

Electrical trawling for brown shrimp: Impact on young life stages in nurseries and spawning areas?

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The application of electric pulse fields in fishing gear is considered to be one of the most promising options to increase the sustainability of demersal trawl fisheries. In the pulse trawl for brown shrimp, a low-intensity electrical field selectively induces a startle response in the shrimps. Other benthic organisms are left untouched and can escape underneath a hovering trawl. Extensive testing of this device in the North Sea revealed a discard reduction of 35-65% and less bottom contact of 80%. In addition, the results of the hitherto performed analyses of the exposure and survival experiments seem to indicate that the use of these pulses has no immediate harmful effects on different adult fish and invertebrate species.

However the impact on other marine life stages is still unknown. As brown shrimp are caught in coastal zones and estuaries, important nurseries or spawning areas for a wide range of marine species, electrofishing over these grounds could therefore harm embryos, larvae and juveniles if exposed during their most sensitive stages.

As cod (*Gadus morhua*) was already considered to be a vulnerable species to electrical pulses (De Haan *et. al.*, 2009) experiments were carried out on different developmental stages of this roundfish species in cooperation with the cod breeding centre of Nofima in Tromsø, Norway. Three stages of embryonated eggs, four larval stages and one juvenile stage were exposed to a homogeneous worst case electrical field of 150V.m⁻¹ during 5 seconds. Survival, injury and development were macro- and microscopically inspected until 2 weeks after metamorphosis. All experiments were performed in triplicate and the appropriate controls were included.

No significant density or hatching differences could be established between control and exposed groups in the different egg stages. Also in the juvenile stage no difference in mortality was observed. In the larval stages there was no significant effect of the electrical pulses on survival in the stages exposed immediately after hatching, the endogenous stage eating rotifers and the metamorphosing stage. However in the exogenous larval stage, when the yolk is completely depleted and larvae have to actively eat *Artemia*, there was a significant difference with the exposed animals exhibiting a higher mortality. On all sampled larvae a morphological analysis is on-going which may reveal differences in yolk resorption and growth or may reveal phenomena such as starvation or deformation.

References

De Haan D., B. van Marlen, T.S. Kristiansen and J.E. Fosseidengen. 2009. The effect of pulse stimulation on biota – Research in relation to ICES advice – Progress report on the effects on cod. IMARES report C098/08: 25pp.