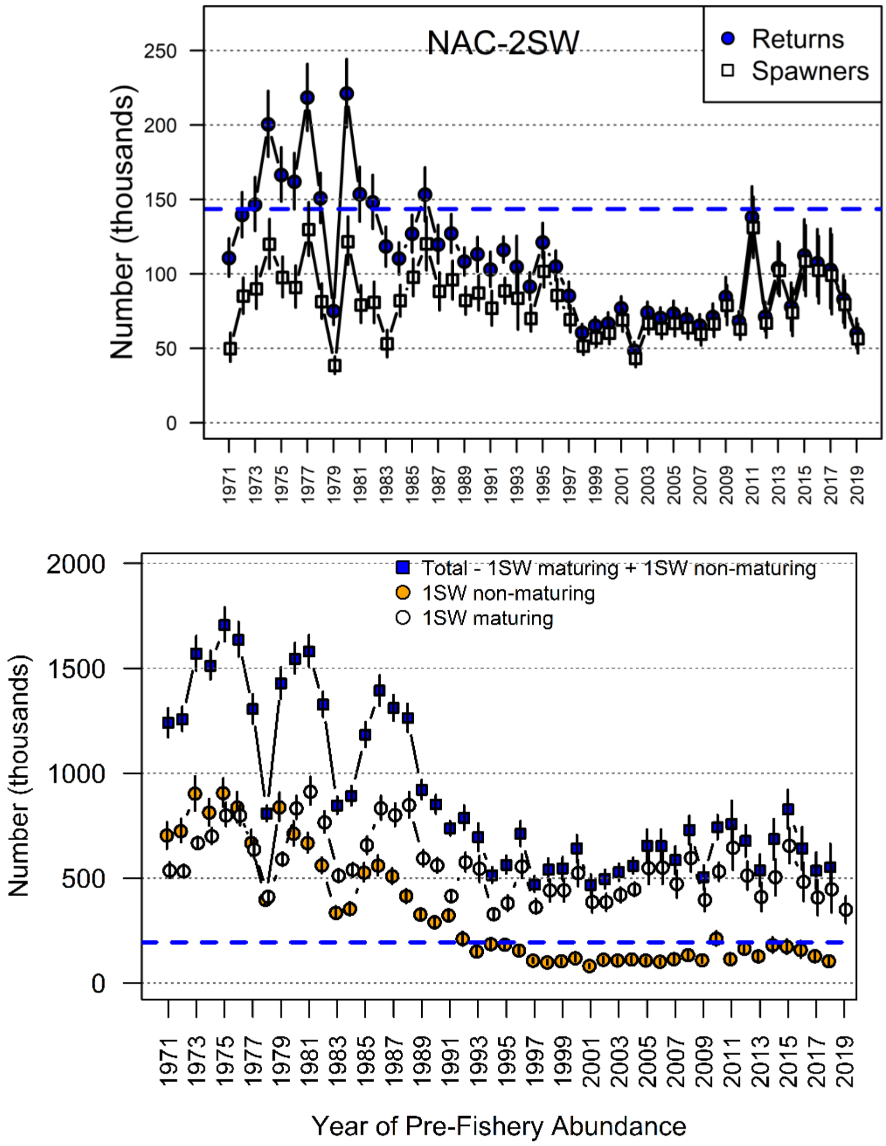

Figure 6 Top panel: Estimated (median, 5th to 95th percentile range, in thousands) returns (blue circles) and spawners (white squares) of 2SW salmon for NAC, 1971–2019. The dashed line is the corresponding 2SW conservation limit for NAC. Bottom panel: Estimated (median, 5th to 95th percentile range, in thousands) pre-fishery abundance (PFA) for 1SW maturing, 1SW non-maturing, and the total cohort of 1SW salmon for NAC, PFA years 1971–2018. The dashed blue horizontal line is the corresponding sum of the 2SW conservation limits for NAC (143 494), corrected for 11 months of natural mortality (193 697) against which 1SW non-maturing salmon are assessed.

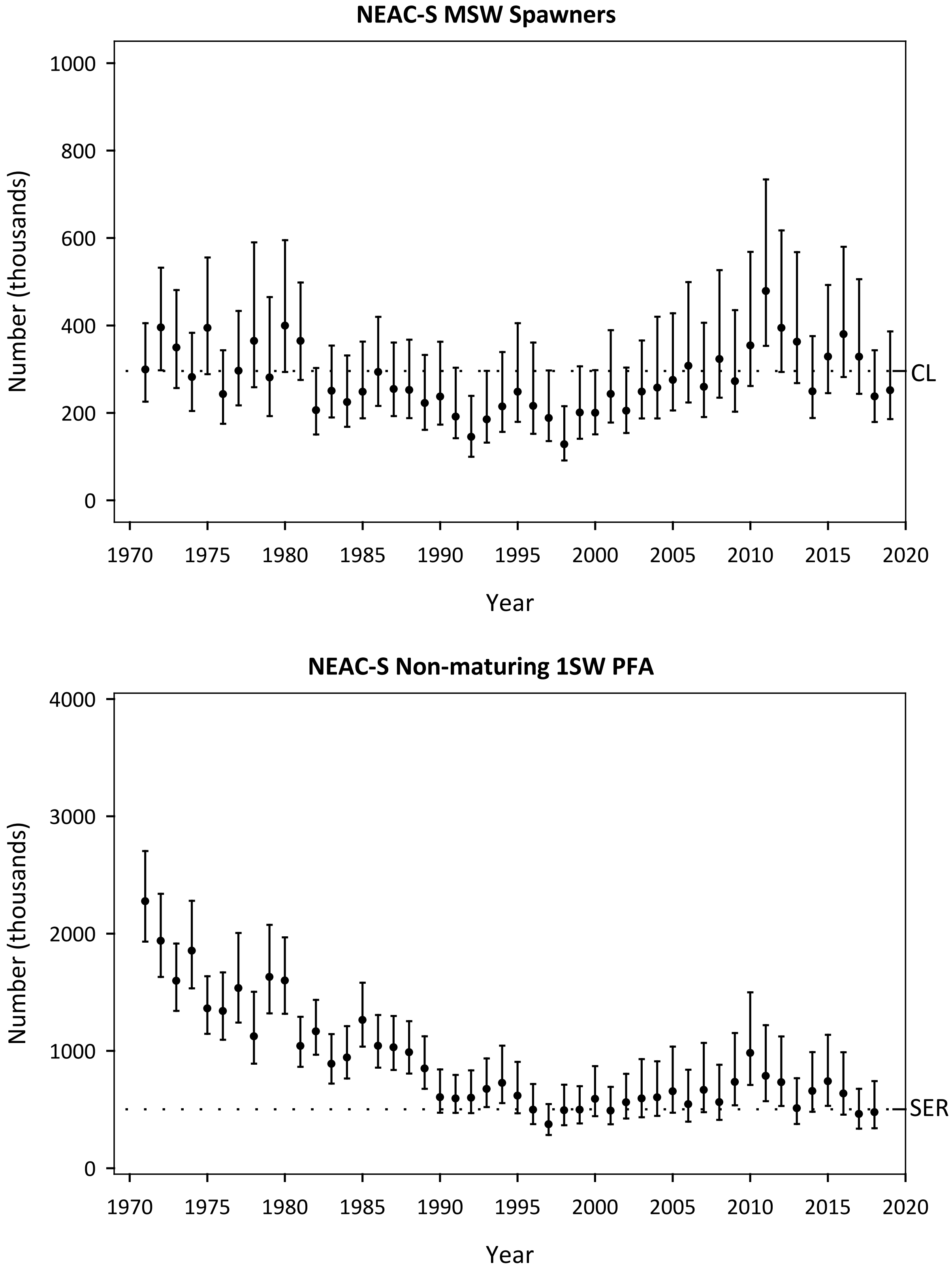

Figure 7 Estimated spawning escapement (upper panel) and PFA (lower panel), and spawning escapement with 90% confidence limits for non-maturing 1SW salmon (MSW spawners) in the Southern NEAC (NEAC–S) stock complex.

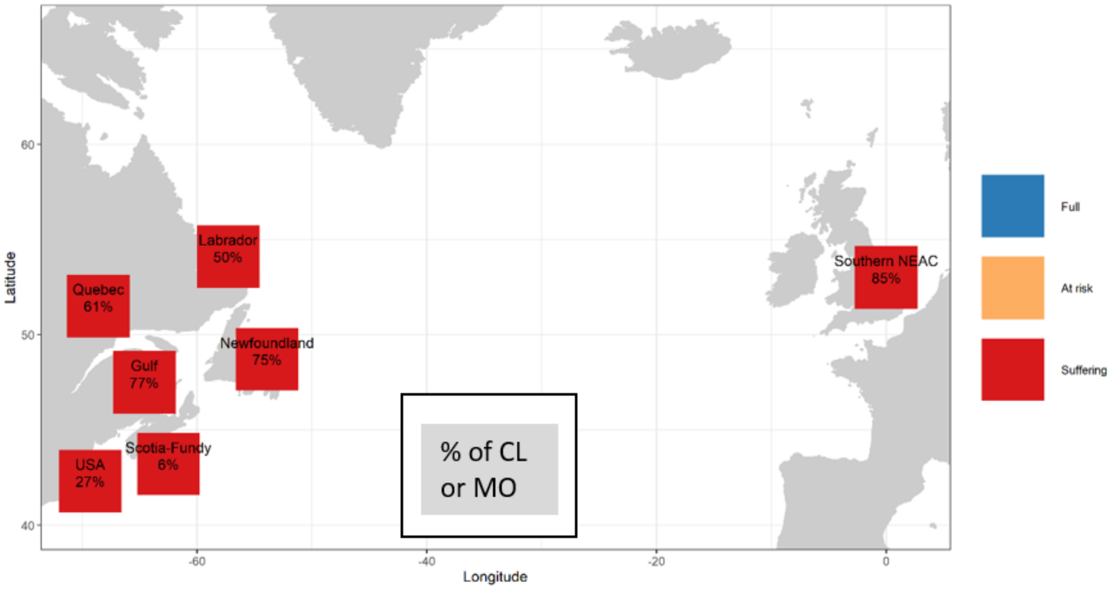

Figure 8 Summary of 2SW (NAC regions) and MSW (Southern NEAC) 2019 median (from the Monte Carlo posterior distributions) spawner estimates in relation to conservation limits (CLs) or management objectives (MO – only for USA and Scotia–Fundy). The colour shading, which in this case is relevant for red only as all stocks in these regions are categorized as suffering reduced reproductive capacity, represents the three ICES stock status designations: full (blue – at full reproductive capacity: the 5th percentile of the spawner estimate is above the CL); at risk (orange – at risk of suffering reduced reproductive capacity: the median spawner estimate is above the CL, but the 5th percentile is below); and suffering (red – suffering reduced reproductive capacity: the median spawner estimate is below the CL).

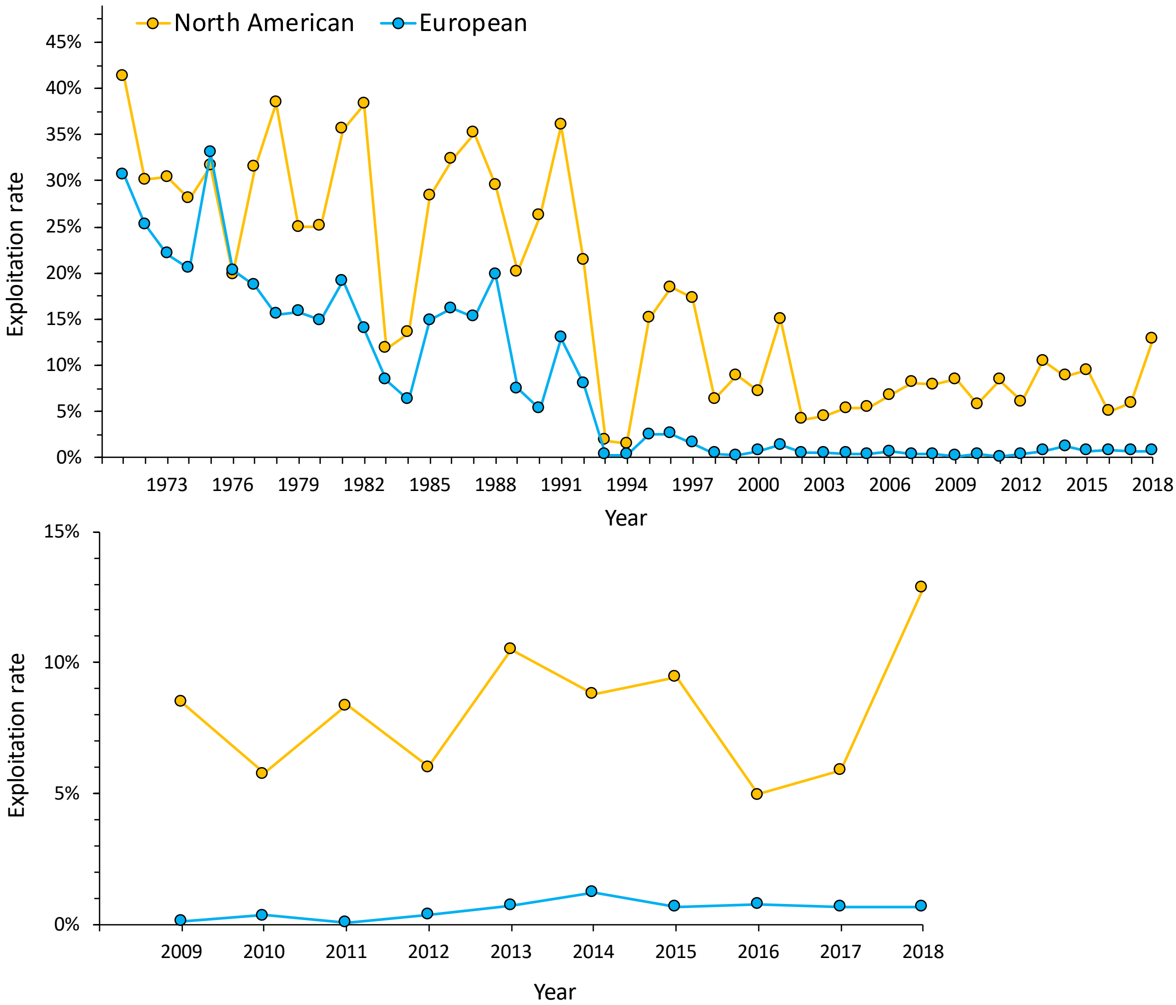

Figure 9 Exploitation rate (%) for NAC 1SW non-maturing and southern NEAC non-maturing Atlantic salmon at West Greenland, 1971–2018 (top) and 2009–2018 (bottom). Exploitation rate estimates are only available to 2018, as 2019 exploitation rates are dependent on 2020 returns.

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Annex 1 Glossary of acronyms and abbreviations

1SW *(one-sea-winter).* Maiden adult salmon that has spent one winter at sea.
2SW *(two-sea-winter).* Maiden adult salmon that has spent two winters at sea.
CL, i.e. S_{lim} *(conservation limit).* Demarcation of undesirable stock levels or levels of fishing activity; the ultimate objective when managing stocks and regulating fisheries is to ensure that there is a high probability that undesirable levels are avoided.
ICES (*International Council for the Exploration of the Sea*).
NAC (*North American Commission*). A commission under NASCO.
NAFO (*Northwest Atlantic Fisheries Organization*). NAFO is an intergovernmental fisheries science and management organization that ensures the long-term conservation and sustainable use of fishery resources in the Northwest Atlantic.
NASCO (*North Atlantic Salmon Conservation Organization*).
NEAC (*North-East Atlantic Commission*). A commission under NASCO.
PFA *(pre-fishery abundance).* The numbers of salmon estimated to be alive in the ocean from a particular stock at a specific time.

Annex 2 Scientific basis

ICES stock data category	1 (ICES, 2019c).
Assessment type	Run–reconstruction models and Bayesian forecasts, taking into account uncertainties in the data.
Input data	Nominal catches (by sea-age class and continent of origin) for internal use fisheries. Estimates of unreported/illegal catches. Estimates of exploitation rates. Natural mortalities (from earlier assessments).
Discards and bycatch	No salmon discards in the directed salmon fishery.
Indicators	A framework of indicators (FWI) is used to indicate whether a significant change has occurred in the status of stocks in intermediate years where multi-annual management advice applies.
Other information	Advice subject to annual review. Stock annex completed in 2014 and updated in 2019 (ICES, 2019d).
Working group	Working Group on North Atlantic Salmon (WGNAS) (ICES, 2020).