

***Take Home Message by Timothy F Sheehan,
NOAA Fisheries, USA***

Ladies and Gentlemen,

First, I would like to thank the Conveners and the Steering Committee for organizing this symposium. It has allowed for an excellent exchange of information on recent research on salmon at sea and its implications for management. The arrangements have been superb and the organization of the sessions excellent. Each day of the meeting has built upon and reiterated messages from earlier in the week. I had a number of preconceived notions prior to coming to La Rochelle and I must say that my expectations were met if not exceeded.

This meeting has highlighted the considerable increase in our understanding of the marine phase of salmon and the steps that will need to be taken to manage and conserve the species in the face of the increased mortality at sea. In being asked to summarize my 'take home' messages, I thought back to some prior exercises I have been involved with back home where we are continually evaluating our programs role's in restoring our endangered Atlantic salmon populations. My 'take home' messages from this meeting fully support the deliberations we conducted back home and the information presented at this meeting solidifies my opinion on what avenues that we as a community of researchers and managers working with declining salmon populations should be pursuing

Most of these management options relate to freshwater, through maximizing available habitat, improving access and ensuring that our rivers are producing the maximum number of healthy wild smolts. Maintaining stock diversity will be vital in ensuring that the salmon have the best chance to adapt to whatever conditions the future holds under a changing global climate. The value of historical databases and the importance of our long-term monitoring programs in freshwater have been highlighted during this symposium. The latter provide estimates of marine survival and other information such as trends in smolt output and their quality. Pursuing an adaptive approach to our management actions is essential so that we can learn as we go and correct our course of action to maximize the benefit realized from our effort.

The big picture going forward will be that we need to be proactive in ensuring that the salmon's interests are represented in long-term planning and we need to focus on the entire ecosystem; habitat improvements aimed at the salmon should bring benefits for other diadromous species that may, in turn, assist salmon stocks to re-build. Coupling our interests with those of the diadromous species complex will not only allow us to take a broader ecosystem level view, but it may make a larger pool of resources available to us.

Thank you for your attention.

*Take Home Message by Raoul Bierach,
Directorate for Nature Management, Norway*

When I sat down yesterday afternoon to think about this after two, and I have to say, in many ways “mind blowing” days, the words of my first boss at the Directorate for Nature Management came to my mind. And I quote – “Last year we stood at the edge of a great abyss. This year we have taken a big step forward”.

Well no...

Working at the Directorate for Nature Management, and being given the task of dealing with all aspects of management of wild salmon in Norway at a national level, I have, of course, a managers perspective ... and the questions about what does this all mean – for management, I might add, and what can I use this for ... again in management, come naturally to me.

But doing this at a presentation by presentation level or even trying to pull out the most important findings or key messages was simply not possible at this stage...so I had to take a step back (and that might be even more wise, when you are standing at the edge of an abyss) and look at the big picture, and even think back to why we were so keen on launching this big project and task to learn more about salmon at sea...

Well, the thing is, we have known or at least have had a pretty good idea for quite a long time that the big underlying and more or less natural fluctuations in salmon abundance must have something to do with conditions stocks and cohorts are experiencing at sea. We had also strong indications that there were differences between stocks from different areas, and maybe some mechanisms behind these fluctuations, that could be understood or, even better, that we could find some good and simple indicators for those mechanisms, that could be monitored and used in salmon management.

And, of course, all was aimed at getting closer to developing some tools or models that would enable us to say something more precise about how salmon stocks are doing, before the last dead fish was accounted for... and that this would enable us to better adapt management actions in a precautionary manner to those more or less natural, big scale, underlying fluctuations.

At that point of time I thought, and still do so today, that in order to achieve this goal, we have to learn more about where different stocks or stock groupings are in time and space and, of course, learn more about the mechanisms that are important for how stocks are doing.

The message I take home is that, yes we have obviously learned a lot more about where salmon stocks are in space and time and yes we have learned more about possible mechanisms and possible indicators to predict salmon abundance in the future...but that there might still be some work ahead in order to really get to that point where we can make better predictions of salmon abundance.

Last but not least, I think, some very interesting tools have been developed and refined that at some level have already proven to be very useful in salmon management.

And in closing I think that after all the analysis work has been finished and articles are published I would encourage you all to sit down around one table and synthesize all of this work into how does this fit together, what can we already use, what is missing.

***Take Home Message by Sergey Prusov,
Knipovich Polar Research Institute of Marine Fisheries and Oceanography,
Russian Federation***

Ladies and Gentlemen!

First of all, on behalf of my colleagues participating in this international symposium, I would like to thank NASCO and ICES for organizing this Salmon Summit.

This Summit has been an excellent forum for researchers to present their most recent findings about salmon at sea to those concerned with the conservation of wild salmon stocks and their sustainable exploitation.

These new findings improve our understanding of salmon and open new possibilities for rational fisheries management.

The Atlantic salmon is an anadromous species and we know that its complex life-cycle, with extensive migrations between the open sea and home rivers, represents a major challenge in regulating the fisheries taking place in different waters.

At this symposium we have been presented with details of advances in molecular genetic techniques which open new possibilities for identifying population structuring to a degree that was previously unattainable. The power of this new tool has been demonstrated in several studies presented here. This, to my mind, provides new opportunities for improving knowledge of the distribution of different salmon populations contributing to the mixed-stock fisheries.

These interceptory mixed-stock fisheries represent a threat to the resource as they may cause damage to individual salmon stocks, including those in Russia. Last year Norway, Russia and Finland started a new project: "Trilateral cooperation on our common resource; the Atlantic salmon in the Barents region" (Kolarctic Salmon) which aims to merge modern science with traditional salmon fishing knowledge to create in the future a sustainable, long-term and knowledge-based salmon management regime for the Atlantic salmon stocks of the Barents region. We hope that the results from this cooperative initiative will ensure the conservation and sustainable use of salmon stocks by recreational fishery owners and traditional coastal fishermen.

Once again the importance of good scientific knowledge for salmon management cannot be over-estimated. I hope that the results presented at this symposium will provide a better basis on which managers can base their decisions.

*Take Home Message by Bénédicte Valadou,
ONEMA, France*

The Ministry of sustainable planning and development and the Ministry of marine fisheries, in partnership with Onema, launched a national strategy for migratory fishes management. A national framework for the safeguarding of diadromous fishes, including salmon, has now been defined with several strategic goals that we must now translate into action. Some of these are major goals and the information from the presentations which have been made during this meeting will be an important contribution to developing action plans to achieve these. For example, we can take account of the Gérald's information from ICES regarding the importance of habitat maintenance and restoration and maintaining long times series on abundance. There was a clear message that there must be integrated management which considers other species and diversity consideration and not just salmon issues

For example, in the French strategy, guideline number 6 entitled "Manage stocks sustainably" is going to become a reality by a study that will update and improve the assessment of stocks relative to their capacity for exploitation. This will be carried out by a French scientific organization. Some presentations on the management of salmon link closely to this issue and show that management cannot advance without a strong scientific basis and taking advantage of the experiences of other salmon producing countries around the world. Like Ted said to us, environmental change adds further complexity to the development of good governance. This will also be addressed in the French strategy.

Then, guideline number 9 entitled "Strengthen the expertise of restocking projects" should allow the essential elements of restocking to be identifying. Here, research on genetic is very important to identify the contribution of hatcheries to populations and to assess the needs for restocking programs in the future. This reflects our commitment to the Williamsburg's resolution.

Other guidelines will help set up an implementation plan to monitor salmon in order to better understand salmon life history dynamics. They will also help develop a study on estuarine and marine ecology. It is obvious that improving knowledge is paramount for the effective evolution of this national strategy that is vibrant and forward-looking.

***Take Home Message by Ken Whelan,
Atlantic Salmon Trust, UK***

Over the past two decades, an increasing proportion of North Atlantic salmon are dying at sea during their oceanic feeding migration. The Salmon Summit brought us closer to understanding the factors underlying this increased mortality. The integrated nature of the research presented at the summit clearly shows the benefits of sharing of facilities and pooling expertise. For the very first time in the history of salmon science the coordination of surveys in time and space has provided synchronous trans-Atlantic data on individual cohorts of salmon and facilitated the tracking of post smolt movements across the ocean. The work involved a concerted, coordinated research effort to trace the underlying migration and distribution routes of individual salmon stocks and regional stock complexes. Innovation in the areas of genetics, isotope analyses, scale interpretation and pelagic sampling technology has provided us with tools which hold out a realistic expectation of understanding the factors regulating cycles of dearth and abundance of Atlantic salmon at sea.

The SALSEA Merge programme has delivered a major ICES based salmon database. This database includes three separate but interlinked components covering cruise data (biology, physico-chemical data, oceanography etc), scales data and genetic data. It is hoped that over time all workers will migrate relevant salmon information to this database and will adopt it as the principal location for the storage and analysis of shared marine salmon data.

An increasing awareness and appreciation of the Atlantic salmon's role in the marine ecosystem, arising from the Summit, will hopefully lead to an acceptance of salmon as a member of the pelagic family of fishes and a realisation that any ecosystem-based approach to the management of these stocks necessitates an acceptance that surveys of the pelagic zone of our oceans could and should include a migratory fish component.

If we are to understand more fully the life of Atlantic salmon at sea efforts should now shift to an assessment of the later years at sea; the mechanisms which control where the fish are located during their first winter at sea; when maturing and non-maturing 1SW fish separate and what determines their decision to mature. Remaining seas such as the Irminger Sea and East Greenland, need to be surveyed and their role in marine recruitment better understood. More intensive studies are also required to separate out the areas of the oceans where salmon survival is poor in a continuing effort to understand when, where, why or how salmon are dying at sea.

For me the key messages arising from the presentations made at the Salmon Summit were the following:

The need to shift our emphasis from survivors to those in trouble

For too long we have limited our research efforts to studying the near shore and in-river survivors. We must now refocus and seek to learn more about those failing to survive at sea,

The average fish is a dead fish

Up to 95% of smolts are dying at sea in their first year

Mortality is due to North Atlantic wide factors

The factors governing mortality are common factors spread across the ocean

There may be a degree of learning involved in the migration patterns of post smolts at sea

Smolts may need to jump currents

Movement at sea may be directional and post-smolts may have to change currents on several occasions to reach their destination

Salmon dive to 800 to 900m in winter

Salmon may seek out the thermocline in spring and summer and dive to depths of 800m or more in winter, where they can stay for up to 24 hours

If, due to poor feeding and reduced growth, post-smolts are forced to spend more time in smaller size slots they are then open to far greater levels of predation

Once changes have occurred ocean systems have huge inherent inertia and are very slow to recover to normal levels

The mean smolt age is dropping in some areas and smaller younger smolts are migrating to sea. Smaller post-smolts survive poorly at sea.

Natural selection always imposes a cost and the greater the extent of the change the greater the cost.

In our salmon stocks today we are looking at the product of past selection pressures

Reducing mans impacts on our salmon stocks may be the key to ensuring their survival.