



Popular science summary of the PhD thesis

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Title of the PhD thesis	Eastern Baltic cod infected with <i>Contracaecum osculatum</i> : physiological mechanisms and the importance of monitoring infection loads
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Science summary

The Eastern Baltic cod stock, *Gadus morhua*, is in distress. Fish are in a historically poor individual nutritional state, natural mortality is high, and the large fish have disappeared while the stock biomass has declined substantially since the late 1980s. The stock is now considered on the verge of collapse. Several ecosystem factors have been suggested to drive these changes, including infections with the parasitic nematode *Contracaecum osculatum*, which is found in cod livers. Despite strong indications of reduced individual nutritional condition with increasing nematode infection load in cod, a knowledge gap exists in our understanding of the physiological consequences of the infections. Therefore, the main objective of this thesis was to investigate how infections with *C. osculatum* associate with the physiological and nutritional conditions in individual cod, and – where possible – to reveal causality between infection and Eastern Baltic cod health status. This was achieved through a series of laboratory experiments with live cod, and through data collection in the field. The results were subsequently integrated into bioenergetics and statistical models to shed further light on the impacts of high infection loads on cod health. Furthermore, assessment of the liver category method, a newly implemented method to monitor infection loads in cod livers in the Baltic region, was carried out. The results show that high infection density is associated with an impaired physiological condition of the infected cod, and individuals with high infection densities reveal signs of suffering from severe liver disease. The bioenergetics model revealed that growth is lower in infected compared with non-infected individuals. Moreover, a strong negative relationship between condition and infection density was found, and the probability of cod being in a critical condition increased with increasing infection density. Finally, the assessment of the liver category method showed that the current approach is a good predictor of the total number of nematodes in the liver of Baltic cod; thus, it serves as a suitable tool for the continuous monitoring of infection loads in the Baltic region. Since growth, recruitment (reduced fecundity and skipped spawning), and natural mortality all are related to the body condition of cod, parasite-induced reduction in condition and impaired health of infected individuals are expected to negatively affect the productivity of the Eastern Baltic cod stock. The thesis highlights parasite infections as a potential important driver of the poor status of Eastern Baltic cod.