



IP(19)07rev2

NASCO Implementation Plan for the period 2019-2024

***EU – Sweden
(Revised October 2021)***

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The main purpose of this Implementation Plan is to demonstrate what actions are being taken by the Parties / jurisdictions to implement NASCO's Resolutions, Agreements and Guidelines.

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

Questions in the Implementation Plan are drawn from the following documents:

- *NASCO Guidelines for Management of Salmon Fisheries, CNL(09)43 (referred to as the 'Fisheries Guidelines');*
- *Report of the Working Group on Stock Classification, CNL(16)11;*
- *Minimum Standard for Catch Statistics, CNL(93)51 (referred to as the 'Minimum Standard');*
- *Revised matrix for the application of the six tenets for effective management of an Atlantic salmon fishery, WGCST(16)16¹;*
- *NASCO Plan of Action for the Application of the Precautionary Approach to the Protection and Restoration of Atlantic Salmon Habitat, CNL(01)51;*
- *NASCO Guidelines for Protection, Restoration and Enhancement of Atlantic Salmon Habitat, CNL(10)51 (referred to as the 'Habitat Guidelines');*
- *Williamsburg Resolution, CNL(06)48;*
- *Guidance on Best Management Practices to address impacts of sea lice and escaped farmed salmon on wild salmon stocks (SLG(09)5) (referred to as the 'BMP Guidance');*
- *Guidelines for Incorporating Social and Economic Factors in Decisions under the Precautionary Approach (CNL(04)57); and*
- *Road Map' to enhance information exchange and co-operation on monitoring, research and measures to prevent the spread of G. salaris and eradicate it if introduced', NEA(18)08.*

Party:	European Union
Jurisdiction / Region:	Sweden

¹ This document can be obtained from the NASCO Secretariat; email hq@nasco.int

1. Introduction		
1.1 What are the objectives for the management of wild salmon? (Max 200 words)		
<p>The long-term objective is to keep the national stock complex above 75% of maximum production.</p> <p>For individual stocks in rivers, no stock should have reduced reproductive capacity according to the national evaluation model.</p> <p>The natural genetic variation within and genetic differences between stocks should be maintained, or restored if so required.</p> <p>No net loss of accessible habitat area or habitat quality shall occur.</p> <p>Salmon management should take into account the biodiversity of rivers and the coastal ecosystem.</p>		
1.2 What reference points (e.g. conservation limits, management targets or other measures of abundance) are used to assess the status of stocks? (Max 200 words) <i>(Reference: Sections 2.4 and 2.5 of the Fisheries Guidelines)</i>		
<p>The reference point for the Swedish stock complex is set according to WGNAS as the conservation limit (S_{lim}). This value is also used as the reference value in reporting according to article 17 in the EU Habitat directive.</p> <p>The reference point for individual stocks are set from the number of deposited eggs (4.5 per m² of salmon habitat), or if such data are lacking, from electrofishing data with a lower limit of 10 parr (>0+) per 100 m² (Tamario & Degerman 2017).</p>		
1.3 What is the current status of stocks under the new classification system outlined in CNL(16)11?		
Stock Classification Score	Salmon Classification Category	No. rivers
0	Not at Risk	6
1	Low Risk	8
2	Moderate Risk	4
3	High Risk	4
N/A	Artificially Sustained	1
N/A	Lost	
N/A	Unknown	
Additional comments: New classification performed December 5 th 2018 by Swedish Univ. of Agricultural Sciences. River Lagan is artificially sustained, but wild salmon exist in the tributary Smedjeån.		
1.4 How is stock diversity (e.g. genetics, age composition, run-timing, etc.) taken into account in the management of salmon stocks? (Max 200 words)		
<p>A genetic screening of all stocks (baseline) was run 2015-2017 to establish a genetic baseline. Additional sampling of genetics will be performed annually to secure that goals of genetic diversity are met. We have identified three tributaries with lower than expected allelic richness. Actions needed are under discussion.</p> <p>Age and size composition of stocks are monitored through catch statistics from rivers (length, weight, sex). Additional sampling for age determination is carried out annually in two rivers. Based on these data recommendations have been published on voluntary maximum lengths for landing fish in individual rivers. This is also incorporated in the national legislation in rivers with weak stocks.</p>		

<p>Run-timing was initially monitored through catch statistics, from which the open season was originally set at the national level. In some rivers with weak stocks the fishing season has been further shortened after discussions with the local fishing associations. Increased open season (March) was tested in one river (R. Suseån), but resulted in high by-catches of trout kelt and was abandoned.</p> <p>At present run-timing data cannot be monitored solely by catch statistics due to the shortened fishing season. Instead we rely on data from two sites, one in the designated river (R. Högvadsån) where a traditional salmon trap is run, and one in the main river downstream (R. Ätran) where ascending spawners are monitored using an automatic camera equipped fish counter (Vaki-system).</p>	
<p>1.5 To provide a baseline for future comparison, what is the current and potential quantity of salmon habitat? (Max 200 words) <i>(Reference: Section 3.1 of the Habitat Guidelines)</i></p>	
<p>It is estimated that 237 ha salmon habitat was available in 1999. A recent compilation (2015) found an increased area to 253 ha. This is mainly due to increased connectivity in the form of fishways. Large inaccessible areas are still situated upstream hydropower dams. The extent of the former distribution range of salmon and its former habitat prevalence will be compiled</p>	
<p>1.6 What is the current extent of freshwater and marine salmonid aquaculture?</p>	
Number of marine farms	0
Marine production (tonnes)	0
Number of freshwater facilities	1 only smolt production (River Lagan)
Freshwater production (tonnes)	0
<p>Append one or more maps showing the location of aquaculture facilities and aquaculture free zones in rivers and the sea.</p>	
<p>Within the habitat of Atlantic salmon there is today only one aquaculture facility with salmonid fish. This is the hatchery and salmon rearing station at Laholm, River Lagan. The production of salmon is land-based in an indoor facility, and no fish is kept in cages in freshwater or the sea. No fish can escape from the facility.</p> <p>Only Atlantic salmon of the River Lagan strain is used as brood-stock (genetic screening). Circa 400 ascending adult salmon are stripped of eggs and milt annually. Annually, 100 000 one-year old smolt and 30 000 two-year old smolt are produced. These are stocked in Rivers Lagan and Nissan as compensation for hydropower development that has led to loss of rearing habitat upstream and deterioration of habitat quality downstream.</p> <p>The production of smolt for River Göta älv is conducted in an inland facility, in a river system draining to the Baltic sea. It is situated upstream of several migration obstacles, i.e. the risk of contamination wild Baltic salmon with alien genetic material is minimized.</p> <p>Otherwise no salmon or rainbow trout farms exist in coastal waters or in coastal rivers within the range of Atlantic salmon. However, rainbow trout is farmed at several places in watersheds emptying on the Swedish west coast. All these are in inland waters, well beyond the migration of Atlantic salmon.</p>	
<p>1.7 Please describe the process used to consult NGOs and other stakeholders and industries in the development of this Implementation Plan. (Max 200 words)</p>	
<p>A public conference was held in November 29th 2018. The present status, suggested improvement to national legislation and the new implementation plan were presented. The public could ask questions and raise new issues, both orally and in writing. At the meeting were representatives of several different NGOs, regional fishing officers, fishing right owners, the Sportfishing association of Sweden and the press. (At the meeting the Year of the salmon 2019 was also launched.)</p>	

<p>2. Management of Salmon Fisheries: <i>In this section please review the management approach to each of the fisheries in your jurisdiction (i.e. commercial, recreational and other fisheries) in line with the relevant NASCO Resolutions, Agreements and Guidelines. For Parties / jurisdictions that prosecute mixed-stock fisheries, there should at least one action related to their management.</i></p>
<p>2.1 What are the objectives for the management of the fisheries for wild salmon? <i>(Max. 200 words)</i></p> <p>Management should consider both production and conservation goals, with the latter being prioritized at the present stock situation, aiming at full reproductive capacity of individual river stocks with maintained or restored genetic diversity.</p> <p>Fishing must be adapted to each stock status and diversity, while maintaining a common framework as far as possible with respect to general rules and legislation.</p> <p>Increased local awareness and participation in salmon management and conservation is encouraged.</p>
<p>2.2 What is the decision-making process for the management of salmon fisheries, including predetermined decisions taken under different stock conditions (e.g. the stock levels at which regulations are triggered)? <i>(Max. 200 words)</i> <i>(This can be answered by providing a flow diagram if this is available.)</i> <i>(Reference: Sections 2.1 and 2.7 of the Fisheries Guidelines)</i></p> <p>The Swedish Agency for Marine and Water Management monitors the fisheries and evaluates the status of the stocks and the fishing annually, with the assistance of the County Administrative Boards and the Swedish University of Agricultural Sciences. Suggestions of altered management are first discussed in this group (National fish management group) before suggestions are made to stakeholders and NGO's.</p> <p>Fishing rights owners, NGO's or the public can also continuously suggest actions for conservation and rebuilding of stocks.</p> <p>Evaluation of the status of each stock and the stock-complex as a whole is carried out annually. Altered legislation is normally applied before the start of the next fishing season. If there is need for urgent regulation of fishing rules the Swedish Agency for Marine and Water Management can take appropriate measures to regulate or even stop salmon fisheries both on the coast and in specific rivers. So far this has not been necessary as voluntary actions are undertaken if needed, e.g. closed river fishing during the warm summer of 2018.</p>
<p>2.3 (a) Are any fisheries permitted to operate on salmon stocks that are below their reference point (e.g. Conservation Limits)? If so, (b) how many such fisheries are there and (c) what approach is taken to managing them that still promotes stock rebuilding? <i>(Max 200 words)</i> <i>(Reference: Section 2.7 of the Fisheries Guidelines)</i></p>
<p>a) Yes, but with caution.</p>
<p>b) 10 individual rivers (46% of rivers monitored) are below references values, but fishing does not occur in 3 of these rivers.</p>
<p>c) Proposal for a new national legislation that all large (MSW) salmon caught will have to be released in river fisheries. The size of salmon that needs to be released will be adapted to characteristics of the individual rivers. An increase in egg deposition of at least 25% is expected from this management action, according to an assessment made.</p> <p>Catch and release are practiced in an increasing amount in rivers, today ca 30% of the catch is released back alive. This is not required by the national legislation, but is voluntary. With dwindling stocks these voluntary restrictions have increased due to information exchange with responsible authorities.</p>

2.4	<p>(a) Are there any mixed-stock salmon fisheries? If so (b) how are these defined, (c) what was the mean catch in these fisheries in the last five years and (d) how are they managed to ensure that all the contributing stocks are meeting their conservation objectives? (Max. 300 words in total) <i>(Reference: Section 2.8 of the Fisheries Guidelines)</i></p>
	<p>(a) Yes, in three rivers (see b). The coastal fishery was formerly a mixed-stock fishing, but catches of salmon is now negligible (no salmon traps, no commercial fishing, restrictive regulation of gill nets fishing with a ban on fishing at depth of 3 m or more, number of nets limited and set time and mesh size is regulated). Reported catches in the coastal fishery are below 50 kg (often by-catch of salmon in trawling) in 2016-2018.</p>
	<p>(b) There are mixed-stock fisheries in three rivers because of stocking of reared salmon smolt (fin-clipped), a compensation for lost habitat upstream and poorer habitat downstream (e.g. hydropowering) due to hydropower production. Wild salmon from tributaries are caught in rod-and-line fishing along with stocked salmon.</p>
	<p>(c) The exact amount of wild salmon caught in these rivers has not been possible to monitor fully due to lack of detailed catch statistics (inadequate reporting of fin-clipped salmon). A study performed in River Göta älv in 2018 (when also the reporting of fin-clipping was satisfactory) revealed that 30 – 40 % (500 salmon) of the total catch was wild salmon and the other part result of compensatory releases of farmed and fin clipped smolts. The amount in the other two rivers is estimated to be much less, around 50 salmon. This would amount to 10% of the total annual nominal catch of wild salmon in river Lagan and Nissan, and less than 5% of the total nominal catch (reared and wild).</p>
	<p>(d) The Swedish Agency for Marine and Water management will propose to change the national legislation prohibiting landing of wild salmon (with adipose fin) in these rivers starting in 2019. As for the wild stocks they are managed and monitored as all other stocks.</p>
2.5	<p>How are socio-economic factors taken into account in making decisions on management of salmon fisheries? (Max. 200 words) <i>(Reference: Section 2.9 of the Fisheries Guidelines)</i></p>
	<p>The fishing right is privately owned and often managed in the form of “fishing management units” (FMU; “Fiskevårdsområden” in Swedish). These are often organized within “The Swedish Federation of Fishing Rights Owners”.</p> <p>The decision-making process includes these and other stakeholders, e.g. the national sport fishing association, nature conservancy groups, coastal household fishing associations etc., in the form of a written remittance of suggested fisheries management. This procedure gives a transparent process and is common in Sweden. Biannually or annually a conference, where all stakeholders are invited, is held presenting stock status, suggestions on future fishery management and where the advice of ICES and NASCO is presented.</p>
2.6	<p>What is the current level of unreported catch and what measures are being taken to reduce this? (Max. 200 words) <i>(Reference: Section 2.2 of the Fisheries Guidelines and the Minimum Standard)</i></p>
	<p>As a precautionary approach it has nationally been decided to estimate the unreported catch to 10% of the reported catch (both reared and wild salmon). The correct figure is definitively lower, but not quantified as data from sport fishing and household fishing on the coast is not available. However, a survey undertaken in 2000 showed small numbers of salmon caught in household fishing.</p> <p>Catch statistics from the rivers regarding numbers and weight of salmon landed is good and reliable. The commercial salmon fishery on the coast is gone. But, as stated above, sport fishing and household fishing on the coast are not reporting. According to Swedish legislation, responsible authorities cannot force these fishermen to submit catch statistics. Sweden is planning a large survey of coastal fishing of salmon and brown trout, which will improve the estimate of unreported catches.</p>
2.7	<p>Has an assessment under the Six Tenets for Effective Management of an Atlantic Salmon Fishery been conducted? If so, (a) has the assessment been made available to the Secretariat and (b) what actions are planned to improve the monitoring</p>

<p>and control of the fishery? (c) If the six tenets have not been applied, what is the timescale for doing so? (Max. 200 words) <i>(Reference: Six Tenets for Effective Management of an Atlantic Salmon Fishery, WGCST(16)16)</i></p>		
a) No assessment carried out yet.		
d) Not applicable.		
e) No formal assessment according to the protocol has been performed. It is scheduled to be carried out in 2022.		
<p>2.8 Identify the threats to wild salmon and challenges for management associated with their exploitation in fisheries, including bycatch of salmon in fisheries targeting other species.</p>		
Threat / challenge F1	Decreased marine survival.	
Threat / challenge F2	Mixed-stock fisheries in three rivers (wild and reared salmon).	
Threat / challenge F3	Over-exploitation of large salmon in weak stocks.	
Threat / challenge F4	46% of river stocks are assessed having reduced reproductive capacity.	
Threat / challenge F4	Maintaining genetic diversity of stocks and biodiversity of salmon rivers.	
<p>2.9 What SMART actions are planned during the period covered by this Implementation Plan (2019 – 2024) to address each of the threats and challenges identified in section 2.8 to implement NASCO’s Resolutions, Agreements and Guidelines and demonstrate progress towards achievement of its goals and objectives for the management of salmon fisheries?</p>		
Action F1:	Description of action:	New fishing rules: Implementing fishing rules that decrease exploitation of weak stocks by introducing maximum length for landed fish (prohibiting catch of large salmon) or if needed more restrictive fishing rules.
	Planned timescale (include milestones where appropriate):	2021 – new legislation enforced. <u>Quantitative goal</u> -Decreased number of rivers with weak stocks (reduced reproductive capacity) from the present 10 rivers with weak stocks.
	Expected outcome:	Less stocks with reduced reproductive capacity and increased smolt production.
	Approach for monitoring effectiveness & enforcement:	Existing monitoring with fishery statistics (number of wild salmon landed), electrofishing data and migration data from fish counters.
	Funding secured for both action and monitoring programme?	Yes
Action F2:	Description of action:	Fin-clipping smolts: Continued fin-clipping (adipose fin) of <u>all</u> reared and stocked salmon and brown trout smolt.
	Planned timescale (include milestones where appropriate):	Ongoing since 2005. Will continue 2019-2024.
	Expected outcome:	Enabling anglers to distinguish between wild and reared salmon

		in field, which facilitates action F4.
	Approach for monitoring effectiveness & enforcement:	Catch statistics, where presence of adipose fin is registered. Also, the County Board's regionally responsible fisheries officer checks smolt quality and fin-clipping before release of reared smolt.
	Funding secured for both action and monitoring programme?	Yes
Action F3:	Description of action:	Coastal MSF: Avoiding mixed-stock fisheries on the coast.
	Planned timescale (include milestones where appropriate):	Ongoing – today no licenced trap net remain on the coast. <u>Quantitative goal</u> -No new mixed stock fisheries operating on the coast.
	Expected outcome:	Catches of salmon in coastal waters will stay negligible (compare with section 2.4 above).
	Approach for monitoring effectiveness & enforcement:	Information to people responsible for river fisheries of what is required for sufficient data catch statistics. Legal actions are not permitted according to Swedish fishery legislation, but if stock status/or the presence of mixed-stock fisheries cannot be assessed the river stock as a whole could be considered as of weak status. Field survey to quantify coastal fishery. Comparisons can be made with previous questionnaires by SCB (Statistics Sweden) and the former field survey in 2000 (Thörnqvist 2000).
	Funding secured for both action and monitoring programme?	Yes
Action F4:	Description of action:	Riverine MSF: Avoiding mixed-stock fisheries in rivers with stocking of reared salmon in the main river stem and production of wild salmon in tributaries.
	Planned timescale (include milestones where appropriate):	2021 – new legislation enforced. <u>Quantitative goal</u> - No landed wild salmon in rivers with mixed stocks of reared and wild salmon. - The reproductive capacity of tributary stocks improved in 2024.
	Expected outcome:	Recovery of wild salmon stocks in tributaries to the rivers Göta älv, Nissan and Lagan.
	Approach for monitoring effectiveness & enforcement:	Electrofishing. Catch statistics.
	Funding secured for both action and monitoring programme?	Yes

Action F5:	Description of action:	Genetic diversity: Successively, improve knowledge of genetic diversity and status of all stocks in the main rivers, and larger tributaries.
	Planned timescale (include milestones where appropriate):	Ongoing since 2015. Will continue 2019-2024.
	Expected outcome:	Improved genetic baseline and genetic diversity data will give a new tool for management, where genetic diversity can be included in management (see section 1.1).
	Approach for monitoring effectiveness & enforcement:	Genetic samples collected with electrofishing. Increased data (analysed individual) in baseline.
	Funding secured for both action and monitoring programme?	Expected
Action F6:	Description of action:	Designated (index) river:Continued monitoring in the designated (index) river.
	Planned timescale (include milestones where appropriate):	Ongoing since 1954.
	Expected outcome:	Quality assured monitoring of stock development. Also, the diversity of the whole fish fauna is monitored.
	Approach for monitoring effectiveness & enforcement:	Data collection by means of electrofishing, PIT-tags, fish counters, smolt & spawner traps combined with fishery statistics. The fish counter is situated at a hydropower plant. Environmental court will 2024 take decision on permit for the hydropower plant at that decision can affect the possibility for ongoing fish counting in the river.
	Funding secured for both action and monitoring programme?	Yes
Action F7:	Description of action:	Stock status: Annually assesses each river stock's reproductive capacity. Stocks with a salmon habitat less than 2 hectares will be assessed only if data (electrofishing, automatic fish counters) is available from other programmes (outside salmon monitoring).
	Planned timescale (include milestones where appropriate):	Ongoing, since 2017 using improved assessment model.
	Expected outcome:	Attainment of essential data for better local and national management.
	Approach for monitoring effectiveness & enforcement:	Salmon smolt traps, fish counters and electrofishing.
	Funding secured for both action and monitoring programme?	Yes

Action F8:	Description of action:	Exploitation in rivers: Monitor exploitation in two rivers.
	Planned timescale (include milestones where appropriate):	Ongoing since 2000.
	Expected outcome:	Attainment of data used for the ICES WGNAS salmon stock complex assessment.
	Approach for monitoring effectiveness & enforcement:	Data collection by means of PIT-tags, fish counters and salmon traps combined with fishery statistics (see also Action F9).
	Funding secured for both action and monitoring programme?	Yes
Action F9:	Description of action:	Improve catch statistics; -in rivers, with regard to catch and release and fin-clipping. -on the coast, through a survey estimate of salmon and brown trout catch in the recreational fishery.
	Planned timescale (include milestones where appropriate):	Have total reporting of C&R in river fishery in 2024. Have total reporting of presence/absence of adipose fin from fishing in all rivers in 2024 (one river remaining).
	Expected outcome:	Improved catch statistics and better knowledge of what today is reported as “unreported catches”. Resulting in better catch advice.
	Approach for monitoring effectiveness & enforcement:	Information to people responsible for river fisheries of what is required for sufficient data catch statistics. Legal actions are not permitted according to Swedish fishery legislation, but if stock status/or the presence of mixed-stock fisheries cannot be assessed the river stock as a whole could be considered as of weak status. Field survey to quantify coastal fishery. Comparisons can be made with previous questionnaires by SCB (Statistics Sweden) and the former field survey in 2000 (Thörnqvist 2000).
	Funding secured for both action and monitoring programme?	Expected
Action F10:	Description of action:	Initiate and support formation of fish management units (FMU) in salmon rivers.
	Planned timescale (include milestones where appropriate):	Ongoing. (The law on formation of FMU’s was established in 1982.)
	Expected outcome:	A special project aimed to facilitate the forming of new units and facilitating local management has been initiated in 2018 by the Swedish Federation of Fishing Rights Owners and funded by the Swedish Agency for Marine and Water Management. This will give basis for future actions.
	Approach for monitoring effectiveness & enforcement:	Project reporting in 2019.

Funding secured for both action and monitoring programme?	Yes
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3. Protection and Restoration of Salmon Habitat:
In this section please review the management approach to the protection and restoration of habitat in your jurisdiction in line with the relevant NASCO Resolutions, Agreements and Guidelines.

3.1 How are risks to productive capacity identified and options for restoring degraded or lost salmon habitat prioritised, taking into account the principle of ‘no net loss’ and the need for inventories to provide baseline data? (Max. 200 words)
(Reference: Section 3 of the Habitat Guidelines)

Productive capacity is assessed on a stock basis, river by river, according to the national model (see Section 1.1 and 1.2). Habitat area has been found to be linked with genetic diversity of salmon, and thereby with salmon population status. Further, salmon habitat is important for overall biodiversity and river health, as well as several ecosystem services. Conservation of the salmon habitat is also essential for red-listed species, e.g. sea lamprey, freshwater pearl mussel and the kingfisher. Salmon habitat conservation and restoration is thus an important societal task and prioritized in water management.

The habitat area is continuously monitored. Sweden has started to develop a standardized method for identifying salmon habitat and to assess the quality (in a scale from 0 to 8). The model will be further improved during the implementation period.

As evident from section 1.5 the total salmon habitat has increased 7% from 1999 to 2015. New and continued inventories and restoration measures are suggested below. Several of the actions suggested will increase available habitat and the quality of habitat. Net loss of available habitat or the habitat quality shall be avoided.

3.2 How are socio-economic factors taken into account in making decisions on salmon habitat management? (Max. 200 words)
(Reference: Section 3.9 of the Habitat Guidelines)

Fishing rights and waters are privately owned, but generally open to the public through fishing licenses. Socioeconomic factors are considered in the management. Relevant stakeholders are invited to be involved in the management process. Along with the Swedish Federation of Fishing Rights Owners and the Swedish Anglers association, also several municipalities participate in the work with salmon and healthy rivers. Through “Catchments Partnerships” (according to the Water framework directive; in Swedish Vattenråd) societal cooperation has also increased along river valleys.

As stated in section 2.1 public participation in management and conservation is encouraged through information and transparent decision making. To increase information transfer the Swedish Agency for Marine and Water Management is developing a public web-site focussing on salmon (Baltic, Atlantic and land-locked salmon of Lake Vänern).

3.3 What management measures are planned to protect wild Atlantic salmon and its habitats from (a) climate change and (b) invasive aquatic species? (Max. 200 words each)
(Reference: Section 3.2 of the Habitat Guidelines)

(a)
 -The most important issues are to implement better water regulation from hydropower production and to regulate water removal by agriculture and urban areas. In Sweden a national program to evaluate and mitigate the ecological effects of hydropower production begin in 2022. Through a process in the environmental courts during the period 2022-2042, all 2 100 Swedish hydropower

plants will, according to a new law, get court decisions on modern and more environmentally friendly operations. A part of these hydropower plants, less than 50, are located in Atlantic salmon rivers. This should improve flow regimes and migration routes for aquatic biota (incl. salmon) as well as open up previously (due to barriers) inaccessible spawning grounds. This will provide some of the best possible measures against the detrimental effects of climate change through greater resilience to environmental change.

- Further enhancement of salmon river habitats will continue, to increase the total area of accessible salmon habitat in 2019-2024 compared to 2015, for greater resilience to climate change. Best available methods to restore salmon habitat will be developed, including web-based guidelines on a planned “Restoration website”, by the Swedish Agency for Marine and Water Management.

(b)

- Systematically evaluate risk of introduction of alien species and measures to prevent introduction or dispersal of alien species. A risk classification on invasive species has been published 2018 by Swedish Species Information Centre at Swedish Agriculture University.

- Increasing numbers of pink salmon are observed in Swedish rivers. We will develop a good practice to mitigate negative ecological effects of pink salmon on the Swedish Atlantic salmon stocks.

3.4 Identify the main threats to wild salmon and challenges for management in relation to estuarine and freshwater habitat.

Threat / challenge H1	Acidification of rivers.
Threat / challenge H2	Knowledge gaps in how hydropower production and other exploitation of watercourses impact salmon migration and salmon habitat loss and measures on how to restore salmon migration routes and river habitats.
Threat/ Challenge H3	Enhancement of salmon habitats in rivers
Threat / challenge H4	Invasive alien species

3.5 What SMART actions are planned during the period covered by this Implementation Plan (2019 – 2024) to address each of the threats and challenges identified in section 3.4 to implement NASCO’s Resolutions, Agreements and Guidelines and demonstrate progress towards achievement of its goals and objectives for the Protection, Restoration and Enhancement of Atlantic Salmon Habitat?

Action H1:	Description of action:	Continued liming of acidified salmon rivers and tributaries
	Planned timescale (include milestones where appropriate):	Ongoing since 1976. <u>Quantitative goal</u> -Continued liming 2019-2024 of all rivers systems presently in the liming program.
	Expected outcome:	Keeping pH-levels above 6.0 and inorganic aluminium at non-toxic levels, thereby minimizing mortality of eggs and fry. General high biodiversity (especially invertebrates, amphibians and fish) in salmon rivers.
	Approach for monitoring effectiveness & enforcement:	Electrofishing & chemical monitoring carried out by the County Administrative Boards.
	Funding secured	Yes

	for both action and monitoring programme?	Funded within the Swedish liming programme.
Action H2:	Description of action:	<p>Measures to create better knowledge and understanding of the impact of hydropower production and other exploitation of watercourse, on salmon migration and loss of salmon habitat and develop methods to recreate salmon migration routes and restore habitats.</p> <ol style="list-style-type: none"> 1. Develop a plan for environmentally friendly hydropower production including salmon rivers. 2. Document the distribution of Atlantic salmon in Swedish rivers before hydropower exploitation (1880). 3. Compiling habitat surveys, adding quality assured and new data when required. 4. Development of best available methods to restore salmon habitat. 5. Publish national guidelines for best available technology (BAT) of fish passages. 6. Develop national guidelines for water regulation.
	Planned timescale (include milestones where appropriate):	<ol style="list-style-type: none"> 1. Plan for development of environmentally friendly hydropower plants published in 2021. 2. A map of the former salmon distribution published in 2019 (part of International Year of the Salmon 2019). Have a quantitative analysis of former (1880s) and present available habitat areas and salmon production finished in 2023. 3. A compilation of existing salmon habitats was carried out in 2015. An update published in 2020 and the quality of the salmon habitats quantified in 2024. 4. Development of methods to restore habitats is undertaken in cooperation with a Life-project. Results are planned to be presented in 2022 or 2023. 5. A guidelines on BAT for fish passages published in 2020. Compilation of existing knowledge, from international and national literature. 6. Handbook for guidelines of water regulation available 2022.
	Expected outcome:	<ol style="list-style-type: none"> 1. Several Atlantic salmon rivers negatively affected by hydropower production could have improved salmon stock status by applying environmental friendly hydropower production. Probably no significant effect on stocks during the IP period 2019-2024, but in the long run. 2. Attain a good basis for planning of restoration efforts, such as connectivity measures, and possibility for environmental consideration in competing river exploitation interests as for example court decision on modern environmentally friendly operational conditions for hydropower plants. 3. The data compilation will form the basis for further actions to improve quality and extent of salmon habitats. 4. Web-based guidelines on a planned “Restoration website” of the Swedish Agency for Marine and Water Management.

		<p>5. Handbook on BAT for fish passages electronically available. Will facilitate decision-making in planning new fish passages.</p> <p>6. Recommendations for water regulation successively implemented in water systems with hydropower production, and possibly also in water systems where other water withdrawal occurs.</p>
	Approach for monitoring effectiveness & enforcement:	The result of these measures will be monitored and evaluated as part of the national assessment of salmon production and status of salmon stocks.
	Funding secured for both action and monitoring programme?	Yes
		Choose an item.
		Choose an item.
Action H3:	Description of action:	Continued improvement of habitat in salmon rivers.
	Planned timescale (include milestones where appropriate):	<p>Ongoing since the late 1970s.</p> <p><u>Quantitative goal</u> -Increase the total area of accessible salmon habitat during 2019-2024 as compared to 2015.</p>
	Expected outcome:	Improved conditions facilitating increased smolt production, salmon genetic diversity and general aquatic and riparian biodiversity.
	Approach for monitoring effectiveness & enforcement:	Habitat surveys and electrofishing.
	Funding secured for both action and monitoring programme?	Yes
Action H4:	Description of action:	Systematically evaluate risk of introduction of alien species and measures to prevent introduction and dispersal of alien species.
	Planned timescale (include milestones where appropriate):	<p>Good ability for the public to identify and report alien species through a national website (published in 2019).</p> <p>Educate fishermen in recognizing invasive species and the importance of removing alien species such as pink salmon when fishing by publishing information on for example the Swedish sport fishing association's website, Swedish Agency of Marine and Water Management's website and social media. Ongoing 2019-2024</p>
	Expected outcome:	Improved ability to prevent introduction of alien species, detect and identify alien species and take measures against alien species. Such as <i>Oncorhynchus</i> species.

	Approach for monitoring effectiveness & enforcement:	Good detection ability and awareness of the risks of introduction of alien species. Monitoring as well as prevention measures for dispersal of invasive species or if possible their removal. Good detection ability and awareness for the monitoring of <i>Oncorhynchus</i> species.
	Funding secured for both action and monitoring programme?	Yes
<p>4. Management of Aquaculture, Introductions and Transfers, and Transgenics:</p> <p><i>Council has requested that for Parties / jurisdictions with salmon farms, there should be a greater focus on actions to minimise impacts of salmon farming on wild salmonid stocks. Each Party / jurisdiction with salmon farming should therefore include at least one action relating to sea lice management and at least one action relating to containment, providing quantitative data in Annual Progress Reports to demonstrate progress towards the international goals agreed by NASCO and the International Salmon Farmers Association (ISFA):</i></p> <ul style="list-style-type: none"> • <i>100% of farms to have effective sea lice management such that there is no increase in sea lice loads or lice-induced mortality of wild salmonids attributable to the farms;</i> • <i>100% farmed fish to be retained in all production facilities.</i> <p><i>In this section please provide information on all types of aquaculture, introductions and transfers, and transgenics (including freshwater hatcheries, smolt-rearing etc.</i></p>		
<p>4.1 (a) Is the current policy concerning the protection of wild salmonids consistent with the international goals on sea lice and containment agreed by NASCO and ISFA? (b) If the current policy is not consistent with these international goals, when will current policy be adapted to ensure consistency with the international goals and what management measures are planned to ensure achievement of these goals and in what timescale? (Max. 200 words for each) <i>(Reference: BMP Guidance)</i></p>		
(a) Not applicable as Sweden has no rearing of salmon in net pens in the sea.		
(b) See above.		
<p>4.2 (a) What quantifiable progress can be demonstrated towards the achievement of the international goals for 100% of farms to have effective sea lice management such that there is no increase in sea lice loads, or lice-induced mortality of wild salmonids attributable to sea lice? (b) How is this progress monitored, including monitoring of wild fish? (c) If progress cannot be demonstrated, what additional measures are proposed and in what timescale? (Max. 200 words each) <i>(Reference: BMP Guidance)</i></p> <p><i>The measures by which these goals may be achieved, and against which the Review Group will be measuring the effectiveness of the Implementation Plan, are set out in the BMP Guidance SLG(09)5 (Best management practice; reporting and tracking; factors facilitating implementation) as agreed by NASCO and ISFA.</i></p>		
(a) Not applicable as Sweden has no rearing of salmon in net pens in the sea.		
(b) Not applicable as Sweden has no rearing of salmon in net pens in the sea.		
(c) Not applicable as Sweden has no rearing of salmon in nets pen in the sea.		
<p>4.3 (a) What quantifiable progress can be demonstrated towards the achievement of the international goals for achieving 100% containment in all (i) freshwater and (ii) marine aquaculture production facilities? (b) How is this progress monitored,</p>		

<p>including monitoring of wild fish (genetic introgression) and proportion of escaped farmed salmon in the spawning populations? (c) If progress cannot be demonstrated, what additional measures (e.g. use of sterile salmon in fish farming) are proposed and in what timescale? (Max. 200 words each) <i>(Reference: BMP Guidance)</i> <i>The measures by which these goals may be achieved, and against which the Review Group will be measuring the effectiveness of the Implementation Plan, are set out in the BMP Guidance SLG(09)5 (Best management practice; reporting and tracking; factors facilitating implementation) as agreed by NASCO and ISFA.</i></p>	
(a)(i)	Not applicable.
(a)(ii)	Not applicable.
b)	Not applicable.
c)	Not applicable.
<p>4.4 What adaptive management and / or scientific research is underway that could facilitate better achievement of NASCO’s international goals for sea lice and containment such that the environmental impact on wild salmonids can be minimised? (Max 200 words) <i>(Reference: BMP Guidance and Article 11 of the Williamsburg Resolution)</i></p>	
Not applicable.	
<p>4.5 What is the approach for determining the location of aquaculture facilities in (a) freshwater and (b) marine environments to minimise the risks to wild salmonid stocks? (Max. 200 words for each)</p>	
(a)	Farming of rainbow trout is not allowed within the distribution range of Atlantic salmon in rivers. In rivers without <i>Gyrodactylus salaris</i> salmonids are not allowed to be stocked, due to the risk of spreading the parasite.
(b)	Not applicable.
<p>4.6 What progress has been made to implement NASCO’s guidance on introductions, transfers and stocking? (Max. 200 words) <i>(Reference: Articles 5 and 6 and Annex 4 of the Williamsburg Resolution)</i></p>	
<p>Open rivers and streams by removing barriers and create conditions required for fish migration, including habitat restoration of spawning and nursery areas. For example in river Ätran, upstream migration of the Atlantic salmon increased with 47% during the first year.</p> <p>Publication in 2018 of a national Alien Species List, with ecological impact assessments (including indigenous species) of more than a thousand of alien species. About forty fish species, including “door-knockers” (species potentially introduced in near future) are systematically evaluated by using a method developed by Norwegian Biodiversity Information Centre.</p> <p>River classification - complementing and updating the list of “national valuable lakes and streams”, taking into account environmental, cultural and/or fish/fishery perspectives.</p> <p>Special efforts are made to increase knowledge and awareness on risks of illegal introductions and transfers of fish, including non-indigenous populations/species, diseases and parasites. For example by web-information, web-application developed for facilitating citizen participation in reporting and campaigns.</p>	
<p>4.7 Is there (a) a requirement to evaluate thoroughly risks and benefits before undertaking any stocking programme and (b) a presumption against stocking for purely socio-political / economic reasons? (Max. 200 words each) <i>(Reference: Guidelines for incorporating social and economic factors in decisions under the</i></p>	

<i>Precautionary Approach and Annex 4 of the Williamsburg Resolution)</i>	
(a) Decisions on fish stocking are examined by the competent authorities, i.e. the regional county boards. The decisions are based on potential risk, as for example fish with infectious diseases or none-indigenous species, including populations. Decisions are taken with respect to, for example valuable populations and/or habitats.	
(b) No	
4.8 What is the policy / strategy on use of transgenic salmon? (Max. 200 words) (Reference: Article 7 and Annex 5 of the Williamsburg Resolution)	
Transgenic fish is due to national legislation only allowed to be kept in enclosed biosecurity laboratory facilities. The Swedish Agency for Marine and Water Management examine time-limited permits.	
4.9 For Members of the North-East Atlantic Commission only: What measures are in place, or are planned, to implement the eleven recommendations contained in the ‘Road Map’ to enhance information exchange and co-operation on monitoring, research and measures to prevent the spread of <i>Gyrodactylus salaris</i> and eradicate it if introduced, including the development and testing of contingency plans? (Max. 200 words) (Reference ‘Road Map’ to enhance information exchange and co-operation on monitoring, research and measures to prevent the spread of <i>G. salaris</i> and eradicate it if introduced, NEA(18)08)	
Sweden is participating in the NASCO <i>Gyrodactylus salaris</i> -group. Extended cooperation with Norway is ongoing, e.g. with regard to information on known populations of <i>Gyrodactylus</i> , risk analysis, determination of species and clads/haplotypes. As a part of this cooperation eDNA as a method to detect <i>Gyrodactylus</i> was successfully tested together with Norwegian colleagues in 2018.	
A contingency plan for <i>Gyrodactylus</i> is planned (see below).	
4.10 Identify the main threats to wild salmon and challenges for management in relation to aquaculture, introductions and transfers, and transgenics.	
Threat / Challenge A1	Impact of <i>Gyrodactylus salaris</i> on stocks.
Threat / challenge A2	Invasions of alien Atlantic salmon, often escapees from salmon farms in other countries.

4.11 What SMART actions are planned during the period covered by this Implementation Plan (2019 – 2024) to address each of the threats and challenges identified in section 4.10 to implement NASCO’s Resolutions, Agreements and Guidelines and demonstrate progress towards achievement of its goals and objectives for aquaculture, introductions and transfers, and transgenics?		
Action A1:	Description of action:	Continued monitoring of <i>Gyrodactylus salaris</i> , and develop a road map and contingency plan to prevent spread of <i>Gyrodactylus salaris</i> to not infected rivers.
	Planned timescale (include milestones where appropriate):	Monitoring ongoing since 2001 in its present form. First investigations 1989-1992. Roadmap report submitted to NASCO in 2021-2022. Contingency plan developed during 2021-2022.
	Expected outcome:	Quality assured data on presence and prevalence of the parasite. Decided actions to be undertaken if the parasite spreads to new water systems close to Norway or Finland. Relevant authorities and stakeholders identified. The parasite is considered endemic to the Baltic sea area.
	Approach for monitoring effectiveness & enforcement:	In the present program, salmon fry and parr are collected with electrofishing and then screened for <i>Gyrodactylus</i> . Cooperation with Norway to determine species and haplotype. eDNA may be introduced in the monitoring from 2020. Existing monitoring program (Action A1).
	Funding secured for both action and monitoring programme?	Yes
Choose an item.		
Action A2:	Description of action:	Develop the national ability to genetically identify alien Atlantic salmon (<i>Salmo salar</i>).
	Planned timescale (include milestones where appropriate):	Good ability to identify escaped reared Atlantic salmon during the IP period 2019-2024
	Expected outcome:	Ability to identify alien species and stocks. According to the impending new legislation only fin-clipped salmon can be landed in stocked salmon rivers. If escapees from salmon farms occur, they will have intact adipose fins (and cannot be harvested in the river fishery). It is important to rapidly be able to identify these fish genetically so that they may be removed when they pass fish ladders or are caught in brood stock fishery.
	Approach for monitoring effectiveness & enforcement:	Comparing genetic analyses with other countries will secure for good detection ability.
	Funding secured for both action and monitoring programme?	Yes
Choose an item.		