

WWGNAS 2023

Update WGNAS benchmark

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1 WGNAS Benchmarking - Timelines

- WKSaIModel Workshop for Salmon Life-Cycle Modelling (4 days, 5-8 January 2021, remote)
- ICES WGNAS benchmark scoping meeting (3 days, 15-17 November 2022, hybrid)
- ICES WGNAS 2023
- ICES WGNAS benchmark Data meeting (3 days, week 19-23 June 2023, remote)
- ICES WGNAS benchmark Assessment meeting (5 days, week October 23th-27th 2023, hybrid)

2 Scoping meeting (wrap-up)

- Report available on the share point (WKBsalmon 2022 + WGNAS 2023/background doc)

Objectives

- **Build a shared vision of the benchmark**
 - LCM as one corner stone
- **Agree on objectives and tasks**
 - Modelling hypotheses to be reviewed and tested
 - Data required
- **Establish priorities**
 - 1 = must be done
 - 2 = Should be done
 - 3 = examine the possibility of

3 Advance the benchmark work

- **Review on the main issues identified as “priority 1” (Tab. 1, WKBSalmon scoping meeting report)**

Identify the data issues to be advanced from now to the Data meeting

- Update/improve some data series : biological characteristics, returns ...
- Prepare the compilation of new data series to be eventually used in the LCM

- **Organize to advance between WGNAS 2023 and the data meeting in June 2023**

- Identify names/timelines for each task
- Need a specific data call for benchmark (the data-meeting) ?

(● Keep in mind)

- Assessment meeting : Essentially a review of the options we will propose
- Not a lot of space to produce anything new during the Assessment meeting
- Best prepare a baseline model (minimum changes /PFA) + limited number of alternatives

Table 1. Resolutions (update from WKBSalmon Scopong meeting report)

Level of priority : 1 = must be done ; 2 = should be done ; 3 = examine the possibility

Model, setting, analysis	Who / When	Data	Who / When	Level of priority
Time series to be considered for the benchmark				1
		<p>Benchmark will be based on time serie 1971-2021.</p> <p>These data, in addition to the 2022 data, will be considered during the WGNAS 2023. However, the 2022 data will still be considered provisional at that time.</p>		

Consideration of Russian Federation stock units				1
<ul style="list-style-type: none"> It was agreed to keep Russian SU in the LCM as is contributes to the whole dynamics 2 options have been discussed to treat Russian data 2021 onward (see in “data” section). Depending on the technical feasibility of the different options, check the sensitivity of the assessment to the hypothesis done for data completion. 	<p>To be implemented in the LCM Framework.</p> <p>Etienne R. + Rémi P. + any other volunteers.</p> <p>Try to implement during WGNAS 2023 based on data to 2022</p>	<ul style="list-style-type: none"> Two options to complete the Russian data 2021 onward: <ul style="list-style-type: none"> Option 1 - Complete the time series based on previous values (e.g. average last five years) + with high observation uncertainty around them so has to limit the influence on the model outputs; This options is the easiest way to proceed. Option 2 - Put “NA” (non available) in the time series for Russian data for 2021 onwards. This option may require some some substantial work in all R-scripts for post-treatment; <p><u>Technical note:</u> From a technical point of view, “NA” can only be set for the “Nimble data” (= those that are at the left hand side of a likelihood term) but not for the “Nimble constant”. Values should be given to the constants anyway. Then use average calculated over the five last-years.</p> <ul style="list-style-type: none"> Agree on options to represent Russia in the ouputs (graphs, compliance to CL ...) 	<p>An option has been developed for running NEAC RR in WGNAS 2023. Based on the available total catches in weight (available from NASCO), and a method to split among the 4 russian regions and the two sea-ages.</p> <p>This option will be reviewed during the Data meeting in June 2023</p> <p>Other options could also be reviewed</p>	

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| | | <ul style="list-style-type: none">- Russia should not be removed from models outputs (graphs ...)- Should Russia be removed from the calculation of the compliance to conservation limits calculated at the scale of NEAC complex (NEAC and N.NEAC) | | |
|--|--|--|--|--|

Harmonizing the life histories between NAC and NEAC				1
		<ul style="list-style-type: none">• Align NAC with NEAC <p>For NAC data, consider 1SW and MSW (MSW = sum of 2SW + older fish)</p> <ul style="list-style-type: none">- Returns- hw catches- Biological characteristics <ul style="list-style-type: none">• (+ Need to account for fish older than 1SW non mature in the WG catches)	<p>NAC SU experts.</p> <p>Guillaume D.+ leading Julien, Cindy, Andrew Taylor, Derek Hogan, Martha Robertson</p> <p>WP presented before the June Data meeting.</p> <p>(+/or Updated stock annex)</p>	

Mixed Stock Fishery - Allocation to the different stock units

Review and evaluate the availability and representativeness of the genetic data to allocate catches in Faroes and W. Greenland to the different stock units, and evaluate different modeling options

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To be considered

Allocation based on proportions or proportionnal to abundance (homogeneous harvest rate)

- **W. Greenland fishery**
 - Split between NAC / N.NEAC / S.NEAC
 - Split among SU within stock complexes
- **Faroes fishery.**
 - Split between N.NEAC / S. NEAC)
 - Split among SU within stock complexes

Current version of the LCM

- **W. Greenland fishery**
 - Split between NAC / NEAC origin fish using “scale/genetic” data
 - Split among SU within NAC using genetic data (Bradbury et al., 2016, compiled by Olmos et al.), and a split among SU within NEAC using constant proportions.
- **Faroes fishery.** Split among all NEAC SU (North and South) using constant proportions (themselves derived from average PFA relative abundance calculated from the RR model).

To be implemented in the LCM Framework.

Etienne R. + Rémi P. + any other volunteers.

Try to implement one baseline option + one or two other ones during WGNAS 2023.

Review and evaluate the availability and representativeness of the genetic data to allocate catches in Faroes and W. Greenland

- to the different stock complexes
- to the different SU within stock complexes

One group with 2 sub-groups (Faroes split/ WG split) working together.

Geir, Vidar, Tim, and Dennis – possibly Phil included in initial email to kick it off

WP presented at the Data meeting in June 2023

Based on the evaluation of the availability and representativeness of genetic data to allocate catches in Faroes and W. Greenland, evaluate the options for catch allocations (separately for Faroes and W. Greenland fishery):

- Use genetic assignement data
- Use allocation proportional to abundance (homogeneous harvest rate)
- Use a combination of the two

Mixed Stock Fishery - Other data improvements				1
		<p>Harmonizing life history btw NAC and NEAC</p> <ul style="list-style-type: none"> • W Greenland catches currently omit fish older than 1SW non-maturing. → Update the time series of catches at West Greenland to consider both non-maturing 1SW and older sea-ages. 	<p>Lead Tim Sheehan + WG fishery experts</p> <p>WP presented at the data meeting.</p> <p>(+/or Updated stock annex)</p>	
		<p>Uncertainty</p> <ul style="list-style-type: none"> • Review the methods developed to quantify uncertainty in total Faroes and W. Greenland catches • W Greenland catches. The LCM currently considers very low uncertainty around W Greenland catches (CV = 5% arbitrarily fixed). → Mobilise the sampling data available at WG to give an uncertainty of the catches (conversion weight → numbers and split by sea ages) 	<p>Faroes Fishery</p> <p>Lead Geir B., James O.</p> <p>(Update stock annex)</p> <p>WG fishery</p> <p>Lead Tim S. + Martha R. + WG fishery experts</p> <p>WP presented at the data meeting.</p> <p>(+/or Updated stock annex)</p>	

Multiple years forecast and catch advice				1
1 - Catch options, sharing agreement				
<ul style="list-style-type: none"> It was agreed that no change was justified, so to continue with the sharing agreements currently used in the PFA forecast models (8.4% for Faroes, 40/60 for WG). Sharing Agreements were defined historically as a management options as it is a social agreement on what might be equitable use of resources. <p>Implementation in the LCM would consist in setting homewater catches and all other marine fisheries at zero and scaling the total fish caught at Faroes or WG following the sharing agreement rule.</p> <ul style="list-style-type: none"> Other options could be considered in the future: <ul style="list-style-type: none"> An other option for implementation in the LCM would be to scale the homewater catches according to the Sharing Agreement. For example at Faroes: $hw \text{ catches} = (100 - 8.4) / 8.4 \times \text{Faroes Catches}$. Managers could consider other options for determining the appropriate sharing agreements and the impact of these alternatives could be evaluated within the LCM. 	<p>To be implemented in the LCM Framework.</p> <p>Etienne R. + Rémi P. + any other volunteers</p> <p>Try to implement for the Data meeting</p>	<ul style="list-style-type: none"> Clarify the sharing agreement origin and justification in the Stock Annex Review the data to convert total weight into number of fish for both Faroes and Greenland 	<p>Lead: Tim S. + Martha R. can be contacted for information</p> <p>Updated Stock Annex</p> <p>Should be ready for the Data meeting in June.</p>	

Multiple years forecast and catch advice

2 - Compliance to conservation limits

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- Report achievements of management objectives in terms of both total egg deposition (1SW + MSW) and split by sea ages.

- Assessment of scenarios based on the probability that the total egg deposition achieves some threshold (= management objectives, CI or other) has the best biological/ecological rationale.

- However, some marine fisheries specifically target some particular sea-age classes (typically MSW at W. Greenland) and therefore, it makes sense to assess the influence of fishery scenario on that particular sea-age class.

To be implemented in the LCM Framework.

Etienne R. + Rémi P. + any other volunteers

Try to implement for the Data meeting

- Management Objectives (CL or other) in total number of eggs AND split by sea-ages.

⇒ All Stock units have to provide CL both in total eggs and split 1SW/MSW. Open book to review the method used to split between sea-ages. Default method can be used either (based on the 5 last year average of the proportion of eggs spawned by 1SW/MSW).

- **Iceland and Russia.** CL is currently estimated from the fitting of hockey stick models between lagged eggs and PFA estimated from run-reconstruction and PFA forecasting models. 2 options:
 - Continue with the same method
 - Develop a new method to estimate CL from LCM outputs. Fitting SR relationship from eggs/PFA outputs would then need to back-calculate the lagged eggs deposition associated with each PFA year from the LCM outputs)

All SU/country experts

Update Stock annex, section management ref. points.

Should be ready for the Data meeting.

Etienne R. and Rémi P.

Implementation of the hockey stick for country with no CL based on output of the LCM model.

Improving data series in every jurisdictions				1
<ul style="list-style-type: none"> • Homewater catches • Returns • Biological characteristics (smolt ages, sex ratio, fecundity) possibly as time series 			WP and/or Revised Stock annex Data meeting or September 2023 at the latest	
Adding new SU in the LCM				3
Consider the possibility to expand the model to add new SU <ul style="list-style-type: none"> • Denmark • Spain • Portugal • Germany (see the additional discussion about the Inner Bay of Fundy) in the “Future improvements” table.	To be implemented in the LCM, depending on the data availability and technical feasibility Assessment meeting	Provision of data/inputs for the LCM <ul style="list-style-type: none"> • Denmark (Niels) • Spain (Dennis contact people to set a meeting) • Portugal (Dennis contact people) • Germany (German representative WGNAS) + see the additional discussion about the Inner Bay of Fundy in the “Future improvements” table.	Lead : Alan W. + Dennis E. (with help of ICES) set a meeting with key people (experts of the considered SU + modellers) Etienne R. can help in providing list of data needed. WP to evaluate the feasibility presented at the Data meeting	

Codes repository and servor		1
<ul style="list-style-type: none"> Examine the possibility to use GitHub as a repository for data and code <ul style="list-style-type: none"> wg_WGNAS repository has been created on the ICES GitHub expert group workspace https://github.com/ices-eg/wg_WGNAS To be discussed : access rights commit/pull/push (all WG members or a short list) Data, outputs (+ last version of model code) should also be available on the share point 	<p>Continue discussion with ICES to open repositories for LCM and other WGNAS stuff</p> <p>Include Guillaume, James, Geir, Rémi, Clément, Stephen, Hkynur. Alan Walker to forward CEFAS contact.</p>	
Routines to create outputs from the LCM		1
<ul style="list-style-type: none"> All participants to review all available Figures, Tables (in documents and presentations) and provide feedback, if any so as R routines to create outputs can be updated. 	<p>All participants</p> <p>Propositions made for WGNAS 2023 and assessment meeting</p>	
Documenting the LCM		1
<ul style="list-style-type: none"> WP - Presentation LCM WP - Guidelines to navigate within / run the R codes to run the LCM WP - Comparison of the output of both the LCM and PFA models (Maxime's working paper complemented by 2023 WGNAS results) 	<p>Etienne R. + Maxime O. + R. Patin + any other volunteers)</p> <p>3 WP presented at the</p>	

			assessment meeting	
Data base and shiny web app				1
<p>The data base and associated web app developed at Institut Agro and that was presented at WK SalModel 2021 (https://sirs.agrocampus-ouest.fr/discardless_app/WGNAS-ToolBox/) is recognized as a valuable tool.</p> <p>It is robust to update the data series (update of the data series, including adding news years) provided there is no change in the data structure. But any change in the model or in the data structure (change in variable names, new variable ...) will require update of the shiny app.</p> <p>A discussion is needed to plan sustainability and maintenance. Do we carry on the developments? With which resources to do that. Do we transfer it to ICES services?</p>			To be discussed at WGNAS 2023 and during the data meeting	
Improving data series (returns, homewater catches) in every jurisdictions				2
<ul style="list-style-type: none"> An option in terms of modelling is to explicitly consider the correlation between returns and homewater catches estimates in the likelihood. Could be done using a bivariate lognormal likelihood function for returns and homewater catches with covariation between those two variables. 	Would presumably not be done for the benchmark	<p>Estimates of returns and homewater catches (including uncertainty) by sea age groups in every stock units are required as key inputs in the LCM. It would be important for jurisdictions to review the methods used to estimate returns and homewater catches and to provide better estimates if any.</p> <ul style="list-style-type: none"> For some SU, uncertainty around estimates of returns looks very low and is probably largely underestimated. Also, uncertainty around homewater catches is currently arbitrarily fixed to CV = 5% (lognormal with 	<p>Experts of all SU and jurisdictions</p> <p>WP presented at the data meeting</p> <p>+ Updated Stock annex</p>	

		CV = 5%). This is because probability distributions of returns are estimated by raising point estimates of homewater catches by estimates of harvest rates drawn in probability distributions from expertise. An improvement would consist in developing independent estimates (and uncertainty) of homewater catches and returns.		
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