

**Nehring, S.H.; Leuchs (1999):
Neozoa (Macrozoobenthos) in the German
North Sea coast**

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Summary

The present study explains comprehensively for the first time the probable area of origin, possible introduction vectors, primary finds in northern Europe and, specifically for Germany, the current setup degree and/or setup status as well as the verified or presumed ecological and economic effects for all known and presumed Neozoa under the macrozoobenthic species at the German North Sea coast.

➤ A Neozoon (plural: Neozoa, n.) is an animal species, that after the year 982 AD (first introduction of American organisms in Europe; trans-Atlantic cruise of Eric the Red) under direct or indirect anthropogenic involvement reached a specific area and lives there widely since at least three generations (= established reproduction community) or over a longer period (at least 25 years) up to now. For the unambiguous classification of a Neozoon, two types are distinguished:

- A *Neozoon actuale* (plural: Neozoa actualia, n.) is an animal species for which the definition applies to a considerable degree; the short form Neozoon, -a can be used for linguistic simplification.
- A *Neozoon incertum* (plural: Neozoa incerta, n.) is an animal species that appeared in a specific area after the year 982 AD and where direct or indirect anthropogenic involvement for occurrence (e.g. in the area probable always existent) and/or the current setup of a reproduction community is to be strongly doubted.

A third type of a non-indigenous animal is

- the Neozoon simulatum (plural: Neozoa simulata, n.). It is an animal species that appears after the year 982 AD without recognizable connection with human activities in the appropriate area and also possibly reproduces (= natural expansion of the areal).
- In total, 26 species could be identified, in which the human influence is directly or indirectly responsible for the introduction. Main area of origin is the Atlantic coast of North America (a survey is given in table 3.1-1 on page 13). Further 13 species are to be classified as Neozoa incerta, of which five species are extinct at present. In the case of the other eight species, the setup status and/or its allochthone/autochthone origin remain unde-

undetermined (table 3.2-1 on page 67). A great number of Neozoa simulata are found on the German North Sea coast. Six species are presented in table 3.3-1 on page 94; their selection occurred against the background that these species are often mentioned in connection with the emergence and the establishment of non-indigenous animals.

- The share of the Neozoa actualia compared to the respective total macrozoobenthic species numbers amounts to approx. 1% in the case of Helgoland, approx. 3% in the Wadden Sea, approx. 10% in the brackish water zone of the estuaries and approx. 7% in the brackish canals and ditches.
- Only approx. 40% of the macrozoobenthic neozoa species were introduced directly from the area of origin into the German coastal waters (movement through inland canals are not included!). All other species were at first introduced into other countries bordering the North Sea and spread particularly with the assistance of water currents as natural vector and/or were also introduced by transplanting oysters as unintentional accompanying forms e.g. into the German Wadden Sea.
- Up to now, no relevant ecological or economic effects by established Neozoa could be proved on the German North Sea. Here, the autochthonous long-term populations were disturbed massively again and again through the seasons, through the tide rhythm with ebb and flood, through changing drain regime etc. so that there is no reliable population network. Therefore, it is presumed that regarding the stability of the different ecological systems, it is of secondary importance if Neozoa are able to establish. They are simply integrated.
- Since the last Ice Age, the last 10,000 years were seemingly not sufficient in order to obtain again a complete species inventory for all ecological niches in German coastal waters of the North Sea. Also in the last 100 years, the estuaries were strongly affected by anthropogenic impacts producing new vacant niches. Therefore, it is presumed that many other unused possibilities exist for the establishment of non-indigenous species. In future further Neozoa will establish permanent populations. On a global scale, an increasing exchange of species might well lead to more uniform biocoenoses.
- Up to now a comprehensive evaluation for the status of the terrestrial, limnic and marine Neozoa is still to be found. The question whether an enforced control of Neozoa – as it is often required by nature conservation – really helps dynamics in nature, is open to doubt. Virtually every species has been a "foreign" species some time, and the retrospective on the past can not be the only vision of protection of species in nature conservation.