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Proceedings of the Newfoundland and Labrador Region Salmonid Stock Assessment Meeting

Compte rendu de la réunion d'évaluation des stocks de salmonidés de la Région de Terre-Neuve et du Labrador

November 9, 2006

Le 9 novembre 2006

80 East White Hills Road, Northwest Atlantic Fisheries Centre, St. John's, NL

80 East White Hills Road, Centre des pêches de l'Atlantique Nord-Ouest, St. John's, T.-N.-L.

Meeting Chairperson
C. Bourgeois

Président de réunion
C. Bourgeois

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SUMMARY

The fourteenth annual Salmonid Stock Assessment Meeting for the Newfoundland and Labrador Region was held in St. John's, Newfoundland and Labrador, November 9, 2006. The general status of Newfoundland and Labrador salmon stocks, based on scientific data compiled during 2006 was presented. Scientific data on the trends in adult salmon returns in Newfoundland and Labrador, Newfoundland smolt production, and harvests of salmonids in Labrador were presented along with an update in the marine conditions off Newfoundland and Labrador. The methods and results for setting conservation requirements for Atlantic salmon in Labrador were also presented and the conservation limit of 190 eggs per 100 m^2 was accepted until more data are available to conclude otherwise. Throughout the assessment meeting the knowledge and experiences of the scientific community, conservation groups, anglers and aboriginal fishers were shared. The following proceedings report summarizes the presentations and provides recommendations and comments made during the meetings. An account of the general status of Atlantic salmon stocks in Newfoundland and Labrador in 2006 is also provided. The meeting Terms of Reference, agenda, a list of attendees and detailed summary sheets for the various salmon stocks assessed are appended.

SOMMAIRE

Le 9 novembre 2006 a eu lieu la quatorzième réunion annuelle sur l'évaluation du stock de salmonidés de la région de Terre-Neuve et du Labrador, à St. John's, à Terre-Neuve-et-Labrador. On y a présenté l'état général des stocks de saumons de Terre-Neuve et du Labrador à partir de données scientifiques compilées en 2006. Des données scientifiques sur les tendances affichées par les remontes de saumons adultes à Terre-Neuve et au Labrador, sur la production de saumoneaux à Terre-Neuve et sur les prélèvements de salmonidés au Labrador ont été présentées, ainsi qu'une mise à jour sur les conditions marines au large de Terre-Neuve et du Labrador. On a également présenté les méthodes et les résultats pour l'établissement des exigences en matière de conservation pour le saumon de l'Atlantique au Labrador, et la limite de conservation de 190 oeufs par 100 m^2 a été acceptée jusqu'à ce que l'on dispose d'autres données permettant de tirer une conclusion différente. Tout au long de la réunion d'évaluation, les membres de la communauté scientifique, les groupes de conservation, les pêcheurs à la ligne et les pêcheurs autochtones ont partagé leurs connaissances et leurs expériences. Le compte rendu suivant résume les présentations et fait état des recommandations et des commentaires émis durant la réunion. Une estimation de l'état général des stocks de saumons de l'Atlantique à Terre-Neuve et au Labrador en 2006 y est également fournie. Le cadre de référence de la réunion, son programme, la liste des participants et des résumés détaillés concernant les différents stocks de saumons évalués figurent en annexe.

INTRODUCTION

The fourteenth annual Newfoundland and Labrador Region Salmonid Stock Assessment meeting was held at the Northwest Atlantic Fisheries Centre in St. John's, Newfoundland and Labrador, November 9, 2006, to review information on the status of Newfoundland and Labrador Atlantic salmon stocks in 2006. In addition to Department of Fisheries and Oceans (DFO) scientific staff, the meeting was also attended by invited participants: DFO Policy and Economics Branch, Scientist Emeritus (DFO), Government of Newfoundland and Labrador Department of Inland Fish & Wildlife/Environment & Conservation, Miawpukek First Nation, Government of Nunatsiavut, Federation of Newfoundland Indians, the Indian Bay Ecosystem Corporation (IBEC), a member representing both the Harry's River Salmon Working Group (HRSWG) and the Bay St. George Rivers North (BSGRN) Working Group and the Department of Biology (MUN).

This report provides information concerning the status of Atlantic salmon stocks in Newfoundland and Labrador in 2006. Summaries of each of the presentations with comments and recommendations are given. Summary sheets of the various salmon stocks assessed are appended.

Complete details of the data and methodologies used in the assessments are published in the Canadian Science Advisory Secretariat (CSAS) Research Document series, while the overall report on the status of stocks is contained in the CSAS Science Advisory Report 2006/050. CSAS Publications are available in Portable Document Format (PDF) at http://www.dfo-mpo.gc.ca/csas/Csas/Home-Accueil_e.htm.

The meeting Terms of Reference are provided in Appendix 1. A copy of the agenda for the November 2006 meeting is provided in Appendix 2. Participants attending the assessment sessions, in whole or in part are listed in Appendix 3. Furthermore, individual stock status data are provided in the summary sheets in Appendix 4.

SUMMARY OF SALMON STOCK STATUS

SUMMARY

Labrador (SFA 1-2 & 14B)

- In Labrador, returns of small salmon decreased in 2006 compared to 2005 at three of four counting facilities. The 2005 and 2006 index of abundance, and hence spawners, are the highest in the time series.

- Numbers of large salmon declined in 2006 compared to 2005; also returns of large salmon still appear to be lower than prior to the closure of the commercial fishery.

  Labrador SFA 1

  - English River has met or exceeded conservation requirements in only one of the last eight years.

Labrador SFA 2

- Sand Hill River has met or exceeded conservation requirements for the last three years of a total of 12 years (1970-73, 1994-96, and 2002-2006).

- Muddy Bay Brook has met or exceeded conservation requirements for the last four years of a total of five years.

- Southwest Brook (Paradise River) has met or exceeded conservation requirements for five out of eight years.

Newfoundland (SFAs 3-14A)

- In Newfoundland there was a general decline in returns of small and a general increase in large salmon compared to 2005. Egg depositions were for the most part above the moratorium means.

- Abundance of salmon during the moratorium years continues to be lower than prior to the closure of the commercial fisheries.

- There is a concern with the viability of the salmon stock in the upper section of the Exploits River (upstream of Red Indian Lake).

- There is concern with the low level of large salmon spawners in the Bay St. George area (SFA13).

Northeast and Eastern Newfoundland (SFAs 3-8)

- In spite of greatly increased spawning in 1992-1996, subsequent returns of small and large salmon are still low.

- Conservation requirements were achieved in two (Campbellton and Middle Brook) of six assessed rivers.

- Exploits River, Terra Nova River and Northwest River (Port Blandford) have yet to achieve conservation requirements due mainly to habitat expansion.

- Campbellton River and Middle Brook have met or exceeded conservation requirements in each year of assessment during the commercial salmon fishery moratorium.

- Gander River has met or exceeded conservation requirements in only seven of the last 15 years.

- The lower Exploits River has achieved conservation requirements ten out of 15 years. The number of spawners in the middle Exploits has increased since the moratorium whilst the number of spawners in the upper Exploits has declined since 1997.

Southern Newfoundland (SFA 9-11)

- Conservation requirements were achieved in two (Northeast and Conne River) out of the four rivers assessed. The 2006 egg deposition was equal to the 1992-2005 mean for Northeast and Rocky whilst it was below the 1992-2005 mean for Little and Conne rivers.

Southwest Newfoundland (SFA 12 -13)

- Conservation requirements were achieved on Harry's River for the first time in 2006.

- Increases in returns of small salmon were observed in the two rivers assessed: Harry's and Highlands rivers.

- Total population sizes remain low, particularly in two-sea-winter (2SW) maiden salmon.

Northwest Newfoundland (SFA 14A)

- Conservation requirements were exceeded in the two assessed rivers in 2006.

Newfoundland salmon status

Prepared by: *J. B. Dempson Department of Fisheries and Oceans Canada*

As noted in past years, salmon abundance can be tracked by examining trends of individual stocks, or in a collective manner where information on salmon returns to all assessed rivers can be combined either on a regional (e.g. Northeast coast, South coast, etc.) or island-wide basis. During the review of this material it was noted that the index of large salmon abundance for insular Newfoundland did not appear to increase as much in 2006 as some expected given the changes that occurred within individual regions. This is illustrated below for the West and South coast indices versus the composite index for all Newfoundland:

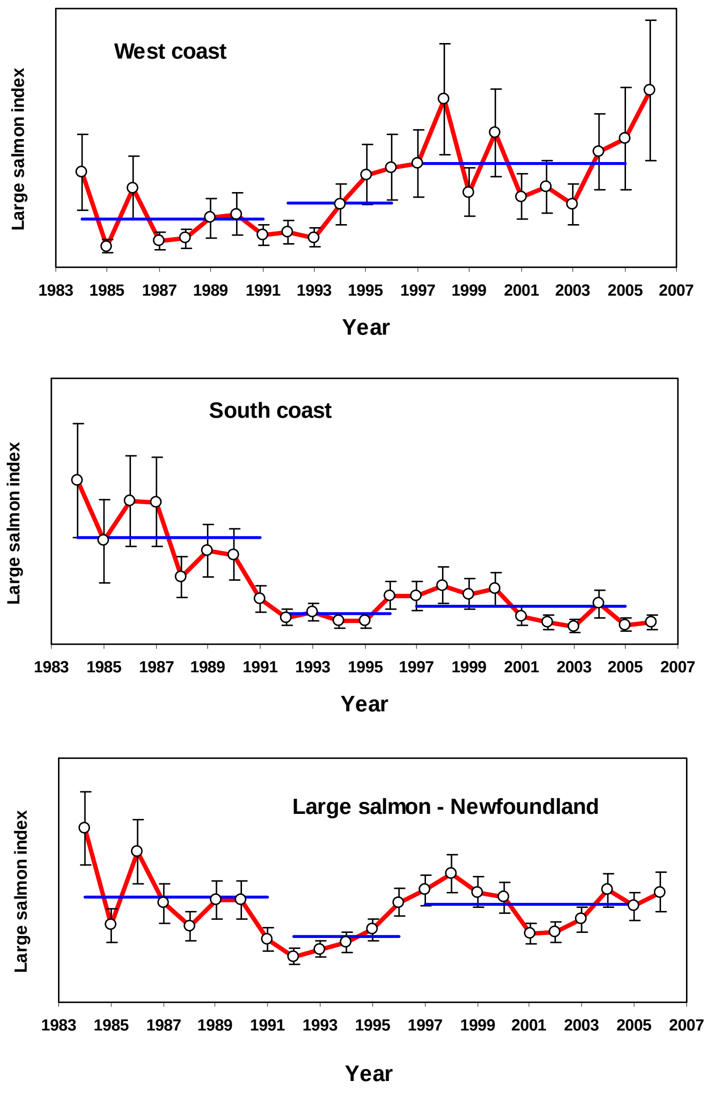

Figure 1. Trends in abundance of large salmon for west coast, south coast, and a composite index for all insular Newfoundland, 1984 – 2006.

As the composite index for all Newfoundland showed only a modest increase in large salmon abundance for 2006, a question was asked as to whether the index was being driven by the South coast where large salmon increased, but by very little relative to other regions.

A review of all the material was subsequently carried out. There are several reasons why the combined index appeared to reflect the South coast more than some of the other regions. It was pointed out that the regional or island-wide indices are determined by the respective individual rivers that make up each analysis. For the South coast, for example, four rivers had data for 2006 (Conne River, Little River, Rocky River and Northeast Brook, Trepassey) with up to 7 rivers in some of the earlier years (e.g. no longer any abundance data for Biscay Bay River, Northeast River Placentia, etc). In contrast, the West coast had only two rivers contributing to the index in 2006 (Western Arm Brook and Torrent River) and thus the increase shown was driven by the apparent highest returns ever recorded for Torrent River. A similar situation occurred for the Southwest (Bay St. George) Region where only two rivers, Highlands and Harry's, had data for 2006 with the latter river also having the highest reported return of large salmon. Regions with more rivers included would inherently have a larger influence on the combined estimate than regions with fewer rivers and consequently the South coast would intuitively have more influence than a region with only two or three rivers. For the combined composite index for the entire island all rivers have equal weight.

Another reason for the apparent anomaly relates to the overall precision of the respective regional estimates. For the South coast, standard errors are quite small by comparison with, say, the West coast (shown in the figure above). Consequently, the precision of the trend in estimates for South coast rivers somewhat overwhelms the trends in the other regions where the standard errors are quite large to such an extent that the "trend" itself is less clearly defined.

The composite index for the island was recalculated whereby each region was now given equal weight rather than each individual river. In this case there was very little difference between the two indices as illustrated below:

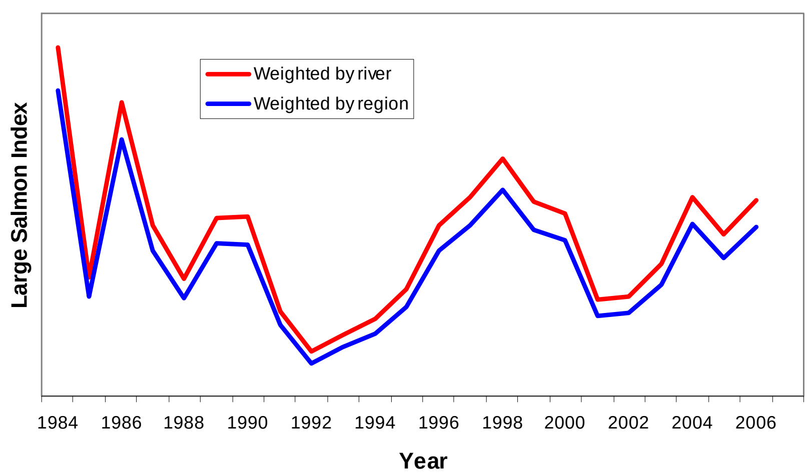

Figure 2. Composite index of abundance for insular Newfoundland illustrating two scenarios whereby each river is given equal weight in the index (red line) or where the index is weighted by each region (blue line).

The South coast then does influence the overall composite index but mostly because of the consistency in its results.

Another variation of the combined index was run with each river again having equal weight but this time where the two rivers that produce the greatest numbers of large salmon, namely Gander and Exploits rivers, were omitted. As expected, the overall index is lower when these rivers are deleted. Thus the argument could be made that inclusion of these rivers tends to inflate the overall index. What this serves to illustrate is that the combined composite index is influenced by each river that inherently is included in the analysis. Rivers with longer time series have greater influence than rivers with fewer years of data and we are better served by trying to ensure as many rivers as possible are monitored to determine the status of the resource.

OVERVIEW OF PRESENTATIONS

There were a total of 6 presentations given; 5 are summarized in this report, 1 was provided as an information item for the attendees. There was also a discussion about creating Conservation Units for Newfoundland and Labrador. An overview of the discussion is provided.

One presentation concerned Newfoundland salmon stocks and smolt production and two were concerning Labrador salmon stocks. The first of the two Labrador salmon presentations dealt with Labrador salmon stock returns, environmental conditions and an update on the harvest of salmonids in various fisheries in Labrador. The second Labrador salmon presentation was an update on the egg deposition levels for Labrador Rivers. There was concern in previous years that mortalities were occurring at sea and that this may be related to possible changes in environmental conditions. During this years RAP, similar to 2005, a presentation was given on marine conditions that could impact Atlantic salmon. The preliminary results of an acoustic tagging and tracking of smolts and kelts at Conne River, Bay d'Espoir, NL was also presented and summarized, as well as the discussion on the Conservation Units for Newfoundland and Labrador.

Fourteen (14) salmon stocks were assessed relative to conservation requirements in insular Newfoundland (plus three sections for Exploits River); and four Labrador stocks (English River, Muddy Bay Brook, Paradise River and Sand Hill River). Five of the rivers were not included this year due to poor conditions during the time of the snorkel survey. Results of these individual rivers are provided in the Summary Sheets (Appendix 4).

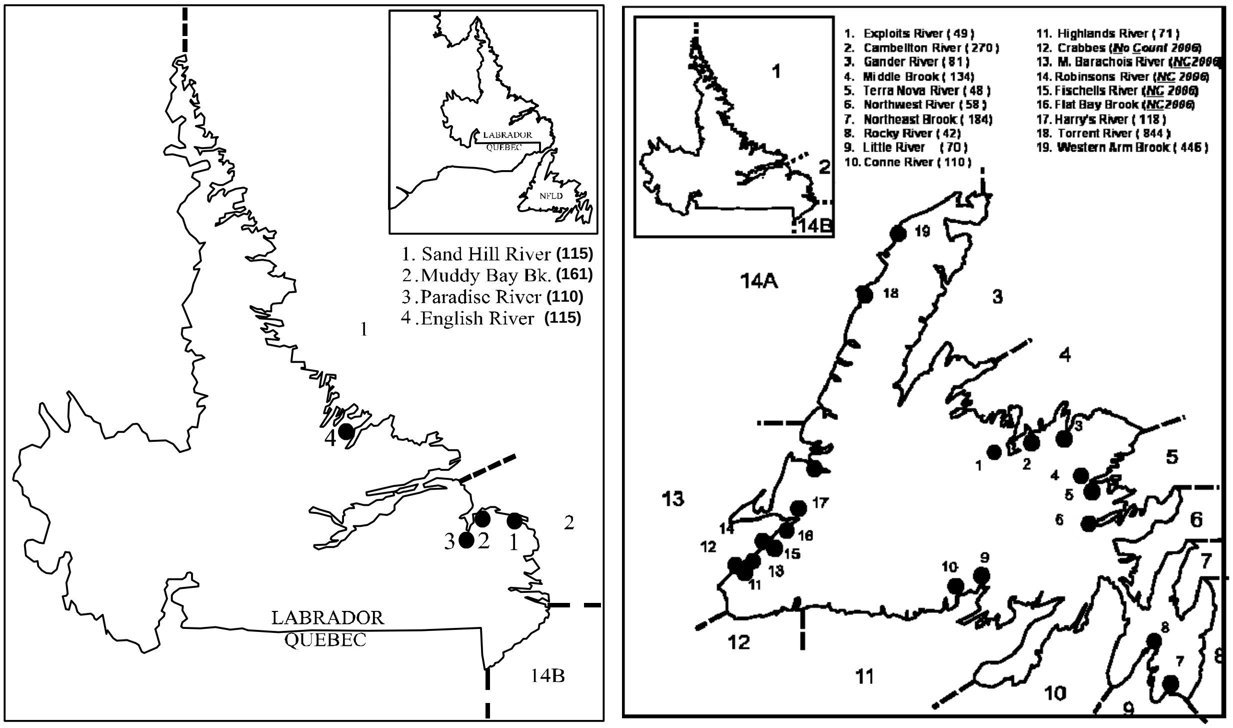

Figure 3: Map illustrations of the Salmon Fishing Areas of Newfoundland and Labrador region. The Map also shows the individual rivers assessed and the percentage of conservation egg requirements (in brackets) achieved in 2006**.**

SUMMARIES OF INFORMATION PRESENTED

1. Marine Environmental Conditions-update for 2006

Presenter: *Eugene Colbourne, Department of Fisheries and Oceans Canada*

Summary: The North Atlantic Oscillation (NAO) index for 2006 was below normal indicating widespread warming throughout the Northwest Atlantic. Spring air temperatures were at an all time record of >4°C above average on the Labrador Coast at Cartwright and the third highest on record at St. John's where June temperatures were 3.5°C above average. Sea-ice extent during 2006 was below the long-term average for the twelfth consecutive year, the longest period of lighter-than-normal sea-ice conditions since record keeping began in the early 1960s.

Ocean surface temperatures off Cape Spear during 2005 remained at the 60-year record high of 1°C above normal set in 2004. These warmer-than-normal values continued in 2006 with values reaching 2°C above normal in early July. Oceanographic data collected during the spring and summer of 2006 on the Newfoundland and Labrador Shelf generally showed above normal temperatures with the area of the cold intermediate layer (CIL <0°C) shelf water below normal for the 12th consecutive year off Cape Bonavista.

Preliminary analyses have shown strong associations between marine environmental conditions and marine survival of salmon, adult salmon run timing and abundance of both large and small salmon. For example, salmon run-times are significantly correlated with both sea-surface temperature in eastern Newfoundland waters and spring sea-ice cover with later run-times associates with cold conditions and extensive ice cover. There is insufficient information at present to quantify these relationships. However, based on historical data the current marine environment in Newfoundland and Labrador waters is favourable for survival of Atlantic salmon.

Comments:

- There should be a cross reference between environmental data and seal data.
- The distribution and size of capelin in Labrador improved in 2004 and may be related to temperature.
- There is an increase in the number of ring seals and Harps seals to some extent.
- Historical Decadal Oscillations have occurred during the 70's, 80's and early 90's, however, we are now experiencing an extended warm period.

Recommendations:

2. Status of Atlantic Salmon (Salmo salar L.) Stocks of Insular Newfoundland, (SFAs 3-14A), 2005

Presenter: *C. E. Bourgeois, Department of Fisheries and Oceans Canada*
Authors: *C. E. Bourgeois, M. F. O'Connell, J. B. Dempson, D. G. Reddin, G. Veinott, R. Poole and N. M. Cochrane*

Summary: The commercial Atlantic salmon fishery moratorium, implemented in insular Newfoundland in 1992, entered its 15th year in 2006. Overall there was a general decline in returns of small salmon and an increase in the returns of large salmon. Small salmon returns to rivers on the Northeast and East coasts (SFA's 4-8) in 2006 declined in 5 of the 6 assessed rivers while large fish increased in 4 of the 6 assessed rivers. Two of the 6 rivers achieved conservation requirements while 4 of the 6 rivers had returns above the 1992-2005 mean. Returns to South coast (SFA's 9 - 11), for small and large salmon increased for 2 of the 4 rivers assessed. Two rivers, Conne and Northeast Trepassey, achieved conservation. Returns to the Southwest coast (SFA's 12-13) for small salmon increased for both rivers assessed while large salmon returns increased for Harry's River. Harry's River exceeded conservation requirements for the first time in 2006. Returns to the Northwest coast (SFA 14A) were down for small salmon in one river while returns for large salmon increased in one river. Both Torrent and Western Arm Brook achieved conservation requirements in 2006. Sea survival in 2006 increased in 3 out of the 5 monitoring sites. Smolt production in 2006 decreased from 2005 for Conne River and Rocky River and increased in all other rivers except Northeast Trepassey where it remained similar to 2006. Western Arm Brook recorded its highest smolt production ever in 2006.

Comments:

- There are many different factors that are affecting the population. Some years these factors may be more significant than others.
- Smolt production does not necessarily provide higher returns the next year.
- There is a lack of information on marine survival.
- Climate affects the productivity of salmon (e.g. low water).

Recommendations:

- There should be a study to gather information on marine survival.

3. Returns to rivers in Labrador and harvests of salmonids in various fisheries, 2006

***Presenter*:** *R. J. Poole, Department of Fisheries and Oceans*
***Co-author*:** *D. G. Reddin, Department of Fisheries and Oceans*

Summary: In 2006, returns to four counting fences were enumerated and environmental conditions documented. Furthermore, harvests of salmonids in the food fishery and angling were recorded.

A total of 484 small and 44 large salmon returned to English River in 2006. Returns of small salmon were 143% higher than in 2005 while returns of large salmon were 157% higher. For Southwest Brook (Paradise River), a total of 326 small and 35 large salmon returned to the river in 2006. Returns of small salmon were 62% lower and returns of large salmon were 35% lower than in 2005. For Muddy Bay Brook (Dykes River), a total of 445 small and 17 large salmon returned to the river in 2006. Returns of small salmon were 14% lower and returns of large salmon were 15% lower than in 2005. For Sand Hill River, a total of 4,872 small and 543 large salmon returned to the main stem of the river (exclusive of Northwest Tributary) in 2006. Returns of small and large salmon decreased by almost 31% and 38% respectively, compared to 2005. Small salmon decreased substantially in 2006 at three of four counting facilities. The number of large salmon is still lower than prior to the closure of the commercial fishery in 1998.

Water flows in 2006 were similar to or below the average minimum values for the Alexis and Eagle Rivers in southern Labrador for much of the summer. Water flows in northern Labrador were not as low as those in southern Labrador. Water flows for Naskaupi and Ugjoktok in 2006 reached mean flows during mid summer and at times were near or above average maximum values.

Landings in the four fisheries for Food, Social and Ceremonial (FSC) purposes in 2005 were similar to 2004 totalling 32 tonnes (figures unavailable for 2006). In 2006, angling catches in Northern Labrador (SFA 1) decreased for small and large salmon. Effort increased and overall catch rates declined compared to those of 2005. In Southern Labrador, landings of small and large salmon were lower than in 2005 and effort decreased. The catch rate increased slightly, however, remained comparable to 2005.

Comments:

- There continues to be a great deal of concern about the status of salmon stocks in Labrador rivers particularly in Lake Melville where there is high fishing effort in the food fisheries.
- Food fisheries now fish closer to adjacent communities than was the case during commercial fishery.
- Hook-and-release fishing is 75% of the angling in Labrador and if mortality rates are higher than the assumed 10% it could impact spawning escapement. Where angling is frequently from a boat and where rivers descend quickly from higher mountain ranges, it is possible for hook-and-release fishing to result in higher mortality rates than the assumed value of 10%.

- Angling catch statistics come from camp logbooks for northern Labrador and a mix of license stub return data and camp data in Southern Labrador. However, it is important to note that license stub data from 2006 is not yet available for southern Labrador. Current year estimate for southern Labrador comes from camp data for Eagle and Sand Hill rivers compared to previous years License Stub Return data.
- Four rivers in Labrador have achieved the 190 egg per m^2 reference conservation level in 2006.

Recommendations:

1. DFO should continue to support the assessment projects in Labrador at least at current levels.
2. An assessment project should be initiated for a river(s) in Lake Melville where stock status remains largely unknown.
3. There should be a study to determine hook-and-release mortality rates for Labrador. This study should assess the difference between angling mortality from the river bank as compared to angling mortality from boats.

4. Conservation Requirements for Atlantic salmon (*Salmo salar* L.) in Labrador rivers

***Presenter*:** D. G. Reddin, Department of Fisheries and Oceans
***Co-authors*:** J.B. Dempson, and P.G. Amiro, Department of Fisheries and Oceans

Summary: This paper provides interim methods and results for setting conservation requirements for Atlantic salmon (*Salmo salar* L.) in Labrador. The current standard conservation requirement of 240 eggs per 100 m^2 of parr-rearing habitat used for some Eastern Canadian rivers was deemed questionable for Labrador because Labrador rivers are on the northern edge of the range of Atlantic salmon and have a much colder climate. As a result of the colder climate, Labrador salmon generally spend longer in freshwater than do salmon populations to the south. Also, many Labrador rivers have abundant anadromous charr (*Salvelinus alpinus* L.) and trout (*Salvelinus fontinalis* Mitchill) which are not present in rivers to the south and may compete with salmon in freshwater for space and food. Because Labrador salmon are exploited in FSC (fisheries by aboriginal people for food, social and ceremonial purposes) fisheries in addition to angling, it requires the development of an interim value until such time that more definitive reference points can be developed. The preferred approaches to defining biological reference points are through the analysis of stock and recruit relationships (SR). The collection of a sufficient SR time series requires a number of years of measured spawners and adult returns which do not exist for any Labrador river. We examined three previously published methods for deriving conservation limits and describe three alternate approaches for Labrador. The first of these alternate approaches is based on a quasi-stock and recruit method and uses fishery generated SR data. The second considers measured smolt production from Sand Hill River adjusted to variable freshwater survival rates. The third converts angling catch rates and river returns from a counting fence to construct SR data from a limit of 50% of the equilibrium population. Results from the three methods show 161 (95th CL 110 to 309) eggs per 100 m^2 for the quasi-SR approach and 152 (95th CL 80 to 370) eggs per 100 m^2 based on the Sand Hill smolt production data and 187 (95th CL 153 to 201) per 100 m^2 from the SR analysis of Sand Hill River fence and angling data. Based on the data and analysis, and until more information can be collected at higher escapements, it is recommended that a conservation limit of 190 eggs per 100 m^2 be adopted.

Comments:

- Nunatisiavut representative was pleased to see DFO had followed up on the recommendations of previous RAP sessions with respect to conservation limits.

Recommendations:

1. Accept the 190 eggs per m^2 as an interim conservation limit for defining conservation egg requirements in Labrador rivers until more extensive SR data becomes available.

5. Acoustic tagging and tracking of Atlantic salmon

Presenter: J. B. Dempson, Department of Fisheries and Oceans

Summary: In many areas of the north Atlantic, populations of Atlantic salmon are either in a state of decline or even extirpated such that concern over the continued survival of the species has been given more attention in recent years. It is commonly believed that factors responsible for the decline operate in the marine environment, particularly during the critical period when salmon first go to sea. In order to address this issue further, Atlantic salmon smolts (N = 49) and kelts (N = 15) were tagged with acoustic transmitters and released from Conne River during April and May of 2006. The objectives were to determine movements and migration patterns throughout the Bay d'Espoir fiord, and obtain insight into the initial survival and residency time of both life history stages. A total of 21 Vemco VR2 receivers were positioned at various locations throughout Bay d'Espoir while manual tracking was also carried out in areas proximate to where fish were initially released.

Of the 15 kelt that were tagged and released all were subsequently accounted for. Two (2) kelt returned to the general area of the mouth of Conne River after an absence of 54 – 57 days. The remaining kelt spent an average of 13 days (range = 5 to 33 days) in Bay d'Espoir before exiting the fiord. Most kelt appear to have exited Bay d'Espoir via Lampidoes Passage. With respect to smolts, 35 of 49 (71%) provided tracking information. Most smolts exited the fiord either by way of Lampidoes Passage (34%) or by way of Dawson/Riches Island Passage (43%). About 11% of the smolt were recorded travelling through Little (Gaultois) Passage. The average residency time of smolts that were successfully tracked was 13 days, but ranged from 4 to 27 days. Those smolt that exited via Little (Gaultois) Passage spent an extra week in the fiord as their residency time was estimated to be 22 days. Results from this initial study indicated that immediate survival of tracked smolt appeared to be quite high by comparisons with studies carried out in other areas.

6. Designation of Conservation Units (CU's) for Atlantic salmon in Newfoundland and Labrador

There was a discussion on the request, to the Science branch, from the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) to assign Conservation Units to the salmon rivers in Eastern Canada. A map showing the potential CU's that were decided upon was presented and the Chair of the meeting welcomed any comments or suggestions for changes to the CU's in Newfoundland and Labrador with a prerequisite of also providing scientific evidence to support an amendment. Genetic evidence would make it easy to designate the CU's; however, there are limited genetic studies in Eastern Canada. The CU's were presented for Newfoundland and Labrador based on phenotypic and phylogenetic factors.

Comments/Suggestions Received: SFAs 9-12

Prepared by: *G. Perry Department of Fisheries and Oceans Canada*

Background:

- develop salmon aquaculture site guidelines
- identify "important" Atlantic salmon rivers on the south coast
- develop criteria to rank rivers
    - importance to the recreational fishery as measured by catch and effort data, watershed areas, habitat characteristics (# spawning and rearing units, proportions of fluvial/lacustrine habitat), biological characteristics, and several crude estimates of population sizes.

The criteria were applied to 67 rivers in SFAs 9-12 with reported salmon angling catch over the past decade. Based on that review and given the limited biological information available for south coast stocks, particularly in the more isolated rivers to the west of Bay d'Espoir, some changes to the proposed South Coast Conservation Unit include:

- Rivers emptying into La Poile Bay and west to be grouped with the Southwest Coast Unit
- Avalon Peninsula rivers, at least those in SFA 9, should be grouped into the Northeast Coast Unit (or perhaps, SFA 9-10 could be grouped together into a single unit)
- South Coast Unit be defined as east of La Poile Bay to the Burin Peninsula (i.e. SFA 11) or to Cape St. Mary's (SFA 10 and 11)

Geological factors

- Surficial geology for the south coast is dominated by bedrock with little or no superficial sediments; except the Avalon, which has a veneer or blanket of glacial deposits and organic deposits from bogs and fens.
- Bedrock geology - For La Poile Bay and west, the geology is more similar to that of the Southwest Coast. La Poile Bay to the Burin Peninsula is dominated by acid intrusive rocks.
- The bedrock and surficial geology influence water quality and water chemistry. Almost all of the east of La Poile Bay rivers, including the Burin Peninsula and Placentia Bay rivers, have low pH and low total alkalinity. It is likely to expect that salmon populations in these watersheds would be adapted to these conditions and these adaptations would likely have genetic underpinnings.
- La Poile Bay-west drains from the Long Range Mountains like those of the Southwest Coast.

Environmental factors

- Mean seasonal temperatures and mean annual precipitation are different along the south coast. The SFA 11 area is warmer in summer and wetter than other parts of the south coast. This likely influences run timing.
- There are oceanographic differences across the south coast; the contributions of the Gulf Stream, the Gulf discharge, and the Labrador Current adds some complexity. This may be significant for salmon populations.

Salmon Production

- Under the assumption that angling catch is correlated with adult returns, catch statistics for SFA 9-12 suggest that 6 rivers in SFA 11 - Long Harbour, Grandy's Br., Grey, White Bear, Garnish, and Conne - produce almost half of the salmon produced on the entire south coast.

This coupled with the geological, and environmental factors and susceptibility to anthropogenic change (e.g. acidification) suggest that SFA 11 should be identified as a conservation unit.

Habitat

- Many of the rivers on the south coast have high relief and limited accessible lacustrine habitat. Differences in freshwater production and 1SW/MSW population components between rivers characterized by fluvial habitats and those containing both fluvial and lacustrine habitats are well known. Avalon rivers have both habitats with grilse populations; South Coast rivers also appear to be predominantly grilse rivers even though the majority of rivers have predominantly fluvial habitats, where one might expect to see MSW components. However, given that most of the salmon production appears to come from those 6 rivers in SFA 11 that have both fluvial and lacustrine habitats, something different is happening - are these 'big' rivers serving as reservoirs for genetic diversity in south coast stocks?
- The proximity of the La Poile Bay-west rivers to those of Bay St. George, particularly Grand Codroy and the similar geology may suggest that biological characteristics of salmon populations may be similar.

ACKNOWLEDGEMENTS

Thanks are extended to all who participated at the November meeting, particularly those from outside DFO who gave up their own time to attend and contribute to the sessions. Nadine Wells kindly assisted with co-ordinating the meeting.

APPENDIX 1

Terms of Reference

Meeting of the Newfoundland and Labrador Regional Advisory Process on Salmonids

E. B. Dunne Boardroom, Northwest Atlantic Fisheries Centre
St. John's, Newfoundland and Labrador

November 9, 2006

Meeting Chairperson:
Chuck Bourgeois, Section Head, Salmonids, Aquatic Resources Division, DFO, Newfoundland and Labrador Region.

Background:
There are 15 Atlantic salmon (*Salmo salar*) management areas, known as Salmon Fishing Areas (SFAs) 1-14B, in Newfoundland and Labrador. Within these areas there are more than 200 rivers with reported Atlantic salmon populations characterized by differences in life history traits including freshwater residence time, age at first spawning, and the extent of ocean migrations. This year marks the final year of the five-year Atlantic salmon management program. The November meeting is intended primarily to update those stocks/rivers considered during the last assessment meeting, with emphasis on determining the level of conservation spawning requirement achieved.

Objectives:
An update of any new information available concerning the status of Atlantic Salmon stocks will be presented for Salmon Fishing Area (SFA)[1] regions as follows:

- Labrador: SFAs 1-2, 14B

- Newfoundland: SFAs 3-14A

The meeting will focus on the general state of salmon stocks in Newfoundland and Labrador and identify any conservation issues requiring adjustments to the management plan. Detailed assessments of individual rivers will not be carried out. Rather, regional overviews of the status of stocks will be tabled.

The following topics specific to salmon will be discussed:
- Update on smolt production and marine survival of Newfoundland salmon.
- Status conservation egg deposition requirements for Labrador.
- Harvests of salmonids in various fisheries in Labrador.

Products:
A stock status update, proceedings report and associated research documents will be produced as a result of this meeting.

[1] There are 15 Atlantic salmon (*Salmo salar L.)* management areas know as Salmon Fishing Areas (SFAs) 1-14B in Newfoundland and Labrador. See Science Advisory Report 2005/052, Figures 1 and 2 for illustration.

Invited Participants:
DFO Science, Fisheries Management and Policy & Economics
Government of Newfoundland and Labrador
Parks Canada
Various Non-Governmental Organizations and Associations
Various Aboriginal Groups
Memorial University of Newfoundland
Various Salmon Working Groups
Various Aquaculture Groups

APPENDIX 2

Agenda
Atlantic Salmon 2006 Stock Status Update

E.B. Dunne Boardroom, NWAFC
9 November 2006

0900 Introduction (Bourgeois)
- review of agenda

0915 Data Review:
- Marine Environmental Conditions (update) (Colbourne)
- Returns to Insular Newfoundland Rivers - Smolt production and marine survival trends (Bourgeois)
- Returns to Labrador Rivers (Poole)
- Coffee Break (1030)
- Harvests of salmonids in various fisheries in Labrador (update) (Poole)
- Conservation Requirements for Atlantic salmon in Labrador rivers (Reddin & Dempson)

1230 - 1300 Lunch

1300
- Experimental Ponds in Newfoundland (R. Knochel)
- Preliminary results of the Acoustic Tagging and Tracking of smolts and kelts at Conne River, Bay d'Espoir (Dempson)
- Designation of Conservation Units for Atlantic salmon in Newfoundland and Labrador
- Manuscripts for upgrade to Research Documents
- Other Business

APPENDIX 3

List of individuals who participated, in whole or in part, at the November 2006 salmonid stock assessment meeting.

NAME	AFFILIATION & ADDRESS	PHONE	FAX	E-MAIL
Bourgeois, C.	Science, DFO, P.O. Box 5667, NAFC, St. John's, NL, A1C-5X1	772-2128	772-3578	bourgeoisc@dfo-mpo.gc.ca
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APPENDIX 4

Summary Sheets

STOCK: Muddy Bay Brook (Dykes River SFA 2) **213 km²**

CONSERVATION REQUIREMENT: 0.582 million eggs calculated as fluvial area x 1.9 eggs/m²

Year	2002	2003	2004	2005	2006	MIN [1]	MAX [1]
Total returns to river							
Small	106	394	454	520	445	106	520
Large	11	31	28	20	17	11	31
Recreational harvest (small salmon)							
Retained	9	13	30	1	0	0	30
Released	4	2	17	0	0	0	17
Recreational harvest (large salmon)							
Retained	0	0	0	0	0	0	0
Released	2	0	0	0	0	0	2
Spawners							
Small	106	394	454	520	445	106	519
Large	11	31	28	20	17	11	31
Egg conservation requirement							
% met	43	153	173	190	161	43	190

[1] Min and max are for the period of record except recreational harvest is since 1994.
[2] Preliminary
Note: Any changes from previous years are due to the updating of preliminary data.

Recreational catches: catches are from License stub return data - no way of knowing if upstream or downstream of fence.

Data and methodology: complete counts of salmon were obtained at a fish counting fence. Counts were adjusted in 2003 for fence non-operational periods.

State of the stock: returns of small salmon have increased from 2002 to 2005 with a decrease in 2006, whereas, large salmon returns increase from 2002 to 2003 but decreased in 2004, 2005 and 2006. Conservation limits for Labrador rivers are 190 eggs per 100m2 which is used to evaluate the percent of egg requirements met which were exceeded in 2004-2006.

Forecast: No forecast available.

STOCK: Southwest Brook (Paradise River SFA 2) **385 km²**

CONSERVATION REQUIREMENT: 0.714 million eggs calculated as fluvial area x 1.9 eggs/m²

Year	1998	1999	2001	2002	2003	2004	2005	2006	MIN [1]	MAX [1]
Total returns to river										
Small	110	331	323	235	158	615	858	326	110	858
Large	4	43	32	34	16	54	54	35	4	54
Recreational harvest (small salmon)										
Retained	0	0	0	0	0	0	0	0	0	0
Released	0	0	0	0	0	0	0	0	0	0
Recreational harvest (large salmon)										
Retained	0	0	0	0	0	0	0	0	0	0
Released	0	0	0	0	0	0	0	0	0	0
Spawners										
Small	110	331	321	231	156	615	858	326	110	858
Large	4	43	32	34	16	54	54	35	4	54
Egg conservation requirement										
% met	39	139	110	82	52	201	267	110	39	267

[1] Min and max are for the period of record except recreational harvest is since 1994.
[2] Preliminary
Note: Any changes from previous years are due to the updating of preliminary data and biological characteristics information.

Recreational catches: catches are not recorded separately for Southwest Brook which is a tributary of Paradise River.

Data and methodology: complete counts of salmon were obtained at a fish counting fence. Counts were adjusted in 1998, 2003 and 2005 for fence non-operational periods.

State of the stock: 2006 returns show a decrease for small and large over 2004 and 2005 but increases over most years. Conservation limits for Labrador rivers are 190 eggs per 100m2 which is used to evaluate the percent of egg requirements met which were exceeded in 2004-2006.

Forecast: No forecast available.

STOCK: Sand Hill River (SFA 2) **1155 km²**

CONSERVATION REQUIREMENT: 10.099 million eggs calculated as fluvial area x 1.9 eggs/m²

Year	1994	1995	1996	2002	2003	2004	2005	2006 [2]	MIN [1]	MAX [1]
Total returns to river										
Small	2180	2796	3319	3141	3171	4008	7007	4872	2038	7007
Large	730	560	414	561	627	604	875	543	138	875
Recreational harvest (small salmon)										
Retained	279	289	321	155	212	109	177	123	109	321
Released	326	340	702	679	608	647	925	628	326	925
Recreational harvest (large salmon)										
Retained	29	28	20	1	7	1	5	2	0	28
Released	7	14	36	68	60	86	104	30	0	104
Other removals										
Small	0	0	0	0	15	0	0	0		
Large	0	0	0	0	2	0	0	0		
Spawners										
Small	1868	2473	2928	2918	2883	3834	6735	4686	1819	6735
Large	700	531	390	553	612	595	860	538	136	860
Egg conservation requirement										
% met	65	70	74	81	82	101	168	115	34	168

[1] Min and max are for the period of record except recreational harvest which is since 1994.
[2] Preliminary
Note: Any changes from previous years are due to the updating of preliminary data and biological characteristics information.

Recreational catches: catches are from angling camps on Sand Hill River and observations of counting fence staff.

Data and methodology: counts of salmon were obtained at a fish counting fence. Total river returns were adjusted for non-operational periods for all years except 2005 & 2006.

State of the stock: numbers of both small and large were down from 2005 but above all other years. Conservation limits for Labrador rivers are 190 eggs per 100m² which is used to evaluate the percent of egg requirements met which were exceeded in 2004-2006.

Forecast: No forecast available.

STOCK: English River (SFA 1)

Accessible drainage area=125 km²

CONSERVATION REQUIREMENT: 0.510 million eggs calculated as fluvial area x 1.9 eggs/m²

Year	1999	2000	2001	2002	2003	2004	2005	2006	MIN [1]	MAX [1]
Total returns to river										
Small	59	367	224	190	108	56	337	484	56	484
Large	48	15	41	31	19	25	28	44	15	48
Recreational harvest (small salmon)										
Retained	5	8	5	1	0	2	0	6	0	8
Released	0	0	0	0	0	0	0	0	0	0
Recreational harvest (large salmon)										
Retained	2	0	0	0	0	0	0	0	0	2
Released	0	0	0	0	0	0	0	0	0	0
Other Removals										
Small	0	0	10	5	21	0	0	5	0	21
Large	0	0	2	2	2	0	0	0	0	2
Spawners										
Small	54	359	209	184	87	54	337	473	54	474
Large	46	15	39	29	17	25	28	44	15	46
Egg conservation requirement										
% met	40	73	63	52	26	26	80	115	26	115

[1] Min and max are for the period of record.

[2] Preliminary

Note: Any changes from previous years are due to the updating of preliminary data and biological characteristics information.

Recreational catches: observations from counting fence workers.

Data and methodology: complete counts of salmon were obtained at fish counting fence. Total returns to river for 2003-2006 include fish counted below fence on swim-thru before removal.

State of the stock: returns have increased from previous years. Conservation limits for Labrador rivers are 190 eggs per 100m ^{2} which is used to evaluate the percent of egg requirements met which was exceeded in 2006; only one year out of eight.

Forecast: No forecast available.

STOCK: Exploits River **Drainage area:** 11602 km²

CONSERVATION REQUIREMENT: 95.9 million eggs (equivalent to 56,670 small salmon) calculated as fluvial area x 2.4 eggs/m2 and lacustrine area x 368 eggs/ha.

Year	**2000**	**2001**	**2002**	**2003**	**2004**	**2005***	**2006***	**MIN**	**MAX**
Total returns:									
Small	12063	19370	15589	29,198	27195	28050	24860	4470	29956
Large	684	1347	890	1,336	949	1967	3365	89	3365
Recreational harvest (small salmon)									
Retained	1467	2430	2730	3633	3292	3879	2263	577	4407
Released	2899	2967	3551	2975	2494	5470	1991	1145	5672
Recreational harvest (large salmon)									
Retained	0	0	0	0	0	0	0	0	83
Released	252	289	331	198	153	511	256	0	350
Other Removals	40	59	51	62	11	24	33	0	117
Broodstock removal	0	0	0	0	0	0	0	0	5111
Spawners	10919	17902	13310	26538	24589	25516	25697	2326	30559
Fry Stocked	0	0	0	0	0	0	0	0	6416567
Egg conservation requirement									
% met	21	34	25	51	47	49	49	6	69
Lower	56	91	56	141	130	89	131	26	215
Middle	16	27	23	39	37	51	40	2	51
Upper	2	5	3	7	2	4	1	0	125

Min and max are for the period of record since 1974.

* Preliminary

Data and methodology: There are 35 million m2 units of fluvial habitat and 34,000 ha of lacustrine habitat. Conservation egg requirements are to come from small salmon. Previous fry releases are backcalculated to eggs for % of conservation egg deposition achieved in areas stocked. Total returns to the river are based on the count at Bishop Falls fishway plus known removals below the fishway.

State of Stock: Overall returns to the Exploits River, have improved during the moratorium years; however returns to the upper section of the watershed are extremely low and all efforts should be made to increase escapement to this section of the watershed.

Forecast: No quantative forecast available

STOCK: Campbellton River (SFA 4) **296 km² (accessible)**

CONSERVATION REQUIREMENT: 2.916 million eggs (~ 1,480 small salmon) calculated as fluvial area x 2.4 eggs/m² and lacustrine area x 368 eggs/ha

Year	1999	2000	2001	2002	2003	2004	2005 [2]	2006 [3]	MIN [1]	MAX [1]
Total returns to river										
Small	3076	1798	2151	1974	2219	2726	3746	2769	1798	4001
Large	493	208	119	123	152	161	276	328	119	560
Recreational harvest (small salmon)										
Retained	433	226	148	136	170	222	191	180	13	365
Released	242	176	29	57	20	95	37	52	20	372
Recreational harvest (large salmon)										
Retained	-	-	-	-	-	-	-	-	0	0
Released	46	51	9	6	0	4	8	5	0	51
Precocious post smolts	83	208	228	253	147	365	364	121	13	365
Spawners										
Small	2536	1345	1772	1579	1900	2112	3191	3187	1346	3675
Large	491	203	118	122	152	160	275	275	118	557
Egg conservation requirement										
% met	312	152	148	138	191	212	324	270	138	324
Smolt count	47256	35596	37170	32630	35089	32780	30123	33302	30123	62050
% Sea survival (corrected)										
(Adult return year)	5.03	3.66	5.35	5.14	6.02	7.27	9.90	7.40	2.25	9.90

[1] Min and max are for the period of record since 1993.
[2] Preliminary
[3] Mean of 2003-05

Note: Any changes from previous reports are due to the updating of preliminary data and biological characteristics information.

Recreational catches: The recreational catch for 2006 was derived from the mean of angling catches from 2002-2005.

Data and methodology: Smolts were enumerated at a counting fence. Returning adults salmon are enumerated at a fish counting fence with a video camera system. A hook-and–release mortality rate of 10 % was used in the calculations of spawning escapements for the years 1993-05. Recreational data for 1997-05 were from the License Stub Return System, however the 2006 figures are not tabulated . Sea survival is corrected to exclude previous spawners in the upstream migration. Pervious spawners were estimated in 1999 from survival patterns in previous years. The egg conservation requirement for years of low sample numbers from the recreational fishery was calculated using the average whole weight of females and percent female by combining samples from 1993 to 2005. Precocious Post smolts were excluded from the spawning population since their contributions are not fully known.

State of the stock: Conservation requirements were met for all years from 1993 to 2006, with an overall mean of 237 percent.

Forecast: No forecast available.

STOCK: Gander River (SFA 4) **Drainage area:** 6,398 km²

CONSERVATION REQUIREMENT: 46.211 million eggs (21,828 small salmon) calculated as fluvial area x 2.4 eggs/m² and lacustrine area x 368 eggs/ha

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005 [2]	2006 [2]	MIN [1]	MAX [1]
Total returns to river													
Small	24191	10637	19060	18742	14074	12517	13444	13657	18521	17828	13959	6745	26205
Large	1753	1883	3649	4815	1942	1682	1898	1853	2668	2461	1927	473	4815
Recreational harvest (small salmon)													
Retained	4537	1381	2737	2429	1318	1865	1726	1735	1325	1741	1632	1318	4537
Released	3323	1522	2531	848	684	756	678	664	795	1105	811	664	3323
Recreational harvest (large salmon)													
Retained	-	-	-	-	-	-	-	-	-	-	-	-	-
Released	685	236	284	215	110	180	184	65	58	208	129	65	685
Spawners													
Small	19322	9103	16070	16228	12756	10471	11650	11787	17091	16140	12246	5565	24739
Large	1685	1860	3621	4794	1931	1735	1880	1911	2536	2449	1914	473	4794
Egg conservation requirement													
% met	115	61	110	121	86	84	91	96	144	111	81	36	128

[1] Min and max are for the period of record since 1984 except recreational harvest is since 1994.
[2] Preliminary
Note: Any changes from previous years are due to the updating of preliminary data and biological characteristics information.

Recreational catches: The number of small salmon retained in 2006 was 1632 and the number released was 811.

Data and methodology: Complete counts of salmon were obtained at a fish counting fence during 1989-99, and have historically been counted at a fishway located on a tributary, Salmon Brook. Returns to the entire Gander River for 2000-2006 were estimated from relationships between counts at the Salmon Brook fishway and total returns to the counting fence for the period 1989-1999. Recreational fishery data for 1994-2006 are from the License Stub Return System. The data used for 2006 are the 1992-2005 means. A hook-and-release mortality of 10% was used in the calculation of total returns and spawning escapements for the years 1993-2006.

State of the stock: Conservation requirement in terms of eggs and small salmon was not achieved in 2006. In terms of small salmon, conservation requirement was met only in 1993. Conservation egg requirement was achieved in seven of the 15 moratorium years. Using Salmon Brook as an indicator of returns to the entire river, it is likely that returns of small salmon of a magnitude similar to or greater than those in 1992-2006 occurred in pre-moratorium years.

Forecast: No forecast available.

STOCK: Middle Brook (SFA 5) **Drainage area:** 276 km²

CONSERVATION REQUIREMENT: 2.3 million eggs (~ 1,012 small salmon) calculated as fluvial area x 2.4 eggs/m² and lacust area x 368 eggs/ha

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005 [2]	2006 [2]	MIN [1]	MAX [1]
Total returns to river												
Small	1352	2625	1948	1749	1525	916	1183	1520	1516	1153	626	2625
Large	262	196	130	190	62	69	74	88	62	115	13	262
Recreational harvest (small salmon)												
Retained	163	275	180	112	391	117	97	190	114	130	84	391
Released	54	73	83	25	458	28	29	24	84	41	19	458
Recreational harvest (large salmon)												
Retained	-	-	-	-	-	-	-	-	-	-	-	-
Released	9	8	15	23	13	1	2	1	10	4	1	31
Spawners												
Small	1184	2342	1760	1635	1088	796	1083	1328	1393	1019	461	2342
Large	261	195	129	187	61	69	74	88	61	115	13	261
Egg conservation requirement												
% met	193	301	222	217	132	101	134	162	163	134	49	301

[1] Min and max are for the period of record since 1984 except recreational harvest is since 1994.

[2] Preliminary

Note: Any changes from previous years are due to the updating of preliminary data and biological characteristics information.

Recreational catches: A total of 130 small salmon was retained in 2006 and 41 were released.

Data and methodology: Complete counts are available from a fishway located on the lower river. Recreational fishery data were obtained from the License Stub Return System; data for 2006 are the 2002-2005 means. A hook-and-release mortality of 10% was used in the calculation of total returns and spawning escapements for the years 1993-2006.

State of the stock: Conservation requirement in terms of eggs and small salmon was met for all years since the moratorium started in 1992 except for small salmon (79%) in 2002. Egg deposition was below conservation requirement for pre-salmon moratorium years 1985-1991. Counts of small salmon similar to or higher than those observed during the moratorium years occurred in pre-salmon moratorium years. The 2006 count of 1049 small salmon was 26% lower than in 2005, 30% lower than the 1992-1996 mean and 27% lower than the 1997-2005 mean. The 2006 count of 115 large salmon was 85% higher than in 2005, 5% higher than the 1992-1996 mean and 9% lower than the 1997-2005 mean.

Forecast: No forecast available.

STOCK: Terra Nova River (SFA 5) **Drainage area:** 1,883 km²

CONSERVATION REQUIREMENT: 14.3 million eggs (~ 7,094 small salmon) calculated as fluvial area x 2.4 eggs/m² and lacustrine area x 368 eggs/ha

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005 [2]	2006 [2]	MIN [1]	MAX [1]
Total returns to river												
Small	1732	1868	1892	1629	2261	1435	2271	3006	2372	2536	1127	3050
Large	528	394	344	232	330	271	330	397	313	426	56	637
Recreational harvest (small salmon)												
Retained	389	187	120	146	254	146	105	134	114	125	105	645
Released	221	365	229	464	312	142	133	229	151	164	133	464
Recreational harvest (large salmon)												
Retained	-	-	-	-	-	-	-	-	-	-	-	-
Released	13	66	10	71	4	7	10	7	6	8	4	71
Broodstock removal [3]												
Small	352	270	239	132	254	0	0	0	0	0	64	352
Large	29	0	3	5	21	0	0	0	0	0	0	44
Spawners												
Small	1063	1425	1542	1425	1786	1311	2179	2885	2272	2426	815	2893
Large	497	387	340	224	309	271	329	397	313	426	56	588
Egg conservation requirement												
% met	31	33	33	27	36	28	42	54	42	48	14	55

[1] Min and max are for the period of record since 1984 except recreational harvest is since 1994.

[2] Preliminary

[3] In 1994-2001, a number of adults were removed as broodstock for an incubation facility for subsequent fry stocking back to Terra Nova River above Mollyguajeck Falls; these adults were deducted from spawning escapements and the calculation of percent of conservation requirement presented above.

Note: Any changes from previous years are due to the updating of preliminary data and biological characteristics information.

Recreational catches: A total of 125 small salmon was retained in 2006 and 164 were released.

Data and methodology: Counts are available from a fishway located on the lower river. Returns to the river in 2000 were estimated based on the relationship between counts at the upper fishway and total returns to the the lower fishway for previous years. Recreational fishery data for 1994-2006 are from the License Stub Return System; data for 2006 are the 2002-2005 means. A hook-and-release mortality of 10% was used in the calculation of total returns and spawning escapements for the years 1993-2006.

State of the stock: The proportion of conservation requirement achieved in 2006 was 48%. The 2006 count of 2481 small salmon was 7% higher than in 2005 and 22% higher than the 1997-2005 mean. Although this river has never achieved conservation requirement, egg depositions during the moratorium years 1992-2006 were generally higher than in pre-moratorium years. It should be noted that accessible rearing habitat for anadromous Atlantic salmon above the lower fishway more than doubled in 1985 with the opening of the area above Mollyguajeck Falls.

Forecast: No forecast available.

STOCK: **Northwest River (SFA 5)** **Drainage Area:** 689 km^2

CONSERVATION REQUIREMENT: **4.07 million eggs (equivalent to 1,726 small salmon)**
Management Target 2002-2005 **700 salmon**

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Min	Max
Total returns:														
Small	498	593	466	540	314	272	102	443	1,012	1207	1210	783	102	1210
Large	135	203	182	104	93	106	50	114	273	265	305	197	50	305
Recreational Harvest(small salmon)														
retained	97	0	0	0	0	0	0	0	51	65	78	62	0	97
released	0	7	0	0	0	0	0	0	0	0	0	0	0	7
Recreational Harvest(large salmon)														
retained	0	0	0	0	0	0	0	0	0	0	0	0	0	0
released	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other removals														
Small	5	1	0	0	1	2	0	1	2	3	13	17	0	17
Large	1	8	0	0	1	0	0	1	0	1	3	8	0	8
Spawners														
Small	396	592	466	540	313	270	102	442	959	1163	1119	704	102	1163
Large	134	195	182	104	92	106	50	113	273	264	302	189	50	302
Conservation Requirement														
% eggs met	37	55	46	42	28	27	11	37	81	92	93	58	11	93
Smolt Count	-	-	-	-	-	11281	-	-	-	-	-	-		
Smolt-to-adult Survival	-	-	-	-	-	1	-	-	-	-	-	-		

Note: Any changes from previous reports are due to the updating of preliminary data and biological characteristics information.

Data and methodology: Counts of adults have been available from a counting fence since 1995.
A smolt population estimate was conducted in 2000.
Angling data for 2003 provided by Parks Canada.

State of the stock: Conservation egg deposition has not been met during the time series from 1995. A single smolt population estimate resulted in the lowest sea survival recorded on any river studied.

Forecast: No forecast available.

STOCK: Northeast Brook, Trepassey (SFA 9) **Drainage area:** 21 km²

CONSERVATION REQUIREMENT: 0.14 million eggs (~ 51 small salmon) calculated as fluvial area x 2.4 eggs/m² and lacustrine area x 368 eggs/ha

Year	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004 [2]**	**2005 [2]**	**2006 [2]**	**MIN [1]**	**MAX [1]**
Total returns to river													
Small	73	50	91	95	83	56	65	115	70	69	76	49	158
Large	15	9	11	18	14	8	2	11	11	5	5	2	41
Recreational harvest (sm. salmon)													
Retained													
Released													
Recreational harvest (lg. salmon)													
Retained													
Released													
Spawners													
Small	73	50	91	95	83	56	65	115	70	69	75	49	158
Large	15	9	11	18	14	8	2	11	11	5	5	2	41
Egg conservation requirement													
% met	196	135	256	248	216	157	156	303	198	168	184	126	368
Smolt count	1749	1829	1727	1419	1740	916	2076	1064	1571	1384	1385	792	2076
% Sea survival													
(Adult return year)	9.2	2.9	5.0	5.5	5.8	3.2	7.1	5.5	6.6	4.4	5.5	2.6	9.2

[1] Min and max are for the period of record since 1984.
[2] Preliminary

Data and methodology: Counts of adults and smolts have been available from a counting fence since 1984 and 1986. In the past, this small system was part of a group of experimental rivers involved in research on stock-recruitment relationships and definition of smolt production in terms of various habitat types. The system has become an important indicator of smolt (year i) to (small salmon year i + 1) survival (repeat spawners included).

State of the stock: Conservation egg requirment has been met every year in the time series, but the lowest level achieved occurred in 1992. In terms of small salmon, the lowest percentage of conservation requirement achieved also occurred in 1992. The maximum number of smolts counted was 2,076 in 2002 while the lowest was 792 in 1995. Highest sea survival prior to the commercial salmon-fishing moratorium (8.1%) was recorded in 1987. Lowest survival (2.6%) occurred in 1992. Since the start of the moratorium in 1992, sea survival rose to a peak of 9.2% in 1996 only to plummet to 2.9% in 1997; an improvement over this low was noted for 1998-2000 but dropped again to 3.2% in 2001. Sea survival in 2006 increased 25% from that of 2005 and is on par with the 1992-2005 mean.

Forecast: No forecast available.

STOCK: Rocky River (SFA 9) **Drainage area:** 296 km²

CONSERVATION REQUIREMENT: 3.4 million eggs (~ 881 small salmon) calculated as fluvial area x 2.4 eggs/m² and lacustrine area x 368 eggs/ha

Year	2000	2001	2002	2003	2004	2005	2006	MIN [1]	MAX [1]
Total returns to river									
Small	277	233	276	402	169	427	352	80	435
Large	104	60	78	73	235	95	56	1	235
Recreational harvest (small salmon)									
Retained	N/A	N/A	0	0	0	0	0	0	0
Released	N/A	N/A	5	5	0	6		0	5
Recreational harvest (large salmon)									
Retained	N/A	N/A	0	0	0	0	0	0	0
Released	N/A	N/A	0	0	0	2		0	0
Broodstock removal	0	0	0	0		0	0	0	76
Spawners									
Small	277	233	276	401	169	426	352	158	435
Large	104	60	78	73	235	95	56	1	89
Fry stocked	0	0	0	0	0	0	0	81983	434500
Egg conservation requirement									
% met	42	31	38	50	51	55	42	17	56
Smolt count	7616	9392	10144	4440	13047	15847	13200	4440	16900
% Sea survival									
(Adult return year)	2.1	3	3	4	4	3	2.2	1.8	4.2

[1] Min and max are for the period of record since 1987.

[2] Preliminary smolt to adult survival for 2001 -2005 is smolt to small salmon

Background: Rocky River was stocked with salmon fry from 1983 to 1987 with the first returns to the reconstructed fishway realized in 1987. Also in 1987 140 adult salmon were transferred into Rocky River from Little Salmonier River.

Data and Methodology: Fluvial habitat consists of 1.08 million m2 and lacustrine habitat includes 2200 ha. Biological characteristics used in calculations are those for Rocky River stock. Previous fry releases are back calculated to eggs for % of target egg achieved in areas stocked. Complete adult counts are available from a trap installed in the fishway. Smolts have been enumerated annually since 1990. Sea survival is smolt to 1SW salmon returns to the fishway prior to 2001.

Recreational fisheries: 2002 was the first time a recreational fishery (hook and release only) was opened on Rocky River.

State of the stock: Stock is still in the development phase.

Forecast: There is no forecast for this stock.

STOCK: **Little River (SFA 11)** **Drainage Area:**

CONSERVATION REQUIREMENT: 0.306 million eggs (equivalent to 230 small salmon)

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Min[1]	Max[1]
Total returns:	84	135	801	478	313	356	616	161	528	335	687	231	162	61	801
Small	73	118	674	399	264	307	564	125	487	322	656	216	136	55	674
Large	11	17	127	79	49	49	52	36	41	13	31	15	26	3	127
Recreational Harvest(small salmon)	-	-	-	-	-	-	-	-	-	-	-	-	-		
retained	-	-	-	-	-	-	-	-	-	-	-	-	-		
released	-	-	-	-	-	-	-	-	-	-	-	-	-		
Recreational Harvest(large salmon)	-	-	-	-	-	-	-	-	-	-	-	-	-		
retained	-	-	-	-	-	-	-	-	-	-	-	-	-		
released	-	-	-	-	-	-	-	-	-	-	-	-	-		
Other removals	0	5	19	14	9	10	3	0	6	0	0	0	0	0	19
Small	0	5	18	13	7	8	3	0	5	0	0	0	0	0	18
Large	0	0	1	1	2	2	0	0	1	0	0	0	0	0	2
Brood stock removals:	0	85	119	3	188	258	352	0	0	0	0	0	0	0	352
Spawners	84	45	663	461	116	88	261	161	522	335	687	231	162	26	687
Small	73	33	538	383	N/A	57	N/A	125	482	322	656	216	136	13	656
Large	11	12	125	78	N/A	31	N/A	36	40	13	31	15	26	3	125
Fry Stocked	118472	0	92528	145921	0	306180	298458	288897	0	0	0	0	0	0	306180
Conservation Requirement % eggs met	37	56	288	200	231	38	263	69	224	144	295	99	70	29	295
Smolt Count	501	2712	4449	2521	3320	1177	2703	4983	9963	8570	4640	1283	753	324	9963

[1] Max and Min are for the period since 1987.

Note: Any changes from previous reports are due to the updating of preliminary data and biological characteristics information.

Recreational catches: The river is presently closed to angling.

Data and methodology: Returns to the river are assessed by a counting fence.

State of the stock: Returns of salmon are considered to be minimum values as salmon are often observed spawning below the counting fence.

Forecast: No forecast available.

STOCK: Conne River (SFA 11) **Drainage area:** 602 km²

MANAGEMENT TARGET: 7.8 million eggs (~ 4,000 small salmon) calculated as fluvial area x 2.4 eggs/m² and lacustrine area x 368 eggs/ha

CONSERVATION REQUIREMENT: 4.34 million eggs (~ 2,475 small salmon)

Year	2000	2001	2002	2003	2004	2005	2006 [2]	MIN [1]	MAX [1]
Total returns to home waters									
Small	5177	1503	2573	1953	3818	1978	2623	1503	10155
Large	216	140	167	51	175	105	170	51	516
First Peoples' harvest									
Small	0	0	0	0	0	0	0	0	948
Large	0	0	0	0	0	0	0	0	11
Recreational harvest (small salmon)									
Retained	730	215	275	180	444	75	395	108	3302
Released	-	-	-	-	-	-	-	0	80
Recreational harvest (large salmon)									
Retained	-	-	-	-	-	-	-	0	27
Released	-	2	-	-	-	-	-	0	0
Broodstock removal									
Small	0	0	0	0	0	0	0	25	245
Large	0	0	0	0	0	0	0	0	1
Spawners									
Small	4431	1286	2295	1770	3366	1898	2210	1286	7823
Large	216	140	167	51	174	105	168	51	488
Management Target									
% met	117	37	63	45	89	51	61	37	219
Egg conservation requirement	210	67	113	81	160	91	110	67	394
% met									
Smolt estimate	60777	86898	81806	71479	79667	66196	35487	35487	100983
% Sea survival	8.1	2.5	3.0	2.4	5.3	2.5	4.0	2.4	10.2
(Adult return year)									

[1] Min and max are for the period of record since 1974. First Peoples' harvest in salt water includes some salmon from other rivers. First Peoples' fishery quota of 1200 fish has been in effect since 1986, but was reduced to 500 fish for 1993. First Peoples' fishery and recreational fishery were closed again in 1998 and 1999.
[2] Preliminary

Data and methodology: Smolt estimates are derived from mark-recapture surveys. Returning adult salmon are enumerated at a fish counting fence. Angling harvests for Conne River are from DFO statistics. A video camera system was introduced in 1993.

State of the stock: The Management Target, which is higher than the conservation egg requirement, was met from 1986 to 1990 and again in 1996 and 2000, with 61% achieved in 2006. Sea survival to small salmon returns increased from 2.5% (2005 returns) to 4.0% (2006), but is still well below historic highs. In contrast with the Mangement Target, the Conservation egg requirement was met or exceeded from 1986-1990, 1993, 1995 - 2000, and again in 2002 and 2004 with 110% attained in 2006.

Forecast: Smolt estimates for 2006 are anomalously low by comparison with previous values. High water levels in early-to-mid April coupled with somewhat warmer temperatures may have resulted in some smolts leaving the river early in 2006. There is no way to reconcile whether the run was indeed early or was in fact the lowest attained to date. If the latter is the case, the adult runs of small salmon in 2007 would be expected to be quite low.

STOCK: **Highlands River (SFA 13)** **Drainage area:** 183 km²

CONSERVATION REQUIREMENT: 1.5 million eggs calculated as fluvial area x 2.4 eggs/m² and lacustrine area x 368 eggs/ha

Year	2000	2001	2002	2003	2004	2005 [2]	2006 [2]	MIN [1]	MAX [1]
Total returns to home waters									
Small	58	75	169	294	507	101	233	58	507
Large	67	65	87	166	252	153	114	29	252
Recreational harvest (small salmon)									
Retained						2			
Released									
Recreational harvest (large salmon)									
Retained									
Released						2			
Spawners									
Small	58	75	169	294	507	99	233	58	507
Large	67	65	87	166	252	153	114	29	252
Conservation requirement									
% met	34	35	53	99	155	75	71	28	155
Smolt count	13120	-	-	-	-	-	-	5922	15839
% Sea survival									
Small	0.6	0.6	-	-	-	-	-	0.6	3.2
Large	1.1	0.7	0.7	-	-	-	-	0.4	1.4
(Adult return year)									

[1] Min and max are for the period of record since 1974.
[2] Preliminary

Data and methodology: Counts of smolt and adult salmon were obtained with a fish counting fence in 1980 - 82 and in 1993 - 2006. Adults salmon only have been enumerated since 2001. Sea survival was calculated for small salmon returning in year i + 1 and for large salmon returning in year i + 2, by dividing the number of returning adults by the number of smolts in year i.

State of the stock: The number of large salmon returning increased coincident with the closure of the commercial salmon fishery in 1992, but fell in each of the next four years following the previously high peak in 1997. Returns of small and large salmon remain highly variable with the greatest returns recorded occurring in 2004. Since then salmon returns have declined. The conservation spawning requirements were achieved in 1997, essentially met in 2003 (99%), and exceeded in 2004. Only 71% of conservation was attained in 2006. Note that reports indicate upwards of 12 salmon were observed passing up river prior to fence installation in 2005, but these numbers can't be fully reconciled. Angling removals for 2006 are currently incomplete.

Forecast: No forecast was made as smolts have not been monitored since 2000.

STOCK: Harry's River (SFA 13) **Drainage area:** 816 km²

CONSERVATION REQUIREMENT: 7.8 million eggs calculated as fluvial area x 2.4 eggs/m² and lacustrine area x 368 eggs/ha

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005[2]	2006[2]	MIN [1]	MAX [1]
Total returns to river												
Small	1747	1659	1713	1271	1028	1640	2334	2828	2495	2905	888	2905
Large	201	191	176	49	132	285	422	498	453	676	16	676
Recreational harvest (small salmon)												
Retained	2	-	-	-	-	-	91	223	96	160	2	319
Released	884	625	702	796	518	400	237	534	177	356	23	1411
Recreational harvest (large salmon)												
Retained	-	-	-	-	-	-	-	-	-	-	0	0
Released	174	138	47	78	51	75	132	266	44	155	28	220
Spawners												
Small	1657	1596	1643	1191	976	1600	2211	2543	2376	2704	573	2704
Large	184	177	171	41	127	277	403	470	449	660	13	660
Egg conservation requirement												
% met	50	49	49	29	33	60	84	98	92	118	13	118
Spawners on Pinchgut Brook tributary												
Small	613	593	608	441	200	592	352	292			200	749
Large	68	63	63	15	3	23	22	15			3	68

[1] Min and max are for the period of record since 1974.

[2] Preliminary

Note: Any changes from previous reports are due to the updating of preliminary data and biological characteristics information.

Recreational catches: The fishery was limited to catch and release angling from 1996 to 2002 but was expanded in 2003-2006 to permit a limited retention fishery as part of an overall conservation/recovery/ stewardship program. The in-season review indicated the returns to the river would meet or exceed the 2002 returns, therefore the river was opened to retention angling on July 1. The retention fishery was restricted to a daily retention of one small salmon and a seasonal limit of two small salmon. Retention angling was restricted to the main stem of Harry's River from Home Pool at the outlet of Georges Lake to the river mouth. No retention of salmon is permitted on Georges Lake and Pinchgut Lake, hook and release only.

Data and methodology: Total returns to Harry's River in 2006 were determined from a counting fence operated at Gallant's from May 27-September 11, snorkel surveys conducted below the fence site in early September and angling removals below the fence. Angling data used for 2006 are the means for 2004-2005 from the License Stub Return System.

Total returns to Harry's River in 2003-2005 were determined from a counting fence operated at the mouth of the river. Spawning escapements were determined by subtracting angling removals. Estimates of total spawners in 1992-2002 were derived from counts of small and large salmon at a fish counting fence operated on Pinchgut Brook tributary adjusted for the percentage of the total spawning activity observed on Pinchgut Brook tributary during surveys conducted in the fall of 1995-1997. Recreational fishery data for 1994-2006 are from the License Stub Return System. Spawners in 2001-2002 include an adjustment for small and large salmon observed in snorkel surveys of the lower part of the mainstem below George's Lake in mid-August. A hook-and-release mortality of 10% was used in the calculation of total returns and spawning escapements for the years 1993-2006.

State of the stock: The stock has shown some major signs of improvement since 1992 with increased juvenile densities and proportion of large salmon. The conservation requirement attained in 2006 (118%) is the highest on record and the only time this river achieved conservation.

Forecast: No forecast available.

STOCK: Torrent River (SFA 14A) **Drainage area:** 619 km²

CONSERVATION REQUIREMENT: 1.5 million eggs (~ 656 small salmon) calculated as fluvial area x 2.4 eggs/m² and lacustri area x 368 eggs/ha

Year	1998	1999	2000	2001	2002	2003	2004	2005 [3]	2006 [3]	MIN [1]	MAX [1]
Total returns to river [2]											
Small	5388	4857	4154	2637	4861	3955	5110	4065	4048	96	7475
Large	761	421	596	443	432	341	549	777	1429	7	780
Recreational harvest (small salmon)											
Retained	341	720	359	376	822	588	674	259	586	137	822
Released	480	1294	330	449	1299	695	854	273	780	76	1299
Recreational harvest (large salmon)											
Retained	-	-	-	-	-	-	-	-	-	-	-
Released	42	224	85	57	111	107	128	64	103	28	224
Specimens collected below fishway: Small								126			
Spawners											
Small	4999	4008	3762	2216	3909	3297	4351	3653	3384	121	6923
Large	757	399	587	437	421	330	536	771	1419	3	771
Egg conservation requirement											
% met	924	680	657	400	597	496	686	675	844	161	1279

[1] Min and max are for the period of record since 1974.
[2] Total returns are approximate because of spawning below the fishway.
[3] Preliminary.
Note: Any changes from previous reports are due to the updating of preliminary data and biological characteristics information.

Recreational catches: The restriction of hook-and-release angling until a minmum spawning escapement of 750 salmon had passed through the fishway was dropped in 1999. The area above the fishway has been open to hook-and-release angling since 2002; however, there is no estimate of the proportion of released fish that occurs above.

Data and methodology: Returns to the river are determined from counts at the fishway and recreational catch data below the fishway. The fishway has been monitored since 1966. Recreational fishery data for 1994-2006 are from the License Stub Return System; data for 2006 are the 2002-2005 means. A hook-and-release mortality of 10% was used in the calculation of spawning escapements for the years 1985-2006.

State of the stock: The count of small salmon at the Torrent River fishway in 2006 was 7% lower than in 2005 while large salmon was 84% higher. Returns have shown an increasing trend since the late 1970s with the highest returns occurring since 1992. It is estimated that the Torrent River stock has achieved conservation requirement every year since 1978. This is due to the successful enhancement program carried out in 1972-1976 when adult salmon were used to colonize new habitat opened up above the fishway. The conservation requirement was achieved again in 2006, and is the highest on record since 1998.

Forecast: No forecast available.

STOCK: Western Arm Brook (SFA 14A) **Drainage area:** 149 km²

CONSERVATION REQUIREMENT: 0.91 million eggs (~ 292 small salmon) calculated as fluvial area x 2.4 eggs/m² and lacustrine area x 105 eggs/ha

Year	1998	1999	2000	2001	2002	2003	2004	2005 [3]	2006 [3]	MIN [1]	MAX [1]
Total returns to river											
Small	1718	1046	1492	563	1465	1406	1151	1019	1300	233	1718
Large	128	22	120	28	48	23	74	43	44	0	128
Recreational harvest (small salmon)[4]											
Retained	-	-	21	24	-	-	-	-	-	0	24
Released	-	-	0	0	-	-	-	-	-	0	0
Recreational harvest (large salmon)											
Retained	-	-	-	-	-	-	-	-	-	-	-
Released	-	-	-	-	-	-	-	-	-	-	-
Known removals above counting fence											
Small	68	1	3	6	2	20	2	30	22	0	346
Large	0	0	0	0	0	2	1	1	1	0	3
Spawners											
Small	1650	1045	1468	533	1463	1386	1149	989	1278	117	1650
Large	128	22	120	28	48	21	73	42	43	0	128
Egg conservation requirement											
% met	625	370	567	193	510	466	425	351	446	30	625
Smolt count	17139	13500	12706	16013	14999	12086	17323	8607	20856	6232	23845
% Sea survival [2]											
(Adult return year)	7.2	6.1	11.1	4.4	9.1	9.4	9.5	5.9	15.1	2.2	15.1

[1] Min and max are for the period of record since 1974.
[2] Sea survival is from smolt to returns as small salmon.
[3] Preliminary
[4] Biological sampling by angling
Note: Any changes from previous reports are due to the updating of preliminary data and biological characteristics information.

Recreational catches: The river has been closed to angling since 1989. The angling that took place in 2000-2001 from the mouth of the river to 0.5km upstream was part of a biological sampling experiment. The purpose of this experiment was to collect biological information from up to 100 small salmon.

Data and methodology: Counts of smolts and adult salmon were obtained at a fish counting fence located at the mouth of the river in 1971-2006. A hook-and-release mortality of 10% was used in the calculation of spawning escapements for the years 1985-89 when there was a recreational fishery.

State of the stock: Returns of small salmon in 2006 were 28% higher than those in 2005 while returns of large salmon were 2% higher. The percentage of the conservation requirement achieved in 2006 was 27% higher than in 2005 and 131% higher than in 2001 which was the second lowest year since 1992. The low percentage of conservation requirement achieved in 2001 and 1997 indicates that the status of this stock can fluctuate widely from one year to the next. Smolt production in 2006 was 142% higher than in 2005 but 13% lower than the maximum production value (23845) achieved in 1997.

Forecast: No forcast available.