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Proceedings of the regional peer review of the update on the status of Atlantic Salmon in Newfoundland and Labrador - 2013

December 3-4, 2013
St. John's, NL

Chairperson: Keith Clarke
Editor: Erika Parrill

Science Branch
Fisheries and Oceans Canada
PO Box 5667
St. John's NL A1C 5X1

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Foreword

The purpose of these Proceedings is to document the activities and key discussions of the meeting. The Proceedings may include research recommendations, uncertainties, and the rationale for decisions made during the meeting. Proceedings may also document when data, analyses or interpretations were reviewed and rejected on scientific grounds, including the reason(s) for rejection. As such, interpretations and opinions presented in this report individually may be factually incorrect or misleading, but are included to record as faithfully as possible what was considered at the meeting. No statements are to be taken as reflecting the conclusions of the meeting unless they are clearly identified as such. Moreover, further review may result in a change of conclusions where additional information was identified as relevant to the topics being considered, but not available in the timeframe of the meeting. In the rare case when there are formal dissenting views, these are also archived as Annexes to the Proceedings.

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SUMMARY

A regional advisory process (RAP) on the status of Atlantic Salmon in Newfoundland and Labrador (NL) was held December 3-4, 2013 in St. John's, NL. Its purpose was to provide the most recent information concerning the status of Atlantic Salmon stocks for Salmon Fishing Areas (SFAs) 1-2 and 14B in Labrador, and SFAs 3-14A in Newfoundland.

A Science Advisory Report (SAR) was written and reviewed during the meeting. It includes overall and SFA summaries for Atlantic Salmon, which were written and reviewed at the RAP meeting. Detailed rapporteur notes of discussions pertaining to the working papers presented at the RAP were produced. This Proceedings Report includes an abstract and discussion for the working papers presented, and also a list of research recommendations suggested by meeting participants.

Compte rendu de l'examen régional par les pairs sur la mise à jour de la situation du saumon de l'Atlantique à Terre-Neuve-et-Labrador – 2013

SOMMAIRE

Une réunion du processus de consultation régionale sur la situation du saumon de l'Atlantique à Terre-Neuve-et-Labrador a eu lieu les 3 et 4 décembre 2013 à St. John's (Terre-Neuve-et-Labrador). Elle visait à fournir les derniers renseignements sur la situation des stocks de saumon de l'Atlantique dans les zones de pêche du saumon (ZPS) 1, 2 et 14B au Labrador et les ZPS 3 à 14A à Terre-Neuve.

Un avis scientifique a été rédigé et examiné au cours de la réunion. Il comprend des résumés sur le saumon de l'Atlantique (en général et selon la ZPS), qui ont été rédigés et examinés au cours de la réunion du processus de consultation régionale. Des notes détaillées du rapporteur sur les discussions tenues pour les documents de travail présentés à la réunion du processus de consultation régionale ont été préparées. Le présent compte rendu comprend un résumé et une discussion sur les documents de travail présentés, de même qu'une liste des recommandations relatives à la recherche proposées par les participants de la réunion.

INTRODUCTION

A regional advisory process (RAP) meeting was held December 3-4, 2013 in St. John's, NL to assess the status of Atlantic Salmon stocks for SFAs 1-2 and 14B in Labrador, and SFAs 3-14A in Newfoundland. The meeting was attended by various employees from Fisheries and Oceans Canada (DFO), Parks Canada, the government of Newfoundland and Labrador, representatives of non-governmental organizations and various Aboriginal groups. The meeting's terms of reference, agenda, participant list, and tabled working papers are provided in Appendices I through IV, respectively.

A Science Advisory Report (SAR) was written and reviewed during the meeting. It includes overall and SFA summaries for Atlantic Salmon. Detailed rapporteur notes of open discussions and debates pertaining to the working papers presented at the RAP were produced. This Proceedings Report includes an abstract and discussion summary for the working papers presented, and also a list of research recommendations suggested by meeting participants

WORKING PAPER ABSTRACTS AND DISCUSSION SUMMARIES

Accuracy and Utility of the Atlantic Salmon Licence Stub (Angler Log) Return Program in Newfoundland and Labrador

G. Veinott, DFO Science

Abstract

The accuracy of the licence stub program is dependent on a high level of compliance by anglers. At the population level the uncertainty in the estimate of average harvest per angler is acceptable. Other population level metrics obtained from the data such as number of released fish and effort are likely estimated with similar margins-of-error and confidence. On a river by river basis, the estimated number of harvested fish becomes less certain as fewer anglers submit returns on specific rivers or are polled during a telephone survey. Fisheries and Oceans Canada's science and resource managers need to determine what level of risk is acceptable. There is little doubt that the licence stub program is useful. The data is used for multiple purposes including annual stock assessments, to meet international obligations, and to evaluate the impact of management measures such as implementation of the River Classification System. The licence stub program contains demographic and catch data that may be valuable to the fishing industry such as the origin of anglers fishing different rivers, rivers with the highest catch per unit effort, and rivers with the highest catch of large fish. It may also be possible to expand the number of rivers upon which stock assessments are carried out based on the licence stub data.

Discussion

One participant asked whether non-residents were contacted when DFO obtains angling information. It was stated that non-residents are not contacted to participate in a telephone survey, and that the current random sampling process only includes resident anglers. Another meeting participant inquired about the total percentage of anglers contacted. It was clarified that although some anglers refuse to participate in the angling survey, DFO currently attempts to contact 1,300 out of approximately 15,000 angler survey participants. It was also stated that it is suspected that there is little difference in the amount of fish caught between respondents and non-respondents. It was suggested by DFO scientists that the voluntary response rate prior to reminders has remained relatively consistent at approximately 7 %. A meeting participant further inquired about the costs associated with conducting the survey. Fisheries and Oceans Canada

stated that in addition to funding received from the licence sales, the Department spends approximately $30,000 on the survey. It was stated that the cost estimate does not include the technician's salary who oversees the survey and that the most expensive aspect of the survey is the mail-outs. It was concluded that a creel survey could be an affordable and viable option to supplement data collection.

A further discussion was held about how to correctly report angling time. It was suggested by DFO meeting participants that anglers do not need to report the time taken to reach a river, but rather the actual number of hours spent fishing. In addition, it was clarified that DFO calculates data for rod days. Although DFO converts fishing hours to rod days, it was stated that the Department would prefer to analyze hours as it reduces the bias. It was suggested that Catch Per Unit Effort (CPUE) is more accurate based on hours of fishing instead of rod days. Some meeting participants suggested that there are many variables that affect CPUE such as water temperature and wind direction. It was clarified by DFO scientists that CPUE measures the number of fish caught per unit of effort rather than effort under ideal conditions. It was also stated that CPUE is not used as an indicator of stock abundance, but rather as a gauge to help establish harvest levels.

Participants deliberated about the accuracy of the data being collected by the survey. Scientists at DFO suggested that the Department takes the information at face value and does not have the ability to examine the accuracy of the information being provided by anglers. The meeting participants also discussed whether anglers purchase more than one licence. It was concluded that although some anglers can purchase more than one licence due to vendors not being able to access a database detailing purchasers, it does not occur very often as evidenced by small number of duplicate stub returns received for the same angler. It was also stated that there is currently no requirement for stubs from licences to be returned. It was suggested that if a vendor database was created, then the stubs could be returned. However, it was noted that if DFO prevents anglers from purchasing a licence because they don't return their stub and try to enforce that, people would simply be able to, in theory, tick the box that says "did not fish" and return a useless stub giving false effort information. It was mentioned that DFO currently obtains a 25 % return rate of stubs from anglers, and that the return rate may be attributed to DFO's practice of sending out reminders to anglers. Some meeting participants suggested that DFO should target specific rivers that are in need of more data by surveying anglers until a specific number of responses are obtained. It was also mentioned that determining CPUE and population assessments on data from a survey with a 25 % response rate was questionable. It was clarified by DFO meeting participants that those determinations are a matter of risk-tolerance considerations by fisheries management. And currently, catch data is only used on rivers where DFO has information on actual adult counts.

The usage of catch and release data was also discussed by meeting participants. It was stated that catch per angler was used as a parameter in the study. Multiple meeting participants suggested that there are many anglers catching and releasing more than four fish. Representatives from DFO suggested that if anglers see someone catching and releasing more than four fish that they should contact DFO's Conservation and Protection (C&P) Branch. It was suggested by some meeting participants that they would be uncomfortable reporting such activities due to the probability of retaliation by the offender. A participant from DFO suggested that anglers can report fishing offences anonymously and that data suggests that it is very rare for anglers to report catching and releasing 3 or 4 salmon a day. One meeting participant suggested that the NL Region of DFO should consider implementing the practices of DFO in Quebec pertaining to anglers not being allowed to leave an area without having their fish authorized by DFO. It was stated by one meeting participant that on Harry's River 414 salmon were counted as retained and 499 salmon were counted as hooked and released. It was

suggested by the participant that the statistics were being inflated for hook and release. It was clarified by DFO that due to this particularly small sample size, there was a large margin of error.

Can Angling Data be used to Infer Trends in Salmon Abundance?

B. Dempson, DFO Science

Abstract

Trends in angling data for insular Newfoundland were examined in relation to abundance information compiled from returns of Atlantic Salmon to fishways and fish counting fences. A data set obtained using catch metrics (retained catch, released catch, total catch, CPUE) from the top 30 rivers in Newfoundland, based on average catch over the period 1994 to 2012 which represent 80 % of the overall total catch, was more closely associated with actual trends in salmon abundance than an alternative index that used angling information from individual SFAs. At an intermediate scale, an example was shown for the northeast and east coast (SFAs 4-5) where an angling index derived using data from 19 different rivers was strongly associated with a relative index of salmon abundance estimated from returns of Atlantic Salmon at five rivers. However, at the individual river scale angling catch metrics were strongly associated with salmon returns at some locations, but not others. In summary, general trends in Atlantic Salmon abundance for insular Newfoundland were apparent in angling statistics. Angling catch metrics are potentially useful to infer abundance trends at smaller, regional scales (e.g. SFA level), but independent sources of abundance are required in order to evaluate the level of association. At the individual river scale, caution is advised as angling statistics may only reflect trends in catch and not abundance. Regardless, regional summaries of angling catch data should be included in the SAR.

Discussion

A participant requested clarification on how DFO knows which postal codes are fishing particular rivers. It was put forward that information pertaining to postal codes can be linked with corresponding stubs that are returned. Another meeting participant asked DFO representatives why Labrador was not included in this particular assessment although Labrador is included in the stub system. The participant was instructed that 87 % of angling data is from the island of Newfoundland and only 13 % is from Labrador. It was concluded that this was due to data on Labrador angling being a mix of both stub and private angling/camp data.

Further discussion was held on the possibility that salmon were being caught more than once and whether mortality of catch and release was included in the data being presented. Representatives from DFO remarked that catch and release mortality was an important consideration and pointed to research being conducted in Norway pertaining to low instances of salmon being caught and released on several occasions. It was also pointed out that DFO's current assessment process usually includes a provision for catch and release mortality.

Comments were made concerning the large increase of salmon and anglers in the Bay St. George area. It was asked by one participant whether the data suggested that the anglers in the Bay St. George area have been catching less salmon per unit of effort. It was concluded that anglers in the Bay St. George area have been catching less salmon per unit of effort. It was further noted that Harry's River was not considered in the assessment in question due to a short time-series.

Participants also conversed about the demographics of anglers. It was also suggested that although the number of anglers "bottomed out" in 2007, there has been a resurgence of anglers over the past three years and that there is still uncertainty relating to whether the anglers are

utilizing the increased number of licences. It was further proposed that the increase of anglers in the Bay St. George area had various demographics.

Atlantic Salmon Population Genetics for Southern Newfoundland: The Identification of Designatable Units (DUs) and Farm Escapees

I. Bradbury, DFO Science

Abstract

In 2010, Committee on the Status of Endangered Wildlife in Canada (COSEWIC) designated Atlantic Salmon populations along southern Newfoundland (DU4) as threatened. As previous work had shown unusually high genetic differentiation throughout southern Newfoundland, we re-examined population structuring in the region with extensive parr sampling (2008-12) and both genetic and genomic analysis. Multivariate and Bayesian clustering support a hypothesis of two discrete groups with the dividing boundary located near the Burin Peninsula. Genomic analysis confirms that the groups present represent populations that are both discrete and differ adaptively (relevant genes) and represent deep divergent lineages (mtDNA). This analysis is consistent with the presence of two DU's in southern Newfoundland and suggests that a re-assessment for the region is warranted.

Given recent reports of escaped farmed salmon along the south coast of Newfoundland, we also evaluated the potential to use both genetic and genomic tools for identifying farmed escaped Atlantic Salmon and subsequent hybridization. Using an existing baseline of regional wild populations and farmed salmon (i.e. Saint John River strain), accurate identification (>99 %) was possible both with a microsatellite panel (n=15) and targeted SNP (n=96) panels. We explored the ability of both marker types to quantify the presence of hybridization using simulated hybrids. The microsatellite panel was unable to successfully identify or classify hybrid individuals, however accurate identification of various hybrid classes (F1, F2, etc.) was possible with the targeted SNP panels examined. To further demonstrate the application of genetic approaches for the identification of farmed escapees in southern Newfoundland, we analyzed tissue samples from 64 suspected farmed escapees sampled from the wild following escapes in 2012 and 2013. Individual assignment confirmed an aquaculture origin for 97 % of these individuals. Individuals not of aquaculture origin were assigned to wild stocks either in, or adjacent to, their capture location. This work suggests that highly accurate escape and hybrid identification is possible using genetic and genomic tools for Atlantic Salmon in this region.

Discussion

The meeting participants first discussed data relating to DUs. It was stated that all of the sampling in the population genetics study was recent and that the data suggested that any integration between wild and aquaculture salmon would not have affected wild salmon due to a level of resilience. A participant inquired whether DNA could differentiate landlocked from anadromous salmon. It was stated that there are new data coming out regarding identifying genes and polymorphisms that may be associated, and also that DNA research is very close to identifying that variation. Concerned participants asked DFO representatives about information relating to a potential splitting of DU4. It was stated that since the south coast is under consideration for listing by the COSEWIC, responsibility lies with COSEWIC to take into account community information pertaining to salmon genetics. A DFO representative clarified that they could only speak to where the genetic data changes and not to where the possible split could be located. It was identified that the genetic changes occur somewhere between Garnish and Grand Bank, and also that similar genetic changes can be seen in other species such as rainbow smelt due to an underlying history of the region. It was mentioned that the genetic split is difficult to gauge as there is not a lot of data collected on the phenomena.

Discussion amongst meeting participants later turned to matters relating to farm escapes. It was stated that DFO has not collected data samples to identify wild hybrid salmon. Scientists from DFO stated that they wish to conduct research on wild hybrid salmon in the future. Information concerning the potential breeding of wild and farmed salmon was brought to the attention of meeting participants. It was suggested that according to the literature wild and farmed salmon do interbreed. Representatives from DFO's Aquaculture Management section stated that they have done some testing on fertilized eggs between wild and farmed salmon and have shown that hybrid eggs could be fertilized in Newfoundland. Other comments from meeting participants suggested that farmed salmon are more aggressive than wild salmon, and also that hybrids do not fare as well as wild salmon.

Observations of Escaped Farm-Origin Atlantic Salmon in Rivers and Coastal Waters of the South Coast of Newfoundland

C. Hendry, DFO Fisheries and Aquaculture Management

Abstract

The Atlantic Salmon aquaculture industry has been growing steadily in Newfoundland during the past decade, increasing from a production level of just under 3,000 t in 2001 to 16,831 t in 2012. Accompanying this increase is concern about the biological and genetic risks to declining wild populations of Atlantic Salmon and general biodiversity of aquatic ecosystems. Little is known about the behaviour and distribution of escaped Atlantic Salmon from marine cage aquaculture sites on the south coast of Newfoundland, and the extent of their interactions with wild Atlantic Salmon and other species.

A preliminary study was carried out in 2012 (October) and 2013 (May and October) at seven locations (coastal waters and rivers) in proximity to salmon aquaculture sites on the south coast of Newfoundland. One-hundred and thirteen farm-origin Atlantic Salmon were sampled for fork length, whole weight, gross visual observations, sexual maturity, and stomach contents. Scale samples and adipose fin clips were also obtained for later confirmation of farm-origin and genetic analysis, respectively. Results suggest that some escapes can forage for food, survive for many months in freshwater, sexually mature, and cohabitate with wild Atlantic Salmon. This information can help initiate further scientific research into the biology and behaviour of escaped farmed Atlantic Salmon and provide insights into escape management.

Discussion

It was indicated at the beginning of the participants' discussion that currently there is no evidence for genetic interaction amongst farmed and wild Atlantic Salmon in Newfoundland. It was also pointed out that there has not been much data collected on escaped Atlantic Salmon, and that the data collected represents a small sample size. A DFO representative clarified for meeting participants that the study did not occur year-round. The study was stated to have been completed via trips taken in October 2012, May 2013 and October 2013. It was stated that 13 salmon were caught in saltwater and 101 in freshwater. A DFO representative confirmed that efforts were directed towards sightings and that there was an element of bias in the study. Wild salmon were mentioned as being caught during the study, and that their presence inferred concurrent residency. Four wild salmon were stated to have been encountered on the Garnish River. A participant inquired whether the study checked the age of the fish. It was indicated that scale samples were collected during the study to determine farmed vs. wild origin Atlantic Salmon. Another participant asked whether the farmed fish captured had sea lice or Infectious Salmon Anaemia (ISA). It was clarified that only one salmon was identified as having sea lice and that the farmed salmon were not checked for ISA. It was also mentioned that there was no difference in stomach or sexual content in the spring and fall salmon caught during the study.

A representative of the Miaqpukek First Nation (MFN) told meeting participants that the MFN holds a communal licence for rainbow trout on Little River. It was suggested that many salmon have been caught on Little River as by-catch, and that a River Guardian sent many samples to DFO. Participants at the meeting voiced concerns about the lengthy time for DFO to process salmon samples.

Meeting participants discussed in detail their accepted definition of trickle losses, which is generally defined as <1 %. A concerned participant suggested that 1 % of 10,000,000 aquaculture salmon on the south coast could be significant as this would be many times greater than the wild Atlantic Salmon population on the south coast. It was further mentioned that accounting errors could be equally as significant as trickle losses. A DFO representative stated that accounting errors are not included in escapements.

A meeting participant proposed that DFO should document farmed salmon in Newfoundland rivers, and also the movements and distribution of the escaped fish. Multiple participants expressed concern regarding the recapture efforts by DFO with gill nets. The concerned participants suggested that the number of new applications and expansion of aquaculture be halted until escapement issues can be rectified. The participants also claimed to be baffled by the suggestion that angling be banned while the aquaculture industry expands. Scientists from DFO stated that they have not observed spawning activity of escaped farmed salmon, but escaped salmon were observed in Garnish River in the vicinity of wild salmon at a time when spawning would normally occur. There is documented evidence of negative interactions between wild and escaped salmon in countries such as Norway and Scotland. It was suggested that there remains a lack of directed research towards potential wild-farmed salmon interactions in Canada. Participants further proposed that more comprehensive research and monitoring programs should be completed rather than only opportunistic sampling in the form of spot checks. Twenty special licences were issued by DFO in May 2013 in an attempt to recover farmed escapes. Two farmed salmon were reportedly caught. One participant disagreed with issuing special licences because they claimed that it is not always easy to distinguish farmed fish from wild fish, and that the distinctive physical features of farmed salmon are not as common and apparent as suggested by DFO representatives, therefore they might be removing wild salmon in an area already designated as threatened by COSEWIC. One participant suggested that all farmed salmon should be marked so they can be easily identified, and also highlighted frustration surrounding the current practice of anglers having to use a tag on a suspected farmed salmon and not receiving a replacement tag until the season has closed.

Genetic Analysis of Food, Social and Ceremonial Atlantic Salmon Fisheries in Coastal Labrador

I. Bradbury, DFO Science

Abstract

We evaluated stock composition and exploitation of Atlantic Salmon in a food, social and ceremonial fishery in coastal Labrador, Canada using genetic mixture analysis and individual assignment with a microsatellite baseline (15 loci, 11,575 individuals) encompassing the species western Atlantic range. Mixture analysis accuracy to regional reporting groups was >90 %. Together, fishery samples (2006-11; 1,772 individuals) clustered tightly with neighbouring populations, and both Bayesian and maximum likelihood mixture analyses indicate that 85-98 % of the harvest are of Labrador origin. Estimates of fishery associated exploitation were highest for Labrador salmon (4.3-9.4 % per year) and generally <1 % for other regions. Individual assignment of fishery samples indicates that non-local contributions to the fishery

(e.g., Maritimes, Gaspé Peninsula) were rare and occurred primarily in southern Labrador, consistent with discrete migration pathways through the Strait of Belle Isle.

Discussion

The presenter stated that there is some overlap between the baselines in Southern Labrador within the study. A participant questioned the presenter about whether the date the salmon were caught affected the outcome of the study. The presenter stated that it is difficult to tell whether the outcome of the study was affected due to the small sample size which took place over two-months throughout the previous six years. It was highlighted that timings of the fisheries in Labrador do affect the composition of salmon.

A participant inquired whether DFO was able to separate salmon in Lake Melville from other salmon located in Labrador. It was clarified that micro-satellites cannot currently differentiate between salmon located in Lake Melville and the rest of Labrador. It was highlighted that DFO hopes to use better markers for salmon in the future, and that there is an increasing number of receivers off the Labrador coast for data collection.

A participant articulated that it was an interesting fact to see that Newfoundland and Labrador salmon comprised only a small portion of the West Greenland fish. Another participant suggested that when looking at the International Council for the Exploration of the SEA (ICES) assessment of salmon, it may be assumed that there is a limited number of large salmon off the Labrador coast. A participant also remarked that they were surprised about the number of salmon originating from the United States in the Labrador fishery due to the low numbers associated with the salmon fishery in the United States.

Northwest River Update

J. Feltham, Terra Nova National Park - Parks Canada

No abstract provided.

Discussion

The presenter articulated that annual counts at Northwest River were discontinued after 2011 and are now replaced with a multi-year process; probably do a count once every five years. In 2011, there were 916 salmon counted through the fence. It was also stated that the last estimated population return of Atlantic Salmon based on a creel survey was approximately 105, but the current population is unknown.

Rigolet Tagging Program

C. McLean, Nunatsiavut Government

No abstract provided.

Discussion

It was noted that 130 salmon, 35 trout and 4 charr were tagged as part of this study using floy spaghetti tags and most of the effort and the majority of the recaptures occurred in the Upper Lake Melville area. The presenter stated that all recaptures except one, were caught with 3½ inch mesh gillnets in saltwater. One participant inquired about the objectives of the research. The presenter clarified that there were several research objectives. The high subsistence of the Inuit fishery in the Lake Melville-Rigolet area was noted, as well as the increasing pressure from Rigolet to re-open the commercial salmon fishery. However, the presenter articulated that the main objective was not to help re-open the commercial fishery, but rather to gain a better understanding of the origin and migration pattern of Salmonids in the Rigolet/Lake Melville area,

prior to considering a location for a second counting fence in the Labrador Inuit Settlement Area (LISA).

It was concluded by the presenter that a counting fence located at Tom Luscombes River will not provide any indication of how the subsistence fishery in Rigolet may be impacting Atlantic Salmon populations. The tagging study suggests there is little subsistence harvest occurring in the Tom Luscombes River area. A participant inquired about the length of time for tagged salmon to be recaptured. It was stated that the shortest travel time for recapture was 4 days and the longest was 3 weeks. It was noted that the longest recapture was angled on the Kenamu River. It was also highlighted that the Kenamu River is suspected as not being the large producer of salmon as once previously thought. The presenter suggested that the construction on the Trans-Labrador Highway along the river may have affected the numbers of salmon.

Participants later discussed whether sample size can or cannot suggest that an exploitation rate is high. Finally, participants were concerned about the DFO funding cuts to the counting facility on English River, which is currently the only assessment river in Northern Labrador.

Assessment of Individual Rivers

M. Robertson and R. Poole, DFO Science

Abstract

In 2013, Atlantic Salmon conservation egg requirements were achieved on two (50 %) of the four assessed rivers in Labrador and eight (67 %) of the 12 assessed rivers in Newfoundland.

The abundance index of small salmon returning to Labrador is variable and 2013 returns were below the previous six-year mean (2007-12). There has been an increasing trend in the abundance of large salmon since 2010. An increase of large salmon in 2013 is well above the previous six-year mean. Salmon returning to assessed rivers in Labrador are not adjusted for marine exploitation. The abundance index of small salmon returning to Newfoundland continues to fluctuate and has generally remained lower than pre-moratorium levels (1984–91) where adjustments to correct for marine exploitation have been made. Small salmon returns in 2013 were lower than the previous five-year mean (2008–12). Returns of large salmon in 2013 were greater than the previous five-year mean.

Marine smolt survival appears to be the major factor limiting the abundance of Atlantic Salmon within the region. Inter-annual variation in the index of marine smolt survival continues to fluctuate widely. Marine survival in 2013 averaged 5.5 % across all five monitored rivers in Newfoundland. The overall index of marine survival for 2013 was below the previous five-year mean (2008-12). One of the five monitored rivers (Conne River) in 2013 had marine smolt survival rates greater than the previous five-year mean. Attempts have been made to enumerate smolts at Sand Hill River, Labrador. Given the size and environmental conditions of the river, a robust mark-recapture program will need to be designed and implemented at this site. Marine survival of smolts enumerated using a fence in 2012 to returning small salmon in 2013 was 2 %. Survival to large salmon will be determined in 2014. Marine mortality of smolts in Labrador include both natural and marine fishing mortality (Aboriginal and subsistence fisheries, Greenland salmon fishery).

Labrador Aboriginal and subsistence fisheries harvested approximately 14,204 salmon (36 t) in 2012, which is similar to the previous six-year mean. Recreational catch statistics for Newfoundland and Labrador have been highly variable since 2005. Estimates of retained salmon (27,863 small salmon) and total catch (61,251 retained and released salmon) for 2012 are similar to the previous five year mean.

Discussion

A participant inquired about the length of time since there was a “big” harvest in Newfoundland. It was stated that the last large harvest of Atlantic Salmon in Newfoundland occurred in 1984. Another participant asked whether the information presented was extrapolated. The presenter clarified that none of the data was extrapolated and reflected total counts, except for data pertaining to the Gander River, which was based on counts obtained from one of its tributaries, Salmon Brook.

It was remarked by one participant that there is a high proportion of the Terra Nova River watershed above Mollyguajeck Falls. They stated that if one looks at counts over the previous six years, then there is a fairly straight relationship with number of salmon that went over the falls and number of salmon that went through the fishway.

Another participant mentioned that salmon returning to Conne River appear to be much shorter and fatter recently than during previous years. It was also suggested that the salmon returning to Conne River do not taste “different,” but rather act “differently” when recently hooked. In addition, a representative from the MFN stated that River Guardians sent samples of a fungus collected from salmon in the Conne River area to the Canadian Food Inspection Agency (CFIA) for analysis. When asked about changes to salmon run times in Conne River, a representative of the DFO stated that salmon run times are approximately one week earlier than in the past. It was also pointed out that run times have changed for most of the rivers where DFO has salmon counts. It was noted that Western Arm Brook on the Great Northern Peninsula currently has an average run time that is about three weeks earlier than in the 1970s.

It was suggested by a participant that anglers from the Northern Peninsula and Southern Labrador believe that recent salmon returns have been much lower than historical records. However, it was articulated that salmon licences have increased and that anglers are changing areas due to the declines in salmon numbers as based on returns at counting fences.

A report titled “*Bay St George Salmon Stewardship Group Analysis for DFO Science Regional Advisory Process (RAP) December 3-4, 2013”* was distributed to select participants for information purposes, but it was not presented and reviewed at the RAP.

A participant made a comment that the angling data presented suggested that exploitation rates at Terra Nova were much lower than the rest of Newfoundland. Another participant claimed that the last number of salmon recorded for Mollyguajeck Falls in 2001 is actually higher than the number presented. It was also mentioned by a participant that Eagle River does not have a counting fence, and that DFO could extrapolate data from Eagle to Sand Hill River to create a population estimate. A participant also pointed out that while conservation requirements were mentioned in the presentation, there was no discussion pertaining to management levels. A DFO representative stated that future analysis will establish red, yellow and green areas pertaining to different management levels.

It was noted that marine survival of smolts is a major limiting factor for salmon production and that research is needed to determine what factors affect survival. Factors other than those in the marine environment may also affect survival, such as the size and condition of smolts leaving freshwater. DFO representatives indicated that they are unsure whether all smolts have an equal chance of survival. Finally, participants deliberated over the need for changes to conservation requirements. It was stated that original conservation requirements were established in the 1990s, and due to a desire for all DFO fisheries management to work with stock recruitment curves and a desire to lower both limit and management targets the conservation requirements changed. It was stated that the new requirements will go into effect in February, 2014. It was asked by a participant whether the changes would make salmon in the

Conne River area not deemed as threatened. It was clarified that the changes to conservation requirements will not affect COSEWIC's process or evaluation of the salmon. A final comment made by a representative from the MFN highlighted that the Aboriginal Band has an issue with how SARA and COSEWIC only deal with extinction and not fisheries management issues.

Science Advisory Report for Atlantic Salmon

Keith Clarke, Meeting Chairperson, DFO Science

The 2012 and 2013 draft SARs for the update on the status of Atlantic Salmon in Newfoundland and Labrador were made available to the participants to read, review and discuss during the meeting.

Discussion

At the beginning of the discussion, multiple participants from non-governmental organizations expressed their opposition to salmon being reviewed on a multi-year basis. Representatives from DFO's Science Branch indicated that there was a possibility of holding an annual stakeholder meeting to provide updates on salmon that would not be part of the CSAS process. A representative from the Wildlife Division stated that the multi-year process is a top-down management style. Some stakeholders suggested that the five--year management plan is satisfactory as long as "emergency" meetings can be held if the stocks or particular rivers take a serious downturn.

Participants conversed about their interpretation of particular definitions and a need for the SAR's context section to include definitions of controversial words. Discussion then turned to whether 2012 was a "good" or "bad" year for angled catch according to stub return. There was notable conflict amongst meeting participants over how statistics were being presented in the SAR and also that catch does not necessarily infer abundance.

Regarding consensus on the SARs summary bullets, several participants commented whether aquaculture research pertaining to Atlantic Salmon escapees and its interactions with wild salmon needs to be listed as a bullet. It was clarified for participants that the SAR should reflect the Terms of Reference objectives. Participants also discussed the potential addition of bullets for genetic analysis of the south coast Atlantic Salmon DU as well as smolt counts and marine survival estimates at Sand Hill River, Labrador.

There was some opposition to the calculation of conservation requirements for Terra Nova River – Mollyguajeck Falls and its inclusion in the SAR. Discussion amongst participants highlighted that enhanced watersheds have had exceptions in the past and that the watersheds do not have to meet conservation requirements to allow harvests. Due to opposition, the portion of the SAR concerning Mollyguajeck Falls under the SFAs 3-8 section was removed.

During the discussion, there was a suggestion by participants to add figures within the resource status section of the SAR depicting each SFA. Participants also conversed about what to include and exclude from the sources of uncertainty section of the SAR regarding farmed salmon escapees. There was debate surrounding key uncertainties such as escape movement/distribution, interbreeding, disease and parasites, impacts of aquaculture on wild salmon populations, and identification of farmed fish. Various participants also highlighted their opposition to the essence of the river classification system and put forward a question asking why harvest levels are not being recommended to be increased on rivers that have high egg depositions. There was also a debate about harvest versus human-induced mortality, and participants had a general lack of consensus on the need to state "angling mortality" or "human-induced mortality" due to recent definition changes in the *Fisheries Act*.

Participants later discussed the proposed discontinuation of the English River monitoring project as this is the only index river located in SFA 1. It was agreed that this should be reflected in the Management Issues portion of the SAR. Near the end of the meeting, participants also deliberated whether the south coast has poaching problems which could be at greater levels than other areas of Newfoundland and Labrador, such as the Exploits River. Participants also conversed about ISA. It was stated that in the future, a statistically viable sample will need to be killed when conducting tests for diseases such as ISA. Finally, meeting participants highlighted CPUE variations resulting from camp data and the need to clarify the differences in the future.

RESEARCH RECOMMENDATIONS

1. Develop an understanding of wild-farmed salmon interactions :
    I. Movements/distribution of escapees in marine and freshwater environment;
    II. Disease (ISA) and parasites; and
    III. The genetics of, and interbreeding between, wild and farmed Atlantic Salmon and whether eggs can be fertilized in NL waters.
2. Develop an understanding of at-sea mortality of Atlantic Salmon, including smolt fitness.
3. Angling exploitation rates should be further investigated to determine whether it could replace more traditional counts at counting facilities.
4. More assessment work required in SFA 12 in light of recent COSEWIC recommendation.
5. Complete creel surveys as needed on specific rivers for assessment purposes to reduce uncertainty in angler log data.
6. Evaluate interception of Atlantic Salmon fisheries in Saint Pierre and Miquelon, Greenland, and Labrador.
7. Atlantic Salmon assessment work should continue at English River, Labrador as it is the only index river in SFA 1.

APPENDIX I: TERMS OF REFERENCE

Update on the Status of Atlantic Salmon in Newfoundland and Labrador

Regional Peer Review Process - Newfoundland and Labrador Region

December 3-4, 2013
St. John's, NL

Chairperson: Keith Clarke, Environmental Sciences Division, DFO, NL Region

Context

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 370 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 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 SFA regions as follows:

- Labrador: SFAs 1-2, 14B
- Newfoundland: SFAs 3-14A

The objective of this meeting will be to produce science advice on the request of FMB (Fisheries Management Branch). The meeting is not intended as a forum to seek changes/alterations to the Atlantic Salmon Management Plan. The meeting will focus on the general state of salmon stocks in Newfoundland and Labrador and identify conservation issues. Detailed assessments of individual rivers will not be carried out. Rather, regional overviews of the status of stocks will be tabled. An update on smolt production, marine survival of Newfoundland salmon and ecological considerations that impact the survival of salmonid species will be presented. Information on the genetic analysis of southern Newfoundland populations including the identification of Designatable Units (DUs) and farm escapees will be updated from the 2012 assessment. Also, genetic estimates of stock composition of salmon harvested in the Labrador food, social and ceremonial (FSC) fishery (2006-2011) will be presented. Advice will also be provided on the accuracy and utility of the license stub survey.

Expected publications

- Science Advisory Report (SAR)
- Proceedings
- Research Document(s)

Participation

- DFO Science, Fisheries Management, Policy & Economics and SARA Program
- 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

*There are 15 Atlantic Salmon (*Salmo salar L.*) management areas know as Salmon Fishing Areas (SFAs) 1-14B in Newfoundland and Labrador. See CSAS Science Advisory Report 2011/077, Figures 1 and 2 for illustration.

APPENDIX II: AGENDA

Regional Peer Review of the Update on the Status of Atlantic Salmon in Newfoundland and Labrador - 2013

Comfort Inn - St. John's, NL

December 3-4, 2013

Chair: Keith Clarke

Tuesday, December 3

Time	Description	Presenter
0900	Welcome, Introductions	K. Clarke
0910	Review of Agenda and Terms of Reference	K. Clarke
0920	Accuracy and Utility of the Licence Stub Survey	G. Veinott
1015	Trends in Abundance as Inferred from Recreational Catch Data	B. Dempson
1050	*BREAK*	N/A
1100	Atlantic Salmon Population Genetics for Southern Newfoundland: the Identification of DUs	I. Bradbury
1120	Observations of Escaped Farm-Origin Atlantic Salmon in Rivers and Coastal Waters of the South Coast of Newfoundland	C. Hendry
1230	*LUNCH*	N/A
1330	Atlantic Salmon Population Genetics for Southern Newfoundland: the Identification of Farm Escapes	I. Bradbury
1350	Genetic Analysis of FSC Labrador Fisheries	I. Bradbury
1425	Northwest River Update	J. Feltham
1435	Rigolet Tagging Program	C. McLean
1505	*BREAK*	N/A
1520	Assessment of Individual Rivers	M. Robertson and R. Poole
1645	Wrap-up Discussion of all Presentation/Manuscripts for Upgrade to Research Documents	All
1700	*ADJOURN*	N/A

Wednesday, December 4

Time	Description	Presenter
0900	Overview of Science Advisory Report and Tasks for Day 2, and Review of Draft SAR and Inclusion of Recommendations	All
1030	*BREAK*	N/A
1045	Review of Draft SAR and Inclusion of Recommendations	All
1200	*LUNCH*	N/A
1300	Review of Draft SAR and Inclusion of Recommendations	All
1500	*BREAK*	N/A
1515	Review of Draft SAR and Inclusion of Recommendations	All
1600	Discussion of Research Needs/Next Steps	All
1630	*ADJOURN*	N/A

APPENDIX III: LIST OF PARTICIPANTS

Name	Association	Address	Email	Phone
Keith Clarke	DFO	NAFC	keith.clarke@dfo-mpo.gc.ca	772-2907
Elizabeth Barlow	DFA-NL	Centre for Aquaculture Health and Development, St. Alban's	elizabethbarlow@gov.nl.ca	538-3725
Chris Hendry	DFO	NAFC	chris.hendry@dfo-mpo.gc.ca	772-6674
Julie Whalen	Torngat Secretariat	Goose Bay, NL	julie.whalen@torngatsecretariat.ca	896-6781
Erika Parrill	Proceedings Contractor	St. John's, NL	erikaparrill@yahoo.ca	771-5418
Geoff Veinott	DFO	NAFC	geoff.veinott@dfo-mpo.gc.ca	772-7989
George Russell Jr.	Nunatukavut	Goose Bay, NL	grussell@nunatukavut.ca	896-0592 ext. 229
Sue Forsey	DFO	NAFC	sue.forsey@dfo-mpo.gc.ca	772-6157
Dale Richards	DFO	NAFC	dale.e.richards@dfo-mpo.gc.ca	772-8892
Dounia Hamoutene	DFO	NAFC	dounia.hamoutene@dfo-mpo.gc.ca	772-5872
Janet Feltham	Terra Nova National Park, Parks Canada	Glovertown, NL	janet.feltham@pc.gc.ca	533-3156
Tony Tuck	NL Outfitters Association	Clarenville, NL	tony@flyfishinggreyriver.ca	466-2440
Sherrylynn Rowe	CFER, MI, MUN	St. John's, NL	sherrylynn.rowe@mi.mun.ca	778-0318
Don Hutchens	SCNL	St. John's, NL	don.hutchens@gmail.com	753-4968
Jason Simms	DFO	NAFC	Jason.simms@dfo-mpo.gc.ca	772-2045
Cyr Couturier	NAIA	St. John's, NL	cyre@naia.ca	754-2854 ext. 2
Sid Styles	BSGSSG/HRSWG	Stephenville, NL	skip_ncr@hotmail.com	643-5911
Ward Samson	NLWF	Main Brook, NL	ward.samson@nf.sympatico.ca	865-4107
Ian Bradbury	DFO	NAFC	ian.bradbury@dfo-mpo.gc.ca	772-5869
Brian Dempson	DFO	NAFC	brian.dempson@dfo-mpo.gc.ca	772-4475
Carole Grant	DFO	NAFC	carole.grant@dfo-mpo.gc.ca	772-2128
Dave Reddin	Scientist Em.	St. Phillips	reddindg@hotmail.com	895-2009
Martha Robertson	DFO	NAFC	Martha.robertson@dfo-mpo.gc.ca	772-4553
Rebecca Poole	DFO	Goose Bay	Rebecca.poole@dfo-mpo.gc.ca	772-4553
Ross Hinks	MFN	Conne River	rhinks@mfngov.ca	882-3001
Carl McLean	Nunatsiavut Government (NG)	Goose Bay, NL	carl_mclean@nunatsiavut.com	896-8582
Don Ivany	ASF	Corner Brook	divany@asf.ca	632-5100
Dave Meerburg	ASF	Port Franks, ON	dmeerburg@asf.ca	519-243-2316
Kevin Stroud	FABEC	Glovertown, NL	kevinstroud@nf.sympatico.ca	533-2391
Marie Clement	MUN	Goose Bay, NL	marie.clement@mi.mun.ca	896-6215
Craig Purchase	MUN	-	cfpurchase@mun.ca	864-4452
Chuck Bourgeois	-	St. John's	c.bourgeois@outlook.com	726-3511
Scott Nightingale	Salmonid Association of Eastern Newfoundland	St. John's	scottn@nl.rogers.com	368-8125
Rex Porter	DFO	St. Phillips, NL	rex.porter@bellaliant.net	895-2154
Rob Perry	Senior Aquatics Biologist	Corner Brook, NL	robperry@gov.nl.ca	637-2023

APPENDIX IV: LIST OF WORKING PAPERS PRESENTED

- G. Veinott and N. Cochrane – "*Accuracy and Utility of the Atlantic Salmon Licence Stub (Angler Log) Return Program in Newfoundland and Labrador*"
- M. Robertson – "*Assessment of Individual Rivers*"
- I. Bradbury – "*Atlantic Salmon Population Genetics for Southern Newfoundland: The Identification of Designatable Units (DUs) And Farm Escapees*"
- I. Bradbury – "*Genetic Analysis of Food, Social And Ceremonial Atlantic Salmon Fisheries in Coastal Labrador*"