SECTION VIII

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Report of the FC Working Group on Greenland Halibut Management Strategy Evaluation (WGMSE) 2-4 May 2010 Halifax, Nova Scotia, Canada

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Report of the FC Working Group on Greenland Halibut Management Strategy Evaluation (WGMSE)

(FC Doc. 10/5)

2-4 May 2010
Halifax, Nova Scotia, Canada

1. Opening of the Meeting

The Co-Chair Antonio Vazquez (EU) opened the meeting at 1005 hrs on Sunday, 2 May 2010. He welcomed the delegates to the Prince George Hotel in Halifax (Annex 1). He explained that the first day of this meeting would focus on, as agreed at the January 2010 meeting in Brussels, the consolidation of the preliminary reports of the consultants and of the response of the Scientific Council concerning the request formulated by the Working Group last January 2010 (see item 4). Mr. Vazquez would preside over agenda items 1 – 4. Co-Chair Sylvie Lapointe (Canada) would preside over agenda items 5 -11.

2. Appointment of Rapporteur

Ricardo Federizon (NAFO Secretariat) was appointed Rapporteur.

3. Adoption of Agenda

Item 4 "Presentation of Scientific Council Advice" was inserted. The adopted agenda is presented in Annex 2.

4. Presentation of Scientific Council Advice

At the January 2010 Meeting in Brussels, this Working Group formulated a request to the Scientific Council (SC) to review and comment on a suite of operating models conditioned on SCAA to determine their plausibility in the context of MSE. It was noted in the request that a set of operating models conditioned by Extended Survival Analysis (XSA) method has already been agreed by the SC as a plausible representation of the real system.

In response to the request, the SC met by correspondence through SharePoint and WebEx video conference in March and April 2010. The report of the meeting is contained in SCS Doc 10/04.

Ricardo Alpoim (SC Chair) presented the response. He explained that the SC reviewed seven different operating models conditioned by SCAA in a MSE context for Greenland halibut. It was noted that in comparison with the XSA-based results, the SCAA results present a more optimistic view of the status and productivity of the Greenland halibut stock although most of the SCAA based operating models are consistent in giving a perception of the stock as being in a depleted state. The SC considers the reviewed operating models (see item 5a) to be plausible in the context of MSE.

5. New Management Strategies Specifications for Evaluation

a) Operating models (OMs)

As agreed in the January 2010 meeting, two sets of operating models – one conditioned by XSA and another conditioned by SCAA – using the same input data would be tested. It was **agreed** in this meeting to consider the following operating models:

1) XSA-conditioned:

CAV – Current Assessment View: M = 0.2, flat-topped PR, S-R segmented regression;

LMV – Lower M view: Same as CAV but it assumes M = 0.1;

CAV_domed: Same as CAV, but with domed PR;

CAV_varM: Same as CAV but M increases from 0.2 at age 10 to 0.4 at age 14 and it is constant at that level in older ages;

CAV_dep: Same as CAV but segmented regression forced to have a maximum at the maximum observed recruitment and a slope equal to the best fit through the origin;

LMV_dep: Same as CAV_dep but with M = 0.1.

2) SCAA-conditioned:

Reference Case (RC): Beverton-Holt steepness (h) = 0.9, natural mortality (M) = 0.2, exponential decrease in selectivity for ages 11+;

RC with flat commercial selectivity (estimated) for ages 11+;

RC with flat commercial selectivity (fixed) for ages 11+;

RC with M = 0.1;

RC with M = 0.2 for ages 0 – 10, linear increase to M = 0.4 for age 14; and constant thereafter;

RC with h=0.6 in the assessment, to simulate a stock that has a larger maximum recruitment which has been severely recruitment-overfished;

RC with a modified Ricker stock-recruitment relationship.

b) Management Procedures (Harvest Control Rules)

As agreed at the January 2010 Meeting, a simple model-free harvest control rule (HCR) would be analyzed. The change in the perceived status of the stock (from a multi-year trend of research surveys) would be used to adjust the total allowable catch (TAC), from year (y) to year (y+1), according to Equation 2 in NAFO SCR Doc 09/37:

$$TAC_{y+1} = TAC_y \times (1 + \lambda \times slope)$$

A value of λ = 1.25 would be assigned in the case of a declining stock ($slope < 0$), and a value of λ = 1 would be assigned in the case of increasing stock ($slope > 0$). $\lambda > 1$ is required in the case of a perceived decline. Refinements are expected on this rule in terms of the most appropriate value for λ given the management objectives. Slope is calculatedbased on the unweighted average slope of log-linear regression lines fit to the last five years of each index, and it was **agreed** that biomass calculations instead of abundance calculations be used in the process.

c) Performance Targets (PT) and Performance Statistics (PS)

Performance statistics allow the evaluation of the success of the proposed HCR across the agreed set of OMs relative to management objectives. It was **agreed** that four properties (or Performance Targets) would be evaluated in the context of risk management:

1) The probability of the decline of 25% or more in terms of exploitable biomass from 2011 to 2016 is kept at 10%[1] or lower.

2) a) The probability of annual TAC variation of greater than 15% be kept at 25% or lower and

   b) The probability of variation of TAC more than 25% over any period of 3 years should be kept at 25% or lower.

   If the conditions a) **and** b) are not met, then an alternate performance target should be considered as follows:

   c) The TAC should not be below 10 000 t for the period 2011-2015 in any one year with a probability of 25% on a year by year basis.

3) The magnitude of the average TAC in the short, medium and long term should be maximized.

4) The probability of failure to meet or exceed a milestone within a prescribed period of time should be kept at 25% or lower. *Milestone* means the average exploitable biomass for the period 1985-1999 to be compared with the exploitable biomass in 2031.

Concern was raised by Norway that the lower catch limit specified in PT 2c may not be sustainable in a given situation of the resource. If this alternative PT is activated, a critical evaluation should therefore be made of the consequences for the further development of the stock.

The Performance Statistics associated with the corresponding Performance Targets listed above are presented in Annex 3.

6. Communication with the Scientific Council

This Working Group expressed its great appreciation to the SC specifically on its previous work on MSE and on the response to the request (see item 4). The Co-Chair Antonio Vazquez agreed to communicate and present the results of this meeting to SC when it meets in June 2010 considering that the SC is also conducting a full assessment of Greenland halibut. It was recognized that the SC might have comments on the results of this meeting which may be useful when this Working Group meets again in September 2010 (see item 7) to formulate recommendations to the Fisheries Commission.

7. Developing Workplan for Next Steps

The WG agreed the results of the MSE should be updated to include the most recent data and stock assessment by Scientific Council, scheduled for June 2010.

The Working Group indicated that the preferred option would be to continue to contract respective consultant's services needed to rerun the MSE with the agreed OMs, HCR, and PS. Canada was requested to continue to fund/administer the work of Dr. David Miller on XSA-based MSE and the EU of Dr. Doug Butterworth on SCAA-based MSE. Noting that this approach depended on several factors, including the results of an updated assessment of the stock from SC in mid-June, as well as the availability and schedule of the consultants after then, the WG requested that the consultants' tasks be undertaken by end-July if possible. It is desirable that the results be made available for examination by the WG as far as possible in advance of the September WG meeting.

The Working Group decided to have another meeting in order to consider the updated analysis and formulate specific recommendations on Greenland halibut based on the MSE results. It was **determined** to have the 3rd

[1] Should the risk tolerance level of 10% unduly constrain the tuning of the Harvest Control Rule such that a rule cannot be developed to satisfy this or other constraints, then flexibility is provided to consider a risk tolerance level of up to 25%.

WGMSE meeting for 2 days (16-17 September 2010) in Halifax, Canada. The meeting dates fall on the week prior to the NAFO Annual Meeting and are subject to confirmation of the Contracting Parties. The recommendations from the 3rd WGMSE meeting, including the 2011 Greenland halibut TAC, will be forwarded to the Fisheries Commission at the Annual Meeting for consideration for adoption.

8. Recommendations to the Fisheries Commission of the Proposed Approach

This item was deferred to the next Working Group meeting scheduled in September 2010.

9. Other Matters

There was no other matter to discuss.

10. Adoption of Report

This report was adopted through correspondence after the meeting.

11. Adjournment

The Co-Chairs thanked the meeting participants for their stimulating input over the course of the meeting. The meeting was adjourned at 1845 hrs on Tuesday, 4 May 2010.

Annex 1. List of Participants

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Annex 2. Agenda

1. Opening of the Meeting
2. Appointment of Rapporteur
3. Adoption of the Agenda
4. Presentation of Scientific Council Advice
5. New Management Strategies Specifications for Evaluation

   a) Operating Models
   b) Management Procedures (Harvest Control Rules)
   c) Performance Targets and Performance Statistics
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Annex 3. Performance Statistics

Performance Statistic for Performance Target 1:

$$\frac{P_{2016}}{P_{2011}},$$

where P_y is the exploitable biomass computed at the start of the year indicated.

Performance Statistics for Performance Target 2 a):

$$\left\{\sum_{y=2010}^{y=2029}\frac{|C_{y+1}-C_y|}{C_y}\right\}\Big/20\ ;\ X_y=\frac{|C_{y+1}-C_y|}{C_y}-0.15\ ;$$

$$I_y=\begin{Bmatrix}1\ if X_y>0\\0\ if\ X_y\le 0\end{Bmatrix};\ \begin{Bmatrix}Prob^{*}=\frac{1}{5}\sum_{y=2010}^{2015}I_y\\ Prob=\frac{1}{20}\sum_{y=2010}^{2029}I_y\end{Bmatrix}$$

Performance Statistic for Performance Target 2 b):

$$\left\{\sum_{y=2010}^{y=2027}\frac{|C_{y+3}-C_y|}{C_y}\right\}\Big/18\ ;\ X_y=\frac{|C_{y+3}-C_y|}{C_y}-0.25;\ I_y=\begin{Bmatrix}1\ if X_y>0\\0\ if\ X_y\le 0\end{Bmatrix};Prob=\frac{1}{18}\sum_{y=2010}^{2027}I_y$$

where C_y is the TAC for the year indicated.

Performance Statistics for Performance Target 2c):

$$C_{2011};\ C_{2012};\ C_{2013};\ C_{2014};\ C_{2015};$$

Performance Statistics for Performance Target 3:

$$\frac{1}{5}\sum_{y=2011}^{2015}C_y\ ;\ \frac{1}{5}\sum_{y=2016}^{2020}C_y\ ;\frac{1}{20}\sum_{y=2011}^{2030}C_y$$

Performance Statistic for Performance Target 4:

$\frac{P_{achieved}}{P_{milestone}}$ where $P_{achieved}= P_{2031}$ and $P_{milestone}=\frac{1}{5}\sum_{y=1985}^{1999}P_y$