Fisheries and Oceans Canada | Pêches et Océans Canada
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Canadian Science Advisory Secretariat
Newfoundland and Labrador Region **Science Response 2019/026**

PRELIMINARY DATA REVIEW TO INFORM POTENTIAL INTERIM 2019 ATLANTIC SALMON MANAGEMENT APPROACH IN NEWFOUNDLAND AND LABRADOR

Context

Total returns of Atlantic Salmon in Newfoundland and Labrador (NL) declined by >30% on more than half of monitored rivers in 2016 and 2017 in comparison to the previous generation (DFO 2017, DFO 2018). Consecutive declines of this magnitude are unusual for salmon stocks in NL and have not been observed since the moratorium on the commercial Atlantic Salmon fishery in 1992. These declines triggered full stock assessments for the 2016 and 2017 salmon returns (DFO 2017, DFO 2018).

Following the assessment for the 2017 returns, the 2018 recreational Atlantic Salmon fishery opened with a reduction in seasonal harvest limits from two, four, or six fish (consistent with the River Classification System; Veinott et al. 2013) to one fish retention on all rivers that permit retention, and a reduction in the catch and release limit from four to three fish. This represented a significant reduction compared to historical retention limits**.** Fisheries and Oceans Canada (DFO) Fisheries Management requested that Science conduct an in-season review during the 2018 fishing season to provide an update on stock status. Final returns of adult salmon in 2018 were predicted based on the relationship between counts up to a given date (July 15th in Newfoundland and July 22nd in Labrador) and final returns over the previous three generations. Average harvest estimates (2012-16) were removed from predicted returns to assess the number of rivers expected to meet or exceed the Limit Reference Point and the Upper Stock Reference Point. Based on the results of the in-season review, Science recommended a precautionary management approach whereby all rivers would close to retention angling and continue as catch and release only for the remainder of the season. Science also recommended implementation of strict environmental protocols involving river closures when water temperatures exceeded 18°C (DFO 2019).

Throughout November 2018, DFO Fisheries Management held six public meetings across NL to discuss Atlantic Salmon management for the upcoming 2019 season and hosted an annual Salmonid Inland Compliance and Resource Management Workshop. During these meetings, the majority of anglers and stakeholders recommended that the Department's management approach for the 2019 Atlantic Salmon angling season in NL should be announced earlier than previous years.

The biennial Regional Peer Review Meeting for the Assessment of Atlantic Salmon is not scheduled until March 5-7, 2019, which is the earliest date that allows Science to have the necessary data (e.g., 2018 returns and fisheries data) required to conduct a full stock assessment. Therefore, Fisheries Management requested a preliminary data review to inform a potential interim 2019 Atlantic Salmon Management Approach in NL, and to provide advice on the following question: **can salmon stocks sustain a one fish retention on all rivers that permit retention, and an additional one fish retention (for a total of two) on Class 4 and 6 rivers?**

This Science Response Report results from the Regional Science Response Process of February 1, 2019 on the Preliminary data review to inform potential interim 2019 Atlantic Salmon Management Approach in Newfoundland and Labrador.

Analysis and Response

Methods

Nineteen populations of Atlantic Salmon were monitored in 2018 (Fig. 1). Adult salmon were counted on four rivers in Labrador and 15 rivers in Newfoundland. The salmon count on Northwest River-Port Blandford (SFA 5) was incomplete due to a fence washout for an extended period of time in 2018, and is therefore excluded from this data review. Washouts also occurred on Harry's River (SFA 13) in 2018; however, these events were very brief (two days each) and likely resulted in only a slight underestimate of total salmon. A washout at Conne River (SFA 11) occurred after the majority of adult salmon had migrated upstream and likely had very little effect on the total count in 2018.

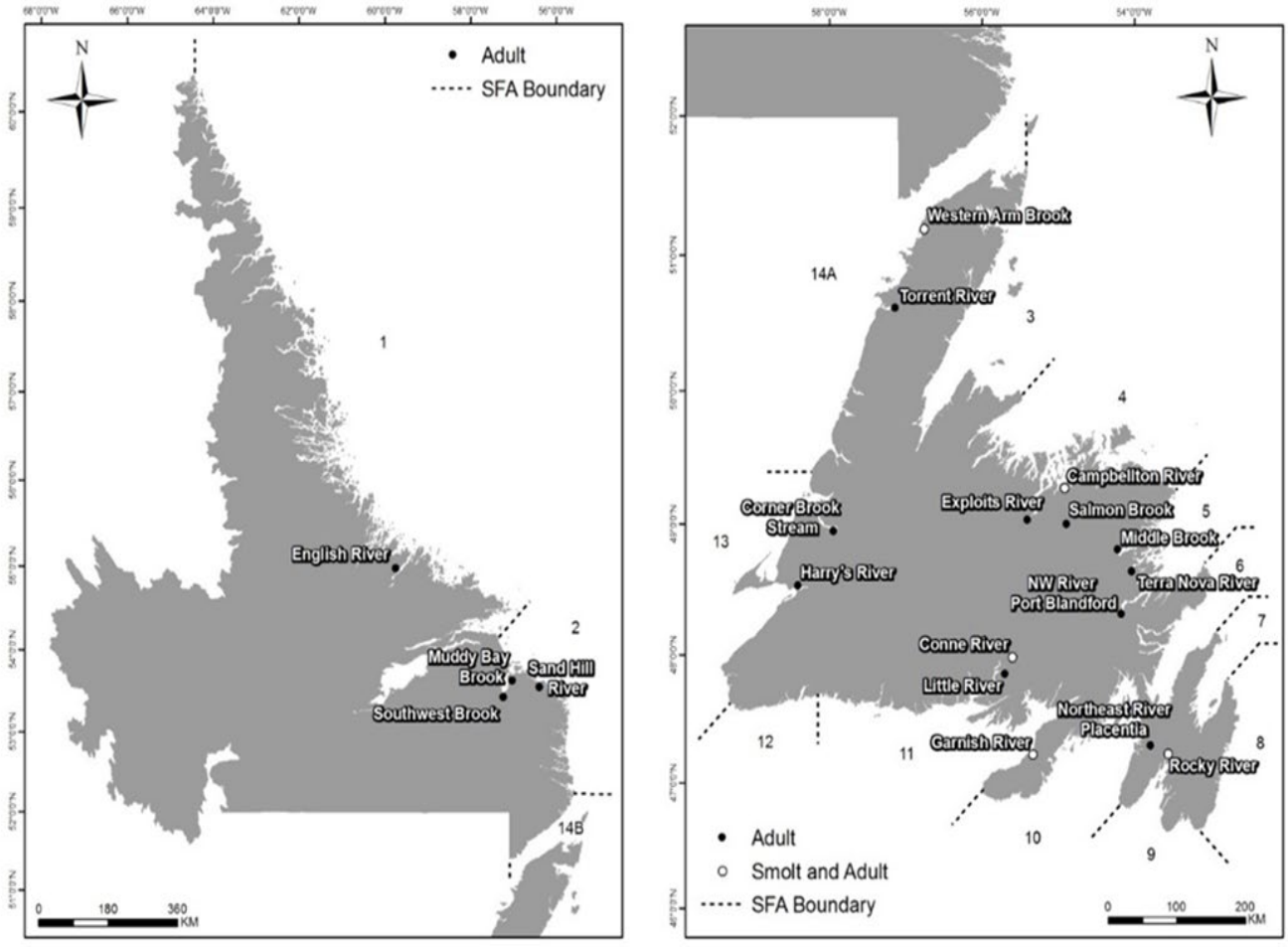

Figure 1: Maps showing the locations of rivers in SFAs 1–14B where Atlantic Salmon populations were monitored in 2018.

2018 Atlantic Salmon counts in comparison to average returns during two reference periods

Total counts of salmon (small + large) on 18 rivers in 2018 were compared to average total returns (i.e., counts adjusted for fishery removals below monitoring facilities) during two previous reference periods:

- **Reference Period 1 (2016-17)**: the two years during which Atlantic Salmon declined by >30% on more than half of monitored rivers relative to the previous generation; and
- **Reference Period 2 (2011-15 for Newfoundland and 2010-15 for Labrador)**: one generation before the 2016-17 declines, where one generation is five years in Newfoundland and six years in Labrador.

Average total returns during Reference Period 2 (2011-15 for Newfoundland and 2010-15 for Labrador) are unavailable for two Newfoundland rivers (Northeast River, Placentia and Garnish River) as neither of these rivers have been monitored consistently since 2011. Therefore, comparisons of 2018 total counts relative to average returns during Reference Period 2 are made for 16 of the 18 monitored rivers, versus all 18 rivers during Reference Period 1 (2016-17). It is important to note that 2018 count data are preliminary and will be updated to final returns once fisheries removal data have been analyzed. This information will be assessed during the March 2019 Regional Peer Review Assessment for Atlantic Salmon.

Results

Reference Period 1

Total counts of salmon in 2018 were higher on 50% of monitored rivers (9 of 18) relative to average total returns during 2016-17, lower on 17% (3 of 18) and showed no change (i.e. <10%) on 33% of rivers (6 of 18; Table 1).

Reference Period 2

Total counts in 2018 were higher on only 12% of rivers (2 of 16) in comparison to average total returns during Reference Period 2 (2011-15 for Newfoundland and 2010-15 for Labrador), lower on 44% (7 of 16) and showed no change on the remaining 44% of rivers (7 of 16; Table 1). Declines >50% on Conne River and Little River in 2018 in comparison to both reference periods (Table 1) indicate that salmon stocks in SFA 11 (Fig. 1) continue to decline.

Table 1. Total counts of Atlantic Salmon (small + large) on monitored NL rivers in 2018 in comparison to the average total returns (and percent change) during Reference Period 1 (2016-17) and Reference Period 2 (2011-15 in Newfoundland and 2010-15 for Labrador). Percent change of <10% is considered no change.

River Name (SFA)	Total Count 2018	Mean Total Returns 2016-17[1]	Mean Total Returns 2010/11-2015[2]	Percent Change 2016-17[1]	Percent Change 2010/11-2015[2]
Exploits River (SFA 4)	18,323	20,072	33,513	-9	-45
Campbellton River (SFA 4)	4,313	2,377	4,675	81	-8
Salmon Brook (SFA 4)	1,036	682	1,700	52	-39
Middle Brook (SFA 4)	3,389	2,522	3,316	34	2

River Name (SFA)	Total Count 2018	Mean Total Returns 2016-17[1]	Mean Total Returns 2010/11-2015[2]	Percent Change 2016-17[1]	Percent Change 2010/11-2015[2]
Terra Nova River (SFA 5)	4,794	4,508	4,615	6	4
Rocky River (SFA 9)	329	325	414	1	-20
Northeast River, Placentia (SFA 10)	841	669	NA	26	NA
Conne River (SFA 11)	454	971	2,029	-53	-78
Little River (SFA 11)	8	31	138	-70	-94
Garnish River (SFA 11)	339	378	NA	-10	NA
Harry's River (SFA 13)	3,054[3]	3,385	3,577	-10	-15
Corner Brook Stream (SFA 13)	111	112	102	0	9
Torrent River (SFA 14A)	4,235	4,418	4,650	-4	-9
Western Arm Brook (SFA 14A)	1,459	1,174	1,313	24	11
English River (SFA 1)	947	809	681	17	39
Southwest Brook, Paradise River (SFA 2)	260	87	264	199	-2
Muddy Bay Brook (SFA 2)	319	225	369	42	-13
Sand Hill River (SFA 2)	4,161	2,166	4,248	92	-2

[1] Reference Period 1, [2] Reference Period 2, [3] likely an underestimate due to temporary fence washouts.

Stock Assessment Triggers

Twenty-five percent (4 of 16) of monitored rivers in 2018 had declines >30% relative to the generation prior to 2016 (Table 1). This represents a small improvement over the two previous years when declines in total returns >30% relative to the previous generation occurred on 50% of monitored rivers in 2016 (DFO 2017) and 63% of monitored rivers in 2017 (DFO 2018).

Index of Atlantic Salmon Abundance

Annual indices of salmon abundance (for small and large salmon separately) were calculated for 14 rivers in Newfoundland (1992-2018) and 4 rivers in Labrador (2002-18) using total salmon returns (and counts in 2018). Due to large differences in the absolute number of salmon returning to monitored rivers, the index was based on log transformed returns to each river in a given year (similar to Dempson et al. 2004). Log transformed returns can be averaged by year to produce an annual index, however not every river was monitored in every year. To predict

returns for missing years (least-squared means) a generalized linear model was fit with a negative binomial distribution (and log link), with year and river as factors. The mean index and associated 90% confidence intervals (CI) were back-transformed from the log scale to show the abundance index on the scale of salmon returns.

The abundance of small salmon in Newfoundland is variable and has been declining since 2010 (Fig. 2a). Although there was a slight increase in 2018, abundance is well below the 2011-15 generation mean. The abundance of small salmon also declined in Labrador during 2016 and 2017 (Fig 2b), but increased in 2018 to a level similar to the 2010-15 generation mean. Large salmon abundance has been continuously declining in Newfoundland (Fig. 2c) and Labrador (Fig. 2d) since 2015 and remains well below the previous generation mean in both regions.

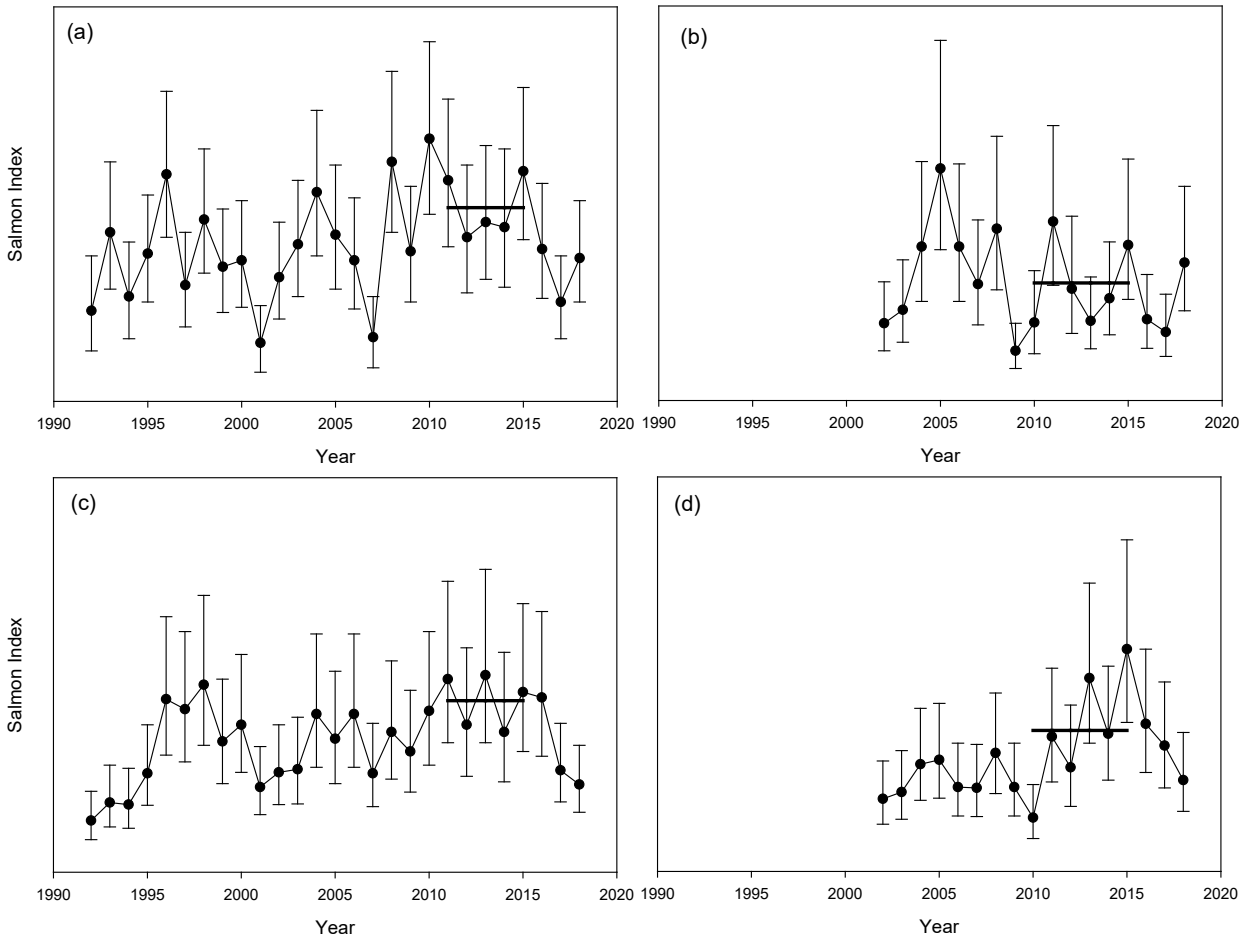

Figure 2. Mean abundance index of small (<63 cm) Atlantic Salmon for Newfoundland (a) and Labrador (b) and large salmon (≥ 63 cm) for Newfoundland (c) and Labrador (d). Vertical lines represent 90% confidence intervals. The bold horizontal line represents mean abundance during Reference Period 2 (2011-15 for Newfoundland and 2010-15 for Labrador).

Conclusions

Can salmon stocks sustain a one fish retention on all rivers that permit retention, and an additional one fish retention (for a total of two) on Class 4 and 6 rivers?

Given recent declines in Atlantic Salmon stocks (DFO 2017, 2018) and the uncertainty regarding 2019 returns, Science recommends continuation of the precautionary approach for the management of the Atlantic Salmon recreational fishery in NL (DFO 2009). Although overall salmon abundance (both small and large) has been declining in recent years, preliminary count data for 2018 indicates a slight improvement in the abundance of small salmon, such that Atlantic Salmon stocks in NL could sustain a retention limit of up to one salmon on all rivers that permit retention. It is important to note that a one fish retention limit represents a significant reduction compared to historical retention limits (50%, 75% and 83% for Class 2, 4 and 6 rivers, respectively).

Whether salmon stocks can sustain an additional one fish retention (for a total of two) on Class 4 and Class 6 rivers cannot be assessed at this time. This will be reviewed during the March 2019 Regional Peer Review Process for the Assessment of Atlantic Salmon.

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Sources of information

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