

Hard substratum habitats in harbors and the associated ascidian fauna

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As coastal waters get filled with urban structures, for example in harbors, new habitats are introduced in the marine environment. These habitats have shown to attract a higher number of non-native species than natural habitats. To get an overview of native and non-native fouling species communities that can be present in harbors we have done a series of field studies in 2008 and 2009, focusing on sixteen different hard substratum habitats in the pleasure craft harbor of Breskens, The Netherlands. These habitats differed mainly in the material of the substrate, their orientation, the light intensity and their position in relation to the low water line. They include (1) the outside, underside and inside of the floats of several floating docks, (2) 14 x 14 cm PVC plates submerged for respectively 3, 6, 9 and 12 months, deployed in March, June, September and December, (3) wooden pilings, (4) vertical iron harbor walls and (5) a diagonal stone rip-rap dike. The diversity and abundance of species in each habitat was scored by making overview and detail photographs through e.g. a 1 x 1 m iron frame divided by fishing lines in 14 x 14 cm grids. Voucher specimens were collected, and finally the species presence/absence per 2,8 x 2,8 cm grid was scored in the lab on the basis of the photos and vouchers. The communities in virtually all the studied habitats turned out to be unique, i.e. differed significantly. Here we present the results, focusing on the native and non-native ascidian species assemblages present. The community similarities were calculated on the basis of the Bray-Curtis measure and illustrated in a 2D Multi-dimensional scaling (MDS) plot made with the program Primer 6.1.10 (Primer-E). Our results show that one should investigate a combination of hard substratum habitats to get a reliable measure of the total abundance of invasive fouling species present in a harbor. To manage invasive species one can use these results to reduce the abundance of invasive fouling species in harbors by minimizing the number of their preferred habitats.