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Labrador Subsistence Food Fisheries - Mixed-Stock Fisheries Context

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 41.4 t during 2004 to 2014, 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.
- An analysis of the regional contributions of Atlantic salmon to the sampled catches in the Labrador subsistence fisheries indicates that the large majority (92% to 96%) 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.
- As the majority of the salmon harvested in the Labrador subsistence fisheries originate from the Labrador Central regional group, the status of salmon in Labrador is relevant in the context of management of these fisheries.
- Absolute estimates of returns of salmon are available to four individual rivers in Labrador using counting fences. Additional information is available from the compilation of recreational fisheries catches in a larger number of rivers of Labrador.
- Based on the counting facilities, stock status varies between southern Labrador (SFA 2) and northern Labrador (SFA 1). The status of English River in SFA 1 has improved since monitoring began in 1999; returns were below conservation requirements every year during 1999 to 2005 but returns were greater than conservation in 8 of 9 years between 2006 and 2014. In contrast, while conservation requirements were frequently exceeded in the monitored rivers of southern Labrador between 1999 and 2005, during 2006 to 2014 conservation requirements were exceeded in only 11 of 25 year/river combinations, with returns in all three rivers in southern Labrador below conservation requirements in 2014.
- Angling catches are considered to reflect to some extent relative abundance over time in rivers. Whereas counts at the three monitoring fences in SFA 2 show a decline in recent years from higher returns in the early 2000s, the angling catches (retained and released) of large salmon and small salmon show a continuous increase over time. For SFA 1, the continuous increase in angling catches of both size groups corresponds to the increased counts at the monitoring facility in northern Labrador.

INTRODUCTION

NASCO has defined mixed stock fisheries (MSFs) as fisheries exploiting a significant number of salmon from two or more river stocks (NASCO 2009). Fisheries on mixed-stocks pose particular difficulties for management, as they cannot target only stocks that are above their conservation limits. Fisheries in estuaries and especially rivers are more likely to meet this requirement. NASCO has also agreed that management of homewater fisheries should be based on the status of individual river stocks and ICES has advised that the management of all fisheries should be based upon assessments of the status of individual stocks. NASCO (2009) provides a number of actions associated with the management of mixed stock fisheries including knowledge of the stocks that contribute to the fishery and the status of each of those stocks.

In support of the agenda item in the North American Commission agenda to address mixed stock fisheries in domestic waters of commission member countries, 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,
- summary of status of stocks of Atlantic salmon in Labrador,
- summaries of the biological sampling program of this fishery, and
- results of 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. Commercial fisheries management measures to reduce exploitation on mixed stocks were introduced at various periods in the late 1900s (Table 1). 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 just under 10 t during 2000 to 2014, 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, 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 2014, the percentage of the total Labrador subsistence harvests which were taken in coastal areas has ranged from 15.0% to 25.6% (Table 2). Approximately similar percentages of the harvests in SFA 1A and SFA 2 occur in coastal areas (Table 3). In 2014, 26.9 t, 81.9% of total subsistence fisheries harvests of Atlantic salmon, were harvested from areas classified as estuaries and 5.9 t (18.1%) were from locations classified as coastal.

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.

- In 2014, 144 licences issued for upper Lake Melville and approximately 152 licences issued for the coast of northern and southern Labrador. Furthermore, there is a limit of one designate or licence holder per household
- Target species are Trout and Arctic Char with a seasonal limit of 50 Trout / Char
- A maximum by-catch of 3 Salmon can be retained
- Fishing must cease when either 3 Salmon or 50 Trout and/or Char 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 vary by location (Figure 3):
    - Davis Inlet to Cape Chidley: June 28 to July 21
    - Cape Rouge to Davis Inlet: June 14 to July 7
    - Cape Rouge to Fish Cove Point (including Lake Melville): June 07 to July 1 and July 19 to August 2 (Kenamu closes July 31)
    - Fish Cove Point to Cape Charles: July 09 to July 28
- Fishers must remove their nets from the water between the hours of 6:00 p.m. Sunday to 6:00 p.m. Monday
- Completed log books of catch and effort must be submitted to DFO at the end of season.

2) Aboriginal Food Social and Ceremonial (FSC) fisheries

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

- Nunatsiavut Government (7,500 members)
- Innu Nation (2,500 members) , and
- Nunatukavut Community Council (former Labrador Metis Nation) (3,000 members).

In response to the Supreme Court of Canada decision interpreting Section 35 of the Constitution Act of 1982, the Department of Fisheries and Oceans provided communal licences to Aboriginal groups of Labrador for food, social and ceremonial purposes (FSC). Between 1999 and 2005, a FSC fishery was conducted by members of the Labrador Inuit Association (LIA) in the north 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 fished for salmon in Lake Melville from the community of Sheshatshiu and further north from the community of Natuashish. In 2004, members of the Nunatukavut Community Council (formerly Labrador Métis Nation) on the south coast of Labrador negotiated a subsistence fishery with the Department of Fisheries and Oceans in the area between Fish Cove Point and Cape St. Charles, located in SFA 2 (Figures 1 and 2).

All FSC fisheries are controlled through the issuance of a communal licence by Fisheries and Oceans Canada (DFO) which includes carcass tags for all harvested fish. 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 2014, the total number of carcass tags issued was 15,700 tags. The fishing gear used is gillnets. There are a number of management measures implemented in all three of the licences. These include:

- Monofilament netting not permitted
- A maximum length of 25 fathoms of net per designated fisher
- Net must be set in a straight line
- Fishers must remove their nets from the water between the hours of 6:00 p.m. Sunday to 6:00 p.m. Monday
- Gear must be tended every 24 hours
- All harvested salmon must be tagged
- Completed log book 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 4.5 inches
- For the ULM area, the season extends from June 15 to July 9 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 upon request

Innu Nation

- Minimum mesh size of 3 inches and maximum mesh size of 4 inches
- Fishing season extends from May 15 to September 15
- Fishing 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-Sheshatshiu areas
- 1,500 tags were issued.

Nunatukavut Community Council

- Minimum mesh size of 3.5 inches and maximum mesh size of 4 inches
- Fishing season extends from July 6 to August 15
- Fishing takes place in tidal waters from Fish Cove Point to Cape Charles
- 6,000 tags were issued.

HARVESTS IN THE LABRADOR SUBSISTENCE FISHERIES

Harvests by community groups and by resident trout licence holders are reported in logbooks. Innu Nation guardians compile catch statistics from daily records of landings by family (Reddin et al. 2002). Total harvests are estimated by adjusting the logbook catches proportionately to the number of fishers reporting out of the total licenced/designated (Reddin et al. 2005). In 2001, reporting rates were 100% for the Innu Nation fishery in Sheshatshiu, 71% for the Labrador Inuit Association (LIA), and 79% for the resident trout fishery (Reddin et al. 2002). For the 2002 fishery, reporting rates were 97% for the Innu Nation fishery in Sheshatshiu, 82% for the Labrador Inuit Association fisheryin Lake Melville and northern Labrador, and 84% for the resident food fishery in Lake Melville and southern Labrador (Reddin et al. 2004). In 2004, reporting rates for the various fisheries were 86% for the LIA fishery in Lake Melville and northern Labrador, 83% for the Innu Nation fishery in Sheshatshiu, 96% for the resident food fishery in Lake Melville, northern and southern Labrador, and 80% for the Labrador Metis Nation (LMN) fishery (Reddin et al. 2005). The combined return rate for the 2014 fisheries was 64%.

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 4 for the years 2000 to 2014. Harvests of Atlantic salmon in the Labrador subsistence fisheries ranged from 15.6 t in 2000 to 41.4 t in 2011 (Table 4). With the exception of 2013, the small salmon size group comprises greater than 55% of the total harvest by weight, usually greater than 70% by number of salmon harvested (Table 4). 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 2014 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 4).

There are annual variations in the harvest levels among the Salmon Fishing Areas in Labrador. On average over the period 2000 to 2014, the proportions of the total harvest, by number, of Atlantic salmon have been equally partitioned between SFA 1A and SFA 1B at about 30% each and the remaining 40% from the southern Labrador area (Table 4). For small salmon, the average over the 2000 to 2014 period has been 27% and 30% of the total for SFA 1A and 1B, respectively, with the highest percentage, 43% from southern Labrador SFA 2 (Table 4; Figure 4). For large salmon number numbers harvested, the percentages are more closely split among the three fishing areas, 36%, 32% and 32%, for SFA 1A, 1B and 2, respectively (Table 4; Figure 4).

Harvests are separated for the Labrador resident trout fishery (Table 5) and the aboriginal food, social and ceremonial (FSC) fisheries (Table 6).

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 350 to just over 900 small salmon, less than 100 to 365 large salmon, in total (Table 5). The majority of the resident trout fishery harvests of Atlantic salmon are taken in the southern Labrador SFA 2; on average 75% by weight, 78% by number over the period 2000 to 2014 (Table 5). Harvests in Lake Melville (SFA 1B) have averaged 24% by weight, and 21% by number of the total harvest and harvests in northern Labrador SFA 1A have been 1% or less of the total (Table 5).

The reported harvests in the aboriginal FSC fisheries in Labrador over the period 2004 to 2014 have ranged from 24.7 t to 39.3 t, size groups combined with large salmon representing between 34% and 61% of the total harvest of salmon by weight, 21% to 47% of the total by number (Table 6). These harvests (2004 to 2014) have represented between 7,200 and 10,600 small salmon, 2,500 to 6,000 large salmon by number. As the majority of the Labrador subsistence fishery harvests are taken in the aboriginal FSC fisheries (83% to 94% for small salmon by number; 76% to 84% for large salmon by number; 2004 to 2014), the distributions of the harvests among the Salmon Fishing Areas are the same as those for the overall harvests. For small salmon, numbers the average over the 2004 to 2014 period has been 25% and 32% of the total for SFA 1A and 1B, respectively, with the highest percentage, 44% from southern Labrador SFA 2 (Table 6). For large salmon number numbers harvested, the percentages are more closely split among the three fishing areas, 36%, 32% and 32%, for SFA 1A, 1B and 2, respectively (Table 6).

STATUS OF STOCKS IN LABRADOR

Counting projects occur on four Labrador rivers out of about 100 extant salmon rivers; one in SFA 1A, no facilities in SFA 1B, three in SFA 2 and no facilities in SFA 14B (Figure 5).

Of the four counting fences with multiple years of information in Labrador, the river with the largest population of salmon is Sand Hill River (SFA 2). Counts for Sand Hill River are available for various periods including the early 1970s when there was a large commercial fishery operating in eastern Canada and at Greenland, and most recently since the closure of the commercial fisheries in Newfoundland (1992) and Labrador (1998) (Table 7).

For Sand Hill River, counts of small salmon were in the range of 2,000 to 4,800 fish in the early 1970s and mid-1990s. Since 2002, the counts of small salmon have been very variable, ranging between 1,600 fish in 2009 to a high of almost 8,600 fish in 2011 (Table 7). For large salmon, counts were generally low in the 1970s (between 138 and 504 fish), increased in the early 1990s (414 to 730) and since 2002 have most often been greater than 500 fish, ranging from 320 in 2010 to a high of 1,271 large salmon in 2013 (Table 7).

Conservation requirements for Labrador are defined on the basis of an egg deposition rate of 190 eggs per 100 m^2 of accessible river habitat.

The status of English River in SFA 1 has improved since monitoring began in 1999 (Table 8). Returns were below conservation requirements every year during 1999 to 2005 (approximately the first generation of fish since the closure of the Labrador commercial fishery) but returns were greater than conservation in 8 of 9 years between 2006 and 2014. The status of rivers in SFA 2 is somewhat different from that of SFA 1. Conservation requirements were frequently exceeded in the monitored rivers between 1999 and 2005 (6 of 10 year/river combinations) but during 2006 to 2014, conservation requirements were exceeded in only 11 of 25 year/river combinations (Table 8) and since 2009, conservation requirements were simultaneously exceeded in all three monitored rivers in 2011 only, and all three were below conservation in 2014.

ICES (2015) presents estimates of returns of small salmon and large salmon to Labrador based on return rates (fish per km^2) to the four counting facilities in Labrador raised to total accessible spawning habitat for the salmon rivers in Labrador (Figure 6). Small salmon returns to Labrador in 2014 were the highest on record (Figure 6). Large salmon returns in

2014 were also the highest on record for Labrador. The increase in the estimated returns and spawners of small salmon and large salmon in 2014 are a reflection of the high counts of small salmon and large salmon noted in the single monitoring site in northern Labrador (SFA 1) (Figure 6).

Prior to 1992, both small salmon and large salmon could be retained in the recreational fishery in Labrador. Since 2011, no large salmon can be retained in the angling fishery. Season bag limits are based on the river classification system with all rivers in SFA 14B and most rivers in SFA 2 with a season bag limit of two small salmon retained. Rivers in SFA 2 not crossed by the Trans Labrador highway and rivers in SFA 1 have season retention limits of 4 small salmon.

Consistent with the changes in the management measures for the angling fishery, the harvest of small salmon has declined over time in all areas of Labrador. The total catch of small salmon which includes kept and released fish, has however increased in SFA 1 and SFA 2 but shows a decline in SFA 14B from the peak values of the early 2000s (Figure 7a). The large salmon retained numbers have declined to no take in 2011 while the large salmon released catches have shown a continuous increase in SFA 1 and SFA 2 from the mid 1990s when those data began to be recorded. Overall catches of large salmon, including retained and released fish, show a sustained increase in SFA 1 and SFA 2 and a peak in SFA 14B in the early 2000s (Figure 7b).

Angling catches may not be a direct and proportional index of abundance among SFAs and even years due to the large changes in fisheries management over the years. But they should impart some information on relative abundance. Whereas counts at the three monitoring fences in SFA 2 show a decline in recent years from higher returns in the early 2000s, the angling catches of large salmon and small salmon show a continuous increase over time (Figures 6, 7a). For SFA 1, the continuous increase in angling catches corresponds to the increased counts at the single monitoring fence in SFA 1 (Figures 6, 7a).

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 various communities 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 and adipose clipped fish may be sampled for microtags. Since 2006, 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. Results of the sampling program of the most recent three years are summarized in this report.

The NCC and NG sampling programme of Labrador Aboriginal fisheries continued in 2012 to 2014. 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 2012, a total of 420 samples were collected from the Labrador subsistence fisheries, 151 from northern Labrador (SFA 1A), 42 from Lake Melville (SFA 1B) and 227 samples from southern Labrador (SFA 2) (Table 7). Based on the interpretation of the scale samples, 79% of all the samples taken were 1SW salmon, 10% were 2SW, and 11% were previously spawned salmon. One fish was 3SW. The majority of salmon sampled were river ages 3 to 5 years (96%) (modal age 4). There were very few river age 1 (0.2%) or river age 2 (1.9%) salmon sampled suggesting, as in previous years (2006 to 2011), that very few salmon from the most southern stocks of North America (USA, Scotia-Fundy) were exploited in these fisheries.

In 2013, a total of 544 samples were collected from the Labrador subsistence fisheries, 160 from northern Labrador (SFA 1A), 84 from Lake Melville (SFA 1B) and 300 samples from southern Labrador (SFA 2) (Table 7). Based on the interpretation of the scale samples, 79% of all the samples taken were 1SW salmon, 16% were 2SW, and 5% were previously spawned salmon. The majority of salmon sampled were river ages 3 to 6 years (99%) (modal age 4). There were no river age 1 and few river age 2 (1%) salmon sampled, suggesting, as in previous years (2006 to 2012), that very few salmon from the most southern stocks of North America (USA, Scotia-Fundy) were exploited in these fisheries.

In 2014, a total of 208 samples were collected from the Labrador Aboriginal fisheries (Table 7). Based on the interpretation of the scale samples (203 of 208), 81% of all the samples taken were 1SW salmon, 12% were 2SW, and 7% were previously spawned salmon. The majority of salmon sampled were river ages 3 to 6 years (98%) (modal age 4). There were no river age 1 and few river age 2 (2%) salmon sampled, suggesting, as in previous years (2006 to 2013), 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%, and 1.7% for the sampling years 2012 to 2014, respectively.

LABRADOR FISHERY ORIGIN AND COMPOSITION OF THE CATCHES

As presented at the NASCO annual meeting in 2014, 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. 2014a,b; 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 8.

The twelve reporting groups were used for mixture analysis of the fishery samples. The accuracy of assignment in the mixture analyses was very high, 94.5%. The power of the baseline to resolve rare contributions was examined using simulations; accurate estimation of the rare stock contributions was possible when they represented from 0.5-1.0% and above.

A total of 771 individuals were analyzed from the Labrador FSC fishery during the period 2012-2014. The number and distribution of samples varied annually but samples were distributed throughout the fishery in all three years (Figure 6).

The numbers of salmon from each regional group in the Labrador subsistence fisheries were estimated using the mixture analysis regional contributions. The estimated proportional contributions of the twelve groups (and associated standard errors) based on combined samples for 2006 to 2011 and combined samples for 2012 to 2014 are shown in Table 9. The uncertainties in the estimated contributions are lowest (coefficient of variation, CV, of 1%) for the largest contributing group (Labrador Central) with CVs exceeding 50% for almost all the other groups (Table 9).

The Labrador Central (LAB) regional group represents the majority (almost 92 to 96%) of the salmon in the Labrador subsistence fishery with minor contributions from all the other regional groups (Table 9; Figure 7; Bradbury et al. 2014a). Raised to estimated catches of salmon in 2012 to 2014, the Central Labrador regional group represented 96% of the catch, followed by Ungava/Northern Labrador (UNG), Quebec/Labrador South (QLS) and Newfoundland (NFL) at about 1% each (Table 10). No USA origin salmon were identified in the mixed stock analysis of samples from 2012 to 2014 and raised catches for those years are essentially zero (Table 10). However Bradbury et al. (2014a) 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 (Figure 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 4% were identified in samples from northern Labrador SFA 1A and lesser proportions in southern Labrador SFA 2 (Figure 8). Fishery samples from SFA 2 were also dominated by the Labrador Central regional assignments with minor contributions from neighbouring regional groups ranging from Ungava / Northern Labrador, Quebec / Southern Labrador, and Newfoundland (Figure 8).

REFERENCES CITED

Bradbury IR, Hamilton LC, Rafferty S, et al. (2014a) Genetic evidence of local exploitation of Atlantic salmon in a coastal subsistence fishery in the Northwest Atlantic. Canadian Journal of Fisheries and Aquatic Sciences 72: 83-95.

Bradbury IR, Hamilton LC, Robertson MJ, et al. (2014b) Landscape structure and climatic variation determine Atlantic salmon genetic connectivity in the northwest Atlantic. Canadian Journal of Fisheries and Aquatic Sciences 71, 246-258.

ICES. 2015. Report of the Working Group on North Atlantic Salmon (WGNAS), 17–26 March, Moncton, Canada. ICES CM 2015/ACOM:09. 332 pp.

Moore J-S, Bourret V, Dionne M, *et al.* (2014) Conservation genomics of anadromous Atlantic salmon across its North American range: outlier loci identify the same patterns of population structure as neutral loci. *Molecular Ecology* 23, 5680-5697.

NASCO. 2009. NASCO Guidelines for the Management of Salmon Fisheries. North Atlantic Salmon Conservation Organization (NASCO), Edinburgh, Scotland, UK. NASCO Council Document CNL(09)43. 12 p.

Reddin, D.G., Anthony, R., Anderson, M. and Andrew, G. 2002. Environmental conditions and harvests in various fisheries for salmonids in Labrador, 2001. DFO Can. Sci. Adv. Secr. Res. Doc. 2002/030.

Reddin, D.G., Anthony, R., Watts, K., Nuna, R., and Luther, R.J. 2004. Environmental conditions and harvests in various fisheries for salmonids in Labrador, 2002. DFO Can. Sci. Adv. Secr. Res. Doc. 2004/003.

Reddin, D.G., Poole, R.J., King, W., Oliver, S., Nuna, R., and Parr, T. 2005. Harvests in various fisheries for salmonids, Atlantic salmon returns to rivers and environmental conditions in Labrador, 2004. DFO Can. Sci. Adv. Secr. Res. Doc. 2005/006.

Reddin, D.G., Poole, R.J., King, W., Oliver, S., Nuna, R., and Parr, T. 2008. Harvests in various fisheries for salmonids, Atlantic salmon returns to rivers and environmental conditions in Labrador, 2005. DFO Can. Sci. Adv. Secr. Res. Doc. 2008/024.

Reddin, D.G., Poole, R.J., Brown, V., Lethbridge, R., Mesher, H., Pardy, M., and Lethbridge, B. 2013. Atlantic salmon returns to four rivers and harvests in various fisheries in Labrador for 2006-09. DFO Can. Sci. Advis. Sec. Res. Doc. 2013/105. v + 26 p.

Table 1. Summary of the important changes in management measures for the mixed-stock commercial fisheries of Atlantic salmon in eastern Canada.

Year	Measure	Intercepted stocks affected
1972	Closure of the drift net fishery at Port aux Basques, Newfoundland	Newfoundland, Quebec, Maritime provinces
1972 to 1980	Closure of commercial fisheries of the Maritime provinces and reductions in Quebec Bycatch of salmon in other marine fisheries could be retained	Quebec, Maritime provinces, US stocks
1981 to 1984	Re-opening of commercial fisheries in the Maritime provinces with reduced seasons, reduced licenced effort, and quotas	Quebec, Maritime provinces, US stocks
1985	Closure of the Maritime commercial fisheries, buyback of licences, prohibition of retention of buycatch of Atlantic salmon	Quebec, Maritime provinces, US stocks
1989 to 1991	Reductions in commercial fisheries of Newfoundland and Labrador using quotas, reduced seasons, reduced licence effort	stocks from eastern North America
1992	Moratorium of the Newfoundland commercial salmon fishery, reductions in Labrador and Quebec	stocks from eastern North America
1998	Moratorium of the Labrador commercial salmon fishery, further reductions in Quebec commercial fisheries (remaining commercial fishery in Ungava Bay area and lower north shore of St. Lawrence (Q9))	Quebec, possibly Maritime and Newfoundland stocks
1999	Closure of the commercial fishery in Ungava Bay, Quebec	Quebec
2000	Closure of the last commercial fishery (Quebec Q9) in eastern Canada	Quebec, possibly Maritime and Newfoundland stocks

Table 2. Labrador subsistence fisheries harvests (weight in t; aboriginal and resident food) by geographic location of harvests, 2000 to 2014.

	Harvest (kg)			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	9.32	36.36	74.4	25.6
2009	22.61	7.20	29.81	75.9	24.1
2010	29.36	6.23	35.59	82.5	17.5
2011	34.05	7.31	41.36	81.6	18.4
2012	28.98	7.58	36.56	87.2	12.8
2013	31.53	8.45	39.97	75.6	24.4
2014	26.87	5.95	32.83	81.9	18.1

Table 3. The percentages of the harvested weight of Atlantic salmon in the Labrador subsistence fisheries that are taken in coastal areas, 2009 to 2014. 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%	17.5%
2011	32.0%	0%	10.0%	33.0%	17.7%
2012	31.0%	0%	16.5%	32.1%	20.7%
2013	29.0%	0%	13.4%	33.0%	21.1%
2014	27.0%	0%	12.6%	32.0%	18.1%

Table 4. 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 2014. Data for 2014 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 (prov.)	17,929	14,897	32,826	8,965	4,003	12,969	45.4%	30.9%
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 (prov.)	3,923	6,348	10,271	1,910	1,720	3,630	61.8%	47.4%
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%
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 (prov.)	6,871	4,829	11,700	3,394	1,253	4,647	41.3%	27.0%
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%

	Weight (kg)			Number of fish			% Large	
Year	Small	Large	Total	Small	Large	Total	By weight	By number
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 (prov.)	7,135	3,720	10,855	3,661	1,030	4,691	34.3%	22.0%

Table 5. 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 2014. Data for 2014 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 (prov.)	886	746	1,632	454	204	659	45.7%	31.0%
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 (prov.)	11	17	29	6	4	10	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%
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 (prov.)	381	425	806	183	110	293	52.7%	37.6%
SFA 2 (southern Labrador)								
2000	2,242	897	3,139	1,212	260	1,472	28.6%	17.7%

	Weight (kg)			Number of fish			% Large	
Year	Small	Large	Total	Small	Large	Total	By weight	By number
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 (prov.)	493	304	797	265	90	355	38.2%	25.2%

Table 6. 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 2014. Data for 2014 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 (prov.)	17,044	14,151	31,195	8,511	3,799	12,310	45.4%	30.9%
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 (prov.)	3,911	6,331	10,243	1,904	1,716	3,620	61.8%	47.4%
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%
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 (prov.)	6,490	4,404	10,894	3,211	1,143	4,354	40.4%	26.2%
SFA 2 (southern Labrador)								
2000	0	0	0	0	0	0	na	na

	Weight (kg)			Number of fish			% Large	
Year	Small	Large	Total	Small	Large	Total	By weight	By number
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 (prov.)	6,642	3,415	10,058	3,396	940	4,336	34.0%	21.7%

Table 7. Number of small salmon and large salmon enumerated at the counting fences in Labrador.

Year	Sand Hill River (SFA 2)		Muddy Bay Brook (SFA 2)		Southwest Brook (Paradise River) (SFA 2)		English River (SFA 1)	
	Small salmon	Large salmon	Small salmon	Large salmon	Small salmon	Large salmon	Small salmon	Large salmon
1970	3,600	138						
1971	3,596	266						
1972	2,038	175						
1973	4,761	504						
1994	2,180	730						
1995	2,796	560						
1996	3,319	414						
1997								
1998					110	4		
1999					331	43	59	48
2000							367	15
2001					323	32	224	41
2002	3,141	561	106	11	235	34	190	31
2003	3,171	627	394	31	158	16	133	19
2004	4,008	604	454	28	615	54	56	25
2005	7,007	875	520	20	858	54	337	28
2006	4,967	568	445	17	326	35	484	44
2007	3,222	693	240	14	303	32	498	42
2008	4,842	795	474	36	495	35	414	51
2009	1,605	723	115	10	67	13	280	105
2010	2,225	320			173	17	296	47
2011	8,565	970	348	19	380	33	419	156
2012	3,527	734			211	29	423	82
2013	1,646	1,271	296	36	79	63	467	160
2014	1,834	587	152	22	182	38	839	190

Table 8. Percentage of conservation egg requirements met in the returns to the counting fences in Labrador. Grey shaded cells highlight years when egg depositions were estimated to be less than 100% of the conservation requirements.

Characteristic	Sand Hill River (SFA 2)	Muddy Bay Brook (SFA 2)	Southwest Brook (tributary of Paradise River) (SFA 2)	English River (SFA 1)
Accessible drainage area (km^2)	1,155	213	384	125
Conservation egg requirements (millions)	10.10	0.71	1.43	0.51
Percentage of conservation egg requirements attained				
Year	Sand Hill River (SFA 2)	Muddy Bay Brook (SFA 2)	Southwest Brook (tributary of Paradise River) (SFA 2)	English River (SFA 1)
1994	65			
1995	70			
1996	74			
1997				
1998			39	
1999			139	40
2000				73
2001			110	63
2002	81		82	52
2003	82		52	26
2004	101		201	26
2005	168		267	80
2006	118	161	110	115
2007	89	90	102	115
2008	125	184	157	109
2009	59	46	26	117
2010	54		57	86
2011	204	130	124	176
2012	96		75	129
2013	82	125	57	188
2014	59	66	72	276
Years for which conservation requirements met or exceeded				
Since 1999 (post closure of commercial fishery)	5 of 13	4 of 7	8 of 15	8 of 16
In most recent five years	1 of 5	2 of 3	1 of 5	4 of 5

Table 9. Number of samples collected and percentages of samples by river age within the sampling areas from the aboriginal food fisheries in Labrador.

PERCENTAGE OF SAMPLES BY RIVER AGE WITHIN THE THREE SAMPLED AREAS IN 2012

Area	Number of Samples	River Age					
		1	2	3	4	5	6
Northern Labrador (SFA 1A)	149	0.7	3.4	19.5	56.4	18.1	2.0
Lake Melville (SFA 1B)	40	0.0	5.0	15.0	67.5	12.5	0.0
Southern Labrador (SFA 2)	225	0.0	0.4	23.6	54.2	20.4	1.3
All areas	414	0.2	1.9	21.3	56.3	18.8	1.4

PERCENTAGE OF SAMPLES BY RIVER AGE WITHIN THE THREE SAMPLED AREAS IN 2013

Area	Number of Samples	River Age					
		1	2	3	4	5	6
Northern Labrador (SFA 1A)	160	0.0	0.0	24.4	59.4	14.4	1.9
Lake Melville (SFA 1B)	84	0.0	0.0	15.5	59.5	25.0	0.0
Southern Labrador (SFA 2)	300	0.0	1.7	18.7	61.0	17.7	1.0
All areas	544	0.0	0.9	19.9	60.3	17.8	1.1

PERCENTAGE OF SAMPLES BY RIVER AGE WITHIN THE THREE SAMPLED AREAS IN 2014

Area	Number of Samples	River Age					
		1	2	3	4	5	6
Northern Labrador (SFA 1A)	89	0.0	2.2	38.2	43.8	14.6	1.1
Lake Melville (SFA 1B)	40	0.0	0.0	55.0	32.5	12.5	0.0
Southern Labrador (SFA 2)	74	0.0	2.7	14.9	58.1	23.0	1.4
All areas	203	0.0	2.0	33.0	46.8	17.2	1.0

Table 10. Correspondence between ICES areas used for the assessment of status of North American salmon stocks and the regional groups (Figure 4.9.1) 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 11. Contributions of regional groups (percentages, mean and standard error) to the Labrador subsistence fisheries catches based on mixture analysis of samples in 2006 to 2011 (Bradbury et al. 2014) and 2012 to 2014 (ICES 2015).

Region-code	Region-name	2006 to 2011	2012 to 2014
UNG	Ungava-Northern Labrador	0.5% (0.27)	2.7% (0.71)
LAB	Central Labrador	96.0% (0.72)	95.3% (0.93)
QLS	Lower North Shore-Southern Labrador	1.3% (0.49)	< 0.1% (0.10)
NFL	Newfoundland	0.9% (0.36)	1.1% (0.44)
AVA	Avalon-East Newfoundland	< 0.1% (0.04)	< 0.1% (0.05)
QUE	Higher North Shore Quebec	0.3% (0.27)	< 0.1% (0.11)
GAS	Gaspe	0.3% (0.34)	0.2% (0.27)
ANT	Anticosti	< 0.1% (0.05)	< 0.1% (0.03)
GUL	Southern Gulf of St Lawrence	0.4% (0.21)	0.7% (0.37)
NOS	Nova Scotia	< 0.1% (0.05)	< 0.1% (0.06)
FUN	Inner Bay of Fundy	< 0.1% (0.05)	< 0.1% (0.04)
USA	USA	0.3% (0.16)	< 0.1% (0.06)

Table 12. Estimated annual catches (number of fish; median, 10th to 90th percentiles) by regional group of North American origin salmon in the Labrador subsistence fisheries (aboriginal and resident), 2012 to 2014, based on genetic stock identification of combined samples (2012-2014). Regional groups are shown in Figure 5.

Acronym	2012	2013	2014	Average (% of total)
Harvest (number of all salmon)	14,204	13,539	12,969	13,571
UNG	365 (256 - 501)	352 (246 - 487)	338 (233 - 473)	351 (2.6%)
LAB	13,543 (13,363 – 13,704)	12,904 (12,741 – 13,060)	12,368 (12,208 – 12,509)	12,938 (95.7%)
QLS	0 (0 - 9)	0 (0 - 6)	0 (0 - 4)	0 (0%)
NFL	145 (77 - 243)	139 (74 - 228)	128 (69 - 209)	137 (1.0%)
AVA	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0%)
QUE	0 (0 - 21)	0 (0 - 18)	0 (0 - 17)	0 (0%)
GAS	20 (2 - 81)	18 (1 - 80)	16 (1 - 79)	18 (0.1%)
ANT	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0%)
GUL	86 (34 - 169)	78 (29 - 163)	80 (32 - 150)	81 (0.6%)
NOS	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0%)
FUN	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0%)
USA	0 (0 - 1)	0 (0 - 2)	0 (0 - 1)	0 (0%)

Figure 1. Summary of harvests, in weight (t), of Atlantic salmon by geographic origin of the fisheries for eastern Canada, 2000 to 2014.

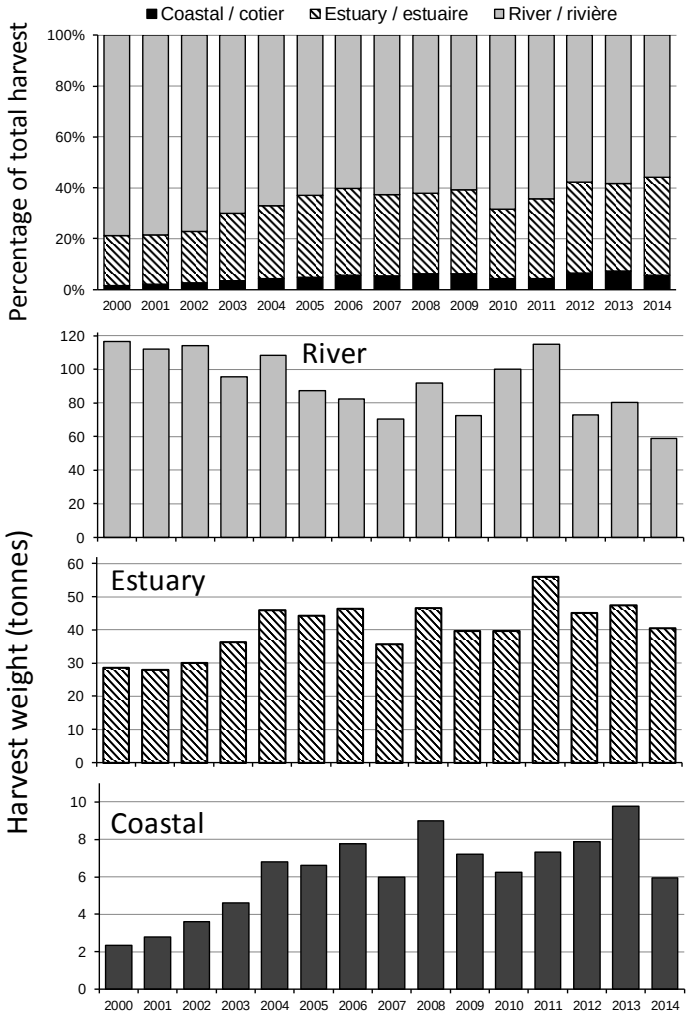

Figure 2. Map of Labrador showing the area represent by the Labrador Inuit Lands and the Labrador Inuit Settlement Area.

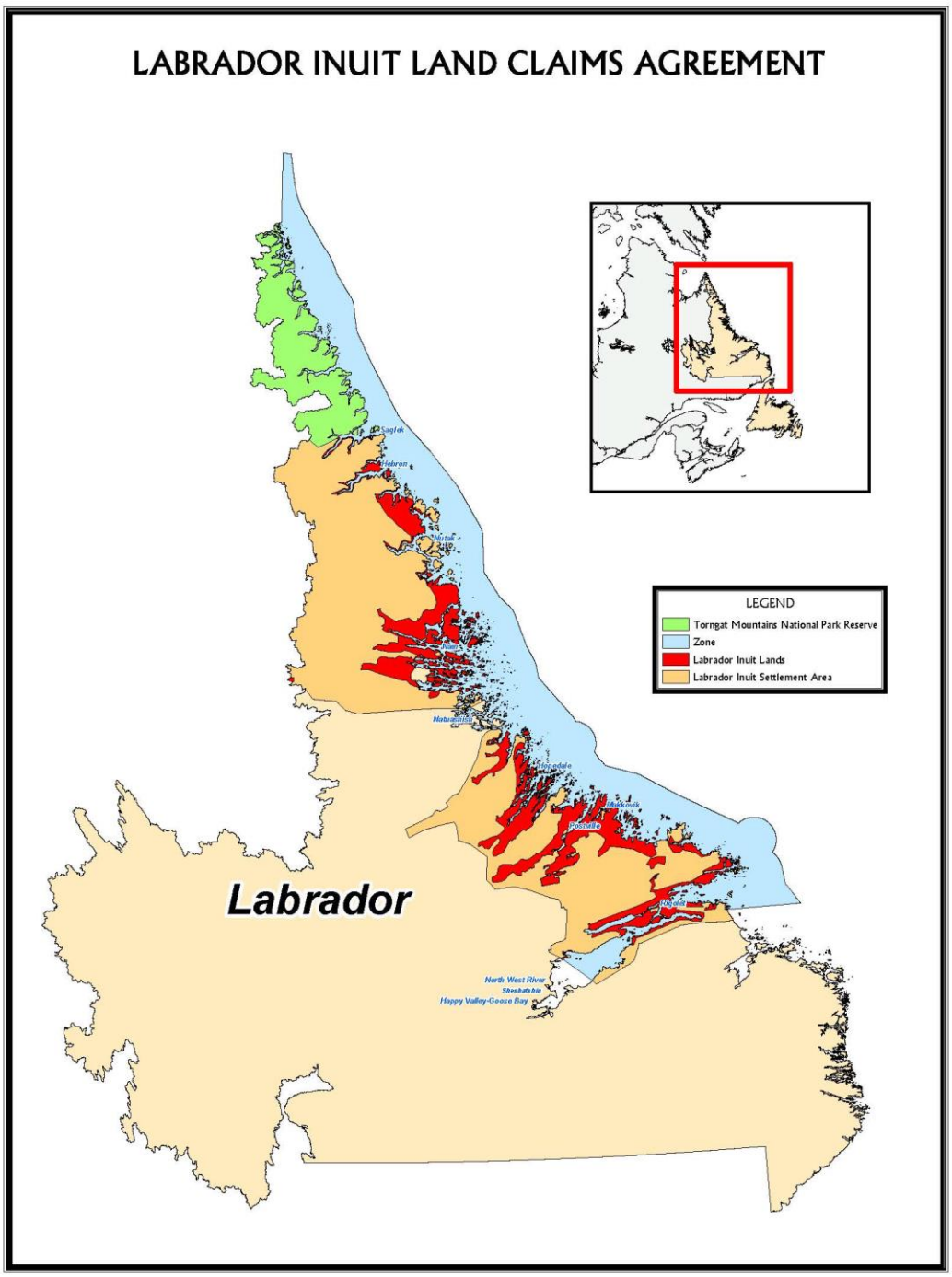

Figure 3. Total harvests (by number and size group) of Atlantic salmon in the Labrador subsistence fisheries by Salmon Fishing Area, 2000 to 2014. Place names referred to in the text are also shown for reference.

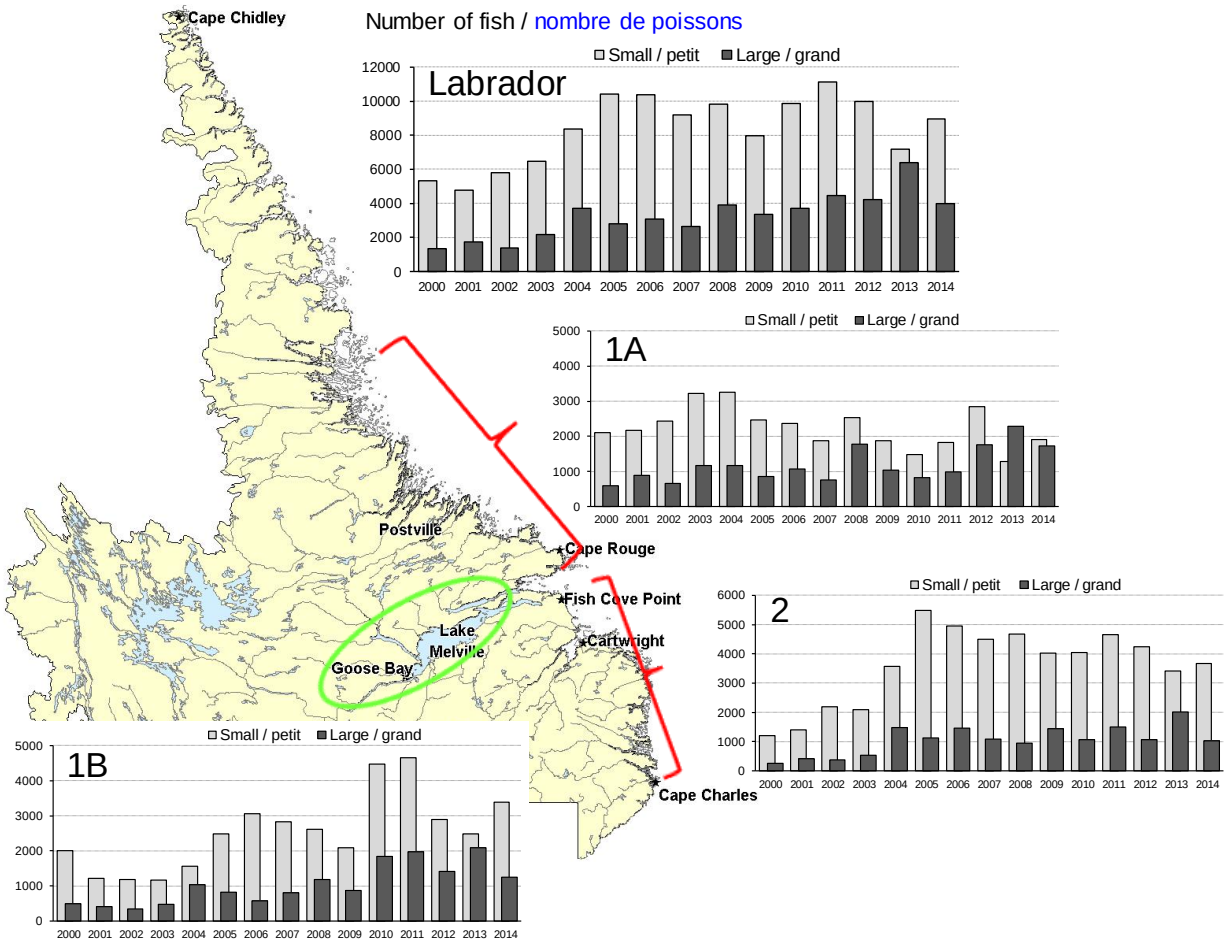

Figure 4. Distribution (percentages) of the Labrador subsistence fisheries harvests (by number) of small salmon (upper panel) and large salmon (lower panel) among the three Salmon Fishing Areas, 2000 to 2014.

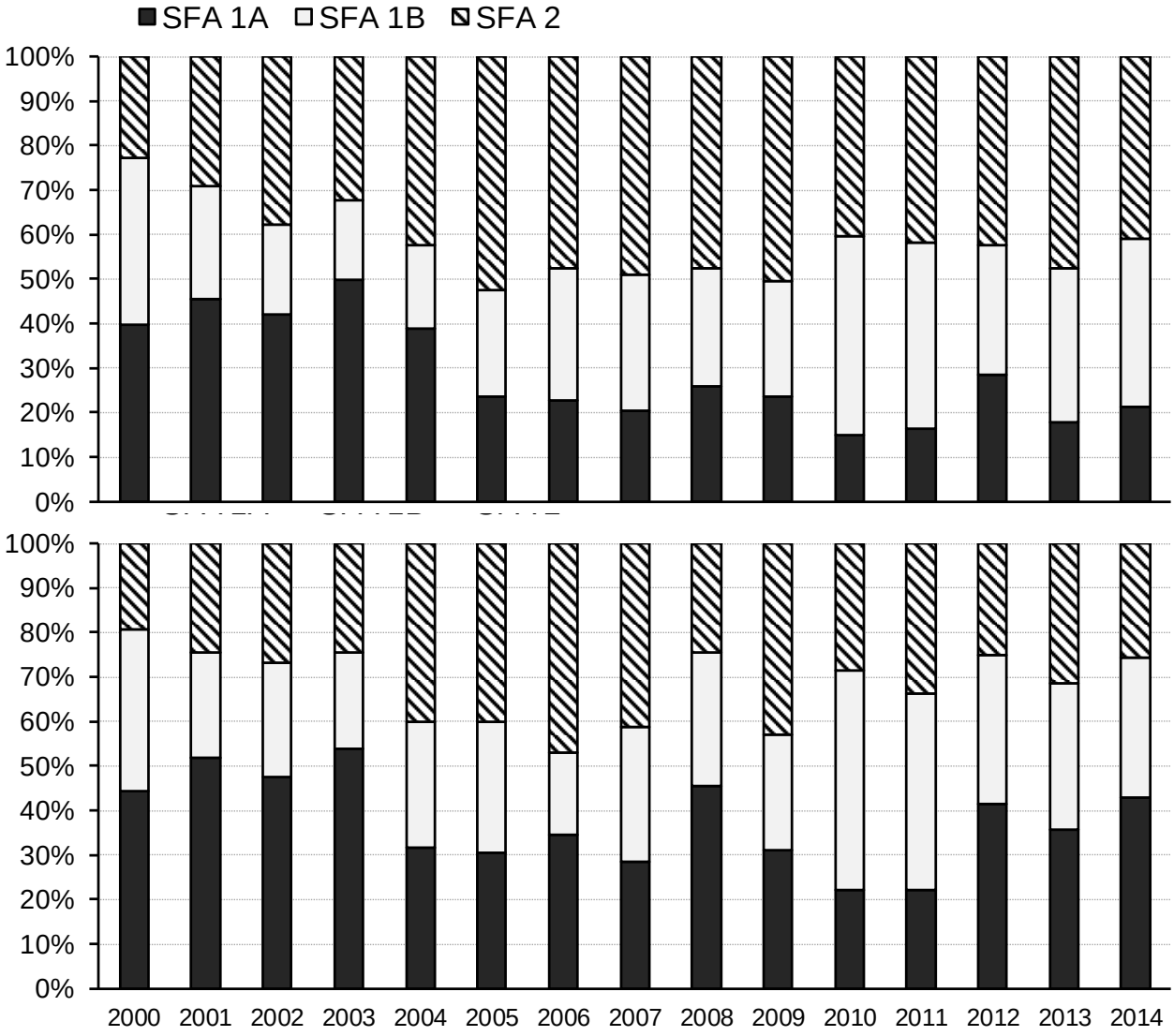

Figure 5. Map of Labrador showing Salmon Fishing Areas (SFA), general location and years of operation of counting fence projects. The area in Lake Melville is referred to as SFA 1B whereas the coastal area in northern Labrador is SFA 1A.

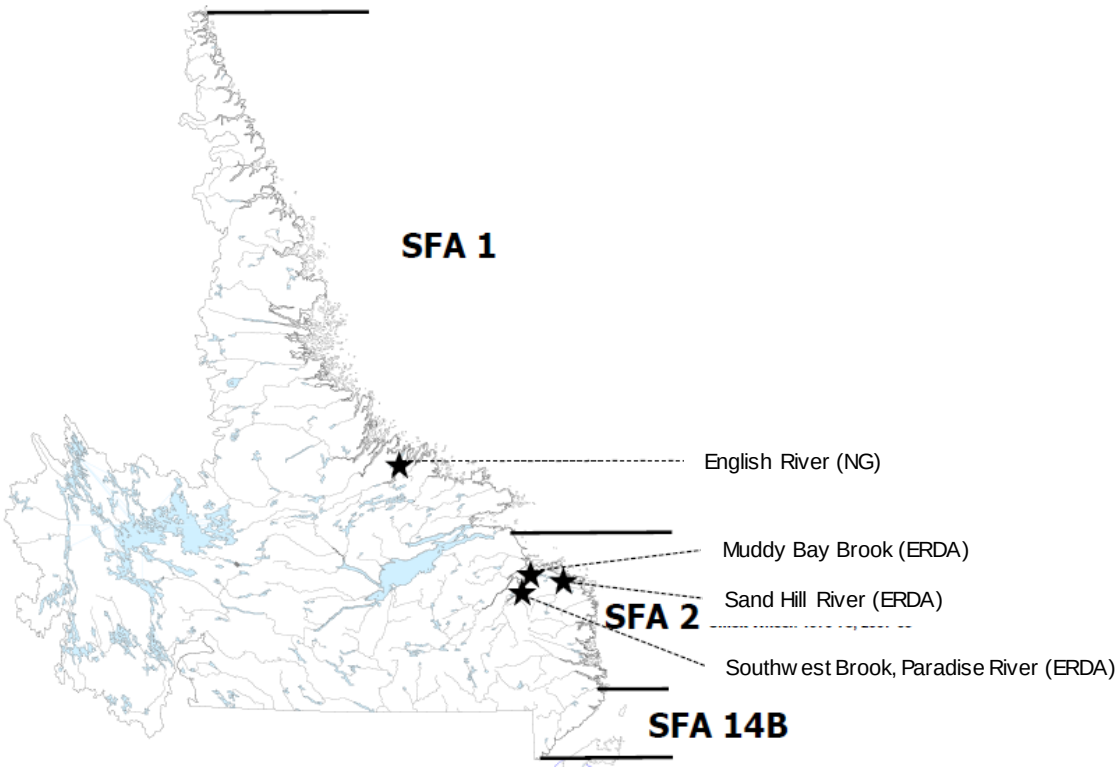

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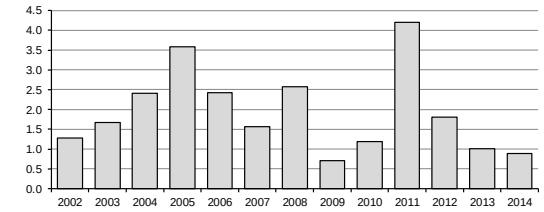
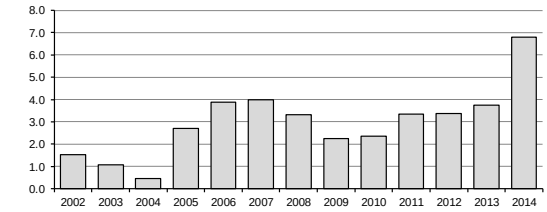
Figure 6. Summary of the counts from monitored rivers in Labrador for 2002 to 2014 (upper figures) and the estimates returns to rivers of small salmon and large salmon to all of Labrador as reported by ICES (2015).

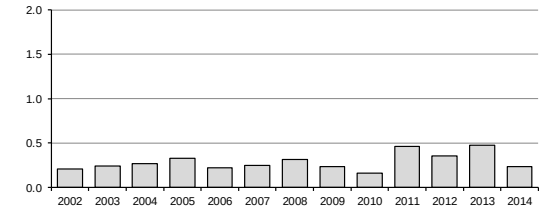
Small salmon per km² for SFA 2



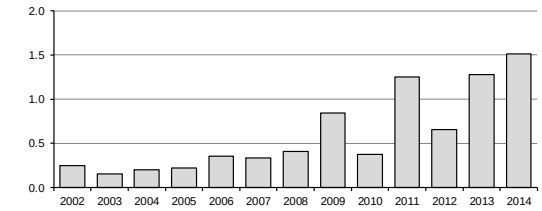
Small salmon per km² for SFA 1



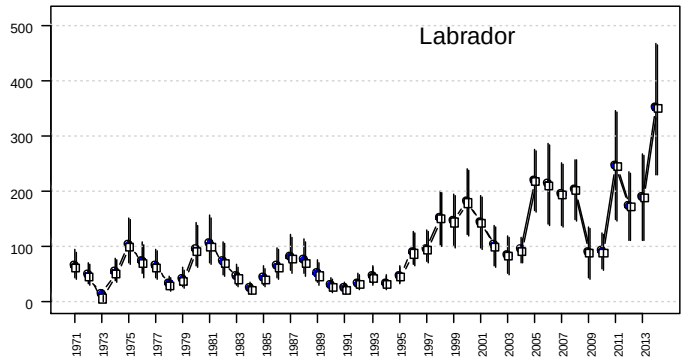
Large salmon per km² for SFA 2



Large salmon per km² for SFA 1



Small salmon returns (number of fish X 1000) to rivers of Labrador



Large salmon returns (number of fish X 1000) to rivers of Labrador

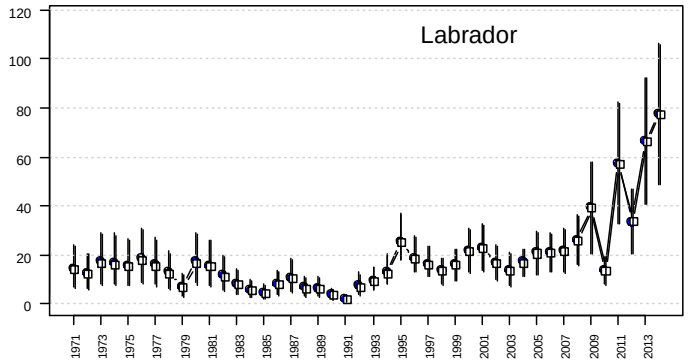


Figure 7a. Reported small salmon recreational catch (retained plus released) by Salmon Fishing Area in Labrador, 1970 to 2014.

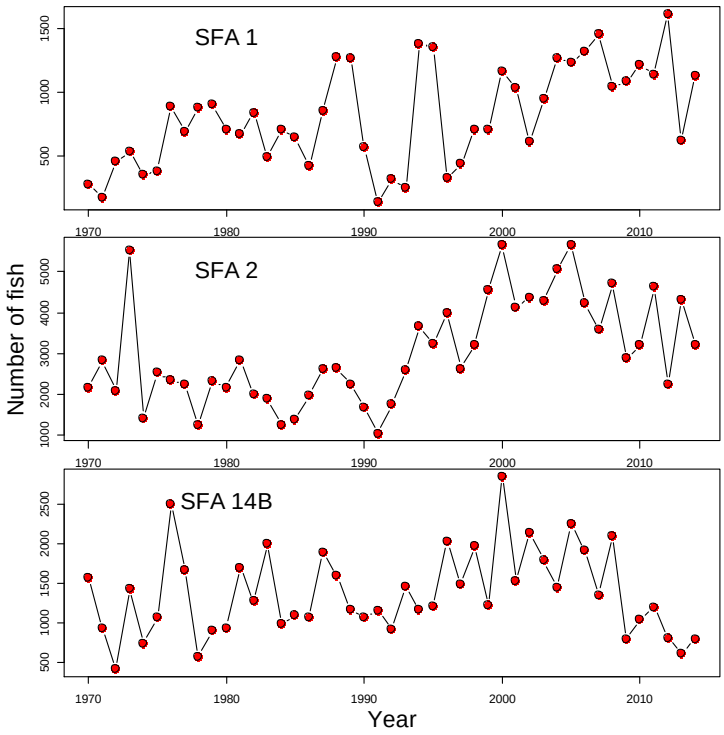


Figure 7b. Reported large salmon recreational catch (retained plus released) by Salmon Fishing Area in Labrador, 1970 to 2014.

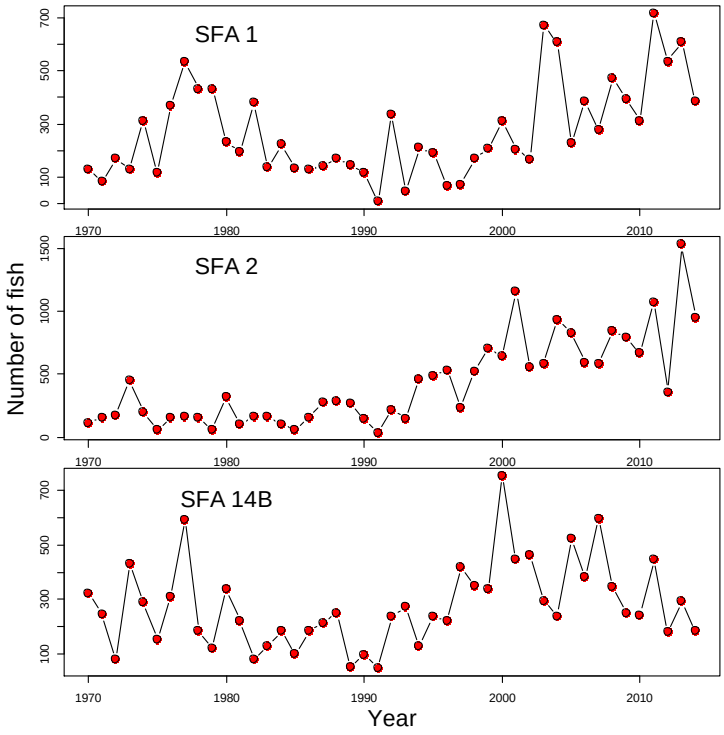


Figure 8. Map of sample locations used in the microsatellite baseline development for Atlantic salmon in North America and the regional groups resolved from the baseline. See Bradbury et al. 2015 for details and Tables 8 and 9 for location abbreviations.

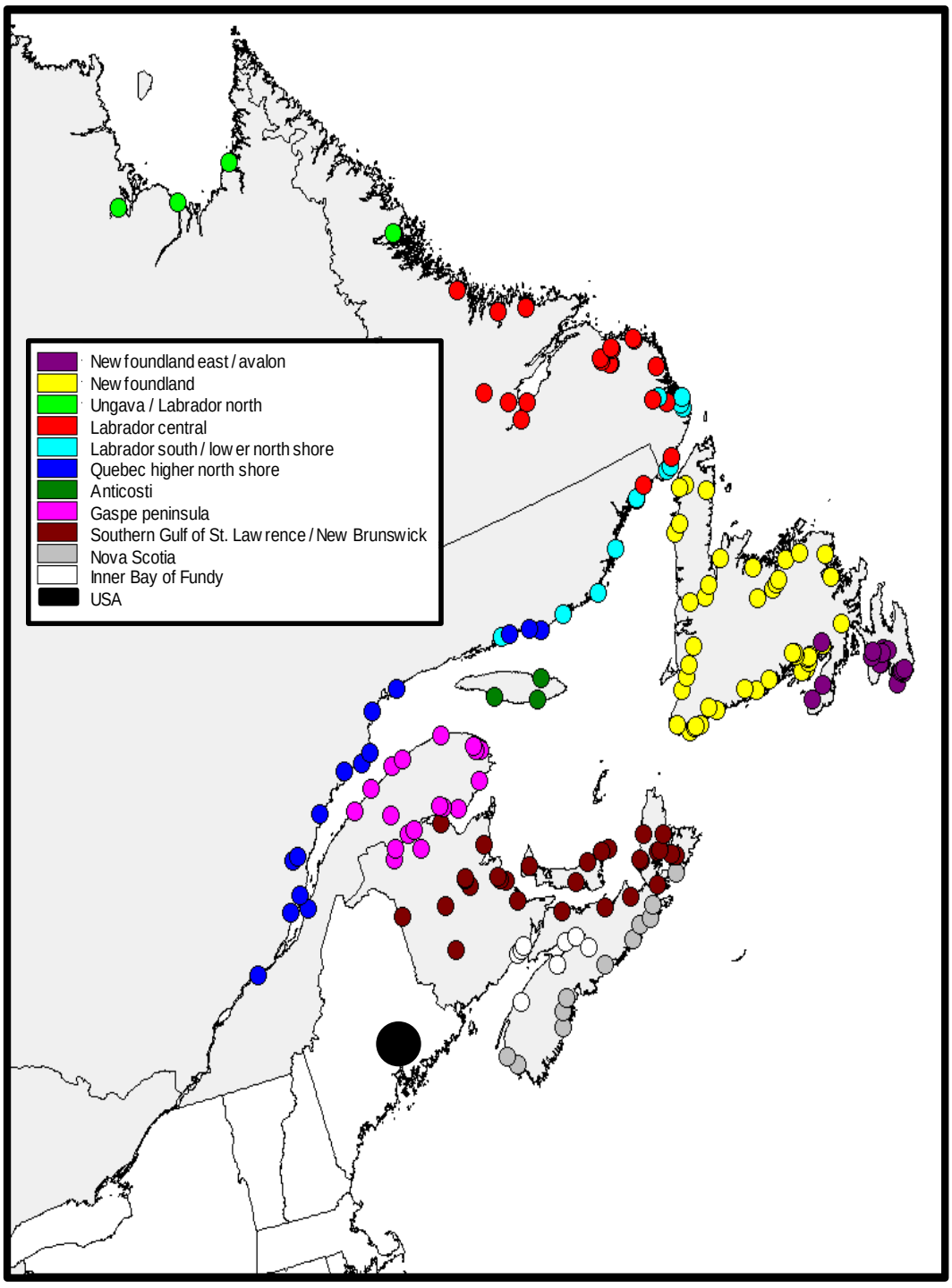


Figure 9. Map of sample locations from the Labrador Atlantic salmon subsistence fishery, 2012 to 2014. Maximum number of samples per year indicated on each panel.

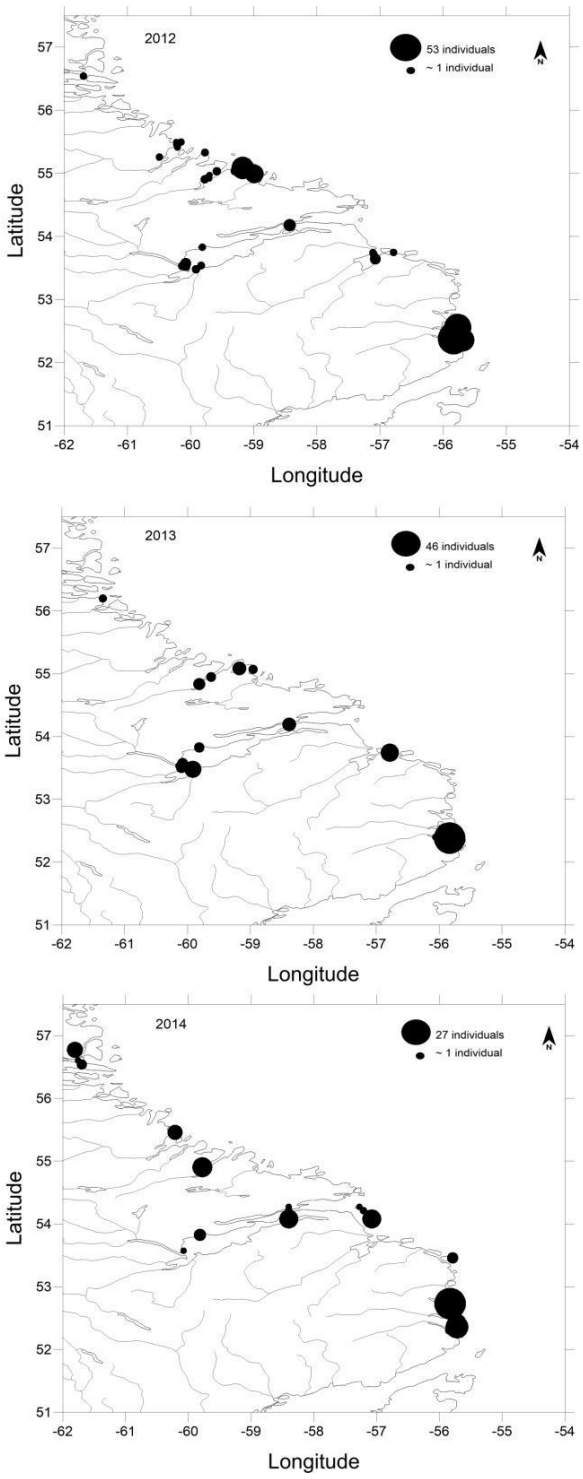


Figure 10. Estimates of mixture composition of samples from the Labrador Atlantic Salmon subsistence fishery by year (A-C) and overall (D). Baseline locations refer to regional reporting groups identified in Figure 5 and Table 8.

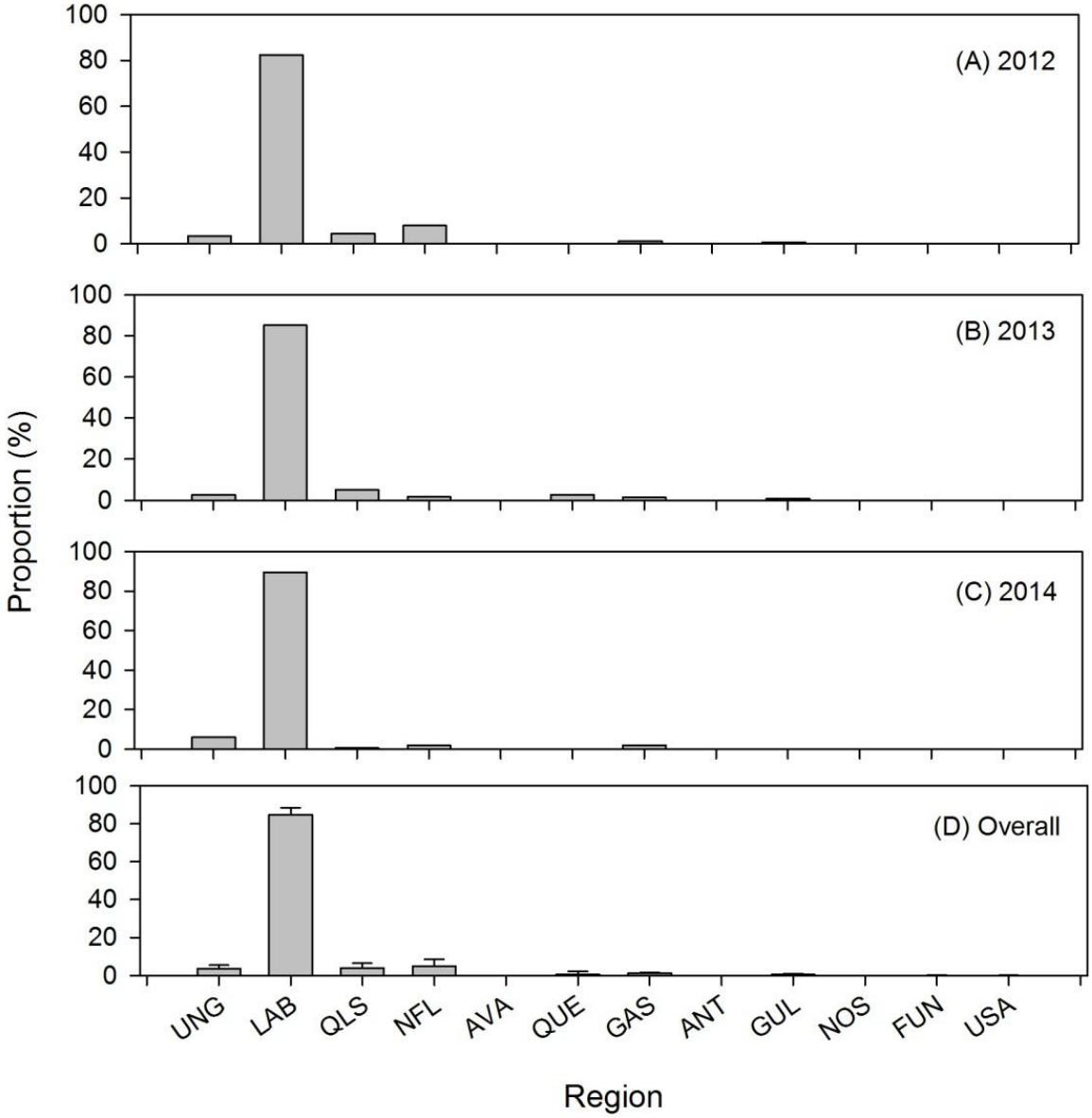


Figure 11. Bayesian estimates of mixture composition of samples from the Labrador Atlantic Salmon fishery ofr the combined samples from 2012 to 2014 by Salmon Fishing Area (1A, 1B, 2). Baseline locations refer to regional reporting groups identified in Figure 5 and Table 8.