

## WGC(20)14

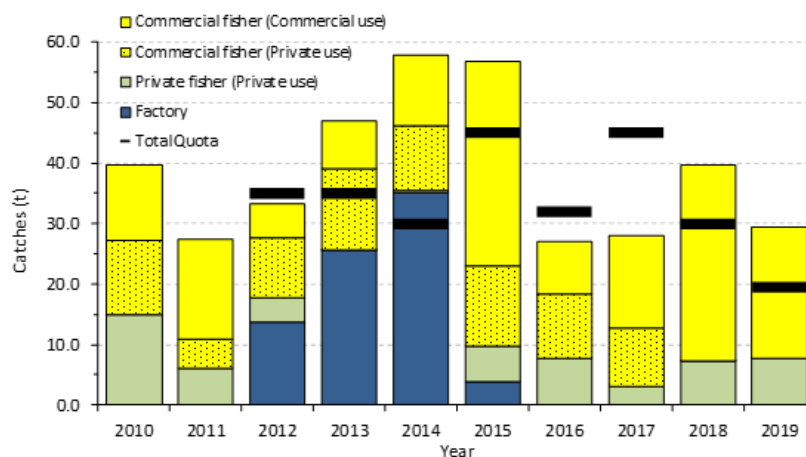
### *West Greenland Commission Inter-sessional Correspondence*

The West Greenland Commission's inter-sessional correspondence took place from 8 - 27 May. It is set out below, under the relevant Agenda item. If an Agenda item is not listed, no inter-sessional correspondence took place.

#### **4. Review of the 2019 Fishery and ACOM Report from ICES on Salmon Stocks in the Commission Area**

- 4.1 2019 Harvest: The NGO representative referred to the '2019 Report on the Salmon Fishery in Greenland', [WGC\(20\)04](#), that shows the catch at Greenland in 2019 as 30.4 tonnes. He noted that in the ICES advice and the WGNAS report, the catch in 2019, with input by the Greenland member of the ICES Working Group, was 29.8 tonnes. He also noted that in Greenland's Annual Progress Report [CNL20\(40\)](#), the catch in 2019 is shown as 28.8 tonnes. The NGO representative said that although these are small differences in the reported harvest for Greenland, it is necessary to determine which number is to be used in the calculation of the 2020 quota, considering the overrun in 2019. The ICES WGNAS was advised by the Greenland member that the catch of 30.4 tonnes initially reported was reduced due to duplication noted in 26 catch reports. The NGO representative asked whether there are specific reasons for a further reduction in the estimated harvest in 2019 to 28.8 tonnes.
- 4.2 The representative of Denmark (in respect of the Faroe Islands and Greenland) (DFG) agreed that the initial catch in [WGC\(20\)04](#) was 30.4 tonnes. She clarified that later on an analysis was made of the catch reports and some double reporting was identified. The Greenland Institute of Natural Resources and GFLK had slightly differing numbers because some reports were kept in the Institute's catch estimate, which were estimated by the GFLK as double reports. The representative of DFG underlined the fact that the Greenland Institute of Natural Resources is an independent institution and the official catch is always GFLK's catch estimate, in salmon and all other fisheries. The representative of DFG concluded that the official catch for 2019 was 28.8 tonnes and it is from this amount that the TAC for 2020 will be calculated.
- 4.3 The representative of the United States understood from the information provided that at least part of the reason for the overharvest in 2019 was because of an almost two-week delay between harvest by fishers and receipt of catch reports by GFLK. She asked if this was correct and whether there are any other aspects that contributed to this situation.
- 4.4 The representative of DFG replied that there were several factors to the delay in the reporting in 2019, some more difficult to manage than others. Firstly, she noted that reports may be late if the license holder is acting slowly in the reporting and does not report immediately after catching salmon. She reported that the Ministry of Fisheries, Hunting and Agriculture encourages fishermen to report continuously during the season and has several ways to give reminders throughout the fishing season. Secondly, she said that reports may be late according to the processing at the municipalities. She reported that they are working continuously on improving the timing of reporting from fishermen, but it was still quite a new requirement, that will inevitably take time to implement.

- 4.5 Unreported Catch Estimate for 2019: The representative of the NGOs noted that the ICES advice and ICES WGNAS report identify the unreported catch estimate for Greenland to be 10 tonnes for 2019. From the advice, ‘The Greenlandic authorities indicated a further 10 tonnes of unreported harvest.’ This value is used in the assessments by ICES. In Greenland's Annual Progress Report [CNL\(20\)40](#), the unreported catch is estimated to be 5.8 tonnes in 2019. The representative of the NGOs asked how the estimate of 5.8 tonnes was determined.
- 4.6 The representative of DFG noted that for a number of years ICES has estimated the unreported catch in Greenland to be 10 tonnes. However, she reported that since Greenland now has a known pool of participants in the fishery, GFLK has made an attempt to estimate the unreported catch in the Annual Status Report based on the reporting from the 2019 salmon fishery. The representative of DFG stated that there are several methods to provide an estimate of this and GFLK chose a simple method in order to limit the time used for this matter, as the salmon fishery is not a commercial fishery. She reported that it was assumed that the distribution of catch reports and 0-catch reports are more or less similar among the license holders that did not report. Then, there is an average number of reports per license (that reported a catch), and average amount of catch per report. These numbers combined, led to the estimate of 5.8 tonnes of under-reported catches. She noted that each number could have been calculated with standard deviations but this was not done in order to keep the task as simple as possible.
- 4.7 Location and Magnitude of Sales by Professional Fishermen: The representative of the NGOs noted that at the meeting of the WGC in 2019, the representative of DFG advised in section 4.6 of the report that ‘professional fishers were allowed to sell fish to outlets other than open-air markets where there was no open-air market in the local community’. The ICES WGNAS report indicates that professional fishermen sold 21.8 tonnes of their catch and retained 0.1 tonnes for personal use. In the past, professional fishermen often reported about 10 tonnes of salmon retained for personal use in the years prior to 2018 as per the figure below from ICES.



- 4.8 The representative of the NGOs asked the representative of DFG why professional fishermen are no longer retaining salmon for their personal use and if the representative of DFG can also identify how much of the catch of professional fishermen was sold through open-air markets and how much was sold elsewhere (as only approx. 100 kg of their harvest was retained for personal use of a total catch of 21.8 tonnes). He also

asked the representative of DFG to provide a list of the open-air markets in 2019 and the catch at each.

- 4.9 The representative of DFG reported that it is not within the power of the Government of Greenland to explain how fishermen conduct their business. However, it could be assumed that they sell all they can and keep the rest for themselves. She said that 100 kg should keep you and your family very well fed for the rest of the year.
- 4.10 The representative of DFG reported that there are open-air markets in most cities and settlements in Greenland which often consist of nothing more than a table, perhaps with a canopy to keep the sellers dry. Fishermen can sell their catch to the locals and thus, most often sales notes are not drafted. She stated that it is part of the cultural heritage of Greenland, that you can go to the local open-air market and buy the catch of the day from fishermen and hunters. She noted that this is how professional fishermen and hunters can sell products that cannot be sold to the factories and how locals that do not fish or hunt can still maintain a traditional Greenlandic diet. Therefore, the Government of Greenland cannot provide numbers for sales in open-air markets.
- 4.11 In follow up correspondence the representative of the NGOs thanked the representative of DFG for the answers. He sought clarification in the response to the question on Location and Magnitude of Sales by Professional Fishermen when DFG had stated '*It is not within the power of the Government of Greenland to explain how fishermen conduct their business, however, as business men it could be assumed that they sell all that they can and keep the rest for themselves. 100 kg should keep you and your family very well feed for the rest of the year.*'
- 4.12 The representative of the NGOs stated that this response indicates a misunderstanding of the request for clarification by the NGOs. He noted that in 2019, the catch information provided to ICES by DFG indicated that 276 professional fishermen retained 100 kg for personal use and sold 21,800 kg (Table 5.1.1.3 of the ICES WGNAS report) and in previous years between 2010-2017, this same group of fishermen reported retaining about 10,000 kg for personal use (Figure 5.1.1.2 of the ICES WGNAS report). He noted that in 2019 the retained catch per professional fisherman would be 0.4 kg and not 100 kg as DFG has implied. The representative of the NGOs asked for clarification to explain what has changed in either fishermen's food preferences or more likely how the catch data was being collected, i.e. are professional fishermen now expected to show all of their catch as sold?
- 4.13 The representative of DFG replied that as stated in the previous reply, the Government of Greenland cannot explain why this change has occurred as it is not within their power to explain how the fishermen choose to conduct their business. She stated, for information, that there has been no change in the reporting or the collection of catch data in this period.

## **6. Regulatory Measures**

- 6.1 2020 Catch Limit, Monitoring and Management of the 2020 Fishery: The representative of the United States noted that despite additional efforts to improve monitoring, control, and reporting of the West Greenland fishery, an overharvest occurred again this year. She said that the United States would appreciate it, if the representative of DFG would confirm prior to the WGC video conference that, in line with the current regulatory measure, the 2020 quota will be reduced by the amount of its 2019 overharvest. The representative of the United States asked the representative of DFG to explain what its understanding of that level should be.

- 6.2 The representative of DFG replied that, due to an overharvest of 9.3 tonnes in 2019, it has been recommended to the Government of Greenland that it approve a catch limit of 20.7 tonnes for 2020. Due to the reduction of the quota, it has further been recommended to the Government of Greenland, in agreement with KNAPK, to move the start of the fishing season to 1<sup>st</sup> September in 2020 in order to ensure that the fishermen in North Greenland also get a chance to fish for salmon in 2020.
- 6.3 The representative of the United States also noted appreciation of the additional steps being taken to improve monitoring and reporting in 2020 to help ensure closure of the fishery in time to avoid a third year of overharvest. While the implementation of those efforts is underway, the United States wondered if it might also be prudent to consider other steps to ensure effective in-season monitoring and quota management. For instance, she asked if it might be possible to pause the fishery at an appropriate time (perhaps based on the progress of catches during the 2019 fishery) to allow latent catch reports to arrive and be counted or to lower the initial quota by an appropriate amount to provide a sufficient buffer to ensure no overharvest occurs should similar delays in reporting occur again in 2020?
- 6.4 The representative of Canada had similar questions on whether there could be any practical process amendments to this summer's harvest reporting that could be taken to ensure an overharvest does not occur in 2020.
- 6.5 The representative of DFG thanked the United States for the suggestion of pausing the fishery during the season. She reported that this option has been considered, however, there are some challenges in doing so. A large proportion of the license holders in the Greenlandic salmon fishery are recreational fishermen who may not have the same habits of keeping track of information regarding closing and opening of fisheries, as private fishermen do. This increases the risk of an illegal fishery, if recreational fishermen are fishing for salmon in good faith, when the fishery is paused. In addition, this is not a management measure that is used in other fisheries and, thus, might be very difficult to implement both for the administration and the fishermen. The representative of DFG reported that for every fishery, GFLK estimates when the quota will be exhausted considering the catch effort throughout a fishing season and announces the closure in due time. She noted that last year, the salmon fishery was closed when it was estimated to reach 90% utilisation. At that time, she reported, they did not have an estimate of the delay in the reporting – as the 2018 season could not be used as a baseline. However, this year they do have an estimate of the delay in the reporting and that will be part of the estimation of when to close the fishery.
- 6.6 Following up, the representative of the United States said that she appreciated the responses provided by DFG and reported first that she appreciated the difficulties with instituting a 'pause' during the 2020 fishery to ensure quota compliance and thanked DFG for the explanation. Second, she noted that the United States appreciated the explanation of how quota compliance is managed in other fisheries (i.e. 90%). She stated that the information on reporting and reporting delays gained from 2019 should be useful in devising guidelines for the salmon fishery in 2020, and said that the United States is interested in learning about the proposed approach in more detail.
- 6.7 Process to Develop the Next Regulatory Measure: The representative of the United States noted that the current regulatory measure ends in 2020. She suggested that the WGC agree to an inter-sessional process aimed at beginning discussion of new management measures for the West Greenland fishery for adoption in 2021. Specifically, she said that the United States would support a process where the WGC

holds an inter-sessional meeting, virtually if necessary, in the winter / spring 2021 and, if needed, a second inter-sessional meeting just before the start of the 2021 NASCO Annual Meeting. The representative of the United States sought other views on this prior to the video conference.

- 6.8 The representative of Canada supported the proposal to begin the process of discussing new management measures through inter-sessional meetings, most likely initially via video conference.
- 6.9 The representative of DFG noted that given the amount of meetings that have been moved from 2020 to 2021 and financial restrictions, due to Covid-19, it would be preferred either not to have an inter-sessional meeting before the Annual Meeting or to have an inter-sessional meeting via video conference. She said alternatively, a physical meeting could be held in Greenland.

## **7. Sampling in the West Greenland Fishery**

- 7.1 Sampling at Nuuk: The representative of the NGOs stated that in the ICES Advice, NAFO Division 1D, where Nuuk is the major community, accounts for almost 30% of the harvest in 2019 (8 tonnes of 28 tonnes in West Greenland). The ICES WGNAS report (end of section 5.2) identifies the importance of sampling in the Nuuk market to represent this important area of the fishery. The representative of the NGOs noted his understanding that only two weeks were sampled out of a total of a six week fishing season in 2019. He asked, therefore, if the representative of DFG could provide further details on the difficulties encountered obtaining weekly samples at Nuuk in 2019, and what will be done to improve the level of sampling there in 2020.
- 7.2 The representative of DFG reported that, in recent years, hygiene requirements at the modern market in Nuuk have made it increasingly difficult to obtain samples, as sampling would require removing salmon from the refrigerated display coolers and sampling with lab equipment (DNA vials full of preservatives) in front of customers. She noted that this had in the past led to customer reluctance and resentment from fishermen. The representative of DFG said that for this reason, carcass sampling (DNA samples from discarded heads and skeletons, after the removal of fillets) was initiated in 2019 as an alternative to normal sampling. She noted that the main advantage of this method is the lack of conflict with fishermen and customers and no increased fishery for sampling, but it also means that scale samples and weight data cannot be obtained. However, a DNA sample and individual length is obtained.
- 7.3 The representative of DFG stated that other alternatives could be scientific surveys, or purchase of salmon for scientific sampling, but that would potentially increase total catches. Therefore, the carcass sampling tested in 2019 seemed a reasonable way to move forward as it can be scaled up in 2020. The representative of DFG said that as the start of the fishing season will most probably be moved to 1 September, it will be feasible to take samples in more weeks than in 2019 as it will not collide with this year's survey cruise.
- 7.4 Covid-19: The representative of the United States asked for DFG's view on whether the 2020 sampling program could continue despite the pandemic. She said that if it were not possible to deploy foreign samplers this year, whether DFG have ideas for how samples might be taken and whether Greenland has the resources to undertake additional sampling this year. The United States was pleased to see that Greenland was able to sample at Nuuk on two occasions last year and wondered if there might be a possibility of expanding that effort. If so, the representative of the United States asked

whether sampling would be restricted to Nuuk or would there be a possibility of collecting samples from other communities? The representative of the United States asked whether it would be possible to collect the full suite of samples (i.e. length, weight, scale sample, tissue sample) or just length and tissue samples as collected in 2019.

- 7.5 The representative of Canada also expressed concern about whether foreign samplers should or would be able to travel to Greenland. He questioned whether flights would be available and affordable, what the rules would be concerning quarantining of visitors, and, as experienced in Canada's northern communities, whether foreign visitors would be welcome by local communities. He asked the representative of DFG if they would advise that planning for visiting samplers should proceed as in the past. If not, whether Greenland would be in a position to provide all the personnel necessary to collect the required samples.
- 7.6 The representative of DFG reported that at this stage the borders of Greenland are closed and the Government has yet to announce when they will be opened and whether any restrictions will be implemented, when open. Further, the countries where the samplers originate from might also have restrictions on travel. The representative of DFG therefore said that at this stage she could not say whether it will be possible for the samplers to come to Greenland. Having a season start on 1 September might assist in planning, as later in the summer she may have a better idea of the possibilities.
- 7.7 The representative of DFG reported that Greenland does not have a contingency plan as such but has discussed some options that might be explored if the foreign samplers cannot come to Greenland this year. One option could be that a number of scale envelopes and guidelines for how to take samples are issued together with licenses for professional license holders in the areas where the samplers normally sample. A video could explain how to take samples. Another option, which might be combined with the first is that the wildlife officers / fisheries inspectors could take samples in the chosen areas. The representative of DFG noted that the Greenland Institute of Natural Resources would continue to take samples in Nuuk as in 2019.
- 7.8 Following up, the representative of the United States said that she appreciated the responses provided by DFG and made the following replies:
- the United States certainly understands the difficulties in planning for the sampling of the 2020 fishery given their current global situation;
  - the United States is hopeful that the members of the WGC will be supportive of considering and agreeing to the WGC(20)08rev (Draft Statement of Co-operation on the West Greenland Fishery Sampling Program for 2020), while also collectively working on an alternative plan(s) in case travel by foreign samplers is restricted;
  - the United States is very appreciative that sampling in Nuuk will continue in 2020;
  - the United States also appreciates the other alternatives referenced by DFG (providing scale envelope guidelines with licenses for professional fishers and wildlife officers / fisheries inspectors taking some samples);
  - the United States looks forward to furthering this discussion and working with DFG more closely to identify options that will have a high likelihood of success; and
  - the United States remains committed to the Sampling Program and will work co-operatively with all Parties involved to design and implement a program that will

collect the required data to inform the assessment and management of this stock complex.

## **10. Other Business**

- 10.1 The representative of DFG said that DFG recognises the work that the United States has been doing in connection with the restoration of habitat for salmon in the rivers of origin. She referred to the United States' Annual Progress Report, [CNL\(20\)27](#) stating that they are pleased that the United States has a goal of opening up a further 5,000 units (1 unit = 100 square meters) of natural salmon habitat, considering the importance of habitat for the survival of salmon. She noted however, that only 18,600 units of 397,092 units, or less than 5%, is currently accessible in the important Penobscot River used as an index of salmon mortality at sea. She noted that even if the goal is achieved and all the effort is used in the current period, 94% of the Penobscot River would remain inaccessible to salmon. The representative of DFG therefore asked the representative of the United States whether there is currently access to any natural salmon spawning habitats in either Penobscot River or any of its connected rivers. The representative of DFG asked, alternatively, whether there are any suitable parr locations with direct migration paths to the ocean, without migrating smolts having to pass either dams or hydropower plants.
- 10.2 The representative of the United States replied that the 18,600 units of habitat referenced in the question are the sum of unimpeded Atlantic salmon juvenile rearing habitat in the Penobscot River only, which is completely accessible to the ocean (i.e. with no dams or other barriers to downstream passage). She said that this accounts for a fraction of the rearing habitat located within the Penobscot River as it represents only the habitat below the lowermost dam (Milford Dam).
- 10.3 The representative of the United States noted that their Implementation Plan (IP) addresses connectivity on two separate fronts given the significant differences in their regulatory authorities for dams that generate power compared to dams that do not. For non-hydroelectric dams and other barriers that are generally much smaller than hydroelectric dams and block less habitat, the goal in their IP is to restore access to 5,000 units of habitat over five years. Whereas for hydroelectric dams, which are much larger and typically block more habitat, their goal is to restore access to 10,000 units of habitat over five years. The representative stated that the United States considers habitat to be accessible above dams when passage of adults and juveniles is safe and effective to allow for both survival and recovery. She noted that many of the hydroelectric dams in the Penobscot River are working towards meeting criteria that would allow the United States to consider the dams accessible to adult and juvenile salmon. The United States acknowledged that these 5-year gains are small compared to the amount of habitat located above their lower most dams, but these are aggressive goals that the United States feels are achievable given the recent track record working on connectivity issues within their salmon rivers. She said that improving the connectivity of salmon rivers will take years of dedicated effort as well as financial resources to address, but the United States remains committed to this program.
- 10.4 The representative of the United States stated, as noted above, that the Penobscot River is heavily impacted by dams and approximately 95% of its juvenile rearing habitat is located above one or more dams. However, she reported that this is not the case for all of their salmon rivers. The salmon rivers located in Eastern Maine (collectively referred to as the Downeast Salmon Habitat Recovery Unit) have a total of approximately 40,000 units of juvenile rearing habitat and currently approximately 28,500 units (71%)

have unimpeded access to the ocean. She noted that even with this high percentage of habitat with direct access to the ocean, their restoration program is still heavily focused on improving connectivity projects located within these rivers.

- 10.5 The representative of DFG also noted that the United States had not listed cormorant predation as a potential threat to migrating smolts, although cormorants are documented to predate up to 50% of smolt cohorts or more in other parts of the North Atlantic, particularly near dams with poor migration conditions for salmon. She therefore asked the United States to provide information on changes in cormorant population over the last two to three decades or inform DFG whether there have been any recent investigations related to smolt predation by cormorants in the United States and whether there is any management plans for cormorants.
- 10.6 In response, the representative of the United States reported that double-crested cormorants have been federally protected in the United States under the Migratory Bird Treaty Act since 1972, and as a consequence, their abundance in coastal Maine waters has increased sharply since that time. Double-crested cormorants are known predators of Atlantic salmon out-migrating smolts. She referred to a 1996 publication which estimated that cormorants preyed upon 7.5-9.2% of stocked smolts in the Penobscot River between the years 1992 through 1994. The authors noted that much of this predation occurred within the vicinity of hydroelectric dams or during the freshwater to saltwater transition, a period when smolts are known to be vulnerable to predation.
- 10.7 The representative of the United States also reported that in 2013, NOAA Fisheries Service scientists published a study describing a cormorant harassment project and its impact on smolt predation. The authors concluded that there was a reduction in smolt mortality during harassment events, but also noted that low sample sizes and other shortcomings of the project prevented sweeping conclusions from being made (e.g. sources of mortality were not identified with only one of the thirty tags from unsuccessful fish recovered from a cormorant rookery). The representative of the United States reported that the authors concluded that non-lethal harassment appeared to be an effective means to reduce loss of emigrating smolts, but that ongoing restoration activities should result in increased abundance of multiple diadromous species populations within the river, which may increase the prey field for piscivores and result in a higher percentage of smolts successfully entering the marine environment. The authors also stated that recent declines in cormorant populations may be attributable to populations exceeding their carrying capacity and a concurrent resurgence of cormorant predators. As such, there is a possibility for trending towards lower cormorant predation rates on smolts. She noted that a follow-up investigation has not been conducted.
- 10.8 The representative of the United States also stated that wide-spread cormorant harassment or eradication programs are not feasible from a resource or legal standpoint. Given that cormorant predation appears to be focused on constriction points, such as dams, one aspect of the connectivity restoration strategy is to make dams 'invisible' to migrating smolts. As noted above, the United States is working to include strict survival and passage standards on relicensing activities for federally licensed dams. She noted that enabling a high proportion of migrating smolts to survive a dam and to pass through a dam quickly is hypothesised to increase the likelihood of the smolt being able to avoid a predation event by minimising interrupted / delayed migration. She stated that the United States have seen that recently enacted regulatory measures that have led to operational changes at the dams in the Penobscot River have increased smolt survival



from a range of 52-94% survival to greater than 96% survival. The United States is also working to restore the suite of coevolved diadromous fish populations within Maine, which were once abundant and co-occurred with Atlantic salmon (e.g. alewife and blueback herring). It is hypothesised that increasing and complicating the prey field during the time of Atlantic salmon smolt out-migration may increase smolt survival during this critical phase as the other coevolved diadromous species may serve as alternate prey for predators such as double crested cormorants.

- 10.9 The representative of DFG thanked the representative of the United States for her comprehensive reply.
- 10.10 The representative of DFG said that DFG recognised the work that Canada has been doing in connection with the restoration of habitat for salmon in the rivers of origin. She referred to Canada's Annual Progress Report, [CNL\(20\)44](#). She noted that Canada has not listed dams as a potential threat to migrating salmon at various life stages although dams are known to lead to water warming, increased smolt mortality and blocking adult salmon from returning to spawning grounds. She asked Canada therefore, whether dams or hydropower plants are considered to have no negative impacts on local salmon stocks in Canada.
- 10.11 The representative of Canada replied stating that there are dams and hydropower plants on a number of rivers with Atlantic salmon populations in eastern Canada and some are having impacts on local salmon populations. Throughout most of the middle and northern range of Atlantic salmon populations in eastern Canada, dams and hydropower facilities are not impacting Atlantic salmon. The rivers with the most important fish passage threats are located in the southern areas of the Atlantic salmon distribution, on the Atlantic coast portions of New Brunswick and Nova Scotia.
- 10.12 The representative of Canada reported that there are four population designatable units (DU) in the Scotia-Fundy Region: the Outer Bay of Fundy, Inner Bay of Fundy, Southern Uplands, and eastern Cape Breton. All four salmon designatable units in the Scotia-Fundy area have been assessed by an independent scientific body (Committee on the Status of Endangered Wildlife in Canada) as endangered, meaning that the risk of extirpation for these populations is high.
- 10.13 He stated that Recovery Potential Assessments have been conducted for the three DUs that produce multi-sea-winter salmon that undertake long distance high seas migrations to the Labrador Sea and to Greenland. The representative of Canada referred first to the eastern Cape Breton DU which has major threats associated with marine survival, exacerbated by land use activities. He said that fish passage and acidification of freshwaters are not considered to be important threats to salmon in this area.

*'Freshwater habitat supply is not thought to be limiting salmon abundance in Eastern Cape Breton rivers at present, and evidence of significant habitat loss was not found during this Recovery Potential Assessment. Threats in freshwater environments with a medium level of overall concern are (importance not implied by order): infrastructure (roads, power lines, etc.); culverts; genetic effects of small population size; forestry; illegal targeting of Atlantic Salmon while fishing under a general license; stocking of rainbow, brown and brook trout; salmon stocking for fisheries enhancement; changes in predator or prey abundance; non-native fish; silt and sediment; and altered hydrology.'* (DFO. 2014. Recovery Potential Assessment for Eastern Cape Breton Atlantic Salmon. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2013/072.)

- 10.14 The representative of Canada then referred to the southern Uplands DU which is located in the Atlantic coast of Nova Scotia. In this region, Atlantic salmon abundance has shown a precipitous decline. The recovery potential assessment for this DU (DFO 2013) identified fish passage constraints and acidification of freshwaters as major threats to salmon and factors limiting recovery.

*'Threats to persistence and recovery in freshwater environments identified with a high level of overall concern include (importance not implied by order): acidification, altered hydrology, invasive fish species, habitat fragmentation due to dams and culverts, and illegal fishing and poaching. River acidification has significantly contributed to reduced abundance or extirpation of populations from many rivers in the region during the last century. Although most systems are not acidifying further, few are recovering and most are expected to remain affected by acidification for more than 60 years. Acidification and barriers to fish passage are thought to have reduced the amount of freshwater habitat by approximately 40%, an estimate that may be conservative. However, given the low abundance of salmon at present, habitat quantity is not thought to be currently limiting for populations in rivers where barriers and acidification are not issues. Whether freshwater habitat becomes limiting in the future depends on the dynamics of recovered populations.'* (DFO. 2013. Recovery Potential Assessment for Southern Upland Atlantic Salmon. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2013/009).

- 10.15 In response to these threats, mitigation programs have been initiated, including modifications to upstream and downstream fish passage (e.g. bypass facilities for smolts at the Morgan Falls facility on the LaHave River) as dams and hydropower facilities authorisations are renewed and pilot liming project on the West River Sheet Harbour to determine the effectiveness of such actions on recovering salmon populations.

- 10.16 Finally, the representative of Canada referred to the Outer Bay of Fundy DU which is located in the Bay of Fundy area of the province of New Brunswick and borders Maine (USA). This DU is also assessed as endangered.

*'In freshwater, hydroelectric dams and illegal fishing activities are identified as the threats of highest concern. Potential freshwater mitigation measures/actions for high level threats include: implement/improve downstream fish passage, remove or refurbish reservoirs/dams, increase education and awareness activities, public outreach, and increased enforcement in areas of concern. The larger rivers of the Outer Bay of Fundy DU have had a century or more of industrial development that has severely impacted Atlantic Salmon habitat. Dams, regulated flows, headponds, other habitat alteration, as well as inputs of point-source pollutants, have limited the accessibility and reduced the connectivity on the main stem Saint John River (and some tributaries) between Mactaquac Dam and Grand Falls. In total, there is an estimated 41.75 million m<sup>2</sup> of historically accessible productive freshwater habitat available in the area occupied by Atlantic Salmon in this DU of which, 40.4 million m<sup>2</sup> (97%) remain currently accessible. Fish passage facilities provide access to 41.1% of the habitat considered currently accessible.'* (DFO. 2014. Recovery Potential Assessment for Outer Bay of Fundy Atlantic Salmon. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2014/021.)

- 10.17 The representative of Canada concluded that in response to these threats, mitigation

programmes have been initiated, including modifications to downstream fish passage for smolts at dams in the Saint John River. A detailed multi-year study is near completion on the options for refurbishment / replacement / removal of the Mactaquac Dam on the Saint John River, including considerations of the ecosystem consequences of options.

- 10.18 The representative of DFG noted that at least three of the index rivers (LaHave, Saint John River and de la Trinité) which are important since they are used as input data to ICES through the Framework of Indicators report, are either blocked or partly blocked by different types of dams or hydropower plants. She asked if there are dams in those rivers, potentially blocking or partly blocking migration to spawning grounds and smolt migration paths.
- 10.19 The representative of Canada replied that the representative of DFG was correct that the LaHave River, Nova Scotia (in Salmon Fishing Area 21 of the Scotia-Fundy area) and the Saint John River, New Brunswick (Salmon Fishing Area 23 of the Scotia-Fundy area) have dams with associated hydropower facilities. He explained that:
- upstream fish passage with integrated counting facilities is provided at these facilities by means of a fishway for the LaHave River and by a trap / lift / transport system for the Saint John River;
  - downstream fish passage of salmon smolts is enhanced on the LaHave River using a bypass facility to circumvent passage through the turbine, that is also used as the monitoring platform for assessing smolts; and
  - for the Saint John River, a large spillway diverts fish away from turbines and provides downstream passage.
- 10.20 For the River de la Trinité on the Quebec lower north shore of the St. Lawrence River, the representative of Canada explained that there is a low head dam near the outlet of the river but it does not have hydropower generating facilities:
- upstream passage is provided by means of a fishway with an integrated counting facility.
  - downstream fish passage occurs readily by spillage over the lower level dam and is not considered to be an impediment to smolt or post-spawned salmon downstream migration.
- 10.21 The representative of Canada reported that these dams have existed on these rivers since at least the late 1970s and early 1980s. They provide important monitoring data for salmon populations in their respective regions and due to the length of the monitored times series of adult returns and the variations noted over time, they provide significant indicators of the status of salmon in the larger assessment areas of eastern Canada and are used in the Framework of Indicators for monitoring interim year Pre-Fishery Abundance.
- 10.22 The representative of DFG noted that Canada had listed acidification, warming water and predation by invasive species, as the greatest threat to wild Atlantic salmon stocks, but not whether these are local or global problems in Canada. She asked Canada to provide information on development in cormorant populations in Canada in the last two to three decades and whether there has been any recent investigations related to smolt predation by cormorant in Canada and whether there is any management plans for cormorants.

- 10.23 The representative of Canada replied that, as described in the response to the earlier question, acidification is an important threat in the Southern Uplands DU of the Scotia-Fundy area. He said that this is the result of the poor buffering capacity of the underlying geology which was severely reduced during the 1970s and early 1980s due to atmospheric distribution of industrial compounds and low pH precipitation. Although there are localised and periodic low pH events associated with snow melt in the spring in a few areas, the threat of acidification is much less than for the Southern Uplands area.
- 10.24 The representative of Canada reported that non-native species predation and more importantly interactions including competition, displacement, pathogens and parasites, by invasive species tends to be more localised, and of more concern in the southern areas with larger human populations and road access to entire watersheds that facilitates the illegal transfers and introductions. Regarding cormorants, these migratory aquatic birds are native to eastern Canada and localised populations (rookeries) are found in all provinces. He explained that:
- in Environment and Climate Change Canada (2019) reports on the Trends in Canada's bird populations ([www.canada.ca/en/environment-climate-change/services/environmental-indicators/trends-birdpopulations.html](http://www.canada.ca/en/environment-climate-change/services/environmental-indicators/trends-birdpopulations.html)), seabird species that are indicated to be increasing or stable include the Double-crested cormorant and the Great Cormorant, both species native to eastern Canada;
  - predation on salmon smolts by cormorants and other aquatic birds is often highlighted by salmon fishing groups as a major impediment to salmon abundance. Predation by seabirds in Europe and in the eastern United States appears most important in rivers where fish migrations are impeded by in-river barriers and artificial headponds. In most areas of eastern Canada, such impediments to free passage of salmon smolts are not a global concern with local exceptions;
  - there are a limited number of studies on seabird abundances and predation. Cairns (2001) conducted a review of diet of several seabirds in eastern Canada (Cairns, D.K. 1998. Diet of cormorants, mergansers, and kingfishers in eastern North America. Can. Tech. Rep. Fish. Aquat. Sci. No. 2225);
  - a recent study of diet of cormorants conducted on a major salmon producing river (Restigouche) by Carrier *et al.* indicated that salmon smolts were a minor component of cormorant diet (see abstract of poster presented at the Atlantic Salmon Ecosystem Forum, 2016); hence
  - cormorant or other seabird predation is not considered to be an important threat to wild Atlantic salmon in eastern Canada and there are no management plans to address such a low threat.
- 10.25 The representative of Canada concluded that Canada cannot comment on the status of cormorant plans in the United States. Within Canada, cormorants are not a federal jurisdiction and are managed by provinces.
- 10.26 The representative of DFG thanked the representative of Canada for his comprehensive reply.

## **11. Date and Place of the Next Meeting**

- 11.1 Process to develop the next Regulatory Measure: The representative of the United States noted that the current regulatory measure ends in 2020. She suggested that

the WGC agree to an inter-sessional process aimed at beginning discussion of new management measures for the West Greenland fishery for adoption in 2021. Specifically, she said that the United States would support a process where the WGC holds an inter-sessional meeting, virtually if necessary, in the winter / spring 2021 and, if needed, a second inter-sessional meeting just before the start of the 2021 NASCO Annual Meeting. The representative of the United States sought other views on this prior to the video conference.

11.2 The representative of Canada supported the proposal to begin the process of discussing new management measures through inter-sessional meetings, most likely initially via video conference.

11.3 The representative of DFG noted that given the amount of meetings that have been moved from 2020 to 2021 and financial restrictions, due to Covid-19, it would be preferred either not to have an inter-sessional meeting before the Annual Meeting or to have an inter-sessional meeting via video conference. She said alternatively, a physical meeting could be held in Greenland.