Working group on North Atlantic salmon (WGNAS)

Ida Ahlbeck-Bergendahl, Julien April, Hlynur Bardarson, Geir H. Bolstad, Ian Bradbury, Mathieu Buoro, Gerald Chaput, Guillaume Dauphin, Dennis Ensing, Jaakko Erkinaro, et al.

WORKING GROUP ON NORTH ATLANTIC SALMON (WGNAS)

VOLUME 1 | ISSUE 16

ICES SCIENTIFIC REPORTS

RAPPORTS
SCIENTIFIQUES DU CIEM

ICES INTERNATIONAL COUNCIL FOR THE EXPLORATION OF THE SEA
CIEM CONSEIL INTERNATIONAL POUR L'EXPLORATION DE LA MER

International Council for the Exploration of the Sea
Conseil International pour l'Exploration de la Mer

H.C. Andersens Boulevard 44-46
DK-1553 Copenhagen V
Denmark
Telephone (+45) 33 38 67 00
Telefax (+45) 33 93 42 15
www.ices.dk
info@ices.dk

ISSN number: 2618-1371 I © 2019 International Council for the Exploration of the Sea

ICES Scientific Reports

Volume 1 | Issue 16

WORKING GROUP ON NORTH ATLANTIC SALMON (WGNAS)

Recommended format for purpose of citation:

ICES. 2019. Working Group on North Atlantic Salmon (WGNAS).
ICES Scientific Reports. 1:16. 368 pp. http://doi.org/10.17895/ices.pub.4978

Editors

Martha Robertson

Authors

Ida Ahlbeck-Bergendahl • Julien April • Hlynur Bardarson • Geir H. Bolstad • Ian Bradbury • Mathieu Buoro • Gérald Chaput • Guillaume Dauphin • Dennis Ensing • Jaakko Erkinaro • Peder Fiske • Marko Freese • Jonathan Gillson • Stephen Gregory • Nora Hanson • Nick Kelly • Hugo Maxwell • David Meerburg • Michael Millane • Rasmus Nygaard • Maxime Olmos • James Ounsley • Sergey Prusov • Etienne Rivot • Martha Robertson • Ian Russell • Tim Sheehan • Kjell Rong Utne • Alan Walker • Vidar Wennevik

ICES CIEM
International Council for the Exploration of the Sea
Conseil International pour l'Exploration de la Mer

Contents

i Executive summary

WGNAS met to consider questions posed to ICES by the North Atlantic Salmon Conservation Organisation (NASCO) and also generic questions for regional and species Working Groups posed by ICES.

The terms of reference were addressed by reviewing working documents prepared prior to the meeting as well as development of analyses, documents and text during the meeting.

The report is presented in five sections, structured to the terms of reference. Sections include:

1. Introduction;
2. Catches, farming and significant developments, threats and opportunities;
3. The status of stocks in the Northeast Atlantic Commission area;
4. The status of stocks in the North American Commission area;
5. The status of stocks in the West Greenland Commission area.

In summary of the findings of the Working group on North Atlantic Salmon:

- In the North Atlantic, exploitation rates on Atlantic salmon continue to be among the lowest in the time-series.
- Nominal catch in 2018 was 1090 t. This was 73 t below the updated catch for 2017 (1163 t) and 119 t and 283 t less than the previous five and ten year means, respectively.
- The provisional estimate of farmed Atlantic salmon production in the North Atlantic area for 2018 was 1575 kt; production of farmed Atlantic salmon in this area has been over one million tonnes since 2009 and in 2018 provisional worldwide production of 2335 kt is 2000 times the catch of wild Atlantic salmon.
- The Working Group reported on a range of new findings regarding salmon assessment and management: including an update of salmon populations in Germany, smolt marine survival studies in the UK, tracking programmes in the Northwest Atlantic, satellite tagging at Greenland, salmon sampling program in the Nordic Sea, long-term collaborative project focusing on salmon at sea in Norway, methods for estimating bycatch in pelagic fisheries, a single Bayesian life cycle model for the North Atlantic, and modelling the drivers of Atlantic salmon population declines across the Atlantic basin.
- A number of threats were discussed including disease and parasite events in wild salmon in England and Wales (RVS), Norway (salmon fluke and UDN), and Sweden (UDN and RVS); sea lice monitoring in Norway, infectious agents on salmon in the Labrador Sea, and pathogen testing at Greenland.
- The Working Group noted unusually dry river conditions throughout the North Atlantic area in 2018.
- Specific for the NEAC area, exploitation rates on NEAC stocks continue to decline and catches in 2018 were 960 t. This was 60 t below the updated catch for 2017 (1020 t) and 7% and 20% below the previous five-year and ten-year means respectively. Northern NEAC stock complexes, prior to the commencement of distant-water fisheries, were considered to be at full reproductive capacity. The southern NEAC stock complexes however, were considered to be suffering reduced reproductive capacity.
- Specific for the NAC area, the 2018 provisional harvest in Canada was 90 t, which was the lowest in the time-series since 1960. The majority of harvest fisheries on NAC stocks were directed toward small salmon. In recreational fisheries, large salmon could only be retained on 14 rivers in Québec.

- In 2018, 2SW returns to rivers were suffering reduced reproductive capacity in five of the six assessment regions of NAC, ranging from 3% in the USA to 127% in the Gulf.
- The continued low abundance of salmon stocks across North America, 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 abundance of Atlantic salmon.
- In Greenland, a total catch of 39.9 t was reported for 2018 compared to 28.0 t in 2017. North American origin salmon comprised 83.1% of the sampled catch.

Members representing EU Member States replied to the questions by RCG-DSG on data needs for assessment by WGNAS by providing a list of data currently used in the assessment, data of potential use, and data of potential use in future. Regarding data quality the Group takes uncertainty into account in the assessment, but recognises potential challenges associated with the timeliness and completeness of data reporting. The Group reported that no formal process for the selection of monitored rivers currently exists, and recommends that selection of such rivers remains within the competence of individual MS. The data types and sampling frequency of data collection on such rivers were also reported on.

ii Expert group information

Expert group name	Working Group on North Atlantic Salmon (WGNAS)
Expert group cycle	Annual
Year cycle started	2019
Reporting year in cycle	1/1
Chair	Martha Robertson, Canada
Meeting venue and dates	25 March–4 April 2019, Bergen, Norway, 28 participants

1 Introduction

1.1 Main tasks

At its 2018 Statutory Meeting, ICES resolved (C. Res. **2018**/2/ACOM21) that the **Working Group on North Atlantic Salmon** [WGNAS] (chaired by Martha Robertson, Canada) will meet in Bergen, Norway, 26 March–4 April 2019 to address: (a) relevant points in the Generic ToRs for Regional and Species Working Groups for each salmon stock complex; (b) questions regarding data requirements under the EU Data Collection Framework (EU-DCF) and Data Collection-Multi-Annual Programme (EU-DCMAP); and (c) questions posed to ICES by the North Atlantic Salmon Conservation Organisation (NASCO).

The terms of reference were met. The questions posed in the Generic ToRs for Regional and Species Working Groups for each salmon stock complex overlap substantially with the questions posed by NASCO. As such, responses to the former were restricted to a limited subset of the questions; brief responses are provided in Annex 5. Questions regarding data requirements under the EU-DCF and EU-DCMAP are addressed in Annex 10.

The sections of the report which provide the answers to the questions posed by NASCO, are identified below:

Question		Section
	Posed by NASCO	
1	**With respect to Atlantic salmon in the North Atlantic area:**	Section 2
1.1	provide an overview of salmon catches and landings by country, including unreported catches and catch and release, and production of farmed and ranched Atlantic salmon in 2018[1].	2.1, 2.2 and Annex 4
1.2	report on significant new or emerging threats to, or opportunities for, salmon conservation and management[2];	2.3
1.3	provide a compilation of tag releases by country in 2018; and	2.5
1.4	identify relevant data deficiencies, monitoring needs and research requirements.	Annex 8
2	**With respect to Atlantic salmon in the Northeast Atlantic Commission area:**	Section 3
2.1	describe the key events of the 2018 fisheries[3];	3.1
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;	3.2
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;	3.3
3	**With respect to Atlantic salmon in the North American Commission area:**	Section 4
3.1	describe the key events of the 2018 fisheries (including the fishery at St Pierre and Miquelon)[3]	4.1

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;	4.2
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;	4.3
4	**With respect to Atlantic salmon in the West Greenland Commission area:**	Section 5
4.1	describe the key events of the 2018 fisheries[3];	5.1
4.2	describe the status of the stocks[4];	5.3

Notes:

[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] ***With regard to question 1.2, ICES is requested to include reports on any significant advances in understanding of the biology of Atlantic salmon that is pertinent to NASCO, including information on any new research into the migration and distribution of salmon at sea and the potential implications of climate change for salmon management.***

[3] ***In the responses to questions 2.1, 3.1 and 4.1, ICES is asked 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).***

[4] ***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, the Working Group considered 35 Working Documents submitted by participants (Annex 1). Information provided by correspondence by Working Group members unable to attend the meeting is included in the list of working documents. References cited in the Report are provided in Annex 2, a full address list for the meeting participants is provided in Annex 3 and a complete list of acronyms used within this document is provided in Annex 7.

1.2 Participants

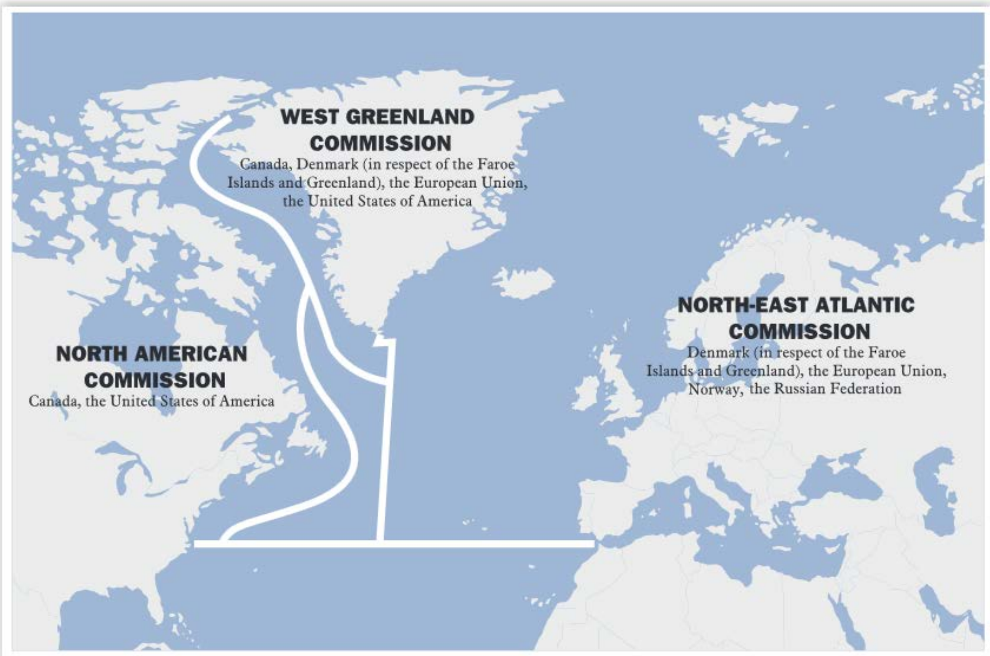
Member	Country
Ahlbeck-Beregndahl, I.	Sweden
April, J.	Canada
Bardarson, H.	Iceland
Bolstad, G.	Norway
Bradbury, I.	Canada (Video link)
Buoro, M.	France
Chaput, G.	Canada
Dauphin, G.	Canada
Ensing, D.	UK (Northern Ireland)
Erkinaro, J.	Finland
Fiske, P.	Norway
Freese, M.	Germany
Gillson, J.	UK (England & Wales)
Gregory, S.	UK (England & Wales)
Hanson, N.	UK (Scotland)
Kelly, N.	Canada
Maxwell, H.	Ireland
Meerburg, D.	Canada
Millane, M.	Ireland
Nygaard, R.	Greenland (Video link)
Olmos, M.	France
Ounsley, J.	UK (Scotland)
Prusov, S.	Russian Federation
Rivot, E.	France
Robertson, M.	Canada
Russell, I.	UK (England & Wales)
Sheehan, T.	United States
Utne, K.	Norway

Member	Country
Walker, A.	UK (England & Wales)
Wennevik, V.	Norway

1.3 Management framework for salmon in the North Atlantic

The advice generated by ICES in response to the Terms of Reference posed by the North Atlantic Salmon Conservation Organisation (NASCO), is pursuant to NASCO's role in international management of salmon. 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. While sovereign states retain their role in the regulation of salmon fisheries for salmon originating in their own rivers, distant water salmon fisheries, such as those at Greenland and Faroes, which take salmon originating in rivers of another Party are regulated by NASCO under the terms of the Convention. NASCO now has six Parties that are signatories to the Convention, including the EU which represents its Member States.

NASCO discharges these responsibilities *via* three Commission areas shown below:



1.4 Management objectives

NASCO has identified the primary management objective of that organisation as:

"To contribute through consultation and cooperation to the conservation, restoration, enhancement and rational management of salmon stocks taking into account the best scientific advice 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 being "to maintain both the productive capacity and diversity of salmon stocks" (NASCO, 1998).

NASCO's Action Plan for Application of the Precautionary Approach (NASCO, 1999) provides interpretation of how this is to be achieved, as follows:

- "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".

1.5 Reference points and application of precaution

Conservation limits (CLs) for North Atlantic salmon stock complexes have been defined as the level of stock (number of spawners) that will achieve long-term average maximum sustainable yield (MSY). In many regions of North America, the CLs are calculated as the number of spawners required to fully seed the wetted area of the river. The definition of conservation in Canada varies by region and in some areas, historically, the values used were equivalent to maximizing / optimizing freshwater production. These are used in Canada as limit reference points and they do not correspond to MSY values. Reference points for Atlantic salmon are currently being reviewed for conformity with the Precautionary Approach policy in Canada. Revised reference points are expected to be developed. In some regions of Europe, pseudo stock–recruitment observations are used to calculate a hockey-stick relationship, with the inflection point defining the CLs. In the remaining regions, the CLs are calculated as the number of spawners that will achieve long-term average MSY, as derived from the adult-to-adult stock and recruitment relationship (Ricker, 1975; ICES, 1993). NASCO has adopted the region specific CLs (NASCO, 1998). These CLs are limit reference points (S_{lim}); having populations fall below these limits should be avoided with high probability.

Atlantic salmon has characteristics of short-lived fish stocks; mature abundance is sensitive to annual recruitment because there are only a few age groups in the adult spawning stock. Incoming recruitment is often the main component of the fishable stock. For such fish stocks, the ICES MSY approach is aimed at achieving a target escapement (MSY $B_{escapement}$, the amount of biomass left to spawn). No catch should be allowed unless this escapement can be achieved. The escapement level should be set so there is a low risk of future recruitment being impaired, similar to the basis for estimating B_{pa} in the precautionary approach. In short-lived stocks, where most of the annual surplus production is from recruitment (not growth), MSY $B_{escapement}$ and B_{pa} might be expected to be similar.

It should be noted that this is equivalent to the ICES precautionary target reference points (S_{pa}). Therefore, stocks are regarded by ICES as being at full reproductive capacity only if they are above the precautionary target reference point. This approach parallels the use of precautionary reference points used for the provision of catch advice for other fish stocks in the ICES area.

Management targets have not yet been defined for all North Atlantic salmon stocks. When these have been defined, they will play an important role in ICES advice.

For the assessment of the status of stocks and advice on management of national components and geographical groupings of the stock complexes in the NEAC area, where there are no specific management objectives:

- ICES requires that the lower bound of the confidence interval of the current estimate of spawners is above the CL for the stock to be considered at full reproductive capacity.
- When the lower bound of the confidence limit 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 be suffering reduced reproductive capacity.

For catch advice on fish exploited at West Greenland (non-maturing 1SW fish from North America and non-maturing 1SW fish from Southern NEAC), ICES has adopted, a risk level of 75% of simultaneous attainment of management objectives (ICES, 2003) as part of an management plan agreed by NASCO. ICES applies the same level of risk aversion for catch advice for homewater fisheries on the North American stock complex.

NASCO has not formally agreed a management plan for the fishery at Faroes. However, the Working Group has developed a risk-based framework for providing catch advice for fish exploited in this fishery (mainly MSW fish from NEAC countries). Catch advice is currently provided at both the stock complex and country level (for NEAC stocks only) and catch options tables provide both individual probabilities and the probability of simultaneous attainment of meeting proposed management objectives for both. 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 will generally be quite low when large numbers of management units are used.

Full details of the assessment approaches used by the Working Group are provided in the Stock Annex, and this includes a general introduction in Section 1. Readers new to this report would be advised to read the Stock Annex in the first instance (See Annex 6).

2 Atlantic salmon in the North Atlantic area

2.1 Catches of North Atlantic salmon

2.1.1 Nominal catches of salmon

The nominal catch of a fishery is defined as the round, fresh weight of fish that are caught and retained. Total nominal catches of salmon reported by country in all fisheries for 1960–2018 are given in Table 2.1.1.1. Catch statistics in the North Atlantic also include fish-farm escapees and, in some Northeast Atlantic countries, ranched fish (see Section 2.2.2). Catch and release has become increasingly commonplace in some countries, but these fish do not appear in the nominal catches (see Section 2.1.2).

Icelandic catches have traditionally been split into two categories, 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 Iceland in 1998, but ranching for rod fisheries in two Icelandic rivers continued into 2018 (Table 2.1.1.1). Catches in Sweden have also now been split between wild and ranched categories over the entire time-series. The latter fish represent adult salmon which have originated from hatchery-reared smolts and which have been released under programmes to mitigate for hydropower development schemes. These fish are also exploited very heavily in homewaters and have no possibility of spawning naturally in the wild. While ranching does occur in some other countries, this is on a much smaller scale. Some of these operations are experimental and at others harvesting does not occur solely at the release site. The ranched component in these countries has therefore been included in the nominal catch.

Figure 2.1.1.1 shows the total reported nominal catch of salmon grouped by the following areas: 'Northern Europe' (Norway, Russia, Finland, Iceland, Sweden and Denmark); 'Southern Europe' (Ireland, UK (Scotland), UK (England & Wales), UK (Northern Ireland), France and Spain); 'North America' (Canada, USA and St Pierre et Miquelon (France)); and 'Greenland and Faroes'.

The provisional total nominal catch for 2018 was 1090 t, 73 t below the updated catch for 2017 (1163 t) and 119 and 283 t below the mean for the last five and ten years, respectively. Catches were below the previous five and ten-year means in the majority of countries and were the lowest in the entire time-series (1960 to 2018). The catch in UK (Scotland) was at a historical low level (19 t), representing a drop by three and fivefold compared with the previous five and ten years means (65 and 107 t), respectively. The reduction in catch in the last three years reflects both the impact of conservation regulations and the increased uptake of catch and release in recent years.

Nominal catches (weight only) in homewater fisheries were split, where available, by sea age or size category (Table 2.1.1.2). The data for 2018 are provisional and, as in Table 2.1.1.1, include both wild and reared salmon and fish-farm escapees in some countries. A more detailed breakdown, providing both numbers and weight for different sea age groups for most countries, is provided in Annex 4. Countries use different methods to partition their catches by sea age class (outlined in the footnotes to Annex 4). The composition of catches in different areas is discussed in more detail in Sections 3, 4, and 5.

ICES recognises that mixed-stock fisheries present particular threats to stock status. These fisheries predominantly operate in coastal areas and NASCO specifically requests that the nominal catches in homewater fisheries be partitioned according to whether the catch is taken in coastal, estuarine or riverine areas. Figure 2.1.1.2 presents these data on a country-by-country basis. It should be noted, however, that the way in which the nominal catch is partitioned among categories varies between countries, particularly for estuarine and coastal fisheries. For example, in some countries these catches are split according to particular gear types and in other countries the split is based on whether fisheries operate inside or outside headlands. While it is generally easier to allocate the freshwater (riverine) component of the catch, it should also be noted that catch and release (C&R) is now in widespread use in many countries (Section 2.1.2) and these fish are excluded from the nominal catch. Noting these caveats, these data are considered to provide the best available indication of catch in these different fishery areas. Figure 2.1.1.2 shows that there is considerable variability of the distribution of the catch among individual countries. There are no coastal fisheries in Iceland, Spain, Denmark, or Finland. Coastal fisheries ceased in Ireland in 2007 and no fishing has occurred in coastal waters of UK (Northern Ireland) since 2012 or in UK (Scotland) since 2015. In most countries in recent years the majority of the catch has been taken in rivers and estuaries. However, in Norway and Russia roughly half of the total catch has been taken in coastal waters in recent years and in UK (England & Wales) around 70-80% of the total catch has been taken in coastal waters in the last three years.

Coastal, estuarine and riverine catch data for the period 2007 to 2018 aggregated by region are presented in Figure 2.1.1.3. In northern Europe, catches in coastal fisheries have been in decline over the period and have reduced from 458 t in 2007 to 359 t in 2018. Freshwater catches have been fluctuating between 763 t (2008) and 461 t (2018) over the same period. At the beginning of the time-series about half the catch was taken in coastal waters and half in rivers, whereas since 2008 the coastal catch represents around 30%–40% of the total. In southern Europe, catches in coastal and estuarine fisheries have declined over the period. While coastal and estuarine fisheries have historically made up the largest component of the catch, coastal fisheries dropped sharply in 2007 (from 306 t in 2006 to 71 t in 2007) and have remained at lower levels. Estuarine fisheries have also generally declined from 72 t in 2007 to 36 t in 2018. The reduction in later years in coastal and estuarine fisheries reflects widespread measures to reduce exploitation in a number of countries. At the beginning of the time-series about half the catch was taken in coastal waters and one third in rivers. From 2007 to 2009 the coastal catch comprised about 20% of the total catch; this increased to around one third of the catch from 2010 to 2016, while the coastal catch in 2017 and 2018 was around one fourth of the total catch.

In North America, the total catch has been fluctuating between 94 and 182 t over the period 2007 to 2018. Two thirds of the total catch in this area has been taken in riverine fisheries; the catch in coastal fisheries has been relatively small in any year with the biggest catch taken in 2013 and 2017 (13 t in both years).

In Greenland, the total catch, which is all coastal, increased steadily from 25 t in 2007 to 56 t in 2015 but decreased to 40 t in 2018.

2.1.2 Catch and release

The practice of catch and release in rod fisheries has become increasingly common. This has occurred in part as a consequence of salmon management measures aimed at conserving stocks while maintaining opportunities for recreational fisheries, but also reflects increasing voluntary release of fish by anglers. In some areas of Canada and USA, mandatory catch and release of large (MSW) salmon has been in place since 1984, and since the beginning of the 1990s it has also been widely used in many European countries.

The nominal catches presented in Section 2.1.1 do not include salmon that have been caught and released. Table 2.1.2.1 presents catch-and-release information from 1991 to 2018 for countries that have records. Catch and release may also be practised in other countries while not being formally recorded or where figures are only recently available. There are large differences in the percentage of the total rod catch that is released: in 2018 this ranged from 19% in Sweden, to 93% in UK (Scotland) reflecting varying management practices and angler attitudes among these countries. There are no restrictions on the numbers of fish that may be caught on a catch-and-release basis in most countries. For all countries, the percentage of fish released has tended to increase over time. There is also evidence from some countries that larger MSW fish are released in larger proportions than smaller fish. Overall, over 166 000 salmon were reported to have been released around the North Atlantic in 2018, 6% below the average for the last five years (177 000).

Summary information on how catch and release levels are incorporated into national assessments was provided to ICES in 2010 (ICES, 2010).

2.1.3 Unreported catches

Unreported catches by year (1987 to 2018) and Commission Area are presented in Table 2.1.3.1 and are presented relative to the total nominal catch in Figure 2.1.3.1. A description of the methods used to derive the unreported catches was provided in ICES (2000) and updated for the NEAC Region in ICES (2002). Detailed reports from different countries were also submitted to NASCO in 2007 in support of a special session on this issue. There have been no estimates of unreported catch for Russia since 2008, for Canada in 2007 and 2008, and for France since 2016. There are also no estimates of unreported catch for Spain and St Pierre & Miquelon (France), where total catches are typically small.

In general, the methods used by each country to derive estimates of unreported catch have remained relatively unchanged and thus comparisons over time may be appropriate (see Stock Annex). However, the estimation procedures vary markedly between countries. For example, some countries include only illegally caught fish in the unreported catch, while other countries include estimates of unreported catch by legal gear as well as illegal catches in their estimates. Over recent years, efforts have been made to reduce the level of unreported catch in a number of countries (e.g. through improved reporting procedures and the introduction of carcass tagging and logbook schemes).

The total unreported catch in NASCO areas in 2018 was estimated to be 314 t. The unreported catch in NEAC in 2018 was estimated at 279 t, and that for West Greenland and NAC at 10 t and 24 t, respectively. The 2018 unreported catch by country is provided in Table 2.1.3.2. It is not possible to partition the unreported catches into coastal, estuarine and riverine areas.

Summary information on how unreported catches are incorporated into national and international assessments was provided to ICES in 2010 (ICES, 2010).

2.2 Farming and sea ranching of Atlantic salmon

2.2.1 Production of farmed Atlantic salmon

The provisional estimate of farmed Atlantic salmon production in the North Atlantic area for 2018 is 1575 kt, which is similar to production for 2017 (1577 kt) and the previous five-year mean (1558 kt). The production of farmed Atlantic salmon in this area has been over one million tonnes since 2009 (Table 2.2.1.1 and Figure 2.2.1.1). Norway and UK (Scotland) continue to produce the majority of the farmed salmon in the North Atlantic (81% and 10% respectively). Farmed salmon production in 2018 was above the previous five-year mean in all countries with the exception of Canada (production in 2018 estimated from 2017 data), Faroes and UK (Scotland) (production in 2018 represents a projected estimate). Data for UK (N. Ireland) since 2001 and data for east coast

USA since 2012 are not reported to ICES, as the data 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 over one million tonnes since 2001 and has been over two million tonnes since 2012. It is difficult to source reliable production figures for all countries outside the North Atlantic area and it has been necessary to use 2017 data from the FAO Fisheries and Aquaculture Department database for some countries in deriving a worldwide estimate for 2018. The total worldwide production in 2018 is provisionally estimated at around 2335 kt (Table 2.2.1.1 and Figure 2.2.1.1), which is similar to 2017 (2335 kt) and higher than the previous five-year mean (2272 kt). Production of farmed Atlantic salmon outside the North Atlantic is estimated to have accounted for one third of the worldwide total in 2018 and is still dominated by Chile (82%). Atlantic salmon are being produced in land-based and closed containment facilities around the world and the figures provided in Table 2.2.1.1 may not include all countries where such production is occurring.

The worldwide production of farmed Atlantic salmon in 2018 was over 2000 times the reported nominal catch of Atlantic salmon in the North Atlantic.

2.2.2 Harvest of ranched Atlantic salmon

Ranching has been defined as the production of salmon through smolt releases with the intent of harvesting the total population that returns to freshwater (harvesting can include fish collected for broodstock) (ICES, 1994). The release of smolts for commercial ranching purposes ceased in Iceland in 1998, but ranching with the specific intention of harvesting by rod fisheries has been practised in two Icelandic rivers since 1990 and these data are now included in the ranched catch (Table 2.1.1.1). A similar approach has been adopted, over the available time-series, for one river in Sweden (River Lagan). These hatchery origin smolts are released under programmes to mitigate for hydropower development schemes with no possibility of spawning naturally in the wild. These have therefore also been designated as ranched fish and are included in Figure 2.2.2.1. In Ireland ranching is currently only carried out in two salmon rivers under limited experimental conditions. A catch of 1011 fish was reported on the Gudenå River in Denmark, where the majority of fish are believed to be of ranched origin.

The total harvest of ranched Atlantic salmon in countries bordering the North Atlantic in 2018 was 40 t (Iceland, Ireland and Sweden; Table 2.2.2.1; Figure 2.2.2.1) with the majority of catch taken in Iceland (33 t). The total harvest was 8% above the mean of the last five years (37 t). No estimate of ranched salmon production was made in UK (N. Ireland) where the proportion of ranched fish was not assessed between 2008 and 2018 due to a lack of microtag returns.

2.3 NASCO has asked ICES to report on significant, new or emerging threats to, or opportunities for, salmon conservation and management

2.3.1 Diseases and parasites

2.3.1.1 Update on Red Vent Syndrome (*Anisakiasis*)

Over recent years, there have been reports from a number of jurisdictions in NEAC and NAC of salmon returning to rivers with swollen and/or bleeding vents (ICES, 2018). The condition, known as red vent syndrome (RVS or *Anisakiasis*), has been noted since 2004, and has been linked to the presence of a nematode worm, *Anisakis simplex* (Beck et al. 2008), which occurs commonly in other marine fish and marine mammals. A number of regions within NEAC observed a notable increase in the incidence of salmon with RVS in 2007 (ICES, 2008). Levels in NEAC were typically lower from 2008 (ICES, 2009; ICES, 2010; ICES, 2011).

Trapping records for rivers in the UK (England & Wales) and France suggested that levels of RVS increased again in 2013, with the observed levels being the highest in the time-series for some of the monitored stocks (ICES, 2014). Monitoring for the presence of RVS has continued on three rivers in UK (England & Wales) (Tyne, Dee and Lune). For all sites, the incidence of RVS was higher in 2018 than the previous year, with levels on the Dee and Lune the highest in their time-series.

There is no clear indication that RVS affects either the survival of the fish in freshwater or their spawning success. Recent results have also demonstrated that affected vents show signs of progressive healing in freshwater (ICES, 2014).

2.3.1.2 Update on sea lice investigations in Norway

The surveillance programme for sea lice infections on wild salmon post-smolts and sea trout at specific localities along the Norwegian coast continued in 2018 (Nilsen *et al*., 2018a). Activities in the field included trawling for salmon post-smolts in fjords and coastal areas, the capture of sea trout/arctic char in nearshore traps and nets, and the use of sentinel cages with smolts placed at various locations. The field examinations were conducted in two periods; an early period covering the migration period of salmon post-smolts, and a period one week later, focused on sea trout infection. As in previous years, the field activities in the surveillance programme were based on predictions from a hydrodynamic model describing the spread and geographic distribution of salmon louse larvae. Field sampling was directed at areas where the model predicted high densities of infective sea louse copepodites in the smolt migration period.

In general, the surveillance programme demonstrated varying infection pressure along the coast during the post-smolt migration period in 2018. There were low levels of sea lice and low infection pressure in southeastern Norway, higher levels in some areas in western Norway with expected negative impacts on wild salmon post-smolts. In mid-Norway, levels of sea lice infection were generally found to be low to moderate. In the three northernmost counties, the results indicated a limited negative effect of sea lice on migrating salmon, although in some areas the effect was moderate.

The sea lice situation on the fish farms did not change significantly compared to 2017, though the level of mature female lice in spring was at the lowest level observed since 2013. Production of lice larvae decreased in some production areas (seven out of 13) and increased in others (six out of 13). The use of chemicals to treat sea louse infections on farmed salmon continues to decrease (a 38% reduction in prescriptions issued compared to 2017), given that fish farmers are switching to alternative methods for the removal of sea lice, such as various thermal and mechanical methods. Resistance to the commonly used chemicals continues to be a serious problem throughout Norway (Hjeltnes *et al*., 2019).

In last year's report, a new management regime for salmonid aquaculture was described and was implemented in 2017 (ICES, 2018). Under this management regime, the level of aquaculture production in 13 defined production areas along the coast will be regulated and adjusted according to the estimated added mortality inferred on wild salmon populations in the production areas arising from sea louse infections. The results from the monitoring program for sea lice in 2018 were evaluated by an expert group and the different production areas were placed in three categories (Nilsen et al. 2018b). The expert group concluded that, based on results from monitoring in 2018, in 8 of the production areas added mortality from sea lice was below 10%, in four areas the added mortality was considered to be between 10% and 30%, while in one area the mortality was considered to be above 30%. The classification of the production zones in 2018 will not result in a reduction in production in zones classified as "red" (>30% added mortality) in 2019. A decision on any reductions in production in "red" zones will be made in late 2019, based on the combined results from monitoring in 2018 and 2019.

2.3.1.3 Update on *Gyrodactylus salaris*

Norway

No new rivers were declared free of the parasite in 2018. In total, *G. salaris* has been recorded in 50 Norwegian salmon rivers since 1975. Of these rivers, 32 have been declared free of the parasite, 11 have been treated against the parasite and are currently awaiting parasite-free declaration if the parasite is not found in the coming years, and seven rivers are still infected (Hytterød *et al.*, 2019). The rivers that are still infected are located in two regions (four rivers in the Driva region, Møre og Romsdal county and three rivers in the Drammen region, Buskerud and Vestfold counties).

Russian Federation

In 2017, the introduction of the parasite *Gyrodactylus salaris* was confirmed in the salmon rivers Pak and Shovna in the basin of the Lower Tuloma Reservoir. The introduction of the parasite was believed to have originated from transfers of rainbow trout to the cage-aquaculture farms in the reservoir. No new information is available for 2018.

2.3.1.4 Other updates on disease issues

Sweden

Disease outbreaks continued to impact the health of returning salmon in Swedish rivers in 2018. The Swedish National Veterinary Institute (SVA) received increased numbers of reports of fish with severe fungal infections. In November, reports of large numbers of weak and dead fish came in from several rivers, all with fungal infections. The causative agent is believed to have been *Saprolegnia* sp. and is likely a secondary infection following injury or exposure to other stressors, although primary infection has not been ruled out. The extremely warm and dry summer in 2018 probably put extra stress on returning salmon. Some cases of red vent syndrome were also identified in 2018, and about 20% of broodstock fish had ulcerative dermal necrosis (UDN) like symptoms and occasional fungal infections. It is unknown if the types or causes of infections on the west coast are the same as those seen on the Baltic Sea coast and the SVA is continuing sampling to find out more.

Russian Federation

ICES (2016) noted that during summer 2015 there was a mass mortality of adult salmon observed in the Kola River, Murmansk region, which was diagnosed as being due to UDN. Salmon parr in the river did not show any sign of disease. In 2016–2017, mortality of spawning fish caused by the same disease was observed again in the Kola River and in the Tuloma River (ICES, 2018), the outlet of which is located 10 km from the Kola River mouth. Both rivers drain into the inner part of the Kola Bay.

In 2018, adult salmon in the Kola and the Tuloma rivers continued to show signs of disease, however there was no large-scale mortality of fish as in previous years. In 2018, parr densities (1+ and older) in both rivers were higher than in 2016 and 2017 but lower than 10-year means. The Murmansk Regional Commissions on Regulation for Harvesting Anadromous Fish did not restrict or close salmon recreational fisheries in the Kola River or in the tributaries of the Tuloma river system for the 2018 season.

2.3.1.5 Presence and Abundance of Infectious Agents on Atlantic salmon in the Labrador Sea

Infectious agents are key components of animal ecology and drivers of host population dynamics. The limited knowledge of the diversity and transmission of bacteria, viruses, and other microparasites hosted by wild animals restricts management capacity and the ability to meet conservation goals. In 2016 and 2017, tissue samples from individual fish were collected by a sampler participating in the International Sampling Program at West Greenland in support of a disease survey program. In 2016, 43 kidney samples were collected and in 2017, 30 gill, spleen, liver, heart, kidney, and pyloric caeca samples were collected. The objectives of this research is to assess the presence and abundance of viral genome sequences and to determine whether there are similarities between North American and European origin fish captured in the Labrador Sea. Tissue processing and data analysis is being conducted by Fisheries and Oceans Canada (DFO) Pacific Biological Station, Nanaimo, BC in collaboration with the Atlantic Salmon Federation.

European and North American stocks were represented in the 2016 (European = 33, North American = ten) and 2017 (European = four, North American = 26) samples based on genetic analysis. Tissue samples were genotyped using genome-wide single nucleotide polymorphisms. The samples were processed using the Fluidigm Biomark HT-qPCR platform and assay panel to quantify the presence and relative loads of 47 agents. Agent profiles did not differ significantly between years within continental stock groupings ($p>0.05$ for both stock groups).

Nine agents were detected overall, including one species of bacteria, three viruses, and five microparasites, commonly occurring within hosts. There was greater richness among the North American origin stock group (nine agents; mean 1.6 agents per individual) than European origin fish (five agents; mean 0.9 agents per individual).

The primary differences between the agent profiles of North American and European origin groups in the marine environment was alternate contributions and greater richness of agents in North American fish. Individual agent loads were relatively similar between continent origin groups in the marine environment. These data will be compiled with results collected from adult returns from a number of Eastern Canadian rivers, analysed further and submitted for publication in the near future.

2.3.1.6 Atlantic salmon viral pathogen testing (VHSV, PRV-1, PRV-3, PMCV) at Greenland in 2017

Understanding the ecology and epidemiology of viral pathogens has practical and crucial consequences in assessing health of fish stocks and may shed light on the interactions between wild and farmed fish. In 2017, heart and spleen tissue from 30 individual fish were collected by a sampler participating in the International Sampling Program at West Greenland. The samples were in support of a disease survey program conducted by researchers at Technical University of Denmark (Copenhagen, Denmark). The objective of the program was to investigate the presence of four viral pathogens in Atlantic salmon across the Northeast Atlantic. The four pathogens were as follows:

- Viral Haemorragic Septicaemia virus (VHSV; OIE, 2017);
- Piscine orthoreovirus genotype 1 (PRV-1; Wessel *et al.*, 2017) ;
- Piscine orthoreovirus subtype 3 (PRV-3; Olsen *et al.*, 2015) ;
- Piscine myocarditis virus (PMCV; Garseth *et al.*, 2018).

The four pathogens are considered ubiquitous and are known to cause disease outbreaks in farmed fish. There are no aquaculture facilities in Greenland and therefore these samples were collected to provide an estimate of pathogen prevalence from areas where the possibility of virus exchange between farmed and wild fish by contact through farms or escapees is considered to be minimal.

Post RNA extraction, samples were tested for the presence of VHSV, PRV-1, PRV-3, and PMCV. All samples tested negative, providing preliminary information on the status of these viruses of salmon at Greenland. Samples from rivers and coastal areas were also collected from Atlantic salmon and sea trout from Denmark, Sweden, Ireland, Faroe Islands, France and Belgium and were combined with sample results from Greenland. Results from the survey describing the PRV-1 results have recently been accepted for publication in the Journal of Fish Diseases (Vendramin *et al*., accepted).

2.3.2 Unusually dry conditions in 2018

Changes in climate are global, and the increased natural mortality of salmon at sea in recent years is likely linked to climate change (Chaput, 2012; ICES, 2017b). The higher temperatures predicted as a result of climate change are also predicted to affect all components of the global freshwater system and the most likely scenarios are for higher temperatures, wetter winters, drier summers and more extreme events of flooding and drought (IPCC, 2007; 2014; ICES, 2017b). The Working Group has previously reported on the very poor recruitment of juvenile salmon in many rivers in UK (England and Wales) in 2016, with a combination of unusually warm winter temperatures and extreme flows adversely affecting spawning success and potential implications for numbers of returning adults in future years (ICES, 2017a).

In 2018, a number of jurisdictions around the North Atlantic reported exceptionally dry and warm conditions over the summer period, resulting in particularly low flows and above average temperatures. River flow is a key factor affecting river entry and upstream migration of returning salmon, with consequent effects on angler effort and catches, and will likely have contributed to the relatively low catches reported in many jurisdictions. In addition, high temperatures can affect the survival of salmon subject to catch and release and may result in management interventions that reduce effort.

Unusually hot and dry conditions were experienced on both sides of the North Atlantic, and the following summary provides some examples from the different jurisdictions:

- The Newfoundland region of Canada experienced an increase in the frequency of river closures due to high temperatures and/or low water levels in the past two years. During the 2018 angling season, 83% of scheduled salmon rivers in Newfoundland were closed for part of the season due to extreme environmental conditions with 30.9% of potential angling days lost, the highest since 1987 (36.9%).
- In the Gulf region of Canada, there were a number of warm-water temperature and low flow events in 2018 that affected fisheries access to Atlantic salmon in several rivers. In the Miramichi and Margaree Rivers, different sections of the river were closed for 47 and 18 days, respectively.
- In UK (England and Wales), many rivers experienced flows that were less than 50% of the long-term average in the period May to August, representing a significant part of the rod fishing season. Above average water temperatures were also recorded in many river catchments leading to some restrictions on fishing. For example, on one river, a temperature threshold applied (19°C measured at a lower river fish counter site at 09:00), whereby anglers voluntarily ceased fishing. This threshold was exceeded on 44 days during the fishing season, and anglers were only able to fish on four days during the period

26 June to 10 August. Similar voluntary fishing restrictions applied on some other catchments.

- In UK (Scotland), rivers experienced a prolonged period of extremely low flows throughout 2018. Such low flows are known to present difficult conditions for anglers catching fish, and salmon have been shown to delay their entry into rivers until flows increase, which can be towards the end of the fishing season. Both the size of the catch in 2018 (historical low) and the allocation of catch among fishing methods may have been influenced by these environmental conditions.
- In 2018, UK (Northern Ireland) experienced a prolonged warm and dry period during the summer months. This resulted in very low flows, especially in the smaller coastal streams, into the autumn months, restricting the accessibility of these rivers to returning adults. For example, water levels on the River Bush were so low that fish were unable to enter the river at the river outflow on Runkerry Strand and were forced to remain in Runkerry Bay until conditions improved. Predation on these fish by marine cetaceans was observed on several occasions, and it is thought that this contributed to the small number of ascending adults reported from the River Bush adult trap.
- Ireland experienced an extended period of above average temperatures and exceptionally low rainfall in summer 2018. During this period, Inland Fisheries Ireland (IFI) requested that anglers suspend catch and release fishing to prevent undue stress in the recovery of released fish. In addition, long periods of very low water levels are likely to have hindered the migration of returning adult salmon into certain river systems. In the Erriff, a temporary modification to the fish pass had to be constructed to facilitate the successful transit of salmon from the estuary into the river. Furthermore, uncharacteristically large late runs of fish were observed in two drought-impacted rivers (the River Boyne in the east of Ireland and to a lesser extent the River Owenmore in the northwest of Ireland).
- In Norway, the second half of June and the whole of July were unusually hot and dry in large areas of the country. This led to low catches and late migration into rivers, especially in smaller rivers. In-river exploitation was therefore reduced in many of the smaller rivers in the country. The delayed migration into rivers probably led to higher nominal catches in the marine environment than in rivers for the first time since 2004.
- Water temperature was recorded daily in the River Säveån on the Swedish west coast from July 5th to November 14th, 2018. The water temperature was on average 3°C higher during this period compared to the average of 1999–2018, with water temperatures above 20°C for 36 days in a row. The high water temperature was accompanied by extremely low flows in all salmon rivers on the west coast. For example, the index River Högvadsån had flows of 0.28–0.76 m^3/s during June–August 2018, compared to average flows of 4.6–6.0 m^3/s during 1999–2018.
- France experienced a very wet winter with above average precipitation rates in 2018. Flood events occurred in many rivers, which could have affected the reproductive success of adults and juvenile mortality rates. In contrast to winter, the spring and summer periods were very dry, with August being the 4th hottest on record. Low flows affected the upstream migration of returning adults and the efficiency of the fish counters. Water temperature was particularly high during the upstream migration period on the Rhine river (above 20°C in May).

2.3.3 Update on the Atlantic salmon stock situation in Germany

While German salmon populations were once plentiful and significant contributors to European salmon stocks (especially in the large rivers Rhine and Elbe), the species disappeared throughout the entire country. Extirpation of the species began after the onset of the industrial revolution over a century ago, affecting stocks nationwide that continued to decline until around the 1950s, when all remaining populations were lost (Monnerjahn, 2011; Wolter, 2015).

Factors impacting the stocks are thought to be river degradation, habitat destruction, pollution and overexploitation (Monnerjahn, 2011; Wolter, 2015; Andreska and Hanel, 2015). Today, Atlantic salmon is a priority species in Annex II and V of the Habitat Directive, is listed as "vulnerable" in the IUCN Red List for Europe and as "extremely rare" in the German Red List. It took until the late 1970s when initiatives started the first reintroduction programs (at that time mostly uncoordinated) in specific parts of main German rivers and their tributaries. Monnerjahn (2011) published an overview of the status and efforts taken in those four river systems (River Ems, Rhine, Weser and Elbe) that are listed in WGERAAS (ICES, 2015a; Figure 2.3.3.1).

The overarching management objective for Atlantic salmon in Germany is the re-establishment of self-sustaining stocks in the above-mentioned catchment areas. In order to achieve this goal, key management objectives are the improvement of river connectivity, the quantitative and qualitative improvement of spawning and nursery habitats and a coordinated, scientifically based salmon broodstock management. Since the beginning of the reintroduction efforts in German rivers, stocking material from several countries (Denmark, France, Ireland, Spain, Sweden, UK (Scotland)) have been used to restore local salmon populations (Monnerjahn, 2011; Schneider, 2011). At present, stocked fish are almost exclusively introduced from Denmark, southwest Sweden and France and are supplemented with offspring from artificial reproduction of returnees (where possible) as well as selected strains with habitat-specific traits or similarities in order to ideally match the specific demands of the recipient stocking habitat.

Reintroduction programs in German river systems are currently driven by stakeholders in both the public and private sector, and include international commissions, river management cooperatives, pan-regional and local angling associations. In Germany, inland fisheries are regulated and legislated regionally, putting salmon management including protection and catch control into the responsibility of each of its respective 16 federal states. As a result, legislation such as that regulating harvest, closed seasons or minimum landing sizes may differ among states, even within the same river system. Recreational harvest of salmon in two federal states (Lower Saxony and Saxony) is legal under restricted conditions, whereas targeted commercial fisheries for salmon do not exist in Germany. However, illegal fisheries and/or accidental bycatch of salmon by stow or fykenet fisheries as well as by recreational fishers may exist and potentially hinder the success of recovery programmes.

Although many recovery projects have been running for over 20 years, German salmon populations are still heavily dependent on artificial sustaining measures. There are a number of reasons for this, but the main drivers are probably–aside from the high level of degradation of German watercourses–high predation rates (cormorant, piscivorous fish), poaching and especially barriers on the lower River Rhine. Identifying potential habitats and risks to their reproductive capacity is a main emphasis of Atlantic salmon restoration efforts in Germany. The implementation of the EU Water Framework Directive remains the most important tool for restoring degraded and lost habitat as well as for improving river connectivity and habitat accessibility. Today, more salmon habitats are being restored than destroyed. However, only a fraction of the vast salmon habitats that once existed in German rivers are still available.

Today, Atlantic salmon is an integral part of the fauna in the Rivers Rhine and Elbe and their tributaries, again. Nevertheless, many challenges need to be overcome to achieve the goal of self-sustaining salmon stocks in these two river systems. Unfortunately, in the Weser and Ems rivers, the conditions for the salmon reintroduction are still unfavourable. In the main stem of the middle course of the river Weser the free passage for migratory fish is strongly affected and the lower reaches of the river Ems River are heavily modified due to an economically important shipyard. An improvement of this situation cannot be expected in the short or medium term.

2.3.4 Atlantic salmon return rate increases with smolt length

Recent declines in Atlantic salmon stocks have tended to be attributed to extrinsic factors thought to affect survival at sea (e.g. Beaugrand and Reid, 2012). However, there is increasing evidence that effects carried over from their freshwater phase are also important determinants of Atlantic salmon marine return rates (Russell *et al*., 2012). A potentially rewarding strategy to improve management of Atlantic salmon populations might be to promote the quality of emigrating smolts to maximize their marine survival. However, the relationships between smolt characteristics and their marine survival are not clear. Gregory *et al.* (2019) developed a multi-state Capture Mark Recapture (CMR) state–space model to test the effect of smolt length on their subsequent marine return rate, while considering (1) the time individuals spend at sea (here one or more winters), which is thought to be related to marine mortality rates; (2) variation in marine return rate due to other (explanatory) variables, such as years; (3) imperfect detection of returning adults due to inefficiency in monitoring devices; and (4) data loss due to failure of monitoring devices.

This model was applied to data collected on the River Frome (Dorset, UK) because the quantity and quality of the data were suitable to test the hypothesis. Individual Atlantic salmon smolts emigrating from and returning to the River Frome have been monitored using passive integrated transponder (PIT) telemetry since 2006. Each autumn (late-August to mid-September), approximately 10 000 individual parr (juvenile, freshwater life-stage of salmon) were captured, marked with a PIT tag under anaesthesia, and returned to the river at their site of capture. In the following spring (late-March to mid-May), >95% of River Frome parr smoltify and migrate to sea (Ibbotson *et al*., 2013). A proportion of these smolts are sampled on their sea-ward migration using a rotary screw trap (RST), and then measured (fork length, nearest mm) and weighed (g). All captured smolts were returned to the river 50 m downstream of the RST within one hour of their capture. Returning adult salmon are detected on two PIT antenna arrays installed 8 km and 11.5 km upstream of the tidal limit, the second of which was not operational for the first five years of monitoring. Only PIT-tagged age 1 smolts were considered. The final sample size analysed was 3688. Only 86 of the 3688 (2.33%) smolts were detected returning as 1 sea-winter (1SW) or multi sea-winter (MSW) adults. The number of PIT-tagged smolts trapped leaving the Frome varied annually between 224 and 628, as did the percent of those observed returning that varied between 0 and 5%.

The CMR model was built in a Bayesian state–space modelling (SSM) framework that distinguishes the unknown latent process (return rates affected by smolt length and annual variations) from the observation process (imperfect detection of returning adults). The model assumed: (1) that smolt length affects the survival during the first year at sea, but the survival during the second year at sea is constant, i.e. 1SW return rate is estimated as a function of smolt length and annual variations, and MSW return rate is equal to the 1SW return rate penalized by a term that is constant between years and individuals, and (2) the effect of smolt length on their 1SW return rate was constant between years and individuals ; (3) the efficiencies of the adult detection devices were considered constant in time.

Three models were fitted and compared: (1) a “Null” model with no annual deviations or length effect, (2) a “Year” model with annual deviations but no length effect, and (3) a “Length” model with both annual deviations and a length effect. In the “Length” model, the survival of a smolt after its first year at sea was modelled on the logit scale as a linear function of its length. The return rate of a smolt as a MSW fish was calculated directly by adding an additional mortality term to account for one (or more) additional years spent at sea. The probability of an individual smolt moving between states (smolt to 1SW, MSW or dead) was given by a state transition matrix. Similarly, the probability of detecting an individual that returned to the river (detected as a 1SW, MSW or not detected) was given by an observation transition matrix. The likelihood was then the integration of the capture history of the individual smolt over all the possible states and observations. Parameter values were estimated by Monte Carlo Markov Chain (MCMC) using the JAGS sampler (http://mcmc-jags.sourceforge.net/). MCMC chains run for 150 000 iterations on three chains, with 50 000 discarded after burn in, and parameter values saved from every 100th iteration.

The "Length" model was preferred over the "Year" model that omitted the length effect, and both were preferred over the "Null" model that omitted both the length effect and the annual deviations. All chains mixed well, all Gelman-Rubin *R* statistics were <1.05, and the posterior densities were unimodal and different from the priors. The difference in Leave-One-Out (LOO) Information Criteria between the top-ranked and next best model was δlooic = 7.42, which is considered a large difference by other (more conventional) Information Criterion, e.g. Akaike Information Criteria. The estimated length effect was positive, and its 95% credible intervals did not intercept zero. Over all the years analysed, the effect of smolt length was to increase their subsequent 1SW return rate from approximately 0.95% (25–75% quantiles: 0.95–0.96) for a 120 mm smolt to ≈ 3.42% (25–75% quantiles: 2.56–4.54) for a 160 mm smolt (Figure 2.3.4.1), 120–160 mm being the normal range of observed smolt lengths on the River Frome.

Using individual smolt data collected on the River Frome for an 11-year period and Bayesian model selection, the study provides evidence of an effect of Atlantic salmon smolt length on their marine return rate as 1SW. This effect was substantial within the normal range of River Frome smolt sizes (length quantiles: 2.5% = 118 mm, 97.5% = 161 mm), increasing the probability of 1SW return rate by a factor of three from <1% to 3.5% for a 12 cm to a 16 cm smolt, respectively. The fact that few studies have had access to such individual data on smolt emigration and adult returns in conjunction with well-adapted statistical methods, might explain why previous findings have been mixed; results ranging from a positive effect of smolt size on marine return rate through to negative or no effects (Gregory *et al.*, 2018).

The model estimated other parameters of interest. MSW return rate was estimated to be approximately half the estimate of mean 1SW marine return rate, and the 95% Bayesian credible intervals of the additional MSW mortality parameter estimate did not include zero. This suggests that there is a real and non-negligible mortality associated with spending multiple winters at sea, and notably higher than 1SW mortality. Our parameterisation of MSW return rate was, however, a strong simplification, and it would be an exciting perspective to explore these strong assumptions if more data became available. It is important to also remain cognisant that return rates might not measure actual survival (or mortality) rates because of the confusion between the mortality and the maturation schedule (probability to mature as a 1SW fish or later). With sufficient data, an exciting research avenue might be to reparameterise the model to separate out the between-individual and temporal variations on their survival and maturation schedule.

Many other factors might explain a non-negligible amount of the overall or unexplained variation in marine return rates besides smolt length, including migration timing and marine conditions. It would be elementary to extend this model to explore the role of these factors in post-smolt survival. Although this study was limited to smolt length as an explanatory variable of 1SW marine return rate, the model was developed to be extensible and general and it would be straightforward to incorporate additional explanatory variables, different parameter definitions, and data from other locations.

In conclusion, the study presents credible evidence of an effect of Atlantic salmon smolt length on their subsequent 1SW marine return rate. These findings therefore add support to the growing, yet still equivocal evidence that 'bigger is better' among salmon smolts (Gregory *et al.*, 2018). The precise mechanism of this effect deserves further study but could include differences in predator avoidance due to size or swimming ability or different migration routes. Moreover, this model provides an extensible and flexible approach to exploring the generality of this pattern, across rivers and datasets. These findings suggest that factors affecting salmon in their freshwater phase has a significant influence on their later life stages, including those at sea, and thus affects their fitness (Russell *et al.*, 2012). Since it is easier to affect management actions in the freshwater relative to the marine environment, in-river conditions, such as habitat cover and food availability, could be managed to nurture larger and better condition salmon smolts.

2.3.5 Tracking Studies in the Northwest Atlantic

2.3.5.1 Update of select acoustic tagging studies in Canada

There is continued interest in the development of techniques to help investigate salmon survival at sea and to better partition survival between different periods of the marine phase of the life cycle. To this end, NASCO's International Atlantic Salmon Research Board (IASRB) adopted a resolution in 2014 to further support the development of telemetry programmes in the ocean.

Results of ongoing projects led by the Atlantic Salmon Federation (ASF) in collaboration with the Ocean Tracking Network (OTN), Miramichi Salmon Association (MSA), Restigouche River Watershed Management Committee, Department of Fisheries and Oceans (DFO) and others, to assess estuarine and marine survival of tagged Atlantic salmon released in rivers of the Gulf of St Lawrence (GoSL), Canada were presented to the Working Group. More than 3900 smolts from four rivers (Cascapedia, Restigouche, southwest and northwest branches of the Miramichi) were tagged with acoustic transmitters and released over a period of sixteen years, 2003 to 2018. In addition, other research projects were releasing acoustically tagged smolts in 2017 (Vieux Fort and Jacques Cartier rivers) and 2018 into the Gulf of St Lawrence from North Lake River in PEI and Western Arm Brook in NW Newfoundland and Vieux Fort and Jacques Cartier, Québec. Acoustic arrays to detect tagged fish were positioned at the head of tide of each river, at the exit from the bays to the GoSL and at the Strait of Belle Isle (SoBI) leading to the Labrador Sea, more than 800 km from the point of the furthest release.

Over time, there were declines in apparent survival for salmon smolts from Miramichi Bay in contrast to no declines in salmon smolts from Chaleur Bay (Figure 2.3.5.1.1). For the NW Miramichi, the probability of surviving from the HoT array to the Outer Bay array has decreased to about 10–20% in the last two years (Figure 2.3.5.1.1, lower panel). The differences in apparent survival rates in two neighbouring coastal areas over two time periods and the modelled spatial and temporal differences spatially have been hypothesized to be in part related to differences in predation pressures on migrating smolts from striped bass present in the Miramichi Bay during the smolt migration period but not in the Chaleur Bay (Daniels *et al.*, 2018). Once the smolts leave the coastal bays, inferred apparent survival rates through the Gulf of St Lawrence were generally in the range of 0.4 to 0.7 with survival rates exceeding 0.999 per km and 0.96 to 0.99 per day for all rivers and years (Chaput *et al.*, 2018).

The SoBI (between Labrador and Newfoundland) appears to be the primary route for smolts and kelts exiting the GoSL. The only other possible exit is through the Cabot Strait, and this array has been in place since 2012. Only two smolt tags were detected on the Cabot array (originating in Miramichi in 2012 and Cascapedia in 2013) although adult salmon, tagged as kelts in the preceding year, have crossed this array. In 2018, kelts from Miramichi, Restigouche and Cascapedia rivers as well as Western Arm Brook crossed the SoBI array during a four-week period at end of June through late July, whereas smolts from many different stocks crossed this line together between July 12–25, with earlier crossing by smolts from the nearby Western Arm Brook (Figure 2.3.5.1.2).

In 2017, an array of 20 receivers (approximately 16 km) was placed in the ocean perpendicular to the shore near the community of Port Hope Simpson (PHS) in southern Labrador. Data were downloaded from these receivers in August 2018, at the same time as an additional 20 receivers were deployed, extending the PHS line to 32 km. Up until August 2018, there were a total of 44 acoustic tags detected, so far determined to be 30 Atlantic salmon, six striped bass and three cod (Figure 2.3.5.1.3). The striped bass were detected closer to shore than the Atlantic salmon. Origins of the Atlantic salmon have been determined as three kelt from Lake Melville Labrador, originating from north of the PHS line. There were detections of tagged fish originating south of the PHS line including from Newfoundland (one kelt from Campbellton River and two from Western Arm Brook), from Québec (one smolt from Vieux Fort River, two kelt from Sainte Marguerite River, two smolt from Jacques Cartier River, and four smolt and two kelt from Cascapedia River), from New Brunswick (five kelt from Restigouche River, and two smolt and two kelt from Miramichi River), and from the USA (one smolt from Narraguagus River, and three smolt from Penobscot River).

2.3.5.2 Update on Pop-off Satellite Tagging Atlantic Salmon at Greenland

A new five-year collaborative study was initiated in 2018 by the Atlantic Salmon Federation (Canada), NOAA Fisheries Service (USA), Fisheries and Oceans Canada, and Association of Fishers and Hunters (Greenland) to track salmon fitted with pop off satellite tags (PSATs) from Greenland to coastal regions of origin. Funding for the project is provided by project partners, Equinor (an international private company invested in oil and gas exploration) and Canada's Atlantic Salmon Research Joint Venture.

The objectives of this study are to:

- Map the marine distribution and migration patterns for maiden Atlantic salmon tagged in coastal waters off the west coast of Greenland.
- Examine the oceanographic (physical and biological) features occurring in the salmon's distribution and migratory routes and assess how they could be linked to survival and growth.

Atlantic salmon were captured, primarily via trolling, and tagged with PSATs (Microwave Telemetry Inc. (Colombia, Maryland) X-tags) at West Greenland near Qaqortoq in October 2018. The study area covers a large portion of the marine range of Atlantic salmon in the North Atlantic as salmon originating in both North America and Europe are expected to be tagged. Genetic assignments were conducted for all fish tagged to determine region of origin (Jeffery *et al.*, 2018, Figure 4.1.5.2). PSAT tags were programed to detach and begin transiting collected data approximately five months post-release or on May 1, 2019. PSAT tags can also be detached and transmit earlier due to a number of different pre-programmed release mechanisms such as remaining at a constant depth for a set period of time or reaching a pre-program maximum depth limit.

A total of 17 Atlantic salmon were captured in early October; 12 were tagged and released with PSATs, two with acoustic tags and three were not tagged but only sampled (due to damage incurred during capture). Trolling was the primary method for salmon capture (n=14), but fish were also captured via drift gillnets (n=3). Of the three sampled fish, one was captured via trolling and two via gillnets. The gillnet fish were captured by a fisher and sampled opportunistically. Trolling was conducted over 12.5 days (~94 hours) and resulted in ~0.15 salmon per hour. An additional 12 salmon were hooked but not landed.

The 12 PSAT tagged salmon averaged 65.8 cm fork length and 3.7 kg whole weight (Table 2.3.5.2.1). Six individuals were identified as North American origin and six were identified as European origin (Figure 4.1.5.2). For the North American origin salmon, one was identified as originating in the USA reporting group, four from the Gaspe Peninsula reporting group, and one from the Ungava Bay reporting group. All six European origin salmon were identified as originating in the United Kingdom/Ireland reporting group.

As of mid-March 2019, 8 tags have popped off and transmitted (Table 2.3.5.2.1; Figure 2.3.5.2.1). A total of three tags popped-off in October 2018, three in December 2018, one in February 2019, and one in March 2019. All tags released due to the constant depth release mechanisms, except for the March 2019 release, which was due to pre-programmed release mechanism. The March 2019 release was identified as a USA origin individual. A total of four tags have not popped off yet. One (Ungava Bay reporting group) is assumed 'lost' as its timed released date was early March 2019, but three (two Gaspé Peninsula and one United Kingdom/Ireland reporting group) are assumed active as their timed released date is May 2019.

Two fish were tagged with acoustic tags. No information is expected from the acoustic tagged fish until the acoustic receivers deployed around the east coast of North America are retrieved and downloaded. Both acoustic tagged fish have been identified as North American in origin (one each from the Labrador South and Gaspe Peninsula reporting groups).

The three fish that were captured and only sampled were both North American and European in origin. There was a single fish from three different reporting groups (Labrador South, Gaspe Peninsula and United Kingdom/Ireland).

Much time was spent ground-truthing methodologies in 2018 and solidifying contacts in the region. The message received from numerous local fishers was that salmon fishing in the Qaqortoq region was poor in 2018. This anecdotal claim was supported by seemingly relatively small number of salmon observed for sale at the market, the low amount of fishing effort observed during our sampling, and the relatively low catch rates compared to 2017. During reconnaissance in 2017, the catch rate was ~1.43 salmon per hour compared to ~0.15 salmon per hour in 2018. Poor catch rates in Qaqortoq may have been a local phenomenon, as harvest in other regions of Greenland did not appear to suffer in 2018 as anecdotally observed from the international West Greenland sampling programme.

In 2019, modifications will be implemented with the objective of tagging 50 salmon with PSATs. The primary effort will remain trolling as this method is cost-effective and results in the least harm/injury to salmon compared to other capture methods. The sampling period will be extended from early September to late October and taggers will be scheduled to minimize overlap and maximize days fished. We will also develop backup plans (obtain local contact and fishing vessels, provide trolling gear, etc.) in other regions of Greenland if catch rates in Qaqortoq remain low.

The Working Group encourages the continuation and expansion of tracking programmes as information from such programmes is expected to be useful in the assessment of marine survival and distribution of North Atlantic salmon stocks. The Working Group also notes that these techniques have been proposed, and are being implemented in other areas, both in the Northwest and the Northeast Atlantic (e.g. SALSEA Track), in line with the NASCO IASRB resolution.

2.3.6 New opportunities for sampling salmon at sea

2.3.6.1 The International Ecosystem Summer Survey of the Nordic Seas (IESSNS) and other surveys

The IESSNS is a collaborative program involving research vessels from Iceland, the Faroes, Greenland and Norway. Surveys are carried out annually in July–August and present an opportunity for improving knowledge of many marine fish species including salmon at sea. The area surveyed (2.8 million km^2 in 2018) overlaps in time and space with the known distribution of post-smolts in the North Atlantic, and as these cruises target pelagic species such as herring and mackerel with surface trawling at predetermined locations, bycatch of salmon post-smolts and adult salmon is not uncommon. In 2018 a total of 80 post-smolt and adult salmon were caught by the participating vessels in different regions of the North Atlantic (Figure 2.3.6.1.1). This post-smolt distribution is similar to previous marine surveys for salmon at-sea (Anon, 2012) and simulated distributions based on larger sample size from directed surveys (Mork *et al.*, 2012), but with a tendency of a more western geographic distribution.

The Working Group has been liaising with the coordinator of the IESSNS surveys to clarify sampling protocols and a number of samples have been collected and frozen for subsequent analysis. The Institute of Marine Research (Bergen, Norway) is developing a plan to collate all the information from the analysis of the samples of individual salmon caught in earlier years, as well as those from last year's cruises. In addition to the IESSNS, there is also occasional bycatch of salmon during other pelagic research surveys. As these other surveys do not perform surface trawling, the number of salmon caught is low. However, some salmon are occasionally caught in the North Sea, the Barents Sea and during spring in the Norwegian Sea.

The samples are expected to provide valuable information on the distribution of salmon at sea, the size, sex and diet of individual fish, and will also enable stock origin to be investigated using genetic techniques. The IESSNS survey data will also provide information on salmon distribution in relation to other pelagic species, hydrography and plankton abundance.

2.3.6.2 Project "SeaSalar"

A new research project focusing on salmon at sea was initiated in Norway in 2018 (https://www.seasalar.no). The main aim of the project is to examine factors impacting variation in marine survival and growth of Atlantic salmon in the North Atlantic over time and in different geographical areas. The project also aims to establish a long-term inter-institutional collaboration for present and future projects. An important part of the project is to utilize existing datasets and activities, including salmon collected at sea, genetic material, archival scale samples, survival data, population size data and dataseries on other marine species and oceanic ecosystems. The project will also apply new genetic, stable isotope and fatty acid analyses and electronic tagging technologies as well as modelling to provide novel results. The project, which is funded by the Research Council of Norway, started 1 August 2018 and will last four years.

2.3.6.3 New approaches to estimating bycatch in pelagic fisheries

A new approach for studying bycatch of salmon in fisheries is to utilize automatic detections of salmon PIT (Passive Integrated Tags) tags when screening landings of pelagic fish. In 2015, the Working Group received information from the Institute of Marine Research (IMR; Bergen, Norway), related to a new tagging initiative and wide-scale tag screening programme for mackerel and Norwegian Spring-spawning herring in the Northeast Atlantic, with approximately 50 000 mackerel and 30 000 herring being tagged annually (ICES, WGWIDE 2015b). Screening of commercial landings currently takes place at 23 European (UK, Iceland, Norway, Denmark, Faroes) factories processing pelagic fish for human consumption. Any tagged salmon in the catches are expected to be detected during automatic screening of pelagic fish landings. The use of PIT tags for salmon is increasing rapidly, and in 2018 more than 120 000 salmon were released with such tags. Lists of unknown tags detected at factories have in previous years been distributed to countries with PIT-tagging programs, and salmon post-smolts in catches have been identified. This list includes 339 unknown tags as of September 2018. An updated list will be distributed to the National Tagging coordinators and to the members of the Working Group.

2.3.7 Embedding Atlantic salmon stock assessment within an integrated Bayesian life cycle modelling framework

The Working Group previously reviewed developments in modelling and forecasting the abundance of Atlantic salmon using the Bayesian life cycle model (ICES, 2015b; 2016; 2017a; 2018). The life cycle model improves on the stock assessment approach currently used by ICES to estimate abundance of post-smolts at sea before any fisheries (Pre Fishery Abundance; PFA), and to forecast the influence of catch options at sea on the returns in the different jurisdictions in Europe and North America (ICES, 2018). It also provides a framework to improve understanding of the drivers and mechanisms of changes in Atlantic salmon population dynamics and productivity in the North Atlantic.

2.3.7.1 Progress in stock assessment models

The previous version of the life cycle model reviewed in 2017 was applied to six stock units in NAC and seven stock units in Southern NEAC, where the populations of all stock units follow the same life-history processes but with stock-specific parameters and data inputs. Stock units of Northern NEAC were not included because of differences in the available time-series, which only cover the period after 1983.

In 2018, the Working Group reviewed an extension of the life cycle model to eleven stock units in Northern NEAC. The model has been applied to time-series of data that extend from 1971 to 2014. The oldest part of the time-series (1971–1982) had been previously excluded for the Norwegian stock units because of high uncertainty of the data. These historical data were now considered by increasing uncertainty around return estimates to account for the higher uncertainty for the historical part of the time-series.

In 2019, the Working Group reviewed a model that incorporated the dynamics of all stock units in NAC, Southern NEAC and Northern NEAC in a single hierarchical model (Figure 2.3.7.1.1). The model provides the opportunity for modelling covariation in the dynamics of the different populations that share migration routes and feeding areas at sea, and which are harvested in mixed-stock fisheries, particularly at West Greenland for NAC and NEAC and at Faroes for NEAC. The model provides estimates of trends in marine productivity (expressed as post-smolt survival rate to 1 January of the first winter at sea) and the proportion maturing as one-sea-winter salmon for all stock units in Northern and Southern NEAC, and NAC (Figure 2.3.7.1.2).

Additionally, a single model is now used to forecast the population dynamics of all stock units simultaneously, which is of particular interest when assessing catch options for mixed-stock fisheries operating on a mixture of stocks from both NAC, Northern and Southern NEAC (West Greenland) or both Northern and Southern NEAC (Faroes). The model also provides a major improvement to the assessment and forecast models of Atlantic salmon currently used by ICES, by providing catch options for the combined West Greenland and Faroes salmon fisheries (Figure 2.3.7.1.3).

2.3.7.2 Investigating the drivers of Atlantic salmon population declines across the Atlantic basin

Based on the life cycle previously described, the environmental drivers and the demographic mechanisms of the widespread decline of marine survival rates of Atlantic salmon in the North Atlantic Ocean were investigated by considering the 13 stocks units from the NAC and Southern NEAC complexes.

First, relying on the flexibility of the hierarchical modelling approach, the temporal variations in post-smolt survival of the 13 stock units were explicitly modelled as the sum of trends in a hierarchy of spatial scales to partition the synchronous and asynchronous parts of the signal. This allows the investigation of the degree of synchrony in Atlantic salmon post-smolt survival and the explicit quantification of the amount of variance that is captured by trends at various spatial scales.

Second, the model is used to investigate whether the temporal variations in the post-smolt survival were best explained by environmental variations encountered by salmon during the early part of the post-smolt marine phase when salmon use transitional habitats, or during the subsequent part of the first year at sea when salmon of different origins concentrate in common foraging areas. To test this hypothesis, an extensive review of the literature on post-smolt migration routes was conducted to define different space-time domains associated with the early phase or with the late phase of the first year at sea. Such a framework allows for assessing the relationships between the temporal variations of marine survival and environmental covariates (Sea Surface Temperature (SST) and Primary Production (PP)) defined in different space-time domains, and as well with proxies of large-scale environmental conditions, the North Atlantic Oscillation (NAO) and the Atlantic Multidecadal Oscillation (AMO).

Results show a strong coherence in the temporal variation in post-smolt survival among the 13 stock units of NAC and Southern NEAC. The common trend of the temporal variation of the post-smolt survival for the 13 stock units explains 37% of the temporal variability and declines by a factor of 1.8 over the 1971–2014 time-series. Synchrony in survival is stronger between stocks within each complex. The common trends at the scale of the NAC and the Southern NEAC complexes capture 60% and 42% of the total temporal variance, respectively. The remaining part of the variability was explained by local-scale factors. Temporal patterns of the post-smolt marine survival are best explained by sea surface temperature (SST, negative correlation) and Primary Production (PP, positive correlation) variations encountered by salmon in space-time domains corresponding to late summer/early autumn feeding areas, specifically, in the Labrador Sea/Grand Banks for the NAC complex and the Norwegian Sea for the Southern NEAC complex. SST and PP account for 27% and 26% of the variance of the common trends for the NAC complex, respectively and 21% and 14% of the variance of the common trends in the Southern NEAC complex, respectively. Temporal variations of SST and PP measured in specific space-time domains were much weaker predictors of the post-smolt marine survival.

These findings support the hypothesis of a simultaneous response of salmon populations to large-scale bottom–up environmentally driven changes in the North Atlantic that can impact on populations originating in distant continental habitats. In addition, the ecological drivers and/or mechanisms differ between NAC and Southern NEAC populations because of partially different migration routes at sea.

2.4 Reports from ICES expert group and other investigations relevant to North Atlantic salmon

2.4.1 WGDIAD

The Working Group on the Science Requirements to Support Conservation, Restoration and Management of Diadromous Species (WGDIAD) provides a forum for the coordination of ICES activities relating to species which use both freshwater and marine environments to complete their life cycles; such as eel, Atlantic salmon, sea trout, lampreys, shads, smelts, etc. The Working Group considers progress and future requirements in the field of diadromous science and management and organizes Expert Groups (EGs), Theme Sessions and Symposia. There is also a significant role in coordinating with other science and advice Working Groups in ICES. The 2018 chairs were Dennis Ensing (UK) and Johan Dannewitz (Sweden).

The required self-evaluation by the group in 2018 indicated a continuing need of a coordination group for diadromous species to assist EGs in achieving their goals within the framework of the Science plan, keep ICES abreast of important issues relating to diadromous fish species and ensure these issues are communicated to relevant EGs and Study Groups within both SCICOM and ACOM. The annual meeting of WGDIAD was held on 25 September 2018 during the ICES Annual Science Conference (ASC) in Hamburg, Germany. Hugo Maxwell (Ireland) was elected to replace outgoing co-chair Johan Dannewitz (Sweden). At the 2018 meeting, the group discussed the following topics relevant to Atlantic salmon:

- The ongoing work within ICES to evaluate the stock assessment methods used by individual countries in their national eel management plans, and the importance of coordination at the international level;
- International Year of the Salmon (IYS)–progress and engagement by ICES;
- The development and function of the pan-regional diadromous subgroup (DSG) within the Regional Coordination Groups (RCGs) to coordinate and identify data collection needs for diadromous species in relation to the EU data collection regulation Data Collection Framework/Data Collection-Multi-Annual Programme (DCF/DC-MAP).

In addition, a Theme Session proposal submission for the 2019 ICES ASC was discussed. This proposal, titled ‘Advances in data-limited assessment methodologies for marine and diadromous stocks’ has subsequently been accepted. Although not directly aimed at Atlantic salmon, it will potentially be of interest to salmon researchers working on data-limited salmon stocks or other data-limited diadromous fish species. The 2019 ICES ASC will be held in Gothenburg, Sweden, from 9–12 September.

Furthermore, a potential Theme Session proposal for the 2020 ICES ASC was also discussed. Possible focus areas of this proposal include advantages and disadvantages of stocking fish, and developments of methods and technical equipment for monitoring of migratory fish. The next meeting of WGDIAD will be held at a date to be confirmed during the 2019 ICES ASC.

2.4.2 SAlmonids Management ARound the CHannel (SAMARCH)

SAMARCH is a five-year project that started in April 2017 (due to end April 2022) and part funded by the France-England Interreg Channel programme. The project will provide new transferable scientific knowledge to inform the management of salmon and sea trout in the estuaries and coastal waters of both the French and English sides of the Channel. Although the project involves working on a number of rivers in the Channel area, the majority of the data collection and research will focus on five salmon and sea trout monitored rivers in the Channel area. These are the rivers Frome and Tamar in southern England and the rivers Scorff, Oir and Bresle in northern France.

There are four technical work-packages in the SAMARCH project.

WP T1 Fish Tracking–Uses acoustic tracking technology to follow salmon and sea trout smolts through the estuaries of the rivers Frome, Tamar, Scorff and Bresle in the springs of 2018–2020 to apportion smolt mortality rate between the estuary and the nearshore coast. Sea trout kelts from the Frome, Tamar and Bresle will also be marked with both acoustic and data storage tags to track their movements through the estuary and around the coast.

WP T2 Genetic Tool Development–Collect samples of juvenile brown trout from rivers in northern France and southern England and adult sea trout across the Channel to build a common trout and sea trout genetic dataset to identify the river-of-origin of sea trout caught at sea. Genetic analysis to identify the sex of large numbers of juvenile and adult salmon and sea trout will generate new information for stock assessment models used to manage salmonid stocks in UK (England & Wales) and France.

WP T3 Salmonid Stock Assessment Models–Involves collecting new data on the marine survival of salmonids and using this and historic data from five monitored rivers to develop new and improve existing models used for salmonid stock assessment in England and France. Historical salmonid scale collections will be analysed to generate data on changes in growth rates and sex ratio over time. The project will also assess the fecundity of salmonids. These new data will feed into the models used to manage salmonid stocks in England and France. See also Section 2.3.7.

WP T4 Stakeholders and Training–Will be used to ensure the results produced by the project inform, improve and develop new policies for the management of salmonids in estuaries and coastal waters. It will engage with stakeholders in both England and France and further afield to maximise the impact of the results generated by the project.

Further information about SAMARCH is available online at www.samarch.org

2.5 NASCO has asked ICES to provide a compilation of tag releases by country in 2018

Data on releases of tagged, finclipped and other marked salmon in 2018 were provided to the Working Group and are compiled as a separate report (ICES, WGNAS Addendum 2019). In summary (Table 2.5.1), approximately 2.7 million salmon were marked in 2018, a decrease from the 2.8 million fish marked in 2017. The adipose clip was the most commonly used primary mark (2.14 million), with coded wire microtags (CWT) (0.241 million) the next most common primary mark, and 189 022 fish were marked with external tags. Most marks were applied to hatchery-origin juveniles (2.64 million), while 62 296 wild juveniles, 7903 wild adults and 1315 hatchery adults were also marked. The use of PIT tags, Data Storage Tags (DSTs), radio and/or sonic transmitting tags (pingers) has increased in recent years and in 2018, 135 157 salmon were tagged with these tag types (Table 2.5.1). The Working Group noted that not all electronic tags were reported in the tag compilation. Tag users should be encouraged to include these tags or tagging programmes as this greatly facilitates identification of the origin of tags recovered in fisheries or tag scanning programmes in other jurisdictions.

A recommendation has been developed by the Working Group for more efficient identification of the origin of PIT tagged salmon. A creation of a database listing individual PIT tag numbers or codes identifying the origin, source or programme of the tags should be recorded on a North Atlantic basin-wide scale. This is needed to facilitate identification of individual tagged fish taken in marine fisheries or surveys back to the source. Data on individual PIT tags used in Norway have now been compiled, but an ICES coordinated database, where the data could be stored, is needed.

Since 2003, the Working Group has reported information on marks 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 USA, genetic "marking" procedures have been adopted where broodstock are genetically screened and 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 the individual escaped from. This has also been applied in Iceland, and in the 2018 fisheries nine out of 11 farmed escapees could be traced to the pens they escaped from by matching their genotypes to known parental genotypes.

Issues pertinent to particular Commission areas are included in subsequent sections and, where appropriate, carried forward to the recommendations (Annex 8).

Table 2.1.1.1. Total reported nominal catch of salmon by country (in tonnes round fresh weight), 1960–2018. (2018 figures include provisional data).

	NAC Area			NEAC (N. Area)								NEAC (S. Area)						Faroes & Greenland				Total	Unreported catches	
						Iceland		Sweden					UK	UK	UK				East	West		Reported		
Year	Canada (1)	USA	St. P&M	Norway (2)	Russia (3)	Wild	Ranch (4)	Wild	Ranch (15)	Denmark	Finland	Ireland (5,6)	(E & W)	(N.Irl.) (6,7)	(Scotl.)	France (8)	Spain (9)	Faroes (10)	Grld.	Grld. (11)	Other (12)	Nominal Catch	NASCO Areas (13)	International waters (14)
1960	1,636	1	-	1,659	1,100	100	-	40	0	-	-	743	283	139	1,443	-	33	-	-	60	-	7,237	-	-
1961	1,583	1	-	1,533	790	127	-	27	0	-	-	707	232	132	1,185	-	20	-	-	127	-	6,464	-	-
1962	1,719	1	-	1,935	710	125	-	45	0	-	-	1,459	318	356	1,738	-	23	-	-	244	-	8,673	-	-
1963	1,861	1	-	1,786	480	145	-	23	0	-	-	1,458	325	306	1,725	-	28	-	-	466	-	8,604	-	-
1964	2,069	1	-	2,147	590	135	-	36	0	-	-	1,617	307	377	1,907	-	34	-	-	1,539	-	10,759	-	-
1965	2,116	1	-	2,000	590	133	-	40	0	-	-	1,457	320	281	1,593	-	42	-	-	861	-	9,434	-	-
1966	2,369	1	-	1,791	570	104	2	36	0	-	-	1,238	387	287	1,595	-	42	-	-	1,370	-	9,792	-	-
1967	2,863	1	-	1,980	883	144	2	25	0	-	-	1,463	420	449	2,117	-	43	-	-	1,601	-	11,991	-	-
1968	2,111	1	-	1,514	827	161	1	20	0	-	-	1,413	282	312	1,578	-	38	5	-	1,127	403	9,793	-	-
1969	2,202	1	-	1,383	360	131	2	22	0	-	-	1,730	377	267	1,955	-	54	7	-	2,210	893	11,594	-	-
1970	2,323	1	-	1,171	448	182	13	20	0	-	-	1,787	527	297	1,392	-	45	12	-	2,146	922	11,286	-	-
1971	1,992	1	-	1,207	417	196	8	17	1	-	-	1,639	426	234	1,421	-	16	-	-	2,689	471	10,735	-	-
1972	1,759	1	-	1,578	462	245	5	17	1	-	32	1,804	442	210	1,727	34	40	9	-	2,113	486	10,965	-	-
1973	2,434	3	-	1,726	772	148	8	22	1	-	50	1,930	450	182	2,006	12	24	28	-	2,341	533	12,670	-	-
1974	2,539	1	-	1,633	709	215	10	31	1	-	76	2,128	383	184	1,628	13	16	20	-	1,917	373	11,877	-	-
1975	2,485	2	-	1,537	811	145	21	26	0	-	76	2,216	447	164	1,621	25	27	28	-	2,030	475	12,136	-	-
1976	2,506	1	3	1,530	542	216	9	20	0	-	66	1,561	208	113	1,019	9	21	40	<1	1,175	289	9,327	-	-
1977	2,545	2	-	1,488	497	123	7	9	1	-	59	1,372	345	110	1,160	19	19	40	6	1,420	192	9,414	-	-
1978	1,545	4	-	1,050	476	285	6	10	0	-	37	1,230	349	148	1,323	20	32	37	8	984	138	7,682	-	-
1979	1,287	3	-	1,831	455	219	6	11	1	-	26	1,097	261	99	1,076	10	29	119	<0,5	1,395	193	8,118	-	-
1980	2,680	6	-	1,830	664	241	8	16	1	-	34	947	360	122	1,134	30	47	536	<0,5	1,194	277	10,127	-	-
1981	2,437	6	-	1,656	463	147	16	25	1	-	44	685	493	101	1,233	20	25	1,025	<0,5	1,264	313	9,954	-	-
1982	1,798	6	-	1,348	364	130	17	24	1	-	54	993	286	132	1,092	20	10	606	<0,5	1,077	437	8,395	-	-
1983	1,424	1	3	1,550	507	166	32	27	1	-	58	1,656	429	187	1,221	16	23	678	<0,5	310	466	8,755	-	-
1984	1,112	2	3	1,623	593	139	20	39	1	-	46	829	345	78	1,013	25	18	628	<0,5	297	101	6,912	-	-
1985	1,133	2	3	1,561	659	162	55	44	1	-	49	1,595	361	98	913	22	13	566	7	864	-	8,108	-	-
1986	1,559	2	3	1,598	608	232	59	52	2	-	37	1,730	430	109	1,271	28	27	530	19	960	-	9,255	315	-
1987	1,784	1	2	1,385	564	181	40	43	4	-	49	1,239	302	56	922	27	18	576	<0,5	966	-	8,159	2,788	-
1988	1,310	1	2	1,076	420	217	180	36	4	-	36	1,874	395	114	882	32	18	243	4	893	-	7,737	3,248	-
1989	1,139	2	2	905	364	141	136	25	4	-	52	1,079	296	142	895	14	7	364	-	337	-	5,904	2,277	-
1990	911	2	2	930	313	141	285	27	6	13	60	567	338	94	624	15	7	315	-	274	-	4,925	1,890	180-350

Table 2.1.1.1. (Continued). Total reported nominal catch of salmon by country (in tonnes round fresh weight), 1960–2018. (2018 figures include provisional data).

	NAC Area			NEAC (N. Area)								NEAC (S. Area)						Faroes & Greenland				Total	Unreported catches	
Year	Canada (1)	USA	St. P&M	Norway (2)	Russia (3)	Iceland Wild	Iceland Ranch (4)	Sweden Wild	Sweden Ranch (15)	Denmark	Finland	Ireland (5,6)	UK (E & W)	UK (N.Irl.) (6,7)	UK (Scotl.)	France (8)	Spain (9)	Faroes (10)	East Grld.	West Grld. (11)	Other (12)	Reported Nominal Catch	NASCO Areas (13)	International waters (14)
1991	711	1	1	876	215	129	346	34	4	3	70	404	200	55	462	13	11	95	4	472	-	4,106	1,682	25-100
1992	522	1	2	867	167	174	462	46	3	10	77	630	171	91	600	20	11	23	5	237	-	4,119	1,962	25-100
1993	373	1	3	923	139	157	499	44	12	9	70	541	248	83	547	16	8	23	-	-	-	3,696	1,644	25-100
1994	355	0	3	996	141	136	313	37	7	6	49	804	324	91	649	18	10	6	-	-	-	3,945	1,276	25-100
1995	260	0	1	839	128	146	303	28	9	3	48	790	295	83	588	10	9	5	2	83	-	3,629	1,060	-
1996	292	0	2	787	131	118	243	26	7	2	44	685	183	77	427	13	7	-	0	92	-	3,136	1,123	-
1997	229	0	2	630	111	97	59	15	4	1	45	570	142	93	296	8	4	-	1	58	-	2,364	827	-
1998	157	0	2	740	131	119	46	10	5	1	48	624	123	78	283	8	4	6	0	11	-	2,395	1,210	-
1999	152	0	2	811	103	111	35	11	5	1	62	515	150	53	199	11	6	0	0	19	-	2,247	1,032	-
2000	153	0	2	1,176	124	73	11	24	9	5	95	621	219	78	274	11	7	8	0	21	-	2,912	1,269	-
2001	148	0	2	1,267	114	74	14	25	7	6	126	730	184	53	251	11	13	0	0	43	-	3,069	1,180	-
2002	148	0	2	1,019	118	90	7	20	8	5	93	682	161	81	191	11	9	0	0	9	-	2,654	1,039	-
2003	141	0	3	1,071	107	99	11	15	10	4	78	551	89	56	192	13	9	0	0	9	-	2,457	847	-
2004	161	0	3	784	82	111	18	13	7	4	39	489	111	48	245	19	7	0	0	15	-	2,157	686	-
2005	139	0	3	888	82	129	21	9	6	8	47	422	97	52	215	11	13	0	0	15	-	2,155	700	-
2006	137	0	3	932	91	93	17	8	6	2	67	326	80	29	192	13	11	0	0	22	-	2,028	670	-
2007	112	0	2	767	63	93	36	6	10	3	58	85	67	30	171	11	9	0	0	25	-	1,548	475	-
2008	158	0	4	807	73	132	69	8	10	9	71	89	64	21	161	12	9	0	0	26	-	1,721	443	-
2009	126	0	3	595	71	126	44	7	10	8	36	68	54	16	121	4	2	0	0.8	26	-	1,318	343	-
2010	153	0	3	642	88	147	42	9	13	13	49	99	109	12	180	10	2	0	1.7	38	-	1,610	393	-
2011	179	0	4	696	89	98	30	20	19	13	44	87	136	10	159	11	7	0	0.1	27	-	1,629	421	-
2012	126	0	3	696	82	50	20	21	9	12	64	88	58	9	124	10	7	0	0.5	33	-	1,412	403	-
2013	137	0	5	475	78	116	31	11	4	11	46	87	84	4	119	11	5	0	0.0	47	-	1,270	306	-
2014	118	0	4	490	81	51	18	24	6	9	58	57	54	5	84	12	6	0	0.1	58	-	1,134	287	-
2015	140	0	4	583	80	94	31	11	7	9	45	63	68	3	68	16	5	0	1.0	56	-	1,284	325	-
2016	135	0	5	612	56	71	34	6	3	9	51	58	86	4	27	6	5	0	1.5	26	-	1,195	335	-
2017	110	0	3	666	47	62	24	17	10	12	32	59	49	5	27	10	2	0	0.3	28	-	1,163	353	-
2018	90	0	1	594	80	66	33	12	4	11	24	58	42	4	19	10	3	0	0.8	39	-	1,090	314	-
Average																								
2013-2017	128	0	4	565	68	79	28	14	6	10	46	65	68	4	65	11	5	0	1	43	-	1,209	321	-
2008-2017	138	0	4	626	75	95	34	13	9	10	50	75	76	9	107	10	5	0	1	36	-	1,374	361	-

Table 2.1.1.1. (Continued). Total reported nominal catch of salmon by country (in tonnes round fresh weight), 1960–2018. (2018 figures include provisional data).

Key:

1. Includes estimates of some local sales, and, prior to 1984, by-catch.
2. Before 1966, sea trout and sea charr included (5% of total).
3. Figures from 1991 to 2000 do not include catches taken in the recreational (rod) fishery.
4. From 1990, catch includes fish ranched for both commercial and angling purposes.
5. Improved reporting of rod catches in 1994 and data derived from carcase tagging and log books from 2002.
6. Catch on River Foyle allocated 50% Ireland and 50% N. Ireland.
7. Angling catch (derived from carcase tagging and log books) first included in 2002.
8. Data for France include some unreported catches.
9. Weights estimated from mean weight of fish caught in Asturias (80-90% of Spanish catch).
10. Between 1991 & 1999, there was only a research fishery at Faroes. In 1997 & 1999 no fishery took place; the commercial fishery resumed in 2000, but has not operated since 2001.
11. Includes catches made in the West Greenland area by Norway, Faroes, Sweden and Denmark in 1965-1975.
12. Includes catches in Norwegian Sea by vessels from Denmark, Sweden, Germany, Norway and Finland.
13. No unreported catch estimate available for Canada in 2007 and 2008. Data for Canada in 2009 and 2010 are incomplete. No unreported catch estimate available for Russia since 2008.
14. Estimates refer to season ending in given year.
15. Catches from hatchery-reared smolts released under programmes to mitigate for hydropower development schemes; returning fish unable to spawn in the wild and exploited heavily.

Table 2.1.1.2. Total reported nominal catch of salmon in homewaters by country (in tonnes round fresh weight), 1960–2018. (2018 figures include provisional data). S = Salmon (2SW or MSW fish). G = Grilse (1SW fish). Sm = small. Lg = large; T = S + G or Lg + Sm.

	NAC Area				NEAC (N. Area)												NEAC (S. Area)										
								Russia	Iceland		Sweden						Ireland			UK	UK(N.I.)						
Year	Canada (1)			USA	Norway (2)			(3)	Wild	Ranch	Wild	Ranch	Denmark	Finland			(4,5)			(E&W)	(4,6)	UK(Scotland)			France	Spain	Total
	Lg	Sm	T	T	S	G	T	T	T	T	T	T	T	S	G	T	S	G	T	T	T	S	G	T	T	T	T
1960	-	-	1,636	1	-	-	1,659	1,100	100	-	40	0	-	-	-	-	-	-	743	283	139	971	472	1,443	-	33	7,177
1961	-	-	1,583	1	-	-	1,533	790	127	-	27	0	-	-	-	-	-	-	707	232	132	811	374	1,185	-	20	6,337
1962	-	-	1,719	1	-	-	1,935	710	125	-	45	0	-	-	-	-	-	-	1,459	318	356	1,014	724	1,738	-	23	8,429
1963	-	-	1,861	1	-	-	1,786	480	145	-	23	0	-	-	-	-	-	-	1,458	325	306	1,308	417	1,725	-	28	8,138
1964	-	-	2,069	1	-	-	2,147	590	135	-	36	0	-	-	-	-	-	-	1,617	307	377	1,210	697	1,907	-	34	9,220
1965	-	-	2,116	1	-	-	2,000	590	133	-	40	0	-	-	-	-	-	-	1,457	320	281	1,043	550	1,593	-	42	8,573
1966	-	-	2,369	1	-	-	1,791	570	104	2	36	0	-	-	-	-	-	-	1,238	387	287	1,049	546	1,595	-	42	8,422
1967	-	-	2,863	1	-	-	1,980	883	144	2	25	0	-	-	-	-	-	-	1,463	420	449	1,233	884	2,117	-	43	10,390
1968	-	-	2,111	1	-	-	1,514	827	161	1	20	0	-	-	-	-	-	-	1,413	282	312	1,021	557	1,578	-	38	8,258
1969	-	-	2,202	1	801	582	1,383	360	131	2	22	0	-	-	-	-	-	-	1,730	377	267	997	958	1,955	-	54	8,484
1970	1,562	761	2,323	1	815	356	1,171	448	182	13	20	0	-	-	-	-	-	-	1,787	527	297	775	617	1,392	-	45	8,206
1971	1,482	510	1,992	1	771	436	1,207	417	196	8	17	1	-	-	-	-	-	-	1,639	426	234	719	702	1,421	-	16	7,574
1972	1,201	558	1,759	1	1,064	514	1,578	462	245	5	17	1	-	-	-	32	200	1,604	1,804	442	210	1,013	714	1,727	34	40	8,356
1973	1,651	783	2,434	3	1,220	506	1,726	772	148	8	22	1	-	-	-	50	244	1,686	1,930	450	182	1,158	848	2,006	12	24	9,767
1974	1,589	950	2,539	1	1,149	484	1,633	709	215	10	31	1	-	-	-	76	170	1,958	2,128	383	184	912	716	1,628	13	16	9,566
1975	1,573	912	2,485	2	1,038	499	1,537	811	145	21	26	0	-	-	-	76	274	1,942	2,216	447	164	1,007	614	1,621	25	27	9,603
1976	1,721	785	2,506	1	1,063	467	1,530	542	216	9	20	0	-	-	-	66	109	1,452	1,561	208	113	522	497	1,019	9	21	7,821
1977	1,883	662	2,545	2	1,018	470	1,488	497	123	7	9	1	-	-	-	59	145	1,227	1,372	345	110	639	521	1,160	19	19	7,755
1978	1,225	320	1,545	4	668	382	1,050	476	285	6	10	0	-	-	-	37	147	1,082	1,229	349	148	781	542	1,323	20	32	6,514
1979	705	582	1,287	3	1,150	681	1,831	455	219	6	11	1	-	-	-	26	105	922	1,027	261	99	598	478	1,076	10	29	6,340
1980	1,763	917	2,680	6	1,352	478	1,830	664	241	8	16	1	-	-	-	34	202	745	947	360	122	851	283	1,134	30	47	8,119
1981	1,619	818	2,437	6	1,189	467	1,656	463	147	16	25	1	-	-	-	44	164	521	685	493	101	844	389	1,233	20	25	7,351
1982	1,082	716	1,798	6	985	363	1,348	364	130	17	24	1	-	49	5	54	63	930	993	286	132	596	496	1,092	20	10	6,275
1983	911	513	1,424	1	957	593	1,550	507	166	32	27	1	-	51	7	58	150	1,506	1,656	429	187	672	549	1,221	16	23	7,298
1984	645	467	1,112	2	995	628	1,623	593	139	20	39	1	-	37	9	46	101	728	829	345	78	504	509	1,013	25	18	5,882
1985	540	593	1,133	2	923	638	1,561	659	162	55	44	1	-	38	11	49	100	1,495	1,595	361	98	514	399	913	22	13	6,667
1986	779	780	1,559	2	1,042	556	1,598	608	232	59	52	2	-	25	12	37	136	1,594	1,730	430	109	745	526	1,271	28	27	7,742
1987	951	833	1,784	1	894	491	1,385	564	181	40	43	4	-	34	15	49	127	1,112	1,239	302	56	503	419	922	27	18	6,611
1988	633	677	1,310	1	656	420	1,076	420	217	180	36	4	-	27	9	36	141	1,733	1,874	395	114	501	381	882	32	18	6,591
1989	590	549	1,139	2	469	436	905	364	141	136	25	4	-	33	19	52	132	947	1,079	296	142	464	431	895	14	7	5,197
1990	486	425	911	2	545	385	930	313	146	280	27	6	13	41	19	60	-	-	567	338	94	423	201	624	15	7	4,327

Table 2.1.1.2. (Continued). Total reported nominal catch of salmon in homewaters by country (in tonnes round fresh weight), 1960–2018. (2018 figures include provisional data). S = Salmon (2SW or MSW fish). G = Grilse (1SW fish). Sm = small. Lg = large; T = S + G or Lg + Sm.

	NAC Area				NEAC (N. Area)												NEAC (S. Area)										
								Russia	Iceland		Sweden						Ireland			UK	UK(N.I.)						
Year	Canada (1)			USA	Norway (2)			(3)	Wild	Ranch	Wild	Ranch	Denmark	Finland			(4,5)			(E&W)	(4,6)	UK(Scotland)			France	Spain	Total
	Lg	Sm	T	T	S	G	T	T	T	T	T	T	T	S	G	T	S	G	T	T	T	S	G	T	T	T	T
1991	370	341	711	1	535	342	876	215	129	346	34	4	3	53	17	70	-	-	404	200	55	285	177	462	13	11	3,530
1992	323	199	522	1	566	301	867	167	174	462	46	3	10	49	28	77	-	-	630	171	91	361	238	599	20	11	3,847
1993	214	159	373	1	611	312	923	139	157	499	44	12	9	53	17	70	-	-	541	248	83	320	227	547	16	8	3,659
1994	216	139	355	0	581	415	996	141	136	313	37	7	6	38	11	49	-	-	804	324	91	400	248	648	18	10	3,927
1995	153	107	260	0	590	249	839	128	146	303	28	9	3	37	11	48	-	-	790	295	83	364	224	588	10	9	3,530
1996	154	138	292	0	571	215	787	131	118	243	26	7	2	24	20	44	-	-	685	183	77	267	160	427	13	7	3,035
1997	126	103	229	0	389	241	630	111	97	59	15	4	1	30	15	45	-	-	570	142	93	182	114	296	8	3	2,300
1998	70	87	157	0	445	296	740	131	119	46	10	5	1	29	19	48	-	-	624	123	78	162	121	283	8	4	2,371
1999	64	88	152	0	493	318	811	103	111	35	11	5	1	29	33	63	-	-	515	150	53	142	57	199	11	6	2,220
2000	58	95	153	0	673	504	1,176	124	73	11	24	9	5	56	39	96	-	-	621	219	78	161	114	275	11	7	2,873
2001	61	86	148	0	850	417	1,267	114	74	14	25	7	6	105	21	126	-	-	730	184	53	150	101	251	11	13	3,016
2002	49	99	148	0	770	249	1,019	118	90	7	20	8	5	81	12	94	-	-	682	161	81	118	73	191	11	9	2,636
2003	60	81	141	0	708	363	1,071	107	99	11	15	10	4	63	15	75	-	-	551	89	56	122	71	193	13	7	2,432
2004	68	94	161	0	577	207	784	82	111	18	13	7	4	32	7	39	-	-	489	111	48	159	88	247	19	7	2,133
2005	56	83	139	0	581	307	888	82	129	21	9	6	8	31	16	47	-	-	422	97	52	126	91	217	11	13	2,133
2006	55	82	137	0	671	261	932	91	93	17	8	6	2	38	29	67	-	-	326	80	28	118	75	193	13	11	1,999
2007	49	63	112	0	627	140	767	63	93	36	6	10	3	52	6	59	-	-	85	67	30	100	71	171	11	9	1,511
2008	57	100	157	0	637	170	807	73	132	69	8	10	9	65	6	71	-	-	89	64	21	110	51	161	12	9	1,680
2009	52	74	126	0	460	135	595	71	122	44	7	10	8	25	13	38	-	-	68	54	16	83	37	121	5	2	1,278
2010	53	100	153	0	458	184	642	88	124	36	9	13	13	37	13	49	-	-	99	109	12	111	69	180	10	2	1,525
2011	69	110	179	0	556	140	696	89	98	30	20	19	13	29	15	44	-	-	87	136	10	126	33	159	11	7	1,579
2012	52	74	126	0	534	162	696	82	50	20	21	9	12	31	33	64	-	-	88	58	9	84	40	124	10	8	1,368
2013	66	72	138	0	358	117	475	78	116	31	10	4	11	32	14	46	-	-	87	84	4	74	45	119	11	4	1,217
2014	41	77	118	0	319	171	490	81	51	18	24	6	9	31	26	58	-	-	56	54	5	58	26	84	12	6	1,071
2015	54	86	140	0	430	153	583	80	94	31	11	7	9	32	13	45	-	-	63	68	3	39	29	68	16	5	1,224
2016	56	79	135	0	495	117	612	56	71	34	6	3	9	37	14	51	-	-	58	86	5	18	8	27	6	5	1,164
2017	55	55	110	0	503	164	666	47	62	24	17	10	12	27	5	32	-	-	59	49	5	19	7	27	10	2	1,131
2018	40	50	90	0	427	167	594	80	66	33	12	4	11	13	11	24	-	-	58	42	4	12	8	19	10	3	1,050
Average																											
2013-2017	54	74	128	0	421	144	565	68	79	28	14	6	10	32	15	46	-	-	65	68	4	42	23	65	11	4	1161
2008-2017	55	83	138	0	475	151	626	75	92	34	13	9	10	35	15	50	-	-	75	76	9	72	35	107	10	5	1324

1. Includes estimates of some local sales, and, prior to 1984, by-catch.
2. Before 1966, sea trout and sea charr included (5% of total).
3. Figures from 1991 to 2000 do not include catches of the recreational (rod) fishery.
4. Catch on River Foyle allocated 50% Ireland and 50% N. Ireland.
5. Improved reporting of rod catches in 1994 and data derived from carcase tagging and log books from 2002.
6. Angling catch (derived from carcase tagging and log books) first included in 2002.

Table 2.1.2.1. 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, 1991–2018. Figures for 2018 are provisional.

Year	Canada [4]		USA		Iceland		Russia [1]		UK (E&W)		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	22,167	28	239	50			3,211	51														
1992	37,803	29	407	67			10,120	73														
1993	44,803	36	507	77			11,246	82	1,448	10												
1994	52,887	43	249	95			12,056	83	3,227	13	6,595	8										
1995	46,029	46	370	100			11,904	84	3,189	20	12,151	14										
1996	52,166	41	542	100	669	2	10,745	73	3,428	20	10,413	15										
1997	50,009	50	333	100	1,558	5	14,823	87	3,132	24	10,965	18										
1998	56,289	53	273	100	2,826	7	12,776	81	4,378	30	13,464	18										
1999	48,720	50	211	100	3,055	10	11,450	77	4,382	42	14,846	28										
2000	64,482	56	0	-	2,918	11	12,914	74	7,470	42	21,072	32										
2001	59,387	55	0	-	3,611	12	16,945	76	6,143	43	27,724	38										
2002	50,924	52	0	-	5,985	18	25,248	80	7,658	50	24,058	42										
2003	53,645	55	0	-	5,361	16	33,862	81	6,425	56	29,170	55										
2004	62,316	57	0	-	7,362	16	24,679	76	13,211	48	46,279	50					255	19				
2005	63,005	62	0	-	9,224	17	23,592	87	11,983	56	46,165	55	2,553	12			606	27				
2006	60,486	62	1	100	8,735	19	33,380	82	10,959	56	47,669	55	5,409	22	302	18	794	65				
2007	41,192	58	3	100	9,691	18	44,341	90	10,917	55	55,660	61	15,113	44	470	16	959	57				
2008	54,887	53	61	100	17,178	20	41,881	86	13,035	55	53,347	62	13,563	38	648	20	2,033	71			5,512	5
2009	52,151	59	0	-	17,514	24			9,096	58	48,436	67	11,422	39	847	21	1,709	53			6,696	6
2010	55,895	53	0	-	21,476	29	14,585	56	15,012	60	78,041	70	15,142	40	823	25	2,512	60			15,041	12
2011	71,358	57	0	-	18,593	32			14,406	62	64,870	73	12,688	38	1,197	36	2,153	55	424	5	14,303	12
2012	43,287	57	0	-	9,752	28	4,743	43	11,952	65	63,628	74	11,891	35	5,014	59	2,153	55	404	6	18,611	14
2013	50,630	59	0	-	23,133	34	3,732	39	10,458	70	54,002	80	10,682	37	1,507	64	1,932	57	274	9	15,953	15
2014	41,613	54	0	-	13,616	41	8,479	52	7,992	78	37,355	82	6,537	37	1,065	50	1,918	61	982	15	20,281	19
2015	65,440	64	0	-	21,914	31	7,028	50	8,113	79	46,836	84	9,383	37	111	100	2,989	70	647	18	25,433	19
2016	68,925	65	0	-	22,751	43	10,793	76	9,700	80	49,469	90	10,280	41	280	100	3,801	72	362	17	25,198	21
2017	57,357	66	0	-	19,667	42	10,110	77	11,255	83	44,257	90	11,259	36	126	100	4,435	69	625	17	25,924	21
2018	50,184	73	0	-	20,957	42	10,779	73	6,486	88	34,721	93	12,562	32	3,249	65	4,613	79	710	19	22,024	22
5-yr mean 2013-2017	56,793	62	0	-	20,216	38	8,028	59	9,504	78	46,384	85	9,628	38	618	83	3,015	66	578	15	22,558	19
% change on 5-year mean	-12	19	-	-	4	10	34	24	-32	13	-25	9	30	-15	426	-21	53	20	23	25	-2	18

Table 2.1.3.1. Estimates of unreported catches by various methods in tonnes within national EEZs in the Northeast Atlantic, North American and West Greenland Commissions of NASCO, 1987–2018.

Year	Northeast Atlantic	North-America	West Greenland	Total
1987	2,554	234	-	2,788
1988	3,087	161	-	3,248
1989	2,103	174	-	2,277
1990	1,779	111	-	1,890
1991	1,555	127	-	1,682
1992	1,825	137	-	1,962
1993	1,471	161	< 12	1,644
1994	1,157	107	< 12	1,276
1995	942	98	20	1,060
1996	947	156	20	1,123
1997	732	90	5	827
1998	1,108	91	11	1,210
1999	887	133	12.5	1,032
2000	1,135	124	10	1,269
2001	1,089	81	10	1,180
2002	946	83	10	1,039
2003	719	118	10	847
2004	575	101	10	686
2005	605	85	10	700
2006	604	56	10	670
2007	465	-	10	475
2008	433	-	10	443
2009	317	16	10	343
2010	357	26	10	393
2011	382	29	10	421
2012	363	31	10	403
2013	272	24	10	306
2014	256	21	10	287

Year	Northeast Atlantic	North-America	West Greenland	Total
2015	298	17	10	325
2016	298	27	10	335
2017	318	25	10	353
2018	279	24	10	314
Mean				
2013–2017	288	23	10	321

Notes:

There were no estimates available for Canada in 2007–2008 and estimates for 2009–2010 are incomplete.

No estimates have been available for Russia since 2008.

Unreported catch estimates are not provided for Spain and St Pierre & Miquelon.

No estimates were available for France for 2018.

Table 2.1.3.2. 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, 2018.

Commission Area	Country	Unreported Catch t	Unreported as % of Total North Atlantic Catch (Unreported + Reported)	Unreported as % of Total National Catch (Unreported + Reported)
NEAC	Denmark	5	0.3	31
NEAC	Finland	3	0.2	11
NEAC	Iceland	2	0.1	2
NEAC	Ireland	6	0.4	9
NEAC	Norway	255	16.6	30
NEAC	Sweden	2	0.1	12
NEAC	UK (E & W)	5	0.3	11
NEAC	UK (N.Ireland)	0	0.0	6
NEAC	UK (Scotland)	2	0.1	9
NAC	USA	0	0.0	0
NAC	Canada	24	1.6	21
WGC	Greenland	10	0.7	20
	Total Unreported Catch *	314	22.4	
	Total Reported Catch of North Atlantic salmon	1,087		

*** No unreported catch estimate available for France and Russia in 2018.**

Unreported catch estimates not provided for Spain or St Pierre & Miquelon

Table 2.2.1.1. Production of farmed salmon in the North Atlantic area and in areas other than the North Atlantic (in tonnes round fresh weight), 1980–2018.

Year	North Atlantic Area										Outside the North Atlantic Area						World-wide
	Norway	UK (Scot.)	Faroes	Canada	Ireland	USA	Iceland	UK (N.Ire.)	Russia	Total	Chile	West Coast USA	West Coast Canada	Australia	Turkey	Total	Total
1980	4,153	598	0	11	21	0	0	0	0	4,783	0	0	0	0	0	0	4,783
1981	8,422	1,133	0	21	35	0	0	0	0	9,611	0	0	0	0	0	0	9,611
1982	10,266	2,152	70	38	100	0	0	0	0	12,626	0	0	0	0	0	0	12,626
1983	17,000	2,536	110	69	257	0	0	0	0	19,972	0	0	0	0	0	0	19,972
1984	22,300	3,912	120	227	385	0	0	0	0	26,944	0	0	0	0	0	0	26,944
1985	28,655	6,921	470	359	700	0	91	0	0	37,196	0	0	0	0	0	0	37,196
1986	45,675	10,337	1,370	672	1,215	0	123	0	0	59,392	0	11	0	10	0	0	59,392
1987	47,417	12,721	3,530	1,334	2,232	365	490	0	0	68,089	41	196	0	62	0	299	68,388
1988	80,371	17,951	3,300	3,542	4,700	455	1,053	0	0	111,372	165	925	0	240	0	1,330	112,702
1989	124,000	28,553	8,000	5,865	5,063	905	1,480	0	0	173,866	1,860	1,122	1,000	1,750	0	5,732	179,598
1990	165,000	32,351	13,000	7,810	5,983	2,086	2,800	<100	5	229,035	9,478	696	1,700	1,750	300	13,924	242,959
1991	155,000	40,593	15,000	9,395	9,483	4,560	2,680	100	0	236,811	14,957	1,879	3,500	2,653	1,500	24,489	261,300
1992	140,000	36,101	17,000	10,380	9,231	5,850	2,100	200	0	220,862	23,715	4,238	6,600	3,300	680	38,533	259,395
1993	170,000	48,691	16,000	11,115	12,366	6,755	2,348	<100	0	267,275	29,180	4,254	12,000	3,500	791	49,725	317,000
1994	204,686	64,066	14,789	12,441	11,616	6,130	2,588	<100	0	316,316	34,175	4,834	16,100	4,000	434	59,543	375,859
1995	261,522	70,060	9,000	12,550	11,811	10,020	2,880	259	0	378,102	54,250	4,868	16,000	6,192	654	81,964	460,066
1996	297,557	83,121	18,600	17,715	14,025	10,010	2,772	338	0	444,138	77,327	5,488	17,000	7,647	193	107,655	551,793
1997	332,581	99,197	22,205	19,354	14,025	13,222	2,554	225	0	503,363	96,675	5,784	28,751	7,648	50	138,908	642,271
1998	361,879	110,784	20,362	16,418	14,860	13,222	2,686	114	0	540,325	107,066	2,595	33,100	7,069	40	149,870	690,195
1999	425,154	126,686	37,000	23,370	18,000	12,246	2,900	234	0	645,590	103,242	5,512	38,800	9,195	0	156,749	802,339
2000	440,861	128,959	32,000	33,195	17,648	16,461	2,600	250	0	671,974	166,897	6,049	49,000	10,907	0	232,853	904,827
2001	436,103	138,519	46,014	36,514	23,312	13,202	2,645	-	0	696,309	253,850	7,574	68,000	12,724	0	342,148	1,038,457
2002	462,495	145,609	45,150	40,851	22,294	6,798	1,471	-	0	724,668	265,726	5,935	84,200	14,356	0	370,217	1,094,885
2003	509,544	176,596	52,526	38,680	16,347	6,007	3,710	-	300	803,710	280,301	10,307	65,411	15,208	0	371,227	1,174,937
2004	563,914	158,099	40,492	37,280	14,067	8,515	6,620	-	203	829,190	348,983	6,645	55,646	16,476	0	427,750	1,256,940
2005	586,512	129,588	18,962	45,891	13,764	5,263	6,300	-	204	806,484	385,779	6,110	63,369	16,780	0	472,038	1,278,522
2006	629,888	131,847	11,905	47,880	11,174	4,674	5,745	-	229	843,342	376,476	5,811	70,181	20,710	0	473,178	1,316,520
2007	744,222	129,930	22,305	36,368	9,923	2,715	1,158	-	111	946,732	331,042	7,117	70,998	25,336	0	434,493	1,381,225
2008	737,694	128,606	36,000	39,687	9,217	9,014	330	-	51	960,599	388,847	7,699	73,265	25,737	0	495,548	1,456,147
2009	862,908	144,247	51,500	43,101	12,210	6,028	742	-	2,126	1,122,862	233,308	7,923	68,662	29,893	0	339,786	1,462,648
2010	939,575	154,164	45,391	43,612	15,691	11,127	1,068	-	4,500	1,215,128	123,233	8,408	70,831	31,807	0	234,279	1,449,407

Table 2.2.1.1. (Continued) Production of farmed salmon in the North Atlantic area and in areas other than the North Atlantic (in tonnes round fresh weight), 1980–2018.

Year	North Atlantic Area										Outside the North Atlantic Area						World-wide
	Norway	UK (Scot.)	Faroes	Canada	Ireland	USA	Iceland	UK (N.Ire.)	Russia	Total	Chile	West Coast USA	West Coast Canada	Australia	Turkey	Total	Total
2011	1,065,974	158,018	60,473	41,448	12,196	6,031	1,083	-	8,500	1,353,723	264,349	7,467	83,144	36,662	0	391,622	1,745,345
2012	1,232,095	162,223	76,564	52,951	12,440	-	2,923	-	8,754	1,547,950	399,678	8,696	79,981	43,982	0	532,337	2,080,287
2013	1,168,324	163,234	75,821	47,649	9,125	-	3,018	-	16,097	1,483,268	492,329	6,834	74,673	42,776	0	616,612	2,099,880
2014	1,258,356	179,022	86,454	29,988	9,368	-	3,965	-	18,675	1,585,828	644,459	6,368	54,971	41,591	0	747,389	2,333,217
2015	1,303,346	171,722	66,090	48,684	13,116	-	3,260	-	3,232	1,609,450	608,546	10,431	92,926	48,331	0	760,234	2,369,684
2016	1,233,619	162,817	68,271	33,011	16,300	-	8,420	-	12,857	1,535,295	531,897	8,017	90,511	56,115	0	686,540	2,221,835
2017	1,237,762	189,707	71,172	34,945	19,305	-	11,265	-	13,016	1,577,172	613,611	6,520	85,608	52,580	0	758,319	2,335,491
2018	1,278,386	150,774	64,732	34,945	12,200	-	13,448	-	20,216	1,574,701	613,611	8,326	85,608	52,580	0	760,125	2,334,826
5-yr mean 2013-2017	1,240,281	173,300	73,562	38,855	13,443	-	5,986	-	12,775	1,558,203	578,168	7,634	79,738	48,279	0	713,819	2,272,021
% change on 5-year mean	3	-13	-12	-10	-9	-	125	-	58	1	6	-	7	9	-	6	3

Notes:

Data for 2018 are provisional for many countries.

Where production figures were not available for 2018, values as in 2017 were assumed.

West Coast USA = Washington State.

West Coast Canada = British Columbia.

Australia = Tasmania.

Source of production figures for non-Atlantic areas: http://www.fao.org/fishery/statistics/global-aquaculture-production/en

Data for UK (N. Ireland) since 2001 and data for East coast USA since 2012 are not publicly available.

Table 2.2.2.1. Production of ranched salmon in the North Atlantic (tonnes round fresh weight), 1980–2018.

Year	Iceland (1)	Ireland (2)	UK(N.Ireland) River Bush (2,3)	Sweden (2)	Norway various facilities (2)	Total production
1980	8.0			0.8		9
1981	16.0			0.9		17
1982	17.0			0.6		18
1983	32.0			0.7		33
1984	20.0			1.0		21
1985	55.0	16.0	17.0	0.9		89
1986	59.0	14.3	22.0	2.4		98
1987	40.0	4.6	7.0	4.4		56
1988	180.0	7.1	12.0	3.5	4.0	207
1989	136.0	12.4	17.0	4.1	3.0	172
1990	285.1	7.8	5.0	6.4	6.2	310
1991	346.1	2.3	4.0	4.2	5.5	362
1992	462.1	13.1	11.0	3.2	10.3	500
1993	499.3	9.9	8.0	11.5	7.0	536
1994	312.8	13.2	0.4	7.4	10.0	344
1995	302.7	19.0	1.2	8.9	2.0	334
1996	243.0	9.2	3.0	7.4	8.0	271
1997	59.4	6.1	2.8	3.6	2.0	74
1998	45.5	11.0	1.0	5.0	1.0	64
1999	35.3	4.3	1.4	5.4	1.0	47
2000	11.3	9.3	3.5	9.0	1.0	34
2001	13.9	10.7	2.8	7.3	1.0	36
2002	6.7	6.9	2.4	7.8	1.0	25
2003	11.1	5.4	0.6	9.6	1.0	28
2004	18.1	10.4	0.4	7.3	1.0	37
2005	20.5	5.3	1.7	6.0	1.0	35
2006	17.2	5.8	1.3	5.7	1.0	31
2007	35.5	3.1	0.3	9.7	0.5	49
2008	68.6	4.4	-	10.4	0.5	84
2009	44.3	1.1	-	9.9	-	55
2010	42.3	2.5	-	13.0	-	58
2011	30.2	2.5	-	19.1	-	52
2012	20.0	5.3	-	8.9	-	34
2013	30.7	2.8	-	4.2	-	38
2014	17.9	2.8	-	6.2	-	27
2015	31.4	4.7	-	6.6	-	43
2016	33.6	3.0	-	3.1	-	40
2017	24.4	2.8	-	10.0	-	37
2018	32.8	3.0	-	4.1	-	40
5-yr mean 2013-2017	27.6	3.2		6.0		37
% change on 5-year mean	19	-7		-32		8

1 From 1990 to 2000, catch includes fish ranched for both commercial and angling purposes. No commercial ranching since 2000.
2 Total yield in homewater fisheries and rivers.
3 The proportion of ranched fish was not assessed between 2008 and 2018 due to a lack of microtag returns.

Table 2.3.5.2.1. Details of the 12 captured, PSAT tagged and released Atlantic salmon in October 2018. Capture and release date, capture method, origin and biological characteristics data are presented. Pop-off date and pop-off mechanisms are presented for eight tags. 'Timed' mechanisms indicates the tag released on the pre-programmed release date and 'cd' indicates the tag released due to the constant depth release mechanism. A total of four tags have not popped off yet: two are assumed 'lost' as their timed released date was early March 2019, but two are assumed active as their timed released date is May 2019. Continent of origin groups are North American (NA) and European (EUR). Region of origin groups are detailed in Figure 2.3.5.1.

Fish #	Date	Gear	COO	ROO code	ROO group	Tag Type	FL (mm)	WW (kg)	River Age	Virgin Sea Age	Pop-off Date	Pop-off Mech-anism
1	3-Oct-18	Trolling	NA	USA	Maine, United States	PSAT	68.5	5.1	Na	1.0	4-Mar-19	timed
2	6-Oct-18	Trolling	EUR	BRI	United Kingdom/Ireland	PSAT	65.0	3.6	3.0	1.0	12-Dec-18	cd
3	6-Oct-18	Trolling	EUR	BRI	United Kingdom/Ireland	PSAT	58.0	2.6	2.0	1.0	20-Oct-19	cd
4	7-Oct-18	Trolling	NA	GAS	Gaspe Peninnsula	PSAT	70.0	4.2	2.0	1.0	4-Feb-19	cd
5	7-Oct-18	Trolling	EUR	BRI	United Kingdom/Ireland	PSAT	66.0	3.8	2.0	1.0	17-Dec-18	cd
6	8-Oct-18	Trolling	NA	UNG	Ungava Bay	PSAT	66.0	3.7	5.0	1.0	-	-
7	9-Oct-18	Trolling	NA	GAS	Gaspe Peninnsula	PSAT	64.0	3.5	2.0	1.0	-	-
8	9-Oct-18	Drift gillnet	EUR	BRI	United Kingdom/Ireland	PSAT	63.5	2.5	2.0	1.0	24-Oct-18	cd
9	9-Oct-18	Trolling	EUR	BRI	United Kingdom/Ireland	PSAT	64.0	3.1	2.0	1.0	6-Dec-18	cd
10	9-Oct-18	Trolling	NA	GAS	Gaspe Peninnsula	PSAT	70.0	4.3	na	na	-	-
11	10-Oct-18	Trolling	EUR	BRI	United Kingdom/Ireland	PSAT	64.0	3.5	2.0	1.0	-	-
12	12-Oct-18	Trolling	NA	GAS	Gaspé Peninnsula	PSAT	71.0	4.6	2.0	1.0	25-Oct-18	cd
13	4-Oct-18	Trolling	NA	LAS	Labrador South	Acoustic	61.5	3.0	2.0	1.0	-	-
14	9-Oct-18	Trolling	NA	GAS	Gaspe Peninnsula	Acoustic	62.0	3.0	2.0	1.0	-	-
15	6-Oct-18	Trolling	EUR	BRI	United Kingdom/Ireland	-	63.0	3.5	2.0	1.0	-	-
16	9-Oct-18	Drift gillnet	NA	LAS	Labrador South	-	66.2	2.5	3.0	1.0	-	-
17	9-Oct-18	Drift gillnet	NA	GAS	Gaspe Peninnsula	-	71.0	3.0	2.0	1.0	-	-

Table 2.5.1. Summary of Atlantic salmon tagged and marked in 2018 - 'Hatchery' and 'Wild' juvenile refer to smolts and parr.

		Primary Tag or Mark				
Country	Origin	Microtag	External mark[2]	Adipose clip	Other Internal[1]	Total
Canada	Hatchery Adult	0	75	0	1,240	1,315
	Hatchery Juvenile	0	191	180,501	38	180,730
	Wild Adult	0	1,907	300	214	2,421
	Wild Juvenile	0	5,654	10,853	2,065	18,572
	Total	**0**	**7,827**	**191,654**	**3,557**	**203,038**
Denmark	Hatchery Adult	0	0	0	0	0
	Hatchery Juvenile	0	20,000	317,000	0	337,000
	Wild Adult	0	0	0	0	0
	Wild Juvenile	0	0	0	0	0
	Total	**0**	**20,000**	**317,000**	**0**	**337,000**
France	Hatchery Adult	0	0	0	0	0
	Hatchery Juvenile	0	0	98,774	0	98,774
	Wild Adult	0	0	0	313	313
	Wild Juvenile	0	0	0	3,700	3,700
	Total	**0**	**0**	**98,774**	**4,013**	**102,787**
Iceland	Hatchery Adult	0		0	0	0
	Hatchery Juvenile	62,931	0	0	0	62,931
	Wild Adult	0	98	0	0	98
	Wild Juvenile	4,736	0	0	0	4,736
	Total	**67,667**	**98**	**0**	**0**	**67,765**
Ireland	Hatchery Adult	0	0	0	0	0
	Hatchery Juvenile	157,832	0	0	0	157,832
	Wild Adult	0	0	0	0	0
	Wild Juvenile	3,701	0	0	0	3,701
	Total	**161,533**	**0**	**0**	**0**	**161,533**

Country	Origin	Primary Tag or Mark				
		Microtag	External mark[2]	Adipose clip	Other Internal[1]	Total
Norway	Hatchery Adult	0	0	0	0	0
	Hatchery Juvenile	0	4,000	106,544	0	110,544
	Wild Adult	0	175	588	0	763
	Wild Juvenile	0	257	12,393	0	12,650
	Total	**0**	**4,432**	**119,525**	**0**	**123,957**
Russia	Hatchery Adult	0	0	0	0	0
	Hatchery Juvenile	0	0	1,059,924	0	1,059,924
	Wild Adult	0	1,254	0	0	1,254
	Wild Juvenile	0	0	0	0	0
	Total	**0**	**1,254**	**1,059,924**	**0**	**1,061,178**
Spain	Hatchery Adult	0	0	0	0	**0**
	Hatchery Juvenile	0	154,464	0	0	**154,464**
	Wild Adult	0	0	0	0	**0**
	Wild Juvenile	0	0	0	0	**0**
	Total	**0**	**154,464**	**0**	**0**	**154,464**

[1] Includes other internal tags (PIT, ultrasonic, radio, DST, etc.)

[2]Includes Carlin, spaghetti, streamers, VIE etc.

Table 2.5.1. (Continued) Summary of Atlantic salmon tagged and marked in 2018 - 'Hatchery' and 'Wild' juvenile refer to smolts and parr.

		Primary Tag or Mark				
Country	Origin	Microtag	External mark[2]	Adipose clip	Other Internal[1]	Total
Sweden	Hatchery Adult	0	0	0	0	0
	Hatchery Juvenile	0	0	166,648	0	166,648
	Wild Adult	0	0	0	0	0
	Wild Juvenile	0	0	0	218	218
	Total	**0**	**0**	**166,648**	**218**	**166,866**
UK (England &	Hatchery Adult	0	0	0	0	0
Wales)	Hatchery Juvenile	0	0	3,463	239	3,702
	Wild Adult	0	628	0	0	628
	Wild Juvenile	4,521	0	10,150	96	14,767
	Total	**4,521**	**628**	**13,613**	**335**	**19,097**
UK (N. Ireland)	Hatchery Adult	0	0	0	0	0
	Hatchery Juvenile	8,199	0	53,713	0	61,912
	Wild Adult	0	0	0	0	0
	Wild Juvenile	0	0	0	0	0
	Total	**8,199**	**0**	**53,713**	**0**	**61,912**
UK (Scotland)	Hatchery Adult	0	0	0	0	0
	Hatchery Juvenile	0	0	0	1	1
	Wild Adult	0	319	0	18	337
	Wild Juvenile	0	0	0	3,952	3,952
	Total	**0**	**319**	**0**	**3,971**	**4,290**
USA	Hatchery Adult	0	0	0	0	0
	Hatchery Juvenile	0	0	240,304	1,449	241,753
	Wild Adult	0	0	0	2,089	2,089
	Wild Juvenile	0	0	0	0	0
	Total	**0**	**0**	**240,304**	**3,538**	**243,842**

Country	Origin	Primary Tag or Mark Microtag	External mark[2]	Adipose clip	Other Internal[1]	Total
All Countries	Hatchery Adult	0	75	0	1,240	1,315
	Hatchery Juvenile	228,962	178,655	2,226,871	1,727	2,636,215
	Wild Adult	0	4,381	888	2,634	7,903
	Wild Juvenile	12,958	5,911	33,396	10,031	62,296
	Total	**241,920**	**189,022**	**2,261,155**	**15,632**	**2,707,729**

[1] Includes other internal tags (PIT, ultrasonic, radio, DST, etc.)

[2]Includes Carlin, spaghetti, streamers, VIE etc.

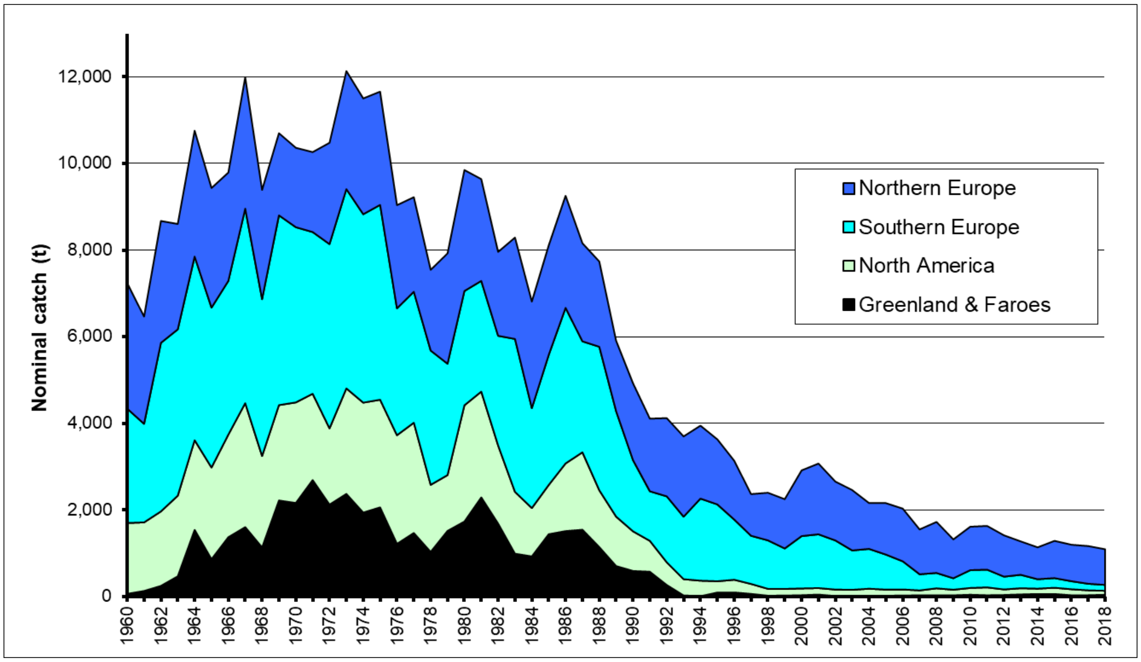


Figure 2.1.1.1. (a) Total reported nominal catch of salmon (tonnes round fresh weight) in four North Atlantic regions, 1960–2018.

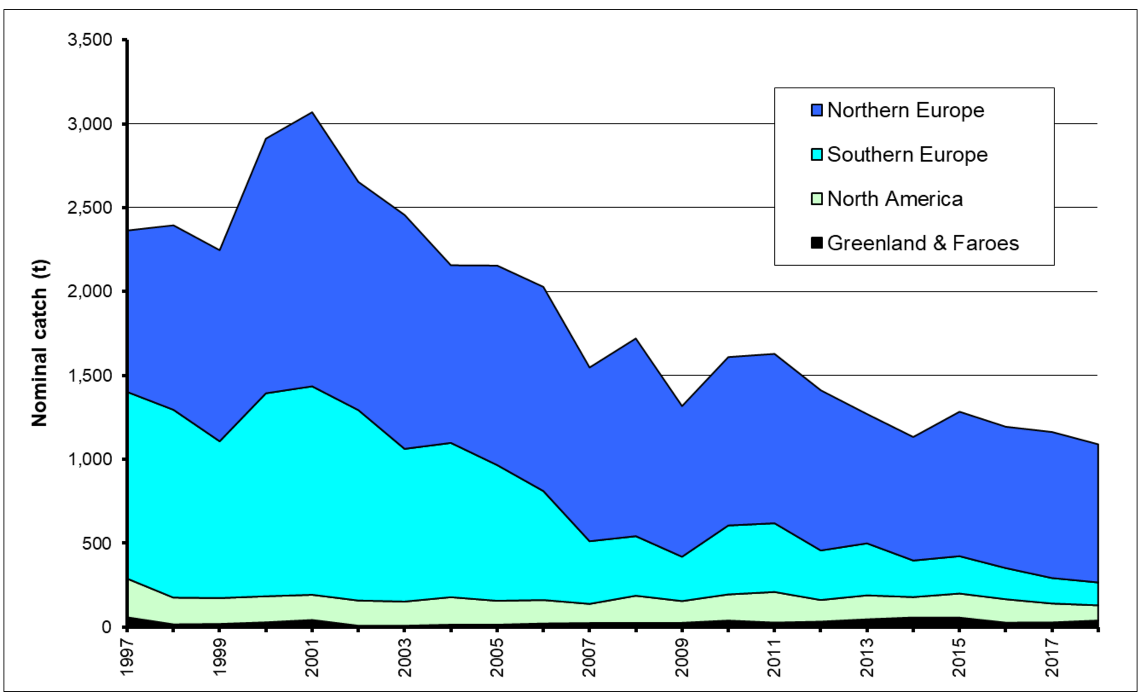


Figure 2.1.1.1. (b) Total reported nominal catch of salmon (tonnes round fresh weight) in four North Atlantic regions, 1997–2018.

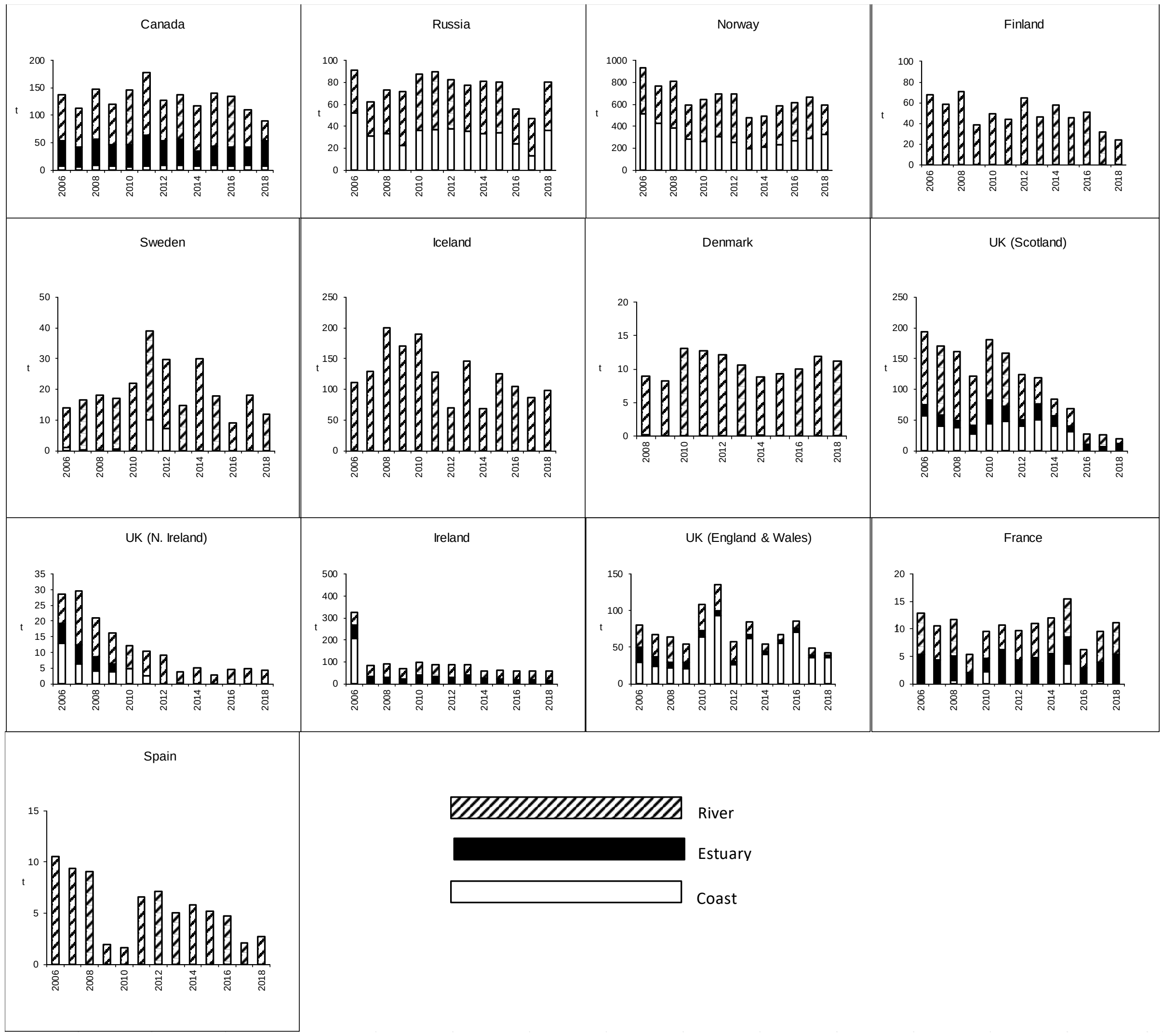


Figure 2.1.1.2. Nominal catch (tonnes) taken in coastal, estuarine and riverine fisheries by country, 2006–2018. The way in which the nominal catch is partitioned among categories varies between countries, particularly for estuarine and coastal fisheries, see text for details. Note also that the y-axes scales vary.

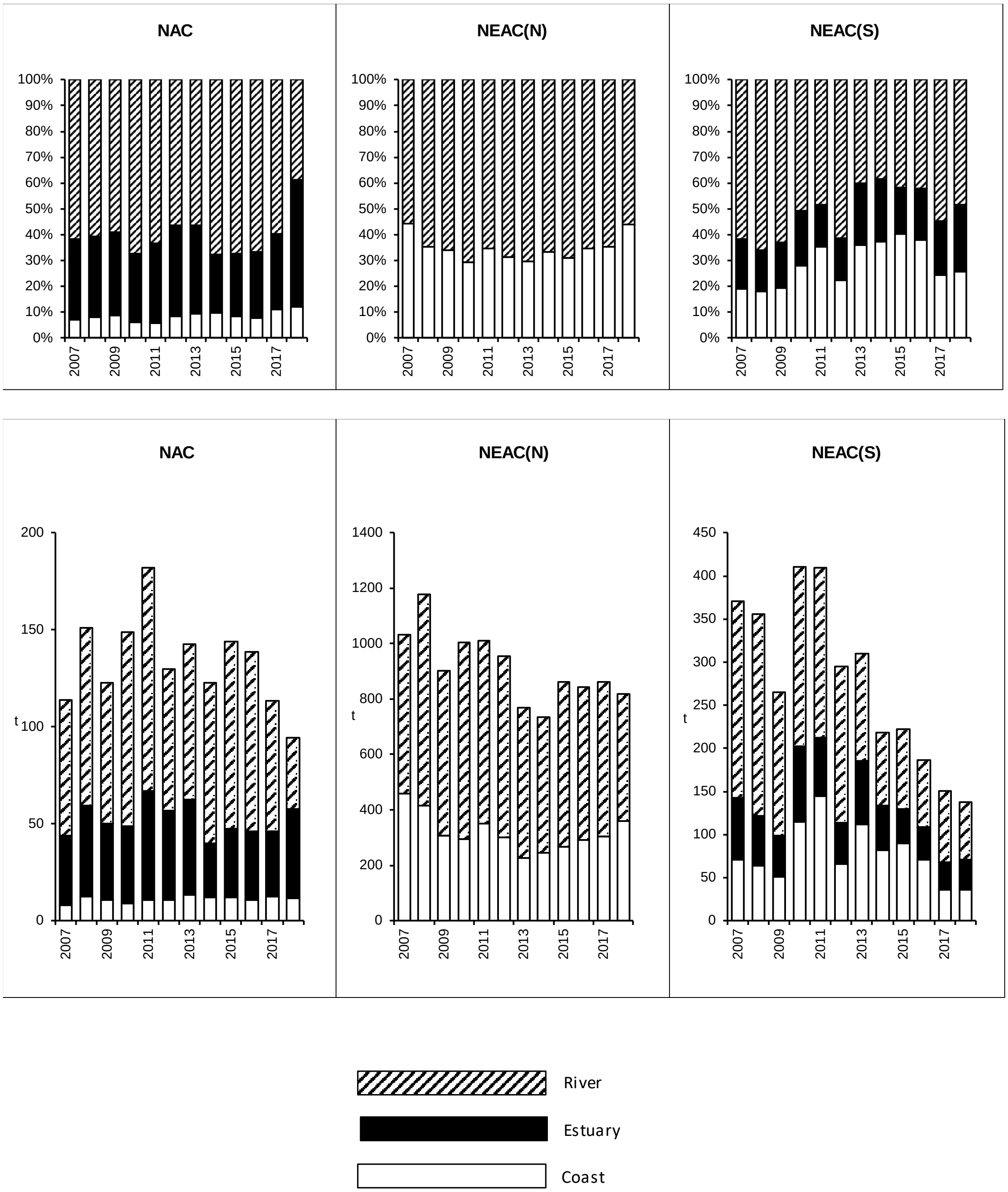


Figure 2.1.1.3. Top panel - percentages of nominal catch taken in coastal, estuarine and riverine fisheries for the NAC area (2007–2018) and for NEAC northern and southern areas (2007–2018). Bottom panel - Nominal catches (tonnes) taken in coastal, estuarine and riverine fisheries for the NAC area (2007–2018) and for NEAC northern and southern areas (2007–2018). Note that y-axes vary.

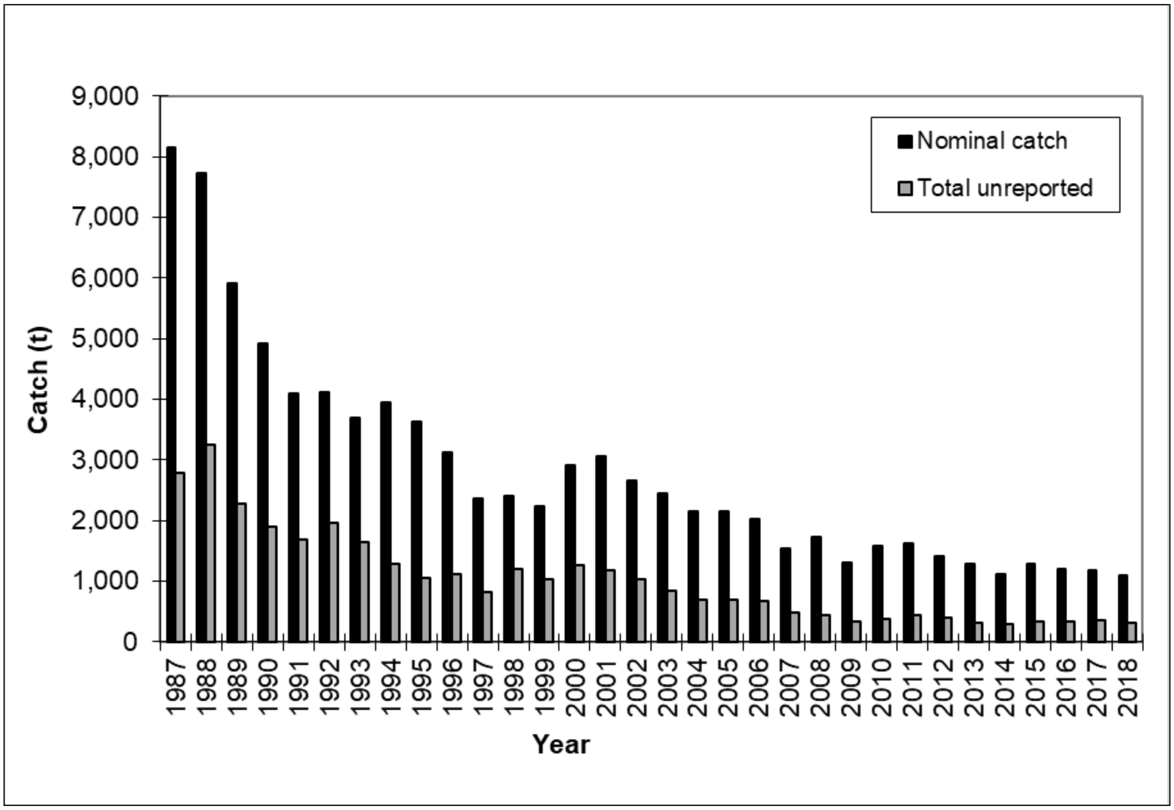


Figure 2.1.3.1. Nominal North Atlantic salmon catch and unreported catch in NASCO Areas, 1987–2018.

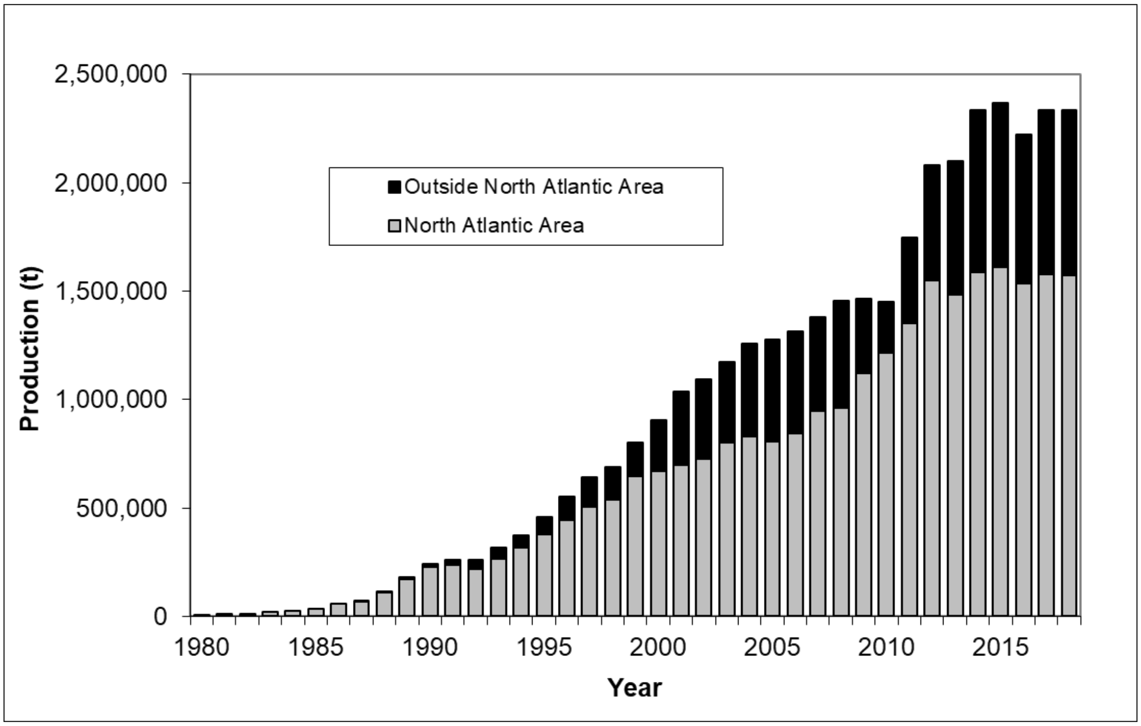


Figure 2.2.1.1. Worldwide farmed Atlantic salmon production, 1980–2018.

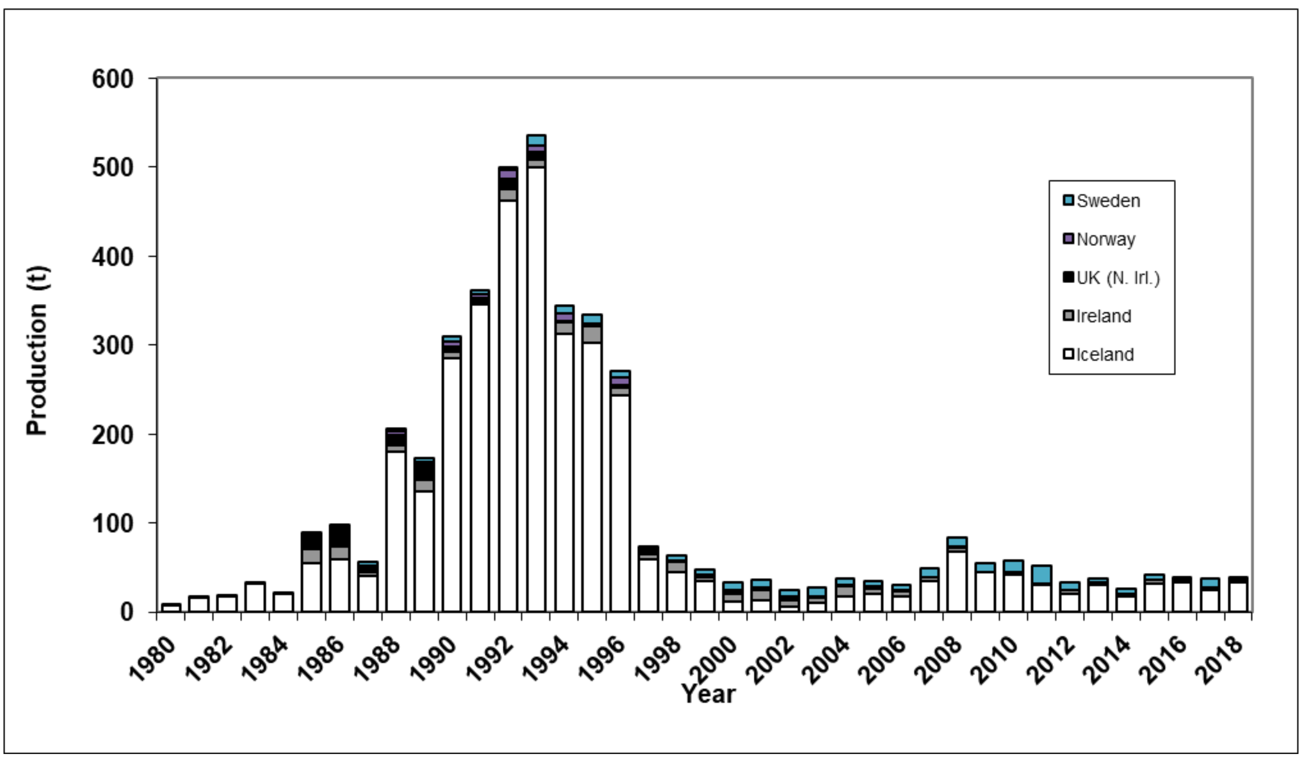


Figure 2.2.2.1. Production of ranched salmon (tonnes round fresh weight) in the North Atlantic, 1980–2018.

Figure 2.3.3.1. (Modified after Monnerjahn, 2011)

The figure shows the borders of the Federal States (dashed lines) and former salmon rivers in Germany with existing, ongoing reintroduction programs of Atlantic salmon, namely Rhine, Ems, Weser and Elbe. The main sites where natural reproduction of reintroduced salmon has been proven so far, are indicated by a cross. Further details and maps on the habitats and introduction sites are given in the EU German Focus Area Report on Habitats to NASCO (2009).

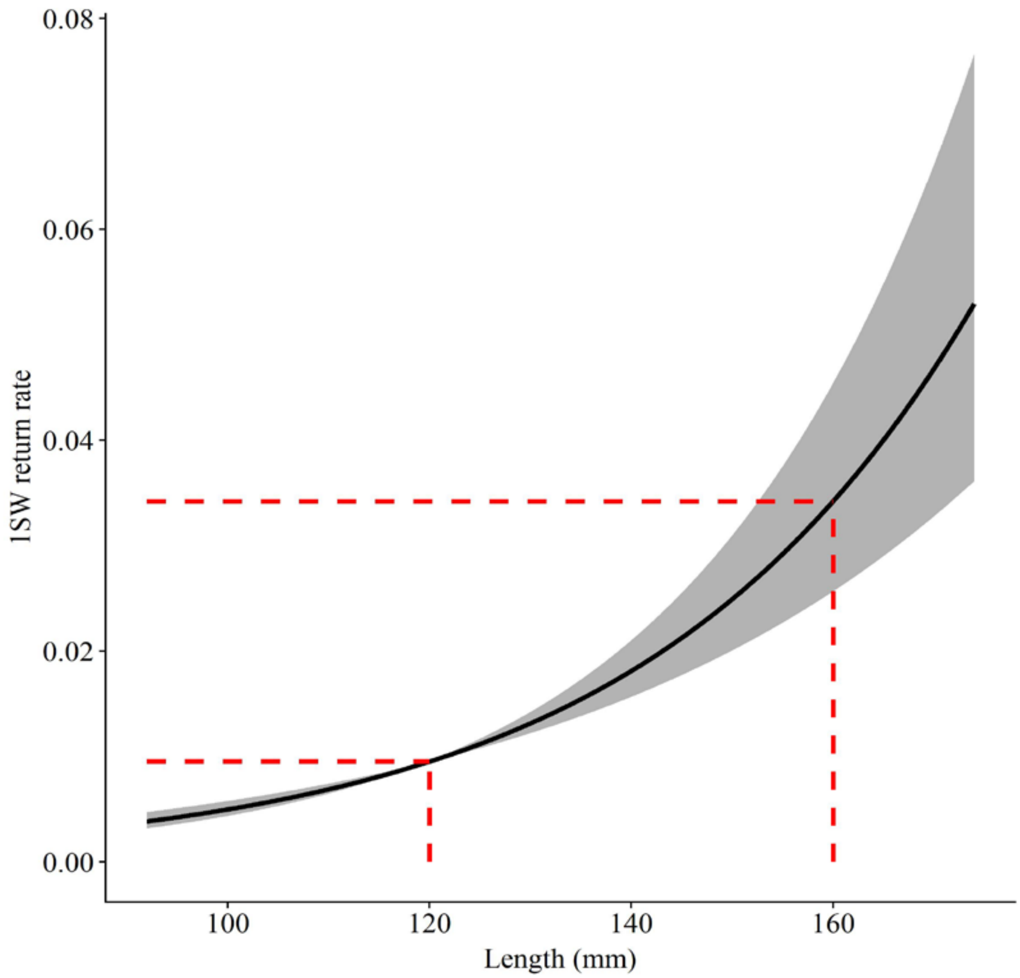


Figure 2.3.4.1. Estimated marine return rate after one winter at sea (1SW) as a function of fork length of individual Atlantic salmon (*Salmo salar*) smolt emigrating from the River Frome (Dorset, UK). Black solid line is the estimated effect and grey bands delimit the estimated 25 to 75% Bayesian credibility interval band around that effect (approximate standard errors).

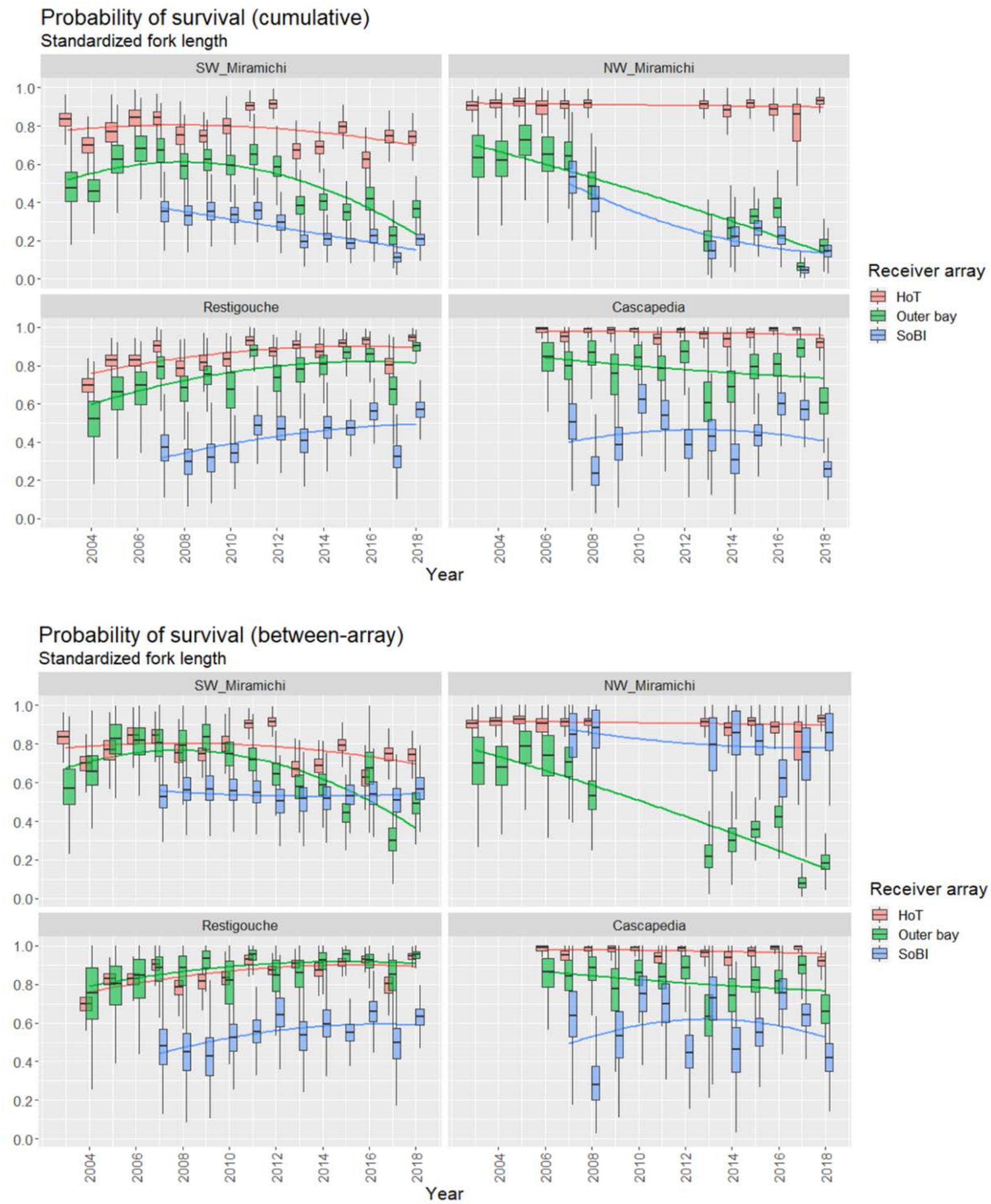


Figure 2.3.5.1.1. Plots of posterior distributions of the cumulative probability of survival (upper panel) and probability of survival between arrays (lower panel) for a smolt of centered length 14.6 cm from the point of release to the head of tide arrays (labelled HoT- Head of Tide), to the Outer Bay arrays on exit to the Gulf of St Lawrence and through the Strait of Belle Isle (labelled SoBI) on exit to the Labrador Sea for four rivers, 2003 to 2018.

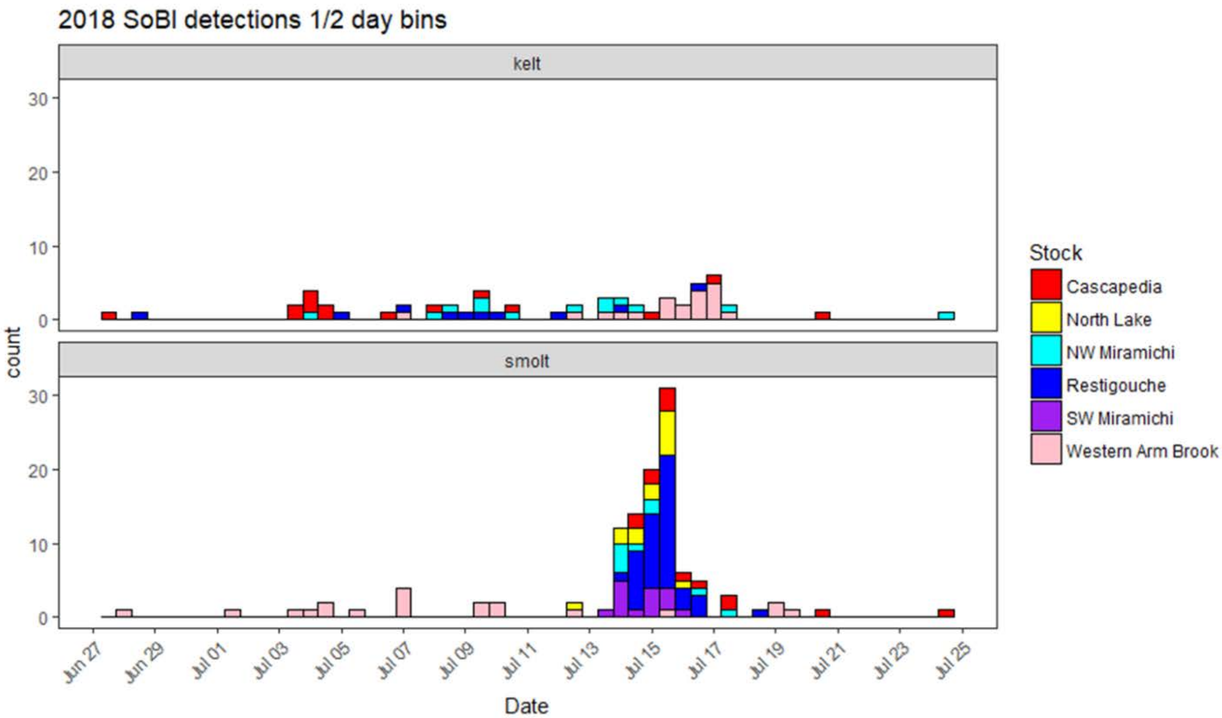


Figure 2.3.5.1.2. Counts and dates of acoustically tagged Atlantic salmon smolts and kelt from various Gulf of St Lawrence rivers crossing the Strait of Belle Isle receiver array in 2018.

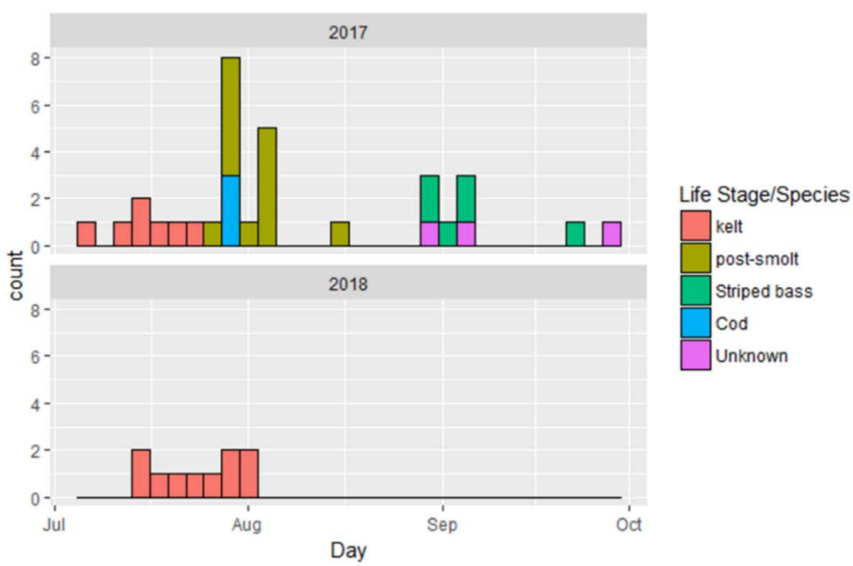


Figure 2.3.5.1.3. Counts and timing of acoustically tagged species from various research programs crossing the Port Hope Simpson (Labrador) receiver array in 2017 and 2018, up to the beginning of August 2018.

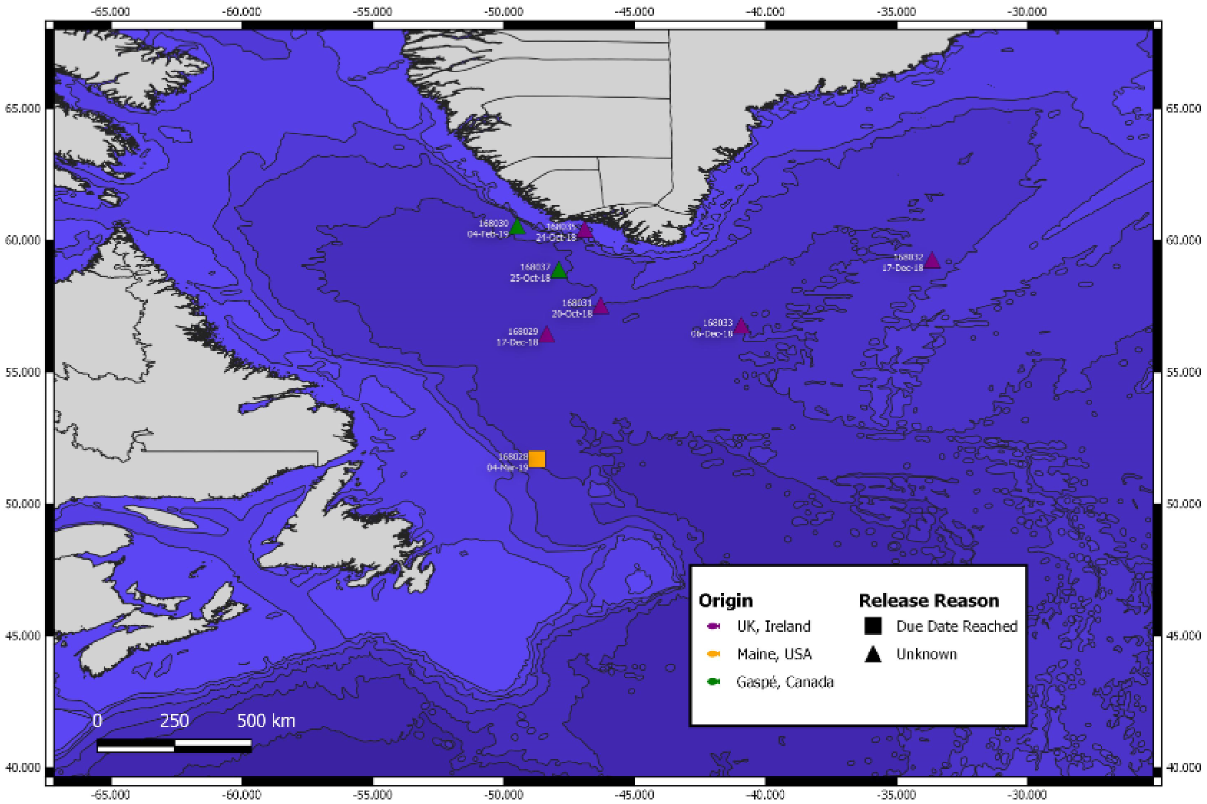


Figure 2.3.5.2.1. Pop-off location of Atlantic salmon tagged at Greenland in October 2018 identifying fish origin and pop-off mechanism as of March 17, 2019.

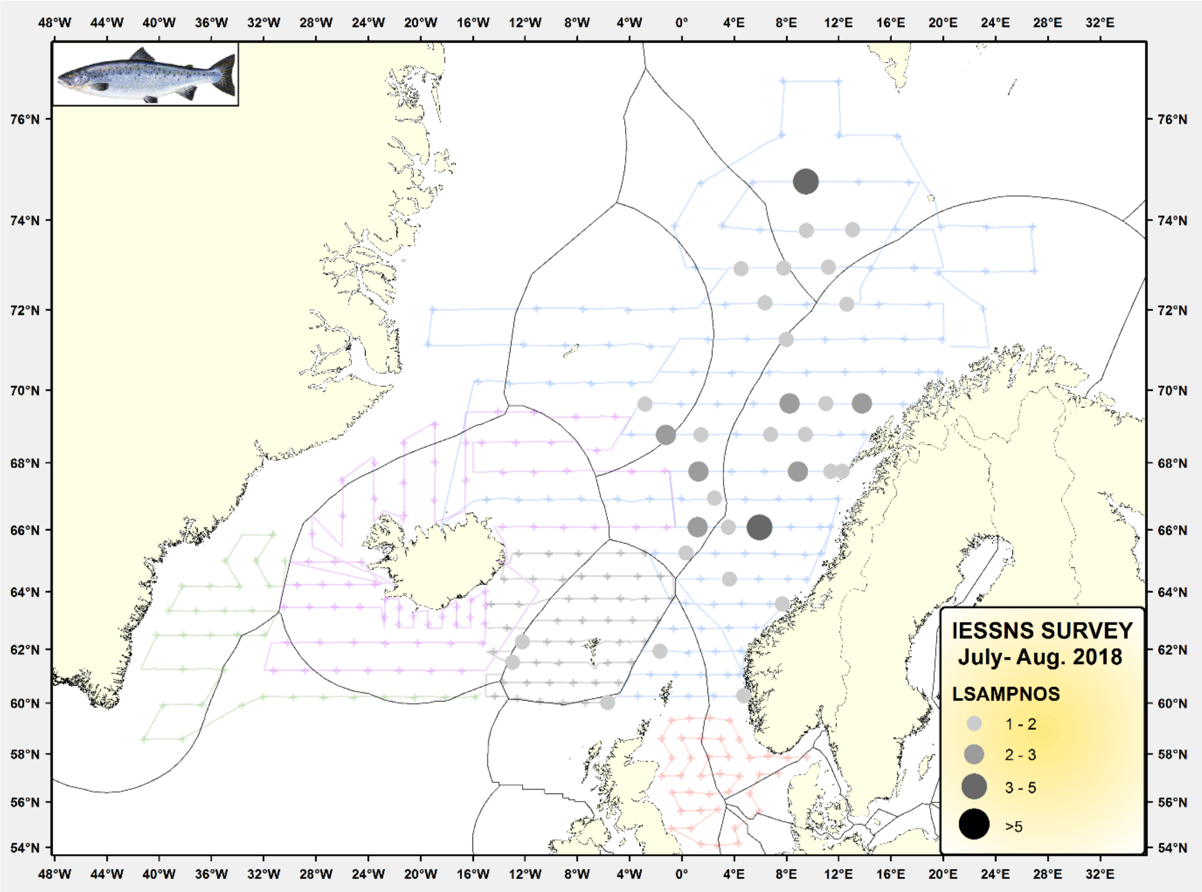


Figure 2.3.6.1.1. Catches in number of Atlantic salmon taken by the IESSNS survey in the Northeast Atlantic in July 2018. The catches are dominated by postsmolts. This is the main survey where salmon would be expected to be taken by the survey nets.

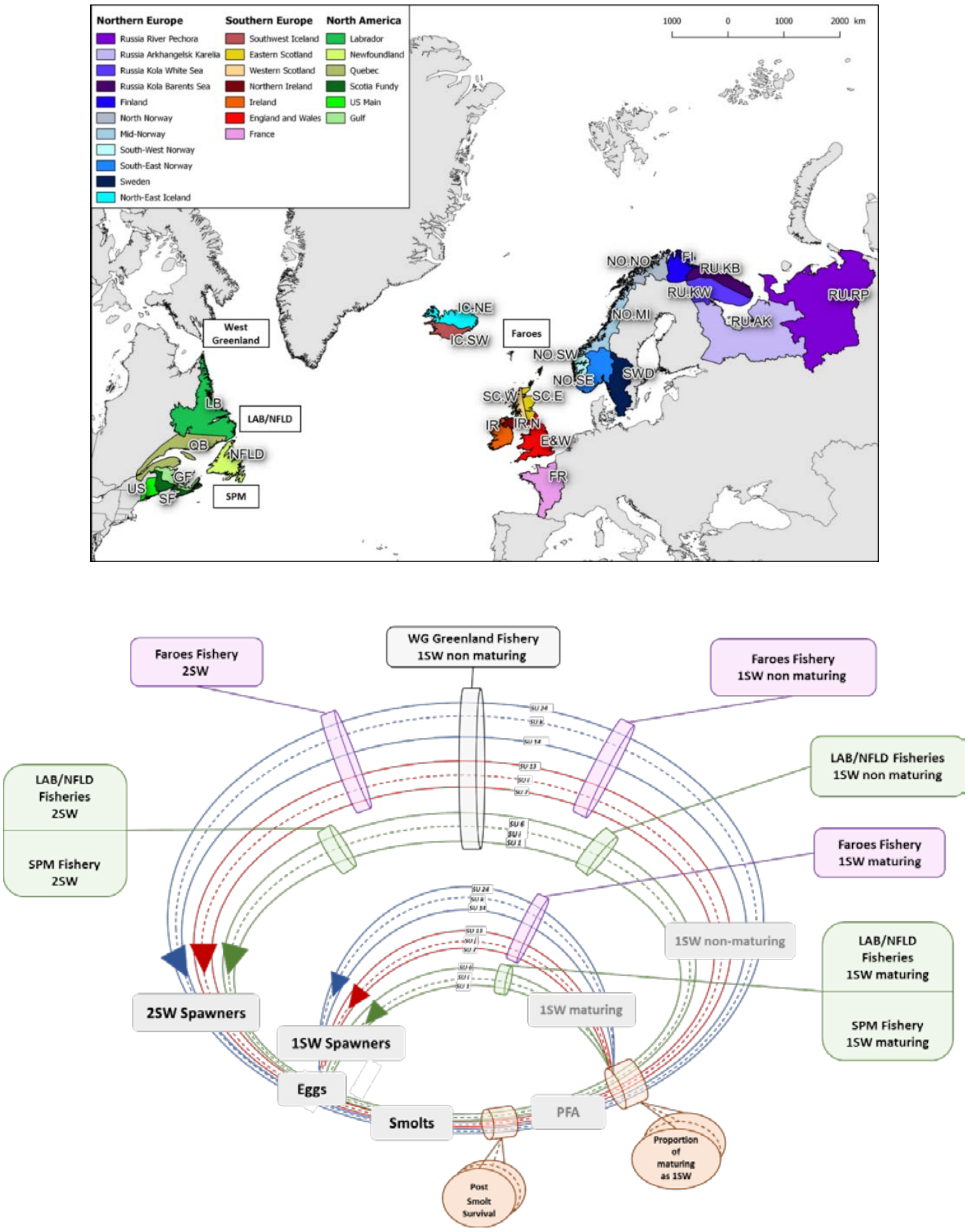


Figure 2.3.7.1.1. Schematic of the life cycle model applied to the 24 stock units of Northern and Southern NEAC and North America. Variables in light blue are the main stages considered in the stage-structured model. The smolt-to PFA survival (post-smolt survival) and the proportion of maturing PFA are estimated for the time-series (1971–2014) and modelled as a random walk with covariation among stock units. Stock units of the Northern and Southern NEAC complex are potentially harvested by the mixed-stock fishery operating around the Faroes islands as 1SW maturing and non-maturing fish, and as 2SW fish. Stock units of the NAC complex are potentially harvested by the mixed-stock fishery operating around the Labrador and Newfoundland and Saint Pierre and Miquelon as 1SW maturing and non-maturing fish, and as 2SW fish. Stock units of the Northern and Southern NEAC complex are potentially harvested by the mixed-stock fishery operating at West Greenland as 1SW non maturing fish.

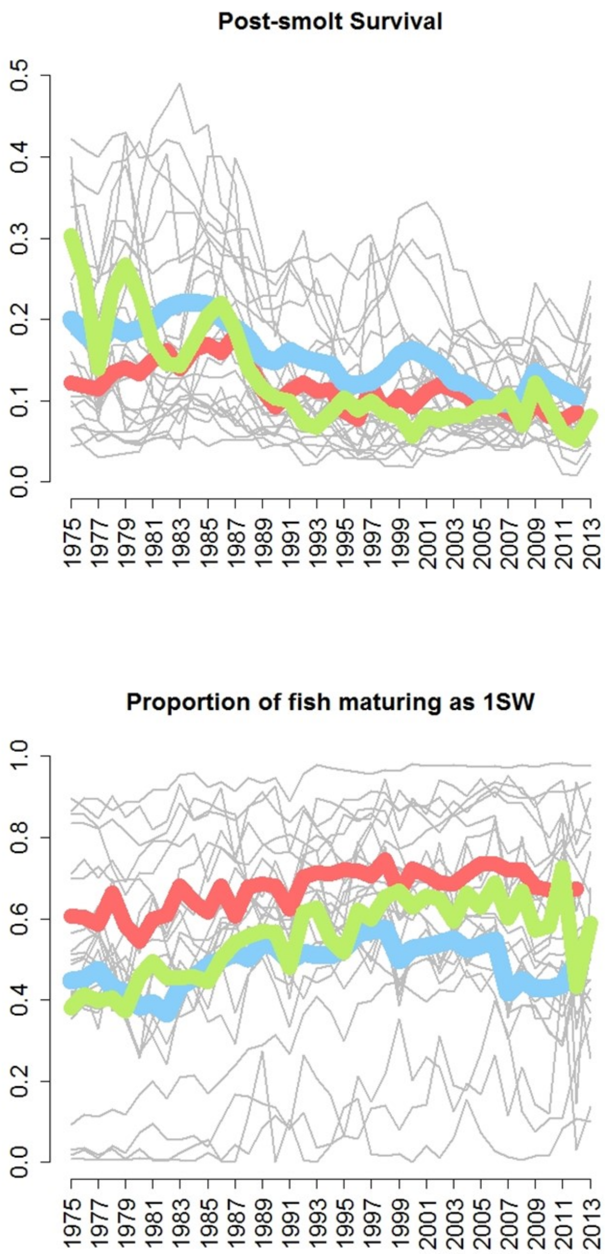


Figure 2.3.7.1.2. Time-series of (top panel) smolt-PFA survival (plotted in the natural scale) and (bottom panel) proportion of fish maturing as 1SW for the 24 Stock Units (thin grey lines) and averaged over the three continental stock groups (thick colour lines). NAC=green, NNEAC= blue, SNEAC=red.

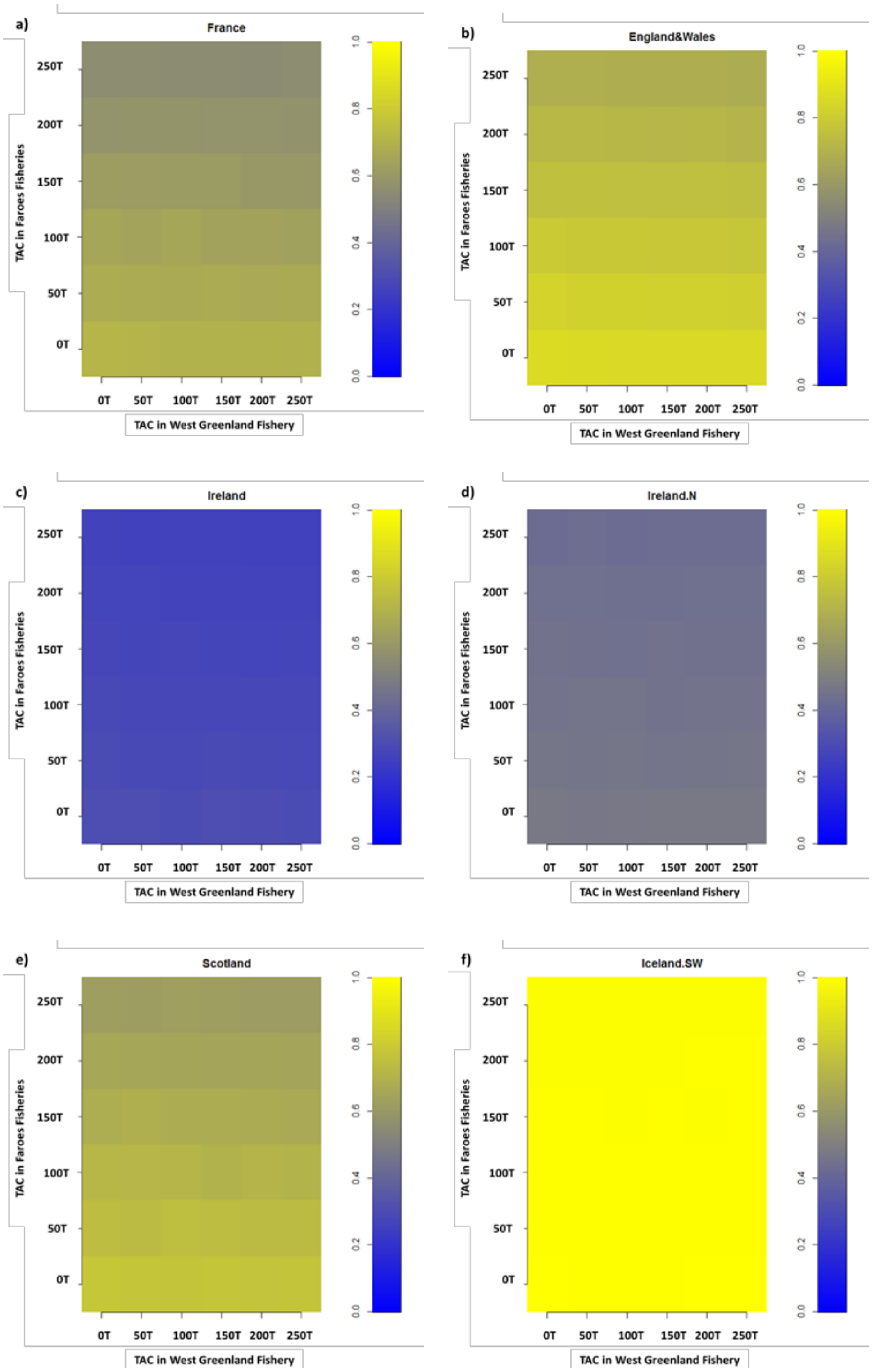


Figure 2.3.7.1.3. Probability to reach Conservation Limits under different catches options at West Greenland and Faroes: 0, 50, 100, 150, 200 and 250 t (five year projections) for Stock Units of the Southern European complex potentially impacted by both mixed-stock fisheries.

3 Northeast Atlantic Commission area

3.1 NASCO has requested ICES to describe the key events of the 2018 fisheries

In 2018, ICES advised that there were no mixed-stock fisheries options on the NEAC stock complexes at the Faroes for the fishing seasons 2018/2019 to 2020/2021 (ICES, 2018). NASCO subsequently agreed a multiannual (three year) decision for the Faroes fishery stipulating not to set a quota for these seasons. The measure for 2019/2020 and 2020/2021 was predicated on the application of a Framework of Indicators (FWI) to provide an annual check that there had been no substantive change in the forecasts of abundance. When the FWI was applied in January 2019, there was no indication that the forecast estimates of abundance for the three stock complexes in the FWI had been underestimated. There was, therefore, no need for a full reassessment by ICES in 2019.

3.1.1 Fishing at Faroes

No fishery for salmon has been prosecuted since 2000.

3.1.2 Key events in NEAC homewater fisheries

Several countries in the NEAC area reported unusually warm and dry conditions in 2018 and these will have affected salmon runs and catches; further details are provided in Section 2.3.2.

Total landings from marine fisheries in Norway were higher than landings from river fisheries for the first time since 2004. This is not due to changes in management, but most likely due to the dry conditions causing salmon to stay in the sea and delay their river return combined with less favourable fishing conditions in rivers.

3.1.3 Gear and effort

No significant changes in gear type used were reported in 2018; however, changes in effort were recorded. The number of gear units licensed or authorised in several of the NEAC area countries provides a partial measure of effort (Table 3.1.3.1), but does not take into account other restrictions, for example, closed seasons. In addition, there is no indication from these data of the actual number of licences actively utilized or the time each licensee fished.

The numbers of gear units used to take salmon with nets and traps have declined markedly over the available time-series in all NEAC countries. This reflects the closure of many fisheries and increasingly restrictive measures to reduce levels of exploitation in many countries. There are fewer measures of effort in respect of in-river rod fisheries, and these indicate differing patterns over the time-series. However, anglers in all countries are making increasing use of catch and release (see below).

Trends in effort are shown in Figures 3.1.3.1 and 3.1.3.2 for the Northern and Southern NEAC countries respectively. In the Northern NEAC area, driftnet effort in Norway accounted for the majority of the effort expended in the early part of the time-series. However, this fishery closed in 1989, reducing the overall effort substantially. The number of bag nets and bend nets in Norway has decreased for the past 15–20 years and in 2018, was the second lowest in the time-series for bend nets. There was a slight increase in the number of bag nets from the previous year. The number of gear units in the coastal fishery in the Archangelsk region, Russia, has been relatively stable and increased again in 2018 after having ended with the lowest figure in the time-series in 2017. The number of units in the in-river fishery at the Archangelsk region decreased markedly between 1996 and 2002 but has since remained relatively stable.

The numbers of gear units licensed in UK (England & Wales) and Ireland (Table 3.1.3.1) were among the lowest reported in the time-series. In UK (Scotland) the number of fixed engine and net and coble was the lowest in the time-series. For UK (Northern Ireland) driftnet, draftnet, bag nets and boxes decreased throughout the time-series and no commercial fishing activity has occurred in coastal Northern Irish waters since 2012. Licence numbers remained stable for over a decade, before decreasing from 2002 due to fishery closures. In France, the number of nets in estuaries has been reduced while the in-river effort has remained relatively stable after a marked reduction in 1993. The 2018 figure shows a slight decrease from the previous year.

Rod effort trends, where available, have varied for different areas across the time-series (Table 3.1.3.1). In the Northern NEAC area, the number of anglers and fishing days in Finland showed a marked decrease in 2017 following a new fishery agreement between Finland and Norway with the number of fishing days decreasing in the River Teno/Tana from 31 923 in 2016 to close to 10 000 in the last two years. In the Southern NEAC area, rod licence numbers increased from 2001 to 2011 in UK (England & Wales), subsequently declined between 2012 and 2016, but showed a marked increase in numbers in 2017 due to the introduction of a new free licence for young fishermen (18 years or younger). There was a drop in the annual licence sales in 2018; although similar a number of these free junior licences were issued, as in 2017. In Ireland, there was an increase in the early 1990s owing to the introduction of one-day licences. In France, the effort was fairly stable throughout the time period but in 2017 and 2018 there was a slight increase in the number of licences issued.

3.1.4 Catches

NEAC area catches are presented in Table 3.1.4.1. The provisional nominal catch in the NEAC area in 2018 (960 t) was 60 t below the updated catch for 2017 (1020 t) and 7% and 20% below the previous five-year and ten-year means respectively. Compared to the 1960–1980 time period mean, the 2018 nominal catch showed an 85% decrease. It should be noted that changes in nominal catch may reflect changes in exploitation rates and the extent of catch and release in rivers, in addition to stock size, and thus cannot be regarded as a direct indicator of abundance. The provisional total nominal catch in Northern NEAC in 2018 (824 t) was slightly lower than the updated catch for 2017 (870 t) and the previous five-year mean (815 t), but 5% below the previous ten-year mean. Catches in 2018 were close to long-term means in most Northern NEAC countries although the catch in Finland has decreased from 51 t in 2016, 32 t in 2017, to 24 t in 2018. In the Southern NEAC area the provisional total nominal catch for 2018 (136 t) is the lowest in the time-series, 14 t below the updated catch for 2017 (150 t) and was 42% and 52% below the previous five-year and ten-year means respectively. Catches in 2018 were close to or below long-term means in all Southern NEAC countries. The greatest reductions in catches in Southern NEAC were observed in UK (Scotland) where the catch in 2018 (19 t) was 8 t below the catch in 2017 (27 t) and below the previous five- and ten-year means (65 and 107 t, respectively). Figure 3.1.4.1 shows the trends in nominal catches of salmon in the Southern and Northern NEAC areas from 1971 until 2018. The catch in the Southern NEAC area has declined over the period from about 4500 t in 1972 to 1975 to below 1000 t since 2003. The catch fell sharply in 1976, and between 1989 and 1991, and continues to show a steady decline over the last 15 years from over 1000 t to currently below 150 t. The catch in the Northern NEAC area declined over the time-series, although this decrease was less distinct than the reductions noted in the Southern NEAC area. The catch in the Northern NEAC area varied between 2000 t and 2800 t from 1971 to 1988, fell to a low of 962 t in 1997, and then increased to over 1600 t in 2001. Catch in the Northern NEAC area has exhibited a downward trend since and has been consistently below 1000 t since 2012. Thus, the catch in the Southern NEAC area, which comprised around $^{2}/_{3}$ of the total NEAC catch in the early 1970s, has been lower than that in the Northern NEAC area since 1999, and has been around $^{1}/_{5}$ of the total catch in the NEAC area in recent years.

3.1.5 Catch per unit of effort (CPUE)

CPUE can be influenced by various factors, such as fishing conditions, perceived likelihood of success and experience. Both CPUE of net and rod fisheries might be affected by measures taken to reduce fishing effort, for example, changes in regulations affecting gear. If changes in one or more factors occur, a pattern in CPUE may not be immediately evident, particularly over larger areas. It is, however, expected that for a relatively stable effort, CPUE can reflect changes in the status of stocks and stock size. CPUE may be affected by increasing rates of catch and release in rod fisheries.

The CPUE data are presented in Tables 3.1.5.1 to 3.1.5.6. The CPUE for rod fisheries have been derived by relating the catch to rod days or angler season. CPUE for net fisheries were calculated as catch per licence-day, gear-day, licence-tide, trap-month or crew-month.

In the Southern NEAC area, CPUE has decreased in the net fisheries in the SW and NW regions of the UK (England & Wales) and a long-term increase was noticed in the NE region (Figure 3.1.5.1). The CPUE for the net and coble fisheries in UK (Scotland) show a general decline over the time-series with a slight increase in some of the most recent years (Table 3.1.5.5). The CPUE for the fixed engine fisheries has shown a slight increase since 2010, but in 2016–2018 there was no information on effort due to changes in fishery regulations (Table 3.1.5.5). The CPUE values for rod fisheries in UK (England & Wales) show a general positive trend (Figure 3.1.5.1).

In the Northern NEAC area the CPUE for the commercial coastal net fisheries in the Archangelsk area, Russia, showed a general decrease, but an increase again since 2016. The CPUE for the Archangelsk in-river fishery has shown a general increase (Figure 3.1.5.1 and Table 3.1.5.2). Other Russian river fisheries showed 2018 CPUE figures that were mostly above the means of the previous five years (Table 3.1.5.2) and the overall trend shows a small increase across the time-series (Figure 3.1.5.1). In Finland, the CPUE per angler-season in the rivers Teno and Näätämöjoki has been relatively stable over time (Figure 3.1.3.1). After the major change in fishery regulation on the Teno, the 2017 figures were clearly higher than in the previous year and the five-year means, but decreased again in 2018 (Table 3.1.5.1). For the River Näätämöjoki, CPUE figures for 2018 were at or lower than the long-term and five-year means. A general positive trend was observed for the CPUE in the Norwegian net fisheries (Figure 3.1.5.1). Similarly, the CPUE values in 2018 were higher than the long-term means both for bag nets and bend nets (Table 3.1.5.6).

3.1.6 Age composition of catches

The percentage of 1SW salmon in NEAC catches is presented by country in Table 3.1.6.1 and shown separately for Northern and Southern NEAC countries in Figure 3.1.6.1. Except for Iceland, the proportion of 1SW salmon has declined for all countries over the period 1987–2018. The decline in the proportion of 1SW salmon is evident in both stock complexes.

The overall percentage of 1SW fish in Northern NEAC catches remained reasonably consistent averaging 66% in the period 1987–2000 (range 61% to 72%), but has fallen in more recent years

(2001–2018) to 57% (range 48% to 69%), when greater variability among countries and years has also been evident. Comparing the two periods, the proportion of 1SW has decreased in Russia, Norway, Finland, and Sweden significantly so for the three latter, while a significant increase has been apparent for Iceland. On average, 1SW fish comprise a higher percentage of the catch in Iceland than in the other Northern NEAC countries in the period 2001–2018 (Table 3.1.6.1).

In the Southern NEAC area, the percentage of 1SW fish in catches averaged 60% (range 49% to 64%) in 1987–2000 and 55% (range 45% to 63%) in 2001–2018. Comparing the two periods, the percentage of 1SW salmon has decreased in all Southern NEAC countries presented (Table 3.1.6.1), significantly so for Spain (data from the Asturias region).

3.1.7 Farmed and ranched salmon in catches

The contribution of farmed and ranched salmon to national catches in the NEAC area in 2018 was again generally low in most countries, with the exception of Norway, Iceland and Sweden, and is similar to the values reported in previous years. Farmed and ranched fish are included in assessments of the status of national stocks (Section 3.3) for Norway.

The estimated proportion of farmed salmon in Norwegian angling catches in 2018 was at the lower end of the range (3%) in the time-series, whereas the proportion in samples taken from Norwegian rivers in autumn was together with last year the lowest in the time-series (4%). No current data are available for the proportion of farmed salmon in coastal fisheries in Norway. A small number of escaped farmed salmon (11) was also reported from catches in Icelandic rivers in 2018, and nine of them were genetically traced back to the cages they had escaped from. Small proportions (<0.5%) of farmed salmon were also reported in catches from Ireland and UK (Scotland).

The number of farmed salmon that escaped from Norwegian farms in 2018 is reported to be approximately 160 000 fish (provisional figure), substantially up from the previous year (15 000). An assessment of the likely effect of these fish on the estimates of PFA has been reported previously (ICES, 2001).

The release of smolts for commercial ranching purposes ceased in Iceland in 1998, but ranching for rod fisheries in two Icelandic rivers continued in 2018. Icelandic catches have traditionally been split into two separate categories, wild and ranched (Table 2.1.1.1). In 2018, 32.8 t were reported as ranched salmon in contrast to 65.6 t harvested as wild. Similarly, Swedish catches have been split into two separate categories, wild and ranched (Table 2.1.1.1). In 2018, 4.1 t were reported as ranched salmon in contrast to 12.4 t harvested as wild. Ranching occurs on a much smaller scale in Ireland.

3.1.8 National origin of catches

3.1.8.1 Catches of Russian salmon in northern Norway

A mixed-stock Atlantic salmon fishery operates off the coast of northern Norway, in the three northernmost counties: Nordland, Troms and Finnmark. Annual landings in these counties in the last ten years varied between 114 and 165 t with most catches taken in Finnmark (Statistics Norway). Different salmon stocks from Norwegian, Finnish and Russian rivers migrate along the coastal areas at the time when the fishery operates.

Previously the Working Group has reported on investigations of the coastal fisheries in northern Norway where genetic methods have been applied to analyse the stock composition of this mixed-stock fishery (ICES, 2015b) based on results from the Kolarctic Salmon project (Kolarctic

ENPI CBC programme 2007–2013). Overall, the incidence of Russian salmon in the coastal catches varied strongly within season and among fishing regions, averaging 17% for 2011–2012 in the coastal catches in Finnmark County, while nearly 50% of all salmon captured in Varangerfjord, close to the border, were of Russian origin. Catches in May and June were composed of salmon from wider geographical areas, whereas catches in July and August contained more salmon from local populations (Niemelä *et al*., 2014). However, it should be noted that these estimated proportions of Russian salmon in the catches are based on the extended season permitted for the research fishery in the Kolarctic Salmon project. Proportions of Russian salmon are likely to be different in the regular fishing season, especially since the proportion of Russian salmon was highest in the early period of the research fishery, when there is no regular fishery.

In autumn 2015, the Russian Federation and Norway signed the Memorandum of Understanding between the Ministry of Climate and Environment (Norway) and the Federal Agency for Fishery (the Russian Federation) on cooperation in management of and monitoring and research on wild Atlantic salmon in Finnmark County (Norway) and the Murmansk region (the Russian Federation). The Working Group on Atlantic salmon in Finnmark County and the Murmansk Region was established under the MoU consisting of managers and scientists from each country as appointed by Parties.

The first report of the Group "Status and Management of Salmon Stocks in Finnmark County and the Murmansk Region" was prepared in 2018 and sent to the Ministry of Climate and Environment (Norway) and the Federal Agency for Fishery (the Russian Federation), however the report has not been published yet. There was no meeting of the Group in 2018 as it was postponed to March 2019.

3.1.9 Exploitation indices of NEAC stocks

Exploitation rates have been plotted for 1SW and MSW salmon from the Northern NEAC (1983 to 2018) and Southern NEAC (1971 to 2018) areas and are displayed in Figure 3.1.9.1. National exploitation rates are an output of the NEAC PFA Run Reconstruction Model. These were combined as appropriate by weighting each individual country's exploitation rate to the reconstructed returns. Data gathered prior to the 1980's represent estimates of national exploitation rates while post-1980s exploitation rates have often been subject to more robust analysis informed by projects such as the national coded wire programme in Ireland.

The exploitation of 1SW salmon in both Northern NEAC and Southern NEAC areas has shown a general decline over the time-series (Figure 3.1.9.1), with a notable sharp decline in 2007 as a result of the closure of the Irish driftnet fisheries in the Southern NEAC area. The weighted exploitation rate on 1SW salmon in the Northern NEAC area was 39% in 2018, which was slightly lower than the previous five-year (42%) and ten-year (42%) means. Exploitation on 1SW fish in the Southern NEAC complex was 12% in 2018, which is at the same level as the previous five-year (11%) and the ten-year (12%) means.

The exploitation rate of MSW fish also exhibited an overall decline over the time-series in both Northern NEAC and Southern NEAC areas (Figure 3.1.9.1), with a notable sharp decline in 2008. Exploitation on MSW salmon in the Northern NEAC area was 42% in 2018, which was slightly lower than the previous five-year mean (44%) but showed a decline from the ten-year mean (45%). Exploitation on MSW fish in Southern NEAC was 12% in 2018, which was at the same level as the previous five-year (11%) and ten-year (12%) means.

The rate of change of exploitation of 1SW and MSW salmon in NEAC countries over the available time periods is shown in Figure 3.1.9.2. This was derived from the slope of the linear regression between time and natural logarithm transformed exploitation rate. The relative rate of change of exploitation over the entire time-series indicates an overall reduction of exploitation in most Northern NEAC countries for 1SW and MSW salmon (Figure 3.1.9.2). Exploitation in Finland has been relatively stable over the time period, while the largest rate of reduction has been for 1SW salmon in Russia. The Southern NEAC countries have also shown a general decrease in exploitation rate (Figure 3.1.9.2) on both 1SW and MSW components. The greatest rate of decrease shown for both 1SW and MSW fish was in UK (Scotland), while France (MSW) and Iceland (both 1SW and MSW) showed relative stability in exploitation rates during the time-series. Exploitation for 1SW salmon in France shows an increase over the time-series.

3.2 Management objectives and reference points

3.2.1 NEAC conservation limits

River-specific Conservation Limits (CLs) have been derived for salmon stocks in most countries in the NEAC area (France, Ireland, UK (England & Wales), UK (Northern Ireland), Finland, Norway and Sweden) and these are used in national assessments. In these cases, CL estimates for individual rivers are summed to provide estimates at a country level for these countries.

River-specific CLs have also been derived for salmon stocks in UK (Scotland) and for a small number of rivers in Russia, but these are not yet used in national assessments. An interim approach has been developed for countries that do not use river-specific CLs in the national assessment. This approach is based on the establishment of pseudo-stock–recruitment relationships for national salmon stocks; further details are provided in the Stock Annex (Annex 6).

CL estimates for all individual countries are summed to provide estimates for the northern and southern NEAC stock complexes (Table 3.2.1.1). These data are also used to estimate the Spawner Escapement Reserves (SERs; the CL increased to take account of natural mortality between the recruitment date of 1st January in the first sea winter and return to home waters). SERs are estimated for maturing and non-maturing 1SW salmon from the individual countries as well as Northern NEAC and Southern NEAC stock complexes (Table 3.2.1.1). The Working Group considers that the current national CL and SER levels may be less appropriate to evaluating the historical status of stocks (e.g. pre-1985), that in many cases have been estimated with less precision.

3.2.2 Progress with setting river-specific conservation limits

3.2.2.1 UK (Scotland)

In UK (Scotland), 218 rivers have been identified which support salmon fisheries. In 2018, assessment was undertaken at the scale of the river, or on groups of smaller neighbouring rivers where rod fishery data were not yet available by river. In addition, stocks associated with Special Areas of Conservation (SACs), designated under the EU Habitats Directive due to their importance for Atlantic salmon, were assessed separately. In 2018, a total of 173 assessable areas were identified and informed the basis of management measures implemented in 2019.

In previous years, the number of salmon eggs required was estimated to fall between 1.1 and 9.8 eggs/m^2 of wetted area of salmon habitat, derived from internationally monitored rivers at the same latitude (Crozier *et al.*, 2003). This was used in the absence of Scotland-specific information and Marine Scotland Science has been working to produce Scotland-specific egg requirements. In 2018, Bayesian hierarchical modelling methods (Prévost *et al.*, 2003; White *et al.*, 2016) were employed to fit conservation limits for 11 Scottish rivers with spawning stock and recruitment abundance data and transport them to all assessable areas without such data, using a Ricker stock–recruitment model and taking into account the wetted area available to salmon, productivity and geographic location. This has led to a general reduction in the median egg requirement for assessable areas lacking stock and recruitment data. Methodological development is ongoing to investigate whether alternative stock–recruitment relationships and additional river covariates can improve the model.

In addition, the methods used to estimate the numbers of adults from rod catches have also been re-examined. The new model found that rod exploitation rate was related to month and flow conditions but the geographic component that had been included in previous years' models was removed. Using this method annual exploitation rates derived for UK (Scotland) are slightly larger than those from Ireland, similar to those from UK (England & Wales) and generally lower than those used in Norway.

3.3 Status of stocks

3.3.1 The NEAC PFA run-reconstruction model

The Working Group uses a run-reconstruction model to estimate the PFA of salmon from countries in the NEAC area (Potter *et al*., 2004). PFA in the NEAC area is defined as the number of 1SW recruits on 1 January in the first sea winter. The model is generally based on the annual retained catch in numbers of 1SW and MSW salmon in each country, which are raised to take account of minimum and maximum estimates of non-reported catches and exploitation rates of these two sea-age groups. These values are then raised to take account of the natural mortality between 1 January in the first sea winter and the mid-date of return of the stocks to freshwater.

Where the standard input data are themselves derived from other data sources, the raw data may be included in the model to permit the uncertainty in these analyses to be incorporated into the modelling approach. Some countries have developed alternative approaches to estimate the total returning stock, and the Working Group reports these changes and the associated data inputs in the year in which they are first implemented.

For some countries, the data are provided in two or more regional blocks. In these instances, model output is provided for the regions and is combined to provide stock estimates for the country as a whole. The input data for Finland comprise the total Finnish and Norwegian catches (net and rod) for the River Teno, and the Norwegian catches from this river are not included in the input data for Norway.

A Monte Carlo simulation (9999 resamples) is used to estimate confidence intervals on the stock estimates. Further details of the model are provided in the Stock Annex, including a step-by-step walkthrough of the modelling process.

3.3.2 Changes to the national input data for the NEAC PFA run-reconstruction model

Model inputs are described in detail in Section 2.2 of the Stock Annex, and input data for the current year are provided in Appendix 3 of the Stock Annex. No changes were made the national/regional input data for the model beyond adding new data for 2018 and updating values for 2017 when necessary.

3.3.3 Changes to the NEAC PFA run-reconstruction model

The exploitation rate for Northern and Southern NEAC has so far been estimated as the difference between the number of returns and spawners divided by the number of returns. This calculation provided inaccurate exploitation rates for Northern NEAC because some spawners in Russia are returns from the previous year, so called 'delayed spawners'. This has been changed so that the exploitation rate is estimated as the retained catch divided by the returns, where the catch does not include the catch of delayed spawners.

3.3.4 Description of national stocks and NEAC stock complexes as derived from the NEAC run-reconstruction model

The NEAC PFA run-reconstruction model provides an overview of the status of national salmon stocks in the Northeast Atlantic. It does not capture variations in the status of stocks in individual rivers or small groups of rivers, although this has been addressed, in part, by the regional splits within some countries and the analysis set out in Section 3.3.5.

The model output for each country has been displayed as a summary sheet (Figures 3.3.4.1(a–j)) comprising the following:

- PFA and SER of maturing 1SW and non-maturing 1SW salmon.
- Homewater returns and spawners (90% confidence intervals) and CLs for 1SW and MSW salmon.
- Exploitation rates of 1SW and MSW salmon in homewaters estimated from the returns and catches.
- Total catch (including unreported) of 1SW and MSW salmon.
- National pseudo stock–recruitment relationship (PFA against lagged egg deposition) is used to estimate CLs in countries that do not provide one based upon river-specific estimates (Section 3.2). This panel also includes the sum of the river-specific CLs where this is used in the assessment.

Tables 3.3.4.1–3.3.4.6 summarise salmon abundance estimates for individual countries and stock complexes in the NEAC area. The PFA of maturing and non-maturing 1SW salmon and the numbers of 1SW and MSW spawners for the Northern NEAC and Southern NEAC stock complexes are shown in Figure 3.3.4.2.

The model provides an index of the current and historical status of stocks based on fisheries data. The 5th and 95th percentiles shown by the whiskers in each of the plots (Figures 3.3.4.1 and 3.3.4.2) reflect the uncertainty in the input data. It should also be noted that the results for the full time-series can change when the assessment is re-run from year to year and as the input data are refined. In this regard, changes to the data inputs for UK (Scotland) resulted in alterations to the PFA and spawner time-series and changes in CL and SER values for the Southern NEAC stock complex.

Status of stocks is assessed relative to the probability of exceeding CLs, or for PFA, SERs. Based on the NEAC run-reconstruction model, the status of the two age groups of the Northern NEAC stock complex, prior to the commencement of distant-water fisheries in the latest available PFA year, were considered to be at full reproductive capacity (Section 1.5; Figure 3.3.4.2). In the Southern NEAC complex, 1SW and MSW stocks were considered to be suffering reduced reproductive capacity prior to the commencement of distant-water fisheries in the latest available PFA year (Figure 3.3.4.2).

The abundances of both maturing 1SW and non-maturing 1SW recruits (PFA) for northern NEAC (Figure 3.3.4.2) show a general decline over the time period, with the decline more marked in the maturing 1SW stock. Both Northern NEAC stocks have however, been at full reproductive capacity prior to the commencement of distant-water fisheries throughout the time-series.

1SW spawners in the Northern NEAC stock complex have been at full reproductive capacity throughout the time-series. MSW spawners, on the other hand, while generally being at full reproductive capacity, have periodically been at risk of suffering reduced reproductive capacity (Figure 3.3.4.2).

The abundance of maturing 1SW recruits (PFA) for Southern NEAC (Figure 3.3.4.2) demonstrates a declining trend over the time period. Both maturing and non-maturing 1SW stock complexes were at full reproductive capacity prior to the commencement of distant-water fisheries in the early part of the time-series. Since the early 1990s, however, the non-maturing 1SW stock has been at risk of suffering reduced reproductive capacity in the majority of the assessment years (Figure 3.3.4.2). The maturing 1SW stock, on the other hand, was first assessed as being at risk of suffering reduced reproductive capacity in 2009. For most years thereafter, the stock has either been at risk of suffering reduced reproductive capacity or suffering reduced reproductive capacity (Figure 3.3.4.2).

Both the 1SW and MSW spawning stocks in the Southern NEAC stock complex have been at risk of suffering reduced reproductive capacity or suffering reduced reproductive capacity for the majority of the time-series and are suffering reduced reproductive capacity in the latest assessment (Figure 3.3.4.2).

Individual country stocks

The assessment of PFA against SER (Figure 3.3.4.3) and returns and spawners against CL are shown for individual countries (Figures 3.3.4.4 and 3.3.4.5) and by regions (Figures 3.3.4.6 and 3.3.4.7) for the most recent PFA and return years. These assessments show the same broad contrasts between Northern (including Iceland) and Southern NEAC stocks as was apparent in the stock complex data.

For all countries in Northern NEAC, the PFAs of both maturing and non-maturing 1SW stocks were at full reproductive capacity prior to the commencement of distant-water fisheries in the most recent PFA year, except for non-maturing 1SW stocks in the River Teno/Tana (Finland & Norway) which were at risk of suffering reduced reproductive capacity (Figure 3.3.4.3). Spawning stocks in Sweden and Norway were at full reproductive capacity in the most recent assessment. However, both maturing and non-maturing spawners in the River Teno/Tana (Finland & Norway) and Russia were at risk of suffering or suffering reduced reproductive capacity (Figures 3.3.4.4 and 3.3.4.5). In addition, maturing spawners in Iceland were at risk of suffering reduced reproductive capacity.

In Southern NEAC, all maturing 1SW stocks with the exception of UK (Northern Ireland) were suffering reduced reproductive capacity both prior to the commencement of distant-water fisheries and at spawning (Figures 3.3.4.3 and 3.3.4.4). In UK (Northern Ireland), the PFA and spawners of maturing 1SW stocks were at full reproductive capacity (Figures 3.3.4.3 and 3.3.4.4). For Southern NEAC non-maturing 1SW stocks, UK (Northern Ireland) and UK (England & Wales) were at full reproductive capacity before the commencement of distant-water fisheries (Figures 3.3.4.3 and 3.3.4.4) and at risk of suffering, or suffering reduced reproductive capacity in other countries. Southern NEAC MSW spawning stocks were at full reproductive capacity in UK (Northern Ireland) and UK (England & Wales) while elsewhere they were at risk of suffering, or suffering, reduced reproductive capacity (Figure 3.3.4.5).

Figures 3.3.4.6 and 3.3.4.7 provide more detailed descriptions of the status of returning and spawning stocks by country and region (where assessed) for both Northern and Southern NEAC stocks, again for the most recent return year.

3.3.5 Compliance with river-specific conservation limits

In the NEAC area, nine jurisdictions currently assess salmon stocks using river-specific CLs (Tables 3.3.5.1 and 3.3.5.2 and Figure 3.3.5.1). The attainment of CLs is assessed based on spawners, after fisheries.

- For the River Teno/Tana (Finland/Norway), the number of individual stocks with established CLs rose from nine between 2007 and 2012 (with five annually assessed against CL), to 24 (25 including the main stem) since 2013 (with seven to 15 assessed against CL). No stocks met CL prior to 2013. Since then, CL attainment has fluctuated within a range of 20% to 40% of individual stocks assessed. In 2018, including the main stem, six out of 15 (40%) assessable stocks attained CL.
- CLs were established for 439 Norwegian salmon rivers in 2009, but CL attainment was retrospectively assessed for 165–170 river stocks back to 2005. An average of 178 stocks have been assessed since 2009. An overall increasing trend in CL attainment was evident from 39% in 2009 to 89% in 2017 (data are pending for 2018).
- Since 1999, CLs have been established for 85 river stocks in Russia (Murmansk region) with eight of these annually assessed for CL attainment, 88% of which have consistently met their CL during the time-series.
- Sweden established CLs in 2016 for 23 stocks which rose to 24 stocks in 2017. Eight of the 20 stocks assessed (40%) met CL in 2016, six of the 22 stocks (27%) assessed met CL in 2017 and seven out of 23 (30%) met CL in 2018.
- In France, CLs were established for 28 river stocks in 2011, rising to 35 by 2016. The percentage of stocks meeting CL peaked in 2013 (74%) and declined to a consistent 60% since 2016. The 1SW stock component had a high CL attainment of 80% in 2018.
- Ireland established CLs for all 141 stocks in 2007, rising to 143 since 2013 to include catchments above hydroelectric dams. The mean percentage of stocks meeting CLs is 37% over the time-series, with the highest attainment of 41% achieved in 2011 and 2012. This has been followed by a progressive decline thereafter to 29% in 2018.
- UK (England & Wales) established CLs in 1993 for 61 rivers, increasing to 64 from 1995 with an overall mean of 46% meeting CL. In 2018, only 22% of assessed stocks met CL which is the joint lowest year in the time-series along with 2014.
- Data on UK (Northern Ireland) river-specific CLs are presented from 2002, when CLs were assigned to ten river stocks. Since 2012, 19 stocks have established CLs with up to 17 of these assessed annually for CL attainment. A mean of 41% have met their CLs over the presented time-series. A downward trend is evident since 2016 (76%), with 44% of assessed stocks attaining CL in 2018.
- UK (Scotland) has established CLs for 173 assessment groups (rivers and small groups of rivers) with retrospective assessment conducted to 2011. For domestic management, stock status is expressed as the probability of achieving CL and attainment is set at 60%. Mean attainment over the time-series was 55%. In 2017, the most recent reporting year available, 49% of assessment groups met CL.
- Iceland has set provisional CLs for all salmon producing rivers and continues to work towards finalising an assessment process for determining CL attainment.
- No river-specific CLs have been established for Denmark, Germany, Portugal, and Spain.

3.3.6 Marine survival (return rates) for NEAC stocks

An overview of the trends of marine survival for wild and hatchery-reared smolts returning to homewaters (i.e. before homewater exploitation) is presented in Figures 3.3.6.1 and 3.3.6.2. The figures provide the percent change in return rates between five-year means for the smolt years 2008 to 2012 and 2013 to 2017 for 1SW salmon, and 2007 to 2011 and 2012 to 2016 for 2SW salmon. Note, however, that Northern NEAC is now only represented by one river: River Imsa (1SW and 2SW) in Norway. Tagging of smolts with pit-tags started in three rivers in Norway in 2016 and more rivers are likely to be added in future. Furthermore, the problem with salmon return counting at the weir in River Vesturdalsa in Iceland has been solved, so data will be available from 2018 again. As of 2018, the River Halselva has been removed from these data, because it is not considered a representative river; the time-series ended in 2011, and it is suspected that the stock is maintained by fish straying from the nearby River Alta. It should also be pointed out that percent-change of survival rates for hatchery smolts from Southern NEAC are only available for Irish and Icelandic rivers, due to a gap in the time-series (2007–2010) of rivers in UK (Northern Ireland). The annual return rates for different rivers and experimental facilities are presented in Tables 3.3.6.1 and 3.3.6.2.

The overall trend for hatchery smolts in Southern NEAC areas is generally indicative of a decline in marine survival except for River Burrishoole (Ireland). Northern NEAC hatchery smolts, represented only by River Imsa in Norway, shows a decline in return rates of MSW, but an increase for 1SW smolts (Figure 3.3.6.2). For the wild smolts in the Southern NEAC areas eight out of 15 dataseries show a decrease. For the River Imsa data show an increase in 1SW but a decrease in 2SW return rates in the most recent five-year period compared to the previous five years (Figure 3.3.6.1). The percentage change between the mean of the five-year periods varied from a 68% decline (River Dee 1SW) to a 48% increase (River Scorff) (Figure 3.3.6.1). However, the scale of change in some rivers is influenced by low return numbers creating high uncertainty, which may have a large consequence on the percentage change.

Least squared (or marginal mean) mean annual return rates were calculated to provide indices of survival for northern and southern 1SW and 2SW returning adult wild and hatchery salmon in the NEAC area (Figure 3.3.6.3). Values were calculated to balance for variation in the annual number of contributing experimental groups through application of a GLM (generalised linear model) with survival related to smolt year and river, each as factors, with a quasi-Poisson distribution (log-link function). Each of the hatchery and wild, 1SW and 2SW, northern and southern area river survival indices were run independently, as presented in Tables 3.3.6.1 and 3.3.6.2. Only return rates given in separate 1SW and 2SW age classes were used. Note, again, that the River Halselva has been removed in 2018, and the River Halselva had generally low sea survival. Note also that estimated year effects are presented on a log-scaled y-axis, and that the y-axes differ between panels. In summary:

- 1SW return rates of wild smolts to the Northern NEAC area (three river indices) although varying annually, have generally decreased since 1980. The time-series can be seen as three periods, 1981 to 1993, 1994 to 2005 and 2006 to 2017. In the first period, survival was generally high (mean 8.6%), before declining in 1994 to a period of low, but gradually improving survival (mean of 3.9%), followed by a further decline from 2004 to 2006. Survival in the third period (2006 to 2017) has been at the lowest level (mean of 2.1%). The return rate for the last point in the time-series (for the 2017 smolt cohort) of 3.0% is down on the 2016 return rate of 3.4%. Additionally, there is a variable return rate for the 2SW wild component (comprising three river indices), with the most recent return rate (for 2016 smolt cohort) of 1.7%, representing a slight increase on the figure from the previous year.

- Return rates of 1SW wild smolts to the Southern NEAC area (eight river indices) have generally decreased since 1980. A steep decrease between 1988 and 1989 was followed by a decline from around 13.8% to around 5.0% over the period 1993 to 2010. An increase in 2009 was followed by two years of declining survival. This subsequently improved slightly for the 2012 smolt cohort to 6.0%, declined for the 2013 cohort to 2.9% (the lowest in the time-series), and increased to 5.7% for the 2015 cohort with the latest figure being slightly lower or 4.6% (2017 cohort). There is a weak negative trend for the 2SW wild component (five river indices), and pre-1999 rates were generally higher (mean 2.2%) than post-2000 rates (mean 1.3%). Following the recovering return rate in 2015, from 1.0% in 2014 to 1.4%, the return rate of the most recent cohort (2016) was back down to the 2014 level, or 1.0%.
- 1SW return rates of hatchery smolts to the Northern NEAC area (four river indices) although varying annually, have decreased slightly since 1980. This seems to be driven by a decreased return rate since 2000 (2000–2017 mean 1.8%) compared to the preceding period (1981–1999 mean 3.5%). The negative trend is not evident for the 2SW hatchery component (four river indices). The increase observed from the 2007 to the 2009 smolt cohorts has not been maintained. The most recent return rate in 2016 (0.3%) is lower compared to the preceding year (0.9%).
- 1SW return rates of hatchery smolts to the Southern NEAC area (13 river indices) although varying annually, have decreased strongly since 1980. The returns since the 2003 cohort have been low with the highest return rate being 2.5% for the 2007 cohort, which is the same as the lowest return for the period from 1980 to 2003 (1995 cohort). The return of 1.0% for the 2017 cohort were down on the previous year, and was the second lowest in the series, after 2009. The ten most recent years include the nine lowest return rates in the time-series, and again indicate a persistent period of poor marine survival. There is only one 2SW hatchery component for the southern NEAC area (River Ranga, Iceland), but since 2002 there have been no 2SW adults returns from hatchery smolts.

The low return rates in recent years highlighted in these analyses are broadly consistent with the trends in estimated returns and spawners as derived from the PFA model (Section 3.3.4), and that abundance is strongly influenced by factors in the marine environment.

The method to estimate smolt and spawner runs in French index rivers was revised in 2016. A novel harmonised hierarchical Bayesian framework was built to analyse index rivers data and to provide Bayesian estimates that integrate all available data (Servanty and Prévost, 2016). The new models provide revised time-series of abundance of parr, smolts and spawners in the four French index Rivers, Bresle (Normandy), Oir (Normandy), Scorff (Brittany), and Nivelle (Basque country). Parr are not monitored in the Bresle. Smolts are not monitored in the Nivelle. Return rates are estimated from smolt-to-adult returns, except for the Nivelle where return rates are from parr to adult. Time-series of high return rates in the River Oir (Normandy, France) must be considered with caution. Indeed, a large number of spawners originating in other rivers of the Bay of Mont Saint Michel probably stray into the River Oir and artificially increase the ratio of spawners/smolts used to calculate the return rates. All estimates are based on wild fish only except for the River Nivelle where juvenile stocking occurred from 1986 to 1995, which contributed to adult returns from 1988 to 2000.

Table 3.1.3.1. Number of gear units licensed or authorized by country and gear type.

Year	England & Wales					UK (Scotland)		UK (N. Ireland)			Ireland				France		
	Gillnet licences	Sweepnet	Hand-held net	Fixed engine	Rod & Line	Fixed engine[1]	Net and coble[2]	Driftnet	Draftnet	Bagnets and boxes	Driftnets No.	Draftnets	Other nets Commercial	Rod	Rod and line licences in freshwater	Com. nets in freshwater[5]	Drift net Licences in estuary[6,7]
1971	437	230	294	79	-	3080	800	142	305	18	916	697	213	10566	-	-	-
1972	308	224	315	76	-	3455	813	130	307	18	1156	678	197	9612	-	-	-
1973	291	230	335	70	-	3256	891	130	303	20	1112	713	224	11660	-	-	-
1974	280	240	329	69	-	3188	782	129	307	18	1048	681	211	12845	-	-	-
1975	269	243	341	69	-	2985	773	127	314	20	1046	672	212	13142	-	-	-
1976	275	247	355	70	-	2862	760	126	287	18	1047	677	225	14139	-	-	-
1977	273	251	365	71	-	2754	684	126	293	19	997	650	211	11721	-	-	-
1978	249	244	376	70	-	2587	692	126	284	18	1007	608	209	13327	-	-	-
1979	241	225	322	68	-	2708	754	126	274	20	924	657	240	12726	-	-	-
1980	233	238	339	69	-	2901	675	125	258	20	959	601	195	15864	-	-	-
1981	232	219	336	72	-	2803	655	123	239	19	878	601	195	15519	-	-	-
1982	232	221	319	72	-	2396	647	123	221	18	830	560	192	15697	4145	55	82
1983	232	209	333	74	-	2523	668	120	207	17	801	526	190	16737	3856	49	82
1984	226	223	354	74	-	2460	638	121	192	19	819	515	194	14878	3911	42	82
1985	223	230	375	69	-	2010	529	122	168	19	827	526	190	15929	4443	40	82
1986	220	221	368	64	-	1955	591	121	148	18	768	507	183	17977	5919	58[8]	86
1987	213	206	352	68	-	1679	564	120	119	18	768	507	183	17977	5724[9]	87[9]	80
1988	210	212	284	70	-	1534	385	115	113	18	836	507	183	11539	4346	101	76
1989	201	199	282	75	-	1233	353	117	108	19	801	507	183	16484	3789	83	78
1990	200	204	292	69	-	1282	340	114	106	17	756	525	189	15395	2944	71	76
1991	199	187	264	66	-	1137	295	118	102	18	707	504	182	15178	2737	78	71
1992	203	158	267	65	-	851	292	121	91	19	691	535	183	20263	2136	57	71
1993	187	151	259	55	-	903	264	120	73	18	673	457	161	23875	2104	53	55
1994	177	158	257	53	37278	749	246	119	68	18	732	494	176	24988	1672	14	59
1995	163	156	249	47	34941	729	222	122	68	16	768	512	164	27056	1878	17	59
1996	151	132	232	42	35281	643	201	117	66	12	778	523	170	29759	1798	21	69
1997	139	131	231	35	32781	680	194	116	63	12	852	531	172	31873	2953	10	59
1998	130	129	196	35	32525	542	151	117	70	12	874	513	174	31565	2352	16	63
1999	120	109	178	30	29132	406	132	113	52	11	874	499	162	32493	2225	15	61
2000	110	103	158	32	30139	381	123	109	57	10	871	490	158	33527	2037	16	51
2001	113	99	143	33	24350	387	95	107	50	6	881	540	155	32814	2080	18	63
2002	113	94	147	32	29407	426	102	106	47	4	833	544	159	35024	2082	18	65
2003	58	96	160	57	29936	363	109	105	52	2	877	549	159	31809	2048	18	60
2004	57	75	157	65	32766	450	118	90	54	2	831	473	136	30807	2158	15	62
2005	59	73	148	65	34040	381	101	93	57	2	877	518	158	28738	2356	16	59
2006	52	57	147	65	31606	364	86	107	49	2	875	533	162	27341	2269	12	57
2007	53	45	157	66	32181	238	69	20	12	2	0	335	100	19986	2431	13	59
2008	55	42	130	66	33900	181	77	20	12	2	0	160	0	20061	2401	12	56
2009	50	42	118	66	36461	162	64	20	12	2	0	146	38	18314	2421	12	37
2010	51	40	118	66	36159	189	66	2	1	2	0	166	40	17983	2200	12	33
2011	53	41	117	66	36991	201	74	2	1	2	0	154	91	19899	2540	12	29
2012	51	34	115	73	35135	237	79	1	1	2	0	149	86	19588	2799	12	25
2013	49	29	111	62	33301	238	59	0	0	0	0	181	94	19109	3010	12	25
2014	48	34	109	65	31605	204	56	0	0	0	0	122	37	18085	2878	12	20
2015	52	33	102	63	30847	127	65	0	0	0	0	100	6	18460	2850	12	20
2016	49	34	105	62	30214	13	43	0	0	0	0	98	4	18303	3015	19	20
2017	46	32	112	57	35162	10	41	0	0	0	0	105	5	18212	4214	20	20
2018	38	30	87	57	31655	0	26	0	0	0	0	97	8	16700	3937	19	20
Mean 2013-2017	49	32	108	62	32,226	118	53	0	0	0	0	121	29	18,434	3,193	15	21
% change[3]	-22.1	-7.4	-19.3	-7.8	-1.8	-100.0	-50.8	0.0	0.0	0.0	0.0	-20.0	-72.6	-9.4	23.3	26.7	-4.8
Mean 2008-2017	50	36	114	65	33,978	156	62	5	3	1	0	138	40	18,801	2,833	14	29
% change[3]	-24.6	-16.9	-23.5	-11.8	-6.8	-100.0	-58.2	-100.0	-100.0	-100.0	0.0	-29.8	-80.0	-11.2	39.0	40.7	-29.8

[1] Number of gear units expressed as trap months.
[2] Number of gear units expressed as crew months.
[3] (2018/mean - 1) * 100
[4] Dash means "no data"
[5] Lower Adour only since 1994 (Southwestern France), due to fishery closure in the Loire Basin.
[6] Adour estuary only (Southwestern France).
[7] Number of fishermen or boats using drift nets: overestimates the actual number of fishermen targeting salmon by a factor 2 or 3.
[8] Common licence for salmon and sea trout introduced in 1986, leading to a short-term increase in the number of licences issued.
[9] Compulsory declaration of salmon catches in freshwater from 1987 onwards.

Table 3.1.3.1. Continued. Number of gear units licensed or authorized by country and gear type.

	Norway				Finland					Russia	
					The Teno River			R. Näätämö	Kola Peninsula	Archangel region	
					Recreational fishery		Local rod and	Recreational	Catch-and-release	Commercial,	
Year	Bagnet	Bendnet	Liftnet	Driftnet	Tourist anglers		net fishery	fishery	Fishing days	number of gears	
				(No. nets)	Fishing days	Fishermen	Fishermen	Fishermen		Coastal	In-river
1971	4608	2421	26	8976	-	-	-	-	-	-	-
1972	4215	2367	24	13448	-	-	-	-	-	-	-
1973	4047	2996	32	18616	-	-	-	-	-	-	-
1974	3382	3342	29	14078	-	-	-	-	-	-	-
1975	3150	3549	25	15968	-	-	-	-	-	-	-
1976	2569	3890	22	17794	-	-	-	-	-	-	-
1977	2680	4047	26	30201	-	-	-	-	-	-	-
1978	1980	3976	12	23301	-	-	-	-	-	-	-
1979	1835	5001	17	23989	-	-	-	-	-	-	-
1980	2118	4922	20	25652	-	-	-	-	-	-	-
1981	2060	5546	19	24081	16859	5742	677	467	-	-	-
1982	1843	5217	27	22520	19690	7002	693	484	-	-	-
1983	1735	5428	21	21813	20363	7053	740	587	-	-	-
1984	1697	5386	35	21210	21149	7665	737	677	-	-	-
1985	1726	5848	34	20329	21742	7575	740	866	-	-	-
1986	1630	5979	14	17945	21482	7404	702	691	-	-	-
1987	1422	6060	13	17234	22487	7759	754	689	-	-	-
1988	1322	5702	11	15532	21708	7755	741	538	-	-	-
1989	1888	4100	16	0	24118	8681	742	696	-	-	-
1990	2375	3890	7	0	19596	7677	728	614	-	-	-
1991	2343	3628	8	0	22922	8286	734	718	1711	-	-
1992	2268	3342	5	0	26748	9058	749	875	4088	-	-
1993	2869	2783	-	0	29461	10198	755	705	6026	59	199
1994	2630	2825	-	0	26517	8985	751	671	8619	60	230
1995	2542	2715	-	0	24951	8141	687	716	5822	55	239
1996	2280	2860	-	0	17625	5743	672	814	6326	85	330
1997	2002	1075	-	0	16255	5036	616	588	6355	68	282
1998	1865	1027	-	0	18700	5759	621	673	6034	66	270
1999	1649	989	-	0	22935	6857	616	850	7023	66	194
2000	1557	982	-	0	28385	8275	633	624	7336	60	173
2001	1976	1081	-	0	33501	9367	863	590	8468	53	121
2002	1666	917	-	0	37491	10560	853	660	9624	63	72
2003	1664	766	-	0	34979	10032	832	644	11994	55	84
2004	1546	659	-	0	29494	8771	801	657	13300	62	56
2005	1453	661	-	0	27627	7776	785	705	20309	93	69
2006	1283	685	-	0	29516	7749	836	552	13604	62	72
2007	1302	669	-	0	33664	8763	780	716		82	53
2008	957	653	-	0	31143	8111	756	694		66	62
2009	978	631	-	0	29641	7676	761	656		79	72
2010	760	493	-	0	30646	7814	756	615		55	66
2011	767	506	-	0	31269	7915	776	727		78	52
2012	749	448	-	0	32614	7930	785	681		72	53
2013	786	459	-	0	33148	8074	785	558		110	71
2014	700	436	-	0	32852	7791	746	396		57	74
2015	724	406	-	0	33435	7809	765	232		81	62
2016	798	438	-	0	31923	7273	712	512		42	59
2017	854	419	-	0	10074	2468	506	405		29	54
2018	900	411	-	0	10556	2586	507	512		56	58
Mean 2013-2017	772	432		0	28,286	6,683	703	421		64	64
% change [3]	16.5	-4.8		0.0	-62.7	-61.3	-27.9	21.7		-12.2	-9.4
Mean 2008-2017	807	489		0	29,675	7,286	735	548		67	62
% change [3]	11.5	-15.9		0.0	-64.4	-64.5	-31.0	-6.5		-16.3	-7.1

[3] (2018/mean - 1) * 100

[4] Dash means "no data"

Table 3.1.4.1. Nominal catch of salmon in the NEAC Area (in tonnes round fresh weight), 1960-2018 (2018 figures are provisional).

Year	Southern NEAC	Northern NEAC (1)	Faroes (2)	Other catches in international waters	Total Reported Catch	Unreported catches NEAC Area (3)	Unreported catches International waters (4)
1960	2 641	2 899	-	-	5 540	-	-
1961	2 276	2 477	-	-	4 753	-	-
1962	3 894	2 815	-	-	6 709	-	-
1963	3 842	2 434	-	-	6 276	-	-
1964	4 242	2 908	-	-	7 150	-	-
1965	3 693	2 763	-	-	6 456	-	-
1966	3 549	2 503	-	-	6 052	-	-
1967	4 492	3 034	-	-	7 526	-	-
1968	3 623	2 523	5	403	6 554	-	-
1969	4 383	1 898	7	893	7 181	-	-
1970	4 048	1 834	12	922	6 816	-	-
1971	3 736	1 846	-	471	6 053	-	-
1972	4 257	2 340	9	486	7 092	-	-
1973	4 604	2 727	28	533	7 892	-	-
1974	4 352	2 675	20	373	7 420	-	-
1975	4 500	2 616	28	475	7 619	-	-
1976	2 931	2 383	40	289	5 643	-	-
1977	3 025	2 184	40	192	5 441	-	-
1978	3 102	1 864	37	138	5 141	-	-
1979	2 572	2 549	119	193	5 433	-	-
1980	2 640	2 794	536	277	6 247	-	-
1981	2 557	2 352	1 025	313	6 247	-	-
1982	2 533	1 938	606	437	5 514	-	-
1983	3 532	2 341	678	466	7 017	-	-
1984	2 308	2 461	628	101	5 498	-	-
1985	3 002	2 531	566	-	6 099	-	-

Year	Southern NEAC	Northern NEAC (1)	Faroes (2)	Other catches in international waters	Total Reported Catch	Unreported catches NEAC Area (3)	Unreported catches International waters (4)
1986	3 595	2 588	530	-	6 713	-	-
1987	2 564	2 266	576	-	5 406	2 554	-
1988	3 315	1 969	243	-	5 527	3 087	-
1989	2 433	1 627	364	-	4 424	2 103	-
1990	1 645	1 775	315	-	3 735	1 779	180-350
1991	1 145	1 677	95	-	2 917	1 555	25-100
1992	1 524	1 806	23	-	3 353	1 825	25-100
1993	1 443	1 853	23	-	3 319	1 471	25-100
1994	1 896	1 684	6	-	3 586	1 157	25-100
1995	1 775	1 503	5	-	3 283	942	-
1996	1 394	1 358	-	-	2 752	947	-
1997	1 112	962	-	-	2 074	732	-
1998	1 120	1 099	6	`	2 225	1 108	-
1999	934	1 139	0	-	2 073	887	-
2000	1 210	1 518	8	-	2 736	1 135	-
2001	1 242	1 634	0	-	2 876	1 089	-
2002	1 135	1 360	0	-	2 496	946	-
2003	908	1 394	0	-	2 303	719	-
2004	919	1 059	0	-	1 978	575	-
2005	809	1 189	0	-	1 998	605	-
2006	650	1 217	0	-	1 867	604	-
2007	372	1 036	0	-	1 407	465	-
2008	355	1 178	0	-	1 533	433	-
2009	266	898	0	-	1 164	317	-
2010	410	1 003	0	-	1 414	357	-
2011	410	1 009	0	-	1 419	382	-
2012	295	955	0	-	1 250	363	-

Year	Southern NEAC	Northern NEAC (1)	Faroes (2)	Other catches in international waters	Total Reported Catch	Unreported catches NEAC Area (3)	International waters (4)
2013	310	770	0	-	1 080	272	-
2014	217	736	0	-	953	256	-
2015	222	859	0	-	1 081	298	-
2016	186	842	0	-	1 028	298	-
2017	150	870	0	-	1 020	318	-
2018	136	824	0	-	960	279	-
Average							
2013–2017	234	815	0	-	1032	288	-
2008–2017	282	912	0	-	1194	329	-

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 given year.**

Table 3.1.5.1. CPUE for salmon rod fisheries in Finland (Teno, Näätämö), France, and UK(Northern Ireland) (River Bush).

	Finland (R. Teno)		Finland (R. Näätämö)		France	UK(N.Ire.)(R.Bush)
	Catch per angler season	Catch per angler day	Catch per angler season	Catch per angler day	Catch per angler season	Catch per rod day
Year	kg	kg	kg	kg	Number	Number
1974		2.8				
1975		2.7				
1976		-				
1977		1.4				
1978		1.1				
1979		0.9				
1980		1.1				
1981	3.2	1.2				
1982	3.4	1.1				
1983	3.4	1.2				0.248
1984	2.2	0.8	0.5	0.2		0.083
1985	2.7	0.9	n/a	n/a		0.283
1986	2.1	0.7	n/a	n/a		0.274
1987	2.3	0.8	n/a	n/a	0.39	0.194
1988	1.9	0.7	0.5	0.2	0.73	0.165
1989	2.2	0.8	1.0	0.4	0.55	0.135
1990	2.8	1.1	0.7	0.3	0.71	0.247
1991	3.4	1.2	1.3	0.5	0.60	0.396
1992	4.5	1.5	1.4	0.3	0.94	0.258
1993	3.9	1.3	0.4	0.2	0.88	0.341
1994	2.4	0.8	0.6	0.2	2.32	0.205
1995	2.7	0.9	0.5	0.1	1.15	0.206
1996	3.0	1.0	0.7	0.2	1.57	0.267
1997	3.4	1.0	1.1	0.2	0.44 [1]	0.338
1998	3.0	0.9	1.3	0.3	0.67	0.569
1999	3.7	1.1	0.8	0.2	0.76	0.27
2000	5.0	1.5	0.9	0.2	1.06	0.26
2001	5.9	1.7	1.2	0.3	0.97	0.44
2002	3.1	0.9	0.7	0.2	0.84	0.18
2003	2.6	0.7	0.8	0.2	0.76	0.24
2004	1.4	0.4	0.9	0.2	1.25	0.25
2005	2.7	0.8	1.3	0.2	0.74	0.32
2006	3.4	1.0	1.9	0.4	0.89	0.46
2007	2.9	0.8	1.0	0.2	0.74	0.60
2008	4.2	1.1	0.9	0.2	0.77	0.46
2009	2.3	0.6	0.7	0.1	0.50	0.14
2010	3.0	0.8	1.3	0.2	0.87	0.23
2011	2.4	0.6	1.0	0.2	0.65	0.12
2012	3.6	0.9	1.7	0.4	0.61	0.15
2013	2.5	0.6	0.7	0.2	0.57	0.27
2014	3.3	0.8	1.4	0.3	0.73	0.15
2015	2.6	0.6	1.7	0.3	0.77	0.07
2016	2.9	0.7	1.1	0.2	0.60	0.05
2017	5.7	1.4	0.8	0.2	0.35	
2018	2.6	0.6	0.9	0.2	0.25	
Mean	3.1	1.0	1.0	0.2	0.8	0.3
2013-17	3.0	0.7	1.3	0.3	0.7	0.1

[1] Large numbers of new, inexperienced anglers in 1997 because cheaper licence types were introduced.

Table 3.1.5.2. CPUE for salmon in coastal and in-river fisheries in the Archangelsk region and the catch and release rod fishery in the Kola Peninsula in Russia.

	Archangelsk region		Barents sea basin			White sea basin
	Commercial fishery					
Year	Coastal	In-river	Rynda	Kharlovka	Eastern Litsa	Ponoi
1992			2.37	1.45	2.95	4.50
1993	0.34	0.04	1.18	1.46	1.59	3.57
1994	0.35	0.05	0.71	0.85	0.79	3.30
1995	0.22	0.08	0.49	0.78	0.94	3.77
1996	0.19	0.02	0.70	0.85	1.31	3.78
1997	0.23	0.02	1.20	0.71	1.09	6.09
1998	0.24	0.03	1.01	0.55	0.75	4.52
1999	0.22	0.04	0.95	0.77	0.93	3.30
2000	0.28	0.03	1.35	0.77	0.89	3.55
2001	0.21	0.04	1.48	0.92	1.00	4.35
2002	0.21	0.11	2.39	0.99	0.89	7.28
2003	0.16	0.05	1.16	1.14	1.04	8.39
2004	0.25	0.08	1.07	0.98	1.31	5.80
2005	0.17	0.08	1.18	0.82	1.63	4.42
2006	0.19	0.05	0.92	1.46	1.46	6.28
2007	0.14	0.09	0.92	0.78	1.46	5.96
2008	0.12	0.08	1.27	1.14	1.52	5.73
2009	0.09	0.05	1.18	1.29	1.35	5.72
2010	0.21	0.08	1.10	0.99	0.98	4.78
2011	0.15	0.07	0.60	0.90	0.99	4.01
2012	0.17	0.09	1.10	0.87	0.97	5.56
2013	0.12	0.09	0.98	0.85	1.09	4.37
2014	0.22	0.10	1.25	1.42	1.55	5.20
2015	0.16	0.09	1.04	1.33	1.70	3.94
2016	0.31	0.08	1.05	1.28	1.42	3.35
2017	0.36	0.07	1.07	1.88	2.03	3.83
2018	0.29	0.09	1.07	1.54	1.92	3.62
Mean	0.21	0.07	1.14	1.07	1.32	4.78
2013-17	0.23	0.09	1.08	1.35	1.56	4.14

Table 3.1.5.3. CPUE data for net and fixed engine salmon fisheries by region in UK (England & Wales). Data expressed as catch per licence-tide, except the northeast, for which the data are recorded as catch per licence-day.

		Region (aggregated data, various methods)				
Year	North East drift nets	North East	South West	Midlands	Wales	North West
1988		5.49				-
1989		4.39				0.82
1990		5.53				0.63
1991		3.20				0.51
1992		3.83				0.40
1993	8.23	6.43				0.63
1994	9.02	7.53				0.71
1995	11.18	7.84				0.79
1996	4.93	3.74				0.59
1997	6.48	4.40	0.70	0.48	0.07	0.63
1998	5.92	3.81	1.25	0.42	0.08	0.46
1999	8.06	4.88	0.79	0.72	0.02	0.52
2000	13.06	8.11	1.01	0.66	0.18	1.05
2001	10.34	6.83	0.71	0.79	0.16	0.71
2002	8.55	5.59	1.03	1.39	0.23	0.90
2003	7.13	4.82	1.24	1.13	0.11	0.62
2004	8.17	5.88	1.17	0.46	0.11	0.69
2005	7.23	4.13	0.60	0.97	0.09	1.28
2006	5.60	3.20	0.66	0.97	0.09	0.82
2007	7.24	4.17	0.33	1.26	0.05	0.75
2008	5.41	3.59	0.63	1.33	0.06	0.34
2009	4.76	3.08	0.53	1.67	0.04	0.51
2010	17.03	8.56	0.99	0.26	0.09	0.47
2011	19.25	9.93	0.63	0.14	0.10	0.34
2012	6.80	5.35	0.69		0.21	0.31
2013	11.06	8.22	0.54		0.08	0.39
2014	10.30	6.12	0.43		0.07	0.31
2015	12.93	7.22	0.64		0.08	0.39
2016	10.95	9.98	0.78		0.10	0.38
2017	7.58	5.64	0.58		0.15	0.26
2018	6.27	6.05	1.07		0.15	0.92
Mean	8.98	5.73	0.77	0.84	0.11	0.60
2013-17	10.56	7.44	0.59		0.10	0.35

Table 3.1.5.4. CPUE for salmon rod fisheries in each region in UK (England & Wales). CPUE is expressed as number of salmon (including released fish) caught per 100 days fished.

Year	Region						NRW	England &
	NE	Thames	Southern	SW	Midlands	Wales	Wales	Wales
1997	5.0	0.6	3.1	5.2	1.7	2.6	2.6	4.0
1998	6.5	0.0	5.9	7.5	1.3	3.9	3.9	6.0
1999	7.4	0.3	3.1	6.3	2.1	3.5	3.5	5.5
2000	9.2	0.0	5.2	8.8	4.9	4.4	4.4	7.9
2001	11.3	0.0	11.0	6.6	5.4	5.5	5.5	8.7
2002	9.4	0.0	18.3	6.0	3.5	3.6	3.6	6.8
2003	9.7	0.0	8.8	4.7	5.2	2.9	2.9	5.7
2004	14.7	0.0	18.8	9.6	5.5	6.6	6.6	11.4
2005	12.4	0.0	12.7	6.2	6.6	4.5	4.5	9.0
2006	14.2	0.0	15.6	8.7	6.6	5.9	5.9	10.1
2007	11.7	0.0	18.0	8.7	5.7	6.0	6.0	9.6
2008	12.7	0.0	21.8	10.9	5.8	7.3	7.3	10.5
2009	9.5	0.0	13.7	5.7	3.6	3.6	3.6	6.6
2010	16.7	2.8	17.1	9.9	4.3	6.5	6.5	10.2
2011	17.5	0.0	14.5	9.4	6.5	6.0	6.0	10.9
2012	15.4	0.0	17.3	9.2	6.3	6.5	6.5	10.6
2013	16.7	0.0	10.0	5.9	7.9	5.7	5.7	8.9
2014	12.1	0.0	11.9	4.8	5.0	6.9	4.4	7.1
2015	8.7	0.0	16.6	8.8	9.0	7.0	4.8	7.1
2016	13.5	0.0	16.8	7.8	9.5	8.5	6.4	9.1
2017	13.5	0.0	13.6	8.7	8.0	9.3	6.6	9.4
2018	10.5	0.0	5.0	4.9	6.7	9.0	4.0	7.2
Mean	11.7	0.2	12.7	7.5	5.5	5.7	5.1	8.3
Mean (2013-2017)	12.9	0.0	13.8	7.2	7.9	7.5	5.6	8.3

Table 3.1.5.5. CPUE data for UK (Scotland) net fisheries. Catch in numbers of fish per unit of effort.

Year	Fixed engine	Net and coble CPUE
	Catch/trap month [1]	Catch/crew month
1952	33.9	156.4
1953	33.1	121.7
1954	29.3	162.0
1955	37.1	201.8
1956	25.7	117.5
1957	32.6	178.7
1958	48.4	170.4
1959	33.3	159.3
1960	30.7	177.8
1961	31.0	155.2
1962	43.9	242.0
1963	44.2	182.9
1964	57.9	247.1
1965	43.7	188.6
1966	44.9	210.6
1967	72.6	329.8
1968	47.0	198.5
1969	65.5	327.6
1970	50.3	241.9
1971	57.2	231.6
1972	57.5	248.0
1973	73.7	240.6
1974	63.4	257.1
1975	53.6	235.7
1976	42.9	150.8
1977	45.6	188.7
1978	53.9	196.1
1979	42.2	157.2
1980	37.6	158.6
1981	49.6	183.9
1982	61.3	180.2
1983	55.8	203.6
1984	58.9	155.3
1985	49.6	148.9
1986	75.2	193.4
1987	61.8	145.6
1988	50.6	198.4
1989	71.0	262.4
1990	33.2	146.0
1991	35.9	106.4
1992	59.6	153.7
1993	52.8	125.2
1994	92.1	123.7
1995	75.6	142.3
1996	57.5	110.9
1997	33.0	57.8
1998	36.0	68.7
1999	21.9	58.8
2000	54.4	105.5
2001	61.0	77.4
2002	35.9	67.0
2003	68.3	66.8
2004	42.9	54.5
2005	45.8	80.9
2006	45.8	73.3
2007	47.6	91.5
2008	56.1	52.5
2009	42.2	73.3
2010	77.0	179.3
2011	62.6	80.7
2012	50.2	46.7
2013	64.6	129.4
2014	60.6	79.2
2015	74.8	50.2
2016	0*	65.4
2017	0*	52.4
2018	0*	147.1
Mean	50.8	151.8
2013-2017	66.7	75.3

[1] Excludes catch and effort for Solway Region

* No information on effort for fixed engine presented due to fishery regulation

Table 3.1.5.6. CPUE (number of salmon in three size groups caught per gear-day) for marine fisheries in Norway.

	Bagnet				Bendnet		
Year	< 3kg	3-7 kg	>7 kg		< 3kg	3-7 kg	>7 kg
1998	0.88	0.66	0.12		0.80	0.56	0.13
1999	1.16	0.72	0.16		0.75	0.67	0.17
2000	2.01	0.90	0.17		1.24	0.87	0.17
2001	1.52	1.03	0.22		1.03	1.39	0.36
2002	0.91	1.03	0.26		0.74	0.87	0.32
2003	1.57	0.90	0.26		0.84	0.69	0.28
2004	0.89	0.97	0.25		0.59	0.60	0.17
2005	1.17	0.81	0.27		0.72	0.73	0.33
2006	1.02	1.33	0.27		0.72	0.86	0.29
2007	0.43	0.90	0.32		0.57	0.95	0.33
2008	1.07	1.13	0.43		0.57	0.97	0.57
2009	0.73	0.92	0.31		0.44	0.78	0.32
2010	1.46	1.13	0.39		0.82	1.00	0.38
2011	1.30	1.98	0.35		0.71	1.02	0.36
2012	1.12	1.26	0.43		0.89	1.03	0.41
2013	0.69	1.09	0.25		0.38	1.30	0.29
2014	1.83	1.08	0.24		1.27	1.08	0.29
2015	1.32	1.61	0.30		0.41	1.16	0.22
2016	0.84	1.40	0.35		0.55	1.83	0.42
2017	1.65	1.35	0.30		1.02	1.49	0.45
2018	2.05	1.56	0.30		1.08	1.51	0.41
Mean	1.22	1.13	0.28		0.77	1.02	0.32
2013-17	1.27	1.31	0.29		0.73	1.37	0.33

Table 3.1.6.1. Percentage of 1SW salmon in nominal reported catches from countries in the Northeast Atlantic, 1987–2018.

Year	Ice-land	Fin-land	Nor-way	Rus sia	Swe-den	Northern countries	UK (Scot)	UK (E&W)	Fran ce	Spain (As-turia)	Southern countries
1987		66	61	71		**63**	61	68	77		**63**
1988		63	64	53		**62**	57	69	29		**60**
1989	69	66	73	73	41	**72**	63	65	33		**63**
1990	66	64	68	73	75	**69**	48	52	45	71	**49**
1991	71	59	65	70	74	**66**	53	71	39	37	**58**
1992	72	70	62	72	69	**65**	55	77	48	45	**59**
1993	76	58	61	61	67	**63**	57	81	74	33	**64**
1994	63	55	68	69	67	**67**	54	77	55	61	**61**
1995	71	59	58	70	85	**62**	53	72	60	22	**59**
1996	73	79	53	80	68	**61**	53	65	51	22	**57**
1997	73	69	64	82	57	**68**	54	73	51	21	**60**
1998	82	75	66	82	66	**70**	58	82	71	49	**65**
1999	70	80	65	78	81	**68**	45	68	27	13	**54**
2000	82	69	67	75	69	**68**	54	79	58	63	**65**
2001	78	52	58	74	54	**60**	55	75	51	36	**63**
2002	83	40	49	70	62	**54**	54	76	69	33	**64**
2003	75	50	61	67	79	**62**	52	66	51	14	**56**
2004	86	50	52	68	50	**58**	51	81	40	59	**59**
2005	87	74	67	66	59	**69**	58	76	41	15	**62**
2006	84	73	54	77	61	**60**	57	78	50	16	**62**
2007	91	35	42	69	34	**50**	57	78	45	25	**62**
2008	90	37	46	58	36	**54**	48	76	42	11	**55**
2009	91	72	49	63	40	**59**	49	72	42	30	**54**
2010	82	56	56	58	49	**61**	55	78	67	33	**63**
2011	85	68	41	58	32	**50**	36	57	35	2	**45**
2012	86	75	47	70	30	**55**	49	50	38	18	**49**
2013	90	65	52	65	38	**62**	55	58	47	13	**56**

Year	Ice-land	Fin-land	Nor-way	Rus sia	Swe-den	Northern countries	UK (Scot)	UK (E&W)	Fran ce	Spain (As-turia)	Southern countries
2014	80	70	59	63	46	**61**	49	54	40	4	**50**
2015	91	60	51	65	29	**59**	60	47	34	4	**52**
2016	81	53	43	66	35	**48**	50	42	51	30	**45**
2017	84	41	48	46	27	**51**	46	40	61	29	**45**
2018	87	77	52	55	46	**60**	60	45	40	21	**50**
Means											
1987–2000	72	67	64	72	68	66	55	71	51	40	60
2001–2018	85	58	52	64	45	57	52	64	47	22	55

Table 3.2.1.1. Conservation limit options for NEAC stock groups estimated from river-specific values, where available, or the national PFA run-reconstruction model. SERs based on the CLs used are also shown. All values are given in numbers of fish.

	National Model CLs		River Specific CLs		Conservation limit used		SER	
	1SW	MSW	1SW	MSW	1SW	MSW	1SW	MSW
Northern NEAC								
Finland			12,000	9,698	12,000	9,698	14,567	16,588
Iceland NE	5,231	1,819			5,231	1,819	6,446	3,111
Norway			53,448	73,923	53,448	73,923	67,850	122,734
Russia	59,176	31,622			59,176	31,622	75,256	56,616
Sweden			1,898	2,654	1,898	2,654	2,446	4,608
			Stock Complex		**131,753**	**119,717**	**166,564**	**203,658**

	National Model CLs		River Specific CLs		Conservation limit used		SER	
	1SW	MSW	1SW	MSW	1SW	MSW	1SW	MSW
Southern NEAC								
France			17,400	5,100	17,400	5,100	22,420	9,399
Iceland (south & we	17,308	1,357			17,308	1,357	21,326	2,322
Ireland			211,471	46,943	211,471	46,943	268,452	77,939
UK (E & W)			53,988	29,918	53,988	29,918	68,535	51,176
UK (NI)			19,676	3,393	19,676	3,393	24,061	5,685
UK (Sco)	280,657	205,529			280,657	205,529	356,280	346,502
			Stock Complex		**600,500**	**292,241**	**761,074**	**493,022**

Table 3.3.4.1. Estimated number of returning 1SW salmon by NEAC country or region and year.

	Northern NEAC								Southern NEAC									NEAC Area		
Year	Finland	Iceland N&E	Norway	Russia	Sweden	Total 5%	Total 50%	Total 95%	France	Iceland S&W	Ireland	UK(EW)	UK(NI)	UK(Scot)	Total 5%	Total 50%	Total 95%	Total 5%	Total 50%	Total 95%
1971	26 096	9 424		154 411	17 220				49 758	62 595	1 056 638	82 302	181 805	607 723	1 822 022	**2 056 598**	2 355 920			
1972	101 924	8 611		117 454	13 680				98 967	50 597	1 123 341	79 033	159 023	610 303	1 882 647	**2 146 496**	2 472 546			
1973	47 365	10 338		173 303	16 869				60 651	54 490	1 223 401	93 631	138 737	751 376	2 055 694	**2 345 652**	2 706 636			
1974	65 123	10 292		172 379	24 365				28 255	38 725	1 394 658	117 562	151 531	723 422	2 167 191	**2 471 260**	2 864 627			
1975	78 233	12 579		263 709	26 573				56 317	60 027	1 542 492	120 575	124 483	607 482	2 200 097	**2 529 602**	2 955 671			
1976	71 193	12 610		184 176	14 961				51 982	47 548	1 048 212	80 515	86 526	460 036	1 560 158	**1 789 061**	2 088 917			
1977	40 187	17 523		117 187	6 789				40 208	48 403	907 251	91 281	85 125	585 610	1 558 722	**1 776 422**	2 057 116			
1978	38 384	17 833		118 352	8 036				41 090	63 606	792 430	104 449	110 947	614 627	1 543 613	**1 744 656**	2 002 755			
1979	34 197	17 064		164 001	8 219				47 048	58 905	726 752	99 841	77 915	619 678	1 452 586	**1 650 464**	1 905 647			
1980	27 112	2 588		117 051	10 647				97 826	26 688	552 953	93 410	98 777	409 346	1 149 960	**1 298 875**	1 478 286			
1981	24 259	13 343		96 883	19 458				77 551	34 548	291 832	97 966	77 363	525 023	996 044	**1 117 258**	1 280 437			
1982	14 464	6 146		84 893	17 039				47 688	35 401	604 524	83 600	111 736	594 165	1 336 996	**1 490 438**	1 682 645			
1983	35 225	9 055	699 517	141 665	22 769	814 592	**910 241**	1 021 508	51 034	44 816	1 063 137	122 223	157 046	684 793	1 920 798	**2 143 308**	2 417 194	2 813 476	**3 056 608**	3 350 512
1984	38 444	3 277	728 329	152 872	31 895	856 210	**959 037**	1 077 649	84 405	27 531	558 517	106 889	61 693	641 333	1 341 213	**1 497 721**	1 693 300	2 266 994	**2 459 958**	2 689 053
1985	51 288	22 660	742 320	209 497	38 302	964 104	**1 068 421**	1 186 198	31 394	44 252	928 130	106 809	80 047	582 434	1 589 196	**1 789 734**	2 037 525	2 632 795	**2 861 744**	3 134 385
1986	40 229	28 200	646 220	179 036	39 828	849 292	**937 154**	1 034 937	47 946	73 139	1 035 750	123 660	89 936	672 456	1 839 959	**2 072 319**	2 357 538	2 764 243	**3 013 111**	3 311 022
1987	48 500	16 601	543 531	190 919	31 701	760 143	**835 327**	919 864	87 051	45 457	669 627	127 875	49 198	564 366	1 380 292	**1 577 563**	1 829 916	2 201 270	**2 415 210**	2 681 098

Year	Northern NEAC								Southern NEAC									NEAC Area		
	Finland	Iceland N&E	Norway	Russia	Sweden	Total 5%	Total 50%	Total 95%	France	Iceland S&W	Ireland	UK(EW)	UK(NI)	UK(Scot)	Total 5%	Total 50%	Total 95%	Total 5%	Total 50%	Total 95%
1988	28 654	23 929	498 226	132 074	26 518	649 341	**711 374**	781 952	29 071	81 725	907 251	176 922	115 695	687 894	1 788 094	**2 026 564**	2 334 820	2 493 464	**2 740 182**	3 058 639
1989	62 709	12 965	548 451	196 898	7 748	756 277	**830 517**	923 696	15 917	45 668	653 358	118 499	111 096	753 255	1 501 744	**1 717 216**	2 045 875	2 320 193	**2 552 902**	2 888 274
1990	62 422	9 696	491 840	163 419	18 054	680 612	**747 405**	827 093	26 701	41 890	408 197	84 935	92 167	498 574	1 026 510	**1 169 122**	1 392 506	1 761 691	**1 919 722**	2 159 178
1991	61 355	14 073	429 256	138 340	22 636	606 917	**668 928**	739 627	19 613	46 350	290 727	83 738	51 606	420 949	808 167	**927 242**	1 127 311	1 461 784	**1 597 827**	1 808 282
1992	86 728	26 527	362 054	171 071	25 225	618 265	**675 944**	739 224	35 835	52 996	423 398	88 058	104 185	542 863	1 104 099	**1 265 450**	1 528 455	1 768 974	**1 943 015**	2 214 459
1993	58 540	21 850	363 592	147 124	24 775	568 786	**619 185**	674 564	51 207	52 047	344 072	121 944	122 136	599 938	1 145 230	**1 313 493**	1 616 717	1 758 151	**1 934 044**	2 242 263
1994	32 566	6 977	491 458	173 596	19 261	656 449	**727 265**	810 254	39 982	42 962	439 116	135 937	83 951	610 472	1 201 411	**1 374 604**	1 669 984	1 914 075	**2 106 812**	2 403 770
1995	32 489	18 231	320 276	155 913	28 175	512 522	**558 881**	611 609	13 293	52 849	491 046	103 266	77 913	593 746	1 179 756	**1 346 956**	1 627 970	1 734 000	**1 909 217**	2 193 507
1996	49 723	9 757	244 308	212 231	16 823	490 762	**536 054**	585 448	16 335	45 623	458 162	76 640	80 545	446 797	987 746	**1 138 004**	1 397 796	1 516 752	**1 675 189**	1 941 114
1997	45 458	13 379	282 532	208 551	7 641	512 625	**559 785**	614 527	8 409	33 294	457 775	69 001	95 559	387 788	924 443	**1 062 949**	1 284 285	1 477 970	**1 627 001**	1 851 499
1998	57 061	22 758	367 691	227 826	6 159	625 838	**685 124**	751 735	16 517	45 635	478 860	75 738	208 024	433 114	1 119 086	**1 275 063**	1 527 499	1 794 286	**1 963 755**	2 220 701
1999	84 040	11 582	342 278	176 928	9 655	573 675	**627 281**	687 176	5 546	37 044	447 022	59 800	54 139	296 434	797 057	**913 148**	1 083 413	1 412 177	**1 542 146**	1 718 972
2000	90 890	12 141	563 173	193 203	17 837	801 046	**881 917**	972 473	14 128	32 985	619 799	92 018	78 734	458 773	1 144 811	**1 315 686**	1 579 248	2 010 368	**2 201 471**	2 480 349
2001	65 927	11 028	486 977	261 431	11 017	752 465	**843 201**	950 173	12 245	29 549	492 038	79 678	63 305	475 303	1 022 362	**1 165 791**	1 427 149	1 835 974	**2 017 601**	2 295 948
2002	40 796	19 109	297 807	235 754	10 576	541 655	**607 923**	700 636	28 234	36 734	430 159	75 315	114 686	359 184	945 067	**1 062 065**	1 251 329	1 534 147	**1 678 520**	1 882 575
2003	40 211	10 178	412 797	211 062	5 803	610 870	**685 308**	772 834	18 333	44 059	421 674	57 844	70 298	343 960	851 960	**972 653**	1 187 455	1 515 993	**1 661 470**	1 885 422
2004	17 057	27 457	250 024	148 147	4 837	405 439	**450 431**	506 658	22 403	44 053	311 198	104 235	67 474	467 266	894 237	**1 034 821**	1 299 562	1 336 998	**1 489 450**	1 755 085
2005	37 467	24 387	371 161	168 225	4 738	549 738	**611 131**	682 527	14 386	65 211	309 039	85 227	84 727	469 632	903 139	**1 043 400**	1 319 755	1 501 618	**1 658 996**	1 940 869

	Northern NEAC								Southern NEAC									NEAC Area		
Year	Finland	Iceland N&E	Norway	Russia	Sweden	Total 5%	Total 50%	Total 95%	France	Iceland S&W	Ireland	UK(EW)	UK(NI)	UK(Scot)	Total 5%	Total 50%	Total 95%	Total 5%	Total 50%	Total 95%
2006	65 685	25 686	300 273	204 588	5 285	542 484	**604 584**	682 238	20 296	46 056	236 909	84 128	57 439	421 802	752 931	**882 216**	1 130 696	1 343 403	**1 493 282**	1 747 045
2007	19 170	19 087	167 709	110 141	1 645	286 498	**319 982**	361 297	15 712	52 720	240 218	79 995	84 928	433 027	773 415	**945 051**	1 223 436	1 088 031	**1 266 492**	1 547 690
2008	20 751	17 500	210 051	114 752	2 578	330 059	**368 083**	414 305	15 665	63 647	254 335	79 068	53 273	351 510	695 514	**857 455**	1 115 058	1 058 944	**1 226 827**	1 487 826
2009	36 597	28 077	168 396	108 727	2 723	313 009	**347 111**	386 016	4 461	71 963	206 415	49 125	33 224	272 749	544 393	**664 170**	862 324	885 757	**1 013 490**	1 215 471
2010	29 549	22 540	249 728	123 433	4 611	389 782	**432 150**	481 778	15 129	73 756	275 206	98 881	33 143	495 313	837 290	**1 036 027**	1 354 190	1 264 179	**1 468 907**	1 790 528
2011	33 481	18 485	175 863	132 163	5 040	330 688	**367 137**	410 258	10 411	52 079	236 128	65 623	23 896	278 891	568 802	**696 189**	909 945	929 657	**1 065 342**	1 283 916
2012	57 955	9 630	195 427	152 981	5 579	381 271	**424 998**	478 464	11 197	29 505	242 097	38 190	54 725	345 588	606 490	**766 776**	1 035 558	1 025 165	**1 193 982**	1 464 404
2013	33 366	22 913	184 047	118 528	3 247	327 414	**366 421**	413 325	15 906	88 014	204 423	53 097	61 232	276 673	608 052	**744 497**	960 589	967 281	**1 113 899**	1 332 924
2014	47 401	10 788	251 663	112 104	9 656	388 179	**436 562**	493 279	14 001	21 691	126 013	31 262	27 629	160 575	330 150	**403 872**	517 281	752 646	**842 779**	967 013
2015	29 653	30 236	221 365	116 847	3 058	363 012	**405 554**	455 901	12 989	60 231	178 234	38 435	29 269	250 197	490 365	**600 532**	784 244	888 504	**1 008 007**	1 197 178
2016	23 093	12 966	171 915	82 905	1 665	265 681	**295 442**	330 153	11 780	35 425	180 769	40 877	55 766	240 900	481 854	**600 705**	793 870	774 827	**897 738**	1 092 835
2017	12 550	12 663	226 618	30 005	2 592	255 720	**285 964**	322 477	14 786	36 803	196 011	29 758	47 068	201 455	446 389	**559 710**	746 884	728 403	**847 721**	1 035 605
2018	31 689	13 434	231 780	99 325	10 949	350 547	**392 000**	441 628	12 442	31 902	159 655	37 340	42 114	177 302	394 188	**492 902**	653 433	776 387	**887 169**	1 055 397
10yr Av.	33 534	18 173	207 680	107 702	4 912	336 530	**375 334**	421 328	12 310	50 137	200 495	48 259	40 807	269 965	530 797	**656 538**	861 832	899 280	**1 033 903**	1 243 527

Table 3.3.4.2. Estimated number of returning MSW salmon by NEAC country or region and year.

	Northern NEAC								Southern NEAC									NEAC Area		
Year	Finland	Iceland N&E	Norway	Russia	Sweden	Total 5%	Total 50%	Total 95%	France	Iceland S&W	Ireland	UK(EW)	UK(NI)	UK(Scot)	Total 5%	Total 50%	Total 95%	Total 5%	Total 50%	Total 95%
1971	23 955	9 651		132 595	641				10 763	24 373	158 812	90 849	21 895	361 112	593 774	**676 165**	795 699			
1972	25 211	15 089		134 551	505				21 633	37 601	169 499	150 352	19 147	468 172	768 061	**877 882**	1 036 541			
1973	40 781	14 083		222 486	2 259				13 243	33 863	182 837	114 245	16 741	466 020	735 268	**837 411**	989 800			
1974	68 761	13 370		209 821	1 417				6 156	29 167	205 819	84 107	18 307	333 603	599 898	**686 971**	798 447			
1975	88 351	14 784		225 453	404				12 302	30 959	231 576	115 980	15 022	442 608	743 789	**860 400**	1 033 146			
1976	69 402	12 150		195 099	1 208				9 020	26 774	160 229	60 621	10 450	236 705	437 951	**512 134**	622 243			
1977	47 934	16 952		134 354	518				6 962	26 079	139 785	76 216	10 303	347 289	525 081	**614 051**	768 498			
1978	24 416	21 851		116 123	641				7 119	33 732	120 885	64 287	13 406	457 997	586 264	**704 530**	938 000			
1979	24 486	14 421		101 637	1 665				8 125	21 617	108 463	31 910	9 396	356 414	445 806	**540 795**	749 354			
1980	23 888	20 105		168 880	3 243				17 018	30 346	119 968	103 460	11 908	482 420	652 180	**774 457**	994 156			
1981	28 282	7 036		96 612	714				11 691	20 276	88 826	145 329	9 341	453 375	639 468	**737 724**	890 652			
1982	37 692	8 064		85 469	3 484				7 218	14 368	51 457	56 341	13 492	290 752	374 709	**437 729**	546 811			
1983	41 647	6 161	428 035	124 071	2 283	546 569	**604 462**	671 008	7 805	23 911	106 274	64 132	18 933	317 935	475 088	**543 976**	657 070	1 057 727	**1 151 893**	1 281 381
1984	35 047	7 944	439 098	123 469	3 195	553 885	**610 469**	675 683	12 695	20 253	76 540	51 517	7 440	276 257	385 614	**448 733**	570 573	972 798	**1 064 336**	1 195 425
1985	33 915	5 124	405 012	135 262	1 182	530 196	**582 744**	641 930	9 506	14 761	83 738	75 554	9 635	290 094	419 673	**488 080**	617 279	982 604	**1 074 536**	1 212 419
1986	27 848	13 931	486 477	133 760	607	602 650	**664 704**	735 837	9 720	12 278	94 877	103 582	10 844	357 538	513 048	**595 821**	735 271	1 155 388	**1 265 095**	1 418 894
1987	36 263	14 435	367 629	99 542	2 727	474 250	**522 889**	576 636	5 181	10 898	117 353	82 456	5 548	245 645	404 445	**473 230**	593 570	910 241	**998 838**	1 128 712

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(Scot)	Total			Total		
						5%	50%	95%							5%	50%	95%	5%	50%	95%
1988	25 746	9 295	306 233	99 636	2 935	406 372	**445 276**	489 101	14 238	12 388	84 834	107 782	15 622	251 335	422 001	**493 557**	619 000	855 440	**940 581**	1 071 976
1989	25 220	7 879	219 797	97 101	10 243	332 763	**361 486**	396 245	6 488	11 059	77 605	86 812	12 436	248 142	379 570	**448 131**	573 300	734 839	**811 525**	939 630
1990	27 798	8 329	260 327	124 709	5 340	393 198	**428 046**	468 626	6 659	11 030	37 160	106 746	11 321	270 105	377 907	**448 679**	589 806	796 642	**879 331**	1 022 409
1991	37 285	5 770	219 592	122 199	7 158	363 041	**394 133**	429 042	6 115	10 942	55 960	46 759	5 816	197 815	269 110	**326 591**	452 681	655 496	**721 982**	851 123
1992	36 178	8 616	239 316	116 378	9 985	379 479	**411 972**	449 300	7 613	12 337	42 965	35 825	13 326	183 827	247 739	**298 433**	407 146	650 635	**713 380**	823 843
1993	38 031	9 734	229 482	137 746	11 278	398 933	**427 775**	461 019	3 578	6 050	42 011	39 311	31 428	192 761	263 673	**321 047**	439 690	684 154	**750 803**	872 460
1994	35 591	8 238	223 921	121 882	8 586	369 982	**400 527**	435 074	7 612	9 802	67 498	55 717	11 047	233 112	324 345	**388 330**	533 688	717 048	**791 119**	939 442
1995	23 449	5 226	241 154	138 597	4 253	382 929	**414 100**	449 146	3 650	10 058	65 190	55 391	9 344	271 086	343 823	**419 159**	589 087	749 893	**835 285**	1 007 842
1996	21 721	6 851	241 454	104 545	6 982	354 037	**383 299**	416 070	6 507	6 510	43 600	57 281	10 233	218 227	279 307	**347 731**	508 595	655 530	**732 890**	892 044
1997	26 326	3 859	159 362	85 311	5 035	259 850	**281 391**	305 399	3 343	7 303	56 122	35 456	12 755	162 312	228 918	**285 276**	402 671	506 432	**567 578**	686 771
1998	24 960	5 626	191 614	105 440	2 781	306 809	**331 831**	359 416	2 801	4 512	32 838	23 099	17 502	131 313	175 126	**214 789**	307 088	499 558	**548 680**	642 503
1999	29 704	6 448	204 387	93 216	1 980	308 712	**337 241**	368 551	6 076	8 827	51 387	46 167	7 963	155 216	227 309	**288 302**	406 582	558 742	**627 646**	744 582
2000	56 593	3 787	282 966	162 361	7 085	476 351	**514 764**	558 551	4 252	2 398	64 057	48 226	10 595	158 000	240 239	**294 954**	409 392	742 179	**812 419**	930 580
2001	68 531	4 350	333 542	114 816	8 411	488 204	**531 835**	581 266	4 985	4 216	56 963	52 027	6 625	206 390	269 490	**339 566**	500 682	787 099	**875 667**	1 040 452
2002	59 899	4 115	288 576	125 346	5 795	445 881	**486 275**	530 656	4 613	4 562	65 632	47 064	8 487	147 127	231 987	**285 348**	388 889	704 825	**774 018**	884 710
2003	43 370	4 321	255 758	87 255	1 381	361 234	**394 100**	429 768	6 637	7 285	69 468	60 245	5 089	169 990	263 237	**329 284**	456 943	648 239	**724 799**	854 117
2004	19 627	4 241	231 234	67 197	4 248	299 865	**327 411**	361 304	12 369	5 885	37 901	51 242	5 354	230 581	272 617	**350 725**	532 869	595 296	**680 545**	862 494
2005	16 255	5 267	213 048	80 553	2 844	292 961	**319 036**	348 178	7 698	5 199	49 354	56 036	6 714	222 458	280 016	**355 208**	529 727	593 655	**676 182**	851 999

Year	Finland	Iceland N&E	Norway	Russia	Sweden	Northern NEAC Total 5%	Northern NEAC Total 50%	Northern NEAC Total 95%	France	Iceland S&W	Ireland	UK(EW)	UK(NI)	UK(Scot)	Southern NEAC Total 5%	Southern NEAC Total 50%	Southern NEAC Total 95%	NEAC Area Total 5%	NEAC Area Total 50%	NEAC Area Total 95%
2006	25 624	5 034	270 340	77 066	2 970	350 545	**382 075**	416 908	7 703	4 309	35 738	50 170	5 304	270 290	293 642	**382 889**	603 688	668 677	**768 240**	991 482
2007	37 313	4 830	230 334	80 554	2 800	329 698	**356 690**	386 433	7 282	2 649	25 017	48 299	5 506	223 171	245 439	**319 662**	485 772	595 723	**677 502**	846 345
2008	37 477	6 246	265 187	126 173	3 885	402 678	**441 591**	485 194	8 058	3 036	18 565	52 981	4 291	294 675	295 381	**390 528**	618 551	729 579	**834 998**	1 064 237
2009	16 096	5 054	207 898	107 229	3 466	310 614	**341 224**	376 771	3 732	4 692	23 613	40 827	4 344	244 169	252 522	**327 907**	512 179	587 034	**671 553**	858 456
2010	25 796	7 139	229 361	132 240	4 014	365 627	**400 510**	440 402	3 065	9 716	21 988	60 846	6 344	320 528	329 554	**430 901**	657 163	723 744	**833 085**	1 061 898
2011	19 902	7 977	318 819	131 995	9 399	445 035	**490 459**	543 475	8 607	4 938	23 985	102 218	8 112	412 731	437 287	**575 294**	861 410	919 938	**1 067 790**	1 354 672
2012	24 012	4 458	279 819	64 988	10 683	347 616	**385 202**	428 436	6 873	2 813	20 939	80 091	18 942	321 295	357 806	**468 081**	718 072	735 892	**855 485**	1 110 452
2013	23 118	5 142	197 538	74 219	4 551	278 137	**305 806**	337 287	7 038	7 754	24 008	78 010	6 052	295 899	333 657	**432 771**	657 709	633 281	**739 534**	965 212
2014	25 101	6 160	202 734	73 699	9 774	287 039	**318 488**	355 517	8 782	4 742	19 983	52 512	3 299	202 710	232 248	**300 709**	439 136	543 461	**621 485**	761 631
2015	24 140	5 889	255 986	69 166	6 636	326 933	**362 779**	406 951	9 886	4 321	20 910	86 050	4 249	245 531	296 802	**384 381**	570 341	651 470	**749 047**	940 925
2016	25 831	8 251	280 900	58 985	2 606	339 687	**377 305**	420 176	4 191	6 156	20 486	111 201	7 859	272 102	333 461	**439 122**	663 309	704 094	**819 748**	1 045 566
2017	17 857	4 648	284 682	54 562	5 079	328 906	**368 113**	413 258	4 754	5 264	18 935	89 217	6 326	246 117	293 616	**385 101**	582 408	653 318	**754 916**	958 151
2018	10 974	5 084	268 380	71 848	11 298	331 465	**370 113**	415 463	7 275	5 617	20 788	88 872	5 697	129 256	209 201	**270 451**	381 760	566 476	**642 354**	762 822
10yr Av.	21 283	5 980	252 612	83 893	6 751	336 106	**372 000**	413 774	6 420	5 601	21 564	78 984	7 122	269 034	307 615	401 472	604 349	671 871	**775 500**	981 978

Table 3.3.4.3. Estimated pre-fishery abundance of maturing 1SW salmon (potential 1SW returns) by NEAC country or region and year.

	Northern NEAC								Southern NEAC									NEAC Area		
Year	Finland	Iceland N&E	Norway	Russia	Sweden	Total 5%	Total 50%	Total 95%	France	Iceland S&W	Ireland	UK(EW)	UK(NI)	UK(Scot)	Total 5%	Total 50%	Total 95%	Total 5%	Total 50%	Total 95%
1971	31 757	11 730		NA	22 214				64 468	77 623	1 344 654	105 475	222 707	777 783	2 261 352	**2 613 117**	3 050 847			
1972	124 127	10 739		151 278	17 647				128 296	62 677	1 436 122	101 708	194 958	780 753	2 339 321	**2 732 267**	3 213 846			
1973	57 720	12 846		222 703	21 808				78 631	67 509	1 563 202	120 321	170 648	961 499	2 563 473	**2 988 197**	3 509 891			
1974	79 311	12 755		220 821	31 380				36 636	47 956	1 777 591	150 016	185 480	923 127	2 695 184	**3 137 379**	3 713 632			
1975	95 263	15 557		339 328	34 160				73 019	74 322	1 966 242	153 853	152 754	777 318	2 744 912	**3 217 178**	3 831 819			
1976	86 624	15 642		236 469	19 284				67 587	58 883	1 336 499	103 303	106 243	588 606	1 939 227	**2 280 927**	2 707 904			
1977	48 971	21 678		150 727	8 772				52 011	59 956	1 155 299	116 610	104 468	748 744	1 938 194	**2 258 367**	2 672 634			
1978	46 751	22 034		152 403	10 358				53 199	78 585	1 010 675	133 314	136 042	784 283	1 912 598	**2 217 680**	2 599 012			
1979	41 661	21 133		211 417	10 606				60 825	72 704	927 365	127 596	95 379	789 453	1 803 993	**2 098 887**	2 472 487			
1980	33 099	3 311		150 714	13 756				126 481	33 234	708 898	120 421	121 635	527 461	1 438 765	**1 661 855**	1 935 303			
1981	29 817	16 661		125 419	25 137				101 007	43 145	379 762	126 943	96 398	679 845	1 257 845	**1 443 881**	1 686 477			
1982	17 879	7 792		110 021	22 046				62 193	44 222	776 456	108 836	138 130	766 474	1 676 055	**1 914 630**	2 214 582			
1983	43 196	11 406	890 700	182 736	29 380	1 014 111	**1 161 166**	1 332 240	66 639	55 878	1 360 698	157 763	193 550	884 205	2 399 848	**2 741 307**	3 162 711	3 485 689	**3 904 831**	4 404 517
1984	47 054	4 176	926 579	196 197	41 243	1 065 197	**1 219 592**	1 404 350	109 558	34 289	715 555	137 225	76 416	823 619	1 675 004	**1 919 560**	2 214 974	2 806 128	**3 143 988**	3 523 651
1985	62 416	28 002	943 783	269 405	49 455	1 196 788	**1 357 095**	1 548 441	40 517	54 761	1 179 567	136 661	97 953	743 032	1 977 740	**2 278 798**	2 650 752	3 247 082	**3 639 061**	4 099 460
1986	49 029	34 936	821 110	230 207	51 374	1 053 961	**1 190 967**	1 350 930	62 080	90 273	1 321 702	158 353	110 271	857 871	2 291 487	**2 636 962**	3 067 782	3 417 290	**3 833 894**	4 336 335
1987	59 156	20 626	691 157	245 987	40 910	940 246	**1 063 414**	1 204 760	113 259	56 403	856 539	163 984	61 117	723 523	1 733 352	**2 016 234**	2 389 121	2 736 335	**3 087 666**	3 516 356

	Northern NEAC								Southern NEAC									NEAC Area		
Year	Finland	Iceland	Norway	Russia	Sweden		Total		France	Iceland	Ireland	UK(EW)	UK(NI)	UK(Scot)		Total			Total	
		N&E				5%	50%	95%		S&W					5%	50%	95%	5%	50%	95%
1988	35 072	29 674	635 174	169 630	34 079	802 439	**905 373**	1 021 923	37 862	101 149	1 157 331	226 057	142 241	881 673	2 232 041	**2 584 630**	3 033 147	3 085 298	**3 490 420**	3 984 386
1989	76 398	16 097	698 532	252 141	9 997	935 778	**1 055 767**	1 203 396	20 809	56 484	833 543	152 192	136 434	960 842	1 876 268	**2 190 670**	2 646 637	2 877 536	**3 250 421**	3 752 836
1990	76 107	12 035	626 414	208 652	23 336	840 303	**949 196**	1 076 911	34 700	51 928	519 689	108 865	113 040	638 066	1 279 303	**1 488 847**	1 802 965	2 174 459	**2 447 181**	2 810 053
1991	74 660	17 423	546 360	177 769	29 215	748 648	**848 970**	962 078	25 381	57 297	370 327	106 635	63 102	536 843	1 006 174	**1 178 377**	1 449 640	1 805 865	**2 032 941**	2 341 890
1992	105 368	32 855	460 907	218 734	32 621	762 074	**855 373**	959 051	46 570	65 461	537 665	112 390	127 239	692 567	1 372 352	**1 608 537**	1 969 504	2 186 361	**2 466 601**	2 859 338
1993	71 110	26 988	462 206	188 265	32 079	700 124	**785 383**	880 882	66 167	64 241	437 751	155 021	149 055	765 287	1 420 738	**1 670 418**	2 075 262	2 168 878	**2 460 595**	2 887 837
1994	39 637	8 630	625 826	223 056	24 916	812 472	**925 989**	1 058 103	51 617	53 144	559 169	173 035	102 516	778 002	1 496 353	**1 747 101**	2 154 535	2 370 853	**2 681 674**	3 126 656
1995	39 458	22 539	407 752	200 145	36 387	631 537	**710 491**	799 029	17 118	65 152	623 902	131 470	95 233	758 005	1 463 976	**1 711 655**	2 093 991	2 137 705	**2 425 712**	2 842 033
1996	60 560	12 075	310 240	271 564	21 705	605 782	**680 560**	767 650	21 275	56 367	583 186	97 952	98 468	569 163	1 229 861	**1 444 494**	1 796 509	1 876 254	**2 129 089**	2 505 983
1997	55 244	16 517	359 408	266 877	9 862	631 857	**710 598**	802 572	10 868	41 109	580 642	88 123	116 595	494 243	1 148 591	**1 348 794**	1 653 134	1 822 992	**2 064 540**	2 396 827
1998	69 299	28 084	467 673	292 607	7 977	772 781	**870 422**	983 774	21 342	56 284	608 810	96 440	253 964	551 613	1 383 299	**1 614 241**	1 949 950	2 208 966	**2 490 147**	2 865 911
1999	102 136	14 270	435 371	226 215	12 478	705 549	**793 969**	892 745	7 179	45 752	568 222	75 953	66 103	376 840	988 243	**1 156 519**	1 399 673	1 737 929	**1 957 140**	2 237 841
2000	110 531	15 021	716 909	247 747	23 091	988 135	**1 117 172**	1 264 564	18 231	40 738	787 996	117 192	96 068	584 129	1 421 677	**1 669 971**	2 036 189	2 474 282	**2 795 401**	3 209 244
2001	80 055	13 613	619 458	335 445	14 245	931 738	**1 070 757**	1 236 232	15 822	36 501	626 076	101 395	77 253	605 861	1 269 350	**1 483 872**	1 836 285	2 266 759	**2 563 304**	2 972 140
2002	49 521	23 639	378 400	302 414	13 694	668 331	**774 155**	913 450	36 447	45 360	547 332	95 812	139 884	458 114	1 167 889	**1 343 918**	1 608 673	1 888 630	**2 127 983**	2 440 501
2003	48 917	12 586	525 644	270 815	7 524	758 536	**870 444**	1 004 911	23 794	54 469	536 856	73 875	85 778	438 252	1 055 485	**1 233 017**	1 531 723	1 869 462	**2 112 540**	2 448 404
2004	20 769	33 871	317 752	189 658	6 237	501 393	**572 213**	658 952	28 996	54 490	396 300	132 780	82 468	595 843	1 108 682	**1 312 298**	1 665 945	1 654 549	**1 891 181**	2 264 871
2005	45 483	30 090	471 777	215 735	6 096	680 636	**775 968**	887 140	18 563	80 300	393 102	108 361	103 427	597 776	1 120 876	**1 323 926**	1 692 236	1 849 190	**2 106 919**	2 504 236

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(Scot)	Total			Total		
						5%	50%	95%							5%	50%	95%	5%	50%	95%
2006	79 819	31 702	381 389	261 242	6 815	668 223	**765 561**	886 045	26 149	56 772	301 474	106 898	70 199	536 493	933 545	**1 120 046**	1 455 332	1 656 835	**1 895 513**	2 254 643
2007	23 290	23 565	213 106	140 759	2 125	354 153	**405 487**	471 252	20 334	65 183	305 881	102 002	103 354	551 300	964 433	**1 196 364**	1 566 665	1 350 177	**1 607 730**	1 991 474
2008	25 199	21 577	267 446	146 723	3 328	408 910	**467 102**	539 583	20 264	78 730	323 031	100 835	65 129	447 066	867 408	**1 084 391**	1 429 509	1 315 155	**1 557 225**	1 916 391
2009	44 539	34 666	214 240	137 521	3 528	384 819	**437 017**	497 917	5 755	88 818	262 661	62 384	40 527	347 653	676 988	**841 567**	1 105 688	1 091 176	**1 282 807**	1 563 668
2010	35 885	27 787	317 126	156 152	5 969	481 338	**546 729**	622 880	19 536	91 081	350 944	125 954	40 462	632 607	1 044 137	**1 314 544**	1 728 979	1 573 327	**1 865 424**	2 296 225
2011	40 754	22 868	223 552	167 603	6 498	407 252	**464 168**	530 045	13 409	64 299	301 416	83 618	29 269	355 537	708 190	**883 651**	1 169 074	1 153 176	**1 351 735**	1 652 865
2012	70 334	11 886	248 079	195 208	7 230	471 951	**537 735**	620 403	14 418	36 440	307 872	48 571	66 731	439 502	756 398	**970 573**	1 327 517	1 269 759	**1 513 767**	1 884 173
2013	40 658	28 254	234 602	152 291	4 197	405 293	**464 580**	536 534	20 522	108 591	260 614	67 527	74 849	352 647	758 232	**940 614**	1 231 595	1 201 243	**1 409 266**	1 715 469
2014	57 684	13 327	320 920	143 921	12 492	479 712	**554 319**	640 531	18 118	26 799	160 062	39 957	33 690	204 351	412 452	**512 546**	661 199	930 153	**1 070 769**	1 248 916
2015	36 091	37 382	281 796	150 174	3 954	449 660	**515 098**	592 031	16 806	74 359	227 674	49 022	35 947	318 963	610 625	**760 911**	1 007 637	1 098 053	**1 282 585**	1 545 499
2016	28 121	16 027	218 471	106 611	2 152	328 075	**374 771**	429 171	15 150	43 767	230 194	51 991	68 214	306 167	601 411	**761 380**	1 014 153	961 861	**1 137 360**	1 402 103
2017	15 273	15 617	288 281	38 347	3 352	316 350	**362 702**	418 965	19 166	45 371	249 055	37 924	57 382	256 401	555 861	**708 744**	959 243	903 866	**1 075 827**	1 331 834
2018	38 479	16 588	294 602	127 574	14 108	433 332	**497 187**	572 162	16 056	39 324	203 748	47 612	51 378	225 351	491 803	**621 465**	839 630	963 840	**1 122 833**	1 357 633
10yr Av.	40 782	22 440	264 167	137 540	6 348	415 778	**475 431**	546 064	15 894	61 885	255 424	61 456	49 845	343 918	661 610	**831 599**	1 104 471	1 114 645	**1 311 237**	1 599 838

Table 3.3.4.4. Estimated pre-fishery abundance of non-maturing 1SW salmon (potential MSW returns) by NEAC country or region and year.

	Northern NEAC								Southern NEAC									NEAC Area		
Year	Finland	Iceland N&E	Norway	Russia	Sweden	Total 5%	**50%**	95%	France	Iceland S&W	Ireland	UK E&W	UK NI	UK SCO	Total 5%	**50%**	95%	Total 5%	**50%**	95%
1971	52 160	27 077		266 270	4 522				61 253	65 638	394 543	375 760	32 794	1 292 654	1 897 001	**2 239 843**	2 668 632			
1972	79 480	25 416		429 252	7 093				39 672	59 240	385 131	281 161	28 877	1 148 655	1 648 861	**1 956 749**	2 346 132			
1973	125 208	23 813		397 697	4 520				20 367	51 035	390 675	194 896	31 219	776 755	1 234 174	**1 477 266**	1 788 095			
1974	160 407	26 426		430 889	3 387				35 035	54 254	450 838	267 909	25 896	1 038 318	1 572 500	**1 890 551**	2 308 450			
1975	125 123	21 709		366 563	4 382				29 333	46 777	333 918	174 120	17 993	698 043	1 105 946	**1 312 982**	1 592 113			
1976	86 457	29 683		253 510	2 471				21 395	45 458	278 200	178 718	17 625	790 657	1 106 532	**1 346 469**	1 681 827			
1977	45 152	38 071		218 700	2 535				21 752	58 512	247 640	158 220	22 789	975 791	1 209 542	**1 499 193**	1 969 965			
1978	47 394	25 481		199 245	4 374				21 018	37 827	211 860	88 334	16 242	744 649	900 093	**1 130 267**	1 523 337			
1979	54 359	36 037		346 129	8 767				40 488	53 636	245 583	229 758	21 177	1 029 163	1 329 638	**1 636 505**	2 106 519			
1980	69 872	14 367		239 548	5 754				30 868	36 979	193 859	306 781	17 734	997 011	1 316 901	**1 596 524**	1 966 875			
1981	84 984	15 983		214 525	10 207				21 332	26 627	125 029	145 332	24 570	688 626	861 260	**1 038 090**	1 288 130			
1982	87 271	12 255	831 970	269 694	7 216	1 016 613	1 213 361	1 453 542	20 707	42 628	207 405	149 276	33 156	694 628	957 415	**1 156 685**	1 426 121	2 008 177	2 375 230	2 820 913
1983	70 065	14 716	807 217	251 487	7 531	965 010	**1 153 967**	1 385 555	26 901	35 752	143 287	109 254	13 449	550 867	720 553	**889 233**	1 134 646	1 723 691	**2 049 478**	2 456 835
1984	68 949	9 909	754 702	276 642	4 149	934 718	**1 118 002**	1 340 281	20 667	26 304	153 286	149 482	17 175	564 806	762 663	**943 556**	1 209 520	1 731 048	**2 068 108**	2 491 454
1985	60 444	25 357	910 476	280 325	3 885	1 069 409	**1 284 463**	1 534 232	25 023	22 340	193 106	220 225	19 367	777 644	1 044 149	**1 272 166**	1 577 071	2 148 974	**2 561 019**	3 041 330
1986	74 151	26 100	704 149	215 483	7 325	863 801	**1 029 816**	1 232 893	15 777	19 870	225 857	178 911	10 443	564 952	842 045	**1 026 300**	1 290 268	1 739 937	**2 062 693**	2 467 980
1987	50 467	16 709	559 114	197 720	6 661	696 169	**834 026**	998 057	31 814	21 930	168 444	216 443	26 725	552 917	842 187	**1 032 637**	1 303 637	1 571 787	**1 871 661**	2 251 046
1988	51 036	14 404	427 583	197 197	19 716	596 946	**712 281**	848 795	18 529	19 820	162 740	187 477	21 508	576 190	817 056	**997 024**	1 262 859	1 437 654	**1 711 923**	2 068 802
1989	53 565	14 942	478 753	242 000	10 531	669 711	**801 494**	958 140	14 779	19 528	73 607	198 798	19 520	515 569	679 231	**852 828**	1 133 973	1 375 631	**1 662 916**	2 031 220
1990	67 904	10 350	393 833	231 643	13 298	598 135	**719 950**	859 203	12 563	19 245	98 922	88 109	10 122	362 825	466 807	**600 573**	837 839	1 091 171	**1 328 866**	1 641 546
1991	63 867	15 005	412 442	214 070	17 973	607 537	**726 529**	871 420	16 480	21 388	83 709	74 824	22 371	366 259	468 282	**592 680**	797 773	1 100 565	**1 326 625**	1 613 645
1992	67 049	16 970	396 529	253 233	20 222	632 769	**756 135**	903 471	8 262	10 626	78 836	76 940	52 660	362 598	471 080	**601 598**	827 317	1 130 457	**1 367 710**	1 673 137
1993	63 216	14 375	385 950	226 175	15 306	591 413	**707 612**	846 969	14 387	17 053	113 807	98 222	18 646	400 955	522 290	**672 501**	941 074	1 139 252	**1 390 454**	1 719 703
1994	42 507	9 202	417 298	257 854	7 810	613 644	**736 391**	883 804	7 117	17 512	110 165	98 075	15 832	466 364	552 699	**725 225**	1 040 616	1 195 489	**1 476 013**	1 861 975
1995	39 055	11 945	414 009	194 029	12 520	564 196	**672 974**	806 268	12 718	11 345	75 858	102 932	17 322	382 187	463 369	**612 017**	905 777	1 056 113	**1 298 967**	1 641 803
1996	45 392	6 654	266 064	154 600	8 863	402 613	**483 776**	580 600	6 608	12 609	96 148	63 726	21 457	282 206	375 723	**495 977**	717 956	798 959	**988 328**	1 255 223
1997	43 118	9 701	320 346	192 143	4 924	476 118	**573 320**	685 404	5 441	7 785	55 776	41 079	29 432	225 758	284 122	**371 729**	538 698	781 019	**952 400**	1 178 776
1998	51 277	11 113	341 106	169 050	3 475	478 790	**577 633**	694 813	11 346	15 140	86 457	79 828	13 332	263 628	365 269	**490 978**	707 446	871 997	**1 076 486**	1 351 615

	Northern NEAC								Southern NEAC									NEAC Area		
Year	**Finland**	**Iceland**	**Norway**	**Russia**	**Sweden**	**Total**			**France**	**Iceland**	**Ireland**	**UK**	**UK**	**UK**	**Total**			**Total**		
		N&E				5%	**50%**	95%		**S&W**		E&W	NI	SCO	5%	**50%**	95%	5%	**50%**	95%
1999	97 343	6 525	471 587	295 410	12 467	738 830	**886 266**	1 065 034	7 951	4 138	107 332	83 730	17 774	267 879	382 642	**500 950**	710 386	1 154 321	**1 399 209**	1 713 187
2000	117 719	7 483	555 662	207 066	14 784	753 398	**905 933**	1 092 853	9 698	7 247	97 623	92 509	13 082	357 066	446 831	**591 279**	881 265	1 237 974	**1 513 045**	1 890 488
2001	103 119	7 062	480 610	225 979	10 144	692 276	**830 298**	1 000 253	8 787	7 829	110 734	82 231	14 198	252 237	374 411	**489 512**	688 772	1 095 428	**1 328 950**	1 628 195
2002	74 509	7 457	426 306	158 446	2 447	557 974	**669 284**	806 252	12 577	12 545	117 429	105 190	8 504	291 159	425 649	**566 318**	807 752	1 013 694	**1 244 798**	1 560 378
2003	33 722	7 321	387 075	121 858	7 425	461 038	**558 467**	674 974	23 153	10 140	63 977	88 815	8 999	390 145	439 088	**600 286**	927 167	932 280	**1 169 045**	1 536 796
2004	27 940	9 048	355 298	145 975	5 002	452 147	**544 507**	655 840	14 408	8 956	82 849	97 189	11 287	376 906	449 572	**605 399**	921 255	929 084	**1 160 773**	1 511 990
2005	44 023	8 678	449 590	139 087	5 213	539 315	**648 037**	779 206	14 373	7 407	60 256	87 106	8 909	455 720	472 794	**650 555**	1 040 634	1 046 786	**1 311 854**	1 740 103
2006	64 053	8 359	383 308	145 409	4 900	507 345	**607 864**	728 929	13 648	4 563	42 265	84 018	9 228	376 124	395 667	**544 977**	841 854	934 254	**1 164 661**	1 512 256
2007	64 333	10 758	442 643	229 740	6 825	625 110	**757 114**	914 539	15 106	5 237	31 483	91 891	7 181	496 757	477 739	**664 284**	1 070 194	1 144 249	**1 435 950**	1 896 637
2008	27 668	8 729	347 204	194 629	6 082	483 268	**586 351**	710 248	7 032	8 082	39 864	70 819	7 307	412 561	404 958	**556 747**	889 165	921 734	**1 153 539**	1 521 665
2009	44 297	12 269	382 698	240 433	7 035	568 767	**689 269**	828 862	5 734	16 703	36 999	105 101	10 672	537 467	529 105	**728 630**	1 128 173	1 136 473	**1 432 234**	1 880 267
2010	34 137	13 765	531 116	240 403	16 490	690 526	**838 410**	1 020 871	16 099	8 522	40 629	175 791	13 711	696 951	705 119	**980 267**	1 501 952	1 451 500	**1 833 883**	2 412 148
2011	41 061	7 723	466 953	117 494	18 800	538 202	**655 024**	794 053	12 781	4 855	35 271	138 894	31 774	541 628	573 657	**794 451**	1 250 057	1 154 739	**1 460 917**	1 961 231
2012	39 726	8 868	328 834	134 164	7 969	431 840	**521 652**	631 014	13 159	13 357	40 623	135 120	10 161	499 158	538 225	**736 116**	1 138 055	1 005 190	**1 266 517**	1 702 526
2013	43 147	10 601	338 495	133 527	17 132	445 638	**545 916**	660 052	16 477	8 189	34 153	91 206	5 586	343 401	376 553	**514 176**	765 104	855 857	**1 067 601**	1 367 603
2014	41 403	10 177	427 454	125 808	11 678	508 311	**618 072**	756 167	18 673	7 460	36 382	150 531	7 210	420 317	481 996	**662 006**	1 006 094	1 027 903	**1 290 768**	1 688 133
2015	44 454	14 245	469 670	107 305	4 580	525 535	**641 920**	777 853	7 990	10 641	35 284	194 512	13 372	462 309	544 131	**751 233**	1 161 739	1 112 673	**1 402 587**	1 867 833
2016	30 719	8 012	474 583	99 246	8 897	511 473	**623 431**	761 422	9 043	9 076	32 547	155 574	10 777	418 445	475 850	**657 627**	1 022 565	1 030 114	**1 292 251**	1 712 059
2017	18 844	8 796	447 179	130 772	19 741	514 364	**628 627**	769 431	13 558	9 675	35 223	153 517	9 697	219 851	338 492	**461 196**	678 970	887 397	**1 097 408**	1 389 271
10yr Av.	41 095	10 515	420 965	162 275	10 549	532 867	**647 716**	785 508	12 209	9 212	36 323	130 944	11 775	482 899	510 733	**704 554**	1 093 310	1 084 043	**1 363 625**	1 801 010

Table 3.3.4.5. Estimated number of 1SW spawners by NEAC country or region and year.

	Northern NEAC								Southern NEAC									NEAC Area		
Year	Finland	Iceland	Norway	Russia	Sweden	Total			France	Iceland	Ireland	UK(EW)	UK(NI)	UK(Scot)	Total			Total		
		N&E				5%	**50%**	95%		S&W					5%	**50%**	95%	5%	**50%**	95%
1971	12 971	4 715		NA	8 135				48 018	31 354	394 859	34 801	36 392	244 854	607 907	**806 067**	1 066 726			
1972	50 696	4 303		72 043	6 459				95 487	25 257	419 975	38 155	31 849	272 823	681 393	**907 834**	1 193 997			
1973	23 641	5 179		78 265	7 931				58 521	27 307	459 831	45 980	27 804	344 593	737 153	**984 755**	1 300 320			
1974	32 383	5 145		94 016	11 406				27 265	19 360	521 662	58 439	30 349	320 952	736 773	**993 540**	1 336 043			
1975	38 871	6 300		111 697	12 524				54 337	30 033	577 124	60 423	24 920	287 080	780 668	**1 052 171**	1 424 896			
1976	35 328	6 299		109 338	7 017				50 162	23 814	391 309	40 011	17 330	214 312	561 485	**753 980**	1 013 558			
1977	20 009	8 747		74 059	3 205				38 808	24 113	341 631	45 061	17 033	294 678	591 116	**779 873**	1 025 818			
1978	19 177	8 917		58 464	3 781				39 655	31 774	295 340	52 802	22 230	307 829	595 241	**770 158**	997 308			
1979	16 961	8 538		74 607	3 859				45 403	29 501	271 548	52 043	15 578	330 986	593 415	**766 044**	992 891			
1980	13 529	1 294		73 343	5 027				94 396	13 336	206 492	48 585	19 738	218 960	487 544	**621 307**	778 522			
1981	12 049	6 679		53 716	9 205				74 831	17 301	70 511	51 252	15 547	286 001	421 817	**527 526**	675 711			
1982	7 246	3 075		49 865	8 059				46 008	17 717	169 856	44 470	22 397	290 124	476 114	**605 228**	766 374			
1983	17 559	4 525	160 894	64 718	10 765	204 242	**260 242**	325 214	49 234	22 412	360 789	64 487	31 343	345 543	709 134	**892 080**	1 122 086	961 561	**1 153 163**	1 390 629
1984	19 223	1 635	163 717	80 517	14 991	222 629	**282 771**	349 856	81 445	13 773	196 378	55 980	12 344	317 006	560 839	**694 599**	866 807	829 065	**978 689**	1 163 625
1985	25 604	11 324	171 702	92 904	18 159	262 315	**322 413**	390 475	30 294	21 980	235 553	56 011	16 046	326 757	538 265	**704 135**	910 165	849 353	**1 027 564**	1 244 757
1986	20 055	14 083	152 175	102 590	18 840	255 912	**310 079**	370 819	44 546	36 505	321 934	65 464	17 954	361 390	682 672	**878 135**	1 119 664	985 121	**1 191 178**	1 436 966
1987	24 157	8 292	127 563	95 702	14 995	226 655	**273 201**	324 469	81 038	22 717	201 705	68 688	15 257	319 001	574 666	**741 569**	962 606	839 402	**1 016 610**	1 241 872

	Northern NEAC								Southern NEAC									NEAC Area		
Year	Finland	Iceland	Norway	Russia	Sweden	Total			France	Iceland	Ireland	UK(EW)	UK(NI)	UK(Scot)	Total			Total		
		N&E				5%	**50%**	95%		S&W					5%	**50%**	95%	5%	**50%**	95%
1988	14 298	11 904	117 057	86 772	12 543	204 087	**245 081**	289 608	27 008	40 890	343 884	96 253	41 153	437 239	817 699	**1 014 245**	1 277 873	1 059 693	**1 260 932**	1 528 443
1989	24 979	6 495	184 237	96 568	3 647	268 255	**317 634**	380 062	14 793	22 823	224 218	64 884	12 206	479 919	652 928	**836 989**	1 126 916	966 078	**1 157 320**	1 453 690
1990	24 886	4 852	165 428	97 188	9 915	259 751	**304 371**	358 438	24 815	20 884	159 459	46 306	35 076	343 718	524 108	**646 706**	846 555	823 019	**954 701**	1 160 141
1991	24 471	7 034	143 942	83 143	12 411	232 551	**273 221**	321 573	18 251	23 163	117 432	46 431	18 381	291 086	424 042	**527 711**	707 968	690 139	**803 268**	990 270
1992	34 477	13 281	122 214	115 924	13 883	263 730	**302 971**	345 343	33 345	26 440	159 720	49 633	45 835	376 296	570 274	**710 293**	944 798	867 112	**1 014 207**	1 254 318
1993	23 335	10 946	120 943	113 878	13 549	248 312	**285 040**	325 563	47 626	26 025	141 433	71 941	72 068	417 921	651 099	**800 171**	1 072 163	932 221	**1 086 602**	1 365 722
1994	13 054	3 498	165 858	115 978	10 541	262 100	**311 461**	370 557	37 172	21 549	124 880	81 162	25 261	424 108	583 443	**735 160**	1 004 145	887 193	**1 049 605**	1 317 922
1995	12 939	9 089	107 514	121 296	17 622	235 580	**270 989**	310 669	11 624	26 414	178 372	64 375	25 759	416 353	594 201	**737 770**	988 894	860 801	**1 010 648**	1 263 358
1996	22 256	4 880	80 634	138 430	10 499	227 184	**259 054**	291 577	14 272	22 800	183 450	49 029	34 774	329 155	515 192	**648 127**	883 465	771 718	**908 152**	1 145 835
1997	20 451	6 705	105 011	158 096	4 764	260 960	**296 868**	337 063	7 349	16 599	227 226	45 890	38 425	292 716	521 154	**641 112**	840 047	812 614	**938 695**	1 139 931
1998	25 595	11 402	137 893	162 952	3 855	300 334	**344 024**	392 488	14 452	22 833	220 313	52 043	156 310	326 854	674 435	**811 485**	1 037 513	1 010 002	**1 157 271**	1 386 201
1999	33 484	6 032	127 824	162 843	6 016	294 416	**338 345**	386 583	4 856	18 891	232 890	42 046	20 033	229 266	459 852	**561 703**	713 365	787 986	**900 704**	1 056 845
2000	36 216	6 315	213 873	141 652	11 103	351 659	**411 811**	479 738	12 336	16 830	351 499	64 885	33 128	346 130	695 980	**843 075**	1 080 000	1 096 029	**1 258 460**	1 501 411
2001	26 227	5 844	186 337	199 053	6 857	365 891	**427 669**	498 188	10 701	15 394	255 521	57 531	32 223	368 531	619 453	**753 512**	991 744	1 032 323	**1 185 758**	1 434 821
2002	18 219	10 319	111 964	210 851	6 594	303 820	**360 391**	426 469	24 734	19 072	215 356	54 316	61 773	276 103	559 226	**669 171**	843 551	904 163	**1 033 080**	1 215 892
2003	18 015	5 508	157 354	198 596	3 634	324 741	**385 677**	456 147	16 065	22 972	247 039	45 285	31 083	277 454	543 175	**656 961**	852 999	914 179	**1 045 836**	1 248 295
2004	7 646	15 159	93 887	145 978	3 004	227 026	**267 397**	314 740	19 623	22 900	157 265	81 037	36 669	379 578	583 750	**715 732**	959 293	844 982	**985 196**	1 229 834

	Northern NEAC								Southern NEAC									NEAC Area		
Year	Finland	Iceland	Norway	Russia	Sweden	Total			France	Iceland	Ireland	UK(EW)	UK(NI)	UK(Scot)	Total			Total		
		N&E				5%	**50%**	95%		S&W					5%	**50%**	95%	5%	**50%**	95%
2005	16 853	13 650	140 722	132 790	2 967	263 239	**309 269**	360 357	12 589	33 953	171 271	66 692	49 052	381 260	600 243	**730 611**	983 215	901 151	**1 041 247**	1 298 412
2006	29 508	14 149	111 408	162 905	3 310	273 142	**323 391**	378 142	17 749	24 011	126 792	67 746	37 622	340 746	509 796	**630 252**	857 425	822 699	**956 295**	1 185 763
2007	8 585	10 707	61 628	123 530	1 027	174 119	**207 110**	247 231	13 721	28 004	221 314	65 672	65 316	354 478	623 395	**785 906**	1 048 543	827 006	**994 318**	1 259 176
2008	9 357	10 184	87 756	93 449	1 875	173 624	**204 167**	238 257	13 703	33 670	231 951	65 159	40 332	290 838	559 292	**713 854**	960 799	760 273	**919 020**	1 167 996
2009	16 416	16 846	71 509	100 967	1 977	178 775	**209 569**	245 676	3 899	37 421	190 095	40 488	24 977	225 741	433 378	**547 885**	738 097	638 103	**759 662**	951 989
2010	13 243	13 557	116 031	92 239	3 344	205 935	**240 568**	279 458	13 211	39 042	252 999	81 744	26 580	403 618	672 307	**861 035**	1 161 172	909 786	**1 101 379**	1 405 276
2011	14 924	11 443	80 248	102 749	3 251	184 617	**214 608**	247 504	9 118	27 649	216 835	51 865	19 595	228 783	460 512	**582 129**	789 469	669 800	**797 639**	1 008 706
2012	25 956	5 776	89 988	109 921	4 052	205 705	**237 802**	274 153	9 777	15 633	220 106	31 800	49 620	290 841	508 405	**662 044**	919 278	743 784	**901 577**	1 158 297
2013	14 919	14 187	90 574	100 294	2 279	191 559	**225 104**	261 999	13 907	46 794	187 356	43 869	56 123	224 176	485 483	**616 550**	824 910	704 921	**843 889**	1 055 320
2014	21 164	6 671	138 384	90 926	6 754	225 717	**266 559**	314 792	12 245	11 736	116 208	26 297	25 435	129 107	272 822	**343 278**	452 825	528 371	**612 266**	729 150
2015	13 387	19 598	108 724	89 795	2 136	201 885	**236 306**	275 341	11 372	33 080	163 510	32 543	27 235	207 982	401 252	**506 443**	681 532	632 966	**743 725**	923 338
2016	10 396	8 551	82 607	76 545	1 247	154 598	**181 247**	211 483	10 295	19 510	166 740	34 746	52 419	209 130	413 045	**527 769**	711 150	592 683	**710 363**	894 439
2017	6 280	8 498	109 679	39 748	1 941	140 071	**168 104**	201 624	12 937	20 201	181 106	26 273	43 435	176 598	384 342	**493 609**	676 729	549 906	**664 094**	847 547
2018	15 809	8 989	120 627	51 338	9 303	177 744	**209 649**	246 356	10 878	17 570	145 162	33 818	39 046	154 031	336 913	**432 153**	586 211	540 707	**643 365**	799 215
10yr Av.	15 249	11 412	100 837	85 452	3 628	186 660	**218 951**	255 839	10 764	26 864	184 012	40 344	36 447	225 001	436 846	**557 290**	754 137	651 103	777 796	977 328

Table 3.3.4.6. Estimated number of MSW spawners by NEAC country or region and year.

	Northern NEAC								Southern NEAC									NEAC Area		
Year	Finland	Iceland	Norway	Russia	Sweden	Total			France	Iceland	Ireland	UK(EW)	UK(NI)	UK(Scot)	Total			Total		
		N&E				5%	**50%**	95%		N&E					5%	**50%**	95%	5%	**50%**	95%
1971	10 725	2 890			268				6 703	7 292	83 645	52 205	10 969	130 441	226 155	**299 561**	405 836			
1972	11 360	4 534		58 720	213				13 513	11 337	89 320	93 032	9 581	166 770	297 422	**395 742**	536 124			
1973	18 389	4 219		65 933	949				8 273	10 214	95 827	71 133	8 381	144 843	258 596	**349 726**	484 597			
1974	30 546	4 008		98 295	599				3 846	8 752	107 861	52 604	9 157	89 049	204 176	**280 565**	381 397			
1975	39 788	4 441		86 634	171				7 682	9 253	121 221	73 146	7 521	163 560	290 565	**395 871**	549 320			
1976	31 142	3 631		86 822	507				5 640	8 025	83 931	38 012	5 229	91 888	174 416	**241 625**	340 642			
1977	21 504	5 086		71 733	219				4 362	7 804	73 279	47 610	5 159	149 392	215 780	**295 422**	434 462			
1978	10 942	6 540		50 485	271				4 454	10 062	63 182	40 845	6 712	232 342	258 839	**364 483**	575 946			
1979	13 404	4 323		44 506	700				5 070	6 468	56 703	20 700	4 716	179 850	193 687	**278 694**	467 099			
1980	13 151	6 048		47 840	1 368				10 648	9 072	62 597	66 880	5 951	239 898	294 851	**403 449**	603 429			

Year	Northern NEAC								Southern NEAC									NEAC Area		
Year	Finland	Iceland N&E	Norway	Russia	Sweden	Total 5%	**50%**	95%	France	Iceland N&E	Ireland	UK(EW)	UK(NI)	UK(Scot)	Total 5%	**50%**	95%	Total 5%	**50%**	95%
1981	15 559	2 107		65 956	300				7 611	6 074	46 816	94 135	4 678	192 201	273 901	**361 188**	499 919			
1982	20 719	2 411		40 717	1 476				4 698	4 341	32 535	36 697	6 744	115 228	148 858	**204 000**	301 284			
1983	22 758	1 850	100 979	49 376	964	142 160	**178 038**	219 215	5 105	7 165	63 711	41 893	9 472	116 354	187 573	**248 782**	349 504	355 805	**429 167**	536 414
1984	19 240	2 385	104 159	62 059	1 341	155 780	**191 082**	230 636	8 255	6 048	43 290	33 420	3 732	124 774	167 700	**223 596**	332 267	348 484	**417 828**	529 109
1985	18 702	1 543	95 489	50 965	496	136 806	**168 854**	204 826	6 176	4 460	53 575	49 060	4 823	125 008	187 232	**247 820**	364 574	348 105	**419 078**	537 474
1986	15 312	4 171	115 048	52 322	256	149 929	**188 992**	233 258	6 320	3 682	50 947	67 837	5 429	147 884	216 168	**289 638**	414 258	394 886	**480 487**	610 842
1987	19 757	4 321	89 705	53 224	1 144	137 832	**170 893**	206 815	3 375	3 270	79 429	54 615	2 999	105 592	193 873	**255 035**	363 741	355 705	**427 533**	540 833
1988	14 100	2 785	72 642	44 937	1 235	111 987	**137 194**	165 587	9 274	3 692	52 940	71 484	10 002	97 919	188 462	**252 453**	366 862	319 800	**391 412**	507 228
1989	11 269	2 351	77 781	50 708	4 343	126 573	**147 895**	172 790	4 206	3 290	40 899	57 864	4 987	105 314	161 163	**221 983**	334 708	305 851	**371 318**	486 268
1990	12 450	2 502	91 430	48 120	2 664	134 242	**158 654**	187 141	4 327	3 328	14 918	71 435	7 029	131 009	173 293	**237 345**	364 322	326 554	**398 451**	527 195
1991	16 765	1 730	76 399	60 455	3 573	137 020	**160 505**	185 842	3 990	3 274	41 081	31 710	3 316	106 688	141 966	**193 227**	308 164	297 027	**354 876**	470 828

	Northern NEAC								Southern NEAC									NEAC Area		
Year	**Fin-land**	**Ice-land**	**Norway**	**Rus-sia**	**Swe-den**	**Total**			**France**	**Ice-land**	**Ireland**	**UK(EW)**	**UK(NI)**	**UK(Scot)**	**Total**			**Total**		
		N&E				5%	**50%**	95%		**N&E**					5%	**50%**	95%	5%	**50%**	95%
1992	16 204	2 588	84 502	58 440	5 019	144 142	**168 308**	195 925	4 942	3 688	20 869	24 327	8 929	79 026	99 279	**144 181**	240 739	262 071	**314 517**	412 721
1993	17 147	2 926	78 228	55 848	5 639	137 929	**161 253**	186 595	2 324	1 808	24 175	27 717	27 663	95 273	133 228	**184 978**	292 517	289 129	**347 365**	458 711
1994	15 978	2 465	76 507	65 236	4 289	142 515	**166 029**	191 908	5 322	2 931	40 168	39 406	6 619	115 680	156 312	**213 668**	345 257	317 250	**381 315**	514 727
1995	10 538	1 567	83 809	64 239	2 443	139 411	**164 038**	191 481	2 555	2 997	37 926	40 289	5 422	153 677	179 478	**247 046**	401 734	338 085	**412 650**	567 573
1996	10 841	2 051	82 683	63 355	4 013	140 198	**164 269**	190 442	4 564	1 962	19 603	42 488	6 784	133 897	152 473	**214 516**	358 516	311 488	**379 945**	524 427
1997	13 166	1 157	57 851	52 851	2 886	110 173	**129 237**	150 251	2 342	2 186	38 779	26 927	8 455	101 118	135 676	**187 804**	295 047	262 333	**318 019**	426 003
1998	12 445	1 688	69 658	41 977	1 603	108 627	**128 559**	150 824	1 955	1 348	12 526	17 854	13 597	76 932	91 347	**127 084**	211 408	213 881	**257 336**	341 975
1999	14 862	2 249	72 222	54 791	1 137	123 436	**146 056**	170 508	4 245	2 831	33 969	37 875	5 392	102 224	141 263	**199 043**	308 370	283 462	**346 164**	455 121
2000	28 240	1 366	102 626	59 012	4 072	167 188	**197 013**	229 276	2 975	817	44 189	41 002	7 157	98 297	150 702	**201 679**	306 687	339 874	**400 448**	507 108
2001	30 767	1 656	122 930	89 485	4 828	214 665	**251 372**	292 434	3 496	1 396	37 092	44 622	4 289	144 038	178 517	**243 417**	389 419	419 144	**497 320**	645 317
2002	26 827	1 650	106 598	74 400	3 338	183 439	**214 988**	250 487	3 234	1 599	47 578	40 483	4 505	99 828	154 718	**205 223**	299 967	362 137	**422 038**	521 863

	Northern NEAC								Southern NEAC									NEAC Area		
Year	**Fin-land**	**Ice-land**	**Norway**	**Rus-sia**	**Swe-den**	**Total**			**France**	**Ice-land**	**Ireland**	**UK(EW)**	**UK(NI)**	**UK(Scot)**	**Total**			**Total**		
		N&E				5%	**50%**	95%		**N&E**					5%	**50%**	95%	5%	**50%**	95%
2003	19 556	2 035	95 962	63 442	794	155 748	**183 233**	213 672	4 626	2 335	54 622	53 770	2 140	122 489	188 744	**250 679**	366 946	365 538	**435 024**	553 477
2004	8 802	1 909	87 348	48 141	2 433	126 567	**149 977**	177 773	8 634	1 947	24 572	45 809	3 036	167 914	187 639	**259 611**	424 739	333 965	**410 973**	577 251
2005	7 264	2 425	79 375	36 371	1 623	107 176	**127 712**	150 965	5 398	1 821	37 752	50 194	4 028	169 083	206 180	**275 977**	435 856	330 554	**405 321**	565 684
2006	11 461	2 763	101 304	46 441	1 704	138 949	**164 740**	192 779	5 386	1 506	25 243	45 539	3 812	214 372	222 885	**305 095**	505 447	383 192	**471 609**	674 638
2007	16 769	3 087	84 033	39 759	1 611	124 408	**146 179**	170 717	5 101	899	21 607	44 201	4 255	174 610	189 700	**258 578**	408 336	331 372	**405 494**	557 814
2008	16 798	3 442	125 505	47 416	2 606	166 635	**196 761**	232 820	5 630	1 309	15 796	48 617	3 420	237 343	233 916	**321 071**	528 815	425 888	**520 379**	727 395
2009	7 218	3 250	100 297	70 224	2 342	156 478	**184 975**	218 385	2 609	1 735	20 160	37 478	3 427	198 552	201 435	**270 190**	438 236	379 864	**457 988**	631 281
2010	11 584	4 432	123 167	61 080	2 705	174 632	**203 892**	238 100	2 143	3 404	18 955	56 014	5 616	256 878	258 705	**351 542**	557 233	457 695	**557 364**	762 660
2011	8 900	5 275	178 825	72 555	5 616	231 313	**273 110**	320 800	6 020	1 883	20 358	91 883	6 678	336 062	349 907	**477 022**	738 410	616 079	**751 673**	1 014 312
2012	10 755	2 979	157 113	64 141	7 211	207 750	**244 280**	285 679	4 822	1 324	17 887	73 738	17 236	266 452	296 173	**398 678**	625 223	532 388	**644 880**	876 715
2013	10 378	3 549	111 853	33 552	2 951	138 600	**163 538**	191 702	4 916	3 477	20 657	71 338	5 545	244 410	272 502	**364 611**	568 230	431 595	**529 114**	731 618

	Northern NEAC								**Southern NEAC**									**NEAC Area**		
Year	**Fin-land**	**Ice-land**	**Norway**	**Rus-sia**	**Swe-den**	**Total**			**France**	**Ice-land**	**Ireland**	**UK(EW)**	**UK(NI)**	**UK(Scot)**	**Total**			**Total**		
		N&E				5%	**50%**	95%		**N&E**					5%	**50%**	95%	5%	**50%**	95%
2014	11 268	4 307	124 497	36 706	6 364	154 677	**184 271**	218 641	6 168	2 364	17 024	48 326	3 030	165 583	187 740	**251 457**	377 635	365 879	**437 210**	565 688
2015	10 772	4 014	147 570	33 889	4 626	169 206	**201 927**	242 889	6 928	2 034	17 873	79 406	3 990	206 794	248 384	**330 759**	501 304	443 527	**534 231**	709 526
2016	11 617	5 858	159 694	31 816	1 954	177 880	**211 941**	251 348	2 929	3 256	17 765	102 789	7 489	234 472	286 400	**385 867**	590 471	492 029	**600 765**	806 325
2017	8 907	3 623	162 423	25 087	3 805	169 721	**204 776**	246 617	3 314	2 845	16 428	83 999	5 960	213 794	254 734	**340 771**	521 508	452 258	**547 601**	732 525
2018	5 465	4 011	160 690	25 140	9 606	171 434	**206 733**	247 606	5 081	2 755	17 538	84 550	5 292	110 295	179 834	**237 930**	342 848	375 025	**446 624**	558 541
10yr Av.	9 686	4 130	142 613	45 419	4 718	175 169	**207 944**	246 177	4 493	2 508	18 465	72 952	6 426	223 329	253 581	**340 883**	526 110	454 634	**550 745**	738 919

Table 3.3.5.1. Time-series of jurisdictions in the Northern NEAC area with established CLs and trends in the number of stocks meeting CLs.

	Teno River (Finland/Norway)				Norway				Russia				Sweden			
Year	**No. CLs**	**No. assessed**	**No. met**	**% met**	**No. CLs**	**No. assessed**	**No. met**	**% met**	**No. CLs**	**No. assessed**	**No. met**	**% met**	**No. CLs**	**No. assessed**	**No. met**	**% met**
1999									85	8	7	88				
2000									85	8	7	88				
2001									85	8	7	88				
2002									85	8	7	88				
2003									85	8	7	88				
2004									85	8	7	88				
2005					0	167*	70	42	85	8	7	88				
2006					0	165*	73	44	85	8	7	88				
2007	9	5	0	0	80	167*	76	46	85	8	7	88				
2008	9	5	0	0	80	170*	87	51	85	8	7	88				
2009	9	5	0	0	439	176	68	39	85	8	7	88				
2010	9	5	0	0	439	179	114	64	85	8	7	88				
2011	9	5	0	0	439	177	128	72	85	8	7	88				
2012	9	5	0	0	439	187	139	74	85	8	7	88				
2013	25	7	2	29	439	185	111	60	85	8	7	88				

	Teno River (Finland/Norway)				Norway				Russia				Sweden			
Year	**No. CLs**	**No. assessed**	**No. met**	**% met**	**No. CLs**	**No. assessed**	**No. met**	**% met**	**No. CLs**	**No. assessed**	**No. met**	**% met**	**No. CLs**	**No. assessed**	**No. met**	**% met**
2014	25	10	4	40	439	167	116	69	85	8	7	88				
2015	25	10	2	20	439	179	132	74	85	8	7	88				
2016	25	11	4	36	439	174	143	82	85	8	7	88	23	20	8	40
2017	25	15	4	29	439	191	170	89	85	8	7	88	24	22	6	27
2018	25	15	6	40	439	NA	NA	NA	85	8	7	88	24	23	7	30

*** CL attainment retrospectively assessed, NA = data pending.**

Table 3.3.5.2. Time-series of jurisdictions in the Southern NEAC area with established CLs and trends in the number of stocks meeting CLs.

	France				Ireland				UK (England & Wales)				UK (Northern Ireland)				UK (Scotland)			
Year	No. CLs	No. assessed	No. met	% met	No. CLs	No. assessed	No. met	% met	No. CLs	No. assessed	No. met	% met	No. CLs	No. assessed	No. met	% met	No. CLs	No. assessed	No. met	% met
1993									61	61	33	54								
1994									63	63	41	65								
1995									63	63	26	41								
1996									63	63	31	49								
1997									64	64	21	33								
1998									64	64	30	47								
1999									64	64	19	30								
2000									64	64	27	42								
2001									64	58	21	36								
2002									64	64	28	44	10	10	4	40				
2003									64	64	20	31	10	10	4	40				
2004									64	64	42	66	10	10	3	30				
2005									64	64	32	50	10	10	4	40				
2006									64	64	38	59	10	10	3	30				
2007					141	141	45	32	64	64	33	52	10	6	2	33				
2008					141	141	54	38	64	64	43	67	10	5	3	60				

	France				Ireland				UK (England & Wales)				UK (Northern Ireland)				UK (Scotland)			
Year	No. CLs	No. assessed	No. met	% met	No. CLs	No. assessed	No. met	% met	No. CLs	No. assessed	No. met	% met	No. CLs	No. assessed	No. met	% met	No. CLs	No. assessed	No. met	% met
2009					141	141	56	40	64	64	23	36	10	6	2	33				
2010					141	141	56	40	64	64	38	59	10	7	2	29				
2011	28	28	15	54	141	141	58	41	64	64	41	64	11	9	3	33	173	173	112	65
2012	28	28	16	57	141	141	58	41	64	64	36	56	19	15	7	47	173	173	110	64
2013	30	27	20	74	143	143	57	40	64	64	21	33	19	16	8	50	173	173	97	56
2014	33	30	22	73	143	143	57	40	64	64	14	22	19	17	4	24	173	173	83	48
2015	33	27	16	59	143	143	55	38	64	64	23	36	19	17	7	41	173	173	92	53
2016	35	35	21	60	143	143	48	34	64	64	22	34	19	17	13	76	173	173	89	51
2017	35	35	21	60	143	143	44	31	64	64	30	47	19	16	8	50	173	173	84	49
2018	35	35	21	60	143	143	41	29	64	64	14	22	19	16	7	44	NA	NA	NA	NA

NA = data pending.

Table 3.3.6.1. Estimated survival of wild smolts (%) to return to homewaters (prior to coastal fisheries) for various monitored rivers in the NE Atlantic area.

Smolt	Iceland[1]			Norway[2]		France[8]			
migration	Ellidaar	R.Vesturdalsa[4]		R. Imsa		Nivelle[5]	Scorff	Oir	Bresle
year	1SW	1SW	2SW	1SW	2SW	All ages	All ages	All ages	All ages
1975	20.80								
1980									
1981				17.30	4.00				
1982				5.30	1.20				
1983				13.50	1.30				
1984				12.10	1.80				5.09
1985	9.40			10.20	2.10	16.84			5.04
1986				3.80	4.20	2.35		31.32	8.74
1987				17.30	5.60	2.52		42.70	8.24
1988	12.70			13.30	1.10	2.99		46.73	
1989	8.10			8.70	2.20	2.08		9.98	
1990	5.40			3.00	1.30	4.36		6.80	
1991	8.80			8.70	1.20	7.45		24.62	
1992	9.60			6.70	0.90	7.98		17.06	3.46
1993	9.80			15.60		4.83		19.38	2.93
1994	9.00					1.31		24.82	5.53
1995	9.40		1.45	1.80	1.50	2.09	10.45	33.92	2.60
1996	4.60	2.51	0.37	3.50	0.90	2.71	21.31	5.41	2.75
1997	5.30	1.00	1.51	1.70	0.30	2.35	5.53	39.41	4.48
1998	5.30	1.53	1.04	7.20	1.00	2.38	4.96	21.66	2.42
1999	7.70	1.30	1.22	4.20	2.20	4.11	11.54	93.87	10.98
2000	6.30	1.14	0.68	12.50	1.70	0.40	9.57	9.80	7.03
2001	5.10	3.40	1.32	3.60	2.23	0.67	4.81	23.36	
2002	4.40	1.11	2.31	5.50	0.90	1.69	22.62	10.78	2.32
2003	9.10	5.47	0.59	3.50	0.70	1.44	11.05	28.17	4.40
2004	7.70	5.68	0.60	5.90	1.40	0.98	6.26	14.27	5.01
2005	6.40	2.47	0.91	3.70	1.80	3.29	8.30	24.00	2.48
2006	7.10	1.75	0.95	0.80	5.80	2.42	7.03	14.98	3.08
2007	19.25	0.89	0.30	0.80	0.60	3.71	4.94	12.58	3.47
2008	14.90	2.59	1.07	1.10	2.30	2.15	2.98	7.43	2.01
2009	14.20	1.33	1.57	2.40	3.10	1.60	6.49	16.16	15.00
2010	8.60	1.97	1.11	1.70	1.10	2.81	4.39	18.10	6.15
2011	6.10	1.31	0.57	3.90	2.90	0.73	4.94	14.75	3.25
2012	10.90	2.06		3.50	1.70	1.65	8.46	22.98	3.14
2013	4.30		0.33	2.20	2.40	1.15	9.02	21.09	9.96
2014	7.20	1.62		3.00	0.80	1.12	5.80	9.58	5.73
2015	10.90			1.40	1.40	1.32	9.44	13.72	3.19
2016	7.90		2.00	4.10	1.30		9.08	12.66	6.61
2017	10.80	2.30		3.50					
Mean	8.97	2.18	1.05	6.03	1.91	3.02	8.59	22.33	5.18
(5-year)	8.24	1.84	1.17	2.84	1.84		8.36	16.01	5.73
(10-year)	10.43	1.68	0.84	2.41	2.21	1.80	6.55	14.91	5.85

[1] Microtags.
[2] Carlin tags, not corrected for tagging mortality.
[3] Microtags, corrected for tagging mortality.
[4] Assumes 50% exploitation in rod fishery.
[5] From 0+ stage in autumn
[6] Incomplete returns.
[7] Assumes 30% exploitation in trap fishery.
[8] France data based on retruns to freshwater
[9] Minimum count. High flows hindered sampling effort
[10] Bush 2SW data based on retruns to freshwater

Table 3.3.6.1. Continued. Estimated survival of wild smolts (%) to return to homewaters (prior to coastal fisheries) for various monitored rivers in the NE Atlantic area.

Smolt	Ireland			UK (Scotland)[2]		UK (NI)[7]		UK (E & W)					
migration	R. Corrib		B'shoole	North Esk		R. Bush		R. Dee		R. Tamar		R. Frome	
year	1SW	2SW	1SW	1SW	MSW	1SW[3]	2SW[10]	1SW	MSW	1SW	MSW	1SW	MSW
1975													
1980	17.90	1.06	5.3				0.59						
1981	9.20	3.76	12.3	8.24	3.79		0.92						
1982	20.90	3.33	12.2	11.22	4.95								
1983	10.00	1.84	8.6				1.69						
1984	26.20	1.98	19.8	6.00	4.00		1.45						
1985	18.90	1.75	19.3	13.63	5.35		1.92						
1986			20.0			31.30	1.94						
1987	16.60	0.71	26.9	10.43	3.89	35.10	0.44						
1988	14.60	0.69	22.9			36.20	0.85						
1989	6.70	0.71	7.1	6.62	4.15	25.00	1.44						
1990	5.00	0.63	16.0	5.98	3.13	34.70	1.76						
1991	7.30	1.26	21.7	7.61	3.11	27.80	2.22						
1992	7.30		15.9	10.87	6.46	29.00	1.99						
1993	10.80	0.07	23.9	14.45	6.09		1.99	6.30	2.50				
1994	9.80	1.35	26.9	10.93	3.58	27.10	0.75	1.30	1.20				
1995	8.40	0.07	14.6	8.44	3.82		2.50	2.70	0.40				
1996	6.50	1.17	18.3	5.86	2.70	31.00	2.14	4.80	2.10				
1997	12.70	0.75	15.6	7.19	4.19	19.80	0.72	6.20	3.40				
1998	5.50	1.06	12.4	2.55	1.35	13.40	0.52	2.30	3.70				
1999	6.40	0.91	14.9	6.78	3.78	16.50	0.75	5.00	12.40				
2000	9.40		22.5	6.04	2.80	10.10	0.15	2.00	0.90				
2001	7.20	1.08	16.6	4.70	2.86	12.40	0.27	4.30	0.00				
2002	6.00	0.53	12.3	2.22	1.95	11.30	0.23	2.90	0.70	3.60	1.40	5.60	1.74
2003	8.30	2.10	19.4			6.80	0.35	2.60	0.40	6.10	1.80	4.83	0.94
2004	6.30	0.80	12.8			6.80	0.44	4.50	1.00	6.00	1.50	5.29	2.90
2005			8.1	6.66	2.78	5.90	0.61	5.10	0.50	6.40	1.20		
2006	3.60	0.70	12.9	3.28	3.40	14.00	0.82	4.30	1.50	3.50	2.40	5.11	2.22
2007	1.30	1.60	8.4	4.99	3.98	8.30	0.80	1.30	0.70	3.50	3.40	5.69	1.30
2008	1.70	1.00	8.2	6.40	5.30	3.97	0.69	2.50	1.30	1.70	0.90	3.13	1.63
2009	6.00	1.00	8.9	9.00	8.65	5.92	0.95	4.80	1.10	8.20	1.90	7.68	2.58
2010	2.90	1.20	7.5			3.96	1.34	1.90	1.00	3.40	5.00	8.64	2.40
2011	2.36	0.00	10.8			2.67	0.53	0.00	0.30	1.10	1.90	1.50	1.80
2012	1.49	0.00	9.4			11.70	1.79	4.80		2.50		3.20	2.10
2013	2.23	0.30	4.5			4.60	0.91	1.90	1.40		4.70	1.50	2.10
2014	2.85	0.50	8.00			2.90	0.33		0.50			2.00	2.70
2015	5.50	0.60	7.80			6.70	0.51	0.50	1.80	4.20	2.30	5.90	3.00
2016	6.90	0.20	7.50			3.80	0.76	0.30		3.50	1.40	4.40	2.00
2017	3.60		7.10			3.20				4.60		2.60	
Mean	8.29	1.05	13.87	7.50	4.00	15.06	1.06	3.14	1.76	4.16	2.29	4.47	2.10
(5-year)	3.79	0.28	7.44			5.94	0.81	1.88	1.00	3.40	2.97	3.40	2.34
(10-year)	3.32	0.69	8.10	6.80	5.33	5.45	0.87	2.00	1.07	3.51	2.81	4.36	2.18

1 Microtags.
2 Carlin tags, not corrected for tagging mortality.
3 Microtags, corrected for tagging mortality.
4 Assumes 50% exploitation in rod fishery.
5 From 0+ stage in autumn.
6 Incomplete returns.
7 Assumes 30% exploitation in trap fishery.
8 France data based on retruns to freshwater
9 Minimum count. High flows hindered sampling effort
10 Bush 2SW data based on retruns to freshwater

Table 3.3.6.2. Estimated survival of hatchery smolts (%) to return to homewaters (prior to coastal fisheries) for various monitored rivers in the NE Atlantic area.

Smolt year	Iceland[1]		Norway[2]				Sweden[2]	
	R. Ranga		R. Imsa[3]		R. Drammen		R. Lagan	
	1SW	2SW	1SW	2SW	1SW	2SW	1SW	2SW
1980								
1981			10.10	1.30				
1982			4.20	0.60				
1983			1.60	0.10				
1984			3.80	0.40	3.50	3.00	11.80	1.10
1985			5.80	1.30	3.40	1.90	11.80	0.90
1986			4.70	0.80	6.10	2.20	7.90	2.50
1987			9.80	1.00	1.70	0.70	8.40	2.40
1988			9.50	0.70	0.50	0.30	4.30	0.60
1989	1.58	0.08	3.00	0.90	1.90	1.30	5.00	1.30
1990	0.84	0.19	2.80	1.50	0.30	0.40	5.20	3.10
1991	0.02	0.04	3.20	0.70	0.10	0.10	3.60	1.10
1992	0.37	0.05	3.80	0.70	0.40	0.60	1.50	0.40
1993	0.66	0.05	6.50	0.50	3.00	1.00	2.60	0.90
1994	1.22	0.16	6.20	0.60	1.20	0.90	4.00	1.20
1995	1.09	0.10	0.40	0.00	0.70	0.30	3.90	0.60
1996	0.17	0.03	2.10	0.20	0.30	0.20	3.50	0.50
1997	0.32	0.06	1.00	0.00	0.50	0.20	0.60	0.50
1998	0.46	0.02	2.40	0.10	1.90	0.70	1.60	0.90
1999	0.36	0.04	12.00	1.10	1.90	1.60	2.10	
2000	0.91	0.06	8.40	0.10	1.10	0.60		
2001	0.37	0.10	3.30	0.30	2.50	1.10		
2002	0.35		4.50	0.80	1.20	0.80		
2003	0.20		2.60	0.70	0.30	0.60		
2004	0.60		3.60	0.70	0.40	0.40		
2005	1.04		2.80	1.20	0.30	0.70		
2006	1.00		1.00	1.80	0.10	0.60		
2007	1.80		0.60	0.70	0.20	0.10		
2008	2.40		1.80	2.20	0.10	0.30		
2009			1.30	3.30				
2010	0.49		2.60	1.90				
2011	0.93		1.70	0.80				
2012	0.90		1.90	0.20				
2013	0.29		3.00	0.70				
2014	1.10		1.60	0.30				
2015	0.30		1.60	0.80				
2016	0.30		2.00	0.30				
2017	0.70		4.30					
Mean	0.74	0.08	3.82	0.81	1.34	0.82	4.86	1.20
(5-year)	0.58		2.02	0.56				
(10-year)	0.95		1.81	1.27	0.15	0.20		

[1] Microtagged.

[2] Carlin-tagged, not corrected for tagging mortality.

[3] since 1999 only 1 year old smolts included

Table 3.3.6.2. Continued. Estimated survival of hatchery smolts (%) to return to homewaters (prior to coastal fisheries) for various monitored rivers and experimental facilities in Ireland and UK (Northern Ireland).

	Ireland										UK (N. Ireland)[3]	
Smolt year	R. Shannon	R. Screebe	R. Burrishoole[1]	R. Delphi/ R. Burrishoole[4]	R. Delphi	R. Bunowen	R. Lee	R. Corrib Cong.[2]	R. Corrib Galway[2]	R. Erne	R. Bush 1+ smolts	R. Bush 2+ smolts
1980	8.63		5.58				8.32	0.94				
1981	2.80		8.14				2.00	1.50				
1982	4.05		10.96				16.32	2.70	16.15			
1983	3.88		4.55					2.82	4.09		1.90	8.10
1984	4.97	10.37	27.08				2.27	5.15	13.17	9.44	13.30	
1985	17.81	12.33	31.05				15.75	1.41	14.45	8.23	15.40	17.50
1986	2.09	0.43	9.40				16.42		7.69	10.81	2.00	9.70
1987	4.74	8.40	14.13				8.76		2.16	6.97	6.50	19.40
1988	4.92	9.25	17.21				5.51	4.47		2.94	4.90	6.00
1989	5.03	1.77	10.50				1.71	5.98	4.83	1.19	8.10	23.20
1990	1.33		11.41		0.20		2.52	0.25	2.27	2.62	5.60	5.60
1991	4.25	0.31	13.65	10.78	6.19		0.76	4.87	4.03	1.28	5.40	8.80
1992	4.35	1.35	7.39	10.01	1.67	4.18		0.94	0.57		6.00	7.80
1993	2.91	3.36	11.99	14.34	6.48	5.45		0.98			1.10	5.80
1994	5.21	1.86	14.29	3.94	2.71	10.82			5.30		1.60	
1995	3.63	4.12	6.57	3.42	1.73	3.47		2.38			3.10	2.40
1996	2.93	1.81	5.35	10.63	6.74	3.45					2.00	2.30
1997	5.97	0.37	13.32	17.30	5.64	5.25	7.00			7.74	-	4.10
1998	3.12	1.30	4.93	7.16	3.13	2.88	4.92	3.35	2.89	2.61	2.30	4.50
1999	0.96	2.83	8.15	19.92	8.25	1.97			3.56	3.30	2.70	5.80
2000	1.17	3.82	11.81	19.53	13.24	5.43	3.55	6.69		4.00	2.80	4.40
2001	1.98	2.46	9.73	17.25	7.40	3.16	1.95	3.40		6.00	1.10	2.20
2002	1.01	4.12	9.17	12.57	4.90	2.00	1.93		2.03	1.89	0.68	3.07
2003	1.17		5.95	3.71	1.48	1.65	4.31		1.17	0.96	2.45	1.87
2004	0.41	1.78	9.36	7.64	2.31	1.77	2.23		4.40	3.13	0.71	1.89
2005	0.64	3.37	4.40	10.97		0.97	0.96		4.76	0.87	1.80	1.70
2006	0.27	1.35	5.17	3.68	1.48		0.19	0.30	0.16	0.86	2.00	3.75
2007	0.50	0.77	7.11		3.64				3.49	0.66		
2008		0.19	1.35		1.38		0.05		1.62			
2009	0.34	0.19	2.33		1.48		0.07		1.34	1.14		
2010	0.20	0.10	3.00		1.90		0.09	1.40	1.43	0.90		
2011	0.40		5.20		1.30		0.09	2.00	0.36	0.50	0.80	1.86
2012	0.50		3.20		1.80		0.22	6.60		1.90	2.19	3.46
2013	0.20	0.30	3.20		1.70		0.05	1.40	0.92	0.70	1.34	1.21
2014	0.10	0.70	4.40		2.30		0.10	1.60	1.20	1.00	0.75	0.67
2015	0.40		3.50		0.30		0.10	2.20	1.10	1.30	2.89	1.44
2016	0.60		3.50		2.40		0.03	2.20		0.70	0.52	2.61
2017	0.40		3.50		0.80		0.02	1.10	0.70	1.50	0.51	0.89
Mean												
(5-year)	0.36	0.50	3.56		1.70		0.10	2.80	1.07	1.12	1.54	1.88
(10-year)	0.36	0.38	3.68		1.82		0.09	2.49	1.43	0.98	1.42	1.88

[1] Return rates to rod fishery with constant effort.

[2] Different release sites

[3] Microtagged.

Figure 3.1.3.1. Overview of effort as reported for various fisheries and countries in the Northern NEAC area, 1971–2018. Notice that some of the y-axes are given in thousands.

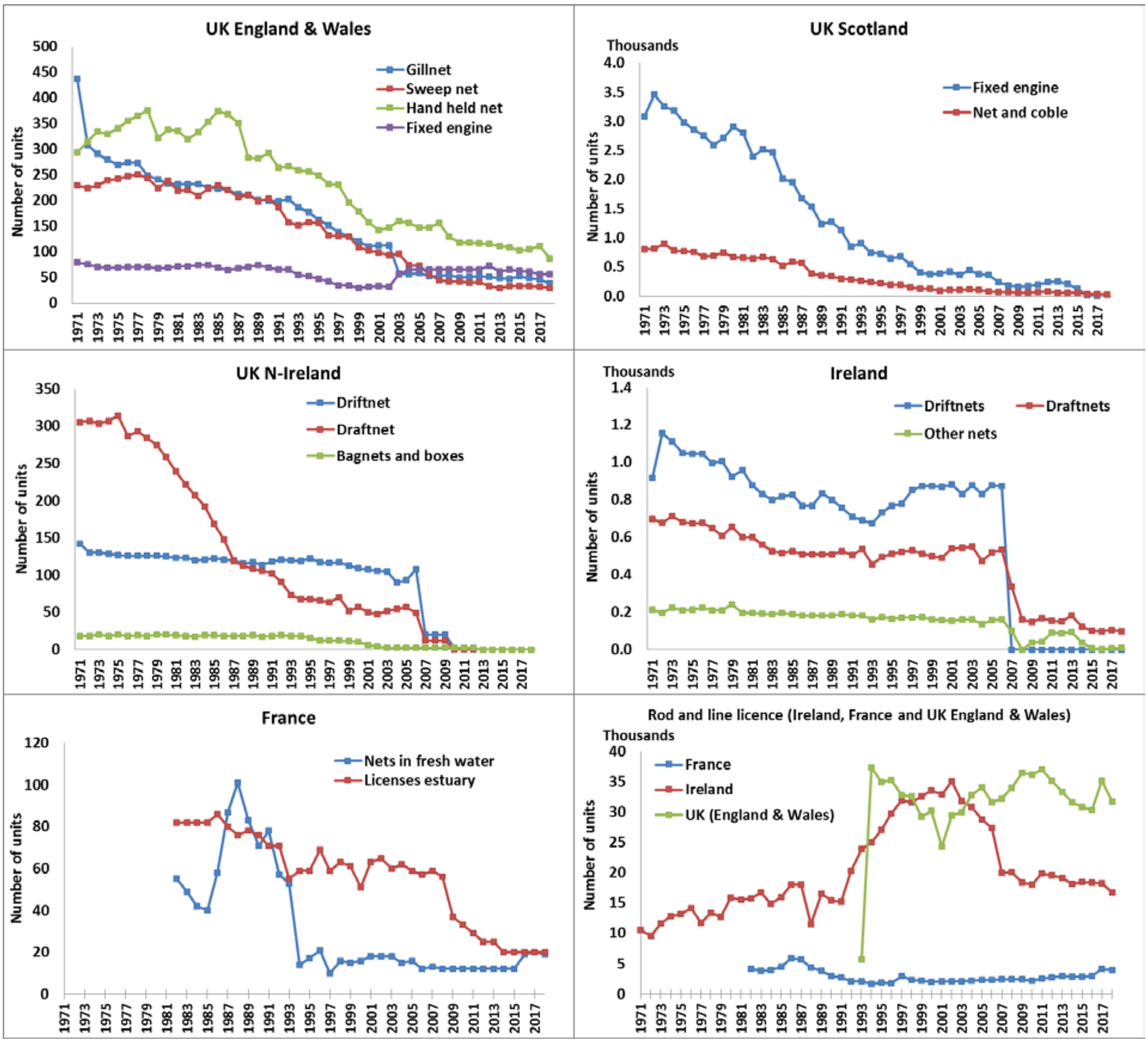


Figure 3.1.3.2. Overview of effort as reported for various fisheries and countries in the Southern NEAC area, 1971–2018. Notice all the y-axes on the right panel are given in thousands.

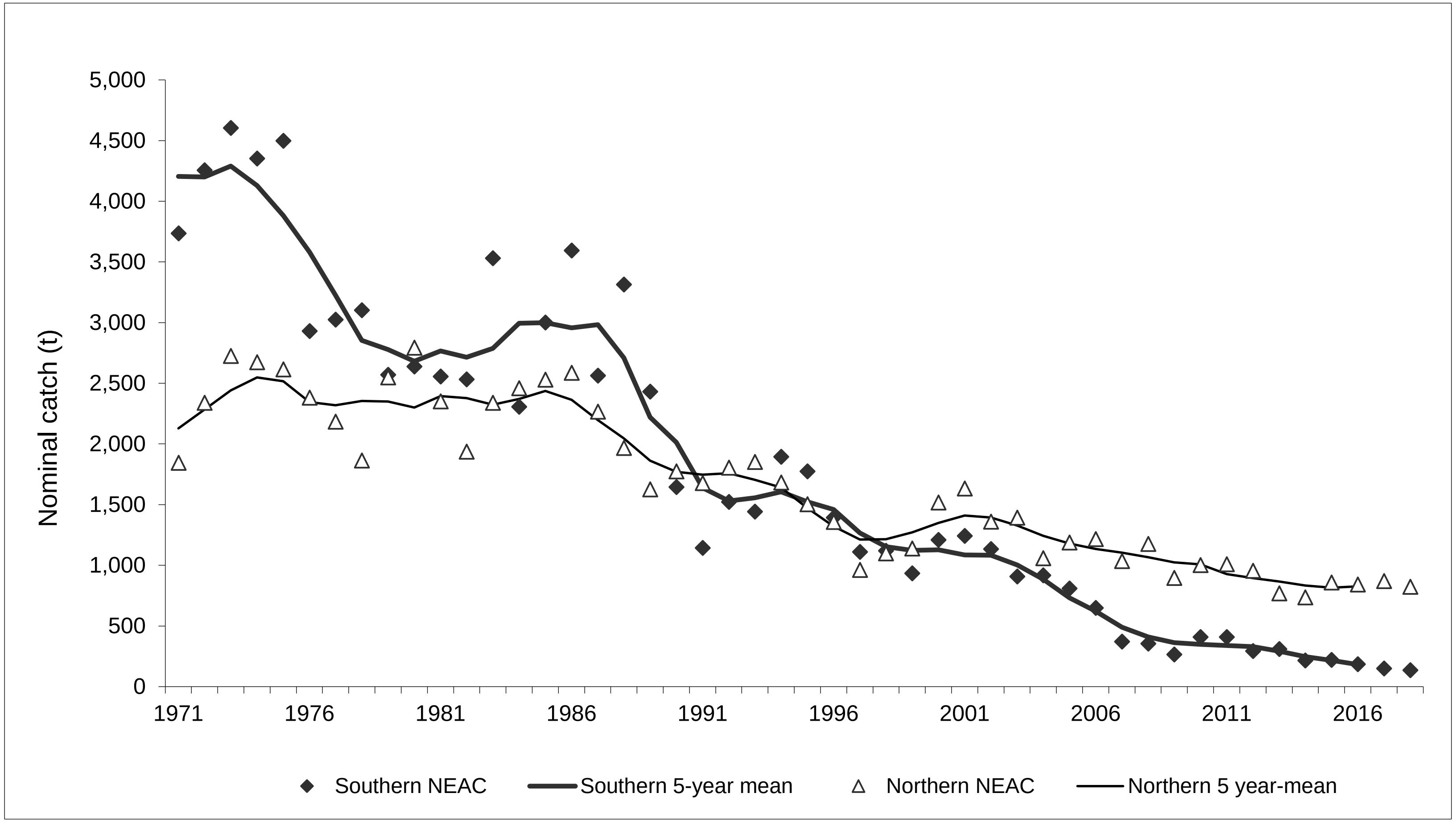


Figure 3.1.4.1. Nominal catches of salmon and 5-year running means in the Southern and Northern NEAC areas, 1971–2018.

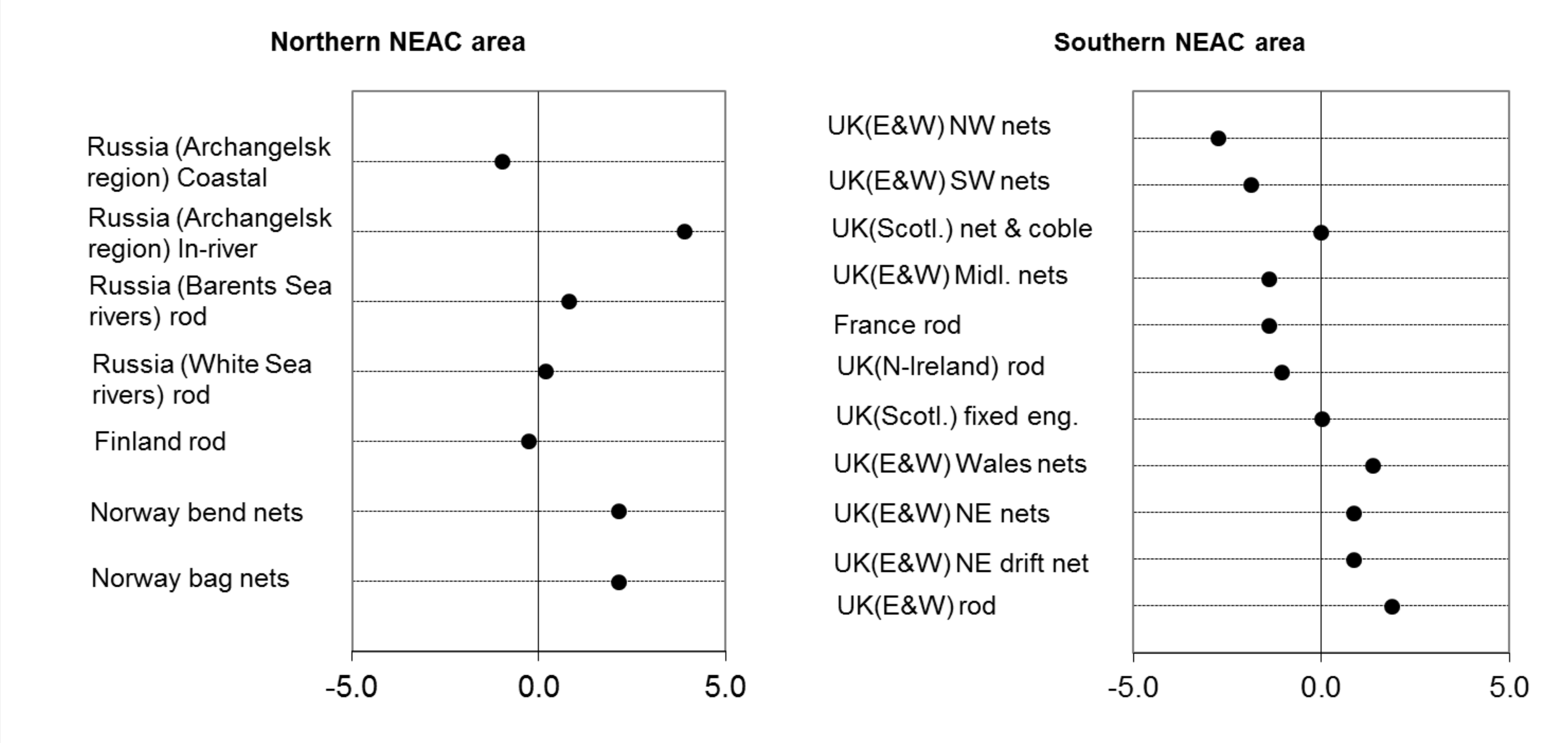


Figure 3.1.5.1 Proportional change (%) over years in CPUE estimates in various rod and net fisheries in Northern and Southern NEAC areas.

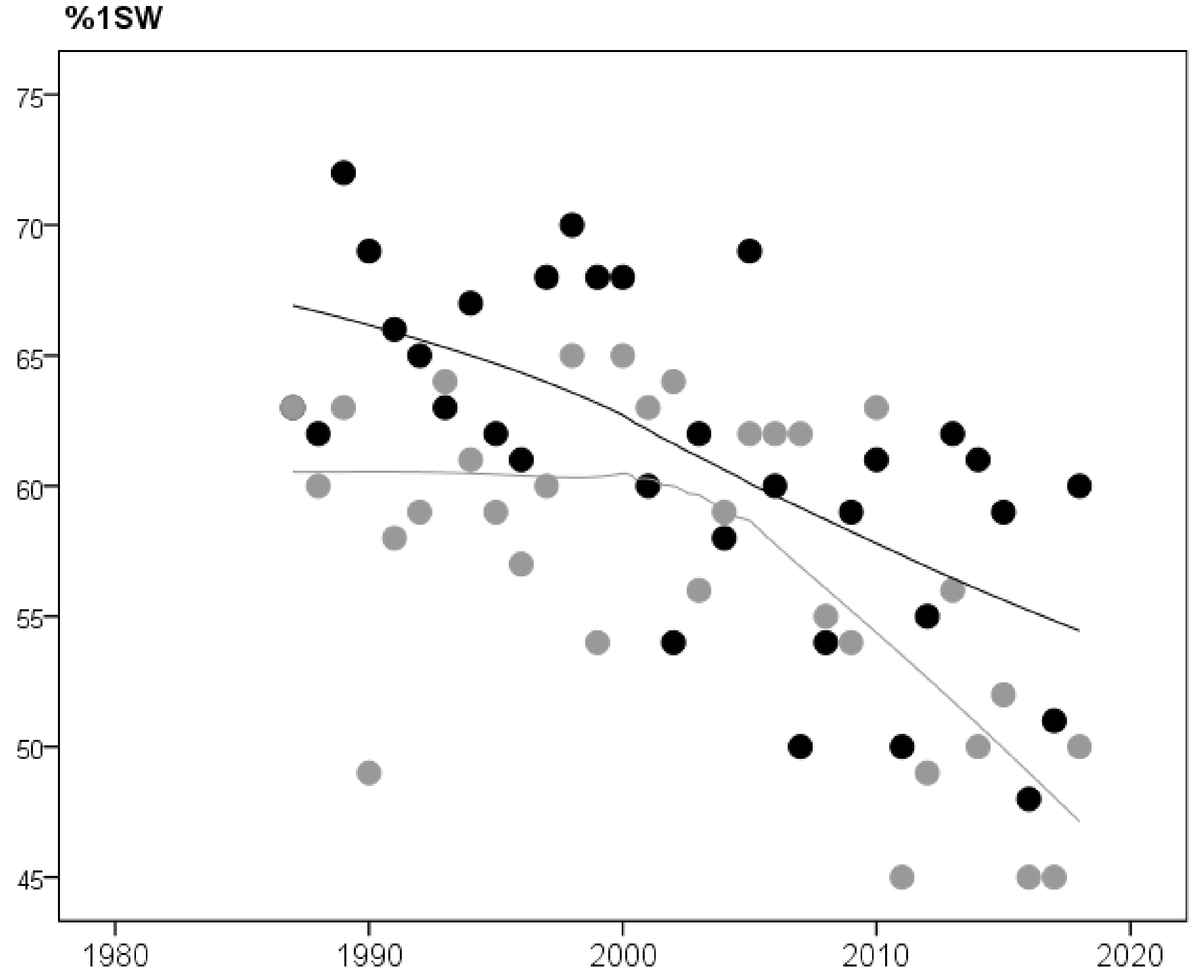


Figure 3.1.6.1. Percentage of 1SW salmon in the reported catch for the Northern (black) and Southern (grey) stock complexes, 1987–2018. LOESS regression lines over the time-series given in black and grey respectively.

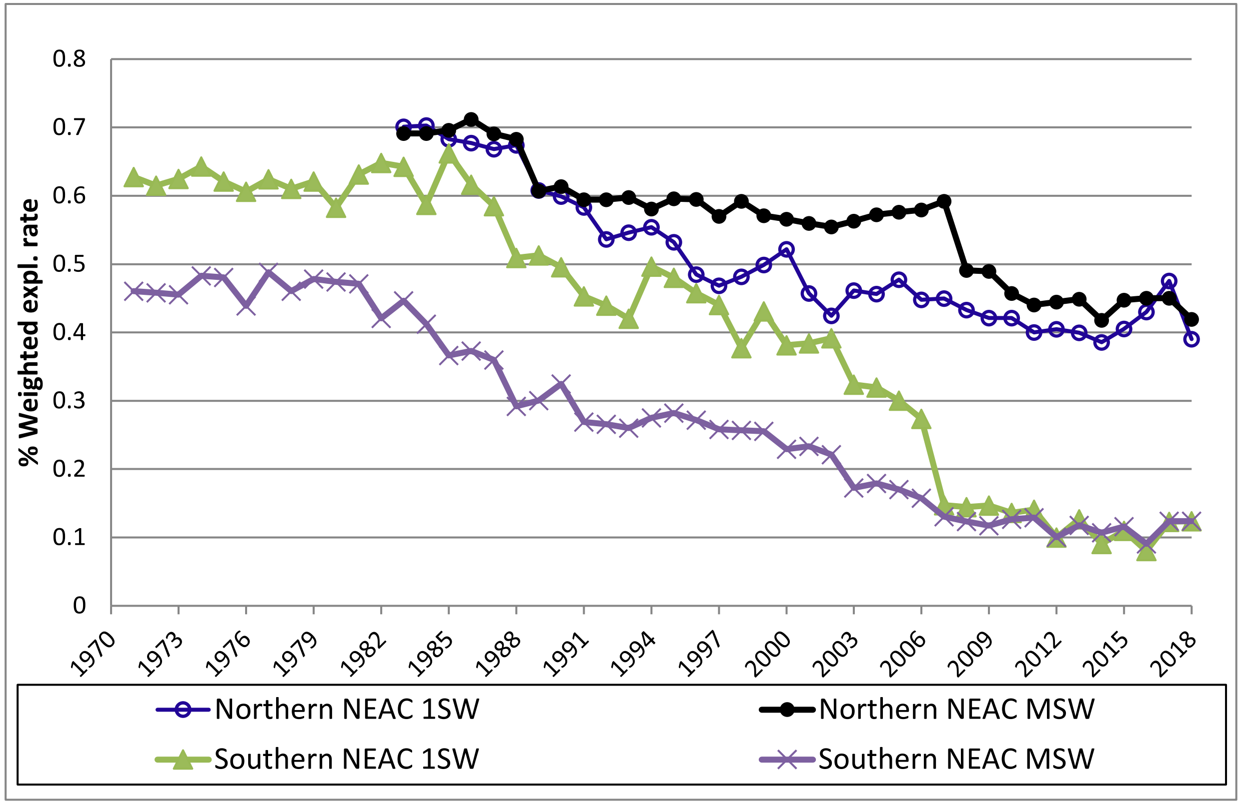


Figure 3.1.9.1. Mean annual exploitation rate of wild 1SW and MSW salmon by commercial and recreational fisheries in NEAC countries from 1971 to 2018.

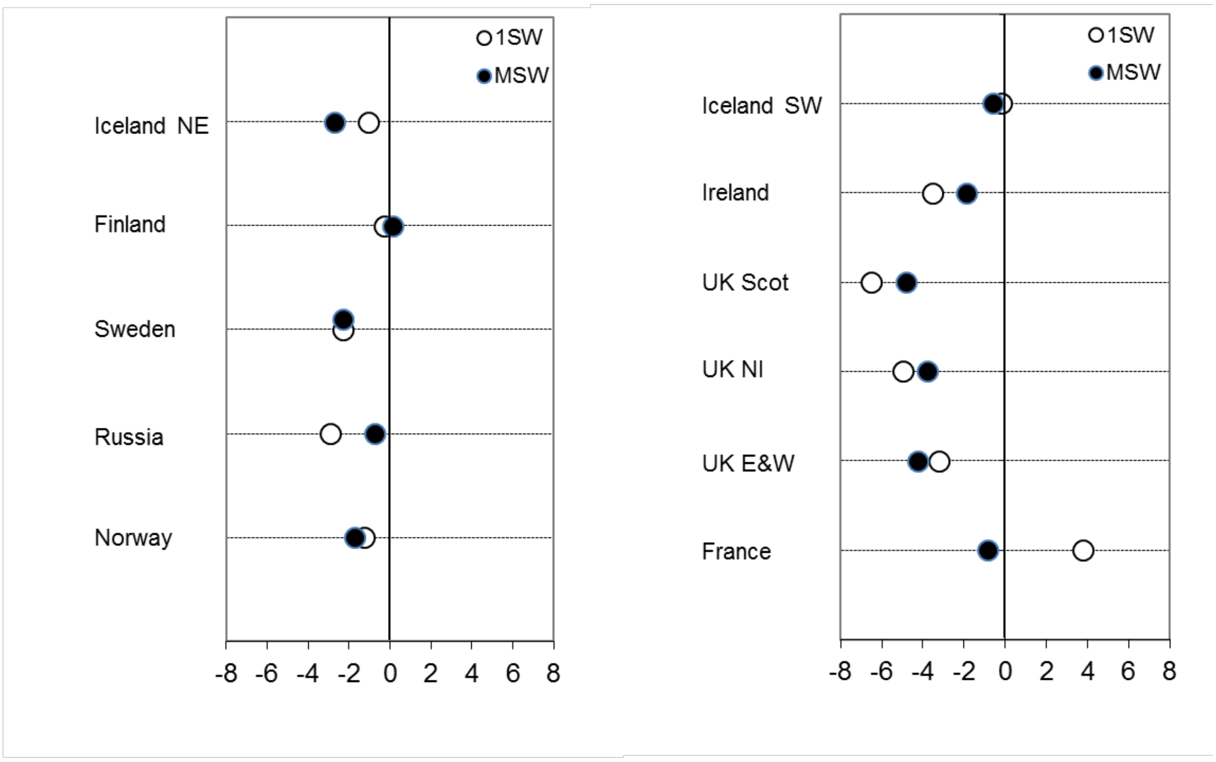


Figure 3.1.9.2. The rate of change of exploitation of 1SW and MSW salmon in Northern NEAC (left) and Southern NEAC (right) countries.

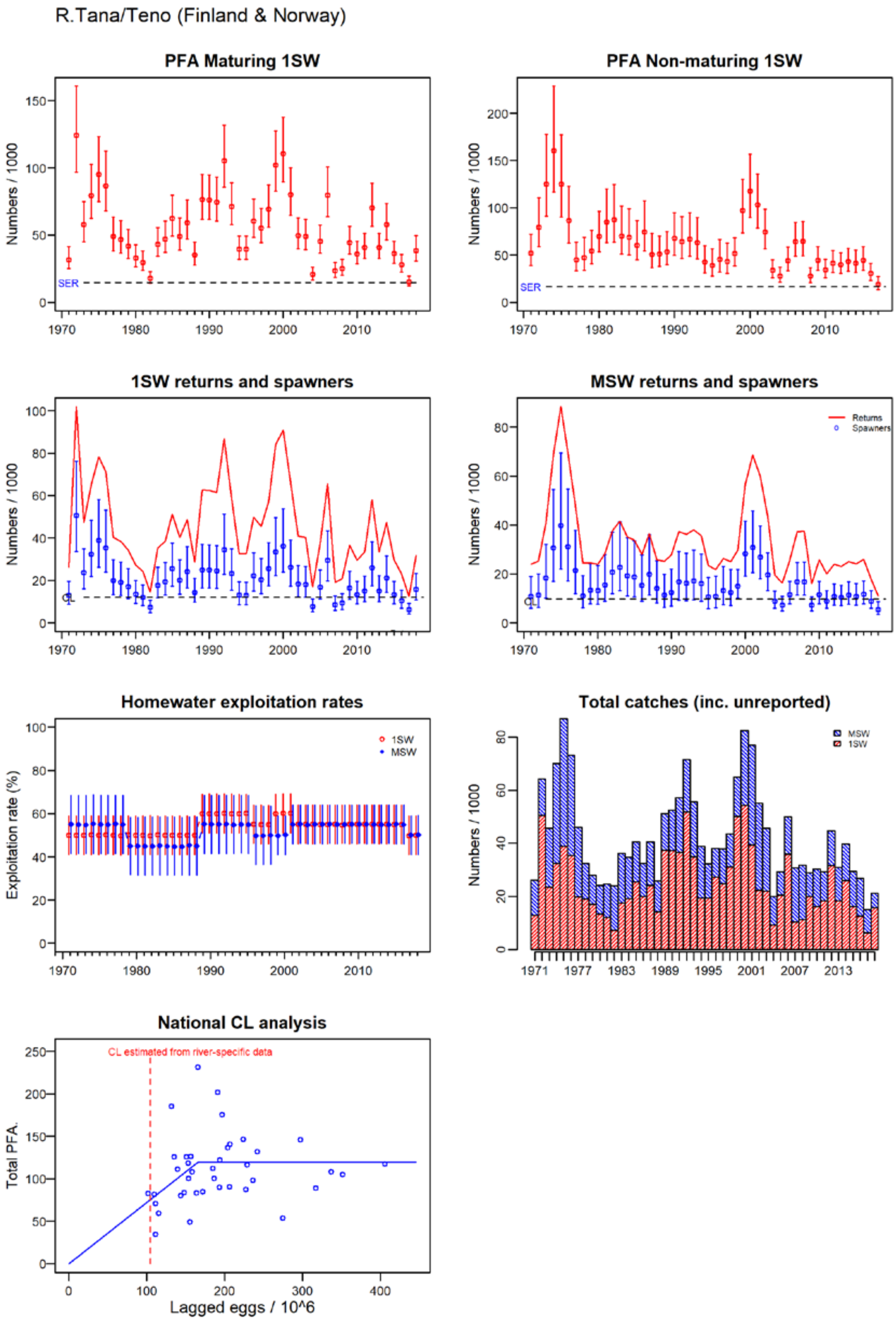


Figure 3.3.4.1a. Summary of fisheries and stock description, River Teno / Tana (Finland and Norway combined). The sum of the river-specific CL, which is used for assessment purposes, is included on the national CL analysis plot (for comparison, the CL estimated from the national S–R relationship is at the inflection point).

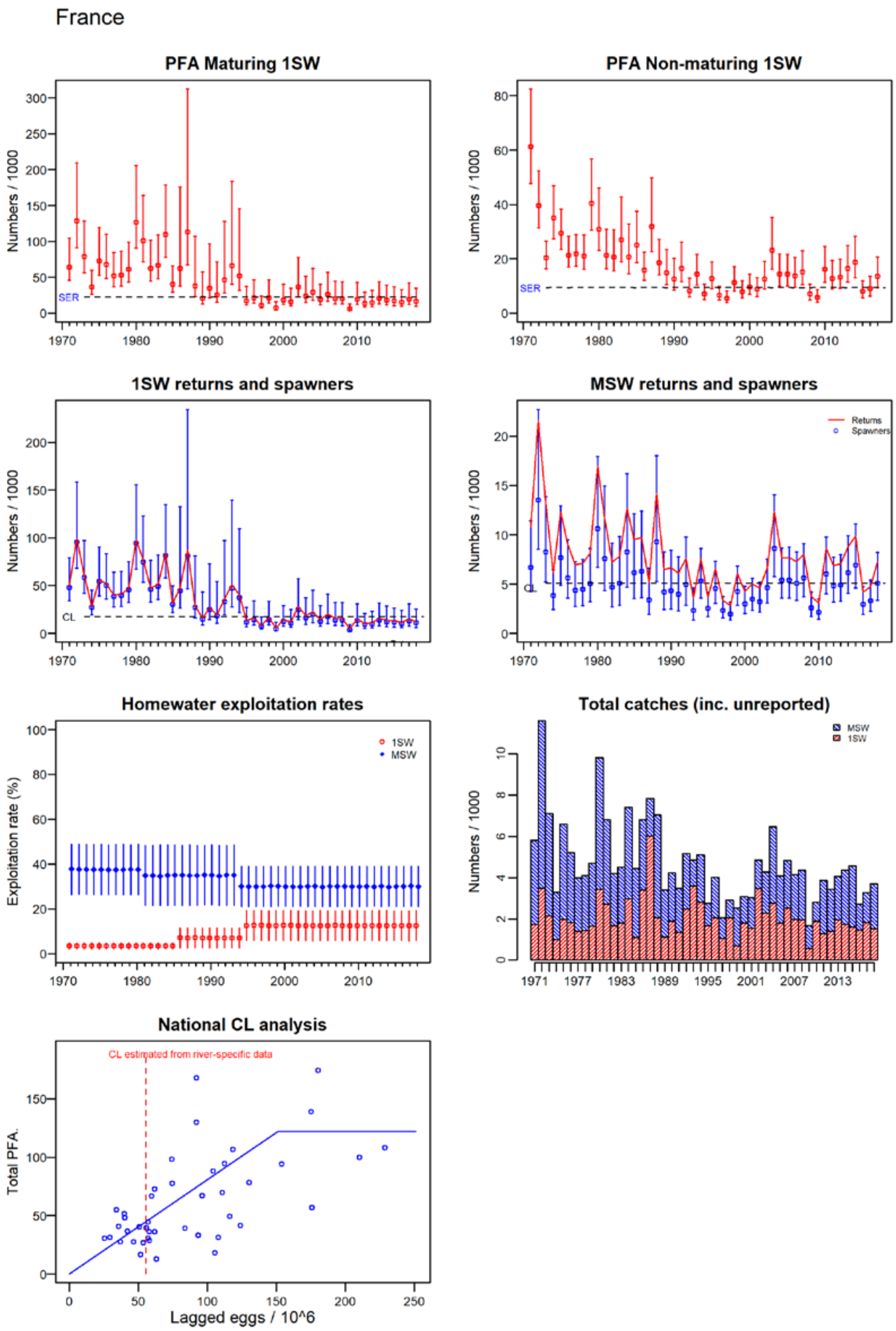


Figure 3.3.4.1b. Summary of fisheries and stock description, France. The sum of the river-specific CL, which is used for assessment purposes, is included on the national CL analysis plot (for comparison, the CL estimated from the national S–R relationship is at the inflection point).

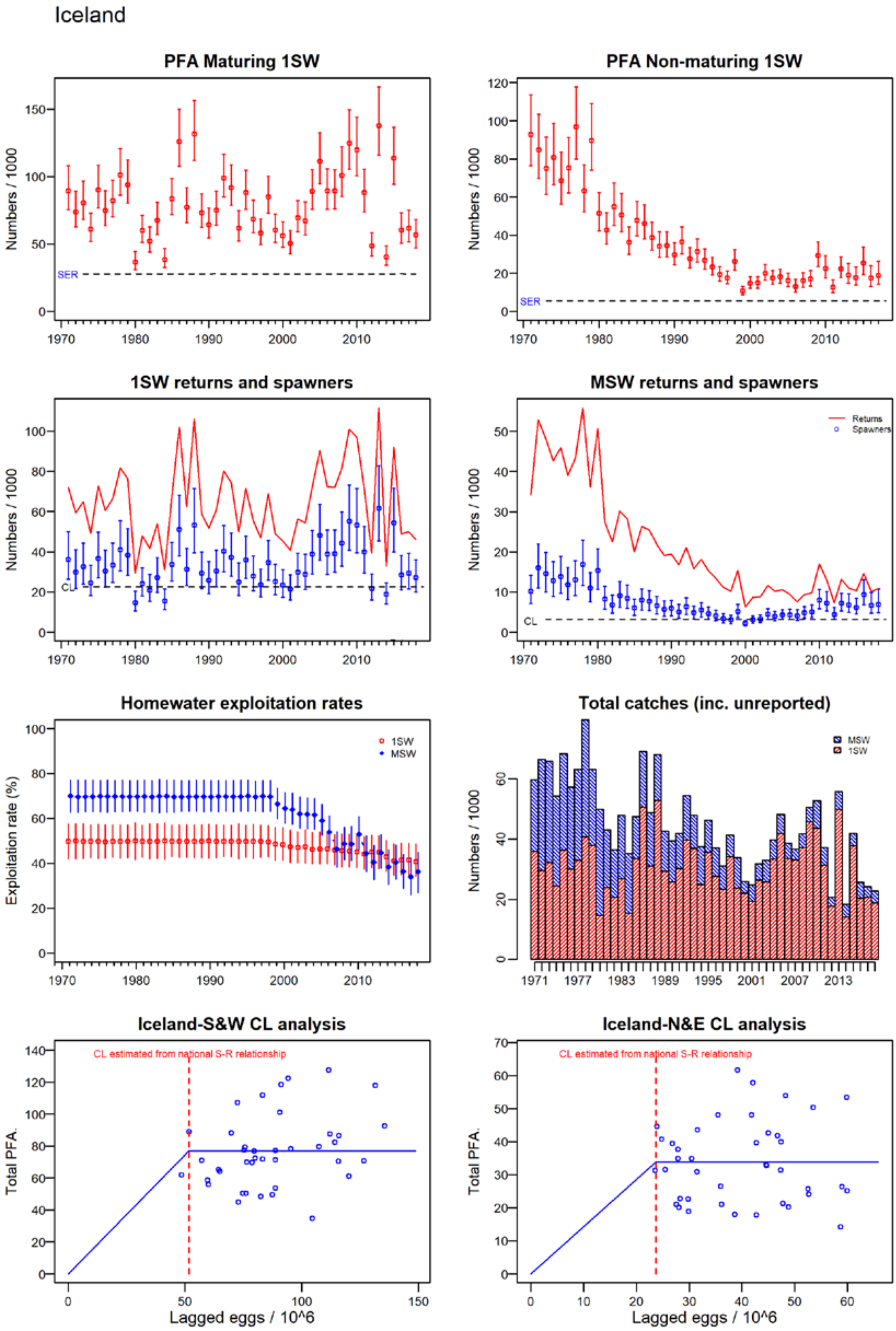


Figure 3.3.4.1c. Summary of fisheries and stock description, Iceland. The sum of the river-specific CL, which is used for assessment purposes, is included on the national CL analysis plot (for comparison, the CL estimated from the national S–R relationship is at the inflection point).

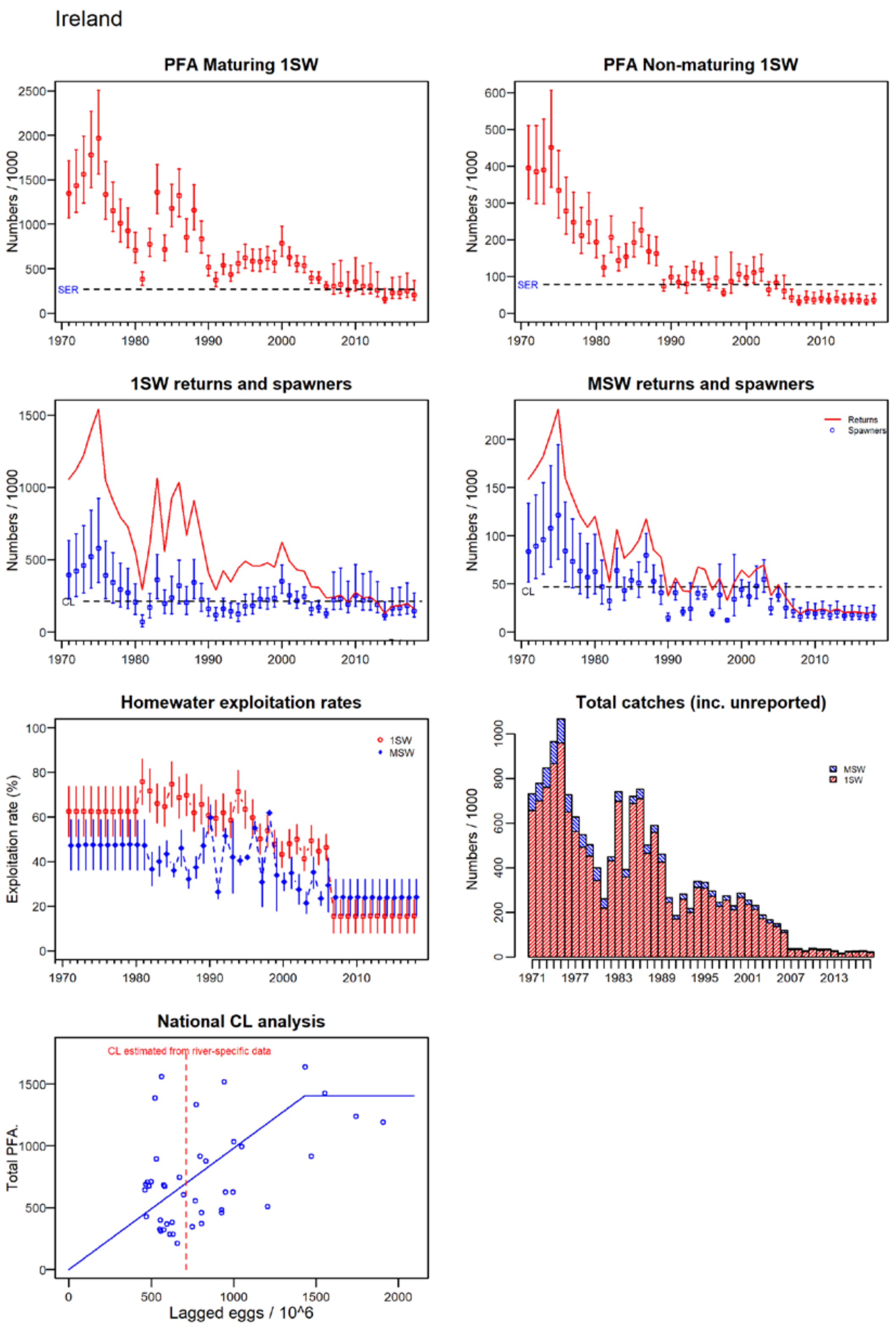


Figure 3.3.4.1d. Summary of fisheries and stock description, Ireland. The sum of the river-specific CL, which is used for assessment purposes, is included on the national CL analysis plot (for comparison, the CL estimated from the national S–R relationship is at the inflection point).

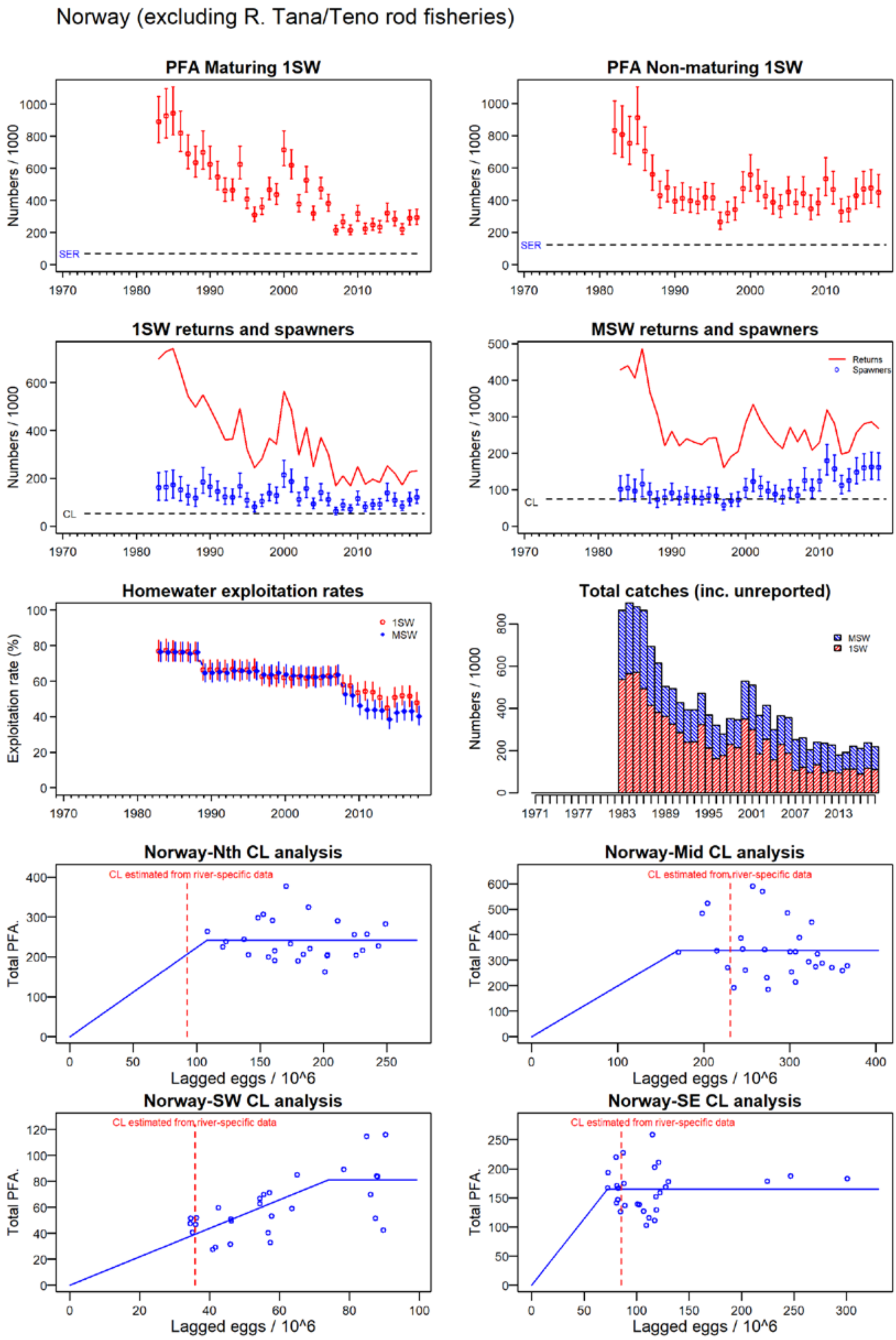


Figure 3.3.4.1e. Summary of fisheries and stock description, Norway (minus Norwegian catches from the R. Teno / Tana). The sum of the river-specific CLs, which are used for assessment purposes, are included on the regional CL analysis plots (for comparison, the CLs estimated from the regional S–R relationships are at the inflection points).

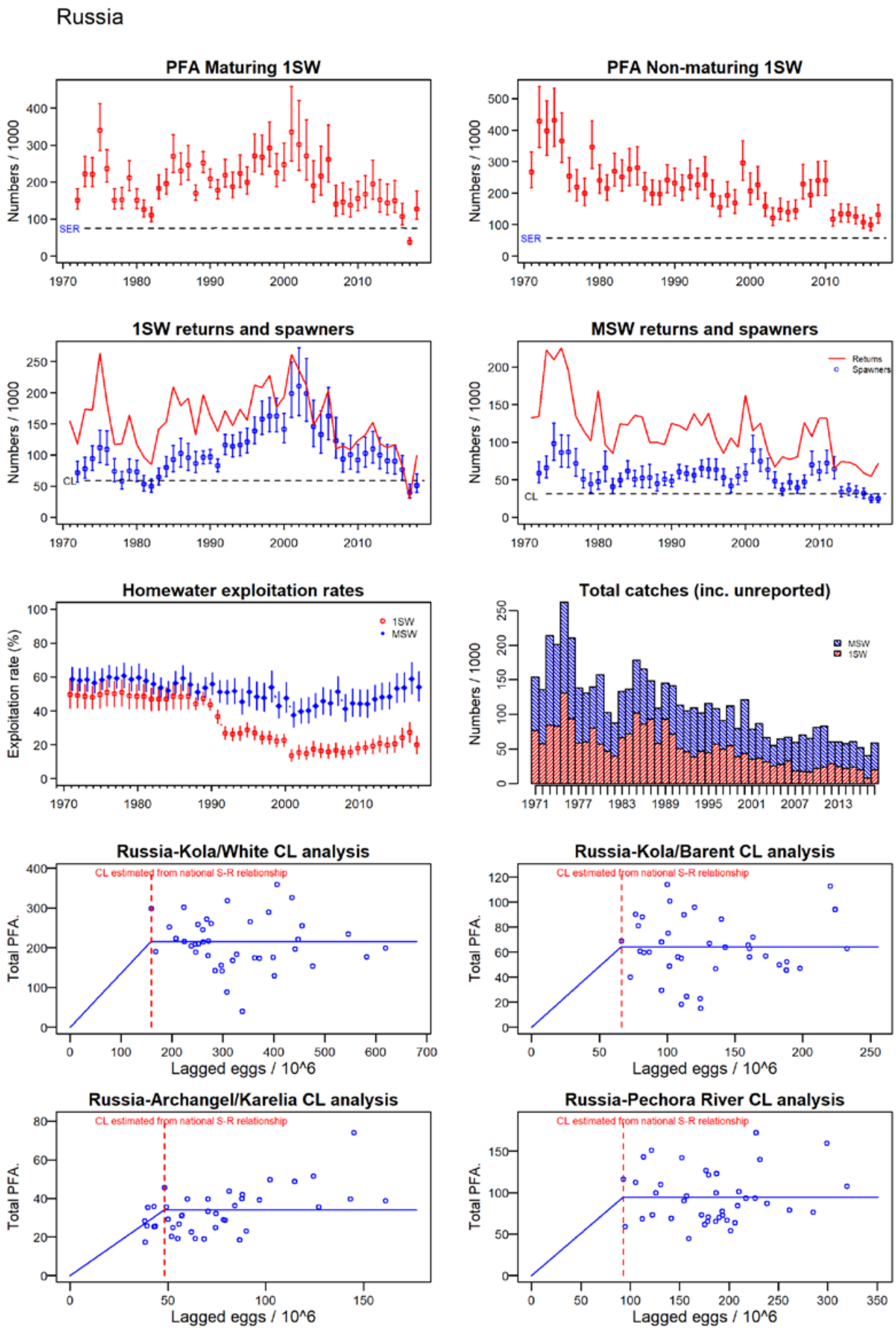


Figure 3.3.4.1f. Summary of fisheries and stock description, Russia. The sum of the river-specific CL, which is used for assessment purposes, is included on the national CL analysis plot (for comparison, the CL estimated from the national S–R relationship is at the inflection point).

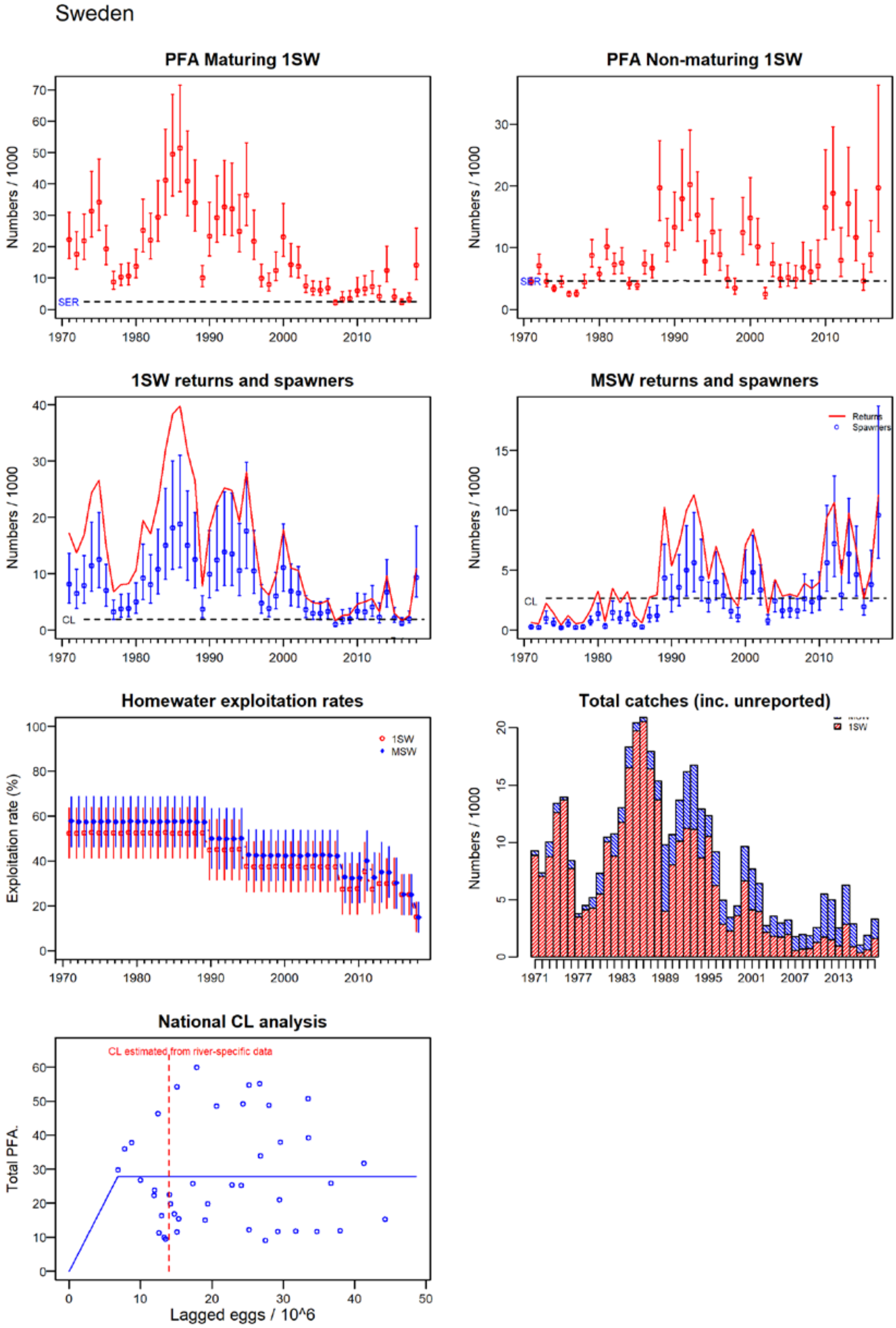


Figure 3.3.4.1g. Summary of fisheries and stock description, Sweden. The sum of the river-specific CL, which is used for assessment purposes, is included on the national CL analysis plot (for comparison, the CL estimated from the national S–R relationship is at the inflection point).

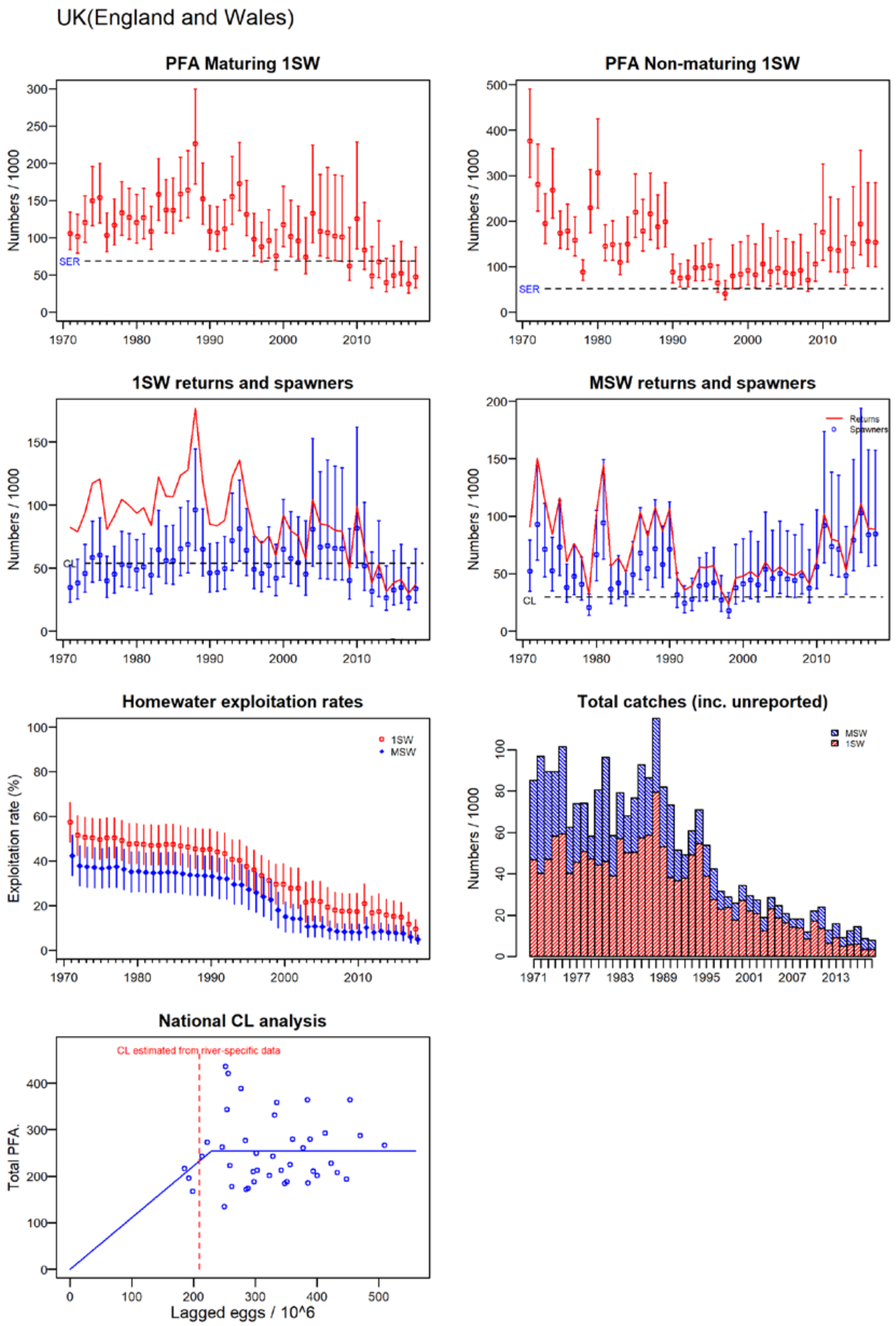


Figure 3.3.4.1h. Summary of fisheries and stock description, UK (England & Wales). The sum of the river-specific CL, which is used for assessment purposes, is included on the national CL analysis plot (for comparison, the CL estimated from the national S–R relationship is at the inflection point).

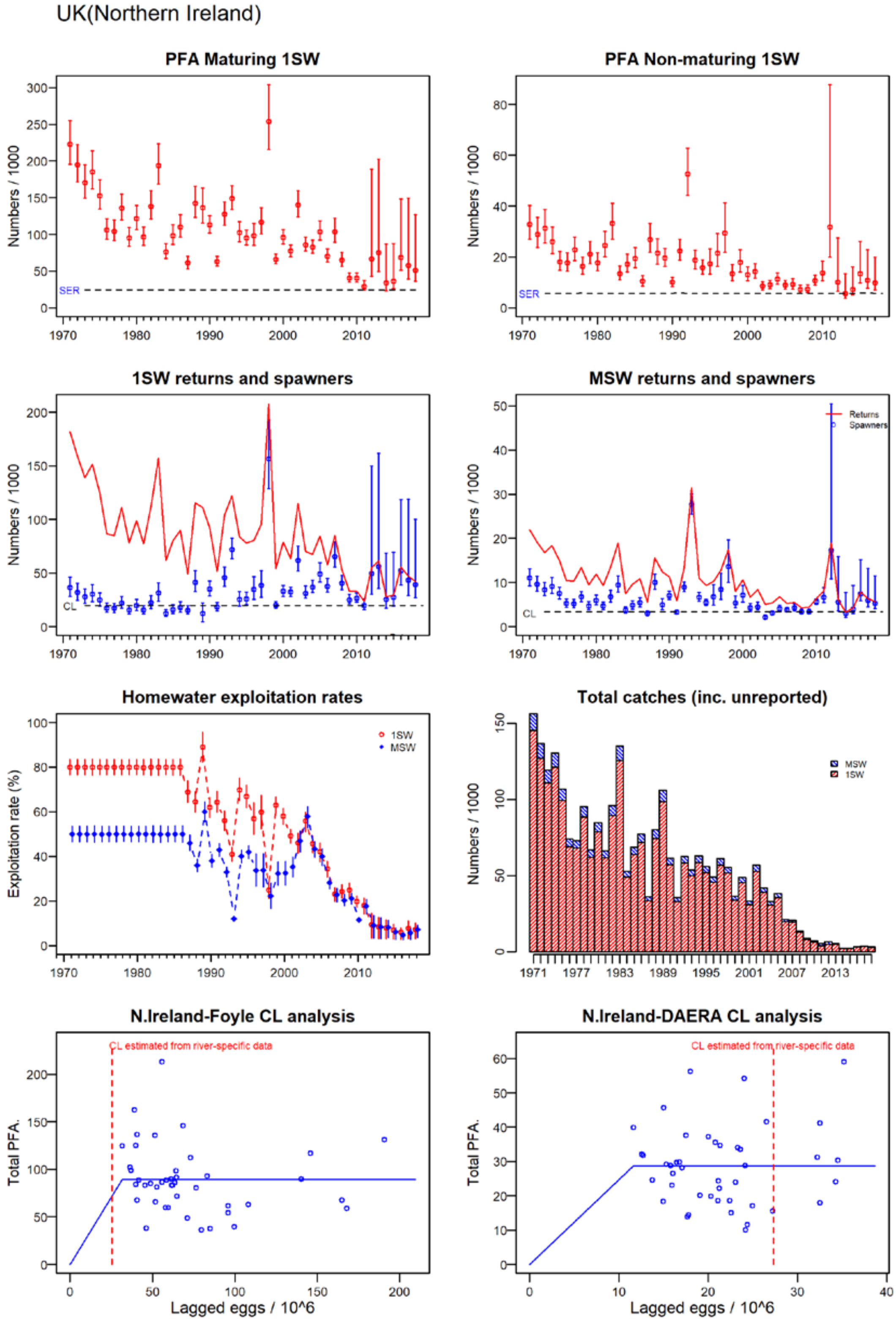


Figure 3.3.4.1i. Summary of fisheries and stock description, UK (Northern Ireland). The sum of the river-specific CLs, which are used for assessment purposes, are included on the regional CL analysis plots (for comparison, the CLs estimated from the regional S–R relationships are at the inflection points).

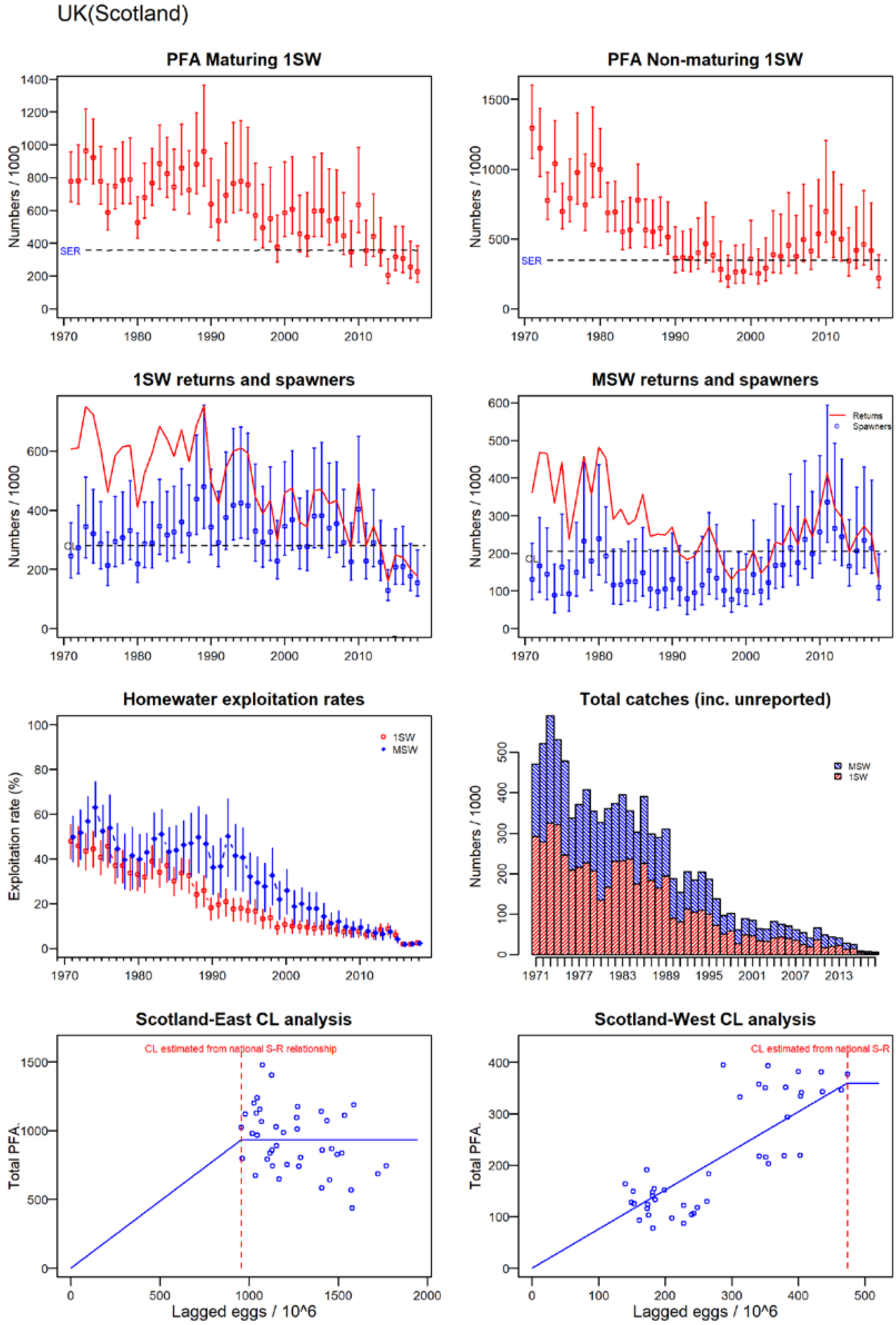


Figure 3.3.4.1j. Summary of fisheries and stock description, UK (Scotland). The sum of the river-specific CLs, which are used for assessment purposes, are included on the regional CL analysis plots (for comparison, the CLs estimated from the regional S–R relationships are at the inflection points).

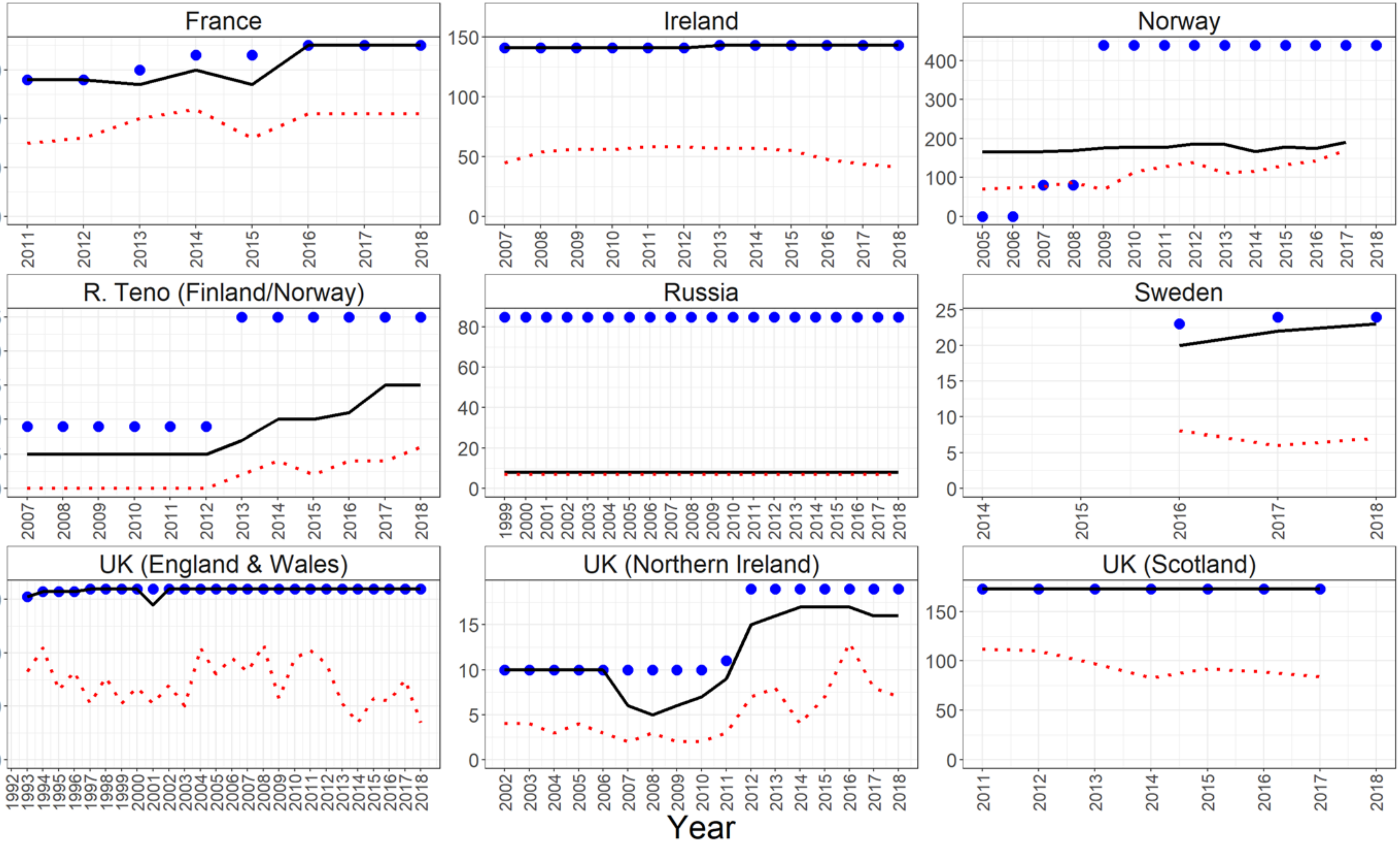


Figure 3.3.5.1 Time-series showing the number of rivers with established CLs (blue dotted lines), the number of rivers assessed annually (black solid lines), and the number of rivers meeting CLs annually (red dotted lines) for jurisdictions in the NEAC area.

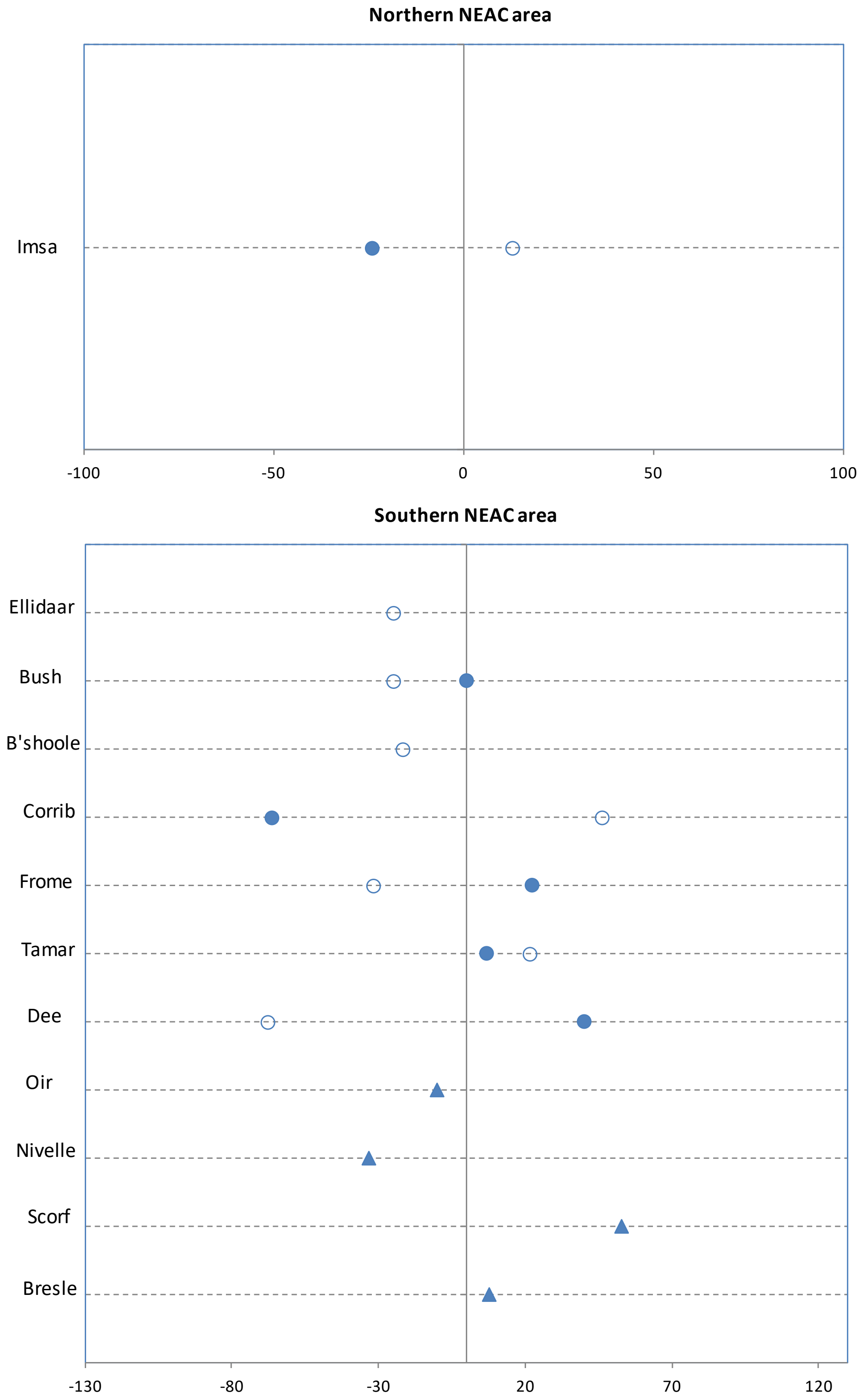


Figure 3.3.6.1. Comparison of the percent change in the five-year mean returns for 1SW and MSW wild salmon smolts to rivers of Northern (upper panel) and Southern NEAC (lower panel) areas for the 2008 to 2012 and 2013 to 2017 smolt years (2007 to 2011 and 2012 to 2016 for MSW salmon). Open circle are for 1SW and filled circles are for MSW dataseries. Triangles indicate all sea ages without separation. Populations with at least three datapoints in each of the two time periods are included in the analysis. The scale of change in some rivers is influenced by low return numbers creating high uncertainty, which may have a large consequence on the percentage change.

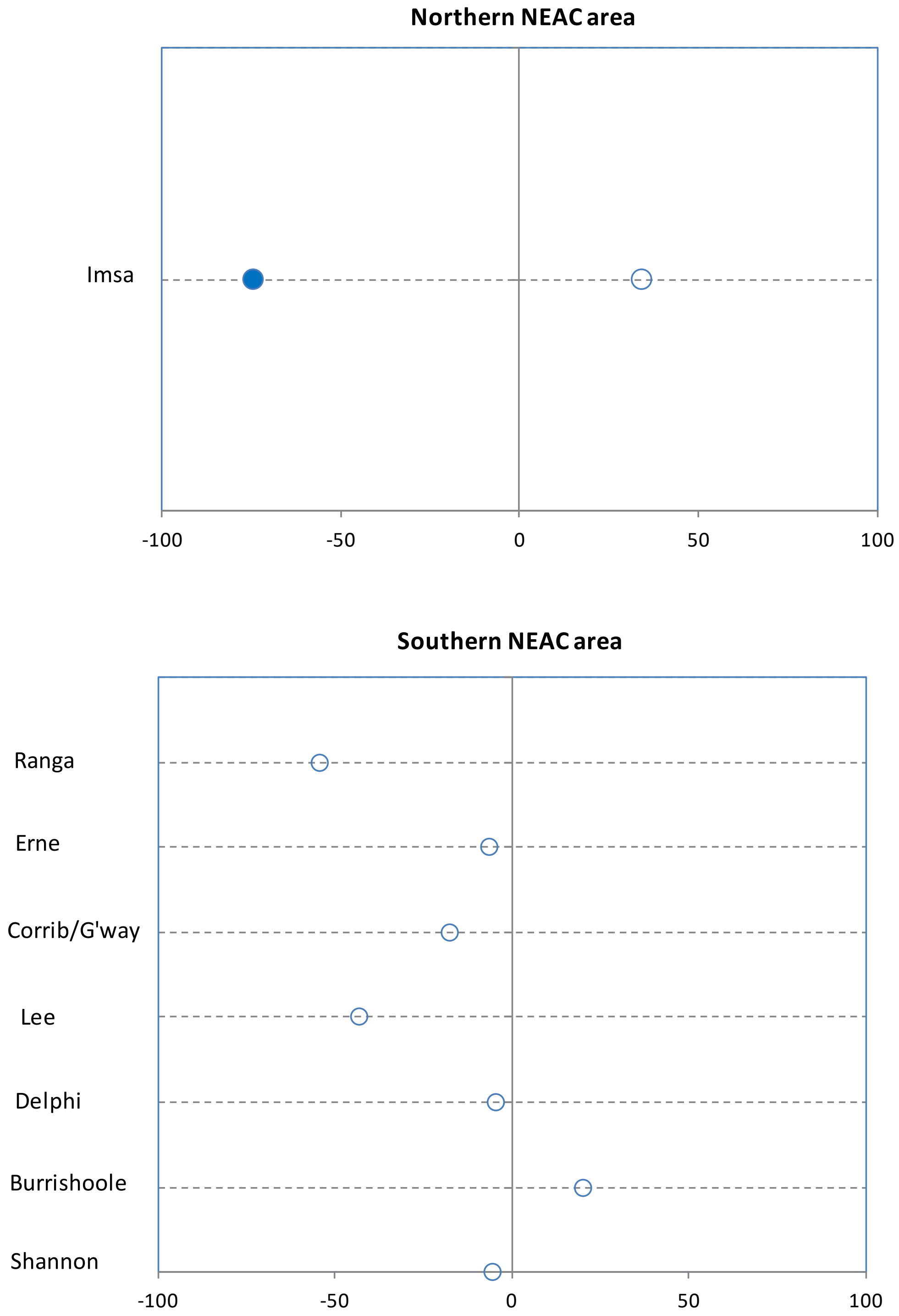


Figure 3.3.6.2. Comparison of the percent change in the five-year mean returns for 1SW and 2SW hatchery salmon smolts to rivers of Northern (upper panel) and Southern NEAC (lower panel) areas for the 2008 to 2012 and 2013 to 2017 smolt years (2007 to 2011 and 2012 to 2016 for 2SW salmon). Open circle are for 1SW and filled circles are for 2SW dataseries. Populations with at least three datapoints in each of the two time periods are included in the analysis. The scale of change in some rivers is influenced by low return numbers creating high uncertainty, which may have a large consequence on the percentage change.

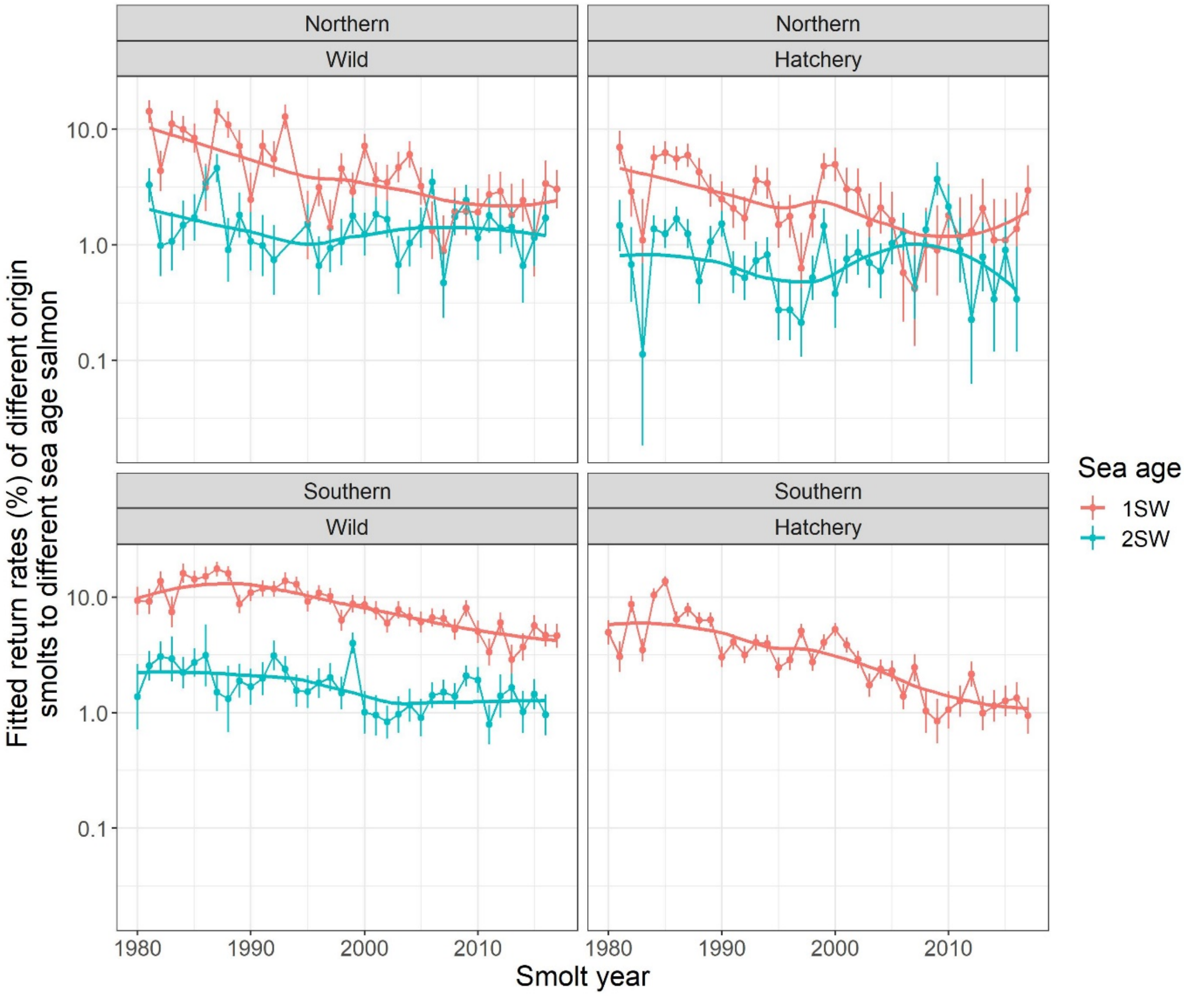


Figure 3.3.6.3. Least squared (marginal mean) average annual survival indices (%) of wild (left hand panels) and hatchery origin smolts (right hand panels) of 1SW (red) and 2SW (blue) salmon to Northern (top panels) and Southern NEAC areas (bottom panels). For most rivers in Southern NEAC, the values 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 represent standard errors. Note the *y*-axis scale is on a log scale and differs among panels, and there are no return rates in 1993 and 1994 for 2SW wild smolts in the Northern NEAC. Trend lines are from locally weighted polynomial regression (LOESS) and are meant to be a visual interpretation aid. Following details in Tables 3.3.6.1 and 3.3.6.2 the analyses included estimated survival (%) to 1SW and 2SW returns by smolt year.

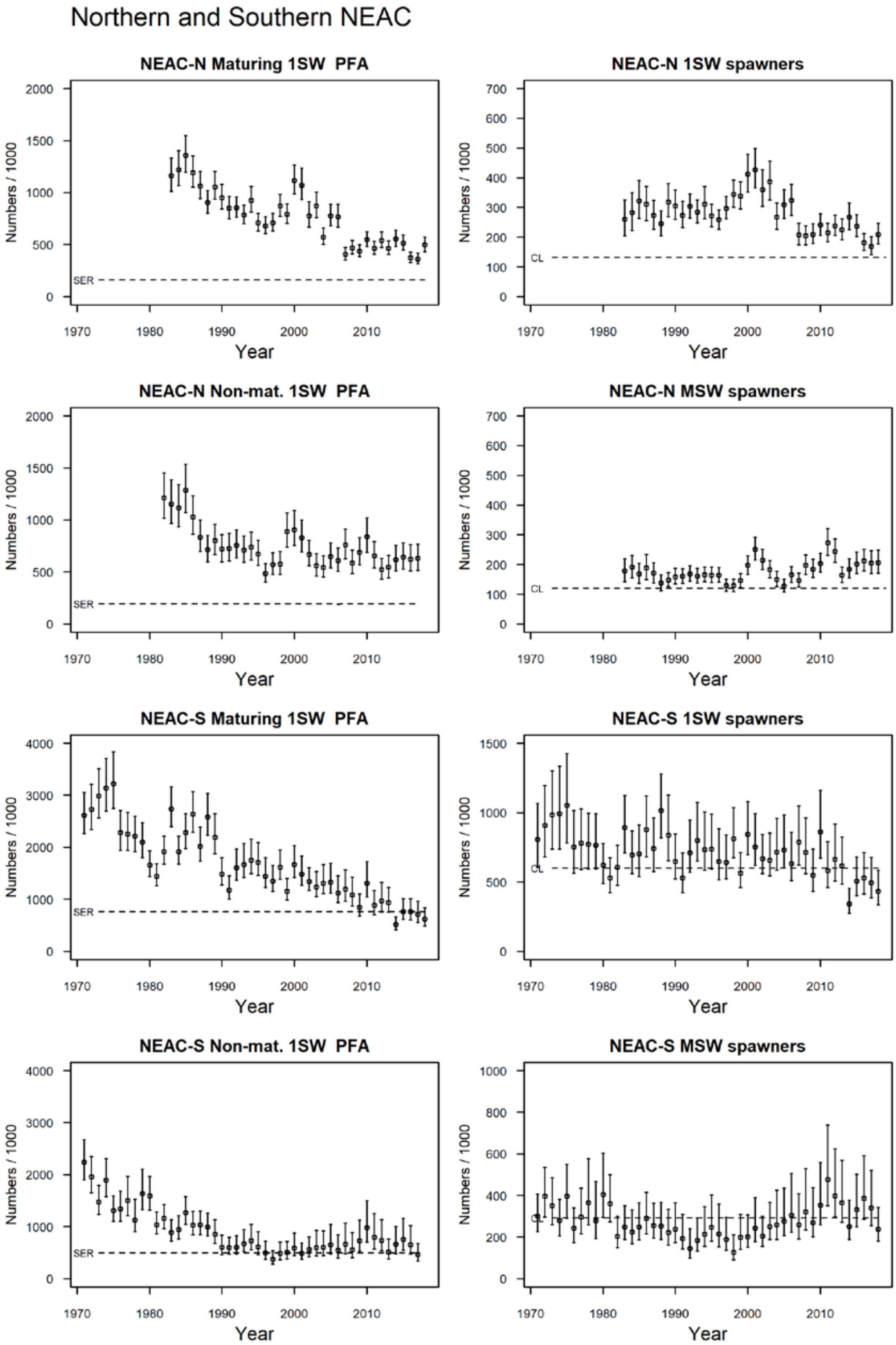


Figure 3.3.4.2. Estimated PFA (left panels) and spawning escapement (right panels) with 90% confidence limits, for maturing 1SW (1SW spawners) and non-maturing 1SW (MSW spawners) salmon in northern (NEAC-N) and southern (NEAC-S) NEAC stock complexes.

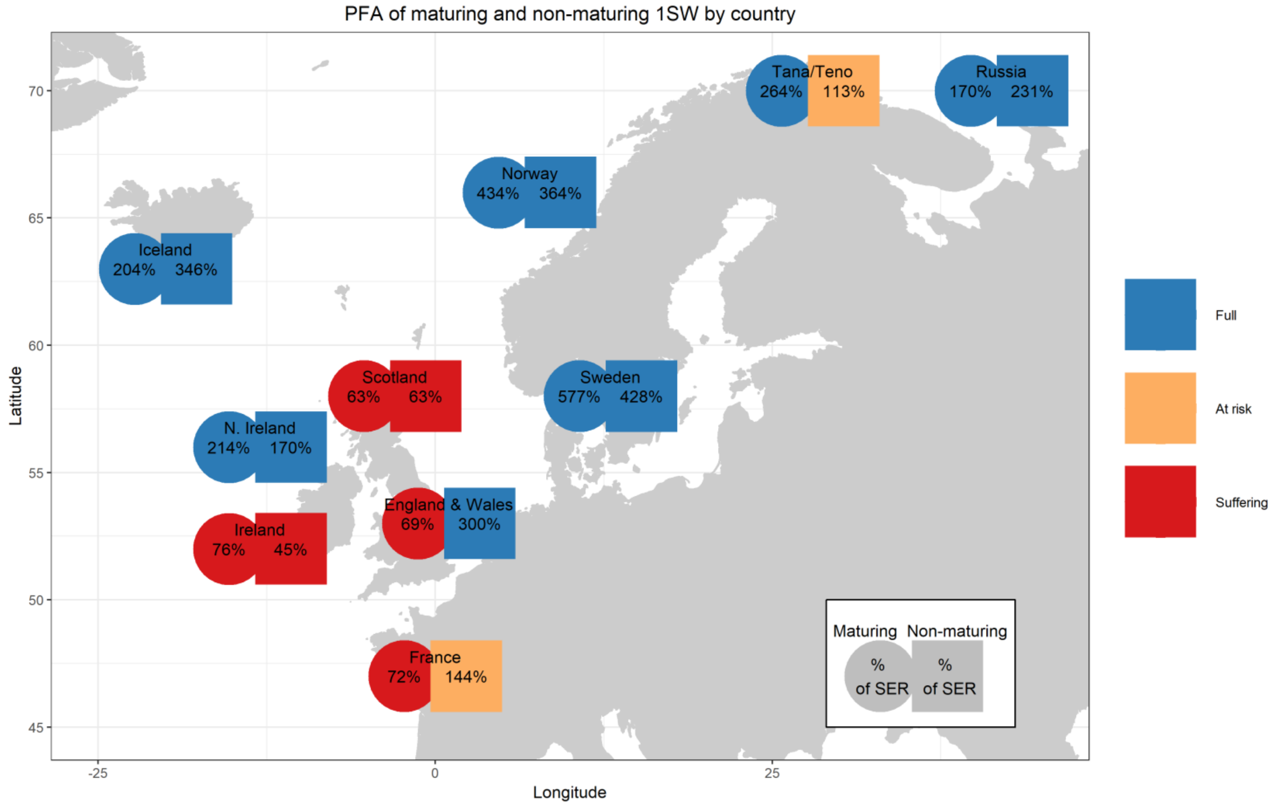


Figure 3.3.4.3. PFA of maturing (2018) and non-maturing (2017) in percent of spawner escapement reserve (% of SER). The percent of SER is based on the median of the Monte Carlo distribution. The colour shading represents the three ICES stock status designations: Full (at full reproductive capacity: the 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).

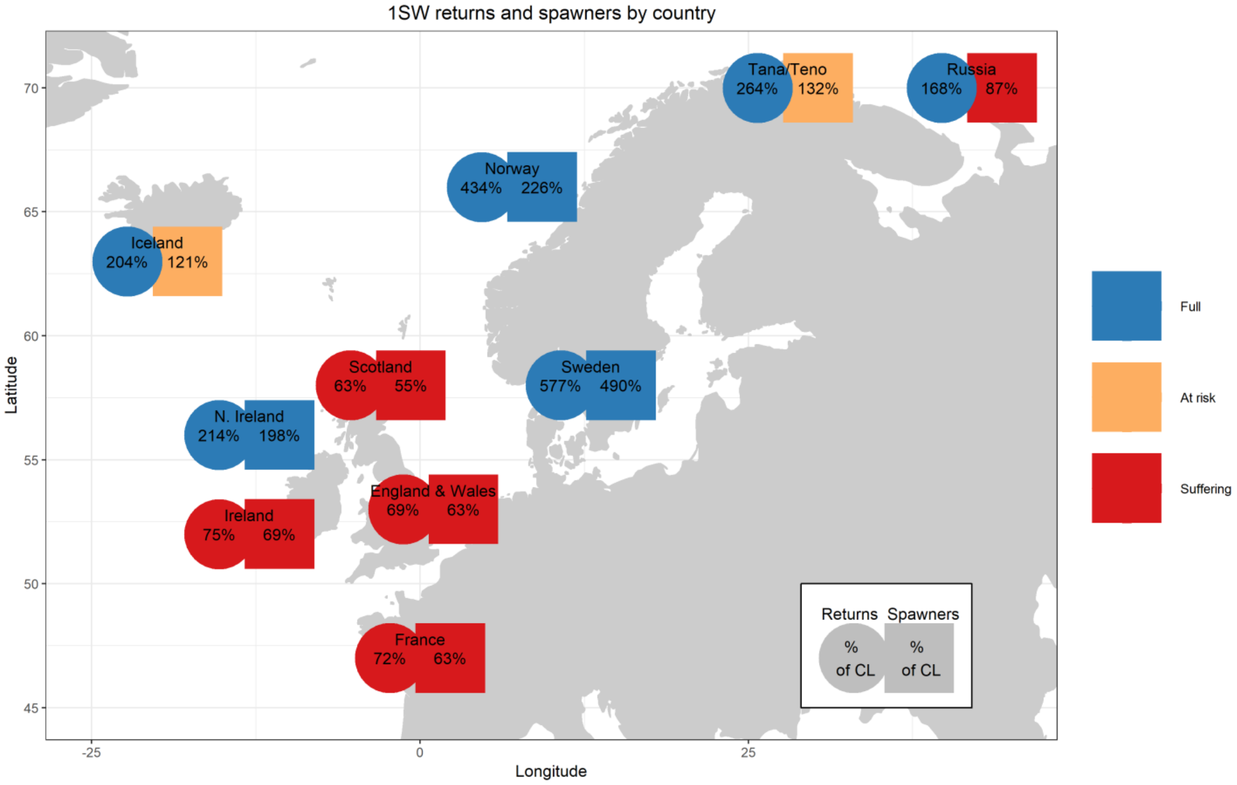


Figure 3.3.4.4. 1SW returns and spawners in percent of conservation limit (% of CL) for 2018. The percent of CL is based on the median of the Monte Carlo distribution. The colour shading represents the three ICES stock status designations: Full (at full reproductive capacity: the 5th percentile of the 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).

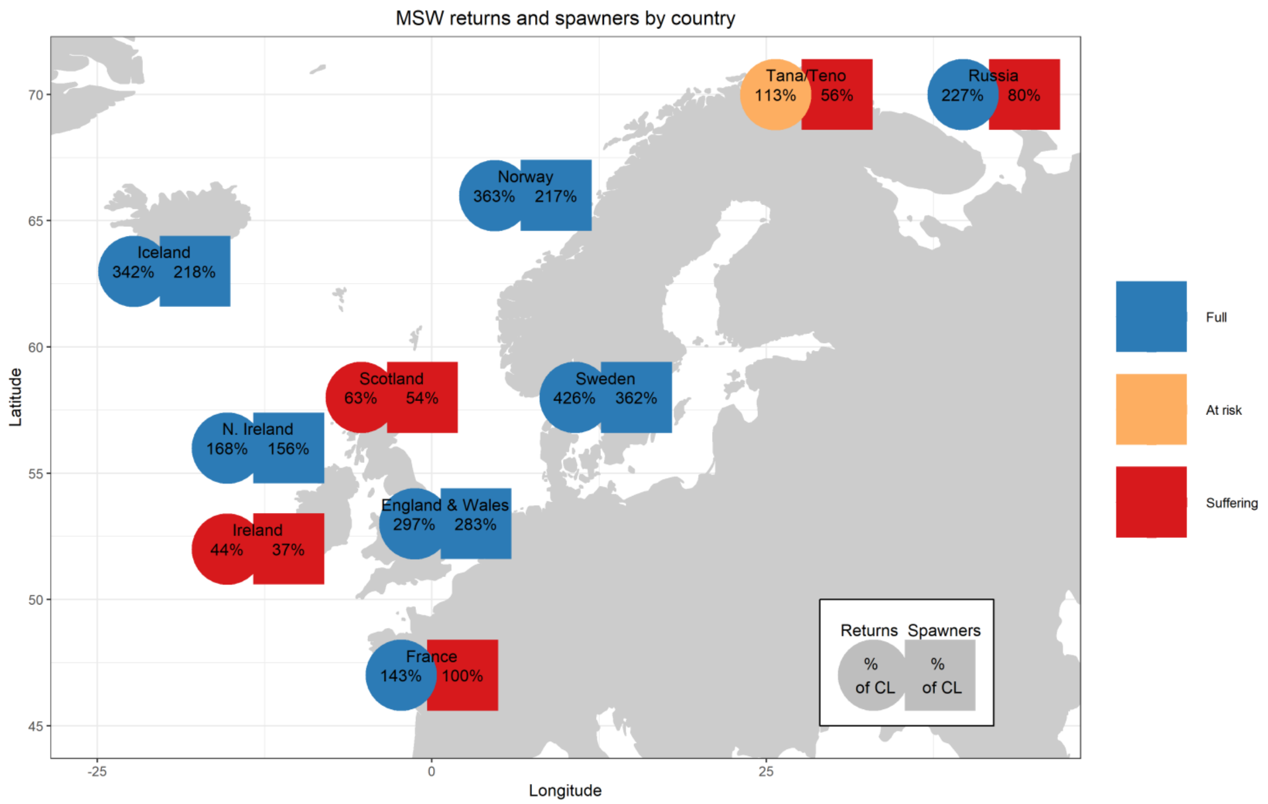


Figure 3.3.4.5. MSW returns and spawners in percent of conservation limit (% of CL) for 2018. The percent of CL is based on the median of the Monte Carlo distribution. The colour shading represents the three ICES stock status designations: Full (at full reproductive capacity: the 5th percentile of the 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).

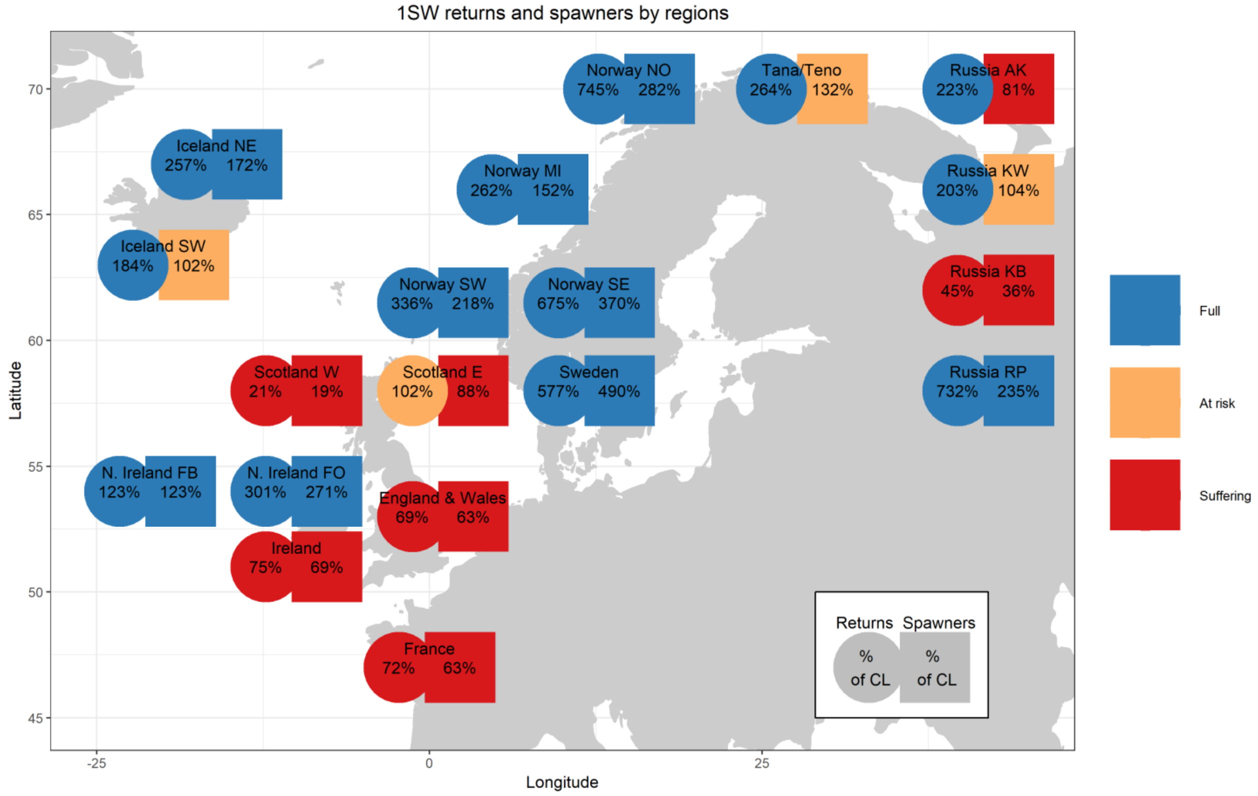


Figure 3.3.4.6. 1SW returns and spawners in percent of region-specific conservation limit (% of CL) for 2018. The percent of CL is based on the median of the Monte Carlo distribution. The colour shading represents the three ICES stock status designations: Full (at full reproductive capacity: the 5th 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).

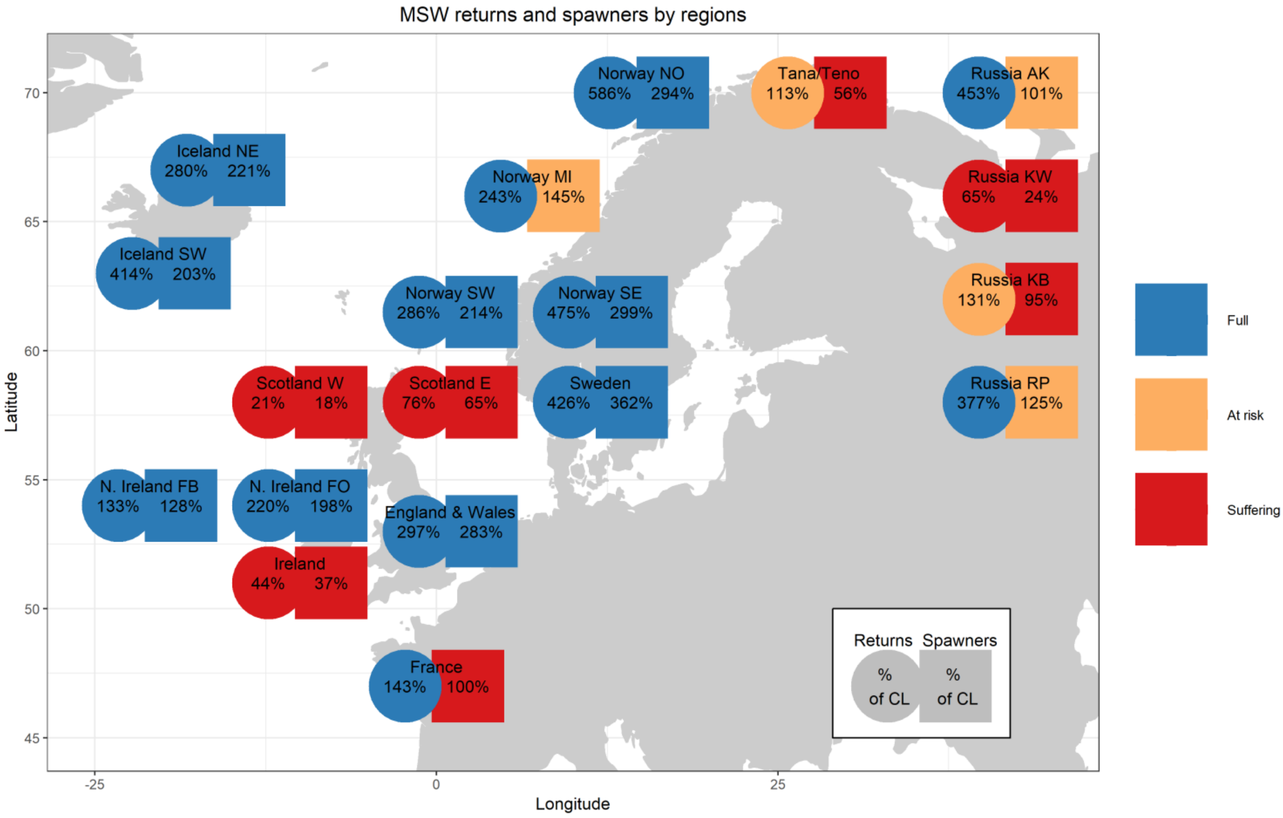


Figure 3.3.4.7. MSW returns and spawners in percent of region-specific conservation limit (% of CL) for 2018. The percent of CL is based on the median of the Monte Carlo distribution. The colour shading represents the three ICES stock status designations: Full (at full reproductive capacity: the 5th 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).

4 North American Commission

4.1 NASCO has requested ICES to describe the key events of the 2018 fisheries

The previous advice provided by ICES (2018) indicated that there were no mixed-stock fishery catch options on the 1SW non-maturing salmon component for the 2018 to 2020 PFA years. The NASCO Framework of Indicators of North American stocks for 2019 did not indicate the need for a revised analysis of catch options and no new management advice for 2019 is provided. The assessment was updated to 2018 and the stock status is consistent with the previous years' assessments and catch advice.

4.1.1 Key events of the 2018 fisheries

There were no significant changes in the 2018 fisheries.

4.1.2 Gear and effort

Canada

The 23 areas for which Fisheries and Oceans Canada (DFO) manages the salmon fisheries are called Salmon Fishing Areas (SFAs). Inner Bay of Fundy Atlantic salmon, SFA 22 and part of SFA 23, have been federally listed as endangered under the Canadian Species at Risk Act and information for these stocks are not included in the information and advice provided to NASCO, as with the exception of one population, these stocks have a localized migration strategy while at sea and an incidence of maturity after one winter at sea. In Québec, the management of Atlantic salmon is delegated to the province (Ministère des Forêts, de la Faune, et des Parcs) and the fishing areas are designated by Q1 through Q11 (Figure 4.1.2.1). Harvests (fish which were retained) and catches (including harvests and fish caught and released in recreational fisheries) are categorized in two size groups: small and large. Small salmon, generally 1SW, in the recreational and subsistence fisheries refer to salmon less than 63 cm fork length. In historic commercial fisheries small salmon refer to fish less than 2.7 kg whole weight. Large salmon, generally MSW and repeat spawners, in recreational and subsistence fisheries are greater than or equal to 63 cm fork length. In historic commercial fisheries, large salmon refer to fish greater than or equal to 2.7 kg whole weight.

Three groups exploited salmon in Canada in 2018: Indigenous; Labrador resident subsistence, and recreational fishers. There were no commercial salmon fisheries in Canada in 2018 and retaining bycatch of salmon in commercial fisheries targeting other species is not permitted. Salmon discards from these fisheries are not estimated, however, previous analyses by ICES indicated the extent was low (ICES, 2004). The sale of Atlantic salmon caught in any Canadian fishery is prohibited.

In 2018, four subsistence fisheries harvested salmon in Labrador: 1) Nunatsiavut Government (NG) members fishing in northern Labrador communities (Rigolet, Makkovik, Hopedale, Postville, and Nain); 2) Innu Nation members fishing in the northern Labrador community of Natuashish and Lake Melville community of Sheshatshiu; 3) NunatuKavut Community Council (NCC) members fishing in southern Labrador and Lake Melville and, 4) Labrador residents fishing in Lake Melville and various coastal communities. The NG, Innu, and NCC fisheries were monitored by Indigenous Fishery Guardians/Officers jointly administered by the Indigenous groups and DFO. Fish were caught using multifilament gillnets of 15 fathoms (27.4 m) in length of a stretched mesh size ranging from 3 to 4 inches (7.6 to 10.2 cm). Nets are generally set in estuaries and coastal bays within headlands. Catch statistics are based on logbook reports.

Most catches (92% in 2018, Figure 2.1.1.2) in Canada now take place in rivers or in estuaries. Fisheries are principally managed on a river-by-river basis and in areas where retention of large salmon in recreational fisheries is allowed, the fisheries are closely controlled. In other areas, fisheries are managed on larger management units that encompass a collection of geographically neighbouring stocks. The commercial fisheries are now closed and the remaining coastal subsistence fisheries in Labrador are mainly located in bays generally inside the headlands. Sampling of the Labrador subsistence fisheries continued in 2018 for biological characteristics and tissue samples to identify the origin of harvested salmon.

The following management measures were in effect in 2018:

Indigenous food, social, and ceremonial (FSC) fisheries

In Québec, Indigenous fisheries took place subject to agreements, conventions or through permits issued to the communities. There are approximately ten communities with subsistence fisheries in addition to the fishing activities of the Inuit in Ungava (Q11), who fished in estuaries or within rivers. The permits generally stipulate gear, season, and catch limits. Catches with permits have to be reported collectively by each Indigenous group. However, catches under a convention, such as for Inuit in Ungava, do not have to be reported. When reports are not available, the catches are estimated based on the most reliable information available (i.e. local enforcement officer or biologist reports). In the Maritimes (SFAs 15 to 23), FSC agreements were signed with several Indigenous groups (mostly First Nations) in 2018. The signed agreements often included allocations of small and large salmon and the area of fishing was usually in-river or estuaries. Harvests that occurred both within and outside agreements were obtained directly from the Indigenous groups. In Labrador (SFAs 1 and 2), FSC agreements with the NG, Innu, and NCC resulted in fisheries in estuaries and coastal areas. By agreement with First Nations, there were no FSC fisheries for salmon in Newfoundland in 2018. Harvests by Indigenous recreational fishers were reported under the recreational harvest categories.

Labrador resident subsistence fisheries

DFO is responsible for regulating the Labrador resident fishery. In 2018, a licensed gillnet subsistence trout and charr fishery for Labrador residents took place in estuary and coastal areas of Labrador. A total of 271 licences were issued in 2018. Conditions restrict a seasonal bycatch of three salmon of any size while fishing for trout and charr; three salmon tags accompanied each licence. Resident fishers were required to remove their nets from the water once their bycatch of salmon was caught. Catches exceeding three salmon must be discarded. All licensed resident fishers were requested to complete and return logbooks to DFO.

Recreational fisheries

Licences are required to fish recreationally for Atlantic salmon in Canada. Gear is restricted to fly fishing and there are daily and seasonal bag limits. Recreational fisheries management in 2018 varied by area and large portions of the southern areas remained closed to all directed salmon fisheries (Figure 4.1.2.2).

Within the province of Québec, there are 114 salmon rivers. Fishing for salmon was prohibited on 33 rivers. Large salmon could be retained throughout the season on eight rivers (seven in the north and lower North shore, and one in the South on the Causapscal, a tributary of the Matapedia River) and for part of the season on six other rivers. Small salmon could be retained for the entire season on 59 rivers and 8 rivers permit catch and release only. In 2018, the new seasonal permit allowed a total retention of four salmon for the season, of which only one could be a large salmon. The only exception was for the four rivers located in the Ungava Bay region, where anglers could retain four salmon of any size. Before that change, the annual limit in Québec per angler was seven salmon of any size.

Mandatory catch and release measures for large salmon have been in effect since 1984 in the Maritime provinces of Canada (SFA 15 to 23). Following the very low returns to many Gulf rivers in 2014, mandatory catch and release measures for small salmon were implemented in the Gulf region (SFAs 15 to 18) in 2015 and have continued. In 2018, due to prolonged warm-water temperatures, sections of the Miramichi and Margaree rivers were closed to recreational fishing for 47 and 18 days, respectively. In Scotia-Fundy (SFAs 19 to 23), only three rivers (located in eastern Cape Breton, SFA 19) were open to angling for Atlantic salmon, restricted to catch and release.

In Newfoundland and Labrador, changes to recreational retention and catch and release limits were implemented in 2018 after two poor years of salmon returns in 2016 and 2017. The previous retention limit of two, four or six small salmon depending on the river classification system (Veinott *et al.*, 2013) was reduced to one small salmon per season in 2018. In addition, the daily limit for catch and release angling was reduced from four salmon to three, along with the implementation of a seasonal catch and release limit of 10 fish. During the 2018 angling season, 83% (131) of scheduled rivers (158) in Newfoundland were closed for part of the season due to environmental conditions (high water temperatures and/or low water levels). In total, 30.9% of angler days (product of rivers and days closed) were lost due to environmental closures in Newfoundland in 2018, the highest since 1987 (36.9%). The retention fishery was closed in Newfoundland (20 July 2018) and Labrador (3 August 2018) after in-season reviews based on the returns to date and expected returns to the end of the year.

In all areas of eastern Canada, there is no estimate of salmon released as bycatch in recreational fisheries targeting other species.

USA

There were no recreational or commercial fisheries for anadromous Atlantic salmon in the USA in 2018.

France (Islands of Saint Pierre and Miquelon)

Nine professional and 80 recreational gillnet licences were issued in 2018 (Table 4.1.2.1), the maximum numbers permitted for both groups by legislation. Professional licences had a maximum authorization of three nets of 360 metres maximum length each whereas recreational licences were restricted to one net of 180 metres. The selling of Atlantic salmon was only allowed by professional licence holders and was restricted to within the islands of Saint Pierre and Miquelon.

4.1.3 Catches in 2018

Canada

The provisional harvest of salmon in 2018 by all users was 89.5 t, approximately 19% lower than the 2017 harvest of 109.9 t (Tables 2.1.1.1, 2.1.1.2; Figure 4.1.3.1). The 2018 harvest was the lowest in the time-series since 1960. The 2018 harvest was comprised of 27 765 small salmon (49.7 t) and 8420 large salmon (39.8 t), 11% fewer small salmon and 27% fewer large salmon by number compared to 2017. There has been a dramatic decline in harvest since 1988 as a result of the closure of commercial fisheries (year of closure: Newfoundland 1992, Labrador 1998, Québec 2000).

The Working Group recommends complete and timely reporting of catch statistics from all fisheries for all areas of eastern Canada.

Indigenous FSC fisheries

The provisional harvest by Indigenous groups in 2018 was 53.4 t, lower than the 61.3 t reported in 2017 (Table 4.1.3.1). The percentage of large salmon by number (43%) was lower than the approximately 50% of the previous three years.

In Labrador, total catch from Indigenous fishers was estimated by raising the reported catch to the total number of fishers. For Québec, catches from the Indigenous fisheries were to be reported collectively by each Indigenous community. As in Québec, Indigenous groups with fishing agreements in the DFO Gulf and Maritimes regions were expected to report their catches. When reports were not available, the catches were estimated on the basis of the most reliable information available (i.e. local enforcement officer or biologist reports). The reliability of the catch estimates varies among user groups. Reports in most years were incomplete. The 2018 values will be updated when the reports are finalised.

Labrdor resident subsistence fisheries

The estimated catch for the Labrador resident fisheries in 2018 was 1.5 t, similar to the previous year and the lowest values since the time-series began in 2000. This represents approximately 592 fish, 26% large by number (Table 4.1.3.2).

Recreational fisheries

Harvest in recreational fisheries in 2018 totalled 18 587 small and large salmon (34.7 t). This harvest, by number, decreased 22.2% from the 2017 harvest and 34.0% from the previous five-year mean, and is the lowest in the time-series since 1974 (Table 4.1.3.3; Figure 4.1.3.2). The small salmon harvest of 17 627 fish was 19.9% lower than the 2017 harvest. The large salmon harvest of 960 fish was 49.1% below the 2017 harvest and these were taken exclusively in Québec in both years. The small salmon size group has contributed 90% on average of the total recreational harvests since the imposition of catch and release measures for large salmon in recreational fisheries in the Maritimes (SFA 15 to 23) and Newfoundland (SFA 3 to 14B) in 1984 (retention of large salmon ceased in Labrador in 2011).

In 2018, 50 184 salmon (27 708 small and 22 476 large) were caught and released (Table 4.1.3.4; Figure 4.1.3.3), representing 73% of the total catch (including retained fish), the highest value of the time-series and has consistently been above 50% since 1997. For large salmon, 96% of the catch was released (retention permitted only in Québec), which was the highest value in the time-series (since 1984 closures in Maritimes and Newfoundland).

Recreational catch statistics for Atlantic salmon are not collected regularly in all areas of Canada and there is no enforceable mechanism in place that requires anglers to report their catch statistics, except in Québec where reporting of harvested salmon is an enforced legal requirement. The last recreational angler survey for New Brunswick was conducted in 1997, and the catch rates for the Miramichi River from that survey have been used to estimate catches (both harvest and catch and release) for all subsequent years.

Commercial fisheries

All commercial fisheries for Atlantic salmon remained closed in Canada in 2018 and the catch therefore was zero.

Unreported catches

The unreported catch for Canada totalled 24.4 t in 2018. The majority of this unreported catch is illegal fisheries directed at salmon (Tables 2.1.3.1, 2.1.3.2). Of the unreported catch, which could be attributed to a geographic location, 8 t was considered to have occurred in inland waters, 1 t in estuaries and 3 t in marine waters.

USA

There are no commercial or recreational fisheries for anadromous Atlantic salmon in the USA and the catch therefore was zero. Unreported catches in the USA were estimated to be 0 t.

France (Islands of Saint Pierre and Miquelon)

A total harvest of 1.3 t was reported for Saint Pierre and Miquelon in 2018, a decrease of 54% from the 2017 reported harvest of 2.8 t (Tables 2.1.1.1, 4.1.2.1) and the third lowest catch in the time-series since 1990.

There are no unreported catch estimates for the time-series.

4.1.4 Harvest of North American salmon, expressed as 2SW salmon equivalents

Harvest histories (1972 to 2018) of salmon, expressed as 2SW salmon equivalents in the PFA year (year of 1SW salmon at sea), are provided in Table 4.1.4.1. The Newfoundland and Labrador commercial fishery was historically a mixed-stock fishery and harvested both maturing and non-maturing 1SW salmon as well as 2SW maturing salmon. The harvest of repeat spawners and older sea ages was not considered in the run-reconstructions.

Harvests of 1SW non-maturing salmon in Newfoundland and Labrador commercial fisheries have been adjusted by natural mortalities of 3% per month for 13 months, and 2SW harvests in these same fisheries have been adjusted by one month to express all harvests as 2SW equivalents in the year and time they would reach rivers of origin. The Labrador commercial fishery has been closed since 1998. Harvests from the Indigenous Peoples' fisheries in Labrador (since 1998) and the residents' food fishery in Labrador (since 2000) are both included. Mortalities in mixed-stock fisheries and losses in terminal locations (including harvests, losses from catch and release mortality and other removals including broodstock) in Canada were summed with those of the USA to estimate total 2SW equivalent losses in North America. The terminal fisheries included coastal, estuarine and river catches of all areas, except Newfoundland and Labrador where only river catches were included, and excluding Saint Pierre & Miquelon. Data inputs were updated to 2018.

Total 2SW harvest equivalents of North American origin salmon in all fisheries peaked at 526 000 fish in 1974 and was above 200 000 fish in most years until 1990 (Table 4.1.4.1; Figure 4.1.4.1). Harvest equivalents within North America peaked at about 363 000 in 1976 and have remained below 12 000 2SW salmon equivalents for most years between 1999 and 2018 (Table 4.1.4.1; Figure 4.1.4.1). The proportion of the 2SW harvest equivalents taken in North America has varied from 0.46 to 0.65 of the total removals in all fisheries during 2007 to 2018 (Figure 4.1.4.1).

In the most recent year (2018), the losses of the cohort destined to be 2SW salmon in terminal areas of North America was estimated at 3405 fish (median), 49% of the total North American catch of 2SW salmon. The percentages of harvests occurring in terminal fisheries ranged from 17 to 33% during 1972 to 1991 and 44 to 87% during 1992 to 2018 (Table 4.1.4.1). Percentages increased significantly since 1992 with the reduction and closures of the Newfoundland and Labrador commercial mixed-stock fisheries. The percentage of 2SW salmon harvested in North American fisheries in 2018 is 57% (Table 4.1.4.1). The percentages of the 2SW harvests by fishery and fishing area are summarized in Figure 4.1.4.1. The percentage of the 2SW harvest equivalents taken at Greenland was as high as 56% in 1992 and 2002 and as low as 5% in 1994 when the internal use fishery at Greenland was suspended (Figure 4.1.4.1). In the last three years, the Greenland share of the 2SW harvest equivalents has been 36% to 53%. For similar years, the harvests in the Labrador subsistence fisheries have been 22 to 33% of the total harvests and 19% to 24% in terminal fisheries of Québec (Figure 4.1.4.1).

4.1.5 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 programs of current marine fisheries (Labrador and Saint Pierre and Miquelon) are used to determine region of origin of harvested salmon.

Labrador subsistence fisheries sampling program

Salmon harvested in the Labrador subsistence fisheries (SFAs 1 and 2, Figure 4.1.2.1) were sampled opportunistically for length, weight, sex, scales (for age analysis) and tissue (genetic analysis). Fish were also examined for the presence of external tags or marks.

In 2018, a total of 799 samples (6% of harvest by number) were collected from the Labrador subsistence fisheries: 131 from northern Labrador (SFA 1A), 308 from Lake Melville (SFA 1B), and 360 samples from southern Labrador (SFA 2) (Figure 4.1.2.1). Not all scales can be interpreted for sea age and/or river age. Based on the interpretation of the scale samples (n=788), percentage sea age composition was 81% 1SW, 15% 2SW, 3% 3SW and 1% previously spawned salmon. All of the salmon sampled (n=786) were river ages 3 to 6 years (modal age 4, 65%). There were no river age 1 or 2 salmon sampled, suggesting, as in previous years (2006 to 2017), that very few salmon from the most southern stocks of North America (USA, Scotia-Fundy) were exploited in these fisheries.

Labrador: Sample summary 2018								
Area	Number of Samples	River Age (percentage of samples)						
		1	2	3	4	5	6	7
Northern Labrador (SFA 1A)	288	0.0	0.0	22.9	69.1	7.3	0.7	0.0
Lake Melville (SFA 1B)	146	0.0	0.0	27.4	63.0	8.9	0.7	0.0
Southern Labrador (SFA 2)	352	0.0	0.0	12.5	62.5	23.9	1.1	0.0
All areas	786	0.0	0.0	19.1	65.0	15.0	0.9	0.0

For 2017 and 2018, a total of 994 samples from the Labrador subsistence salmon fisheries were analysed using the SNP panel with 31 range-wide reporting groups (Table 4.1.5.1; Figures 4.1.5.1, 4.1.5.2). The estimated percent contributions (and associated 95% credible interval) to each reporting group are shown in Tables 4.1.5.2 and 4.1.5.3 and summarized in Figures 4.1.5.3 and 4.1.5.4. As in previous years, the estimated origin of the samples was dominated (>98%) by the Labrador groups. Although two samples of USA origin were detected in the 2017, none were detected in 2018. The dominance of the Labrador reporting group is consistent with previous analyses conducted for the period 2006–2016 which estimated >95.0% of the harvest was attributable to Labrador stocks. Furthermore, assignment of harvest within the three Labrador genetic reporting groups suggest largely local harvest within salmon fishing areas.

The percentage of the small salmon and large salmon catch which was sampled and analysed for stock origin was approximately 3% to 4% by size group in 2017 and 2018, indicating that the size groups are equally represented in the analysed samples. The percentage of the catch which is processed for stock origin (3.8%), is less than the percentage of the catch sampled (6% by number) due to resource constraints.

Labrador Subsistence fishery sampling			
Size group	Statistics	2017	2018
Small salmon	Samples	294	325
	Catch	6868	8373
	% of catch	4.3%	3.9%
Large salmon	Samples	189	153
	Catch	6192	4085
	% of catch	3.1%	3.7%
Small and large salmon	Samples	495	499
	Catch	13 060	12 458
	% of catch	3.8%	4.1%

Saint Pierre and Miquelon fisheries sampling programme

Fifty-six samples (9% of harvest by number) were collected from the Saint Pierre and Miquelon salmon fishery between 31 May and 4 July 2018. Based on the interpretation of the scale samples, percentage sea age composition was 93% 1SW and 7% 2SW, with no previously spawned salmon. River ages ranged from two to five years (modal age 3).

Saint Pierre and Miquelon: Sample summary 2018									
Size group	Number of Samples	Virgin Sea Age (%)		River Age (%)					
		1SW	2SW	1	2	3	4	5	6
Small salmon (<63 cm)	52	100.0	0.0	0.0	26.9	46.1	23.1	3.9	0.0
Large salmon (≥63 cm)	4	0.0	100.0	0.0	75.0	25.0	0.0	0.0	0.0
All	56	93.0	7.0	0.0	30.4	44.6	21.4	03.6	0.0

A total of 193 (137 in 2017 and 56 in 2018) samples collected from the Saint Pierre and Miquelon fisheries were analysed using the SNP panel range wide baseline (Figures 4.1.5.1 and 4.1.5.2). The estimated percent contributions to the reporting groups (and associated 95% credible interval) are shown in Table 4.1.5.4 and summarized in Figures 4.1.5.5 and 4.1.5.6. In contrast to previous years when samples of the catch were dominated by large salmon (≥63 cm), samples for 2017 and 2018 were dominated by small salmon (< 63 cm) (Figure 4.1.5.7). Analysis using the SNP panel of the 193 individuals showed the consistent dominance of three reporting groups and little differences between the two years (83–89%: from southern Gulf of St Lawrence, Gaspe Peninsula, and Newfoundland) (Figures 4.1.5.5 and 4.1.5.6 and Table 4.1.5.4). The largest contribution in both years was from the Newfoundland reporting groups totalling >60% in each year.

There was no information on how the samples were collected, however the proportion of the catch comprising small salmon was reported to have been 0.77 whereas the proportion small salmon in the samples was 0.93 indicating that sampling was not representative of the total catch in 2018.

Recommendations for future activities

The Working Group recommends improved catch statistics and sampling of the Labrador and Saint Pierre and Miquelon fisheries. Improved catch statistics and sampling of all aspects of the fishery across the fishing season will improve the information on biological characteristics and stock origin of salmon harvested in these mixed-stock fisheries.

4.1.6 Exploitation rates

Canada

Provisional mean exploitation rates in the 2018 recreational fishery for retained small salmon was 5.8% for Newfoundland (eleven rivers; range of 2 to 20%) and 1.4% for Labrador (Sand Hill River only), a decrease from the previous five year mean of 46% for Newfoundland and 54% for Labrador. In Québec, total fishing exploitation rate was estimated at 16%, with rates of 7% for the Indigenous fishery and 9% for the recreational fishery. The recreational exploitation rate for large salmon in Québec was 3%, the lowest value observed since 1984; it is mostly influenced by the increase in the number of released fish in recent years due to regulatory changes. Retention of small and large salmon in the recreational fisheries of Nova Scotia, New Brunswick and Prince Edward Island was not permitted in 2018.

USA

There was no exploitation of anadromous salmon in homewaters.

Exploitation trends for North American salmon fisheries

Annual exploitation rates of small salmon (mostly 1SW) and large salmon (mostly MSW) in North America for the 1971 to 2018 time period were calculated by dividing annual estimated losses (harvests, estimated mortality from catch and release (ICES, 2010), broodstock) in all North American fisheries by annual estimates of the returns to North America prior to any homewater fisheries. The fisheries included coastal, estuarine and river fisheries in all areas, as well as the commercial fisheries of Newfoundland and Labrador, which harvested salmon from all regions in North America.

Exploitation rates of both small and large salmon fluctuated annually but remained relatively steady until 1984 when exploitation of large salmon declined sharply with the introduction of the non-retention of large salmon in angling fisheries and reductions in commercial fisheries (Figure 4.1.6.1). Exploitation of small salmon declined steeply in North America with the closure of the Newfoundland commercial fishery in 1992. Declines continued in the 1990s with continuing management controls in all fisheries to reduce exploitation. In the last few years, exploitation rates on small salmon and large salmon have remained at the lowest in the time-series, averaging 9% for large salmon and 13% for small salmon over the past ten years. However, exploitation rates across regions within North America are highly variable.

4.2 Management objectives and reference points

Management objectives are described in Section 1.4 and reference points and the application of precaution are described in Section 1.5.

Fisheries and Oceans Canada (DFO) has undertaken a revision of reference points for Atlantic salmon in Canada that conform to the Precautionary Approach (ICES, 2016). DFO Maritimes Region (Scotia-Fundy) has retained the current conservation requirement based on 240 eggs per

100 m² as the Limit Reference Point (DFO, 2012; Gibson and Claytor, 2013). DFO Newfoundland Region retained the current conservation requirement based on 240 eggs per 100 m² of fluvial rearing habitat, and in addition for insular Newfoundland 368 eggs per ha of lacustrine habitat (or 150 eggs per ha for stocks on the northern peninsula of Newfoundland), as equivalent to their Limit Reference Point and have defined the Upper Stock Reference as 150% of the Limit Reference Point (DFO, 2017). The Province of Québec revised the Limit Reference point and Upper Stock Reference point using a Bayesian hierarchical analysis of stock–recruitment data (Dionne *et al.*, 2015; MFFP, 2016; ICES, 2017a). DFO Gulf Region revised and defined the Limit Reference Point in that region of Canada using the proportion of eggs from MSW salmon as a covariate in the Bayesian Hierarchical Model (DFO, 2018). The Limit Reference Points in all cases are defined in terms of total eggs from all sizes and sea ages of salmon.

As changes were made to the reference points used to manage harvests of large salmon in DFO Gulf Region and Québec, the 2SW salmon Conservation Limits (CLs) were revised. DFO (2018a) provides the DFO Gulf Region river-specific egg requirements corresponding to the Limit Reference Point as well as the mean number of small salmon and large salmon which would contribute these eggs based on mean life-history characteristics available. The proportion 2SW salmon in the large salmon size group is an input value used in the run-reconstruction of abundance of 2SW salmon, and this value varies by Salmon Fishing Area in DFO Gulf Region. The sum of the river-specific large salmon requirement by Salmon Fishing Area (15 to 18), the proportions 2SW in the large salmon size group by area and the corresponding revised 2SW requirements for DFO Gulf Region are summarized in the table below.

Salmon Fishing area	Total large salmon required	prop. 2Sw in large salmon size group	2sw requirement
15	9 704	0.65	6 308
16	14 202	0.68	9 707
17	729	1.00	729
18	2 431	0.82	1993
Southern Gulf of St Lawrence	27 066		18 737

For Québec, MFFP's management plan for recreational fishery (MFFP, 2016) provides river-specific upper reference points, expressed in number of eggs, to regulate large salmon retention. Based on a mean 2SW proportion of 0.449 in the returns, a mean weight of 4.54 kg, a mean fecundity of 1535 eggs per kg and a female proportion of 0.71, the 2SW requirement is provisionally revised at 32 085.

The revised 2SW CL (18 737 fish) for Gulf is a 38% decrease from the previous value whereas the revised 2SW CL for Québec is a slight increase (9%) from the previous value. Revised CLs for 2SW salmon for Canada total 114 295 (previous value 123 349) for a combined revised total for North America of 143 494 2SW salmon (previous value 152 548). No other changes to the 2SW CLs or the Management Objectives were made from those identified previously (ICES, 2015b).

The revised 2SW CL values will be used in the next full assessment and catch advice period, in 2021, or earlier if the framework of indicators for 2020 indicates that an earlier assessment and revised catch advice would be warranted.

Country and Comission Area	Stock Area	2SW spawner requirement number of fish (previous)	2SW Management Objective (number of fish)
	Labrador (LAB)	34 746	
	Newfoundland (NFLD)	4022	
	Québec (QC)	32 085 (29 446)	
	Southern Gulf of St Lawrence (GULF)	18 737 (30 430)	
	Scotia-Fundy (SF)	24 705	10 976
Canada Total		114 295 (123 349)	
USA		29 199	4549
North American Total		143 494 (152 548)	

4.3 Status of stocks

Based on information provided in the update (2018) of the NASCO Database of Salmon Rivers, a total of 857 rivers have been identified in eastern Canada. There are 21 rivers in eastern USA where salmon are or were present within the last half century. Conservation requirements have been defined for 498 (58%) of these rivers in eastern Canada and all rivers in USA. Assessments of adult spawners and egg depositions relative to conservation requirements were reported for 86 rivers in eastern North America in 2018.

4.3.1 Smolt abundance

Canada

Wild smolt production was estimated in 12 rivers in 2018 (Table 4.3.1.1). The relative smolt production, standardized to the size of the river using the CL egg requirements, was highest in Vieux-Fort River (Québec) and lowest in Rocky River (Newfoundland) (Figure 4.3.1.1). Trends in smolt production over the time-series declined ($p < 0.05$) in Nashwaak River (Scotia-Fundy, 1998–2016), Conne River (Newfoundland, 1987–2017) and the two monitored rivers of Québec (St. Jean, 1989–2018; de la Trinite, 1984–2018), whereas production significantly increased ($p < 0.05$) in Western Arm Brook (Newfoundland, 1971–2018). No other rivers showed statistically significant long-term trends (Figure 4.3.1.1).

USA

In 2018, wild salmon relative smolt production was estimated on the Sheepscot River and the Narraguagus River (Table 4.3.1.1; Figure 4.3.1.1). Smolt production has declined over time ($p<0.05$) in both Sheepscot River (2009–2018) and Narraguagus River (1997–2018).

4.3.2 Estimates of total adult abundance

Returns of small (1SW), large (MSW), and 2SW salmon (a subset of large) to each region were originally estimated by the methods and variables developed by Rago *et al*. (1993) and reported by ICES (1993). Further details are provided in the Stock Annex (Annex 6). The returns for individual river systems and management areas for both sea age groups were derived from a variety of methods. These methods included counts of salmon at monitoring facilities, population estimates from mark–recapture studies, and applying angling and commercial catch statistics, angling exploitation rates, and measurements of freshwater habitat. The 2SW component of the large returns 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 homewater commercial fisheries, except in the case of the Newfoundland and Labrador regions where returns do not include landings in commercial and food fisheries. This avoided double counting fish because commercial catches in Newfoundland and Labrador and food fisheries in Labrador were added to the sum of regional returns to create the pre-fishery abundance estimates (PFA) of North American salmon.

Total returns of salmon to USA rivers are the sum of trap catches and redd-based estimates.

Data from previous years were updated and corrections were made to data inputs when required (e.g. 2017 data were finalised and 2018 data are considered to be preliminary).

Since 2002, Labrador regional estimates are generated from data collected at four counting facilities, one in SFA 1 and three in SFA 2 (Figures 4.1.2.1, 4.3.2.1). The current method to estimate Labrador returns assumes that the total returns to the northern area are represented by returns at the single monitoring facility in SFA 1 and returns in the southerly areas (SFA 2 and 14b) are represented by returns at the three monitoring facilities in SFA 2. The production area (km^2) in SFA 1 is approximately equal to the combined production area in SFA 2 and 14b. The uncertainty in the estimates of returns and spawners has been relatively high compared with other regions in recent years (approximate coefficient of variation of 12–26% since 2002).

The Working Group recommends that additional monitoring be considered in Labrador to estimate stock status for that region. Additionally, efforts should be undertaken to evaluate the utility of other available data sources (e.g. Indigenous and recreational catches and effort) to describe stock status in Labrador.

Estimates of small, large and 2SW salmon returns to the six geographic areas and overall for NAC are reported in Tables 4.3.2.1 to 4.3.2.3 and are shown in Figures 4.3.2.2 to 4.3.2.4.

Small salmon returns

- The total estimate of small salmon returns to North America in 2018 (581 700) was 29% higher than the revised estimated returns in 2017 (449 400), and the 2018 estimate ranks third (descending rank) out of the 48 year time-series.
- Small salmon returns decreased in 2018 from the previous year in the southern regions (Québec, Gulf, Scotia-Fundy, USA) and increased in the northern regions of Newfoundland and Labrador.
- Small salmon returns in 2018 were the third lowest on record for Gulf (19 050), and the second lowest on record for Scotia-Fundy (1346).
- Small salmon returns to Labrador (285 000) and Newfoundland (252 400) combined represented 92% of the total small salmon returns to North America (581 700) in 2018.

Large salmon returns

- The total estimate of large salmon returns to North America in 2018 (131 800) was 24% lower than the revised estimate for 2017 (172 800).
- Large salmon returns decreased from the previous year in four (Labrador, Newfoundland, Québec, and USA) of the six geographical regions in 2018, and increased in Gulf and Scotia-Fundy.

- Large salmon returns in 2018 were the third lowest on record for Québec, the fourth lowest for Scotia-Fundy, and the fifth lowest on record for USA, whereas large salmon returns to Labrador (45 900) in 2018 were the seventh highest on record.
- Large salmon returns to Labrador (45 900), Québec (27 800), and Gulf (33 100) combined represented 81% of the total large salmon returns to North America in 2018.

2SW salmon returns

- The total estimate of 2SW salmon returns to North America in 2018 (78 100) was 23% lower than the revised estimate for 2017 (102 000).
- 2SW salmon returns decreased from the previous year in four (Labrador, Newfoundland, Québec, and USA) of the six geographical regions in 2018, and increased in Gulf and Scotia-Fundy.
- 2SW salmon returns in 2018 were among the lowest values on record, 36th to 46th, in five of the six assessment regions, the exception being Labrador with estimated 2SW salmon returns in 2018 being seventh highest of the 28-year time-series.
- 2SW salmon returns to Labrador (29 800), Québec (20 300), and Gulf (23 700) combined represented 95% of 2SW salmon returns to North America in 2018. There are few 2SW salmon returns to Newfoundland (2300 in 2018), as the majority of the large salmon returns to that region are comprised of previously spawned 1SW salmon.

Estimated returns of small salmon and large salmon for Québec in 2018 are likely underestimated. As a result of low water conditions, adult returns in 2018 in a number of rivers did not occur until after the spawner surveys had been conducted in the early autumn when conditions are generally favourable for visual surveys. No correction for this was provided in the data used in the run-reconstruction and realized returns to Québec in 2018 are expected to be better than presented here.

Increased estimated abundance of small salmon in Newfoundland is not reflected in all areas of Newfoundland (Figure 4.3.2.5). Estimated abundance has increased in the salmon fishing areas of the northeast coast of Newfoundland (SFA 3–6) and in the western portion of the island (SFA 13 and 14A) while estimated abundance has strongly declined on the south coast (SFA 10–12) and the eastern portion of the island (SFA 7–9), reflecting important differences in status of salmon stocks in the Newfoundland region. The northeast and western portions of Newfoundland are contributing to increased proportions of the total returns to Newfoundland; in the early 1970s, the percentage of total returns from these areas ranged from 65% to 77% in contrast to 85% to 91% of the total since 2010. Changes in the recreational fisheries management measures in recent years have resulted in lower catches in this fishery and as a result increasing uncertainty in the Salmon Fishing Area specific estimates of abundance.

4.3.3 Estimates of spawning escapements

Updated estimates for small, large and 2SW salmon spawners (1971 to 2018) were derived for the six geographic regions (Tables 4.3.3.1 to 4.3.3.3). A comparison between the numbers of returns and spawners for small and large salmon is presented in Figures 4.3.2.2 and 4.3.2.3. A comparison between the numbers of 2SW returns, spawners, CLs, and management objectives (Scotia-Fundy and USA) is presented in Figure 4.3.2.4.

Small salmon spawners

- The total estimate of small salmon spawners in 2018 for North America (558 700) was 32% higher than 2017, and the 2018 estimate ranks second (descending rank) out of the 48-year time-series.

- Estimates of small salmon spawners decreased in 2018 from the previous year in the southern regions (Québec, Gulf, Scotia-Fundy, USA) and increased in the northern regions of Newfoundland and Labrador.
- Small salmon spawners in 2018 were the fourth lowest on record for Gulf (18 200), and the second lowest on record for Scotia-Fundy (900).
- Small salmon spawners for Labrador (283 800) and Newfoundland (236 100) combined represented 93% of the total small salmon spawners estimated for North America in 2018.

Large salmon spawners

- The total estimate of large salmon spawners in North America for 2018 (127 000) decreased by 24% from the revised value in 2017 (166 500).
- Estimates of large salmon spawners decreased in four (Labrador, Newfoundland, Québec, and USA) of the six geographical regions in 2018, but increased in 2018 for Gulf and Scotia-Fundy.
- Large salmon spawners in 2018 were the among the lowest of the time-series for Québec and Scotia-Fundy (42) as well as for USA (43), in the lower quarter for Gulf (31), approximately midway for Newfoundland (21) and seventh highest for Labrador.
- Large salmon spawners for Labrador (45 700), Québec (23 900), and Gulf (32 500) regions combined represented 80% of the total large salmon spawners in North America in 2018, with Newfoundland representing 18% of the total.

2SW salmon spawners

- The total estimate of 2SW salmon spawners in North America for 2018 (75 100) decreased by 24% from the revised estimate for 2017 (98 300), and was lower than the combined 2SW CL for NAC (152 548).
- Estimates of 2SW salmon spawners decreased (18% to 40%) from the previous year in four (Labrador, Newfoundland, Québec, and USA) of the six geographical regions in 2018, and increased in Gulf (18%) and Scotia-Fundy (28%).
- Estimates of 2SW salmon spawners in 2018 were the fifth (48-year time-series) lowest for Newfoundland, sixth lowest for USA, seventh lowest for Québec and Scotia-Fundy, eighteenth lowest for Gulf but seventh highest on record for Labrador.
- Estimates (median) of 2SW salmon spawners were below the region specific 2SW CLs in five of the six geographical regions in 2018, ranging from 3% in the USA to 125% in Gulf. It was the first time in six years that the 2SW spawners in Labrador were below the region-specific 2SW CL. The 2SW CLs were last exceeded in 2015 for Newfoundland and in 1982 for Québec.The 2SW CLs have never been exceeded for Scotia-Fundy and USA.
- The 2SW management objectives for Scotia-Fundy (10 976) and USA (4549) were not met in 2018 and have not been met since 1991 (Scotia-Fundy), and 1990 (USA). For USA, 2SW returns are assessed relative to the management objective as adult stocking programmes for restoration efforts contribute to the number of spawners.

4.3.4 Egg depositions in 2018

Egg depositions by all sea ages combined in 2018 exceeded or equalled the river-specific CLs in 38 of the 86 assessed rivers (44%) and were less than 50% of CLs in 28 rivers (33%) (Figure 4.3.4.1). Large deficiencies in egg depositions (≤10% CLs) were noted in 15 assessed rivers (17%).

CLs were exceeded in two of four (50%) assessed rivers in Labrador, nine of seventeen rivers (53%) in Newfoundland, 24 of 36 rivers (67%) in Québec, and three of six rivers (50%) in Gulf.

None of the seven assessed rivers in Scotia-Fundy met CLs and, with the exception of Middle River, all were below 50% of CLs. Large deficiencies in egg depositions were noted in the Southern Upland (SFA 21) and Outer Bay of Fundy (SFA 23) regions of Scotia-Fundy where assessed rivers were less than 4% of CLs.

Large deficiencies in egg depositions were noted in the USA. All eight rivers for which proportion of their CLs was assessed were below 7%. All anadromous Atlantic salmon fisheries in the USA are closed.

The time-series of attained CLs for assessed rivers is presented in Table 4.3.4.1 and Figure 4.3.4.2. The time-series includes all assessed small rivers on Prince Edward Island (SFA 17) individually and an additional eight partially assessed rivers in the USA.

In Canada, 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 476 since 2014. The number of rivers assessed annually has ranged from 61 to 91 and the annual percentages of these rivers achieving CL has ranged from 26% to 67% (44% in 2018) with no temporal trend.

Conservation limits have been established for 33 river stocks in the USA since 1995. Sixteen of these are assessed against CL attainment annually with none meeting CLs to date. The proportion of the conservation requirement attained is only presented in Figure 4.3.4.1 for the six rivers with the most precise adult abundance estimates.

4.3.5 Marine survival (return rates)

In 2018, return rate estimates were available from ten wild and two hatchery populations from rivers distributed among Newfoundland, Québec, Scotia-Fundy, and USA (Tables 4.3.5.1 to 4.3.5.4). Return rates for wild small salmon declined for monitored rivers in Québec (1SW, $p<0.05$) over the time period, whereas there was no statistically significant trend for populations in Newfoundland and Scotia-Fundy (Figure 4.3.5.1). Although significant declines were not evident in the analysis for Scotia-Fundy, small salmon return rates have been below long-term means in recent years. Overall, regional return rates have improved since the low value of 2012. After a decline in wild 2SW return rates for Scotia-Fundy since the 2010 smolt year, return rates in 2018 (2016 smolt year) improved and are comparable to pre-2010 values (Figure 4.3.5.1). Québec showed a statistically significant decline for 2SW salmon ($p <0.05$) and 2018 return rates were up slightly from the low 2012 value (Figure 4.3.5.1).

In 2018, the return rate of small salmon of hatchery origin to the Penobscot River (USA) was similar to 2017 and was equal to the mean of 1991 to present. The return rate of hatchery-origin small salmon to the Saint John River (Scotia-Fundy, SFA 23) decreased from 2017 by 54% (Table 4.3.5.3; Figure 4.3.5.2). Hatchery origin 2SW return rates in 2018 decreased from 2017 for the Saint John (Scotia-Fundy) and were the lowest recorded on that river (0.0%) (Table 4.3.5.4; Figure 4.3.5.2). On the Penobscot River, the hatchery origin 2SW return rate in 2018 decreased from 2017 by approximately 33% (Table 4.3.5.4; Figure 4.3.5.2).

Regional least squared (or marginal mean) mean annual return rates were calculated to balance for variation in the annual number of contributing experimental groups through application of a GLM (generalised linear model) with survival related to smolt year and river with a quasi-Poisson distribution (log-link function) (Figures 4.3.5.1 and 4.3.5.2). Analyses of time-series of regional return rates of wild smolts to small salmon and 2SW adults by area for the period of 1970 to 2018 (Tables 4.3.5.1 to 4.3.5.4; Figures 4.3.5.1 and 4.3.5.2) indicate the following:

- Return rates of wild smolts exceed those of hatchery released smolts;
- Small salmon return rates to rivers in Newfoundland vary annually and without trend over the period 1970 to 2018;

- Small salmon return rates for Newfoundland populations in 2018 were greater than those for other populations in eastern North America;
- Small salmon (1SW) return rates of wild smolts to Québec vary annually and have declined over the period 1983/1984 to 2017/2018;
- Small salmon and 2SW return rates of wild smolts to the Scotia-Fundy vary annually and without a statistically significant trend over the period mid-1990s to 2018. However, individual river trends for Scotia-Fundy may vary from the overall trend (e.g. declines in return rates to Southern Upland index rivers; DFO, 2013);
- In Scotia-Fundy and USA, hatchery smolt return rates to 2SW salmon have decreased over the period 1970 to 2018. 1SW return rates for Scotia-Fundy hatchery stocks have also declined for the period, while they have been stable for USA.

4.3.6 Pre-fisheries abundance (PFA)

4.3.6.1 North American run–reconstruction model

The run-reconstruction model developed by Rago *et al*. (1993) and described in previous Working Group reports (ICES, 2008; 2009) and in the primary literature (Chaput *et al*., 2005) was used to estimate returns and spawners by size (small salmon, large salmon) and sea age group (2SW salmon) to the six geographic regions of NAC. The input data were similar in structure to the data used previously by the Working Group (ICES, 2012; Stock Annex). Estimates of returns and spawners to regions were provided for the time-series to 2018. The full set of data inputs are included in the Stock Annex and the summary output tables of returns and spawners by sea age or size group are provided in Tables 4.3.2.1 to 4.3.2.3 and 4.3.3.1 to 4.3.3.2.

4.3.6.2 Non-maturing 1SW salmon

The non-maturing component of 1SW salmon, destined to be 2SW returns (excluding 3SW and previous spawners) is represented by the PFA estimate for year i designated as PFANAC1SW. This annual PFA is the estimated number of salmon in the North Atlantic on 1 August of the second summer at sea. As the PFA estimates for potential 2SW salmon requires estimates of returns to rivers, the most recent year for which an estimate of PFA is available is 2017. This is because PFA estimates for 2018 require 2SW returns to rivers in North America in 2019.

The PFA estimates accounting for returns to rivers, fisheries at sea in North America, fisheries at West Greenland, and corrected for natural mortality are shown in Figure 4.3.6.1 and Table 4.3.6.1. The median of the estimates of non-maturing 1SW salmon in 2017 was 121 300 salmon (90% C.I. range 98 600 to 146 200). This value is 23% lower than the previous revised value for 2016 (156 900) and 20% lower than the previous five year mean (152 100). The estimated non-maturing 1SW salmon in 2017 ranks 34 (descending rank) of the 47 year time-series.

4.3.6.3 Maturing 1SW salmon

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 an entire smolt cohort.

The reconstructed distribution of the PFA of the 1SW maturing cohort of North American origin is shown in Figure 4.3.6.1 and Table 4.3.6.1. The estimated PFA of the maturing component in 2018 was 608 200 fish, 29% above the previous year revised value and 12% above the previous five year mean (543 400). Maximum abundance of the maturing cohort was estimated at over 910 000 fish in 1981 and the recent estimate ranks 15 (descending rank) of the 48-year time-series.

4.3.6.4 Total 1SW recruits (maturing and non-maturing)

The pre-fishery abundance of 1SW maturing salmon and 1SW non-maturing salmon from North America from 1971–2017 (2018 PFA requires 2SW returns in 2019) were summed to give total recruits of 1SW salmon (Figure 4.3.6.1; Table 4.3.6.1). The PFA of the 1SW cohort, estimated for 2017, was 592 700 fish, 7% lower than the revised 2016 PFA estimate (639 000), and 10% lower than the previous five year mean (656 300). The 2017 PFA estimate ranks 35 (descending rank) of the 47-year time-series. The abundance of the 1SW cohort has declined by 66% over the time-series from a peak of 1 705 000 fish in 1975.

4.3.7 Summary on status of stocks

Warm-water and low water conditions in several regions in eastern Canada resulted in a number of recreational fisheries closures and these conditions may also have impacted the end of season spawner estimates in some areas. Recreational fishery closures in Newfoundland in 2017 and 2018 due to these environmental conditions were the most important since 1987.

In 2018, the median estimates of returns to rivers and of spawners were below the CLs for 2SW salmon for five of the six assessment regions of NAC, and are therefore suffering reduced reproductive capacity (Figure 4.3.2.4, Figure 4.3.7.1). For Gulf Region, the 5th percentile is below the CL and the stock is at risk of suffering reduced reproductive capacity. The percentages (based on medians) of CLs attained from 2SW spawners in 2018 ranged from a low of 3% in USA to 125% in Gulf region. For 2SW salmon returns to rivers prior to in-river exploitation, the percentages of CL attained were minimally higher, ranging from 2% to 127%, respectively.

The returns of 2SW salmon to the two southern areas (Scotia-Fundy and USA) were 13% and 12%, respectively, of the management objectives for these areas. For USA, 2SW returns are assessed relative to the management objective as adult stocking programmes for restoration efforts contribute to the number of spawners.

The rank of the estimated returns in the 1971 to 2018 time-series and the proportions of the 2SW CLs achieved in 2018 for six assessment regions in North America are shown below:

Region	Rank of 2018 returns in 1971 to 2018, (48=LOWEST)		Rank of 2018 returns in 2009 to 2018 (10=LOWEST)		Median estimate of 2018 2SW spawners as percentage of Conservation Limit (% of management objective)
	1SW	2SW	1SW	2SW	(%)
Labrador	1	7	1	7	85
Newfoundland	6	44	4	9	57
Québec	34	46	7	9	54
Gulf	46	36	8	6	125
Scotia-Fundy	47	42	9	6	6 (13)
USA	24	43	4	7	3 (19)

Estimates of PFA indicate continued low abundance of North American adult salmon. The total population of 1SW and 2SW Atlantic salmon in the Northwest Atlantic has shown an overall declining trend since the 1970s with a period of persistent low abundance since the early 1990s. During 1993 to 2017, the total population of 1SW and 2SW Atlantic salmon was about 610 000 fish, about half of the mean abundance during 1971 to 1992. The estimated maturing 1SW salmon abundance in 2018 was 29% above the estimate for 2017 and was the 15th lowest estimate on record. Overall, 92% of 1SW salmon returns to NAC in 2018 (Figure 4.3.6.1) were from two regions (Labrador and Newfoundland). The non-maturing 1SW PFA for 2017 decreased by 23% from 2016, and ranked 34 (descending rank) of the 47-year time-series. Overall, 95% of 2SW salmon returns to NAC were from three regions in 2018 (Labrador, Québec and Gulf).

The estimates of 1SW salmon returns in 2018 decreased from 2017 in the four southern regions (range 3% to 66%) and increased by 8% and 75% in Newfoundland and Labrador, respectively. 1SW salmon returns remained among the lowest on record for Scotia-Fundy (second lowest on record) and Gulf (third lowest on record). In Labrador, the estimated 1SW salmon returns were estimated to have been the highest of record. Returns to rivers (after commercial fisheries in Newfoundland and Labrador) of 1SW salmon have generally increased over the time-series for the NAC, mainly as a result of the commercial fishery closures in 1992 and subsequently in 1998. Increased returns in recent years were estimated for Labrador and Newfoundland, which have contributed to this increasing trend for NAC. Important variations in annual abundances continue to be observed, such as the low returns of 2009 and 2013 and the high returns of 2011 and 2015 (Figure 4.3.2.2).

The abundances of large salmon (multi-sea-winter salmon including maiden and repeat spawners) returns in 2018 decreased from 2017 in four regions (Labrador, Newfoundland, Québec, and USA; range 18% to 40%), whereas, the returns of large salmon increased in the other two regions (Gulf and Scotia-Fundy by 16% and 29%, respectively). 2SW salmon returns in 2018 also decreased from 2017 in the same four regions as the large salmon (range 18% to 40%), and increased in the same two regions as large salmon returns (increased by 17% for Gulf and 27% for Scotia-Fundy). With the exception of Labrador, the returns of 2SW salmon ranked 36 to 46 of the 48-year time-series.

Wild smolt-to-adult return rates to monitored rivers in eastern North America remain low, with 2017 smolt to 1SW salmon returns ranging from 0.8% for multi-sea-winter salmon stocks to 9.3% for 1SW salmon stocks and return rates of smolts in 2016 to 2SW salmon ranging from 0.2% to 2.2% for multi-sea-winter salmon stocks. A number of monitoring programs in 2018 were unable to estimate smolt production due to exceptional spring discharge conditions, which weakens the critical metrics of adult return rates for the few monitored populations.

Egg depositions by all sea ages combined in 2018 exceeded or equalled the river-specific CLs in 38 of the 86 assessed rivers (44%) and were less than 50% of CLs in 28 rivers (33%) (Figure 4.3.4.1). Large deficiencies in egg depositions (≤10% CLs) were noted in multiple rivers in the Scotia-Fundy and USA areas.

Despite major changes in fisheries, returns to the southern regions of NAC (Scotia-Fundy and USA) remain near historical lows and many populations are currently at risk of extirpation. All salmon stocks within the USA and the Scotia-Fundy regions have been or are being considered for listing under country specific species at risk legislation. Recovery Potential Assessments for the three Designatable Units of salmon in Scotia-Fundy as well as for one Designatable Unit in Québec and one in Newfoundland occurred in 2012 and 2013 to inform the requirements under the Species at Risk Act listing process in Canada (ICES, 2014).

Regional return estimates in 2018 are reflected in the overall 2018 return estimates for NAC, as Labrador and Newfoundland collectively comprise 92% of the small salmon returns, whereas

Labrador, Québec, and Gulf collectively comprise 81% of the large salmon returns and 95% of the 2SW salmon returns to NAC.

Overall, the estimated PFA of 1SW non-maturing salmon ranked 34 (descending rank) of the 47-year time-series and the estimated PFA of 1SW maturing salmon ranked 33 (descending rank) of the 48-year time-series. The continued low abundance of salmon stocks across North America, 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 abundance of Atlantic salmon. Declines in smolt production in some rivers of eastern Canada may also be contributing to lower adult abundance.

Table 4.1.2.1. The number of professional and recreational gillnet licences issued at Saint Pierre & Miquelon and reported landings for the period 1990 to 2018. The data for 2018 are provisional.

Year	Number of licences		Reported Landings (t)		
	Professional	Recreational	Professional	Recreational	Total
1990			1.146	0.734	1.880
1991			0.632	0.530	1.162
1992			1.295	1.024	2.319
1993			1.902	1.041	2.943
1994			2.633	0.790	3.423
1995	12	42	0.392	0.445	0.837
1996	12	42	0.951	0.617	1.568
1997	6	36	0.762	0.729	1.491
1998	9	42	1.039	1.268	2.307
1999	7	40	1.182	1.140	2.322
2000	8	35	1.134	1.133	2.267
2001	10	42	1.544	0.611	2.155
2002	12	42	1.223	0.729	1.952
2003	12	42	1.620	1.272	2.892
2004	13	42	1.499	1.285	2.784
2005	14	52	2.243	1.044	3.287
2006	13	52	1.730	1.825	3.555
2007	13	53	0.970	1.062	2.032
2008	9	55	1.60	1.85	3.45
2009	8	50	1.87	1.60	3.46
2010	9	57	1.00	1.78	2.78
2011	9	58	1.76	1.99	3.76
2012	9	60	0.28	1.17	1.45
2013	9	64	2.29	3.01	5.30
2014	12	70	2.25	1.56	3.81
2015	8	70	1.21	2.30	3.51
2016	8	70	0.98	3.75	4.73
2017	8	80	0.59	2.22	2.82

Year	Number of licences		Reported Landings (t)		
	Professional	Recreational	Professional	Recreational	Total
2018	9	80	0.16	1.13	1.29

Table 4.1.3.1. Harvests (by weight, t), and the percent large by weight and by number in the Indigenous Peoples' Food, Social, and Ceremonial (FSC) fisheries in Canada, 1990 to 2018. The data for 2018 are provisional.

Indigenous Peoples' FSC fisheries			
Year	Harvest (t)	% large	
		by weight	by number
1990	31.9	78	
1991	29.1	87	
1992	34.2	83	
1993	42.6	83	
1994	41.7	83	58
1995	32.8	82	56
1996	47.9	87	65
1997	39.4	91	74
1998	47.9	83	63
1999	45.9	73	49
2000	45.7	68	41
2001	42.1	72	47
2002	46.3	68	43
2003	44.3	72	49
2004	60.8	66	44
2005	56.7	57	34
2006	61.4	61	39
2007	48.0	62	40
2008	62.5	66	43
2009	51.2	65	45
2010	59.1	59	38
2011	70.4	63	41
2012	59.6	62	40
2013	64.0	71	51
2014	52.9	61	41
2015	62.9	67	46
2016	64.0	72	50

Indigenous Peoples' FSC fisheries			
Year	Harvest (t)	% large	
		by weight	by number
2017	61.3	72	51
2018	53.4	64	43

Table 4.1.3.2. Harvests (by weight, t), and the percent large by weight and number in the Labrador Resident Food Fishery, Canada, for the period 2000 to 2018. The data for 2018 are provisional.

Labrador resident food fishery			
Year	Harvest (t)	% Large	
		by weight	by number
2000	3.5	30	18
2001	4.6	33	23
2002	6.2	27	15
2003	6.7	32	21
2004	2.2	40	26
2005	2.7	32	20
2006	2.6	39	27
2007	1.7	23	13
2008	2.3	46	25
2009	2.9	42	28
2010	2.3	37	25
2011	2.1	51	37
2012	1.7	49	32
2013	2.1	65	51
2014	1.6	46	31
2015	2.0	54	38
2016	1.6	56	38
2017	1.6	57	38
2018	1.5	43	26

Table 4.1.3.3. Harvests of small and large salmon by number, and the percent large by number, in the recreational fisheries of Canada for the period 1974 to 2018. The data for 2018 are provisional.

Year	Small	Large	Both Size Groups	% Large
1974	53 887	31 720	85 607	37
1975	50 463	22 714	73 177	31
1976	66 478	27 686	94 164	29
1977	61 727	45 495	107 222	42
1978	45 240	28 138	73 378	38
1979	60 105	13 826	73 931	19
1980	67 314	36 943	104 257	35
1981	84 177	24 204	108 381	22
1982	72 893	24 640	97 533	25
1983	53 385	15 950	69 335	23
1984	66 676	9 982	76 658	13
1985	72 389	10 084	82 473	12
1986	94 046	11 797	105 843	11
1987	66 475	10 069	76 544	13
1988	91 897	13 295	105 192	13
1989	65 466	11 196	76 662	15
1990	74 541	12 788	87 329	15
1991	46 410	11 219	57 629	19
1992	77 577	12 826	90 403	14
1993	68 282	9 919	78 201	13
1994	60 118	11 198	71 316	16
1995	46 273	8 295	54 568	15
1996	66 104	9 513	75 617	13
1997	42 891	6 756	49 647	14
1998	45 810	4 717	50 527	9
1999	43 667	4 811	48 478	10
2000	45 811	4 627	50 438	9
2001	43 353	5 571	48 924	11
2002	43 904	2 627	46 531	6

Year	Small	Large	Both Size Groups	% Large
2003	38 367	4 694	43 061	11
2004	43 124	4 578	47 702	10
2005	33 922	4 132	38 054	11
2006	33 668	3 014	36 682	8
2007	26 279	3 499	29 778	12
2008	46 458	2 839	49 297	6
2009	32 944	3 373	36 317	9
2010	45 407	3 209	48 616	7
2011	49 931	4 141	54 072	8
2012	30 453	2 680	33 133	8
2013	31 404	3 472	34 876	10
2014	33 339	1 343	34 682	4
2015	37 642	1 971	39 613	5
2016	35 303	1 823	37 126	5
2017	22 015	1 886	23 901	8
2018	17 627	960	18 587	5
Previous five-year mean	29 185	1 597	30 782	5

Table 4.1.3.4. Numbers of salmon caught and released in Eastern Canadian salmon angling fisheries, for the period 1984 to 2018. Blank cells indicate no data. Released fish in the kelt fishery of New Brunswick are not included in the totals for New Brunswick nor Canada. Totals for all years prior to 1997 are incomplete and are considered minimal estimates. Estimates for 2018 are preliminary; both preliminary and final figures are shown for 2017.

	Newfoundland & Labrador			Nova Scotia			New Brunswick			Prince Edward Island			Québec			CANADA		
Year	Small	Large	Total	Small	Large	Total	Small	Large	Total	Small	Large	Total	Small	Large	Total	SMALL	LARGE	TOTAL
1984				939	1 655	2 594	851	14 479	15 330							1 790	16 134	17 924
1985		315	315	1 323	6 346	7 669	3 963	17 815	21 778			67				5 286	24 476	29 762
1986		798	798	1 463	10 750	12 213	9 333	25 316	34 649							10 796	36 864	47 660
1987		410	410	1 311	6 339	7 650	10 597	20 295	30 892							11 908	27 044	38 952
1988		600	600	1 146	6 795	7 941	10 503	19 442	29 945	767	256	1 023				12 416	27 093	39 509
1989		183	183	1 562	6 960	8 522	8 518	22 127	30 645							10 080	29 270	39 350
1990		503	503	1 782	5 504	7 286	7 346	16 231	23 577			1 066				9 128	22 238	31 366
1991		336	336	908	5 482	6 390	3 501	10 650	14 151	1 103	187	1 290				5 512	16 655	22 167
1992	5 893	1 423	7 316	737	5 093	5 830	8 349	16 308	24 657			1 250				14 979	22 824	37 803
1993	18 196	1 731	19 927	1 076	3 998	5 074	7 276	12 526	19 802							26 548	18 255	44 803
1994	24 442	5 032	29 474	796	2 894	3 690	7 443	11 556	18 999	577	147	724				33 258	19 629	52 887
1995	26 273	5 166	31 439	979	2 861	3 840	4 260	5 220	9 480	209	139	348		922	922	31 721	14 308	46 029
1996	34 342	6 209	40 551	3 526	5 661	9 187				472	238	710		1 718	1 718	38 340	13 826	52 166
1997	25 316	4 720	30 036	713	3 363	4 076	4 870	8 874	13 744	210	118	328	182	1 643	1 825	31 291	18 718	50 009
1998	31 368	4 375	35 743	688	2 476	3 164	5 760	8 298	14 058	233	114	347	297	2 680	2 977	38 346	17 943	56 289
1999	24 567	4 153	28 720	562	2 186	2 748	5 631	8 281	13 912	192	157	349	298	2 693	2 991	31 250	17 470	48 720

	Newfoundland & Labrador			Nova Scotia			New Brunswick			Prince Edward Island			Québec			CANADA		
Year	Small	Large	Total	Small	Large	Total	Small	Large	Total	Small	Large	Total	Small	Large	Total	SMALL	LARGE	TOTAL
2000	29 705	6 479	36 184	407	1 303	1 710	6 689	8 690	15 379	101	46	147	445	4 008	4 453	37 347	20 526	64 482
2001	22 348	5 184	27 532	527	1 199	1 726	6 166	11 252	17 418	202	103	305	809	4 674	5 483	30 052	22 412	59 387
2002	23 071	3 992	27 063	829	1 100	1 929	7 351	5 349	12 700	207	31	238	852	4 918	5 770	32 310	15 390	50 924
2003	21 379	4 965	26 344	626	2 106	2 732	5 375	7 981	13 356	240	123	363	1 238	7 015	8 253	28 858	22 190	53 645
2004	23 430	5 168	28 598	828	2 339	3 167	7 517	8 100	15 617	135	68	203	1 291	7 455	8 746	33 201	23 130	62 316
2005	33 129	6 598	39 727	933	2 617	3 550	2 695	5 584	8 279	83	83	166	1 116	6 445	7 561	37 956	21 327	63 005
2006	30 491	5 694	36 185	1 014	2 408	3 422	4 186	5 538	9 724	128	42	170	1 091	6 185	7 276	36 910	19 867	60 486
2007	17 719	4 607	22 326	896	1 520	2 416	2 963	7 040	10 003	63	41	104	951	5 392	6 343	22 592	18 600	41 192
2008	25 226	5 007	30 233	1 016	2 061	3 077	6 361	6 130	12 491	3	9	12	1 361	7 713	9 074	33 967	20 920	54 887
2009	26 681	4 272	30 953	670	2 665	3 335	2 387	8 174	10 561	6	25	31	1 091	6 180	7 271	30 835	21 316	52 151
2010	27 256	5 458	32 714	717	1 966	2 683	5 730	5 660	11 390	42	27	69	1 356	7 683	9 039	35 101	20 794	55 895
2011	26 240	8 119	34 359	1 157	4 320	5 477	6 537	12 466	19 003	46	46	92	3 100	9 327	12 427	37 080	34 278	71 358
2012	20 940	4 089	25 029	339	1 693	2 032	2 504	5 330	7 834	46	46	92	2 126	6 174	8 300	25 955	17 332	43 287
2013	19 962	6 770	26 732	480	2 657	3 137	2 646	8 049	10 695	12	23	35	2 238	7 793	10 031	25 338	25 292	50 630
2014	20 553	4 410	24 963	185	1 127	1 312	2 806	5 884	8 690	68	68	136	1 580	4 932	6 512	25 192	16 421	41 613
2015	24 861	6 943	31 804	548	1 260	1 808	11 552	7 489	19 041	68	68	136	3 078	9 573	12 651	40 107	25 333	65 440
2016	26 145	10 206	36 351	362	1 550	1 912	7 130	7 958	15 088	68	68	136	3 905	11 533	15 438	37 610	31 315	68 925
2017	22 544	8 137	30 681	330	732	1 062	5 935	6 179	12 114	68	68	136	3 191	10 173	13 364	32 068	25 289	57 357

	Newfoundland & Labrador			Nova Scotia			New Brunswick			Prince Edward Island			Québec			CANADA		
Year	Small	Large	Total	Small	Large	Total	Small	Large	Total	Small	Large	Total	Small	Large	Total	SMALL	LARGE	TOTAL
2018 (prelim)	19 768	5 287	25 055	382	1 493	1 875	4 880	7 019	11 899	68	68	136	2 610	8.609	11 219	27 708	22 476	50 184

Table 4.1.4.1. Reported harvests and losses expressed as 2SW salmon equivalents in North American salmon fisheries for the period 1972 to 2018. Only midpoints of the Monte Carlo simulated values are shown.

Year (i)	Mixed-stocks					Canada – losses from all sources (terminal fisheries catch and release mortality bycatch mortality) in year i						USA	North American Total	Terminal losses as % of NA Total	Greenland Total	NW Atlantic Total	Harvest in homewaters as % of total NW Atlantic	Estimated abundance in North America (2SW)	Exploitation rates in North America
	NF-LAB Comm / Food 1SW (Year i-1) (a)	% 1SW of total 2SW equivalents (Year i)	NF-LAB Comm / Food 2SW (Year i) (a)	NF-Lab Comm / Food total (Year i)	Saint-Pierre and Miquelon (Year i)	Labrador	Newfoundland	Québec	Gulf	Scotia - Fundy	Total								
1972	22004	0.13	144208	166213	0	425	593	27270	20170	5590	54048	345	220606	25	197632	418238	53	292300	0.75
1973	18822	0.08	205734	224557	0	1005	782	32840	15280	6224	56131	327	281015	20	148170	429185	65	363400	0.77
1974	23738	0.09	235915	259653	0	805	501	47590	18220	13000	80116	247	340016	24	186345	526361	65	449400	0.76
1975	23463	0.09	237662	261126	0	330	491	41260	14080	12520	68681	389	330196	21	154712	484908	68	416700	0.79
1976	35011	0.12	256683	291693	338	830	388	42130	16135	11150	70633	191	362855	20	194685	557540	65	431700	0.84
1977	26751	0.10	241253	268003	0	1290	772	42540	29170	13430	87202	1355	356560	25	112943	469503	76	473400	0.75
1978	26984	0.15	157309	184293	0	760	530	37360	20300	9394	68344	894	253531	27	142706	396238	64	317500	0.80
1979	13501	0.13	92076	105576	0	609	128	25290	6270	3845	36142	433	142151	26	103813	245964	58	172200	0.83
1980	20613	0.09	217283	237896	0	885	636	53515	25345	17300	97681	1533	337110	29	141916	479025	70	451800	0.75
1981	33704	0.14	201367	235071	0	520	434	44500	14638	12840	72932	1267	309270	24	120995	430265	72	365800	0.85
1982	33562	0.20	134407	167968	0	620	397	35260	20750	8911	65938	1413	235319	29	161255	396574	59	291400	0.81
1983	25234	0.18	111601	136835	338	428	415	34420	17410	12272	64945	386	202503	32	145798	348301	58	237500	0.85
1984	19035	0.19	82828	101863	338	510	179	19410	3660	3970	27729	675	130605	22	26837	157442	83	199400	0.65
1985	14327	0.15	78781	93107	338	294	18	22250	880	5020	28462	645	122552	24	32438	154990	79	212300	0.58

Year (i)	Mixed-stocks					Canada – losses from all sources (terminal fisheries catch and release mortality bycatch mortality) in year i						USA	North American Total	Terminal losses as % of NA Total	Greenland Total	NW Atlantic Total	Harvest in home-waters as % of total NW Atlantic	Estimated abundance in North America (2SW)	Exploitation rates in North America
	NF-LAB Comm / Food 1SW (Year i-1) (a)	% 1SW of total 2SW equivalents (Year i)	NF-LAB Comm / Food 2SW (Year i) (a)	NF-Lab Comm / Food total (Year i)	Saint-Pierre and Miquelon (Year i)	Labrador	Newfoundland	Québec	Gulf	Scotia - Fundy	Total								
1986	19587	0.16	104905	124492	281	467	16	27340	1790	2960	32573	606	157953	21	99211	257164	61	266400	0.59
1987	24787	0.16	132272	157059	225	630	12	27290	2030	1450	31412	300	188996	17	123439	312435	60	260200	0.73
1988	31571	0.28	81149	112720	225	710	26	27610	1405	1430	31181	247	144373	22	123871	268244	54	214800	0.67
1989	21903	0.21	81377	103280	225	461	5	23780	1240	350	25836	397	129738	20	84905	214643	60	195700	0.66
1990	19283	0.25	57373	76655	212	357	20	23010	1070	650	25107	695	102669	25	43675	146343	70	175900	0.58
1991	11835	0.23	40443	52278	131	93	18	23560	760	1370	25801	231	78441	33	52179	130621	60	147900	0.53
1992	9844	0.28	25115	34960	261	782	26	24250	1110	1160	27328	167	62716	44	79585	142300	44	145800	0.43
1993	3110	0.19	13276	16386	332	387	52	18590	520	1159	20708	166	37591	56	29807	67398	56	121800	0.31
1994	2077	0.15	11946	14023	386	490	150	19340	680	781	21441	2	35852	60	1886	37738	95	106800	0.34
1995	1183	0.12	8680	9862	94	460	142	17930	510	365	19407	0	29364	66	1886	31250	94	133900	0.22
1996	1034	0.15	5648	6681	177	380	189	17220	830	827	19446	0	26304	74	19181	45485	58	114200	0.23
1997	943	0.14	5597	6540	168	220	131	14130	710	600	15791	0	22499	70	19339	41838	54	93700	0.24
1998	1169	0.40	1762	2931	260	202	90	7930	460	331	9013	0	12204	74	13048	25252	48	64450	0.19
1999	174	0.17	842	1016	262	270	91	6620	775	453	8209	0	9487	87	4324	13811	69	68170	0.14
2000	150	0.12	1050	1200	255	260	141	6310	540	200	7451	0	8906	84	6437	15343	58	69760	0.13

Year (i)	Mixed-stocks					Canada – losses from all sources (terminal fisheries catch and release mortality bycatch mortality) in year i						USA	North American Total	Terminal losses as % of NA Total	Greenland Total	NW Atlantic Total	Harvest in homewaters as % of total NW Atlantic	Estimated abundance in North America (2SW)	Exploitation rates in North America
	NF-LAB Comm / Food 1SW (Year i-1) (a)	% 1SW of total 2SW equivalents (Year i)	NF-LAB Comm / Food 2SW (Year i) (a)	NF-Lab Comm / Food total (Year i)	Saint-Pierre and Miquelon (Year i)	Labrador	Newfoundland	Québec	Gulf	Scotia - Fundy	Total								
2001	283	0.17	1336	1620	243	310	64	7080	960	263	8677	0	10539	82	5930	16469	64	80810	0.13
2002	260	0.19	1079	1339	220	200	42	4220	530	183	5175	0	6734	77	8606	15340	44	51160	0.13
2003	308	0.15	1690	1998	338	232	60	6080	790	209	7371	0	9707	76	3223	12929	75	78340	0.12
2004	350	0.11	2871	3221	190	270	93	5970	810	118	7261	0	10672	68	3474	14146	75	76060	0.14
2005	462	0.17	2187	2649	341	280	86	5330	975	106	6777	0	9767	69	4339	14106	69	78200	0.12
2006	557	0.19	2400	2957	455	220	87	4890	840	152	6189	0	9601	64	4181	13782	70	74570	0.13
2007	557	0.21	2059	2616	212	240	81	4770	810	111	6012	0	8840	68	4933	13773	64	69720	0.13
2008	493	0.14	3036	3529	429	230	86	4480	890	100	5786	0	9743	59	6616	16360	60	76410	0.13
2009	538	0.17	2597	3135	396	220	50	4670	890	121	5951	0	9482	63	7549	17030	56	90530	0.10
2010	439	0.13	2893	3331	456	200	100	4240	810	132	5482	0	9269	59	6672	15941	58	73520	0.13
2011	538	0.13	3457	3994	1001	140	57	5920	1510	79	7706	0	12701	61	8764	21464	59	145200	0.09
2012	609	0.16	3284	3893	151	60	26	4470	720	51	5327	0	9371	57	6870	16241	58	76760	0.12
2013	548	0.10	5032	5580	1234	160	70	4850	1070	33	6183	0	12997	48	7078	20075	65	113000	0.12
2014	429	0.12	3102	3531	593	105	53	3460	360	14	3992	0	8115	49	9598	17713	46	83470	0.10
2015	494	0.09	4773	5267	398	85	91	4050	595	10	4831	0	10495	46	11417	21912	48	123300	0.09

Year (i)	Mixed-stocks					Canada – losses from all sources (terminal fisheries catch and release mortality bycatch mortality) in year i						USA	North American Total	Terminal losses as % of NA Total	Greenland Total	NW Atlantic Total	Harvest in homewaters as % of total NW Atlantic	Estimated abundance in North America (2SW)	Exploitation rates in North America
	NF-LAB Comm / Food 1SW (Year i-1) (a)	% 1SW of total 2SW equivalents (Year i)	NF-LAB Comm / Food 2SW (Year i) (a)	NF-Lab Comm / Food total (Year i)	Saint-Pierre and Miquelon (Year i)	Labrador	Newfoundland	Québec	Gulf	Scotia - Fundy	Total								
2016	514	0.11	4345	4859	278	210	153	4330	590	23	5306	0	10443	51	11726	22168	47	115400	0.09
2017	444	0.08	4809	5252	76	205	64	3810	430	24	4533	0	9861	46	5646	15507	64	110200	0.09
2018	410	0.11	3172	3583	131	120	41	2830	400	14	3405	0	7119	48	5439	12558	57	83900	0.08

Variations in numbers from previous assessments are due to updates to data inputs and to stochastic variation from Monte Carlo simulation.

NF-Lab Comm / Food 1SW (Year i-1) = Catch of 1SW non-maturing * 0.677057 (M of 0.03 per month for 13 months to July for Canadian terminal fisheries).

NF-Lab Comm / Food 2SW (Year i) = catch of 2SW salmon * 0.970446 (M of 0.03 per month for 1 month to July of Canadian terminal fisheries).

Canada: Losses from all sources = 2SW returns - 2SW spawners (includes losses from harvests from catch and release mortality and other in-river losses such as bycatch mortality but excludes the fisheries at St-Pierre and Miquelon and NF-Lab Comm / Food fisheries).

a - starting in 1998 there was no commercial fishery in Labrador; numbers reflect harvests of the Indigenous and residential subsistence fisheries.

Greenland total catch = estimated catch of 1SW non-maturing salmon of North American origin at Greenland discounted for 11 months of mortality at sea as returning 2SW salmon to eastern North America (* 0.719; M of 0.03 per month for 11 months).

Table 4.1.5.1. Correspondence between ICES areas used for the assessment of status of North American salmon stocks and the reporting groups (Figure 4.1.5.1 and Figure 4.1.5.2) defined from the range wide genetic baseline.

ICES region	Reporting group	Group acronym
Québec (North)	Ungava	UNG
Labrador	Labrador Central	LAC
	Lake Melville	MEL
	Labrador South	LAS
Québec	St Lawrence North Shore Lower	QLS
	Anticosti	ANT
	Gaspe Peninsula	GAS
	Québec 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
Europe	Spain	SPN
	France	FRN
	European Broodstock	EUB
	United Kingdom/Ireland	BRI
	Barents-White Seas	BAR
	Baltic Sea	BAL
	Southern Norway	SNO

ICES region	Reporting group	Group acronym
	Northern Norway	NNO
	Iceland	ICE
	Greenland	GL

Table 4.1.5.2. Genetic mixture analysis of Labrador subsistence fisheries, 2017 and 2018 using the SNP range wide baseline. Mean percent values and 95% credible interval by range wide reporting groups (Figure 4.1.5.1 and Figure 4.1.5.2). Small <63 cm, Large >=63 cm. Note that credible intervals with a lower bound including zero indicate little support for the mean assignment value.

Reporting Group	2017			2018		
	Total	**Small**	**Large**	**Total**	**Small**	**Large**
Spain	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
France	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
European Broodstock	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
United Kingdom / Ireland	0.0 (0.0, 0.2)	0.0 (0.0, 0.4)	0.1 (0.0, 0.6)	0.0 (0.0, 0.2)	0.0 (0.0, 0.3)	0.1 (0.0, 0.7)
Barents-White Seas	0.0 (0.0, 0.0)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.0 (0.0, 0.0)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)
Baltic Sea	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
Southern Norway	0.0 (0.0, 0.2)	0.0 (0.0, 0.4)	0.1 (0.0, 0.6)	0.0 (0.0, 0.2)	0.0 (0.0, 0.4)	0.1 (0.0, 0.8)
Northern Norway	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.0 (0.0, 0.2)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.0 (0.0, 0.3)
Iceland	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
Greenland	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
Maine, United States	0.4 (0.0, 1.1)	0.0 (0.0, 0.0)	1.1 (0.1, 2.9)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
Western Nova Scotia	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
Eastern Nova Scotia	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.0 (0.0, 0.0)	0.0 (0.0, 0.1)	0.0 (0.0, 0.2)
Inner Bay of Fundy	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.1)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.1)
Gulf of St Lawrence	0.0 (0.0, 0.2)	0.0 (0.0, 0.3)	0.1 (0.0, 0.6)	0.0 (0.0, 0.2)	0.0 (0.0, 0.2)	0.0 (0.0, 0.5)
Saint John River Aquaculture	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.1)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.1)
Québec City Region	0.0 (0.0, 0.3)	0.0 (0.0, 0.1)	0.1 (0.0, 1.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)
Gaspe Peninsulas	0.2 (0.0, 0.7)	0.0 (0.0, 0.2)	0.5 (0.0, 1.9)	0.0 (0.0, 0.1)	0.0 (0.0, 0.2)	0.0 (0.0, 0.5)
Anticosti	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
St. Lawrence North Shore Lower	0.0 (0.0, 0.1)	0.0 (0.0, 0.2)	0.0 (0.0, 0.3)	0.2 (0.0, 0.8)	0.3 (0.0, 1.2)	0.0 (0.0, 0.4)
Newfoundland 2	0.1 (0.0, 0.5)	0.1 (0.0, 0.8)	0.0 (0.0, 0.2)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.0 (0.0, 0.2)
Fortune Bay	0.0 (0.0, 0.0)	0.0 (0.0, 0.1)	0.0 (0.0, 0.2)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.0 (0.0, 0.3)
Burin Peninsula	0.2 (0.0, 0.8)	0.0 (0.0, 0.2)	0.8 (0.0, 2.6)	0.0 (0.0, 0.1)	0.0 (0.0, 0.2)	0.0 (0.0, 0.4)
Avalon Peninsula	0.0 (0.0, 0.1)	0.0 (0.0, 0.2)	0.0 (0.0, 0.3)	0.0 (0.0, 0.1)	0.0 (0.0, 0.2)	0.0 (0.0, 0.3)
Newfoundland 1	0.4 (0.0, 1.1)	0.3 (0.0, 1.2)	0.3 (0.0, 1.7)	0.0 (0.0, 0.0)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)

Reporting Group	2017			2018		
	Total	**Small**	**Large**	**Total**	**Small**	**Large**
Western Newfoundland	0.0 (0.0, 0.0)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.0 (0.0, 0.0)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)
Northern Newfoundland	0.2 (0.0, 0.7)	0.3 (0.0, 1.2)	0.0 (0.0, 0.1)	0.2 (0.0, 0.7)	0.0 (0.0, 0.0)	0.6 (0.0, 2.4)
Labrador South	**32.8 (28.4, 37.5)**	**32.9 (27.0, 39.0)**	**33.2 (26.2, 40.5)**	**40.4 (35.5, 45.3)**	**51.9 (45.8, 58.0)**	**19.6 (12.5, 27.4)**
Lake Melville	**48.4 (43.6, 53.0)**	**50.8 (44.8, 56.8)**	**46.2 (38.6, 54.0)**	**35.6 (31.0, 40.1)**	**28.5 (23.4, 33.9)**	**47.5 (38.9, 56.3)**
Labrador Central	**17.0 (13.1, 21.3)**	**15.4 (10.6, 20.7)**	**17.0 (11.0, 23.8)**	**23.5 (19.1, 28.3)**	**19.0 (13.9, 24.4)**	**31.7 (23.2, 40.7)**
Ungava	0.2 (0.0, 0.8)	0.0 (0.0, 0.0)	0.5 (0.0, 2.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
Samples	**495**	**294**	**189**	**499**	**325**	**153**

Table 4.1.5.3. Genetic mixture analysis of Labrador subsistence fisheries subset by fishing zone, for 2017 and 2018, using the SNP range wide baseline. Mean and 95% credible interval percent values by range wide reporting groups are shown (Figure 4.1.5.1 and Figure 4.1.5.2). Note that credible intervals with a lower bound including zero indicate little support for the mean assignment value.

Reporting Group	2017			2018		
	SFA 1A	**SFA 1B**	**SFA 2**	**SFA 1A**	**SFA 1B**	**SFA 2**
Spain	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
France	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
European Broodstock	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
United Kingdom/Ireland	0.2 (0.0, 1.5)	0.1 (0.0, 0.5)	0.1 (0.0, 0.6)	0.1 (0.0, 0.8)	0.1 (0.0, 0.7)	0.1 (0.0, 0.6)
Barents-White Seas	0.0 (0.0, 0.2)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)
Baltic Sea	0.0 (0.0, 0.1)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
Southern Norway	0.2 (0.0, 1.6)	0.1 (0.0, 0.5)	0.1 (0.0, 0.7)	0.1 (0.0, 1.0)	0.1 (0.0, 0.7)	0.1 (0.0, 0.6)
Northern Norway	0.0 (0.0, 0.5)	0.0 (0.0, 0.2)	0.0 (0.0, 0.2)	0.0 (0.0, 0.3)	0.0 (0.0, 0.2)	0.0 (0.0, 0.2)
Iceland	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
Greenland	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
Maine, United States	0.0 (0.0, 0.1)	0.0 (0.0, 0.0)	1.1 (0.1, 3.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
Western Nova Scotia	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
Eastern Nova Scotia	0.0 (0.0, 0.4)	0.0 (0.0, 0.1)	0.0 (0.0, 0.2)	0.0 (0.0, 0.2)	0.0 (0.0, 0.2)	0.0 (0.0, 0.1)
Inner Bay of Fundy	0.0 (0.0, 0.2)	0.0 (0.0, 0.0)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)
Gulf of St Lawrence	0.1 (0.0, 1.0)	0.0 (0.0, 0.3)	0.1 (0.0, 0.6)	0.1 (0.0, 0.6)	0.0 (0.0, 0.4)	0.0 (0.0, 0.4)
St. John River & Aquaculture	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.0 (0.0, 0.0)
Québec City Region	0.0 (0.0, 0.3)	0.0 (0.0, 0.1)	0.1 (0.0, 1.0)	0.0 (0.0, 0.2)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)
Gaspe Peninsula	0.1 (0.0, 0.9)	0.0 (0.0, 0.3)	0.5 (0.0, 2.1)	0.1 (0.0, 0.6)	0.0 (0.0, 0.4)	0.0 (0.0, 0.4)
Anticosti	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
St Lawrence N. Shore Lower	0.1 (0.0, 0.7)	0.0 (0.0, 0.2)	0.0 (0.0, 0.3)	0.8 (0.0, 3.0)	0.0 (0.0, 0.3)	0.0 (0.0, 0.2)
Newfoundland 2	0.0 (0.0, 0.4)	0.0 (0.0, 0.1)	0.1 (0.0, 1.1)	0.0 (0.0, 0.2)	0.0 (0.0, 0.2)	0.0 (0.0, 0.1)
Fortune Bay	0.0 (0.0, 0.3)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.1 (0.0, 0.8)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)
Burin Peninsula	0.1 (0.0, 0.8)	0.0 (0.0, 0.3)	0.6 (0.0, 2.2)	0.0 (0.0, 0.5)	0.0 (0.0, 0.3)	0.0 (0.0, 0.3)
Avalon Peninsula	0.1 (0.0, 0.7)	0.0 (0.0, 0.2)	0.0 (0.0, 0.3)	0.0 (0.0, 0.4)	0.0 (0.0, 0.3)	0.0 (0.0, 0.2)
Newfoundland 1	0.0 (0.0, 0.2)	0.0 (0.0, 0.1)	1.1 (0.1, 3.1)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)

Reporting Group	2017			2018		
	SFA 1A	**SFA 1B**	**SFA 2**	**SFA 1A**	**SFA 1B**	**SFA 2**
Western Newfoundland	0.0 (0.0, 0.2)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)
Northern Newfoundland	0.0 (0.0, 0.2)	0.0 (0.0, 0.0)	0.5 (0.0, 2.0)	0.8 (0.0, 2.8)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)
Labrador South	**0.2 (0.0, 2.6)**	**0.6 (0.0, 2.4)**	**88.9 (82.8, 93.8)**	**0.6 (0.0, 4.6)**	**0.4 (0.0, 2.9)**	**98.1 (95.4, 99.6)**
Lake Melville	**0.1 (0.0, 0.9)**	**97.6 (95.2, 99.3)**	**1.8 (0.4, 4.4)**	**5.5 (1.3, 11.7)**	**97.2 (92.6, 99.8)**	**1.3 (0.2, 3.6)**
Labrador Central	**98.6 (94.4, 100)**	**1.4 (0.1, 3.6)**	**4.4 (1.0, 9.4)**	**91.6 (84.8, 96.9)**	**1.9 (0.0, 6.1)**	**0.1 (0.0, 1.4)**
Ungava	0.0 (0.0, 0.1)	0.0 (0.0, 0.0)	0.5 (0.0, 2.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
Samples	**75**	**240**	**180**	**126**	**171**	**202**

Table 4.1.5.4. Genetic mixture analyses of Atlantic salmon (small salmon < 63 cm, large salmon ≥63 cm) harvested in the Saint Pierre and Miquelon fishery in 2017 and 2018 using the range wide SNP baseline. Mean and 95% credible interval percent values by range wide reporting groups are shown (Figure 4.1.5.1 and Figure 4.1.5.2) .Note that credible intervals with a lower bound including zero indicate little support for the mean assignment value.

Reporting Group	2017			2018		
	Total	**Small**	**Large**	**Total**	**Small**	**Large**
Spain	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.1 (0.0, 0.5)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.2 (0.0, 1.0)
France	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.1 (0.0, 0.0)
European Broodstock	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.1 (0.0, 0.0)
United Kingdom/Ireland	0.1 (0.0, 0.9)	0.1 (0.0, 0.9)	1.3 (0.0, 11.8)	1.7 (0.0, 6.5)	1.8 (0.0, 6.9)	2.6 (0.0, 22.7)
Barents-White Seas	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.2 (0.0, 1.7)	0.0 (0.0, 0.3)	0.0 (0.0, 0.4)	0.4 (0.0, 3.6)
Baltic Sea	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.1 (0.0, 0.4)	0.0 (0.0, 0.0)	0.0 (0.0, 0.1)	0.2 (0.0, 1.0)
Southern Norway	0.1 (0.0, 0.8)	0.1 (0.0, 1.0)	1.4 (0.0, 12.9)	0.5 (0.0, 3.6)	0.6 (0.0, 4.6)	2.7 (0.0, 23.3)
Northern Norway	0.0 (0.0, 0.3)	0.0 (0.0, 0.3)	0.4 (0.0, 4.1)	0.1 (0.0, 0.7)	0.1 (0.0, 0.8)	0.7 (0.0, 8.3)
Iceland	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.1 (0.0, 0.2)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.1 (0.0, 0.2)
Greenland	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.1 (0.0, 0.0)
Maine, United States	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.1 (0.0, 0.3)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.2 (0.0, 0.9)
Western Nova Scotia	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.1 (0.0, 0.2)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.1 (0.0, 0.2)
Eastern Nova Scotia	1.6 (0.2, 4.3)	1.7 (0.2, 4.6)	0.3 (0.0, 2.7)	0.1 (0.0, 0.5)	0.1 (0.0, 0.6)	0.5 (0.0, 5.8)
Inner Bay of Fundy	0.0 (0.0, 0.1)	0.0 (0.0, 0.2)	0.2 (0.0, 1.7)	0.0 (0.0, 0.2)	0.0 (0.0, 0.3)	0.3 (0.0, 2.7)
Gulf of St Lawrence	15.7 (9.6, 22.8)	13 (7.1, 20.2)	40.6 (13.6, 70.9)	15.4 (6.6, 26.4)	12.1 (4.2, 22.8)	42.7 (7.3, 84.0)
St. John River & Aqua-culture	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.2 (0.0, 1.7)	0.0 (0.0, 0.3)	0.1 (0.0, 0.4)	0.3 (0.0, 3.1)
Québec City Region	1.9 (0.0, 5.7)	1.9 (0.0, 5.9)	0.2 (0.0, 2.3)	0.7 (0.0, 9.1)	0.6 (0.0, 7.4)	6.3 (0.0, 48.2)
Gaspe Peninsula	8.6 (3.7, 14.7)	9.7 (4.6, 16.3)	0.8 (0.0, 8.5)	12.8 (3.6, 23.8)	12.8 (3.9, 24.0)	14.4 (0.0, 58.0)
Anticosti	2.2 (0.3, 5.4)	2.4 (0.3, 5.8)	0.1 (0.0, 0.5)	5.3 (0.8, 13.0)	5.8 (0.9, 14.2)	0.2 (0.0, 0.9)
St. Lawrence N. Shore Lower	2.0 (0.2, 5.2)	1.6 (0.2, 4.4)	1.1 (0.0, 12.6)	2.0 (0.0, 6.9)	2.1 (0.0, 7.7)	0.9 (0.0, 10.9)
Newfoundland 2	0.1 (0.0, 1.7)	0.2 (0.0, 2.0)	0.4 (0.0, 4.8)	14.5 (5.5, 26.2)	15.8 (6.2, 28.2)	1.0 (0.0, 12.9)
Fortune Bay	0.1 (0.0, 0.9)	0.1 (0.0, 1.2)	0.3 (0.0, 3.0)	6.2 (0.0, 15.3)	6.9 (0.6, 16.7)	0.4 (0.0, 4.5)

Reporting Group	2017			2018		
	Total	**Small**	**Large**	**Total**	**Small**	**Large**
Burin Peninsula	10.8 (5.0, 17.2)	10.3 (3.3, 17.7)	10.4 (0.2, 34.4)	4.2 (0.0, 15.4)	4.8 (0.0, 16.4)	1.1 (0.0, 13.0)
Avalon Peninsula	5.3 (2.1, 9.8)	5.7 (2.2, 10.6)	0.4 (0.0, 5.5)	5.4 (1.2, 12.5)	5.8 (1.2, 13.3)	0.9 (0.0, 10.6)
Newfoundland 1	16.1 (10.0, 23.6)	17.6 (10.9, 25.7)	0.2 (0.0, 2.4)	25.8 (14.0, 39.1)	25.2 (13.1, 39.2)	19.7 (0.1, 59.7)
Western Newfoundland	18.0 (11.7, 25.3)	18.4 (11.8, 26.0)	10.1 (0.2, 34.3)	4.7 (0.4, 12.7)	5.0 (0.3, 13.5)	0.4 (0.0, 4.1)
Northern Newfoundland	11.5 (6.4, 17.8)	11.9 (6.5, 18.4)	10.0 (0.2, 33.4)	0.2 (0.0, 2.8)	0.2 (0.0, 2.9)	0.3 (0.0, 2.4)
Labrador South	5.7 (2.3, 10.5)	5.1 (1.8, 9.6)	19.9 (2.1, 49.0)	0.1 (0.0, 1.2)	0.1 (0.0, 1.3)	1.2 (0.0, 13.8)
Lake Melville	0.0 (0.0, 0.3)	0.0 (0.0, 0.3)	0.3 (0.0, 3.8)	0.1 (0.0, 0.6)	0.1 (0.0, 0.7)	0.7 (0.0, 8.7)
Labrador Central	0.1 (0.0, 0.7)	0.1 (0.0, 0.8)	0.6 (0.0, 6.3)	0.1 (0.0, 0.9)	0.1 (0.0, 1.1)	1.1 (0.0, 12.8)
Ungava	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.1 (0.0, 0.4)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.2 (0.0, 1.0)
Samples	**137**	**128**	**9**	**56**	**52**	**4**

Table 4.3.1.1. Estimated smolt production by smolt migration year in monitored rivers of eastern North America 1991 to 2018.

Smolt Migration Year	USA		Scotia-Fundy				Gulf				
	Narraguagus	Sheepscot	Nashwaak	LaHave	St. Mary's (West Br.)	Middle	Margaree	Northwest Miramichi	Southwest Miramichi	Restigouche	Kedgwick
1991											
1992											
1993											
1994											
1995											
1996				20 511							
1997	2749			16 550							
1998	2845		22 750	15 600							
1999	4247		28 500	10 420				390 500			
2000	1843		15 800	16 300				162 000			
2001	2562		11 000	15 700				220 000	306 300		
2002	1774		15 000	11 860			63 200	241 000	711 400	430 304	155 723
2003	1201		9000	17 845			83 100	286 000	48 500	574 394	68 969
2004	1284		13 600	20 613			105 800	368 000	1 167 000	594 791	85 450
2005	1287		5 200	5270	7350		94 200	151 200		587 440	74 284
2006	2339		25 400	22 971	25 100		113 700	435 000	1 330 000	393 342	120 729
2007	1177		21 550	24 430	16 110		112 400		1 344 000	897 408	109 422
2008	962		7 300	14 450	15 217		128 800		901 500	506 272	47 818

Smolt Migration Year	USA		Scotia-Fundy				Gulf				
	Narraguagus	Sheepscot	Nashwaak	LaHave	St. Mary's (West Br.)	Middle	Margaree	Northwest Miramichi	Southwest Miramichi	Restigouche	Kedgwick
2009	1176	1498	15 900	8644	14 820		96 800		1 035 000	541 726	135 856
2010	2149	2231	12 500	16 215					2 165 000	592 903	94 635
2011	1404	1639	8750					768 000		791 746	253 854
2012	969	849	11 060							719 199	155 356
2013	1237	829	10 120	7159		11 103				542 493	102 955
2014	1615	542	11 100	29 175		11 907				232 274	54 170
2015	1201	572	7900	6664		24 110				536 815	179 685
2016		983	7150	25 849		14 848				271 943	57 035
2017		985	na	na						*288 512*	*50 964*
2018	604	883	na	na		9 554				174 484	57 765

Table 4.3.1.1 (continued). Estimated smolt production by smolt migration year in monitored rivers of eastern North America 1991 to 2018.

Smolt Migration Year	Québec			Newfoundland				
	St. Jean	De la Trinite	Vieux-Fort	Conne	Rocky	Campbellton	Western Arm Brook	Garnish
1991	113 927	40 863		74 645	7 732		13 453	
1992	154 980	50 869		68 208	7 813		15 405	
1993	142 972	86 226		55 765	5 115	31 577	13 435	
1994	74 285	55 913		60 762	9 781	41 663	9 283	
1995	60 227	71 899		62 749	7 577	39 715	15 144	
1996	104 973	61 092		94 088	14 261	58 369	14 502	
1997	na	31 892		100 983	16 900	62 050	23 845	
1998	95 843	28 962		69 841	12 163	50 441	17 139	
1999	114 255	56 557		63 658	8 625	47 256	13 500	
2000	50 993	39 744		60 777	7 616	35 596	12 706	
2001	109 845	70 318		86 899	9 392	37 170	16 013	
2002	71 839	44 264		81 806	10 144	32 573	14 999	
2003	60 259	53 030		71 479	4 440	35 089	12 086	
2004	54 821	27 051		79 667	13 047	32 780	17 323	
2005	96 002	34 867		66 196	15 847	30 123	8 607	
2006	102 939	na		35 487	13 200	33 302	20 826	
2007	135 360	42 923		63 738	12 355	35 742	16 621	
2008	45 978	35 036		68 242	18 338	40 390	17 444	

Smolt Migration Year	Québec			Newfoundland				
	St. Jean	De la Trinite	Vieux-Fort	Conne	Rocky	Campbellton	Western Arm Brook	Garnish
2009	37 297	32 680		71 085	14 041	36 722	18 492	
2010	47 187	37 500		54 392	15 098	41 069	19 044	
2011	45 050	44 400		50 701	9 311	37 033	20 544	
2012	40 787	45 108		51 220	5 673	44 193	13 573	
2013	36 849	42 378		66 261	6 989	40 355	19 710	
2014	56 456	30 741	30 873	56 224	9 901	45 630	19 771	
2015	na	47 566	25 096	32 557	6 454	32 759	14 278	
2016	58 307	42 269	28 234	na	4 542	44 747	14 255	
2017	34 261	27 433	34 447	58 803	5 233	35 910	15 439	11 833
2018	38 356	35 519	16 046	na	3 600	38 464	13 317	10 425

Table 4.3.2.1. Estimated small salmon returns (medians, 5th percentile, 95th percentile; X 1000) to the six geographic areas and overall for NAC 1970 to 2018. Returns for Scotia-Fundy do not include those from SFA 22 and a portion of SFA 23.

Year	Median of estimated returns (X 1000)							5th percentile of estimated returns (X 1000)							95th percentile of estimated returns (X 1000)						
	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC
1970	49.3	135.5	23.7	63.0	26.6	NA	298.9	34.1	120.1	19.4	53.9	22.8	NA	273.0	72.9	150.6	27.9	72.1	30.3	NA	328.4
1971	64.2	118.8	18.7	49.8	18.9	0.03	271.3	44.7	105.2	15.3	42.7	16.0	0.03	244.3	95.6	132.0	22.1	56.9	21.7	0.03	305.9
1972	48.5	110.7	15.6	62.8	17.0	0.02	255.6	33.7	97.6	12.8	53.6	14.1	0.02	231.6	72.0	123.4	18.4	72.1	19.9	0.02	283.5
1973	14.0	160.0	20.7	63.2	24.4	0.02	282.6	9.4	142.0	17.0	54.2	20.8	0.02	261.0	19.8	177.9	24.5	72.2	28.1	0.02	304.0
1974	54.0	120.4	21.0	98.3	43.6	0.06	338.8	37.5	106.9	17.2	83.7	37.2	0.06	309.2	79.3	134.2	24.8	112.9	50.0	0.06	371.4
1975	102.9	151.0	22.6	88.4	33.9	0.08	399.9	71.5	132.9	18.5	75.5	30.5	0.08	358.2	153.0	168.8	26.7	101.1	37.3	0.09	454.2
1976	74.0	158.6	24.9	128.7	52.9	0.19	440.7	51.2	138.9	20.5	110.8	46.6	0.18	401.7	109.1	178.1	29.4	146.7	59.2	0.19	485.1
1977	65.5	159.8	22.8	46.3	46.2	0.08	341.8	45.5	140.0	18.6	40.0	40.2	0.07	309.6	96.9	179.3	26.8	52.6	52.1	0.08	379.5
1978	32.8	139.4	21.3	41.0	15.8	0.16	251.2	22.9	121.9	17.4	36.2	14.5	0.15	229.0	48.0	156.7	25.0	46.0	17.2	0.16	274.6
1979	42.3	152.0	27.1	72.4	48.8	0.25	344.1	29.3	133.0	22.2	62.6	42.3	0.25	315.6	62.9	170.9	32.0	82.1	55.4	0.25	374.3
1980	95.7	172.3	37.2	63.2	70.5	0.82	441.3	66.3	152.5	30.5	54.5	62.7	0.81	400.4	143.4	192.4	43.9	71.9	78.6	0.83	493.1
1981	104.8	225.4	52.0	106.1	59.4	1.13	551.2	72.5	197.6	42.7	85.3	51.0	1.12	497.3	157.7	253.3	61.5	127.3	67.8	1.14	614.7
1982	73.3	201.0	29.6	121.3	36.1	0.33	463.8	50.5	177.7	24.3	96.2	31.4	0.33	418.3	109.2	224.2	34.9	146.4	40.8	0.34	512.6
1983	45.8	156.7	22.5	37.2	22.6	0.30	286.2	31.7	138.0	18.5	29.7	19.9	0.29	259.5	68.1	175.5	26.5	44.7	25.4	0.30	315.8
1984	24.0	206.4	25.2	54.3	42.8	0.60	354.1	16.7	179.7	23.0	44.7	36.6	0.59	323.3	35.6	232.8	27.6	63.8	48.9	0.60	385.0
1985	43.2	195.7	26.7	86.3	47.4	0.39	401.0	29.9	168.3	24.3	68.1	40.1	0.39	362.8	64.4	223.0	29.2	104.1	54.8	0.40	440.7
1986	65.7	200.0	38.3	161.7	49.3	0.76	517.7	45.2	175.0	35.3	127.3	41.7	0.75	465.5	97.2	225.7	41.3	195.7	56.8	0.77	571.4
1987	82.3	135.5	43.9	123.8	51.3	1.13	439.7	56.3	118.4	40.0	98.7	43.3	1.12	394.9	123.0	152.4	47.6	149.0	59.3	1.14	490.8

Year	Median of estimated returns (X 1000)							5th percentile of estimated returns (X 1000)							95th percentile of estimated returns (X 1000)						
	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC
1988	75.8	217.3	50.4	173.7	51.9	0.99	572.0	51.8	189.9	46.3	137.6	44.0	0.98	515.3	113.0	244.6	54.5	209.3	59.6	1.00	631.3
1989	52.0	107.7	39.8	103.7	54.6	1.26	360.6	35.8	94.9	36.6	81.8	46.5	1.25	326.0	77.5	120.5	43.0	125.6	62.6	1.27	397.2
1990	30.2	152.3	45.2	118.1	55.4	0.69	403.2	20.9	138.3	41.9	93.8	46.5	0.68	370.1	45.0	166.7	48.6	142.3	64.2	0.69	436.4
1991	24.1	105.6	35.3	86.0	28.2	0.31	280.4	16.6	96.3	32.7	68.2	24.5	0.31	257.2	36.3	114.9	37.8	103.7	32.0	0.31	304.1
1992	34.5	228.9	39.8	193.4	34.0	1.19	533.2	24.2	199.6	36.8	165.2	29.4	1.18	488.0	51.1	257.9	42.8	221.8	38.7	1.21	577.5
1993	45.8	265.3	34.4	137.0	25.7	0.47	510.3	33.3	235.4	31.9	89.5	21.9	0.46	449.9	66.8	295.1	36.8	184.6	29.5	0.47	570.7
1994	34.0	161.3	32.8	68.0	10.5	0.44	307.8	25.2	138.6	30.5	57.8	9.4	0.43	280.2	48.5	183.2	35.2	78.2	11.6	0.44	335.8
1995	47.8	203.8	26.4	61.0	20.0	0.21	360.8	35.8	173.5	24.5	52.4	17.5	0.21	325.0	66.9	234.6	28.3	70.0	22.5	0.22	396.8
1996	89.8	313.5	35.2	57.4	31.8	0.65	531.1	67.7	269.2	32.8	48.3	27.5	0.65	478.1	127.3	357.3	37.7	66.6	36.1	0.66	588.2
1997	95.7	177.0	26.6	31.1	9.4	0.37	341.1	73.8	159.0	24.6	25.1	8.3	0.36	310.0	131.0	194.5	28.7	37.0	10.5	0.37	380.2
1998	151.0	183.7	28.3	40.7	20.4	0.40	424.7	102.7	171.4	25.8	34.7	18.8	0.40	374.0	199.7	196.2	30.8	46.6	22.0	0.41	475.2
1999	147.5	201.2	29.9	36.2	10.6	0.42	425.7	100.4	185.6	27.4	31.5	9.8	0.42	375.8	194.4	216.7	32.4	40.9	11.4	0.42	476.2
2000	181.6	228.9	27.6	51.3	12.4	0.27	501.9	123.4	216.6	24.5	45.0	11.3	0.27	442.1	240.2	240.7	30.7	57.6	13.4	0.27	561.8
2001	145.8	156.3	18.9	42.9	5.4	0.27	369.5	98.8	148.1	17.2	37.5	5.0	0.26	321.9	192.1	164.4	20.6	48.3	5.8	0.27	416.9
2002	102.4	155.5	30.3	68.8	9.9	0.45	367.2	66.4	143.5	28.1	59.7	9.0	0.45	328.1	138.8	167.8	32.4	77.9	10.7	0.45	407.3
2003	85.7	242.5	25.2	41.5	5.8	0.24	401.1	51.9	232.8	23.2	35.8	5.3	0.24	365.3	119.3	252.0	27.3	47.1	6.4	0.24	436.4
2004	95.3	210.2	34.1	76.2	8.4	0.32	424.4	72.3	192.3	30.6	65.4	7.6	0.32	392.5	117.8	228.2	37.6	87.2	9.2	0.32	456.3
2005	220.6	221.3	23.0	48.5	7.5	0.32	521.6	166.1	176.3	20.9	40.2	6.8	0.32	447.4	275.3	266.2	25.2	56.8	8.2	0.32	595.5
2006	213.4	212.7	28.1	57.6	10.3	0.45	523.0	140.6	194.4	25.9	47.7	9.3	0.45	446.3	286.6	231.3	30.3	67.6	11.3	0.45	598.7

Year	Median of estimated returns (X 1000)							5th percentile of estimated returns (X 1000)							95th percentile of estimated returns (X 1000)						
	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC
2007	193.7	183.7	21.4	41.7	7.7	0.30	448.3	138.0	158.8	19.4	33.0	7.0	0.29	385.8	251.0	208.7	23.4	50.3	8.5	0.30	512.9
2008	203.1	247.6	35.5	62.5	15.4	0.81	564.9	148.9	222.0	32.6	50.2	13.9	0.81	503.1	258.7	272.7	38.5	75.0	16.9	0.82	628.7
2009	102.1	222.5	20.8	25.3	4.2	0.24	375.6	60.0	194.3	19.0	20.4	3.8	0.24	322.5	145.1	250.9	22.7	30.3	4.6	0.24	429.0
2010	122.4	267.6	26.6	73.4	14.9	0.53	505.5	83.0	256.1	24.2	64.3	13.4	0.52	462.8	161.0	279.3	28.9	82.7	16.4	0.53	547.4
2011	247.6	243.8	37.4	73.4	9.5	1.08	612.2	148.9	216.6	34.4	61.4	8.5	1.07	509.5	345.4	270.4	40.4	85.7	10.4	1.09	715.3
2012	173.2	270.6	23.7	18.9	0.6	0.03	486.9	112.2	250.4	21.5	14.9	0.6	0.03	422.2	235.2	290.4	25.8	22.9	0.7	0.03	552.6
2013	155.5	187.7	19.2	24.8	2.1	0.08	389.6	90.6	172.2	17.4	19.1	1.9	0.08	322.9	220.2	203.4	21.0	30.4	2.3	0.08	455.8
2014	266.5	170.0	23.9	16.4	1.4	0.11	477.8	184.7	155.0	21.7	13.2	1.3	0.11	395.6	350.3	185.0	26.0	19.6	1.6	0.11	562.9
2015	256.5	283.6	36.8	42.9	4.2	0.15	624.5	183.1	253.6	33.7	37.0	3.8	0.15	543.8	331.3	313.2	40.0	48.8	4.6	0.15	705.6
2016	204.7	191.2	33.2	25.7	2.6	0.23	458.0	120.0	166.8	30.0	20.7	2.3	0.23	368.8	290.8	215.8	36.4	30.8	2.8	0.23	547.1
2017	162.8	233.3	24.4	23.8	3.9	0.36	449.4	88.6	185.8	21.8	19.6	3.5	0.36	357.6	237.6	281.9	26.9	28.0	4.3	0.37	539.9
2018	285.1	252.4	23.7	19.1	1.3	0.32	581.7	181.1	222.8	21.5	15.3	1.2	0.32	473.4	387.6	281.8	25.9	22.8	1.4	0.33	688.3
Change [(2018-2017)/2017]																					
	0.75	0.08	-0.03	-0.20	-0.66	-0.11	0.29														
Rank (descending) over 48 years																					
	1	6	34	46	47	24	3														

Table 4.3.2.2. Estimated large salmon returns (medians, 5th percentile, 95th percentile; X 1000) to the six geographic areas and overall for NAC 1970 to 2018. Returns for Scotia-Fundy do not include those from SFA 22 and a portion of SFA 23.

Year	Median of estimated returns (X 1000)							5th percentile of estimated returns (X 1000)							95th percentile of estimated returns (X 1000)						
	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC
1970	10.0	14.8	103.4	69.6	20.3	NA	218.4	4.9	11.8	84.8	67.2	18.0	NA	198.1	17.0	17.9	121.9	72.0	22.6	NA	238.7
1971	14.4	12.6	59.2	40.0	15.9	0.65	143.1	7.1	10.0	48.5	37.6	14.1	0.65	128.5	24.2	15.1	69.9	42.5	17.6	0.66	158.5
1972	12.3	12.7	77.1	57.0	19.0	1.38	179.8	6.1	10.1	63.3	49.0	17.1	1.37	161.6	20.9	15.3	91.1	65.1	20.9	1.40	198.7
1973	17.3	17.4	85.3	53.4	14.8	1.43	190.0	8.5	13.8	69.9	45.6	13.4	1.41	168.9	29.2	20.9	100.5	61.3	16.1	1.44	211.6
1974	17.2	14.3	114.3	77.7	28.6	1.39	253.9	8.4	12.7	93.7	66.0	26.3	1.38	227.0	29.0	15.9	134.8	89.4	30.9	1.41	281.0
1975	15.9	18.4	97.3	50.4	30.6	2.33	215.6	7.8	16.1	79.7	43.0	28.0	2.31	193.2	26.8	20.7	114.6	57.8	33.2	2.35	237.8
1976	18.4	16.6	96.5	48.8	28.8	1.32	211.0	9.0	14.7	79.2	41.4	26.0	1.31	188.2	30.7	18.6	114.0	56.1	31.6	1.33	234.1
1977	16.2	14.6	113.8	87.7	38.1	2.00	273.0	8.0	12.9	93.3	75.1	34.6	1.98	245.5	27.3	16.3	134.1	100.3	41.5	2.02	300.3
1978	12.7	11.4	102.4	43.8	22.3	4.21	197.3	6.3	10.3	83.9	38.8	20.6	4.17	176.1	21.4	12.3	120.9	48.9	24.0	4.25	218.3
1979	7.3	7.2	56.6	17.9	12.8	1.94	103.8	3.6	6.3	46.3	15.7	11.6	1.93	92.2	12.2	8.1	66.7	20.0	14.0	1.96	115.6
1980	17.3	12.0	134.3	62.5	43.7	5.80	276.5	8.5	11.1	110.1	54.7	39.6	5.74	247.8	29.3	13.0	158.4	70.3	47.9	5.85	304.9
1981	15.7	28.9	105.6	39.3	28.2	5.60	223.6	7.7	25.3	86.5	32.9	25.5	5.55	200.4	26.2	32.5	124.6	45.7	31.0	5.65	247.1
1982	11.6	11.6	93.6	54.0	23.7	6.06	201.0	5.7	10.1	76.8	42.8	21.5	6.00	178.3	19.5	13.1	110.6	65.4	25.8	6.11	223.9
1983	8.3	12.5	76.8	40.7	20.6	2.16	161.3	4.1	11.3	63.1	33.8	18.4	2.14	144.3	14.1	13.6	90.7	47.6	22.8	2.17	178.4
1984	6.0	12.4	63.7	32.7	24.5	3.22	142.8	3.0	9.1	60.7	23.5	21.2	3.19	130.9	10.1	15.6	66.6	42.0	27.8	3.25	154.3
1985	4.7	11.0	65.9	44.5	34.2	5.53	166.0	2.3	7.7	62.1	32.0	29.3	5.48	151.1	8.0	14.2	69.8	57.3	39.0	5.58	181.2
1986	8.1	12.3	78.1	68.6	28.2	6.18	201.8	4.0	9.4	74.0	49.3	23.8	6.12	180.5	13.7	15.1	82.1	88.1	32.6	6.23	223.2
1987	11.1	8.4	73.5	46.4	17.7	3.08	160.5	5.4	6.4	69.9	34.2	15.0	3.05	145.5	18.6	10.4	77.0	59.0	20.4	3.11	175.9

Year	Median of estimated returns (X 1000)							5th percentile of estimated returns (X 1000)							95th percentile of estimated returns (X 1000)						
	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC
1988	6.8	13.0	81.0	53.4	16.5	3.29	174.2	3.4	9.9	76.4	39.4	13.8	3.26	158.1	11.6	16.1	85.6	67.7	19.2	3.32	190.5
1989	6.7	6.9	73.7	42.4	18.5	3.20	151.6	3.3	5.4	70.1	31.3	15.6	3.17	138.7	11.2	8.5	77.4	53.6	21.4	3.23	164.8
1990	3.8	10.3	72.5	56.9	16.0	5.05	164.6	1.9	8.4	68.1	39.7	13.5	5.01	146.0	6.4	12.2	76.8	73.5	18.5	5.10	182.5
1991	1.9	7.6	65.3	57.4	15.7	2.65	150.6	0.9	6.2	61.7	39.7	13.4	2.62	132.0	3.1	9.0	69.0	75.0	17.8	2.67	168.9
1992	7.5	31.6	65.6	60.0	14.3	2.46	181.7	4.0	22.2	61.7	51.3	12.3	2.44	167.4	12.7	40.9	69.5	68.6	16.3	2.48	195.9
1993	9.4	17.1	50.5	63.7	10.1	2.23	153.5	5.9	13.8	48.6	34.7	8.9	2.21	123.9	15.1	20.5	52.3	93.2	11.2	2.25	183.6
1994	13.0	17.4	51.0	41.4	6.3	1.35	130.8	8.5	13.8	49.2	33.2	5.7	1.33	119.9	20.2	20.9	52.8	49.6	7.0	1.36	142.1
1995	25.5	19.1	59.2	48.3	7.5	1.75	161.8	18.1	14.7	57.3	41.2	6.6	1.73	149.7	37.4	23.4	61.1	55.2	8.4	1.76	176.0
1996	18.8	28.9	53.6	40.8	10.9	2.41	155.9	13.4	23.7	51.4	32.7	9.6	2.39	143.9	27.8	34.1	55.8	48.9	12.2	2.43	168.7
1997	16.2	28.1	44.2	35.8	5.6	1.61	131.8	11.6	22.9	42.4	28.2	5.0	1.60	121.1	23.7	33.1	46.0	43.4	6.2	1.63	143.4
1998	13.4	35.3	33.9	30.4	3.8	1.53	118.4	8.0	27.4	32.1	24.8	3.5	1.51	107.0	18.8	43.2	35.7	36.1	4.2	1.54	130.0
1999	16.1	32.2	37.0	27.3	4.9	1.17	118.5	9.5	25.0	34.8	22.9	4.6	1.16	107.6	22.6	39.3	39.2	31.7	5.3	1.18	129.7
2000	21.8	27.0	35.4	30.0	2.9	0.53	117.6	13.1	23.0	32.5	25.3	2.6	0.53	106.2	30.9	31.0	38.3	34.6	3.1	0.54	129.2
2001	23.2	17.9	37.2	39.8	4.7	0.80	123.5	13.8	15.2	34.2	34.7	4.3	0.79	111.8	32.6	20.6	40.1	44.8	5.1	0.80	135.2
2002	16.8	16.8	26.5	23.5	1.6	0.53	85.8	9.9	13.7	24.1	19.6	1.4	0.52	76.7	24.0	19.9	28.7	27.5	1.7	0.53	94.9
2003	14.2	24.5	42.1	40.1	3.5	1.20	125.5	7.4	19.4	38.8	33.7	3.2	1.19	114.2	20.9	29.5	45.4	46.5	3.9	1.21	136.9
2004	17.0	22.2	36.4	40.0	3.1	1.32	120.0	11.6	17.0	33.8	32.7	2.8	1.30	109.0	22.5	27.4	38.9	47.2	3.4	1.33	130.9
2005	21.0	28.4	35.4	38.3	2.0	0.99	126.2	12.1	20.5	33.1	31.2	1.8	0.99	111.6	29.8	36.4	37.7	45.3	2.2	1.00	140.4
2006	21.1	35.7	32.8	37.9	3.0	1.03	131.5	13.3	30.0	30.6	31.3	2.7	1.02	119.4	29.0	41.4	34.9	44.7	3.3	1.04	143.9

Year	Median of estimated returns (X 1000)							5th percentile of estimated returns (X 1000)							95th percentile of estimated returns (X 1000)						
	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC
2007	21.9	29.6	30.1	35.0	1.6	0.96	119.2	12.9	23.4	27.9	29.4	1.5	0.95	106.3	31.0	35.7	32.2	40.5	1.7	0.97	131.8
2008	26.0	28.9	36.0	28.4	3.3	1.80	124.5	15.9	22.6	32.8	22.4	2.9	1.78	110.3	36.5	35.1	39.2	34.3	3.6	1.82	138.7
2009	39.5	34.4	35.1	36.7	3.1	2.10	150.9	20.8	23.9	32.6	30.8	2.9	2.08	127.8	58.0	44.9	37.5	42.5	3.4	2.11	173.7
2010	18.8	35.4	37.9	33.1	2.5	1.10	128.6	11.6	28.7	35.3	27.6	2.3	1.09	116.8	26.0	42.0	40.4	38.4	2.7	1.11	140.6
2011	57.5	43.5	48.7	65.3	4.8	3.09	222.9	33.0	31.3	45.6	52.8	4.3	3.06	191.9	82.3	55.5	51.9	78.0	5.3	3.12	254.0
2012	33.9	28.8	34.6	27.6	1.3	0.91	127.1	20.6	23.2	32.2	22.7	1.2	0.91	111.3	47.1	34.4	36.9	32.6	1.4	0.92	142.8
2013	64.1	37.8	39.0	35.2	3.2	0.53	180.0	39.5	25.9	36.6	28.1	2.8	0.53	150.8	88.7	49.7	41.5	42.3	3.5	0.54	208.9
2014	62.3	20.2	22.2	23.8	0.8	0.34	129.6	38.7	16.5	20.9	18.9	0.7	0.34	105.2	85.4	23.9	23.6	28.8	0.8	0.34	153.5
2015	88.4	36.8	36.2	34.4	0.7	0.77	197.3	53.5	29.1	33.7	27.3	0.7	0.76	160.7	123.9	44.6	38.6	41.5	0.8	0.78	234.3
2016	72.6	24.6	38.7	36.4	1.6	0.39	174.2	39.7	19.4	36.0	27.7	1.4	0.39	139.1	104.8	29.7	41.4	45.0	1.7	0.40	208.1
2017	76.3	28.1	37.9	28.4	1.2	0.68	172.8	36.6	20.5	35.1	23.0	1.1	0.67	131.8	117.0	35.9	40.7	34.0	1.3	0.68	214.6
2018	45.9	22.9	27.8	33.1	1.5	0.55	131.8	25.0	17.3	25.9	25.2	1.4	0.54	108.3	66.9	28.5	29.8	41.0	1.7	0.55	155.3
Change [(2018-2017)/2017]																					
	-0.40	-0.18	-0.27	0.16	0.29	-0.20	-0.24														
Rank (descending) over 48 years																					
	7	21	46	38	44	43	32														

Table 4.3.2.3. Estimated 2SW salmon returns (medians, 5th percentile, 95th percentile; X 1000) to the six geographic areas and overall for NAC 1970 to 2018. Returns for Scotia-Fundy do not include those from SFA 22 and a portion of SFA 23.

Year	Median of estimated returns (X 1000)							5th percentile of estimated returns (X 1000)							95th percentile of estimated returns (X 1000)						
	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC
1970	10.0	4.1	75.5	59.6	17.1	NA	166.6	4.9	3.1	61.9	57.5	15.0	NA	151.1	17.0	5.2	89.0	61.6	19.3	NA	182.3
1971	14.4	3.6	43.2	34.8	13.5	0.65	110.5	7.1	2.6	35.4	32.6	11.9	0.65	98.3	24.2	4.6	51.0	37.0	15.2	0.66	123.5
1972	12.3	3.7	56.3	49.3	16.0	1.38	139.5	6.1	2.7	46.2	42.4	14.3	1.37	124.4	20.9	4.8	66.5	56.4	17.7	1.40	154.9
1973	17.3	4.6	62.3	47.7	12.9	1.43	146.6	8.5	3.5	51.0	40.6	11.7	1.41	129.0	29.2	5.8	73.3	54.7	14.1	1.44	164.8
1974	17.2	3.6	83.4	67.1	27.1	1.39	200.1	8.4	2.9	68.4	56.9	24.9	1.38	178.7	29.0	4.4	98.4	77.3	29.4	1.41	222.4
1975	15.9	5.2	71.1	42.9	28.9	2.33	166.8	7.8	3.9	58.2	36.7	26.3	2.31	148.5	26.8	6.5	83.6	49.3	31.5	2.35	185.1
1976	18.4	4.4	70.4	40.3	26.7	1.32	161.8	9.0	3.3	57.8	34.2	23.8	1.31	143.3	30.7	5.4	83.2	46.3	29.5	1.33	181.1
1977	16.2	3.5	83.1	80.6	32.3	2.00	218.1	8.0	2.9	68.1	69.0	28.9	1.98	195.6	27.3	4.2	97.9	92.2	35.6	2.02	241.0
1978	12.7	3.6	74.7	36.3	18.8	4.21	150.9	6.3	2.9	61.3	32.2	17.2	4.17	134.1	21.4	4.2	88.3	40.5	20.4	4.25	167.5
1979	7.3	1.7	41.3	12.0	10.5	1.94	75.0	3.6	1.3	33.8	10.6	9.4	1.93	65.9	12.2	2.1	48.7	13.4	11.6	1.96	84.2
1980	17.3	3.9	98.0	56.9	38.6	5.80	221.2	8.5	3.2	80.3	49.8	34.7	5.74	198.4	29.3	4.6	115.6	64.0	42.6	5.85	244.2
1981	15.7	7.0	77.1	24.4	23.2	5.60	153.4	7.7	5.5	63.2	20.4	20.8	5.55	135.4	26.2	8.6	90.9	28.4	25.7	5.65	171.8
1982	11.6	3.2	68.4	42.0	16.7	6.06	148.3	5.7	2.5	56.1	32.8	14.9	6.00	130.5	19.5	3.8	80.7	51.1	18.6	6.11	166.3
1983	8.3	3.7	56.1	31.3	16.5	2.16	118.4	4.1	3.0	46.1	25.7	14.5	2.14	105.0	14.1	4.4	66.2	36.8	18.5	2.17	131.9
1984	6.0	3.4	46.5	29.6	21.5	3.22	110.4	3.0	2.5	44.3	20.8	18.3	3.19	99.7	10.1	4.3	48.6	38.3	24.6	3.25	120.9
1985	4.7	2.7	48.1	35.8	29.7	5.53	126.9	2.3	1.9	45.3	25.2	25.4	5.48	114.4	8.0	3.6	51.0	46.8	34.0	5.58	139.5
1986	8.1	3.3	57.0	57.2	21.4	6.18	153.4	4.0	2.4	54.1	40.6	18.1	6.12	135.3	13.7	4.1	59.9	73.5	24.7	6.23	171.2
1987	11.1	2.4	53.6	35.9	13.7	3.08	119.9	5.4	1.7	51.1	25.8	11.6	3.05	107.3	18.6	3.1	56.2	45.8	15.7	3.11	132.9

Year	Median of estimated returns (X 1000)							5th percentile of estimated returns (X 1000)							95th percentile of estimated returns (X 1000)						
	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC
1988	6.8	3.4	59.1	42.4	11.8	3.29	127.1	3.4	2.4	55.8	31.1	9.9	3.26	114.2	11.6	4.4	62.5	53.9	13.6	3.32	140.0
1989	6.7	1.7	53.8	28.0	14.6	3.20	108.3	3.3	1.2	51.2	20.5	12.4	3.17	98.9	11.2	2.1	56.5	35.5	16.9	3.23	117.5
1990	3.8	2.7	52.9	36.8	11.7	5.05	113.1	1.9	2.0	49.7	26.3	9.9	5.01	101.6	6.4	3.4	56.1	47.5	13.4	5.10	124.6
1991	1.9	2.1	47.7	35.7	13.0	2.65	103.0	0.9	1.6	45.0	24.7	11.2	2.62	91.5	3.1	2.5	50.4	46.8	14.9	2.67	114.8
1992	7.5	8.2	47.9	37.9	12.0	2.46	116.1	4.0	5.5	45.1	32.0	10.3	2.44	107.6	12.7	10.9	50.7	43.7	13.7	2.48	124.9
1993	9.4	4.4	36.8	43.3	8.1	2.23	104.6	5.9	3.2	35.5	23.2	7.2	2.21	83.9	15.1	5.5	38.2	63.4	9.0	2.25	125.3
1994	13.0	4.0	37.2	30.2	5.2	1.35	91.3	8.5	2.9	35.9	24.0	4.6	1.33	82.8	20.2	5.2	38.5	36.5	5.7	1.36	100.9
1995	25.5	3.8	43.2	39.6	6.8	1.75	121.2	18.1	2.6	41.8	33.7	6.0	1.73	110.7	37.4	5.1	44.6	45.5	7.7	1.76	134.4
1996	18.8	5.7	39.1	29.3	9.2	2.41	105.0	13.4	4.1	37.5	23.0	8.1	2.39	95.6	27.8	7.3	40.7	35.6	10.3	2.43	115.6
1997	16.2	6.0	32.3	24.0	4.6	1.61	85.1	11.6	4.2	31.0	18.2	4.1	1.60	76.8	23.7	7.8	33.6	29.8	5.0	1.63	94.6
1998	8.8	6.5	24.8	16.4	2.6	1.53	60.5	5.2	4.5	23.4	12.8	2.4	1.51	54.7	12.5	8.4	26.1	20.1	2.8	1.54	66.4
1999	10.5	6.3	27.0	15.8	4.2	1.17	65.0	6.3	4.4	25.4	12.9	3.9	1.16	59.1	15.0	8.2	28.6	18.8	4.5	1.18	71.0
2000	14.3	6.4	25.8	17.0	2.4	0.53	66.4	8.5	4.5	23.7	14.0	2.2	0.53	59.1	20.4	8.2	27.9	20.0	2.6	0.54	74.0
2001	15.1	2.5	27.1	26.9	4.3	0.79	76.8	9.0	1.7	25.0	23.2	3.9	0.78	69.0	21.6	3.3	29.3	30.6	4.6	0.80	84.6
2002	11.0	2.4	19.3	14.1	1.0	0.50	48.4	6.5	1.6	17.6	11.5	0.9	0.50	42.6	15.9	3.3	21.0	16.7	1.0	0.51	54.3
2003	9.3	3.4	30.7	26.1	3.3	1.19	74.0	4.9	2.2	28.3	21.4	3.0	1.18	66.9	13.8	4.5	33.1	30.8	3.6	1.20	81.2
2004	11.1	3.3	26.5	25.8	2.7	1.28	70.8	7.5	2.1	24.7	20.5	2.5	1.27	63.8	15.0	4.5	28.4	31.0	2.9	1.30	77.6
2005	13.8	4.4	25.9	26.7	1.7	0.98	73.3	7.9	2.5	24.2	21.4	1.5	0.98	65.0	19.7	6.3	27.5	31.8	1.9	0.99	81.8
2006	13.8	5.4	23.9	22.8	2.5	1.02	69.5	8.7	3.6	22.3	18.4	2.3	1.01	62.0	19.2	7.2	25.5	27.3	2.8	1.03	76.9

Year	Median of estimated returns (X 1000)							5th percentile of estimated returns (X 1000)							95th percentile of estimated returns (X 1000)						
	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC
2007	14.4	4.2	22.0	22.5	1.4	0.95	65.4	8.4	2.6	20.4	18.8	1.3	0.95	57.8	20.5	5.7	23.5	26.4	1.5	0.96	73.1
2008	17.0	3.9	26.3	18.7	3.1	1.76	70.7	10.4	2.4	24.0	14.4	2.7	1.75	62.0	24.2	5.3	28.6	23.1	3.4	1.78	79.6
2009	25.6	4.6	25.6	24.4	2.7	2.07	84.8	13.5	2.8	23.8	20.1	2.4	2.05	71.7	38.0	6.4	27.4	28.6	2.9	2.09	98.5
2010	12.2	4.7	27.6	20.3	2.0	1.08	68.0	7.5	3.1	25.8	16.3	1.8	1.07	61.0	17.1	6.2	29.5	24.5	2.2	1.09	74.9
2011	37.3	3.7	35.6	52.3	4.6	3.05	136.5	21.4	2.4	33.3	41.6	4.2	3.02	116.7	53.9	4.9	37.9	62.8	5.1	3.07	156.8
2012	22.0	2.3	25.2	19.6	1.1	0.88	71.0	13.4	1.6	23.5	16.1	1.0	0.87	61.4	30.8	3.0	27.0	23.2	1.2	0.89	81.0
2013	41.5	4.8	28.5	25.1	2.9	0.53	103.5	25.7	3.1	26.7	19.9	2.6	0.52	86.4	58.2	6.6	30.3	30.4	3.3	0.53	121.1
2014	40.5	2.9	16.2	16.8	0.7	0.33	77.3	25.1	1.9	15.2	13.2	0.6	0.33	61.5	56.0	3.8	17.2	20.6	0.8	0.34	93.6
2015	57.3	4.9	26.4	24.5	0.7	0.76	114.4	34.7	3.3	24.6	19.2	0.6	0.75	91.1	81.1	6.6	28.2	29.8	0.7	0.77	139.2
2016	47.0	3.7	28.3	26.6	1.5	0.39	107.4	25.7	2.4	26.3	20.1	1.4	0.39	84.6	68.7	5.0	30.2	33.0	1.7	0.39	130.4
2017	49.5	2.8	27.7	20.3	1.1	0.66	102.0	23.7	1.7	25.6	16.2	1.0	0.66	76.0	76.5	4.0	29.7	24.4	1.2	0.67	129.6
2018	29.8	2.3	20.3	23.7	1.4	0.54	78.1	16.2	1.6	18.9	17.9	1.3	0.54	62.9	43.8	3.1	21.8	29.6	1.6	0.55	93.7
Change [(2018-2017)/2017]																					
	-0.40	-0.18	-0.27	0.17	0.27	-0.18	-0.23														
Rank (descending) over 48 years																					
	7	44	46	36	42	43	33														

Table 4.3.3.1. Estimated small salmon spawners (medians, 5th percentile, 95th percentile; X 1000) to the six geographic areas and overall for NAC 1970 to 2018. Spawners for Scotia-Fundy do not include those from SFA 22 and a portion of SFA 23.

Year	Median of estimated spawners (X 1000)							5th percentile of estimated spawners (X 1000)							95th percentile of estimated spawners (X 1000)						
	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC
1970	45.3	105.1	13.8	39.5	18.4	NA	NA	30.1	89.6	11.3	30.4	14.7	NA	NA	68.9	120.4	16.3	48.4	22.1	NA	NA
1971	60.3	92.0	11.7	32.7	12.1	0.03	209.8	40.7	78.8	9.6	25.5	9.3	0.03	182.9	91.7	105.5	13.8	39.7	15.0	0.03	244.0
1972	45.5	86.2	10.3	40.3	10.8	0.02	194.0	30.8	73.3	8.4	31.0	7.9	0.02	170.0	69.1	99.1	12.1	49.4	13.7	0.02	222.0
1973	6.5	124.4	13.7	45.6	18.3	0.01	208.7	1.9	106.7	11.3	36.6	14.6	0.01	187.2	12.3	142.1	16.2	54.5	22.0	0.01	230.1
1974	51.4	94.1	12.6	76.2	33.1	0.04	268.6	35.0	80.4	10.3	61.5	26.7	0.04	239.4	76.8	107.9	14.9	90.8	39.5	0.04	300.9
1975	99.0	117.5	14.5	67.2	26.2	0.07	325.6	67.5	99.6	11.9	54.6	22.7	0.07	284.2	149.0	135.4	17.1	80.1	29.6	0.07	380.4
1976	68.3	124.2	16.2	90.1	40.8	0.15	341.2	45.5	104.6	13.3	72.1	34.4	0.15	302.2	103.4	143.7	19.1	107.9	47.0	0.15	385.1
1977	60.9	125.4	15.0	24.9	32.1	0.05	259.6	40.9	105.8	12.3	18.7	26.2	0.05	228.2	92.3	144.8	17.7	30.9	38.0	0.05	296.9
1978	30.1	111.0	14.3	22.8	9.0	0.13	188.0	20.2	93.1	11.7	18.0	7.7	0.13	165.9	45.3	128.5	16.9	27.6	10.4	0.13	211.5
1979	38.1	120.7	19.9	49.8	36.5	0.25	266.5	25.2	101.7	16.3	40.2	29.9	0.25	238.7	58.8	139.4	23.4	59.3	43.2	0.25	296.2
1980	91.9	136.5	26.0	43.5	49.6	0.72	349.7	62.5	116.4	21.3	35.1	41.7	0.72	309.4	139.6	156.7	30.7	52.0	57.6	0.73	402.2
1981	99.6	178.8	38.7	69.9	40.2	1.01	430.9	67.3	150.4	31.7	49.3	31.8	1.00	377.8	152.5	206.7	45.7	90.8	48.7	1.02	493.4
1982	69.2	158.6	21.1	89.4	24.4	0.29	364.9	46.4	135.3	17.3	64.3	19.7	0.29	319.4	105.1	181.8	24.9	114.3	29.2	0.29	414.3
1983	41.4	124.3	15.0	23.8	14.8	0.26	220.8	27.4	105.3	12.3	16.2	12.1	0.25	193.5	63.7	143.3	17.8	31.3	17.6	0.26	250.9
1984	21.1	167.1	20.4	21.9	32.8	0.54	264.6	13.8	140.4	18.1	12.4	26.6	0.54	233.6	32.7	193.7	22.7	31.3	38.9	0.55	295.6
1985	40.1	159.1	20.1	60.0	36.2	0.36	317.3	26.8	131.8	17.7	42.3	28.9	0.36	279.0	61.3	186.6	22.5	77.7	43.5	0.37	356.7
1986	62.2	162.8	27.7	121.8	39.5	0.66	416.7	41.7	136.9	24.8	88.4	31.9	0.65	365.6	93.7	188.5	30.7	156.1	47.1	0.67	470.9
1987	77.0	110.9	32.8	90.5	41.2	1.09	355.4	51.0	94.2	29.1	65.5	33.2	1.08	309.8	117.6	128.1	36.6	115.2	49.1	1.10	406.5

Year	Median of estimated spawners (X 1000)							5th percentile of estimated spawners (X 1000)							95th percentile of estimated spawners (X 1000)						
	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC
1988	70.3	177.3	36.4	128.0	42.1	0.92	457.2	46.3	150.1	32.3	92.4	34.4	0.92	401.4	107.5	204.6	40.5	163.6	50.0	0.93	516.5
1989	47.3	89.0	30.7	69.8	43.5	1.08	283.2	31.1	76.4	27.5	48.2	35.5	1.07	248.9	72.8	101.9	33.9	91.6	51.7	1.09	320.0
1990	26.9	122.3	32.8	84.8	44.0	0.62	312.6	17.6	108.1	29.5	60.7	35.2	0.61	280.0	41.7	136.6	36.1	109.0	52.9	0.62	345.9
1991	21.8	85.2	25.2	66.8	22.3	0.24	222.4	14.3	75.9	22.6	49.3	18.5	0.23	199.2	34.0	94.3	27.8	84.4	26.0	0.24	246.5
1992	31.7	205.4	27.4	160.1	26.3	1.12	453.2	21.4	176.3	24.4	131.7	21.6	1.11	408.8	48.3	234.7	30.4	188.1	30.9	1.13	497.5
1993	43.1	238.9	22.0	112.7	20.4	0.44	439.9	30.6	208.7	19.6	66.1	16.7	0.44	379.4	64.1	268.9	24.5	160.5	24.2	0.45	500.9
1994	31.0	129.6	20.7	45.2	9.1	0.43	237.2	22.3	107.3	18.4	35.6	8.0	0.42	210.2	45.6	152.3	23.0	54.9	10.2	0.43	265.0
1995	45.0	170.9	17.7	48.4	17.9	0.21	301.1	32.9	140.6	15.9	39.6	15.4	0.21	266.1	64.1	201.4	19.6	57.0	20.4	0.22	337.6
1996	86.8	274.3	23.2	35.3	28.3	0.65	451.0	64.8	229.9	20.7	28.8	23.9	0.65	398.2	124.3	318.7	25.6	41.8	32.5	0.66	507.3
1997	93.1	151.8	18.0	19.4	8.3	0.37	291.9	71.2	134.3	15.9	14.9	7.2	0.36	261.6	128.4	169.5	20.0	23.9	9.5	0.37	330.9
1998	148.5	158.5	21.2	26.0	19.9	0.40	374.3	100.2	145.9	18.7	21.3	18.3	0.40	324.2	197.2	170.8	23.7	30.5	21.6	0.41	425.2
1999	145.0	176.4	23.7	21.8	10.2	0.42	377.3	97.8	160.9	21.3	18.2	9.4	0.42	327.3	191.8	192.1	26.2	25.4	11.0	0.42	427.6
2000	178.3	204.7	21.1	31.5	12.0	0.27	447.9	120.1	192.6	18.0	26.7	11.0	0.27	388.6	236.9	216.7	24.1	36.4	13.0	0.27	507.7
2001	143.3	133.6	13.7	26.5	5.1	0.27	322.1	96.3	125.4	12.1	22.4	4.7	0.26	274.5	189.6	141.8	15.2	30.5	5.5	0.27	369.5
2002	99.8	132.9	21.3	44.0	9.5	0.45	308.1	63.8	120.6	19.1	36.9	8.7	0.45	269.0	136.2	145.3	23.5	51.1	10.4	0.45	347.6
2003	83.1	219.6	19.3	25.6	5.6	0.24	353.6	49.3	210.0	17.3	21.6	5.1	0.24	318.1	116.7	229.2	21.4	29.7	6.1	0.24	388.9
2004	92.9	188.4	26.3	49.0	8.1	0.32	365.1	69.9	170.4	22.8	40.6	7.4	0.32	333.8	115.4	206.4	29.9	57.5	8.9	0.32	395.9
2005	217.9	196.9	18.3	30.3	7.3	0.32	471.1	163.3	152.6	16.1	24.3	6.6	0.32	397.5	272.5	242.3	20.4	36.2	8.0	0.32	544.4
2006	211.2	191.3	21.6	37.5	10.0	0.45	471.8	138.3	172.6	19.4	30.0	9.1	0.45	396.1	284.4	209.5	23.8	45.0	11.0	0.45	548.0

Year	Median of estimated spawners (X 1000)							5th percentile of estimated spawners (X 1000)							95th percentile of estimated spawners (X 1000)						
	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC
2007	191.4	168.0	16.7	26.9	7.5	0.30	411.0	135.7	142.8	14.7	20.7	6.8	0.29	348.1	248.7	192.7	18.7	33.1	8.3	0.30	474.5
2008	200.6	217.5	26.7	40.1	15.1	0.81	501.3	146.4	191.8	23.7	30.7	13.7	0.81	438.6	256.1	242.5	29.7	49.6	16.6	0.82	564.1
2009	100.4	196.9	16.2	15.5	4.1	0.24	333.3	58.3	168.7	14.4	11.7	3.7	0.24	280.5	143.4	225.4	18.1	19.2	4.5	0.24	386.8
2010	120.5	235.4	20.5	46.9	14.8	0.53	438.4	81.1	223.8	18.1	40.1	13.3	0.52	396.6	159.1	246.9	22.9	53.9	16.3	0.53	479.7
2011	245.5	214.3	28.7	47.6	9.4	1.08	546.3	146.8	186.9	25.8	38.6	8.4	1.07	443.3	343.2	241.3	31.7	56.9	10.3	1.09	648.5
2012	171.4	246.8	18.3	11.6	0.6	0.03	448.6	110.5	226.9	16.1	8.5	0.5	0.03	384.5	233.5	266.7	20.4	14.6	0.6	0.03	514.2
2013	153.7	163.3	15.0	15.1	2.1	0.08	349.6	88.8	147.8	13.2	11.0	1.9	0.08	282.7	218.4	178.5	16.8	19.3	2.3	0.08	415.5
2014	264.5	145.7	18.8	10.6	1.4	0.11	441.5	182.7	130.7	16.6	8.1	1.3	0.11	358.0	348.3	160.5	20.9	13.2	1.5	0.11	525.9
2015	254.7	252.2	28.1	40.7	4.2	0.15	580.7	181.3	222.7	25.0	35.0	3.8	0.15	500.2	329.5	281.8	31.2	46.7	4.6	0.15	661.8
2016	202.6	160.4	26.2	24.3	2.5	0.23	416.8	118.0	135.7	23.1	19.4	2.2	0.23	326.9	288.7	184.8	29.4	29.3	2.8	0.23	506.9
2017	160.8	214.3	19.1	22.2	3.9	0.36	420.6	86.7	165.5	16.5	18.1	3.5	0.36	330.4	235.6	262.6	21.7	26.2	4.3	0.37	511.7
2018	283.8	236.1	18.3	18.2	1.3	0.32	558.1	179.9	206.2	16.1	14.5	1.2	0.32	449.6	386.4	265.8	20.5	21.9	1.4	0.33	664.8
Change [(2018-2017)/2017]																					
	0.76	0.10	-0.04	-0.18	-0.66	-0.11	0.33														
Rank (descending) over 48 years																					
	1	5	31	44	47	23	2														

Table 4.3.3.2. Estimated large salmon spawners (medians, 5th percentile, 95th percentile; X 1000) to the six geographic areas and overall for NAC 1970 to 2018. Spawners for Scotia-Fundy do not include those from SFA 22 and a portion of SFA 23.

Year	Median of estimated spawners (X 1000)							5th percentile of estimated spawners (X 1000)							95th percentile of estimated spawners (X 1000)						
	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC
1970	9.5	12.7	39.1	11.9	7.9	NA	NA	4.4	9.8	32.1	9.6	5.6	NA	NA	16.4	15.8	46.2	14.2	10.2	NA	NA
1971	13.9	11.0	20.3	11.8	8.2	0.49	65.9	6.6	8.4	16.6	9.4	6.4	0.49	56.1	23.7	13.5	23.9	14.2	9.9	0.49	77.1
1972	11.9	11.3	39.7	33.3	12.0	1.04	109.5	5.6	8.7	32.6	25.4	10.1	1.03	95.9	20.5	13.9	46.8	41.0	13.8	1.05	123.4
1973	16.3	15.4	40.3	35.4	7.6	1.10	116.7	7.5	11.8	33.1	27.8	6.3	1.09	101.1	28.2	19.0	47.6	43.0	9.0	1.11	132.9
1974	16.4	13.1	49.1	55.8	15.2	1.15	151.1	7.6	11.5	40.2	44.4	13.0	1.14	132.8	28.2	14.6	57.9	67.3	17.5	1.16	170.3
1975	15.6	17.2	40.8	33.6	17.9	1.94	127.4	7.4	14.9	33.5	26.4	15.3	1.93	112.6	26.5	19.4	48.1	40.9	20.5	1.96	142.8
1976	17.6	15.6	38.8	29.1	17.0	1.13	119.6	8.2	13.6	31.8	22.1	14.2	1.12	104.3	29.9	17.6	45.7	36.2	19.8	1.14	135.8
1977	14.9	11.9	55.5	55.6	21.6	0.64	160.7	6.7	10.2	45.8	43.4	18.1	0.64	141.0	26.0	13.5	65.9	67.9	25.1	0.65	180.6
1978	12.0	9.8	51.2	19.4	10.9	3.31	106.8	5.5	8.8	42.0	14.6	9.2	3.28	93.4	20.7	10.8	60.4	24.2	12.6	3.34	120.6
1979	6.7	6.6	21.9	8.8	7.9	1.51	53.6	3.0	5.7	18.0	6.7	6.7	1.50	47.1	11.6	7.5	25.9	10.9	9.2	1.52	60.5
1980	16.4	10.1	61.0	34.4	23.9	4.26	150.7	7.6	9.2	49.9	26.9	19.8	4.23	132.5	28.4	11.1	71.9	42.1	28.1	4.30	169.2
1981	15.2	27.5	44.7	16.1	12.7	4.34	120.8	7.2	23.9	36.7	9.9	9.9	4.30	106.2	25.7	31.1	52.8	22.2	15.5	4.37	136.1
1982	11.0	10.4	45.3	27.1	10.4	4.64	109.1	5.1	8.9	37.2	15.8	8.3	4.60	92.5	18.9	11.9	53.5	38.3	12.5	4.69	126.0
1983	7.9	11.1	29.7	18.1	5.7	1.77	74.5	3.7	9.9	24.3	11.2	3.5	1.75	63.7	13.6	12.3	35.0	25.0	7.9	1.79	85.7
1984	5.5	11.9	37.1	28.4	20.0	2.55	105.6	2.5	8.6	34.1	19.2	16.7	2.52	94.0	9.6	15.1	40.1	37.7	23.3	2.57	117.6
1985	4.5	10.9	35.5	43.1	28.6	4.88	127.6	2.0	7.6	31.6	30.6	23.7	4.84	112.6	7.7	14.2	39.3	55.8	33.3	4.93	142.5
1986	7.7	12.2	40.6	66.4	24.9	5.57	157.7	3.5	9.4	36.6	47.1	20.4	5.52	136.3	13.2	15.1	44.7	85.9	29.4	5.62	179.1
1987	10.4	8.4	36.1	44.0	16.1	2.78	118.0	4.8	6.4	32.6	31.5	13.4	2.76	102.8	18.0	10.4	39.5	56.3	18.7	2.81	133.3

Year	Median of estimated spawners (X 1000)							5th percentile of estimated spawners (X 1000)							95th percentile of estimated spawners (X 1000)						
	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC
1988	6.1	12.9	43.2	51.7	14.8	3.04	132.0	2.7	9.8	38.6	37.7	12.1	3.01	116.0	10.9	16.0	47.8	65.8	17.5	3.07	148.2
1989	6.2	6.9	41.1	40.6	18.1	2.80	116.0	2.8	5.4	37.5	29.4	15.2	2.78	102.9	10.7	8.4	44.8	51.5	21.0	2.83	128.8
1990	3.5	10.2	41.0	54.9	15.3	4.36	129.3	1.5	8.3	36.6	37.9	12.8	4.32	111.1	6.1	12.1	45.3	71.5	17.8	4.40	147.2
1991	1.8	7.5	33.1	56.0	14.1	2.42	115.0	0.8	6.1	29.4	38.5	11.9	2.39	96.8	3.0	9.0	36.7	73.6	16.3	2.44	133.5
1992	6.8	31.4	32.4	58.1	13.0	2.29	144.2	3.2	22.0	28.5	49.5	11.0	2.27	129.9	11.9	40.7	36.2	66.7	15.0	2.31	158.3
1993	9.0	16.9	25.0	62.8	8.8	2.07	125.1	5.5	13.6	23.2	33.8	7.6	2.05	95.2	14.7	20.3	26.8	92.2	9.9	2.08	154.8
1994	12.5	16.9	24.5	40.3	5.4	1.34	101.4	8.0	13.4	22.7	32.1	4.8	1.33	90.6	19.7	20.4	26.2	48.4	6.1	1.36	112.7
1995	25.1	18.6	34.6	47.4	7.1	1.75	135.1	17.7	14.2	32.7	40.4	6.2	1.73	122.8	37.0	22.9	36.5	54.5	8.0	1.76	149.3
1996	18.4	28.4	30.0	39.7	10.0	2.41	129.3	13.0	23.2	27.8	31.5	8.7	2.39	117.6	27.5	33.6	32.2	47.6	11.2	2.43	142.3
1997	16.0	27.6	24.8	34.5	4.9	1.61	109.9	11.4	22.4	23.0	27.1	4.3	1.60	99.0	23.5	32.6	26.6	42.0	5.5	1.63	121.3
1998	13.1	34.8	23.0	29.5	3.5	1.53	105.6	7.7	27.0	21.2	23.9	3.2	1.51	94.3	18.5	42.8	24.8	35.1	3.8	1.54	116.9
1999	15.7	31.8	27.9	25.8	4.4	1.17	106.8	9.1	24.6	25.7	21.5	4.1	1.16	95.7	22.2	38.9	30.1	30.1	4.8	1.18	118.0
2000	21.4	26.5	26.7	28.9	2.7	1.59	108.0	12.6	22.4	23.9	24.3	2.4	1.57	96.4	30.5	30.5	29.6	33.5	2.9	1.60	119.3
2001	22.7	17.5	27.5	38.4	4.4	1.49	111.9	13.3	14.8	24.9	33.4	4.0	1.48	100.5	32.2	20.2	30.1	43.4	4.8	1.51	123.4
2002	16.5	16.5	20.7	22.7	1.4	0.51	78.3	9.6	13.4	18.4	18.8	1.2	0.51	69.2	23.7	19.6	23.0	26.5	1.5	0.52	87.5
2003	13.9	24.1	33.8	38.8	3.3	1.19	115.0	7.0	19.0	30.5	32.5	3.0	1.18	103.7	20.6	29.1	37.1	45.2	3.6	1.20	126.4
2004	16.6	21.8	28.2	38.7	3.0	1.28	109.5	11.1	16.6	25.6	31.5	2.7	1.27	98.6	22.1	27.1	30.7	45.8	3.2	1.30	120.4
2005	20.6	27.9	28.1	36.8	1.9	1.09	116.3	11.7	19.9	25.8	29.9	1.7	1.08	102.2	29.4	35.9	30.4	43.8	2.1	1.10	130.7
2006	20.8	35.3	26.1	36.6	2.8	1.42	122.9	13.0	29.5	23.9	30.0	2.5	1.41	110.7	28.6	41.0	28.2	43.2	3.1	1.43	135.1

Year	Median of estimated spawners (X 1000)							5th percentile of estimated spawners (X 1000)							95th percentile of estimated spawners (X 1000)						
	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC
2007	21.6	29.2	23.5	33.6	1.5	1.19	110.6	12.5	23.1	21.5	28.1	1.3	1.18	97.8	30.6	35.5	25.7	39.2	1.6	1.20	123.5
2008	25.7	28.4	29.9	27.1	3.2	2.23	116.3	15.5	22.0	26.7	21.2	2.8	2.21	102.3	36.2	34.7	33.0	32.9	3.5	2.25	130.6
2009	39.1	34.2	28.7	35.2	3.0	2.32	142.6	20.4	23.5	26.3	29.4	2.7	2.30	119.5	57.7	44.6	31.2	41.1	3.3	2.34	165.4
2010	18.5	34.8	32.1	31.6	2.4	1.50	120.7	11.3	28.2	29.5	26.2	2.1	1.49	109.0	25.7	41.4	34.6	37.0	2.6	1.52	132.6
2011	57.2	42.7	40.6	63.6	4.7	3.91	212.9	32.8	30.7	37.5	50.8	4.2	3.88	181.6	82.0	55.0	43.8	75.9	5.2	3.95	243.7
2012	33.8	28.6	28.5	26.6	1.2	2.05	120.5	20.5	23.0	26.1	21.6	1.1	2.04	105.0	47.0	34.1	30.8	31.5	1.4	2.07	136.2
2013	63.8	37.4	32.4	33.7	3.1	5.25	175.6	39.2	25.4	29.9	26.8	2.8	5.20	146.9	88.5	49.2	34.8	40.7	3.5	5.30	204.7
2014	62.1	19.9	17.5	23.3	0.7	0.57	124.2	38.5	16.2	16.1	18.3	0.7	0.57	99.6	85.3	23.7	18.8	28.3	0.8	0.58	147.9
2015	88.2	36.3	30.6	33.6	0.7	1.52	191.1	53.4	28.6	28.2	26.6	0.7	1.51	154.4	123.8	44.0	33.1	40.7	0.8	1.53	228.0
2016	72.3	23.9	32.8	35.5	1.5	0.88	166.8	39.4	18.7	30.0	26.9	1.4	0.87	132.1	104.5	29.0	35.5	44.0	1.7	0.89	200.6
2017	76.0	27.6	32.7	27.8	1.2	1.45	166.5	36.3	19.8	29.9	22.2	1.1	1.44	126.0	116.7	35.3	35.5	33.2	1.3	1.47	208.5
2018	45.7	22.5	23.9	32.5	1.5	0.89	127.0	24.8	17.0	21.9	24.6	1.3	0.88	103.6	66.8	28.1	25.9	40.3	1.7	0.90	150.5
Change [(2018-2017)/2017]																					
	-0.40	-0.18	-0.27	0.17	0.31	-0.39	-0.24														
Rank (descending) over 48 years																					
	7	21	42	31	42	43	18														

Table 4.3.3.3. Estimated 2SW salmon spawners (medians, 5th percentile, 95th percentile; X 1000) to the six geographic areas and overall for NAC 1970 to 2018. Spawners for Scotia-Fundy do not include those from SFA 22 and a portion of SFA 23.

Year	Median of estimated spawners (X 1000)							5th percentile of estimated spawners (X 1000)							95th percentile of estimated spawners (X 1000)						
	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC
1970	9.5	3.2	28.5	10.0	6.5	NA	NA	4.4	2.3	23.4	8.2	4.7	NA	NA	16.4	4.2	33.7	11.8	8.3	NA	NA
1971	13.9	3.0	14.8	10.4	7.1	0.49	49.7	6.6	2.1	12.1	8.3	5.6	0.49	41.1	23.7	3.9	17.5	12.6	8.5	0.49	60.3
1972	11.9	3.1	29.0	29.1	10.4	1.04	84.9	5.6	2.2	23.8	22.3	8.7	1.03	73.2	20.5	4.1	34.2	36.1	12.0	1.05	97.3
1973	16.3	3.8	29.4	32.4	6.7	1.10	90.0	7.5	2.8	24.1	25.3	5.5	1.09	76.5	28.2	4.9	34.7	39.1	7.8	1.11	104.8
1974	16.4	3.1	35.8	48.9	14.1	1.15	119.8	7.6	2.4	29.4	38.9	12.0	1.14	103.6	28.2	3.9	42.3	58.9	16.3	1.16	137.0
1975	15.6	4.7	29.8	28.9	16.4	1.94	97.7	7.4	3.4	24.4	22.6	13.9	1.93	84.6	26.5	6.0	35.1	35.2	18.9	1.96	111.6
1976	17.6	4.0	28.3	24.1	15.5	1.13	90.8	8.2	3.0	23.2	18.3	12.9	1.12	77.5	29.9	5.0	33.4	29.9	18.1	1.14	105.8
1977	14.9	2.8	40.5	51.4	18.9	0.64	129.7	6.7	2.2	33.4	40.1	15.7	0.64	111.9	26.0	3.4	48.1	62.7	22.0	0.65	147.7
1978	12.0	3.1	37.4	16.0	9.4	3.31	81.4	5.5	2.5	30.6	12.1	7.9	3.28	70.3	20.7	3.6	44.1	19.9	10.9	3.34	93.2
1979	6.7	1.6	16.0	5.8	6.7	1.51	38.4	3.0	1.2	13.1	4.4	5.7	1.50	32.9	11.6	2.0	18.9	7.1	7.7	1.52	44.4
1980	16.4	3.3	44.5	31.5	21.3	4.26	121.7	7.6	2.6	36.5	24.5	17.7	4.23	106.1	28.4	3.9	52.5	38.4	24.9	4.30	138.0
1981	15.2	6.6	32.6	9.8	10.4	4.34	79.1	7.2	5.1	26.8	5.9	8.2	4.30	67.3	25.7	8.1	38.5	13.6	12.5	4.37	92.1
1982	11.0	2.8	33.1	21.3	7.8	4.64	80.9	5.1	2.2	27.2	12.1	6.2	4.60	67.4	18.9	3.4	39.1	30.3	9.4	4.69	94.8
1983	7.9	3.3	21.7	13.9	4.2	1.77	53.0	3.7	2.7	17.7	8.5	2.7	1.75	44.1	13.6	3.9	25.6	19.5	5.8	1.79	62.3
1984	5.5	3.2	27.1	25.9	17.5	2.55	81.9	2.5	2.3	24.9	17.3	14.5	2.52	71.5	9.6	4.1	29.3	34.7	20.5	2.57	92.5
1985	4.5	2.7	25.9	34.9	24.6	4.88	97.7	2.0	1.9	23.0	24.3	20.5	4.84	85.2	7.7	3.5	28.7	45.8	28.8	4.93	110.2
1986	7.7	3.2	29.7	55.4	18.4	5.57	120.1	3.5	2.4	26.7	38.8	15.3	5.52	102.0	13.2	4.1	32.6	71.9	21.6	5.62	138.3
1987	10.4	2.3	26.3	33.8	12.2	2.78	88.1	4.8	1.6	23.8	23.8	10.2	2.76	75.5	18.0	3.0	28.9	43.8	14.2	2.81	101.1

Year	Median of estimated spawners (X 1000)							5th percentile of estimated spawners (X 1000)							95th percentile of estimated spawners (X 1000)						
	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC
1988	6.1	3.4	31.5	41.0	10.3	3.04	95.7	2.7	2.4	28.2	29.7	8.5	3.01	82.8	10.9	4.4	34.9	52.6	12.1	3.07	108.8
1989	6.2	1.7	30.0	26.8	14.3	2.80	82.0	2.8	1.2	27.3	19.2	12.0	2.78	72.7	10.7	2.1	32.7	34.3	16.5	2.83	91.4
1990	3.5	2.7	29.9	35.8	11.0	4.36	87.2	1.5	2.0	26.7	25.0	9.3	4.32	75.5	6.1	3.4	33.1	46.3	12.8	4.40	98.8
1991	1.8	2.0	24.1	34.9	11.7	2.42	77.0	0.8	1.6	21.5	23.8	9.8	2.39	65.4	3.0	2.5	26.8	46.0	13.5	2.44	88.7
1992	6.8	8.1	23.6	36.7	10.8	2.29	88.6	3.2	5.4	20.8	30.9	9.2	2.27	80.3	11.9	10.8	26.4	42.5	12.5	2.31	97.2
1993	9.0	4.3	18.2	42.8	6.9	2.07	83.8	5.5	3.2	16.9	22.6	6.0	2.05	62.7	14.7	5.4	19.5	62.7	7.8	2.08	104.2
1994	12.5	3.9	17.9	29.5	4.4	1.34	69.9	8.0	2.8	16.6	23.3	3.9	1.33	61.3	19.7	5.0	19.2	35.9	4.9	1.36	79.4
1995	25.1	3.7	25.3	39.1	6.5	1.75	101.7	17.7	2.5	23.9	33.1	5.7	1.73	91.3	37.0	4.9	26.7	45.0	7.3	1.76	114.8
1996	18.4	5.5	21.9	28.4	8.4	2.41	85.5	13.0	3.9	20.3	22.2	7.3	2.39	76.1	27.5	7.1	23.5	34.6	9.4	2.43	96.4
1997	16.0	5.9	18.1	23.3	4.0	1.61	69.3	11.4	4.1	16.8	17.6	3.5	1.60	61.0	23.5	7.6	19.4	29.0	4.4	1.63	78.7
1998	8.6	6.4	16.8	16.0	2.3	1.53	51.5	5.0	4.4	15.5	12.4	2.1	1.51	45.7	12.3	8.3	18.1	19.5	2.5	1.54	57.3
1999	10.3	6.2	20.4	15.1	3.7	1.17	56.8	6.0	4.3	18.8	12.1	3.5	1.16	50.9	14.7	8.1	22.0	18.0	4.0	1.18	62.7
2000	14.1	6.2	19.5	16.4	2.2	1.59	59.9	8.3	4.4	17.4	13.4	2.0	1.57	52.6	20.2	8.0	21.6	19.4	2.4	1.60	67.5
2001	14.8	2.4	20.1	26.0	4.0	1.49	68.8	8.7	1.6	18.2	22.3	3.7	1.48	61.1	21.3	3.2	22.0	29.7	4.4	1.51	76.7
2002	10.8	2.4	15.1	13.6	0.8	0.51	43.2	6.3	1.6	13.5	11.0	0.7	0.51	37.5	15.6	3.2	16.8	16.1	0.9	0.52	49.1
2003	9.0	3.3	24.6	25.3	3.1	1.19	66.6	4.6	2.2	22.3	20.7	2.8	1.18	59.5	13.6	4.5	27.1	30.0	3.4	1.20	73.9
2004	10.9	3.2	20.6	24.9	2.6	1.28	63.4	7.3	2.0	18.7	19.7	2.4	1.27	56.6	14.7	4.5	22.4	30.1	2.8	1.30	70.3
2005	13.5	4.3	20.5	25.7	1.6	1.09	66.7	7.6	2.5	18.8	20.5	1.4	1.08	58.2	19.5	6.2	22.2	30.9	1.7	1.10	75.2
2006	13.6	5.3	19.0	22.0	2.4	1.42	63.7	8.5	3.5	17.5	17.6	2.2	1.41	56.3	19.0	7.1	20.6	26.4	2.6	1.43	71.1

Year	Median of estimated spawners (X 1000)							5th percentile of estimated spawners (X 1000)							95th percentile of estimated spawners (X 1000)						
	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC
2007	14.1	4.1	17.2	21.7	1.3	1.19	59.6	8.2	2.6	15.7	17.9	1.2	1.18	52.0	20.3	5.6	18.8	25.4	1.4	1.20	67.3
2008	16.8	3.8	21.8	17.8	3.0	2.81	66.0	10.2	2.4	19.5	13.6	2.6	2.78	57.3	24.0	5.2	24.1	22.1	3.3	2.83	74.8
2009	25.4	4.6	21.0	23.5	2.5	2.29	79.2	13.3	2.7	19.2	19.3	2.3	2.27	66.0	37.8	6.4	22.7	27.6	2.8	2.31	92.7
2010	12.0	4.6	23.4	19.5	1.9	1.48	62.9	7.3	3.1	21.5	15.5	1.7	1.47	56.0	16.9	6.1	25.3	23.5	2.1	1.50	69.8
2011	37.2	3.6	29.7	50.8	4.6	3.87	129.7	21.3	2.4	27.4	40.5	4.1	3.84	109.9	53.8	4.9	31.9	61.2	5.0	3.91	150.1
2012	21.9	2.3	20.8	18.9	1.0	2.02	66.9	13.3	1.6	19.0	15.4	0.9	2.00	57.3	30.8	2.9	22.5	22.4	1.1	2.04	76.8
2013	41.4	4.7	23.6	24.1	2.9	5.24	102.0	25.5	3.0	21.9	18.9	2.6	5.20	84.7	58.0	6.5	25.4	29.2	3.3	5.29	119.7
2014	40.4	2.8	12.8	16.5	0.7	0.57	73.6	25.0	1.9	11.8	12.8	0.6	0.56	57.8	55.9	3.8	13.7	20.2	0.7	0.57	89.7
2015	57.3	4.8	22.4	23.9	0.7	1.51	110.5	34.6	3.2	20.6	18.7	0.6	1.50	87.1	81.0	6.4	24.1	29.2	0.7	1.52	135.3
2016	46.8	3.6	23.9	26.0	1.5	0.88	102.6	25.5	2.3	21.9	19.6	1.3	0.87	80.1	68.5	4.9	25.9	32.4	1.6	0.89	125.5
2017	49.3	2.8	23.9	19.9	1.1	1.44	98.3	23.5	1.7	21.8	15.8	1.0	1.43	72.3	76.3	3.9	25.9	23.9	1.2	1.45	126.0
2018	29.7	2.3	17.5	23.3	1.4	0.89	75.1	16.1	1.6	16.0	17.4	1.3	0.88	59.6	43.6	3.0	18.9	29.1	1.6	0.89	90.4
Change [(2018-2017)/2017]																					
	-0.40	-0.18	-0.27	0.18	0.28	-0.38	-0.24														
Rank (descending) over 48 years																					
	7	44	42	30	42	43	29														
2SW CL																					
	34.7	4.0	32.1	18.7	24.7	29.2															
% recent year of CL																					

Year	Median of estimated spawners (X 1000)							5th percentile of estimated spawners (X 1000)							95th percentile of estimated spawners (X 1000)						
	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC	LAB	NF	QC	GF	SF	US	NAC
	85%	57%	54%	125%	6%	3%															
2SW management objective																					
					11.0	4.5															
% recent year of management objective																					
					13%	19%															

Table 4.3.4.1. Time-series of stocks in Canada and the USA with established CLs the number of rivers assessed and the number and percent of assessed rivers meeting CLs 1991 to 2018. In 2016, Québec implemented a new Atlantic salmon management plan which changed their river-specific LRP values (Dionne *et al*., 2015).

Year	Canada				USA			
	No. CLs	No. assessed	No. met	% met	No. CLs	No. assessed	No. met	% met
1991	74	64	34	53				
1992	74	64	38	59				
1993	74	69	30	43				
1994	74	72	28	39				
1995	74	74	36	49	33	16	0	0
1996	74	76	44	58	33	16	0	0
1997	266	91	38	42	33	16	0	0
1998	266	83	38	46	33	16	0	0
1999	269	82	40	49	33	16	0	0
2000	269	81	31	38	33	16	0	0
2001	269	78	29	37	33	16	0	0
2002	269	80	21	26	33	16	0	0
2003	269	79	33	42	33	16	0	0
2004	269	75	39	52	33	16	0	0
2005	269	70	31	44	33	16	0	0
2006	269	65	29	45	33	16	0	0
2007	269	61	23	38	33	16	0	0
2008	269	68	29	43	33	16	0	0
2009	375	70	32	46	33	16	0	0
2010	375	68	31	46	33	16	0	0
2011	458	75	50	67	33	16	0	0
2012	472	74	32	43	33	16	0	0
2013	473	75	46	61	33	16	0	0
2014	476	69	20	29	33	16	0	0
2015	476	74	43	58	33	16	0	0
2016	476	62	41	66	33	16	0	0

Year	Canada				USA			
	No. CLs	No. assessed	No. met	% met	No. CLs	No. assessed	No. met	% met
2017	476	68	42	62	33	16	0	0
2018	498	70	38	54	33	16	0	0

Table 4.3.5.1. Return rates (%) by year of smolt migration of wild Atlantic salmon to 1SW (or small) salmon to North American rivers 1991 to 2017 smolt migration years. The year 1991 was selected for illustration as it is the first year of the commercial fishery moratorium for the island of Newfoundland.

SMOLT YEAR	USA	Scotia-Fundy				Gulf				Québec				Nfld						
	Narraguagus	Nashwaak	LaHave	St.Mary's	Middle	Margaree	NWMiramichi	SWMiramcihi	Miramichi	à la barbe	Saint Jean	Bec scie	de la Trinite	Highlands	Conne	Rocky	NE Trepassey	Campbellton	Garnish	WAB
1991										0.6	0.5	1.2	1.6		3.4	3.1	2.6			3.6
1992										0.5	0.4	1.3	0.8		4.0	3.7	4.7			6.1
1993										0.4	0.3	0.9	0.7	1.5	2.7	3.1	5.4	9.0		7.1
1994											0.3	1.2	0.6	1.6	5.8	3.9	8.5	7.3		8.9
1995											0.6	1.4	0.9	1.6	7.2	4.7	9.2	8.1		8.1
1996			1.5								0.3		0.6	3.2	3.4	3.1	2.9	3.4		3.5
1997	0.04		4.3										1.7	1.4	2.9	2.5	5.0	5.3		7.2
1998	0.21	2.9	2.0								0.3		1.4	2.5	3.4	2.7	4.9	6.1		6.1
1999	0.31	1.8	4.8				3.0				0.3		0.4	0.6	8.1	3.2	5.9	3.8		11.1
2000	0.28	1.5	1.2				4.9				0.5		0.3	0.6	2.5	3.1	3.2	6.0		4.4
2001	0.16	3.1	2.7				6.6	8.6	7.9		0.5		0.6		3.0	2.9	7.1	5.3		9.2

SMOLT YEAR	USA	Scotia-Fundy				Gulf				Québec				Nfld						
	Narraguagus	Nashwaak	LaHave	St.Mary's	Middle	Margaree	NWMiramichi	SWMiramcihi	Miramichi	à la barbe	Saint Jean	Bec scie	de la Trinite	Highlands	Conne	Rocky	NE Trepassey	Campbellton	Garnish	WAB
2002	0.00	1.9	2.0			1.5	2.4	3.0	3.0		0.6		0.9		2.4	4.0	5.5	6.8		9.4
2003	0.08	6.4	1.8			1.6	4.1	6.8	5.9		0.6		0.6		5.3	3.8	6.6	7.8		9.5
2004	0.08	5.1	1.1			0.9	2.6	1.8	2.0		0.7		1.0		2.5	3.3	4.4	11.4		5.9
2005	0.24	12.7	8.0	3.0		1.1	3.6				0.4		1.5		4.0	2.2	5.5	9.2		15.1
2006	0.09	1.8	1.5	0.7		0.7	1.4	1.5	1.5		0.3				3.3	1.3	2.7	5.6		3.8
2007	0.35	5.6	2.3	2.2		1.3		1.6			0.4		1.5		4.4	5.6	5.5	11.2		11.6
2008	0.22	3.9	1.2	0.6		0.3		1.0			0.6		0.7		2.4	2.7	2.6	8.8		6.1
2009	0.26	12.4	3.5			1.0		3.3			0.8		1.9		2.5	6.8	4.9	9.5		9.6
2010	0.95	7.9	1.8					1.5			0.7		2.5		2.7	5.1	5.6	11.0		7.1
2011	0.32	0.3									0.4		0.6		3.9	4.6	3.0	9.7		5.7
2012	0.00	1.6									0.4		0.4		5.3	3.7	4.0	9.3		5.2
2013	0.26	1.6	0.6		0.2						0.9		0.6		1.9	5.3		10.0		7.2
2014	0.32	2.9	0.6		0.4						0.9		1.9		4.1			8.8		8.2

SMOLT YEAR	USA	Scotia-Fundy				Gulf				Québec				Nfld						
	Narraguagus	Nashwaak	LaHave	St.Mary's	Middle	Margaree	NWMiramichi	SWMiramcihi	Miramichi	à la barbe	Saint Jean	Bec scie	de la Trinite	Highlands	Conne	Rocky	NE Trepassey	Campbellton	Garnish	WAB
2015	0.09	5.0	0.4		0.2								1.2		3.6			8.4		9.4
2016		2.8	0.7		1.1						0.2		0.5			7.7		3.7		5.7
2017											0.6		0.7		0.8	6.2		8.5	2.8	9.3

Table 4.3.5.2. Return rates (%) by year of smolt migration of wild Atlantic salmon to 2SW salmon to North American rivers 1991 to 2016 smolt migration years. The year 1991 was selected for illustration as it is the first year of the commercial fishery moratorium for the island of Newfoundland.

SMOLT YEAR	USA	Scotia-Fundy				Gulf				Québec				Nfld
	Narraguagus	Nashwaak	LaHave	St.Mary's	Middle	Margaree	NWMiramichi	SW Miramchi	Miramichi	à la barbe	Saint Jean	Bec scie	de la Trinite	Highlands
1991										0.6	0.9	0.4	0.6	
1992										0.5	0.7	0.4	0.5	
1993										0.4	0.8	0.9	0.7	1.2
1994											0.9	1.5	0.7	1.4
1995											0.9	0.4	0.5	1.3
1996			0.2								0.4		0.5	0.9
1997	0.87		0.4										1.1	1.2
1998	0.28	0.7	0.3								0.4		0.7	1.1
1999	0.53	0.8	0.9				1.2				0.7		0.2	0.7
2000	0.17	0.3	0.1				0.5				1.2		0.1	0.7
2001	0.85	0.9	0.6				0.6	3.3	2.3		0.9		0.3	
2002	0.58	1.3	0.5			6.2	0.7	1.4	1.3		0.9		0.5	

SMOLT YEAR	USA	Scotia-Fundy				Gulf				Québec				Nfld
	Narraguagus	Nashwaak	LaHave	St.Mary's	Middle	Margaree	NWMiramichi	SW Miramcihi	Miramichi	à la barbe	Saint Jean	Bec scie	de la Trinite	Highlands
2003	1.01	1.6	0.2			3.9	0.9	2.0	1.6		1.4		0.2	
2004	0.98	1.3	0.3			3.0	0.5	0.8	0.7		1.1		0.7	
2005	0.73	1.5	0.5	0.3		2.3	1.1				0.6		0.5	
2006	0.74	0.6	0.4	0.1		3.0	0.2	0.5	0.4		0.5			
2007	2.07	1.3	0.2	0.1		2.1		0.8			0.5		0.3	
2008	0.65	2.1	0.3			2.4		0.7			1.8		0.5	
2009	1.80	3.3	0.9			5.7		2.2			1.9		0.8	
2010	0.24	0.4	0.2								1.0		0.6	
2011	0.56	1.0									1.7		0.3	
2012	1.02	0.3									0.6		0.1	
2013	1.91	0.5	0.2		1.7						1.9		0.3	
2014	0.51	0.6	0.2		1.5						1.2		0.6	
2015	0.62	1.2	0.4		2.0								0.4	

SMOLT YEAR	USA	Scotia-Fundy				Gulf				Québec				Nfld
	Narraguagus	Nashwaak	LaHave	St.Mary's	Middle	Margaree	NWMiramichi	SW Miramcihi	Miramichi	à la barbe	Saint Jean	Bec scie	de la Trinite	Highlands
2016		0.4	0.2		2.2						0.7		0.2	

Table 4.3.5.3. Return rates (%) by year of smolt migration of hatchery Atlantic salmon to 1SW salmon to North American rivers 1991 to 2017 smolt migration years. The year 1991 was selected for illustration as it is the first year of the commercial fishery moratorium for Newfoundland.

SMOLT YEAR	USA			Scotia Fundy				Gulf				Québec
	Connecticut	Penobscot	Merrimack	Saint John	LaHave	East Sheet	Liscomb	Morell	Mill	West	Valley-field	auxRochers
1991	0.00	0.14	0.01	0.69	4.51	0.15	0.50	3.16			0.48	0.43
1992	0.00	0.04	0.00	0.41	1.26	0.21	0.42	1.43	0.44	2.16	0.70	0.07
1993	0.00	0.05	0.00	0.39	0.62	0.32	0.56	0.14	0.37		0.02	0.10
1994	0.00	0.03	0.00	0.66	1.44	0.36	0.35	5.20	0.11		0.08	0.02
1995		0.08	0.02	1.14	2.26	0.37	0.64					0.07
1996		0.04	0.02	0.56	0.47	0.07	0.17					0.31
1997		0.04	0.02	0.75	0.87	0.03	0.15					0.46
1998		0.04	0.09	0.47	0.34	0.05	0.10					1.04
1999		0.03	0.05	0.46	0.79	0.23						0.32
2000	0.00	0.04	0.01	0.27	0.43	0.03						1.15
2001		0.07	0.06	0.45	0.87							0.02
2002		0.04	0.02	0.34	0.63							0.07

SMOLT YEAR	USA			Scotia Fundy				Gulf				Québec
	Connecticut	Penobscot	Merrimack	Saint John	LaHave	East Sheet	Liscomb	Morell	Mill	West	Valley-field	auxRochers
2003	0.00	0.05	0.03	0.32	0.72							
2004	0.00	0.05	0.02	0.39	0.53							
2005	0.02	0.06	0.02	0.56								
2006	0.00	0.04	0.02	0.24								
2007	0.01	0.13	0.01	0.83								
2008	0.00	0.03	0.00	0.13								
2009	0.00	0.07	0.03	1.44								
2010	0.01	0.12	0.18	0.12								
2011	0.00	0.00	0.00	0.02								
2012		0.01	0.00	0.67								
2013		0.02	0.01	0.11								
2014		0.02		0.24								
2015		0.06		0.11								

SMOLT YEAR	USA			Scotia Fundy				Gulf				Québec
	Connecticut	Penobscot	Merrimack	Saint John	LaHave	East Sheet	Liscomb	Morell	Mill	West	Valley-field	auxRochers
2016		0.05		0.54								
2017		0.05		0.25								

Table 4.3.5.4. Return rates (%) by year of smolt migration of hatchery Atlantic salmon to 2SW salmon to North American rivers 1991 to 2016 smolt migration years. The year 1991 was selected for illustration as it is the first year of the commercial fishery moratorium for Newfoundland.

SMOLT YEAR	USA			Scotia Fundy				Gulf				Québec
	Connecticut	Penobscot	Merrimack	Saint John	LaHave	East Sheet	Liscomb	Morell	Mill	West	Valley-field	auxRochers
1991	0.04	0.19	0.02	0.15	0.48	0.00	0.05	0.04			0.00	0.13
1992	0.08	0.08	0.00	0.22	0.24	0.01	0.03	0.07	0.00	0.05	0.06	0.06
1993	0.04	0.19	0.03	0.19	0.21	0.02	0.03	0.31	0.91		0.01	0.19
1994	0.04	0.22	0.05	0.27	0.23	0.06	0.02					0.05
1995		0.16	0.06	0.19	0.23	0.00	0.03					0.04
1996		0.14	0.09	0.08	0.13	0.01						0.07
1997		0.10	0.11	0.20	0.17	0.01						0.08
1998		0.05	0.06	0.06	0.11	0.00						0.09
1999		0.08	0.13	0.16	0.21	0.00						0.02
2000	0.01	0.06	0.03	0.05	0.07							0.01
2001		0.16	0.26	0.15	0.13							0.02
2002		0.17	0.18	0.11	0.17							

SMOLT YEAR	USA			Scotia Fundy				Gulf				Québec
	Connecticut	Penobscot	Merrimack	Saint John	LaHave	East Sheet	Liscomb	Morell	Mill	West	Valley-field	auxRochers
2003	0.00	0.12	0.05	0.06	0.09							
2004	0.03	0.12	0.13	0.09	0.11							
2005	0.02	0.10	0.10	0.12								
2006	0.02	0.23	0.15	0.06								
2007	0.02	0.30	0.08	0.17								
2008	0.01	0.15	0.05	0.16								
2009	0.04	0.39	0.17	0.13								
2010	0.00	0.09	0.11	0.07								
2011	0.01	0.05	0.02	0.02								
2012		0.03	0.08	0.10								
2013		0.10	0.02	0.02								
2014		0.04		0.09								
2015		0.12		0.04								

SMOLT YEAR	USA			Scotia Fundy				Gulf				Québec
	Connecticut	Penobscot	Merrimack	Saint John	LaHave	East Sheet	Liscomb	Morell	Mill	West	Valley-field	auxRochers
2016		0.08		0.00								

Table 4.3.6.1. Estimates (medians, 5th percentiles, 95th percentiles; X 1000) of Pre-fishery Abundance (PFA) for 1SW maturing salmon (PFA1SWmat) 1SW non-maturing salmon (PFA1SWnonmat) and the total cohort of 1SW salmon (PFA1SWcohort) as of 1 August of the second summer at sea for NAC for the years of Pre-fishery Abundance 1971 to 2018.

Year	Median of estimated PFA (X 1000)			5th percentile of estimated PFA (X 1000)			95th percentile of estimated PFA (X 1000)		
	PFA1SWcohort	PFA1SWnmat	PFA1SWmat	PFA1SWcohort	PFA1SWnmat	PFA1SWmat	PFA1SWcohort	PFA1SWnmat	PFA1SWmat
1971	1238.0	702.3	535.4	1170.0	640.3	500.5	1310.0	766.7	576.4
1972	1257.0	724.0	532.3	1199.0	670.5	502.6	1318.0	782.5	565.1
1973	1569.0	901.2	666.9	1487.0	821.5	636.6	1652.0	984.7	697.9
1974	1512.0	812.3	698.9	1447.0	751.6	661.7	1582.0	878.0	739.4
1975	1705.0	905.6	798.2	1626.0	839.4	745.9	1791.0	975.6	860.9
1976	1634.0	835.5	798.3	1556.0	767.3	751.1	1720.0	910.7	850.0
1977	1304.0	667.2	636.1	1236.0	606.7	594.7	1376.0	730.1	682.7
1978	807.5	396.8	410.5	771.1	368.6	383.3	846.0	426.9	439.3
1979	1427.0	837.4	589.6	1356.0	772.4	557.5	1505.0	908.7	624.4
1980	1545.0	711.7	832.1	1477.0	655.7	781.8	1621.0	771.4	891.5
1981	1578.0	667.4	910.2	1507.0	621.8	847.9	1658.0	715.2	981.9
1982	1327.0	560.6	766.1	1268.0	523.8	715.8	1389.0	599.7	819.6
1983	846.0	334.5	510.9	805.3	305.2	479.9	889.1	366.8	544.6
1984	891.5	353.0	538.4	846.6	321.6	505.0	938.2	386.8	572.1
1985	1184.0	526.4	657.2	1124.0	484.2	615.8	1245.0	572.9	700.2
1986	1393.0	559.7	833.3	1321.0	512.5	776.9	1467.0	609.4	891.8

Year	Median of estimated PFA (X 1000)			5th percentile of estimated PFA (X 1000)			95th percentile of estimated PFA (X 1000)		
	PFA1SWcohort	PFA1SWnmat	PFA1SWmat	PFA1SWcohort	PFA1SWnmat	PFA1SWmat	PFA1SWcohort	PFA1SWnmat	PFA1SWmat
1987	1310.0	509.0	800.3	1251.0	472.5	749.3	1374.0	548.1	858.0
1988	1262.0	414.7	847.6	1196.0	382.7	787.4	1332.0	448.5	910.5
1989	921.1	326.6	594.2	875.6	298.8	556.0	969.7	356.6	634.8
1990	851.0	289.8	561.3	807.6	265.5	525.7	895.5	316.3	596.8
1991	736.3	322.1	414.3	703.2	300.4	389.3	771.3	345.8	440.0
1992	786.5	210.4	575.9	728.3	178.5	529.3	846.0	245.1	622.3
1993	694.5	150.0	544.0	628.3	132.8	481.6	760.9	169.1	606.6
1994	513.8	185.4	328.0	476.7	164.1	299.3	553.1	210.8	357.0
1995	563.2	182.4	380.7	521.2	164.1	343.7	607.2	203.6	418.1
1996	710.7	154.8	555.5	652.8	139.0	500.5	772.3	172.9	614.3
1997	469.2	106.8	361.6	434.1	96.2	329.4	511.2	118.7	402.2
1998	539.5	98.2	441.3	485.0	86.9	389.0	594.6	110.6	493.7
1999	545.5	103.3	442.1	491.4	90.6	390.2	600.3	117.5	494.5
2000	640.8	117.6	522.9	576.2	103.6	461.1	706.0	133.2	585.0
2001	467.7	81.3	386.0	416.8	71.6	337.0	518.1	92.3	435.2
2002	495.4	110.6	384.5	451.6	97.5	344.0	540.0	125.0	425.9
2003	528.4	108.0	420.5	487.8	95.2	383.2	568.9	121.7	457.1
2004	559.0	112.1	446.7	521.9	97.7	413.7	596.8	128.0	479.9

Year	Median of estimated PFA (X 1000)			5th percentile of estimated PFA (X 1000)			95th percentile of estimated PFA (X 1000)		
	PFA1SWcohort	PFA1SWnmat	PFA1SWmat	PFA1SWcohort	PFA1SWnmat	PFA1SWmat	PFA1SWcohort	PFA1SWnmat	PFA1SWmat
2005	655.8	107.1	548.5	577.1	93.9	471.7	734.0	121.7	625.1
2006	652.0	101.7	550.0	571.5	88.9	471.1	732.4	116.0	628.4
2007	584.7	113.0	471.4	518.0	98.5	406.8	653.1	129.3	537.7
2008	726.6	133.3	592.9	657.0	112.6	528.8	797.9	156.3	658.7
2009	505.2	109.1	396.0	448.7	96.4	341.1	562.3	123.0	451.1
2010	740.0	208.8	531.5	683.6	177.5	487.1	798.6	244.0	574.6
2011	756.6	114.0	642.2	648.5	98.1	536.0	865.1	131.9	748.5
2012	675.7	162.9	512.0	601.1	136.5	445.3	751.0	193.1	579.6
2013	536.4	126.3	409.9	462.6	102.6	341.0	611.7	152.8	478.7
2014	686.2	182.9	502.0	589.9	147.8	416.8	784.4	222.2	589.5
2015	827.1	172.9	653.8	734.2	139.4	570.5	920.1	209.6	737.9
2016	639.0	156.9	481.3	536.5	119.2	389.5	742.8	199.6	573.2
2017	592.7	121.3	471.5	495.2	98.6	377.1	690.9	146.2	565.0
2018	na	na	608.2	na	na	496.7	na	na	718.2
Prev. 5-year mean	656.3	152.1	543.4						
Change (recent year relative to previous year)									
	-0.07	-0.23	0.29						

Year	Median of estimated PFA (X 1000)			5th percentile of estimated PFA (X 1000)			95th percentile of estimated PFA (X 1000)		
	PFA1SWcohort	PFA1SWnmat	PFA1SWmat	PFA1SWcohort	PFA1SWnmat	PFA1SWmat	PFA1SWcohort	PFA1SWnmat	PFA1SWmat
Change (recent year relative to previous 5-year mean)									
	-0.10	-0.20	0.12						
Rank (descending; recent year / time-series)									
	35 / 47	34 / 47	15 / 48						

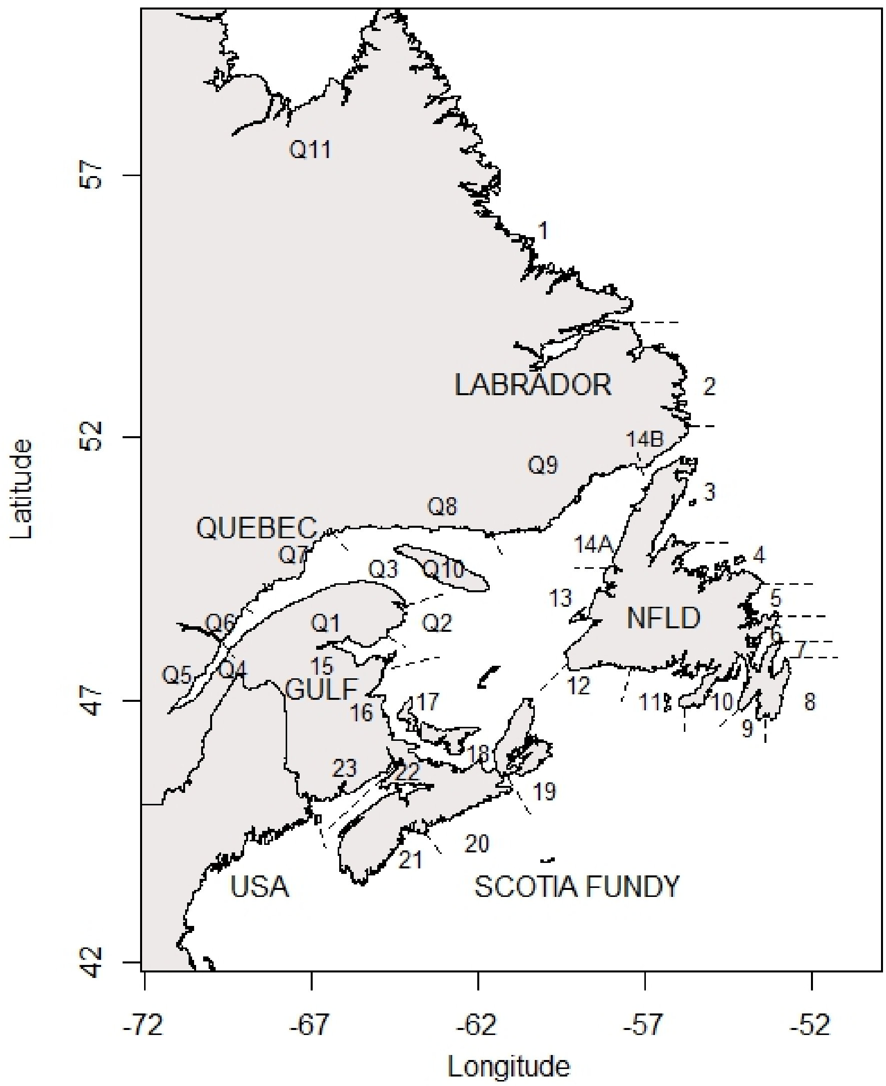


Figure 4.1.2.1. Map of Salmon Fishing Areas (SFAs) and Québec Management Zones (Qs) in Canada.

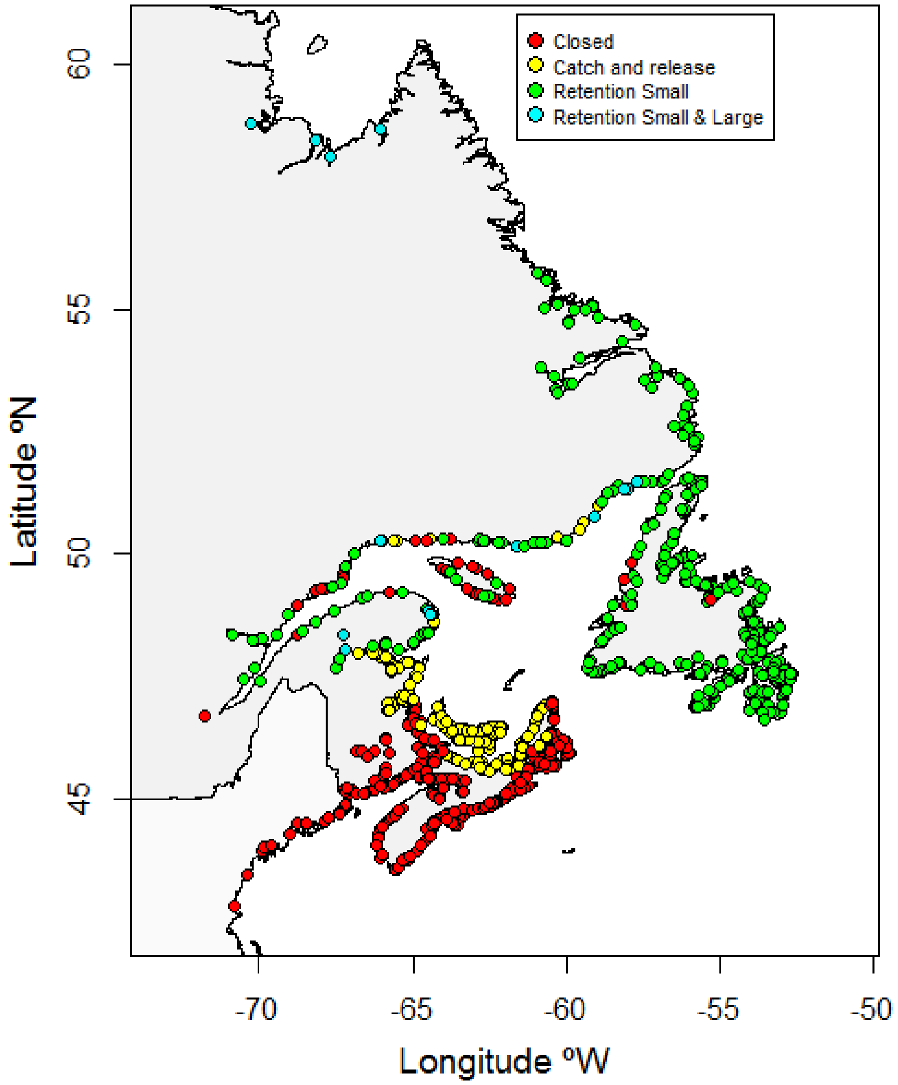


Figure 4.1.2.2. Summary of recreational fisheries management measures in Canada at the start of the season in 2018. Note: details on specific regions are available in the text and may not appear on the figure.

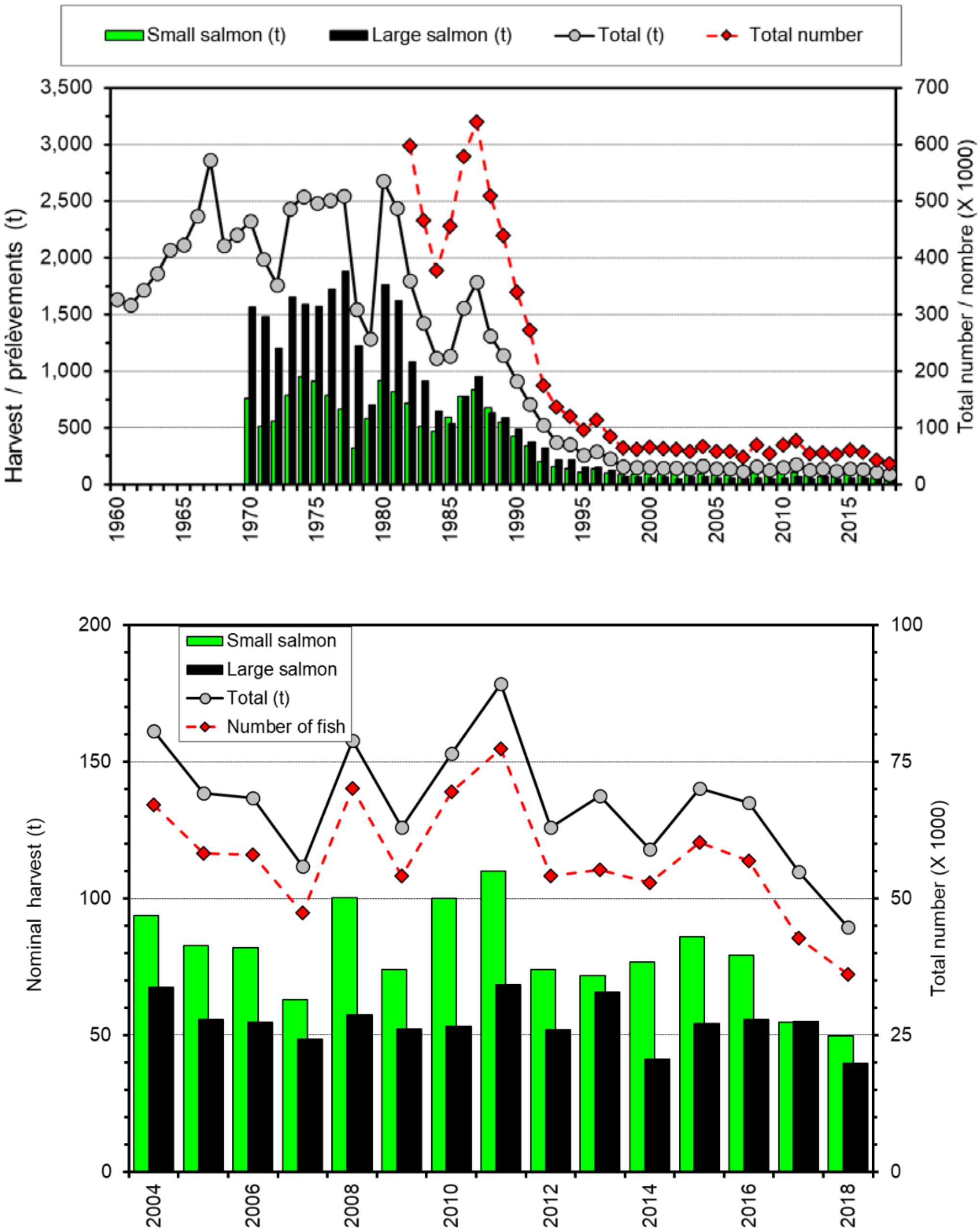


Figure 4.1.3.1. Harvest (t) of small salmon, large salmon and both sizes combined (weight and number) for Canada, 1960 to 2018 (top panel) and 2004 to 2018 (bottom panel) by all users.

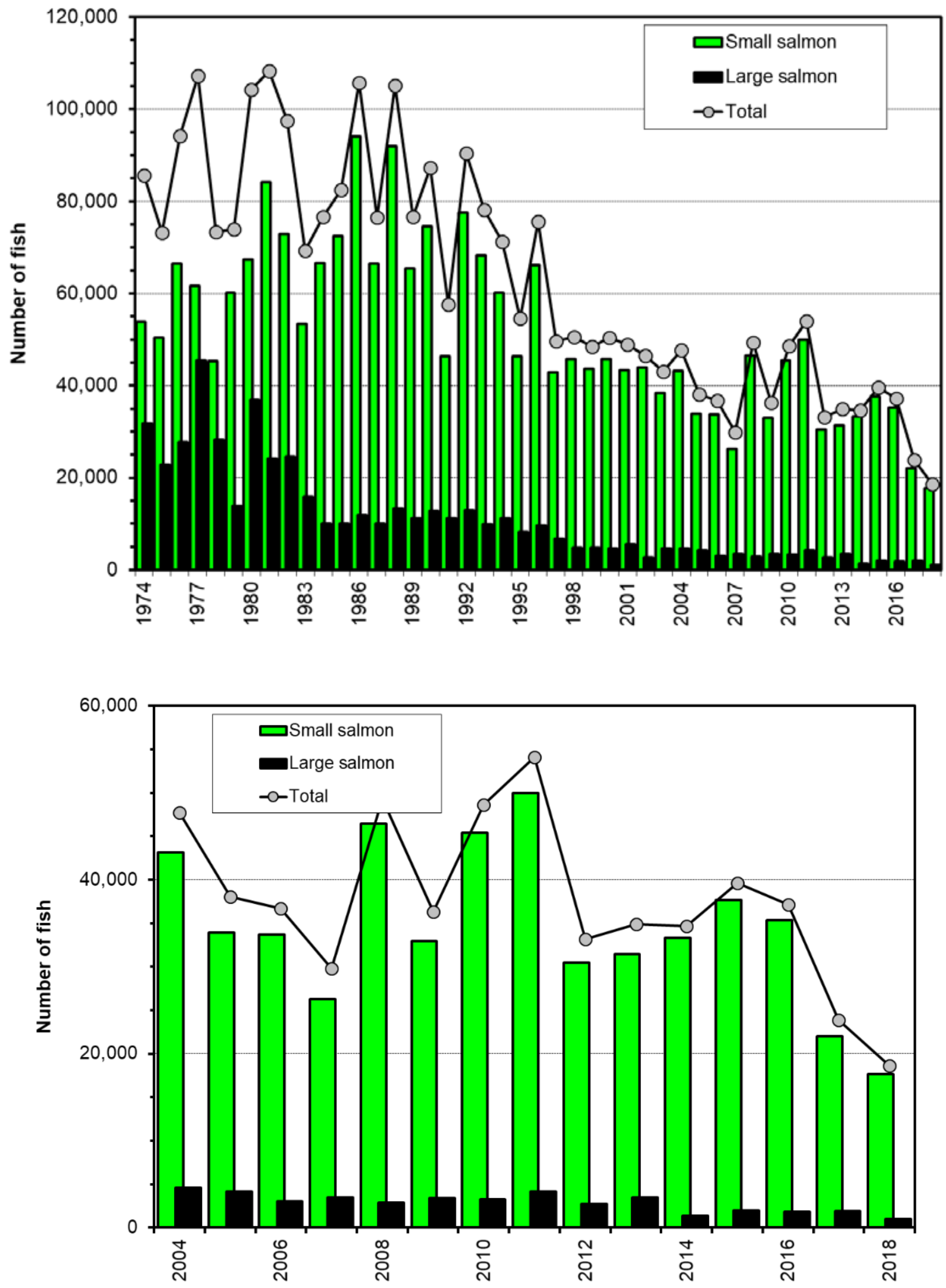


Figure 4.1.3.2. Harvest (number) of small salmon, large salmon, and both sizes combined in the recreational fisheries of Canada, 1974 to 2018 (top panel) and 2004 to 2018 (bottom panel).

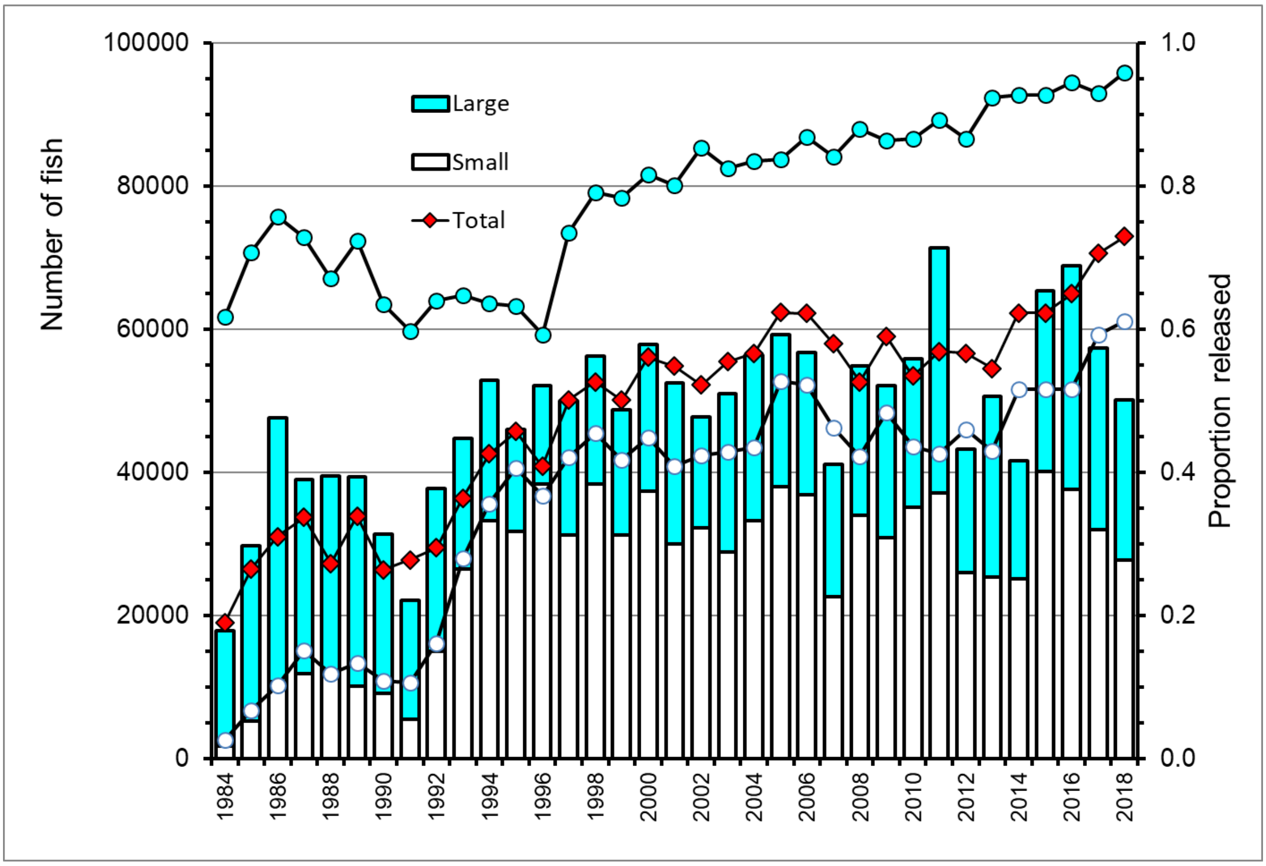


Figure 4.1.3.3. The number (bars) of caught and released small salmon and large salmon in the recreational fisheries of Canada, 1984 to 2018. Black lines represent the proportion released of the total catch (released and retained); small salmon (open circle) large salmon (teal) and both sizes combined (red diamond).

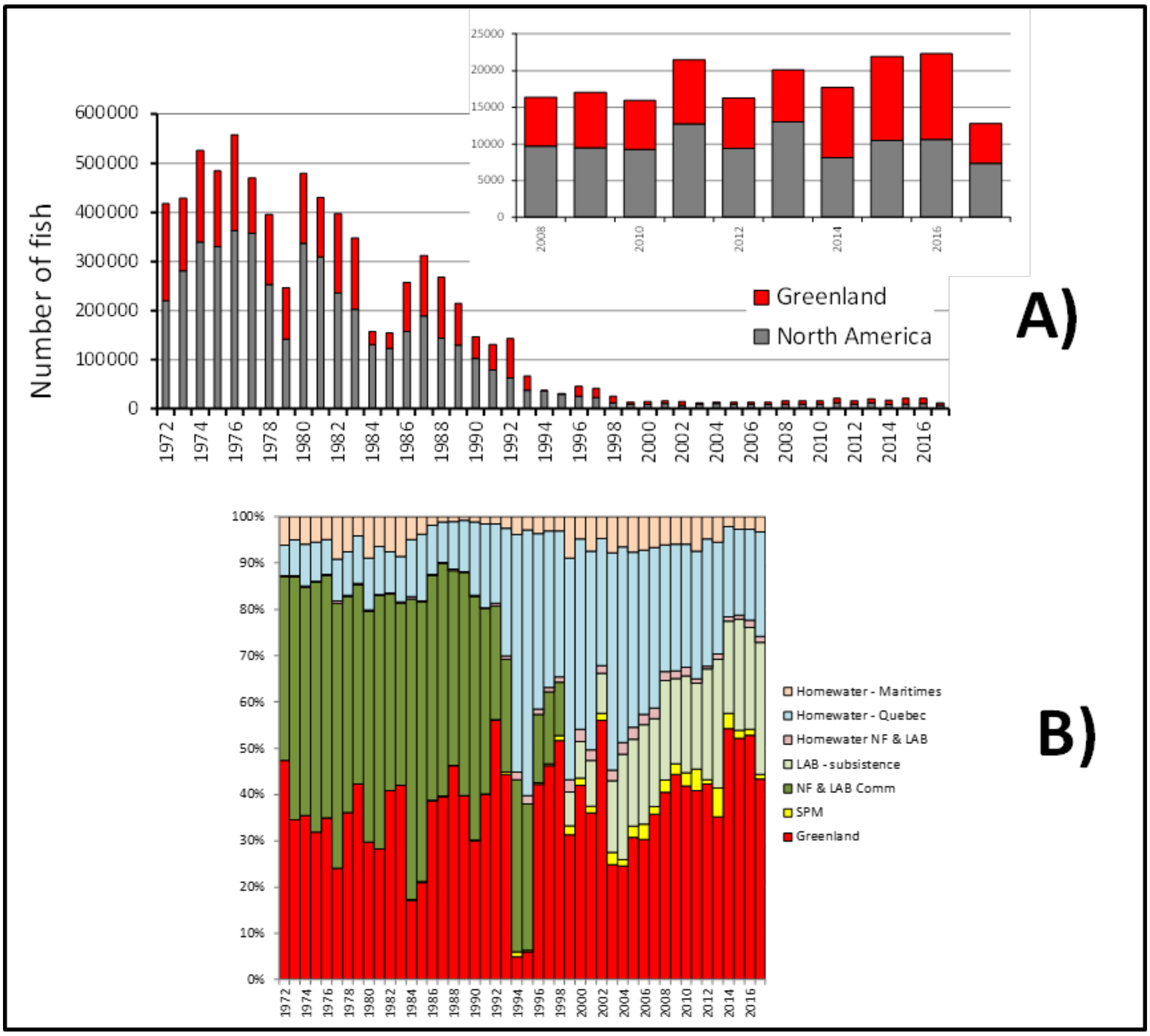


Figure 4.1.4.1. Estimates of 2SW salmon harvest equivalents (number of fish; year of 1SW salmon at sea) taken at Greenland and in North America (upper panel A) and the percentages of the North American origin 2SW salmon harvest equivalents taken in various fishing areas of the North Atlantic (lower panel B) 1972 to 2017.

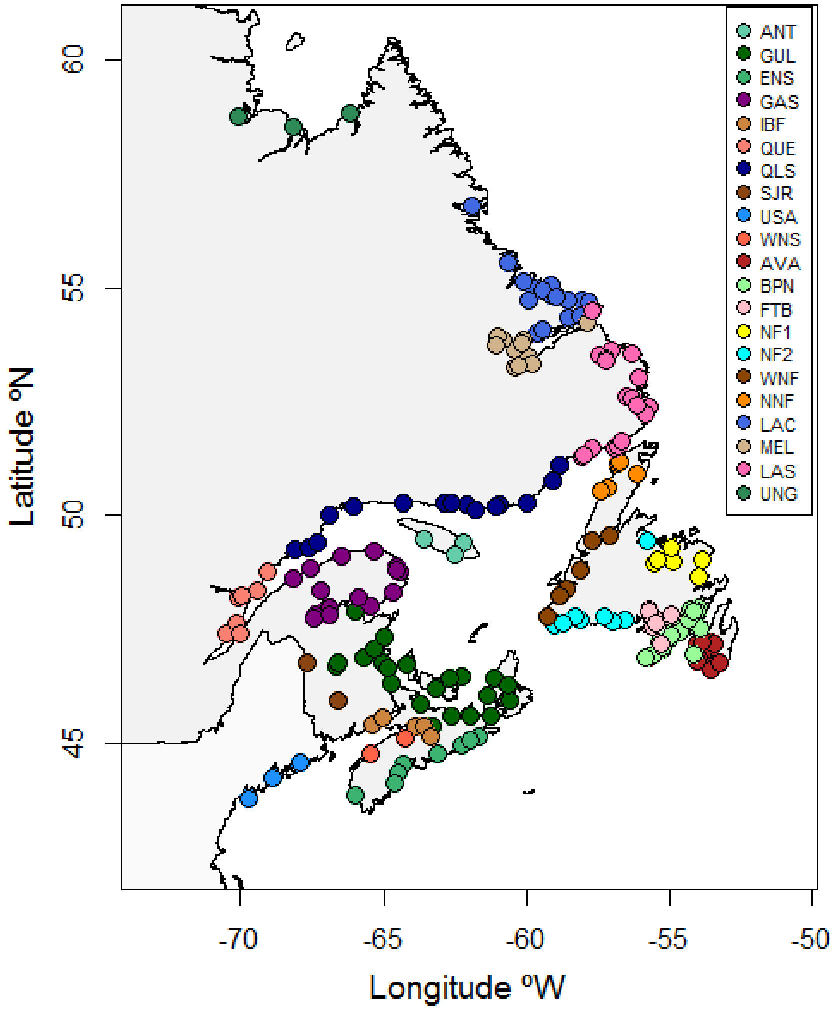


Figure 4.1.5.1 Map of North American sample locations used in the SNP baseline for Atlantic salmon. The 21 North American reporting groups are labelled and identified by colour). See Figure 4.1.5.2 for full range wide baseline sampling locations.

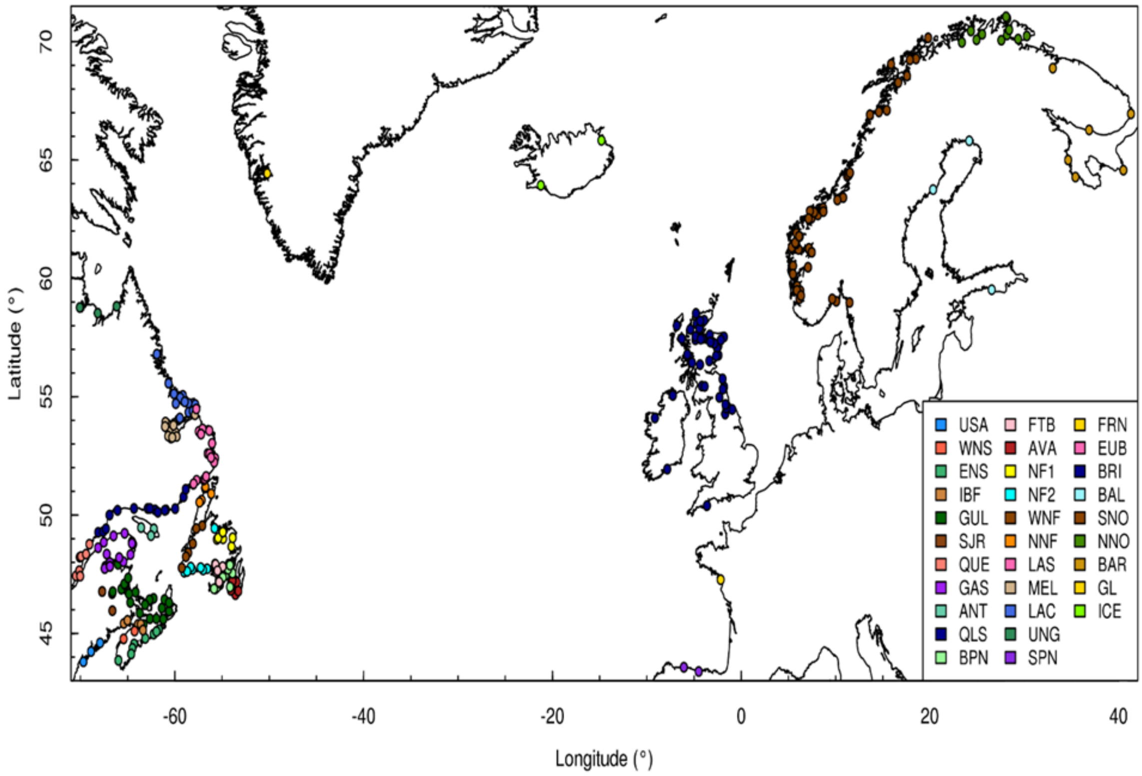


Figure 4.1.5.2. Map of range wide sample locations used in the SNP baseline for Atlantic salmon and the 31 defined reporting groups (labelled and identified by colour). See Figure 4.1.5.1 for finer resolution of North American locations.

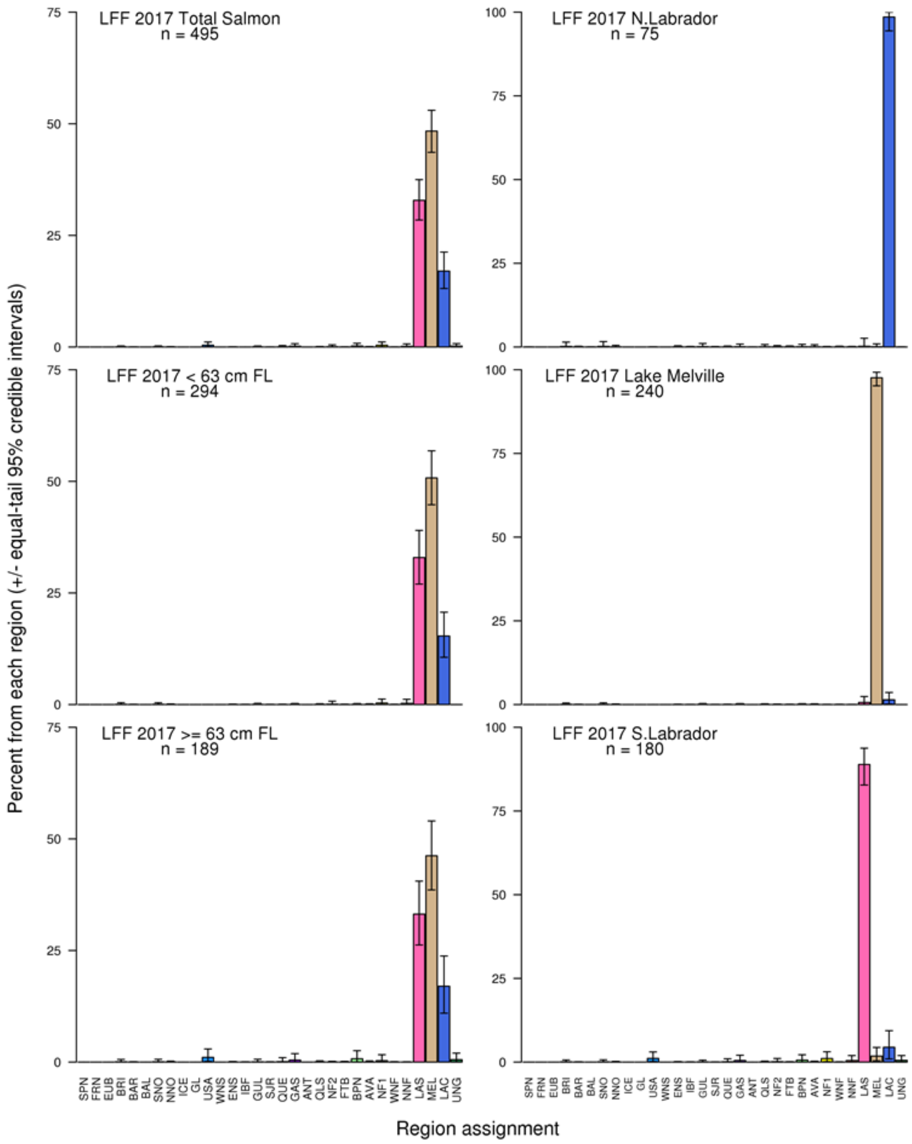


Figure 4.1.5.3. Bayesian estimate of mixture composition of samples from the Labrador Atlantic salmon fisheries for 2017 by size group (small <63 cm, large ≥63 cm) and region (Figure 4.1.2.1: SFA 1A – N. Labrador, SFA 1B – Lake Melville, and SFA 2 –S. Labrador). Baseline locations refer to regional reporting groups identified in Figure 4.1.5.1 and Figure 4.1.5.2. Regional assignment acronyms explained in Table 4.1.5.1. Data summarized in Table 4.1.5.2. Note that credible intervals with a lower bound including zero indicate little support for the mean assignment value.

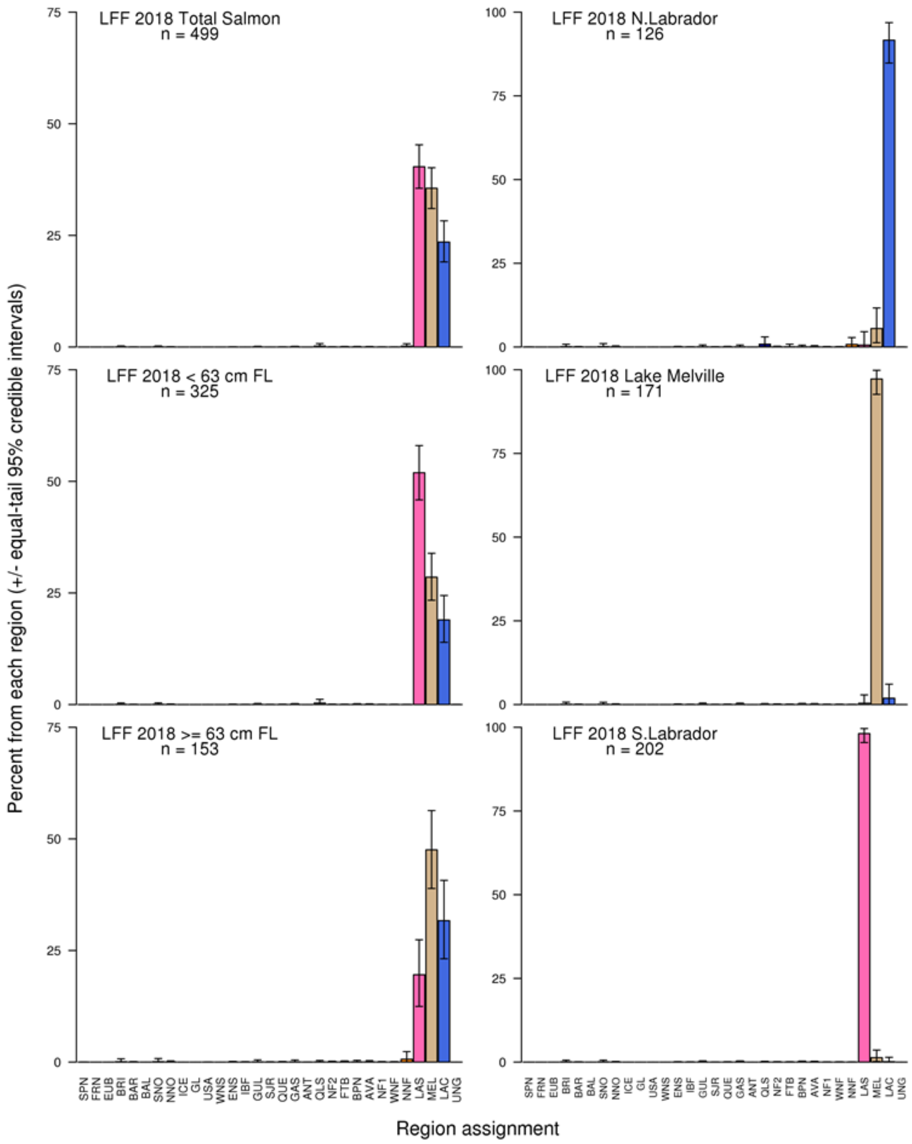


Figure 4.1.5.4. Bayesian estimate of mixture composition of samples from the Labrador Atlantic salmon fisheries for 2018 by size group (small <63 cm, large ≥63 cm) and region (Figure 4.1.2.1: SFA 1A – N. Labrador, SFA 1B – Lake Melville, and SFA 2 – S. Labrador). Baseline locations refer to regional reporting groups identified in Figure 4.1.5.1 and Figure 4.1.5.2. Regional assignment acronyms explained in Table 4.1.5.1. Data summarized in Table 4.1.5.2.

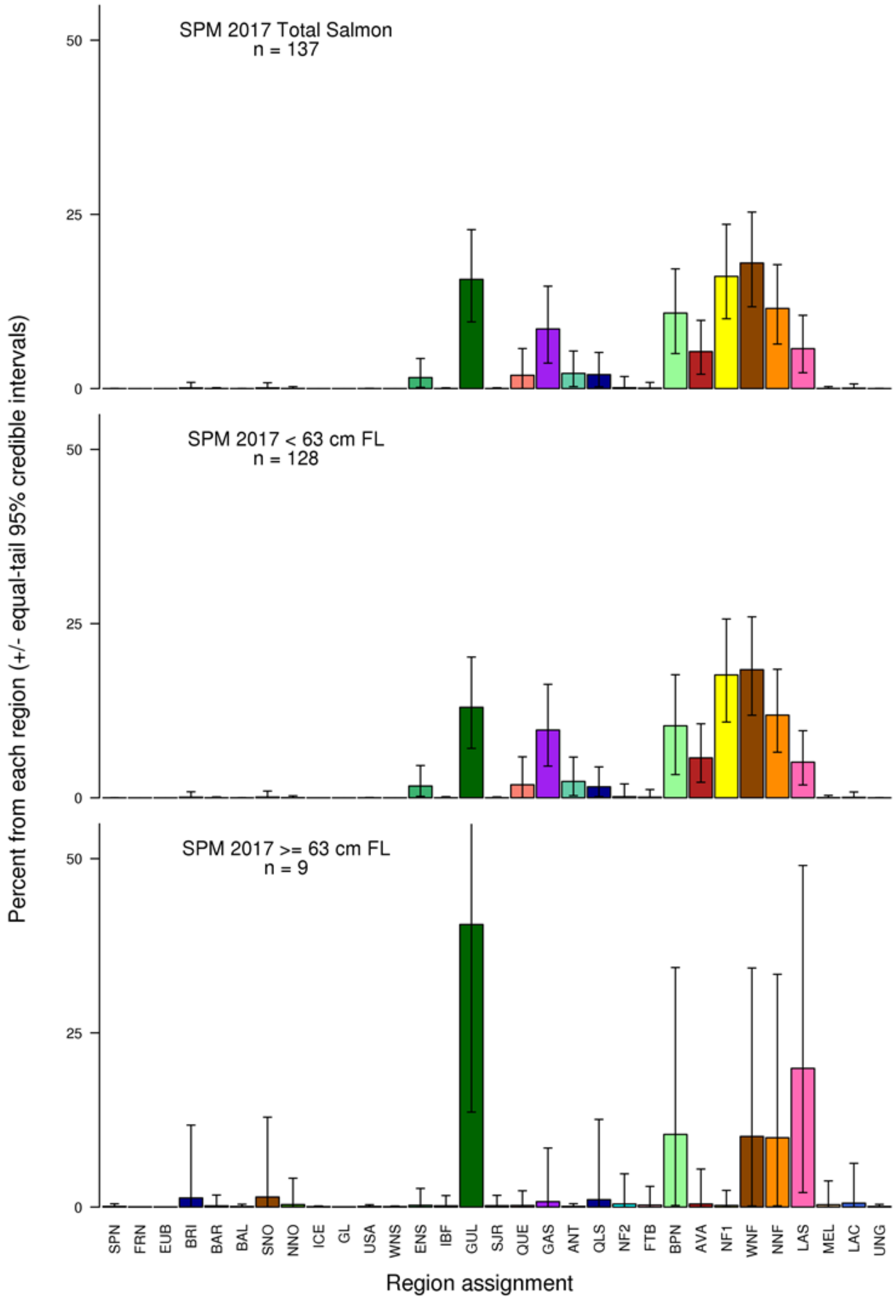


Figure 4.1.5.5. Bayesian mixture estimates of composition of samples from the Saint Pierre and Miquelon Atlantic salmon fishery using SNPs for 2017 overall and by size group (small <63 cm, large ≥63 cm). Baseline locations refer to regional reporting groups identified in Figure 4.1.5.1 and Figure 4.1.5.2. Regional assignment acronyms explained in Table 4.1.5.1. Data summarized in Table 4.1.5.3. Note that credible intervals with a lower bound including zero indicate little support for the mean assignment value.

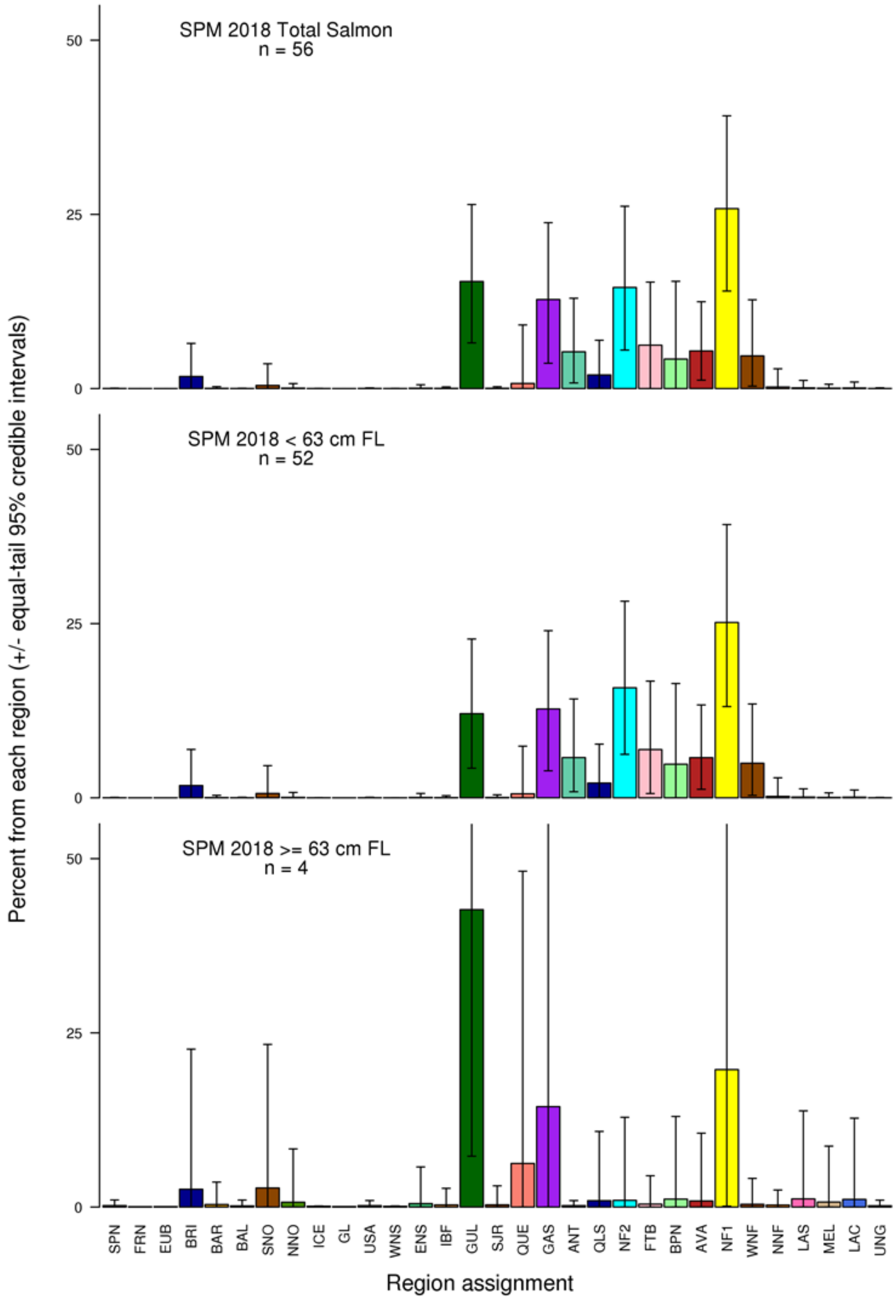


Figure 4.1.5.6. Bayesian mixture estimates of composition of samples from the Saint Pierre and Miquelon Atlantic salmon fishery using SNPs for 2018 overall and by size group (small <63 cm, large ≥63 cm). Baseline locations refer to regional reporting groups identified in Figure 4.1.5.1 and Figure 4.1.5.2. Regional assignment acronyms explained in Table 4.1.5.1. Data summarized in Table 4.1.5.3. Note that credible intervals with a lower bound including zero indicate little support for the mean assignment value.

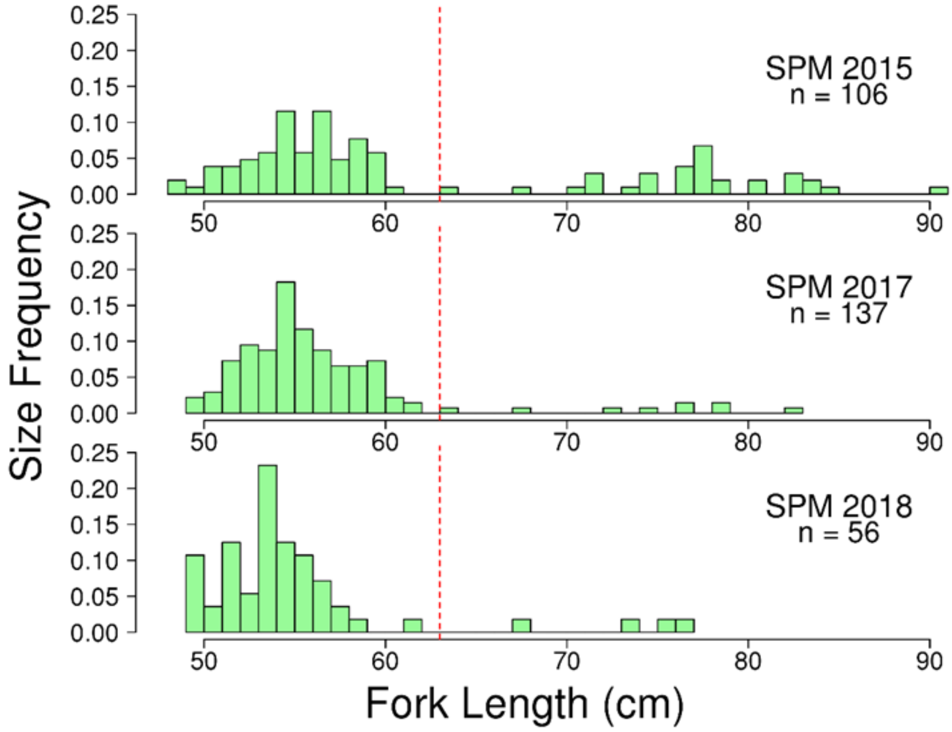


Figure 4.1.5.7. Frequency of large (≥63 cm) and small (<63 cm) samples from the Saint Pierre and Miquelon Atlantic salmon fishery from 2015, 2017, 2018 (2015 data from Bradbury *et al*., 2018).

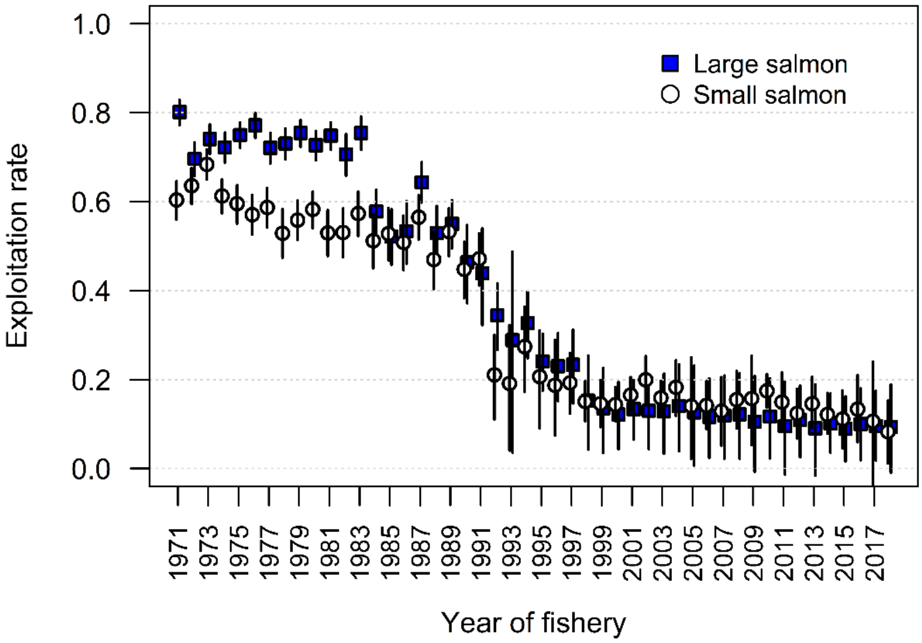


Figure 4.1.6.1. Exploitation rates in North America on the North American stock complex of small and large salmon 1971 to 2018. The symbols are the median and the error bars are the 5th to 95th percentiles of the distributions from Monte Carlo simulation.

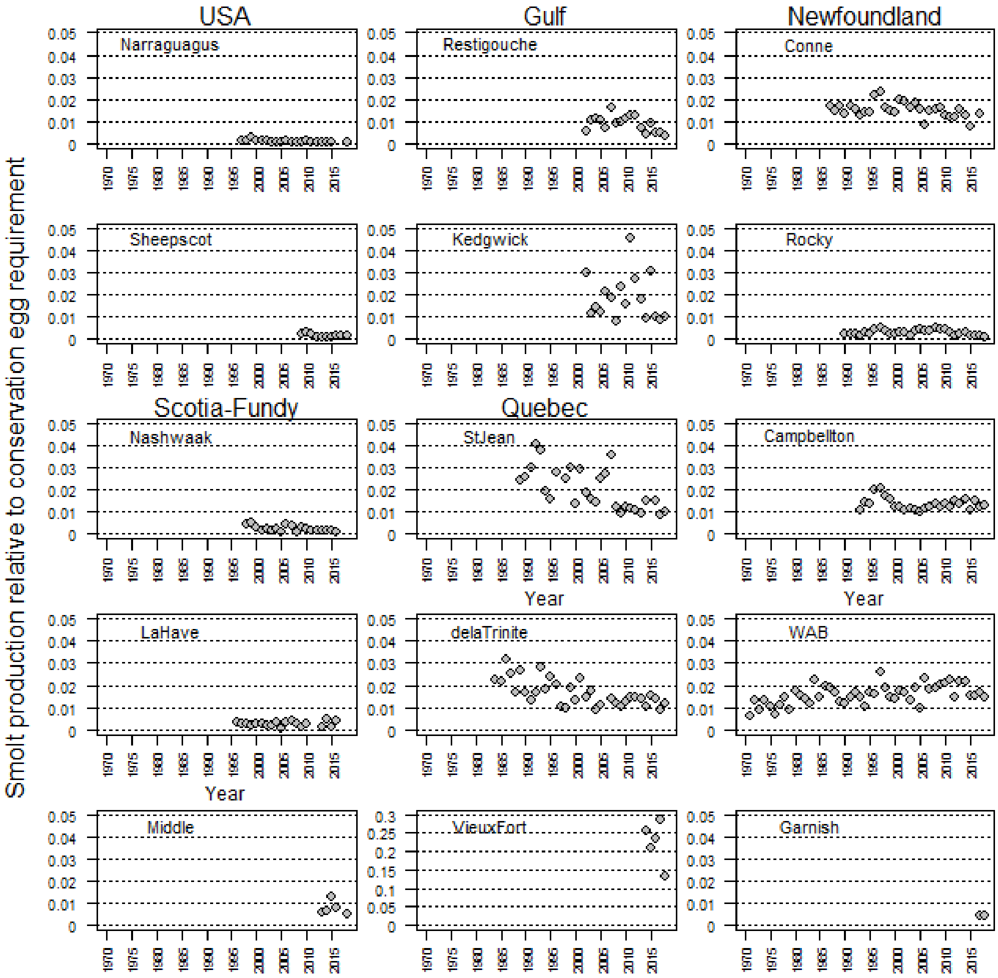


Figure 4.3.1.1. Time-series of wild smolt production from eleven monitored rivers in eastern Canada and one river in eastern USA, 1970 to 2018. Smolt production is expressed as a proportion of the conservation egg requirements for the river. The Unama'ki Institute of Natural Resources began monitoring smolts on Middle River (Scotia-Fundy) in 2011 and smolt population estimates are available for 2013–2018 (excluding 2017).

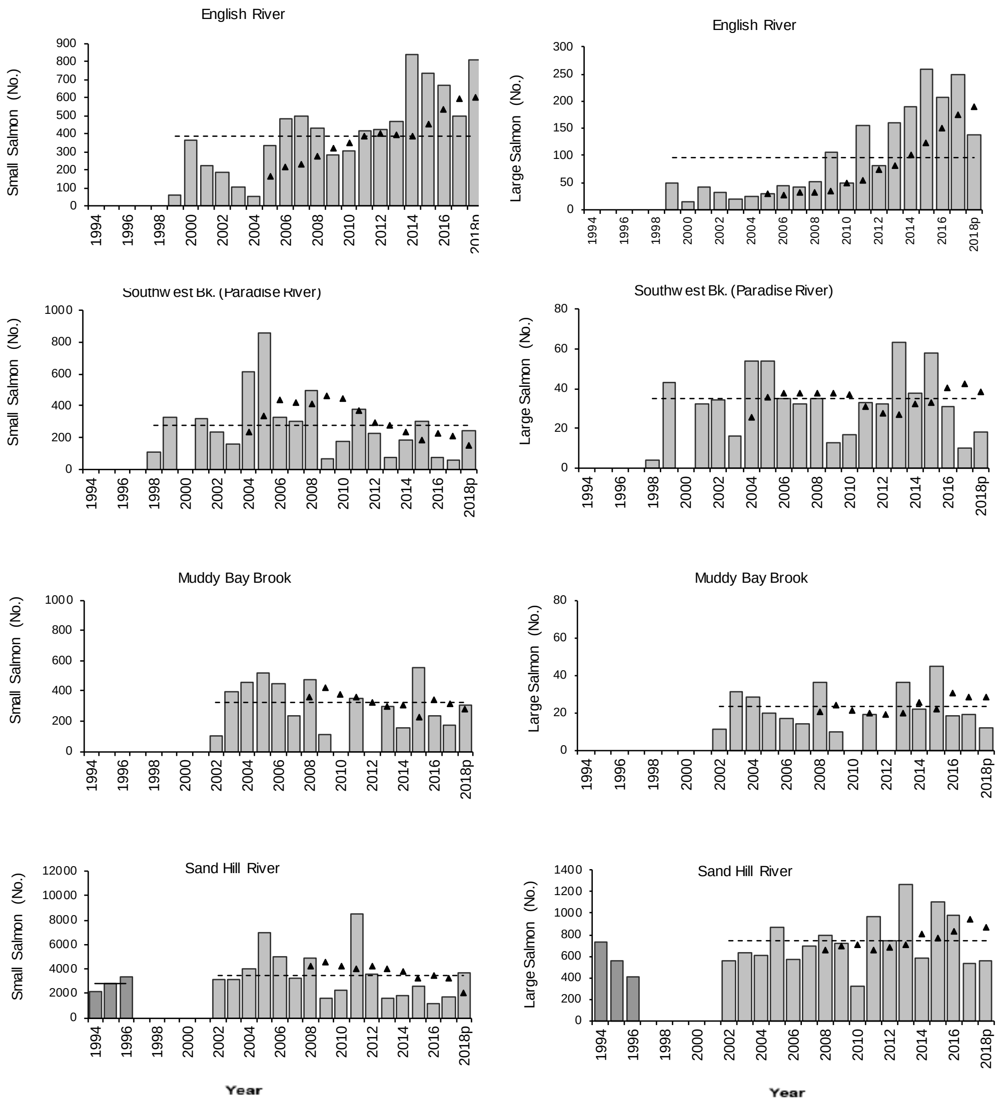


Figure 4.3.2.1. Total returns of small salmon (left column) and large salmon (right column) to English River (SFA 1), Southwest Brook (Paradise River) (SFA 2), Muddy Bay Brook (SFA 2), and Sand Hill River (SFA 2) Labrador, 1994–2018. The solid horizontal line represents the pre-moratorium (commercial salmon fishery in Newfoundland and Labrador) mean, the dashed line the moratorium mean, and the triangles the previous six-year mean.

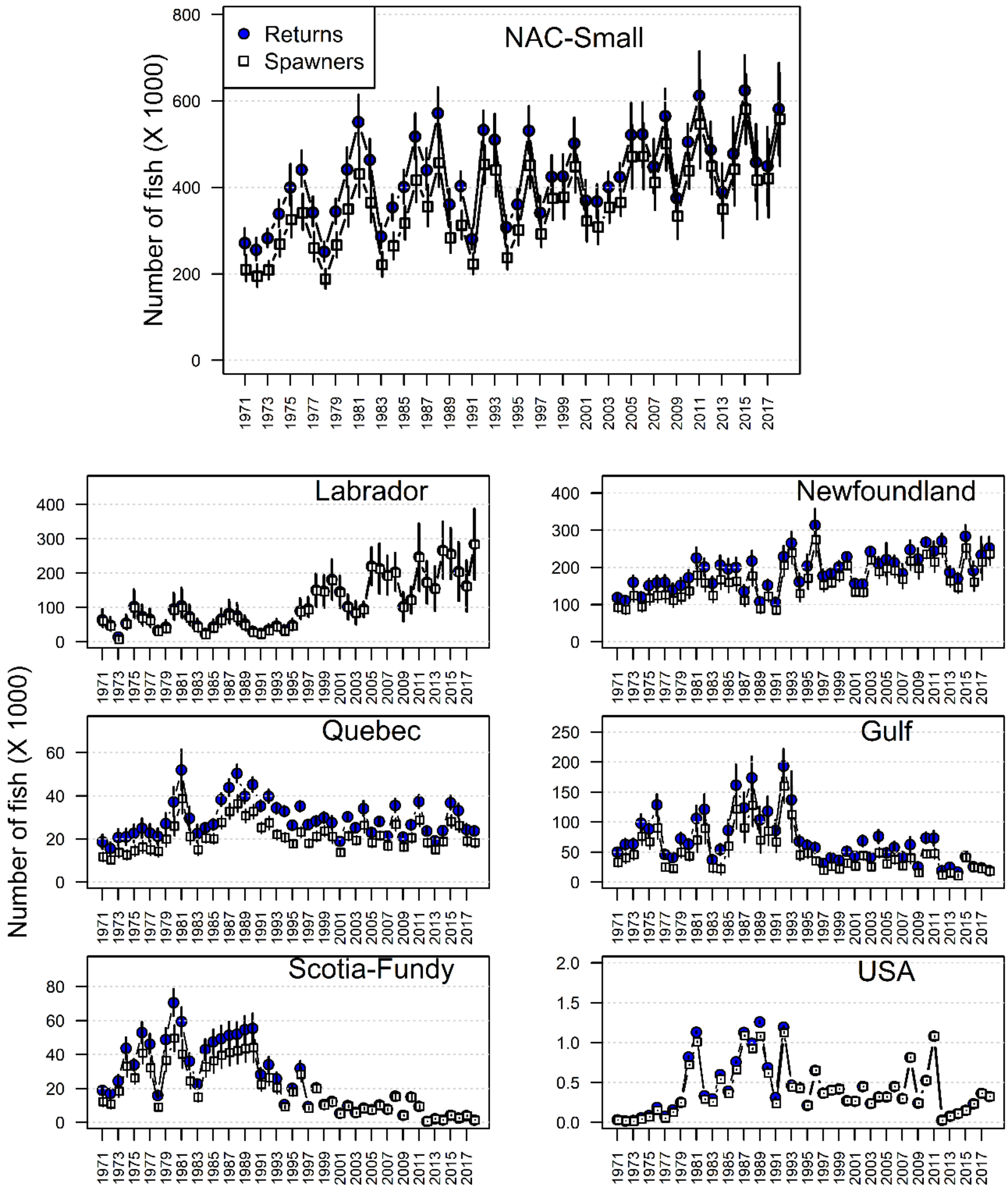


Figure 4.3.2.2. Estimated (median 5th to 95th percentile range, X 1000) returns (shaded circles) and spawners (open square) of small salmon for NAC and to each of the six assessment regions 1971 to 2018. Returns and spawners for Scotia-Fundy do not include those from SFA 22 and a portion of SFA 23.

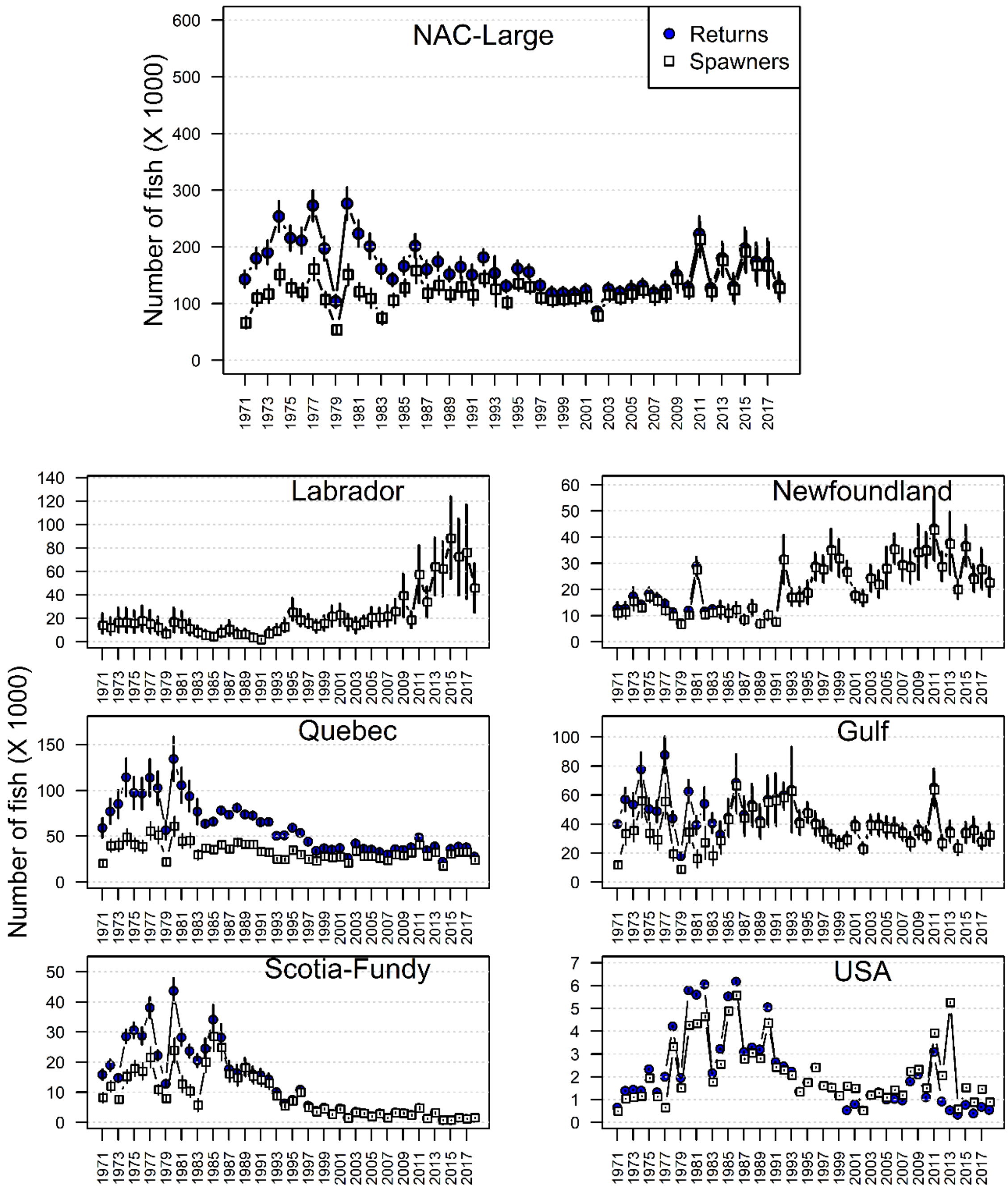


Figure 4.3.2.3. Estimated (median 5th to 95th percentile range, X 1000) returns (shaded circles) and spawners (open square) of large salmon for NAC and to each of the six assessment regions 1971 to 2018. Returns and spawners for Scotia-Fundy do not include those from SFA 22 and a portion of SFA 23. For USA estimated spawners exceed the estimated returns due to adult stocking restoration efforts.

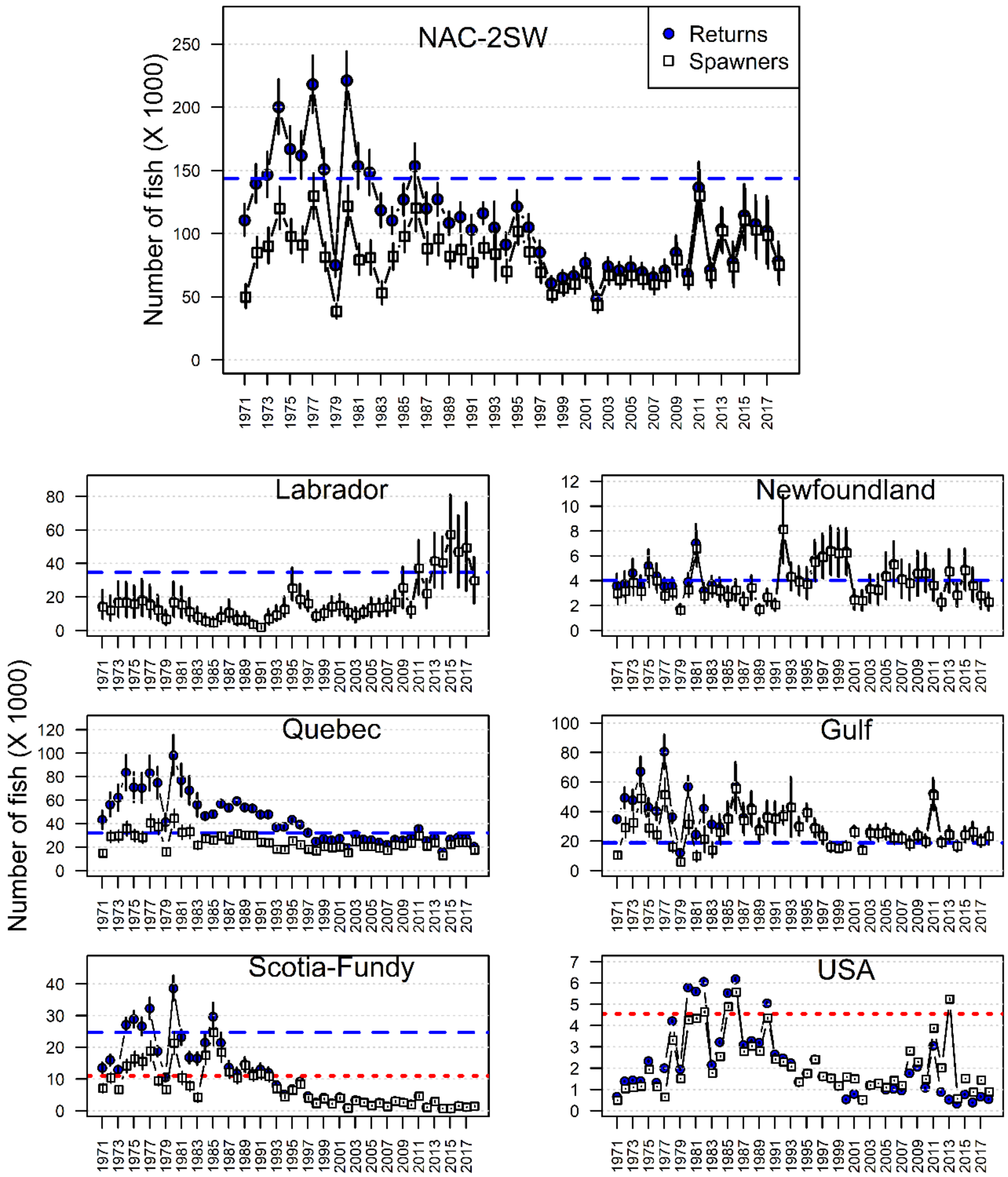


Figure 4.3.2.4. Estimated (median 5th to 95th percentile range, X 1000) returns (shaded circles) and spawners (open square) of 2SW salmon for NAC and to each of the six assessment regions 1971 to 2018. The dashed line is the corresponding 2SW Conservation Limit for NAC overall and for each region; the 2SW CL for USA (29 990 fish) is off the scale in the plot for USA. The dotted line in the Scotia-Fundy and USA panels are the region specific management objectives. Returns and spawners for Scotia-Fundy do not include those from SFA 22 and a portion of SFA 23. For USA estimated spawners exceed the estimated returns due to adult stocking restoration efforts; therefore 2SW returns are assessed relative to the management objective for USA.

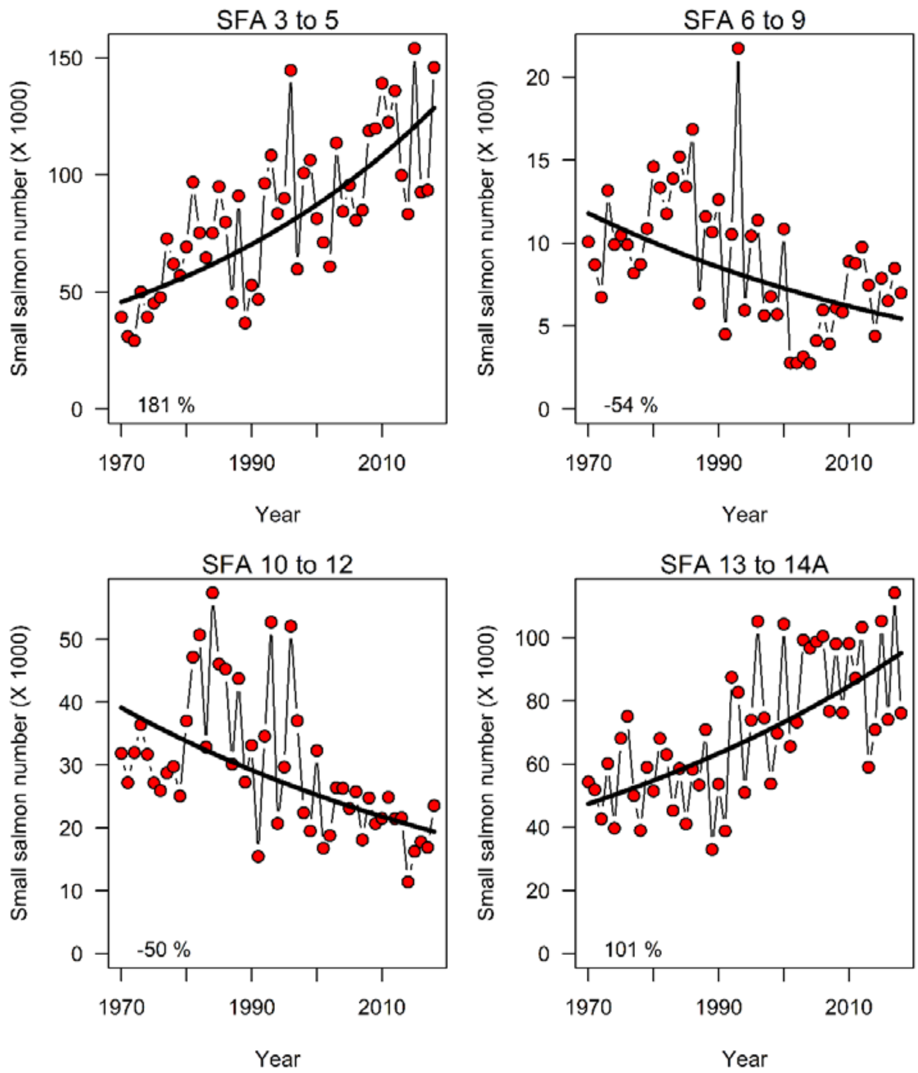


Figure 4.3.2.5. Estimated (median, X 1000) returns of small salmon to subregions of Newfoundland (SFA locations are shown in Figure 4.1.2.1) over the period 1971 to 2018. The exponential trend line and the percent change over the time-series are shown in each panel.

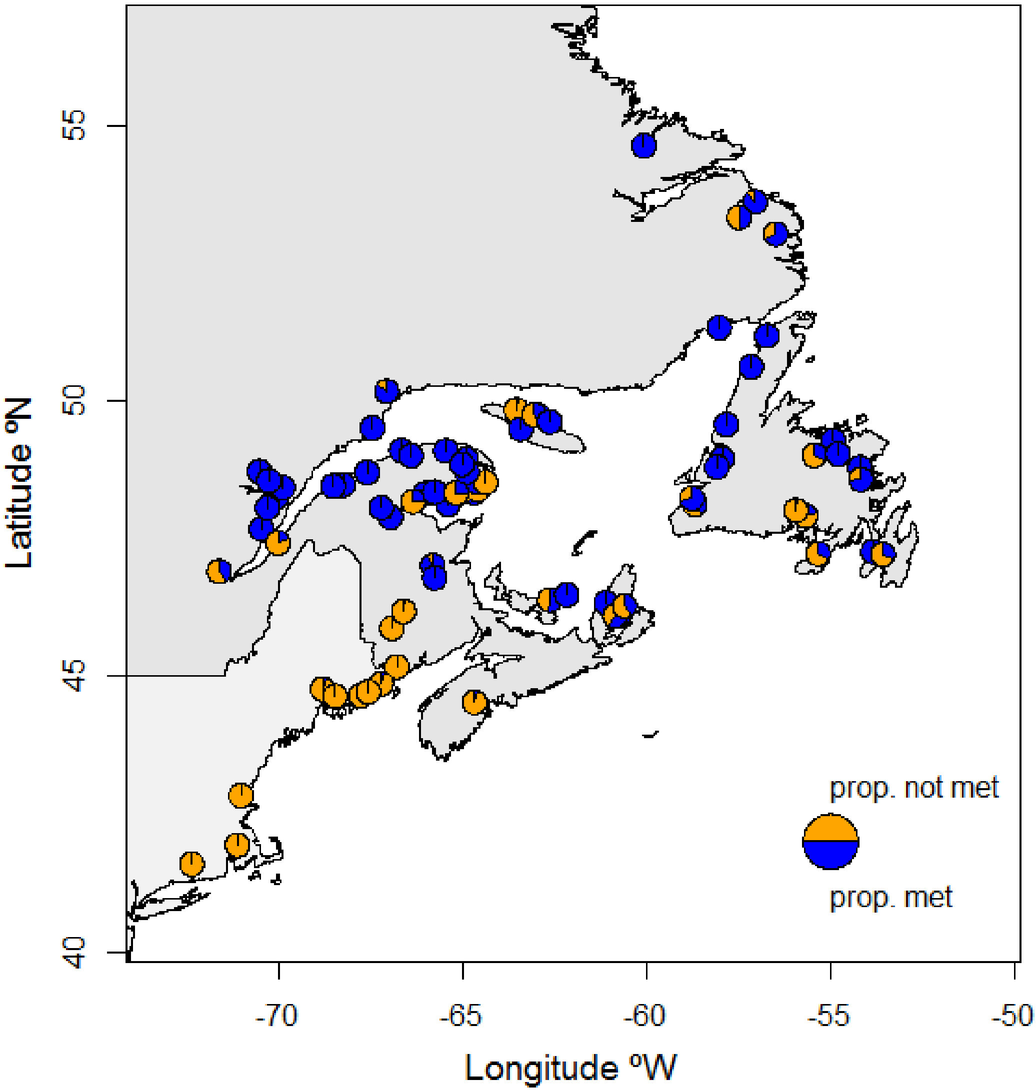


Figure 4.3.4.1. Proportion of the conservation requirement attained in the 86 assessed rivers of the North American Commission area in 2018.

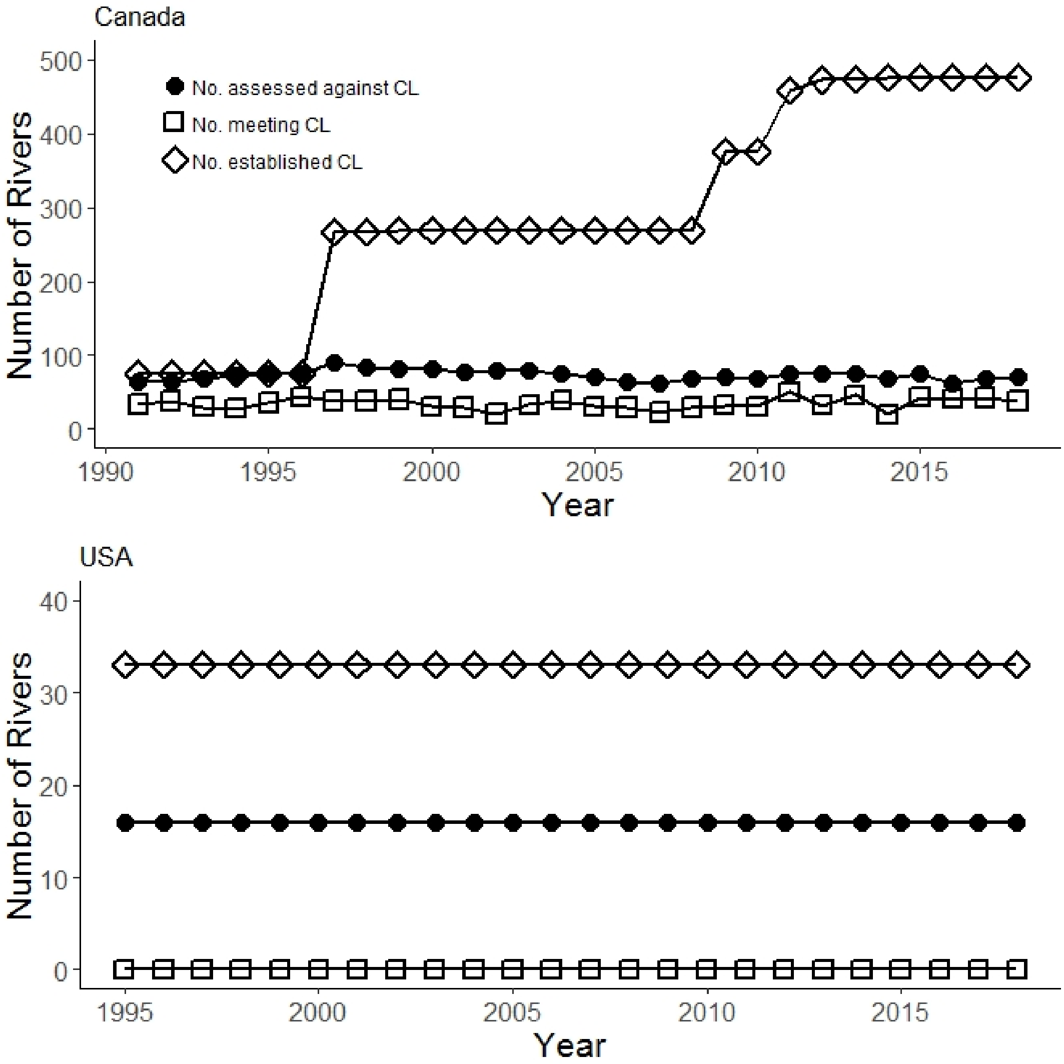


Figure 4.3.4.2. Time-series for Canada and the USA showing the number of rivers with established CLs, the number rivers assessed, and the number of assessed rivers meeting CLs for the period 1991 to 2018.

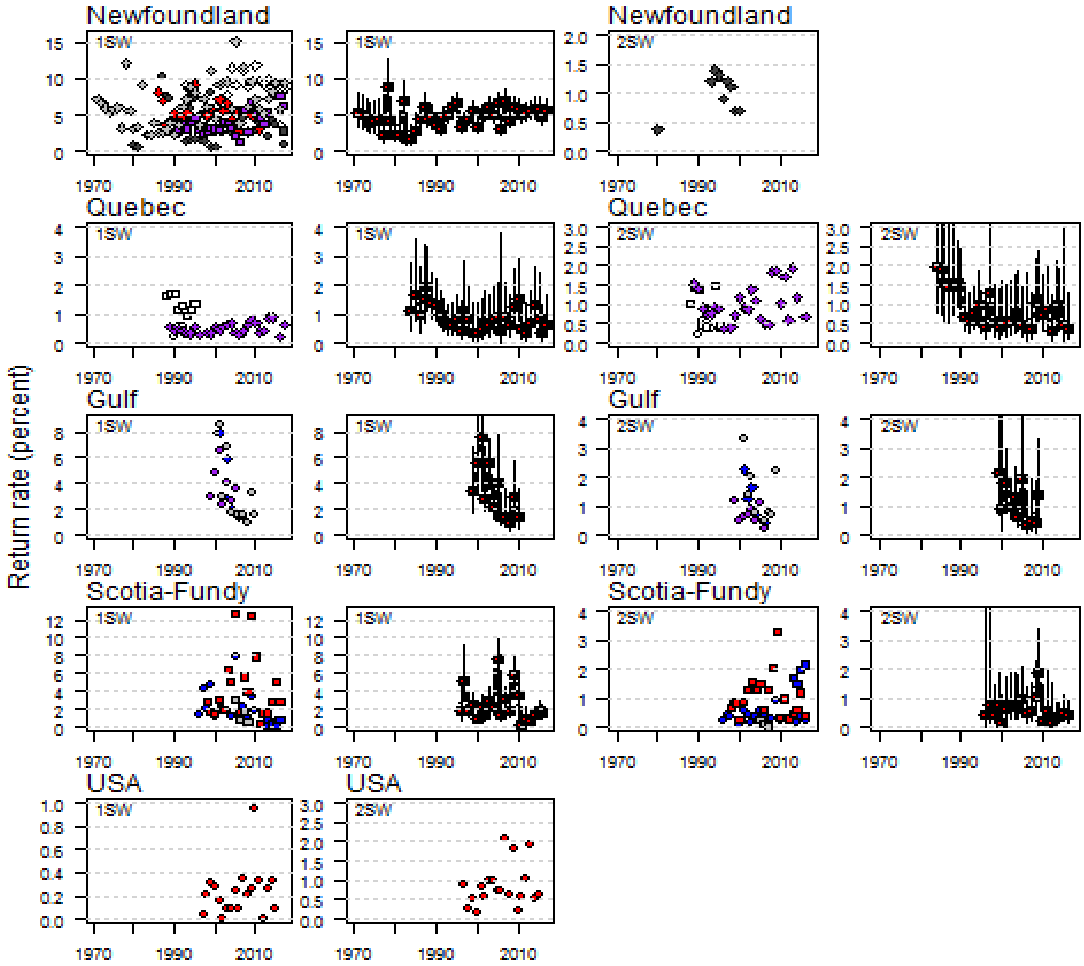


Figure 4.3.5.1. Estimated annual return rates (left and third column of panels; individual rivers are shown with different symbols and colours) and least squared (or marginal mean) mean annual return rates (with one standard error bars) (second and right column of panels) of wild origin smolts to 1SW and 2SW salmon to the geographic areas of North America. The standardized values are annual means derived from a general linear model analysis of rivers in a region. Note y-scale differences among panels. Standardized rates are not shown for regions with a single population.

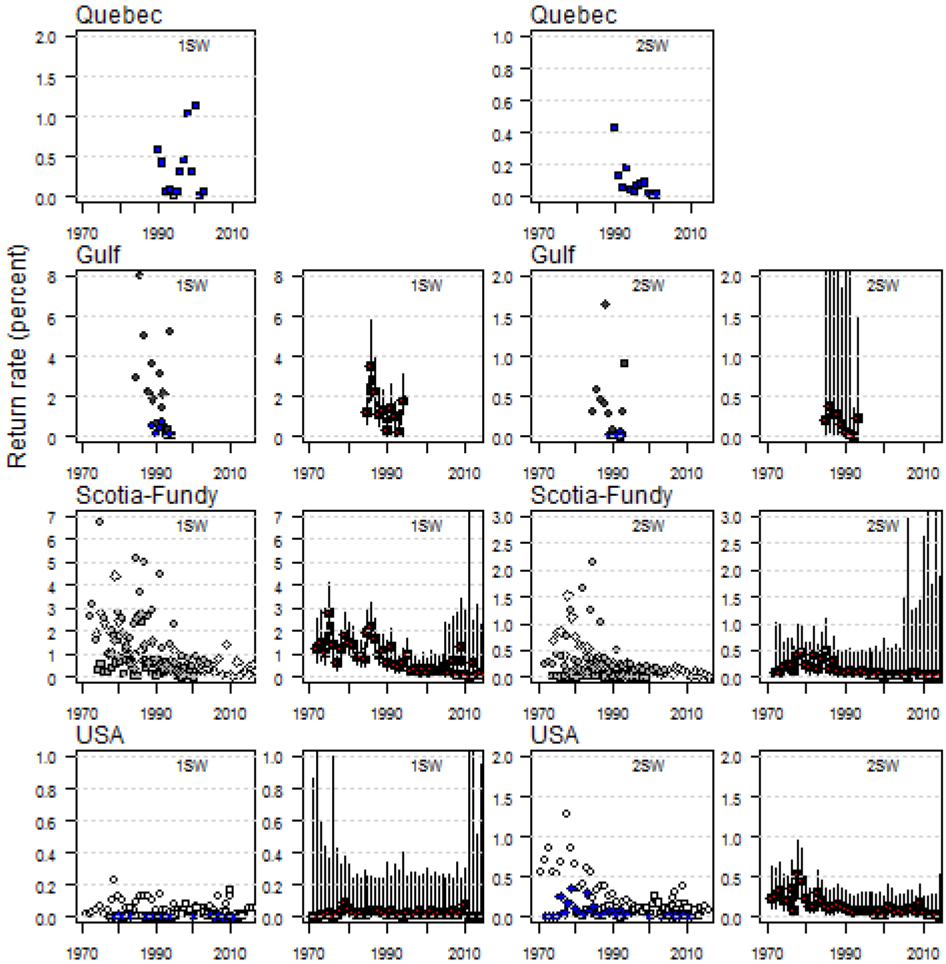


Figure 4.3.5.2. Estimated annual return rates (left and third column of panels; individual rivers are shown with different symbols and colours) and least squared (or marginal mean) mean annual return rates (with one standard error bars) of hatchery origin smolts to 1SW and 2SW salmon to the geographic areas of North America. The standardized values are annual means derived from a general linear model analysis of rivers in a region. Note y-scale differences among panels. Standardized rates are not shown for regions with a single population.

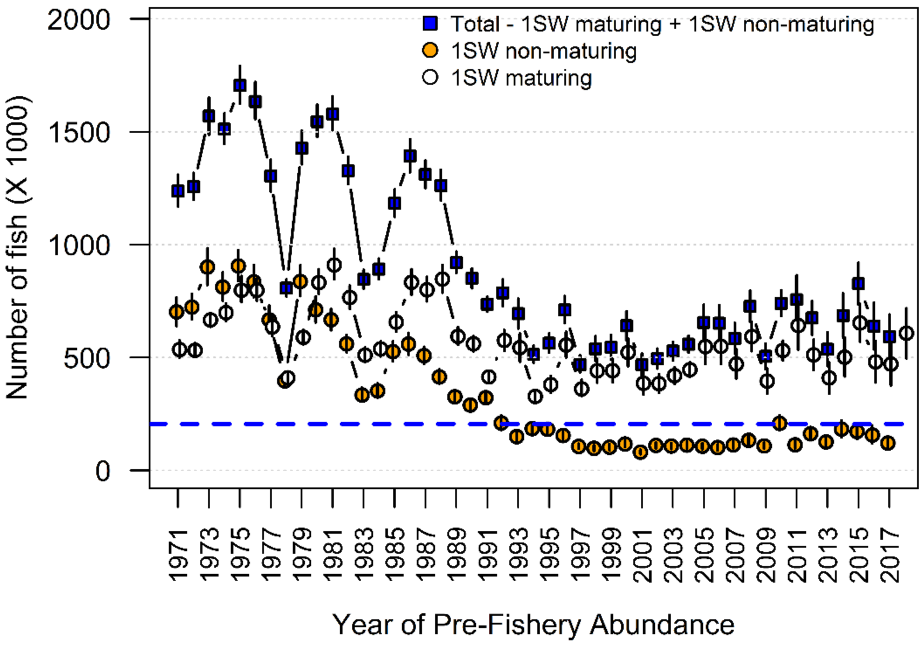


Figure 4.3.6.1. Estimated (median, 5th to 95th percentile range, X 1000) Pre-fishery Abundance (PFA) for 1SW maturing, 1SW non-maturing, and total cohort of 1SW salmon for NAC, PFA years 1971 to 2017. The dashed blue horizontal line is the corresponding sum of the 2SW conservation limits for NAC (152 548) corrected for 11 months of natural mortality (205 918) against which 1SW non-maturing are assessed.

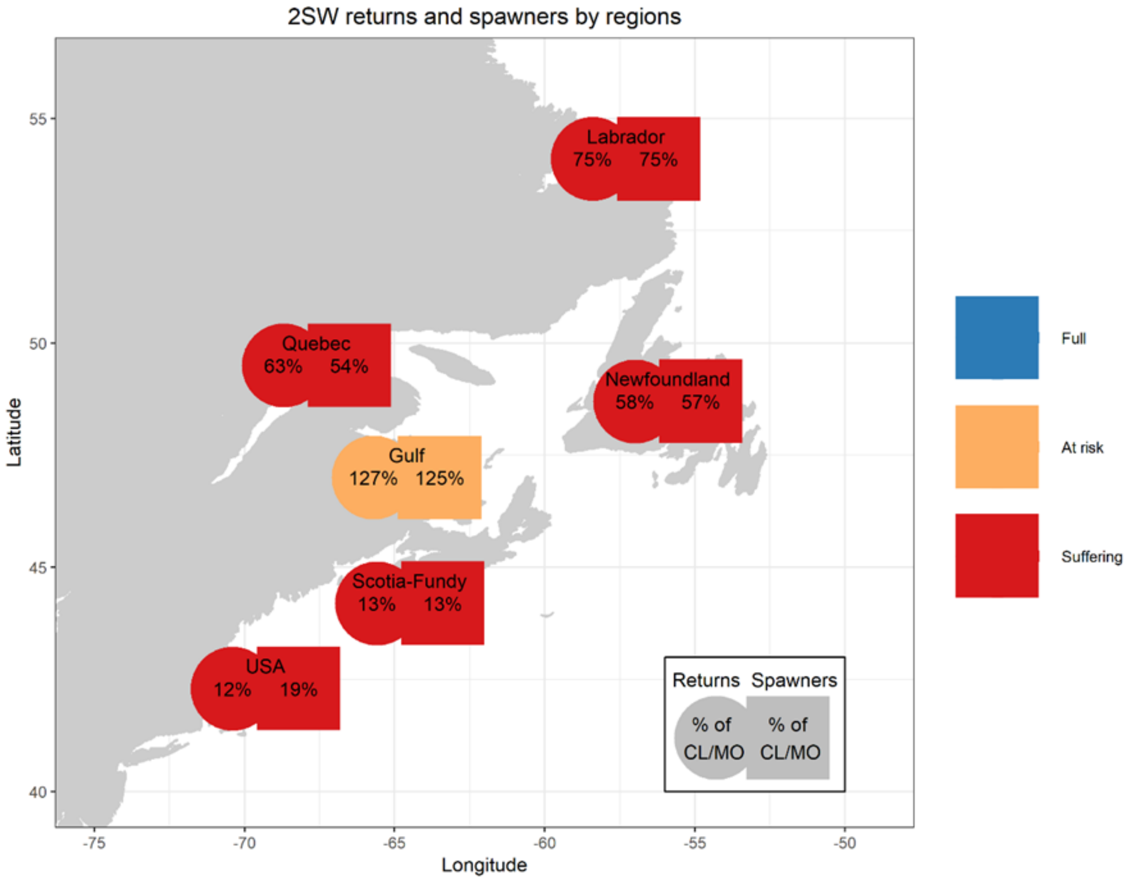


Figure 4.3.7.1. Estimated returns (square symbol) and spawners (circle symbol) of 2SW salmon in 2018 to six assessment regions of North America relative to ICES stock status categories. The percentage of the 2SW CLs for the four northern regions and to the rebuilding management objectives (MO) for the two southern areas are shown based on the median of the Monte Carlo distribution. The colour shading 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).

5 Atlantic salmon in the West Greenland Commission

5.1 NASCO has requested ICES to describe the key events of the 2018 fishery

The previous advice provided by ICES (2018) indicated that there were no mixed-stock fishery catch options on the 1SW non-maturing salmon component for the 2018 to 2020 PFA years. The NASCO Framework of Indicators for the West Greenland Commission, run in January 2019, did not indicate the need for a revised analysis of catch options and therefore no new management advice for 2019 or 2020 is provided. This year's assessment of the contributing stock complexes confirms the previously provided advice.

The Atlantic salmon fishery is regulated according to the Government of Greenland's Executive Order no. 5 of 21, 21 September 2018. Since 1998, with the exception of 2001, the export of Atlantic salmon has been banned. Since 2002 there have been two landing categories reported for the fishery: commercial landings where licensed fishers can sell salmon to hotels, institutions and local markets and private landings where both licensed and unlicensed fishers fish for private consumption. During 2012 to 2014 (for the first time since 2001), licensed fishers were additionally allowed to land to factories and a 35 t factory quota was set by the Greenland authorities. This quota was reduced to 30 t in 2014. The quota did not apply to the commercial or private landings and the export ban persisted as the landed salmon could only be sold within Greenland. In 2015, the Government of Greenland unilaterally set a quota for all components of the fishery (private, commercial, and factory landings) to 45 t as a quota could not be agreed by all parties of the West Greenland Commission of NASCO (NASCO, 2015; see WGC(15)21). The Government of Greenland did agree that any overharvest in a particular year would result in an equal reduction in the catch limit in the following year and as a result of an overharvest in 2015, the 2016 quota was unilaterally set by Greenland to 32 t. Given the lack of overharvest in 2016, the 2017 quota was set to 45 t. The export ban persists as the landed salmon could only be sold within Greenland.

In 2018, the Government of Greenland set a total quota for all components of the 2018–2020 fisheries to 30 t as agreed by all parties of the West Greenland Commission of NASCO (NASCO, 2018; see WGC(18)11). 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 wild Atlantic salmon or its products from Greenland and to prohibit landings and sales to fish processing factories. They also agreed to restrict the fishery from 15 August to no later than 31 October each year and 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 including 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 licensed fishers, and mandatory reporting requirements of all fishers. The measure also stated that as a condition of the licence, all fishers will be required to allow samplers from the NASCO sampling program to take samples of their catches upon request. The measure was applied to the 2018 fishery and will apply to the 2019 and 2020 fisheries if the FWI indicate no significant change in the previously provided catch advice.

Only hooks, fixed gillnets and driftnets are allowed to target salmon directly and the minimum mesh size has been 140 mm (stretched mesh) since 1985. Since 2015, the fishing season has been set from 15 August with a closing date of 31 October or until the total quota was reached. The

2018 fishery was closed on 31 October and a total of 18.4 t had been registered. Due to an administrative oversight, reports from two municipalities were not received. In addition, due to the consequence of not receiving a licence in the following year unless a report was received, reports from individual fishers were submitted after the close of the fishery. The majority of these reports were of zero harvest and totalled only 0.5 t. As a result, the total reported landings for the 2018 fishery was corrected to 39.9 t in March 2019 resulting in an overharvest of approximately 10 t.

5.1.1 Catch and effort in 2018

Commercial fishers are allowed to use up to 20 gillnets at a time either as single gillnets fixed to the shore or up to 20 sections (~70 m per section) connected and used as a driftnet. Private licensed fishers can only use one gillnet fixed to the shore. All nets must be tended regularly and marked with name and contact information. Gillnets are only allowed in the inshore areas.

Nets are the preferred gear in Greenland and very little rod and reel fishing in salt water takes place. However, a recreational fishery directly targeting salmon via rod and reel seems to be slowly evolving among a small number of residents in the Nuuk and Qaqortoq regions. Reporting landings from this fishery is mandatory, but are considered insignificant at this time.

Catch data were collated from fisher reports. The reports were screened for errors and missing values. Catches were assigned to a NAFO/ICES Division based on the reporting community. Reports which contained only the total number of salmon caught or the total catch weight without the number of salmon, were corrected using 3.25 kg gutted weight per salmon. Since 2005, it has been mandatory to report gutted weights, and these have been converted to whole weight using a conversion multiplier of 1.11.

In 2018, a total catch of 39.9 t was reported and was distributed among the six NAFO Divisions on the west coast of Greenland and in ICES Division XIV (East Greenland) (Tables 5.1.1.1 and 5.1.1.2; Figure 5.1.1.1). The 2018 total catch is an increase over the 2017 value (28.0 t). For West Greenland only, 39.0 t were reported in 2018 and 27.8 t in 2017. A harvest of 0.8 t was reported from East Greenland in 2018, accounting for 2.0% of the total reported catch. Harvest reported for East Greenland is not included in assessments of the contributing stock complexes, owing to a lack of information on the stock composition of that fishery. Reported landings of Atlantic salmon increased from 1960 to a peak of 2689 t reported in 1971 and generally decreased until the closure of the export commercial fishery in 1998. Reported landings for the internal use only fishery peaked in 2014 (57.8 t) and have averaged 38.0 t over the past ten years (2009–2018; Table 5.1.1.1; Figure 5.1.1.2). Of the total catch for 2018 (39.9 t), 81.5% (32.5 t) was reported by commercial fishers and 18.5% (7.4 t) from private fishers (Table 5.1.1.3; Figure 5.1.1.2) compared to 88.9% (24.9 t) from commercial fishers and 11.1% (3.1 t) from private fishers in 2017 (Table 5.1.1.4). In 2018, 81.8% (32.6 t) were reported as commercial landings and 18.2% (7.3 t) were reported as for private use compared to the 2017 figures of 54.6% (15.3 t) and 45.4% (12.7 t) respectively. Only 0.4% (0.1 t) of commercial fisher landings were identified as for private use in 2018 compared to 39% in 2017. A small amount of private fisher landings (146 kg) were identified as for commercial use, although private fishers are not allowed to sell their catch.

There is currently no quantitative approach for estimating the unreported catch for the private fishery, but the 2018 value is likely to have been at the same level as reported by the Greenlandic authorities in recent years (10 t). The 10 t estimate was historically meant to account for private use fishers in smaller communities fishing for personal consumption, but not reporting landings. This estimate was not meant to represent non-reporting by commercial fishers. The Working Group previously did not have a method for estimating unreported catch from commercial fishers until recently with the implementation of official comparisons of the sampling program statistics and reported landings as well as the previously implemented phone surveys. An adjustment for some unreported catch, primarily for commercial landings, has been done since 2002 by comparing the weight of salmon seen by the sampling teams and the corresponding community-specific reported landings for the entire fishing season (see Section 5.2). However, sampling only occurs during a portion of the fishing season and therefore these adjustments are considered minimum adjustments for unreported catch.

The seasonal distribution of catches has previously been reported to the Working Group (ICES, 2002), but since 2002 this has generally not been possible. Although fishers are required to record daily catches, previous comparisons of returned catch reports suggest that many fishers do not provide daily statistics. The seasonal distribution for factory landings, when allowed, is assumed to be accurate given the reporting structure in place between the factories and the Greenland Fisheries Licence Control Authority (GFLK).

The Working Group is aware of the updated reporting requirements starting with the 2015 fishery and they reported on the seasonal distributions of catches for the 2016 and 2017 fisheries (ICES, 2017a; ICES, 2018). The Working Group did not receive information on the seasonal distributions of catches for the 2018 fishery. Reported landings for the 2016 and 2017 fisheries did seem to reflect general spatial/temporal patterns of the fishery (early reported landings in the southern regions (1D–1F), later reported landings in the northern regions (1A–1C), low landings in the northernmost regions (1A–1B)). Given the absence of temporal landings statistics for the 2018 fishery the Working Group was unable to present the temporal dynamics of the fishery or formally compare reported landings by standard week and community to the sampling data to evaluate if non-reporting was evident.

Greenland Authorities issued 786 licences (329 for commercial fishers and 457 for private fishers) and received 1536 reports from 557 fishers in 2018 (Table 5.1.1.3; Table 5.1.1.5; Figure 5.1.1.3). The overall reporting rate was 71% (786 licences issued and 557 reporting fishers): commercial fisher reporting rate was 71% (329 licences issued and 235 reporting fishers) and private fisher reporting rate was 70% (457 licences issued and 322 reporting fishers). In 2017, 631 reports from 143 fishers (93 commercial and 50 private) and 282 commercial licences were received (Tables 5.1.1.4 and 5.1.1.5; Figure 5.1.1.3). The 2017 commercial fisher reporting rate was 33% (282 licences issued and 93 reporting fishers). The number of licences issued, the number of fishers who reported, and the number of reports received increased in 2018 as a result of the new regulations requiring all fishers to receive a licence and mandatory reporting requirements. These levels are among the highest in the time-series and the number of fishers reporting landings matches the levels recorded during the commercial export fishery from 1987 to 1991.

The Working Group previously reported on the procedures for reporting salmon harvested in Greenland (ICES, 2014; ICES, 2016) and modifications to these procedures were made by the Government of Greenland in 2018. In summary, all fishers are required to have a licence to fish for Atlantic salmon and all licence holders are required to report catches. Reports can be made to GFLK by email, phone, fax, or return logbook on a daily basis. Factory landings, when allowed, are submitted to GFLK either on a daily or weekly basis, depending on the likelihood of exceeding a quota. No factory landings were allowed in 2018.

Similar information is requested for factory, commercial and private fisher landings. Requested data include fishing date, location, and information on catch and effort required for the calculation of catch per unit of effort statistics. These types of data allow for a more accurate characterization and assessment of the nature and extent of the fishery than is currently available. The Working Group did not receive any detailed statistics beyond reported landings and licence related information by community and NAFO Divisions and therefore could not further characterize and assess the fishery beyond what is currently presented. The Working Group has previously been informed that this level of detail is often lacking from commercial and private landing reports. The variations in the numbers of people reporting catches, variation in reported landings in each of the NAFO Divisions and documentation of non-reporting of landings (ICES, 2018) highlights the need for better landings data. The Working Group recommends that the Government of Greenland continue efforts to improve the reporting system of catch in the Greenland fishery and that detailed statistics related to spatially and temporally explicit catch and effort data for all fishers be made available to the Working Group for analysis.

5.1.2 Phone surveys

The Working Group was informed that a phone survey to gain further information on the 2018 fishery was not initiated. Phone surveys were previously conducted in 2015, 2016, and 2017 to assess the 2014, 2015, and 2016 fisheries, respectively. The number of fishers contacted, the questions asked, and the method to estimate unreported catch differed from year to year. Based on the results from these surveys, estimated 'adjusted landings (survey)' of 12.2 t for the 2014 fishery, 5.0 t for the 2015 fishery, and 4.2 t for the 2016 fishery were added to the 'adjusted landings (sampling)' as described in Section 5.2, and 'reported landings' to estimate the 'landings for assessment'. A phone survey was initiated for the 2017 fishery, but only nine fishers were contacted. Given the small number of fishers contacted, no landings adjustment were estimated. Phone surveys were not conducted following the 2018 fishery and therefore no landing adjustments were estimated. A summary of the reported landings, adjusted landings (sampling), and adjusted landings (survey) is presented in Table 5.1.2.1. Adjusted 'landings for assessment' do not replace the official reported statistics.

5.1.3 Exploitation

An extant exploitation rate for NAC and Southern NEAC non-maturing 1SW fish at West Greenland can be calculated by dividing the estimated continent of origin reported harvest of 1SW salmon at West Greenland by the PFA estimate for the corresponding year for each stock complex. Exploitation rates are available for the 1971 to 2017 PFA years (Figure 5.1.3.1). The most recent estimate of exploitation available is for the 2017 fishery as the 2018 exploitation rate estimates are dependent on the 2018 PFA estimates, which depends on 2019 2SW returns. NAC PFA estimates (Table 4.3.6.1) are provided for August of the PFA year and Southern NEAC PFA estimates (Table 3.3.4.4) are provided for January of the PFA year, the latter adjusted by seven months (1 January to 1 August) of natural mortality at 0.03 per month. The 2017 NAC exploitation rate was 6.7%, which is a slight increase over the 2016 estimate (5.4%), but below the previous five-year mean (8.4%, 2012–2016). It remains among the lowest in the time-series, but within the range of exploitation estimates calculated since the early 2000s. NAC exploitation rate peaked in 1971 at approximately 41%. The 2017 Southern NEAC exploitation rate of 0.8% is equal to the 2016 estimate and the previous five-year mean (2012–2016). The 2017 estimate remains one of the lowest in the time-series. Southern NEAC exploitation rate at Greenland peaked in 1975 at 35%. It should be noted that annual estimates of exploitation vary slightly from year to year as they are dependent on the output from the run-reconstruction models, which vary slightly from assessment to assessment (see Sections 4.3.6.1 and 3.3.1).

5.2 International sampling programme

The international sampling programme for the fishery at West Greenland agreed by the parties at NASCO continued in 2018 (NASCO 2018; see WGC(18)10). The sampling was undertaken by participants from Canada (1), Ireland (2), UK (Scotland) (1), UK (England and Wales) (1), and USA (1). Sampling began on 22 August and continued through 5 October 2018.

Samplers were stationed in four communities (Figure 5.1.1.1) representing four NAFO Divisions: Sisimiut (NAFO division 1B), Maniitsoq (1C), Paamiut (1E) and Qaqortoq (1F). As in previous years, no sampling occurred in the fishery in East Greenland. No sampling occurred at any factories as factory landings were not allowed in 2018. Tissue and biological samples were collected from all sampled fish.

A total of 1563 salmon were observed by the sampling teams, approximately 12% by weight of the reported landings. Of this total, 1115 were sampled for biological characteristics, 265 fish were only checked for an adipose clip, and 183 were documented as being landed, but were not sampled or examined further. A total of 1064 fork lengths and weights, 1048 scale samples for age determination, and 1111 tissue samples for DNA analysis to determine the continent and region of origin of the fish were available for analysis (Table 5.2.1). A subsample of 979 genetic samples were processed for continent of origin analysis due to resource limitations.

A total of 11 adipose fin clipped fish were recorded, no internal or external tags were identified by samplers. Two tags not reported by samplers, both of Canadian origin, were returned directly to the Greenland Institute of Natural Resources in 2018.

Starting in 2002, non-reporting of harvest was evident based on a comparison of reported landings and sample data. In at least one of the NAFO Divisions where international samplers were present, the sampling team observed more fish than were reported as being landed for the whole season. When there is this type of discrepancy, the reported landings are adjusted ("Adjusted landings (sampling)") according to the estimated total weight of the fish identified as being landed during the sampling effort and these adjusted landings are carried forward for assessments. Adjusted landings do not replace the official reported statistics (Tables 5.1.1.1 and 5.1.1.2).

The time-series of reported landings and subsequent adjusted landings (sampling) for 2002–2018 are presented in Table 5.2.2. In most years, with the exception of 2006, 2011, 2015 and 2018, discrepancies were identified, although sometimes minor in magnitude. It should be noted that samplers are only stationed within selected communities for 2–6 weeks in total per year whereas the fishing season runs for 10–12 weeks. It is not possible to correct for non-reporting for an entire fishing season or area given the discrepancy in sampling coverage vs. fishing season without more accurate daily/weekly catch statistics. Landings for assessment are presented in Table 5.1.2.1.

Landings in Nuuk were 20% of the total reported landings in 2018 and averaged 16% over the past ten years (2008–2017). As reported previously (ICES, 2012), access to fish in support of the sampling programme in Nuuk had in previous years been compromised. In 2015, the conditions attached to a salmon fishing licence were modified and a requirement allowing samplers access to landed catch was included. However, given the difficulty and cost associated with samplers participating in the sampling programme and potentially being denied access to fish, no commitment was made to send an international sampler to Nuuk in 2015.

As part of the international sampling programme agreed to by NASCO (NASCO, 2018; see WGC(18)10) the Government of Greenland, in cooperation with the Greenland Institute of Natural Resources, agreed to provide a local sampler to sample Atlantic salmon from Nuuk on a weekly basis during the 2018 fishing season. Unfortunately, only a small number of samples (n=3) from a single individual private fisher were collected from Nuuk in 2018. These samples and data have been included in the sampling database, but have not contributed to the analysis of the 2018 fishery given the low sample size. The Government of Greenland, in cooperation with the Greenland Institute of Natural Resources, had also agreed to provide a local sampler to sample Atlantic salmon from Nuuk on a weekly basis during the 2015–2017 fisheries (NASCO, 2015; NASCO, 2016; NASCO 2017), but no samples were collected.

Although the potential for bias exists when describing the biological characteristics of the harvest, stock assessment results, and catch advice, this potential bias is expected to be small given that sampling occurred both to the north (NAFO Division 1C) and to the south (NAFO Division 1E) of Nuuk. Regardless, the need to obtain samples from fish landed in Nuuk is reiterated given the magnitude of its reported landings. The Working Group recommends that the West Greenland Commission of NASCO continue to support the implementation of a broad geographic sampling programme, including sampling in Nuuk, and consideration should be given to expanding the programme across the fishing season to more accurately estimate continent and region of origin and biological characteristics of the mixed-stock fishery.

5.2.1 Biological characteristics of the catches

The mean length and whole weight of North American 1SW salmon was 63.8 cm and 2.91 kg and the means for European 1SW salmon were 63.9 cm and 2.93 kg (Table 5.2.1.1). The North American 1SW fork length estimate was slightly lower than the 2017 value (66.6 cm) and the previous ten year means (65.7 cm, 2008–2017). The European 1SW mean fork length was slightly lower than the 2017 value (64.8 cm) and the previous ten-year mean (64.5 cm, 2008–2017).

North American salmon sampled from the fishery at West Greenland were predominantly river age two (29.8%), three (38.4%) and four (24.1%) year old fish (Table 5.2.1.2). European salmon were predominantly river age two (62.1%) and three (19.0%) year old fish (Table 5.2.1.3). As expected, the 1SW age group dominated the 2018 sample collection for both the North American (97.4%) and European (97.4%) origin fish (Table 5.2.1.4).

5.2.2 Continent of origin of catches at West Greenland

In 2018, 1111 usable genetic samples were collected from four communities in four NAFO divisions: Sisimiut in 1B (n=387), Maniitsoq in 1C (n=480), Paamiut in 1E (n=26), and Qaqortoq in 1F (n=216). Due to funding limitations, a subset of 979 were genetically analysed: Sisimiut (n=323), Maniitsoq (n=413), Paamiut (n=26) and Qaqortoq (n=216) (Figure 5.2.2.1 and Table 5.2.2.1).

From 1969–2001, scale pattern analysis was used to make continent of origin determinations and estimate the proportion of the harvest originating in North American and European rivers (Reddin and Friedland, 1999). From 2002–2016, DNA isolation and the subsequent microsatellite analyses were performed according to standardized protocols (King *et al.*, 2001; Sheehan *et al.*, 2010). A database of approximately 5000 Atlantic salmon genotypes of known origin were used as a baseline to assign the samples to continent of origin.

In 2017, a Single Nucleotide Polymophism rangewide baseline (SNP; Jeffery *et al.*, 2018) providing 20 North American and eight European reporting groups was used for continent and region of origin analysis. The baseline has been revised, resulting in 21 North American and ten European reporting groups (Figure 5.2.2.2 and Table 5.2.2.2). A Bayesian approach is used to estimate mixture composition or assign individuals to continent and region of origin. The approach uses the R package rubias (Anderson *et al.*, 2008).

In total, 83.1% of the salmon sampled in 2018 were of North American origin and 16.9% were of European origin (Table 5.2.2.1). These findings show that large proportions of fish from the North American stock complex continue to contribute to the fishery (Figure 5.2.2.3 and Table 5.2.2.3). The NAFO division-specific continent of origin assignments for 2018 are presented in

Table 5.2.2.1 and Figure 5.2.2.4. The annual variation in the continental representation among divisions within the recent time-series (Figure 5.2.2.5) underscores the need to sample multiple NAFO Divisions to achieve the most accurate estimate of the contribution of fish from each continent to the mixed-stock fishery.

The estimated weighted proportions of North American and European salmon since 1982 and the weighted numbers of North American and European salmon caught at West Greenland (excluding unreported catch and reported harvest from ICES Area 14) are provided in Table 5.2.2.3 and Figure 5.2.2.6. Approximately 10 600 (~32.4 t) North American origin fish and approximately 2600 (~6.6 t) European origin fish were harvested in 2018. The 2018 total number of fish harvested (13 200) is an increase from the 2017 estimate (8300), but is only 3.9% of the maximum estimate of 336 000 fish harvested since 1982. Estimates prior to 1982 may be biased due to non-random sampling of catch, but approach 900 000 individuals harvested in the early 1970s.

5.2.3 Region of origin of catches at West Greenland

The Working Group has previously reported on the region of origin of catches at West Greenland, both for North American and European origin salmon (ICES, 2018). An update for the 2017 fishery (Table 5.2.3.1; Figure 5.2.3.1) and new results for the 2018 fishery (Table 5.2.3.2; Figure 5.2.3.2), based on the updated rangewide SNP baseline, is available. The North American contributions to the West Greenland fishery are dominated by the Gaspe Peninsula, the Gulf of St Lawrence, and the Labrador South reporting groups. These three groups accounted for 71% of the North American contributions in 2017 and 70% in 2018. The Northeast Atlantic contributions were dominated by the United Kingdom/Ireland reporting group (88% of the European contributions in 2017 and 84% in 2018).

From North America, there are smaller (2–5%), but consistent contributions to the harvest for a number of other reporting groups (Labrador Central, Lake Melville, Maine United States, Quebec City Region, St Lawrence N. Shore Lower, and Ungava). Within the European contributions, all other reporting groups were estimated to contribute 0–1% to the overall harvest. The update results support the previous conclusion by ICES (2017a) that stocks from Northern NEAC do not contribute a significant amount to the harvest at West Greenland. Further, the variation in NAFO division-specific region of origin assignments highlight the variation of region-specific contributions across years and NAFO divisions.

A single sample, based on the individual assignment method, was identified as having originated from the Greenland (i.e. Kapisillit River) reporting group. The fish was sampled on 14 September 2018 from the local market in Maniitsoq (NAFO Division 1C). The Kapisillit River is located at the head of the Nuup Kangerlua, adjacent to Nuuk in NAFO Division 1D. The fish was 66.8 cm FL, approximately 3.5 kg whole weight, river age of 4 years, marine age of 1SW and had not spawned previously.

5.3 NASCO has requested ICES to describe the status of the stocks

The stocks contributing to the Greenland fishery are the NAC 2SW and Southern NEAC MSW complexes. The midpoints of the spawner abundance estimates for the seven stock complexes exploited at West Greenland are below CLs (Figure 5.3.1). A more detailed overview of status of stocks in the NEAC and NAC areas is presented in the relevant Commission sections (Sections 3 and 4).

5.3.1 North American stock complex

The total estimate of 2SW salmon spawners in North America for 2018 decreased by 24% from revised 2017 estimate and ranks 29th (descending rank) out of the 48-year time-series. The mid-points of the spawner abundance estimates were below the CLs for all regions of NAC and are therefore suffering reduced reproductive capacity (Figure 4.3.2.4). The proportion of the 2SW CL attained from 2SW spawners was 75% for Labrador, 57% for Newfoundland, 54% for Québec, 125% for the Gulf region, and 6% and 3% (13% and 19% of the management objectives) for Scotia-Fundy and USA, respectively. Within each of the geographic areas, there are individual river stocks which are failing to meet CLs (Table 4.3.4.1 and Figure 4.3.4.2). In the southern areas of NAC (Scotia-Fundy and USA) there are numerous populations at high risk of extinction and these are under consideration or receiving special protections under federal legislation. The estimated exploitation rate of North American origin salmon in North American fisheries has declined (Figure 4.1.6.1) from peaks of 81% in 1971 for 2SW salmon to a mean of 10% over the past ten years.

5.3.2 MSW Southern European stock complex

The midpoint of the spawner abundance estimate for the Southern NEAC MSW stock complex was below the CL and is therefore suffering reduced reproductive capacity (Figure 3.3.4.2). Individual countries stock status within the NEAC MSW stock complex varied across all three stock status designations (Figure 3.3.4.5). Note that rivers in the south and west of Iceland are included in the assessment of the Southern NEAC stock complex (Figure 3.3.4.7). Within individual jurisdictions, there are large numbers of rivers not meeting CLs after homewater fisheries (Table 3.3.5.1 and Figure 3.3.5.1). The status of MSW spawners against CLs is summarized in Figure 5.3.1. Homewater exploitation rates on the MSW Southern NEAC stock complex are shown in Figure 3.1.9.1. Exploitation on MSW fish in Southern NEAC was 12% in 2018, which was similar to the previous five year (11%) and ten year (12%) means.

Table 5.1.1.1. Nominal catches of salmon at West Greenland since 1960 (t 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 1969–1975 were taken 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	

Year	Norway	Faroes	Sweden	Denmark	Greenland	Total	Quota	Comments
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
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	

Year	Norway	Faroes	Sweden	Denmark	Greenland	Total	Quota	Comments
1988	-	-	-	-	893	893	840	Quota for 1988–1990 was 2520 t with an opening date of August 1. 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 Greenland authorities
1993	-	-	-	-			89	The fishery was suspended. NASCO adopt a new quota allocation model.
1994	-	-	-	-			137	The fishery was suspended and the quotas were bought out.
1995	-	-	-	-	83	83	77	Quota advised by NASCO
1996	-	-	-	-	92	92	174	Quota set by Greenland 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

Year	Norway	Faroes	Sweden	Denmark	Greenland	Total	Quota	Comments
2002	-	-	-	-	9	9	55	Quota bought out, quota represented the maximum allowable catch (no factory landing allowed), and higher catch figures based on sampling programme information are used for the assessments
2003	-	-	-	-	9	9		Quota set to nil (no factory landing 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 landing allowed) and fishery restricted to catches used for internal consumption in Greenland
2007	-	-	-	-	25	25		Quota set to nil (no factory landing 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 landing allowed and fishery restricted to catches used for internal consumption in Greenland
2011	-	-	-	-	28	28		same as previous
2012	-	-	-	-	33	33	(35)	Unilateral decision made by Greenland to allow factory landing with 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

Year	Norway	Faroes	Sweden	Denmark	Greenland	Total	Quota	Comments
2014	-	-	-	-	58	58	(30)	Unilateral decision made by Greenland to allow factory landing 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 overharvest of 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 landing allowed and fishery restricted to catches used for internal consumption in Greenland

Table 5.1.1.2. Distribution of nominal catches (t) by Greenland vessels since 1960. NAFO Division is represented by 1A–1F. 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	1A	1B	1C	1D	1E	1F	Unk.	West Greenland	East Greenland	Total
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	-	1 420	6	1426
1978	81	349	245	186	113	10	-	984	8	992
1979	120	343	524	213	164	31	-	1 395	+	1395
1980	52	275	404	231	158	74	-	1 194	+	1194
1981	105	403	348	203	153	32	20	1 264	+	1264
1982	111	330	239	136	167	76	18	1 077	+	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

Year	1A	1B	1C	1D	1E	1F	Unk.	West Greenland	East Greenland	Total
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 [1]	-	-	-	-	-	-	-	-	-	-
1994 [1]	-	-	-	-	-	-	-	-	-	-
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
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

Year	1A	1B	1C	1D	1E	1F	Unk.	West Greenland	East Greenland	Total
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

1 The fishery was suspended.

+ Small catches <5 t.

- No catch.

Table 5.1.1.3. Reported landings (t) by licence type, landing category, the number of fishers reporting and the total number of landing reports received in 2018. Empty cells identify categories with no reported landings and 0.0 entries represents reported values of <0.1. Rounding issues are evident for some totals.

NAFO/ICES	Licence type	No. of Fishers	No. of Reports	Comm. (kg)	Private (kg)	Factory (kg)	Total (kg)
1A	Private	35	58	0.0	0.2		0.2
1A	Commercial	63	177	2.2	0.0		2.2
1A	**TOTAL**	**98**	**235**	**2.2**	**0.2**		**2.4**
1B	Private	47	105		1.0		1.0
1B	Commercial	31	125	4.6			4.6
1B	**TOTAL**	**78**	**230**	**4.6**	**1.0**		**5.7**
1C	Private	25	51		0.8		0.8
1C	Commercial	56	200	12.9			12.9
1C	**TOTAL**	**81**	**251**	**12.9**	**0.8**		**13.7**
1D	Private	125	163	0.0	1.4		1.4
1D	Commercial	18	120	6.8			6.8
1D	**TOTAL**	**143**	**283**	**6.8**	**1.4**		**8.2**
1E	Private	20	86		1.5		1.5
1E	Commercial	24	98	2.7	0.1		2.8
1E	**TOTAL**	**44**	**184**	**2.7**	**1.6**		**4.2**
1F	Private	65	169	0.0	2.0		2.0
1F	Commercial	40	130	2.8			2.8
1F	**TOTAL**	**105**	**299**	**2.8**	**2.0**		**4.8**
XIV	Private	5	42		0.4		0.4
XIV	Commercial	3	12	0.4			0.4
XIV	**TOTAL**	**8**	**54**	**0.4**	**0.4**		**0.8**
ALL	Private	322	674	0.0	7.2		7.3
ALL	Commercial	235	862	32.5	0.1		32.6
ALL	**TOTAL**	**557**	**1536**	**32.5**	**7.4**		**39.9**

Table 5.1.1.4. Reported landings (t) by landing category, the number of fishers reporting and the total number of landing reports received for licensed and unlicensed fishers in 2016–2017. Empty cells identify categories with no reported landings and 0.0 entries represents reported values of <0.1. Rounding issues are evident for some totals.

NAFO/ICES	Licensed	No. of Fishers	No. of Reports	Comm.	Private	Factory	Total	Licensed	No. of Fishers	No. of Reports	Comm.	Private	Factory	Total
	2017							**2016**						
1A	NO	2	12	0	0		0	NO						0
1A	YES	15	66	0.3	0.8		1.1	YES	9	19		0.7		0.7
1A	**TOTAL**	**17**	**78**	**0.3**	**0.9**		**1.1**	**TOTAL**	**9**	**19**	**0**	**0.7**		**0.7**
1B	NO						0	NO	4	9		0.2		0.2
1B	YES	9	40	1.4	0.2		1.7	YES	7	22	0.1	1		1
1B	**TOTAL**	**9**	**40**	**1.4**	**0.2**		**1.7**	**TOTAL**	**11**	**31**	**0.1**	**1.1**		**1.2**
1C	NO	7	23	0	0.4		0.4	NO	8	30		1		1
1C	YES	33	135	5.9	3		8.9	YES	23	113	4.1	2.1		6.2
1C	**TOTAL**	**40**	**158**	**5.9**	**3.4**		**9.3**	**TOTAL**	**31**	**143**	**4.1**	**3.1**		**7.3**
1D	NO	17	44	0	0.9		0.9	NO	8	13		0.9		0.9
1D	YES	7	23	5.1	0.9		5.9	YES	8	42	1.2	2.5		3.8
1D	**TOTAL**	**24**	**67**	**5.1**	**1.8**		**6.9**	**TOTAL**	**16**	**55**	**1.2**	**3.4**		**4.6**
1E	NO	8	24	0	0.6		0.6	NO	13	22		1.4		1.4
1E	YES	15	114	0.7	1.9		2.6	YES	10	74	0.6	2.5		3.1
1E	**TOTAL**	**23**	**138**	**0.7**	**2.5**		**3.2**	**TOTAL**	**23**	**96**	**0.6**	**3.9**		**4.5**
1F	NO	16	51	0	1.2		1.2	NO	27	66	0.1	2.9		3

NAFO/ICES	Licensed	No. of Fishers	No. of Reports	Comm.	Private	Factory	Total	Licensed	No. of Fishers	No. of Reports	Comm.	Private	Factory	Total
1F	YES	12	78	1.8	2.6		4.4	YES	13	46	2.6	1.7		4.3
1F	**TOTAL**	**28**	**129**	**1.8**	**3.8**		**5.6**	**TOTAL**	**40**	**112**	**2.7**	**4.6**		**7.3**
XIV	NO						0	NO	9	46		1.3		1.3
XIV	YES	2	21	0.1	0.2		0.3	YES	1	1		0.2		0.2
XIV	**TOTAL**	**2**	**21**	**0.1**	**0.2**		**0.3**	**TOTAL**	**10**	**47**	**0**	**1.5**		**1.5**
ALL	NO	50	154	0	3.1		3.1	NO	69	186	0.1	7.6		7.7
ALL	YES	93	477	15.3	9.7		24.9	YES	71	317	8.6	10.8		19.4
ALL	**TOTAL**	**143**	**631**	**15.3**	**12.7**		**28**	**TOTAL**	**140**	**503**	**8.7**	**18.4**		**27.1**

Table 5.1.1.5. Total number of licences issued by NAFO (1A-1F)/ICES Divisions and the number of people reporting catches of Atlantic salmon in the Greenland fishery. Reports received by fish plants prior to 1997 and to the Licence Office from 1998 to present. Blanks cells indicate that the data were not reported or available. Starting in 2018, a new regulation was enacted which required all fishers to have a licence to fish for Atlantic salmon. Prior to 2018, only commercial fishers were required to have a licence.

Year	Licences	1A	1B	1C	1D	1E	1F	ICES	Unk.	Number of fishers reporting	Number of reports received
1987		78	67	74		99	233		0	579	
1988		63	46	43	53	78	227		0	516	
1989		30	41	98	46	46	131		0	393	
1990		32	15	46	52	54	155		0	362	
1991		53	39	100	41	54	123		0	410	
1992		3	9	73	9	36	82		0	212	
1993											
1994											
1995		0	17	52	21	24	31		0	145	
1996		1	8	74	15	23	42		0	163	
1997		0	16	50	7	2	6		0	80	
1998		16	5	8	7	3	30		0	69	
1999		3	8	24	18	21	29		0	102	
2000		1	1	5	12	2	25		0	43	
2001	452	2	7	13	15	6	37		0	76	
2002	479	1	1	9	13	9	8		0	41	
2003	150	11	1	4	4	12	10		0	42	
2004	155	20	2	8	4	20	12		0	66	
2005	185	11	7	17	5	17	18		0	75	
2006	159	43	14	17	20	17	30		0	141	
2007	260	29	12	26	10	33	22		0	132	
2008	260	44	8	41	10	16	24		0	143	
2009	294	19	11	35	15	25	31	9	0	145	
2010	309	86	17	19	16	30	27	13	0	208	389
2011	234	25	9	20	15	20	23	5	0	117	394

Year	Licences	1A	1B	1C	1D	1E	1F	ICES	Unk.	Number of fishers reporting	Number of reports received
2012	279	35	9	32	8	16	16	6	0	122	553
2013	228	28	8	21	19	7	11	1	0	95	553
2014	321	21	8	40	20	10	14	1	0	114	669
2015	310	18	18	58	31	14	41	9	0	189	938
2016	263	9	11	31	16	23	40	10	3	143	503
2017	282	17	9	40	24	23	28	2	0	143	631
2018	786	98	78	81	143	44	105	8	0	557	1536

Table 5.1.2.1. Adjusted landings estimated from comparing the weight of salmon seen by the sampling teams and the corresponding community-specific reported landings (Adjusted landings (sampling)) and from phone surveys (Adjusted landings (survey)). Dashes '-' indicate that no adjustment was necessary or no phone surveys were conducted from 2002–2013 or 2017. Adjusted landings (sampling and surveys) are added to the reported landings and estimated unreported catch for assessment purposes. Rounding issues are evident for some totals.

Year	Reported Landings (West Greenland only)	Adjusted Landings (Sampling)	Adjusted Landings (Survey)	Landings for Assessment
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	-	-	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	-	-	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	-	5.0	60.9
2016	25.7	0.3	4.2	30.2
2017	27.8	0.3	-	28.0
2018	39.0	-	-	39.0

Table 5.2.1. Size of biological samples and percentage (by number) of North American and European salmon in research vessel catches at West Greenland (1969 to 1982), from commercial samples (1978 to 1992, 1995 to 1997, and 2001) and from local consumption samples (1998 to 2000, and 2002 to present). Parenthetical genetic sample numbers represent the number of samples available. Genetic-based continent of origin assignments are considered to be 100% accurate.

Source	Year	Sample Size			Continent of Origin (%)			
		Length	Scales	Genetics	North American	(95% CI)[1]	European	(95% CI)[1]
Research	1969	212	212		51	(57, 44)	49	(56, 43)
	1970	127	127		35	(43, 26)	65	(75, 57)
	1971	247	247		34	(40, 28)	66	(72, 50)
	1972	3488	3488		36	(37, 34)	64	(66, 63)
	1973	102	102		49	(59, 39)	51	(61, 41)
	1974	834	834		43	(46, 39)	57	(61, 54)
	1975	528	528		44	(48, 40)	56	(60, 52)
	1976	420	420		43	(48, 38)	57	(62, 52)
	1978[2]	606	606		38	(41, 38)	62	(66, 59)
	1978[3]	49	49		55	(69, 41)	45	(59, 31)
	1979	328	328		47	(52, 41)	53	(59, 48)
	1980	617	617		58	(62, 54)	42	(46, 38)
	1982	443	443		47	(52, 43)	53	(58, 48)
Commercial	1978	392	392		52	(57, 47)	48	(53, 43)
	1979	1653	1653		50	(52, 48)	50	(52, 48)
	1980	978	978		48	(51, 45)	52	(55, 49)
	1981	4570	1930		59	(61, 58)	41	(42, 39)
	1982	1949	414		62	(64, 60)	38	(40, 36)
	1983	4896	1815		40	(41, 38)	60	(62, 59)
	1984	7282	2720		50	(53, 47)	50	(53, 47)
	1985	13 272	2917		50	(53, 46)	50	(52, 34)
	1986	20 394	3509		57	(66, 48)	43	(52, 34)
	1987	13 425	2960		59	(63, 54)	41	(46, 37)
	1988	11 047	2562		43	(49, 38)	57	(62, 51)
	1989	9366	2227		56	(60, 52)	44	(48, 40)

Source	Year	Sample Size			Continent of Origin (%)			
		Length	Scales	Genetics	North American	(95% CI)[1]	European	(95% CI)[1]
	1990	4897	1208		75	(79, 70)	25	(30, 21)
	1991	5005	1347		65	(69, 61)	35	(39, 31)
	1992	6348	1648		54	(57, 50)	46	(50, 43)
	1995	2045	2045		68	(75, 65)	32	(35, 28)
	1996	3341	1397		73	(76, 71)	27	(29, 24)
	1997	794	282		80	(84, 75)	20	(25, 16)
	2001	4721	2655		69	(71, 67)	31	(33, 29)
Local Consumption	1998	540	406		79	(84, 73)	21	(27, 16)
	1999	532	532		90	(97, 84)	10	(16, 3)
	2000	491	491	490	70		30	
	2002	501	501	501 (1001)	68		32	
	2003	1743	1743	1779	68		32	
	2004	1639	1639	1688	73		27	
	2005	767	767	767	76		24	
Local Consumption	2006	1209	1209	1193	72		28	
	2007	1116	1110	1123	82		18	
	2008	1854	1866	1853	86		14	
	2009	1662	1683	1671	91		9	
	2010	1261	1265	1240	80		20	
	2011	967	965	964	92		8	
	2012	1372	1371	1373	82		18	
	2013	1155	1156	1149	82		18	
	2014	892	775	920	72		28	
	2015	1708	1704	1674	80		20	
	2016	1300	1240	1302	66		34	
	2017	1369	1328	986 (1367)	74		26	
	2018	1064	1048	979 (1111)	83		17	

[1] CI - confidence interval calculated by method of Pella and Robertson (1979) for 1984–1986 and binomial distribution for the others. 2 During 1978 Fishery. 3 Research samples after 1978 fishery closed.

Table 5.2.2. Reported landings (kg) for the West Greenland Atlantic salmon fishery from 2002 to the present by NAFO division and the division-specific adjusted landings (sampling) where the sampling teams observed more fish landed than were reported. Adjusted landings (sampling) were not calculated for 2006, 2011, 2015 and 2018, as the sampling teams did not observe more fish than were reported. Shaded cells indicate that sampling took place in that year and division.

Year	Type	1A	1B	1C	1D	1E	1F	Total
2002	Reported	14	78	2100	3752	1417	1661	9022
	Adjusted						2408	9769
2003	Reported	619	17	1621	648	1274	4516	8694
	Adjusted			1782	2709		5912	12 312
2004	Reported	3476	611	3516	2433	2609	2068	14 712
	Adjusted				4929			17 209
2005	Reported	1294	3120	2240	756	2937	4956	15 303
	Adjusted				2730			17 276
2006	Reported	5427	2611	3424	4731	2636	4192	23 021
	Adjusted							
2007	Reported	2019	5089	6148	4470	4828	2093	24 647
	Adjusted						2252	24 806
2008	Reported	4882	2210	10024	1595	2457	4979	26 147
	Adjusted				3577		5478	28 627
2009	Reported	195	6151	7090	2988	4296	4777	25 496
	Adjusted				5466			27 975
2010	Reported	17 263	4558	2363	2747	6766	4252	37 949
	Adjusted		4824		6566		5274	43 056
2011	Reported	1858	3662	5274	7977	4021	4613	27 407
	Adjusted							
2012	Reported	5353	784	14 991	4564	3993	2951	32 636
	Adjusted		2001				3694	34 596
2013	Reported	3052	2358	17 950	13 356	6442	3774	46 933
	Adjusted		2461				4408	47 669
2014	Reported	3625	2756	13 762	19 123	14 979	3416	57 662
	Adjusted						4036	58 282

Year	Type	1A	1B	1C	1D	1E	1F	Total
2015	Reported	751	8801	10 055	17 966	4170	14 134	55 877
	Adjusted							
2016	Reported	763	1234	7271	4630	4492	7265	25 655
	Adjusted		1498					25 919
2017	Reported	1114	1665	9335	6858	3219	5563	27 754
	Adjusted		1942					28 031
2018	Reported	2434	5684	13 726	8202	4214	4788	39 048
	Adjusted							

Table 5.2.1.1. Annual mean whole weights (kg) and fork lengths (cm) by sea age and continent of origin of Atlantic salmon caught at West Greenland 1969 to the present, excluding 1977, 1993 and 1994 (NA = North America and E = Europe).

	Whole Weight (kg)									Fork Length (cm)					
	1SW		2SW		PS		All Sea Ages		Total	1SW		2SW		PS	
Year	NA	E	NA	E	NA	E	NA	E		NA	E	NA	E	NA	E
1969	3.12	3.76	5.48	5.80	-	5.13	3.25	3.86	3.58	65.0	68.7	77.0	80.3	-	75.3
1970	2.85	3.46	5.65	5.50	4.85	3.80	3.06	3.53	3.28	64.7	68.6	81.5	82.0	78.0	75.0
1971	2.65	3.38	4.30	-	-	-	2.68	3.38	3.14	62.8	67.7	72.0	-	-	-
1972	2.96	3.46	5.85	6.13	2.65	4.00	3.25	3.55	3.44	64.2	67.9	80.7	82.4	61.5	69.0
1973	3.28	4.54	9.47	10.00	-	-	3.83	4.66	4.18	64.5	70.4	88.0	96.0	61.5	-
1974	3.12	3.81	7.06	8.06	3.42	-	3.22	3.86	3.58	64.1	68.1	82.8	87.4	66.0	-
1975	2.58	3.42	6.12	6.23	2.60	4.80	2.65	3.48	3.12	61.7	67.5	80.6	82.2	66.0	75.0
1976	2.55	3.21	6.16	7.20	3.55	3.57	2.75	3.24	3.04	61.3	65.9	80.7	87.5	72.0	70.7
1977	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1978	2.96	3.50	7.00	7.90	2.45	6.60	3.04	3.53	3.35	63.7	67.3	83.6	-	60.8	85.0
1979	2.98	3.50	7.06	7.60	3.92	6.33	3.12	3.56	3.34	63.4	66.7	81.6	85.3	61.9	82.0
1980	2.98	3.33	6.82	6.73	3.55	3.90	3.07	3.38	3.22	64.0	66.3	82.9	83.0	67.0	70.9
1981	2.77	3.48	6.93	7.42	4.12	3.65	2.89	3.58	3.17	62.3	66.7	82.8	84.5	72.5	-
1982	2.79	3.21	5.59	5.59	3.96	5.66	2.92	3.43	3.11	62.7	66.2	78.4	77.8	71.4	80.9
1983	2.54	3.01	5.79	5.86	3.37	3.55	3.02	3.14	3.10	61.5	65.4	81.1	81.5	68.2	70.5
1984	2.64	2.84	5.84	5.77	3.62	5.78	3.20	3.03	3.11	62.3	63.9	80.7	80.0	69.8	79.5
1985	2.50	2.89	5.42	5.45	5.20	4.97	2.72	3.01	2.87	61.2	64.3	78.9	78.6	79.1	77.0
1986	2.75	3.13	6.44	6.08	3.32	4.37	2.89	3.19	3.03	62.8	65.1	80.7	79.8	66.5	73.4
1987	3.00	3.20	6.36	5.96	4.69	4.70	3.10	3.26	3.16	64.2	65.6	81.2	79.6	74.8	74.8
1988	2.83	3.36	6.77	6.78	4.75	4.64	2.93	3.41	3.18	63.0	66.6	82.1	82.4	74.7	73.8
1989	2.56	2.86	5.87	5.77	4.23	5.83	2.77	2.99	2.87	62.3	64.5	80.8	81.0	73.8	82.2
1990	2.53	2.61	6.47	5.78	3.90	5.09	2.67	2.72	2.69	62.3	62.7	83.4	81.1	72.6	78.6
1991	2.42	2.54	5.82	6.23	5.15	5.09	2.57	2.79	2.65	61.6	62.7	80.6	82.2	81.7	80.0
1992	2.54	2.66	6.49	6.01	4.09	5.28	2.86	2.74	2.81	62.3	63.2	83.4	81.1	77.4	82.7
1993	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1994	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1995	2.37	2.67	6.09	5.88	3.71	4.98	2.45	2.75	2.56	61.0	63.2	81.3	81.0	70.9	81.3
1996	2.63	2.86	6.50	6.30	4.98	5.44	2.83	2.90	2.88	62.8	64.0	81.4	81.1	77.1	79.4

	Whole Weight (kg)									Fork Length (cm)					
	1SW		2SW		PS		All Sea Ages		Total	1SW		2SW		PS	
Year	NA	E	NA	E	NA	E	NA	E		NA	E	NA	E	NA	E
1997	2.57	2.82	7.95	6.11	4.82	6.9	2.63	2.84	2.71	62.3	63.6	85.7	84.0	79.4	87.0
1998	2.72	2.83	6.44	-	3.28	4.77	2.76	2.84	2.78	62.0	62.7	84.0	-	66.3	76.0
1999	3.02	3.03	7.59	-	4.20	-	3.09	3.03	3.08	63.8	63.5	86.6	-	70.9	-
2000	2.47	2.81	-	-	2.58	-	2.47	2.81	2.57	60.7	63.2	-	-	64.7	-
2001	2.89	3.03	6.76	5.96	4.41	4.06	2.95	3.09	3.00	63.1	63.7	81.7	79.1	75.3	72.1
2002	2.84	2.92	7.12	-	5.00	-	2.89	2.92	2.90	62.6	62.1	83.0	-	75.8	-
2003	2.94	3.08	8.82	5.58	4.04	-	3.02	3.10	3.04	63	64.4	86.1	78.3	71.4	-
2004	3.11	2.95	7.33	5.22	4.71	6.48	3.17	3.22	3.18	64.7	65.0	86.2	76.4	77.6	88.0
2005	3.19	3.33	7.05	4.19	4.31	2.89	3.31	3.33	3.31	65.9	66.4	83.3	75.5	73.7	62.3
2006	3.10	3.25	9.72	-	5.05	3.67	3.25	3.26	3.24	65.3	65.3	90.0	-	76.8	69.5
2007	2.89	2.87	6.19	6.47	4.94	3.57	2.98	2.99	2.98	63.5	63.3	80.9	80.6	76.7	71.3
2008	3.04	3.03	6.35	7.47	3.82	3.39	3.08	3.07	3.08	64.6	63.9	80.1	85.5	71.1	73.0
2009	3.28	3.40	7.59	6.54	5.25	4.28	3.48	3.67	3.50	64.9	65.5	84.6	81.7	75.9	73.5
2010	3.44	3.24	6.40	5.45	4.17	3.92	3.47	3.28	3.42	66.7	65.2	80.0	75.0	72.4	70.0
2011	3.30	3.18	5.69	4.94	4.46	5.11	3.39	3.49	3.40	65.8	64.7	78.6	75.0	73.7	76.3
2012	3.34	3.38	6.00	4.51	4.65	3.65	3.44	3.40	3.44	65.4	64.9	75.9	70.4	72.8	68.9
2013	3.33	3.16	6.43	4.51	3.64	5.38	3.39	3.20	3.35	66.2	64.6	81.0	72.8	69.9	73.6
2014	3.25	3.02	7.60	6.00	4.47	5.42	3.39	3.13	3.32	65.6	64.7	86.0	78.7	73.6	83.5
2015	3.36	3.13	7.52	7.1	4.53	3.81	3.42	3.18	3.37	65.6	64.4	84.1	82.5	74.2	67.2
2016	3.18	2.79	7.77	5.18	4.03	4.12	3.32	2.89	3.18	65.2	62.6	85.1	76.0	72.2	70.9
2017	3.42	3.31	6.50	3.69	4.94	8.00	3.50	3.36	3.26	66.6	64.8	85.1	72.4	76.7	81.9
2018	2.91	2.93	9.27	5.59	4.53	-	2.97	3.00	2.97	63.8	63.9	87.5	76.3	77.1	-
Prev. 10-year mean	3.29	3.16	6.79	5.54	4.40	4.71	3.39	3.27	3.35	65.7	64.5	82.1	77.0	73.3	73.9
Overall mean	2.90	3.15	6.67	6.12	4.13	4.78	3.04	3.24	3.14	63.6	65.1	82.3	80.5	72.1	75.8

Table 5.2.1.2. River age distribution (%) and mean river age for all North American origin salmon caught at West Greenland from 1968 to the present, excluding 1977, 1993 and 1994.

Year	1	2	3	4	5	6	7	8
1968	0.3	19.6	40.4	21.3	16.2	2.2	0	0
1969	0	27.1	45.8	19.6	6.5	0.9	0	0
1970	0	58.1	25.6	11.6	2.3	2.3	0	0
1971	1.2	32.9	36.5	16.5	9.4	3.5	0	0
1972	0.8	31.9	51.4	10.6	3.9	1.2	0.4	0
1973	2.0	40.8	34.7	18.4	2.0	2.0	0	0
1974	0.9	36	36.6	12.0	11.7	2.6	0.3	0
1975	0.4	17.3	47.6	24.4	6.2	4.0	0	0
1976	0.7	42.6	30.6	14.6	10.9	0.4	0.4	0
1977	-	-	-	-	-	-	-	-
1978	2.7	31.9	43.0	13.6	6.0	2.0	0.9	0
1979	4.2	39.9	40.6	11.3	2.8	1.1	0.1	0
1980	5.9	36.3	32.9	16.3	7.9	0.7	0.1	0
1981	3.5	31.6	37.5	19.0	6.6	1.6	0.2	0
1982	1.4	37.7	38.3	15.9	5.8	0.7	0	0.2
1983	3.1	47.0	32.6	12.7	3.7	0.8	0.1	0
1984	4.8	51.7	28.9	9.0	4.6	0.9	0.2	0
1985	5.1	41.0	35.7	12.1	4.9	1.1	0.1	0
1986	2.0	39.9	33.4	20.0	4.0	0.7	0	0
1987	3.9	41.4	31.8	16.7	5.8	0.4	0	0
1988	5.2	31.3	30.8	20.9	10.7	1.0	0.1	0
1989	7.9	39.0	30.1	15.9	5.9	1.3	0	0
1990	8.8	45.3	30.7	12.1	2.4	0.5	0.1	0
1991	5.2	33.6	43.5	12.8	3.9	0.8	0.3	0
1992	6.7	36.7	34.1	19.1	3.2	0.3	0	0

Year	1	2	3	4	5	6	7	8
1993	-	-	-	-	-	-	-	-
1994	-	-	-	-	-	-	-	-
1995	2.4	19.0	45.4	22.6	8.8	1.8	0.1	0
1996	1.7	18.7	46.0	23.8	8.8	0.8	0.1	0
1997	1.3	16.4	48.4	17.6	15.1	1.3	0	0
1998	4.0	35.1	37.0	16.5	6.1	1.1	0.1	0
1999	2.7	23.5	50.6	20.3	2.9	0.0	0	0
2000	3.2	26.6	38.6	23.4	7.6	0.6	0	0
2001	1.9	15.2	39.4	32.0	10.8	0.7	0	0
2002	1.5	27.4	46.5	14.2	9.5	0.9	0	0
2003	2.6	28.8	38.9	21.0	7.6	1.1	0	0
2004	1.9	19.1	51.9	22.9	3.7	0.5	0	0
2005	2.7	21.4	36.3	30.5	8.5	0.5	0	0
2006	0.6	13.9	44.6	27.6	12.3	1.0	0	0
2007	1.6	27.7	34.5	26.2	9.2	0.9	0	0
2008	0.9	25.1	51.9	16.8	4.7	0.6	0	0
2009	2.6	30.7	47.3	15.4	3.7	0.4	0	0
2010	1.6	21.7	47.9	21.7	6.3	0.8	0	0
2011	1.0	35.9	45.9	14.4	2.8	0	0	0
2012	0.3	29.8	39.4	23.3	6.5	0.7	0	0
2013	0.1	32.6	37.3	20.8	8.6	0.6	0	0
2014	0.4	26.0	44.5	21.9	6.9	0.4	0	0
2015	0.1	31.6	40.6	21.6	6.0	0.2	0	0
2016	0.1	21.3	43.3	26.8	7.3	1.1	0	0
2017	0.3	31.0	41.6	19.6	7.2	0.3	0	0
2018	0.5	29.8	38.4	24.1	6.5	0.7	0	0
Previous 10-year mean	0.7	28.6	44.0	20.2	6.0	0.5	0	0

Year	1	2	3	4	5	6	7	8
Overall mean	2.3	31.2	39.8	18.8	6.8	1.0	0.1	0

Table 5.2.1.3. River age distribution (%) and mean river age for all European origin salmon caught in West Greenland 1968 to the present, excluding 1977, 1993 and 1994.

Year	1	2	3	4	5	6	7	8
1968	21.6	60.3	15.2	2.7	0.3	0	0	0
1969	0	83.8	16.2	0	0	0	0	0
1970	0	90.4	9.6	0	0	0	0	0
1971	9.3	66.5	19.9	3.1	1.2	0	0	0
1972	11.0	71.2	16.7	1.0	0.1	0	0	0
1973	26.0	58.0	14.0	2.0	0	0	0	0
1974	22.9	68.2	8.5	0.4	0	0	0	0
1975	26.0	53.4	18.2	2.5	0	0	0	0
1976	23.5	67.2	8.4	0.6	0.3	0	0	0
1977	-	-	-	-	-	-	-	-
1978	26.2	65.4	8.2	0.2	0	0	0	0
1979	23.6	64.8	11.0	0.6	0	0	0	0
1980	25.8	56.9	14.7	2.5	0.2	0	0	0
1981	15.4	67.3	15.7	1.6	0	0	0	0
1982	15.6	56.1	23.5	4.2	0.7	0	0	0
1983	34.7	50.2	12.3	2.4	0.3	0.1	0.1	0
1984	22.7	56.9	15.2	4.2	0.9	0.2	0	0
1985	20.2	61.6	14.9	2.7	0.6	0	0	0
1986	19.5	62.5	15.1	2.7	0.2	0	0	0
1987	19.2	62.5	14.8	3.3	0.3	0	0	0
1988	18.4	61.6	17.3	2.3	0.5	0	0	0
1989	18.0	61.7	17.4	2.7	0.3	0	0	0
1990	15.9	56.3	23.0	4.4	0.2	0.2	0	0
1991	20.9	47.4	26.3	4.2	1.2	0	0	0
1992	11.8	38.2	42.8	6.5	0.6	0	0	0

Year	1	2	3	4	5	6	7	8
1993	-	-	-	-	-	-	-	-
1994	-	-	-	-	-	-	-	-
1995	14.8	67.3	17.2	0.6	0	0	0	0
1996	15.8	71.1	12.2	0.9	0	0	0	0
1997	4.1	58.1	37.8	0.0	0	0	0	0
1998	28.6	60.0	7.6	2.9	0.0	1.0	0	0
1999	27.7	65.1	7.2	0	0	0	0	0
2000	36.5	46.7	13.1	2.9	0.7	0	0	0
2001	16.0	51.2	27.3	4.9	0.7	0	0	0
2002	9.4	62.9	20.1	7.6	0	0	0	0
2003	16.2	58.0	22.1	3.0	0.8	0	0	0
2004	18.3	57.7	20.5	3.2	0.2	0	0	0
2005	19.2	60.5	15.0	5.4	0	0	0	0
2006	17.7	54.0	23.6	3.7	0.9	0	0	0
2007	7.0	48.5	33.0	10.5	1.0	0	0	0
2008	7.0	72.8	19.3	0.8	0.0	0	0	0
2009	14.3	59.5	23.8	2.4	0.0	0	0	0
2010	11.3	57.1	27.3	3.4	0.8	0	0	0
2011	19.0	51.7	27.6	1.7	0	0	0	0
2012	9.3	63.0	24.0	3.7	0	0	0	0
2013	4.5	68.2	24.4	2.5	0	0	0	0
2014	4.5	60.7	30.8	4.0	0	0	0	0
2015	9.2	54.9	28.8	5.8	1.2	0	0	0
2016	2.5	63.3	29.6	4.3	0.3	0	0	0
2017	10.0	73.0	15.4	1.7	0	0	0	0
2018	13.7	62.1	19.0	5.2	0	0	0	0
Previous 10-year mean	9.2	62.4	25.1	3.0	0.2	0	0	0

Year	1	2	3	4	5	6	7	8
Overall mean	16.3	61.2	19.3	2.9	0.3	0	0	0

Table 5.2.1.4. Sea age composition (%) of samples from fishery landings in West Greenland by continent of origin from 1985 to present, excluding 1977, 1993 and 1994.

Year	North American			European		
	1SW	2SW	Previous Spawn-ers	1SW	2SW	Previous Spawners
1985	92.5	7.2	0.3	95.0	4.7	0.4
1986	95.1	3.9	1.0	97.5	1.9	0.6
1987	96.3	2.3	1.4	98.0	1.7	0.3
1988	96.7	2.0	1.2	98.1	1.3	0.5
1989	92.3	5.2	2.4	95.5	3.8	0.6
1990	95.7	3.4	0.9	96.3	3.0	0.7
1991	95.6	4.1	0.4	93.4	6.5	0.2
1992	91.9	8.0	0.1	97.5	2.1	0.4
1993	-	-	-	-	-	-
1994	-	-	-	-	-	-
1995	96.8	1.5	1.7	97.3	2.2	0.5
1996	94.1	3.8	2.1	96.1	2.7	1.2
1997	98.2	0.6	1.2	99.3	0.4	0.4
1998	96.8	0.5	2.7	99.4	0.0	0.6
1999	96.8	1.2	2.0	100.0	0.0	0.0
2000	97.4	0.0	2.6	100.0	0.0	0.0
2001	98.2	2.6	0.5	97.8	2.0	0.3
2002	97.3	0.9	1.8	100.0	0.0	0.0
2003	96.7	1.0	2.3	98.9	1.1	0.0
2004	97.0	0.5	2.5	97.0	2.8	0.2
2005	92.4	1.2	6.4	96.7	1.1	2.2
2006	93.0	0.8	5.6	98.8	0.0	1.2
2007	96.5	1.0	2.5	95.6	2.5	1.5
2008	97.4	0.5	2.2	98.8	0.8	0.4

Year	North American			European		
	1SW	2SW	Previous Spawn-ers	1SW	2SW	Previous Spawners
2009	93.4	2.8	3.8	89.4	7.6	3.0
2010	98.2	0.4	1.4	97.5	1.7	0.8
2011	93.8	1.5	4.7	82.8	12.1	5.2
2012	93.2	0.7	6.0	98.0	1.6	0.4
2013	94.9	1.4	3.7	96.6	2.4	1.0
2014	91.3	1.1	7.6	96.1	2.4	1.5
2015	97.0	0.7	2.3	98.2	1.2	0.6
2016	93.5	2.5	4.0	95.5	3.5	1.0
2017	92.5	1.5	6.0	93.1	5.7	1.2
2018	97.4	0.4	2.2	97.4	2.6	0.0
Previous 10-year mean	94.5	1.3	4.2	94.6	3.9	1.5
Overall mean	95.3	2.0	2.7	96.6	2.5	0.8

Table 5.2.2.1. The number of samples and continent of origin of Atlantic salmon by NAFO Division sampled in West Greenland in 2018.

NAFO Division	Sample dates	Numbers			Percentages	
		North American	European	Total	North American	European
1B	Sep 18 – Sep 30	276	47	323	85.4	14.6
1C	Sep 08 – Oct 04	335	78	413	81.1	18.9
1E	Sep 07 – Sep 27	15	11	26	57.7	42.3
1F	Aug 24 – Sep 21	187	29	216	86.6	13.4
Total		814	165	979	83.1	16.9

Table 5.2.2.2. SNP baseline reporting groups and codes used for continent and region of origin assignments in 2018. See Figure 5.2.2.3 for location details.

ICES region	Reporting group	Group acronym	ICES region	Reporting group	Group acronym
Quebec (North)	Ungava	UNG	Europe	Spain	SPN
Labrador	Labrador Central	LAC		France	FRN
	Lake Melville	MEL		European Broodstock	EUB
	Labrador South	LAS		United Kingdom / Ireland	BRI
Quebec	St Lawrence North Shore Lower	QLS		Barents-White Seas	BAR
	Anticosti	ANT		Baltic Sea	BAL
	Gaspe Peninsula	GAS		Southern Norway	SNO
	Quebec City Region	QUE		Northern Norway	NNO
Gulf	Gulf of St Lawrence	GUL		Iceland	ICE
Scotia-Fundy	Inner Bay of Fundy	IBF		Greenland	GL
	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			

Table 5.2.2.3. The estimated percentage and numbers of North American (NA) and European (E) Atlantic salmon caught in West Greenland fishery based on NAFO Division continent of origin estimates weighted by catch weight (1982 to the present, excluding 1993 and 1994). Numbers are rounded to the nearest hundred fish. Unreported catch is not included in this assessment.

	Percentage by continent weighted by catch		Numbers of salmon by continent	
Year	NA	E	NA	E
1982	57	43	192 200	143 800
1983	40	60	39 500	60 500
1984	54	46	48 800	41 200
1985	47	53	143 500	161 500
1986	59	41	188 300	131 900
1987	59	41	171 900	126 400
1988	43	57	125 500	168 800
1989	55	45	65 000	52 700
1990	74	26	62 400	21 700
1991	63	37	111 700	65 400
1992	45	55	46 900	38 500
1995	67	33	21 400	10 700
1996	70	30	22 400	9700
1997	85	15	18 000	3300
1998	79	21	3100	900
1999	91	9	5700	600
2000	65	35	5100	2700
2001	67	33	9400	4700
2002	69	31	2300	1000
2003	64	36	2600	1400
2004	72	28	3900	1500
2005	74	26	3500	1200
2006	69	31	4000	1800

	Percentage by continent weighted by catch		Numbers of salmon by continent	
2007	76	24	6100	1900
2008	86	14	8000	1300
2009	89	11	7000	800
2010	80	20	10 000	2600
2011	93	7	6800	600
2012	79	21	7800	2100
2013	82	18	11 500	2700
2014	72	28	12 800	5400
2015	79	21	13 500	3900
2016	64	36	5100	3300
2017	74	26	6100	2200
2018	80	20	10 600	2600

Table 5.2.3.1. Bayesian estimates of mixture composition for West Greenland Atlantic Salmon fishery by region and overall for 2017. Baseline locations refer to regional reporting groups identified in Table 5.2.2.2 and Figure 5.2.2.2. Sample locations are identified by NAFO Divisions. Mean estimates provided with 95% credible interval in parentheses. Credible intervals with a lower bound of zero, or close to zero, indicate little support for the mean assignment value. Grey font indicate reporting groups with lower all credible intervals equal to zero.

Reporting Group	RO	NAFO 1B	NAFO 1C	NAFO 1E	NAFO 1F	Overall
Baltic Sea	EUR	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.1 (0.0, 0.3)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
Barents-White Seas	EUR	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.1 (0.0, 1.1)	0.0 (0.0, 0.1)	0.0 (0.0, 0.0)
European Broodstock	EUR	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
France	EUR	1.1 (0.2, 2.6)	0.3 (0.0, 1.1)	0.0 (0.0, 0.0)	1.1 (0.2, 2.6)	0.8 (0.3, 1.4)
Greenland	EUR	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
Iceland	EUR	0.6 (0.1, 1.6)	0.3 (0.0, 1.1)	0.0 (0.0, 0.1)	0.7 (0.1, 2.0)	0.5 (0.2, 1.0)
Northern Norway	EUR	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.2 (0.0, 2.2)	0.0 (0.0, 0.1)	0.0 (0.0, 0.0)
Southern Norway	EUR	0.5 (0.0, 1.6)	0.1 (0.0, 0.8)	0.9 (0.0, 7.5)	0.8 (0.1, 2.2)	0.4 (0.1, 0.9)
Spain	EUR	2.3 (1.0, 4.1)	0.6 (0.1, 1.7)	0.1 (0.0, 0.4)	1.0 (0.2, 2.5)	1.3 (0.7, 2.1)
United Kingdom/Ireland	EUR	14.9 (11.3,	24.4 (20.0,	26.0 (8.3,	28.3 (23.1,	22.4 (19.8,
Anticosti	NA	0.6 (0.1, 1.6)	1.6 (0.5, 3.3)	0.1 (0.0, 0.3)	0.0 (0.0, 0.0)	0.7 (0.2, 1.3)
Avalon Peninsula	NA	0.0 (0.0, 0.1)	0.0 (0.0, 0.2)	0.3 (0.0, 3.1)	0.0 (0.0, 0.2)	0.0 (0.0, 0.1)
Burin Peninsula	NA	0.0 (0.0, 0.3)	0.1 (0.0, 0.7)	0.4 (0.0, 4.2)	0.3 (0.0, 1.3)	0.0 (0.0, 0.1)
Eastern Nova Scotia	NA	0.3 (0.0, 1.5)	1.5 (0.5, 3.2)	0.2 (0.0, 1.8)	1.0 (0.1, 2.6)	1.0 (0.4, 1.8)
Fortune Bay	NA	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.1 (0.0, 1.4)	0.0 (0.0, 0.1)	0.0 (0.0, 0.0)
Gaspe Peninsula	NA	21 (16.2, 26)	24.3 (19.4,	21 (4.7, 45.4)	17.3 (12.5,	20.7 (17.9,
Gulf of St Lawrence	NA	27.9 (22.9,	18.8 (14.4,	23.4 (5.6,	22 (17, 27.4)	22.8 (20.0,
Inner Bay of Fundy	NA	0.0 (0.0, 0.1)	0.0 (0.0, 0.0)	0.1 (0.0, 0.8)	0.0 (0.0, 0.1)	0.0 (0.0, 0.0)
Labrador Central	NA	2.2 (0.5, 4.5)	3.7 (1.5, 6.5)	6.4 (0.0, 22.8)	3.2 (1.2, 6.1)	2.9 (1.7, 4.4)
Labrador South	NA	13.3 (9.6, 17.5)	8.6 (5.5, 12.3)	0.4 (0.0, 4.8)	6.6 (3.7, 10)	9.7 (7.8, 11.8)
Lake Melville	NA	0.8 (0.0, 2.4)	1.6 (0.4, 3.5)	0.4 (0.0, 4.3)	2.8 (1.1, 5.1)	1.6 (0.8, 2.6)
Maine, United States	NA	2.7 (1.2, 4.8)	1.2 (0.3, 2.5)	0.1 (0.0, 0.2)	1.4 (0.4, 3.1)	1.6 (0.9, 2.5)
Newfoundland 1	NA	0.1 (0.0, 0.9)	0.4 (0.0, 1.5)	0.1 (0.0, 1.1)	0.1 (0.0, 0.7)	0.4 (0.1, 0.9)
Newfoundland 2	NA	0.0 (0.0, 0.4)	0.1 (0.0, 1.2)	0.2 (0.0, 2.1)	0.7 (0.1, 1.9)	0.2 (0.0, 0.7)
Northern Newfoundland	NA	0.6 (0.0, 1.7)	0.0 (0.0, 0.1)	0.1 (0.0, 0.9)	1.4 (0.4, 3.1)	0.7 (0.3, 1.4)
Quebec City Region	NA	0.4 (0.0, 2.5)	1.4 (0.3, 3.5)	0.2 (0.0, 1.6)	0.3 (0.0, 2.4)	1.5 (0.6, 2.6)
St. John River & Aquacul-	NA	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.1 (0.0, 0.8)	0.0 (0.0, 0.1)	0.0 (0.0, 0.0)
St. Lawrence N. Shore	NA	5.4 (3.1, 8.1)	2.9 (1.4, 4.9)	6.6 (0.2, 22.6)	6.6 (3.9, 9.9)	4.8 (3.5, 6.3)
Ungava	NA	2.9 (1.4, 5.0)	6.6 (4.3, 9.5)	12.5 (1.7,	4.2 (2.2, 6.8)	4.8 (3.6, 6.2)
Western Newfoundland	NA	2.2 (0.8, 4.1)	1.3 (0.3, 2.8)	0.1 (0.0, 1.1)	0.0 (0.0, 0.1)	1.1 (0.5, 2.0)
Western Nova Scotia	NA	0.1 (0.0, 0.6)	0.0 (0.0, 0.0)	0.0 (0.0, 0.1)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)

Table 5.2.3.2. Bayesian estimates of mixture composition for West Greenland Atlantic Salmon fishery by region and overall for 2018. Baseline locations refer to regional reporting groups identified in Table 5.2.2.2 and Figure 5.2.2.2. Sample locations are identified by NAFO Divisions. Mean estimates provided with 95% credible interval in parentheses. Credible intervals with a lower bound of zero, or close to zero, indicate little support for the mean assignment value. Grey font indicate reporting groups with lower all credible intervals equal to zero.

Reporting Grouping	CO	NAFO 1B	NAFO 1C	NAFO 1E	NAFO 1F	Overall
Baltic Sea	EU	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.2)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
Barents-White Seas	EU	0.0 (0.0, 0.1)	0.0 (0.0, 0.0)	0.1 (0.0, 0.7)	0.0 (0.0, 0.1)	0.0 (0.0, 0.0)
European Broodstock	EU	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
France	EU	0.6 (0.1, 1.7)	0.8 (0.2, 1.9)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.5 (0.2, 1.1)
Greenland	EU	0.0 (0.0, 0.0)	0.2 (0.0, 0.9)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.1 (0.0, 0.4)
Iceland	EU	0.0 (0.0, 0.0)	0.5 (0.1, 1.3)	0.0 (0.0, 0.0)	0.9 (0.1, 2.6)	0.4 (0.1, 0.9)
Northern Norway	EU	0.1 (0.0, 0.6)	0.0 (0.0, 0.1)	0.2 (0.0, 1.8)	0.0 (0.0, 0.2)	0.0 (0.0, 0.1)
Southern Norway	EU	0.6 (0.0, 1.7)	1.0 (0.2, 2.1)	0.6 (0.0, 5.5)	0.6 (0.0, 2.3)	0.6 (0.2, 1.2)
Spain	EU	2.5 (1.0, 4.5)	0.6 (0.1, 1.7)	0.0 (0.0, 0.1)	0.7 (0.0, 2.3)	1.2 (0.6, 2.0)
United Kingdom/Ireland	EU	10.9 (7.7,	15.8 (12.5,	41.1 (23.5,	11.3 (7.4,	14.5 (12.3,
Anticosti	NA	0.2 (0.0, 1.2)	0.3 (0.0, 1.0)	0.1 (0.0, 1.6)	0.9 (0.1, 2.6)	0.4 (0.1, 0.9)
Avalon Peninsula	NA	0.0 (0.0, 0.2)	0.0 (0.0, 0.1)	0.2 (0.0, 1.9)	0.0 (0.0, 0.2)	0.0 (0.0, 0.1)
Burin Peninsula	NA	0.0 (0.0, 0.6)	0.0 (0.0, 0.2)	0.5 (0.0, 5.6)	0.5 (0.0, 2.8)	0.0 (0.0, 0.1)
Eastern Nova Scotia	NA	0.0 (0.0, 0.1)	0.1 (0.0, 0.9)	0.1 (0.0, 0.9)	1.0 (0.1, 2.7)	0.2 (0.0, 0.8)
Fortune Bay	NA	0.1 (0.0, 0.7)	0.0 (0.0, 0.1)	0.1 (0.0, 1.0)	1.2 (0.0, 3.5)	0.1 (0.0, 0.5)
Gaspe Peninsula	NA	34.2 (28.7,	29.2 (24.6,	15.7 (2.9,	21.8 (16.0,	29.1 (26.1,
Gulf of St Lawrence	NA	16.4 (12.1,	12.6 (9.2,	3.8 (0.0, 19.0)	13.4 (8.8,	13.8 (11.5,
Inner Bay of Fundy	NA	0.0 (0.0, 0.0)	0.0 (0.0, 0.1)	0.1 (0.0, 0.5)	0.0 (0.0, 0.1)	0.0 (0.0, 0.0)
Labrador Central	NA	1.4 (0.2, 3.5)	4.1 (1.9, 6.7)	3.9 (0.1, 13.6)	5.9 (2, 10.5)	3.3 (1.8, 5.2)
Labrador South	NA	15.6 (11.7,	12.4 (9.1,	11.4 (2.5,	18.4 (12.6,	14.8 (12.4,
Lake Melville	NA	4.8 (2.7, 7.5)	5.2 (3.2, 7.7)	3.8 (0.1, 13.6)	4.3 (1.6, 8.0)	4.9 (3.5, 6.4)
Maine, United States	NA	1.9 (0.7, 3.6)	2.7 (1.3, 4.4)	0.0 (0.0, 0.2)	1.8 (0.4, 4.0)	2.2 (1.4, 3.3)
Newfoundland 1	NA	1.6 (0.5, 3.3)	0.7 (0.1, 1.7)	1.8 (0.0, 11.1)	0.7 (0.0, 3.5)	1.2 (0.6, 2.1)
Newfoundland 2	NA	0.6 (0.0, 2.0)	0.1 (0.0, 0.7)	0.6 (0.0, 6.7)	1.1 (0.0, 3.8)	0.5 (0.0, 1.3)
Northern Newfoundland	NA	0.9 (0.2, 2.3)	0.6 (0.1, 1.6)	1.2 (0.0, 8.9)	1.0 (0.1, 2.9)	0.9 (0.4, 1.6)
Quebec City Region	NA	1.0 (0.0, 3.1)	1.0 (0.0, 2.9)	4.1 (0.0, 19.1)	3.6 (1.3, 6.8)	1.5 (0.5, 2.7)
St. John River & Aquacul-	NA	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	2.7 (0.0, 12.6)	0.0 (0.0, 0.3)	0.0 (0.0, 0.2)
St. Lawrence N. Shore	NA	2.8 (1.2, 5.0)	6.3 (4.1, 9.0)	3.9 (0.1, 13.7)	3.7 (1.4, 6.9)	4.5 (3.3, 6.0)
Ungava	NA	2.8 (1.3, 4.8)	3.4 (1.9, 5.3)	3.7 (0.1, 13.1)	6.4 (3.6, 10.0)	3.9 (2.8, 5.2)
Western Newfoundland	NA	1.0 (0.0, 2.5)	2.4 (1.0, 4.2)	0.1 (0.0, 0.7)	0.6 (0.0, 2.3)	1.3 (0.6, 2.2)
Western Nova Scotia	NA	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.1)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)

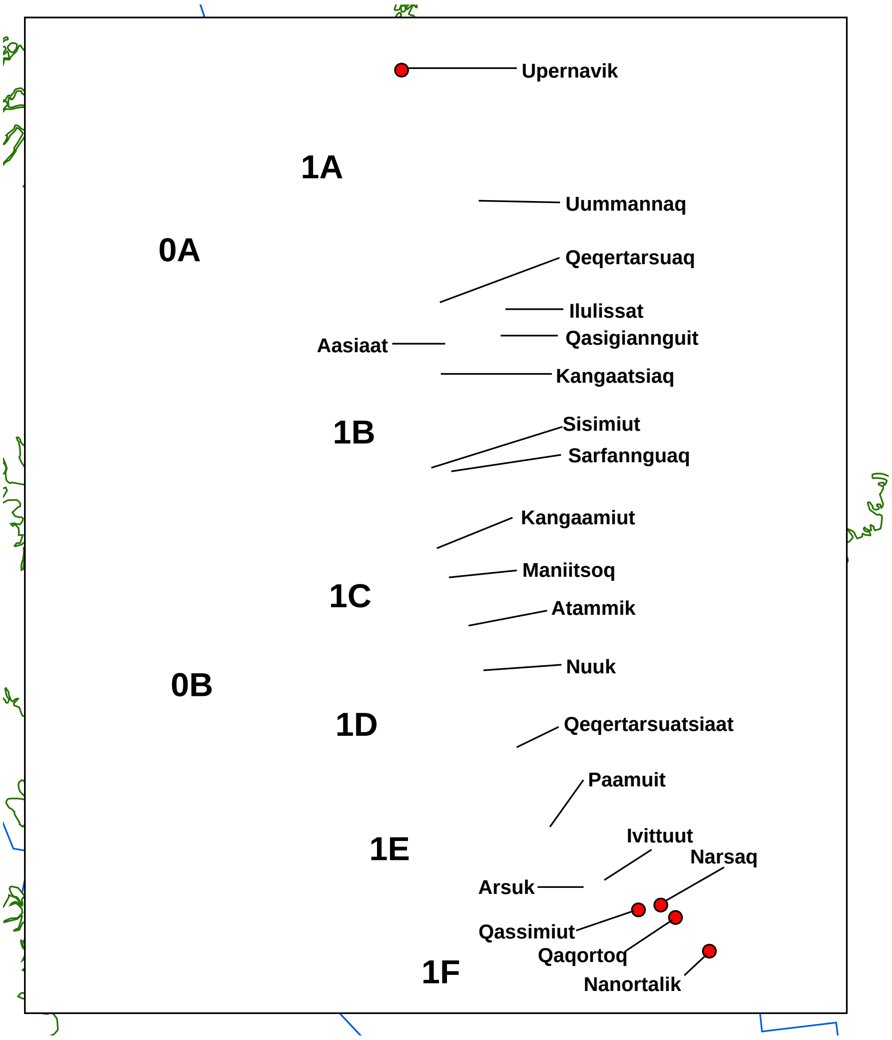


Figure 5.1.1.1. Map of southwest Greenland showing communities to which Atlantic salmon have historically been landed and corresponding NAFO divisions. In 2018 samples were obtained from Sisimiut (NAFO Division 1B), Maniitsoq (1C), Paamiut (1E) and Qaqortoq (1F).

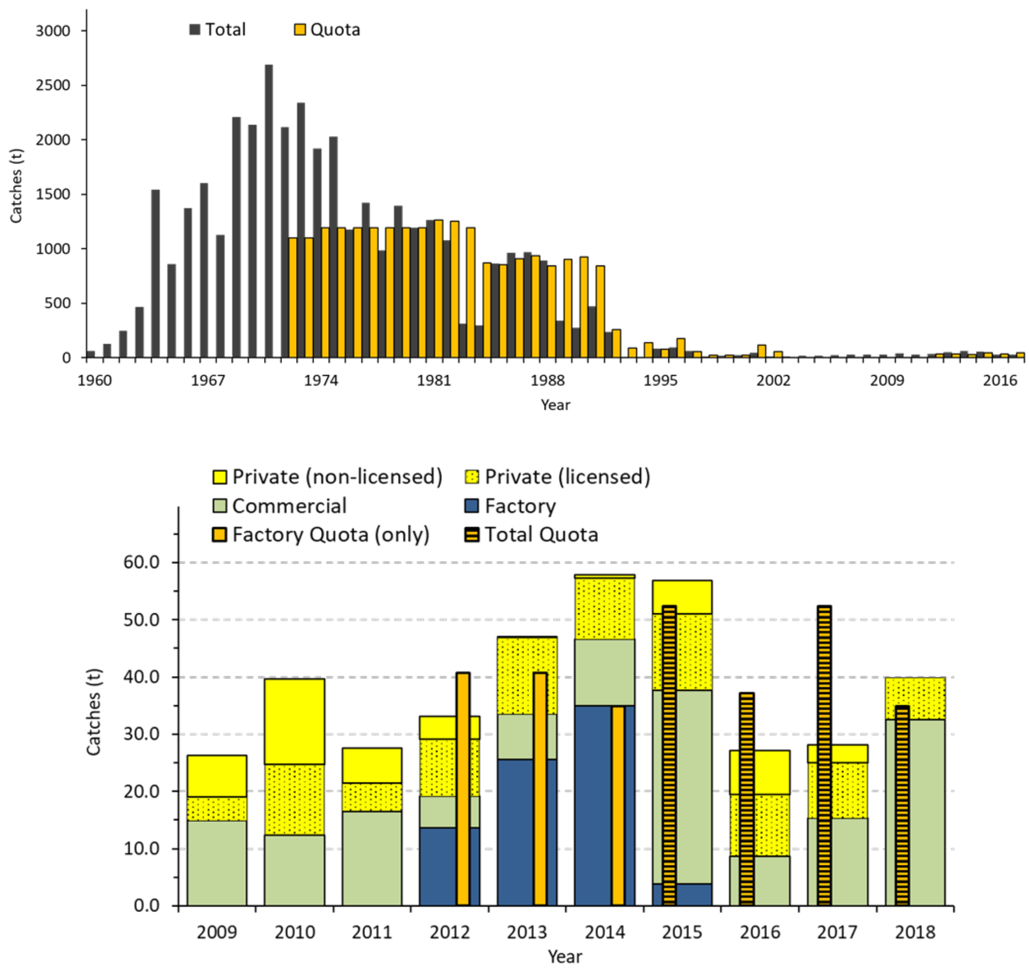


Figure 5.1.1.2. Nominal catches and commercial quotas (t, round fresh weight) of salmon at West Greenland for 1960–2018 (top panel) and 2009–2018 (bottom panel). Total reported landings from 2009–2018 are displayed by landings type. No quotas were set from 2002–2011, a factory only quota was set from 2012–2014, and a single quota of 45 t for all components of the fishery was applied in 2015, reduced to 32 tin 2016, and set to 45 t in 2017. In 2018, a quota of 30 t was set for all components of the fishery and all fishers were required to have a licence to fish for Atlantic salmon.

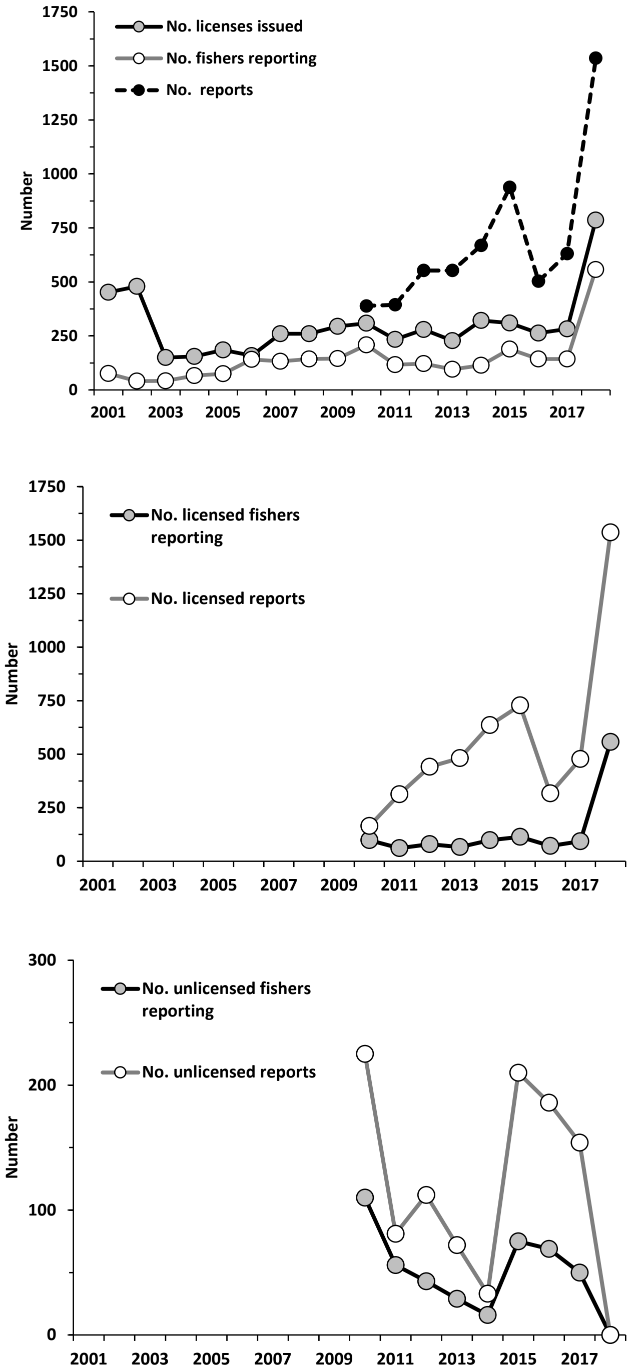


Figure 5.1.1.3. Number of licences issued, total number of fishers reporting landings, and the total number of reports received (2001–2018; top). The number of fishers reporting and the number of reports received for licensed (middle) and unlicensed (bottom) fishers are also provided. Data describing licensed and unlicensed fisher landings reports are only available since 2010 and all fishers were required to have a licence starting in 2018.

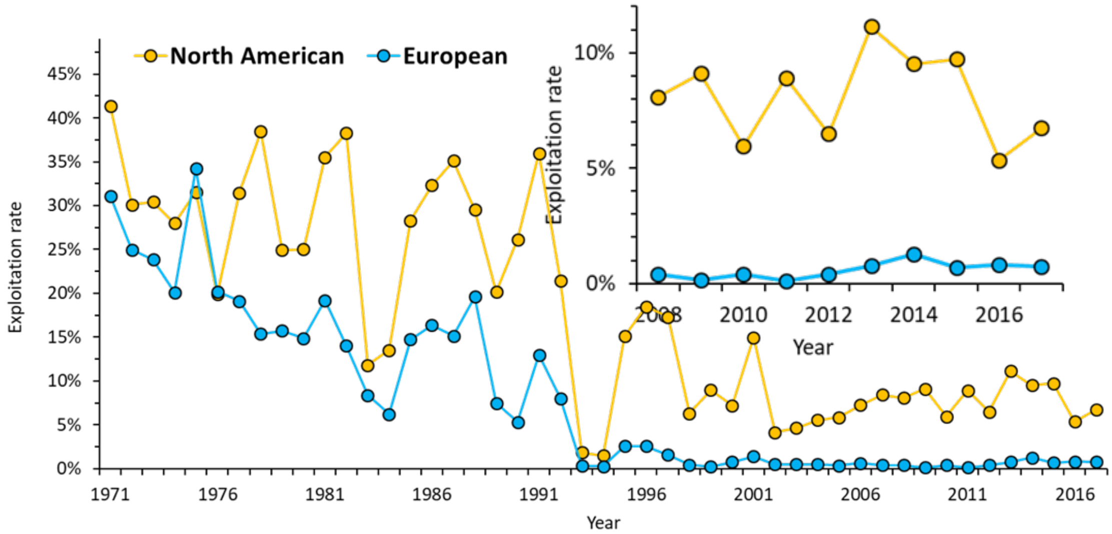


Figure 5.1.3.1. Exploitation rate (%) for NAC 1SW non-maturing and Southern NEAC non-maturing Atlantic salmon at West Greenland, 1971–2017 and 2008–2017 (inset). Exploitation rate estimates are only available to 2017, as 2018 exploitation rates are dependent on 2019 returns.

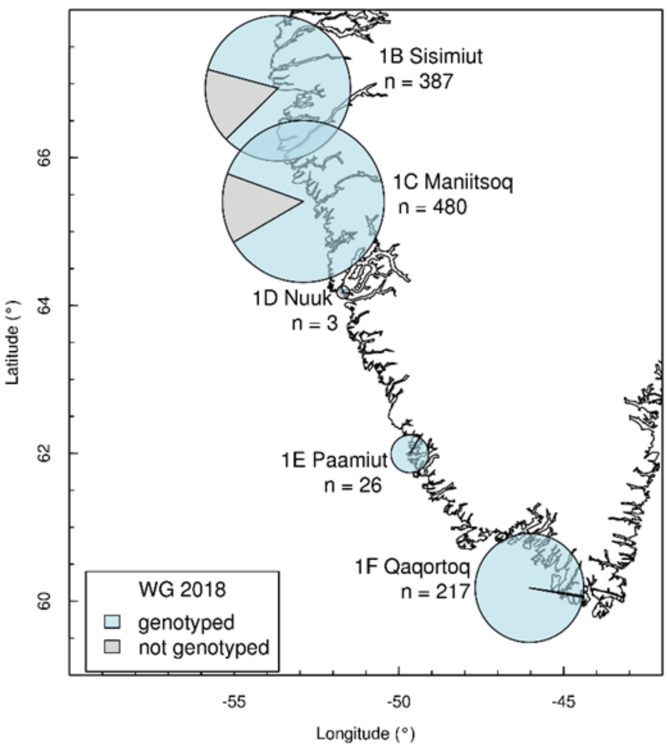


Figure 5.2.2.1. Map showing total samples and subsamples for West Greenland Atlantic Salmon fishery 2018 SNP-based analyses to estimate continent and region of origin. Pie charts are scales to sample size and blue and grey areas represent the proportions genotyped and not genotyped.

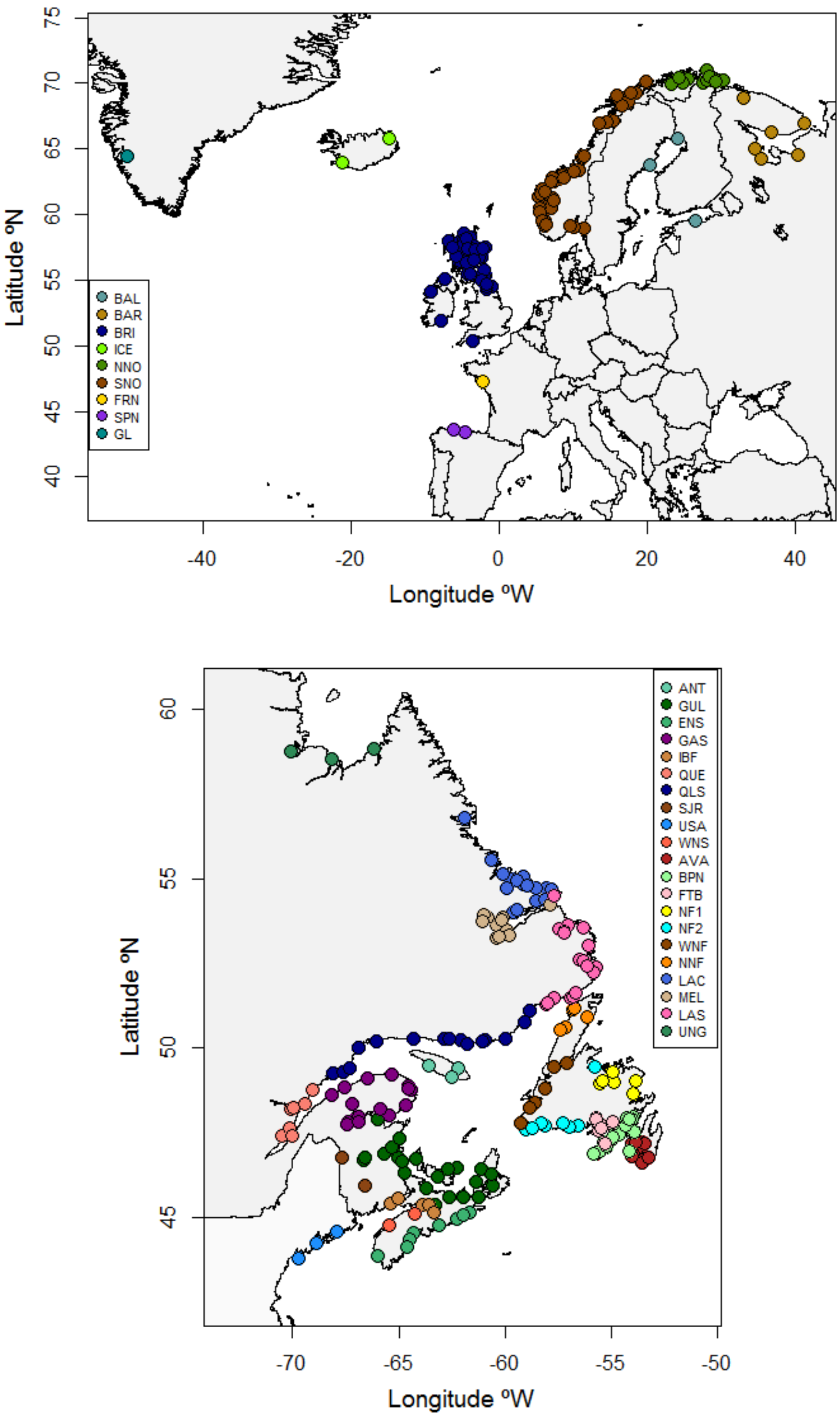


Figure 5.2.2.2. Map of sample locations for the SNP-based genetic baseline for European (top) and North American (bottom) reporting groups. The EUB (European Broodstock) reporting group does not have a geographic location and is therefore not represented on the top map. See Table 5.2.2.2 for location abbreviations.

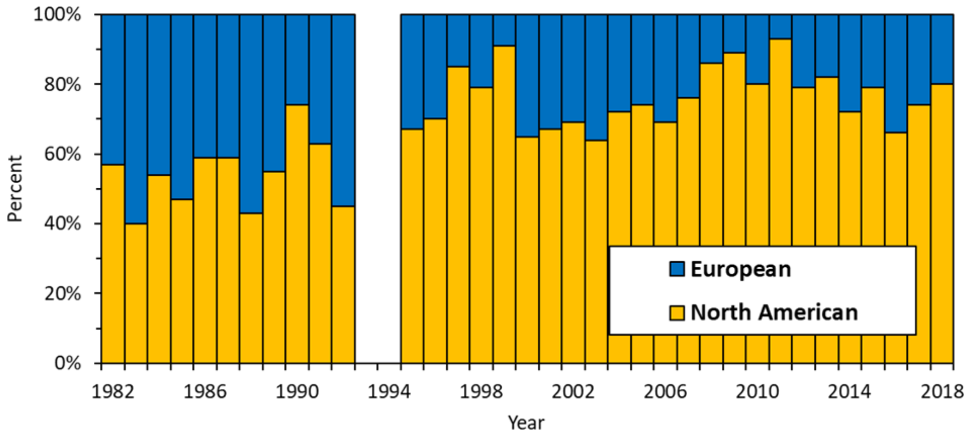


Figure 5.2.2.3. Percent of the sampled catch by continent of origin for 1982 to the present.

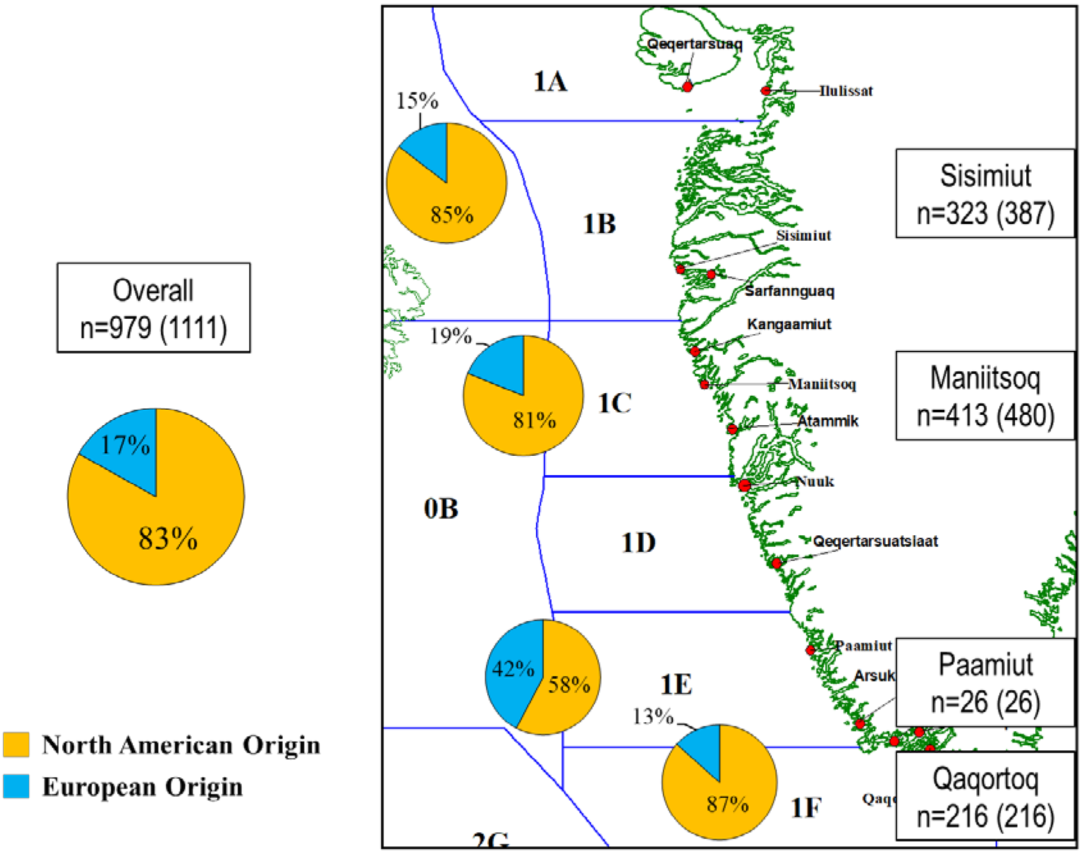


Figure 5.2.2.4. Percentage of North American and European origin Atlantic salmon sampled from the 2018 Greenland fishery according to NAFO division and community sampled. Samples were collected from four NAFO divisions (1B (Sisimiut), 1C (Maniitsoq), 1E (Paamiut), and 1F (Qaqortoq)). Sample size is provided and the subsample genotyped and analysed is identified parenthetically.

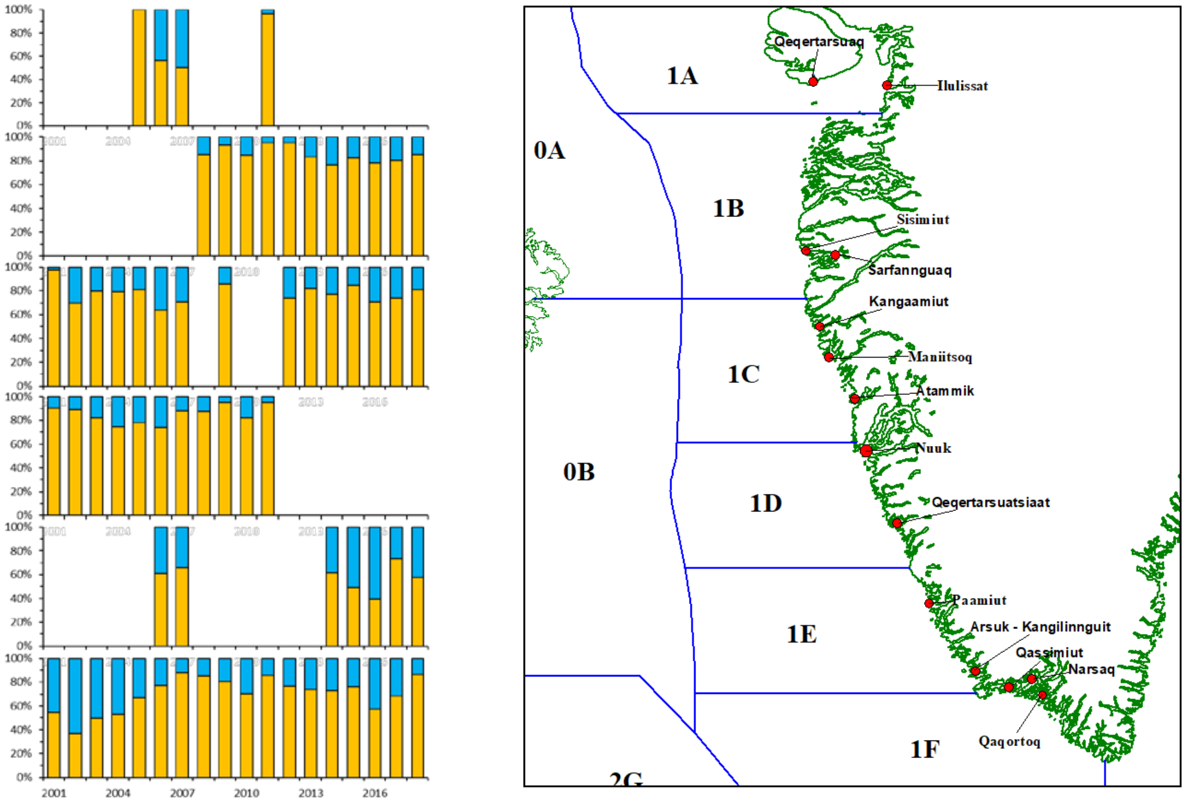


Figure 5.2.2.5. Percentage of North American (orange) and European (blue) origin Atlantic salmon sampled from Greenland fisheries by year (2001–2018) and NAFO Division. Where data are presented, samples were collected during that year and within that division. The Division 1A 2005 value is from a single sample.

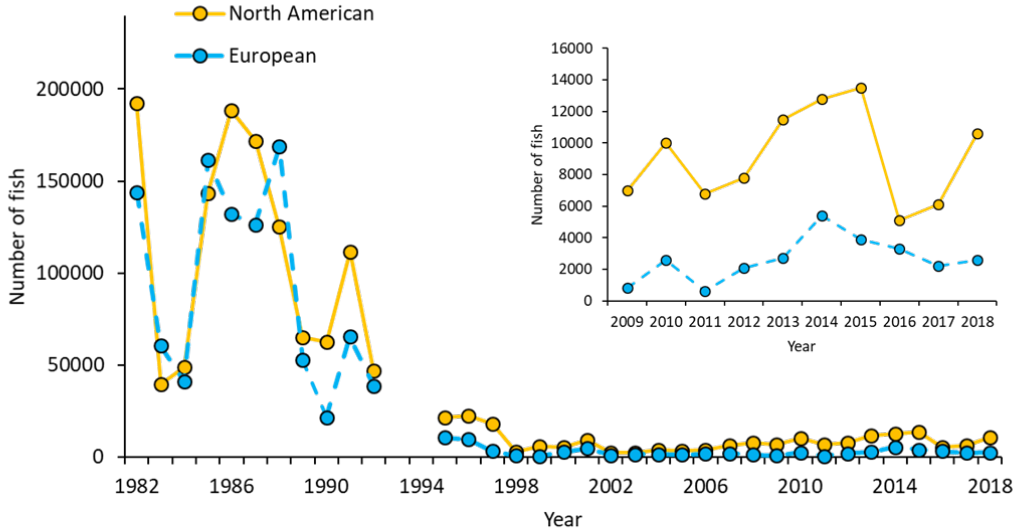


Figure 5.2.2.6. Number of North American and European Atlantic salmon caught at West Greenland from 1982–2018 and 2009–2018 (inset). Estimates are based on continent of origin by NAFO division, weighted by catch (weight) in each division. Numbers are rounded to the nearest hundred fish. Unreported catch not included.

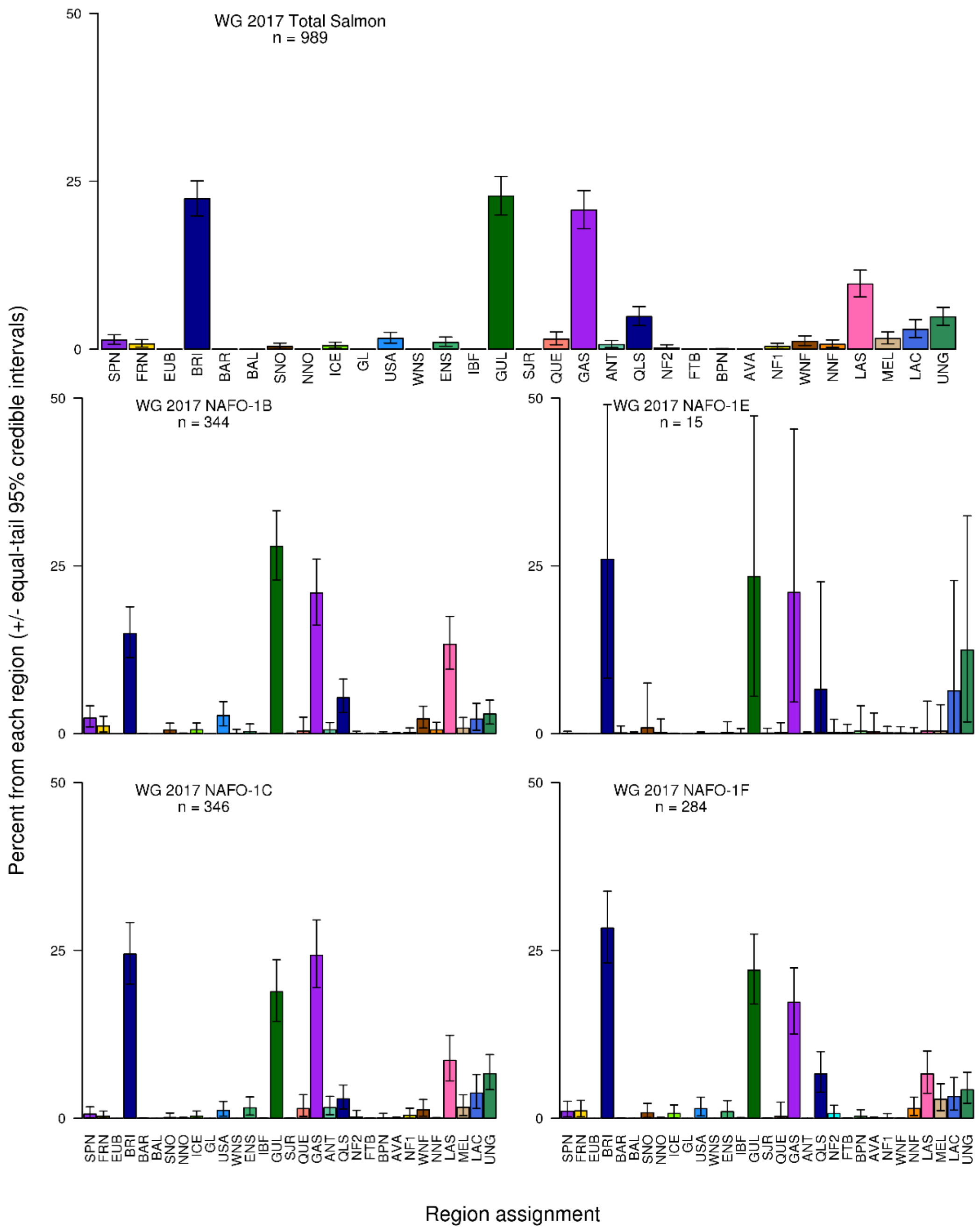


Figure 5.2.3.1. Bayesian estimates of mixture composition of samples from the West Greenland Atlantic salmon fishery for 2017 by region and overall using the SNP baseline. Baseline locations refer to genetic reporting groups identified in Table 5.2.2.2 and Figure 5.2.2.2. See Table 5.2.3.1 for detailed results. Credible intervals with a lower bound of zero indicate little support for the mean assignment value.

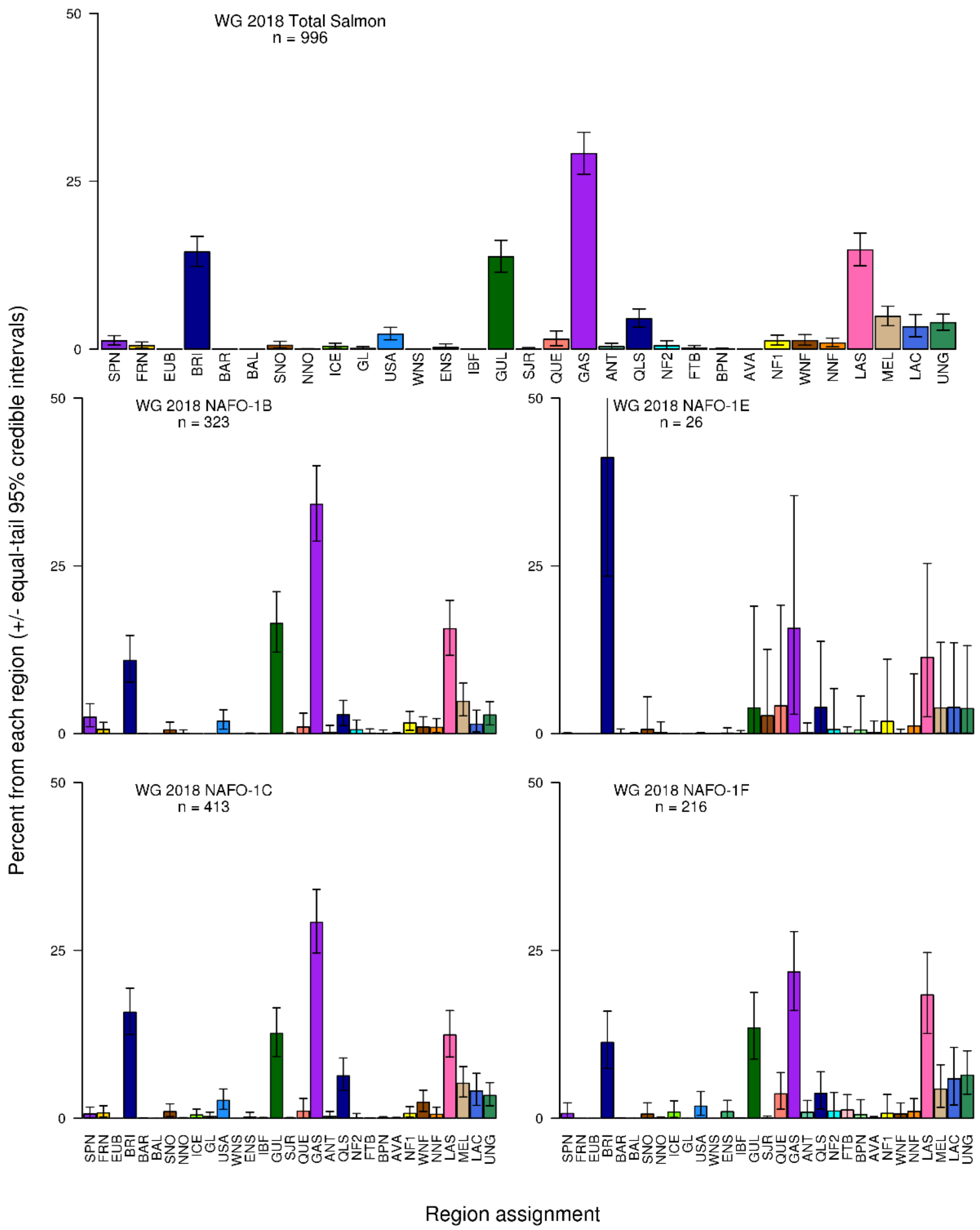


Figure 5.2.3.2. Bayesian estimates of mixture composition of samples from the West Greenland Atlantic salmon fishery for 2018 by region and overall using the SNP baseline. Baseline locations refer to genetic reporting groups identified in

Table 5.2.2.2 and Figure 5.2.2.2. See Table 5.2.3.1 for detailed results. Credible intervals with a lower bound of zero indicate little support for the mean assignment value.

Figure 5.3.1. Summary 2SW (NAC regions) and MSW (Southern NEAC) 2018 median (from the Monte Carlo posterior distributions) spawner estimates in relation to Conservation Limits/Management Objectives (CL/MO). The colour shading represents the three ICES 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).

Annex 1: List of Working Papers submitted to WGNAS 2019

WP No.	Authors	Title
01	Nygaard, R.	The salmon fishery in Greenland 2018 Draft
02	Sheehan, T.F., Bašić, T., Deschamps, D., Dugan, S., Lipsky, C., Millane, M., Tray, E., Nygaard, R., Bradbury, I.R., Robertson, M.J., Ó Maoiléidigh, N., Carr, J., Vendramin, N. and Zegers, G.	The International Sampling Program: Continent of Origin and Biological Characteristics of Atlantic Salmon Collected at West Greenland in 2018
03	Bardarson, H., Gudbergsson, G., Jonsson, I.R., and Sturlaugsson, J.	National Report for Iceland: The 2018 Salmon Season
04	Prusov, S., and Ustyuzhinsky, G.	Atlantic Salmon Fisheries and Status of Stocks in Russia. National Report for 2018
05	Erkinaro, J., Orell, P., Falkegård, M., Kuusela, J., Kylmäaho, M., Johansen, N., Haantie, J., Pohjola, J.-P. and Länsman, M.	Status of Atlantic salmon stocks in the rivers Teno/Tana and Näätämöjoki/Neidenelva, Finland/Norway
06	Fiske, P., Wennevik, V., Jensen, A.J., Utne, K.R., and Bolstad, G.	Atlantic salmon; National Report for Norway 2018
07	Ahlbeck Bergendahl, I., Degerman, E., Söderberg, L. and Sers, B.	Fisheries, Status and Management of Atlantic Salmon stocks in Sweden: National Report for 2018
08	Rasmussen, G.	National report for Denmark 2018
09	Jacobsen, J.A.	Status of the fisheries for Atlantic salmon and production of farmed salmon in 2018 for the Faroe Islands
10	Millane, M., Ó Maoiléidigh, N., Gargan, P., White, J., O'Higgins, C. Fitzgerald, K., Dillane, M., McGrory, T., Bond, N., McLaughlin, D., Rogan, G., Cotter, D., Maxwell, H., and Poole, R.	National Report for Ireland: The 2018 Salmon Season
11	Marine Scotland Science, Salmon and Freshwater Fisheries	National Report for UK (Scotland): 2018 season
12	Cefas, Environment Agency and Natural Resources Wales	Salmon stocks and fisheries in UK (England and Wales), 2018 - Preliminary assessment prepared for ICES, April 2019
13	Ensing, D., Kennedy, R., and Boylan, P.	Summary of Salmon Fisheries and Status of Stocks in Northern Ireland for 2017
14	Buoro, M	National report France 2018
15	Freese, M	National Report Germany 2018
16	de la Hoz, J.	Salmon Fisheries and Status of Stocks in Spain (Asturias-2018)
17	April, J. and Cauchon, V.	Status of Atlantic salmon Stocks in Québec in 2018
18	April, J. and Cauchon, V.	Smolt production, freshwater and sea survival on two index rivers in Québec, the Saint-Jean and the Trinité (2018)

WP No.	Authors	Title
19	Fisheries and Oceans Canada (Kelly, N)	Status of Newfoundland and Labrador Atlantic Salmon 2018
20	Biron, M., Chaput, G., Cairns, D., Dauphin, G., Douglas, S. and LeBlanc, S.	Atlantic Salmon (*Salmo Salar*) in DFO Gulf Region Salmon Fishing Areas 15–18 to 2018
21	Fisheries and Oceans Canada	Stock status update of Atlantic salmon in Salmon Fishing Areas (SFAs) 19–21 and 23, Canada
22	Atkinson, E., Sweka, J., Kocik, J., Gephard, S., Lipsky, C, Bailey, M., and Sheehan, T.	National Report for the United States, 2018
23	Jaugeon, B	Annual Report on the Atlantic Salmon Fishery at St Pierre and Miquelon 2018 Season
24	Chaput, G., April, J.,1 Cairns, D., Biron, M., Douglas, S., Jones, R., Kelly, N., LeBlanc, S., Levy, A., Poole, R., Raab, D., and Robertson, M.	Catch Statistics and Aquaculture Production Values for Canada: preliminary 2018, final 2017
25	Russell, I.C., Fiske, P., Samokhvalov, I. and Magnuson, S.	NASCO NEAC Framework of Indicators Working Group Report – 2019
26	Chaput, G, Kærgaard, K, Maoiléidigh, N. Ó., and Saunders, R.	NASCO NAC Framework of Indicators Working Group Report, 2019
27	Rivot, E., Olmos, M., Chaput, G., and Prévost, E.	A hierarchical life cycle model for Atlantic salmon stock assessment at the North Atlantic basin scale
28	Bradbury, I.	Genetic analyses of mixed-stock fisheries in the Northwest Atlantic
29	Gregory, S. D., Ibbotson, A. T., Riley, W. D., Nevoux, M., Lauridsen, R. B., Russell, I. C., Britton, J. R., Gillingham, P. K., Simmons, O. M. and Rivot, E.	Atlantic salmon return rate increases with smolt length
30	Sheehan, T., Carr, J., Chafe, G., Renkawitz, M., Robertson, M., Lyberth, B., and Bradbury, I.	Update on Pop-off Satellite Tagging Atlantic Salmon at Greenland
31	Vendramin, N. and Sheehan, T. F.	Atlantic salmon viral pathogen testing (VHSV, PRV-1, PRV-3, PMCV) at Greenland in 2017
32	Teffer, A., Carr, J., Tabata, A., Shultze, A., Bradbury, I., Deschamps, D., Brunsdon, E., Mordecai, G., Miller, K.	Presence and Abundance of Infectious Agents on Atlantic salmon in the Labrador Sea
33	Atlantic Salmon Federation	Research Update (presentation)
34	Gregory, S.D. and Rivot, E.	Project SAMARCH 2017–2022 (presentation)
35	Olmos, M., Payne, M., Nevoux, M., Chaput, G., Prevost, E., Du Pontavice, H., Sheehan, T., Mills, K. and Rivot, E.	Investigating the drivers of Atlantic salmon population decline across the Atlantic Basin (presentation)
36	Ensing, D.	Update on WGDIAD

Annex 2: References cited

Anderson, E.C., Waples, R.S., and Kalinowski, S.T. 2008. An improved method for predicting the accuracy of genetic stock identification. Canadian Journal of Fisheries and Aquatic Sciences 65(7): 1475–1486.

Andreska, J., and Hanel, L. 2015. Historical occurrence and extinction of Atlantic salmon in the River Elbe from the fourteenth to the twentieth centuries. Archives of Polish Fisheries, 23:3–16.

Anon. 2012. Final Project Report of SALSEA-Merge - Advancing understanding of Atlantic Salmon at Sea: Merging Genetics and Ecology to Resolve Stock-specific Migration and Distribution patterns. Grant Agreement number: 212529. EU Framework Programme.

Beaugrand, G., and Reid, P.C. 2012. Relationships between North Atlantic salmon, plankton, and hydroclimatic change in the Northeast Atlantic. ICES Journal of Marine Science, 69: 1549–1562.

Beck, M., Evans, R., Feist, S.W., Stebbing, P., Longshaw, M., and Harris, E. 2008. *Anisakis simplex* sensu lato associated with red vent syndrome in wild Atlantic salmon *Salmo salar* in England and Wales. Diseases of Aquatic Organisms, 82: 61–65.

Bradbury, I.R., Wringe, B.F., Watson, B., Paterson, I., Horne, J., Beiko, R., Lehnert, S.J., Clément, M., Anderson, E.C., Jeffery, N.W., Duffy, S., Sylvester, E., Robertson, M., and Bentzen, P. 2018. Genotyping-by-sequencing of genome-wide microsatellite loci reveals fine-scale harvest composition in a coastal Atlantic salmon fishery. *Evolutionary Applications.* https://doi.org/10.1111/eva.12606 .

Chaput, G. 2012. Overview of the status of Atlantic salmon (*Salmo salar*) in the North Atlantic and trends in marine mortality. ICES Journal of Marine Science 69: 1538–1548.

Chaput, G., Legault, C.M., Reddin, D.G., Caron, F., and Amiro, P.G. 2005. Provision of catch advice taking account of non-stationarity in productivity of Atlantic salmon (*Salmo salar* L.) in the Northwest Atlantic. ICES Journal of Marine Science, 62: 131–143.

Chaput, G., Carr, J., Daniels, I., Tinker, S., Jonsen, I., and Whoriskey, F. 2018. Atlantic salmon (*Salmo salar*) smolt and early post smolt migration and survival inferred from multi-year and multi-stock acoustic telemetry studies in the Gulf of St Lawrence, Northwest Atlantic. ICES Journal of Marine Science, fsy156.doi.org/10.1093/fsy156.

Crozier, W.W., Potter, E.C.E., Prevost, E., Schon, P.J., and O'Maoileidigh, N. 2003. A coordinated approach towards the development of a scientific basis for management of wild Atlantic salmon in the North-East Atlantic (SALMODEL). Queens University of Belfast, Belfast.

Daniels, J., Chaput, G., and Carr, J. 2018. Estimating consumption rate of Atlantic salmon smolts (*Salmo salar*) by Striped Bass (*Morone saxatilis*) in the Miramichi River estuary using acoustic telemetry. *Canadian* Journal of *Fisheries* and *Aquatic* Sciences, Sci. https://doi.org/10.1139/cjfas-2017-0373.

DFO-Fisheries and Oceans Canada. 2012. Reference Points Consistent with the Precautionary Approach for a Variety of Stocks in the Maritimes Region. DFO Canadian Science Advisory Secretariat Science Advisory Report 2012/035.

DFO-Fisheries and Oceans Canada. 2013. Recovery Potential Assessment for Southern Upland Atlantic Salmon. DFO Canadian Science Advisory Secretariat Science Advisory Report. 2013/009.

DFO-Fisheries and Oceans Canada. 2017. Stock Assessment of Newfoundland and Labrador Atlantic Salmon – 2016. DFO Canadian Science Advisory Secretariat Science Advisory Report 2017/035.

DFO-Fisheries and Oceans Canada. 2018a. Limit Reference Points for Atlantic Salmon Rivers in DFO Gulf Region. DFO Canadian Science Advisory Secretariat Science Response. 2018/015.

Dionne, M., Dauphin, G., Chaput, G., and Prèvost, E. 2015. Actualisation du modèle stock–recrutement pour la conservation et la gestion des populations de saumon atlantique du Québec, ministère des Forêts, de la Faune et des Parcs du Québec, Direction générale de la gestion de la faune et des habitats, Direction l'expertise sur la faune aquatique, 66 pp.

Garseth, H., Fritsvold, C., Svendsen, J.C., Bang Jensen, B., and Mikalsen, A.B. 2018. Cardiomyopathy syndrome in Atlantic salmon *Salmo salar* L.: A review of the current state of knowledge. Journal of Fish Diseases, 41:11–26.

Gibson, A.J.F., and Claytor, R.R. 2013. What is 2.4? Placing Atlantic Salmon Conservation Requirements in the Context of the Precautionary Approach to Fisheries Management in the Maritimes Region. DFO Canadian Science Advisory Secretariat Research Document 2012/043. iv + 21 p.

Gregory, S.D., Nevoux, M., Riley, W.D., Beaumont, W.R.C., Jeannot, N., Lauridsen, R.B., Marchand, F., *et al*. 2017. Patterns on a parr: drivers of long-term salmon parr length in UK and French rivers depend on geographical scale. Freshwater Biology, 62: 1117–1129.

Gregory, S.D, Armstrong, J.D., and Britton, J.R. 2018. Is bigger really better? Towards improved models for testing how Atlantic salmon *Salmo salar* smolt size affects marine survival. Journal of Fish Biology, 92: 579–592.

Gregory, S.D., Ibbotson, A.T., Riley, W.D., Nevoux, M., Lauridsen, R.B., Russell, I.C., Britton, J.R., Gillingham, P.K., Simmons, O.M., and Rivot, E. In press. Atlantic salmon return rate increases with smolt length. ICES Journal of Marine Science.

Hjeltnes B., Bang-Jensen B., Bornø, G., Haukaas A., and Walde C.S. Ed. 2019. Fiskehelserapporten 2018, utgitt av Veterinærinstituttet 2019. Veterinærinstituttets rapportserie, Rapport 6a - 2019: 1–132.

Hytterød, S., Darrud, M., Mohammed, S.N., Holter, T., and Hansen, H. 2019. The post-treatment control programme to ascertain freedom from infection with *Gyrodactylus salaris* 2018. Norwegian Veterinary Institute, Annual report: 1–5.

Ibbotson, A.T, Riley, W.D., Beaumont, W.R.C., Cook, A.C., Ives, M.J., Pinder, A.C., and Scott, L.J. 2013. The source of autumn and spring downstream migrating juvenile Atlantic salmon in a small lowland river. Ecology of Freshwater Fish, 22: 73–81.

ICES-International Council for the Exploration of the Sea. 1993. Report of the Working Group on the North Atlantic Salmon (WGNAS). 5–12 March 1993, Copenhagen, Denmark. ICES, Doc. CM 1993/Assess: 10.

ICES-International Council for the Exploration of the Sea. 1994. Report of the Working Group on the North Atlantic Salmon (WGNAS). 6–15 April 1994, Reykjavik, Iceland. ICES, Doc. CM 1994/Assess: 16, Ref. M.

ICES-International Council for the Exploration of the Sea. 2000. Report of the Working Group on the North Atlantic Salmon (WGNAS). April 3–13 2000, Copenhagen, Denmark. ICES CM 2000/ACFM: 13. 301 pp.

ICES-International Council for the Exploration of the Sea. 2001. Report of the Working Group on North Atlantic Salmon (WGNAS). 2–11 April 2001, Aberdeen, Scotland. ICES CM 2001/ACFM: 15. 290 pp.

ICES-International Council for the Exploration of the Sea. 2002. Report of the Working Group on North Atlantic Salmon (WGNAS). 3–13 April 2002, Copenhagen, Denmark. ICES CM 2002/ACFM: 14. 299 pp.

ICES-International Council for the Exploration of the Sea. 2004. Report of the Study Group on the Bycatch of Salmon in Pelagic Trawl Fisheries (SGBYSAL), 9–12 March 2004, Bergen, Norway. ICES CM 2004/I:01. 66 pp.

ICES-International Council for the Exploration of the Sea. 2008. Report of the Working Group on North Atlantic Salmon (WGNAS). 1–10 April 2008, Galway, Ireland. ICES CM 2008/ACOM: 18. 235 pp.

ICES-International Council for the Exploration of the Sea. 2009. Report of the Working Group on North Atlantic Salmon (WGNAS). 30 March–8 April 2009, Copenhagen, Denmark. ICES CM 2009/ACFM: 06. 283 pp.

ICES-International Council for the Exploration of the Sea. 2010. Report of the Working Group on North Atlantic Salmon (WGNAS), 22–31 March 2010, Copenhagen, Denmark. ICES CM 2010/ACOM: 09. 302 pp.

ICES-International Council for the Exploration of the Sea. 2011. Report of the Working Group on North Atlantic Salmon (WGNAS), 22–31 March 2011, Copenhagen, Denmark. ICES CM 2011ACOM: 09. 284 pp.

ICES-International Council for the Exploration of the Sea. 2012. Report of the Working Group on North Atlantic Salmon (WGNAS), 26 March–4 April 2012, Copenhagen, Denmark. ICES CM 2012/ACOM: 09. 322 pp.

ICES. WKESDCF. 2012. Report of the Workshop on Eel and Salmon DCF Data (WKESDCF), 3–6 July 2012, ICES HQ, Copenhagen, Denmark. ICES CM / ACOM:62. 67 pp.

ICES-International Council for the Exploration of the Sea. 2014. Report of the Working Group on North Atlantic Salmon (WGNAS), 19–28 March 2014, Copenhagen, Denmark. ICES CM 2014/ACOM:09. 431 pp.

ICES-International Council for the Exploration of the Sea. 2015a. Report of the Working Group on Effectiveness of Recovery Actions for Atlantic Salmon (WGERAAS). ICESCM2015/SSGEPD:03 116 pp.

ICES-International Council for the Exploration of the Sea. 2015b. Report of the Working Group on North Atlantic Salmon (WGNAS), 17–26 March 2015, Moncton, Canada. ICES CM 2015/ACOM:09. 461 pp.

ICES-International Council for the Exploration of the Sea. 2016. Report of the Working Group on North Atlantic Salmon (WGNAS), 30 March–8 April 2016, Copenhagen, Denmark. ICES CM 2016/ACOM:10. 363 pp.

ICES-International Council for the Exploration of the Sea. 2017a. Report of the Working Group on North Atlantic Salmon. 29 March–7 April 2017, Copenhagen, Denmark. ICES CM 2017/ACOM:20, 296 pp.

ICES-International Council for the Exploration of the Sea. 2017b. Report of the Workshop on Potential Impacts of Climate Change on Atlantic Salmon Stock Dynamics (WKCCISAL), 27–28 March 2017, Copenhagen, Denmark. ICES CM 2017/ACOM:39, 86 pp.

ICES-International Council for the Exploration of the Sea. 2018. Report of the Working Group on North Atlantic Salmon (WGNAS), 4–13 April 2018, Woods Hole, MA, USA. ICES CM 2018/ACOM:21. 386 pp.

ICES. WGNAS Addendum. 2018. ICES Advisory Committee, ICES CM 2018/ACOM:21. ICES Compilation of Microtags, Finclip and External Tag Releases 2017 by the Working Group on North Atlantic Salmon (WGNAS). 4–13 April 2018, Woods Hole, MA, USA.

ICES. WGWIDE. 2015. Report of the Working Group on Widely Distributed Stocks (WGWIDE), 25–31 August 2015, Pasaia, Spain. ICES CM 2015/ACOM:15. 588 pp.

ICES. WGNAS Addendum. 2019. Compilation of Microtags, Finclip and External Tag Releases 2018 by the Working Group on North Atlantic Salmon, 25 March–4 April 2019, Bergen, Norway. ICES CM 2019/FRSG. 25 pp.

IPCC. 2007. Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. IPCC, Geneva. 104 pp.

IPCC. 2014. Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Inter-governmental Panel on Climate Change [Barros, V.R., Field, C.B., Dokken, D.J. , Mastrandrea, M.D., Mach, K.J., Bilir, T.E, Chatterjee, M., Ebi, K.L., Estrada, Y.O., Genova, R.C., Girma, B., Kissel, E.S., Levy, A.N., MacCracken, S., Mastrandrea, P.R., and White, L.L. (Eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 688 pp.

Jeffery, N.W., Wringe, B.F., McBride, M., Hamilton, L.C., Stanley, R.R.E., Bernatchez, L., Bentzen, P., Beiko, R.G., Clément, M., Gilbey, J., Sheehan, T.F., and Bradbury, I.R. 2018. Range-wide regional assignment of Atlantic salmon (*Salmo salar*) using genome wide single-nucleotide polymorphisms. Fisheries Research, 206: 163–175.

King, T.L., Kalinowski, S.T., Schill, W.B., Spidle, A.P., and Lubinski, B. A. 2001. Population structure of Atlantic salmon (*Salmo salar* L.): a range-wide perspective from microsatellite DNA variation. Molecular Ecology, 10: 807–821.

MFFP-Ministère des Forêts, de la Faune et des Parcs. 2016. Plan de gestion du saumon Atlantique 2016–2026, ministère des Forêts, de la Faune et des Parcs, Direction générale de l’expertise sur la faune et ses habitats, Direction de la faune aquatique, Québec, 40 pp. www.mffp.gouv.qc.ca/faune/peche/plan-gestion-saumon.jsp.

Monnerjahn, U. 2011. Atlantic Salmon (*Salmo salar* L.) re-introduction in Germany: a status report on national programmes and activities. Journal of Applied Ichthyology, 27(3): 33–40.

Mork, K.A., Gilbey, J., Hansen, L.P., Jensen, A.J., Jacobsen, J.A., Holm, M., Holst, J.C., O´ Maoiléidigh, N., Vikebø, F., McGinnity, P., Melle, W., Thomas, K., Verspoor, E., and Wennevik, V. 2012. Modelling the migration of post-smolt Atlantic salmon (*Salmo salar*) in the Northeast Atlantic. ICES Journal of Marine Science, 69: 1616–1624.

NASCO-North Atlantic Salmon Conservation Organization. 2015. Report of the Thirty-Second Annual Meetings of the Commissions. 2–5 June 2015, Happy Valley-Goose Bay, Canada.

NASCO-North Atlantic Salmon Conservation Organization. 2016. Report of the Thirty-Third Annual Meetings of the Commissions. 7–10 June 2016, Bad Neuenahr-Ahrweiler, Germany.

NASCO-North Atlantic Salmon Conservation Organization. 2017. Report of the Thirty-Fourth Annual Meetings of the Commissions. 5–9 June 2017, Varberg, Sweden.

NASCO-North Atlantic Salmon Conservation Organization. 2018. Report of the Thirty-Five Annual Meetings of the Commissions. 12–15 June 2018, Portland, Maine, USA

Niemelä, E., Wennevik, V., Vähä, J.P., Ozerov, M., Fernandez, R.D., Svenning, M-A., Falkegård, M., Kalske, T., Christiansen, B., Samoylova, E., and Prusov, S. 2014. Recent investigations into the stock composition of the Norwegian and Russian coastal salmon fisheries (the Kolarctic salmon project) // Report of the Theme-based Special Session. Management of single and mixed stock fisheries, with particular focus on fisheries on stocks below their conservation limit. NASCO, CNL(14)68. P. 103–108.

Nilsen, R., Serra-Llinares, R.M., Schrøder Elvik, K.M., Didriksen, Bjørn, P. A, Sandvik, A.D., Karlsen, Ø., Finstad, B., and Lehmann, G.B. 2018a. Lakselusinfestasjon på vill laksefisk langs norskekysten. Rapport fra Havforskningen, 34-2018: 1–35.

Nilsen, F., Ellingsen, I., Finstad, B., Helgesen, K.O., Karlsen, Ø., Kristoffersen, A., Sandvik, A.D., Sægrov, H., Ugedal, O., Vollset, K.W., and Qviller, L. 2018b. Vurdering av lakselusindusert villfiskdødelighet per produksjonsområde i 2018. Rapport fra ekspertgruppe for vurdering av lusepåvirkning.

OIE. 2017. Viral Haemorrhagic Septicaemia. OIE Aquatic Animal Disease Cards 3:123–148.

Olsen, A.B., Hjortaas, M., Tengs, T., Hellberg, H. and Johansen, R. 2015. First description of a new disease in rainbow trout (*Oncorhynchus mykiss* (Walbaum)) similar to heart and skeletal muscle inflammation (HSMI) and detection of a gene sequence related to piscine orthoreovirus (PRV). PLoS One 10:1–14.

Prévost, E., Parent, E., Crozier, W., Davidson, I., Dumas, J., Gudbergsson, G., Hindar, K., *et al*. 2003. Setting biological reference points for Atlantic salmon stocks: transfer of information from data-rich to sparse-data situations by Bayesian hierarchical modelling. ICES Journal of Marine Science 60, 1177–1193.

Potter, E.C.E., Crozier, W.W., Schön, P.-J., Nicholson, M.D., Maxwell, D.L., Prévost, E., Erkinaro, J., Gudbergsson; G., Karlsson; L., Hansen; L.P., MacLean, J.C., Ó Maoiléidigh, N., and Prusov, S. 2004. Estimating and forecasting pre-fishery abundance of Atlantic salmon (*Salmo salar L.*) in the Northeast Atlantic for the management of mixed-stock fisheries. ICES Journal of Marine Science, 61: 1359–1369.

Rago, P.J., Reddin, D.G., Porter, T.R., Meerburg, D.J., Friedland, K.D., and Potter, E.C.E. 1993. A continental run reconstruction model for the non-maturing component of North American Atlantic salmon: analysis of fisheries in Greenland and Newfoundland Labrador, 1974–1991. ICES CM 1993/M: 25.

Reddin, D.G. and Friedland, K. 1999. A history of identification to continent of origin of Atlantic salmon (*Salmo salar* L.) at west Greenland, 1969–1997. Fisheries Research, 43: 221–235.

Russell, I, Aprahamian, M., Barry, J., Davidson, I., Fiske, P., Ibbotson, A., Kennedy, R., *et al*. 2012. The influence of the freshwater environment and the biological characteristics of Atlantic salmon smolts on their subsequent marine survival. ICES Journal of Marine Science, 69: 1563–1573.

Schneider, J. 2011. Review of reintroduction of Atlantic salmon (*Salmo salar*) in tributaries of the Rhine River. Journal of Applied Ichthyology, 27(3): 24–32.

Servanty, S., and Prévost, E. 2016. Mise à jour et standardisation des séries chronologiques d'abondance du saumon atlantique sur les cours d'eau de l'ORE DiaPFC et la Bresle. Rapport final, février 2016. Fiche action ONEMA – INRA 2013-2015 (action n° 35).

Sheehan, T.F., Legault, C.M., King, T.L., and Spidle, A.P. 2010. Probabilistic-based Genetic Assignment model (PGA): assignments to subcontinent of origin of the West Greenland Atlantic salmon harvest. ICES Journal of Marine Science, 67: 537–550.

Statistics Norway – Sea catches of salmon and sea trout: https://www.ssb.no/en/jord-skog-jakt-og-fiskeri/statistikker/sjofiske.

Veinott, G., Cochrane, N., and J.B. Dempson. 2013. Evaluation of a river classification system as a conservation measure in the management of Atlantic salmon in Insular Newfoundland. Fisheries Management and Ecology, 20(5): 454–459.

Vendramin, N., Cuenca, A., Sørensen, J., Alencar, A.L.F., Christiansen, D., Axen, C., Lieffrig, F., Ruane, N.M., Martin, P., Sheehan, T., Iburg, T.M., Rimstad, E. and Olesen, N.J. Accepted. Presence and genetic variability of Piscine orthoreovirus genotype 1 (PRV-1) in wild salmonids in Northern Europe and Atlantic Ocean. Journal of Fish Diseases.

Wessel, Ø., Braaen, S., Alarcon, M., Haatveit, H., Roos, N., Markussen, T., Tengs, T., Dahle, M.K., and Rimstad, E. 2017. Infection with purified Piscine orthoreovirus demonstrates a causal relationship with heart and skeletal muscle inflammation in Atlantic salmon. PLoS One, 12:e0183781.

White, J., Ó Maoiléidigh, N., Gargan, P., de Eyto, E., Chaput, G., Roche, W., McGinnity, P., *et al*. 2016. Incorporating natural variability in biological reference points and population dynamics into management of Atlantic salmon (*Salmo salar* L.) stocks returning to home waters. ICES Journal of Marine Science, 73: 1513–1524.

Wolter, C. 2015. Historic catches, abundance, and decline of Atlantic salmon *Salmo salar* in the River Elbe. Aquatic Sciences, 77(3): 367–380.

Annex 3: List of participants

Name	Institute	Country	EMAIL
Ida Ahlbeck-Bergendahl	Swedish University of Agricultural Sciences Department of Aquatic Resources-SLU Aqua	Sweden	ida.ahlbeck.bergendahl@slu.se
Julien April	Service de la Faune Aquatique	Canada	julien.april@mffp.gouv.qc.ca
Hlynur Bardarson	Marine and Freshwater Research Institute	Iceland	hlynur.bardarson@hafogvatn.is
Geir H. Bolstad	Norwegian Institute for Nature Research	Norway	geir.bolstad@nina.no
Ian Bradbury (by correspondance)	Fisheries and Oceans Canada Northwest Atlantic Fisheries Centre	Canada	ian.bradbury@dfo-mpo.gc.ca
Mathieu Buoro	National Institute of Agricultural Research	France	mathieu.buoro@inra.fr
Gérald Chaput	Fisheries and Oceans Canada-DFO	Canada	gerald.chaput@dfo-mpo.gc.ca
Guillaume Dauphin	Fisheries and Oceans Canada-DFO	Canada	guillaume.dauphin@dfo-mpo.gc.ca
Dennis Ensing	Agri-food and Biosciences Institute (AFBI) Fisheries & Aquatic Ecosystems Branch	NI, UK	dennis.ensing@afbini.gov.uk
Jaakko Erkinaro	Finnish Game and Natural Resources Institute Finland	Finland	jaakko.erkinaro@luke.fi
Peder Fiske	Norwegian Institute for Nature Research	Norway	Peder.Fiske@nina.no
Marko Freese	Thünen Institute of Fisheries Ecology	Germany	Marko.Freese@thuenen.de
Jonathan Gillson	Cefas Lowestoft	UK	jonathan.gillson@cefas.co.uk
Stephen Gregory	Salmon & Trout Research Centre Game & Wildlife Conservation Trust FBA River Laboratory	UK	sgregory@gwct.org.uk
Nora Hanson	Marine Scotland Science Freshwater Laboratory Field Station	Scotland, UK	Nora.hanson@gov.scot
Nick Kelly	Fisheries and Oceans Canada Northwest Atlantic Fisheries Centre	Canada	Nick.kelly@dfo-mpo.gc.ca
Hugo Maxwell	Marine Institute	Ireland	Hugo.maxwell@marine.ie
David Meerburg	Atlantic Salmon Federation	Canada	dmeerburg@asf.ca

Name	Institute	Country	EMAIL
Michael Millane	Inland Fisheries Ireland	Ireland	michael.millane@fisheriesIreland.ie
Rasmus Nygaard (by correspondence)	Greenland Institute for Natural Resources	Greenland	rany@natur.gl
Maxime Olmos	Agrocampus Ouest UMR 985 ESE Ecologie et Santé des Ecosysteme	France	maxime.olmos@agrocampus-ouest.fr
James Ounsley	Marine Science Scotland Freshwater Fisheries Laboratory	Scotland, UK	James.ounsley@gov.scot
Sergey Prusov	Knipovich Polar Research Institute of Marine Fisheries and Oceanography(PINRO)	Russia	prusov@pinro.ru
Etienne Rivot	Agrocampus Ouest UMR 985 ESE Ecologie et Santé des Ecosysteme	France	etienne.rivot@agrocampus-ouest.fr
Martha Robertson (Chair)	Fisheries and Oceans Canada Northwest Atlantic Fisheries Center	Canada	martha.robertson@dfo-mpo.gc.ca
Ian Russell	Centre for Environment, Fisheries and Aquaculture Science (Cefas) Lowestoft Laboratory	UK	ian.russell@cefas.co.uk
Tim Sheehan	NOAA Fisheries Service Northeast Fisheries Science Center	USA	tim.sheehan@noaa.gov
Kjell Rong Utne	Institute of Marine Research	Norway	kjell.rong.utne@imr.no
Alan Walker	Centre for Environment, Fisheries and Aquaculture Science (Cefas) Lowestoft Laboratory	UK	Alan.walker@cefas.co.uk
Vidar Wennevik	Institute of Marine Research	Norway	Vidar.Wennevik@imr.no

Annex 4: Reported catch of salmon in numbers and weight (tonnes round fresh weight) by sea age class. Catches reported for 2017 may be provisional. Methods used for estimating age composition given in footnote

		1SW		2SW		3SW		4SW		5SW		MSW (1)		PS		Total	
Country	Year	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
Greenland	1982	315 532	-	17 810	-	-	-	-	-	-	-	-	-	2 688	-	336 030	1 077
	1983	90 500	-	8 100	-	-	-	-	-	-	-	-	-	1 400	-	100 000	310
	1984	78 942	-	10 442	-	-	-	-	-	-	-	-	-	630	-	90 014	297
	1985	292 181	-	18 378	-	-	-	-	-	-	-	-	-	934	-	311 493	864
	1986	307 800	-	9 700	-	-	-	-	-	-	-	-	-	2 600	-	320 100	960
	1987	297 128	-	6 287	-	-	-	-	-	-	-	-	-	2 898	-	306 313	966
	1988	281 356	-	4 602	-	-	-	-	-	-	-	-	-	2 296	-	288 254	893
	1989	110 359	-	5 379	-	-	-	-	-	-	-	-	-	1 875	-	117 613	337
	1990	97 271	-	3 346	-	-	-	-	-	-	-	-	-	860	-	101 477	274
	1991	167 551	415	8 809	53	-	-	-	-	-	-	-	-	743	4	177 103	472
	1992	82 354	217	2 822	18	-	-	-	-	-	-	-	-	364	2	85 540	237
	1993	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1994	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1995	31 241	-	558	-	-	-	-	-	-	-	-	-	478	-	32 277	83

		1SW		2SW		3SW		4SW		5SW		MSW (1)		PS		Total	
Country	Year	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
	1996	30 613	-	884	-	-	-	-	-	-	-	-	-	568	-	32 065	92
	1997	20 980	-	134	-	-	-	-	-	-	-	-	-	124	-	21 238	58
	1998	3 901	-	17	-	-	-	-	-	-	-	-	-	88	-	4 006	11
	1999	6 124	18	50	0	-	-	-	-	-	-	-	-	84	1	6 258	19
	2000	7 715	21	0	0	-	-	-	-	-	-	-	-	140	0	7 855	21
	2001	14 795	40	324	2	-	-	-	-	-	-	-	-	293	1	15 412	43
	2002	3 344	10	34	0	-	-	-	-	-	-	-	-	27	0	3 405	10
	2003	3 933	12	38	0	-	-	-	-	-	-	-	-	73	0	4 044	12
	2004	4 488	14	51	0	-	-	-	-	-	-	-	-	88	0	4 627	15
	2005	3 120	13	40	0	-	-	-	-	-	-	-	-	180	1	3 340	14
	2006	5 746	20	183	1	-	-	-	-	-	-	-	-	224	1	6 153	22
	2007	6 037	24	82	0	6	0	-	-	-	-	-	-	144	1	6 263	25
	2008	9 311	26	47	0	0	0	-	-	-	-	-	-	177	1	9 535	26
	2009	7 442	27	268	1	0	0	-	-	-	-	-	-	328	1	8 038	29
	2010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11 579	40
Greenland	2011	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8 088	28
	2012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9 622	33

		1SW		2SW		3SW		4SW		5SW		MSW (1)		PS		Total	
Country	Year	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
	2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14 030	47
	2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17 440	58
	2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16 855	57
	2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8 522	27
	2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8 023	28
	2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12 864	40
Canada	1982	358 000	716	-	-	-	-	-	-	-	-	240 000	1 082	-	-	598 000	1 798
	1983	265 000	513	-	-	-	-	-	-	-	-	201 000	911	-	-	466 000	1 424
	1984	234 000	467	-	-	-	-	-	-	-	-	143 000	645	-	-	377 000	1 112
	1985	333 084	593	-	-	-	-	-	-	-	-	122 621	540	-	-	455 705	1 133
	1986	417 269	780	-	-	-	-	-	-	-	-	162 305	779	-	-	579 574	1 559
	1987	435 799	833	-	-	-	-	-	-	-	-	203 731	951	-	-	639 530	1 784
	1988	372 178	677	-	-	-	-	-	-	-	-	137 637	633	-	-	509 815	1 310
	1989	304 620	549	-	-	-	-	-	-	-	-	135 484	590	-	-	440 104	1 139
	1990	233 690	425	-	-	-	-	-	-	-	-	106 379	486	-	-	340 069	911
	1991	189 324	341	-	-	-	-	-	-	-	-	82 532	370	-	-	271 856	711
	1992	108 901	199	-	-	-	-	-	-	-	-	66 357	323	-	-	175 258	522

		1SW		2SW		3SW		4SW		5SW		MSW (1)		PS		Total	
Country	Year	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
	1993	91 239	159	-	-	-	-	-	-	-	-	45 416	214	-	-	136 655	373
	1994	76 973	139	-	-	-	-	-	-	-	-	42 946	216	-	-	119 919	355
	1995	61 940	107	-	-	-	-	-	-	-	-	34 263	153	-	-	96 203	260
	1996	82 490	138	-	-	-	-	-	-	-	-	31 590	154	-	-	114 080	292
	1997	58 988	103	-	-	-	-	-	-	-	-	26 270	126	-	-	85 258	229
	1998	51 251	87	-	-	-	-	-	-	-	-	13 274	70	-	-	64 525	157
	1999	50 901	88	-	-	-	-	-	-	-	-	11 368	64	-	-	62 269	152
	2000	55 263	95	-	-	-	-	-	-	-	-	10 571	58	-	-	65 834	153
	2001	51 225	86	-	-	-	-	-	-	-	-	11 575	61	-	-	62 800	147
	2002	53 464	99	-	-	-	-	-	-	-	-	8 439	49	-	-	61 903	148
	2003	46 768	81	-	-	-	-	-	-	-	-	11 218	60	-	-	57 986	141
	2004	54 253	94	-	-	-	-	-	-	-	-	12 933	68	-	-	67 186	162
	2005	47 368	83	-	-	-	-	-	-	-	-	10 937	56	-	-	58 305	139
	2006	46 747	82	-	-	-	-	-	-	-	-	11 248	55	-	-	57 995	137
	2007	37 075	63	-	-	-	-	-	-	-	-	10 311	49	-	-	47 386	112
	2008	58 386	100	-	-	-	-	-	-	-	-	11 736	57	-	-	70 122	158
	2009	42 943	74	-	-	-	-	-	-	-	-	11 226	52	-	-	54 169	126

		1SW		2SW		3SW		4SW		5SW		MSW (1)		PS		Total	
Country	Year	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
	2010	58 531	100	-	-	-	-	-	-	-	-	10 972	53	-	-	69 503	153
	2011	63 756	110	-	-	-	-	-	-	-	-	13 668	69	-	-	77 424	179
Canada	2012	43 192	74	-	-	-	-	-	-	-	-	10 980	52	-	-	54 172	126
	2013	41 311	72	-	-	-	-	-	-	-	-	13 887	66	-	-	55 198	138
	2014	44 171	77	-	-	-	-	-	-	-	-	8 756	41	-	-	45 328	106
	2015	48 838	86	-	-	-	-	-	-	-	-	11 473	54	-	-	60 311	140
	2016	45 265	79	-	-	-	-	-	-	-	-	11 716	56	-	-	56 981	135
	2017	32 439	57	-	-	-	-	-	-	-	-	11 578	55	-	-	44 017	112
	2018	27 765	50	-	-	-	-	-	-	-	-	8 420	40	-	-	36 185	90
USA	1982	33	-	1 206	-	5	-	-	-	-	-	-	-	21	-	1 265	6
	1983	26	-	314	1	2	-	-	-	-	-	-	-	6	-	348	1
	1984	50	-	545	2	2	-	-	-	-	-	-	-	12	-	609	2
	1985	23	-	528	2	2	-	-	-	-	-	-	-	13	-	566	2
	1986	76	-	482	2	2	-	-	-	-	-	-	-	3	-	563	2
	1987	33	-	229	1	10	-	-	-	-	-	-	-	10	-	282	1
	1988	49	-	203	1	3	-	-	-	-	-	-	-	4	-	259	1
	1989	157	0	325	1	2	-	-	-	-	-	-	-	3	-	487	2

		1SW		2SW		3SW		4SW		5SW		MSW (1)		PS		Total	
Country	Year	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
	1990	52	0	562	2	12	-	-	-	-	-	-	-	16	-	642	2
	1991	48	0	185	1	1	-	-	-	-	-	-	-	4	-	238	1
	1992	54	0	138	1	1	-	-	-	-	-	-	-	-	-	193	1
	1993	17	-	133	1	0	0	-	-	-	-	-	-	2	-	152	1
	1994	12	-	0	0	0	0	-	-	-	-	-	-	-	-	12	0
	1995	0	0	0	0	0	0	-	-	-	-	-	-	-	-	0	0
	1996	0	0	0	0	0	0	-	-	-	-	-	-	-	-	0	0
	1997	0	0	0	0	0	0	-	-	-	-	-	-	-	-	0	0
	1998	0	0	0	0	0	0	-	-	-	-	-	-	-	-	0	0
	1999	0	0	0	0	0	0	-	-	-	-	-	-	-	-	0	0
	2000	0	0	0	0	0	0	-	-	-	-	-	-	-	-	0	0
	2001	0	0	0	0	0	0	-	-	-	-	-	-	-	-	0	0
	2002	0	0	0	0	0	0	-	-	-	-	-	-	-	-	0	0
	2003	0	0	0	0	0	0	-	-	-	-	-	-	-	-	0	0
	2004	0	0	0	0	0	0	-	-	-	-	-	-	-	-	0	0
	2005	0	0	0	0	0	0	-	-	-	-	-	-	-	-	0	0
	2006	0	0	0	0	0	0	-	-	-	-	-	-	-	-	0	0

		1SW		2SW		3SW		4SW		5SW		MSW (1)		PS		Total	
Country	Year	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
	2007	0	0	0	0	0	0	-	-	-	-	-	-	-	-	0	0
	2008	0	0	0	0	0	0	-	-	-	-	-	-	-	-	0	0
	2009	0	0	0	0	0	0	-	-	-	-	-	-	-	-	0	0
	2010	0	0	0	0	0	0	-	-	-	-	-	-	-	-	0	0
	2011	0	0	0	0	0	0	-	-	-	-	-	-	-	-	0	0
	2012	0	0	0	0	0	0	-	-	-	-	-	-	-	-	0	0
USA	2013	0	0	0	0	0	0	-	-	-	-	-	-	-	-	0	0
	2014	0	0	0	0	0	0	-	-	-	-	-	-	-	-	0	0
	2015	0	0	0	0	0	0	-	-	-	-	-	-	-	-	0	0
	2016	0	0	0	0	0	0	-	-	-	-	-	-	-	-	0	0
	2017	0	0	0	0	0	0	-	-	-	-	-	-	-	-	0	0
	2018	0	0	0	0	0	0	-	-	-	-	-	-	-	-	0	0
Faroe	1982/83	9 086	-	101 227	-	21 663	-	448	-	29	-	-	-	-	-	132 453	625
Islands	1983/84	4 791	-	107 199	-	12 469	-	49	-	-	-	-	-	-	-	124 508	651
	1984/85	324	-	123 510	-	9 690	-	-	-	-	-	-	-	1 653	-	135 177	598
	1985/86	1 672	-	141 740	-	4 779	-	76	-	-	-	-	-	6 287	-	154 554	545
	1986/87	76	-	133 078	-	7 070	-	80	-	-	-	-	-	-	-	140 304	539

		1SW		2SW		3SW		4SW		5SW		MSW (1)		PS		Total	
Country	Year	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
	1987/88	5 833	-	55 728	-	3 450	-	0	-	-	-	-	-	-	-	65 011	208
	1988/89	1 351	-	86 417	-	5 728	-	0	-	-	-	-	-	-	-	93 496	309
	1989/90	1 560	-	103 407	-	6 463	-	6	-	-	-	-	-	-	-	111 436	364
	1990/91	631	-	52 420	-	4 390	-	8	-	-	-	-	-	-	-	57 449	202
	1991/92	16	-	7 611	-	837	-	-	-	-	-	-	-	-	-	8 464	31
	1992/93	-	-	4 212	-	1 203	-	-	-	-	-	-	-	-	-	5 415	22
	1993/94	-	-	1 866	-	206	-	-	-	-	-	-	-	-	-	2 072	7
	1994/95	-	-	1 807	-	156	-	-	-	-	-	-	-	-	-	1 963	6
	1995/96	-	-	268	-	14	-	-	-	-	-	-	-	-	-	282	1
	1996/97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0
	1997/98	339	-	1 315	-	109	-	-	-	-	-	-	-	-	-	1 763	6
	1998/99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0
	1999/00	225	-	1 560	-	205	-	-	-	-	-	-	-	-	-	1 990	8
	2000/01	0	-	0	-	0	-	-	-	-	-	-	-	-	-	0	0
	2001/02	0	-	0	-	0	-	-	-	-	-	-	-	-	-	0	0
	2002/03	0	-	0	-	0	-	-	-	-	-	-	-	-	-	0	0
	2003/04	0	-	0	-	0	-	-	-	-	-	-	-	-	-	0	0

		1SW		2SW		3SW		4SW		5SW		MSW (1)		PS		Total	
Country	Year	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
	2004/05	0	-	0	-	0	-	-	-	-	-	-	-	-	-	0	0
	2005/06	0	-	0	-	0	-	-	-	-	-	-	-	-	-	0	0
	2006/07	0	-	0	-	0	-	-	-	-	-	-	-	-	-	0	0
	2007/08	0	-	0	-	0	-	-	-	-	-	-	-	-	-	0	0
	2008/09	0	-	0	-	0	-	-	-	-	-	-	-	-	-	0	0
	2009/10	0	-	0	-	0	-	-	-	-	-	-	-	-	-	0	0
	2010/11	0	-	0	-	0	-	-	-	-	-	-	-	-	-	0	0
	2011/12	0	-	0	-	0	-	-	-	-	-	-	-	-	-	0	0
	2012/13	0	-	0	-	0	-	-	-	-	-	-	-	-	-	0	0
	2013/14	0	-	0	-	0	-	-	-	-	-	-	-	-	-	0	0
Faroe	2014/15	0	-	0	-	0	-	-	-	-	-	-	-	-	-	0	0
Islands	2015/16	0	-	0	-	0	-	-	-	-	-	-	-	-	-	0	0
	2016/17	0	-	0	-	0	-	-	-	-	-	-	-	-	-	0	0
	2017/18	1	-	1	-	1	-	-	-	-	-	-	-	-	-	0	0
	2018/19	0	-	0	-	0	-	-	-	-	-	-	-	-	-	0	0
Finland	1982	2 598	5	-	-	-	-	-	-	-	-	5 408	49	-	-	8 006	54
	1983	3 916	7	-	-	-	-	-	-	-	-	6 050	51	-	-	9 966	58

		1SW		2SW		3SW		4SW		5SW		MSW (1)		PS		Total	
Country	Year	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
	1984	4 899	9	-	-	-	-	-	-	-	-	4 726	37	-	-	9 625	46
	1985	6 201	11	-	-	-	-	-	-	-	-	4 912	38	-	-	11 113	49
	1986	6 131	12	-	-	-	-	-	-	-	-	3 244	25	-	-	9 375	37
	1987	8 696	15	-	-	-	-	-	-	-	-	4 520	34	-	-	13 216	49
	1988	5 926	9	-	-	-	-	-	-	-	-	3 495	27	-	-	9 421	36
	1989	10 395	19	-	-	-	-	-	-	-	-	5 332	33	-	-	15 727	52
	1990	10 084	19	-	-	-	-	-	-	-	-	5 600	41	-	-	15 684	60
	1991	9 213	17	-	-	-	-	-	-	-	-	6 298	53	-	-	15 511	70
	1992	15 017	28	-	-	-	-	-	-	-	-	6 284	49	-	-	21 301	77
	1993	11 157	17	-	-	-	-	-	-	-	-	8 180	53	-	-	19 337	70
	1994	7 493	11	-	-	-	-	-	-	-	-	6 230	38	-	-	13 723	49
	1995	7 786	11	-	-	-	-	-	-	-	-	5 344	38	-	-	13 130	49
	1996	12 230	20	1 275	5	1 424	12	234	4	19	1	-	-	354	3	15 536	44
	1997	10 341	15	2 419	10	1 674	15	141	2	22	1	-	-	418	3	15 015	45
	1998	11 792	19	1 608	7	1 660	16	147	3	-	-	-	-	460	3	15 667	48
	1999	17 929	31	2 055	8	1 643	17	120	2	6	0	-	-	592	3	22 345	63
	2000	20 199	37	5 247	25	2 502	25	101	2	0	0	-	-	1 090	7	29 139	96

		1SW		2SW		3SW		4SW		5SW		MSW (1)		PS		Total	
Country	Year	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
	2001	14 979	25	6 091	28	5 451	59	101	2	0	0	-	-	2 137	12	28 759	126
	2002	8 095	15	5 550	20	3 845	41	135	2	10	0	-	-	2 466	15	20 101	94
	2003	8 375	15	2 332	8	3 551	33	145	2	5	0	-	-	2 424	15	16 832	75
	2004	4 177	7	1 480	6	1 077	10	246	4	6	0	-	-	1 430	11	8 416	39
	2005	10 412	19	1 287	5	1 420	14	56	1	40	1	-	-	804	7	14 019	47
	2006	17 359	30	4 217	18	1 350	13	62	1	0	0	-	-	764	5	23 752	67
	2007	4 861	7	5 368	20	2 287	22	17	0	6	0	-	-	1 195	8	13 734	59
	2008	5 194	8	2 518	8	4 161	40	227	4	0	0	-	-	1 928	11	14 028	71
	2009	9 960	13	1 585	5	1 252	11	223	3	0	0	-	-	899	5	13 919	38
	2010	7 260	13	3 270	13	1 244	11	282	4	5	0	-	-	996	8	13 057	49
	2011	9 043	15	1 859	8	1 434	13	173	3	10	0	-	-	789	5	13 308	44
	2012	15 904	30	2 997	13	1 234	11	197	3	5	0	-	-	967	7	21 304	64
	2013	9 408	14	3 044	15	1 186	11	63	1	7	0	-	-	806	5	14 514	46
	2014	13 031	26	3 323	13	928	9	96	2	0	0	-	-	1 284	7	18 662	58
Finland	2015	8 255	13	3 562	16	1 069	9	79	1	0	0	-	-	903	6	13 868	45
	2016	6 763	14	3 028	10	1 997	20	91	1	0	0	-	-	959	5	12 838	51
	2017	2 533	5	1 642	7	1 349	14	116	2	3	0			530	3	28 973	31

		1SW		2SW		3SW		4SW		5SW		MSW (1)		PS		Total	
Country	Year	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
	2018	6 699	11	849	4	393	4	43	1	0	0	-	-	719	5	8704	24
Iceland	1991	29 601	-	11 892	-	-	-	-	-	-	-	-	-	-	-	41 493	130
	1992	38 538	-	15 312	-	-	-	-	-	-	-	-	-	-	-	53 850	175
	1993	36 640	-	11 541	-	-	-	-	-	-	-	-	-	-	-	48 181	160
	1994	24 224	59	14 088	76	-	-	-	-	-	-	-	-	-	-	38 312	135
	1995	32 767	90	13 136	56	-	-	-	-	-	-	-	-	-	-	45 903	145
	1996	26 927	66	9 785	52	-	-	-	-	-	-	-	-	-	-	36 712	118
	1997	21 684	56	8 178	41	-	-	-	-	-	-	-	-	-	-	29 862	97
	1998	32 224	81	7 272	37	-	-	-	-	-	-	-	-	-	-	39 496	119
	1999	22 620	59	9 883	52	-	-	-	-	-	-	-	-	-	-	32 503	111
	2000	20 270	49	4 319	24	-	-	-	-	-	-	-	-	-	-	24 589	73
	2001	18 538	46	5 289	28	-	-	-	-	-	-	-	-	-	-	23 827	74
	2002	25 277	64	5 194	26	-	-	-	-	-	-	-	-	-	-	30 471	90
	2003	24 738	61	8 119	37	-	-	-	-	-	-	-	-	-	-	32 857	99
	2004	32 600	84	6 128	28	-	-	-	-	-	-	-	-	-	-	38 728	111
	2005	39 980	101	5 941	28	-	-	-	-	-	-	-	-	-	-	45 921	129
	2006	29 857	71	5 635	23	-	-	-	-	-	-	-	-	-	-	35 492	93

		1SW		2SW		3SW		4SW		5SW		MSW (1)		PS		Total	
Country	Year	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
	2007	31 899	74	3 262	15	-	-	-	-	-	-	-	-	-	-	35 161	89
	2008	44 391	106	5 129	26	-	-	-	-	-	-	-	-	-	-	49 520	132
	2009	43 981	103	4 561	24	-	-	-	-	-	-	-	-	-	-	48 542	126
	2010	43 457	105	9 251	43	-	-	-	-	-	-	-	-	-	-	52 708	147
	2011	28 550	74	4 854	24	-	-	-	-	-	-	-	-	-	-	33 404	98
	2012	17 011	15	2 848	14	-	-	-	-	-	-	-	-	-	-	19 859	29
	2013	40 412	97	4 274	19	-	-	-	-	-	-	-	-	-	-	44 686	116
	2014	13 593	29	3 317	17	-	-	-	-	-	-	-	-	-	-	16 910	47
	2015	33 713	78	3 201	16	-	-	-	-	-	-	-	-	-	-	36 914	94
	2016	14 410	32	3 445	18	-	-	-	-	-	-	-	-	-	-	17 855	51
	2017	20 226	45	6 141	27	-	-	-	-	-	-	-	-	-	-	26 367	73
	2018	20 873	47	8 944	23	-	-	-	-	-	-	-	-	-	-	23 906	66
Sweden	1990	7 430	18	-	-	-	-	-	-	-	-	3 135	15	-	-	10 565	33
	1991	8 990	20	-	-	-	-	-	-	-	-	3 620	18	-	-	12 610	38
	1992	9 850	23	-	-	-	-	-	-	-	-	4 655	26	-	-	14 505	49
	1993	10 540	23	-	-	-	-	-	-	-	-	6 370	33	-	-	16 910	56
	1994	8 035	18	-	-	-	-	-	-	-	-	4 660	26	-	-	12 695	44

		1SW		2SW		3SW		4SW		5SW		MSW (1)		PS		Total	
Country	Year	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
	1995	9 761	22	-	-	-	-	-	-	-	-	2 770	14	-	-	12 531	36
	1996	6 008	14	-	-	-	-	-	-	-	-	3 542	19	-	-	9 550	33
Sweden	1997	2 747	7	-	-	-	-	-	-	-	-	2 307	12	-	-	5 054	19
	1998	2 421	6	-	-	`	-	-	-	-	-	1 702	9	-	-	4 123	15
	1999	3 573	8	-	-	-	-	-	-	-	-	1 460	8	-	-	5 033	16
	2000	7 103	18	-	-	-	-	-	-	-	-	3 196	15	-	-	10 299	33
	2001	4 634	12	-	-	-	-	-	-	-	-	3 853	21	-	-	8 487	33
	2002	4 733	12	-	-	-	-	-	-	-	-	2 826	16	-	-	7 559	28
	2003	2 891	7	-	-	-	-	-	-	-	-	3 214	18	-	-	6 105	25
	2004	2 494	6	-	-	-	-	-	-	-	-	2 330	13	-	-	4 824	19
	2005	2 122	5	-	-	-	-	-	-	-	-	1 770	10	-	-	3 892	15
	2006	2 585	4	-	-	-	-	-	-	-	-	1 772	10	-	-	4 357	14
	2007	1 228	3	-	-	-	-	-	-	-	-	2 442	13	-	-	3 670	16
	2008	1 197	3	-	-	-	-	-	-	-	-	2 752	16	-	-	3 949	18
	2009	1 269	3	-	-	-	-	-	-	-	-	2 495	14	-	-	3 764	17
	2010	2 109	5	-	-	-	-	-	-	-	-	3 066	17	-	-	5 175	22
	2011	2 726	7	-	-	-	-	-	-	-	-	5 759	32	-	-	8 485	39

		1SW		2SW		3SW		4SW		5SW		MSW (1)		PS		Total	
Country	Year	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
	2012	1 900	5	-	-	-	-	-	-	-	-	4 826	25	-	-	6 726	30
	2013	1 052	3	-	-	-	-	-	-	-	-	1 996	12	-	-	3 048	15
	2014	2 887	8	-	-	-	-	-	-	-	-	3 657	22	-	-	6 544	30
	2015	1 028	2	-	-	-	-	-	-	-	-	2 569	15	-	-	3 597	18
	2016	742	2	-	-	-	-	-	-	-	-	1 389	7	-	-	2 131	9
	2017	1 004	3	-	-	-	-	-	-	-	-	2 520	15	-	-	3 524	18
	2018	1 712	8	-	-	-	-	-	-	-	-	2 027	11	-	-	3 678	17
Norway	1981	221 566	467	-	-	-	-	-	-	-	-	213 943	1 189	-	-	435 509	1 656
	1982	163 120	363	-	-	-	-	-	-	-	-	174 229	985	-	-	337 349	1 348
	1983	278 061	593	-	-	-	-	-	-	-	-	171 361	957	-	-	449 422	1 550
	1984	294 365	628	-	-	-	-	-	-	-	-	176 716	995	-	-	471 081	1 623
	1985	299 037	638	-	-	-	-	-	-	-	-	162 403	923	-	-	461 440	1 561
	1986	264 849	556	-	-	-	-	-	-	-	-	191 524	1 042	-	-	456 373	1 598
	1987	235 703	491	-	-	-	-	-	-	-	-	153 554	894	-	-	389 257	1 385
	1988	217 617	420	-	-	-	-	-	-	-	-	120 367	656	-	-	337 984	1 076
	1989	220 170	436	-	-	-	-	-	-	-	-	80 880	469	-	-	301 050	905
	1990	192 500	385	-	-	-	-	-	-	-	-	91 437	545	-	-	283 937	930

		1SW		2SW		3SW		4SW		5SW		MSW (1)		PS		Total	
Country	Year	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
	1991	171 041	342	-	-	-	-	-	-	-	-	92 214	535	-	-	263 255	877
	1992	151 291	301	-	-	-	-	-	-	-	-	92 717	566	-	-	244 008	867
	1993	153 407	312	62 403	284	35 147	327	-	-	-	-	-	-	-	-	250 957	923
	1994	-	415	-	319	-	262	-	-	-	-	-	-	-	-	-	996
	1995	134 341	249	71 552	341	27 104	249	-	-	-	-	-	-	-	-	232 997	839
	1996	110 085	215	69 389	322	27 627	249	-	-	-	-	-	-	-	-	207 101	786
Norway	1997	124 387	241	52 842	238	16 448	151	-	-	-	-	-	-	-	-	193 677	630
	1998	162 185	296	66 767	306	15 568	139	-	-	-	-	-	-	-	-	244 520	741
	1999	164 905	318	70 825	326	18 669	167	-	-	-	-	-	-	-	-	254 399	811
	2000	250 468	504	99 934	454	24 319	219	-	-	-	-	-	-	-	-	374 721	1 177
	2001	207 934	417	117 759	554	33 047	295	-	-	-	-	-	-	-	-	358 740	1 266
	2002	127 039	249	98 055	471	33 013	299	-	-	-	-	-	-	-	-	258 107	1 019
	2003	185 574	363	87 993	410	31 099	298	-	-	-	-	-	-	-	-	304 666	1 071
	2004	108 645	207	77 343	371	23 173	206	-	-	-	-	-	-	-	-	209 161	784
	2005	165 900	307	69 488	320	27 507	261	-	-	-	-	-	-	-	-	262 895	888
	2006	142 218	261	99 401	453	23 529	218	-	-	-	-	-	-	-	-	265 148	932
	2007	78 165	140	79 146	363	28 896	264	-	-	-	-	-	-	-	-	186 207	767

		1SW		2SW		3SW		4SW		5SW		MSW (1)		PS		Total	
Country	Year	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
	2008	89 228	170	69 027	314	34 124	322	-	-	-	-	-	-	-	-	192 379	807
	2009	73 045	135	53 725	241	23 663	219	-	-	-	-	-	-	-	-	150 433	595
	2010	98 490	184	56 260	250	22 310	208	-	-	-	-	-	-	-	-	177 060	642
	2011	71 597	140	81 351	374	20 270	183	-	-	-	-	-	-	-	-	173 218	696
	2012	81 638	162	63 985	289	26 689	245	-	-	-	-	-	-	-	-	172 312	696
	2013	70 059	117	49 264	227	14 367	131	-	-	-	-	-	-	-	-	133 690	475
	2014	85 419	171	47 347	203	12 415	116	-	-	-	-	-	-	-	-	145 181	490
	2015	83 196	153	64 069	296	15 407	134	-	-	-	-	-	-	-	-	162 672	583
	2016	65 470	117	69 167	321	19 406	174	-	-	-	-	-	-	-	-	154 043	612
	2017	83 032	164	67 761	307	20 913	196	-	-	-	-	-	-	-	-	171 706	667
	2018	84 348	167	62 447	289	15 247	138	-	-	-	-	-	-	-	-	162 197	594
Russia	1987	97 242	-	27 135	-	9 539	-	556	-	18	-	-	-	2 521	-	137 011	564
	1988	53 158	-	33 395	-	10 256	-	294	-	25	-	-	-	2 937	-	100 065	420
	1989	78 023	-	23 123	-	4 118	-	26	-	0	-	-	-	2 187	-	107 477	364
	1990	70 595	-	20 633	-	2 919	-	101	-	0	-	-	-	2 010	-	96 258	313
	1991	40 603	-	12 458	-	3 060	-	650	-	0	-	-	-	1 375	-	58 146	215
	1992	34 021	-	8 880	-	3 547	-	180	-	0	-	-	-	824	-	47 452	167

		1SW		2SW		3SW		4SW		5SW		MSW (1)		PS		Total	
Country	Year	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
	1993	28 100	-	11 780	-	4 280	-	377	-	0	-	-	-	1 470	-	46 007	139
	1994	30 877	-	10 879	-	2 183	-	51	-	0	-	-	-	555	-	44 545	141
	1995	27 775	62	9 642	50	1 803	15	6	0	0	0	-	-	385	2	39 611	129
	1996	33 878	79	7 395	42	1 084	9	40	1	0	0	-	-	41	1	42 438	131
	1997	31 857	72	5 837	28	672	6	38	1	0	0	-	-	559	3	38 963	110
	1998	34 870	92	6 815	33	181	2	28	0	0	0	-	-	638	3	42 532	130
	1999	24 016	66	5 317	25	499	5	0	0	0	0	-	-	1 131	6	30 963	102
	2000	27 702	75	7 027	34	500	5	3	0	0	0	-	-	1 853	9	37 085	123
	2001	26 472	61	7 505	39	1 036	10	30	0	0	0	-	-	922	5	35 965	115
	2002	24 588	60	8 720	43	1 284	12	3	0	0	0	-	-	480	3	35 075	118
Russia	2003	22 014	50	8 905	42	1 206	12	20	0	0	0	-	-	634	4	32 779	107
	2004	17 105	39	6 786	33	880	7	0	0	0	0	-	-	529	3	25 300	82
	2005	16 591	39	7 179	33	989	8	1	0	0	0	-	-	439	3	25 199	82
	2006	22 412	54	5 392	28	759	6	0	0	0	0	-	-	449	3	29 012	91
	2007	12 474	30	4 377	23	929	7	0	0	0	0	-	-	277	2	18 057	62
	2008	13 404	28	8 674	39	669	4	8	0	0	0	-	-	312	2	23 067	73
	2009	13 580	30	7 215	35	720	5	36	0	0	0	-	-	173	1	21 724	71

		1SW		2SW		3SW		4SW		5SW		MSW (1)		PS		Total	
Country	Year	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
	2010	14 834	33	9 821	48	844	6	49	0	0	0	-	-	186	1	25 734	88
	2011	13 779	31	9 030	44	747	5	51	0	0	0	-	-	171	1	23 778	82
	2012	17 484	42	6 560	34	738	5	53	0	0	0	-	-	173	1	25 008	83
	2013	14 576	35	6 938	36	857	6	27	0	0	0	-	-	93	1	22 491	78
	2014	15 129	35	7 936	38	1 015	7	34	0	0	0	-	-	106	1	24 220	81
	2015	15 011	38	7 082	36	723	5	19	0	0	0	-	-	277	1	23 112	80
	2016	11 064	28	4 716	22	621	4	23	0	0	0	-	-	289	2	16 713	56
	2017	5 592	14	5 930	28	644	4	7	0	0	9	-	-	90	0	12 263	56
	2018	12 626	30	9 355	43	820	5	13	0	0	0	-	-	232	1	23 046	80
Ireland	1980	248 333	745	-	-	-	-	-	-	-	-	39 608	202	-	-	287 941	947
	1981	173 667	521	-	-	-	-	-	-	-	-	32 159	164	-	-	205 826	685
	1982	310 000	930	-	-	-	-	-	-	-	-	12 353	63	-	-	322 353	993
	1983	502 000	1 506	-	-	-	-	-	-	-	-	29 411	150	-	-	531 411	1 656
	1984	242 666	728	-	-	-	-	-	-	-	-	19 804	101	-	-	262 470	829
	1985	498 333	1 495	-	-	-	-	-	-	-	-	19 608	100	-	-	517 941	1 595
	1986	498 125	1 594	-	-	-	-	-	-	-	-	28 335	136	-	-	526 460	1 730
	1987	358 842	1 112	-	-	-	-	-	-	-	-	27 609	127	-	-	386 451	1 239

		1SW		2SW		3SW		4SW		5SW		MSW (1)		PS		Total	
Country	Year	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
	1988	559 297	1 733	-	-	-	-	-	-	-	-	30 599	141	-	-	589 896	1 874
	1989	-	-	-	-	-	-	-	-	-	-	-	-	-	-	330 558	1 079
	1990	-	-	-	-	-	-	-	-	-	-	-	-	-	-	188 890	567
	1991	-	-	-	-	-	-	-	-	-	-	-	-	-	-	135 474	404
	1992	-	-	-	-	-	-	-	-	-	-	-	-	-	-	235 435	631
	1993	-	-	-	-	-	-	-	-	-	-	-	-	-	-	200 120	541
	1994	-	-	-	-	-	-	-	-	-	-	-	-	-	-	286 266	804
	1995	-	-	-	-	-	-	-	-	-	-	-	-	-	-	288 225	790
	1996	-	-	-	-	-	-	-	-	-	-	-	-	-	-	249 623	685
	1997	-	-	-	-	-	-	-	-	-	-	-	-	-	-	209 214	570
	1998	-	-	-	-	-	-	-	-	-	-	-	-	-	-	237 663	624
	1999	-	-	-	-	-	-	-	-	-	-	-	-	-	-	180 477	515
	2000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	228 220	621
	2001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	270 963	730
Ireland	2002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	256 808	682
	2003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	204 145	551
	2004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	180 953	489

		1SW		2SW		3SW		4SW		5SW		MSW (1)		PS		Total	
Country	Year	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
	2005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	156 308	422
	2006	-	-	-	-	-	-	-	-	-	-	-	-	-	-	120 834	326
	2007	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30 946	84
	2008	-	-	-	-	-	-	-	-	-	-	-	-	-	-	33 200	89
	2009	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25 170	68
	2010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	36 508	99
	2011	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32 308	87
	2012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32 599	88
	2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32 303	87
	2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20 883	56
	2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	23 416	63
	2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21 504	58
	2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26 714	72
	2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21 425	58
UK	1985	62 815	-	-	-	-	-	-	-	-	-	32 716	-	-	-	95 531	361
(England &	1986	68 759	-	-	-	-	-	-	-	-	-	42 035	-	-	-	110 794	430
Wales)	1987	56 739	-	-	-	-	-	-	-	-	-	26 700	-	-	-	83 439	302

		1SW		2SW		3SW		4SW		5SW		MSW (1)		PS		Total	
Country	Year	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
	1988	76 012	-	-	-	-	-	-	-	-	-	34 151	-	-	-	110 163	395
	1989	54 384	-	-	-	-	-	-	-	-	-	29 284	-	-	-	83 668	296
	1990	45 072	-	-	-	-	-	-	-	-	-	41 604	-	-	-	86 676	338
	1991	36 671	-	-	-	-	-	-	-	-	-	14 978	-	-	-	51 649	200
	1992	34 331	-	-	-	-	-	-	-	-	-	10 255	-	-	-	44 586	171
	1993	56 033	-	-	-	-	-	-	-	-	-	13 144	-	-	-	69 177	248
	1994	67 853	-	-	-	-	-	-	-	-	-	20 268	-	-	-	88 121	324
	1995	57 944	-	-	-	-	-	-	-	-	-	22 534	-	-	-	80 478	295
	1996	30 352	-	-	-	-	-	-	-	-	-	16 344	-	-	-	46 696	183
	1997	30 203	-	-	-	-	-	-	-	-	-	11 171	-	-	-	41 374	142
	1998	30 272	-	-	-	-	-	-	-	-	-	6 645	-	-	-	36 917	123
	1999	27 953	-	-	-	-	-	-	-	-	-	13 154	-	-	-	41 107	150
	2000	48 153	-	-	-	-	-	-	-	-	-	12 800	-	-	-	60 953	219
	2001	38 480	-	-	-	-	-	-	-	-	-	12 827	-	-	-	51 307	184
	2002	34 708	-	-	-	-	-	-	-	-	-	10 961	-	-	-	45 669	161
	2003	14 656	-	-	-	-	-	-	-	-	-	7 550	-	-	-	22 206	89
	2004	24 753	-	-	-	-	-	-	-	-	-	5 806	-	-	-	30 559	111

		1SW		2SW		3SW		4SW		5SW		MSW (1)		PS		Total	
Country	Year	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
	2005	19 883	-	-	-	-	-	-	-	-	-	6 279	-	-	-	26 162	97
UK	2006	17 204	-	-	-	-	-	-	-	-	-	4 852	-	-	-	22 056	80
(England &	2007	15 540	-	-	-	-	-	-	-	-	-	4 383	-	-	-	19 923	67
Wales)	2008	14 467	-	-	-	-	-	-	-	-	-	4 569	-	-	-	19 036	64
	2009	10 015	-	-	-	-	-	-	-	-	-	3 895	-	-	-	13 910	54
	2010	25 502	-	-	-	-	-	-	-	-	-	7 193	-	-	-	32 695	109
	2011	19 708	-	-	-	-	-	-	-	-	-	14 867	-	-	-	34 575	136
	2012	7 493	-	-	-	-	-	-	-	-	-	7 433	-	-	-	14 926	58
	2013	13 113	-	-	-	-	-	-	-	-	-	9 495	-	-	-	22 608	84
	2014	7 678	-	-	-	-	-	-	-	-	-	6 541	-	-	-	14 219	54
	2015	9 053	-	-	-	-	-	-	-	-	-	10 209	-	-	-	19 262	68
	2016	9 447	-	-	-	-	-	-	-	-	-	13 047	-	-	-	22 494	86
	2017	4 866	-	-	-	-	-	-	-	-	-	7 298	-	-	-	12 164	49
	2018	3 180	-	-	-	-	-	-	-	-	-	3 830	-	-	-	11 640	42
UK	1982	208 061	496	-	-	-	-	-	-	-	-	128 242	596	-	-	336 303	1 092
(Scotland)	1983	209 617	549	-	-	-	-	-	-	-	-	145 961	672	-	-	355 578	1 221
	1984	213 079	509	-	-	-	-	-	-	-	-	107 213	504	-	-	320 292	1 013

		1SW		2SW		3SW		4SW		5SW		MSW (1)		PS		Total	
Country	Year	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
	1985	158 012	399	-	-	-	-	-	-	-	-	114 648	514	-	-	272 660	913
	1986	202 838	525	-	-	-	-	-	-	-	-	148 197	744	-	-	351 035	1 269
	1987	164 785	419	-	-	-	-	-	-	-	-	103 994	503	-	-	268 779	922
	1988	149 098	381	-	-	-	-	-	-	-	-	112 162	501	-	-	261 260	882
	1989	174 941	431	-	-	-	-	-	-	-	-	103 886	464	-	-	278 827	895
	1990	81 094	201	-	-	-	-	-	-	-	-	87 924	423	-	-	169 018	624
	1991	73 608	177	-	-	-	-	-	-	-	-	65 193	285	-	-	138 801	462
	1992	101 676	238	-	-	-	-	-	-	-	-	82 841	361	-	-	184 517	600
	1993	94 517	227	-	-	-	-	-	-	-	-	71 726	320	-	-	166 243	547
	1994	99 479	248	-	-	-	-	-	-	-	-	85 404	400	-	-	184 883	648
	1995	89 971	224	-	-	-	-	-	-	-	-	78 511	364	-	-	168 482	588
	1996	66 465	160	-	-	-	-	-	-	-	-	57 998	267	-	-	124 463	427
	1997	46 866	114	-	-	-	-	-	-	-	-	40 459	182	-	-	87 325	296
	1998	53 503	121	-	-	-	-	-	-	-	-	39 264	162	-	-	92 767	283
	1999	25 255	57	-	-	-	-	-	-	-	-	30 694	143	-	-	55 949	199
	2000	44 033	114	-	-	-	-	-	-	-	-	36 767	161	-	-	80 800	275
	2001	42 586	101	-	-	-	-	-	-	-	-	34 926	150	-	-	77 512	251

		1SW		2SW		3SW		4SW		5SW		MSW (1)		PS		Total	
Country	Year	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
	2002	31 385	73	-	-	-	-	-	-	-	-	26 403	118	-	-	57 788	191
	2003	29 598	71	-	-	-	-	-	-	-	-	27 588	122	-	-	57 091	192
	2004	37 631	88	-	-	-	-	-	-	-	-	36 856	159	-	-	74 033	245
	2005	39 093	91	-	-	-	-	-	-	-	-	28 666	126	-	-	67 117	215
	2006	36 668	75	-	-	-	-	-	-	-	-	27 620	118	-	-	63 848	192
UK	2007	32 335	71	-	-	-	-	-	-	-	-	24 098	100	-	-	56 433	171
(Scotland)	2008	23 431	51	-	-	-	-	-	-	-	-	25 745	110	-	-	49 176	161
	2009	18 189	37	-	-	-	-	-	-	-	-	19 185	83	-	-	37 374	121
	2010	33 426	69	-	-	-	-	-	-	-	-	26 988	111	-	-	60 414	180
	2011	15 706	33	-	-	-	-	-	-	-	-	28 496	126	-	-	44 202	159
	2012	19 371	40	-	-	-	-	-	-	-	-	19 785	84	-	-	39 156	124
	2013	20 747	45	-	-	-	-	-	-	-	-	17 223	74	-	-	37 970	119
	2014	12 581	26	-	-	-	-	-	-	-	-	13 329	58	-	-	25 910	84
	2015	13 659	29	-	-	-	-	-	-	-	-	9 165	39	-	-	22 824	68
	2016	4 298	8	-	-	-	-	-	-	-	-	4 151	18	-	-	8 449	27
	2017	3 633	7	-	-	-	-	-	-	-	-	4 327	19	-	-	7 960	26
	2018	3 810	8	-	-	-	-	-	-	-	-	2557	12	-	-	6 367	19

		1SW		2SW		3SW		4SW		5SW		MSW (1)		PS		Total	
Country	Year	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
France	1987	6 013	18	-	-	-	-	-	-	-	-	1 806	9	-	-	7 819	27
	1988	2 063	7	-	-	-	-	-	-	-	-	4 964	25	-	-	7 027	32
	1989	1 124	3	1 971	9	311	2	-	-	-	-	-	-	-	-	3 406	14
	1990	1 886	5	2 186	9	146	1	-	-	-	-	-	-	-	-	4 218	15
	1991	1 362	3	1 935	9	190	1	-	-	-	-	-	-	-	-	3 487	13
	1992	2 490	7	2 450	12	221	2	-	-	-	-	-	-	-	-	5 161	21
	1993	3 581	10	987	4	267	2	-	-	-	-	-	-	-	-	4 835	16
	1994	2 810	7	2 250	10	40	1	-	-	-	-	-	-	-	-	5 100	18
	1995	1 669	4	1 073	5	22	0	-	-	-	-	-	-	-	-	2 764	10
	1996	2 063	5	1 891	9	52	0	-	-	-	-	-	-	-	-	4 006	13
	1997	1 060	3	964	5	37	0	-	-	-	-	-	-	-	-	2 061	8
	1998	2 065	5	824	4	22	0	-	-	-	-	-	-	-	-	2 911	8
	1999	690	2	1 799	9	32	0	-	-	-	-	-	-	-	-	2 521	11
	2000	1 792	4	1 253	6	24	0	-	-	-	-	-	-	-	-	3 069	11
	2001	1 544	4	1 489	7	25	0	-	-	-	-	-	-	-	-	3 058	11
	2002	2 423	6	1 065	5	41	0	-	-	-	-	-	-	-	-	3 529	11
	2003	1 598	5	-	-	-	-	-	-	-	-	1 540	8	-	-	3 138	13

		1SW		2SW		3SW		4SW		5SW		MSW (1)		PS		Total	
Country	Year	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
	2004	1 927	5	-	-	-	-	-	-	-	-	2 880	14	-	-	4 807	19
	2005	1 236	3	-	-	-	-	-	-	-	-	1 771	8	-	-	3 007	11
	2006	1 763	3	-	-	-	-	-	-	-	-	1 785	9	-	-	3 548	13
	2007	1 378	3	-	-	-	-	-	-	-	-	1 685	9	-	-	3 063	12
	2008	1 471	3	-	-	-	-	-	-	-	-	1 931	9	-	-	3 402	12
	2009	487	1	-	-	-	-	-	-	-	-	975	4	-	-	1 462	5
	2010	1 658	4	-	-	-	-	-	-	-	-	821	4	-	-	2 479	7
	2011	1 145	3	-	-	-	-	-	-	-	-	2 126	9	-	-	3 271	11
	2012	1 010	2	-	-	-	-	-	-	-	-	1 669	7	-	-	2 679	10
France	2013	1 457	3	-	-	-	-	-	-	-	-	1 679	7	-	-	3 136	10
	2014	1 469	3	-	-	-	-	-	-	-	-	2 159	9	-	-	3 628	12
	2015	1 239	3	-	-	-	-	-	-	-	-	2 435	9	-	-	3 674	12
	2016	1 017	2	-	-	-	-	-	-	-	-	972	4	-	-	1 989	6
	2017	1 524	4	-	-	-	-	-	-	-	-	986	5	-	-	2 510	9
	2018	1 071	4	-	-	-	-	-	-	-	-	1 678	6	-	-	2 749	10
Spain (2)	1993	1 589	-	827	-	75	-	-	-	-	-	-	-	-	-	2 491	8
	1994	1 658	5	-	-	-	-	-	-	-	-	735	4	-	-	2 393	9

		1SW		2SW		3SW		4SW		5SW		MSW (1)		PS		Total	
Country	Year	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
	1995	389	1	-	-	-	-	-	-	-	-	1 118	6	-	-	1 507	7
	1996	349	1	-	-	-	-	-	-	-	-	676	3	-	-	1 025	4
	1997	169	0	-	-	-	-	-	-	-	-	425	2	-	-	594	3
	1998	481	1	-	-	-	-	-	-	-	-	403	2	-	-	884	3
	1999	157	0	-	-	-	-	-	-	-	-	986	5	-	-	1 143	6
	2000	1 227	3	-	-	-	-	-	-	-	-	433	3	-	-	1 660	6
	2001	1 129	3	-	-	-	-	-	-	-	-	1 677	9	-	-	2 806	12
	2002	651	2	-	-	-	-	-	-	-	-	1 085	6	-	-	1 736	8
	2003	210	1	-	-	-	-	-	-	-	-	1 116	6	-	-	1 326	6
	2004	1 053	3	-	-	-	-	-	-	-	-	731	4	-	-	1 784	6
	2005	412	1	-	-	-	-	-	-	-	-	2 336	11	-	-	2 748	12
	2006	350	1	-	-	-	-	-	-	-	-	1 864	9	-	-	2 214	10
	2007	481	1	-	-	-	-	-	-	-	-	1 468	7	-	-	1 949	8
	2008	162	0	-	-	-	-	-	-	-	-	1 371	7	-	-	1 533	7
	2009	106	0	-	-	-	-	-	-	-	-	250	1	-	-	356	1
	2010	81	0	-	-	-	-	-	-	-	-	166	1	-	-	247	1
	2011	18	0	-	-	-	-	-	-	-	-	1 027	5	-	-	1 045	5

		1SW		2SW		3SW		4SW		5SW		MSW (1)		PS		Total	
Country	Year	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
	2012	237	1	-	-	-	-	-	-	-	-	1 064	6	-	-	1 301	6
	2013	111	0	-	-	-	-	-	-	-	-	725	4	-	-	836	4
	2014	48	0	-	-	-	-	-	-	-	-	1 160	6	-	-	1 208	6
	2015	46	0	-	-	-	-	-	-	-	-	1 048	5	-	-	1 094	5
	2016	332	1	-	-	-	-	-	-	-	-	806	4	-	-	1 138	5
	2017	140	0	-	-	-	-	-	-	-	-	358	2	-	-	498	2
	2018	123	0	-	-	-	-	-	-	-	-	477	3	-	-	600	3

1. MSW includes all sea ages >1, when this cannot be broken down.

Different methods are used to separate 1SW and MSW salmon in different countries:

- Scale reading: Faroe Islands, Finland (1996 onwards), France, Russia, USA and West Greenland.

- Size (split weight/length): Canada (2.7 kg for nets; 63 cm for rods), Finland up until 1995 (3 kg),

Iceland (various splits used at different times and places), Norway (3 kg), UK Scotland (3 kg in some places and 3.7 kg in others),

All countries except Scotland report no problems with using weight to catergorise catches into sea age classes; mis-classification may be very high in some years.

In Norway, catches shown as 3SW refer to salmon of 3SW or greater.

2. Based on catches in Asturias (80–90% of total catch).

Annex 5: WGNAS responses to the generic ToRs for Regional and Species Working Groups

The Working Group was asked, where relevant, to consider the questions posed by ICES under their generic ToRs for regional and species Working Groups. Only brief responses are provided since the majority of questions are already addressed in response to the ToRs from NASCO (see main report) or in the WGNAS Stock Annex (see Annex 6).

Generic ToR questions	WGNAS response
Consider and comment on ecosystem overviews where available.	A brief ecosystem overview is provided in the WGNAS stock annex (see Annex 6 below) and environmental influences on the stock are incorporated in the annual advice to NASCO. The advice to NASCO is provided for three Commission areas: Northeast Atlantic, North America and West Greenland and may address a wide range of factors affecting salmon at different stages in their life cycle. Detailed consideration has been given to possible ecosystem drivers in both freshwater and the marine environment, but at present it is not possible to incorporate such drivers in the assessment process.
For the fisheries considered by the Working Group consider and comment on: descriptions of ecosystem impacts of fisheries where available; descriptions of developments and recent changes to the fisheries; mixed fisheries overview; and emerging issues of relevance for the management of the fisheries.	i) Salmon fisheries have no, or only minor, influence on the marine ecosystem. The exploitation of salmon in freshwater may affect the riverine ecosystem through changes in species composition. There is limited knowledge of the magnitude of these effects. ii) Any recent changes in fisheries are documented in response to the ToR from NASCO (see main report). iii) Salmon are not caught in mixed fisheries to any great extent. Most salmon are caught in targeted fisheries in homewaters, principally net and trap fisheries in estuaries and coastal waters, and rod-and-line fisheries in freshwater. There is very little bycatch of other species in these fisheries or in the inshore drift and gillnet fishery at West Greenland. There was some limited bycatch of other fish species (e.g. lumpsucker) in the Faroese longline fishery when this fishery operated. There is also some bycatch of salmon post-smolts and adults in pelagic fisheries operated in the Norwegian Sea and North Atlantic; further details were provided in Section 3.4 of the 2014 WGNAS report (ICES, 2014). Some fisheries targeted at other fish species in freshwater and coastal areas (e.g. aboriginal trout and charr fisheries in Canada) are licensed to land salmon caught as a bycatch. Numbers are typically small. Species interaction effects and ecosystem drivers are summarised in the stock annex (see below). iv) NASCO also routinely requests ICES to document emerging issues of relevance to the management of salmon fisheries. Details are provided in Section 2 of the report (above).
Conduct an assessment to update advice on the stock(s) using the method (analytical, forecast or trends indicators) as described in the stock annex and produce a brief report of the work carried out regarding the stock, summarising where the item is relevant: Input data (including information from the fishing industry and NGO that is pertinent to the assessments and projections);	The questions posed in this section of the generic ToR are addressed routinely in the WGNAS report when responding to the questions posed by NASCO. Details of all inputs used in the latest assessments for Atlantic salmon are provided in response to the ToRs from NASCO (see main report). Estimates of unreported catch levels as used in the latest assessments for Atlantic salmon are provided in response to the ToRs from NASCO (see main report). The different components of the catch of Atlantic salmon are reported as fully as possible

Generic ToR questions	WGNAS response
Where misreporting of catches is significant, provide qualitative and where possible quantitative information and describe the methods used to obtain the information; For relevant stocks estimate the percentage of the total catch that has been taken in the NEAFC regulatory area by year in the recent three years; The developments in spawning–stock biomass, total-stock biomass, fishing mortality, catches (wanted and unwanted landings and discards) using the method described in the stock annex; The state of the stocks against relevant reference points; Catch options for next year; Historical performance of the assessment and catch options and brief description of quality issues with these.	in the Working Group report in response to the specific questions posed by NASCO. Details of the data collection procedures for each country / region are also provided in the stock annex. Nominal catches are reported annually by country for all fisheries and estimates of unreported catch are also provided for most countries. These values are carried forward to the advice. Discards do not typically apply for salmon fisheries, although when the Faroese longline fishery was being prosecuted (the fishery has not operated since 2000) there was a legal requirement for salmon <63 cm in total length to be discarded. The catch options risk framework developed by WGNAS for the Faroes fishery makes allowance for these discards. Not applicable to Atlantic salmon. Not applicable to Atlantic salmon. The latest assessments of stock status for Atlantic salmon are provided in response to the ToRs from NASCO (see main report). The latest catch options for Atlantic salmon are provided in response to the ToRs from NASCO (see main report). Quality issues relating to the input data and models are described in the main report and stock annex.
Produce a first draft of the advice on the fish stocks and fisheries under considerations according to ACOM guidelines.	This task will be completed by the WG and WGNAS Chair in advance of the RG/ADG meeting in April.
With reference to the Frequency of Assessment criteria agreed by ACOM (see section 5.1 of WGCHAIRS document 03): (1) Complete the calculation of the first set of criteria, by calculating Mohn's rho index for the final assessment year F; (2) Comment on the list of stocks initially identified as candidates for less frequent assessment from the first set of criteria (adding stocks to the list or removing them would require a sufficient rationale to be provided).	Following agreement with NASCO, WGNAS provides multiyear advice, with forecasts for three years into the future, accompanied by a Framework of Indicators (FWI) for the Greenland fishery and a FWI for Faroese fishery. The FWIs are designed to trigger re-assessment and recalculation of forecasts in the event of a certain proportion of stock status indicators showing a higher than expected performance against the forecast stock status. At the beginning of 2016 the FWI for the Faroese fishery triggered a re-assessment, while the Greenland FWI did not. In light of this WGNAS 2016 provided the appropriate re-assessment for the stocks contributing to the Faroese fishery (North European), and reset the FWI for a further two years. The Greenland FWI and the Faroes FWI were run in January 2017 and both indicated that there was no change in stock status from the previous advice and the previously provided advice was still relevant. The FWIs will be updated for the next multiyear advice cycle planned for Marhc 2018. At which point (and in light of neither FWIs indicating re-assessment in intervening years) the WGNAS have recommended that both NAC and NEAC stocks are re-assessed, to realign the time frames of the respective FWIs.
Consider and propose stocks to be benchmarked;	In 2015 and 2016 the status of NAC and NEAC stocks were assessed using comparable tools to those applied in previous years. Work on developing life cycle forecast models is ongoing and their application is seen to be one year away. Upon the completion of these forecast models, a benchmarking exercise may be requested prior to their implementation, although this remains to be determined.
Review progress on benchmark processes of relevance to the expert group;	Not applicable.

Generic ToR questions	WGNAS response
Propose specific actions to be taken to improve the quality and transmission of the data (including improvements in data collection)	There are significant uncertainties in some of the input data for the assessment models, particularly relating to unreported catches (used in the NEAC assessments). However, efforts are made to take account of these in the stock status and stock forecast models. Data deficiencies are recorded in the 'Quality Considerations' section of the annual advice document and specific concerns/ recommendations for improvement are included in WGNAS reports. Recommendations in relation to data collection needs for assessment of Atlantic salmon were recently provided in the report of the ICES Workshop on Eel and Salmon Data Collection Framework WKESDCF (ICES, 2012c); discussions have continued with the EU on the implementation of these recommendations.
Prepare the data calls for the next year update assessment and for the planned data compilation workshops.	Not applicable to WGNAS.
Update, quality check and report relevant data for the stock: Load fisheries data on effort and catches into the InterCatch database by fisheries/fleet Abundance survey results; Environmental drivers.	Not applicable to WGNAS. The InterCatch database is not used for Atlantic salmon. All data inputs used in assessments are updated and reported in the WGNAS report. All data are subject to routine checking and QA by WGNAS members. Not applicable to WGNAS. Not applicable to WGNAS.
Produce an overview of the sampling activities on a national basis based on the InterCatch database or, where relevant, the regional database.	Not applicable to WGNAS. The InterCatch database is not used for Atlantic salmon.
Identify research needs of relevance for the Working Group.	This is addressed by WGNAS in response to the ToRs from NASCO (see main report).

Annex 6: WGNAS Stock Annex for Atlantic salmon

The table below provides an overview of the WGNAS Stock Annex. Stock Annexes for other stocks are available on the ICES website Library under the Publication Type "Stock Annexes". Use the search facility to find a particular Stock Annex, refining your search in the left-hand column to include the *year*, *ecoregion*, *species*, and *acronym* of the relevant ICES expert group.

Stock ID	Stock name	Last updated	Link
sal-nea	Atlantic Salmon	April 2019	Salmo salar

Annex 7: Glossary of acronyms used in this report

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 (*Advisory Committee*) of ICES. The Committee works on the basis of scientific assessment prepared in the 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 member country under the direction of an independent chair appointed by the Council.

AMO (*Atlantic Multidecadal Oscillation*).

ASC (Annual Science Conference of ICES)

ASF (*Atlantic Salmon Federation*). A non-governmental organisation dedicated to the conservation, protection and restoration of wild Atlantic salmon and the ecosystems on which their well-being and survival depend.

AST *(Atlantic Salmon Trust).* A non-governmental organisation dedicated to salmon and sea trout survival through research on the problems impacting migratory salmonids.

BCIs *(Bayesian Credible Intervals).* A range of values within which an unobserved parameter falls with a particular probability.

BHSRA (*Bayesian Hierarchical Stock and Recruitment Approach*). Models for the analysis of a group of related stock–recruit datasets. Hierarchical modelling is a statistical technique that allows the modelling of the dependence among parameters that are related or connected through the use of a hierarchical model structure. Hierarchical models can be used to combine data from several independent sources.

CL, i.e. Slim (*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.

CMR (*Capture Mark Recapture*). Method to estimate the population of tag or marked fish.

CPUE (*Catch per Unit of Effort*). A derived quantity obtained from the independent values of catch and effort.

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.

DBERAAS (*Database on Effectiveness of Recovery Actions for Atlantic Salmon*). Database output from WGERAAS.

DCF (*Data Collection Framework*). Framework under which EU Member States collect, manage and make available a wide range of fisheries data needed for scientific advice.

DC-MAP (Data Collection Multi-Annual Programme). Framework under which EU Member States collect, manage and make available a wide range of fisheries data needed for scientific advice.

DFO *(Department of Fisheries and Oceans*). DFO and its Special Operating Agency, the Canadian Coast Guard, deliver programs and services that support sustainable use and development of Canada's waterways and aquatic resources.

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.

DSG (*diadromous subgroup*). Pan-regional subgroup within the Regional Coordination Groups to coordinate and identify data collection needs for diadromous species in relation to the EU data collection regulation Data Collection Framework/Data Collection-Multi-Annual Programme.

DST *(Data Storage Tag*). A miniature data logger with sensors including salinity, temperature, and depth that is attached to fish and other marine animals.

FAO (*Food and Agriculture Organization of the United Nations*).

FSC (*Food, Social and Ceremonial fishery*). Indigenous fishery in Canada for food, social or ceremonial purposes.

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 multiannual management advice has occurred.

GFLK (*Greenland Fisheries Licence Control Authority*)

GLM (*Generalised Linear Model*). A conventional linear regression model for a continuous response variable given continuous and/or categorical predictors.

GoSL (*Gulf of St Lawrence*).

IASRB (*International Atlantic Salmon Research Board*). Platform established by NASCO in 2001 to encourage and facilitate cooperation and collaboration on research related to marine mortality in Atlantic salmon.

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

IESSNS (*International Ecosystem Survey of the Nordic Seas*). A collaborative programme involving research vessels from Iceland, the Faroe Islands and Norway.

IFI (*Inland Fisheries Ireland*). The State agency responsible for the protection, management and conservation of Ireland's inland fisheries and sea angling resources.

IHN *(Infecious Haematopoietic Necrosis).* An infectious disease caused by the IHN virus.

IMR (*Institute of Marine Research*). Norwegian institute who provide advice to Norwegian authorities on aquaculture and the ecosystems of the Barents Sea, the Norwegian Sea, the North Sea and the Norwegian coastal zone.

IPN *(Infectious Pancreatic Necrosis).* An infectious disease caused by the IPN virus.

IPPC (*Intergovernmental Panel on Climate Change*)

ISA *(Infectious Salmon Anaemia).* An infectious disease caused by the ISA virus.

IUCN (*International Union for Conservation of Nature*).

IYS (*International Year of the Salmon*). An international framework for collaborative outreach and research launched by NPAFC, NASCO and other partners. The IYS focal year will be 2019, with projects and activities starting in 2018 and continuing into 2020.

JAGS (*Just Another Gibbs Sampler*). A program for analysis of Bayesian hierarchical models using Markov Chain Monte Carlo (MCMC) simulation.

LAB / Lab (*Labrador*). Labrador, Canada.

LE (*Lagged Eggs*). The summation of lagged eggs from 1 and 2 sea-winter fish is used for the first calculation of PFA.

LS *(Lagged Spawners).* The summation of lagged spawners from 1 and 2 sea-winter fish is used for the calculation of PFA.

MCMC (*Markov Chain Monte Carlo*). Re-sampling algorithm used in (Bayesian) statistics.

MFFP *(Ministère des Forêts, de la Faune et des Parcs du Québec).* Ministry of Forests, Wildlife and Parks in the Provincial Government of Québec, Canada.

MSA (*Mixed Stock Analysis*). Genetic analytical technique to estimate the proportions origin of fish in a mixed-stock fishery.

or

MSA (*Miramichi Salmon Association*).

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.

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

NAFO (*Northwest Atlantic Fisheries Organisation*). NAFO is an intergovernmental fisheries science and management organization that ensures the long-term conservation and sustainable use of the fishery resources in the Northwest Atlantic.

NAO (North Atlantic Oscillation).

NASCO (*North Atlantic Salmon Conservation Organisation*). An international organisation, 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.

NCC (*NunatuKavut Community Council*). NCC is one of four subsistence fisheries harvesting salmonids in Labrador.

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

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

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

NF (*Newfoundland*). Newfoundland, Canada.

NG (*Nunatsiavut Government*). NG is one of four subsistence fisheries harvesting salmonids in Labrador. NG members are fishing in the northern Labrador communities.

NOAA (*National Oceanic and Atmospheric Administration*). A scientific agency within the United States Department of Commerce.

OTN (*Ocean Tracking Network*).

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, and used to calculate total PFA, which is then split into PFAm and PFAnm based upon the *proportion of PFAm* (p.PFAm).

PFANAC1SW (*PFA NAC 1SW*). The non-maturing component of 1SW salmon, destined to be 2SW returns (excluding 3SW and previous spawners) is represented by the PFA estimate for year i.

PHS (*Port Hope Simpson*)

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 non-volatile memory.

PMCV (*Piscine myocarditis virus*)

PRV-1 (*Piscine orthoreovirus genotype 1*)

PRV-3 (*Piscine orthoreovirus subtype 3*)

PP (*Primary production*)

PSAT (*pop-off satellite tags*)

RCG (*Regional Coordination Group*). Group(s) that coordinate and identify data collection needs in relation to the EU data collection regulations.

RNA (Ribonucleic acid)

ROO *(Region of Origin)*

RR model (*Run-Reconstruction model*). RR model is used to estimate PFA and national CLs.

RST (*rotary screw trap*). A fish trap with a rotating drum typically used to sample the downstream run of smolts in a river.

RVS (*Red Vent Syndrome*). This condition has been noted since 2005, and has been linked to the presence of a nematode worm, *Anisakis simplex*. This is a common parasite of marine fish and is also found in migratory species. The larval nematode stages in fish are usually found spirally coiled on the mesenteries, internal organs and less frequently in the somatic muscle of host fish.

SAC (*Special Area of Conservation*). Strictly protected site designated under the European Committee Habitats Directive.

SALSEA (*Salmon at Sea*). An international programme of co-operative research, adopted in 2005, designed to improve understanding of the migration and distribution of salmon at sea in relation to feeding opportunities and predation.

SALSEA-Merge (*Salmon at Sea Merge*). SALSEA-Merge is an international programme of cooperative research designed to improve understanding of the migration and distribution of salmon at sea in relation to feeding opportunities and predation. It differentiates between tasks which can be achieved through enhanced coordination of existing ongoing research, and those involving new research for which funding is required.

SALSEA-Track (*Salmon at Sea Track*). SALSEA-Track is the second phase of the SALSEA Programme. It employs advances in telemetry technology to precisely track Atlantic salmon along their migration routes through cooperative international research initiatives.

SAMARCH (*Salmonid Management Round the CHannel*). Project (2017-2022) part funded by the France England Interreg Channel programme. The project will provide new transferable scientific evidence to inform the management of salmon and sea trout (salmonids) in the estuaries and coastal waters of both the French and English sides of the Channel.

SCICOM (*Science Committee of ICES*). Main scientific body in ICES.

SE (*standard error*).

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.

SFA *(Salmon Fishing Areas).* Areas for which the Department of Fisheries and Oceans (DFO) Canada manages the salmon fisheries.

Slim, i.e. CL (*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 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).

SNP (*Single Nucleotide Polymorphism*). Type of genetic marker used in stock identification and population genetic studies.

S–R (*Stock recruitment*)

SoBI (*Strait of Belle Isle*)

SSM (*Bayesian state-space modelling).* Model used to analyse time-series, migration and/or population dynamics data.

SST (*Sea surface temperature*)

SVA (*Swedish National Veterinary Institute*)

TAC (*Total Allowable Catch*). TAC is the quantity of fish that can be taken from each stock each year.

ToR (*Terms of reference*).

UDN (*Ulcerative Dermal Necrosis*). Disease mainly affecting wild Atlantic salmon, sea trout and sometimes other salmonids. It usually occurs in adult fish returning from the sea in the colder months of the year and starts as small lesions on the scale-less regions of the fish, mainly the snout, above the eye and near the gill cover. On entry to freshwater lesions ulcerate and may become infected with secondary pathogens like the fungus Saprolegnia spp. Major outbreaks of UDN occurred in the 1880s (UK) and 1960s–1970s (UK and Ireland), but the disease has also been reported from France, and in 2015 from the Baltic and Russia.

UK (*United Kingdom and Northern Ireland*). Country in Europe.

VHS / VHSV *(Viral Haemorrhagic Septicaemia)*. An infectious fish disease caused by the VHS virus.

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

WGDIAD (*Working Group on the Science Requirements to Support Conservation, Restoration and Management of Diadromous Species)*. Formerly WGRECORDS, WGDIAD was reconstituted as a Working Group from the Transition Group on the Science Requirements to Support Conservation, Restoration and Management of Diadromous Species (TGRECORDS).

WGF (*West Greenland Fishery*). Regulatory measures for the WGF have been agreed by the West Greenland Commission of NASCO for most years since NASCO's establishment. These have resulted in greatly reduced allowable catches in the WGF, reflecting declining abundance of the salmon stocks in the area.

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.

WGWIDE (*Working Group on Widely Distributed Stocks compiles and analyses data on blue whiting, Western and North Sea horse mackerel, North East Atlantic mackerel, Norwegian spring-spawning herring, and boarfish to provide the annual ICES advice*).

WKCCISAL (*The Workshop on Potential Impacts of Climate Change on Atlantic Salmon Stock Dynamics*).

Annex 8: NASCO has requested ICES to identify relevant data deficiencies, monitoring needs and research requirements

The Working Group recommends that it should meet in 2020 (Chair, Martha Robertson, Canada) to address questions posed by ICES, including those posed by NASCO. In the absence of a formal invitation elsewhere, the Working Group intends to convene in the headquarters of ICES in Copenhagen, Denmark. The meeting will be held from 24 March–2 April 2020.

List of recommendations

1. For more efficient identification of the origin of PIT tagged salmon detected in catches processed at pelagic fish factories, or tags detected in other fisheries, the Working Group recommends that lists of individual PIT tag numbers or codes identifying the origin, source or programme of the tags are recorded and made available in a public database, coordinated on a European scale to facilitate identification of individual tagged fish taken in marine fisheries or surveys back to the source.
2. The Working Group recommends complete and timely reporting of catch statistics from all fisheries for all areas of eastern Canada.
3. The Working Group recommends improved catch statistics and sampling of the Labrador and Saint Pierre and Miquelon fisheries. Improved catch statistics and sampling of all aspects of the fishery across the fishing season will improve the information on biological characteristics and stock origin of salmon harvested in these mixed-stock fisheries.
4. The Working Group recommends that additional monitoring be considered in Labrador to estimate stock status for that region. Additionally, efforts should be undertaken to evaluate the utility of other available data sources (e.g. Indigenous and recreational catches and effort) to describe stock status in Labrador.
5. The Working Group recommends that the Government of Greenland continue efforts to improve the reporting system of catch in the Greenland fishery and that detailed statistics related to spatially and temporally explicit catch and effort data for all fishers be made available to the Working Group for analysis.
6. The Working Group recommends that the West Greenland Commission of NASCO continue to support the implementation of a broad geographic sampling programme, including sampling in Nuuk, and consideration should be given to expanding the programme across the fishing season to more accurately estimate continent and region of origin and biological characteristics of the mixed-stock fishery.

Annex 9: WGNAS 2019 Response to Review Group 2018

Annex 10: Technical minutes from the Review Group on North Sea Salmon 2018

RGSalmon 23–26 April 2018

Reviewer: Marc Trudel, Canada

Working Group: WGNAS

WGNAS General comments

The ICES Working Group on North Atlantic Salmon (WGNAS) produced a comprehensive report on the status and trends of Atlantic salmon abundance and productivity in the Northern Europe, Southern Europe, and North America, that included additional information requested by NASCO on Atlantic salmon in the North Atlantic Ocean. The authors of the report should be commended for their effort in pulling a comprehensive document in a very short time. The recommendations from ICES to NASCO with respect to the mixed-stock fisheries in the Faroes and off Greenland remain essentially unchanged from the previous assessment (i.e. no provision for mixed-stock fisheries in these areas that would meet all the conservation requirements for the NEAC and NAC complexes).

Final thoughts I have been involved as an external reviewer for the ICES WGNAS since 2012. During that time, the recommendations from ICES to NASCO for the mixed-stock fisheries have remained essentially unchanged (i.e. no provision for mixed-stock fisheries). Nominal catches have declined in part due to an increase in the catch and release recreational fishery, and a reduction in the retention fishery. One then wonders, what conditions would be needed for the recommendation to change? With the endangered status of Atlantic salmon in the US, and pending designation for stocks in the Scotia Fundy region, it is unlikely that we will ever reach a 95% simultaneous attainment of the conservation limits at the regional level, let alone at the individual population level, in the near and possibly foreseeable future. Hence, the advice for West Greenland will likely remain unchanged until the situation of these stocks improves.

WGNAS Specific comments

North Atlantic	
1) Section 2.1.1 (third to last paragraph). The authors indicated that "Estuarine fisheries have fluctuated between 18 (2008) and 40 t (2015) in the period. This doesn't seem to match the results presented in Figure 2.1.1.3, along with the observation of a dramatic decline reported a few lines above.	Noted. Text will be corrected in 2019 report.
2) Section 2.3.2. Pink salmon are often thought have a fixed 2-year life cycle. However, 3-year old pink salmon are not uncommon in the Great Lakes (see Wagner and Stauffer, 1980). This may need to be corrected in the text. Wagner, W.C., and T.M. Stauffer. 1980. Three-Year-Old Pink Salmon in Lake Superior Tributaries. Trans. Am. Fish. Soc. 109: 458–460.	The WG typically only reports on pink salmon in odd years when widespread captures are reported around the N. Atlantic. In the event of a future review of this issue, reference to such exceptions could be incorporated in the WG report.
3) Section 2.3.3.1. Please indicate the type of tags that were used on striped bass.	The tags recovered outside the historic range of the southern Gulf of St Lawrence were external T-bar tags.
4) Section 2.3.4. The title of this section is misleading, as the authors only reported acoustic telemetry conducted in the Miramichi River, and ignored other studies that were performed in 2017. For instance, David Hardie (Fisheries and Oceans Canada, Bedford Institute of Oceanography) tagged salmon smolts with conventional acoustic tags as well as with predation-tags in some river systems in the Maritimes Region. In future years, it might be desirable to report either on all the acoustic tagging studies performed on Atlantic salmon in Canada, or preferably in the North Atlantic. The later would be preferable, as it would relate to the SALSEA-Track programme.	The WG reports on information presented at the meeting by participants. To date, telemetry activities undertaken by the Atlantic Salmon Federation have been reported by one of the participants. A more complete compilation of telemetry activities occurring annually in the North Atlantic could be provided if this was an item in the TOR of the WG.
5) Section 2.3.7. The authors report the number of salmon that are intercepted in the Icelandic mackerel fishery per 1000 tonnes of mackerel. It might be useful to the reader if the authors expended the bycatch of salmon for the total tonnage of mackerel to give a better sense of how salmon are likely caught in this fishery.	The WG has provided more detailed assessments of the likely extent of salmon bycatch in pelagic fisheries in earlier reports in response to specific questions from NASCO. The updates provided subsequently represent ad hoc updates.
6) Section 2.4.1. The authors provide a summary of the WGERAAS report on the failures and successes of salmon restoration. I have quickly glanced at the appendices in this report, and in general, the studies that were examined to assess the successes and failures of restoration did not compare changes in salmon abundance in nearby reference sites. Hence, it might be difficult to ascribe changes (or lack thereof) that occurred following a restoration activity to that activity. One additional recommendation that should be listed is to include at the very least one nearby reference site as part of the pre- and post-evaluation process.	This useful suggestion has been noted by the WG. However, the WGERAAS report has been completed.

NEAC	
7) Section 3.3.6. The authors correctly pointed out that, for Northern NEAC, marine survival (or return rates) was only available for one population in recent years (in Norway), and as such may not an appropriate indicator of survival trends in Northern NEAC. The authors should also provide a cautionary note regarding the survival of hatchery smolts from Southern NEAC, as estimates are only available for Ireland, which may not be representative of the whole Southern NEAC complex. Hence, it may be difficult to compare trends in smolt survival trends between Northern and Southern NEAC, wild and hatchery smolts, as the aggregate survival may not be integrated over the same spatial scales.	Additional Northern NEAC indicators are now becoming available. With regard to Southern NEAC, data have also been provided for hatchery stocks in Iceland (S & W Iceland is included in Southern NEAC). The text in the 2019 report will be updated.
8) Section 3.3.6, next to last paragraph and last paragraph. The authors indicated that data were available from four French index rivers: Bresle, Oir, Scorff, and Nivelle. However, results for Bresle were not presented in Table 3.3.6.1.	This was a formatting / printing issue. The data were in the Table provided to ICES. Final reports will be reviewed more thoroughly by the WGNAS Chair.
9) Section 3.4.1. Why were catches in the Faroes and off Greenland included as covariates rather than using the actual catch data in the estimation of the Pre-fishery Assessment?	Use of the term 'covariate' was incorrect. For the Faroes, the catch data are directly included in the model along with an estimated unreported catch which has an associated uncertainty that is incorporated in the forecast model when sampling. For Greenland, an observation model is used to estimate the proportion of the catch that is from NEAC, based on sampling information. The comment has been noted and the text will be updated in the report to reflect this when the forecast model is next run.
10) Section 3.4.2. I may have missed this, but how well did the projections do (this was explored for the North American Commission)? For instance, the model was initially run in 2014 to project pre-fishery abundance in 2015, 2016, and 2017. How close were the projected values to those obtained from the latest data? Clearly, this can be affected by domestic management allocations, but it would still be desirable to know how well the model performed to give some confidence to the reader that this model works reasonably well, as it is now used to make projections to 2021. Though I recognize that the variance in the projections increase over time.	The WG agrees that this would be a useful exercise. It is anticipated that the WG will transition to using a life cycle model for future assessment and forecasting. As part of this process a full comparison of the performance of both the new and existing forecasting models would be undertaken.
11) Section 3.4.3. UK (England & Wales). The authors indicated that "Lagged eggs for the maturing component are forecast to decline to the lowers levels in the time-series". I presume the authors refer to the top left panel of Figure 3.4.3.3 here? If so, I don't think I can see this, except perhaps for 2018.	Relevant figure should be 3.4.3.4. However, agree wording inconsistent with figure.
12) Section 3.5.1. It would appear that NASCO has yet to adopt a management objective for the mixed-stock fishery in the Faroes and off Greenland. Is there any indication as to when NASCO is expected to adopt these objectives?	NASCO have previously agreed a formal structure with ICES for the provision of catch advice for the West Greenland fishery. This is not the case for the Faroes fishery. ICES have provided proposals for a management framework, and provide indicative catch advice for the Faroes fishery based on this. However, this has not yet been endorsed by managers at NASCO. The topic is discussed annually during the meetings of the NE Atlantic Commission, but there is currently no indication of when any framework might be adopted.

13) Section 3.5.2. The Working Group noted that incidence of North American salmon in the catches at the Faroes were higher than previously reported due to recent genetic analyses. I presume that this is based on genetic analyses performed on historical samples? It might be desirable to perform an experimental fishery in the Faroes to determine whether or not this is the case with contemporary samples. One approach could be to use longlines to catch the fish. Depending on the duration of the soak time, it may be possible to catch and release the fish alive as was done in the North Pacific during the late 1950s and early 1960s.	The WG recognises that the composition of the catch at Faroes is based on historical samples and that information from contemporary samples would be required to inform management advice should any fishery commence at Faroes. The fishery at Faroes was always prosecuted as a longline fishery.

NAC	
14) Section 4.1.2. The Recreational fisheries end with "In all areas of eastern Canada, there is no estimate of salmon released as bycatch in recreational fisheries targeting other species". I presume here that all the salmon caught as bycatch in these recreational fisheries would have to be released, alive preferentially (unless the fish died during the capture process, it would still have to be released). So that would not be counted as part of the nominal catch, but rather as a catch and release. Is that correct?	Catch and release estimates provided in the report are from the directed salmon fisheries. Catches in non-salmon directed fisheries cannot be retained and such catch must be returned to the water as soon as possible and in a manner that results in the least possible harm, even if dead. These catches are not included as nominal catch nor in the catch and release figures. In fact, even incidental mortality from catch and release is not included as nominal catch because it is not retained.
15) Section 4.1.3. Last paragraph of the Recreational fisheries section. The authors indicated that, except for the province of Québec, Canada does not regularly collect recreational catch statistics for Atlantic salmon. Shouldn't the Working Group recommend that Canada collect this type of information on an annual basis (or some other regular reporting schedule)?	The reporting of catches in all fisheries is one of the six tenets evaluation at NASCO for which Canada indicated this element did not comply. ICES has commented on this issue in the report many times and continues to recommend that catch statistics be collected from all fisheries and all user groups. Canada has commented on this in their Annual Report to NASCO and it remains an important management gap.
16) Section 4.1.6. Section on Canada. The authors indicated that the provisional exploitation rates for 2017 for the retained small salmon in the recreational fishery was 11% for Newfoundland, which was greater than the previous five year mean of 10%. While technically 11% is greater than 10%, this difference is relatively small and well within the measurement errors of these estimates. So perhaps indicating that they are slightly larger or similar might be better.	The WG agrees that care should be taken when highlighting minor difference between years or long-term averages.
17) Section 4.3.5, second paragraph. The authors indicated that the return rate of the small salmon of hatchery origin to the Penobscott was similar to 2016, but above the 1991–present average. This statement is not backed up by the data, as the 1991–present average is 5.2% compared the value of 5% that was used. So there isn't much difference to the long-term average. Note also that many of these survival estimates are similar to each other (for instance 0.2 vs. 0.3%). This should be kept in mind when highlighting differences among years or longer term averages.	The conclusion of the comparison of 2016 vs. the 1991–present average was indeed incorrect and the WG agrees that care should be taken when highlighting minor difference between years or long-term averages.
18) Section 4.4.3.1, second paragraph and Figure 4.4.3.1.1. The authors noted that the lagged spawners for NAC have generally been less than half of the conservation limit for NAC (though they recognized that there were regional differences). Does that mean that Canada should not have had any retention fishery for salmon since the 1970s?	The ICES advice has been that there are no mixed-stock fishery options at Greenland or in North America on 2SW salmon because the expected regional 2SW abundances before fishing are insufficient to meet the regional 2SW CLs. ICES does not advise on salmon fisheries in general for Canada as salmon fisheries in Canada exploit 1SW, 2SW, 3SW and repeat spawners, and in some areas of eastern Canada, such as in Newfoundland, the majority of the salmon returns are of 1SW sea age group. The Precautionary Approach policy for Canada does not state that there should be no fisheries when stocks are below the Limit Reference Point, or for NASCO below CLs, but it does state that fisheries losses should be kept to the lowest level possible. The majority of the large salmon harvests in eastern Canada occur in Indigenous peoples fisheries, in Labrador where stocks are doing better, and in Quebec in a limited number of rivers.
19) There are many tables of time-series in this document, and references are often made between the value ob-	This will be done where possible to facilitate the interpretation of tables and text.

served in 2017 and some average of the time-series (usually the ten year average). It might be useful in the NAC table to include the mean and standard deviation of the data in the report itself for the entire dataset (or some period of high return/survival), the ten year mean, and the five year mean. This should help to put the recent results in perspective!	

West Greenland	
20) Section 5.1.2. The number of phone surveys that were performed this year to help in the assessment of the unreported catch was very low compared to last year (only nine interviews). The reasons for the low participation should be investigated in order to improve the reporting in future years. Perhaps even offering an incentive if necessary.	The WG believes that the issues associated with the phone surveys is a domestic issue and it isn't appropriate for the WG to investigate the reasons for the low participation or to suggest that incentives be offered. The WG did however highlight the importance of this effort and recommended that it be continued in a consistent and robust manner.
21) Section 5.1.3. The exploitation rate for the southern NEAC complex was 0.8% in 2016. The Working Group indicated that this was a slight increase relative to the previous year and five-year mean. As in comment #17, these differences are relatively small compared to the measurement error. Although the Working Group used the word "slight" here, it might simply better to say that they were similar given this uncertainty.	The WG agrees that care should be taken when highlighting minor difference between years or long-term averages. As the Reviewer notes however, the comment was qualified with "slight" in an attempt to identify the difference while minimizing the magnitude.
22) Section 5.2.2. Second to last paragraph. The Working Group indicated that "The annual variation in the continental representation among divisions within the recent time-series underscores the need to sample multiple NAFO Divisions to achieve the most accurate estimates of the contribution of fish from each continent to the mixed-stock fishery". While this looks like this is the case when Figures 5.2.2.4–5.2.2.6 are examined, it is difficult to gauge the magnitude of the variation of these proportions without providing an error estimate for these estimates. It might be worth presenting these in future.	Prior to 2000, the continent of origin (COO) assignments were conducted via linear discriminant function analysis based on scale characteristics. An error rate of approximately 15% was estimated for this process, however, year-specific error rates are not available. Since 2000, the COO have been genetic based and considered to be 100% accurate. This represents half of the time-series available and the most relevant to the assessment of the contemporary sampling program. Given new historical COO data, efforts are currently underway to compare individual scale-based COO assignments to genetic based COO assignments and results from this effort will be reported back to the WG and considered for inclusion into assessment as appropriate.
23) Figure 5.8.3.1. The plot for the risk analysis for the catch options at West Greenland indicate that the mortality function was introduced without error (and fixed at 3% per month). Given that there are some uncertainties associated with this mortality estimates, it might be better to introduce some errors on this term as well. In the past, my understanding was that it was bound between 2% and 4%.	Uncertainties on M are included in the run reconstruction as either a triangular distribution centred on 0.03 with bounds of 0.02 to 0.04 or as a uniform distribution bounded on 0.02 to 0.04. In the risk analysis, no uncertainty on M is included. Adding uncertainty on M at this stage would increase the uncertainty regarding the 2SW returns to North America and further reduce the chances of attaining the 2SW CLs. At present, there is such a low chance of meeting the 2SW CLs in the majority of areas that the advice would be similar. Incorporating uncertainty on M will be considered for the next cycle of multi-year advice.

Annex 10: Addressing questions on the EU Data Collection Framework and the ICES Data call

10.1

This section addresses ToR b) *In relation to EU Member States and their obligations to collect data on salmon fisheries and stocks under the EU Data Collection Framework (DCF) and EU-MAP, and to address European Commission and Regional Coordination Group (RCG) requirements ahead of June 2019*.

b) *i) Comment on specific data needs of the WG from those specified in the DCF and recommend actions to improve data quality for the work of the WG and in the context of future usage of the RDBES database as the source of ICES data for analyses on salmon;*

Note that while the following includes details for countries and regions outside the EU, the EU DCF is only relevant to EU Member States.

With regards to "specific data needs", assessment of Atlantic salmon differs from the approaches commonly adopted for other species, for example in respect of the need for at sea surveys and collection of commercial catch per unit of effort (CPUE) data. Instead, the assessment of salmon is based mainly on data collected on individual river stocks (e.g. catches and counts of returning fish), which are raised and aggregated to provide estimates of the number of fish returning to homewaters for different stock groupings. These estimates are used, in turn, to estimate abundance at earlier points in the life cycle of the fish and to inform the development of catch advice.

The provision of management advice for the mixed-stock fisheries at Faroes and West Greenland is based on assessments of the status of stocks at broad geographic scales. The North American Commission (NAC) is divided into six management units, and the Northeast Atlantic Commission (NEAC) is divided into 19 regions. Assessment of the status of the stocks in these areas is based on estimates of the total abundance - the pre-fishery abundance (PFA) - of different cohorts of salmon at a stage before the distant water fisheries operate. PFA is defined as the cohorts of salmon maturing as one-sea-winter (1SW) and multi-sea-winter (MSW) fish that are alive prior to all the marine fisheries for 1SW salmon (Rago *et al*., 1993). The catch advice for NEAC is then provided for the Northern (N-NEAC) and Southern (S-NEAC) stock complexes and for the different jurisdictions.

The models to estimate the PFA of salmon from different areas are typically based on the catch in numbers of 1SW and MSW salmon in each jurisdiction or region, which are then raised to take account of estimates of non-reported catches and exploitation rates on the two age groups. In some cases, particularly in NAC area, returns to homewater are estimated by alternative methods, such as counts at fishways and counting fences, or from mark and recapture studies. The estimates of fish numbers returning to homewaters are then raised to take account of the natural mortality (M) between the date that the fish are deemed to recruit to the particular fishery of interest and the midpoint of the timing of the respective national fisheries. A value of 0.03 per month is assumed for M. The date of recruitment of NAC stocks (and thus the PFA date) is taken as 1 August in the second summer at sea because these fish are first exploited in the distant water fishery at West Greenland. However, NEAC stocks recruit to the Faroes fishery during their first sea winter and so PFA is calculated at 1 January (i.e. eight months earlier) for these stocks.

To develop catch advice for international fisheries, the Working Group needs estimates of:

- total catch;
- the proportion of 1SW and MSW salmon in the catch;
- unreported catch for 1SW and MSW salmon; and
- exploitation rates for 1SW and MSW salmon to run the PFA model(s).

The Working Group is developing a Life Cycle Model (LCM) which is likely to replace the current PFA model in developing catch advice in the near future. The LCM requires broadly the same input variables but can be more readily modified to incorporate other covariates (e.g. environmental variables) and will provide greater flexibility in exploring hypotheses. In the context of the DCF, the Working Group identified several data requirements of the new life cycle model:

At the scale of regions (or stock units in the life cycle model):

- Proportion at sea ages (1SW, 2SW, etc, & repeat spawners) of returns and catches;
- Time-series of fecundity for all sea ages and repeat spawners;
- Time-series of smolt ages;
- Information to allocate catches in mixed-stock fisheries.

At the scale of monitored rivers:

- Time-series of egg depositions and smolt abundances, to calculate freshwater survival. The total wetted area accessible to salmon across a region would be required to characterize the freshwater survival at the regional scale.
- Time-series of return rates from monitored rivers.

The Working Group reviewed the provisional table of data requirements developed by the RCG in 2018 to confirm which data types were: (i) used by the Working Group, (ii) planned to be used in the near future, or (iii) could potentially be useful, and (iv) whether or not there were any other data needs that should be added to the table. The Working Group has updated the table (see below) with amendments summarised as follows:

Data on **All fisheries exploiting North Atlantic salmon:** these entries are correct, but to note that the WG requires data on both reported and unreported catches and landings.

Data on **Mixed-stock salmon fisheries**: Amended to allow for any new methods of assignment in relation to contributing stocks, and to apply to all mixed-stock fisheries instead of only that at West Greenland.

Data on **Biological data**:

- the spatial frequency of monitored rivers has been amended; see section ii) below;
- methods have been deleted where the list had been incomplete;
- row 9 is a duplication of row 6;
- the WGNAS uses smolt age composition (row 11), the midpoint of the smolt migration period (row 20) and adult fecundity (row 13) but these are not annually updated at this stage; a periodic check to examine for changes would be useful and it is possible that time-series of such variables could be added as a future improvement to the LCM;
- data on density-dependence in freshwater (row 19) are not used; it might be useful to the future LCM but information would be derived from other sources, e.g. in support of the Water Framework Directive (WFD);
- Though not specified as a single item in the table, data collected on smolt abundance and returning adults are used to generate time-series of estimates of marine return rates (a proxy for marine survival). The PFA models used to provide catch advice use a fixed survival rate at present but any substantial change in the time-series indices might prompt a review of the rate used in estimating PFA. Future assessment models (e.g. the LCM) would be improved by the inclusion of marine survival estimates.

With regards to “Actions to improve data quality”, the Working Group quantifies uncertainty in all of its assessments using data provided and ICES takes this information into account when providing advice. However, the Working Group recognizes potential challenges associated with the (i) timeliness and (ii) completeness of data reporting.

Timely provision of national data is challenging because the Working Group has to meet in March/April to prepare the information that ICES requires to develop the advice ahead of the annual NASCO meeting in June. As a consequence, data for the most recent year are always regarded as provisional but are routinely updated the following year.

Not all EU Member States with Atlantic salmon stocks fully report to the Working Group ahead of the annual meeting. The potential effect of no or incomplete reporting on the quality of the Working Group outputs has not been specifically tested but is considered of relatively minor significance since the Member States that do not report, typically support small numbers of stocks. However, the development of an ICES data call during 2019 will formalize the data provision to the Working Group in advance of its 2020 meeting and this, along with standardisation of data report formatting and storage should improve data quality through timely reporting and the availability of new data from other EU Member States.

With regards to "the future use of the RDBES database as a source of ICES data for analyses on salmon", the Working Group is developing approaches to streamline data collection, storage and presentation (facilitated through an ICES data call approach) to facilitate analyses. It is unclear at this stage whether the RDBES will benefit the work of Working Group (the InterCatch database has previously been unsuitable for Atlantic salmon). However, the Working Group is happy to liaise with the ICES DataCentre and the RDBES Steering Group to explore possible opportunities.

b) *ii) Address the following recommendations from the RCG in 2018:*

With regards to "1) Explain and review the selection of national index rivers by the various Member States (noting that "rivers" in the Legal Text is interpreted to represent "waterbodies" (STECF 2017)), and comment on whether these selections are appropriate and sufficient for the WG to perform analyses and provide stock advice", the Working Group notes that the term 'index' river may hold a specific meaning within the context of NASCO and prefers the terminology of 'monitored' river when referring to data collection to reflect that data were available on a regular (usually annual) basis. The assumption would be that all required data would be collected on monitored rivers, as this would minimise the need for sampling the multitude of rivers for separate parameters. However, it may not be practical to collect all data in every monitored river. Selection of rivers to monitor has historically been based on national competencies and according to what each jurisdiction deemed appropriate, affordable and necessary for the management of their salmon stocks.

From a salmon biology perspective, it is useful if monitored rivers are representative of the geographic and demographic variation in a jurisdiction/country. However, proposing that a set proportion of rivers should be established as monitored stocks, such as the one river in 30 suggested by ICES (ICES WKESDCF, 2012), is considered unrealistic by some jurisdictions, particularly those with very large numbers of stocks. There is currently no formal Working Group process for the selection of monitored rivers but the Working Group recommends that selection remains within the competence of individual Member States. The Working Group considers the information provided to it at present on monitored rivers is appropriate and sufficient to meeting its requirements in providing advice to NASCO.

The Working Group recognises the particular practical challenge of data collection in rivers with very small populations of salmon, including those where stocks are recovering, and the need to balance investment in data collection with the relative contribution to national and international assessments.

With regards to "2) *Identify the stocks from which salmon variables should be collected (for parr, smolts, and adults), and advise on sampling frequency and effort (sampling level) to collect these variables*", the variables currently collected for the Working Group are provided for stocks defined at the country or regional level within countries. Stock assessment models are performed at the regional/country level and aggregated to the complex level (North Atlantic (NAC)/North East Atlantic (NEAC)). Information is also provided at the level of the monitored river. Information on adult abundance and age composition is required on an annual basis. In contrast, information on adult sex ratio, fecundity and smolt age composition is required periodically, but time-series might be included in the LCM in future. Information on parr abundance (densities) is used for national assessment and management but not required by the Working Group for present purposes (though the developing LCM might also use such data). Annual indices of survival (requiring monitoring/handling of smolts and adults) are also included in ICES advice to NASCO.

Current sampling effort is considered to be adequate for salmon stocks (information provided on total catch or abundance on an annual basis).

Table of Atlantic salmon data requirements in the Data Collection Framework, adapted by the RCG 2018 and annotated by the WGNAS 2019.

Data type	Code	Parameter (and comment)	Used by Working Group	Future planned	Would be Useful
All fisheries exploiting North Atlantic salmon					
	1	Fishing effort.	X		
	2	Number and weight of all salmon caught separated by fisheries, location, age class. ESTIMATES ARE ALSO REQUIRED FOR UNREPORTED CATCHES.	X		
	3	Number of salmon released in recreational fisheries.	X		
	4	Weight of ranched salmon caught.	X		
Mixed-stock salmon fisheries					
	5	Assignment to jurisdiction/region/river of origin of adult salmon, at least once every 5 years.	X		
Biological data					
	6	Counts (or estimates) of returning adults for at least one river stock in 30, or as based on national assessment requirements.		X	
	7	Sea age composition of returning adults.	X		
	8	Sex ratios of returning adults by sea age at a national/regional level every 5 years (should be in new DC MAP).	X		
	~~9~~	~~Annual counts of ascending adults on index rivers, as agreed by ICES~~ (duplication of row 6).		~~X~~	
	10	Annual smolts counts on monitored rivers.		X	
	11	Annual age composition of smolts.		X	
	12	Surveys for juvenile salmonids to assess stock compliance (national assessments) and Water Framework Directive (WFD) requirements.		X	

Data type	Code	Parameter (and comment)	Used by Working Group	Future planned	Would be Useful
	13	Fecundity of returning adults by sea age at a national/regional level every 5 years (should be in new DC MAP).	X		
	14	Annual fry/parr densities on index rivers, as agreed by ICES – required for WFD not for WGNAS assessments.			X
	15	Egg to smolt survival time-series on index rivers – potential future incorporation in LCM.			X
	16	Annual estimates of sex ratios of adults on index rivers - potential future incorporation in LCM.			X
	17	Annual estimates of sex ratios of smolts on index rivers – potential future incorporation in LCM.			X
	18	Disease and parasite monitoring in wild fish (e.g. BKD, ISA, *Gyrodactylus salaris*, sea lice, etc.).			X
	19	Modelling the density-dependence in the freshwater phase – potential future incorporation in LCM.			X
	20	Midpoint of smolt migration period.	X		
	21	Estimates of ‘smolt to returning adult’ return rates (‘marine survival’) collected annually on monitored rivers, collected at suitable spatial frequency to be decided at country level.	X		

10.2 Data Call for NASCO requested information used by the Working Group

The terms of reference from NASCO defines the work of the ICES WGNAS (the Working Group). Other than for the catch data, the terms of reference are not specific as to what type of information would be used by ICES to develop the status of stocks.

Process for collating catch data

The request for catch data is specific as to the type of information to be compiled:

- provide an overview of salmon catches and landings by country, including unreported catches and catch and release, and production of farmed and ranched Atlantic salmon in 2018[1],

and in each Commission Area, the request includes:

- describe the key events of the 2018 fisheries[3] (ToR 2.1, 3.1, 4.1)

with specifics provided in footnotes 1 and 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;*
3. *In the responses to questions 2.1, 3.1 and 4.1, ICES is asked 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).*

The catch data are an important legacy dataset, with catches dating from 1960. The large number of data tables in the Working Group report are developed in Excel spreadsheets and summarize the compiled data for the report. Because the tables of catches are reproduced in their entirety in every ICES report, there is no risk of losing those data. However, in their configuration, they are not readily accessible for analyses. Some of the tables contain duplicate data entries or are a compilation of other tables, which can lead to errors as each are entered separately.

It is proposed that the catch data currently contained in several tables within the report be transferred to a more formal database structure that would facilitate the data entry, query, analyses and archiving. The database structure could initially be relatively simple, but any database requires adherence to data standards and nomenclature to be effective. Once the data are compiled in a standard format, scripts can be written to extract the information needed by ICES in response to the NASCO terms of reference.

For example, it would be possible to enter the data for these tables in one table structure. The database table entry would be done in Excel using pull-down lists to ensure nomenclature standards. One worksheet tab would be used to enter the current year's data and when complete, the data would be copied to the master file of the time-series which would also be saved in an appropriate format for input to R for developing summary tables and providing opportunities for further analyses. The users would access the spreadsheet for updating and analyses on the Working Group SharePoint site. A data call would be sent to national contacts in, for example early March, to complete the data for the current year, prior to the meeting of the Working Group. A draft template of the data call text has been prepared using the WGBAST text and is provided at the end of this section.

Over the current year, a subgroup of the Working Group members will be formed to develop the catch data table entries, the data formats and nomenclature, to develop the code to generate the historical time-series tables and compilations requested by NASCO, and to finalise the text of the data call (for example, see Section 8.3 below). The subgroup would work by correspondence with a working database, entry format, and analysis scripts to be delivered for the Working Group in early January.

The subgroup would also consider other data used by the Working Group which would benefit from a structured data entry and compilation approach. Other data that could be considered for compilation into a database such as, data required to run the life cycle model for catch advice, effort, CPUE, etc.

10.3 DRAFT Data call: Data submission for ICES selected stocks under WGNAS 2020

1. Scope of the Data call

ICES Member Countries are requested to provide the following for salmon (*Salmo salar*) in the North Atlantic:

- data on salmon catches and landings by country, by commercial and recreational, including unreported catches, and catch and release, and in 2019; and
- data on production of farmed and ranched Atlantic salmon in 2019.

2. Rationale

The data requested will be used by the Working Group on North Atlantic Salmon (WGNAS), which is involved in the provision of ICES advice on fishing opportunities for salmon in the Atlantic.

3. Legal framework

The legal framework for the data call is as follows:

- Article 15 of the NASCO Convention, with reference to obligations of Parties to provide to the Council the available catch statistics, other statistics, and any other available scientific information that the Council requires for the purposes of the Convention.
- Regulation (EU) No 2017/1004 on the establishment of a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the Common Fisheries Policy.
- Commission Implementing Decision (EU) 2016/1251 of 12 July 2016 adopting a multiannual Union programme for the collection, management and use of data in the fisheries and aquaculture sectors for the period 2017–2019.
- Regulation (EU) No 1380/2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009.
- This data call also follows the principles of personal data protection as referred to in paragraph (9) of the preamble in Regulation (EU) 2017/1004 and repealing Council Regulation (EC) No 199/2008.

4. Deadlines

ICES requests that the data be delivered by the Date Month 2020, to provide enough time for additional quality assurance prior to the launch of analyses and the working group meeting.

5. Data to report

5.1 Geographic and temporal scope

Data on landings (Section 5.2.1.) should be reported by Country, Stock Unit, year. Data should be reported from year to 2019. Data for 2019 can be marked as provisional, where necessary. The geographical scope for both species is the North Atlantic.

Table 1. List of species.

Common name	Code	Scientific name
Salmon	SAL	*Salmo salar*

5.2 Data types

5.2.1. Commercial catches and landings, 2019

- Commercial landings (in numbers and kg round fresh weight) by Country, sea age/size class (sea winters or smallvs.large salmon), catch location (coastal, estuarine, riverine) and reported or unreported.
- Fish released back alive (in number) by Country.

5.2.2. Recreational fisheries data, 2019

- Recreational landings (in number and kg) by Country, sea age/size class (sea winters or smallvs.large salmon), catch location (coastal, estuarine, riverine), and for reported and unreported catches.
- Fish released back alive (in number) by Country.

5.2.3. Production of farmed and ranched salmon, 2019

- Amounts (in number and tonnes) by Country.

6. Data submission

Data should be submitted to data.call@ices.dk using the attached template (Annex 1). The template contains descriptions of codes to be used with some examples.

Files for data.call@ices.dk should be submitted in as few emails as possible. The file name must include working group, stock unit, country, and data type references as specified below. Both email subject and file name must include working group, stock unit, and country references.

"20XX DC [expert group] [country] [fishing year]" (example: 2020 WGNAS FI 2019)

7. Contact information

For support concerning details on data deliveries, contact WGNAS chair Martha Robertson (martha.robertson@dfo-mpo.gc.ca) and WGNAS expert Name name (email).

For support concerning any data call issues, please contact the Advisory Department (Advice@ices.dk).

For support concerning other data-submission issues, please contact: data.call@ices.dk.