

**Transcript of IYS talk given by Mark Saunders, Director, IYS Pacific Region at Washington State NPAFC advisors meeting held September 2, 2018 in Seattle WA.**

Good afternoon and thank you for the opportunity to speak to all of you about the International Year of the Salmon. I just want to begin with some context related to the scientist that Doug referred to, Dr. Dick Beamish. Quite a number of years ago Dr. Beamish, a senior researcher with Fisheries and Oceans Canada proposed to the North Pacific Anadromous Fish Commission (NPAFC) an International Year of the Salmon (IYS) as a means to seek support to initiate cruises into the high seas and subsequent modelling collaborations by scientists from around the Pacific Rim to address gaps in our understanding of what was driving salmon productivity, both good and bad, in the North Pacific. We have not conducted high seas research in a meaningful way in decades. Our knowledge of migratory pathways are still just based on highly stylized simple generalizations that don't allow us to tightly link stocks of salmon to the regions of the North Pacific where ecosystem attributes shape their growth and survival. We know that fish from the same stock return together and are similarly late/early or small/large suggesting that they are experiencing the same ecosystem effects. Other stocks may show the same or different trends in the same year. If we can get to sea with modern ships and tools such as genetic stock identification and the high level of capacity we have to understand oceanography, we can begin to develop the depth of understanding that we need to manage and support salmon in a highly uncertain environment.

It took us a couple of years to build on that idea. We held a number of workshops in Vancouver with people from around the Pacific Rim that gave us more detail and confidence that the potential for scientific gain was real and that there was a basis for partnership to find the resources to conduct the work. In addition to what Dick was suggesting it was clear there could be a broader collaboration around salmon. We looked at the International Polar Year (IYP) as a model. Every 25 years countries support an IPY to provide a burst in research related to the earth's polar regions to raise understanding and capacity to another level.

As we were building on this idea, we refined our vision to one of using the four-year period to develop the conditions necessary for the resilience of salmon and people. We realized that it was not possible to recover salmon in four years, but you can reasonably expect in that time frame to raise awareness, develop the institutional connections to be nimble and efficient, begin to conduct the science to fill gaps, and to develop tools decision-makers need to support the resilience of salmon.

I don't think there's any doubt right now about the rate at which the environment is changing. Surprises are now regular occurrences. Salmon are inherently resilient, but our human institutions which are there for salmon are built for a different time. They need to be upgraded in order to be nimble in sharing what we know with others working on the same problems across the hemisphere. We need to combine our intellectual and material assets effectively on the same hemispheric scale, to address our gaps in knowledge. We also need to use this connectedness and capacity to address surprises that we cannot even conceive of today. Veterinarian science could never have anticipated mad cow disease, but they have been well organized to react effectively when such a thing occurs. We need to do the same.

There are thousands of people and a hundred organizations working on salmon conservation that exist in what I call salmon parallel universes. I attended our NPAFC meeting in May with over a hundred experts in salmon enforcement and science from around the Pacific Rim. A month later I attended the NASCO meeting in the Atlantic basin with another group of over a hundred researchers and managers working on almost identical issues related to Atlantic salmon conservation. The two groups have no functional connection and very few individuals even know each other despite the issues they have in common. The issues that we are dealing with are very similar. For example, Steelhead and other stocks in the Pacific Rim have experienced a serious decline in productivity since the mid to late 90s. And that's exactly the same timeframe Atlantic salmon have experienced dramatic decline. It is unlikely a coincidence that these two species, which have very similar life histories, are declining along similar timelines. There is a very good chance that the clues to understanding their declines lie in studying the linked climate conditions that have taken place on the common timeline.

A few months ago, I became aware of a State of Alaska and People project doing some incredible work. Again, a room of a hundred people whose efforts can be informing others across the salmosphere. Salmosphere is our phrase for the northern hemisphere that drives some folks crazy but others like it.

So, the first step in building the conditions for resilience is to connect the parallel universes or silos. That has taken much longer than we would have thought although it shouldn't have been a surprise. I know people in this room understand the challenge is building trust. Trust across a large group of people half a world apart with different cultures and approaches. It took time. NPAFC and NASCO drafted and approved in 2016 a document outlining the IYS including governance. While it has taken longer than we hoped, we have a governance model that is functioning with the help of

face-to-face meetings to strengthen connections.

We have a good connection now to the Atlantic with a Coordinating Committee. We have Steering Committees in both basins that include our partners some of whom are in the room today from government, NGO's, academia, private sector and indigenous peoples. The partners share the responsibility for guiding the IYS and engaging in the development of fundraising strategies. So I would say we have already had some success in beginning to connect institutions.

The next element to think about of course has been well what are you actually going to do? How are you going to set the conditions for resilience beyond connecting institutions. To this end we've been working towards a results-based research plan. We have identified Research Themes and framed them as outcomes that describe the state that we want to achieve. Many initiatives have directional objectives that are just trying to "promote" or "increase" or "improve", which are often unclear in terms of what they actually intend to accomplish. We want to develop projects that are highly impactful so they're going to actually make a difference and remove a barrier that's preventing us from reaching our outcomes. To identify project,s we are bringing experts together to scope work which will break down the barriers. We have held a number of workshops to date. The first one was in Edinburgh last November called the Likely Suspects, looking at the question of what can we do to better understand the survival bottlenecks across life history stages. A publication will be available next week and this project description will guide work in both basins.

In the Pacific Basin, the parties have agreed that they want experts from their countries involved in research planning so we have formed Theme Counsel Groups. There is an open invitation for experts that have interest and expertise related to a research theme/outcome. I'll walk you through the themes/outcomes and give you an idea of what we're trying to achieve.

The first one is the Status of Salmon. The outcome is "the status of salmon and their environments is understood". So, believe it or not, telling the story about the status of salmon is not easy. To many in the general public who see salmon on the menu in restaurants across the country they are unaware of the challenges facing salmon. Even people who are informed and concerned about salmon struggle to understand their status when reports of salmon swing wildly. For example, the Canadian Cohen Commission judicial inquiry was convened immediately after a record low return of Fraser River sockeye in 2009, and in the midst of the inquiry the 2010 return materialized which was the largest return on record. Our scientists and agencies use a confusing array of different metrics to describe the status of salmon. Moving from awareness to action requires clear

communication and problem statements. Right now we can't do that effectively for salmon. The solution lies in bringing scientists together to agree on standards and motivating institutions to support data and visualization systems such as digital atlases to help tell the story. The Status of Salmon Theme Counsel Group will refine the approach to building these tools through a series of workshops and projects of over the duration of the IYS.

The second theme is really at the core of the IYS and that is "Salmon in a Changing Salmosphere". The outcome is "the effects of environmental variability and human factors affecting salmon distribution and abundance are understood and quantified". So, how do we develop that depth of understanding? Again, we've convened a workshop most recently in Santa Barbara this past June with our partner, the National Center for Ecosystem Analysis and Synthesis, bringing together experts in climate and salmon ecology. As a result, we are scoping projects that will facilitate linking downscaled climate models to salmon survival and distribution. One project is to assess and visualize the viability of salmon populations by relating 10 and 25-year future scenarios to conditions across life history stages that could result in their loss. For example, we know that peak river temperatures over 20° C are lethal for returning migrants, and our models for watersheds can provide projections of those conditions. This information will be of great importance to fisheries managers and regulators in freshwater and coastal areas. It will be particularly important if we are to assist salmon through adaptive measures like holding water to provide adequate flow during periods of drought. Additionally, we spend large amounts of money to restore fresh water habitat, and investments like that should be informed about the likelihood that these systems will remain viable. This information can be incorporated into a digital decision support tool for the public and regulators to understand the future projected for salmon.

In addition to the climate modelling we need to be able to ground truth those models and address our gaps in understanding where fish are in the coastal and high seas environments, and what the actual mechanisms are that are affecting them. Dr. Beamish and Dr. Brian Riddell with the Pacific Salmon Foundation have raised close to \$1M Canadian to charter a Russian research vessel to survey the high seas region of the Gulf of Alaska in March 2019 as a proof of concept. If successful, a series of five concurrent surveys across the North Pacific is being considered for 2020 and beyond. The winter surveys can potentially be used to improve forecasts, as it is hypothesized that the abundance for a population of salmon is set after that first winter. It will also provide key information about how salmon react to changing conditions.

This has direct implications to the NPAFC mandate in eradicating illegal, unreported and

unregulated (IUU) fishing. We recently learned that illegal drift net fishing for salmon is increasing as a result of an elaborate system of fishing, processing-at-sea and trans-shipping the product to market without the fish ever being landed by a fishing vessel. The survey work and modelling could assist in directing enforcement overflights and ships to areas where salmon are most likely to be located.

Our third theme is New Frontiers. There are technologies that we have in place now that can be used to increase our understanding, but they are held in pockets, certain labs and institutions. With increased awareness and resourcing, they can be more widely applied to advance our understanding. Genetic stock identification is a good example. We now have excellent genetic baselines that allow us to determine rivers of origin from small tissue samples of salmon. New hand held DNA sequencers can potentially be used at sea to provide near-real-time information to researchers or enforcement officers.

Environmental DNA (eDNA) is another emerging tool to help understand where fish are in the environment. The presence of salmon DNA can be assessed from simple water samples. At some point it is believed that quantifying the amount of eDNA may be possible. We don't have enough boots on the ground to count fish across the hundreds of populations, but we may be able to collect water samples. A single mark-recapture study on one river system can cost as much as \$150K while collecting and analyzing eDNA is a fraction of that.

Our fourth theme is Big Data/Information systems. One of the long-standing barriers is the lack of integrated data systems to allow scientists to link observations to environmental conditions. A hundred years of salmon data exists in all of manner of forms from hard copy reports, to individuals personal computers to mainframe institutional computers. In 2015 the "warm blob" hit and the Pacific Salmon Commission asked the question "What will this mean to our work managing trans-boundary populations of salmon?". A contract was put in place to review the environmental anomalies in that year, as well as the anomalies in salmon and salmon fisheries. After two months the environmental data were collated and summarized and the salmon data was not. It was a hodge podge of observations largely drawn from contacting individuals. We are not limited by the technology. We need to look for incentivized approaches to drawing this data into a modern information system. Graph databases are the technology that Google and Facebook use to rapidly connect us in Social media. For better or worse it is how they effectively send us advertising regarding a product minutes after we run a search looking at that product. We are looking at approaches to apply these technologies to our data issue.

On the networking it is almost a no-brainer. We envision connecting people across the hemisphere that have an interest in salmon. Right now for example, NASCO has a spreadsheet inventory that researchers groan about having to update. This is of keen interest to Pacific researchers. It would allow them to know what projects are taking place and who the people are to connect with. An on-line network would include the metadata about the project and those with an interest in the subject would be instantly notified. We are looking at the potential for software companies to assist in the development and funding of this work.

We also have outreach and human dimension outcomes. In terms of the Human Dimensions "communities, indigenous peoples, youth, harvesters, scientists and resource managers across the northern hemisphere share knowledge and collaboration in the development of new tools and approaches to restoring, managing and sustaining salmon". We will need new approaches to our management systems. We need to bring together western science/management and indigenous perspectives from across the hemisphere.

I would note that in terms of our projects, one of the lenses that we will view them through is to ensure that they will lead directly to improving resource management decisions. They need to drive from DATA to DECISIONS.

Regarding outreach ... "People understand the value of healthy salmon populations and engage to ensure salmon and their varied habitats are conserved and restored against a backdrop of increasing environmental change". We expect all of the research for each outcome will have an outreach element. We are also considering targeted awareness campaigns with our partners in addition to the website and social media. Our website will be on-line in early September.

Where to from here? We will hold an opening event on October 11 in Vancouver in advance of the focal year of the International Year of the Salmon in 2019. There will be an announcement of the IYS with federal, state, provincial and First Nations/Tribes representation from around the Pacific Rim. The announcements will be framed around a cultural celebration of salmon in song, dance, food and story-telling. Youth will be engaged on the day to experience the cultural displays.

On the business of the IYS, we are continuing to plan the research and outreach and most critically to seek funding. The parties are being called on to support the administration of the IYS - approximately \$300K per year through 2022 but the research and outreach projects will be in the

order of \$10M or more and Steering Committee members will be assisting in the development of a funding plan.

When we began working on this there was concern that this was not a good time given downsizing of government and challenging economic times. We argued that there would never be a right time and that the need has never been greater. I am convinced more so every day that what we are attempting to do is needed to make the best effort to sustain salmon. The current and past approaches to salmon conservation while genuine, seem to be effectively documenting a slow and ongoing decline and managing to a shifting baseline. The IYS is our shot at seeing if we can take action and change the way we work. The reaction to our vision of setting the conditions for resilience has been extremely positive. Thanks to Joe for his energy in bringing this group together and I am looking forward to working with many or all of you on the IYS.