

## Definitions of density-threshold of habitat forming infauna species: Examples from *Haploops tubicola* in the Kattegat and Belt Sea

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Historic background information on *Haploops tubicola* in the Kattegat and Belt Sea.

In the beginning of the 20<sup>th</sup> century, (Petersen (1913) found the small tube dwelling crustacean *Haploops* to be common on subtidal muddy bottoms below the halocline in the Kattegat and JCG Petersen named these benthic communities “*Haploops* community” (Figure 1). When systematic monitoring of soft bottom communities was resumed in the 1980ties and 1990ties these communities were largely gone and sampling only showed few records, mostly of few individuals from scattered locations in the Kattegat, Belt Sea and the Sound.. As part of the Danish monitoring under the MSFD *Haploops* was discovered again on one location in the central Kattegat (57°04` N, 11°31` E) with densities in one sample >8000 indiv. M<sup>-2</sup>.

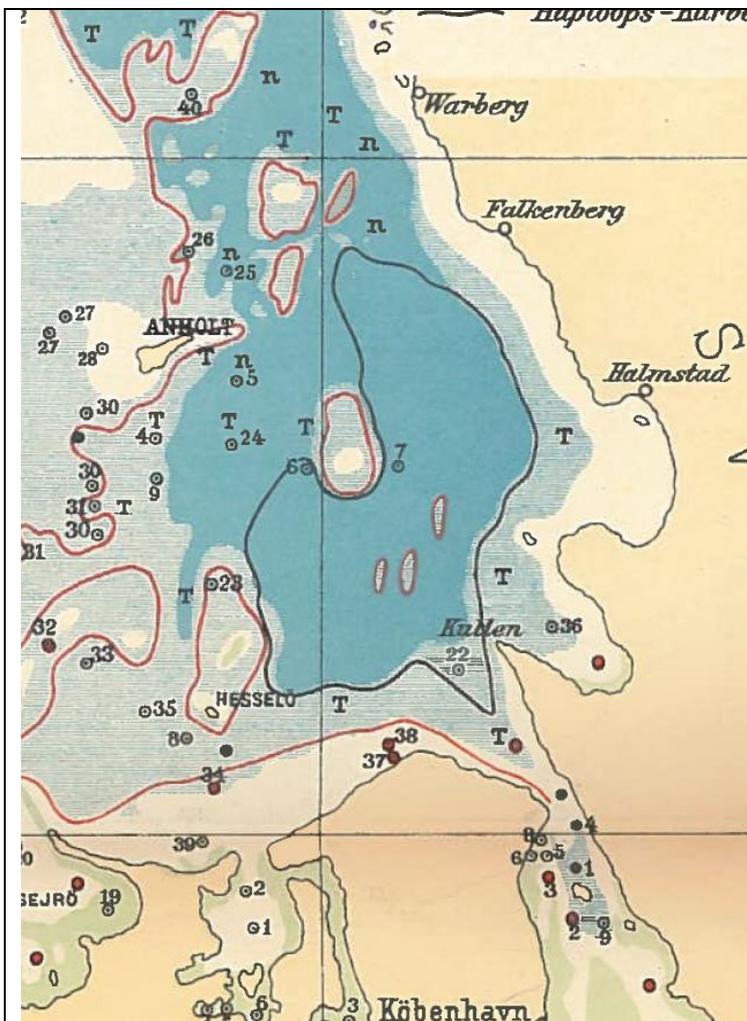


Figure 1. Results from mapping of the *Haploops* community in southern Kattegat by Petersen (1913). Community distribution encircled with black line.

One habitat-forming population with densities >1000 m<sup>-2</sup> still remained in the beginning of the 1980ties in the Great Belt which however, gradually declined (exponentially) during the following 20 years, and the species has not been recorded on that location after 2001 (Figure 2). The findings were furthermore associated with high diversity of other invertebrate taxa and may possibly represent a *haploops*-community

in its pristine (or close to) state and therefore represent a habitat and a community of special conservational interest.

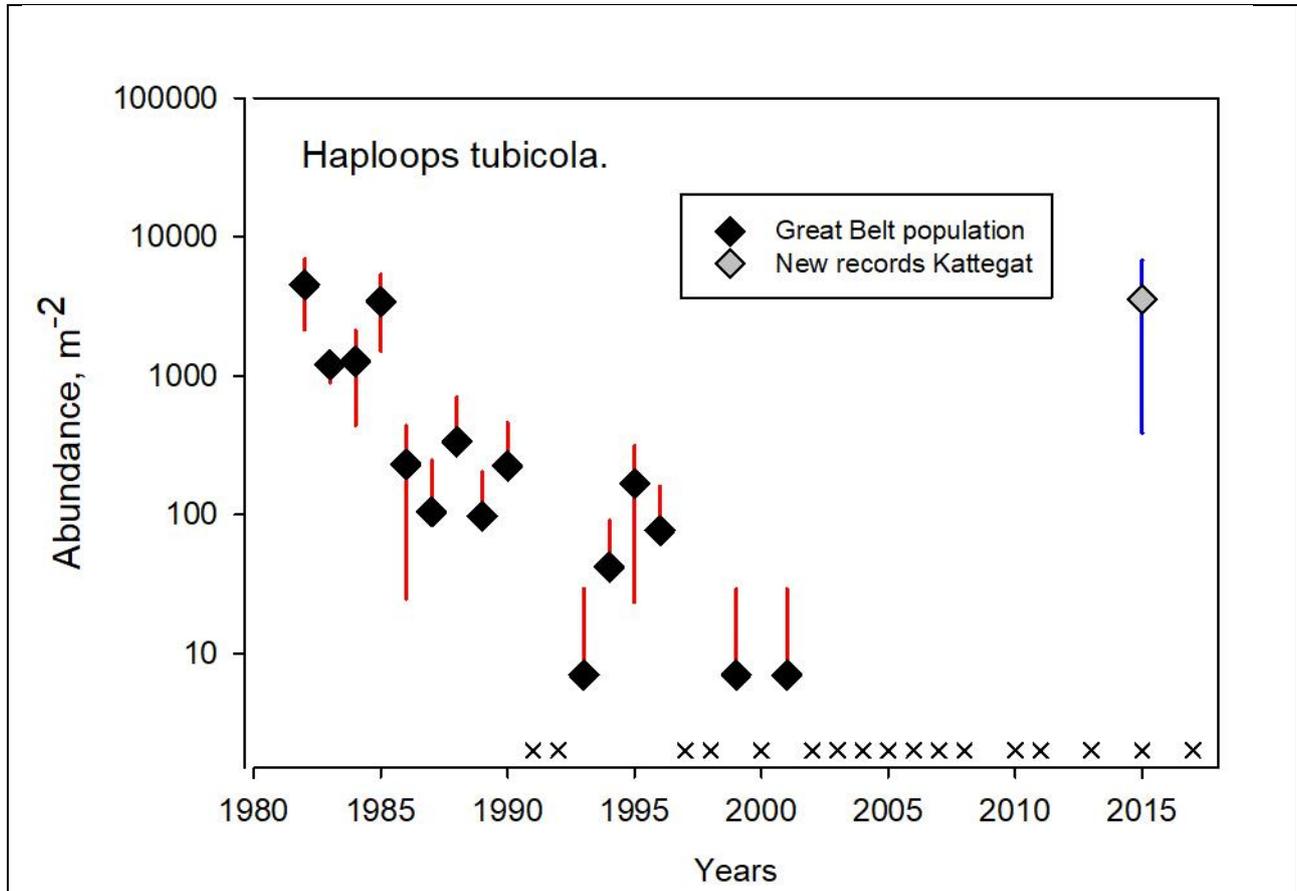


Figure 2. Decline of a *Haploops tubicola* population in the Great Belt during 1982-2001 (black diamonds) and a resent record from the central Kattegat (grey symbol). Lines represents standard deviation and crosses represents years where no Haploops was found on the Great Belt location. Note logarithmic abundance scale.

*Conceptual definitions of Habitat-forming.*

The basic question to be answered is: How many does it take to form a habitat? In case of the *Haploops tubicola* it concerns its population impact on the rest of invertebrate infauna community on aphotic mud bottoms. As Haploops is a relatively small crustacean the question concerns the densities of the animals and their tubes extending above the sediment surface. The concept of habitat formation is related to concepts of dominance and community formation and thus to distinguish between the three concepts in case of Haploops it is proposed that:

- Dominance only concerns the relative abundance of the stock of interest (density of individuals or biomass) in relation to the rest of the community and the phenomenon may be assessed in terms dominance curves, species abundance rankings. In this case, it could simply be represented by the relative abundance of Haploops compared to the rest of the community.
- A Haploops community describes the case where there are consistent similarities in the species assemblages occurring together with dense population of Haploops. Furthermore, such

communities should be restricted to dense populations of Haploops. A Haploops community may be identified from analysis of community similarities.

- A Haploops habitat may share the characteristics of a Haploops community but in addition the Haploops community should provide a habitat for other species in the sense that space taken up by the Haploops is partially or fully compensated by habitat space provided by Haploops.

This document only considers the definition of a Haploops habitat. To be used in relation to MFSD the definition should be applicable to the most common monitoring data formats in a consistent way. Furthermore, as Haploops occur in areas already classified by for example the EUNIS-classification of broad habitat, the definition and subsequent assessment environmental quality of the two “overlapping” habitats should ideally not be in conflicting. This means that if the presence of Haploops habitat is considered to be of interest for conservation then the presence of Haploops in a sample should not be considered as

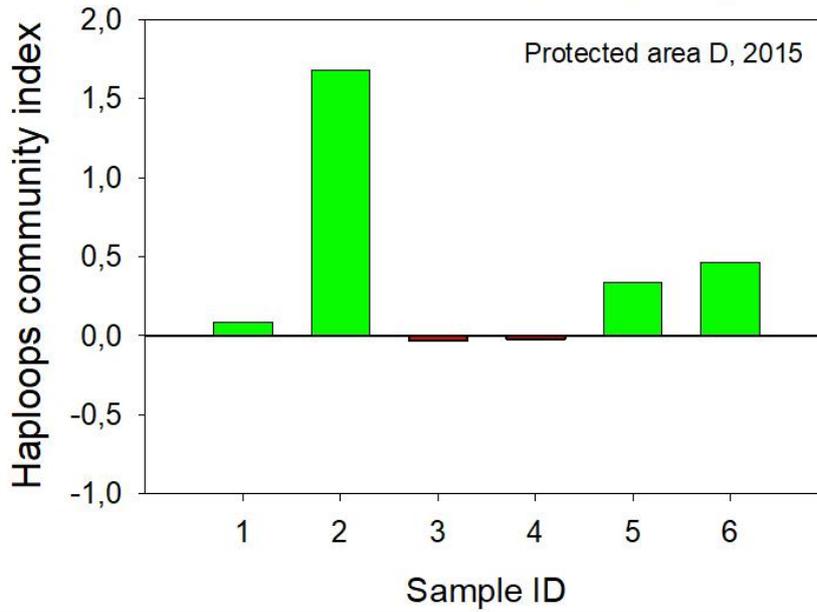
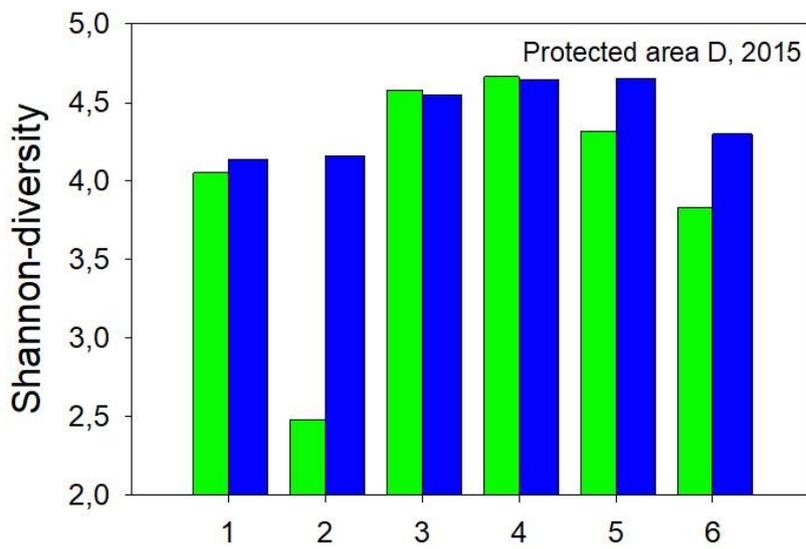
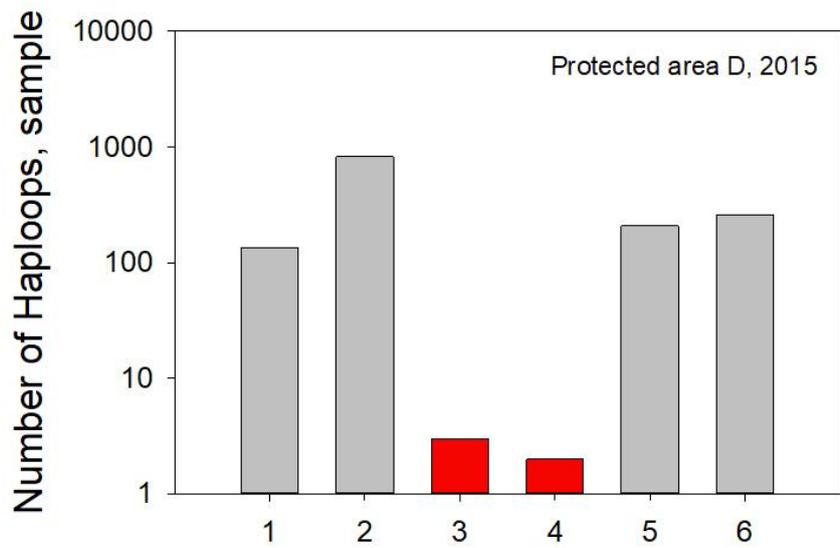


Figure 3A abundance of Haploids (m-2) per sample

