

## Management practices and a benign environment team up to recover a heavily exploited marine fish

The low stock biomass of large marine predators around the world, many of them below safe biological limits or at risk of collapse, has been the concern of scientists and managers over the last few decades.

The Eastern Baltic cod stock was until recently in a severely depleted state and suffered from high fishing pressure. However in 2007, the spawner biomass, (the stock's expected reproductive potential) started to recover rapidly. At the same time, fishing mortality substantially declined to below the management target defined in the EU multi-annual management plan for this stock. This led to a significant recovery of the stock, at a rate that has not been observed for any other depleted cod stock in the North Atlantic in the last few decades.



### Why is the Eastern Baltic cod recovering?

Recent research (Eero et al., 2012) has shown that the Eastern Baltic cod, at risk of collapse in the mid-2000s, was able to recover rapidly due to a combination of increased recruitment (the number of young fish entering a population each year), and efficient management measures to reduce unreported landings.

Based on unofficial information, removals from the cod stock in the years 2004-2006 were estimated to be around 30% higher than reported landings. In later years, catches were reduced, mainly as a result of an intensified fisheries control system (Fig. 1).

In parallel to the decline in unreported landings, an increase in cod offspring, (i.e. recruitment) was observed. A measure of the productivity of a stock is the number of new cod produced per kg of adult population. The increase in this stock productivity since 2005 is outstanding; the number of recruits being produced per kg of adult cod in the recent past is the highest since the 1980s (Fig. 2).

To investigate the relative contributions of reduced removals and increased recruitment production to the stock's recovery, simulations were conducted on what the biomass of cod would be today if these changes had not taken place. The results showed that the reduction in landings and the increase in recruitment equally contributed to the reduction in fishing mortality to the level of management target. The rapid recovery of the biomass was, however, primarily due to increased recruitment (Fig. 3). Thus, the stock recovery would have been slower, if environmental conditions had not been supportive of a higher recruitment.

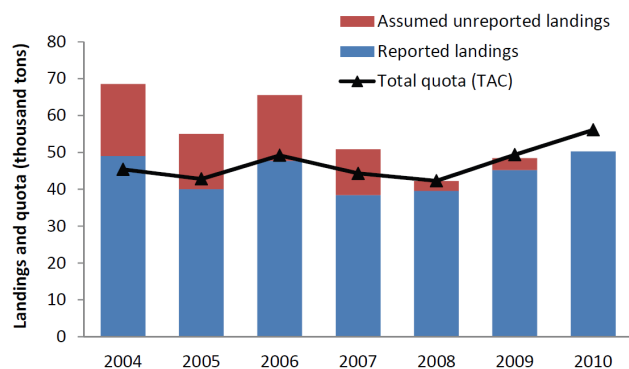


Figure 1. Landings (broken down to the reported and assumed unreported landings) of the eastern Baltic cod compared to the annual quota (TAC).

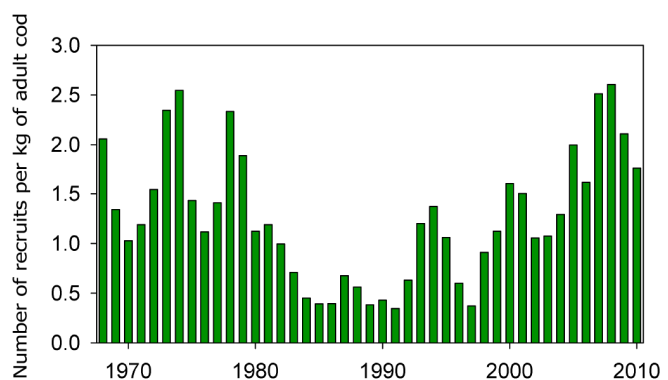


Figure 2. Number of 2-year old cod (recruits) produced per kg of adult cod.

Decline in fishing mortality

Increase in spawner biomass

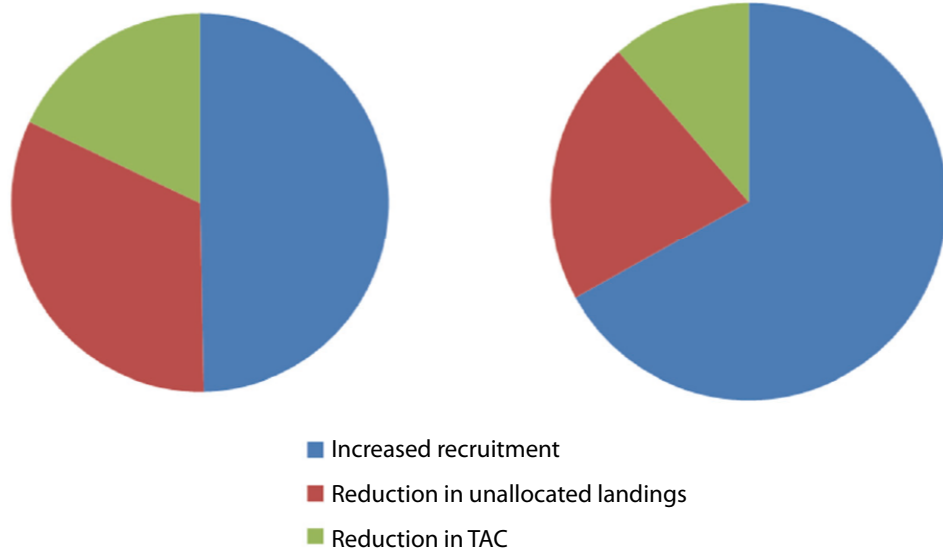


Figure 3. Reduction in fishing mortality of the Eastern Baltic cod was due to a combination of reduced landings (mainly the unreported part of landings) and increased recruitment production (left pie chart). The recovery of cod biomass was mainly due to increased recruitment production (right pie chart).

### Future outlook

The increasing trend in the Eastern Baltic cod biomass is supported by continued relatively high recruitment production, and an EU multiannual management plan that is maintaining a relatively low fishing pressure. The management plan currently allows for continued recovery so that long-term sustainable yields can be obtained from the stock, as long as compliance to the management measures is continuously ensured. Relatively strong incoming year-classes and recently better removal control distinguish the Eastern Baltic cod from other depleted European cod stocks, which have not shown similar positive trends in recent years.

In comparison with some other depleted cod stocks in European waters, it is noteworthy that the Eastern Baltic cod has recovered without a major reduction in TAC (Total Allowable Catch).

The example of the Eastern Baltic cod demonstrates that a substantial reduction in fishing mortality can be achieved when correspondence between catch limits and actual reported catches is ensured. Rapid recovery of the stock, however, requires high recruitment production. When stock production increases due to higher recruitment, an increase in biomass can be achieved without a drastic decline in catch. In contrast, attempts to recover some other depleted European cod stocks by pronounced reductions in TAC, in the context of relatively poor recruitments, have so far been less successful.



### Further information

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### Reference

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