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ICES ADVICE FOR THE EXPLOITATION OF BALTIC SEA FISH STOCKS IN 2013

On 31 May, ICES' Advisory Committee (ACOM) published their advice regarding the exploitation of the Baltic Sea fish stocks for 2013. The following provides a summary and comment on the assessments and advice.

MSY APPROACH

The ICES advice structure has changed over the past few years. Advice is now provided according to a traffic light system and gradually, as data availability allows, shifting from the previously used precautionary approach to achieving MSY for EU fish stocks by 2015, in line with the EU commitment made in Johannesburg in 2002[1], as well as with the Commission's proposed objectives for the reformed Common Fisheries Policy[2].

Rather than focusing on avoiding an undesired outcome – as is the case with the precautionary approach – the MSY framework strives at *achieving a desired* outcome: a high sustainable long-term yield. Fishing mortality figures in line with the MSY target (F_{MSY}) are the levels where a maximised average long-term yield will be possible, and the biomass reference point used (MSY $B_{trigger}$) is a biomass level that will trigger a response when the biomass is estimated to fall below. The ICES transition scheme towards applying the MSY approach implies a stepwise reduction in fishing mortality to F_{MSY} in 2015. The fishing mortality (F) is a measure of the number of fish killed by fishing. The Spawning Stock Biomass (SSB) for the stock is the reproductively mature fish, measured in tonnes.

For this year's advice, ICES is preparing a new approach to so called "data poor stocks", involving proxies that will result in more precise advice in tonners, rather than the former guidelines on whether catches could increase, stay the same or should decrease. This has led to advice on Baltic stocks being separated, with advice on data poor stocks being released slightly later in early June.

COD

Since 2004, the Baltic Sea cod (*Gadus morhua*) is managed as two separate stocks: the Eastern and the Western stock. The stocks are biologically distinct from one another, although there is some migration of fish between the areas. The Eastern stock is currently more than seven times larger than its Western counterpart. In 2007, a multi-annual plan for both cod stocks in the Baltic was adopted (EC 1098/2007), which aims at restoring the fish stocks to sustainable levels and keeping them there.

Subdivision 22–24, Western Baltic

[1]Johannesburg Declaration, WSSD, 2002.
[2]European Commission: Proposal for a Regulation of the European Parliament and of the Council on the Common Fisheries Policy (COM(2011)425).

The Western Baltic cod stock is a highly productive stock and has historically been much larger than it is today. In the nineteen-seventies and eighties it was twice its current size. The stock is stable and has been fluctuating around the precautionary biomass level since 2000.

In recent years, there has been a small increase in spawning stock biomass (SSB). This increase could, however, be due to migration of older fish from the Eastern stock and is supported by observations of more old cod in the western Baltic than expected. The degree of mixing between the eastern and western stocks is estimated to have increased due to the growing eastern Baltic cod stock. ICES acknowledges that this is problematic for the quality of its assessment and recommends tagging and/or genetic studies to determine the extent of migration between the stocks. A recent study also indicates that there may be a new genetically distinct stock in this area which further would complicate future assessments.

ICES estimates the stock to be at full reproductive capacity, but the fishery is strongly dependent on recruiting year classes and the last three year classes have been below the ten year average.

The existing cod management plan aims at rebuilding the stock by limiting the annual catches and there is ± 15 per cent restriction on changes in the total allowable catch (TAC). It also sets out to reduce fishing effort (number of fishing days) by 10 per cent annually until the target fishing mortality (F=0.6) has been reached. However, according to ICES no further reduction in days-at-sea is required for next year.

The total catch in 2011 was 17,200 tonnes, with landings of 16,300 tonnes and 907 tonnes of bycatch (5.3 %). There are indications that considerable amounts of cod are taken in recreational fisheries, especially in the western Baltic but catches are difficult to quantify and are not included in the assessment.

Bycatch in the fishery mostly consist of flatfishes, especially flounder, which can be substantial at times. Some actions have been taken in the past to reduce discards and in 2001, modifications to fishing gear were introduced by the International Baltic Sea Fisheries Commission (IBSFC), including the "Bacoma" cod-end. The fishing industry has pointed out that these measures are ineffective and that increased flounder bycatch interferes with the selectivity of the gear. This has lead to increased cod discard in 2010 and 2011.

The ICES advice for this stock is a Total Allowable Catch of 20,800 tonnes (- 2,2 %), which is in line with the management plan.

However, if the MSY target for 2015 and the so-called MSY transition scheme was applied, a 38.9 % reduction in TAC would be required, resulting in catches of 13,000 tonnes.

The fishing mortality target (F = 0.6) in the current management plan is not in line with MSY management, with FMSY estimated to 0.25. This is a big discrepancy and the management plan is currently under revision, but may be replaced by a Baltic multispecies plan including cod, sprat and herring fisheries.

Subdivision 25–32, Eastern Baltic

The Eastern Baltic cod stock has historically been much larger than it is today. Due to very favourable environmental conditions and extremely strong year classes towards the end of the 1970s, the stock reached its historically highest levels in 1980–1982, when it was more than twice the size of today. In the early 21st Century, however, the stock was severely overfished and at risk of collapse. In recent years, supported by the multiannual plan, the stock has recovered. Fishing mortality has been decreasing since the mid-2000s and is currently at an all time low (F for 2012 is predicted to be 0.27).

The stock (and cod in general) is highly limited by hydrological conditions (salinity and oxygen levels in bottom water) and recent reproduction has only been reported from the Bornholm Deep (subdivision25) and to lesser extent in SD 26. The abundance of cod in northern areas is nowadays very low.

Because cod is a major predator on sprat and herring, it is likely that the current increase of the stock has considerable impact on its prey. This predation has, however, positive effects on cod recruitment as sprat and herring predation on cod eggs decreases. With food (sprat and herring) now less abundant in its main distribution area (SD 25), the mean weight of larger cod has declined drastically in recent years. The lack of sprat in SD 25 may be due to increased predation from cod *or* migration of sprat away from the main distribution area of cod.

The cod fisheries in the eastern Baltic have very little bycatch of other species.

ICES advice is to follow the management plan, which limits the increase in catches to 15 % and results in a TAC for 2013 of 65,900 tonnes – a decrease of 11 per cent.

For eastern Baltic cod, the target F set in the management plan is estimated to be consistent with the MSY approach. The reason given by ICES for the decrease in TAC, despite a positive development in stock biomass, is that SSB has been overestimated in the past few years and that the quality of the cod is poorer than expected (leaner most likely due to increased food competition). The management plan is currently under revision, and is likely to be replaced by a Baltic multispecies plan including cod, sprat and herring fisheries.

HERRING

The Baltic herring (*Clupea harengus*) is managed in four separate areas: the Western Baltic and Kattegat, the central Baltic, Gulf of Riga, Bothnian Sea and the Bothnian Bay.

Subdivision 25–29 and 32, Central Baltic, excluding the Gulf of Riga

This is the largest of the Baltic herring stocks. After showing a steady increase since the beginning of the 2000's, the latest estimate (2011) indicates a slight decrease, with the stock size at about 70 per cent of the long-term average. The last strong year classes were those of 2002 and 2007. Both year classes are, however, just above the long-term average.

In this area, herring is caught together with sprat, resulting in imprecise landings. From 2006, Union vessels operating in the sprat and herring fishery are no longer allowed to land unsorted catches, unless there is a proper sampling scheme to monitor species composition.

Since the TAC has been fully taken in recent years, the incentives for misreporting herring as sprat may have increased, but the possible extent of that is largely unknown. Still, ICES regards the assessment as being good enough to base forecasts on.

The strong increase of the sprat stock in the 1990s (SD 27–29 and 32) increased the competition for food between herring and sprat, which has led to both herring and sprat being leaner due to lack of food. After a steady decrease since the 1990s, the mean weight of herring has now stabilized but remains low.

The recent increase of the Eastern cod stock may also have a significant impact on this herring stock, but only in the southern areas (mainly SD 25) where cod is abundant. Thus predation from cod will have a limited effect on the Central Baltic herring population as a whole. An increased fishing mortality of sprat in the northern areas would most likely have a positive effect on herring by decreasing the competition for food between the two species.

ICES now classifies the stock as at risk of being harvested unsustainably. The fishing mortality, using the precautionary approach (PA), should be F = 0.19. This corresponds to landings of less than 117,000 tonnes. Applying the transition to the MSY framework would result in a fishing mortality higher (F=0.22) than F_{PA}, which is why the ICES advice is to follow F_{PA} at this moment.

For 2013, ICES recommends a TAC of less than 117,000 tonnes – a 25 per cent increase in the TAC compared to last years TAC (including Russia). This is in line with the precautionary approach.

Subdivision 28.1, Gulf of Riga

The recruitment of Gulf of Riga herring is highly dependent on environmental conditions, such as ice cover. Since the end of the 1980s, the majority of winters have been mild, and this climate has been favourable for its reproduction. The year classes of 2005, 2007 and 2009 are strong, while the 2006 and 2010 year classes are poor.

The Gulf of Riga is a semi-enclosed ecosystem of the Baltic Sea and the low salinity restricts the occurrence of marine species. Herring is the dominant species in the Gulf, and the bycatch of sprat in this fishery is low (10%). Cod has not been found in the Gulf of Riga for 25 years, since it only appears there when the cod stock is very high. This makes predation mortality low for the Riga herring.

The fishing mortality for Gulf of Riga herring is currently below the precautionary level but above the Maximum Sustainable Yield. A mix of Gulf of Riga herring and central Baltic herring is caught in Subdivisions 28.1 and 28.2. Therefore, the TAC set for Gulf of Riga herring includes a small proportion of central Baltic herring, currently 12.9% of catches or approximately 4,600 tonnes. An almost negligible amount (0.5 %) of Gulf Riga herring is taken in Subdivision 28.2 together with central Baltic herring.

The discrimination between Gulf of Riga and central Baltic herring is based on differences in otolith structure caused by differences in feeding conditions and growth (otoliths are part of the inner ear, which scientists study in order to determine a specimen's age and growth).

For 2013, ICES recommends a TAC of less than 23,200 tonnes – a 9 per cent decrease and a fishing mortality of 0.35 – in line with the MSY framework.

Subdivision 30, Bothnian Sea

Due to low salinity and mean temperature, the herring in the Gulf of Bothnia is slow growing and relatively small. The spawning stock biomass of Bothnian Sea herring tripled in the late 1980s, only to then drop by 40 per cent by 1999. After that, SSB has been high and has increased even further since 2008.

ICES treats the herring of the Bothnian Sea and Bothnian Bay as two stocks with separate assessments, though data for the weaker, most northern stock is more limited. However, the two areas are currently managed together.

The herring in the Gulf of Bothnia is mainly exploited by Finnish trawlers, but also used to produce the Swedish speciality "surströmming". ICES classifies Bothnian Sea herring as being harvested in a sustainable way, and the landings in 2011 were the highest ever recorded.

In the whole region, mean weight/age have continuously decreased over the last 20 years. The decrease might be due to a combination of decrease in zooplankton prey, density-dependent effects and selective seal predation. This has had financial consequences for the Swedish fishery, as the production of "surströmming" demands a greater size.

Another potential problem for Bothnian herring is dioxin. With exploitation of the stock being low, the number of older specimens can be expected to increase. Since older herring are likely to have accumulated higher amounts of dioxin, that may imply higher concentrations of dioxin in the stock and the catches. An EU dispensation currently allows Sweden and Finland to utilize fish with higher concentration of dioxin and PCB than the Union limit.

For herring in the Bothnian Sea, ICES recommends a TAC of 97,000 tonnes for 2013 – a fishing mortality of 0.16 – resulting in a decrease of 8.1 per cent.

However, the TAC has not been limiting catches since 1991 due to a low market demand and reduced fishing activities in the area.

SPRAT

Sprat (*Sprattus sprattus*) appears to be spread out all over the Baltic Sea and is the largest fish stock in the region. It is managed as a single stock in subdivisions 22–32 – basically the entire Baltic Sea.

The stock is highly affected by the abundance of cod, its main natural predator. Therefore, spawning stock biomass was low in the first half of the eighties, when the cod stocks were very large. In the beginning of the nineties it started to increase and reached the maximum spawning stock biomass ever recorded in 1996–1997 at 1.7 million tonnes.

As with the Bothnian Sea herring, the mean weight of Baltic sprat at a certain age is currently low. This is especially prominent in the northern Baltic (SD 27–32), where most of the sprat currently are concentrated. For both herring and sprat, that may be explained by the diminishing access to zooplankton which is their main prey.

Because of the skewed geographic distribution and the species interactions between sprat, herring and cod, ICES states that decreased fishing effort on sprat in SD 25–26 would likely optimize the growth of cod (more sprat would become available for the growing cod stock). To optimize the yield and growth of sprat and herring, effort could instead be increased in SD 27–32, which would reduce the competition for food between these two species. Consequently, ICES recommends that a spatially explicit harvesting rule be employed for sprat. For the above reasons, it is unlikely that an increased exploitation rate on sprat in SD 27–32 would have negative effects on the cod stock.

In recent years, fishing mortality has been above the estimated precautionary approach. Lower than average recruitment for the year classes of 2007, 2008, 2009 led to a drastic reduction in fishing mortality in 2011 – the lowest in the last ten years. In 2011, a MSY-approach was adopted and the fishing mortality target is now $F_{MSY} = 0.35$.

For 2013, ICES recommends a TAC of less than 278,000 tonnes – a 9 per cent increase relative to last years advice.

SALMON

The Baltic salmon is a unique branch of the Atlantic salmon species. The management of Baltic salmon is divided into two areas: the Main Basin and the Gulf of Bothnia (Subdivisions 22–31) and the Gulf of Finland (Subdivision 32). But, in reality, Baltic salmon consists of a much larger number of river-specific populations, some of which are still very vulnerable.

To date, many of the targets set out in the Salmon Action Plan adopted by the International Baltic Sea Fishery Commission in 1997 have not been reached. A new management plan was tabled by the Commission last year (COM(2011)470), but has not yet been adopted. This is particularly serious as Baltic salmon is listed under the Habitats Directive, obliging Member States to ensure "favourable conservation status". It is also covered by targets in the Water Framework Directive and the Marine Strategy Framework Directive.

Baltic salmon is greatly affected by environmental conditions, especially those prevalent in the rivers of their origin to which they return to spawn. Dams and other forms of habitat destruction have had a devastating effect on salmon habitats and spawning grounds in the freshwater environments. In many parts of the Baltic Sea region, the natural salmon populations have declined or even disappeared.

In some of the bigger rivers, hydropower companies are obliged to carry out major restocking programs, releasing salmon smolt (young salmon), in order to compensate for the loss of habitat and migration obstacles that the hydropower installations have resulted in. There is a risk, however, that this reared salmon will cause deterioration in the genetic variability of the wild salmon stocks.

The process of restocking is also very costly and ineffective. Today, reared fish die in high numbers before becoming adult. Even though 5.5 million reared salmon smolts are released each year, compared to 2.9 million naturally produced, salmon catches consist of between 72–92 per cent wild fish.

Baltic salmon has earlier suffered from a reproduction disorder called M74. The occurrence of M74 has been decreasing since the mid-1990s to a currently low level. However, M74 mortality has varied over the years and sudden changes in the incidence of the disease are likely to occur in the future.

Despite some positive developments, such as improved habitats in both spawning and nursery areas and subsequent increases in natural reproduction, the wild salmon has not recovered in all rivers. Also, the positive trend has been countered by a steep decline in the survival of juvenile salmon (in the post-smolt life stages, when entering the sea). The reasons for this low post-smolt survival are still largely unknown, but the effects are rapidly limiting the effectiveness of the available management tools.

Subdivisions 22–31, Main Basin and the Gulf of Bothnia

This area is inhabited by stocks that are assessed by ICES in five different units, according to biological and genetic conditions. Management actions in this area started in 1997 with the IBSFC Salmon Action Plan, which has led to an overall increase in smolt production. Since 2003, the total wild smolt production has increased substantially but has now leveled off. It is important to remember, however, that this increase is mainly due to increases in 2–3 rivers. Since the old Salmon Action Plan was adopted, the situation in the southern-most rivers is unchanged or even deteriorating.

To evaluate the status of specific stocks, ICES uses the smolt production in 2011 relative to projected natural smolt production capacity on a river-by-river basis. The target for rebuilding stocks is to reach 75 per cent of the estimated potential smolt production for each river. As of now, only one of the northern-most rivers shows a high probability of reaching this level in the near future.

ICES also reports that the post-smolt survival in this area has been low in recent years, resulting in a smaller number of feeding and maturing salmon. The reasons for low post-smolt survival are still unclear, but could be affected by seal (predation) and smolt abundance (probably competition for food), as well as herring recruitment in the Gulf of Bothnia.

A ban of the Baltic Sea drift net fishery came fully into force in January 2008, and for a period of time the salmon catches decreased. Since the ban, the long-line fishery for salmon has increased dramatically and catches are now back to earlier level. The fishing mortality, substantial misreporting, low post-smolt survival and the weak reproduction of some of the stocks, is keeping stocks down. The high levels of misreporting of salmon as sea trout – mainly by the Polish fishery (30%) – also contributes significantly to the low TAC.
As the discrepancy between biological advice and the TAC has been increasing over the past few years, ICES now calls for urgent control measures in order to minimise the suspected widespread misreporting, including internationally coordinated landing inspections.

ICES also states that management should be focused on the individual stocks in the rivers, since fishing on the mixed natural/reared stocks along the coasts or in open sea are harder to deal with. ICES also emphasizes that fishing effort should be focused on rivers or river mouths of the stronger stocks.

For 2013, ICES recommends a catch of 54,000 individuals, which is identical to last year's advice.

Subdivision 32, the Gulf of Finland

This area contains a few small, wild populations together with a few rivers with mixed stocks (consisting of both reared and wild salmon). The wild salmon populations are genetically distinct from each other, which indicate that these still are original salmon stocks, meaning that they have not been mixed with reared salmon. The increased longline fishery in the Main basin probably has negative effects on vulnerable wild stocks in the Gulf of Finland.

According to ICES, the new data available for this area are too sparse to revise the advice from last year, when a TAC of 12,000 specimens was recommended. ICES states that a reduction in the TAC would most likely not safeguard wild populations from exploitation. Instead the ICES advice is to develop more specific harvesting methods, like selective gears in specific areas, significantly reducing the risk of catching wild salmon.

In light of the MSY objective, ICES says that salmon populations in the Gulf of Finland are well below the 75 per cent potential smolt production target and generally not showing signs of recovery.

For this area, ICES recommends that all catches of wild salmon should be kept at a minimum.

SEA TROUT AND OTHER SPECIES

Sea trout

According to ICES, the Baltic Sea contains approximately 1,000 sea trout stocks and about half of them are wild. ICES Working Group figures show that 881 rivers in the region contain sea trout, and that 471 of the stocks are thought to be wild. The status of the stocks varies considerably, as does the quality of their habitats in the rivers.

Sea trout are caught in rivers, coastal areas and the open sea. Because most sea trout do not migrate as extensively as salmon, the majority of the catch is sold locally. Longer migrations do occur, however, and the main fishery is in fact in the Main basin where landings amount to about 60 per cent of the total catches (2011). Therefore, the majority of the catches contains mixed stocks, which is potentially problematic for the weaker stocks.

Catches of sea trout in the Main basin have been fluctuating from around 1,000 tonnes in 2002 to 293 tonnes last year. In total, approximately 500 tonnes were landed in the entire Baltic in 2011. There are also strong indications that significant amounts of salmon are misreported as sea trout, mainly by the Polish fishery in the Main basin. ICES estimates that sea trout catches may have been overestimated by up to 40 per cent in the last years.

There is no TAC set for sea trout, but national regulations include *inter alia* minimum landing size, local and seasonal closures, and minimum mesh sizes for the gillnet fishery.

Based on precautionary considerations and the limited amount of data on sea trout population dynamics, ICES advices that catches in the Gulf of Bothnia and the Gulf of Finland should be reduced to safeguard the remaining wild populations in the region.

Management measures should also be considered and in particular those addressing bycatch of sea trout. Minimum mesh sizes, reduction of fishing effort, habitat restoration and closures in time and space are all viable options. Existing fishing restrictions should be maintained and habitat improvements are needed in many rivers.

Other species and data poor stocks

For a number of other species occurring in the Baltic Sea, ICES is currently attempting to produce more quantitative advice, as a lack of data precludes full advice. The advice on "data poor stocks" in the Baltic Sea will be published on 8 June.

WHAT HAPPENS NEXT?

The European Commission will publish a policy statement on fishing opportunities in 2013 in early June. After consulting the Scientific, Technical and Economic Committee for Fisheries (STECF), it will then publish a proposal for fishing opportunities in the Baltic Sea for 2013 in September 2012. This will be discussed by the Council Working Groups prior to the Fisheries Council's meeting in October, where the 2013 quotas are likely to be agreed. In the meantime, the European Commission on behalf of the European Union will negotiate with Russia, which also fishes the Baltic.

The Lisbon Treaty which came into force on 1 January 2010, gives the European Parliament co-decision powers on most EU fisheries matters, but the setting of annual catch quotas remains the Council's sole responsibility.