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Our Ref: C.24.b 25 June 2010

Subject: ICES Advice

Dear Ewa and Reine,

Thank you for your letter of 21 June 2010 asking for clarification of some issues in the ICES advice 2010.

Cod in Western Baltic Sea Subdivision 22-24

F_{MSY} reference points

You queried the candidate fishing mortality target for F_{MSY} and asked for an explanation as to why only a single value of F_{MSY} has been suggested as well as for a justification for the actual value.

The advice is based on a target fishing mortality (F_{MSY}) which should give the highest sustainable long term yield. However, this target cannot be known with high precision when we are fishing at levels far above F_{MSY} as is for western Baltic Cod. ICES is suggesting the use of a proxy (F_{max}) based on the so-called Yield per recruit model. This approach will be maintained until such time when better information is available. The value is low compare to the historical F level for this stock, but it is clear that the stock has a much higher yield potential than has hitherto been realised - too many discards and too high a fishing mortality. In spite of the approximations made in calculating the target fishing mortality ICES is convinced that the fishing at MSY implies a substantial reduction in fishing mortality for western Baltic Cod as indicated by the adopted proxy.

ICES is following the stock situation and the F_{MSY} proxy will be revised as we gain more experience with the stock dynamics at lower exploitation pressure.

ICES has in some cases provided a range within which F_{MSY} might be found. This is not done for Western Baltic Cod because the present fishing

mortality is far larger than any MSY target that ICES can calculate at this time and because the yield-per-recruit curve has a reasonably well-defined peak making a possible range rather narrow, please see the curve below - Figure 8.4.1.4 in the advice - as calculated by the expert group below.

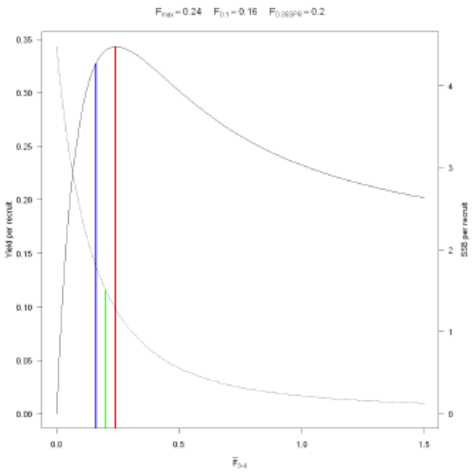

Figure 2.3.21. Cod in SD 2224. YPR plot. With Fmax estimated to be 0.24, F0.1=0.16 and F0.35% SPR=0.20.

To illustrate the problems in calculating a F_{MSY} reference point from data which relates to a stock which is exploited at much higher exploitation level I note that MSY depends on:

- The production function of the unit, which describes the relation between productivity and the size of the unit (e.g., population biomass), which in turn depends on the growth rates, natural mortality rates, and reproductive rates of the members of the production unit;
- Interactions between members of the production unit and interactions with other production units (intra- and inter- specific interactions);
- Environmental conditions (e.g., climate, environmental quality), which affect the production function, and intra- and inter- specific interactions; and
- Fishing practices that determine the size and age composition of the catch (both the landings and the discards).

The models (mathematical and conceptual) used to estimate MSY and associated parameters typically assume that all of the factors not explicitly included in the models remain constant. Thus, MSY estimates are almost always conditional estimates based on current conditions and assumptions.

Emigration of cod out of Subdivisions 22-24

This issue has been subject to numerous investigations. It has been claimed that the reason for the impressive resilience of the stock to the very high fishing pressure the past decades might be because the fishing pressure is overestimated due to migration of cod out of the area a hypothesis that has been analysed several times but with the conclusion that there is no support for this speculation. There are of course some minor migrations across any border we put in between fish stocks.

Bacoma gear and change in regulation in 2010

Regarding the **Bacoma gear** you ask whether the new regulation from 2010 has been taken into account in the forecasting.

The ICES advice 2010 notes:

"...it has not been possible to quantify this change in the regulation [Bacoma window increased to 120 mm along with a extended Bacoma window (5.5 m)] to the extent that it could be used in the forecast." … "It is our experience that the effect of relatively minor changes in technical measures are often not following the text book theory and difficult to predict. This is because compensatory measures in the fishing industry often are dominating and thus the expected improvements in exploitation pattern not realized fully or at all."

However, if the new regulation is effective it will show up next year in our data and it will automatically be taken into account in our forecast.

I hope this answers your questions. Should you want further clarification you are very welcome to come back to us.

Sincerely,

Hans Lassen

Cc Sally Clink, BSRAC
ACOM