North American Commission

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Labrador Subsistence Food Fisheries - Mixed-Stock Fisheries Context

(Tabled by Canada)

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EXECUTIVE SUMMARY

- The Atlantic salmon subsistence fisheries in Labrador take place in estuaries and coastal areas using gillnets and are considered to be mixed stock fisheries. The majority of the salmon harvests in these fisheries take place in fishing locations categorized as estuaries with a reduced potential to intercept salmon from non-local stocks.
- The management of these fisheries includes a number of conditions related to gear, seasons, weekly fishery closures, carcass tagging of harvested salmon, a logbook program for reporting catches, a limit on total harvest using tags, and a prohibition on sales of Atlantic salmon.
- Reported annual harvests of salmon have ranged from 15.6 t to 42.4 t during 2000 to 2016, representing between 4,800 to 11,100 small salmon and 1,400 to 6,400 large salmon annually. The reported harvests in any year have been less than the maximum tags available for these fisheries.
- Sampling of the fishery catches has taken place every year since 2006 by the members and officers of the aboriginal communities involved in the fisheries and the information and data shared with Fisheries and Oceans Canada.
- A recently developed genetic baseline of salmon populations in eastern North America can accurately resolve the origin of salmon to twelve regional groups, with most rivers in Labrador associated to a Labrador Central regional group. This group covers rivers in all Salmon Fishing Areas (1A, 1B, 2, 14B) of Labrador.
- Genetic analyses of the regional contributions of Atlantic salmon to the sampled catches in the Labrador subsistence fisheries for 2006 to 2016 indicate that the large majority (93% to 99%) of the samples assigned to the Labrador Central regional group. Resolution at a finer spatial scale and ultimately to individual river of origin is not possible at this time with the current genetic markers.
- Funding to support the analysis of 2017 and 2018 fishery samples has been secured and the results will be reported to ICES and NASCO as they become available.

INTRODUCTION

In support of the agenda item in the North American Commission agenda to address mixed stock fisheries in domestic waters of Commission member Parties, this document presents the following information:

- current management measures for the Labrador subsistence fisheries on Atlantic salmon
- summaries of annual harvests by location and size group of salmon
- summaries of the biological sampling program of this fishery,
- results from the determination of the origin of salmon sampled from these fisheries using genetic identification techniques

Fisheries for Atlantic salmon that occur at sea, along the coast, and in some cases in estuaries, have the potential to exploit salmon from multiple stock origins. The most important mixed-stock fisheries in Canada historically were the commercial fisheries which occurred in the marine coastal areas and in estuaries throughout eastern Canada. Since 2000, all commercial Atlantic salmon fisheries under Canadian jurisdiction have been closed and the sale of Canadian origin wild Atlantic salmon, regardless of fishery source, is prohibited.

Since the closure of the commercial fisheries for salmon in Canada, salmon are exploited by three user groups: aboriginal fisheries, Labrador resident food fisheries, and recreational fisheries. As reported to ICES and NASCO, the proportion of the Atlantic salmon harvest in Canada from all users (recreational, aboriginal, Labrador resident food) which takes place in rivers (on single stocks), in estuaries, and in coastal areas has varied annually (Figure 1). Coastal harvests have ranged from about 2 t to 9 t during 2000 to 2016, representing about 6% or less of the total annual harvests of Atlantic salmon. Harvests in recreational fisheries occur exclusively in rivers. Harvests in aboriginal food, social and ceremonial fisheries of Quebec and New Brunswick occur in rivers and estuaries whereas harvests in the subsistence food fisheries (aboriginal and resident) of Labrador occur in estuaries and coastal areas.

The aboriginal fisheries that occur in estuaries of Quebec and New Brunswick take place in the vicinity of single rivers, generally in tidal waters of rivers, and consequently are not considered to be mixed-stock fisheries. While the net fisheries for the Labrador subsistence food fisheries are authorized for coastal waters, current fishing activity occurs with gillnets very close to the communities which are located in deep bays along the coast away from the headlands where interception of non-local stocks of salmon historically was an issue. Despite this important change in the location of the current Labrador subsistence fisheries compared to the locations of the historical commercial marine fisheries, the Labrador subsistence fisheries are considered by NASCO as mixed stock fisheries.

GEOGRAPHIC LOCATION OF FISHERIES FOR ATLANTIC SALMON

The subsistence food fisheries in Labrador take place in estuaries and coastal areas. For the purposes of reporting the location of the harvests, the following definition of an estuary is used:

> "D.W. Pritchard (1967. What is an estuary: physical viewpoint. p. 3–5 in: G. H. Lauf (ed.) Estuaries, A.A.A.S. Publ. No. 83, Washington, D.C.) states that an estuary must (1) be partially enclosed, (2) have river(s) running into it, (3) have mix of fresh and sea water. An estuary is thus a partly enclosed coastal body of water in which river water is mixed with seawater, defined by salinity rather than geography. As such Lake Melville in Labrador is considered to be an estuary" (D. Reddin DFO, unpubl. ICES working document).

Based on this definition and from interviews with guardian and fishery officers in Labrador, the fishing locations in Labrador were categorized as estuary or coastal and harvests attributed to these accordingly. Between 2000 and 2016, the percentage of the total Labrador subsistence harvests which were taken in coastal areas has ranged from 15.0% to 25.2% (Table 1). In 2016, 32.6 t, 82.4% of total subsistence fisheries harvests of Atlantic salmon, were harvested from areas classified as estuaries and 7.0 t (17.6%) were from locations classified as coastal. Approximately similar percentages of the harvests in SFA 1A and SFA 2 occur in coastal areas (Table 2).

MANAGEMENT OF THE LABRADOR SUBSISTENCE FOOD FISHERIES

There are two types of subsistence net fisheries in Labrador that authorize the harvest of Atlantic salmon:

- Resident subsistence Trout fishery that permits a by-catch of salmon, and
- Aboriginal Food Social and Ceremonial (FSC) Fisheries that direct for Atlantic salmon.

In recent years, the fishing season and mesh sizes in the various fisheries have been modified in an effort to reduce the capture of large salmon while at the same time providing an opportunity to harvest small salmon, trout and Arctic charr. Carcass tags are required for all harvested salmon in these fisheries and an allocation of tags is provided to each group which sets limits on the total harvest of salmon which can be taken. All sales of salmon are prohibited.

1) Resident Subsistence Trout Fishery

There is a long-standing tradition of trout net fishing in Labrador. Following the closure of the commercial salmon fishery in Labrador in 1998, there was an increased dependency on the trout fishery for subsistence purposes. A subsistence trout net licence is required and available to residents of Labrador to harvest trout for food purposes. There is a recognized by-catch of Atlantic salmon in the trout nets. Tags for salmon were issued on an individual fisher basis to attach to salmon so that legally caught salmon could be identified. There was a catch limit on charr and trout combined of 50 fish per designate or license holder and there is a limit of one designate or licence holder per household. A number of additional management measures are currently in place for this fishery.

- 148 licences issued for Cape Rouge to Fish Cove Point, including Lake Melville (Licence Cap 156) and approximately 140 licences issued for the coast of Labrador in 2016. Furthermore, there is a limit of one designate or licence holder per household.
- Target species are Speckled trout and Arctic charr with a seasonal limit of 50 trout / charr
- A maximum by-catch of 3 Atlantic salmon can be retained

- Fishing must cease when either 3 salmon or 50 trout and/or charr are taken
- All harvested salmon must be tagged
- Licence holders are permitted to use a single net with a maximum length of 15 fathoms
- Monofilament netting materials are not permitted
- Mesh size permitted is 4 inches
- The net must be set in a straight line
- Gear must be marked identifying licence holder
- Seasons in 2016 varied by location (refer to map in Figure 3):
    - Davis Inlet to Cape Chidley: June 24 to July 17
    - Cape Rouge to Davis Inlet: June 17 to July 15
    - Cape Rouge to Fish Cove Point (including Lake Melville): June 03 to July 03 and July 19 to August 03 (Kenamu River closes July 31)
    - Fish Cove Point to Cape Charles: July 12 to July 31
- No fishing (nets must be removed from the water) between the hours of 6:00 p.m. Sunday and 6:00 p.m. Monday.
- Completed logbooks of catch and effort must be submitted to Fisheries and Oceans Canada at the end of season.

2) Aboriginal Food Social and Ceremonial (FSC) fisheries

In response to the Supreme Court of Canada decision interpreting Section 35 of the Constitution Act of 1982, Fisheries and Oceans Canada (DFO) provided resource access to Aboriginal groups of Labrador for FSC purposes. Between 1999 and 2005, a FSC fishery was made available for members of the Labrador Inuit Association (LIA) in northern Labrador as well as the Lake Melville area, both located in SFA 1. In 2006, with the signing of the LIA Land Claims Agreement, a subsistence fishery with the Nunatsiavut Government which is the successor organization to the LIA was negotiated (Figure 2). The Innu Nation also fishes for salmon in Lake Melville from the community of Sheshatshiu and in northern Labrador from the community of Natuashish. In 2004, members of the NunatuKavut Community Council (NCC) on the south coast of Labrador negotiated a subsistence fishery with Fisheries and Oceans Canada in the area between Fish Cove Point and Cape St. Charles, located in SFA 2. In 2013, a subsistence fishery was negotiated with the NCC for access to upper Lake Melville.

The three Aboriginal groups with FSC fisheries in Labrador presently include:

- Nunatsiavut Government
    - 7,200 beneficiaries
    - 900 designated fishers
- Innu Nation
    - 2,200 members
    - 100 designated fishers
- NunatuKavut Community Council
    - 6,000 members
    - 1,050 designated fishers

All FSC fisheries are controlled through the issuance of a communal licence by Fisheries and Oceans Canada which includes carcass tags. Carcass tags are required for all harvested salmon

in these fisheries and an allocation of tags is provided to each group which limits the harvest which can be taken. In 2016, the total number of carcass tags issued was 15,300 tags. The fishing gear used is gillnets.

There are a number of management measures implemented in all three of the licences. These include:

- Mono filament netting not permitted
- A maximum length of 25 fathoms of net per designated fisher
- Net must be set in a straight line
- No fishing (nets must be removed from the water) between the hours of 6:00 p.m. Sunday and 6:00 p.m. Monday.
- Gear must be tended every 24 hours
- All harvested salmon must be tagged
- Completed logbook of catch must be submitted to DFO at the end of season.

Specific measures for each group are described below.

Nunatsiavut Government

- For the Upper Lake Melville (ULM) area, the minimum mesh size is 3 inches and the maximum mesh size is 4 inches
- For the Labrador Inuit Settlement Area (LISA), there are various minimum mesh size requirements from 3 to 5 inches
- For the ULM area, the season extends from June 15 to July 8 and July 19 to August 31
- For LISA, the season extends from June 15 to August 31
- Fishing is allowed in tidal waters of the ULM and in various locations in tidal waters close to communities (Rigolet, Postville, Makkovik, Hopedale and Nain)
- 8,200 tags were issued; 4,200 (500*) for LISA and 4,000 for ULM
  *There is a reserve of 500 tags set aside for further allocation that was requested in 2016

Innu Nation

- Minimum mesh size of 3 inches and maximum mesh size of 4 inches
- For Sheshatshiu, the fishing season extends from May 15 to September 15
    - Fishing is permitted from Fish Cove Point, north to Cape Harrison, including Lake Melville and the inland waters of Little Lake and Grand Lake in Upper Lake Melville
    - Fishing activity in tidal waters does not occur outside the waters of Upper Lake Melville in the Kenamu River-Sheshatshiu areas
- For Natuashish, the fishing season extends from May 15 to August 31
    - Fishing is permitted in the tidal waters extending north and east from Cape Harrigan inclusive of Big Bay and south and east of Anaktalik Bay inclusive of Analtalik and Anktalik Bays including the inland waters of Sango Pond and Big Sango Lake
- 2,000 tags were issued: 1,500 for Sheshatshiu and 500 for Natuashish

NunatuKavut Community Council

- Minimum mesh size of 3.5 inches and maximum mesh size of 4 inches
- Fishing takes place in tidal waters from Fish Cove Point to Cape Charles
- Fishing season extends from July 6 to August 15
- For Upper Lake Melville, fishing takes place in tidal waters inside and west of the boundary line that marks the Labrador Inuit Marine Zone in Lake Melville
- Fishing season extends from June 15 to July 8 and July 19 to August 31
- 6,000 tags were issued: 5,700 for southern Labrador and 300 for Upper Lake Melville

HARVESTS IN THE LABRADOR SUBSISTENCE FISHERIES

FSC and resident subsistence fishers use logbooks to record catch and effort information. Data from returned logbooks are compiled by each user group and submitted to Fisheries and Oceans Canada at the end of the season. Total harvests are estimated by adjusting the reported catches proportionately to the total licenced/designated fishers (Reddin et al. 2005). The combined logbook return rate was 79% in 2016 and ranged from 55% to 87% from 2001 to 2015 (average 74%).

Details of the harvests of Atlantic salmon by size group (small salmon, large salmon) in terms of weight (kg) and number of fish overall and by Salmon Fishing Area are provided in Table 3 for the years 2000 to 2016. Harvests of Atlantic salmon in the Labrador subsistence fisheries ranged from 15.6 t in 2000 to 42.4 t in 2015 (Table 3; Figure 3). With the exception of 2013, 2015 and 2016, the small salmon size group comprises greater than 50% of the total harvest by weight, usually greater than 70% by number of salmon harvested (Table 3). In terms of number of salmon harvested, the subsistence food fisheries annually harvested 4,800 to 11,100 small salmon over the period 2000 to 2016 and large salmon harvests ranged from 1,400 to 6,400 fish, with the peak catches of small salmon in 2011 and large salmon in 2013 (Table 3; Figure 3).

There are annual variations in the harvest levels among the Salmon Fishing Areas in Labrador. On average over the period 2000 to 2016, the proportions of the total harvest, by number, of Atlantic salmon have been equally partitioned between SFA 1A and SFA 1B at 30% each and the remaining 40% from the southern Labrador area (Table 3). For small salmon, the average by number over the 2000 to 2016 period has been 28% and 30% of the total for SFA 1A and 1B, respectively, with the highest percentage, 42% from southern Labrador SFA 2 (Table 3; Figure 4). For large salmon numbers harvested, the percentages are more closely split among the three fishing areas, 37%, 32% and 31%, for SFA 1A, 1B and 2, respectively (Table 3; Figure 4).

Harvests are separated for the Labrador resident trout fishery (Table 4) and the aboriginal food, social and ceremonial (FSC) fisheries (Table 5).

The harvests of Atlantic salmon in the Labrador resident trout fisheries decreased after 2003 as some individuals fishing under the Labrador resident licence began fishing and reporting within the aboriginal communities. Since 2004, the harvests of Atlantic salmon in the resident trout fishery have varied between 1.6 t and 2.9 t, representing between 345 to 921 small salmon, 93 to 365 large salmon, in total (Table 4). The majority of the resident trout fishery harvests of Atlantic salmon are taken in the southern Labrador SFA 2; on average 58% by weight, 62% by number over the period 2004 to 2016 (Table 4). Harvests in Lake Melville (SFA 1B) have averaged 39%

by weight, and 36% by number of the total harvest and harvests in northern Labrador SFA 1A have been approximately 2% of the total (Table 4).

The reported harvests in the aboriginal FSC fisheries in Labrador over the period 2004 to 2016 have ranged from 24.7 t to 40.4 t, with large salmon representing between 34% and 64% of the total harvest of salmon by weight and 21% to 47% of the total by number (Table 5). These harvests (2004 to 2016) have represented between 7,200 and 10,600 small salmon, 2,600 to 6,000 large salmon by number. As the aboriginal FSC fisheries comprise the majority of the Labrador subsistence fishery harvests (90% to 96% for small salmon by number; 91% to 96% for large salmon by number; 2004 to 2016), the distributions of the aboriginal FSC harvests among the Salmon Fishing Areas are the same as those for the overall harvests. For small salmon harvests by number, the average over the 2004 to 2016 period has been 24% and 32% of the total for SFA 1A and 1B, respectively, with the highest percentage, 44% from southern Labrador SFA 2 (Table 5). For large salmon harvested by number, the percentages of the total were highest in SFA 1A at 35% and approximately similar for SFA1B and SFA 2 at 33% and 32%, respectively (Table 5).

SAMPLING PROGRAMME FOR LABRADOR ABORIGINAL FISHERIES

Sampling of the Labrador subsistence fisheries is very difficult as there is no common landing location. Sampling is conducted by personnel from the respective aboriginal groups. In southern Labrador, sampling was conducted by personnel hired by the Nunatukavut Community Council (NCC). In addition, Guardians hired as part of the DFO Aboriginal Fisheries Strategy program were requested to sample salmon. Conservation Officers of the Nunatsiavut Government (NG) also conducted sampling at each community in northern Labrador and in Lake Melville.

Sampling protocols generally consist of sampling landed salmon at random and where possible the total catch of a given boat is examined. Fish are measured (fork length to the nearest cm), weighed (gutted weight or whole weight if available to the nearest 1/10th of a kg) and sex determined. Scales are taken for age analysis and fish are examined for external tags, brands or elastomer marks, adipose clips and microtags. Since 2011, fin clip tissue samples have also been collected for genetic analysis leading to the identification of the origin the salmon.

Sampling program results have been reported annually at ICES since the 2006 fishery sampling program. The NCC and NG sampling programme of Labrador Aboriginal fisheries continued in 2015 and 2016. Landed fish were sampled opportunistically for length, weight, sex, scales (age analysis) and tissue (genetic analysis). Fish were also examined for the presence of external tags or marks.

In 2015, a total of 880 samples were collected from the Labrador subsistence fisheries, 212 from northern Labrador (SFA 1A), 204 from Lake Melville (SFA 1B) and 464 samples from southern Labrador (SFA 2) (Table 6). Based on the interpretation of the scale samples, 77% were 1SW salmon, 19% were 2SW, one sample was a 3SW salmon (<1%), and 4% were previously spawned salmon. The majority of salmon sampled were river ages 3 to 5 years (98%) (modal age 4).

In 2016, a total of 810 samples were collected from the Labrador FSC fisheries: 278 from northern Labrador (SFA 1A), 155 from Lake Melville (SFA 1B), and 377 samples from southern Labrador (SFA 2) (Table 6). Based on the interpretation of the scale samples (n=756), 69% were 1SW salmon, 26% were 2SW, and 5% were previously spawned salmon. The majority of salmon sampled were river ages 3 to 5 years (99%) (modal age 4).

In 2015 and 2016, there were no river age 1 and few river age 2 (0.5%) salmon sampled, suggesting, as in previous years (2006 to 2014), that very few salmon from the most southern stocks of North America (USA, Scotia-Fundy) were exploited in these fisheries.

The intensity of the sampling program (number of samples divided by reported harvests in number of fish from the aboriginal fishery) was 3.1%, 4.2%, 1.7% and 5.8% for the sampling years 2012 to 2015, respectively. In 2015 and 2016, the sampling intensity was 6% in both years.

LABRADOR FISHERY ORIGIN AND COMPOSITION OF THE CATCHES

As presented at the NASCO annual meeting in 2014 and reported to NASCO in 2015, the stock composition and variation in composition of salmon harvested in the Labrador subsistence food fisheries were determined based on a recently developed North American baseline for Atlantic salmon which allows assignment to regional reporting groups of eastern North America (Bradbury et al. 2014, 2015; Moore et al. 2014). In total, twelve regional groups in eastern North America can be reliably identified using 15 microsatellite loci (Figure 5). The regional groups do not correspond directly to the six regions used by the ICES Working Group to characterize stock status and to provide catch advice. The overlap between the regional groups and the ICES areas in North America are shown in Table 7.

Characteristics of microsatellite markers of fishery samples from 2006 to 2016 were assessed relative to the twelve reporting groups. The estimated proportional contributions of the twelve groups (and associated standard errors) based on combined samples for 2006 to 2011 and annual samples for 2012 to 2016 are shown in Figure 6. The uncertainties in the estimated contributions are lowest (coefficient of variation, CV, of 1%) for the largest contributing group (Labrador Central).

The Labrador Central (LAB) regional group represents the majority (almost 93 to 99%) of the salmon in the Labrador subsistence fishery with minor contributions from a few other regions, primarily Ungava-Labrador North (Bradbury et al. 2015). No USA origin salmon were identified in the mixed stock analysis of samples from 2012 to 2016 and raised catches for those years are essentially zero. However, Bradbury et al. (2014) previously reported the presence of USA origin salmon in the samples from the fisheries in 2006 to 2011 with raised harvest estimates of 30 to 40 fish per year.

By Salmon Fishing Area, the samples from Lake Melville (SFA 1B) were essentially 100% from the Labrador Central regional group (Table 8). The Labrador Central regional group was also the dominant regional group in the samples from SFA 1A and SFA 2. Detectable contributions of salmon from the Ungava / Northern Labrador regional group of about 5% were identified in large salmon samples from 2016.

Funding to support the analysis of the 2017 and 2018 fishery samples has been secured and the results will be reported to ICES and NASCO as they become available.

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Table 1. Labrador subsistence fisheries harvests (weight in t; aboriginal and resident food) by geographic location of harvests, 2000 to 2016.

	Harvest (t)			Percentage of harvest	
Year	Estuarine	Coastal	Total	Estuarine	Coastal
2000	13.28	2.34	15.61	85.0	15.0
2001	13.50	2.79	16.29	82.9	17.1
2002	13.99	3.59	17.57	79.6	20.4
2003	17.49	4.62	22.11	79.1	20.9
2004	24.86	6.79	31.65	78.6	21.4
2005	24.72	7.20	31.91	77.5	22.5
2006	25.00	7.77	32.72	76.3	23.7
2007	20.45	6.01	26.46	77.3	22.7
2008	27.04	9.09	36.13	74.8	25.2
2009	22.61	7.20	29.81	75.9	24.1
2010	29.57	6.23	35.80	82.6	17.4
2011	33.84	7.52	41.36	81.8	18.2
2012	28.69	7.87	36.56	78.5	21.5
2013	31.66	8.31	39.97	79.2	20.8
2014	25.72	7.06	32.77	78.5	21.5
2015	34.27	8.16	42.44	80.8	19.2
2016	32.63	6.96	39.59	82.4	17.6

Table 2. The percentages of the harvested weight of Atlantic salmon in the Labrador subsistence fisheries that are taken in coastal areas, 2009 to 2016. All other harvests in these fisheries are taken in estuaries. Salmon fishing areas are shown in Figure 3.

Year	SFA 1A (northern Labrador)	SFA 1B (Lake Melville)	SFA 1 total	SFA 2 (Southern Labrador)	SFA 1 & 2 Labrador
2009	33.0%	0%	16.9%	33.0%	24.1%
2010	33.0%	0%	9.5%	33.0%	17.4%
2011	32.0%	0%	10.0%	33.0%	18.2%
2012	31.0%	0%	16.5%	32.1%	21.5%
2013	29.0%	0%	13.4%	34.1%	20.8%
2014	35.0%	0%	16.3%	32.0%	21.5%
2015	29.0%	0%	13.3%	30.0%	19.2%
2016	31.0%	0%	12.0%	31.0%	17.6%

Table 3. Labrador subsistence food fisheries harvests (weight in kg, and number of fish) by size group and overall, and by Salmon Fishing Area and overall, 2000 to 2016. Data for 2016 are provisional.

	Weight (kg)			Number of fish			% Large	
Year	Small	Large	Total	Small	Large	Total	By weight	By number
Labrador overall								
2000	10,353	5,261	15,614	5,323	1,352	6,675	33.7%	20.2%
2001	9,789	6,499	16,288	4,789	1,721	6,510	39.9%	26.4%
2002	11,581	5,990	17,572	5,806	1,389	7,195	34.1%	19.3%
2003	13,196	8,912	22,108	6,477	2,175	8,653	40.3%	25.1%
2004	17,379	14,270	31,649	8,385	3,696	12,081	45.1%	30.6%
2005	21,038	10,876	31,914	10,436	2,817	13,253	34.1%	21.3%
2006	21,198	11,523	32,721	10,377	3,090	13,467	35.2%	22.9%
2007	17,070	9,386	26,456	9,208	2,652	11,860	35.5%	22.4%
2008	19,386	16,975	36,361	9,834	3,909	13,743	46.7%	28.4%
2009	16,130	13,681	29,810	7,988	3,344	11,332	45.9%	29.5%
2010	20,523	15,070	35,593	9,867	3,725	13,595	42.3%	27.4%
2011	23,123	18,235	41,358	11,138	4,451	15,589	44.1%	28.6%
2012	18,738	17,820	36,559	9,977	4,228	14,204	48.7%	29.8%
2013	14,674	25,299	39,973	7,164	6,375	13,539	63.3%	47.1%
2014	17,916	14,858	32,774	8,959	3,995	12,953	45.3%	30.8%
2015	17,500	24,935	42,435	8,923	6,146	15,069	58.8%	40.8%
2016 (prov.)	14,565	25,027	39,592	7,638	5,598	13,236	63.2%	42.3%
SFA 1A (northern Labrador)								
2000	4,184	2,359	6,543	2,111	599	2,709	36.0%	22.1%
2001	4,446	3,449	7,895	2,178	890	3,068	43.7%	29.0%
2002	4,997	2,769	7,766	2,431	661	3,092	35.7%	21.4%
2003	6,672	5,051	11,723	3,217	1,169	4,386	43.1%	26.7%
2004	6,722	4,729	11,451	3,261	1,167	4,427	41.3%	26.4%
2005	5,044	3,517	8,561	2,468	859	3,327	41.1%	25.8%
2006	4,958	4,081	9,039	2,366	1,062	3,427	45.1%	31.0%
2007	3,263	2,460	5,723	1,874	751	2,624	43.0%	28.6%
2008	5,106	7,809	12,916	2,537	1,776	4,313	60.5%	41.2%
2009	4,045	4,355	8,400	1,880	1,038	2,917	51.8%	35.6%
2010	3,255	3,635	6,890	1,479	823	2,302	52.8%	35.7%
2011	4,012	4,329	8,340	1,825	983	2,809	51.9%	35.0%
2012	5,096	8,097	13,193	2,849	1,752	4,601	61.4%	38.1%
2013	2,635	9,251	11,887	1,278	2,278	3,556	77.8%	64.1%
2014	3,918	6,316	10,234	1,907	1,713	3,621	61.7%	47.3%
2015	4,001	8,544	12,545	2,017	2,093	4,110	68.1%	50.9%
2016 (prov.)	2,701	8,140	10,841	1,392	1,834	3,226	75.1%	56.9%
SFA 1B (Lake Melville)								
2000	3,927	2,006	5,933	2,001	493	2,493	33.8%	19.8%
2001	2,550	1,672	4,222	1,215	409	1,624	39.6%	25.2%
2002	2,389	1,672	4,061	1,178	354	1,532	41.2%	23.1%
2003	2,422	1,975	4,397	1,165	470	1,635	44.9%	28.7%
2004	3,316	3,927	7,243	1,561	1,043	2,604	54.2%	40.1%
2005	5,072	3,414	8,485	2,490	828	3,318	40.2%	24.9%
2006	6,231	2,249	8,480	3,057	577	3,634	26.5%	15.9%
2007	5,043	2,854	7,896	2,827	809	3,636	36.1%	22.3%
2008	5,235	5,818	11,053	2,616	1,179	3,795	52.6%	31.1%
2009	4,128	3,877	8,005	2,084	870	2,954	48.4%	29.4%

	Weight (kg)			Number of fish			% Large	
Year	Small	Large	Total	Small	Large	Total	By weight	By number
2010	9,414	7,506	16,920	4,478	1,847	6,324	44.4%	29.2%
2011	9,826	8,498	18,323	4,648	1,967	6,615	46.4%	29.7%
2012	5,532	6,025	11,557	2,891	1,410	4,301	52.1%	32.8%
2013	5,119	8,684	13,803	2,476	2,084	4,560	62.9%	45.7%
2014	6,863	4,822	11,685	3,390	1,251	4,642	41.3%	27.0%
2015	5,512	9,299	14,811	2,803	2,067	4,870	62.8%	42.4%
2016 (prov.)	5,191	11,953	17,144	2,722	2,409	5,131	69.7%	46.9%
SFA 2 (southern Labrador)								
2000	2,242	897	3,139	1,212	260	1,472	28.6%	17.7%
2001	2,793	1,378	4,172	1,396	422	1,818	33.0%	23.2%
2002	4,196	1,549	5,745	2,197	374	2,571	27.0%	14.6%
2003	4,102	1,885	5,987	2,095	536	2,632	31.5%	20.4%
2004	7,341	5,614	12,955	3,564	1,486	5,050	43.3%	29.4%
2005	10,922	3,946	14,868	5,479	1,130	6,609	26.5%	17.1%
2006	10,008	5,193	15,201	4,955	1,451	6,406	34.2%	22.7%
2007	8,764	4,073	12,837	4,507	1,092	5,599	31.7%	19.5%
2008	9,044	3,349	12,393	4,680	954	5,634	27.0%	16.9%
2009	7,956	5,449	13,405	4,024	1,437	5,461	40.6%	26.3%
2010	8,033	3,952	11,985	4,041	1,069	5,110	33.0%	20.9%
2011	9,285	5,409	14,694	4,665	1,501	6,165	36.8%	24.3%
2012	8,110	3,699	11,809	4,237	1,066	5,303	31.3%	20.1%
2013	6,920	7,364	14,284	3,410	2,012	5,422	51.6%	37.1%
2014	7,135	3,720	10,855	3,661	1,030	4,691	34.3%	22.0%
2015	7,988	7,093	15,081	4,103	1,987	6,030	47.0%	33.0%
2016 (prov.)	6,673	4,936	11,609	3,524	1,355	4,879	42.5%	27.8%

Table 4. Labrador resident trout fisheries harvests (weight in kg, and number of fish) of Atlantic salmon by size group and overall, and by Salmon Fishing Area and overall, 2000 to 2016. Data for 2016 are provisional.

	Weight (kg)			Number of fish			% Large	
Year	Small	Large	Total	Small	Large	Total	By weight	By number
Labrador overall								
2000	2,480	1,057	3,537	1,330	298	1,628	29.9%	18.3%
2001	3,082	1,501	4,583	1,530	449	1,979	32.8%	22.7%
2002	4,504	1,642	6,146	2,349	399	2,747	26.7%	14.5%
2003	4,502	2,157	6,659	2,294	608	2,902	32.4%	20.9%
2004	1,302	869	2,171	652	224	876	40.0%	25.6%
2005	1,817	871	2,688	921	228	1,150	32.4%	19.9%
2006	1,574	1,007	2,581	769	283	1,052	39.0%	26.9%
2007	1,294	388	1,682	640	93	734	23.1%	12.7%
2008	1,253	1,064	2,317	619	210	830	45.9%	25.3%
2009	1,644	1,212	2,856	806	313	1,119	42.4%	28.0%
2010	1,408	861	2,269	731	255	990	37.9%	25.7%
2011	1,027	1,059	2,085	501	290	791	50.8%	36.6%
2012	873	827	1,700	435	206	641	48.7%	32.2%
2013	714	1,342	2,057	345	365	710	65.3%	51.4%
2014	886	746	1,632	454	204	659	45.7%	31.0%
2015	932	1,084	2,016	471	293	764	53.8%	38.4%
2016 (prov.)	698	916	1,614	360	232	592	56.7%	39.1%
SFA 1A (northern Labrador)								
2000	0	0	0	0	0	0	na	na
2001	0	0	0	0	0	0	na	na
2002	0	0	0	0	0	0	na	na
2003	0	0	0	0	0	0	na	na
2004	13	9	22	6	2	8	39.2%	25.0%
2005	13	9	22	6	2	8	39.2%	25.0%
2006	13	9	22	6	2	8	39.2%	25.0%
2007	0	0	0	0	0	0	na	na
2008	20	247	267	4	24	28	92.5%	85.7%
2009	0	0	0	0	0	0	na	na
2010	14	6	20	7	1	8	30.0%	13.0%
2011	7	16	23	3	5	8	69.6%	62.5%
2012	18	70	88	9	15	24	79.5%	62.5%
2013	0	0	0	0	0	0	na	na
2014	11	17	29	6	4	10	59.8%	42.9%
2015	14	59	73	8	12	20	59.8%	42.9%
2016 (prov.)	26	48	74	17	11	28	59.8%	42.9%
SFA 1B (Lake Melville)								
2000	238	160	398	118	38	156	40.2%	24.4%
2001	288	123	411	135	27	161	29.9%	16.5%
2002	309	93	402	152	24	176	23.1%	13.9%
2003	400	272	672	199	71	270	40.5%	26.4%
2004	439	502	942	210	122	332	53.3%	36.7%
2005	711	607	1,318	336	154	490	46.0%	31.4%
2006	223	76	298	111	21	132	25.3%	16.0%
2007	397	57	454	186	15	201	12.6%	7.7%
2008	171	122	293	88	29	117	41.7%	24.8%

	Weight (kg)			Number of fish			% Large	
Year	Small	Large	Total	Small	Large	Total	By weight	By number
2009	243	213	456	122	56	178	46.7%	31.5%
2010	602	461	1,062	292	144	436	43.4%	33.0%
2011	401	656	1,057	190	170	360	62.1%	47.1%
2012	362	526	888	177	131	308	59.2%	42.5%
2013	322	789	1111	153	213	366	71.0%	58.3%
2014	381	425	806	183	110	293	52.7%	37.6%
2015	349	621	970	171	159	330	64.0%	48.2%
2016 (prov.)	246	569	815	123	135	258	69.8%	52.3%
SFA 2 (southern Labrador)								
2000	2,242	897	3,139	1,212	260	1,472	28.6%	17.7%
2001	2,793	1,378	4,172	1,396	422	1,818	33.0%	23.2%
2002	4,196	1,549	5,745	2,197	374	2,571	27.0%	14.6%
2003	4,102	1,885	5,987	2,095	536	2,632	31.5%	20.4%
2004	849	358	1,207	436	100	536	29.6%	18.7%
2005	1,092	255	1,347	579	72	652	18.9%	11.1%
2006	1,338	922	2,260	652	260	912	40.8%	28.5%
2007	897	331	1,228	455	78	533	26.9%	14.6%
2008	1,062	695	1,757	528	157	685	39.6%	22.9%
2009	1,401	998	2,400	684	257	941	41.6%	27.3%
2010	808	376	1,184	441	105	546	31.8%	19.3%
2011	619	387	1,005	308	115	423	38.5%	27.3%
2012	493	232	725	249	60	309	32.0%	19.4%
2013	392	554	946	193	152	344	58.5%	44.0%
2014	493	304	797	265	90	355	38.2%	25.2%
2015	569	405	974	292	123	355	41.6%	34.6%
2016 (prov.)	426	300	726	221	86	307	41.3%	28.0%

Table 5. Labrador aboriginal food, social, and ceremonial fisheries harvests (weight in kg, and number of fish) for Atlantic salmon by size group and overall, and by Salmon Fishing Area and overall, 2000 to 2016. Data for 2016 are provisional.

	Weight (kg)			Number of fish			% Large	
Year	Small	Large	Total	Small	Large	Total	By weight	By number
Labrador overall								
2000	7,873	4,205	12,077	3,993	1,054	5,047	34.8%	20.9%
2001	6,707	4,998	11,705	3,259	1,272	4,531	42.7%	28.1%
2002	7,077	4,348	11,425	3,457	990	4,448	38.1%	22.3%
2003	8,695	6,754	15,449	4,183	1,568	5,751	43.7%	27.3%
2004	16,077	13,401	29,478	7,733	3,472	11,205	45.5%	31.0%
2005	19,221	10,005	29,226	9,515	2,588	12,103	34.2%	21.4%
2006	19,623	10,516	30,140	9,608	2,807	12,415	34.9%	22.6%
2007	15,775	8,999	24,774	8,567	2,559	11,126	36.3%	23.0%
2008	18,133	15,911	34,044	9,215	3,699	12,913	46.7%	28.6%
2009	14,485	12,469	26,955	7,182	3,031	10,213	46.3%	29.7%
2010	19,115	14,209	33,324	9,135	3,470	12,605	42.6%	27.5%
2011	22,096	17,176	39,272	10,637	4,161	14,798	43.7%	28.1%
2012	17,865	16,993	34,858	9,542	4,022	13,564	48.7%	29.7%
2013	13,959	23,957	37,916	6,819	6,010	12,828	63.2%	46.8%
2014	17,031	14,112	31,142	8,504	3,790	12,295	45.3%	30.8%
2015	16,569	23,851	40,419	8,452	5,853	14,305	59.0%	40.9%
2016 (prov.)	13,867	24,111	37,978	7,277	5,366	12,644	63.5%	42.4%
SFA 1A (northern Labrador)								
2000	4,184	2,359	6,543	2,111	599	2,709	36.0%	22.1%
2001	4,446	3,449	7,895	2,178	890	3,068	43.7%	29.0%
2002	4,997	2,769	7,766	2,431	661	3,092	35.7%	21.4%
2003	6,672	5,051	11,723	3,217	1,169	4,386	43.1%	26.7%
2004	6,709	4,720	11,429	3,255	1,165	4,419	41.3%	26.4%
2005	5,031	3,508	8,539	2,462	857	3,319	41.1%	25.8%
2006	4,945	4,072	9,017	2,360	1,060	3,419	45.2%	31.0%
2007	3,263	2,460	5,723	1,874	751	2,624	43.0%	28.6%
2008	5,086	7,562	12,649	2,533	1,752	4,285	59.8%	40.9%
2009	4,045	4,355	8,400	1,880	1,038	2,917	51.8%	35.6%
2010	3,241	3,629	6,870	1,472	822	2,294	52.8%	35.8%
2011	4,005	4,313	8,317	1,822	978	2,801	51.9%	34.9%
2012	5,078	8,027	13,105	2,840	1,737	4,577	61.3%	38.0%
2013	2,635	9,251	11,887	1,278	2,278	3,556	77.8%	64.1%
2014	3,906	6,299	10,205	1,901	1,709	3,611	61.8%	47.4%
2015	3,987	8,485	12,472	2,009	2,081	4,090	68.0%	50.9%
2016 (prov.)	2,675	8,092	10,767	1,375	1,823	3,198	75.2%	57.0%
SFA 1B (Lake Melville)								
2000	3,689	1,846	5,535	1,883	455	2,337	33.4%	19.5%
2001	2,261	1,549	3,810	1,081	382	1,463	40.7%	26.1%
2002	2,080	1,579	3,659	1,027	329	1,356	43.2%	24.3%
2003	2,023	1,703	3,725	966	399	1,365	45.7%	29.2%
2004	2,876	3,424	6,301	1,351	922	2,272	54.4%	40.6%
2005	4,361	2,807	7,167	2,154	674	2,828	39.2%	23.8%
2006	6,008	2,174	8,182	2,946	556	3,502	26.6%	15.9%
2007	4,646	2,796	7,442	2,641	794	3,435	37.6%	23.1%
2008	5,064	5,695	10,760	2,529	1,150	3,679	52.9%	31.3%

	Weight (kg)			Number of fish			% Large	
Year	Small	Large	Total	Small	Large	Total	By weight	By number
2009	3,885	3,663	7,549	1,962	814	2,776	48.5%	29.3%
2010	8,812	7,046	15,858	4,186	1,703	5,888	44.4%	28.9%
2011	9,425	7,841	17,266	4,457	1,798	6,255	45.4%	28.7%
2012	5,170	5,499	10,669	2,714	1,279	3,993	51.5%	32.0%
2013	4,796	7,895	12,691	2,323	1,871	4,194	62.2%	44.6%
2014	6,482	4,397	10,879	3,207	1,141	4,348	40.4%	26.2%
2015	5,163	8,678	13,841	2,632	1,908	4,540	62.7%	42.0%
2016 (prov.)	4,945	11,384	16,329	2,599	2,274	4,873	69.7%	46.7%
SFA 2 (southern Labrador)								
2000	0	0	0	0	0	0	na	na
2001	0	0	0	0	0	0	na	na
2002	0	0	0	0	0	0	na	na
2003	0	0	0	0	0	0	na	na
2004	6,492	5,256	11,748	3,128	1,386	4,514	44.7%	30.7%
2005	9,830	3,691	13,520	4,899	1,058	5,957	27.3%	17.8%
2006	8,670	4,270	12,941	4,303	1,191	5,494	33.0%	21.7%
2007	7,867	3,742	11,609	4,052	1,014	5,066	32.2%	20.0%
2008	7,982	2,654	10,636	4,153	797	4,949	24.9%	16.1%
2009	6,555	4,451	11,006	3,340	1,180	4,520	40.4%	26.1%
2010	7,225	3,576	10,801	3,600	964	4,564	33.1%	21.1%
2011	8,667	5,022	13,689	4,357	1,385	5,742	36.7%	24.1%
2012	7,617	3,467	11,084	3,988	1,006	4,994	31.3%	20.1%
2013	6,528	6,810	13,338	3,217	1,860	5,078	51.1%	36.6%
2014	6,642	3,415	10,058	3,396	940	4,336	34.0%	21.7%
2015	7419	6688	14,107	3811	1864	5,675	47.4%	32.8%
2016 (prov.)	6247	4636	10,883	3303	1269	4,572	42.6%	27.8%

Table 6. Number of samples collected and percentages of samples by river age within the sampling areas from the aboriginal food fisheries in Labrador for 2015 and 2016.

Area	Number of Samples	River Age						
		1	2	3	4	5	6	7
PERCENTAGE OF SAMPLES BY RIVER AGE WITHIN THE THREE SAMPLED AREAS IN 2015								
Northern Labrador (SFA 1A)	212	0.0	0.0	17.5	59.9	20.8	0.9	0.9
Lake Melville (SFA 1B)	204	0.0	1.0	30.4	53.9	14.7	0.0	0.0
Southern Labrador (SFA 2)	464	0.0	0.4	14.4	55.2	27.6	2.4	0.0
All areas	880	0.0	0.5	18.9	56.0	23.0	1.5	0.2
PERCENTAGE OF SAMPLES BY RIVER AGE WITHIN THE THREE SAMPLED AREAS IN 2016								
Northern Labrador (SFA 1A)	234	0.0	0.0	20.0	60.0	20.0	0.0	0.0
Lake Melville (SFA 1B)	153	0.0	0.7	21.6	70.6	7.2	0.0	0.0
Southern Labrador (SFA 2)	369	0.0	0.5	24.9	57.5	15.7	1.4	0.0
All areas	756	0.0	0.5	22.1	62.0	14.7	0.7	0.0

Table 7. Correspondence between ICES areas used for the assessment of status of North American salmon stocks and the regional groups (Figure 5) defined from the North American genetic baseline.

ICES region	Regional group	Group acronym
Quebec	Ungava / Northern Labrador	UNG
Labrador	Labrador Central	LAB
	Quebec / Labrador South	QLS
Quebec	Quebec	QUE
	Anticosti	ANT
	Gaspe	GAS
Gulf	Gulf of St. Lawrence	GUL
Scotia-Fundy	Nova Scotia	NOS
	Inner Bay of Fundy	FUN
USA	USA	US
Newfoundland	Newfoundland	NFL
	Avalon	AVA

Table 8. Estimated percent contributions (mean and standard error) by regional group of North American origin salmon in the Labrador FSC fisheries, 2015 and 2016. Regional groups are shown in Figure 5. Note: values in shaded cells are not significantly different from 0.

Regional Groups	Salmon All size groups Mean (S.E.)		Small Salmon < 63 cm Mean (S.E.)		Large Salmon ≥ 63 cm Mean (S.E.)		Northern Labrador SFA 1A Mean (S.E.)		Lake Melville SFA 1B Mean (S.E.)		Southern Labrador SFA 2 Mean (S.E.)	
Year	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016
ANT	0.03 (0.06)	0.03 (0.06)	0.07 (0.15)	0.05 (0.11)	0.06 (0.16)	0.08 (0.23)	0.07 (0.19)	0.08 (0.20)	0.05 (0.12)	0.06 (0.15)	0.05 (0.12)	0.07 (0.18)
AVA	0.03 (0.07)	0.03 (0.06)	0.06 (0.15)	0.04 (0.07)	0.05 (0.14)	0.10 (0.27)	0.08 (0.23)	0.07 (0.16)	0.05 (0.13)	0.06 (0.18)	0.06 (0.18)	0.07 (0.19)
FUN	0.03 (0.07)	0.03 (0.07)	0.05 (0.11)	0.04 (0.10)	0.06 (0.18)	0.07 (0.20)	0.08 (0.20)	0.08 (0.21)	0.05 (0.14)	0.05 (0.14)	0.07 (0.17)	0.06 (0.17)
GAS	0.05 (0.13)	0.03 (0.08)	0.27 (0.58)	0.04 (0.11)	0.08 (0.23)	0.10 (0.28)	0.17 (0.43)	0.10 (0.30)	0.06 (0.15)	0.06 (0.15)	0.17 (0.44)	0.09 (0.25)
GUL	0.04 (0.10)	0.04 (0.07)	0.34 (0.59)	0.04 (0.10)	0.10 (0.26)	0.11 (0.31)	0.15 (0.38)	0.10 (0.27)	0.06 (0.16)	0.05 (0.14)	0.11 (0.29)	0.07 (0.19)
LAB	98.54 (0.68)	99.26 (0.55)	91.05 (2.92)	99.02 (0.66)	96.09 (2.38)	92.24 (2.74)	94.20 (2.67)	97.19 (1.64)	98.84 (1.10)	99.28 (0.63)	95.98 (2.35)	97.84 (1.29)
NFL	0.03 (0.07)	0.05 (0.12)	0.46 (0.82)	0.12 (0.30)	0.07 (0.19)	0.25 (0.65)	0.14 (0.39)	0.31 (0.69)	0.07 (0.17)	0.07 (0.17)	0.09 (0.27)	0.16 (0.43)
NOS	0.03 (0.07)	0.03 (0.06)	0.06 (0.15)	0.05 (0.12)	0.07 (0.19)	0.09 (0.29)	0.07 (0.19)	0.07 (0.19)	0.05 (0.13)	0.07 (0.19)	0.08 (0.24)	0.08 (0.21)
QLS	0.13 (0.22)	0.05 (0.11)	4.00 (2.32)	0.07 (0.18)	2.29 (2.11)	1.96 (1.88)	0.42 (0.81)	0.09 (0.26)	0.09 (0.25)	0.08 (0.26)	2.11 (2.16)	0.27 (0.68)
QUE	0.05 (0.12)	0.03 (0.07)	1.13 (1.35)	0.04 (0.10)	0.06 (0.16)	0.19 (0.54)	0.15 (0.40)	0.08 (0.26)	0.08 (0.22)	0.07 (0.21)	0.08 (0.23)	0.06 (0.18)
UNG	0.99 (0.60)	0.37 (0.47)	2.46 (1.26)	0.45 (0.47)	0.96 (1.23)	4.74 (1.87)	4.40 (2.49)	1.77 (1.30)	0.55 (0.97)	0.10 (0.25)	1.02 (0.96)	1.14 (0.81)
USA	0.03 (0.06)	0.03 (0.07)	0.07 (0.21)	0.04 (0.08)	0.1 (0.26)	0.06 (0.18)	0.07 (0.21)	0.07 (0.20)	0.06 (0.16)	0.06 (0.18)	0.17 (0.37)	0.07 (0.22)

Figure 1. Summary of harvests, in weight (t), of Atlantic salmon by geographic origin of the fisheries for eastern Canada, 2000 to 2016. Data for 2016 are provisional.

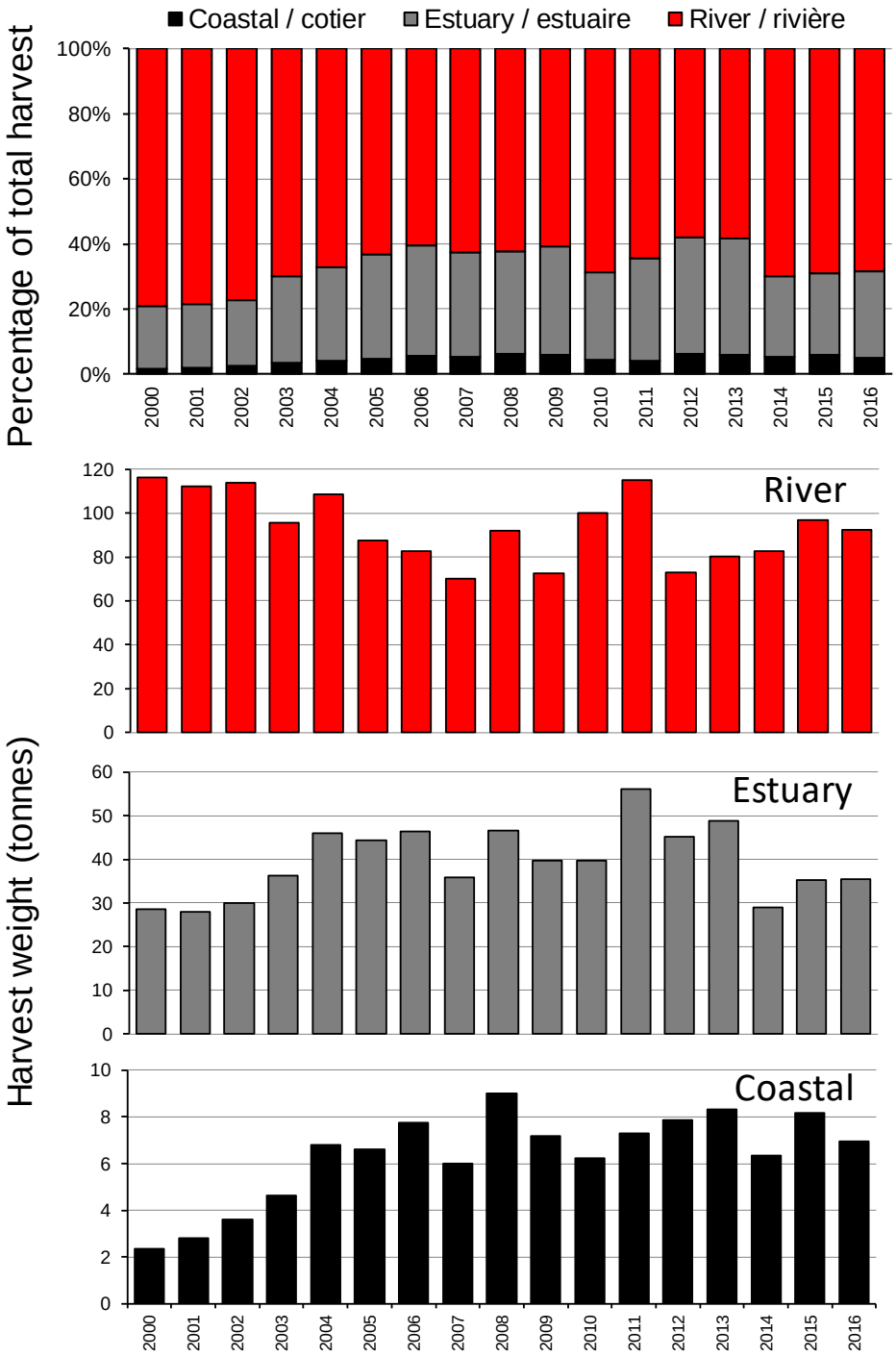

Figure 2. Map of Labrador showing the area represented by the Labrador Inuit Lands and the Labrador Inuit Settlement Area.

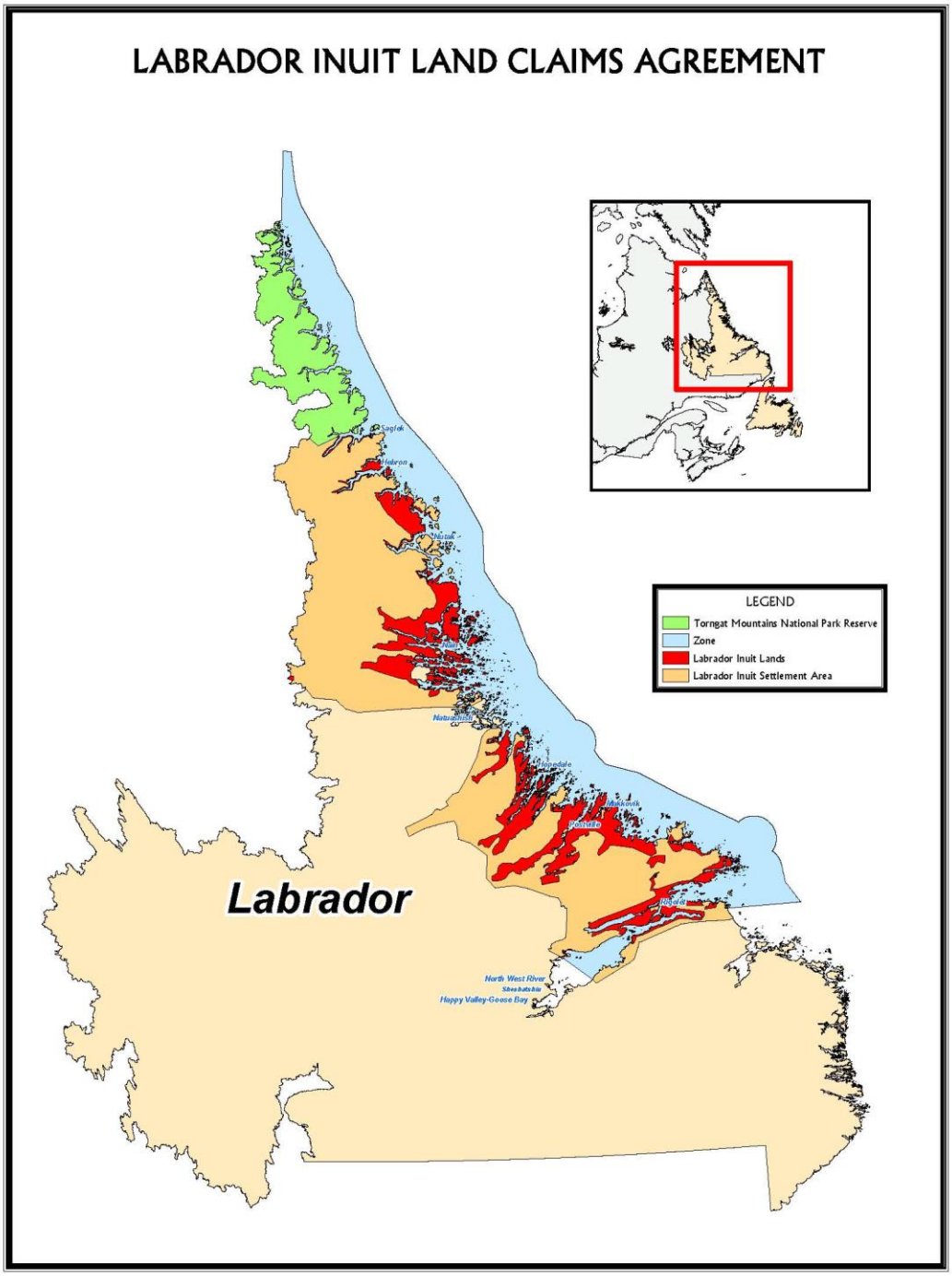

Figure 3. Total harvests (by number and weight) by size group of Atlantic salmon in the Labrador subsistence fisheries by Salmon Fishing Area, 2000 to 2016. Data for 2016 are provisional. Place names referred to in the text are also shown for reference.

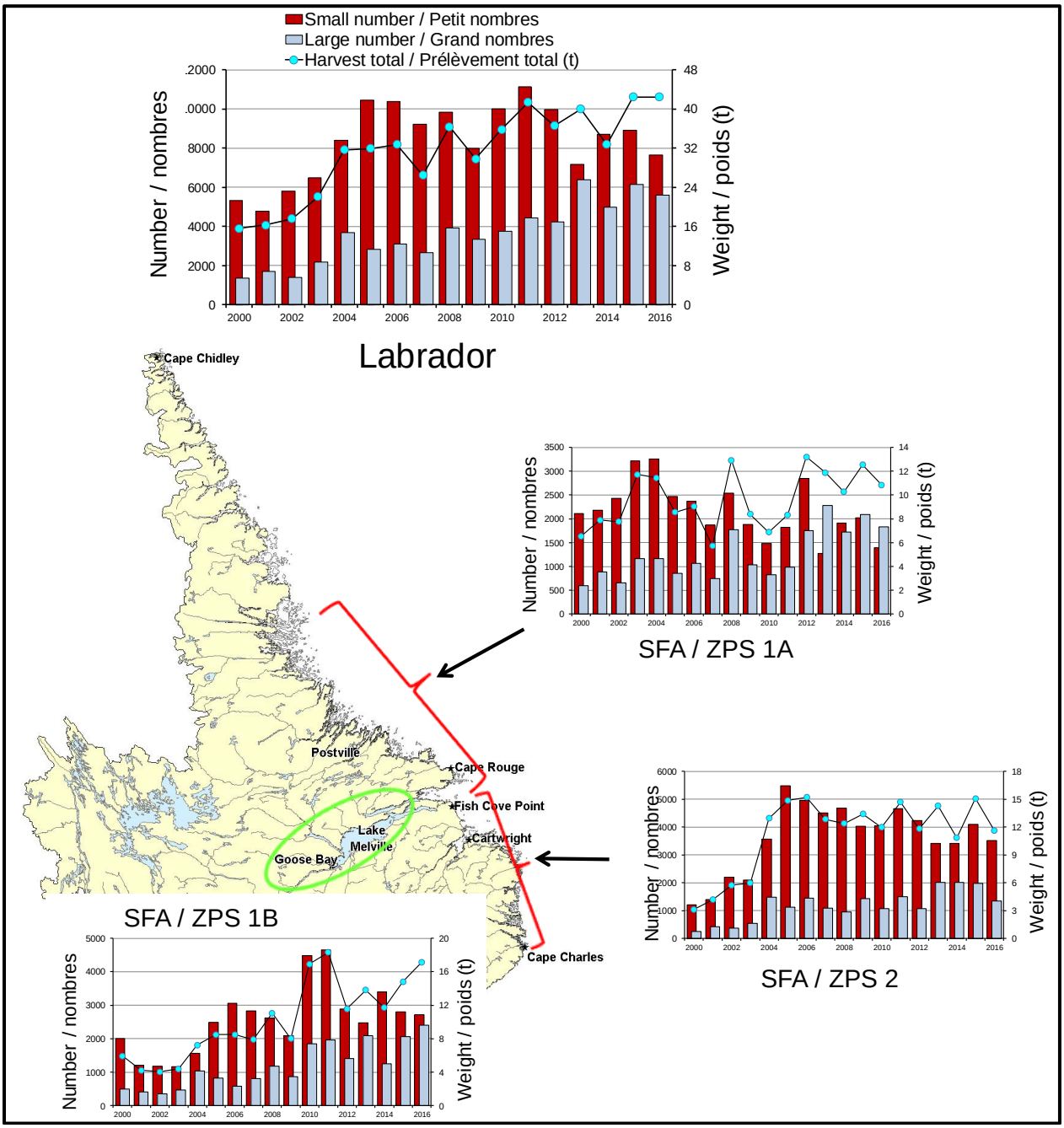

Figure 4. Distribution (percentages) of the Labrador subsistence fisheries harvests (by number) of small salmon (upper panel) and large salmon (lower panel) among the three Salmon Fishing Areas, 2000 to 2016.

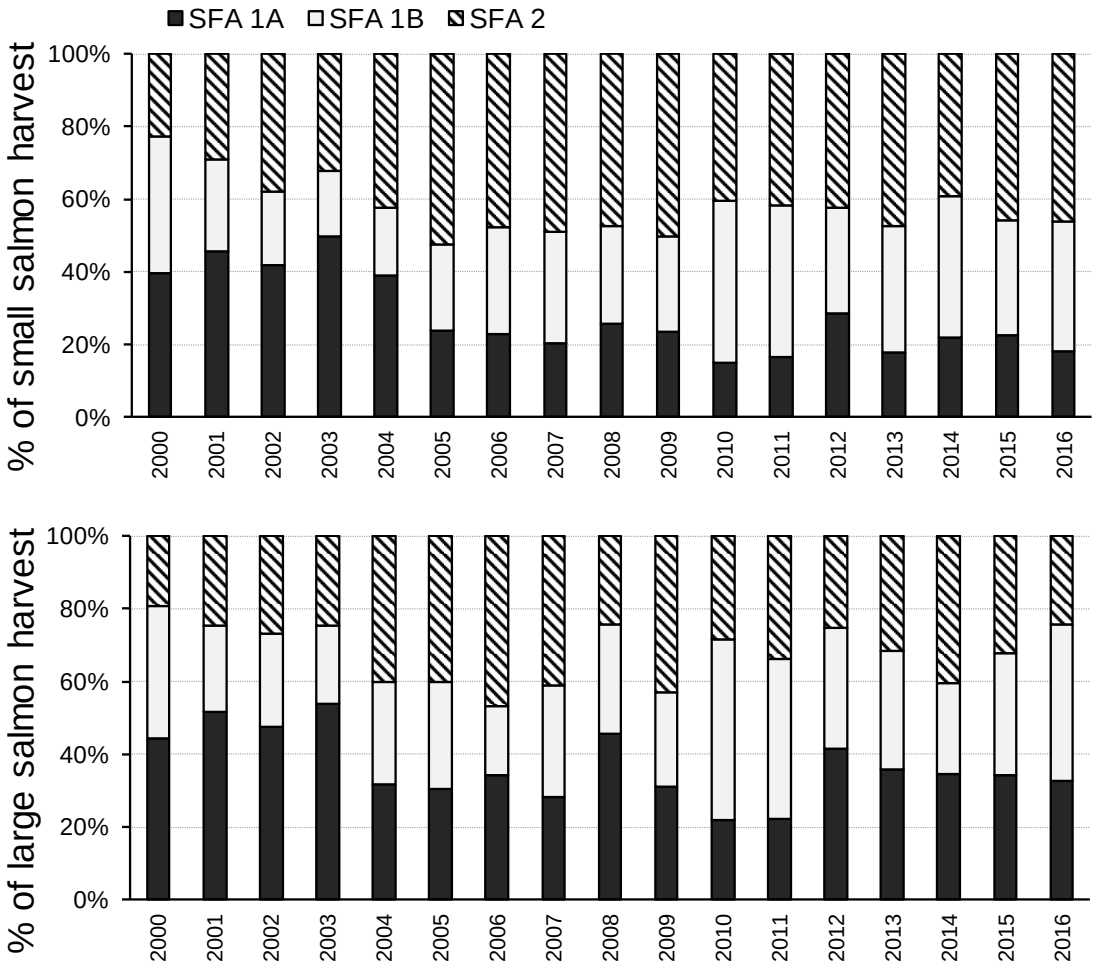

Figure 5. Map of sample locations used in the microsatellite baseline development for Atlantic salmon in North America and the regional groups resolved from the baseline. See Bradbury et al. (2015) for details and Table 7 for location abbreviations.

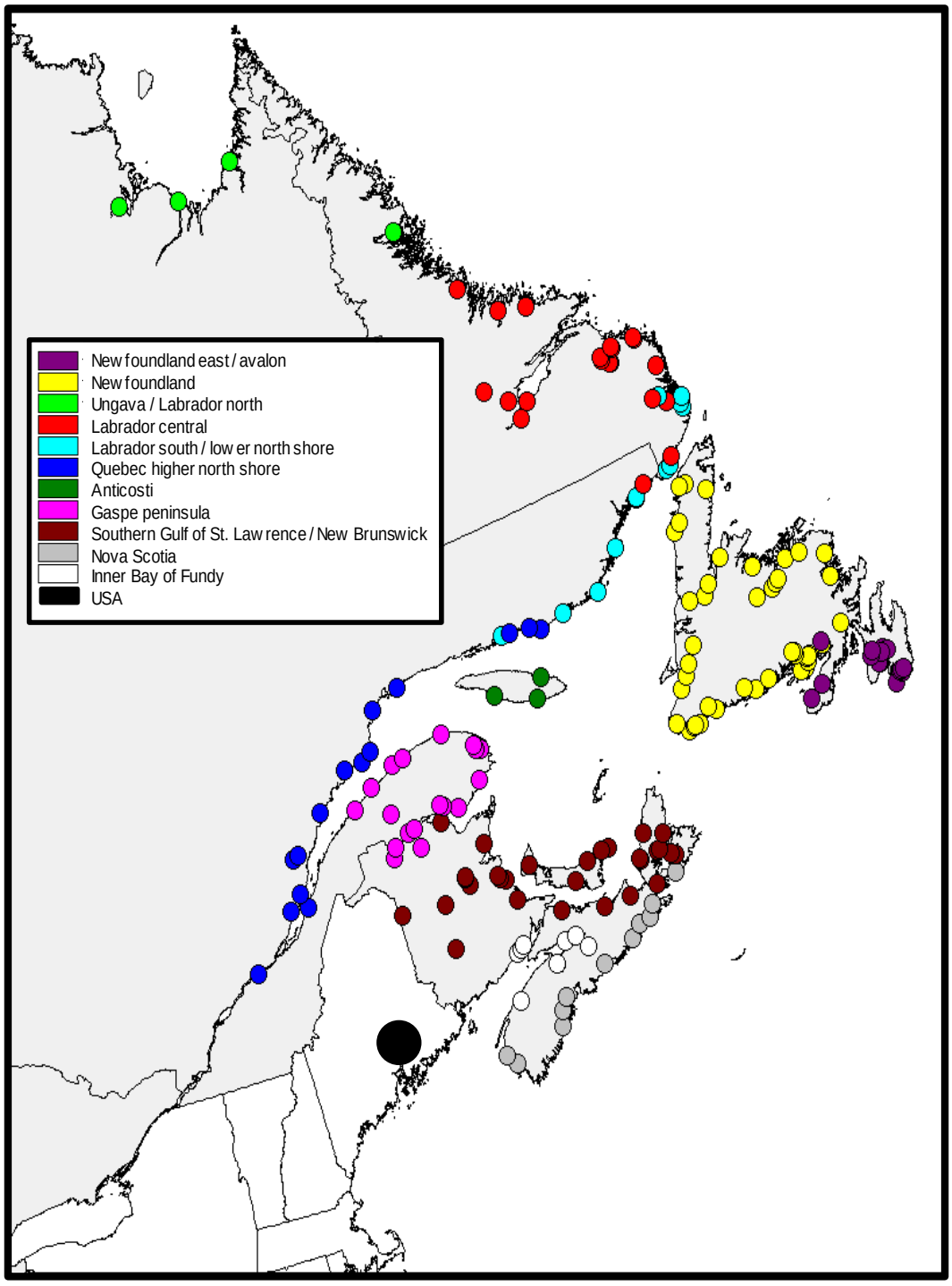

Figure 6. Bayesian estimates of mixture composition of samples from the Labrador Atlantic Salmon aboriginal fisheries from the combined samples for 2006 to 2011, and for each year 2012 to 2016. The groups, other than the first three Labrador groups, refer approximately to the regions used by ICES for assessment (Table 7 and Figure 5).