International Atlantic Salmon Research Board

SAG(18)03

Research Planning and Management for the

International Year of the Salmon

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1. At its Thirty-Third (2016) Annual Meeting, the Council of NASCO recognised that an International Year of the Salmon (IYS) could provide a very good opportunity to raise awareness of the factors driving salmon abundance, the environmental and anthropogenic challenges they face and the measures being taken to address these. An Outline Proposal for an IYS, entitled '*Salmon and People in a Changing World*', which included a proposed rationale, vision, themes and timings for the IYS, together with details of its scope, a governance model and initial budgetary considerations, was broadly accepted by the Council subject to some provisional points of clarification. The focal year of the IYS is 2019 with the intention that research will continue through to 2022.

2. The regional Steering Committees in the North Pacific (NPSC) and North Atlantic (NASC), reporting to the IYS Co-ordinating Committee (CC), were identified and agreed in the outline proposal for the IYS. The NASC and NPSC are expected to provide the fora for cooperation between the lead organizations and core partners, alongside coordinating activities being undertaken in their regions and sharing information with the overall IYS Coordinating Committee. The NASC's mandate is to coordinate the planning, implementation and administration of the IYS and review its progress in the North Atlantic Ocean. In the agreed terms of reference developed by the CC for the NASC (ICC(17)2) it states "through the International Atlantic Salmon Research Board, identify research priorities, review research proposals and coordinate any research programmes implemented" concerning activities relating to Atlantic salmon.

3. Whilst outreach is the agreed focus of the IYS in the North Atlantic it has also previously been agreed that there could be benefits from improved exchanges between scientists working around the salmosphere. Two Atlantic lead projects have already engaged with Pacific researchers and involved them in the Likely Suspects Framework workshop (November 2017) and in the ROAM project. More details regarding these exchanges are provided in Progress Reports on Planning for the International Year of the Salmon, CNL(18)15.

4. In the Pacific the focus for the IYS is on developing a programme of research and gaining funding to deliver it by 2022. The NPAFC IYS Secretariat has produced a draft research prospectus proposing various projects and activities against each of the IYS themes. In developing this document, the NPAFC IYS Secretariat reviewed the 2017 NASCO inventory of research and included projects of interest in the draft prospectus (Annex 1). Rory Saunders (Chair of the International Atlantic Salmon Research Board - the IASRB) and Niall Ó Maoiléidigh (Chair of the Scientific Advisory Group of the IASRB – the SAG) have corresponded with Mark Saunders (IYS Director for Pacific Region) in relation to the document.

5. The members of the SAG are asked to consider the NPAFC Draft IYS Theme Prospectus (Annex 1) and make recommendations to the IASRB on how NASCO should engage with the prospectus.

Chair of SAG and Secretariat
Edinburgh
6 June 2018

Annex 1

DRAFT IYS THEME PROSPECTUSES

PREAMBLE

The following is a draft of an internal North Pacific Anadromous Fish Commission (NPAFC) "living document" outlining a rationale, expected outcome, example impact measures, ideas for signature projects, status, priorities moving forward and funding opportunities for each theme of the IYS (status of salmon, salmon in a changing salmosphere, new frontiers, human dimension, and information systems, as well as outreach and communication). It is expected that the NPAFC IYS Secretariat will keep this document updated throughout the planning process for the IYS.

Discussions with the North Atlantic Salmon Conservation Organization (NASCO) are underway regarding the potential engagement of Atlantic researchers directly in research planning more broadly and contributing to this document. An exercise identifying the research projects on the NASCO International Atlantic Salmon Research Board (IASRB) inventory that fall within the themes of the IYS was completed by the NPAFC IYS Secretariat and a high degree of overlap in research priorities was confirmed. The IASRB and, therefore, its Inventory focuses on research into the causes of marine mortality of Atlantic salmon and the opportunities to counteract this mortality. NASCO Parties and jurisdictions undertake research in the freshwater environment at a jurisdiction level.

LIST OF ABBREVIATIONS

ADFG – Alaska Department of Fish and Game
AST – Atlantic Salmon Trust
CIMRS – Cooperative Institute for Marine Resource Studies
DFO – Fisheries and Oceans Canada
FIRA – Korea Fisheries Resources Agency
FNFC – First Nations Fisheries Council
FREA – Japan Fisheries Research and Education Agency
IASRB – International Atlantic Salmon Research Board
ICES – International Council for the Exploration of the Sea
INRA – French National Institute for Agricultural Research
IOF – Institute for oceans and Fisheries at the University of British Columbia
IOS – Institute of Ocean Sciences
IYS – International Year of the Salmon
LLTK – Long Live the Kings
NASCO – North Atlantic Salmon Conservation Organization
NCEAS – National Center for Ecological Analysis and Synthesis
NIFS – National Institute of Fisheries Science in Korea
NGO – Non-governmental organization
NOAA – National Oceanic and Atmospheric Administration
NPAFC – North Pacific Anadromous Fish Commission
NWFSC – Northwest Fisheries Science Center
OSU – Oregon State University
PBS – Pacific Biological Station
PICES – North Pacific Marine Science Organization
PSC – Pacific Salmon Council
PSF – Pacific Salmon Foundation
ROAM – RAFOS Ocean Acoustic Monitoring
RPI – Rensselaer Polytechnic Institute
SASAP – State of Alaska's Salmon and People
SFU – Simon Fraser University
TINRO – Pacific Scientific Research Fisheries Center in Russia
UAA – University of Alaska Anchorage
UAF – University of Alaska Fairbanks
UBC – University of British Columbia
UFFCA – Upper Fraser Fisheries Conservation Alliance
UINR – Unama'ki Institute of Natural Resources
UNB – University of New Brunswick
USGS – United States Geological Survey
UVic – University of Victoria
UW – University of Washington

STATUS OF SALMON

Theme/Outcome

Outcome: The present status of salmon and their environments is understood.

Theme From IYS Outline Proposal: To understand the present status of salmon and their environments (NPAFC/NASCO accepted).

Rationale:

Salmon are a keystone species and iconic indicators of ecological health. However, there is no centralized source of information on the status of salmon and their environment, or any consistent methodology for reporting and understanding these population and environmental variables. To effectively manage salmon, we must first be able to share the status of salmon and their environments in a consistent manner on an accessible platform. Then we can consider how this differs across watersheds, regions, countries, and the hemisphere, and we can begin to understand how to sustainably manage salmon at different scales and work towards the resiliency of both salmon and people.

Detailed Outcome:

The International Year of the Salmon (IYS) intends to bring together interested partners from across the salmosphere to create a platform for sharing data regarding the status of salmon and their environments that can be used to inform research, outreach, policy development, and management actions. This platform would be an open-access tool that utilizes different types of knowledge (local, scientific, traditional) to assess the overall status of salmon and their environments across the salmosphere. Furthermore, the IYS seeks to review approaches to assessing the status of salmon and their environments and promote a consistent methodology for measuring and reporting these variables. This would facilitate greater overall understanding of salmon and would allow the status of these species to be more easily tracked into the uncertain future.

Example Impact Measures Associated with Outcome:

- Percent of salmon populations whose status is reported using a consistent convention
- Percent of environmental and salmon data holdings available on an open common platform
- Percent of fisheries management plans informed by information on environmental variability
- Percent of data sets that use consistently collected and reported data on salmon status and environmental variables
- Number of annual reports on the status of salmon and their environments

Signature Projects:

1. Status of Salmon Information System – Standardization, collation, and visualization of salmon abundance, distribution, and productivity data in a thoughtfully-designed framework and interactive toolset. This will allow data exploration to generate and critically examine hypotheses about salmon population trends and features. Comparative studies across species, populations, life history types and stages will be the engine that drives deep understanding of linkages to climate and salmon productivity. **Hemisphere:** There is power in the common presentation of status across the hemisphere as a communication tool and scientific value in comparative data sets to increase the capacity to understand factors behind change. ICES has indicated that it may be willing to convene a workshop to facilitate improved exchange of information among salmon scientists working in different parts of the salmosphere.

STATUS: Requires project team to convene and scope project. Sue Grant with DFO is working to develop a prototype for a package of analytical tools to answer a variety of questions in science and management related to Pacific salmon. This tool will filter information from noisy data and will contain different clustering tools to find meaningful relationships, beginning with Fraser River data. Another group needs to work on the larger data piece and additional funding is required. NCEAS is leading a collaboration of researchers, cultural leaders, and others working to bring together integrated, accurate, and up-to-date information that will help to support better salmon decision-making in Alaska called the State of Alaska's Salmon and People (SASAP) project. SASAP has an emphasis on data synthesis (with data from ADF&G). Working to connect DFO/NCEAS/SASAP. The Pacific Salmon Foundation and DFO are collaborating on Salmon Explorer tool, which is a tool designed for the general public.

Interest from First Nations. Waiting on process to engage ICES and the International Atlantic Salmon Research Board.

2. Salmon Atlas – A new version of the Atlas of Pacific Salmon originally produced by the Wild Salmon Center has been proposed. This would be an expanded, web-based, and interactive version similar to the Salmon Explorer web tool, developed by the Pacific Salmon Foundation that allows you to look at maps and graphs depicting salmon and habitat statuses in British Columbia. **Hemisphere:** There is a consensus for the need for this project in the Pacific. In the North Atlantic there is the NASCO Rivers Database (http://www.nasco.int/rivers_cm.html) which will be used by NASCO to produce a State of (North Atlantic) Salmon report in 2019, to coincide with IYS. The new Atlas of Pacific Salmon could be expanded to cover the entire salmosphere.

STATUS: General interest from the North Pacific Steering Committee (NPSC). Requires a project team to scope and look for funding. Could be visualization tool linked to Status of Salmon Information System.

3. Riverscape – A collective review of approaches to assessing the status of river basins and watersheds. There are a wide variety of approaches to assessing the status of watersheds across the salmosphere. New and emerging ideas utilize technology and engage Indigenous Peoples and citizen science. **Hemisphere:** Sharing and documenting best practices can better inform scientists and regulators.

STATUS: Project scoping meeting required to bring together DFO-Luedke/Hyatt, West Coast Aquatic- Tawney Lim, Pacific Salmon Foundation, NCEAS-State of Alaska Salmon and People (SASAP), US and Canadian Ocean Observing System organizations, ONC (interest in data systems to engage citizen science/stream keepers), USGS (Christian Torgersen – has EU contacts), NMFS (Rich Zabel) and potentially NASCO scientists.

Previous and Future Events:

Event	Date	Location	Notes
Workshop on Standardizing Methods for Assessing Salmon and Environmental Data	TBD	TBD	
Initial Meeting of Working Group for the Pacific Salmon Atlas	TBD	TBD	

Priorities Moving Forward:

1) DFO has indicated a willingness to lead this initiative and ICES has indicated a willingness to assist in the development of a Status of Salmon workshop. There is the potential for a Status of the Salmon component of the IYS opening events.

Funding Opportunities:

- Nippon Foundation: Status of Salmon Information System, Salmon Atlas
- Wall Foundation: Scoping Workshop for Standardizing Methods for Assessing Salmon and Environmental Data

SALMON IN A CHANGING SALMOSPHERE

Theme/Outcome:

Outcome: The effects of natural environmental variability and human factors affecting salmon distribution and abundance are understood and quantified.

Theme From IYS Outline Proposal: To understand and quantify the effects of natural environmental variability and anthropogenic factors affecting salmon distribution and abundance and to make projections of their future changes (NPAFC/NASCO accepted).

Rationale:

As natural environmental variability, climate change and human actions continue to alter ecosystems, salmon face an uncertain future. In this time of rapid change, new insights are needed on how these changes will affect salmon to effectively manage what can be controlled and mitigate what cannot. Developing this understanding will be strengthened by communication and collaboration at a salmosphere level, because while some effects may be localized, very likely there are similar processes occurring across the salmosphere. If we can learn how the salmosphere is evolving to better predict changes, we can be adaptive and effective in managing these challenges to improve the resiliency of salmon and the people that depend on them.

Detailed Outcome:

The IYS seeks to bring together researchers across the salmosphere to share findings regarding the effects of the changing environment on salmon, due to both natural variability and human impacts. Through a series of high impact projects, the IYS aims to better understand what challenges salmon will face in the future in order to prepare people, such as Indigenous Peoples, policymakers, and managers, to meet those challenges. Projects such as a series of high seas research cruises in the North Pacific, a framework for identifying bottlenecks across salmon life history stages, and an examination of climate change and future projections in relation to salmon, will allow all concerned stakeholders to be more prepared for the future. By bringing people across the northern hemisphere together to work on understanding the changing salmosphere, the IYS aims to build partnerships and collaborations that will strengthen our overall understanding and ability to manage salmon into the future.

Example Impact Measures Associated with Outcome:

- Percent of management plans informed by future climate change projections
- Number of publications that incorporate/quantify uncertainty
- Percent of stock assessments that include ecosystem level information

Signature Projects:

1. Likely Suspects Framework – An accounting approach to identify likely bottlenecks across life history stages of salmon. The Likely Suspects is a framework under development by the Atlantic Salmon Trust that places candidate mortality factors within an overall spatio/temporal framework of Atlantic salmon throughout the smolt migration phase, both freshwater and marine, with a view to quantifying the potential of each factor to influence survival. The principle objective is to quantify the number of salmon that are dying on their initial migration and at sea, in comparison to earlier periods of higher marine survival, and to allocate these "lost" fish to the various known or hypothesized sources of mortality. A workshop was conducted at the NASCO headquarters in Edinburgh, Scotland, in November 2017 to discuss further development and refinement of the Likely Suspects concept, taking account of previous and on-going related research in the North Atlantic. Five people from the Pacific Basin were invited to attend the workshop adding to the discussion and including highlighting relevant Pacific Basin projects.
Hemisphere: The joint scoping workshop enabled convergent ideas to be discussed and hemispheric level work to be agreed.

STATUS: Concluded scoping workshop in November 2017, final report with recommendations for next steps written. Significant benefits were realized from having joint Atlantic and Pacific representation at the workshop. Agreement was reached that specific follow up tasks would be developing a common language/currency, establishing an operating framework for working together (e.g. meetings/discussion forum), and sharing information to align approaches so that data are comparable. In terms of research activities:

1. One research proposal is to assess similarities and differences in marine survival/abundance trends across salmon species at hemispherical scale.
2. Similarly, a new research priority will be jointly investigating climate change drivers and impacts on salmon at hemispherical scale.

These research topics would help identify broader scale factors potentially contributing to changes in salmon productivity and are well aligned with International Year of the Salmon (IYS) priorities.

2. Winter and summer high seas expeditions in the Pacific basin – There is an opportunity to make significant progress in understanding the marine life history period of Pacific salmon through an intensive coordinated research program in the North Pacific. Large scale winter and summer expeditions utilizing up to five research vessels deployed simultaneously across the North Pacific Ocean has been proposed to NPAFC as an IYS Signature Project. Information, including biological materials for salmon stock identification, data for abundance estimates, and structure of nektonic communities will be collected through the trawl surveys and supplemented by oceanographic, hydrobiological, and trophological studies in the summer-autumn season as well as the wintering period. The objective of these expeditions is to provide estimates of salmon spawning stock recruitment for 3–4 age cohorts of chum and sockeye salmon. These data can then be utilized for fishery forecasting in subsequent years. High seas cruises also represent a tremendous opportunity for outreach (e.g. live streaming). **Hemisphere:** Potential to collaborate on methods related to study of salmon on the high seas including methods and collections.

STATUS: Planning of high seas cruise(s) was discussed at the February 5, 2018 IYS Working Group meeting. It was agreed that the NPAFC IYS-WG would focus on planning for a single cruise in 2019, to test the methodologies, and work towards a multi-vessel series of cruises for 2020 across the North Pacific. Ryan Flagg from Oceans Networks Canada attended and presented information on integrated data system and outreach.

3. Salmon in the Future: Coupling climate and salmon – A small scoping workshop will be convened in June 2018 to bring 15–20 climate and salmon experts together to review the current state of knowledge with respect to the changes in climate driving factors and the underlying mechanisms in the salmosphere and consider the coupling mechanism between these drivers and salmon survival. At this workshop, research topics/projects which would be most likely to make significant improvements in the understanding of climate/salmon interactions and their consequences for salmon management. **Hemisphere:** Salmon populations particularly in the southern regions of their range in the Atlantic and Pacific basins have undergone comparable declines in productivity since the mid-1990s. Collaborative examination of the climate drivers affecting salmon in the past and the future will benefit from joint efforts. ICES and PICES strategic initiative on understanding climate impacts on ecosystems can be a potential mechanism.

STATUS: The workshop will be held at the NCEAS office in Santa Barbara June 27-29, 2018.

4. Salmon in the Future: Other topics – A number of other topics are being explored by IYS partners in the North Pacific that could benefit from hemispheric collaboration, including: 1) the impact of rising sea levels on salmon in coastal and estuarine ecosystems (J. Moore – SFU and Daniel Schindler UW and others with Moore Foundation Funding) 2) the impact of glacier retreat on salmon (J. Moore – SFU and Daniel Schindler UW and others with Moore Foundation Funding), 3) the impact of changing estuarine habitats on salmon—has some interesting linkages to dramatic changes in migrating shorebirds (interest from Ornithological Congress in summer 2018 in convening a joint session) and 4) development of projections of salmon distribution and productivity—DFO Central and Arctic Scientist has been using Facebook to track movement of Atlantic Salmon into the Arctic (Karen Dunwall). NMFS surveying movement into the western Arctic (Ed Farley).

STATUS: Subject to be discussed at Santa Barbara workshop discussed in above in 3.

5. Aquaculture/wild interactions – Considerable research is being conducted in both the Atlantic (Licetrack ~ CAD$1M) and Pacific basins examining the interaction of wild and open-net pen raised salmon with respect to pathogen transfer and the effect of sea lice. **Hemisphere:** Collaboration on this research could expedite increased understanding and implementation of solutions.

STATUS: The research programs in the two basins need to be compared and joint work scoped.

Previous and Future Events:

Event	Date	Location	Notes
Likely Suspects Workshop	November 7-9, 2017	Edinburgh, Scotland	
NPAFC-IYS Workshop on Pacific Salmon Production in a Changing Climate	May 26-27, 2018	Khabarovsk, Russia	In conjunction with NPAFC Annual Meeting; Objectives are to: (1) improve knowledge of the distribution, growth and survival of Pacific salmon in the ocean (current status); (2) increase understanding of the causes of variations in Pacific salmon production (mechanisms); (3) anticipate future changes in the production of Pacific salmon and the marine ecosystems producing them (e.g. modelling); and (4) promote IYS activities
Salmon Futures/Climate Coupling Workshop	June 27-29, 2018	Santa Barbara	
Joint Salmon Ocean Ecology Meeting and NPAFC-IYS Workshop after 2019 NPAFC Annual Meeting	May 18-21, 2019 (subject to change)	Portland, Oregon	Suggestion to keep all topic sessions from 2018 but to emphasize 'status of salmon' and 'salmon in a changing salmosphere'

Priorities Moving Forward:

1) Detailed implementation of March 2019 cruise and securing research vessels from 5 NPAFC member countries for Pacific high seas cruises in 2020/2021

2) Detailed planning and convening Salmon in the Future Scoping Workshop.

3) Detailed strategic planning and convening joint SOEM/NPAFC-IYS Workshop in 2019

Funding Opportunities:

- Nippon Foundation: high seas research cruises
- Wall Foundation: Salmon in the Future Scoping Workshop
- PICES – may be willing to help fund joint SOME/NPAFC-IYS Workshop

NEW FRONTIERS

Theme/Outcome:

Outcome: New technologies and analytical methods are advanced and applied to salmon research. Research is carried out to fill gaps in poorly studied regions of the salmosphere.

Theme from IYS Outline Proposal: To develop new technologies and analytical methods to advance salmon science and to explore the uncharted regions of the salmosphere (NPAFC/NASCO accepted).

Rationale:

With so many recent advancements in technology and analytical methods, it is now possible to use these tools to make major advancements in understanding salmon and how the changing salmosphere is impacting them. From new telemetric methods of tracking salmon, to the use of environmental DNA, to isotope and otolith studies, there are groups of people across the salmosphere already doing this groundbreaking work. Their efforts can be linked and amplified through the IYS to more rapidly and efficiently realize their development and application to gaps in our understanding.

Detailed Outcome:

The IYS aims to further advances in new/emerging technologies and analytical methods that are immediately available to study salmon and understand their life history patterns and to better manage these species. The IYS seeks to facilitate collaboration between groups across the salmosphere who have similar research objectives and could benefit from developing and sharing new/emerging technology. These collaborations and advancements will enhance the ability, from a local to a salmosphere level, to effectively manage salmon for the resiliency of salmon and people into the future.

Example Impact Measures Associated with Outcome:

- Number of salmosphere-scale collaborative projects focusing on new/emerging technologies
- Number of collections of salmon scales and otoliths that are identified
- Percent of salmon researchers who understand and have access to otolith microchemistry laboratories
- Percent of salmon managers and researchers who understand the potential uses for genomics technologies to conduct genetic stock identification and have access to genomics tools and expertise to assess salmon condition

Signature Projects:

1. ROAM – ROAM is an example of a new telemetric tagging method to delineate migratory pathways of salmon at sea and explore causes of marine mortality. The concept is currently being explored by Atlantic researchers out of NOAA Fisheries, Woods Hole Oceanographic Institution, and the Atlantic Salmon Federation. Discussions are ongoing to determine the feasibility of implementing the method in the Pacific. **Hemisphere:** A small workshop will be hosted by Tim Sheehan (NMFS) in March of 2018 (Woods Hole, MA, U.S.A) to further explore this concept. He is interested in having several people from the Pacific attend to assist in developing the concept including its applicability to all salmon across the salmosphere.

STATUS: NPAFC hosted a webinar in the fall that was well attended by North Pacific researchers. There was a follow up meeting during January to consider questions about the feasibility of application from the north Pacific perspective and to ensure we have good attendance from the N. Pacific at the workshop. Report to be circulated.

2. Salmon Genome Map Applied –. We are all familiar with genetic stock ID tools that while available have been very expensive to apply. New microfluidic (tiny amounts of chemicals) high-throughput sequencers and robots allow us to cost-effectively determine stocks of origin in near-real time to inform research and new approaches to in-season management. Sequencing hatchery brood stock can effectively tag an entire release brood. eDNA has the potential to allow us to map the distribution and abundance of salmon from simple water samples collected in freshwater and marine environments. New chip technology can tell us what genes are turned on in fish to assess its physiological condition which will inform salmon management and forecasting. **Hemisphere:** Collaboration among government, academic, and private labs will expedite the development and application of these tools. There is potential for funding for hemispheric-scale research.

STATUS: Had initial discussions with Anita Mueller (Genome BC) and Nathan Taylor (DFO/PBS)—need to convene a small scoping workshop (ICES is holding a special session along a similar line that Nathan is participating in)

3. Advanced methods in telemetry. New tags and sensor arrays – In addition to the ROAM technology there are many possible modifications to existing telemetry arrays applied through SALSEA Track and other initiatives on both coasts such as the Ocean Tracking network. Could gliders and buoys be effectively fitted with sensors? East coast just had a regional telemetry workshop but we did not connect in time to get Pacific folks out to the meeting. **Hemisphere:** A coordinated hemispheric push could address current limitations.

STATUS: Discussions with IASRB/SAG and IYS Steering Committee to strike a telemetry group.

4. CSI Salmon - Retrospective analyses of scale and otolith collections – Studies could link oceanographic data to growth patterns in the North Pacific as well as determine the past distribution of salmon in coastal and high seas using isotope ratios determined using microchemistry. Bone microchemistry to differentiate between stocks, characterize movement, and determine natal origin can be performed on expeditions as well as with historic collections. **Hemisphere:** The laboratory and intellectual capacity required to conduct this work is not universally available. Collaboration among pockets of expertise to refine methods and apply it to collections from both basins is an expedient use of resources. The project could be framed as a "forensics" project to gain the attention of the public and decision-makers.

STATUS: Dion Oxman (ADFG) prepared to assist in convening a workshop prospectus. Evgeny Pakhomov (UBC) very active in the field and chief scientist for the expedition.

Previous and Future Events:

Event	Date	Location	Notes
ROAM Webinar- Pacific Region	October 3, 2017	Online	Video available from NPAFC Secretariat
ROAM Workshop	June 2018 (workshop in March delayed due to weather)	Woods Hole, USA	Interested in attendance from Pacific region

Priorities Moving Forward:

1) Follow-up meeting on ROAM with Pacific researchers.

Potential Funding:

- Nippon Foundation: ROAM, other telemetry methods, CSI salmon
- Wall Foundation: Scoping for the Salmon Genome Map

HUMAN DIMENSION

Theme/Outcome:

Outcome: Communities, Indigenous Peoples, youth, harvesters, scientists and resource managers across the Northern Hemisphere share knowledge and collaborate in the development of new tools and approaches to restoring, managing and sustaining salmon

Theme from IYS Outline Proposal: To improve the resilience of people and salmon through the connection and collaboration of salmon-dependent communities, Indigenous Peoples, youth, harvesters and resource managers across the salmosphere (NPAFC/NASCO accepted).

Rationale:

Since the wellbeing of salmon and people are inextricably linked, it is important that the IYS considers the human dimensions of our associations with salmon. Salmon are not only an important source of food to many people, they are also culturally significant and an important aspect of many coastal economies. As the global population and demand for salmon rises, while climate change alters ecosystems, there is increased uncertainty around the fate of salmon. Looking to the future, it will be imperative to create tools and frameworks for acting quickly and effectively to manage salmon on multiple levels, from local to hemispheric, so as to increase the resilience of both salmon and people.

Detailed Outcome:

The human dimension of the IYS seeks to involve all interested parties—researchers, managers, policymakers, Indigenous Peoples, harvesters, and the public—in collaborating to increase the resiliency of both salmon and people. The IYS strives to increase resiliency by developing innovative decision-making tools that incorporate multiple types of knowledge (scientific, local, traditional) and input from all stakeholders. Furthermore, by generating new and adaptive solutions to management, through strategies that incorporate multiple scales of governance and adaptive mechanisms that allow for fast action, the IYS seeks to leave a legacy of well-informed decision-makers that can effectively sustain, restore, and manage salmon. By facilitating conversations and collaboration across the salmosphere, people can work together to successfully manage salmon across all levels, from local to hemispheric.

Example Impact Measures Associated with Outcome:

- Percent of fisheries management plans informed by information on environmental variability
- Percent of fisheries management plans informed by roundtable discussions
- Percent of fisheries management plans that incorporate multiple types of knowledge

Signature Projects:

1. Deciding to Sustain Salmon (aka Watershed Governance) – The life history of salmon plays out across a spatial continuum of ecosystems from headwaters of river basins to the high seas. Their persistence demands that humans collectively manage the cumulative impacts of their interactions on salmon and their ecosystems along this same continuum. Collaborative processes to bring diverse interests together to plan activities in watersheds and coastal environments in a holistic manner are in place or being considered throughout the world. **Hemisphere:** There is an opportunity to compare processes throughout the hemisphere and draw attention to best practices. The European Union has a watershed governance pilot in four countries and we will be connecting with several pilot processes on Canada's west coast (i.e. West Coast Aquatic).

STATUS: Prospectus for a workshop has been developed. Mark engaging European Union and BC watershed governance processes.

2. Development of salmon fishery management systems for a changing world – Designing a modern salmon management system that draws on multiple types of knowledge (scientific, local, traditional) is prepared for high levels of uncertainty, and respects the needs and rights of Indigenous Peoples. Two symposia are already planned on managing salmon in a changing world, one for Atlantic salmon and a second for chum salmon in Japan.

Previous and Future Events:

Event	Date	Location	Notes
Sustainable Management of Chum in Changing Environments Symposium	March 26, 2018	Tokyo, Japan	Spring Annual Meeting of the Japanese Society of Fisheries Science; In order to endorse effective IYS projects, the present symposium will encourage to: (1) comprehend the vision of IYS program; (2) understand the present status of chum salmon populations and their habitats; (3) assess effects of environmental variability on chum salmon distribution and survival; (4) evaluate new research technologies to advance salmon science; and (5) identify future research topics associated with IYS for the forecast of chum salmon distribution and production, and their sustainable management.
Symposium on Managing the Atlantic salmon in a rapidly changing environment – management challenges and possible responses	June 2019	Norway	In conjunction with NASCO Annual Meeting; a two-day symposium to allow for identification of challenges specific to the North Atlantic salmon, to assist in clarifying the role NASCO can play in addressing them in the future and to provide a basis for a major outreach initiative to increase public and political awareness of these challenges
Strategies for Watershed Governance Workshop	TBD	TBD	

Priorities Moving Forward:

1) Scoping a workshop on strategies for watershed governance in 2018—including Nathan Young (UOttawa), FNFC, PSF—Brian Riddell, EU Water Initiative, POLIS—Oliver Brandes at UVic, and Tawney Lem.

2) Working with Nathan Young, FNFC, Yukon Panel, Jaime Snook (Goose Bay, Labrador), Gord Sterritt (PSC FN Caucus), Shelley Denny, and Carl McLean (NASCO Commissioner) to connect Indigenous groups in order to document the cultural importance of salmon across the salmosphere.

3) Scoping a strategy to define a modern management system—include Jennifer Nener (DFO) and First Nations connections identified in #2; Raoul and Urawa-san as conveners of management workshops.

Potential Funding:

- Wall Foundation: Scoping Workshop for Watershed Governance

INFORMATION SYSTEMS

Theme:

Outcome: Freely available information systems contain historic and current data about salmon and their environment

Theme: From IYS Outline Proposal: To develop an integrated archive of accessible electronic data collected during the IYS and tools to support future research (NPAFC/NASCO accepted).

Rationale:

Currently, there is little information sharing and collaboration at the salmosphere level, despite the fact that there are hundreds of people and groups with similar goals working to conserve salmon. Even on smaller scales, such as national and regional, there can be minimal communication among people working towards the same goal. This can be partially attributed to the lack of centralized information systems which make data on science and management accessible to not only scientists and managers, but also the interested public. These kinds of systems can support collaborative efforts on a hemispheric scale to address common issues and face current and future challenges.

Detailed Outcome:

The IYS seeks to create an open-access information system(s) that will house and mobilize historic, current, and future data on salmon research and management for the entire salmosphere. This system(s) will incorporate multiple types of knowledge (scientific, local, traditional) and will integrate the management side as well. It will facilitate collaboration and data sharing around the salmosphere to enhance our capacity to understand and effectively conserve salmon. This will be one of the most important legacies of the IYS and leverage the collective capacity of the salmosphere to build a resilient future for salmon and people.

Example Impact Measures Associated with Outcome:

- Percent of environmental and salmon data holdings available on open-access information system(s)
- Number of individuals/organizations contributing to the information system
- Number of publications using data that was downloaded from an open access platform
- Number of databases that have international standards applied

Signature Projects:

1. SalmosphereNet – Similar issues are faced by salmon across the salmosphere but there is minimal communication between Pacific and Atlantic researchers and managers. A project is currently underway by Fisheries and Oceans Canada to build an online network to connect people working on salmon-related issues across the country. DFO is also testing cloud-based software tools based on social media platforms that use artificial intelligence to link people, organizations and activities. Static networks tend to fail given the high investment in time and resources required with often limited utility for the user. **Hemisphere:** There is interest to expand this network to the salmosphere. It would facilitate rapid connection of researchers and managers with common interests.

   STATUS: DFO is continuing scoping this project and reported out at the North Pacific Steering Committee Meeting on February 7, 2018.

2. Salmon Project Inventory – NASCO and its International Atlantic Salmon Research Board (IASRB) maintain an inventory of marine salmon projects. **Hemisphere:** A hemispheric inventory of salmon research, management and outreach projects would assist to connect researchers and result in faster transfer of new technologies and methods. NPAFC has been in discussion with a US company based in Portland, Oregon (http://www.sitkatech.com/) that specializes in high level tracking of projects using cloud-based systems.

   STATUS: Need to have follow up conversation about how to move forward and who to consult.

Previous and Future Events:

Event	Date	Location	Notes

Priorities Moving Forward:

1) Convene scoping team for integrated information systems – Status of Salmon and the expedition(s) might be a good place to focus – Kate Moran, Evgeny Pahkamov, Sue Grant, Genome Canada rep, Hal Batchelder PICES

2) Develop a scoping team for SalmosphereNet—Scott Akenhead, Jim Irvine, Rory Saunders, Kate Moran

Potential Funding:

- Nippon Foundation: SalmosphereNet, Salmon Project Inventory
- Wall Foundation: Scoping for the Salmosphere Net or Salmon Project Inventory

OUTREACH AND COMMUNICATION

Theme/Outcome:

Outcome: People understand the value of healthy salmon populations and engage to ensure salmon and their varied habitats are conserved and restored against the backdrop of increasing environmental change.

Theme from IYS Outline Proposal: People understand the value of healthy salmon populations and engage to ensure salmon and their varied habitats are conserved and restored against the backdrop of increasing environmental change (NPAFC/NASCO accepted).

Rationale:

Salmon are very important ecologically, economically, and culturally, yet many people are unaware of the challenges they face and will continue to face into the future. An integral part of conserving salmon includes communicating the value of healthy salmon and healthy ecosystems to the wider public to motivate conservation and management efforts that will ensure the persistence of these keystone species far into the future. With a rapidly changing salmosphere and an uncertain future for these fish, the outreach and communications piece is vital to ensure that we are building resilient futures for salmon and people.

Detailed Outcome:

To disseminate important information on salmon and their environment, the IYS intends to facilitate an international outreach campaign regarding the status and future of salmon in a changing salmosphere. This outreach campaign will reach across the hemisphere to bring important information to not only scientists, policy-makers, managers, and harvesters, but also the public, regarding salmon and the challenges they face. This will be facilitated in multiple and innovative ways, such as through a website, social media, and videos/films, and will be facilitated in part by NGOs across the salmosphere committed to salmon conservation and sustainable management.

Example Impact Measures Associated with Outcome:

- Number of followers on social media sites: Facebook, Twitter, Instagram
- Number of visits to the IYS website
- Number of NGO partners involved in the outreach campaign
- Increase in citizen science involvement
- Number of media outlets reporting on salmon and their habitat
- Number of news stories about the IYS and IYS projects

Signature Projects:

1. Coordinated international awareness campaign to be considered by Pacific and Atlantic NGOs – NASCO NGOs are prepared to be engaged in the IYS outreach and have requested that they be consulted in advance. Long Live the Kings in Seattle, Washington, has volunteered to lead coordination between Pacific NGOs.

STATUS: To support NASCO Parties / jurisdictions and NGOs in delivering IYS outreach, a facilitated two-day workshop took place in March 2018, held in Edinburgh, UK. 32 people attended and invited speakers and communications professionals contributed their expertise including three people representing the Pacific. A report of the workshop has been produced and outreach guidelines are being developed to support the delivery of Outreach during 2019

2. Media Campaign – Multiple production companies have expressed interest in collaborating with the IYS to produce various salmon-related media projects. One interested collaborator is the production company behind UNINTERRUPTED (http://uninterrupted.ca/), a cinematic spectacle on Pacific salmon that was projected onto Vancouver's Cambie Bridge nightly throughout the 2017 summer, reaching a total of 30,000 people. Another example is the National Film Board of Canada, with whom there have been initial discussions regarding a short film to be distributed over social media. This short video is currently in the planning phase and will revolve around the "discovery" of salmon by local Vancouverites as they pass through an urban stream after a disappearance that

lasted for decades. **Hemisphere:** The production groups are interested in international scope projects. Uninterrupted producers have been approached by cities such as London, England that are interested in hosting the production in some form. The NFB of Canada is interested in features on salmon that go beyond Canada and are willing to work with us on projects that include the Atlantic. They also have international partners.

STATUS: Follow-up scoping meeting required—potentially the March 2018 workshop noted in 1 above.

3. Social Media Campaign – Facebook, Twitter, and Instagram pages will enable the IYS to spread outreach messages and information about the IYS to a wide audience, and specifically targets a younger generation, who are the future scientists, managers, policy-makers, and harvesters. This campaign will be facilitated through the NPAFC and NASCO Secretariats.

STATUS: IYS North Pacific Twitter and Facebook pages launched in March 2018.

Previous and Future Events:

Event	Date	Location	Notes
Website Launch	June 2018	Online	yearofthesalmon.org
NASCO IYS Outreach and Communications Workshop	March 27 & 28, 2018	Edinburgh, UK	Workshop report completed. The IYS Outreach Tools document is under development

Priorities Moving Forward:

1) Launch the IYS website and social media pages (Facebook, Twitter, Instagram) to initiate the first phase of the IYS outreach campaign strategy

2) Convene follow-up meeting with Bill Wareham from the David Suzuki Foundation

3) Work with Brian Riddell and Jacques White on convening a meeting of NGOs to consider Pacific Basin and hemispheric collaboration on an awareness campaign, including an opening event linked to fundraising.

Potential Funding: TBD.