**A comment by scientists, Dr Sidney J. Holt and Dr Rainer Froese on management of European fisheries for high sustainable yields, in particular in the Baltic Sea**

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 *1 November 2015*

As scientists who have spent most of their working lives conducting studies of fish population dynamics and the application of that discipline for the rational management of sustainable fisheries, it is extremely disheartening to see the authorities of the European Union setting fishing opportunities for the Baltic Sea which will impede a speedy recovery of the mostly depleted stocks, with a high risk of collapse for the western Baltic cod, which will be fished in 2016 at more than twice the ***FMSY*** rate. This decision violates the management policy formally agreed by the basic organs of the Union: the European Parliament, the Council of Ministers and the Commission. That policy requires that fishing opportunities be derived from establishment of a fishing mortality rate (***F)*** less than that required to provide Maximum Sustainable Yields (***FMSY***), so that stock sizes are rebuilt to and maintained above levels that can produce the maximum sustainable yield (MSY) as required by the reformed Common Fisheries Policy (CFP).

Further, the Council and Commission have proposed a range of ***F***-values for the proposed multi-annual plan for Baltic stocks that largely exceed ***FMSY***. There is no provision in the CFP permitting higher fishing mortalities than ***FMSY***, except for narrowly defined cases during a transition period until 2020.

The Commission had asked ICES to provide estimates of ranges of plausible values around ***FMSY***, but without indicating the conditions governing those ranges. Many assumed – wrongly – that when the ICES Advisers subsequently referred to 95%, that these figures had something to do with statistical confidence limits of the estimates, but that is not so. No such limits have been calculated or approximated. In fact the ICES suggestions were not for ‘best’ estimates of ***FMSY*** values but for best estimates of the ***F***-values resulting in catches no less than 95% of MSY. The selection of the 95% MSY limit is arbitrary (as ICES itself points out) and obscures the fact that the resulting ***F***-ranges are highly asymmetrical, that is, the upper ***F*** value resulting in sustainable catches of 95% of MSY may exceed ***FMSY*** by far, resulting in drastically increased costs of fishing, reduced catch per effort, and stock sizes well below the level that can produce MSY, thus being incompatible with the CFP. Instead, the lower value of ***F*** resulting in 95% of MSY may be a more reasonable and CFP-compliant management target.

The reasons for setting limits of ***F*** less than ***FMSY*** are twofold. Firstly, it cannot be validly assumed that a fishery managed to provide MSY will be economically worthwhile – that it will be profitable by virtue of the market value of the catch being more than the cost of taking it. An ***F*** less than ***FMSY*** would enhance the likelihood that the regulated sustainable fishery would be profitable. Secondly, a lower ***F*** will have a lesser impact on the productivities of the ecosystems being exploited and so contribute to enhanced conservation status of living marine resources.

Parliament has suggested that ***F*** should be set within the range ***F*** = 0 to ***FMSY,*** with a target of ***F***=0.8 ***FMSY***. The Commission has to date offered no guidance as to an optimum value within these ranges based on social and economic considerations that would be in conformity with the CFP, nor has it asked ICES for scientific advice as to the implications of various options within that range. Instead, ICES advice continues to offer several options for continued overfishing (***F*** > ***FMSY***) which are incompatible with the CFP. One of these options, namely fishing Western Baltic cod in 2016 at 2.6 ***FMSY***, has just been chosen by the Council.

At the Annual Scientific Conference of ICES, held in Copenhagen in September 2015, one of the authors of this letter (SJH) presented calculations of the consequences, for sustainable catch, of various fishing mortality rates, and catch rates (catches-per-unit-effort, that determine profitability), specifically for rates at 50% of the ***FMSY*** level, for all known sets of values of the basic dynamic population parameters. The calculations show that with such fishing rates the sustainable catches would be between about 99% and 90% of the MSYs observed in fishes. This range of results depends mainly on the selectivity of each fishery – i.e. whether fish begin to be caught when they are young and small or much later, as adults and even as mature adults, which would lead to a more natural age structure and higher catches. In all cases the catch rates and the resulting profits will be nearly double what would be given by fishing at ***FMSY***. (The results of those calculations will be published in the ICES Journal of marine Science.)

We suggest that until such time as comprehensive analyses have been made by ICES and by the Commission of optimum rate of catch per unit effort and gear selectivity resulting in high yields and profits with low impact on the ecosystem, it would be sensible to consider adopting a provisional value of ***F*** *= 0.5****FMSY.***

We realize that in some stocks, implementation of this policy may lead to strongly reduced catches in the first year, which will, however, be more than compensated by continuous higher catches and profits in subsequent years. Stakeholders should be involved in finding the most acceptable transition path from the current high-cost-low-catch to the future low-cost-high-catch situation.