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Atlantic salmon returns to four rivers and harvests in various fisheries in Labrador for 2006-09

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Foreword

This series documents the scientific basis for the evaluation of aquatic resources and ecosystems in Canada. As such, it addresses the issues of the day in the time frames required and the documents it contains are not intended as definitive statements on the subjects addressed but rather as progress reports on ongoing investigations.

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ABSTRACT

This paper summarizes information collected on salmonids during the years 2006 to 2009 in Labrador. A portable fish counting fence was installed at English River in Northern Labrador, and at Southwest Brook (Paradise River), Muddy Bay Brook, and Sand Hill River, in southern Labrador. Total returns of small and large salmon are used to determine if conservation requirements were met at these four rivers. English River met conservation requirements for all four years. The conservation requirement was met in South West Brook from 2006 to 2008; however, in 2009 the conservation requirement met was the lowest of all its years of operation at 26 %. Muddy Bay Brook returns did not meet the conservation requirement in 2007 or 2009 which was the second lowest of all the years of operation at 46 %. Sand Hill River surpassed conservation requirements in 2006 and 2008, however, in 2007 and 2009, 89 % and 59 % of the conservation requirement was met. Smolt counts were conducted at Sand Hill River since 2007. Smolt counts decreased from 80,994 in 2007 to 59,400 in 2009. Smolt survival of 1SW salmon declined from 6 % in 2007 to 2.5 % in 2008 and increased to 3.7 % in 2009. The survival of MSW salmon from the 2007 smolt class was 1 % and it decreased to 0.05 % in 2008. In 2006-09 there were four subsistence fisheries harvesting salmonids in Labrador. One was a resident trout net fishery with a by-catch of four salmon. The other three fisheries for food, social, and ceremonial (FSC) purposes included the Nunatsiavut Government (formerly the Labrador Inuit Association) (NG), the Innu Nation and the Labrador Metis Nation (LMN). The average percentage for number of small and large salmon over the 4 year period is 74.2 % and 25.8 %, respectively. The average percentage of weight of small and large salmon for the four years is 59.2 % and 40.82 %, respectively. Charr and trout were also harvested with an average number of 8,352 charr, and 11,423 trout of the four years. The average weight of charr and trout was 12,051 kg and 9,915 kg, respectively. Recreational angling catch and effort data is available for Salmon Fishing Area (SFA) 1, 2, 14B. The catch per unit effort for Labrador in 2009 was 0.92, which was lower than previous years.

Remontes du saumon de l’Atlantique dans quatre rivières et récoltes de diverses pêches à l'échelle du Labrador de 2006 à 2009

RÉSUMÉ

Le présent document résume les renseignements recueillis sur les salmonidés de 2006 à 2009 au Labrador. Des barrières portatives de dénombrement des poissons ont été installées dans la rivière English au nord du Labrador ainsi que dans le ruisseau Southwest (rivière Paradise), le ruisseau Muddy Bay et la rivière Sand Hill au sud du Labrador. Le nombre total de remontes de petits et de grands saumons sert à déterminer si les exigences de conservation ont été respectées à l'échelle de ces quatre rivières. La rivière English a respecté les exigences de conservation durant chacune des quatre années. L'exigence de conservation a été respectée dans le ruisseau Southwest de 2006 à 2008; toutefois, en 2009, l'exigence de conservation a été respectée à seulement 26 %, ce qui représente le taux le plus bas de toutes les années d'exploitation. Les remontes du ruisseau Muddy Bay n'ont pas répondu à l'exigence de conservation en 2007 ou en 2009, atteignant seulement 46 %, ce qui représente le deuxième taux le plus faible de toutes les années d'exploitation. La rivière Sand Hill a dépassé les exigences de conservation en 2006 et en 2008; par ailleurs, en 2007 et en 2009, 89 % et 59 % de l'exigence de conservation a été atteinte. Des dénombrements de saumoneaux dans la rivière Sand Hill remontent à 2007. Les dénombrements de saumoneaux ont diminué, passant de 80 994 en 2007 à 59 400 en 2009. Le taux de survie des saumoneaux du stock de saumons unibermarins a lui aussi diminué, passant de 6 % en 2007 à 2,5 % en 2008, pour se rétablir ensuite à 3,7 % en 2009. Le taux de survie du stock de saumons pluribermarins de la classe de saumoneaux de 2007 était de 1 %, et ce taux a diminué à 0,05 % en 2008. De 2006 à 2009, quatre pêches de subsistance ont donné lieu à des prises de salmonidés au Labrador. La pêche à la truite au filet pratiquée par des résidents constituait l'une de ces pêches, et elle a donné lieu à la prise accessoire de quatre saumons. Les trois autres pêches pratiquées à des fins alimentaires, sociales et rituelles sont liées au gouvernement du Nunatsiavut (anciennement appelé l'Association des Inuits du Labrador), à la Nation Innu et à la Nation Métis du Labrador. Sur la période de quatre ans, les pourcentages moyens relatifs aux nombres de petits et de grands saumons étaient de 74,2 % et de 25,8 %, respectivement. En outre, sur la période de quatre ans, les pourcentages moyens relatifs aux poids des petits et des grands saumons étaient de 59,2 % et de 40,82 %, respectivement. Des ombles et des truites ont également été pêchés; en moyenne, 8 352 ombles et 11 423 truites ont été pêchés au cours des quatre années. Le poids moyen des prises d'ombles et de truites était de 12 051 kg et de 9 915 kg, respectivement. Des données sur les prises et l'effort de pêche récréative à la ligne sont disponibles pour les zones de pêche du saumon 1, 2 et 14B. En 2009, les prises par unité d'effort se chiffraient à 0,92 au Labrador, ce qui représente une diminution par rapport aux années précédentes.

INTRODUCTION

Labrador contains vast areas of freshwater with its many streams, rivers and lakes (Anderson 1985). As reported by Reddin et al. 2009 Labrador has 89 salmon rivers with 86,834 Km^2 of accessible drainage area (2009). In spite of its size and importance from a natural resource perspective, little is known about the fish species, their abundance and distribution in Labrador.

There were four index rivers used as indicators of salmon stock status. The four index rivers include English River in Northern Labrador (SFA 1), Southwest Brook, Muddy Bay Brook, and Sand Hill River in southern Labrador (SFA 2) (see Fig. 1). The English River portable fish counting fence is operated in collaboration with the NG (formerly the Labrador Inuit Association) and has been in operation since 1999. The three projects in SFA 2 are conducted in collaboration with the Eagle River Development Association. Southwest Brook has been in operation since 1998 (except for 2000), Muddy Bay Brook since 2000 and Sand Hill River has the longest time series of data being in operation from 1970-73, 1994-96, and 2002 to present. Figs. 2a to 2d display small and large salmon returns for each of these rivers.

The main focus of the projects in Labrador was to inventory the populations of salmonids in rivers within the background of four food fisheries including; subsistence fishery by residents, aboriginal fishery for FSC purposes by the NG, Innu Nation and the LMN and recreational angling.

Beginning in 2000 and continuing into 2009, residents of Labrador were able to fish in the sea for brook trout (*Salvelinus fontinalis* Mitchill) and Arctic charr (*Salvelinus alpinus* L.) with a permitted by catch of four Atlantic salmon (*Salmo salar*).

The three aboriginal groups are provided resource access for FSC purposes. Since 1999, a FSC fishery of 10 tonnes was available for members of the Labrador Inuit Association in the north as well as the Lake Melville area, both located in SFA 1. In late 2005, the Labrador Inuit Land Claims Agreement and the Labrador Inuit Constitution came into effect at the first Assembly of the Nunatsiavut Transitional Government. In 2006 the NG were allocated 10 mt of salmon in the Labrador Inuit Settlement Area and 10 mt in Upper Lake Melville. The Nunatsiavut Government negotiates the harvest limits annually with Department of Fisheries and Oceans Canada (DFO). The Innu Nation also fish in Lake Melville from the community of Sheshatshiu and on the north coast from the community of Natuashish. The harvest limits for 2006-09 have been 3.0 mt of salmon. In 2004 to present, designates of the LMN negotiated a subsistence fishery of 10 mt with the DFO in the area between Fish Cove Point and Cape St. Charles, located in SFA 2.

Harvests of salmon also occurred in the recreational angling fishery in Labrador. In 2001, as part of the 2001-05 Management Plan, several additional rivers in southern Labrador crossed by the new Trans Labrador Highway were added to the list of scheduled rivers and restricted to individual bag limits of two small salmon retained. In 2006-09 bag limit remained the same.

In order to identify legally caught salmon, fishers and anglers were issued tags to attach through the mouth and gills of retained salmon. See Table 1 for harvest limits, fishing area and fishing season from 2006 to 2009 for each fishery. The purpose of this paper is to document; the returns of small and large salmon to four index rivers, the harvests of salmon in four subsistence fisheries and the recreational angling fishery in Labrador for 2006-09.

METHODS

TOTAL SALMON (ID) RETURNS TO RIVERS

English River in northern Labrador and Sand Hill River, Muddy Bay and Southwest Brook in southern Labrador were used as index rivers for salmon stocks. The same sites were used for all years; although, the installation and removal times were different.

All counting fences consisted of sections (each 3 m long) which were installed according to the description in Anderson and McDonald (1978). The fence was constructed of conduit and channel iron, supported by steel posts and 5 cm x 15 cm wooden supports similar to other portable counting fences used in Newfoundland and Labrador. The fence was operated with every conduit in place so that smaller sea trout and Arctic charr could be included in the counts.

Once the counting fence was completely installed and operational, enumeration began by manually counting and then releasing the fish to the upstream side of the standard fish trap. Distinction between large and small salmon and charr was made by comparison to a known measure placed in the bottom of the fish trap. Large salmon were defined as those salmon with a fork length equal to or greater than 63 cm and small salmon were those less than 63 cm. For Arctic Charr, large charr were defined as those charr with a fork length equal to or greater than 40 cm and small charr were those less than 40 cm. All other fish species encountered in the trap were also enumerated.

SMOLT ESTIMATE

Smolt wheels were installed on Sand Hill River and mark-recapture experiments were carried out to provide an accurate population estimate. The smolts in the marking wheel were tagged being careful to avoid mortalities. The smolt were then placed in a fish recovery tank, that was kept at ambient river water temperature at all times, before putting them back in the river. The recapture of marked fish at the recapture wheel was then used to calculate a fairly reliable population estimate.

SUBSISTENCE FISHERIES

There were four subsistence fisheries harvesting salmonids in Labrador from 2006 to 2009: 1) Labrador residents fishing in coastal communities in northern Labrador from Davis Inlet to Cape Chidley, Lake Melville and coastal communities in southern Labrador from Cartwright to Cape St. Charles; 2) Nunatsiavut Government beneficiaries fishing in the northern Labrador coastal communities of Rigolet, Makkovik, Hopedale, Postville, Nain and in Lake Melville; 3) Innu Nation members fishing in Natuashish and in Lake Melville from the community of Sheshatshiu; and, 4) Labrador Métis Nation members fishing in southern Labrador from Fish Cove Point to Cape St. Charles.

For the NG, LMN and resident fisheries, 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. Furthermore, there is a limit of one designate or licence holder per household. Catch statistics were derived from logbooks issued to each fisher. The Innu Nation guardians collected catch statistics by maintaining a daily record of landings per family. Total catches were estimated by adjusting the logbook catches proportionately to the number of fishers reporting out of the total designated/licenced.

Total food fisheries landings for Atlantic salmon in Labrador for SFA 1, 2, and all areas are in Table 2.

ANGLING FISHERIES

Catch and effort data from the angling fishery in northern (SFA 1) and southern Labrador (SFA 2) were collected by DFO enforcement staff in conjunction with angling reports submitted by commercial sports camp operators and processed by DFO Science Branch (see Tables 3a-3d). Procedures for the collection and compilation of angling and commercial fishery data are described by Ash and O'Connell (1987). For purposes of separating 1SW salmon from 2SW salmon in angling fisheries, small salmon are defined as those salmon less than 63 cm and will be mainly 1SW (grilse) in age. Large salmon are those salmon equal to or greater than 63 cm and will be mainly 2SW and older in age. A rod day is any day or portion of a day during which fishing takes place.

In 1994, a new system, viz. the License Stub Return System (LSRS) was initiated for collecting angling statistics in Newfoundland and Labrador. It is based on attaching to the provincial angling licence a detachable stub upon which the angler can record details of where and when the fishing activity took place and the numbers of small and large salmon caught and released. The catch per unit effort (CPUE) is calculated by dividing the catch data (salmon retained + released) by the effort expenditure (the number of rod days) of the angler (O'Connell et al. 1998).

The lack of comparability of DFO angling statistics and the LSRS was a concern, therefore, the data collected by the Conservation and Protection (C&P) staff and the camp operator data will continue to be used for Labrador in SFA 1. For SFA 2, a blend of LSRS and camp operator data was used; whereby camp operator data was continued for Eagle and Sand Hill rivers and LSRS data for all other rivers. The retained catches reported by these two methods were similar. For SFA 14B rivers, the catch statistics for 1996-2005 were derived from the License Stub Return System.

The management plans for the four subsistence fisheries and the recreational fishery as they pertain to salmon for 2006 to 2009 are found in Table 1.

ENVIRONMENTAL DATA

Environmental data consisting of water flow conditions are collected annually from a system of gauging stations set on various rivers which are operated by Environment Canada. Several of these stations have automated data collection platforms with provision for downloading data via satellite. The Province of Newfoundland and Labrador through the Department of Environment and Labour is responsible for downloading the data and provides it in near-real time; albeit with no quality control. Data are archived by Environment Canada after quality control and made available from the Environment Canada Hydat System. Flow data from Alexis, Eagle, Naskaupi, and Ugjoktok rivers were selected to be representative of conditions on Labrador salmon rivers in 2006-09. (see Figs. 3a to 3d)

RESULTS AND DISCUSSION

NORTHERN LABRADOR (SFA 1)

Total Returns

The counting fence at English River has been in operation since 1999 (Reddin et al. 2008). Using the returns from 2009 as a comparison, small salmon returns have been on a decreasing trend since 2007and are below the previous 5 year mean. Large salmon returns however, have shown an increase since 2007 having doubled over 2008 returns. Returns of both small and large salmon for all its years of operation are shown in Fig. 2a.

Smolt to adult survival

Smolt counts were not conducted in Northern Labrador.

Percent of Conservation Requirement Achieved

English River has surpassed the conservation requirement each year since and including 2006. The conservation requirement met in 2009 was 117 % which was the highest met over the 11 years of operation.

Harvests

In Northern Labrador, Atlantic salmon were harvested from the resident fishery as by catch, and from the FSC fishery as well as recreational angling.

There is a subsistence resident fishery which is a trout net fishery with a by-catch of 4 salmon and two aboriginal fisheries for FSC purposes by the Nunatsiavut Government beneficiaries who fish in LISA (Labrador Inuit Settlement Area) and Upper Lake Melville. The Innu Nation also fish in Upper Lake Melville.

In Northern Labrador (SFA 1) numbers of small Atlantic salmon harvested ranged from 3,964 to 5,422 with weights of 8,173 kg to 11,189 kg over the years 2006 to 2009. The numbers of large Atlantic salmon harvested ranged from 1,560 to 2,955 with weights of 5,314 kg to13,627 kg.

In Northern Labrador (SFA 1) numbers of charr harvested ranged from 9,313 to 2,409 with weights of 14,789 kg to 3,190 kg over the years 2006 to 2009. The numbers of trout harvested ranged from 11,384 to 7,406 with weights of 10,326 kg to 6,457 kg.

Harvests of salmon and charr/trout in SFA 1 for 2006 to 2009 are in Tables 4a and 4b.

In the 2009 recreational fishery there was an overall total of 1479 salmon with 255 being retained and 1224 released in SFA 1. The overall totals for the previous 3 years were greater than 2009 by 2 to 17 %, while the mean CPUE of the previous 12 years was 1.39 and less than the CPUE in 2009 by 15 % (Table 3a).

Environmental Conditions

The water flow rate in the Ugjoktok River was used as a representative of the condition of Labrador salmon rivers in Northern Labrador (Fig. 4a). In 2006, water flow rates began to decreased in early June with a slight increase during the third week in June and early July and continued to decrease slowly until early August to the mid or third week in August when it reached Maximum levels. For then into the fall water flow rates steadily decreased into the Fall. In 2007, except for a slight increase in early July there was a steady decline from maximum levels until mid-August when water flow levels stayed at minimum levels until the end of August when flow rate increases until the third week in September to maximum levels, then decreasing into the fall. In 2008, water flow rates in early June were similar to minimum levels until the third week in June there was a slight increase. Water flow rate stayed between mean and minimum levels for the remainder of the summer decreasing to minimum levels into the fall. In 2009, water flow rate remained high throughout the month of June and steadily decreased throughout the month of July. Flow rate then remained similar, being close to minimum levels for the month of August and decreased to minimum levels into the fall.

The water flow rate in the Naskaupi River was used as a representative of the condition of Labrador salmon rivers in Lake Melville (Fig. 4b). In 2006, water flow rates began to decrease steadily from maximum water levels in mid-May until around the third week in June when there was a small increase in until the end of June for the remainder of the summer water flow rates were near mean water flow rates then decreasing close to minimum levels from mid-August into

the fall. In 2007, water flow rates began to decline in mid-June remaining stable for most of the first week in July and then continued declining until mid-Aug. At the end of August water flow rates began to increase until after the third week in September when it reached maximum levels and then began to slowly decrease into the fall. In 2008, water flow rate began to decrease at mid-May, reaching minimum levels at the beginning of June and continuing at this level until the third week in June when it became close to mean water flow rates until the first week in August when it began to decrease again reaching minimum levels after the first week of September and continued to decrease into the fall. In 2009, water flow rates began to decrease during the first week in June continuing on this trend and reaching minimum levels in mid-July and then remaining near minimum levels into August with a very slight increase during the first week of September then staying near minimum levels into the fall.

SOUTHERN LABRADOR (SFA 2)

Total Returns

The counting fence at South West Brook has been in operation since 1998 with the exception of 2000 (Reddin et al. 2008).The year 2009 had the lowest return of small salmon on record at 67. The previous 6 year mean shows a decrease in 2009 by 86 %. Large salmon returns show a similar trend with 13 salmon returning in 2009 being the lowest return since 1998. The previous 6 year mean shows a decrease in 2009 by 65 %. Returns of both small and large salmon for all its years of operation are shown in Fig. 2b.

The counting fence at Muddy Bay Brook has been in operation since 2002 (Reddin et al. 2008). Using the returns from 2009 as a comparison both small and large returns have decreased over 2008. Small salmon returns have decreased by 73 % from the mean between 2003 and 2008. Large salmon are actually the lowest on record and have decreased by 59 % over the previous 6 year mean. Returns of both small and large salmon for all its years of operation are shown in Fig. 2c.

The counting fence at Sand Hill River has been in operation in the 70's, 90's and since 2002 (Reddin et al. 2008). Using the returns from 2009 as a comparison, small salmon returns were the lowest on record. Large salmon returns in 2009 were similar to the 2008 returns and the 2003-08 mean (< 10 %) , however, when compared to the 1970-73, and 1994-96 means the large salmon returns have increased by 167 %, 27 %, respectively. Returns of both small and large salmon at Sand Hill for all its years of operation are shown in Fig. 2d.

Smolt to Adult Survival

Smolt counts on Sand Hill River were conducted in 2007-09 to provide and accurate population estimate. There were also earlier counts in 1970-73. The number of smolts in recent years were higher than in previous years. The smolt count in 2007 was the highest number being 80,994. In 2008, the smolt count decreased to 62,985 and in 2009 it was 59,661. From the smolt counts the smolt survival of small and large salmon was calculated. The proportion of the 2007 smolts surviving were 0.06 small and 0.009 large. In 2008, the proportion of smolts surviving decreased to 0.03 small (Figs. 3a and 3b).

Percent of Conservation Requirement Achieved

South West Brook surpassed the conservation requirement 7out of the 11 years of operation. The percent conservation requirement met in 2009 was 26 which were the lowest of all the years of operation.

Muddy Bay Brook surpassed the conservation requirement 5out of the 8 years of operation. The conservation requirement was not met in 2009 being 46 % which was the second lowest of all the years of operation.

Sand Hill River surpassed conservation requirements in 2006 and 2008. In 2009 only 59 % of the CR was met which is the lowest on record when comparing it with 1994-96 and 2002-08.

Harvests

In Southern Labrador, Atlantic salmon were harvested from the resident fishery as by catch, and from the FSC fishery as well as recreational angling.

There is a subsistence resident fishery which is a trout net fishery with a by-catch of 4 salmon and also an aboriginal fishery for FSC purposes by the Labrador Metis Nation members who fish in Southern Labrador.

In southern Labrador (SFA 2) numbers of small Atlantic salmon harvested ranged from 4,024 to 4,955 with weights of 7,956 kg to 10,008 kg over the years 2006 to 2009. The numbers of large Atlantic salmon harvested ranged from 954 to 1,451 with weights of 3,349 kg to 5,193 kg. However, in 2009 there were 1,437 large salmon with a total weight of 5,449 kg.

In Southern Labrador (SFA 2) numbers of charr harvested ranged from 3,738 to 2,168 with weights of 3,831 kg to 2,495 kg over the years 2006 to 2009. The numbers of trout harvested ranged from 3,766 to 2,119 with weights of 3,206 kg to 1,888 kg.

Harvests in SFA 2 for 2006 to 2009 are found in Tables 4a and 4b.

In 2009, there was an overall total of 3380 salmon with 1024 retained and 2356 released in the recreational fishery. The overall total for the previous 3 years were greater than in 2009 by 23 to 64 %. The mean CPUE of the previous 12 years was 1.15 which is greater than the CPUE in 2009 by 22 % (Table 3b).

Environmental Conditions

Daily water flow rates for the Alexis River in 2006 indicates that for most of the summer water flow rates were low being similar to the minimum daily water flows (see Figure 4d). The water flow never reached maximum rates throughout the summer and continued to be low into the fall. In 2007, water flow rates decreased in early June and stayed at minimum levels until an increase near the end of June. For the remainder of the summer water flow rates were variable reaching maximum levels twice in the last two weeks in August, in early and mid-September. In 2008, water flow rates were near minimum levels until a small increase near the end of August. Daily flow rates remained low until mid-September and early October when the daily water flow rates increased to maximum levels. In 2009, water flow rates were close to minimum levels with a couple of slight increases at the end of July early August and the end of August. Daily water flow rates increased to maximum levels in mid-September and decreasing into the Fall.

Eagle River daily water flow rates can be seen in Fig. 4d. In 2006, water levels were close to minimum levels until the beginning of August there was a slow but continual increase until mid-August then a slow decline of water flow rate to minimum levels in mid-September that continued into the Fall. In 2007, Water flow was close to mean values reaching maximum rates at the end of August then decreasing to mean flows into the Fall. In 2008, from early June to mid-August flow rates were near minimum levels. Water flow rate then increased quickly near the end of August reaching maximum rates then decreasing close to minimum levels again in mid-September. Water flow rate then increased two more times in September and October. In 2009, water flow levels steadily decline from early June to the third week in July at which time there was a small increase with a steady decline until the end of August. Water flow rates then

increased reaching maximum levels near the end of September and steadily decreased into the Fall.

LABRADOR STRAITS (SFA 14 B)

Total Returns

There were no counting fence projects in the Labrador Straits (SFA 14B) between 2006 and 2009.

Smolt to Adult Survival

Smolt counts were not conducted in the Labrador Straits.

Percent of Conservation Requirement Achieved

No information available to determine the Percent Conservation Requirement Achieved in the Labrador Straits (SFA 14B) between 2006 and 2009.

Harvests

In the Labrador Straits, Atlantic salmon were harvested from recreational angling only.

In 2009, there was an overall total of 989 salmon with 179 retained and 810 released. The overall total for the previous 3 years were greater than 2009 by 97 % to 147 %. The mean CPUE of the previous 12 years was 0.74 which is greater than the CPUE in 2009 by 40 %.

LABRADOR (SFAS 1, 2, 14B)

Total Returns

Returns of small salmon decreased in 2009 from the 2008 returns at all four counting facilities. Returns of Large salmon decreased in 2009 from the 2008 returns at two counting facilities, increased at one and remained similar on the other.

Smolt to Adult Survival

Smolt counts were conducted at one site, Sand Hill River, in Labrador.

Percent of Conservation Requirement Achieved

Conservation requirements were met on one of the four index rivers.

Harvests

In total, there were 13,743 Atlantic salmon with a total weight of 36,361 kg reported to be harvested in 2008, the largest harvest over the period from 2006 to 2009.

In total, there were 13,051 charr with a total weight of 18,619 kg and there were 15,151 brook trout with a total weight of 13,532 kg reported to be harvested in 2008, the largest harvest over the period from 2006 to 2009.

Harvests in Labrador from subsistence fishing for 2006 to 2009 are found in Tables 4a and 4b.

In 2009, there was an overall total of 5848 salmon with 1458 retained and 4390 released in the recreational fishery. The overall total for the previous 3 years were greater than in 2009 by 34 to 63 %. The mean CPUE of the previous 12 years was 1.03 which is greater than the CPUE in 2009 by 12 % (Table3d).

SUMMARY AND CONCLUSIONS

Returns of salmonids to rivers in Labrador should continue to be monitored for conservation purposes. Log returns from fish harvesters should continue to provide catch of salmon, charr and trout and efforts to increase log return rates considered.

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Table 1. FSC ,subsistence and recreational fishery harvest limits, fishing area and fishing season from 2006 to 2009.

GROUP	HARVEST LIMITS	FISHING AREA	FISHING SEASON
Nunatsiavut Government	10mt	Labrador Inuit Land Claims Area (LILCA)	May 15 to Aug 31, 2006
		Upper Lake Melvile *Kenamu closesd: July 29, 2006*	Jun 1 to Jul 9 and Jul 19 to Aug 15, 2006
	negotiated annually between DFO and the NG	Labrador Inuit Settlement Area (LISA)	Jun 15 to Aug 31, 2007 Jun 15 to Aug 31, 2008 Jun 15 to Aug 31, 2009
		Upper Lake Melvile *Kenamu closesd: July 28, 2007, July 26, 2008, July25, 2009*	Jun 15 to Jul 9 and Jul 19 to Aug 15, 2007 Jun 15 to Jul 9 and Jul 19 to Aug 31, 2008 Jun 15 to Jul 9 and Jul 19 to Aug 31, 2009
Innu Nation	3.0mt	Fish Cove Point north to Cape Harrison, including Lake Melville and the inland waters of Little Lake and Grand Lake in Upper Lake Melville. *Kenamu closesd: July 29, 2006, July 28, 2007, July 26, 2008, July 25, 2009*	May 14 to Sept 15, 2006 May 15 to Sept 15, 2007 May 15 to Sept 15, 2008
Labrador Métis Nation	10mt	Fish Cove Point to Cape Charles	Jul 7 to Aug 15, 2006 Jul 6 to Aug 15, 2007 Jul 7 to Aug 16, 2008 Jul 6 to Aug 15, 2009
Resident	4 Salmon per Licence Holder	Davis Inlet north to Cape Chidley	Jun 30 to Jul 22, 2006 Jun 29 to Jul 21, 2007 Jun 30 to Jul 23, 2008 Jun 29 to Jul 22, 2009
		Cape Rouge north to Davis Inlet	Jun 16 to Jul 8, 2006 Jun 15 to Jul 7, 2007 Jun 16 to Jul 9, 2008 Jun 15 to Jul 8, 2009
		Cape Rouge south to Fish Cove Point including Lake Melville *Kenamu closesd: July 29, 2006, July 28, 2007, July 26, 2008, July 25, 2009*	Jun 16 to Jul 3 and Jul 21 to Aug 5, 2006 Jun 8 to Jul 2 and Jul 20 to Aug 4, 2007 Jun 9 to Jul 3 and Jul 21 to Aug 5, 2008 Jun 8 to Jul 2 and Jul 20 to Aug 4, 2009
		Fish Cove Point south to Cape Charles	Jul 10 to Jul 29, 2006 Jul 9 to Jul 28, 2007 Jul 9 to Jul 28, 2008 Jul 8 to Jul 27, 2009
Anglers	Unclassified: 4 Salmon one of which can be large Class II: 4 Salmon Class III: 2 Salmon Hook & release limits: 4 per day	Zone 1 Labrador North, Zone 2 Labrador East and Zone 14B L'aunse au Clair to Cape Charles *Angling not permitted in Makkovik Brook* at any time of the year. (2007, 2008, 2009)	Jun 15 to Sept 15, 2006 Jun 15 to Sept 15, 2007 Jun 15 to Sept 15, 2008 Jun 15 to Sept 15, 2009

Table 2. Total food fisheries landings for Atlantic salmon in Labrador for SFA 1, 2, and all areas. The number and weight (kg) of small and large salmon are provided from 1999 to 2009 for SFA 1, and from 2000 to 2009 for SFA 2.

	Small salmon		Large salmon		Total	
	Number	Weight (kg)	Number	Weight (kg)	Number	Weight (kg)
SFA 1						
1999	2,739	5,580	1,084	4,220	3,824	9,800
2000	4,111	8,111	1,092	4,365	5,203	12,474
2001	3,394	6,995	1,299	5,121	4,708	12,117
2002	3,609	7,386	1,015	4,441	4,624	11,827
2003	4,382	9,094	1,639	7,026	6,021	16,120
2004	4,822	10,038	2,210	8,656	7,032	18,694
2005	4,958	10,116	1,687	6,930	6,644	17,046
2006	5,422	11,189	1,639	6,330	7,061	17,519
2007	4,700	8,306	1,560	5,314	6,261	13,619
2008	5,154	10,342	2,955	13,627	8,109	23,968
2009	3,964	8,173	1,907	8,232	5,871	16,405
SFA 2						
1999	-	-	-	-	-	-
2000	1,212	2,242	260	897	1,472	3,139
2001	1,396	2,793	374	1,378	1,770	4,172
2002	2,197	4,196	422	1,549	2,619	5,745
2003	2,095	4,102	536	1,885	2,632	5,987
2004	3,480	7,166	1,450	5,480	5,050	12,852
2005	5,479	10,922	1,130	3,946	6,609	14,868
2006	4,955	10,008	1,451	5,193	6,406	15,201
2007	4,507	8,764	1,092	4,073	5,599	12,837
2008	4,680	9,044	954	3,349	5,634	12,393
2009	4,024	7,956	1,437	5,449	5,461	13,405
All areas						
1999	2,739	5,580	1,084	4,220	3,824	9,800
2000	5,323	10,353	1,352	5,262	6,675	15,613
2001	4,789	9,789	1,673	6,499	6,478	16,288
2002	5,806	11,581	1,437	5,990	7,243	17,572
2003	6,477	13,196	2,175	8,912	8,653	22,108
2004	8,302	17,204	3,660	14,136	12,081	31,546
2005	10,436	21,038	2,817	10,876	13,253	31,914
2006	10,377	21,198	3,090	11,523	13,467	32,721
2007	9,208	17,070	2,652	9,386	11,860	26,456
2008	9,834	19,386	3,909	16,975	13,743	36,361
2009	7,988	16,130	3,344	13,681	11,332	29,810

Table 3a. Atlantic salmon recreational fishery catch and effort data for Salmon Fishing Area 1, Labrador, 1974-2006. Ret. = retained fish; Rel = released fish.

	Effort	Small (<63 cm)			Large (≥63 cm)			Total (Small + Large)			
Year	Rod Days	Ret.	Rel.	Tot.	Ret.	Rel.	Tot.	Ret.	Rel.	Tot.	CPUE
1984	1074	702	.	702	222	.	222	924	.	924	0.86
1985	946	642	.	642	135	.	135	777	.	777	0.82
1986	741	421	.	421	129	.	129	550	.	550	0.74
1987	1011	854	.	854	141	.	141	995	.	995	0.98
1988	1629	1278	.	1278	171	.	171	1449	.	1449	0.89
1989	1296	1269	.	1269	144	.	144	1413	.	1413	1.09
1990	1245	563	.	563	115	.	115	678	.	678	0.54
1991	1056	130	.	130	8	.	8	138	.	138	0.13
1992	899	283	29	312	335	0	335	618	29	647	0.72
1993	422	121	124	245	22	25	47	143	149	292	0.69
1994	1036	453	933	1386	114	96	210	567	1029	1596	1.54
1995	880	500	854	1354	92	97	189	592	951	1543	1.75
1996	879	260	62	322	50	17	67	310	79	389	0.44
1997	1266	300	133	433	46	25	71	346	158	504	0.40
1998	813	256	448	704	61	109	170	317	557	874	1.08
1999	954	350	353	703	109	97	206	459	450	909	0.95
2000	1103	363	801	1164	79	232	311	442	1033	1475	1.34
2001	962	352	681	1033	75	130	205	427	811	1238	1.29
2002	651	129	482	611	28	140	168	157	622	779	1.20
2003	1032	174	777	951	36	633	669	210	1410	1620	1.57
2004	768	116	1152	1268	24	582	606	140	1734	1874	2.44
2005	986	192	1044	1236	36	192	228	228	1236	1464	1.48
2006	961	170	1156	1326	28	357	385	198	1513	1711	1.78
2007	907	185	1276	1461	36	240	276	221	1516	1737	1.92
2008	931	153	890	1043	34	438	472	187	1328	1515	1.63
2009	907	207	877	1084	48	347	395	255	1224	1479	1.63

	Effort	Small (<63 cm)			Large (≥63 cm)			Total (Small + Large)			
Year	Rod Days	Ret.	Rel.	Tot.	Ret.	Rel.	Tot.	Ret.	Rel.	Tot.	CPUE
84-91 X	1125	732	.	732	133	.	133	866	.	866	0.77
95% CL	223	331	.	331	50	.	50	365	.	365	0.25
N	8	8	0	8	8	0	8	8	0	8	8
92-96 X	823	323	400	724	123	47	170	446	447	893	1.09
95% CL	290	191	562	733	154	57	145	260	618	783	0.76
N	5	5	5	5	5	5	5	5	5	5	5
97-08 X	945	228	766	994	49	265	314	278	1031	1308	1.39
95% CL	100	58	228	203	17	125	117	73	319	280	0.35
N	12	12	12	12	12	12	12	12	12	12	12

IN THE ABOVE TABLE A PERIOD INDICATES NO DATA FOR THAT YEAR.

CPUE IS BASED ON RETAINED + RELEASED FISH FOR 1992 - 2009 AND ON RETAINED FISH ONLY PRIOR TO 1992.

Table 3b. Atlantic salmon recreational fishery catch and effort data for Salmon Fishing Area 2, Labrador, 1974-2009. Ret. = retained fish; Rel = released fish. 2009 data are preliminary.

		Effort		Small (<63 cm)		Large (cm)		Total (Small + Large)			
Year	Rod Days	Ret.	Rel.	Tot.	Ret.	Rel.	Tot.	Ret.	Rel.	Tot.	CPUE
1994	3296	1437	2242	3679	263	201	464	1700	2443	4143	1.26
1995	3221	1232	2005	3237	234	256	490	1466	2261	3727	1.16
1996	3966	1405	2591	3996	210	324	534	1615	2915	4530	1.14
1997	3688	1335	1293	2628	112	123	235	1447	1416	2863	0.78
1998	3941	1011	2201	3212	170	354	524	1181	2555	3736	0.95
1999	4529	1329	3229	4558	211	496	707	1540	3725	5265	1.16
2000	5332	1480	4169	5649	183	461	644	1663	4630	6293	1.18
2001	4635	1151	2984	4135	263	891	1154	1414	3875	5289	1.14
2002	4754	1328	3050	4378	179	377	556	1507	3427	4934	1.04
2003	3885	1274	3022	4296	186	398	584	1460	3420	4880	1.26
2004	4786	1228	3836	5064	235	698	933	1463	4534	5997	1.25
2005	4653	1377	4273	5650	255	574	829	1632	4847	6479	1.39
2006	3240	977	3258	4235	199	395	594	1176	3653	4829	1.49
2007	3539	1088	2492	3580	199	385	584	1287	2877	4164	1.18
2008	5349	1247	3469	4716	166	676	842	1413	4145	5558	1.04
2009	3588	854	1714	2568	170	642	812	1024	2356	3380	0.94

		Effort		Small (<63 cm)		Large (cm)		Total (Small + Large)			
Year	Rod Days	Ret.	Rel.	Tot.	Ret.	Rel.	Tot.	Ret.	Rel.	Tot.	CPUE
1994-2008 mean	4188	1260	2941	4201	.	441	645	1464	3382	4846	1.16
95% CL	402	83	457	479	.	112	123	88	538	563	0.09
N	15	15	15	15	.	15	15	15	15	15	15
1994-2008 mean	4313	1183	3466	4649	.	546	756	1394	4011	5405	1.25
95% CL	1104	192	828	980	.	186	196	216	963	1144	0.22
N	5	5	5	5	.	5	5	5	5	5	5

IN THE ABOVE TABLE A PERIOD INDICATES NO DATA FOR THAT YEAR.

CPUE IS IN TERMS OF SMALL AND LARGE SALMON COMBINED (RETAINED + RELEASED FISH).

Table 3c. Atlantic salmon recreational fishery catch and effort data for Salmon Fishing Area 14B, Labrador, 1994-2009. Ret. = retained fish; Rel. = released fish. 2009 data are preliminary.

		Effort		Small (<63 cm)		Large (cm)		Total (Small + Large)			
Year	Rod Days	Ret.	Rel.	Tot.	Ret.	Rel.	Tot.	Ret.	Rel.	Tot.	CPUE
1994	4117	659	506	1165	78	50	128	737	556	1293	0.31
1995	3618	761	443	1204	82	155	237	843	598	1441	0.40
1996	4348	900	1123	2023	74	148	222	974	1271	2245	0.52
1997	3440	730	761	1491	-	418	418	730	1179	1909	0.55
1998	3534	864	1109	1973	*	351	351	864	1460	2324	0.66
1999	2109	397	825	1222	*	338	338	397	1163	1560	0.74
2000	4210	718	2125	2843	*	753	753	718	2878	3596	0.85
2001	2389	546	975	1521	*	447	447	546	1422	1968	0.82
2002	3346	614	1520	2134	*	461	461	614	1981	2595	0.78
2003	3136	664	1125	1789	*	295	295	664	1420	2084	0.66
2004	2748	464	980	1444	*	239	239	464	1219	1683	0.61
2005	2860	438	1803	2241	*	524	524	438	2327	2765	0.97
2006	2542	509	1401	1910	*	381	381	509	1782	2291	0.90
2007	3484	489	863	1352	*	597	597	489	1460	1949	0.56
2008	2745	536	1558	2094	*	347	347	536	1905	2441	0.89
2009	1865	179	500	679	*	310	310	179	810	989	0.53

		Effort		Small (<63 cm)		Large (cm)		Total (Small + Large)			
Year	Rod Days	Ret.	Rel.	Tot.	Ret.	Rel.	Tot.	Ret.	Rel.	Tot.	CPUE
1994-2008 mean	3242	619	1141	1760	.	367	383	635	1508	2143	0.66
95% CL	375	85	259	262	.	101	89	96	335	323	0.11
N	15	15	15	15	.	15	15	15	15	15	15
2004-2008 mean	2876	487	1321	1808	.	418	418	487	1739	2226	0.77
95% CL	445	47	489	489	.	177	177	47	528	524	0.24
N	5	5	5	5	.	5	5	5	5	5	5

IN THE ABOVE TABLE A PERIOD INDICATES NO DATA FOR THAT YEAR

CPUE IS BASED ON RETAINED + RELEASED FISH

** NOT ALLOWED TO RETAIN LARGE SALMON IN ZONE 14B*

Table 3d. Atlantic salmon recreational fishery catch and effort data for Labrador (SFAs 1, 2, and 14B), 1974-2009. Ret. = retained fish; Rel. = released fish.

		Effort		Small (<63 cm)		Large (□63		Total (Small + Large)			
Year	Rod Days	Ret.	Rel.	Tot.	Ret.	Rel.	Tot.	Ret.	Rel.	Tot.	CPUE
1984	7128	2935	.	2935	510	.	510	3445	.	3445	0.48
1985	6366	3101	.	3101	294	.	294	3395	.	3395	0.53
1986	7694	3464	.	3464	467	.	467	3931	.	3931	0.51
1987	8754	5366	.	5366	633	.	633	5999	.	5999	0.69
1988	10211	5523	.	5523	710	.	710	6233	.	6233	0.61
1989	9177	4684	.	4684	461	.	461	5145	.	5145	0.56
1990	8927	3309	.	3309	357	.	357	3666	.	3666	0.41
1991	7500	2323	.	2323	93	.	93	2416	.	2416	0.32
1992	8342	2738	251	2989	781	10	791	3519	261	3780	0.45
1993	9318	2508	1793	4301	378	91	469	2886	1884	4770	0.51
1994**	8449	2549	3681	6230	455	347	802	3004	4028	7032	0.83
1995**	7719	2493	3302	5795	408	508	916	2901	3810	6711	0.87
1996**	9193	2565	3776	6341	334	489	823	2899	4265	7164	0.78
1997**	8394	2365	2187	4552	158	566	724	2523	2753	5276	0.63
1998**	8288	2131	3758	5889	231	814	1045	2362	4572	6934	0.84
1999**	7592	2076	4407	6483	320	931	1251	2396	5338	7734	1.02
2000**	10645	2561	7095	9656	262	1446	1708	2823	8541	11364	1.07
2001**	7986	2049	4640	6689	338	1468	1806	2387	6108	8495	1.06
2002**	8751	2071	5052	7123	207	978	1185	2278	6030	8308	0.95
2003**	8053	2112	4924	7036	222	1326	1548	2334	6250	8584	1.07
2004**	8302	1808	5968	7776	259	1519	1778	2067	7487	9554	1.15
2005**	8499	2007	7120	9127	291	1290	1581	2298	8410	10708	1.26
2006**	6743	1656	5815	7471	227	1133	1360	1883	6948	8831	1.31
2007**	7930	1762	4631	6393	235	1222	1457	1997	5853	7850	0.99
2008**	9025	1936	5917	7853	200	1461	1661	2136	7378	9514	1.05
2009**	6360	1240	3091	4331	218	1299	1517	1458	4390	5848	0.92

		Effort		Small (<63 cm)		Large (□63		Total (Small + Large)			
Year	Rod Days	Ret.	Rel.	Tot.	Ret.	Rel.	Tot.	Ret.	Rel.	Tot.	CPUE
84-91 X	8220	3838	.	3838	441	.	441	4279	.	4279	0.52
95% CL	1052	998	.	998	163	.	163	1138	.	1138	0.10
N	8	8	0	8	8	0	8	8	0	8	8
92-96 X	8604	2571	2561	5131	471	289	760	3042	2850	5891	0.68
95% CL	817	122	1883	1798	222	283	211	336	2146	1894	0.24
N	5	5	5	5	5	5	5	5	5	5	5
97-08 X	8351	2045	5126	7171	246	1180	1425	2290	6306	8596	1.03
95% CL	589	158	882	873	33	191	208	159	1036	1034	0.11
N	12	12	12	12	12	12	12	12	12	12	12

IN THE ABOVE TABLE A PERIOD INDICATES NO DATA FOR THAT YEAR.

CPUE IS BASED ON RETAINED + RELEASED FISH FOR 1992-2009 AND ON RETAINED FISH ONLY PRIOR TO 1992.

***1994-2009 DATA ARE A COMBINATION OF LICENSE STUB DATA, AND CAMP DATA.*

Table 4a: Harvests of Atlantic salmon in the subsistence and FSC (Food for Social and Ceremonial Purposes) Fishery for SFA 1, 2 from 2006 to 2009. Atlantic salmon harvests are divided into small (less than 6 lbs.) and large (6 lbs. and greater) and by number and weight (kg).

		Small Salmon		Large Salmon		Total	
Year	**SFA**	**Numbers**	**Weight (kg)**	**Numbers**	**Weight (kg)**	**Numbers**	**Weight (kg)**
2006	**1**	5,422	11,189	1,639	6,330	7,061	17,519
	2	4,955	10,008	1,451	5,193	6,406	15,201
	Total	**10,377**	**21,198**	**3,090**	**11,523**	**13,467**	**32,721**
2007	**1**	4,700	8,306	1,560	5,314	6,260	13,620
	2	4,507	8,764	1,092	4,073	5,599	12,837
	Total	**9,208**	**17,070**	**2,652**	**9,386**	**11,860**	**26,456**
2008	**1**	5,154	10,342	2,955	13,627	8,109	23,969
	2	4,680	9,044	954	3,349	5,634	12,393
	Total	**9,834**	**19,386**	**3,909**	**16,975**	**13,743**	**36,361**
2009	**1**	3,964	8,173	1,907	8,232	5,871	16,405
	2	4,024	7,956	1,437	5,449	5,461	13,405
	Total	**7,988**	**16,130**	**3,344**	**13,681**	**11,332**	**29,811**

Table 4b: Harvests of charr and trout in the subsistence and FSC (Food for Social and Ceremonial Purposes) Fishery for SFA 1, 2 from 2006 to 2009. Harvests are given by number and weight (kg).

		Charr		Trout	
Year	**SFA**	**Numbers**	**Weight (kg)**	**Numbers**	**Weight (kg)**
2006	**1**	3,675	7,246	8,712	7,320
	2	2,393	2,826	2,119	1,888
	Total	**6,068**	**10,072**	**10,831**	**9,208**
2007	**1**	2,409	3,190	7,591	6,281
	2	2,977	2,828	2,603	2,176
	Total	**5,386**	**6,018**	**10,194**	**8,457**
2008	**1**	9,313	14,789	11,384	10,326
	2	3,738	3,831	3,766	3,206
	Total	**13,051**	**18,620**	**15,150**	**13,532**
2009	**1**	6,736	11,020	7,046	6,457
	2	2,168	2,475	2,472	2,003
	Total	**8,904**	**13,495**	**9,518**	**8,460**

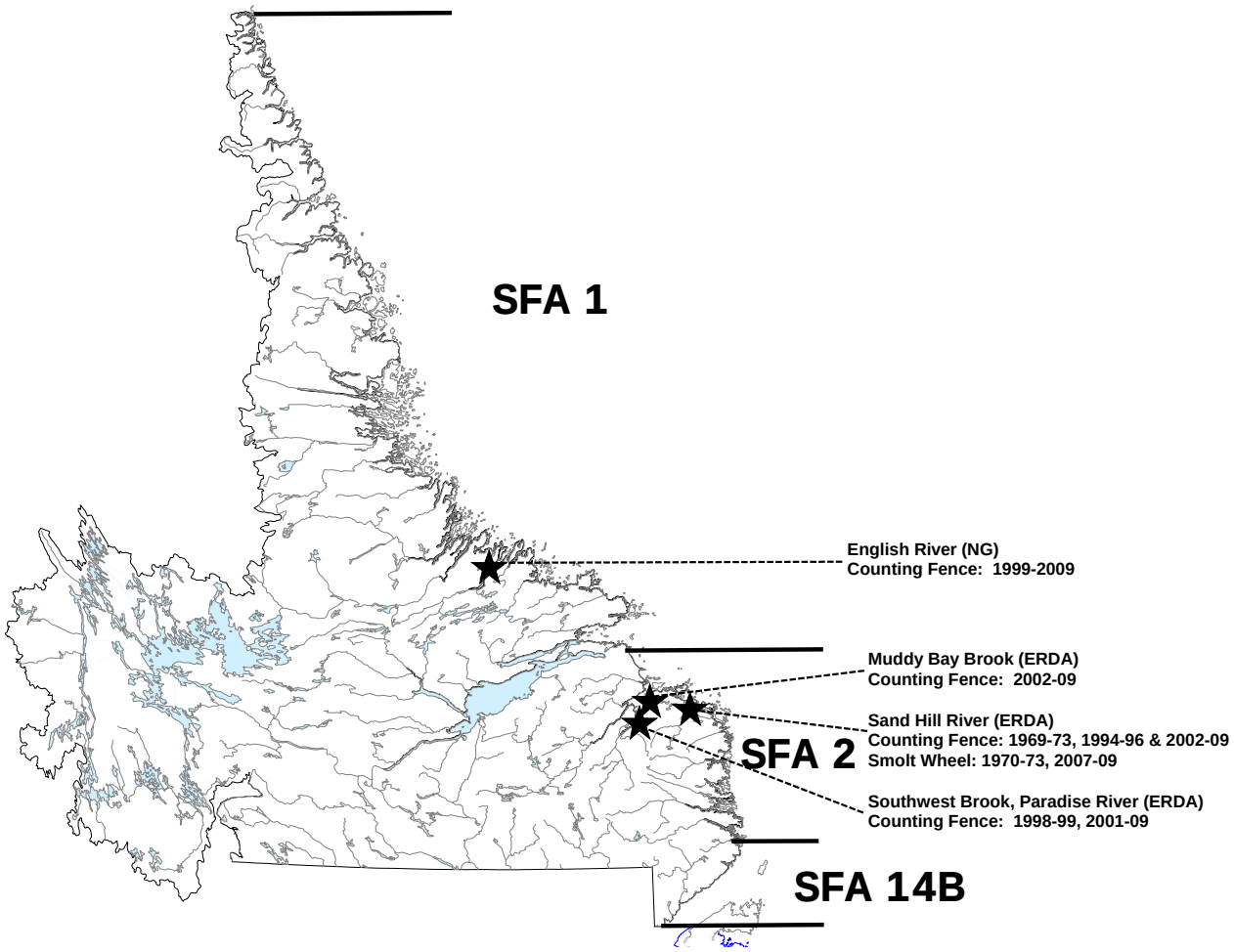

Figure 1. Map of Labrador showing Salmon Fishing Areas (SFA), general location and years of operation of counting fence projects.

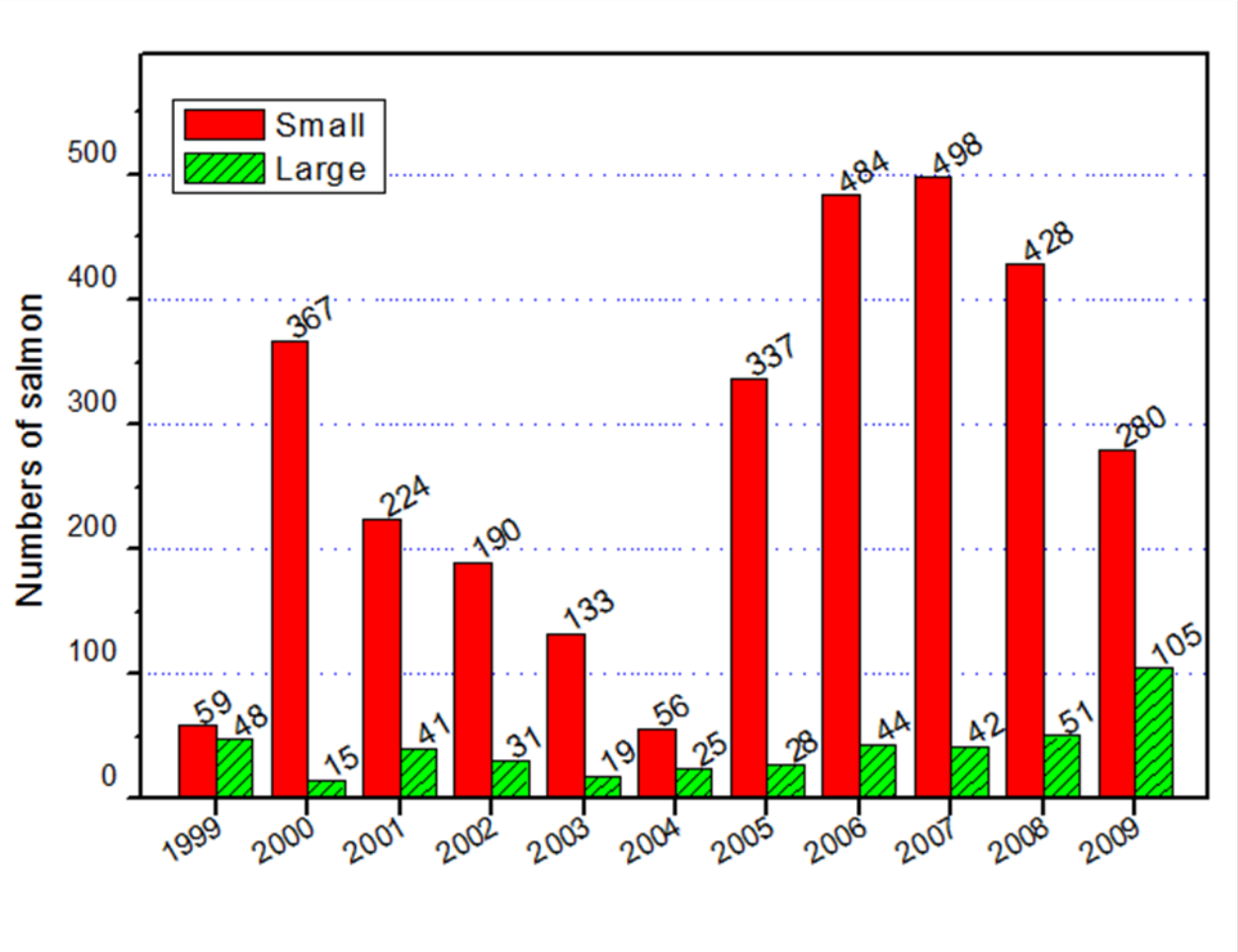

Figure 2a. Small and Large Atlantic salmon returns to English River, Labrador, 1999 to 2009.

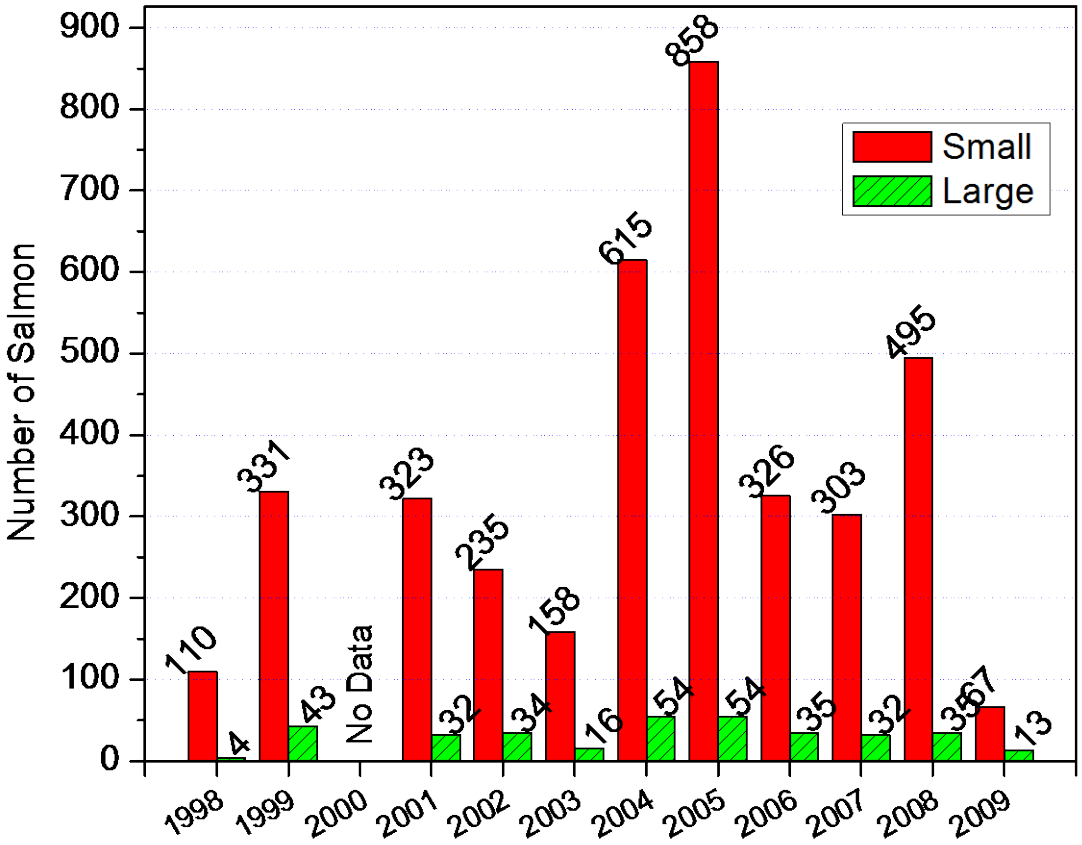

Figure 2b. Small and large Atlantic salmon returns to Southwest Brook, Paradise River, Labrador, 1998-2009. (No Data for 2000)

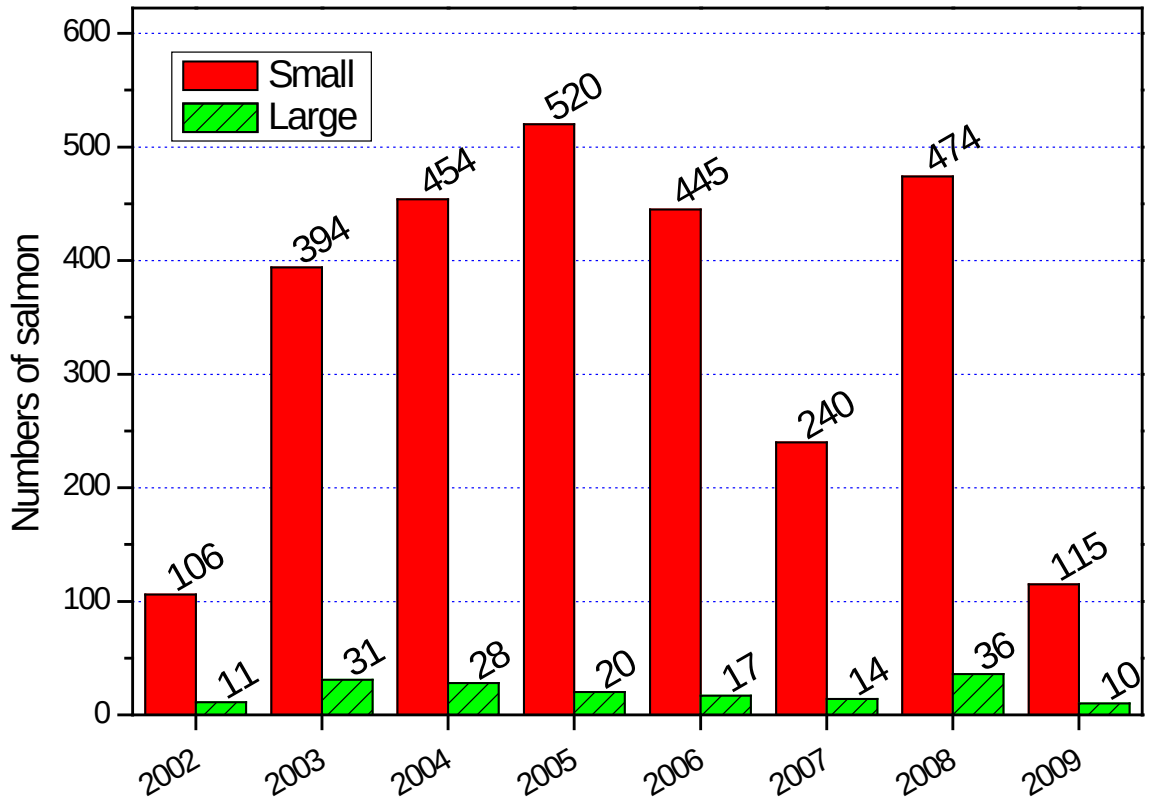

Figure 2c. Small and large Atlantic salmon returns to Muddy Bay Brook, Labrador, 2002-09.

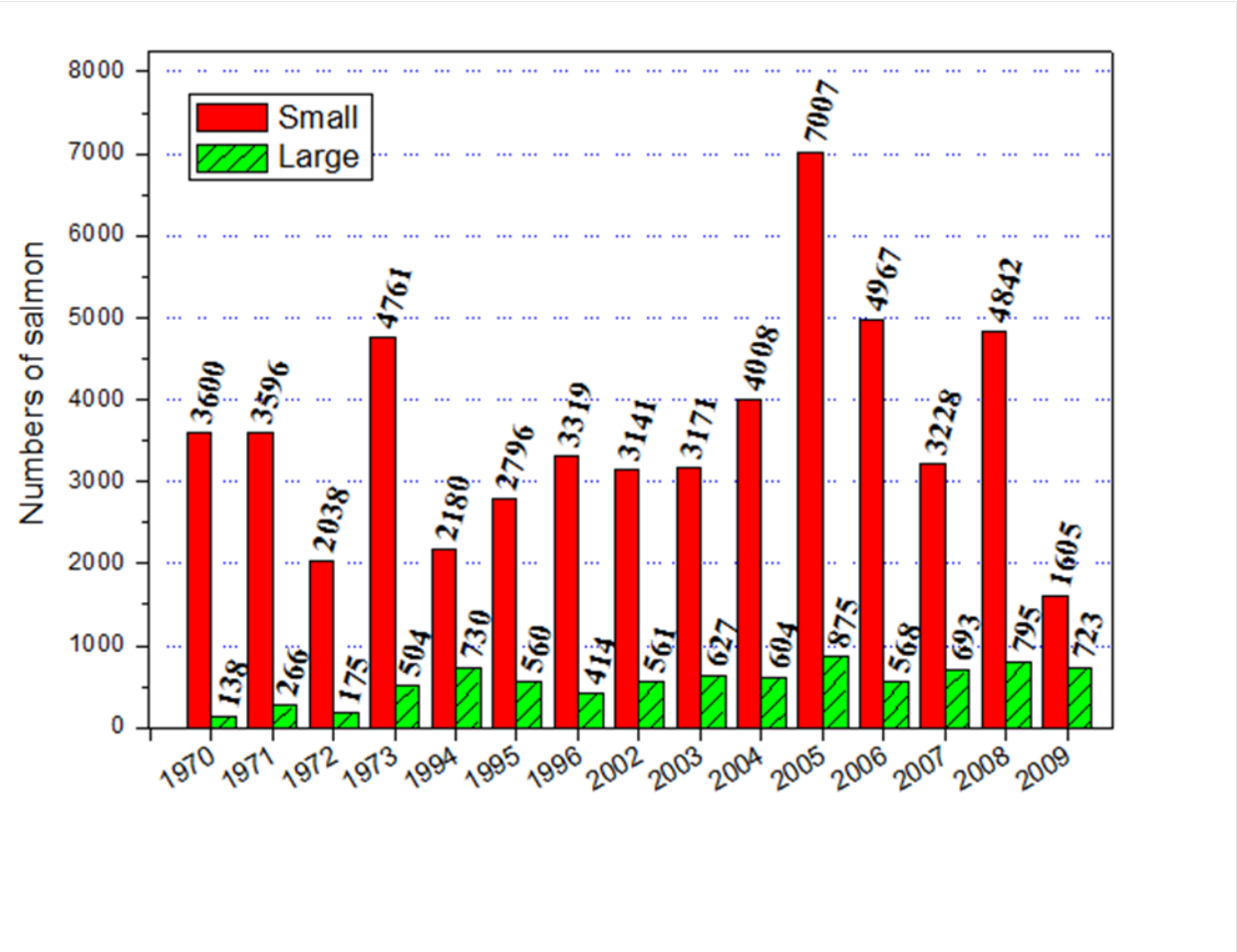

Figure 2d. Small and large Atlantic Salmon returns to Sand Hill River, Labrador, 1970-73, 1994-96, and 2002-09.

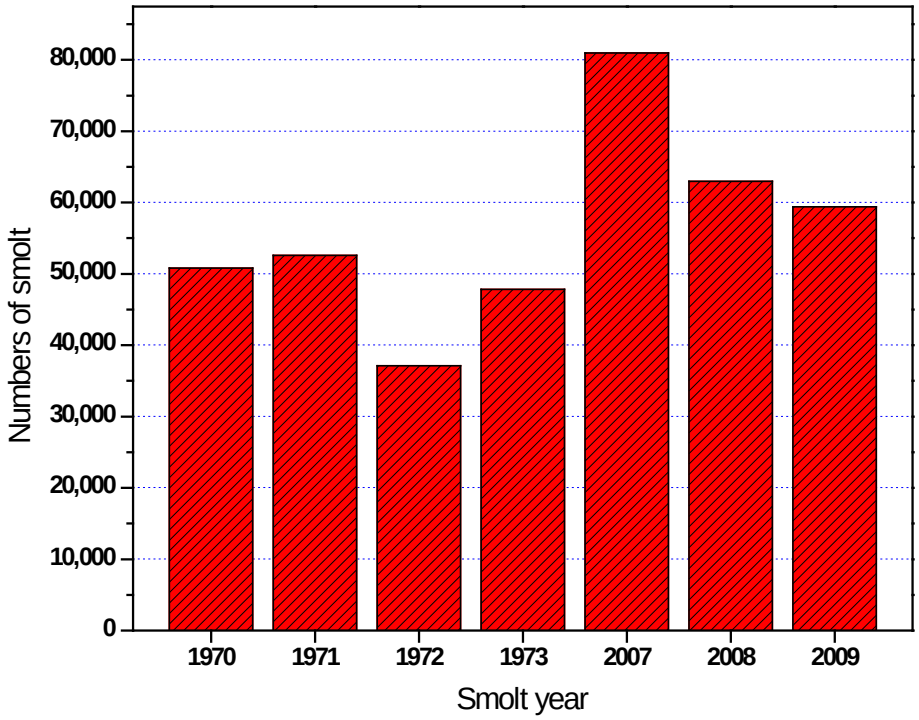

Figure 3a. The population estimate of Atlantic salmon smolt on Sand Hill River Labrador for 1970-73 and 2007-09.

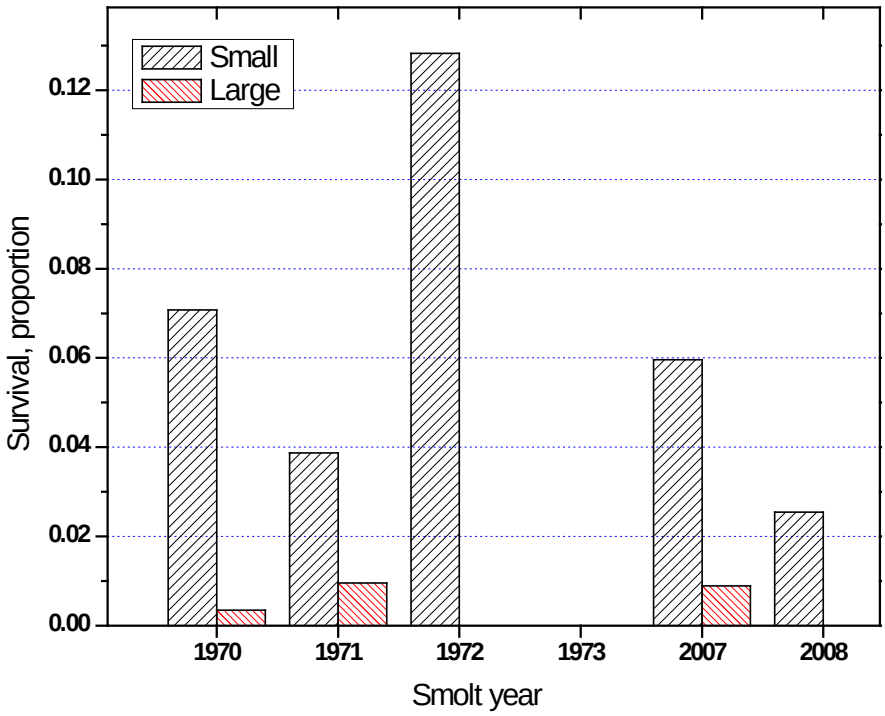

Figure 3b. The proportion of small and large Atlantic salmon smolt that survived from the 1970-72 and from 2007 to 2008 on the Sand Hill River.

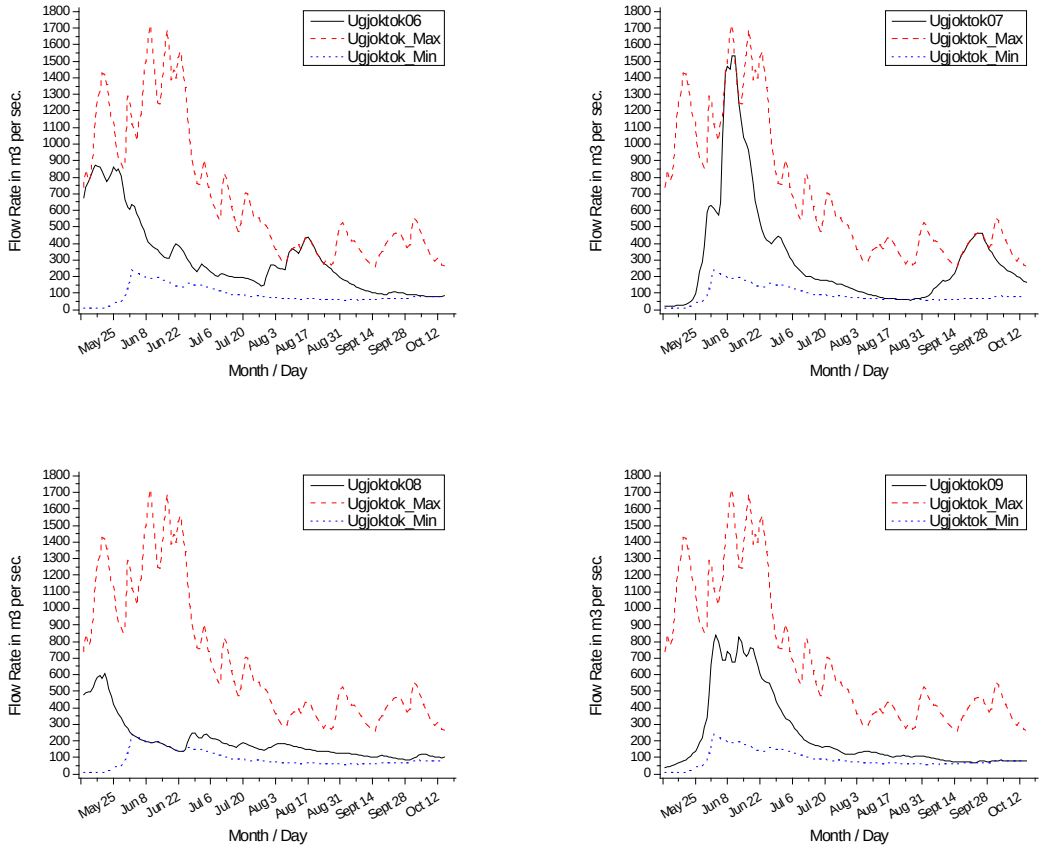

Figure 4a. Flow rates for the Ugjoktok River indicating minimum and maximum flow for 1979-2009 with a comparison to the flow rates on Ugjoktok River in: a). 2006, b). 2007, c). 2008, and d.) 2009.

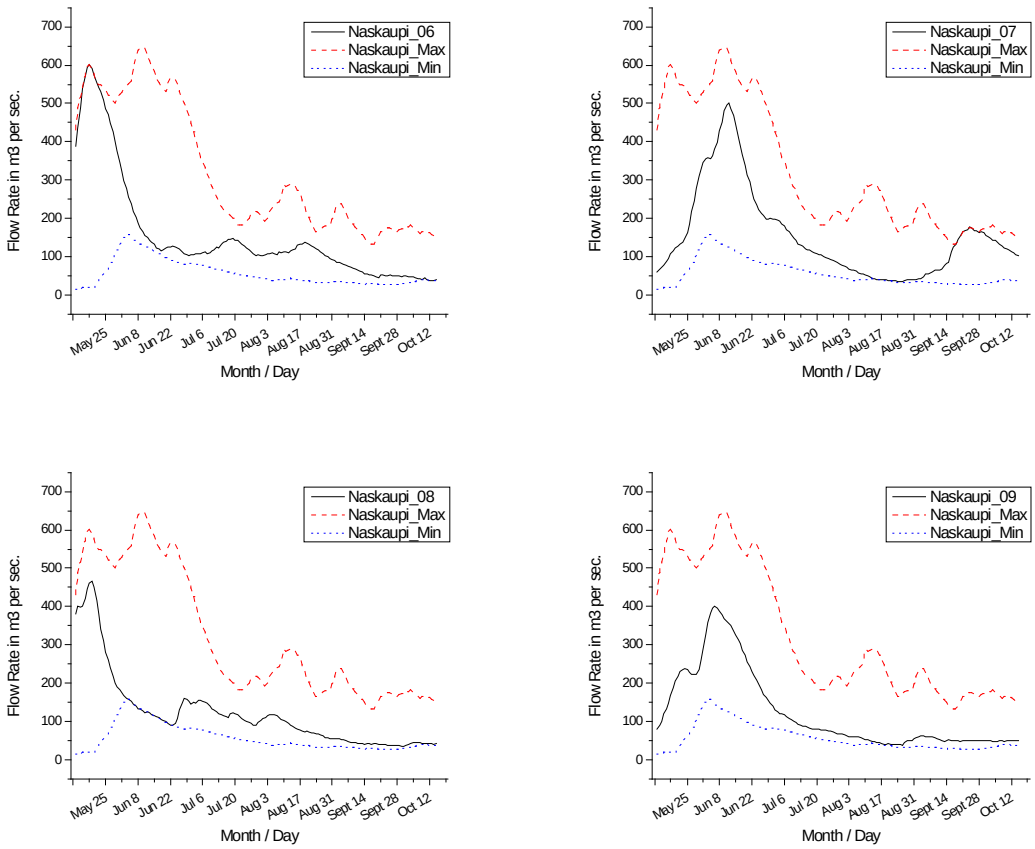

Figure 4b. Flow rates for the Naskaupi River indicating minimum and maximum flow for 1978-2009 with a comparison to the flow rates on Naskaupi River in: a). 2006, b). 2007, c). 2008, and d.) 2009.

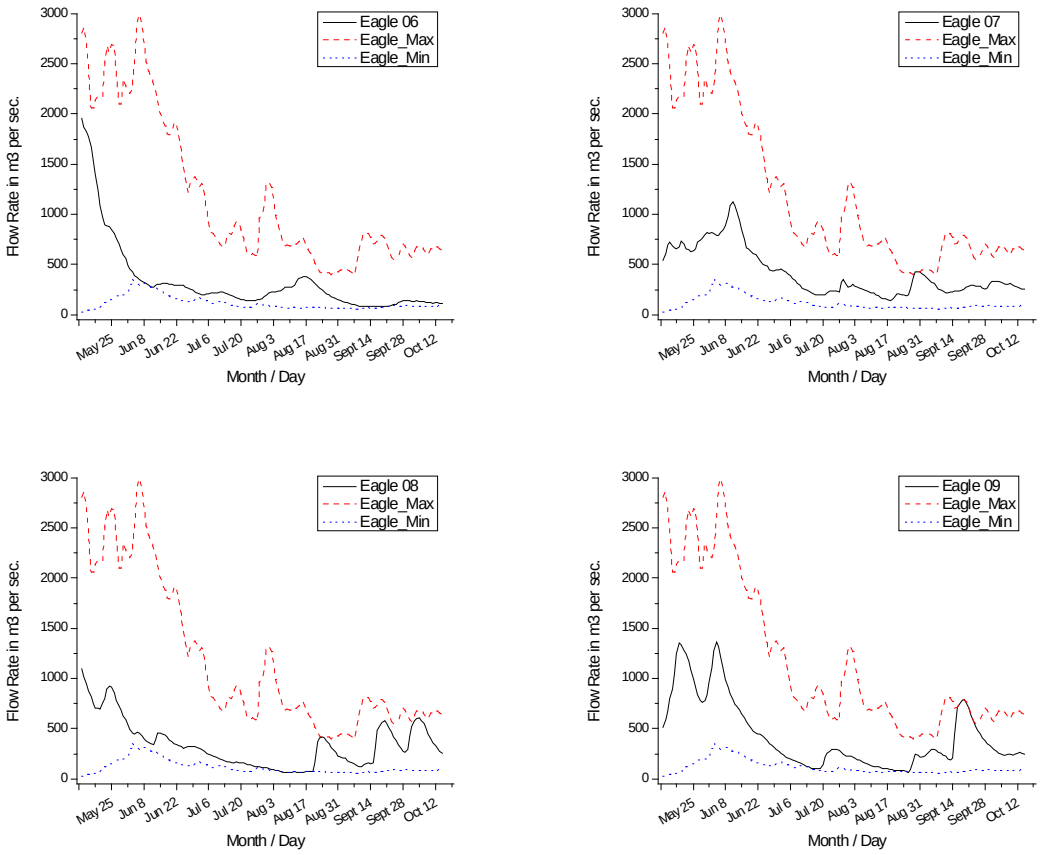

Figure 4c. Flow rates for the Eagle River indicating minimum and maximum flow for 1966-2009 with a comparison to the flow rates on Eagle River in: a). 2006, b). 2007, c). 2008, and d.) 2009.

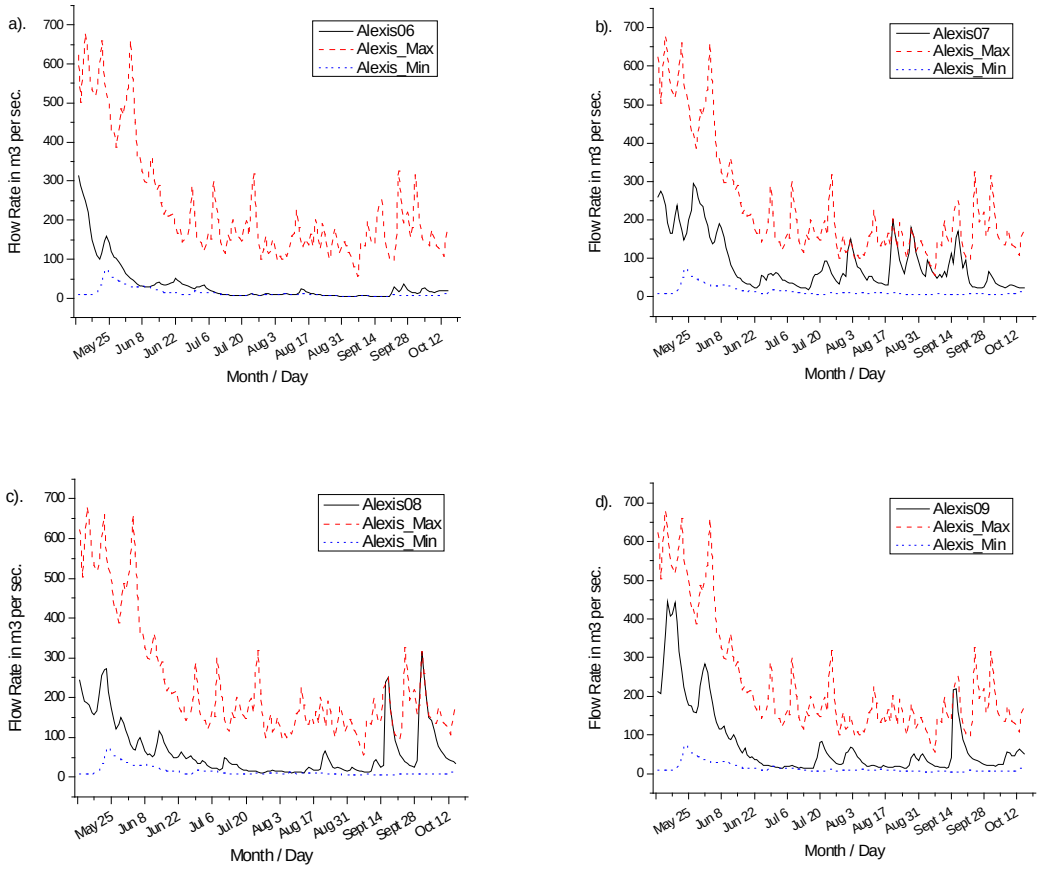

Figure 4d. Flow rates for the Alexis River indicating minimum and maximum flow for 1978-2009 with a comparison to the flow rates on Alexis River in: a). 2006, b). 2007, c). 2008, and d.) 2009.