

## **V. Red List of Macrofaunal Benthic Invertebrates of the Wadden Sea\***

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### INTRODUCTION

In the Wadden Sea, at least 1250 zoobenthic species are known to occur. Of these, about 400 species may be considered as macrobenthic. In the benthic communities of the Wadden Sea area many different systematic groups are represented. The Wadden Sea sediments can generally be divided into mud, muddy sands, sands, as well as gravel and stones, where epifauna and infauna may settle. Harbour and hydraulic facilities, as well as coastal defense structures may act as artificial hard substrates and habitats for a number of species, although these „biotopes“ are not considered in these Red Lists.

In the Wadden Sea, samples can be taken directly on the flats, whereas in the sublittoral zones of the smaller or larger channels, samples are taken indirectly by grabs, corers or dredges. Imaging techniques as well as sampling by scuba-divers are selective methods to investigate mainly epifauna. In the intertidal zone, the latter techniques are difficult to apply because of the high turbidity of the water column.

The population dynamics of species in the Wadden Sea area may exhibit different spatial trends. If there is evidence for significant decrease in abundance of species in a certain area, the species (population) is classified as endangered.

Generally, it is difficult to compile 'red lists' for Wadden Sea macrofaunal species because the spatial distribution is rather flexible. Most of the species reproduce via larval stages which can be dispersed in the neighbourhood or over wide areas. Therefore, these species are often not even confined to the North Sea. The knowledge about the distribution of 'rare species' is generally poor, consequently 'rare' does not necessarily imply 'endangered'.

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\* This list forms part of the Report on the RED LISTS OF BIOTOPES, FLORA AND FAUNA OF THE TRILATERAL WADDEN SEA AREA. For basic information concerning, for example, function of these lists, species taken into account, structure of the lists and abbreviations used, see also the general introduction to the Red Lists.

### Data source

Data to determine trends are only fragmentary, and for some species no new complete data surveys are known. Therefore the present list, which has a draft character for some groups, can be regarded as a challenge for scientists to contribute sufficient data for the evaluation of faunal population developments. Only if trends are documented properly, can clear statements be made about the causes of many of the changes. Future changes that may be induced by climate (warming) can only be understood if a firm data base is provided.

In general, Denmark is not in a position to present a national Red List on marine invertebrates. The general opinion in the Danish scientific community is that no species in the Danish Wadden Sea area qualify for a national red list, given the criteria at hand

### Threat factors

An attempt was made to point out important threat factors which might be responsible for population declines. Beside natural causes (including climate) for decreases in populations, anthropogenic influences such as eutrophication, pollution, fishery impact, and embankment of coastal habitats are the main factors harming endangered species. A specific effect of coastal defence is the loss of brackish waters with their special fauna.

### Summary

In the Wadden Sea, in total, 93 species of macrofaunal benthic invertebrates are threatened in at least one subregion. Of these, 71 species are threatened in the entire area and are therefore placed on the trilateral Red List. 7 species are (probably) extinct in the entire Wadden Sea area. The status of 9 species of macrofaunal invertebrates is critical, 13 species are (probably) endangered, the status of 25 species is (probably) vulnerable and of 17 species (probably) susceptible.

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RED LIST OF MACROFAUNAL BENTHIC INVERTEBRATES  
OF THE WADDEN SEA \*

**EX - Extinct:**

*Alcyonium digitatum*  
*Corambe obscura*  
*Doridiella batava*  
*Dodecaceria concharum*  
(?) *Helcion pellucidum*  
*Lacuna vincta*  
(?) *Rissoa membranacea*

**CR - Critical:**

*Alkmaria romijni*  
*Amphitrite cirrata*  
*Echiurus echiurus*  
*Facelina coronata*  
*Monacha cantiana*  
*Ostrea edulis*  
*Quickella arenaria*  
*Urticina felina*  
*Mya truncata*

**EN - Endangered:**

(?) *Boccardia (Polydora) redekei*  
*Buccinum undatum*  
*Candidula gigaxii*  
(?) *Cerastoderma glaucum* = *C. lamarcki*  
*Clione celata*  
*Gyraulus laevis*  
*Homarus gammarus*  
*Limapontia capitata*  
*Limapontia depressa*  
*Littorina neritoides*  
*Modiolus modiolus*  
(?) *Rhithropanopeus harrisi*  
*Sabellaria spinulosa*

**VU - Vulnerable:**

*Alderia modesta*  
*Amphitrite figulus*  
*Archidoris tuberculata*  
*Assimineea grayana*  
*Candidula intersecta*  
*Corbula (Varicorbula) gibba*  
*Corophium lacustre*  
*Cuthona nana*  
*Eudendrium rameum*  
*Facelina auriculata* = *F. drummondi*  
(?) *Gammarus duebeni*  
*Halichondria panicea*  
*Hydrallmania falcata*  
*Hydrobia ventrosa*  
*Idotea chelipes*  
*Idotea linearis*  
*Limnoria lignorum*  
*Nereis pelagica*  
*Ovatella (Myosotella) myosotis*  
(?) *Palaemon longirostris*  
*Psammechinus miliaris*  
*Sagartiogeton viduatus*  
*Sertularia cupressina*  
*Tenellia pallida* = *Embletonia pallida*  
*Venerupis (Tapes) senegalensis* = *V. pullastra*

**SU - Susceptible:**

*Abra nitida*  
*Amphipholus squamata*  
*Amphithoe helleri* = *Paramphithoe bicuspis*  
*Cancer pagurus*

\* Question-marks indicate that in one of the subregions the status of threat is uncertain.

*Cheirocratus sundevalli*  
*Dendronotus arborescens*  
*Dexamine spinosa*  
*Epitonium clathrus*  
*Erichthonius difformis*  
 (?) *Idotea granulosa*  
*Monopylephorus irroratus*

(?) *Nymphon rubrum*  
 (?) *Palaemonetes varians*  
 (?) *Processa nouveli holthuisi* = *P. canaliculata*  
*Pycnogonum littorale*  
*Spisula solida*  
*Tubificoides heterochaetus*

LIST OF THREATENED MACROFAUNAL BENTHIC INVERTEBRATES  
 OF THE WADDEN SEA

	Red List (trilateral)	Threats	Status of threat in the subregions of the Wadden Sea Area			
			NL	Nds	SH	DK <sup>1</sup>
<b>PORIFERA</b>						
<i>Clione celata</i> Grant, 1826	EN	HAB	VU	CR	EX	(*)
<i>Halichondria panicea</i> (Pallas, 1766)	VU		SU	VU	VU	(*)
<b>CNIDARIA</b>						
<b>Hydrozoa</b>						
<i>Eudendrium rameum</i> (Pallas, 1766)	VU		-	-	VU	(*)
<i>Hydrallmania falcata</i> (Linnaeus, 1758)	VU		EN	-	VU	(*)
<i>Sertularia cupressina</i> (Linnaeus, 1758)	VU		SU	VU	VU	(*)
<b>Anthozoa</b>						
<i>Alcyonium digitatum</i> (Linnaeus, 1758)	EX	EXL	-	-	EX	(*)
<i>Metridium senile</i> (Linnaeus, 1761) (= <i>Metridium dianthus</i> Johnston, 1847)	*	EXL?	*	SU	*	(*)
<i>Sagartiogeton undatus</i> (O.F. Müller, 1788)	*	EXL?	*	SU	VU	(*)
<i>Sagartiogeton viduatus</i> (Gosse, 1860)	VU		-	-	VU	(*)
<i>Urticina eques</i> (Gosse, 1860) (= <i>Tealia felina</i> (Linnaeus, 1758) = <i>T. crassicornis</i> (Johnston, 1847))	*		-	SU	-(?)	*
<i>Urticina felina</i> (Linnaeus, 1761)	CR		CR	SU	CR	(*)
<b>MOLLUSCA</b>						
<b>Polyplacophora</b>						
<i>Lepidochitona cinerea</i> (Linnaeus, 1767)	*		VU	*	*	*

\* Possibly confused with *S. undatus*.

	Red List (trilateral)	Threats	Status of threat in the subregions of the Wadden Sea Area			
			NL	Nds	SH	DK <sup>1</sup>
<b>Prosobranchia</b>						
<i>Assiminea grayana</i> (Flemming, 1928)	VU	HAB, AGR, WAT, PAR	VU	VU	VU	(*)
<i>Buccinum undatum</i> Linnaeus, 1758	EN	POL	CR	EN	SU	(*)
<i>Crepidula fornicata</i> (Linnaeus, 1758)	*		SU	SU	*	*
<i>Epitonium clathrus</i> (Linnaeus, 1758)	SU		-	SU	-	(*)
<i>Helcion pellucidum</i> (Linnaeus, 1758)	EX?		-	EX?	-	(*)
<i>Hydrobia ventrosa</i> (Montagu, 1803)	VU	HAB, WAT	VU	VU	VU	(*)
<i>Lacuna vincta</i> (Montagu, 1803)	EX	HAB	EX	-	-	(*)
<i>Littorina saxatilis</i> (Olivi, 1792)	*	HAB, WAT	VU	SU	*	(*)
<i>Littorina neritoides</i> (Linnaeus, 1758)	EN		CR	VU	-(?)	(*)
<i>Rissoa membranacea</i> (J.Adams, 1800)	EX?	HAB, WAT	EX	(*)	EX	(*)
<b>Opisthobranchia</b>						
<i>Aeolidia papillosa</i> (Linnaeus, 1761)	*		SU	SU	*	(*)
<i>Alderia modesta</i> (Loven, 1844)	VU	HAB, AGR, WAT	SU	SU	EN	(*)
<i>Archidoris tuberculata</i> (Cuvier, 1804)	VU		VU	VU	-(?)	(*)
<i>Corambe obscura</i> (Verrill, 1870)	EX	HAB	EX	-	-	(*)
<i>Cuthona nana</i> (Alder & Hancock, 1842)	VU		VU	-(?)	SU	(*)
<i>Dendronotus arborescens</i> (Ascanius, 1774)	SU		SU	SU	-(?)	(*)
<i>Dordiella batava</i> (Kerbert, 1886)	EX		EX	-	-	(*)
<i>Facelina coronata</i> (Forbes & Goodsir, 1839)	CR		CR	SU	-(?)	(*)
<i>Facelina auriculata</i> (Müller, 1776) (= <i>F. drummondi</i> Thompsen, 1844)	VU		VU	SU	-(?)	(*)
<i>Limapontia capitata</i> (O.F.Müller, 1774)	EN	HAB, AGR, WAT,	CR	VU	VU	(*)
<i>Limapontia depressa</i> (Alder & Hancock, 1862)	EN	HAB, AGR, WAT,	SU	EN	EN	(*)
<i>Tenellia pallida</i> (Alder & Hancock, 1842) = <i>Embletonia pallida</i> (Alder & Hancock, 1854)	VU	HAB, WAT	VU	VU	-(?)	(*)
<b>Pulmonata</b>						
<i>Candidula gigaxii</i> (L. Pfeiffer, 1850)	EN	WAT	VU	-(?)	EX	(*)
<i>Candidula intersecta</i> (Poirlet, 1801)	VU	WAT	VU	-(?)	SU	(*)
<i>Gyraulus laevis</i> (Adler, 1838)	EN	HAB, WAT	EN	-(?)	EN	(*)

	Red List (trilateral)	Threats	Status of threat in the subregions of the Wadden Sea Area			
			NL	Nds	SH	DK <sup>1</sup>
<i>Monacha cantiana</i> (Montagu, 1803)	CR	WAT, HAB, AGR	VU	CR	EX	(*)
<i>Ovatella (Myosotella) myosotis</i> (Draparnaud, 1801)	VU	HAB, AGR, WAT	SU	VU	EN	(*)
<i>Quickella arenaria</i> (Boucjard-Chantereaux, 1837)	CR	HAB, WAT, AGR, DIS	CR	CR	-	(*)
<b>Bivalvia</b>						
<i>Abra nitida</i> (Müller, 1776)	SU	EUT	-	SU	-(?)	(*)
<i>Cerastoderma glaucum</i> (Poiret, 1789) = <i>Cerastoderma lamarcki</i> Reeve, 1843	EN?	HAB, WAT	EN	CR	EN	?
<i>Corbula (Varicorbula) gibba</i> (Olivier, 1792)	VU	EUT	-	VU	-	*
<i>Ensis ensis</i> (Linnaeus, 1758)	*	POL, EUT	-	SU	-	*
<i>Modiolus modiolus</i> (Linnaeus, 1758)	EN	POL, EXL	-	-	EN	(*)
<i>Mya truncata</i> (Linnaeus, 1758)	CR		CR	SU	EX	(*)
<i>Ostrea edulis</i> (Linnaeus, 1758)	CR	HAB, EXL, PAR?	EX	EX	EN	EX
<i>Petricola pholadiformis</i> (Lamarck, 1818)	*		*	SU	VU	*
<i>Scrobicularia plana</i> (Da Costa, 1778)	*	HAB, POL	*	*	VU	*
<i>Spisula solida</i> (Linnaeus, 1758)	SU	POL	-	SU	-	-
<i>Spisula subtruncata</i> (Da Costa, 1778)	*	POL	*	SU	VU	*
<i>Tellina (Angulus) tenuis</i> (Da Costa, 1778)	*		*	SU	VU	*
<i>Venerupis (Tapes) senegalensis</i> (Gmelin, 1791) (= <i>V. pullastra</i> Montagu, 1803)	VU		EN	VU	VU	*
<b>ANNELIDA</b>						
<b>Polychaeta</b>						
<i>Alkmaria romijni</i> Horst 1919	CR	HAB	EX?	-	SU	(*)
<i>Amphitrite cirrata</i> O.F. Müller, 1771	CR		-(?)	-	CR	(*)
<i>Amphitrite figulus</i> (Dalyell, 1853)	VU		SU	SU	VU	*
<i>Boccardia (Polydora) redekei</i> Horst 1920	EN?	HAB	CR?	SU?	SU	(*)
<i>Dodecaceria concharum</i> Orsted, 1843	EX		-(?)	-	EX	(*)
<i>Nereis pelagica</i> Linnaeus, 1761	VU		SU	SU	EN	(*)
<i>Sabellaria spinulosa</i> Leuckart, 1849	EN	EXL?, HAB	EX?	VU	EN	(*)
<i>Streblospio shrubsolii</i> (Buchanan, 1890)	*	HAB	SU	SU	*	*
<b>Oligochaeta</b>						
<i>Monopylephorus irroratus</i> (Verni)	SU		-(?)	SU	-(?)	
<i>Tabificoides heterochaetus</i> (Michaelsen)	SU		-(?)	SU	-(?)	

	Red List (trilateral)	Threats	Status of threat in the subregions of the Wadden Sea Area			
			NL	Nds	SH	DK <sup>1</sup>
<b>CHELICERATA</b>						
<b>Pantopoda</b>						
<i>Nymphon rubrum</i> Hodge, 1865	SU?		SU	SU	-(?)	?
<i>Pycnogonum littorale</i> (Ström, 1762)	SU		SU	SU	-(?)	(*)
<b>CRUSTACEA</b>						
<b>Decapoda</b>						
<i>Cancer pagurus</i> Linnaeus, 1758	*	EXL	SU	SU	*	*
<i>Homarus gammarus</i> (Linnaeus, 1758)	EN	EXL, POL, HAB	EX	-	EN	(*)
<i>Palaemon longirostris</i> (H. Milne-Edw., 1837)	VU?	HAB, EUT?, POL?	VU?	SU?	-	(*)
<i>Palaemonetes varians</i> (Leach, 1814)	SU?	HAB	SU?	-	-	(*)
<i>Processa nouveli holthuisi</i> Al-Adhub & Williamson 1975 (= <i>P. canaliculata</i> , part., Nouvel & Holthuis 1957)	SU?		-	SU	?	(*)
<i>Rhithropanopeus harrisi</i> (Gould, 1841)	EN?	HAB	CR?	(*)	SU	(*)
<b>Isopoda</b>						
<i>Armadillidium album</i> = <i>dillidium</i> (Dollfus, 1887)	?	DIS, EUT?, POL?	VU	(*)	(*)	(*)
<i>Cyathura carinata</i> (Krøyer, 1848)	?	HAB, EUT?, POL?	SU?	(*)	(*)	(*)
<i>Eurydice pulchra</i> Leach, 1815	*		*	*	SU	(*)
<i>Idotea baltica</i> (Pallas, 1772)	*		VU	SU	*	*
<i>Idotea chelipes</i> (Pallas, 1766)	VU	HAB, WAT	VU	SU	SU	*
<i>Idotea granulosa</i> Rathke, 1843	SU?		?	SU	-	(*)
<i>Idotea linearis</i> (Linnaeus, 1767)	VU		VU	SU	SU	(*)
<i>Ligia oceanica</i> (Linnaeus, 1767)	*	HAB, WAT	SU	SU	*	(*)
<i>Limnoria lignorum</i> (Rathke, 1799)	VU	HAB	SU	SU	VU	*
<i>Sphaeroma hookeri</i> (Leach, 1814)	?	HAB, WAT	VU	(*)	(*)	(*)
<b>Amphipoda</b>						
<i>Amphithoe helleri</i> Karaman 1975 (= <i>Paramphithoe bicuspis</i> (Heller 1967))	SU		- (?)	SU	SU	(*)
<i>Caprella linearis</i> (Linnaeus, 1767)	*		*	SU	SU	*
<i>Cheirocratus sundevalli</i> (Rathke, 1843)	SU?		?	SU	-	(*)
<i>Corophium lacustre</i> Vanhöffen 1911	VU	HAB	VU?	VU	VU	(*)

	Red List (trilateral)	Threats	Status of threat in the subregions of the Wadden Sea Area			
			NL	Nds	SH	DK <sup>1</sup>
<i>Corophium bonelli</i> Milne Edwards, 1830	*		?	SU	SU	*
<i>Dexamine spinosa</i> (Montagu, 1813)	SU	*	- (?)	SU	SU	(*)
<i>Erichthonius difformis</i> Milne Edwards, 1830	SU		?	SU	SU	(*)
<i>Gammarus duebeni</i> (Liljeborg, 1851)	VU?	WAT	VU?	VU?	VU?	(*)
<i>Phoxocephalus holböllii</i> (Krøyer, 1842)	*		-	SU	SU	*
<b>ECHINODERMATA</b>						
<b>Ophiuroidea</b>						
<i>Ophiothrix fragilis</i> (Abildgard, 1789)	*		*	SU	-	(*)
<b>Echinoidea</b>						
<i>Amphipholus squamata</i> (Delle Chiaje, 1829)	SU	WAT	SU	SU	(*)	(*)
<i>Psammechinus miliaris</i> (Gmelin, 1778)	VU	WAT, EXL	VU	VU	VU	*
<b>ECHIURA</b>						
<i>Echiurus echiurus</i> (Pallas)	CR		CR	CR	CR	(*)

<sup>1</sup> Denmark is not in a position to present a national Red List on marine invertebrates. The general opinion in the Danish scientific community is that no species in the Danish Wadden Sea area qualify for a national red list, given the criteria at hand.

**Status of threat:**

**EX** = Extinct; **CR** = Critical; **EN** = Endangered; **VU** = Vulnerable; **SU** = Susceptible; \* = not endangered; ? = status of endangerment is not exactly known; - = species does not occur; -(?) = species probably does not occur; (\*) = it is unknown if or if not this species occurs.

**Threats:**

**AFF** = afforestation; **AGR** = agriculture; **CLI** = climatic change; **DIS** = disturbance; **EUT** = eutrophication; **EXL** = exploitation of living resources; **EXM** = mineral exploitation; **FOR** = forestry; **HAB** = loss of habitat; **PAR** = parasites; **POL** = pollution; **WAT** = water regulation.

For more detailed descriptions see the general introduction to the Red Lists.