	<b>Council</b>  <i>Annual Progress Report on Actions taken under the Implementation Plan for the Calendar Year 2021 Canada</i>	<b>CNL(22)40</b>
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***Annual Progress Report on Actions taken under the Implementation Plan for the Calendar Year 2021***

**The Annual Progress Reports allow NASCO to evaluate progress on actions taken by Parties / jurisdictions to implement its internationally agreed Resolutions, Agreements and Guidelines and, consequently, the achievement of their objectives and actions taken in accordance with the Convention.** The following information should be provided through the Annual Progress Reports:

- any changes to the management regime for salmon and consequent changes to the Implementation Plan;
- actions that have been taken under the Implementation Plan in the previous year;
- significant changes to the status of stocks, and a report on catches; and
- actions taken in accordance with the provisions of the Convention.

*In completing this Annual Progress Report please refer to the **Guidelines for the Preparation and Evaluation of NASCO Implementation Plans and for Reporting on Progress, CNL(18)49.***

These reports will be reviewed by the Council. Please complete this form and return it to the Secretariat **no later than 1 April 2022.**

<b>Party:</b>	<b>Canada</b>
<b>Jurisdiction / Region:</b>	<p>Fisheries and Oceans Canada (DFO) is the federal administrative body responsible for the management of Atlantic salmon fisheries and habitat, with the exception of Province of Quebec, which bears this responsibility in its jurisdiction. All provinces, though, are granted exclusive jurisdiction over matters dealing with property, civil rights, the management of public lands and inland waters under Canada's <i>Constitution Act</i>. In Atlantic Canada, DFO has three Regions referred to throughout this Implementation Plan (IP): Gulf, Maritimes, Newfoundland and Labrador:</p> <p>Provincial jurisdictions referred to in the IP include Quebec as well those in Atlantic Canada (New Brunswick, Newfoundland and Labrador; Nova Scotia; and, Prince Edward Island).</p>

**DFO Regions - National**

**DFO Atlantic Regions + Province of Quebec**

Pacific, Central and Arctic, Newfoundland and Labrador, Quebec, Gulf Maritimes

Provincial jurisdictions referred to in the IP include Quebec as well those in Atlantic Canada (New Brunswick, Newfoundland and Labrador; Nova Scotia; and, Prince Edward Island).

**ATLANTIC CANADA**

NEWFOUNDLAND AND LABRADOR, PRINCE EDWARD ISLAND, NEW BRUNSWICK, NOVA SCOTIA

<b>1: Changes to the Implementation Plan</b>	
<b>1.1 Describe any proposed revisions to the Implementation Plan (Where changes are proposed, the revised Implementation Plans should be submitted to the Secretariat by 1 November).</b>	Canada submitted a revised Implementation Plan in November 2021. Further revisions may be undertaken in autumn 2022 to reflect changes in policies and/or programs during 2022.
<b>1.2 Describe any major new initiatives or achievements for salmon conservation and management that you wish to highlight.</b>	Much of the Canadian action to conserve and manage Atlantic salmon in recent years has been guided by Canada’s Wild Atlantic Salmon Conservation Policy implementation plan (2019-2021). That plan identified, in collaboration with Indigenous communities and other partners, a set of 18

priority action items for Atlantic salmon conservation and management, and those actions have been implemented throughout the three-year duration of the plan.

Notwithstanding disruptions due to the COVID-19 pandemic and resulting public health measures and their impacts on activities related to the fishing and management of wild Atlantic salmon, Canada continued in 2021 to implement measures as laid out in its domestic implementation plan. The plan concluded at the end of 2021, with a report outlining the status of the action items, as well as highlighting successes and challenges throughout the term, expected to be released by the middle of 2022.

To build on progress made under the 2019-21 domestic implementation plan, the Government of Canada committed to make new investments and develop a conservation strategy to restore and rebuild wild Atlantic populations and their habitats. To support the development of this strategy, in 2021 Fisheries and Oceans Canada initiated engagement activities with Indigenous communities, provinces, and stakeholder organizations, to inform conservation priorities.

In a particularly substantial investment, in 2021 DFO received \$11.8 million through Natural Resources Canada's Environmental Studies Research Fund to study the migration of Atlantic salmon at sea. By fitting more than 1,300 Atlantic salmon at three different life stages with telemetry tags, this research will provide much-needed insight into marine migration routes, timing and duration at sea, and the effects of environmental variability. This research is also documented in NASCO's Research Inventory.

## 2: Stock status and catches.

### 2.1 Provide a description of any new factors that may affect the abundance of salmon stocks significantly and, if there has been any significant change in stock status since the development of the Implementation Plan, provide a brief (200-word max) summary of these changes.

No new factors affecting salmon abundance have been identified. Status of Atlantic salmon in eastern Canada is as described in the Implementation Plan; stocks from the northern regions (Quebec, Newfoundland, Labrador) are faring better than stocks in southern regions (Nova Scotia, New Brunswick, Prince Edward Island). Recreational fisheries in the southern regions are either closed or, where permitted, recreational fishing is restricted to catch and release only. Indigenous communal fisheries are permitted in all areas subject to conservation requirements, although not all have elected to pursue such fisheries.

### 2.2 Provide the following information on catches: (nominal catch equals reported quantity of salmon caught and retained in tonnes 'round fresh weight' (i.e. weight of whole, ungutted, unfrozen fish) or 'round fresh weight equivalent').

	In-river	Estuarine	Coastal	Total
(a) provisional nominal catch (which may be subject to revision) for 2021 (tonnes)	50.9	45.1	6.7	102.7
(b) confirmed nominal catch of salmon for 2020 (tonnes)	50.3	45	7.6	102.9

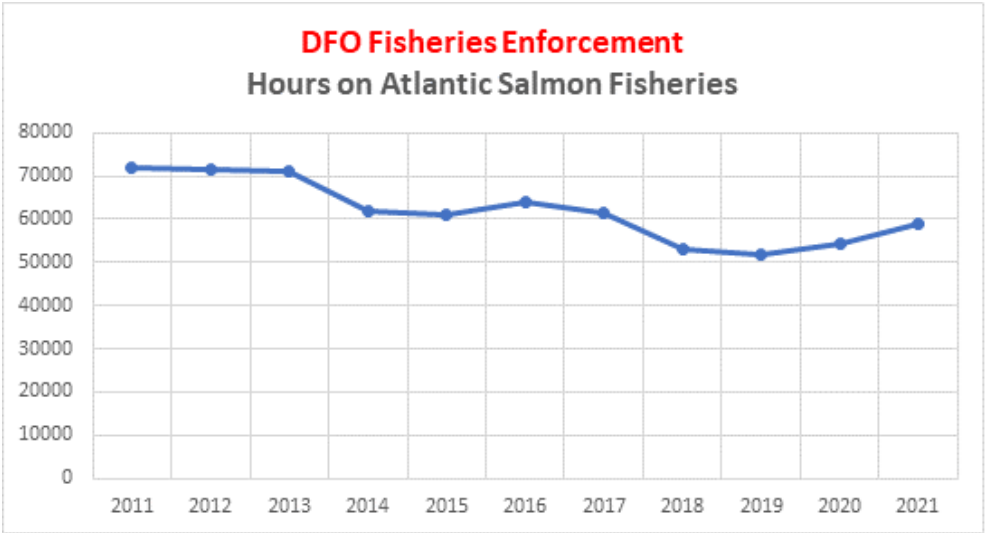
(c) estimated unreported catch for 2021 (tonnes)	N/A	N/A	N/A	19.8 (partial data)
(d) number and percentage of salmon caught and released in recreational fisheries in 2021	Provisional 2021: 55,867 salmon released comprising: 34,445 small salmon (FL < 63 cm) and 21,422 large salmon (FL ≥ 63 cm)			

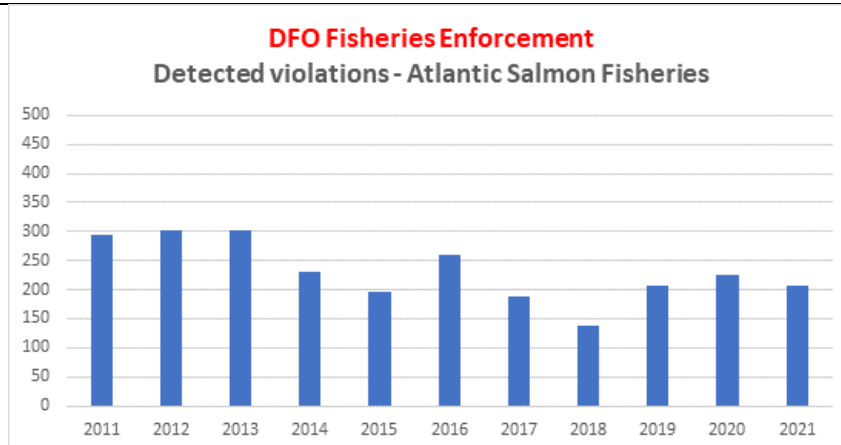
### 3: Implementation Plan Actions.

**3.1 Provide an update on progress on actions relating to the Management of Salmon Fisheries (section 2.9 of the Implementation Plan).**  
*Note: the reports under ‘Progress on action to date’ should provide a **brief overview** of each action. For all actions, provide **clear and concise** quantitative information to demonstrate progress. In circumstances where quantitative information cannot be provided for a particular action because of its nature, a clear rationale must be given for not providing quantitative information and other information should be provided to enable progress with that action to be evaluated. While referring to additional material (e.g. via links to websites) may assist those seeking more detailed information, this will not be evaluated by the Review Group.*

<b>Action F1:</b>	Description of action (as submitted in the IP):	<p><b>Improve understanding of factors affecting survival of salmon at sea, to inform management</b></p> <p>Throughout the North Atlantic, survival at sea of salmon has declined, particularly for populations in the southern and mid-range of the species. There is still no comprehensive understanding of why marine survival is lower than in previous decades. For example, predation factors hypothesized to be contributing to increased mortality, and which could potentially be managed include: predation by native fish such as striped bass; Atlantic cod on out-migrating smolt; seal predation on returning adult salmon in estuaries and rivers; and changes/reductions in the salmon food base (capelin, herring) that are also subject of fishing pressure.</p> <p>Research focused on the identification of the factors that are contributing to reduced sea survival is required to determine if fisheries management actions may contribute to improving marine survival. Even without a complete understanding of the mechanisms involved, scientific information enabling the prediction of salmon returns from the sea could improve management practices.</p>
	Expected outcome (as submitted in the IP):	The objective of the ASRJV Science Plan is to guide the strategic planning and implementation of science initiatives in eastern North America that lead to improved understanding of the trends and causes of variation and/or decline in the abundance and distribution of wild Atlantic salmon.
	Progress on action to date (Provide a brief overview with a quantitative measure, or other justified evaluation, of progress.	<p>The Atlantic Salmon Research Joint Venture (ASRJV) is a collaboration of the Atlantic salmon science community in North America and is working to connect people, projects, and data, to address those research questions that are too large and too complex for any one agency to resolve on its own. Its flagship research study commenced in 2021 and is a five-year collaborative project that seeks to understand genetic and environmental factors that affect survival at sea, particularly those of freshwater environments.</p> <p>Other ASRJV studies include:</p>

	<p><i>Other material (e.g. website links) will not be evaluated):</i></p>	<p>For 2020/2021, the Science committee collectively developed a strategic proposal aimed at addressing priority research related to early phase smolt and post-smolt survival across the species range in eastern Canada.</p> <p>Three projects funded in 2021/2022 included: Potential changes in biological characteristics of juvenile Atlantic salmon over the past 50 years and linkages to environmental factors; Effect of heat stress events and thermal refuge availability on juvenile Atlantic salmon growth, condition and marine survival; and Hydrological and water temperature modelling of Atlantic salmon rivers.</p> <p>A previous ASRJV project, “Using stable isotopes to reveal fifty-year trends in the marine feeding ecology of Atlantic salmon” concluded in 2021, which aimed to characterize how the trophic position of salmon foraging in West Greenland has changed over 50 years. This project relied on samples collected by NASCO parties through the West Greenland Atlantic Salmon Sampling Program. A final report was submitted to DFO, and peer-reviewed publications are anticipated.</p> <p>The ASRJV Science Plan will run until 2023, so further results will be included in later APRs.</p>
	<p>Current status of action:</p>	<p>Ongoing</p>
	<p>If ‘Completed’, has the action achieved its objective?</p>	<p></p>
<p><b>Action F2:</b></p>	<p>Description of action (as submitted in the IP):</p>	<p><b>Action against illegal fishing</b></p> <p>Newfoundland and Labrador Region will combat illegal salmon fishing activities based on strategic patrol plans developed with Intelligence Led Special Operations in cooperation with the inland guardian program, including deploying 90 Inland Fishery Guardians, three Marine Fishery Guardians, and 14 Aboriginal Fishery Guardians. These strategic operations will continue before, during and post-season. DFO plans to deploy these staff for a minimum 60,000 hours, conducting a minimum of 3,400 inspections/year. Provincial Wildlife Enforcement Officers and DFO will support both regular patrols and special operations.</p> <p>Gulf and Maritimes regions have developed mapping software that contains historical angling activity along certain rivers in its regions and provide key information to enforcement officers about areas with illegal activity, creating more effective patrol planning and use of enforcement resources. The first river system where this pilot project has been implemented is the Saint John River, New Brunswick. The Miramichi River system will be added in the near future.</p> <p>Even though all but three rivers in the Maritimes Region have been closed to salmon angling, catch and release became a practiced activity on a number of other major</p>

		<p>salmon rivers under the guise of angling for trout and smallmouth bass. DFO will continue to impose complete angling closures in important salmon holding pools and, in some cases, closures of 20 kilometres or more on specific rivers (Medway, Nova Scotia, and Tobique, New Brunswick).</p> <p>A new IT system is being developed to improve catch registration and regulatory compliance monitoring in Quebec. Wildlife protection officers continue to fight against salmon poaching with the collaboration of wildlife protection assistants from controlled harvesting zones (ZEC).</p> <p>DFO will continue to use social media in order to emphasize the consequences to salmon stocks of illegal activities and bring awareness to the penalties.</p> <p>Planned Surveillance deployments by Region for 2019-2024:</p> <table border="1" data-bbox="502 629 1204 842"> <thead> <tr> <th></th> <th>Patrol Hours</th> <th>Inspections</th> </tr> </thead> <tbody> <tr> <td>NL</td> <td>48,000</td> <td>3,500</td> </tr> <tr> <td>Gulf</td> <td>6,400</td> <td>500</td> </tr> <tr> <td>Maritimes</td> <td>4,600</td> <td>300</td> </tr> <tr> <td>Quebec</td> <td>40,000</td> <td>No specific objectives</td> </tr> </tbody> </table>		Patrol Hours	Inspections	NL	48,000	3,500	Gulf	6,400	500	Maritimes	4,600	300	Quebec	40,000	No specific objectives									
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	<p>Expected outcome <i>(as submitted in the IP):</i></p>	<p>Deterrence of illegal activity will be achieved through increased ability to detect such activities and by publicizing penalties on social media associated with resulting prosecutions.</p>																								
	<p>Progress on action to date <i>(Provide a brief overview with a quantitative measure, or other justified evaluation, of progress. Other material (e.g. website links) will not be evaluated):</i></p>	<p>The following graphs summarize enforcement activities and trends across Canada's Atlantic regions in the last 10 years.</p>  <table border="1" data-bbox="502 1093 1492 1624"> <caption>DFO Fisheries Enforcement Hours on Atlantic Salmon Fisheries</caption> <thead> <tr> <th>Year</th> <th>Hours</th> </tr> </thead> <tbody> <tr><td>2011</td><td>71,000</td></tr> <tr><td>2012</td><td>70,000</td></tr> <tr><td>2013</td><td>70,000</td></tr> <tr><td>2014</td><td>61,000</td></tr> <tr><td>2015</td><td>60,000</td></tr> <tr><td>2016</td><td>63,000</td></tr> <tr><td>2017</td><td>61,000</td></tr> <tr><td>2018</td><td>52,000</td></tr> <tr><td>2019</td><td>51,000</td></tr> <tr><td>2020</td><td>54,000</td></tr> <tr><td>2021</td><td>58,000</td></tr> </tbody> </table>	Year	Hours	2011	71,000	2012	70,000	2013	70,000	2014	61,000	2015	60,000	2016	63,000	2017	61,000	2018	52,000	2019	51,000	2020	54,000	2021	58,000
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The following table provides more detailed information on activities in 2021, by DFO region for three of the Atlantic regions.

DFO Region	Patrol Hours	Fishers checked	Fishing Sites checked
Gulf	8,902	1,029	6,478
Maritimes	2,507	287	2,386
Newfoundland and Labrador	47,455	4,607	9,230
<b>Total</b>	<b>58,864</b>	<b>5,923</b>	<b>18,094</b>

In the Province of Quebec, the development of the new catch registration and monitoring IT system is ongoing. Wildlife protection officers continue to fight salmon poaching together with the collaboration of wildlife protection assistants from controlled harvesting zones (ZEC). The total number of patrol hours focused on Atlantic salmon in Quebec in 2021 by the provincial wildlife protection officers and assistants was 40,878.

Current status of action:	Ongoing
If 'Completed', has the action achieved its objective?	

<b>Action F3:</b>	Description of action (as submitted in the IP):	<p><b>Warm water protocols for adaptive management of recreational fisheries</b></p> <p>Due to the warming of waters and the trends of declining returns of Atlantic salmon in the rivers of Eastern Canada, a number of measures have been put in place to limit fishing activity and to reduce fish mortality. The most significant measure is the use of warm water protocols to reduce stress on salmon during summer months. Warm water</p>
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		<p>protocols for wild Atlantic recreational fisheries have been developed for some jurisdictions in eastern Canada (rivers of Gulf Region and all rivers in Newfoundland and Labrador) and are expected to be developed for other rivers (e.g., rivers with documented problems in Quebec), where they can be proven to function as a useful tool in supporting decisions to promote sustainability of the stocks.</p>
	<p>Expected outcome (as submitted in the IP):</p>	<p>Increased number of rivers with warm water protocol in Canada, and a reduction in the number and proportion of salmon that die as a result of catch and release associated with warm water conditions.</p>
	<p>Progress on action to date (Provide a brief overview with a quantitative measure, or other justified evaluation, of progress. Other material (e.g. website links) will not be evaluated):</p>	<p>In 2021, there was no increase in the number of rivers having warm water protocols. However, existing warm water protocols continued to be used for the adaptive management of fisheries.</p> <p>In Newfoundland and Labrador Region, environmental protocols modify angling activities on rivers based on water temperatures as well as secondary parameters such as water levels and long-term forecast. When conditions are unfavourable, the river in question is closed to fishing for most of the day, but remains open from one hour before sunrise until 10 am. These protocols were in place for all rivers in Newfoundland and Labrador in 2021. The Region implemented such closures in 105 rivers in 2021, of which 63 rivers were re-opened as conditions improved.</p> <p>In the Maritimes Region, rivers are closed to recreational angling during the summer months when water temperatures are most likely to cause stress for salmon. Three rivers were open to catch and release recreational angling in the fall of 2021.</p> <p>In Gulf Region, many rivers do not have recreational fisheries during the summer months. Of the rivers with recreational fisheries in the summer, four have warm water protocols in place.</p> <p>In the Quebec region, warm water protocols were newly established in two rivers in 2020, but temperatures did not reach the threshold that would have led to the closure of the angling activities. In 2021, temperatures reached levels that, under the protocol, required closure of angling activities.</p>
	<p>Current status of action:</p>	<p>Ongoing</p>
	<p>If 'Completed', has the action achieved its objective?</p>	
<p><b>Action F4:</b></p>	<p>Description of action</p>	<p><b>Monitoring and management of Labrador mixed-stock fishery</b></p> <p>In order to reduce the interception of non-Labrador origin salmon in the Labrador</p>



	<i>(as submitted in the IP):</i>	<p>mixed stock fishery, intervention in the fisheries that are most likely to intercept non-Labrador origin salmon will occur. These interventions include the relocation (time, space) of fishing effort away from areas with known interceptions of non-Labrador origin salmon.</p> <p>There is ongoing work to improve logbook reporting (including date and location of catches) and modified/enhanced sampling of the fishery catches to assess origin of the catches and effectiveness of the management interventions at reducing catches of non-Labrador origin salmon.</p> <p>Since 2019, fishery sample processing has been targeted to areas with higher probability of non-local stock interceptions. Partnerships with Indigenous groups will continue in these sampling activities.</p>
	Expected outcome <i>(as submitted in the IP):</i>	Adaptive management of locations and timing of the fishery based on annual estimates of origin of salmon in the Labrador subsistence fisheries. Effectiveness of management actions will be shown by the absence or reduction over time of harvests of non-Labrador origin salmon.
	Progress on action to date <i>(Provide a brief overview with a quantitative measure, or other justified evaluation, of progress. Other material (e.g. website links) will not be evaluated):</i>	<p>Work to manage the Labrador mixed-stock fishery as outlined in the Implementation Plan is ongoing and continued in 2021.</p> <p>In 2021, 1130 samples were collected from salmon harvested in the Labrador subsistence fishery. Genetic analysis is being conducted on 1086 samples from along the Labrador coast, where interceptions of non-Labrador origin salmon are most likely. Final results of these analyses were not available at the time this report was submitted, but will be provided along with information on harvests as part of report to be tabled at the North American Commission ahead of the June 2022 Annual Meeting. Results of the Labrador subsistence fishery sampling program will also be included in the ICES Working Group on North Atlantic Salmon (WGNAS) annual report.</p>
	Current status of action:	Ongoing
	If 'Completed', has the action achieved its objective?	

**3.2 Provide an update on progress on actions relating to Habitat Protection and Restoration** (section 3.5 of the Implementation Plan).

*Note: the reports under ‘Progress on action to date’ should provide a **brief overview** of each action. For all actions, provide **clear and concise** quantitative information to demonstrate progress. In circumstances where quantitative information cannot be provided for a particular action because of its nature, a clear rationale must be given for not providing quantitative information and other information should be provided to enable progress with that action to be evaluated. While referring to additional material (e.g. via links to websites) may assist those seeking more detailed information, this will not be evaluated by the Review Group.*

<b>Action H1:</b>	Description of action (as submitted in the IP):	<p><b>Management of threats related to industrial land-use activities</b></p> <p>DFO will identify and begin development of additional tools and investments in water quality protection, flow management, and fish passage protection, as well as work with partners, including Indigenous peoples and organizations, to identify priority areas for existing habitat programs.</p> <p>The recently modernized <i>Fisheries Act</i> includes provisions related to fish and fish habitat protection, including:</p> <ul style="list-style-type: none"> <li>• measures relating to authorization and permitting of works, undertakings and activities;</li> <li>• creation of fish habitat banks by a proponent of a project;</li> <li>• establishment of standards and codes of practice;</li> <li>• establishment of a public registry; and,</li> <li>• establishment of ecologically significant areas.</li> </ul>
	Expected outcome (as submitted in the IP):	Greater variety of options for regulatory tools and partnerships to reduce the threat to Canada’s Atlantic salmon habitat.
	Progress on action to date (Provide a brief overview with a quantitative measure, or other justified evaluation, of progress. Other material (e.g. website links) will not be evaluated):	<p>In collaboration with a range of stakeholders and partners, Canada has continued to develop tools and invest in projects designed to reduce threats to the habitat of Canada’s Atlantic salmon population.</p> <p>Some of the broad initiatives and tools developed included:</p> <ul style="list-style-type: none"> <li>• Updated the Government of Canada Common Project Search portal in April 2021 to share information about <i>Fisheries Act</i> authorizations.</li> <li>• Implemented an Engagement Framework to provide predictable points of engagement on the development of new tools to protect fish and fish habitat.</li> <li>• Launched an online “Talk Fish Habitat” platform in April 2021 that houses specific activities that are designed for registered users, including Indigenous Peoples, partners and stakeholders, who have expressed an interest in contributing to the development of new tools and approaches to protect fish and fish habitat.</li> </ul>

		<ul style="list-style-type: none"> <li>Released six interim Codes of Practice to improve clarity and transparency about regulatory requirements for project proponents.</li> </ul> <p>A selection of the specific initiatives and projects undertaken and/or funded in collaboration with a range of partners includes:</p> <ul style="list-style-type: none"> <li>Removal of the Campbell Creek dam, situated on a tributary to the Nashwaak River near Fredericton, New Brunswick, to restore fish passage on a priority Atlantic salmon stream.</li> <li>Work led by the Nova Scotia Salmon Association (NSSA) on integrated watershed planning for eight priority Southern Uplands watersheds in which Atlantic salmon are a valued species. In 2021, the NSSA in collaboration with project partners completed habitat and connectivity restoration in four watersheds (Annapolis, LaHave, St Mary's, West River). Further planning work for additional restoration activities was completed and will be implemented in 2022.</li> <li>Since 2019, DFO's Gulf region has worked with the Mi'kmaq of New Brunswick and other partners to advance the development of an integrated watershed management plan for the Miramichi river to improve collaboration, decision-making, and planning with respect to the management of Atlantic salmon and its habitat, including a comprehensive plan to address threats.</li> <li>A comprehensive document entitled "Best Management Practices for the Protection of Freshwater Fish Habitat in Newfoundland and Labrador" was completed and published.</li> </ul>
	Current status of action:	Ongoing
	If 'Completed', has the action achieved its objective?	N/A
<b>Action H2:</b>	Description of action (as submitted in the IP):	<p><b>Management of Acid Rain</b></p> <p>Reduction and elimination of acid rain-causing emissions need to be fully implemented in most areas to mitigate losses of wild Atlantic salmon due to acidification. Some liming of watersheds is being used to buffer acidity, especially in Nova Scotia. The West River Acid Mitigation Project, led by the Nova Scotia Salmon Association (NSSA), commenced in 2005 using liming as a buffering technique. The first decade of this project was funded by the NSSA with recent funding coming from collaboration between the federal and provincial governments and continued funding from the NSSA.</p>

		<p>The following activities will continue during the 2019-2024 IP cycle:</p> <ol style="list-style-type: none"> <li>1) Lime dosing using two dosers to directly treat salmon habitat units affected by acid rain;</li> <li>2) Having completed the first experimental tributary (~180ha of limed land), the helicopter catchment liming project will extend to the next priority tributary of the West River watershed;</li> <li>3) Physical habitat restoration within the West River is addressing a legacy of log driving and nearby road construction, to increase water depth of coldwater habitat pools;</li> <li>4) Continued monitoring, including: operation of the adult salmon counting fence; operation of smolt assessment facilities; and, ongoing electrofishing and water chemistry monitoring;</li> <li>5) Expanding research to include the interplay between forest resiliency/ productivity and catchment liming to integrate salmon and forest economics;</li> <li>6) Expanding research on the interplay of acid mitigation of salmon rivers and the potential for carbon sequestration to address national carbon targets with regard to climate change policy; and,</li> <li>7) being developed based on the experience of the West River project. This strategy will identify priority sites for future acid mitigation strategies based on updated water chemistry and salmon resource data (eDNA) and other considerations.</li> </ol>
	<p>Expected outcome <i>(as submitted in the IP):</i></p>	<p>The liming project in West River has had very positive results. Parr numbers have increased by more than 300 per cent and new sections of the river are being recolonized. Liming can be fairly expensive and must be done repeatedly as long as the source of acidity remains.</p>
	<p>Progress on action to date <i>(Provide a brief overview with a quantitative measure, or other justified evaluation, of progress. Other material (e.g. website links) will not be evaluated):</i></p>	<p>Instream lime dosing continues on the West River, located near Sheet Harbour, Nova Scotia using two automated lime dosers, one on the upper West River main branch (since 2005) and one on the Killag River, a priority tributary to the West River, since 2018.</p> <p>In addition to instream lime dosing, terrestrial catchment liming has occurred in the West River, Sheet Harbour watershed. The first trial project was completed between 2016-2018 where 182 ha of a small second-order stream was treated. Expansion occurred to a second coldwater site where 274 ha were treated between 2019-2021 and 120 ha will complete the project in 2022.</p>

		<p>Further, in 2020 and 2021, a tributary of the West Branch, St. Mary's River has had a total of 121 ha of land treated.</p> <p>Monitoring continues in support of an assessment of acid mitigation techniques. Specifically, the annual smolt estimate and some limited electrofishing are providing the highest quality data. An adult salmon counting fence and limited redd counting surveys are conducted to estimate adult returns.</p> <p>A MSc project is nearing completion (summer 2022) regarding the initial response of forests to catchment liming, including an economic assessment of the return-on-investment for catchment liming specifically, focused on forestry products.</p> <p>Partners at Dalhousie University have conducted two phases of research regarding the interplay of acid rain mitigation and the effects on carbon cycling in freshwater.</p> <p>Finally, the NSSA is in the final year of a four-year project to create watershed stewardship plans for eight priority rivers impacted by acid rain, including the West River.</p>
	<p>Current status of action:</p> <p>If 'Completed', has the action achieved its objective?</p>	<p>Ongoing</p>
<p><b>Action H3:</b></p>	<p>Description of action (as submitted in the IP):</p>	<p><b>Management of Aquatic Invasive Species (AIS)</b></p> <p>In New Brunswick, since 2008, DFO and NGO partners have used physical control methods to contain and reduce Smallmouth bass in Miramichi Lake. A 2018 review of this program indicated that there was evidence of depletion of Smallmouth bass in Miramichi Lake but the extent of the reduction could not be quantified. Given that an eradication program, using rotenone, had been proposed for some time, in 2021 federal and provincial regulatory approval was given to a stakeholder consortium to apply rotenone in Miramichi Lake and the immediate downstream river sections where Smallmouth bass were detected. Although planned for the fall of 2021 the rotenone project has been postponed to 2022.</p> <p>In Nova Scotia, the Province and DFO have collaborated to undertake targeted physical removals of Smallmouth bass and Chain pickerel on selected rivers. In 2020, the Province applied rotenone to Piper Lake to eradicate Smallmouth bass from the headwaters of the St. Mary's River.</p>

	Expected outcome (as submitted in the IP):	<p>The invasive species in Piper Lake, Nova Scotia, is expected to be eliminated.</p> <p>Smallmouth bass in the headwaters of the Miramichi River are expected to be eradicated in 2022.</p>
	Progress on action to date (Provide a brief overview with a quantitative measure, or other justified evaluation, of progress. Other material (e.g. website links) will not be evaluated):	<p>The project to eradicate smallmouth bass in the headwaters of Miramichi River is planned for summer 2022. The North Shore Micmac District Council (NSMDC), an organization serving seven Indigenous Communities in New Brunswick, with the support of a coalition of non-government organizations focused on Atlantic salmon conservation, are leading this project. While this project is being planned, DFO continues activities to monitor and physically remove smallmouth bass in Miramichi Lake. DFO and university partners are also using eDNA methods to characterize the species distribution in the Miramichi watershed.</p> <p>Nova Scotia considered the Piper Lake smallmouth bass eradication project to be successful. Post treatment monitoring in 2021 included extensive netting and electrofishing and determined no fish were present. A comparison of pre- and post-treatment invertebrate communities determined that impacts or changes due to expected mortality associated with Noxfish II was minimal. As an added precaution screens were maintained at the outflow but will be removed this spring to facilitate natural lake recovery. Recolonization of native species will be monitored throughout the 2022 field season.</p>
	Current status of action:	Ongoing
	If 'Completed', has the action achieved its objective?	

**3.3 Provide an update on progress on actions relating to Aquaculture, Introductions and Transfers and Transgenics (section 4.11 of the Implementation Plan).**

*Note: the reports under 'Progress on action to date' should provide a **brief overview** of each action. For all actions, provide **clear and concise** quantitative information to demonstrate progress. In circumstances where quantitative information cannot be provided for a particular action because of its nature, a clear rationale must be given for not providing quantitative information and other information should be provided to enable progress with that action to be evaluated. While referring to additional material (e.g. via links to websites) may assist those seeking more detailed information, this will not be evaluated by the Review Group.*

<b>Action A1:</b>	Description of action (as submitted in the IP):	<b>Research to support assessment of potential impacts of sea lice from farmed fish on wild Atlantic salmon stocks and mitigation measures</b>
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		<p>Ongoing efforts aim to determine the potential impacts of sea lice from farms to wild Atlantic salmon populations. This includes research on sea lice tolerance to various environmental conditions, virulence of sea lice, impacts of co-infections and potential mitigation measures of sea lice on farms. The results of these efforts may inform, as appropriate, any potential new legislative or regulatory approaches to manage sea lice on salmon farms and impacts on wild salmon.</p>
	<p>Expected outcome <i>(as submitted in the IP):</i></p>	<p>Improved understanding of the potential impacts of sea lice from farms to wild Atlantic salmon populations and recommendations for effective mitigation measures, if applicable.</p>
	<p>Progress on action to date <i>(Provide a brief overview with a quantitative measure, or other justified evaluation, of progress. Other material (e.g. website links) will not be evaluated):</i></p>	<p>Federally-funded research to support the assessment of potential impacts of sea lice from farmed fish on wild Atlantic salmon stocks and mitigation measures is ongoing. This includes funding for several ongoing multi-year collaborative research projects with industry in 2021.</p> <p>Examples of ongoing research projects include:</p> <ol style="list-style-type: none"> <li>1. Laboratory experiments conducted at DFO's St. Andrews Biological Station in New Brunswick to assess: (1) the effectiveness of green technologies to control sea lice on farmed salmon, such as lumpfish, selecting resistant families, and probiotics; and (2) the evolution of virulence of sea lice and resistance to treatments on farmed salmon.</li> <li>2. Field surveys of sea lice larvae were conducted in 2019 in Passamaquoddy Bay, New Brunswick, in the intertidal zones near aquaculture sites along the migration routes of Atlantic salmon post-smolts. Results from those surveys, combined with acoustic telemetry studies in the same area from 2018-2021 to determine residence time of Atlantic salmon post-smolts in the nearshore environment, will contribute to our understanding and assessment of exposure of wild fish to farmed-source sea lice.</li> <li>3. Manuscripts on the migration of Atlantic salmon post-smolts and abundance of sea lice larvae are in the process of being submitted. Data for the laboratory experiments are currently being analysed for these projects.</li> </ol> <p>Other ongoing research projects related to sea lice are as follows (including web links to project descriptions):</p>

		<ol style="list-style-type: none"> <li>1. <a href="#">Assessing Heritable Variation in Biological Control of the Salmon Louse by Cleaner Fish and Co-operative Behaviour by their Client, Atlantic Salmon</a></li> <li>2. <a href="#">Assessing the evolution of virulence of the salmon louse (<i>Lepeophtheirus salmonis</i>) in the Bay of Fundy</a></li> <li>3. <a href="#">Assessing the potential for development of thermal resistance of sea lice to warm water showers</a></li> <li>4. <a href="#">Characterization of virulence factors in the salmon lice using post-transcriptional silencing</a></li> <li>5. <a href="#">Validation of genomic selection among Atlantic salmon for resistance to infection by sea lice (<i>Lepeophtheirus salmonis</i>), and concomitant susceptibility to Infectious salmon anaemia virus (ISAV)</a></li> </ol> <p>New projects are also under consideration for future funding and will be reported on in future APRs as appropriate.</p>
	Current status of action:	Ongoing
	If 'Completed', has the action achieved its objective?	
<b>Action A2:</b>	Description of action (as submitted in the IP):	<p><b>Research to support assessment of genetic introgression and mitigation measures.</b></p> <p>Federally-funded research is ongoing to quantify hybridization and introgression of farmed and wild Atlantic salmon in Atlantic Canada using genomic tools. The results of this research may inform, as appropriate, any potential new legislative or regulatory approaches for the management of containment and the impacts of escapement.</p>
	Expected outcome (as submitted in the IP):	Improved understanding of the consequences of introgression for wild populations in Atlantic Canada and recommendations for effective mitigation measures, if applicable.
	Progress on action to date (Provide a brief overview with a quantitative measure, or other justified evaluation, of progress. Other material (e.g. website links) will not be evaluated):	<p>Federally-funded research to support assessment of genetic introgression and mitigation measures is ongoing.</p> <p>This includes funding for several ongoing multi-year research projects and several new multi-year research projects in 2021.</p> <p>Example of ongoing research include:</p> <ol style="list-style-type: none"> <li>1. DFO is in the process of developing a region-specific panel of diagnostic genetic markers to accurately</li> </ol>



		<p>identify Atlantic Salmon as being wild, of aquaculture origin, or a hybrid.</p> <ol style="list-style-type: none"> <li>2. To assess the effectiveness of different molecular biology markers, research is being done to compare genotyping-by-sequencing-based microsatellites with single nucleotide polymorphisms (SNPs) to determine which marker type is optimal in terms of both accuracy and ease of application. A region-specific panel for the detection of European introgression is also planned.</li> <li>3. In 2021, genotyping of the wild-type fish samples for microsatellites analyses were completed. Samples were collected for the wild-type SNP analysis, in which analysis is still anticipated.</li> <li>4. Another research project is being conducted at the St. Andrews Biological Station in New Brunswick to determine the fate of farmed salmon when they escape an aquaculture site. In particular, this research is assessing (1) the residence time and depth distribution of escaped farmed salmon near in the vicinity of the aquaculture site, and (2) the proportion of escaped farmed salmon that are returning to freshwater. Results will provide information that can be used to assess the window to recapture farmed salmon once they escape aquaculture facilities, and to quantify the likelihood that escaped farmed salmon introgress with wild salmon.</li> </ol> <p>Other ongoing research projects related to genetic introgression are as follows (including web links to project descriptions):</p> <ol style="list-style-type: none"> <li>1. <a href="#"><u>Assessment of genetic interactions of farmed fish on wild populations of Atlantic salmon in the Maritimes Region</u></a></li> <li>2. <a href="#"><u>Detecting the presence of escaped farmed Atlantic Salmon in Newfoundland using environmental DNA</u></a></li> <li>3. <a href="#"><u>Development of genomic panels for improved traceability of escaped farmed salmon and estimation of European introgression in NA domestic and wild populations</u></a></li> <li>4. <a href="#"><u>Quantifying levels of introgression of farmed escaped and wild Atlantic Salmon and exploring the genetic consequences for life history variation</u></a></li> </ol> <p>New projects are also under consideration for future funding and will be reported on in future APRs as appropriate.</p>
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	<p>Current status of action:</p> <p>If 'Completed', has the action achieved its objective?</p>	<p>Ongoing</p>
<p><b>Action A3:</b></p>	<p>Description of action (as submitted in the IP):</p>	<p><b>Research with respect to wild and farmed fish health and emerging diseases</b></p> <p>Fish health research contributes to the Government of Canada's ability to identify and address threats to wild fish and ecosystem health.</p> <p>Ongoing fish health research on the east coast of Canada includes studies of:</p> <ul style="list-style-type: none"> <li>• impacts on wild Atlantic salmon of the transmission of Infectious Salmon Anaemia virus (ISAv) originating from Atlantic salmon farms in Atlantic Canada;</li> <li>• disease transfer potential between wild fish and salmon farms;</li> <li>• Piscine orthoreovirus (PRV) susceptibility of Atlantic salmon; and</li> <li>• virulence of <i>Renibacterium salmoninarum</i> in New Brunswick.</li> </ul> <p>Additionally, a federal Emerging Disease Evaluation Committee was established by the Canada Food Inspection Agency – the lead federal regulatory authority for aquatic animal health – and DFO to identify, evaluate, report, and recommend potential management actions of emerging infectious disease of wild and cultured aquatic animals.</p>
	<p>Expected outcome (as submitted in the IP):</p>	<p>Efforts related to fish health are expected to provide improved scientific advice for the management of risks related to disease associated with wild-farmed salmon interactions in Atlantic Canada, and may inform, as appropriate, any potential new legislative or regulatory approaches to mitigate disease impacts on wild fish.</p> <p>The joint CFIA-DFO Committee is expected to improve the process of understanding and evaluating potential emerging diseases of wild and cultured aquatic animals. The committee will improve interdepartmental communication and enable a coordinated federal response.</p>
	<p>Progress on action to date (Provide a brief overview with a quantitative measure, or other justified evaluation, of progress. Other material (e.g. website links) will not be evaluated):</p>	<p>Federally-funded research with respect to wild and farmed fish health and emerging diseases is ongoing.</p> <p>This includes funding for several ongoing multi-year research projects, including several collaborative research projects with industry. New multi-year research projects were also funded in 2021, one of which is a collaborative research project with industry.</p>

		<p>Example of ongoing research include:</p> <ol style="list-style-type: none"> <li>1. Modelling of the dispersal of ISAV in the marine environment by combining a hydrodynamic model with an epidemiological model to assess the risk posed by ISAV outbreaks to wild migrating Atlantic salmon post-smolts.</li> <li>2. A manuscript detailing the dispersal of ISAV from Atlantic salmon farms in Passamaquoddy Bay, New Brunswick is currently being prepared. This will help inform future risk assessment work including understanding exposure by overlaying the migration routes of Atlantic salmon post-smolts and their residence time in relation to infective plumes of ISAV.</li> </ol> <p>The federal Emerging Disease Evaluation Committee has been meeting regularly. Activities for the first year have been focused on developing the methodology to identify and evaluate aquatic emerging diseases.</p> <p>Other ongoing research projects related to wild and farmed fish health are as follows (including web links to project descriptions):</p> <ol style="list-style-type: none"> <li>1. <a href="#">Improvement of methods to detect pathogens in water samples, infectious salmon anaemia virus (ISAV) as a model</a></li> <li>2. <a href="#">PRV susceptibility of Atlantic salmon at different life stages and Eastern Canadian vs European farmed salmon comparative study</a></li> <li>3. <a href="#">Salmon gill poxvirus (SGPV) characterisation in farmed and wild salmon- phase II</a></li> </ol> <p>New projects are also under consideration for future funding and will be reported on in future APRs as appropriate.</p>
	<p>Current status of action:</p> <p>If 'Completed', has the action achieved its objective?</p>	<p>Ongoing</p>

<p><b>4: Additional information required under the Convention</b></p>
<p>4.1 Details of any laws, regulations and programmes that have been adopted or repealed since the last notification.</p>
<p>As part of its commitment under Canada's Species at Risk Act, in 2021 Canada published its Report on the progress of recovery strategy implementation for the period 2010-2015.</p>

<p>In April 2021, Nova Scotia released their Containment Management Framework to supplement the containment management section of an aquaculture licence holder’s Farm Management Plan (FMP). The Framework outlines the infrastructure and procedures needed for containment management; reporting procedures for suspected or confirmed breaches of containment; and the marking specifics used to effectively identify the ownership of any farmed salmon detected outside of a fish farm enclosure.</p> <p>In 2021, the Province of Newfoundland and Labrador update <i>The Code of Containment for the Culture of Salmonids in Newfoundland and Labrador</i> to expand on the requirements for net storage, net testing reporting and auditing. The updates include new requirements on net test timing and the storage of nets in a biosecure manner. The 2021 Code also requires all new salmon net pen operations to demonstrate marine site cage system components and installations meet ISO or certified third-party engineering standards. Written documentation is required from the manufacturer outlining construction materials, strength of the system, and information regarding the environment in which the system has been successfully deployed. By 2024, all marine sites will be required to meet this standard. These additional updates will help further mitigate the possibility of breaches of containment in Newfoundland and Labrador.</p>
<p>4.2 Details of any new commitments concerning the adoption or maintenance in force for specified periods of time of conservation, restoration, and other management measures.</p>
<p>Through 2021, the Province of New Brunswick developed a Finfish Aquaculture Growth Strategy, which encompasses themes that support NASCO commitments and will be implemented in 2022. For example, this Strategy will include support for land-based aquaculture, in particular land-based “post-smolt” facilities, which will help mitigate potential farmed and wild fish interactions. Another theme of the Strategy will help to further enhance fish health management, which will include support for research and tools to reduce sea lice loads in farmed fish.</p> <p>DFO requested advice through the Canadian Science Advisory Secretariat for the development of a risk assessment framework to inform decisions on stocking of wild Atlantic salmon. Advice is anticipated during 2022 and will support the development of a stocking policy.</p>
<p>4.3 Details of any new actions to prohibit fishing for salmon beyond 12 nautical miles.</p>
<p>None.</p>
<p>4.4 Details of any new actions to invite the attention of States not party to the Convention to matters relating to the activities of its vessels which could adversely affect salmon stocks subject to the Convention.</p>
<p>Canada continued to engage with France about the status of their plans to limit the total catch per recreational license in Saint Pierre and Miquelon (SPM), and encouraged France to accede to the NASCO Convention. This was done as part of the annual meeting of the North American Commission, as well as in separate bilateral discussions in March 2021.</p>
<p>4.5 Details of any actions taken to implement regulatory measures under Article 13 of the Convention including imposition of adequate penalties for violations.</p>
<p>Not applicable to Canada.</p>
<p><b>North American Commission Members only:</b></p>

4.6	Details of any new measures to minimise bycatches of salmon originating in the rivers of the other member.
	None, other than those noted in other responses.
4.7	Details of any alteration to fishing patterns that result in the initiation of fishing or increase in catches of salmon originating in the rivers of another Party except with the consent of the latter.
	None.